EVOQUA WATER TECHNOLOGIES LLC

2523 MUTAHAR STREET

PARKER, ARIZONA 85344

RCRA

PART B

APPLICATION

REVISION 3

APRIL 2016

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APPENDICES

SECTION
A

PART A DISCUSSION

Siemens Industry, Inc.
2523 Mutahar Street
Parker, Arizona 85344

Revision 1
April 2012

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LIST OF CITED APPENDICES

A.1 INTRODUCTION

Siemens Industry, Inc. (SII) (formerly known as Westates Carbon – Arizona, Inc. (WCAI) and as Siemens Water Technologies Corp. (SWT)) receives spent (used) activated carbon from its customers. These spent carbons arrive at the Parker facility in a variety of containers, including: barrels, drums, portable tanks, bulk-bags, and bulk truck units. Received spent carbons are thermally reactivated in a furnace. Reactivated carbons are shipped for recycling and/or reuse. This reactivation process is sketched in a Schematic Process Flow Diagram (included in Appendix I). Incidental to the reactivation process is the management of container storage (S01), spent carbon storage tanks (S02), reactivation and reactivation off-gas treatment (X03), and the non-hazardous slurry transfer (recycle water) system, wastewater treatment system, rainwater collection system, and reactivated carbon product storage and shipping.

The November 1995 RCRA Part B permit application discussed an existing carbon reactivation furnace (RF-1) and a future second carbon reactivation furnace (RF-2) that was expected to be installed at the facility. Currently, the second carbon reactivation furnace is operational and the old carbon reactivation furnace was shut down in June 1996, and will not be returned to service. With the exception of a RCRA Closure Plan prepared specifically for the old RF-1 unit, the Part B Permit Applications will only discuss the second carbon reactivation furnace that will continue to be abbreviated in the permit applications as RF-2.

EPA has requested the submittal of a Part A application showing both the inactive RF-1 unit as well as the active RF-2 unit. Therefore, the Part A application from October 1996 has been included in Appendix I.

Since the time of the original October 1996 Part A submittal, the facility has removed certain waste codes from the list of those accepted, and has also been requested by EPA to add a new hazardous waste tank (which increases the tank capacity). Additionally, a Performance Demonstration Test (PDT) of the RF-2 unit has been conducted, resulting in a higher processing capacity than shown on the 1996 Part A application. These differences are reflected in the Part B application. For these reasons, a revised set of Part A forms has been included in Appendix I, in addition to the original 1996 Part A application. This revised set of Part A forms are provided for informational purposes only, and are consistent with the information presented in the Part B application. This supplemental information should provide the EPA reviewers with appropriate information to resolve any apparent discrepancies between the 1996 Part A and the current Part B materials.

Photographs of the facility clearly delineating all treatment, storage, and disposal areas are included with the Part A. A scale drawing of the facility is also included showing the location of all treatment, storage, and disposal areas.

Appendix I also includes a topographic map, property layout drawing, equipment location drawing, and schematic process flow diagram. These figures depict the facility and each of its intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, as well as surrounding land use and water bodies.

There are no injection wells associated with this facility, nor are there any springs, drinking water wells, or surface water bodies within one-quarter mile of the facility.

SECTION
B

FACILITY DESCRIPTION

Siemens Industry, Inc.
2523 Mutahar Street
Parker, Arizona 85344

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FIGURES

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B.1 INTRODUCTION

The following sections contain a general facility description as required by 40 CFR 270.14(b)(1), a description of the topographic map as required by 40 CFR 270.14(b)(19), site location information, seismic considerations, and floodplain standards as required by 40 CFR 270.14(b)(11), and traffic information as required by 40 CFR 270.14(b)(10). Specific maps and diagrams related to this information are contained in Appendices II and III.

Siemens Industry, Inc. (SII) receives spent (used) activated carbon from its customers. These spent carbons arrive at the Parker facility in a variety of containers, including: barrels, drums, portable tanks, bulk-bags, and bulk truck units. Received spent carbons are thermally reactivated in a furnace. Reactivated carbons are then shipped for recycling and/or reuse.

The November 1995 RCRA Part B permit application discussed an existing carbon reactivation furnace (RF-1) and a future second carbon reactivation furnace (RF-2) that was expected to be installed at the facility. Currently, the second carbon reactivation furnace is operational and the old carbon reactivation furnace was shut down in June 1996, and will not be returned to service. With the exception of a RCRA Closure Plan prepared specifically for the old RF-1 unit, the RCRA Part A and Part B Permit Applications will only discuss the second carbon reactivation furnace that will continue to be abbreviated in the permit applications as RF-2.

The description that follows includes information related to this second carbon reactivation furnace (RF-2).

B.1.1 FACILITY OVERVIEW

Spent carbon slurry is fed from the Furnace Feed Tank (T-18) into a dewatering screw where the carbon is dewatered prior to introduction into the carbon reactivation furnace (RF-2). Water from the dewatering screw is returned to the recycle water storage tank. RF-2 is a multiple hearth furnace consisting of five hearths. The spent carbon is introduced into the top hearth and flows downward through the remaining four hearths. Reactivated carbon exits the bottom hearth through a cooling screw. Natural gas burners are provided to ensure adequate heat input to the reactivation unit for all of the spent carbons that are reactivated at the facility. The hot gases generated in RF-2 are routed to an afterburner to ensure the thermal oxidation of organic matter that is not oxidized in the reactivation unit. The afterburner is equipped with two burners that utilize natural gas as the fuel source. From the afterburner, the gases are quenched by direct water contact and routed through a variable throat venturi scrubber for particulate matter control. From the venturi scrubber, the gases are routed to a packed bed scrubber for acid gas control. From the packed bed scrubber, the gases flow through a wet electrostatic precipitator, used for fine particulate matter and metals control. From the wet electrostatic precipitator, the gases are routed through a stack to the atmosphere. The motive force for moving the gases through the air pollution control system is supplied by an induced draft fan. The air pollution control equipment uses a recycle water system. Scrubber blowdown from RF-2 air pollution control equipment is treated in an exempt wastewater treatment unit, or discharged directly to the POTW. A detailed discussion of the facility can be found in Section D.

B.2 GENERAL DESCRIPTION

B.2.1 NATURE OF BUSINESS

The Siemens Industry, Inc. Parker, Arizona facility is a carbon reactivation facility. Activated carbon is utilized in treatment equipment for the removal, by adsorption, of organic compounds from liquid and vapor phase process and waste streams. The activated carbon becomes spent after a period of usage. Spent means that the activated carbon has reached its adsorptive capacity for that particular application and waste stream. Once the activated carbon is spent, it must either be disposed of or reactivated at a facility such as SII's Parker facility. Some of the spent carbon received at the Parker facility is designated as a hazardous waste under the provisions found in the RCRA regulations.

B.2.2 TYPES OF INDUSTRY SERVED

Activated carbon is used in treatment equipment to remove organic compounds from liquid and vapor phase waste streams. The treatment equipment is used in a wide variety of municipal and commercial applications. The industries which use this equipment include, but are not limited to, petroleum refining and marketing facilities, solvent cleaning facilities, computer manufacturing, wastewater treatment facilities, plating facilities, metal forming facilities, auto manufacturing and repair facilities, aircraft manufacturing facilities, and other facilities that generate organic waste streams. Additionally, activated carbon is used in a variety of environmental clean-up applications.

B.2.3 ONSITE FACILITIES

The hazardous waste storage and treatment components of the Parker facility consist of the following hazardous waste management areas (refer to Site Diagrams in Appendix III).

- Container Storage Area
- Spent Carbon Storage Tanks
- Carbon Reactivation Furnace and Associated Air Pollution Control Equipment

Spent carbon is received in containers and bulk tank trucks and roll-off boxes which meet the requirements of the U.S. Department of Transportation where applicable. After inspection and acceptance at the facility, the containerized spent carbon is either transferred, via a feed hopper, into one of the RCRA-regulated spent carbon storage tanks (T-1, T-2, T-5, T-6) or moved to the RCRA-regulated Container Storage Area, in the containers in which it was received, and subsequently transferred to the storage tanks via a feed hopper. The spent carbon is transferred from the feed hoppers to the storage tanks as a water-carbon slurry. Shipments received in tank trucks or roll-off boxes may be pumped as a water-carbon slurry from the transport vehicle into one of the four spent carbon storage tanks directly, or via a feed hopper.

From the spent carbon storage tanks the water-carbon slurry is pumped to the reactivation unit feed tank (T-18). Prior to introduction into the RCRA-regulated carbon reactivation furnace (RF-2), the water-carbon slurry is dewatered by use of a dewatering screw. The dewatered carbon is then fed, via a weigh belt, to the reactivation unit. The water generated in the dewatering step is returned to the recycle water tank (T-9) where it will be reused in the carbon transport system. Because T-9 is used to store recycle water, which is water (material) used repeatedly for the same purpose without having to be reclaimed, this tank is not a RCRA-regulated unit. Once the spent carbon is introduced into the reactivation unit, it is heated to remove moisture, desorb contaminants, and reactivate the carbon. Reactivated product is discharged to a cooling screw and is transferred to the screening process and placed in appropriate containers for shipment. Currently, the packaging and shipping of the reactivated product is performed on-site.

Many of the contaminants desorbed from the carbon in the reactivation unit are thermally destroyed in the high-temperature environment of the reactivation unit. In order to ensure adequate destruction and removal of any remaining contaminants the reactivation unit has been equipped with an afterburner. The afterburner thermally oxidizes organic pollutants remaining in the off-gas stream from the reactivation unit. The reactivation unit is also equipped with add-on air pollution control equipment. A venturi scrubber is provided for particulate matter control, and a packed-bed scrubber is provided for acid gas and particulate matter control. A wet electrostatic precipitator is provided for additional particulate matter control.

Scrubber blowdown generated from RF-2 air pollution control equipment is treated in an exempt wastewater treatment unit (as per 40 CFR 264.1(a)(6) and 270.1(c)(2)(v)), prior to discharge to the POTW. The discharge to the POTW is continuously monitored for pH, total dissolved solids, flow, and temperature to ensure compliance with the discharge limitations found in the facility's current industrial wastewater discharge permit.

All hazardous waste storage and treatment areas at the facility are surrounded by secondary containment systems. Any precipitation that falls within the containment area is collected in a sump and is either placed in a recycle water tank where it is used as makeup or discharged to the POTW.

A more detailed description of the design and operation of the facility can be found in Section D.

B.3 TOPOGRAPHIC MAP

A Topographic Map is provided in Appendix II. The map shows 10-foot elevation contour intervals for a distance of 1000 feet around the facility.

B.3.1 GENERAL REQUIREMENTS

The Topographic Map, in conjunction with other figures in Appendix II and Appendix III, provide the necessary information to meet the additional general requirements listed in 40 CFR 270.14. These items are discussed below:

Scale and Date
The scale on the close-up facility topographic map (Drawing 1541-CM-001, in Appendix III) is 1 inch equals 90 feet, which satisfies the regulatory requirement for a scale of 1 inch equals 200 feet, or less. A date is provided on the map.

100 Year Flood Plain Area
The 100 year flood plain area is discussed later in Section B.4.2. A floodplain map is provided in Appendix II.

Surface Waters
The Topographic Map provided in Appendix II identifies the surface waters and intermittent streams at the facility.

Surrounding Land Use
A Peripheral Land Use Study Diagram, for the Colorado River Indian Tribes Land, provided in Appendix II, identifies the land uses surrounding the facility.

Wind Rose
A wind rose is provided in Appendix II that identifies the prevailing wind speeds and direction.

Map Orientation
The Topographic Map provided in Appendix II identifies the map orientation.

Legal Boundaries
The legal boundaries for the facility are identified in the legal description provided in Appendix II.

Access Control
The treatment process and operating areas of the facility are surrounded by a fence. All gates and entrances are monitored and locked. Appendix III provides a General Site Plan showing the fence, gates, and building entrances. Access control is discussed in further detail in Section F.

Injection and Withdrawal Wells
There are no injection or withdrawal wells on the property or within 1000 feet of the facility, as shown on the Topographic Map provided in Appendix II.

Buildings and Other Structures
Appendix III presents a General Site Plan showing buildings and other structures (e.g., runoff control systems, access and internal roads, storm, sanitary, and process sewerage systems, loading and unloading areas, fire control facilities, etc.) located at the facility.

Drainage and Flood Control Barriers
The facility is located outside the 100-year floodplain (see Section B.3(b)). The hazardous waste storage and treatment operations, and associated equipment are located within secondary containment which prevents the release of hazardous wastes or hazardous waste constituents to the environment, as well as protecting it from contact with surface waters.

Location of Treatment or Disposal Unit and Decontamination Areas
Appendix III presents a General Site Plan and specific process area drawings showing the location of container storage, tank storage, and the components of the RF-2 carbon reactivation furnace (miscellaneous thermal treatment unit) within the facility.

Location of Solid Waste Management Units
The identification and location of the solid waste management units at the facility are provided in Section J.

B.3.2 ADDITIONAL INFORMATION ON THE TOPOGRAPHIC MAP FOR LAND DISPOSAL FACILITIES

Siemens Industry, Inc. does not operate a land disposal facility. Therefore the additional requirements identified in the regulations at 40 CFR 270.14(c) are not applicable.

B.4 LOCATION INFORMATION

B.4.1 SEISMIC CONSIDERATIONS

The facility is located in La Paz County, Arizona near the city of Parker. The facility is located within the Colorado River Indian Tribes (CRIT) reservation lands. Therefore, CRIT has political jurisdiction over the land. La Paz County, Arizona is not listed in 40 CFR 264 Appendix VI, and therefore, compliance with 40 CFR 264.18(a), Seismic Considerations, is not required.

B.4.2 FLOODPLAIN STANDARD

The facility is not located within a 100-year floodplain. Data supporting this fact was taken from the Flood Insurance Rate Map for the Colorado River Indian Reservation. This map is provided in Appendix II. Therefore, compliance with 40 CFR 264.18(b), Floodplains, is not required.

B.5 TRAFFIC INFORMATION

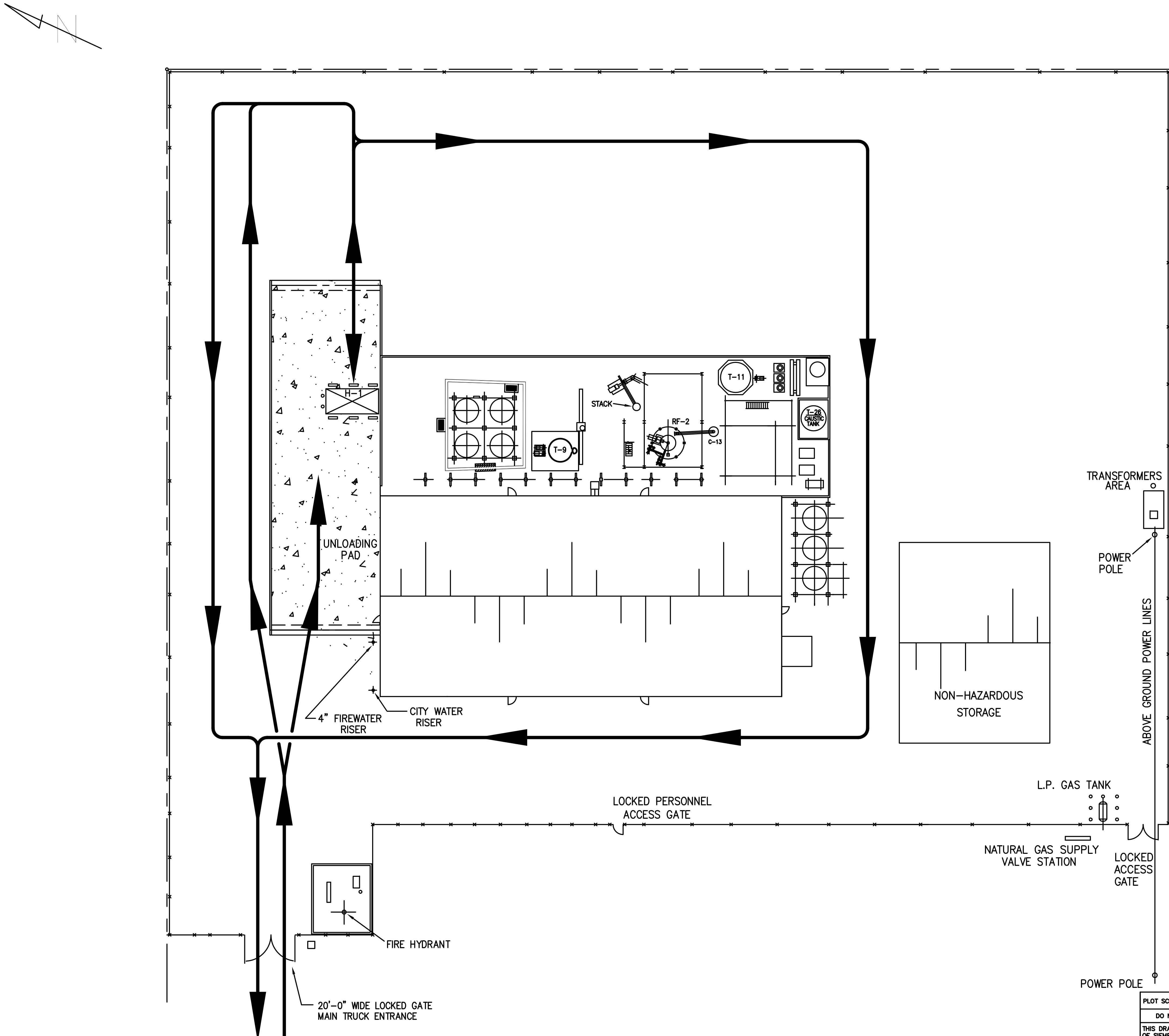
Trucks are used to transport spent carbon to the facility either in containers or in bulk shipments. The access road to the facility intersects Mutahar Street. Mutahar Street can be accessed from Arizona Highway 95. Currently, an average of 2 to 3 loads (20,000 to 30,000 pounds/load) of spent carbon will be received at the facility in any one day and an average of 14 loads will be received in any one week. The average truck traffic associated with product shipments corresponds approximately 1:1 with spent carbon deliveries.

Trucks approach the facility gate on the access road. The truck driver must stop at the gate and present the appropriate documents for inspection by SII management. Once it is determined that the documentation is in order, the truck proceeds to the spent carbon unloading area.

If the truck is transporting spent carbon in containers, the containers are unloaded, inspected, and sampled. Based on the results of the inspection and analysis of the sample, the load will either be accepted or rejected. If the load is rejected, the containers are reloaded on the truck and the truck exits the facility. If the load is accepted the truck is free to leave.

If the truck is transporting spent carbon in bulk, the load is inspected and sampled. Based on the results of the inspection and analysis of the sample, the load will either be accepted or rejected. If the load is rejected the truck exits the facility. If the load is accepted the truck is unloaded and then is free to leave. Figure B-1 shows the traffic pattern within the facility. The access road is currently constructed of asphalt paving and is capable of supporting vehicles up to 80,000 pounds.

Figure B-2 is a map showing the routes truck traffic can take to the facility from the point where it leaves the nearest major highway (Arizona Highway 95). The access roads are capable of supporting vehicles up to 80,000 pounds.



DWG: D14789-09

NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
1	3/16/12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No.

DRAWN: JBE 2/6/07

CHK'D: KEM 2/6/07

ENG'R:

SIEMENS INDUSTRY, INC.
Parker, AZ

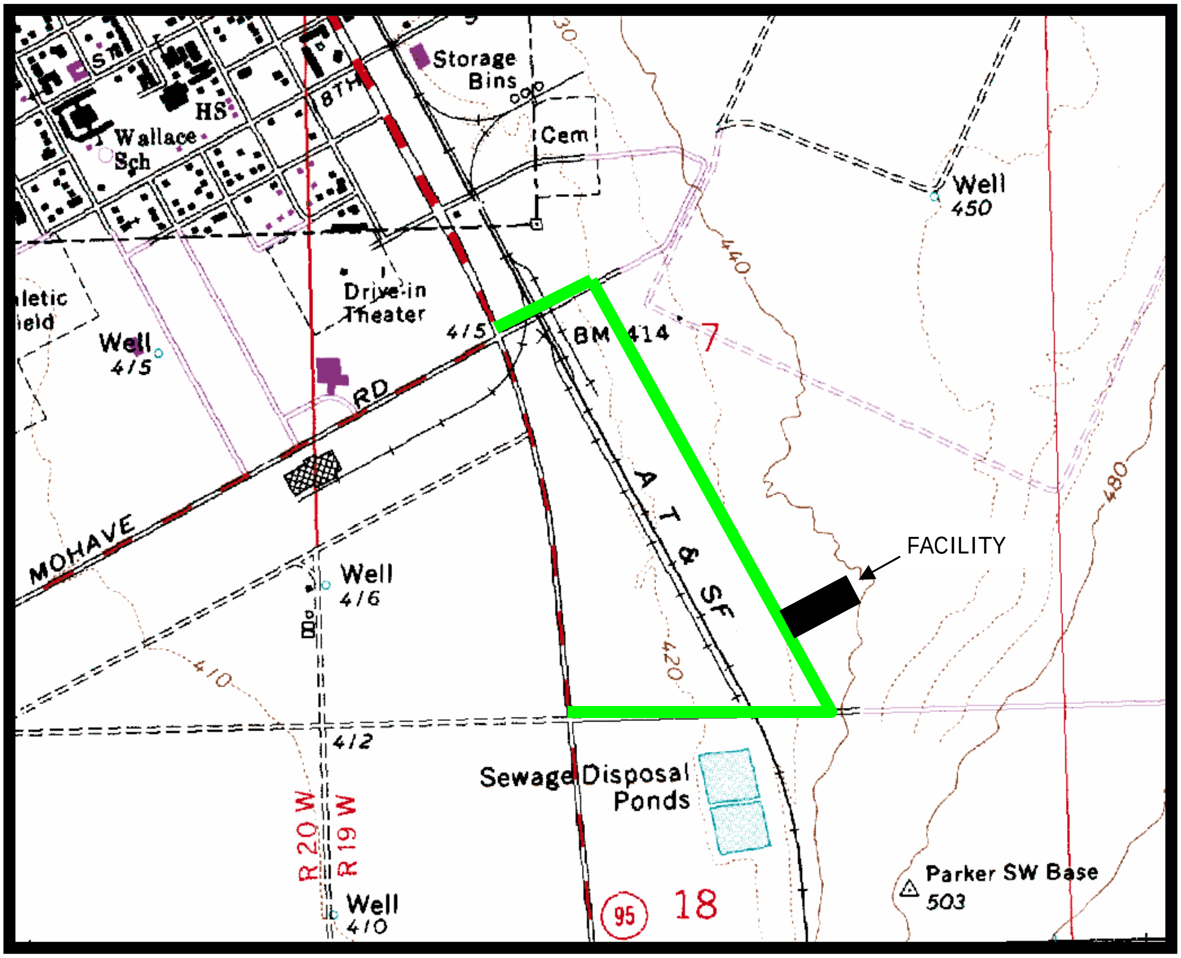
TITLE: FIGURE B-1
ON-SITE TRAFFIC PATTERN

PART No.

DWG No. D14789-09 REV. 1

PRINT DATE: 4/19/12

FIGURE B-2
TRANSPORTATION ROUTES



LEGEND:

INDUSTRIAL PARK ACCESS ROAD (MUTAHAR STREET)

MAIN HIGHWAY (ARIZONA HIGHWAY 95)

SECTION
C

SPENT CARBON CHARACTERISTICS

Siemens Industry, Inc.
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Parker, Arizona 85344

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C.1 INTRODUCTION

The Siemens Industry, Inc. Carbon Reactivation Facility reactivates spent carbon, which may be classified as a RCRA hazardous waste. This section provides a general description of the chemical and physical characteristics of the spent carbon that is accepted and managed at the facility as a RCRA-hazardous waste. This section also references the facility's most recent Waste Analysis Plan which is provided in Appendix IV. The Waste Analysis Plan describes, in detail, the procedures and analyses conducted to assure proper and safe management of the RCRA-hazardous spent carbon. This information is submitted in accordance with 40 CFR 270.14(b)(2) and 40 CFR 264.13.

C.2 CHEMICAL AND PHYSICAL CHARACTERIZATION

C.2.1 CATEGORIES OF SPENT CARBON GENERATORS

The spent carbon received at the facility has typically been used for treating industrial and municipal wastewater, groundwater, surface water, process materials, or for removing pollutants from vent gases.

Constituents in the streams being treated are transported into the porous activated carbon particles by diffusion, where they are adsorbed onto the extensive inner surfaces of the activated carbon. Adsorption continues until the adsorption equilibrium capacity is reached, at which time the influent and effluent concentrations of the constituents in the stream being treated will be equal. However, the purpose of the treatment is to reduce the concentration of certain constituents in the stream being treated and, therefore, it is necessary to replace the activated carbon in the adsorption vessel at or before the point in time when the effluent concentration approaches the treatment objective, which is usually before the activated carbon's equilibrium capacity is reached. The treatment objective is reached either when the activated carbon has been in service for a specified time or when a pre-determined constituent concentration is detected in the effluent stream. The activated carbon is said to be "spent" when the treatment objective is met. Because the treatment objective is to reduce the concentration of certain constituents in the stream being treated, generally only part of the carbon in the adsorption vessel will have reached its equilibrium capacity.

C.2.2 SPENT CARBON HAZARDOUS CONSTITUENTS

Activated carbon is used to remove dilute concentrations of organic constituents from a liquid or gas stream in order that the liquid or gas is suitable for use or discharge. The number of different regulated constituents adsorbed on the activated carbon from a given source depends on the composition of the stream being treated.

The list of organic constituents that may be adsorbed on spent carbon is very extensive, and includes, but is not limited to, volatile organic compounds, polynuclear aromatic hydrocarbons, phthalates, amines, and pesticides. The generator of the spent carbon and Siemens are required to characterize the spent carbon before it is accepted at the facility. Siemens will determine whether a particular spent carbon is manageable at the facility based on a review of the pre-acceptance characterization and the generator's determination of the EPA hazardous waste code. Criteria for acceptance of a particular spent carbon are discussed in the Waste Analysis Plan which can be found in Appendix IV. The complete list of RCRA-regulated waste codes (from 40 CFR 261.21 through 261.33) acceptable for reactivation at the facility is provided in Table C-1.

Activated carbon is not customarily used to remove metals from a waste stream, although, low concentrations may be expected in the spent carbon.

C.2.3 HAZARDOUS CONSTITUENT CONCENTRATIONS EXPECTED ON SPENT CARBON

The concentration of hazardous constituents adsorbed onto the spent carbon is a function of the constituents' concentrations in the stream being treated. Given the variability of the streams being treated, the composition and concentration of the adsorbed constituents on spent carbon varies greatly. Lists of constituent concentrations (range and mean) found on spent carbons are provided in Table C-2 and in Table C-3. The analytical results presented in Table C-3 are the results of the analysis of spent carbons collected during a program designed to identify the metal concentrations found on the types of spent carbon reactivated at the facility. These lists are offered for informational purposes only and are not intended to define the range of constituents, or constituent concentrations, that may be received at the facility.

Organic constituent adsorption by activated carbon is well documented and adsorption concentrations based on influent concentrations can be calculated based on adsorption equilibrium isotherms. For example, groundwater and potable water treatment sources are expected to have influent organic concentrations typically no greater than 1000 parts per billion (ppb), with effluent concentrations at or below drinking water standards. Wastewater treatment applications are expected to have influent concentrations up to 100 parts per million (ppm), with effluent concentrations at or below discharge standards. Again, these lists are offered for informational purposes only and are not intended to define the range of constituents, or constituent concentrations, that may be received at the facility.

C.2.4 EXPECTED SPENT CARBON HAZARDOUS CHARACTERISTICS

In order for the facility to properly store, manage and treat spent carbon, the hazardous characteristics of the spent carbon need to be identified. The nature and extent of these characteristics guide employee health and safety programs and determine management strategies. Hazardous characteristics of corrosivity, ignitability, reactivity, and toxicity are defined at 40 CFR Part 261. Spent carbon characterized as corrosive (40 CFR 261.22) or reactive (40 CFR 261.23) is not accepted at the facility.

Spent carbon characterized as ignitable (40 CFR 261.21) by the generator may be accepted by the facility. These materials will only be accepted at the facility if the material no longer exhibits the characteristic of ignitability prior to introduction into tank storage. This will be accomplished by mixing the spent carbon with water (per the facility Waste Analysis Plan) which simulates the manner in which the material is transferred to the spent carbon into tank storage prior to reactivation.

C.2.5 ACCEPTABLE REGULATED WASTES

The hazardous waste codes acceptable for reactivation at the facility are listed and defined in Table C-1. The complete list of RCRA-regulated wastes which may be adsorbed onto the activated carbon to be processed at the facility is provided in this table. D-series wastes are characteristic wastes, F-wastes are from non-specific sources, K-series wastes are from specific sources, P-series wastes are acutely hazardous commercial chemical products, and U-series wastes are toxic commercial chemical products.

C.2.6 UNACCEPTABLE REGULATED WASTES

The only type of waste that the reactivation facility will accept is spent carbon. The facility will not accept spent carbon containing the F listed dioxin wastes (F020-023, F026, F027, or F032), TSCA-regulated levels of PCBs, infectious wastes, regulated levels of radioactive wastes (as regulated by the Nuclear Regulatory Commission) or spent carbon exhibiting the characteristics of corrosivity (40 CFR 261.22) or reactivity (40 CFR 261.23).

C.3 WASTE ANALYSIS PLAN

The Waste Analysis Plan is included in its entirety as Appendix IV.

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
D001	A SOLID WASTE THAT EXHIBITS THE CHARACTERISTIC OF IGNITABILITY
D004	ARSENIC
D005	BARIUM
D006	CADMIUM
D007	CHROMIUM
D008	LEAD
D009	MERCURY
D010	SELENIUM
D011	SILVER
D012	ENDRIN
D013	LINDANE
D014	METHOXYCHLOR
D015	TOXAPHENE
D016	2,4-D
D017	2,4,5-(SILVEX)
D018	BENZENE
D019	CARBON TETRACHLORIDE
D020	CHLORDANE
D021	CHLOROBENZENE
D022	CHLOROFORM
D023	O-CRESOL
D024	M-CRESOL
D025	P-CRESOL
D026	CRESOL
D027	1,4-DICHLOROBENZENE
D028	1,2-DICHLOROETHANE
D029	1,1-DICHLOROETHYLENE
D030	2,4-DITROTOLUENE
D031	HEPTACHLOR (AND ITS EPOXIDE)
D032	HEXACHLOROBENZENE
D033	HEXACHLOROBUTADIENE
D034	HEXACHLOROETHANE
D035	METHYL ETHYL KETONE
D036	NITROBENZENE
D037	PENTRACHLOROPHENOL

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
D038	PYRIDINE
D039	TETRACHLOROETHYLENE
D040	TRICHLOROETHYLENE
D041	2,4,5-TRICHLOROPHENOL
D042	2,4,6-TRICHLOROPHENOL
D043	VINYL CHLORIDE
F001	SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLOROETHYLENE, METHYLENE CHLORIDE, 1,1,1 TRICHLOROETHANE, CARBON TETRACHLORIDE, CHLORINATED FLUOROCARBONS; AND MIXTURES/BLENDS CONTAINING A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) BEFORE USE OF ONE OR MORE OF THE ABOVE SOLVENTS OR SOLVENTS LISTED IN F002, F004 AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF SPENT SOLVENTS AND MIXTURES
F002	TETRACHLOROETHYLENE, METHYLENE CHLORIDE, TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE, CHLOROBENZENE, 1,1,2-TRICHLOROETHANE; AND MIXTURES/BLENDS CONTAINING A TOTAL OF 10% OR MORE (BY VOLUME) BEFORE USE OF ONE OR MORE OF THE ABOVE SOLVENTS OR SOLVENTS LISTED IN F002, F004 AND F005 AND STILL BOTTOMS FROM RECOVERY OF SPENT SOLVENTS AND MIXTURES
F003	XYLENE, ACETONE ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANANE, METHANOL; MIXTURES/BLENDS OF ABOVE; AND 10% OR MORE (BY VOLUME) OF F001, F002, F004, F005; AND STILL BOTTOMS FROM RECOVERY OF SPENT SOLVENTS
F004	CRESOLS AND CRESYLIC ACID, NOTROBENZENE; SOLVENT MIXTURES/BLENDS OF 10% OR MORE BEFORE USE OF ONE OR MORE OF ABOVE OR F001, F002, F005; STILL BOTTOMS FROM RECOVERY OF SPENT SOLVENTS
F005	TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, 2-NITROPROPANE; MIXTURES/BLENDS OF 10% OR MORE (BY VOLUME) OF ABOVE OR SOLVENTS LISTED IN F001, F002, F004 AND STILL BOTTOMS FROM RECOVERY OF SOLVENTS
F006	WASTEWATER TREATMENT SLUDGES FROM ELECTROPLATING OPERATIONS EXCEPT FROM SULFURIC ACID ANODIZING OF ALUMINUM; TIN PLATING ON CARBON STEEL; ZINC PLATING ON CARBON STEEL; ALUMINUM, ZINC ALUMINUM PLATING ON CARBON STEEL; CLEANING/STRIPPING ASSOCIATED WITH TIN, ZINC AND ALUMINUM PLATING ON CARBON STEEL; AND CHEMICAL ETCHING AND MILLING OF ALUMINUM
F012	QUENCHING WASTEWATER TREATMENT SLUDGES FROM METAL HEAT TREATING OPERATIONS WHERE CYANIDES ARE USED
F019	WASTEWATER TREATMENT SLUDGES FROM CHEMICAL CONVERSION COATING OF ALUMINUM EXCEPT ZIRCONIUM PHOSPHATING IN ALUMINUM CAN WASHING

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
F025	CONDENSED LIGHT ENDS, SPENT FILTERS AND AIDS, SPENT DESICCANT WASTES FROM PRODUCTION OF CERTAIN CHLORINATED ALIPHATIC HYDROCARBONS (HAVING CARBON CHAIN LENGTHS RANGING FROM 1-5 WITH VARYING AMOUNTS AND POSITIONS OF CHLORINE SUBSTITUTION) BY FREE RADICAL CATALYZED PROCESSES.
F035	WASTEWATERS, PROCESS RESIDUALS, PRESERVATIVE DRIPPAGE, AND SPENT FORMULATIONS FORM WOOD PRESERVING PROCESS GENERATED AT PLANTS THAT USE INORGANIC PRESERVATIVES CONTAINING ARSENIC OR CHROMIUM. DOES NOT INCLUDE K001 BOTTOM SEDIMENT SLUDGE FROM TREATMENT OF WASTEWATER FROM WOOD PRESERVING PROCESSES USING CREOSOTE AND/OR PENTACHLOROPHENOL
F037	PETROLEUM REFINERY PRIMARY OIL/WATER/SOLIDS SEPARATION SLUDGE. SLUDGE FROM GRAVITATIONAL SEPARATION OF OIL/WATER/SOLIDS DURING STORAGE OR TREATMENT OF PROCESS WASTEWATERS AND OILY COOLING WASTEWATERS FROM PETROLEUM REFINERIES. (OIL/WATER/SOLIDS SEPARATORS; TANKS AND IMPOUNDMENTS; DITCHES/CONVEYANCES; SUMPS; STORMWATER UNITS. SLUDGES FROM NON-CONTACT ONCE-THROUGH COOLING WATERS, SLUDG3ES FROM AGRESSIVE BIOLOGICAL TREATMENT UNITS, K051 WASTES
F038	PETROLEUM REFINERY SECONDARY (EMULSIFIED) OIL/WATER/SOLIDS SEPARATION SLUDGE-ANY SLUDGE AND/OR FLOAT GENERATED FROM THE PHYSICAL AND/OR CHEMICAL SEPARATION OF OIL/WATER/SOLIDS IN PROCESS WASTEWATERS AND OILY COOLING WASTEWATERS FROM PETROLEUM REFINERIES. SUCH WASTES INCLUDE, BUT ARE NOT LLIMITED TO, ALL SLUDGES AND FLOATS GENERATED IN: INDUCED AIR FLOTATION (IAF) UNITS, TANKS AND IMPOUNDMENTS, AND ALL SLUDGES GENERATED IN DAF UNITS. SLUDGES GENERATED IN STORMWATER UNITS THAT DO NBOT RECEIVE DRY WEATHER FLOW, SLUDGES GENERATED FROM NON-CONTACT ONCE-THROUGH COOLING WATERS SEGREGATED FOR TREATMENT FROM OTHER PROCESS OR OILY COOLING WATERS, SLUDGES AND FLOATS GENERATED IN AGRESSIVE BIOLOGICAL TREATMENT UNITS (INCLUDING SLUDGES AND FLOATS GENERATED IN ONE OR MORE ADDITIONAL UNITS AFTER WASTEWATERS HAVE BEEN TREATED IN AGGRESSIVE GIOLOGICAL TREATMENT UNITS) AND F037,K048, AND K051 WASTES ARE NOT INCLUDED IN THIS LISTING.
F039	LEACHATE FROM DISPOSAL OF MORE THAN ONE RESTRICTED WASTE (HAZARDOUS UNDER SUBPART D; RESULTING FROM THE DISPOSAL OF ONE OR MORE OF EPA HAZARDOUS WASTES: F020, F021, F022, F026, F027, AND/OR F028)
K001	WASTEWATER TREATMENT SLUDGE BOTTOM SEDIMENT THAT USE CREOSOTE AND/OR PENTACHLOROPHENOL
K002	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF CHROME YELLOW AND ORANGE PIGMENTS
K003	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF MOLYBDATE ORANGE PIGMENTS
K004	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF ZINC YELLOW PIGMENTS

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
K005	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF CHROME GREEN PIGMENTS
K006	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF CHROME OXIDE GREEN PIGMENTS (ANHYDROUS AND HYDRATED)
K007	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF IRON BLUE PIGMENTS
K008	OVEN RESIDUE FROM PRODUCTION OF CHROME OXIDE GREEN PIGMENTS
K009	DISTILLATION BOTTOMS FROM THE PRODUCTION OF ACETALDEHYDE FROM ETHYLENE
K010	DISTILLATION SIDE CUTS FROM PRODUCTION OF ACETALDEHYDE FROM ETHYLENE
K014	VICINALS FROM THE PURIFICATION OF TOLUENEDIAMINE IN THE PRODUCTION OF TOLUENEDIAMINE VIA THE HYDROGENATION OF DINITROTOLUENE
K015	STILL BOTTOMS FROM DISTILLATION OF BENZYL CHLORIDE
K016	HEAVY ENDS OR DISTILLATION RESIDUES FROM PRODUCTION OF CARBON TETRACHLORIDE
K017	HEAVY ENDS (STILL BOTTOMS) FROM PURIFICATION COLUMN IN PRODUCTION OF EPICHLOROHYDRIN
K018	HEAVY ENDS FROM FRACTIONATION COLUMN IN ETHYL CHLORIDE PRODUCTION
K019	HEAVY ENDS FORM THE DISTILLATION OF ETHYLENE DICHLORIDE IN ETHYLENE DICHLORIDE PRODUCTION
K020	HEAVY ENDS FROM DISTILLATION OF VINYL CHLORIDE IN VINYL CHLORIDE MONOMER PRODUCTION
K022	DISTILLATION BOTTOM TARS FROM PRODUCTION OF PHENOL/ACETONE FROM CUMENE
K023	DISTILLATION LIGHT ENDS FROM PRODUCTION OF PHTHALIC ANHYDRIDE FROM NAPHTHALENE
K024	DISTILLATION BOTTOMS FROM PRODUCTION OF PHTHALIC ANHYDRIDE FROM NAPHTHALENE
K025	DISTILLATION BOTTOMS FROM THE PRODUCTION OF NITROBENZENEBY THE NITRATION OF BENZENE
K026	STRIPPING STILL TAILS FROM PRODUCTION OF METHY ETHYL PYRIDINES
K029	WASTE FROM PRODUCT STEAM STRIPPER IN PRODUCTION OF 1,1,1-TRICHLOROETHANE
K030	COLUMN BOTTOMS OR HEAVY ENDS FROM COMBINED PRODUCTION OF TRICHLOROETHYLENE AND PERCHLOROETHYLENE
K031	BY-PRODUCT SALTS GENERATED IN PRODUCTION OF MSMA AND CACODYLIC ACID
K032	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF CHLORDANE
K033	WASTEWATER TREATMENT AND SCRUB WATER FROM CHLORINATION OF CYCLOPENTADIENE IN PRODUCTION OF CHLORDANE

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
K034	FILTER SOLIDS FROM FILTRATION OF HEXACHLOROCYCLOPENTADIENE IN PRODUCTION OF CHLORDANE
K035	WASTEWATER TREATMENT SLUDGES GENERATED IN PRODUCTION OF CREOSOTE
K036	STILL BOTTOMS FROM TOLUENE RECLAMATION DISTILLATION IN PRODUCTION OF DISULFOTON
K037	WASTEWATER TREATMENT SLUDGES FROM PRODUCTION DISULFOTON
K038	WASTEWATER FROM WASHING AND STRIPPING OF PHORATE PRODUCTION
K039	FILTER CAKE FROM FILTRATIN OF DIETHYLPHOSPHORODITHIOIC ACID IN PRODUCTION OF PHORATE
K040	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF PHORATE
K041	WASTEWATER TREATMENT SLUDGE FORM PRODUCTION OF TOXAPHENE
K042	HEAVY ENDS OR DISTILLATION RESIDUES FROM DISTILLATION OF TETRACHLOROBENZENE IN PRODUCTION OF 2,4,5-T
K046	WASTEWATER TREATMENT SLUDGES FROM THE MANUFACTURING, FORMULATION AND LOADING OF LEAD-BASED INTIATING COMPOUNDS.
K048	DISSOLVED AIR FLOTATION FLOAT FROM PETROLEUM REFINING INDUSTRY
K049	SLOP OIL EMULSION SOLIDS FROM PETROLEUM REFINING INDUSTRY
K050	HEAT EXCHANGER BUNDLE CLEANING SLUDGE FROM PETROLEUM REFINING INDUSTRY
K051	API SEPARATOR SLUDGE FROM PETROLEUM REFINING INDUSTRY
K052	TANK BOTTOMS (LEADED) FROM PETROLEUM REFINING INDUSTRY
K061	EMISSION CONTROL DUST/SLUDGE FROM PRIMARY PRODUCTION OF STEEL IN ELECTRIC FURNACES
K064	ACID PLANT BLOWDOWN SLURRY/SLUDGE RESULTING FROM THE THICKENING OF BLOWDOWN SLURRY FROM PRIMARY COPPER PRODUCTION
K065	SURFACE IMPOUNDMENT SOLIDS CONTAINED IN AND DREDGED FROM SURFACE IMPOUNDMENTS AT PRIMARY LEAD SMELTING FACILITIES.
K066	SLUDGE FROM TREATMENT OF PROCESS WASTEWATER AND/OR ACID PLANT BLOWDOWN FROM PRIMARY ZINC PRODUCTION
K071	BRINE PURIFICATION MUDS FROM MERCURY CELL PROCESS IN CHLORINE PRODUCTION WHERE SEPARATELY PREPURIFIED BRINE IS NOT USED
K073	CHLORINATED HYDROCARBON WASTE FROM PURIFICAITON STEP OF THE DIAPHRAGM CELL PROCESS USING GRAPHITE ANODES IN CHLORINE PRODUCTION
K083	DISTILLATION BOTTOMS FROM ANILINE PRODUCTION
K084	WASTEWATER TREATMENT SLUDGES GENERATED DURING PRODUCTION OF VETERINARY PHARMACEUTICALS FROM ARSENIC OR ORGANO-ARSENIC COMPOUNDS
K085	DISTILLATION OR FRACTIONATION COLUMN BOTTOMS FROM PRODUCTION OF CHLOROBENZENES

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
K086	SOLVENT WASHES AND SLUDGES, CAUSTIC WASHES AND SLUDGES, OR WATER WASHES AND SLUDGES FROM CLEANING TUBS AND EQUIPMENT USED IN FORMULATION OF INK FROM PIGMENTS, DRIERS, SOAPS, STABILIZERS CONTAINING CHROMIUM AND LEAD
K087	DECANTER TANK TAR SLUGE FROM COKING
K088	SPENT POTLINERS FROM PRIMARY ALUMINUM REDUCTION
K090	EMISSION CONTROL DUST OR SLUDGE FROM FERROCHROMIUMSILICON PRODUCTION
K091	EMISSION CONTROL DUST OR SLUDGE FROM FERROCHROMIUM PRODUCTION
K093	DISTILLAION LIGHT ENDS FROM PRODUCTION OF PHTHALIC ANHYDRIDE FROM ORTHO-XYLENE
K094	DISTILLATION BOTTOMS FROM PRODUCTION OF PHTHALIC ANHYDRIDE FROM ORTHO-XYLENE
K095	DISTILLAION BOTTOMS FROM PRODUCTION OF 1,1,1-TRICHLOROETHANE
K096	HEAVY ENDS FROM HEAVY ENDS COLUMN FROM PRODUCTION OF 1,1,1-TRICHLOROETHANE
K097	VACUUM STRIPPER DISCHARGE FROM CHLORDANE CHLORINATOR IN PRODUCTION OF CHLORDANE
K098	UNTREATED PROCESS WASTEWATER FROM PRODUCTION OF TOXAPHENE
K100	WASTE LEACHING SOLUTION FROM ACID LEACHING OF EMISSION CONTROL DUST/SLUDGE FROM SECONDARY LEAD SMELTING
K101	DISTILLATION TAR RESIDUES FROM DISTILLATIONOF ANILINE-BASED COMPOUNDS IN PRODUCTION OF VETERINARY PHARMACEUTICALS FROM ARSENIC OR ORGANO-ARSENIC COMPOUNDS
K102	RESIDUE FROM USE OF ACTIVATED CARBON FOR DECOLORIZATION IN PRODUCTION OF VETERINARY PHARMACEUTICALS FRO ARSENIC OR ORGANO-ARSENIC COMPOUNDS
K103	PROCESS RESIDUES FROM ANILINE EXTRACTION FROM PRODUCTIONOF ANILINE
K104	COMBINED WASTEWATER STREAMS GENERATED FROM NITROBENZENE/ANILINE PRODUCTION
K105	SEPARATED AQUEOUS STREAM FROM THE REACTOR PRODUCT WASHING STEP IN PRODUCTION OF CHLOROBENZENES
K106	WASTEWATER TREATMENT SLUDGE FROM MERCURY CELL PROCESS IN CHLORINE PRODUCTION
K112	REACTION BY-PRODUCT WATER FROM THE DRYING COLUMN IN PRODUCTION OF TOLUENEDIAMINE VIA HYDROGENATION OF DINITROTOLUENE
K113	CONDENSED LIQUID LIGHT ENDS FROM THE PURIFICATIONOF TOLUENEDIAMINE IN PRODUCTION OF TOLUENEDIAMINE VIA HYDROGENATION OF DINITROTOLUENE
K114	VICINALS FROM PURIFICAITON OF TOLUENEDIAMINE IN PRODUCTION OF TOLUENEDIAMINE VIA HYDROGENATION OF DINITROTOLUENE

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
K115	HEAVY ENDS FROM THE PURIFICATION OF TOLUENEDIAMINE IN PRODUCTION OF TOLUENEDIAMINE VIA HYDROGENATION OF DINITROTOLUENE
K116	ORGANIC CONDENSATE FROM SOLVENT RECOVERY COLUMN IN PRODUCTION OF TOLUENE DIISOCYANATE VIA PHOSGENATION OF TOLUENEDIAMINE
K117	WASTEWATER FROM THE REACTOR VENT GAS SCRUBBER IN PRODUCTION OF ETHYLENE DIBROMIDE VIA BROMINATION OF ETHENE
K118	SPENT ADSORBENT SOLIDS FROM PURIFICATION OF ETHYLENE DIBROMIDE IN PRODUCTION OF ETHYLENE DIBROMIDE VIA BROMINATION OF ETHENE
K125	FILTRATION, EVAPORATION, AND CENTRIFUGATION SOLIDS FROM THE PRODUCTION OF ETHYLENEBISDITHIOCARBAMIC ACID AND ITS SALTS.
K126	BAGHOUSE DUST AND FLOOR SWEEPINGS IN MILLING AND PACKAGING OPERATIONS FROM PRODUCTION OR FORMULATION OF ETHYLENE BIS DITHIOCARBAMIC ACID AND ITS SALTS
P001	2H-1-BENZOPYRAN-2-ONE, 4-HYDROXY-3-(3-OXO-1-PHENYLBUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3% WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRAIONS GREATER THAN 0.3%
P002	ACETAMINE, N-(AMINOTHIOXOMETHYL); Also known as 1-ACETYL-2-THIOUREA
P003	ACROLEIN; Also known as 2-PROPENAL
P004	ALDRIN; Also known as 1,4,5,8-DIMETHANONAPHTHALENE, 1,2,3,4,10,10-HEXA-CHLORO-1,4,4A,5,8,8A,-HEXAHYDRO, (ALPHA, 4ALPHA, 4 ABETA, 5 ALPHA, 8ALPHA, 8ABETA)-
P005	ALLYL ALCOHOL; Also known as 2-PROPEN-1-OL
P007	5-(AMINOMETHYL)-3-ISOXAZOLOL; Also known as 3(2H)-ISOXAZOLONE, 5-(AMINOMETHYL)-
P008	4-AMINOPYRIDINE; Also known as 4-PYRIDINAMINE
P010	ARSENIC ACID H_3ASO_4
P011	ARSENIC OXIDE AS_2O_5; Also known as ARSENIC PENTOXIDE
P012	ARSENIC OXIDE AS_2O_3; Also known as ARSENIC TRIOXIDE
P013	BARIUM CYANIDE
P014	BENZENETHIOL; Also known as THIOPHENOL
P015	BERYLLIUM
P016	DICHLOROMETHYL ETHER; Also known as METHANE, OXYBIS[CHLORO-
P017	BROMOACETONE; Also known as 2-PROPANONE, 1-BROMO-
P018	BRUCINE
P020	DIOSEB; Also known as PHENOL, 2-(1-METHYLPROPYL)-4,6-DINITRO-
P021	CALCIUM CYANIDE; Also known as CALCIUM CYANIDE $CA(CN)_2$
P022	CARBON DISULFIDE
P023	ACETALDEHYDE, CHLORO-; Also known as CHLOROACETALDEHYDE

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
P024	BENZENAMINE, 4-CHLORO-; Also known as P-CHLORANILINE
P026	1-(O-CHLOROPHENYL)THIOUREA; Also known as THIOUREA, (2-CHLOROPHENYL)-
P027	PROPANENITRILE, 3-CHLORO-; Also known as 3-CHLOROPROPIONITRILE
P028	BENZENE, (CHLOROMETHYL)-; Also known as BENZYL CHLORIDE
P029	COPPER CYANIDE; Also known as COPPER CYANIDE CU(CN)
P030	CYANIDES (SOLUBLE CYANIDE SALTS), NOT OTHERWISE SPECIFIED
P031	CYANOGEN; Also known as ETHANEDINITRILE
P033	CYANOGEN CHLORIDE; Also known as CYANOGEN CHLORIDE (CN)CL
P034	2-CYCLOHEXYL-4,6-DINITROPHENOL; Also known as PHENOL, 2-CYCLOHEXYL-4,6-DINITRO-
P036	ARSONOUS DICHLORIDE, PHENYL-; Also known as DICHLOROPHENYLARSINE
P037	DIELDRIN; Also known as 2,7:3,6-DIMETHANONAPHTH[2,3-B]OXIRENE, 3,4,5,6,9,9-HEXACHLORO-1A,2,2A,3,6,6A,7,7A-OCTAHYDRO-, (1AALPHA, 2BETS, 2AALPHA, 3BETAK, 6BETA, 6AALPHA, 7BETA, 7AALPHA)-
P038	ARSINE, DIETHYL-; Also known as DIETHYLARSINE
P039	PHOSPHORODITHIOIC ACID, O,O-DIETHYL S-[2-(ETHYLTHIO)ETHYL]ESTER; Also known as DISULFOTON
P040	O,O-DIETHYL O-PYRAZINYL PHOSPHOROTHIOATE; Also known as PHOSPHOROTHIOIC ACID, O, O-DIMETHYL O-(4 NITROPHENYL) ESTER
P041	PHOSPHORIC ACID, DIETHYL 4-NITROPHENYL ESTER; Also known as DIETHYL-P-NITROPHENYL PHOSPHATE
P042	1,2-BENZENEDIOL, 4-[HYDROXY-2-(METHYLAMINO)ETHYL]-,(R)-; Also known as EPINEPHRINE
P043	DIISOPROPYLFLUOROPHOSPHATE (DFP); Also known as PHOSPHOROFLUORIDIC ACID, BIS (1-METHYLETHYL)ESTER
P044	DIMETHOATE; Also known as PHOSPHORODITHIOIC ACID,O, O-DIMETHYL S-[2-(METHYLAMINO)-2-OXOETHYL]ESTER
P045	2-BUTANONE, 3, 3-DIMETHYL-1-(METHYITHIO)-,O-[METHYLOAMINO)CARBONYL]OXIME; Also known as THIOFANOX
P046	BENZENEETHANAMINE, ALPHA,ALPHA-DIMETHYL-; Also known as ALPHA,ALPHA-DIMETHYLPHENETHYLAMINE
P047	4,6-DINITRO-O-CRESOL, & SALTS; Also known as PHENOL,2-METHYL-4,6-DINITRO-, & SALTS
P048	2,4-DINITROPHENOL; Also known as PHENOL, 2,4-DINITRO-
P049	DITHIOBIURET; Also known as THIOIMIDODICARBONIC DIAMIDE $[H_2N)C(S)]_2NH$
P050	ENDOSULFAN; Also known as 6M9-METHANO-2,4,3-BENZODIOXATHIEPIN, 6,7,8,9,10,1K0-HEXACHLORO-1,5,5A,6,9,91-HEXAHYDRO-,3-OXIDE

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
P051	2,7:3,6-DIMETHANONAPHTH [2,3-B]OXIRENE, 3,4,5,6,9,9-HEXACHLORO-1A,2,2A,3,6,6A,7,7A-OCTAHYDRO-, (1AALPHA, 2BETA, 2ABETA, 3ALPHA, 6ALPHA, 6ABETA, 7BETA, 7AALPHA)-, & METABOLITES; Also known as ENDRIN; Also known as ENDRIN, & METABOLITES
P054	AZIRIDINE; Also known as ETHYLENEIMINE
P056	FLUORINE
P057	ACETAMIDE, 2-FLUORO-; Also known as FLUOROACETAMIDE
P058	ACETIC ACID, FLUORO-,SODIUM SALT; Also known as FLUOROACETIC ACIDE, SODIUM SALT
P059	HEPTACHLOR; Also known as 4,7-METHANO-1H-INDENE, 1,4,5,6,7,8,-HEPTACHLORO-3A,4,7,7A-TETRAHYDRO-
P060	1,4,5,8-DIMETHANONAPHTHALENE,1,2,3,4,10,10-HEXA- CHLORO-1,4,4A,5,7,8,8A-HEXAHYDRO-(1ALPHA, 4ALPHA, 4ABETA, 5BETA,8BETA,8ABETA)-; Also known as ISODRIN
P062	HEXAETHYL TETRAPHOSPHATE; Also known as TETRAPHOSPHORIC ACID, HEXAETHYL ESTER
P063	HYDROCYANIC ACID; Also known as HYDROGEN CYANIDE
P064	METHANE, ISOCYANATO-
P066	ETHANIMIDOTHIOIC ACID, N-[[(METHYLAMINO)CARBONYL]OXY]-, METHYL ESTER; Also known as METHOMYL
P067	AZINIDINE, 2-METHYL; Also known as 1,2-PROPYLENIMINE
P068	HYDRAZINE, METHYL-; Also known as METHYL HYDRAZINE
P069	2-METHYLLACTONITRILE; Also known as PROPANENITRILE, 2-HYDROXY-2-METHYL-
P070	ALDICARB; Also known as PROPANAL, 2-METHYL-2-(METHYLTHIO)-, O-[(METHYLAMINO)CARBONYL]OXIME
P071	METHYL PARATHION; Also known as PHOSPHOROTHIOIC ACID, O, O,-DIMETHYL O-(4-NITROPHENYL)ESTER
P072	ALPHA-NAPHTHYLTHIOUREA; Also known as THIOUREA, 1-NAPHTHALENYL-
P073	NICKEL CARBONYL; Also known as NICKEL CARBONYL $NI(CO)_4$, (T-4)-
P074	NICKEL CYANIDE; Also known as NICKEL CYNAIDE $NI(CN)_2$
P075	NICOTINE, & SALTS; Also known as PYRIDINE, 3-(1-METHYL-2-PYRROLIDINYL)-, (S)-, & SALTS
P077	BENZENAMINE, 4-NITRO-; Also known as P-NITROANILINE
P078	NITROGEN DIOXIDE; Also known as NITROGEN OXIDE NO_2
P082	METHANAMINE, N-METHYL-N-NITROSO-; Also known as N-NITROSODIMETHYLAMINE
P084	N-NITROSOMETHYLVINYLAMINE; Also known as VINYLAMINE, N-METHYL-N-NITROSO-
P085	DIPHOSPHORAMIDE, OCTAMETHYL-; Also known as OCTAMETHYLPYROPHOSPHORAMIDE
P087	OSMIUM OXIDE OSO_4, (T-4)-; Also known as OSMIUM TETROXIDE

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
P088	ENDOTHALL; Also known as 7-OXABICYCLO[2.2.1]HEPTANE-2,3-DICARBOXYLIC ACID
P089	PARATHION; Also known as PHOSPHORIC ACID, O,O-DIETHYL O-(4-NITROPHENYL)ESTER
P092	MERCURY, (ACETATO-O)PHENYL-; Also known as PHENYLMERCURY ACETATE
P093	PHENYLTHIOUREA; Also known as THIOUREA, PHENYL-
P094	PHORATE; Also known as PHOSPHORODITHIOIC ACID, O,O-DIETHYL; Also known as S-[ETHYLTHIO)METHYL] ESTER
P095	CARBONIC DICHLORIDE; Also known as PHOSGENE
P096	HYDROGEN PHOSPHIDE; Also known as PHOSPHINE
P097	FAMPHUR; Also known as PHOSPHOTHIOIC ACID, O-[4-[(DIMETHYLAMINO)SULFONYL]PHENYL] O,O-DIMETHYL ESTER
P098	POTASSIUM CYANIDE
P099	ARGENTATE(1-), BIS(CYANO-C)-, POTASSIUM; Also known as POTASSIUM SILVER CYANIDE
P101	ETHYL CYANIDE; Also known as PROPANENITRILE
P102	PROPARGYL ALCOHOL; Also known as 1-PROPYN-1-OL
P103	SELENOUREA
P104	SILVER CYANIDE
P105	SODIUM AZIDE
P108	STRYCHNIDIN-10-ONE, & SALTS; Also known as STRYCHNINE, & SALTS
P109	TETRAETHYLDITHIOPYROPHOSPHATE; Also known as THIODIPHOSPHIRIC ACID, TETRAETHYL ESTER
P110	TETRAETHYL LEAD
P113	THALLIUM OXIDE TL_2O_3
P114	THALLIUM(L) SELENITE
P115	THALLIUM(L) SULFATE
P116	THIOSEMICARBAZIDE
P118	TRICHLOROMETHANETHIOL
P119	VANADIC ACID, AMMONIUM SALT
P120	VANADIUM PENTOXIDE
P121	ZINC CYANIDE
P123	TOXAPHENE
U001	ACETALDEHYDE (I); Also known as ETHANAL (I)
U002	ACETONE (I); Also known as 2-PROPANONE (I)
U003	ACETONITRILE (I,T)
U004	ACETONITRILE (I,T)

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
U005	2, ACETYLAMINOFLUORENE; Also known as ACETAMIDE, N-9H-FLUOREN-2-YL-
U007	ACRYLAMIDE; Also known as 2-PROPENAMIDE
U008	ACRYLIC ACID (I); Also known as 2-PROPENOIC ACID (I)
U009	ACRYLONITRILE; Also known as 2-PROPENENITRILE
U010	AZIRINO[2',3':3,4]PYRROLO[1,2-a]INDOLE-4,7-DIONE,6-AMINO-8-[[(AMINOCARBONYL)OXY]METHYL]-1,1a,2,8,8a,8b-HEXAHYDRO-8a-METHOXY-5-METHYL-, [1aS-(1AALPHA, 8BETA, 8AALPHA, 8BALPHA)]-; Also known as MITOMYCIN C
U011	AMITROLE; Also known as 1H-1,2,-TRIAZOL-3-AMINE
U012	ANILINE (I,T); Also known as BENZENAMINE (I,T)
U014	AURAMINE; Also known as BENZENAMINE, 4,4'-CARBONIMIDOYLBIS[N,N-DIMETHYL-
U015	AZASERINE; Also known as L-SERINE, DIAZOACETATE (ESTER)
U016	BENZ[C]ACRIDINE
U017	BENZAL CHLORIDE; Also known as BENZENE,(DICHLOROMETHYL)-
U018	BENZ[A]ANTHRACENE
U019	BENZENE (I,T)
U022	BENZO[A]PYRENE
U024	DICHLOROMETHOXY ETHANE; Also known as ETHANE, 1,1'-[METHYLENEBIS(OXY)]BIS[2-CHLORO-
U025	DICHLOROETHYL ETHER; Also known as ETHANE,1,1'-OXYBIS[2-CHLORO-
U026	CHLORNAPHAZIN; Also known as NAPHTHALENAMINE, N,N'-BIS(2-CHLOROETHYL)-
U027	DICHLOROISOPROPYL ETHER; Also known as PROPANE, 2,2'-OXYBIS[2-CHLORO-
U028	1,2-BENZENEDICARBOXYLIC ACID, BIS(2-ETHYLHEXYL) ESTER; Also known as DIETHYLHEXYL PHTHALATE
U029	METHANE, BROMO-; Also known as METHYL BROMIDE
U030	BENZENE, 1-BROMO-4-PHENOXY-; Also known as 4-BROMOPHENYL PHENYL ETHER
U031	1-BUTANOL (I); Also known as N-BUTYL ALCOHOL (I)
U032	CHROMIC ACID H_2CRO_4, CALCIUM SALT; Also known as CALCIUM CHROMATE
U034	CHLORAL; Also known as ACETALDEHYDE, TRICHLORO-
U035	CHLORAMBUCIL; Also known as BENZENEBUTANOIC ACID, 4-[BIS(2-CHLOROETHYL)AMINO]-
U036	CHLORDANE, ALPHA & GAMMA ISOMERS; Also known as 4,7-METHANO-1H-INDENE, 1,2,4,5,6,7,8,8-OCTACHLORO-2,3,3A,4,7,7A-HEXAHYDRO-
U037	CHLOROBENZENE; Also known as BENZENE, CHLORO-
U038	CHLOROBENZILATE; Also known as BENZENEACETIC ACID, 4-CHLORO-ALPHA-(4-CHLOROPHENYL)-ALPHA-HYDROXY-, ETHYL ESTER
U039	P-CHLORO-M-CRESOL; Also known as PHENOL, 4-CHLORO-3-METHYL-
U041	EPICHLOROHYDRIN; Also known as OXIRANE, (CHLOROMETHYL)-

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
U042	2-CHLOROETHYL VINYL ETHER; Also known as ETHENE, (2-CHLOROETHOXY)-
U043	VINYL CHLORIDE; Also known as ETHENE, CHLORO-
U044	CHLOROFORM; Also known as METHANE, TRICHLORO-
U045	METHANE, CHLORO- (I,T); Also known as METHYL CHLORIDE (I,T)
U046	CHLOROMETHYL METHYL ETHER; Also known as METHANE, CHLOROMETHOXY-
U047	BETA-CHLORONAPHTHALENE; Also known as NAPHTHALENE, 2-CHLORO-
U048	O-CHLOROPHENOL; Also known as PHENOL, 2-CHLORO-
U049	4-CHLORO-O-TOLUIDINE, HYDROCHLORIDE; Also known as BENZENAMINE, 4-CHLORO-2-METHYL, HYDROCHLORIDE
U050	CHRYSENE
U051	CREOSOTE
U052	CRESOL (CRESYLIC ACID); Also known as PHENOL, METHYL-
U053	CROTONALDEHYDE; Also known as 2-BUTENAL
U055	CUMENE (I); Also known as BENZENE, (1-METHYLETHYL)- (I)
U056	BENZENE, HEXAHYDRO- (I); Also known as CYCLOHEXANE (I)
U057	CYCLOHEXANONE (I)
U058	CYCLOPHOSPHAMIDE; Also known as 2H-1,3,2-OXAZAPHOSPHORIN-2-AMINE, N,N-BIS (2-CHLOROETHYL)TETRAHYDRO-, 2-OXIDE
U059	DAUNOMYCIN; Also known as 5,12-NAPHTHACENEDIONE, 8-ACETYL-10-[(3-AMINO-2,3,6-TRIDEOXY)-ALPHS-L-LYXO-HEXOPYRANOSY)OXY]-7,8,9,10-TETRAHYDRO-6,8,11-TRIHYDROXY-1-METHOXY-, (8S-CIS)-
U060	DDD; Also known as BENZENE, 1,1'-(2,2-DICHLOROETHYLIDENE)BIS[4-CHLORO-
U061	DDT; Also known as BENZENE, 1,1'-(2,2,2-TRICHLOROETHYLIDENT)BIS[4-CHLORO-
U062	DIALLATE; Also known as CARBAMOTHIOIC ACID, BIS(1-METHYLETHYL)-, S-(2,3-DICHLORO-2-PROPENYL) ESTER
U063	DIBENZ[A,H]ANTHRACENE
U064	DIBENZO[A,I]PYRENE; Also known as BENZO[RST]PENTAPHENE
U066	1,2-DIBROMO-3-CHLOROPROPANE; Also known as PROPANE, 1,2-DIBROMO-3-CHLORO-
U067	ETHANE, 1,2-DIBROMO-; Also known as ETHYLENE DIBROMIDE
U068	METHANE, DIBROMO-; Also known as METHYLENE BROMIDE
U069	DIBUTYL PHTHALATE; Also known as 1,2-BENZENEDICARBOXYLIC ACID, DIBUTYL ESTER
U070	o-DICHLOROBENZENE; Also known as BENZENE, 1,2-DICHLORO-
U071	m-DICHLOROBENZENE; Also known as BENZENE, 1,3-DICHLORO-
U072	p-DICHLOROBENZENE; Also known as BENZENE, 1,4-DICHLORO-

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
U073	3,3'-DICHLOROBENZIDINE; Also known as [1,1'-BIPHENYL]-4,4'-DIAMINE, 3,3'DICHLORO-
U074	1,4-DICHLORO-2-BUTENE (I,T); Also known as 2-BUTENE, 1,4-DICHLORO- (I,T)
U075	DICHLORODIFLUOROMETHANE; Also known as METHANE, DICHLORODIFLUORO-
U076	ETHANE, 1,1-DICHLORO-; Also known as ETHYLIDENE DICHLORIDE
U077	ETHANE, 1,2-DICHLORO-; Also known as ETHYLENE DIBROMIDE
U078	1,1-DICHLOROETHYLENE; Also known as ETHENE, 1,1-DICHLORO-
U079	1,2-DICHLOROETHYLENE; Also known as ETHENE, 1,2-DICHLORO-, (E)
U080	METHANE, DICHLORO-; Also known as METHYLENE CHLORIDE
U081	2,4-DICHLOROPHENOL; Also known as PHENOL, 2,4-DICHLORO-
U082	2,6-DICHLOROPHENOL; Also known as PHENOL,2,6-DICHLORO-
U083	PROPANE, 1,2-DICHLORO-; Also known as PROPYLENE DICHLORIDE
U084	1,3-DICHLOROPROPENE; Also known as 1-PROPENE, 1,3-DICHLORO-
U085	1,2:3,4--DIEPOXYBUTANE (I,T); Also known as 2,2'-BIOXIRANE
U086	N,N'-DIETHYLHYDRAZINE; Also known as HYDRAZINE, 1,2,-DIETHYL-
U087	O,O-DIETHYL S-METHYL DITHIOPHOSPHATE; Also known as PHOSPHORODITHIOIC ACID, 0,0-DIETHYL S-METHYL ESTER
U088	DIETHYL PHTHALATE; Also known 1,2-BENZENEDICARBOXYLIC ACID, DIETHYL ESTER
U089	DIETHYLSTILBESTEROL; Also known as PHENOL, 4,4'-(1,2-DIETHYL-1,2-ETHENEDIYL)BIS-, (E)
U090	DIHYDROSAFROLE; Also known as 1,3-BENZODIOXOLE, 5-PROPYL-
U091	3,3'-DIMETHOXYBENZIDINE; Also known as [1,1'-BIPHENYL]-4,4'-DIAMINE, 3,3'DIMETHOXY-
U092	DIMETHYLAMINE (I); Also known as METHANAMINE, N-METHYL- (I)
U093	BENZENAMINE, N,N-DIMETHYL-4-(PHENYLAZO)-; Also known as P-DIMETHYLAMINOAZOBENZENE
U094	BENZ[A]ANTHRACENE, 7,12-DIMETHYL-; Also known as 7,12-DIMETHYLBENZ[A]ANTHRACENE
U095	3,3'-DIMETHYLBENZIDINE; Also known as [1,1'-BIPHENYL]-4,4'-DIAMINE, 3,3'DIMETHYL-
U097	DIMETHYLCARBAMOYL CHLORIDE; Also known as CARBAMIC CHLORIDE, DIMETHYL-
U098	1,1-DIMETHYLHYDRAZINE; Also known as HYDRAZINE, 1,1-DIMETHYL-
U099	1,2-DIMETHYLHYDRAZINE; Also known as HYDRAZINE, 1,2,-DIMETHYL-
U101	2,4-DIMETHYLPHENOL; Also known as PHENOL, 2,4-DIMETHYL-
U102	DIMETHYL PHTHALATE; Also known as 1,2-BENZENEDICARBOXYLIC ACID, DIMETHYL ESTER
U103	DIMETHYL SULFATE; Also known as SULFURIC ACID, DIMETHYL ESTER

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
U105	2,4-DINITROTOLUENE; Also known as BENZENE, 1-METHYL-2,4-DINITRO-
U106	2,6-DINITROTOLUENE; Also known as BENZENE, 2-METHYL-1,3-DINITRO-
U107	DI-N-OCTYL PHTHALATE; Also known as 1,2-BENZENEDICARBOXYLIC ACID, DIOCTYL ESTER
U108	1,4-DIETHYLENEOXIDE; Also known as 1,4-DIOXANE
U109	1,2-DIPHENYLHYDRAZINE; Also known as HYDRAZINE, 1,2-DIPHENYL-
U110	DIPROPYLAMINE (I); Also known as 1-PROPANAMINE, N-PROPYL- (I)
U111	DI-N-PROPYLNITROSAMINE; Also known as 1-PROPANAMINE, N-NITROSO-N-PROPYL-
U112	ACETIC ACID ETHYL ESTER (I); Also known as ETHYL ACETATE (I)
U113	ETHYL ACRYLATE (I); Also known as 2-PROPENOIC ACID, ETHYL ESTER (I)
U114	ETHYLENEBISDITHIOCARBAMIC ACID, SALTS & ESTERS; Also known as CARBAMODITHIOIC ACID, 1,2- ETHANEDIYLBIS-, SALTS & ESTERS
U115	ETHYLENE OXIDE (I,T); Also known as OXIRANE (I,T)
U116	ETHYLENETHIOUREA; Also known as 2-IMIDAZOLIDINETHIONE
U117	ETHANE, 1,1'-OXYBIS-(I); Also known as ETHYL ETHER (I)
U118	ETHYL METHACRYLATE; Also known as 2-PROPENOIC ACID, 2-METHYL-, ETHYL ESTER
U119	ETHYL METHANESULFONATE; Also known as METHANESULFONIC ACID, ETHYL ESTER
U120	FLUORANTHENE
U121	TRICHLOROMONOFLUOROMETHANE; Also known as METHANE, TRICHLOROFLUORO-
U122	FORMALDEHYDE
U124	FURAN (I); Also known as FURFURAN (I)
U125	2-FURANCARBOXALDEHYDE (I); Also known as FURFURAL (I)
U126	GLYCIDYLALDEHYDE; Also known as OXIRANECARBOXYALDEHYDE
U127	HEXACHLOROBENZENE; Also known as BENZENE, HEXACHLORO-
U128	HEXACHLOROBUTADIENE; Also known as 1,3-BUTADIENE, 1,1,2,3,4,4-HEXACHLORO-
U129	LINDANE; Also known as CYCLOHEXANE, 1,2,3,4,5,6- HEXACHLORO-, (1ALPHA, 2ALPHA, 3BETA, 4ALPHA, 5ALPHA, 6BETA)-
U130	HEXACHLOROCYCLOPENTADIENE; Also known 1,3-CYCLOPENTADIENE, 1,2,3,4,5,5-HEXACHLORO-
U131	HEXACHLOROETHANE; Also known as ETHANE, HEXACHLORO-
U132	HEXACHLOROPHENE; Also known as PHENOL, 2,2'-METHYLENEBIS[3,4,6-TRICHLORO-
U135	HYDROGEN SULFIDE; Also known HYDROGEN SULFIDE H_2S
U136	ARSINIC ACID, DIMETHYL-; Also known as CACODYLIC ACID
U137	INDENO[1,2,3-CD]PYRENE

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
U138	METHANE, IODO-; Also known as METHYL IODIDE
U140	ISOBUTYL ALCOHOL, (I,T); Also known as 1-PROPANOL, 2-METHYL-, (I,T)
U141	ISOSAFROLE; Also known as 1,3-BENZODIOXOLE, 5-(1-PROPENYL)-
U142	KEPONE; Also known as 1,3,4-METHENO-2H-CYCLOBUTA[CD]PENTALEN-2-ONE, 1,1A,3,3A,4,5,5A,5B,6- DECACHLOROOCTAHYDRO-
U143	LASIOCARPINE; Also known as 2-BUTENOIC ACID, 2-METHYL-, 7-[2,3-DIHYDROXY-2-(1-METHOXYETHYL)-3-METHYL-1- OXOBUTOXY]METHYL]-2,3,5,6A-TETRAHYDRO-1H-PYRROLIZIN-1-YL ESTER,[1S-1ALPHA(Z),7(2S*,3R*),7AALPHA]]-
U144	ACETIC ACID, LEAD(2+) SALT; Also known as LEAD ACETATE
U145	LEAD PHOSPHATE; PHOSPHORIC ACID, LEAD(2+) SALT (2:3)
U146	LEAD, BIS(ACETATO-O) TETRAHYDROXYTRI-; Also known as LEAD SUBACETATE
U147	MALEIC ANHYDRIDE; Also known as 2,5-FURANDIONE
U148	MALEIC HYDRAZIDE; Also known as 3,6-PYRIDAZINEDIONE, 1,2-DIHYDRO-
U149	MALONONITRILE; Also known as PROPANEDINITRILE
U150	MELPHALAN; Also known as L-PHENYLALANINE, 4-[BIS(2-CHLOROETHYL)AMINO]-
U151	MERCYR
U152	METHACRYLONITRILE (I,T); Also known as 2-PROPENENITRILW, 2-METHYL- (I,T)
U153	METHANETHIOL (I,T); Also known as THIOMETHANOL (I,T)
U154	METHANOL (I); Also known as METHYL ALCOHOL (I)
U155	METHAPYRILENE; Also known 1,2-ETHANEDIAMINE, N,N- DIMETHYL-N'-W-PYRIDINYL-N'-(2- THIENYLMETHYL)-
U156	METHYL CHLOROCARBONATE (I,T); Also known CARBONOCHLORIDIC ACID, METHYL ESTER (I,T)
U157	BENZ[I]ACEANTHRYLENE, 1,2-DIHYDRO-3-METHYL-; Also known as 3-METHYLCHOLANTHRENE
U158	BENZENAMINE, 4,4'METHYLENEBIS[2-CHLORO-; Also known as 4,4'-METHYLENEBIS(2-CHLOROANILINE)
U159	METHYL ETHYL KETONE (MEK) (I,T); Also known as 2-BUTANONE (I,T)
U161	METHYL ISOBUTYL KETONE (I); Also known as 4-METHYL-2-PENTANONE (I) and PENTANOL, 4-METHYL-
U162	METHYL METHACRYLATE (I,T); Also known as 2-PROPENOIC ACID, 2-METHYL-, METHYL ESTER (I,T)
U163	MNNG; Also known as GUANIDINE, N-METHYL-N'-NITRO-N- NITROSO-
U164	METHYLTHIOURACIL; Also known as 4(1H)-PYRIMIDINONE, 2,3-DIHYDRO-6-METHYL-2-THIOXO-
U165	NAPHTHALENE
U166	1,4-NAPHTHALENEDIONE; Also known as 1,4-NAPHTHOQUINONE

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
U167	1-NAPHTHALENAMINE; Also known as ALPHA-NAPHTHYLAMINE
U168	2-NAPHTHALENAMINE; Also known as BETA-NAPHTHYLAMINE
U169	NITROBENZENE (I,T); Also known as BENZENE, NITRO-
U170	P-NITROPHENOL; Also known as PHENOL, 4-NITRO
U171	2-NITROPROPANE (I,T); Also known as PROPANE, 2-NITRO (I,T)
U172	N-NITROSODI-N-BUTYLAMINE; Also known as 1-BUTANAMINE, N-BUTYL-N-NITROSO-
U173	N-NITROSODIETHANOLAMINE; Also known as ETHANOL, 2,2'-(NITROSOIMINO)BIS-
U174	N-NITROSODIETHYLAMINE; Also known as ETHANAMINE, N-ETHYL-N-NITROSO-
U176	N-NITROSO-N-ETHYLUREA; Also known as UREA, N-ETHYL-N-NITROSO-
U177	N-NITROSO-N-METHYLUREA; Also known as UREA, N-METHYL-N-NITROSO-
U178	N-NITROSO-N-METHYLURETHANE; Also known as CARBAMIC ACID, METHYLNITROSO-,ETHYL ESTER
U179	N-NITROSOPIPERIDINE; Also known as PIPERIDINE, 1-NITROSO-
U180	N-NITROSOPYRROLIDINE; Also known as PYRROLIDINE, 1-NITROSO-
U181	BENZENAMINE, 2-METHYL-5-NITRO-; Also known as 5-NITRO-O-TOLUIDINE
U182	PARALDEHYDE; Also known as 1,3,5-TRIOXANE, 2,4,6- TRIMETHYL-
U183	PENTACHLOROBENZENE; Also known as BENZENE, PENTACHLORO-
U184	PENTACHLOROETHANE; Also known as ETHANE, PENTACHLORO-
U185	PENTACHLORONITROBENZENE (PCNB); Also known as BENZENE, PENTACHLORONITRO-
U186	1,3-PENTADIENE (I); Also known as 1-METHYLBUTADIENE (I)
U187	ACETAMIDE, N-(4-ETHOXYPHENYL)-; Also known as PHENACETIN
U188	PHENOL
U190	PHTHALIC ANHYDRIDE; Also known as 1,3-ISOBENZOFURANDIONE
U191	2-PICOLINE; Also known as PYRIDINE, 2-METHYL-
U192	BENZAMIDE,3,5-DICHLORO-N-(1,1-DIMETHYL-2-PROPYNYL)-; Also known as PRONAMIDE
U193	1,3-PROPANE SULTONE; Also known as 1,2-OXATHIOLANE, 2,2-DIOXIDE
U194	1-PROPANAMINE (I,T); Also known as N-PROPYLAMINE (I,T)
U196	PYRIDINE
U197	P-BENZOQUINONE; Also known as 2,5-CYCLOHEXADIENE-1,4-DIONE
U200	RESERPINE; Also known as YOHIMBAN-16-CARBOXYLIC ACID, 11,17-DIMETHOXY-18-[(3,4,5-TRIMETHOXYBENZOYL)OXY]-, METHYL ESTER, (3BETA, 16BETA, 17ALPHA, 18BETA, 20ALPHA)-
U201	RESORCINOL; Also known as 1,3-BENZENEDIOL
U202	SACCHARIN, & SALTS; Also known as 1,2-BENZISOTHIAZOL-3(2H)-ONE, 1,1-DIOXIDE, & SALTS

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
U203	SAFROLE; Also known as 1,3-BENZODIOXOLE, 5-(2- PROPENYL)-
U204	SELENIOUS ACID; Also known as SELENIUM DIOXIDE
U206	STREPTOZOTOCIN; Also known as GLUCOPYRANOSE, 2-DEOXY-2-(3-METHYL-3-NITROSOUREIDO)-, D-D-GLUCOSE, 2-DEOXY-2-[[(METHYLNITROSOAMINO)-CARBONYL]AMINO]-
U207	1,2,4,5-TETRACHLOROBENZENE; Also known as BENZENE, 1,2,4,5-TETRACHLORO-
U208	1,1,1,2-TETRACHLOROETHANE; Also known as ETHANE, 1,1,1,2-TETRACHLORO-
U209	1,1,2,2-TETRACHLOROETHANE; Also known as ETHANE, 1,1,2,2-TETRACHLORO-
U210	TETRACHLOROETHYLENE; Also known as ETHENE, TETRACHLORO-
U211	CARBON TETRACHLORIDE; Also known as METHANE, TETRACHLORO-
U213	TETRAHYDROFURAN (I); Also known as FURAN, TETRAHYDRO-(I)
U214	ACETIC ACID, THALLIUM(1+) SALT; Also known as THALLIUM(I) ACETATE
U215	THALLIUM(I) CARBONATE; Also known as CARBONIC ACID, DITHALLIUM(1+) SALT
U216	THALLIUM(I) CHLORIDE; Also known as THALLIUM CHLORIDE TLCL
U217	THALLIUM(I) NITRATE; Also known as NITRIC ACID, THALLIUM(1+) SALT
U218	THIOACETAMIDE; Also known as ETHANETHIOAMIDE
U219	THIOUREA
U220	TOLUENE; Also known as BENZENE, METHYL-
U221	TOLUENEDIAMINE; Also known as BENZENEDIAMINE, AR-METHYL-
U222	BENZENAMINE, 2-METHYL-, Also known as HYDROCHLORIDE O-TOLUIDINE HYDROCHLORIDE
U225	BROMOFORM; Also known as METHANE, TRIBROMO-
U226	ETHANE, 1,1,1-TRICHLORO-; Also known as METHYL CHLOROFORM
U227	1,1,2-TRICHLOROETHANE; Also known as ETHANE, 1,1,2-TRICHLORO-
U228	TRICHLOROETHYLENE; Also known as ETHENE, TRICHLORO-
U235	TRIS(2,3-DIBROMOPROPYL) PHOSPHATE; Also known as 1-PROPANOL, 2,3-DIBROMO-, PHOSPHATE (3:1)
U236	TRYPAN BLUE; Also known as 2,7-NAPHTHALENEDISULFONIC ACID, 3,3'-[(3,3'-DIMETHYL[1,1'-BIPHENYL]-4,4'- DIYL)BIS(AZO)BIS[5-AMINO-4-HYDROXY]-, TETRASODIUM SALT
U237	URACIL MUSTARD; Also known as 2,4-(1H,3H)-PYRIMIDINEDIONE, 5-[BIS(2-CHLOROETHYL)AMINO]-
U238	CARBAMIC ACID, ETHYL ESTER; Also known as ETHYL CARBAMATE (URETHANE)
U239	XYLENE (I); Also known as BENZENE, DIMETHYL- (I,T)
U240	ACETIC ACID, 92,4-DICHLOROPHENOXY)-, SALTS & ESTERS; Also known as 2,4-D, SALTS & ESTERS
U243	HEXACHLOROPROPENE; Also known as 1-PROPENE, 1,1,2,3,3,3- HEXACHLORO-

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
U244	THIOPEROXYDICARBONIC DIAMIDE $[(H_2N)C(S)]_2S_2$, TETRAMETHYL-; Also known as THIRAM
U246	CYANOGEN BROMIDE (CN)Br
U247	BENZENE, 1,1'(2,2,2-TRICHLOROETHYLIDENE)BIS[4-METHOXY-; Also known as METHOXYCHLOR
U248	WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRATIONS OF 0.3% OR LESS; Also known as 2H-1-BENZOPYRAN-2-ONE, 4- HYDROXY-3-(3-OXO-1-PHENYL-BUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS OF 0.3% OR LESS
U249	ZINC PHOSPHIDE Zn_3P_2 WHEN PRESENT AT CONCENTRATIONS OF 10% OR LESS
U328	BENZENAMINE, 2-METHYL-; Also known as o-TOLUIDINE
U353	BENZENAMINE, 4-METHYL-; Also known as p-TOLUIDINE
U359	ETHANOL, 2-ETHOXY-; Also known as ETHYLENE GLYCOL MONOETHYL ETHER

Table C-2

Spent Activated Carbon Organic Constituent Data Summary				
		Organics (lb constituent per lb spent activated carbon)		
Constituent	CAS NO.	Minimum	Maximum	Average
1-Butanol	71-36-3	8.67E-04	8.67E-04	8.67E-04
1-Hexane	110-54-3	3.86E-04	8.45E-02	4.24E-02
1,1 Dichloroethane	75-34-3	9.00E-09	3.20E-02	9.71E-04
1,1 Dichloroethene	75-35-4	2.50E-10	2.94E-01	2.51E-03
1,1,1 Trichloroethane	71-55-6	2.50E-09	3.43E-01	1.31E-02
1,1,2 Trichloroethane	79-00-5	5.00E-07	1.41E-02	3.28E-03
1,1,2,2 Tetrachloroethane	79-34-5	1.45E-05	3.31E-04	2.29E-04
1,2 Dibromoethane	106-93-4	2.50E-08	1.98E-02	4.57E-03
1,2 Dichlorobenzene	95-50-1	2.05E-05	4.60E-03	9.99E-04
1,2 Dichloroethane	107-06-2	0.00E+00	1.39E-01	7.18E-03
1,2 Dichloroethene	540-59-0	2.50E-08	7.32E-03	2.13E-03
1,2 Dichloropropane	78-87-5	3.00E-09	5.30E-02	6.06E-03
1,2,3 Trichloropropane	96-18-4	3.72E-06	3.72E-06	3.72E-06
1,2,4 Trimethylbenzene	95-63-6	1.10E-07	4.80E-04	3.84E-04
1,2-Dichloroethene (cis)	156-59-2	1.00E-09	2.63E-03	1.39E-03
1,2-Dichloroethene (trans)	156-60-5	7.32E-05	5.44E-04	3.65E-04
1,3 Dichlorobenzene	541-73-1	7.40E-05	5.48E-04	1.70E-04
1,4 Dichlorobenzene	106-46-7	2.50E-08	3.44E-03	5.20E-04
2,3,4,6 Tetrachlorophenol	58-90-2	1.82E-05	1.82E-05	1.82E-05
2-Butanol	78-92-2	5.90E-04	5.90E-04	5.90E-04
2-Butoxyethanol	111-76-2	2.73E-03	2.73E-03	2.73E-03
2-ethyl-1-Methylbenzene	611-14-3	9.40E-05	9.40E-05	9.40E-05
2-methoxy-1-Propanol		6.24E-03	6.24E-03	6.24E-03
2-Methylnaphthalene	91-57-6	1.63E-05	1.34E-03	4.61E-04
2-Methylphenol (o-Cresol)	95-48-7	2.14E-05	2.14E-05	2.14E-05
3-/4-Methylphenol (m&p Cresol)	108-39-4 & 106-44-5	3.40E-05	3.40E-05	3.40E-05
4-ethyl-1-Methylbenzene		8.10E-05	8.10E-05	8.10E-05
Acenaphthalene	208-96-8	3.36E-05	6.26E-04	3.30E-04
Acenaphthene	83-32-9	2.81E-06	2.41E-05	1.09E-05
Acenaphthylene		1.18E-06	2.66E-06	1.92E-06
Acetone	67-64-1	4.51E-03	8.49E-03	6.50E-03
Acrylic Acid	79-10-7	2.50E-05	2.50E-05	2.50E-05
Acrylonitrile	107-13-1	9.30E-06	9.30E-06	9.30E-06
Aldrin	309-00-2	6.60E-07	6.60E-07	6.60E-07
Aniline	62-53-3	2.51E-05	4.26E-04	1.47E-04
Benzene	71-43-2	2.50E-10	9.25E-02	1.44E-03
Benzo(a)Anthracene	56-55-3	5.60E-07	2.10E-06	1.33E-06
Benzo(b)Fluoranthene	205-99-2	2.30E-07	4.00E-07	3.20E-07
Bromodichloromethane	75-27-46	3.00E-05	6.18E-04	4.06E-04
Butane	106-97-8	9.69E-06	9.69E-06	9.69E-06
Butyl Acetate	123-86-4	1.36E-02	1.36E-02	1.36E-02
Carbon Tetrachloride	56-23-5	3.00E-08	1.36E-02	5.39E-04
Chlorobenzene	108-90-7	2.50E-08	2.75E-03	4.76E-04
Chloroethane	75-00-3	3.89E-03	3.89E-03	3.89E-03

Table C-2

Spent Activated Carbon Organic Constituent Data Summary				
		Organics (lb constituent per lb spent activated carbon)		
Constituent	CAS NO.	Minimum	Maximum	Average
Chloroform	67-66-3	1.40E-08	2.08E-02	1.05E-02
Chloromethane	74-87-3	2.06E-04	2.06E-04	2.06E-04
Chrysene	218-01-9	6.40E-07	6.40E-07	6.40E-07
Cresol	1319-77-3	5.10E-05	1.74E-04	1.13E-04
Cumene	98-82-8	5.78E-06	1.65E-03	4.37E-04
Dibenzofuran	132-64-9	7.66E-06	2.61E-05	1.69E-05
Dicyclopentadiene	77-73-6	6.06E-04	6.49E-02	1.68E-02
Dioxane	123-91-1	1.16E-04	9.20E-04	5.18E-04
Ethanol	64-17-5	3.56E-04	3.56E-04	3.56E-04
Ethyl Acetate	141-78-6	5.87E-03	5.87E-03	5.87E-03
Ethylbenzene	100-41-4	5.00E-10	2.30E-02	1.14E-03
Ethylene Glycol	107-21-1	2.94E-01	2.94E-01	2.94E-01
Fluoranthene	206-44-0	3.11E-06	2.90E-05	1.61E-05
Freon 113	76-13-1	1.10E-09	1.10E-09	1.10E-09
Isobutane	75-28-5	1.42E-02	1.42E-02	1.42E-02
Isopar C		1.27E-03	5.48E-02	2.80E-02
Isopropyl Alcohol	67-63-0	7.00E-03	7.00E-03	7.00E-03
Lindane	58-89-9	1.54E-09	6.70E-06	1.28E-06
m&p-Xylenes	108-38-3 &106-42-3	7.20E-08	2.89E-03	5.90E-04
Methanol	67-56-1	1.36E-01	1.36E-01	1.36E-01
Methoxychlor	72-43-5	2.80E-06	2.80E-06	2.80E-06
Methyl ethyl ketone	78-93-3	1.20E-08	4.10E-03	1.40E-03
Methyl Isobutyl ketone	108-10-1	5.00E-06	4.24E-02	2.94E-03
Methyl methacrylate	80-62-6	2.50E-08	2.50E-08	2.50E-08
methyl tert-butyl ether	1634-04-4	1.22E-07	4.66E-02	5.86E-03
Methylene chloride	75-09-2	1.90E-08	1.30E-01	1.63E-03
Methylnaphthalene	28804-88-8	3.54E-06	5.03E-06	4.29E-06
Naphthalene	91-20-3	6.00E-09	4.93E-03	4.31E-04
n-Hexane	110-54-3	5.51E-04	8.25E-03	4.40E-03
Nitrobenzene	98-95-3	6.99E-06	3.14E-02	4.50E-03
o-Xylene	95-47-6	2.50E-09	9.00E-05	1.22E-05
Pentachlorophenol	87-86-5	1.00E-06	3.97E-03	7.36E-04
Phenanthrene	85-01-8	3.20E-07	2.95E-05	1.08E-05
Phenol	108-95-2	2.00E-07	4.03E-03	1.27E-03
Polychlorinated Biphenyls	1336-36-3	8.00E-07	3.50E-06	2.15E-06
Propylbenzene	103-65-1	9.00E-05	9.00E-05	9.00E-05
Propylene glycol monomethyl ether acetate	107-98-2	1.45E-02	1.45E-02	1.45E-02
Propylene oxide	75-56-9	4.30E-09	4.00E-03	1.00E-03
Styrene	100-42-5	2.50E-08	3.97E-02	3.57E-03
Tetrachloroethane	630-20-6 & 79-34-5	2.96E-03	2.96E-03	2.96E-03
Tetrachloroethylene	127-18-4	0.00E+00	1.59E-01	1.84E-02
Tetrahydrofuran	109-99-9	4.16E-04	4.16E-04	4.16E-04

Table C-2

Spent Activated Carbon Organic Constituent Data Summary				
		Organics (lb constituent per lb spent activated carbon)		
Constituent	**CAS NO.**	Minimum	Maximum	Average
Toluene	108-88-3	1.60E-09	1.30E-01	8.68E-03
Trichloroethylene	79-01-6	2.50E-09	2.17E-01	2.24E-03
Trichlorofluoromethane	75-69-4	1.00E-07	4.00E-02	1.42E-03
Triethylamine	121-44-8	9.54E-03	9.54E-03	9.54E-03
Tris(hydroxymethyl) Aminomethane		1.77E-02	1.77E-02	1.77E-02
Vinyl Chloride	75-01-4	2.30E-08	2.40E-05	2.58E-06
Xylene	1330-20-7	8.00E-10	1.59E-01	3.41E-03

All data reported on a dry carbon basis.

Note: The information presented in this table is considered typical but should not be considered limiting.

Table C-3
Spent Activated Carbon Characterization Summary

Stream Type: Solid
Stream Name: Spent Activated Carbon
Feed Method: Dewatering screw, conveyor belt and rotary airlock

Constituent/Property	Units	Value	
		Typical	Range
Organic Constituents (a)			
Total organics	wt%	3.1	2 - 4
Inorganic Constituents			
Water	wt%	43.5	30 - 50
RCRA Metals (a)			
Antimony	mg/kg	<10	<10
Arsenic	mg/kg	2.8	1.2 - 19
Barium	mg/kg	38.3	1 - 110
Beryllium	mg/kg	0.5	<0.1 - 0.7
Cadmium	mg/kg	0.7	<0.5 - 6.9
Chromium	mg/kg	11	3.1 - 240
Chromium (VI)	mg/kg	<0.9	<1
Lead	mg/kg	2.7	<2 - 25
Mercury	mg/kg	0.1	0 - 0.5
Nickel	mg/kg	21.3	7.5 - 140
Selenium	mg/kg	<2	<1 - 3.9
Silver	mg/kg	1	<0.5 - 1.6
Thallium	mg/kg	10.7	<5 - 29
Other Metals (a)			
Cobalt	mg/kg	4.8	2.1 - 19
Copper	mg/kg	31.4	12 - 60
Manganese	mg/kg	223	54 - 590
Vanadium	mg/kg	6.2	3.7 - 7.9
Zinc	mg/kg	35.4	22 - 44
Elemental Composition (b)			
Carbon (from spent carbon)	wt%	94.5	70 - 99
Carbon (from organic adsorbed on carbon)	wt%	2.9	1.6 - 25
Hydrogen	wt%	0.4	0.2 - 8
Oxygen	wt%	0.5	0.3 - 5
Nitrogen	wt%	0.1	0.06 - 0.5
Sulfur	wt%	0	<0.1
Phosphorous	wt%	0	<0.1
Chlorine/chloride	wt%	1.5	0 - 5
Bromine/bromide	wt%	0	<0.1
Fluorine/fluoride	wt%	0	<0.1
Iodine/iodide	wt%	0	<0.1

(a) - As fed basis (wet)
(b) - Dry basis (as received)

Note: The information presented in this table is considered typical but should not be considered limiting.

SECTION D

PROCESS INFORMATION

Siemens Industry, Inc.
2523 Mutahar Street
Parker, Arizona 85344

Revision 1
April 2012

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TABLES

LIST OF CITED APPENDICES

D.1 INTRODUCTION

This section presents a description of the design and operation of the Siemens Industry, Inc. (SII) carbon reactivation facility. In the November 1995 RCRA Part B permit application, SII discussed an existing carbon reactivation furnace (RF-1) and a future second carbon reactivation furnace (RF-2) that SII expected to install at the facility. Currently, the second carbon reactivation furnace (RF-2) is now operational and the original carbon reactivation furnace (RF-1) was shut down in June 1996, and will not be returned to service. RF-1 will undergo RCRA closure upon final approval of a closure plan submitted to EPA. With the exception of a RCRA Closure Plan prepared specifically for the old RF-1 unit, the RCRA Part A and Part B Permit Applications will only discuss the second carbon reactivation furnace that will continue to be abbreviated in the permit applications as RF-2.

The facility reactivates spent carbon, which, in some cases, may be classified as a RCRA hazardous waste. The facility's container storage area is currently regulated under the provisions found in 40 CFR 264 Subpart I (Use and Management of Containers). The facility's five spent carbon storage tanks are currently regulated under the 40 CFR 264 Subpart J (Tank Systems) requirements. The facility's reactivation unit and its associated air pollution control equipment are currently regulated under the 40 CFR 264 Subpart X (Miscellaneous Units) requirements. The Subpart X classification for carbon reactivation units is consistent with the discussion concerning carbon reactivation units found on page 7200 of the February 21, 1991 Federal Register.

As per the regulations specified in 40 CFR 264.601 and discussions with EPA Region IX, RF-2 underwent a Performance Demonstration Test in March of 2006 that incorporated emission standard requirements from the Hazardous Waste Combustor Maximum Achievable Control Technology (HWC MACT) regulations in 40 CFR 63 Subpart EEE. A copy of the Performance Demonstration Test Plan and the Test Report for RF-2 can be found in Appendix V.

Some of the tank systems referenced in this permit application (including without limitation T-9, T-19, T-11, and wastewater treatment equipment) are not subject to the provisions of 40 CFR Part 264 or 40 CFR Part 270 because they are part of exempt units, including wastewater treatment units and elementary neutralization units. In addition, some of the processes referenced in this permit application (including without limitation the facility's recycle water storage and transport system) are not subject to the provisions of 40 CFR Part 264 or 40 CFR Part 270 because they do not involve the management of a hazardous or solid waste. These tank systems and processes are described in this permit application in order to provide a complete description of the carbon reactivation process and are not intended to be incorporated into the facility's RCRA permit.

D.1.1 FACILITY OVERVIEW

Process flow diagrams of the carbon reactivation process are shown in Drawings PC-1466-

PR-003 and 004 located in Appendix VI. It is important to note that drawings referenced in this permit application include many components of the facility that are exempt from permitting under various provisions of RCRA. These components are provided for informational purposes and ease of review only, and they are not intended to become regulated components of the facility. Spent carbon slurry is fed from the Furnace Feed Tank T-18 into a dewatering screw where the carbon is dewatered prior to introduction into the Carbon Reactivation Furnace (RF-2). Water from the dewatering screw is returned to the recycle water storage tank. RF-2 is a multiple hearth furnace consisting of five hearths. The spent carbon is introduced into the top hearth and flows downward through the remaining four hearths. Reactivated carbon exits the bottom hearth through a cooling screw. RF-2 is equipped with a primary combustion air fan and two shaft cooling fans. Natural gas burners are provided to ensure adequate heat input to the reactivation unit for all of the spent carbons that are reactivated at the facility. The hot gases generated in RF-2 are routed to an afterburner to ensure the thermal oxidation of organic matter that is not oxidized in the reactivation unit. The afterburner is equipped with two burners that utilize natural gas as the fuel source. From the afterburner, the gases are quenched by direct water contact and routed through a variable throat venturi scrubber for particulate matter control. From the venturi scrubber, the gases are routed to a packed bed scrubber for acid gas control. From the packed bed scrubber, the gases flow through a wet electrostatic precipitator, used for fine particulate matter and metals control. From the wet electrostatic precipitator, the gases are routed through a stack to the atmosphere. The motive force for moving the gases through the air pollution control system is supplied by an induced draft fan.

A pH-controlled scrubbing medium (water and caustic solution) is supplied to the air pollution control system from the scrubber water system. The pH is continuously monitored to ensure efficient acid gas removal in both the gas cooler/venturi scrubber and the packed bed scrubber. Caustic is added based on the pH of the scrubber water.

The air pollution control equipment uses a recycle water system. A portion of the scrubber water in the system is continuously discharged (blowdown).

Scrubber blowdown from RF-2 air pollution control equipment is treated in an exempt wastewater treatment unit, or discharged directly to the POTW. The discharge to the POTW is continuously monitored for pH, total dissolved solids, flow and temperature to ensure compliance with the discharge limitations found in the facility's industrial wastewater discharge permit.

D.1.2 CARBON REACTIVATION PROCESS

The carbon reactivation process involves various thermal mechanisms that are discussed in the following section:

Following dewatering the spent granular carbon is fed to the top section of the multiple-hearth furnace. In the pre-drying and drying zones (the top hearths) the water retained in the pores and the surface of the carbon is evaporated by the counter-current flow of hot combustion gases coming from the lower hearths. The temperature of the carbon is raised in the top hearths to approximately 210°F. Upon application of heat, water will evaporate freely when the carbon particle temperature goes over 200°F. The adsorbed water is freed at temperatures of approximately 212°F to 230°F.

Upon the application of heat to the carbon particles at temperatures over 600°F, the high molecular weight organic impurities adsorbed in the carbon will crack to produce gaseous hydrocarbons, hydrogen, and water vapor which escape the pores of the granular carbon while some fixed carbon is retained in the pores of the carbon particles. In these pre-heating and decomposition zones (middle hearths) the temperature of the carbon is increased to about 750°F in a virtually oxygen-free atmosphere. Under these conditions the adsorbed organic impurities in the pores of the carbon are pyrolyzed and all volatile materials are driven off.

By the time the carbon reaches 1200°F, there is little or none of the original adsorbed organic impurities remaining. However, the carbon is not fully regenerated at this point. Carbonaceous residue remaining within the pores of the carbon particles restricts the adsorption capacity and must be removed. The carbonaceous residue is treated in the final heat up and gasification zones (lower hearths) in a way which avoids damage to the original pore structure of the carbon. Gas-phase temperatures from 1350°F to 1650°F are typical for this final step of the thermal regeneration process.

D.1.3 FACILITY CONTAINER STORAGE CAPACITY

The container storage capacity designated in the facility's Part A application is 100,000 gallons. The location of this container storage area (S01) is shown on Drawing No. D14789-02 which can be found in Appendix III. Drawing No. D14789-02 depicts the layout of the facility.

D.2 PROCESS SUMMARY

The following sections, along with the piping and instrumentation diagrams and flow diagrams found in Appendix VI, present an overview of the equipment used at the facility and the flow of carbon through the facility. Detailed descriptions of the RCRA-regulated components can be found in specific sections of Section D.

DRAWING NO.	REV. NO.	TITLE	LOCATION PART B
PC-1466-PR-003	P4	Liquid Phase Carbon Process Flow Diagram -- Balance for RF-2	Appendix VI
PC-1466-PR-004	P4	Vapor Phase Carbon Process Flow Diagram -- Balance for RF-2	Appendix VI
D11135-200	3	Legend and Specialty Items	Appendix VI
D11135-201	3	Spent Carbon Storage/H-1	Appendix VI
D11135-202	3	Spent Carbon Storage/H-2	Appendix VI
D11135-203	3	Recycle Water	Appendix VI
D11135-205	3	Process Water Discharge to POTW	Appendix VI
D11135-211	3	Utilities -Natural Gas, Plant Water, Steam	Appendix VI
D11135-213	3	Reactivation Unit No. 2 Feed System	Appendix VI
D11135-214	3	Reactivation Unit No. 2	Appendix VI
D11135-215	3	Reactivation Unit No. 2 Product Handling	Appendix VI
D11135-216	3	Reactivation Unit No. 2 Off Gas Scrubber	Appendix VI
D11135-217	3	Reactivation Unit No. 2 Process Water	Appendix VI

D.2.1 SPENT CARBON RECEIPT AND STORAGE

Spent carbon is received by truck in containers (i.e., drums, vessels, supersacks, roll-off bins, etc.) or in tank trucks. Following inspection and acceptance at the facility, containerized spent carbon is unloaded in the unloading and receiving area where it is inspected and sampled. If the load is accepted for treatment, the containerized spent carbon is transferred into one of the four spent carbon storage tanks (T-1, T-2, T-5, T-6) via a feed hopper or moved to the Container Storage Area.

Spent carbon received in large containers, such as roll-offs, is typically transferred directly to the spent carbon storage tanks via feed hopper H-1. Spent carbon received in smaller containers, such as drums, is typically moved to the container storage area in the containers in which it was received and subsequently transferred to the spent carbon storage tanks via feed hopper H-2. The containerized spent carbon is transferred to the storage tanks via a hopper because it cannot be pumped directly from the container to the storage tank. Water is added as the carbon passes through the hopper to facilitate removal of the spent carbon from the hopper via an eductor. The carbon is transferred to the storage tanks as a water-carbon slurry. Both H-1 and H-2 are part of the feed system, and are equipped with covers and with a dust collection system. The hoppers and other components of the feed system are constructed of mild steel.

The trucks carrying the bulk loads are retained in the unloading and receiving area and the spent carbon is inspected and sampled. If the shipment is accepted for treatment, the spent carbon is transferred in slurry form to one of the four spent carbon storage tanks, directly or via feed hopper H-1. From the spent carbon storage tanks, the carbon is transferred in slurry form to the Furnace Feed Tank (T-18). Water used in the transfer process is supplied from the recycle water system which consists of a recycle water storage tank (T-9) and associated valves and piping.

D.2.2 CARBON REACTIVATION UNIT (RF-2)

From Furnace Feed Tank (T-18), the spent carbon slurry is fed into a dewatering screw (C-5) where the carbon is dewatered prior to introduction into RF-2. Water from the dewatering screw is returned to the recycle water storage tank. The reactivation unit is a multiple hearth furnace consisting of five hearths. The spent carbon is introduced into the top hearth and flows downward through the remaining four hearths. Reactivated carbon exits the bottom hearth through a cooling screw. RF-2 is equipped with a primary combustion air fan (B-7) and two shaft cooling fans (B-8A and B-8B). For some of the spent carbons reactivated at the facility, the volatile organic matter desorbed from the spent carbon is the primary source of fuel to provide the heat required to reactivate the spent carbon. Natural gas burners are provided to ensure adequate heat input to the reactivation unit for all of the spent carbons that are reactivated at the facility.

D.2.3 REACTIVATED CARBON PACKAGING AND SHIPPING PROCESS

Currently, reactivated carbon product from the cooling screw enters a transporter and is transferred to product storage tanks S-2, S-3 and S-4. The product is transported from a product storage tank to the screening and packaging facilities which are located within the product packaging building.

D.2.4 REACTIVATION UNIT AIR POLLUTION CONTROL PROCESS

RF-2 is equipped with dedicated air pollution control equipment. The hot gases generated in RF-2 are routed to an afterburner (AB-2) to ensure the thermal oxidation of organic matter that is not oxidized in the reactivation unit. The afterburner is designed to provide a minimum destruction and removal efficiency (DRE) of 99.99 percent. The afterburner is equipped with two burners that utilize natural gas as the fuel source. From the afterburner, the gases are routed through a rapid quench system and variable throat venturi scrubber (SC-11) for particulate matter control.

From the venturi scrubber, the gases are routed to a packed bed scrubber (SC-12) for acid gas control. The design efficiency of the packed bed scrubber is 99 percent for HCl removal. The pH-controlled scrubbing medium is supplied from the scrubber water system which is described below.

From the packed bed scrubber, the gases are routed through a wet electrostatic precipitator (W-11). The design criteria of the wet electrostatic precipitator combined with the venturi scrubber is 0.015 grains per dry standard cubic foot corrected to 7% oxygen. From the wet electrostatic precipitator, the gases are routed by an induced draft fan (B-15) through a stack to the atmosphere.

D.2.5 SCRUBBER WATER PROCESS

The air pollution control equipment for the reactivation unit requires a scrubbing medium for acid gas control. The scrubbing medium is supplied via a recycle system. A portion of the scrubber water in the system is continuously discharged (blowdown) in order to prevent the excessive build-up of total dissolved solids in the scrubber water system.

RF-2 is equipped with a dual loop scrubber water system. Scrubber water for the gas cooler/venturi scrubber (SC-11) is supplied from a tank incorporated in the bottom section of SC-12. Pump P-22 is used to route the scrubber water, from the tank in SC-12, to the gas cooler/venturi scrubber and, periodically, to treatment. Scrubber water for the packed bed scrubber (SC-12) is supplied from tank T-19. A pump is used to route the scrubber water from tank T-19 to the upper section of SC-12.

The pH of the dual loop system is continuously monitored to ensure efficient acid gas removal in both the gas cooler/venturi scrubber and the packed bed scrubber. A metering pump delivers caustic to the gas cooler/venturi scrubber and a pump delivers caustic to the packed bed scrubber. Caustic is added independently to each loop based on the pH of the scrubber water.

D.2.6 WASTEWATER TREATMENT PROCESS

Scrubber blowdown from RF-2 air pollution control equipment is treated in an exempt wastewater treatment unit (as per 40 CFR 264.1(a)(6) and 270.1(c)(2)(v)), prior to discharge to the POTW. The discharge to the POTW is continuously monitored for pH, total dissolved solids, flow, and temperature to ensure compliance with the discharge limitations found in the facility's current industrial wastewater discharge permit.

D.3 CONTAINER MANAGEMENT

D.3.1 CONTAINER STORAGE AREA

The RCRA hazardous spent carbon container storage area is located in the north end of the warehouse building. Containers are off-loaded in the unloading area just outside the container storage area and are transported by forklift into the storage area. Containers are stored no more than three containers high, and sufficient aisle space is provided to allow access to the containers for movement and for inspections. The containment system for the container storage area consists of the floor of the warehouse building. The floor slopes towards concrete drainage trenches which flow into a concrete sump. The periphery of the storage area is bermed to contain any spills which may occur. Spilled materials contain mainly solid materials which are readily cleaned up using a shovel or broom. Residual materials may be hosed to the sump using water. The sump is equipped with a pump that can remove accumulation in the sump to the recycle water storage tank. Spent carbon stored in drums may be placed on pallets and can be stacked three high. Larger containers (2000 pounds or greater), such as adsorber vessels, are not stacked. The container storage area is illustrated on the drawings that can be found in Appendix III.

Since neither corrosive nor reactive spent carbon is accepted at the facility, the concrete surface is impervious to chemical attack from the spent carbon. The concrete surface is inspected daily to ensure the absence of any cracks or gaps. An engineering evaluation of the structural integrity of the container storage area concrete pad can be found in Appendix VII. It is possible that ignitable wastes could be brought into the container storage area. Containers are stored more than 50 feet from the nearest property boundary. The scale drawings in Appendix III show that the nearest location of container storage to the property boundary is approximately 84 feet.

The container storage area is designed to hold up to 100,000 gallons of RCRA spent carbon. The containment system is designed to hold a minimum of 10,000 gallons. Because the container storage area is inside, run-on is not a consideration. If a container leaks, any liquids leaking from the container will drain into the sump via the trench system, where it will be transferred to recycle water tank T-9. Details of the container storage area floor, slope, sump, etc. can be found on the drawings contained in Appendix VII.

Facility history indicates that more than half of the containers received do not contain free liquids. All containers however are managed in the same manner, consistent with practices for containers with free liquids.

Identification of Container Storage Areas

Description	Location	Capacity	Status
Spent Carbon Container Storage	Warehouse	100,000 gal	Permitted

D.3.2 CONTAINERS

Spent carbon is received in several different types of containers. Spent carbon can be received in drums, adsorber vessel, supersacks, slurry (tank) trucks, or roll-off bins. Specifications of the types of containers in which spent carbon is typically received can be found in Appendix VIII. The specifications include typical materials of construction and dimensions, but are not all-inclusive.

Drum-type containers are generally moved by placing them on pallets using a forklift in a manner that will not rupture the container or cause it to leak. The containers are always closed except during inspection and sampling and when the spent carbon is being removed from the containers into the reactivation process. No reactive or incompatible spent carbons are received at the facility. The container storage area is more than 50 feet from the closest property boundary, therefore, no special areas are required for the storage of ignitable spent carbon.

After spent carbon is removed from a container it is rinsed to remove residual material. Spent carbon containers may be reused after they are emptied and rinsed, and a visual inspection ensures that the container is in good physical condition. Since no incompatible wastes are accepted into the facility, there is no concern for contact with the small amount of material which may remain in a container after rinsing.

The container storage area is inspected at least weekly (See inspection schedule in Section F). During this inspection, containers are inspected for leaks and for deterioration of containers. Should a container be found to be leaking or in a deteriorated condition, the materials will be promptly removed to a container that is in good condition, placed in an overpack, or transferred to a spent carbon storage tank. Sufficient aisle space is provided for inspection. Containers are managed in accordance with the requirements of 40 CFR 264 Subpart FF and CC (see Section O and Appendix XX) where applicable.

D.4 TANK SYSTEMS

There are five above ground tanks (T-1, T-2, T-5, T-6, and T-18) at the SII facility that are regulated under 40 CFR 264 Subpart J. Specific information about these tanks can be found in Table D-1. The location of each of these tanks is shown on Drawing No. D14789-02 that can be found in Appendix III of this document. P&IDs for tanks and the ancillary equipment area provided in Appendix VI. Tank design drawings are provided in Appendix IX.

TABLE D-1 -- HAZARDOUS WASTE TANK INFORMATION

TANK NUMBER	MATERIALS OF CONSTRUCTION	DIMENSIONS	DESIGN CAPACITY(1) (GALLONS)
T-1	300 Series Stainless Steel	16’-0” Straight Side 10’-0” Diameter 8’-0” 62° Bottom Cone	8,319
T-2	300 Series Stainless Steel	16’-0” Straight Side 10’-0” Diameter 8’-0” 62° Bottom Cone	8,319
T-5	300 Series Stainless Steel	16’-0” Straight Side 10’-0” Diameter 8’-0” 62° Bottom Cone	8,319
T-6	300 Series Stainless Steel	16’-0” Straight Side 10’-0” Diameter 8’-0” 62° Bottom Cone	8,319
T-18	300 Series Stainless Steel	7’-6” Straight Side 10’-4.5” Diameter 9’-4.75” 60° Bottom Cone	6,500

Note:
(1) Design capacity is determined based on a tank height as defined by the level at which a high level alarm and automatic interlock is initiated to discontinue spent carbon transfer.

Any spent carbon received at the facility is eventually routed through one or more of the five spent carbon storage tanks. Placing incompatible or reactive materials in these tanks is not a concern because different spent carbons by their physical nature are not incompatible with each other and reactive wastes are not received at the facility. Spent carbon on a rare occasion may exhibit the characteristic of ignitability, however, because the spent carbon is placed in the tanks in a carbon/water slurry, the resultant mixture is not ignitable. The tanks are operated at atmospheric pressure and ambient temperature.

The tanks are operated under the provisions of Subpart FF and Subpart CC. The Subpart CC compliance plan, the entirety of which can be found in Appendix XX for the SII facility identifies two types of waste management units:

- Waste management units that are exempt from Subpart CC requirements because they are otherwise regulated under the Benzene Waste Operation NESHAP; and

- Waste management units that have a volatile organic (VO) concentration less than 500 ppmw, and are therefore exempt from the Subpart CC air emissions control requirements ((§§265.1085-1087). However, record keeping and monitoring requirements under Subpart CC apply to these units §§265.1082(c)(1 and 1090(f)).

Under the final Subpart CC regulations, tanks and containers that are equipped with and comply with the Benzene Waste Operations NESHAP (Subpart FF) are exempt from all Subpart CC requirements (see 40 CFR §265.1080(b)(7)). Therefore, the facility will demonstrate compliance with Subpart CC regulations by assuring that all tanks and containers at the facility used to manage hazardous waste are equipped with and operate in compliance with Subpart FF. (See Section O and Appendix XX of the Permit Application).

Subpart BB is not applicable for the tank systems as SII conducts periodic tests to show the facility waste stream contains an organic content of less than 10% by weight. Subpart BB information is contained in Section N, and in Appendix XIX of the Permit Application.

Identification of Tank Systems

Description	Location	Capacity	Status
T-1	Tank Storage Area	8,319 gal	Permitted
T-2	Tank Storage Area	8,319 gal	Permitted
T-5	Tank Storage Area	8,319 gal	Permitted
T-6	Tank Storage Area	8,319 gal	Permitted
T-18	Top of RF-2 steel structure	6,500 gal	Permitted
T-9	South of T-1, 2, 5 and 6	10,300 gal	Exempt
T-11	Southeast of RF-2 furnace structure	12,400 gal	Exempt
T-19	Adjacent to packed bed scrubber	660 gal	Exempt
S-1	Outside East wall of main warehouse	44,000 lb	Exempt Product Storage
S-2	Outside East wall of main warehouse	44,000 lb	Exempt Product Storage
S-3	Outside East wall of main warehouse	44,000 lb	Exempt Product Storage

D.4.1 ASSESSMENT OF EXISTING TANK SYSTEMS' INTEGRITY

Appendix IX contains the assessment report for the five hazardous waste tank systems located at the SII facility.

D.4.2 CONTAINMENT AND DETECTION OF RELEASES

The area in which four (T-1, T-2, T-5, and T-6) hazardous waste tanks are located at the SII facility is surrounded by a curbed concrete pad which is an external liner providing secondary containment. The fifth tank, T-18, is a double-walled tank which does not require external secondary containment. The concrete pad is impervious to chemical attack from any spent carbon spills from the tank systems.

All components of the regulated tank systems are elevated above the concrete pad that allows for visual inspection of all components. The tank systems and containment area are visually inspected each day to ensure that no leaks from the tank systems have occurred. The containment area is sloped so that any spilled material will flow into a sump. This sump is equipped with a pump that will remove any accumulated water to the recycle water tank. Any solid material removed from the sump is placed in drums and placed in an appropriate storage location. Any precipitation that falls within the containment area is collected in a sump and is either placed in the recycle water tank or discharged (either with or without pre-treatment) to the POTW.

Ancillary equipment consists of 300 series stainless steel pipe with either Victaulic couplings, welded joints or flanged couplings. The ancillary equipment for the hazardous waste storage tanks is inspected once per day. A P&ID of the ancillary equipment can be found in Appendix VI.

The concrete containment pad has a volume of 12,265 gallons which exceeds by 2,415 gallons the volume of the largest tank system (8,319 gallons) within its boundary plus the precipitation from a 25-year, 24-hour rainfall (2.45 inches = 1,531 gallons). The secondary containment volume calculations can be found in Appendix IX. The containment area is inspected daily to ensure that the concrete pad remains free of cracks or gaps.

D.4.3 CONTROLS AND PRACTICES TO PREVENT SPILLS AND OVERFLOWS

All the hazardous waste storage tanks (T-1, T-2, T-5, T-6, and T-18) are equipped with water and carbon high level alarms to alert operators that the tanks are approaching capacity. The hopper discharge valves are interlocked with the spent carbon storage tanks' high carbon level alarms to ensure overfilling of the tanks does not occur. In the event of a high water level alarm, the operator will discontinue introduction of material into the affected tank. Overflow lines are provided from the hazardous waste storage tanks to the recycle water tank (T-9) to prevent spills. Tank system inspections are conducted in accordance with the inspection schedule and checklists provided in Section F and Appendix XII.

D.5 MISCELLANEOUS UNITS

The spent carbon reactivation unit at the Siemens Industry, Inc. facility is a hazardous waste treatment unit and does not fit the current definition of container, tank, surface impoundment, waste pile, land treatment unit, landfill, incinerator, boiler, industrial furnace ,underground injection well, containment building, corrective action management unit, or a staging pile and therefore, is classified as a miscellaneous unit as per 40 CFR 260.10.

The reactivation furnace is not a hazardous waste incinerator. "Hazardous waste incinerator" is defined in 40 CFR Part 63, Subpart EEE as a "device defined as an incinerator in § 260.10 of this chapter and that burns hazardous waste at any time." (40 CFR 63.1201). "Incinerator" is defined in 40 CFR 260.10 as "any enclosed device that: (1) Uses controlled flame combustion and neither meets the criteria for classification as a boiler, sludge dryer or carbon regeneration unit, nor is listed as an industrial furnace; or (2) Meets the definition of infrared incinerator or plasma arc incinerator. (emphasis supplied)" The RF does not qualify as an incinerator and instead is designated by Subpart X of the RCRA regulations as a Miscellaneous Unit. According to 40 CFR 264.601 of the Subpart X regulations, permit terms and provisions for a Miscellaneous Unit must include appropriate requirements of 40 CFR Subparts I through O and Subparts AA through CC, 40 CFR 270, 40 CFR 63 Subpart EEE, and 40 CFR 146. Other portions of this permit application discuss provisions for management of hazardous waste in tanks and containers. Specific to the carbon reactivation furnace and associated equipment, Siemens Industry, Inc. believes that it is appropriate to regulate emissions in accordance with the provisions of 40 CFR 63 Subpart EEE applicable to existing hazardous waste incinerators (although this unit is not an incinerator). Associated equipment such as the dewatering screw, weigh belt, emission control components, pumps, piping, etc. will be managed similarly to equipment associated with a hazardous waste incinerator as provided in Subpart O (Specifically 40 CFR 264.347(b), (c), and (d)). Please refer to Sections F and G, as well as Appendices XII and XIII.

The spent carbon reactivation unit is used to thermally desorb and destroy organic contaminants adsorbed on the carbon. The process reactivates the carbon which allows for its reuse in air and water pollution control equipment. The presence of these organic contaminants on the spent carbon is the reason that some of the spent carbon is a listed and/or characteristic hazardous waste when it arrives at the facility. Removal of these contaminants in the reactivation process renders the reactivated product non-hazardous. Because of the high temperature environment of the reactivation unit and the associated afterburner, the reactivation unit will thermally oxidize in excess of 99.99 percent of the organic contaminants adsorbed on the spent carbon feed.

Descriptions of the RF-2 process and equipment are provided in the PDT Plan in Appendix V, and are summarized in the sections below. Process Flow Diagrams (PFDs) as well as Piping and Instrumentation Diagrams (P&IDs) for the reactivation process are presented in

Appendix VI. A list of available operating and maintenance procedures for the RF-2 system components is provided for informational purposes in Table D-2.

Table D-2. Operating and Maintenance Manuals

Equipment *	**Manufacturer/ Supplier ****	**Purpose**
Spent Carbon GAC Probes	Dynatrol	Spent Tank Level Control
Eductors	Penberthy	Transferring Spent Carbon
Spent Carbon Storage Tanks	Unknown	Storing Spent Carbon
Carbon Vessels	Siemens	Vapor Control for Spent Tanks
T-Tank PRV	Tyco	Spent Tanks Pressure Relief Valve
T-18 Furnace Feed Tank	Modern	Storing Spent Carbon
Furnace Feed Valve	Linatex	Feed Valve
Dewater Screw	B.W. Sinclair	Dewater Spent Carbon
Weigh Belt	Merrick	Measuring Spent Carbon Feed Rate
Rotary Air Lock	Wm. Meyer	Transfer Spent Carbon
LMI Chemical Pumps	LMI	Off Gas pH control
Magnetic Flow Meters	Rosemount	Off Gas Liquid Flow
Scrubber Pumps	Goulds	Venturi/Packed Bed Pumps
Quench/Venturi Scrubber	Clean Gas Inc.	Air Pollution Control
Packed Bed Scrubber	Clean Gas Inc.	Air Pollution Control
WESP	Clean Gas Inc.	Air Pollution Control
ID Fan	Barron	Gas
Stack	Warren Environmental	Gas Dispersion
CEMS Carbon Monoxide	TECO/Siemens	Measure Carbon Monoxide
CEMS Oxygen Analyzers	Ametek	Measure Oxygen
Stack Flow Meter	Cemtek	Measure Stack Flow Rate
Reactivation Furnace (RF-2)	Hankin Environmental	Reactivate Spent Carbon
Afterburner (AB-2)	Hankin Environmental	Destruction of Organics
Natural Gas Burners	North American	Temperature Control
Thermocouples	Pyco	Temperature Monitoring

***** Note - This table includes components of the facility that are exempt from permitting. Data related to these components is provided for informational purposes and ease of review only and they are not intended to become regulated components of the hazardous waste facility. .

****** Note – Manufactures are listed for informational purposes only. Facility may elect to use other vendors with comparable products.

D.5.1 REACTIVATION UNIT (RF-2)

RF-2 is a multiple hearth furnace consisting of five hearths and an afterburner manufactured by Hankin Environmental Systems, Inc. A venturi scrubber, packed bed scrubber, and wet electrostatic precipitator are used to meet applicable emissions regulations. The furnace and afterburner are equipped with a combustion air system. An induced draft fan is used to exhaust combustion gases from the furnace, afterburner, and air pollution control system. The clean gas stream is exhausted to the atmosphere via a stack. Parameters used to ensure good combustion in the furnace and afterburner (carbon monoxide and oxygen) are monitored in the exhaust gases using a continuous emission monitoring system. Materials of construction are listed in Appendix X for all of the major reactivation furnace and air pollution control equipment. SII may occasionally change materials of constructions that are listed in Appendix X with other materials of construction that are equivalent.

D.5.1.1 MULTIPLE HEARTH FURNACE

The furnace has an outside diameter of 12 feet 10 inches and is 19 feet 8 inches in height. The furnace is raised approximately ten feet off the ground. The furnace shell is manufactured of carbon steel plate. The furnace is continuously seal welded internally to assure an air tight assembly. The furnace is internally lined with block firebrick and block insulation. The hearths and furnace roof are constructed of firebrick. The furnace roof is composed of firebrick backed with block insulation and castable insulation to fill voids under the roof cover plates. The bottom hearth is insulated with block insulation and castable refractory. High strength castable refractory is used to insulate the center shaft and to insulate the rabble arms. Extra strength castable refractory is used for backing of skewbacks. Extreme temperature castable refractory is used for burner settings and insulating castable is used for door linings. Cross-sectional drawings of the furnace and afterburner and materials of construction are located in Appendix X.

Spent carbon is introduced into the top hearth of the reactivation unit and flows downward through the remaining four hearths. The top two hearths are unfired hearths. Hot combustion gases generated in the bottom three hearths are used to complete the dewatering of the spent carbon. The bottom three hearths are fired hearths where the pyrolysis and reaction steps of the reactivation process will occur. Rabble arms, with teeth, each connected to a rotating center shaft, are located above each hearth. The center shaft is air cooled. The rabble teeth will plow the carbon material across the hearth surface and towards drop holes. The carbon will fall through the drop holes to the next lower hearth, and eventually to the outlet of the reactivation unit. Reactivated carbon will exit the bottom hearth through a cooling screw. RF-2 is equipped with a primary combustion air fan (B-7), and two center shaft cooling fans (B-8A and B-8B). Natural gas burners are provided to ensure adequate heat input to the reactivation unit for all carbons that are reactivated at the facility.

D.5.1.2 AFTERBURNER (AB-2)

The afterburner is a self supporting vertical cylindrical chamber approximately 33 feet high with an inside refractory diameter of 5 feet. The design incorporates a mixing zone, choke ring, and a minimum residence time at temperature of greater than one second. The afterburner shell is constructed of steel plate and is internally lined with firebrick and castable insulation. The afterburner is equipped with two low NO_x burners, which utilize heated combustion air. The afterburner chamber is fitted with a total of six air injection nozzles which are placed to provide combustion air and turbulence to promote the oxidation of organic materials in the flue gas.

The afterburner is designed to thermally oxidize greater than 99.99 percent of all organic matter entering the afterburner in the furnace off gas. A cross-section of the afterburner and a list of materials of construction can be found in Appendix X.

D.5.1.3 NOZZLES AND BURNERS

Six North American Manufacturing Company burners (NA 6422-6) are installed in RF-2, two per hearth on hearths 3, 4, and 5. Two North American Manufacturing Company burners (NA 6514-8-B) are installed in the afterburner. Literature describing these burners can be found in Appendix X. Materials of construction of these burners are those listed in the manufacturer's literature or their functional equivalent.

D.5.1.4 QUENCH/VENTURI SCRUBBER (SC-11)

The Quench/Venturi Scrubber is a dual-purpose device used to rapidly quench the hot combustion gases exiting the afterburner and to remove particulate matter. The quench section uses water sprays to cool the afterburner exit gas to the point of adiabatic saturation (approximately 170 to 190°F). The venturi scrubber has an adjustable throat, and is a low energy, vertical down flow type. The throat area is adjusted by a pneumatic cylinder actuator and an electro/pneumatic positioner. The remotely adjustable throat is automatically controlled to maintain a constant pressure differential. The venturi scrubber is located directly below the quench section and is connected by a flooded elbow to the packed bed scrubber. The elbow incorporates a water-filled gas impact section directly beneath the throat to prevent erosion of the shell. The water supply for quench and venturi irrigation is recirculated scrubber water at a total flow of approximately 7.5 gpm/1000 ACFM.

The design drawing for the venturi scrubber as well as a description of the physical dimensions and materials of construction of the venturi scrubber can be found in Appendix X.

D.5.1.5 PACKED BED SCRUBBER (SC-12)

The packed bed scrubber consists of a vertical upflow and cylindrical disengaging section followed by a packed bed section and mist eliminator. The bottom portion of the scrubber is used to remove entrained water droplets from the gas prior to entering the packed section of the scrubber. The packed bed scrubber is designed to remove a minimum of 99 percent of the incoming hydrogen chloride.

The design drawing for the packed bed scrubber as well as a description of the physical dimensions and materials of construction of the packed bed scrubber can be found in Appendix X.

D.5.1.6 WET ELECTROSTATIC PRECIPITATOR (W-11)

The wet electrostatic precipitator (WESP) is a vertical hexagonal tube design with self-irrigating tubes. The WESP consists of inlet gas distribution to promote even distribution of the process gas flow entering the WESP, inlet and outlet plenums and a collecting electrode tube bundle. The WESP is equipped with outboard high voltage insulator compartments which include a purge air system, high voltage distribution-support grids, high intensity rigid tube type charging/precipitating discharge electrodes, high voltage power supply (transformer/rectifier and controller) system, ground sticks, safety key interlocks, warning labels, and electronic control logic equipment and valving.

The WESP, in conjunction with the venturi scrubber, is designed to achieve a maximum outlet particulate matter grain loading of 0.015 grains/dscf adjusted to 7 percent oxygen.

The design drawing for the WESP as well as a description of the physical dimensions and the materials of construction of the WESP can be found in Appendix X.

D.5.1.7 FEED SYSTEM

The spent carbon feed system to RF-2 consists of a furnace feed tank (T-18), a dewatering screw (C-5), and a weigh belt conveyor (C-16). The spent carbon/recycle water slurry is discharged from T-18 to C-5 via a control valve. The dewatered spent carbon is discharged from C-5 on to the weigh belt conveyor which is used to measure the feed rate to RF-2. Feed to RF-2 is stopped by stopping the weigh belt. Equipment design information is provided in Appendix X. Instrumentation and controls are depicted on the P&IDs in Appendix VI.

D.5.1.8 INDUCED DRAFT FAN AND STACK

A variable speed induced draft fan is provided to exhaust combustion gases from the furnace and afterburner and through the air pollution control system. Design information and materials of construction for the fan can be found in Appendix X. The clean gas stream is exhausted to the atmosphere via a 110 foot high stack with an inside diameter of 19.75 inches. Design information and a stack layout drawing are provided in Appendix X.

D.5.1.9 CONTINUOUS EMISSION MONITORING SYSTEM

A continuous emission monitoring system (CEMS) is installed in the stack to monitor the carbon monoxide and oxygen concentrations in the exhaust gas. Dual carbon monoxide analyzer are installed. The CO monitors are a Thermo Environmental Model 48 (or equivalent) and an Ultramat 23 (or equivalent). Dual oxygen analyzers are also installed. The oxygen analyzers are an Ameteck FCA-Control unit (or equivalent) and a Thermox unit (or equivalent). Performance specifications for the CEMS as well as a drawing of the sampling system can be found in Appendix X.

D.5.2 CONTROL SYSTEMS

The facility is equipped with a programmable logic control (PLC) system which monitors process variables to ensure proper facility operation. The instrumentation associated with Automatic Waste Feed Cutoffs and other regulatory compliance is summarized in Table D-3, below. Information related to these instruments is summarized in Appendix X. Operating manuals for each instrument are maintained at the facility.

Table D-3. REGULATORY COMPLIANCE INSTRUMENTATION.

Parameter	Identification Number of Sensor/Transmitter (a)	Instrument Type	Units	Range	Expected Operating Point or Range	Calibration frequency	Averaging	AWFCO (Y/N)
Feed rate of spent activated carbon	WE/WT-427	Weigh cell	lb/h	0-6000	< 2760	Semi-annually	1-hr Block	Y
Total feed rate of mercury	Computer	Calculated	lb/h	NA	0 – 1.9E-03	NA	12-hr RA	N
Total feed rate of SVM	Computer	Calculated	lb/h	NA	0 – 1.0	NA	12-hr RA	N
Total feed rate of LVM	Computer	Calculated	lb/h	NA	0 – 1.2	NA	12-hr RA	N
Afterburner gas temperature	TE-464A/B	T/C	F	0-2400	>1750	Semi-annually	1-hr RA	Y
Venturi scrubber pressure differential	PDIT-556	Pressure sensor	in w.c.	0-50	>15	Annually	1-hr RA	Y
Venturi/Quench scrubber recycle liquid flow rate (Total Flow)	FI-562 (Total of FE/FIT-553, 554, & 555)	Sum of Magnetic flow meters (Dynac Function)	gpm	0-656	>75	Annually	1-hr RA	Y
Packed bed scrubber pH	AE/AIT-590	pH probe	pH	0-14	5	Quarterly	1-hr RA	Y
Packed bed scrubber recycle liquid flow rate	FE/FIT-552	Magnetic flow meter	gpm	0-200	>60	Annually	1-hr RA	Y
Packed bed scrubber pressure differential	PDIT-560	Pressure sensors	in w.c.	0-10	>0.1	Annually	1-hr RA	N
Scrubber blowdown flow rate	FE/FIT-605	Magnetic flow meter	gpm	0-691	>30	Annually	1-hr RA	Y
WESP secondary DC voltage	EI-558	Voltmeter	kVDC	0-80	14-22	NA	1-hr RA	Y
Stack gas flow rate	FE/FIT-700	Ultrasonic meter	acfm	Not available	<10,000	Semi-annually	1-hr RA	Y
Stack gas carbon monoxide (b)	AE-575	Nondispersive infrared CEMS	ppmvd @7% O_2	0-100 0-1000	< 100	Daily/ Quarterly/ Annually	1-hr RA	Y
Stack gas oxygen (b)	AE-576	Paramagnetic CEMS	vol%, dry	0-25	7	Daily/ Quarterly/ Annually	None	N

RA = Rolling average.

(a) Instrument identification from P&IDs.

(b) CEMS calibrations include daily zero and span check, quarterly cylinder gas audit, and annual performance specification test.

D.5.3 MISCELLANEOUS UNIT WASTES

The waste introduced into the reactivation furnaces is spent carbon. This spent carbon is contaminated with various compounds. Refer to Section C for a discussion of the types of wastes accepted for treatment at the facility.

D.5.4 TREATMENT EFFECTIVENESS

The purpose of the facility process is to treat spent carbon by reactivation so that the carbon can be reused. The treatment process consists solely of reactivation, consequently, reactivated carbon exiting the unit is not subject to hazardous waste regulation. The reactivated carbon is screened to separate sizes for various use applications and to remove oversized material, and subjected to quality assurance testing to confirm that it is suitable for reuse.

The quality assurance testing that is conducted depends upon the type of reactivated carbon and the anticipated use of the carbon. On reactivated carbons to be used in vapor applications, a Butane test may be performed. On reactivated carbons used in liquid applications, an iodine number may be calculated. These tests are used to measure the surface area of the reactivated carbon and demonstrate the adsorptive capacity of the product. The facility may also perform tests for size distribution. This testing confirms that the reactivated carbon is suitable for reuse.

D.5.5 ENVIRONMENTAL PERFORMANCE STANDARDS

As per 40 CFR 264.601 and discussions with EPA Region IX, RF-2 underwent a Performance Demonstration Test that incorporated emission standards from the Hazardous Waste Combustor Maximum Achievable Control Technology (HWC MACT) regulations in 40 CFR 63 Subpart EEE. A copy of the approved Performance Demonstration Test Plan, and the Performance Demonstration Test Report for RF-2 can be found in Appendix V. Table D-4 is a listing of the performance standards that RF-2 will be required to meet.

TABLE D-4. PERFORMANCE STANDARDS FOR RF-2

Parameter	Purpose	Standard (1)
Destruction and Removal Efficiency	To limit organic emissions	99.99%
Particulate matter	To limit particulate matter emissions	0.015 gr/dscf (2)
HCl/Chlorine	To limit HCl/chlorine emissions	77 ppmv (3)
Mercury	To limit mercury emissions	130 μg/dscm (4)
Semi volatile metals (5)	To limit Pb and Cd emissions	240 μg/dscm
Low volatile metals (6)	To limit As, Be and Cr emissions	97 μg/dscm
Dioxin and furans	To limit dioxin and furan emissions	0.4 ηg/dscm (7)
Carbon monoxide (8)	To ensure good combustion	100 ppmv
Total hydrocarbons (9)	To limit organic emissions	10 ppmv

Note: Siemens and EPA agreed that although the RF-2 unit is not a hazardous waste combustor, but is a RCRA Subpart X Miscellaneous Treatment Unit, the performance standards applicable to existing hazardous waste incinerators in 40 CFR 63 Subpart EEE would be used as guidance. At the time of the PDT, the appropriate standards were found in 40 CFR 63.1203, and are reflected in the table above. Since completion of the PDT, the regulations at Subpart EEE have been changed, and revised standards have been added at 40 CFR 63.1219. A review of the RF-2 PDT results indicate that the unit meets the new standards at 40 CFR 63.1219.

(1) All values except DRE are corrected to 7% oxygen in the stack gas
(2) gr/dscf is grains per dry standard cubic foot of stack gas
(3) ppmdv is parts per million on a dry volumetric basis in the stack gas
(4) μg/dscm is micrograms per dry standard cubic meter of stack gas
(5) Semi-volatile metals are lead and cadmium
(6) Low volatile metals are arsenic, beryllium and chromium
(7) ηg/dscm is nanograms 2,3,7,8-TCDD toxicity equivalents per dry standard cubic meter
(8) 100 ppm by volume on a dry gas basis using a one hour rolling average
(9) Measured only during the Performance Demonstration Test

D.5.6 DEVELOPMENT OF OPERATING LIMITS

The Siemens Industry, Inc. Carbon Reactivation Furnace RF-2 system demonstrated compliance with all applicable regulatory requirements during a Performance Demonstration Test (PDT) program conducted during 2006, in conformance with the approved PDT Plan (See Appendix V for a copy of the PDT Plan). Operating parameter limits and associated automatic waste feed cutoff setpoints (as applicable) have been established as described in the approved PDT Plan and in the appropriate regulations of 40 CFR 63 Subpart EEE. Most operating parameter limits are based on demonstrations made during the PDT. For some parameters, such as maximum stack gas CO concentration, and minimum packed bed scrubber pressure differential, the limits are based either on regulation, guidance, or equipment manufacturer's recommendations (rather than the PDT demonstrated values).

Limits on a number of operational control parameters must be maintained as an indication that the RF-2 system continues to operate in compliance with the applicable emission standards. Table D-5 summarizes the discussion of the operational parameter limits for the RF-2 unit. To facilitate review, the operating parameters are grouped into the following categories:

- Group A1 parameters are continuously monitored and recorded, and are interlocked with the automatic waste feed cutoff system. Group A1 parameter limits are established from test operating data, and are used to ensure that system operating conditions are equal to or are more rigorous than those demonstrated during the test.
- Group A2 parameters are continuously monitored and recorded, and are interlocked with the automatic waste feed cutoff system. Group A2 parameter limits are established based on regulatory requirements rather than on the test operating conditions, e.g., the maximum stack CO concentration.
- Group B parameters are continuously monitored and recorded, but are not required to be interlocked with the automatic waste feed cutoff system. Operating records are required to ensure that established limits for these parameters are not exceeded. The Group B parameter limits are established based on the operation of the system during the test.
- Group C parameters are continuously monitored and recorded, but are not required to be interlocked with the automatic waste feed cutoff system. Group C parameter limits are based on manufacturer's recommendations, operational safety, and good operating practice considerations rather than on the test operating conditions, e.g., the minimum packed bed scrubber pressure differential.

Table D-5. Operating Parameter Limits

Control Parameters[a]	Anticipated Permit Limit	Comments[b]
GROUP A1 PARAMETERS		
Maximum spent carbon feed rate (lb/hr)	3049	Block hour AWFCO
Minimum afterburner temperature (^oF)	1760	Hourly rolling average AWFCO
Minimum hearth #5 temperature (^oF)	1350	Hourly rolling average AWFCO
Minimum venturi scrubber pressure differential (in. w.c.)	18	Hourly rolling average AWFCO
Minimum quench/venturi scrubber total liquid flow rate (gpm)	75	Hourly rolling average AWFCO
Minimum packed bed scrubber pH	4.4	Hourly rolling average AWFCO
Minimum packed bed scrubber liquid flow rate (gpm)	63	Hourly rolling average AWFCO
Minimum wet scrubber blowdown flow rate (gpm)	58	Hourly rolling average AWFCO
Minimum WESP secondary voltage (kVDC)	22	Hourly rolling average AWFCO
Maximum stack gas flow rate acfm	9,550	Hourly rolling average AWFCO
GROUP A2 PARAMETERS		
Maximum stack gas carbon monoxide (ppmvd, @7% oxygen)[c]	100	Hourly rolling average AWFCO
GROUP B PARAMETERS		
Allowable hazardous constituents	All except dioxin wastes and TSCA PCBs	Class 1 POHC demonstrated
Maximum total chlorine and chloride feed rate (lb/hr)	60	12-hour rolling average
Maximum mercury feed rate (lb/hr)	1.8E-03	12-hour rolling average
Maximum semivolatile metal (Cd + Pb) feed rate (lb/hr)	1.0E-01	12-hour rolling average
Maximum low volatility metal (As + Be + Cr) feed rate (lb/hr)	1.5E+00	12-hour rolling average
GROUP C PARAMETERS		
Minimum packed bed scrubber pressure differential (in. w.c.)	0.1	Hourly rolling average

(a) Group A1 parameters are continuously monitored and recorded, and are interlocked with the automatic waste feed cutoff system. The values for the Group A1 parameters are based on the performance demonstration test operating conditions.

Group A2 parameters are continuously monitored and recorded, and are interlocked with the automatic waste feed cutoff system. The values for the Group A2 parameters are based on regulatory standards or good operating practice rather than performance demonstration test operating conditions.

Group B parameters are continuously monitored and recorded, but are not interlocked with the automatic waste feed cutoff system. Values for the group B parameters are based on the performance demonstration test operating conditions.

Group C parameters are continuously monitoring and recording, but are not interlocked with the automatic waste feed cutoff system. The values for the Group C parameters are based on manufacturer’s specifications and/or operational and safety considerations rather than performance demonstration test operating conditions.

(b) AWFCO = Automatic waste feed cutoff.

(c) AWFCO interlock will not be active during the daily CEM calibration period.

D.5.6.1 Specific Operating Parameters

Operating parameter limits for each of the control parameters have been established as specified in the HWC MACT regulations given in 40 CFR 63.1209 and the approved PDT plan. The following sections describe how each operating parameter limit has been established.

In addition to establishing specific operating limits, SII has limits on the types of waste that can be treated in RF-2. Since SII has demonstrated greater than 99.99% DRE during the PDT while treating chlorobenzene, a Class 1 (most thermally stable) compound, SII will be permitted to treat all of the materials represented by the waste codes in the facility's most recent RCRA Part A permit application. Specific prohibitions are in place for feed materials containing greater than 50 ppm of PCBs and those listed with the waste codes F020, F021, F022, F023, F026 or F027.

D.5.6.2 Parameters Demonstrated During the Test (Group A1 Limits)

Group A1 parameter limits are based on the results of the testing. The following operating parameters have been established as Group A1 parameters for the RF-2 system.

Maximum Spent Carbon Feed Rate [40 CFR 63.1209(j)(3), and 63.1209(k)(4)]

The PDT was conducted in order to demonstrate the maximum feed rate of spent carbon. The spent carbon feed rate is monitored on a continuous basis. The maximum allowable spent carbon feed rate has been established as a block hour average limit from the average of feed rates demonstrated during each of the three runs of the PDT.

Minimum Afterburner Temperature [40 CFR 63.1209(j)(1), and 63.1209(k)(2)]

The PDT was conducted at the minimum afterburner temperature with maximized combustion gas flow rate (minimum residence time), since these are the conditions least favorable for DRE. Organic emissions were also measured under these conditions for risk assessment purposes. Based on successful demonstration of DRE during the PDT, the minimum temperature limit has been established as an hourly rolling average equal to the average of the demonstrated test run average values.

Minimum and Maximum Hearth #5 Temperature

As part of EPA's approval of the PDT Plan, SII was required to establish both a minimum and maximum temperature limit for Hearth #5 of the reactivation furnace. Since both a minimum and maximum temperature could not be demonstrated in the single test condition approved for the test, SII operated Hearth #5 at a maximum temperature during the PDT and has established a minimum temperature limit based on a study of the boiling points of the organic constituents found in the spent activated carbon received at the facility.

Since completion of the PDT, SII has provided documentation from EPA that was developed as part of the HWC MACT regulations, demonstrating that establishing a maximum temperature limit is no longer deemed necessary for thermal treatment systems. Accordingly, no maximum temperature limit is included in Table D-5.

The minimum Hearth #5 temperature limit has been established as an hourly rolling average based on the results of SII's study of organic constituent boiling points.

Minimum Venturi Scrubber Differential Pressure [40 CFR 63.1209(m)(1)(i)(A), 63.1209(o)(3)(i), and 63.1209(n)(3)]

The performance test was conducted to demonstrate the minimum venturi scrubber differential pressure. Venturi scrubber differential pressure is monitored on a continuous basis. Based on successful demonstration of particulate and metals control during the performance test, the minimum venturi scrubber differential pressure limit has been established as the average of the hourly rolling average values demonstrated during each run of the performance test. This limit is implemented as an hourly rolling average value.

Minimum Quench/Venturi Scrubber Recycle Liquid Flow Rate [40 CFR 63.1209 (m)(1)(C), 63.1209(o)(3)(v), and 63.1209(n)(3)]

The performance test was conducted to demonstrate the minimum quench/venturi scrubber recycle flow and maximum stack gas flow, thus establishing a *de facto* minimum liquid to gas ratio. Quench/Venturi scrubber flow and stack gas flow are both monitored on a continuous basis. Based on successful demonstration during the performance test, the minimum quench/venturi scrubber recycle liquid flow rate limit has been established based on the average of the hourly rolling average values demonstrated during each run of the performance test. This limit is implemented as an hourly rolling average.

Minimum Packed Bed Scrubber pH [40 CFR 63.1209(o)(3)(iv)]

The performance test was conducted to demonstrate the minimum packed bed scrubber pH at maximum total chlorine/chloride feed rate. Scrubber pH is monitored on a continuous basis. Based on successful demonstration of HCl and Cl_2 control during the performance test, the minimum packed bed scrubber pH limit has been established as the average of the hourly rolling average pH values demonstrated during each run of the performance test. The permit limit is implemented as an hourly rolling average.

Minimum Packed Bed Scrubber Recycle Liquid Flow Rate [40 CFR 63.1209 (m)(1)(C), 63.1209(o)(3)(v), and 63.1209(n)(3)]

The performance test was conducted to demonstrate the minimum packed bed scrubber recycle flow rate and maximum stack gas flow, thus establishing a *de facto* minimum liquid to gas ratio. Packed bed scrubber recycle flow and stack gas flow are both monitored on a continuous basis. Based on successful demonstration of HCl and Cl_2 control during the performance test, the minimum packed bed scrubber recycle liquid flow rate limit has been established as the average of the hourly rolling average values demonstrated during each run of the performance test. This limit is implemented as an hourly rolling average.

Minimum Scrubber Blowdown Flow Rate [40 CFR 63.1209(m)(1)(i)(B), and 63.1209(n)(3)]

The performance test demonstrated a minimum scrubber blowdown flow rate, in order to demonstrate worst case conditions for solids buildup in the scrubbing system. In order to conserve water, SII recycles most of the liquid from the air pollution control system. However, in order to prevent the buildup of dissolved solids in the recycled water, a certain amount of the water must be purged (or blown down) from the system. As water is purged from the system, fresh makeup water is added. The minimum scrubber blowdown flow rate limit has been based on the average of the hourly rolling average values demonstrated during each run of the performance test. This limit is implemented as an hourly rolling average.

Minimum WESP Secondary Voltage [40 CFR 63.1209(m)(1)(iv), and 63.1209(n)(3)]
Although the HWC MACT regulations do not require any indicator of performance in an electrically enhanced emissions control device, SII believes that it is appropriate to establish a performance indicator. Accordingly, WESP secondary voltage (expressed as KVDC) is used as the indicator of continuing WESP performance. The minimum value has been established as the average of the minimum hourly rolling average secondary voltage values demonstrated during each run of the performance test. The secondary voltage limit is implemented as an hourly rolling average.

Maximum Combustion Gas Velocity (Stack Gas Flow Rate) [40 CFR 63.1209(j)(2), 63.1209(k)(3), 63.1209(m)(2), 63.1209(n)(5), and 63.1209(o)(2)]
The stack gas flow rate (expressed as actual cubic feet per minute) is used as the indicator of combustion gas velocity. The maximum stack gas flow rate was planned to be established from the mean of the maximum hourly rolling average stack gas flow rates measured by SII's stack gas flow rate monitor during each run of the performance test. As stated in the PDT Report (contained in Appendix V), the stack gas flow rate monitor experienced difficulties during the PDT such that the measurements were not reliable. Each isokinetic sampling system used for stack gas emissions measurements during the PDT also included the measurement of stack gas flow rate. Thus, the average stack gas flow rate determinations for each run, derived from the stack gas sampling systems, has been used to establish a maximum stack gas flow rate limit. The maximum stack gas flow rate limit is implemented as an hourly rolling average.

D.5.6.3 Group A2 Parameters

Maximum Stack Gas CO Concentration [40 CFR 63.1203(a)(5)(i)]
The maximum hourly rolling average stack gas CO concentration was maintained at or below 100 ppmv corrected to 7% oxygen (dry basis) during the test. An operating parameter limit for maximum stack gas carbon monoxide concentration of 100 ppmv hourly rolling average corrected to 7% oxygen has been established in according to the applicable regulations.

Fugitive Emissions Control [40 CFR 63.1206(c)(5)(i)(A)]
The HWC MACT regulations require controlling combustion system leaks. By design (no open feed systems), the combustion chamber constitutes a sealed system. There are no locations for combustion system leaks to occur. Therefore, the RF-2 system is in

compliance with 40 CFR 63.1206(c)(5)(i)(A).

D.5.6.4 Group B Parameters

Maximum Total Chlorine/Chloride Feed Rate [40 CFR 63.1209(n)(4), and 63.1209(o)(1)]

During the PDT, SII maximized the feed rate of total chlorine/chloride through the spiking of tetrachloroethene and other chlorinated organic compounds. Since the HCl and Cl_2 emissions measured during the PDT were less than the applicable standard, the limit for total chlorine/chloride feed rate has been set as a 12-hour rolling average, equal to the average of the average total chlorine/chloride feed rate during the three runs of the PDT. Total chlorine/chloride includes the native chlorine/chloride in the spent activated carbon feed plus the spiked chlorine/chloride. Records of feed analyses, and the calculated 12-hour rolling average total chlorine/chloride feed rate values will be maintained to demonstrate compliance with the chlorine/chloride feed rate limit.

Maximum Mercury Feed Rate [40 CFR 63.1209(l)(1)(iii)(D)]

Due to the low amounts of mercury expected in the spent activated carbon, SII has elected to comply with the mercury standard by calculating and complying with a 12-hour rolling average Maximum Theoretical Emission Concentration (MTEC), conservatively assuming no mercury removal across the APC system. The MTEC is complied with as a maximum mercury feed rate limit. This limit has been calculated from the performance test data by using the stack gas flow rate and oxygen concentration, and the maximum allowable stack gas mercury concentration based on the HWC MACT regulations. The feed rate limit is determined assuming that all mercury is emitted, and is complied with as a maximum 12-hour rolling average mercury feed rate limit.

Maximum Semivolatile Metals Feed Rate [40 CFR 63.1209(n)(2)]

SII demonstrated compliance with the semivolatile metal emission standard while spiking lead during the test. Therefore, the permitted feed rate limit for semivolatile metals (total cadmium plus lead) has been set as a 12-hour rolling average value equal to the average semivolatile metal feed rate demonstrated during the three runs of the PDT. Records of feed analyses, and the calculated 12-hour rolling average semivolatile metal feed rate values will be maintained to demonstrate compliance with the semivolatile metal feed rate limit.

Maximum Low Volatility Metals Feed Rate [40 CFR 63.1209(n)(2)]

SII demonstrated compliance with the low volatility metal emission standard while spiking chromium during the test. The emissions measured during the test were significantly lower than the allowable limit. Therefore, the feed rate limit for low volatility metals (total arsenic, plus beryllium, plus chromium) has been set as a 12-hour rolling average extrapolated upward to the HWC MACT standard based on the average low volatility metal feed rate and the average low volatility metal System Removal Efficiency (SRE) during the three runs of the CPT. Extrapolation has been conducted as described in the approved PDT Plan.

Records of feed analyses, and the calculated 12-hour rolling average low volatility metal feed rate values will be maintained to demonstrate compliance with the low volatility metal feed rate limit.

D.5.6.5 Group C3 Parameters

Group C parameter limits are based on manufacturer's recommendations, operational safety and good operating practice considerations. The following parameters are proposed as Group C parameters.

Minimum Packed Bed Scrubber Pressure Differential [40 CFR 63.1209(o)(3)(ii)]

The minimum packed bed scrubber pressure differential is based on past operating experience. This limit has been established as an hourly rolling average limit.

D.5.7 PROTECTION OF GROUNDWATER AND SUBSURFACE ENVIRONMENT

The facility is designed with a containment system that contains any spills of hazardous materials and precipitation that falls on the process areas of the facility. Process wastewater generated at the facility is permitted to be discharged to the local publicly-owned treatment works.

D.5.7.1 GROUNDWATER

Because of the physical properties of activated carbon and the location and design of the facility, the risk of contamination of groundwater and/or the subsurface environment in the areas surrounding the facility is very low.

The primary source of potential contamination from the facility would be the contaminants adsorbed on the spent carbon received and reactivated at the facility. However, because of the physical properties of the carbon (the contaminants are held in the pore structure of the carbon by strong intermolecular forces), these contaminants do not desorb from the carbon until the carbon is introduced into a high temperature environment such as the reactivation unit located at the facility. At these high temperatures, the contaminants are in a gaseous state and are thermally destroyed in the high temperature environment of the reactivation unit and, therefore, do not pose a risk to the groundwater and/or subsurface environment. The facility is designed to contain (see Sections D.3 and D.4) the potential releases that could impact groundwater and/or the subsurface environment. In addition, the potential impacts associated with a release would be minimal at this site because of the depth to the groundwater table and the absence of any drinking water wells, either public or private, in proximity to the facility. The closest potential exposure point is an irrigation supply well which is located more than 2,500 feet away from the facility boundary.

An exposure pathway is not complete for exposure through the groundwater and/or subsurface environment for the reasons stated above (physical characteristics of spent carbon, facility location, and design). Because the exposure pathway is not complete, the facility poses negligible risk to human health or the environment from contamination of groundwater and/or the subsurface environment.

D.5.8 PROTECTION OF SURFACE WATER, WETLANDS, AND SOIL SURFACE

There are no springs, drinking water wells, surface water bodies, or wetlands within one quarter mile of the facility. Outside operating areas of the hazardous waste management facility are paved and are provided with run-on and run-off protection. Container storage is indoors and the floor is sloped and trenched to capture any spills. All containment is free of gaps or cracks which would allow waste materials or contaminated rainwater to leak into the underlying or surrounding soil.

D.5.9 PROTECTION OF THE ATMOSPHERE

Air pollution control equipment has been installed on the reactivation units to limit the potential emissions from the facility. Emissions testing has been conducted and a health risk assessment ahs been approved to assess the potential risks associated with facility emissions.

D.5.9.1 RISK ASSESSMENT

EPA Region IX has approved a Risk Assessment Work Plan (RAW) for a Human Health and Ecological Risk Assessment of the facility. Using this work plan and the PDT results, a risk assessment was conducted and subsequently accepted by EPA. A copy of the Risk Assessment Report is included in this application in Appendix XI.

SECTION
E

GROUNDWATER

Siemens Industry, Inc.
2523 Mutahar Street
Parker, Arizona 85344

Revision 1
April 2012

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E.1 INTRODUCTION

Siemens Industry, Inc. is applying for a Resource Conservation and Recovery Act (RCRA) permit for their Parker, Arizona facility. This permit application is to cover the carbon reactivation furnace (RF-2) and associated container and tank storage areas only. These units are constructed and operated to prevent discharges to the environment and, as such, groundwater monitoring is not required for these units.

SII does not have any additional hazardous waste management units (landfills, surface impoundments, hazardous waste storage tanks without secondary containment) subject to the requirements of 264 Subpart G and 270.14(c) (Groundwater Monitoring). Therefore, this section of the RCRA Part B Permit Application is not applicable to SII's Parker facility.

An Environmental Assessment, including an evaluation of groundwater and the subsurface environment, was conducted in February 1991, and a supplement to the EA was completed in April 1996. These resulted in a "Finding of No Significant Impact" for the SII Parker facility.

SECTION F

PROCEDURES TO PREVENT HAZARDS

Evoqua Water Technologies
2523 Mutahar Street
Parker, Arizona 85344

July 2014
Revision 2

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F.1 INTRODUCTION

The Evoqua Water Technologies (EWT) facility is equipped with safety and emergency equipment and devices for the purpose of minimizing the possibility of an explosion, fire, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water which could threaten human health or the environment. The facility also has security measures and devices to prevent unauthorized site entry and minimize the possibility of livestock or persons contacting hazardous waste or hazardous waste management units.

The facility also has a comprehensive inspection schedule and inspection procedures to ensure that all facility equipment is in proper operating condition and is being operated properly.

The following document describes those safety, emergency and security devices and procedures maintained at the facility in compliance with 40 CFR 270.14(b)(4), 270.14(b)(8), and 270.14(b) (9). The facility may obtain other devices or adopt other procedures from time to time as emergency planning and safety needs evolve. This document also provides the inspection schedule and inspection procedures.

F.2 SAFETY AND SECURITY DEVICES

This section describes the safety and security measures and devices used at the EWT Parker facility to prevent hazards and ensure operator safety. The EWT Parker facility employs standard industrial safety and hygiene practices such as providing protective equipment and clothing for its workers, prohibiting smoking and eating, except in designated areas (outside the operating portions of the facility), providing eye wash and emergency shower stations located throughout the operating portions of the facility, and providing restrooms, showers, and locker facilities.

F.2.1 EQUIPMENT AND DEVICES

SII maintains an inventory of safety and emergency equipment that includes at a minimum the equipment described in Table F-1. The location of the safety and emergency equipment described in Table F-1 is shown in Figure F-1. A list of facility equipment and corresponding safety devices is presented in Table F-2.

Table F-1 -- List of Safety and/or Emergency Equipment

Equipment	Description
Goggles, safety glasses and face shields	Resistant to chemicals and impact
Coveralls and Boot Covers	Variety of materials for special applications
Acid Suits	PVC-double-coated on polyester
Acid Boots	Vinyl-coated; over the sock
Acid Gloves	Vinyl-coated
Regular Gloves	Variety of materials for special applications
Respirators	Resistant to chemicals; with cartridges for dust, acids, organic vapor, pesticides, fumes and mists
Self-Contained Breathing Apparatus	Self-contained escape unit with a 5-minute air supply
	Self-contained breathing apparatus with a 30-minute air supply
Emergency Shower and Eye Wash	Used for flushing and irrigating eyes and skin
First Aid Kit	Used for the immediate treatment of minor injuries and/or illnesses
Fire Extinguishers	Typically 10-pound ABC dry chemical
Alarm System	Electrically powered alarm system activated by buttons throughout the plant

TABLE F-2 – Facility Equipment and Devices

Activity Area	Equipment	Safety Features
Off-Loading	Flexible Off-Loading Hoses	Acid/alkaline resistant, pressure resistant hoses
		Lockable "cam-lok" couplings (or equivalent)
	Fork Lifts and Portable Ramps	Mechanical devices provided to assist in lifting, and transport.
	Receiving Tanks	Railing where necessary around tanks to prevent operators from falling
		Secondary containment equipped with sump and transfer pump to protect against subterranean waste migration in event of primary vessel rupture; also provides inspection of primary vessel from all sides
Treatment and Storage Areas	Piping and Transfer Hose (all wastes)	Piping and hose used to transfer spent carbon is rated for at least 125% of the nominal operating pressure.
		All piping and hose is compatible with waste which it is to service
		Piping runs, where feasible, are along walls, overhead, containment sill, etc. to minimize trip hazards
	Pumps	All pumps are constructed of materials compatible with wastes which they will service
		Pumps are located within containment areas to prevent releases outside the contamination area in the event of a leak

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TABLE F-2 – Facility Equipment and Devices

Activity Area	Equipment	Safety Features
Treatment and Storage Areas (continued)	Pumps (continued)	Pump motors are TEFC to minimize chances of electrical shorting if liquids contact the motors
		All rotating parts of pumps are fitted with guards
	Tanks	All tanks are constructed of materials compatible with wastes they contain
		All tanks reside within spill containment areas. The pad is designed or operated to contain 100% of the volume of the single largest RCRA tank plus the precipitation from a 25-year, 24-hr storm event
		All waste tanks are labeled with tank designation numbers
		Railings are provided where necessary around tanks to prevent operators from falling
	Berms, Trenches, Sumps,	Containment of spills and prevention of runoff from hazardous waste handling areas.
	Lighting	Sufficient overhead artificial lighting is provided, as necessary, during all hours of operation.
Reactivation Furnace	Backup power for control room computer system	Provides continuing control functions in the event of a power failure
	Automatic waste feed cutoff interlocks	Automatically stops waste feeds in the event of deviation from permitted operations or in an emergency. Minimizes potential for emissions.

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F.2.1.1 SAFETY EQUIPMENT

F.2.1.1.1 RESPIRATORS

A variety of respirator cartridges are available for use at this facility. Examples include organic vapor, acid gas, particulate and other special use types.

F.2.1.1.2 SELF-CONTAINED BREATHING APPARATUS

Self-contained breathing apparatus are available for safety purposes. These units are used when confined spaces must be entered. Thirty-minute units (equipped with a 30-minute air supply) are available for use when the confined space area is large enough to accommodate both the employee and the apparatus. A 5-minute escape unit (equipped with a 5-minute air supply) is available for those confined space situations where the space does not permit the use of a 30-minute unit.

F.2.1.1.3 PROTECTIVE CLOTHING

All employees who may come in contact with wastes are supplied with work uniforms consisting of long-sleeved shirts and trousers and/or coveralls for use within the facility. PPE such as goggles, safety glasses, face shields, hard hats, rubber boots, gloves, overalls, tyvek suits and jackets are available on-site and are required to be worn (as appropriate) during waste transfer activities.

F.2.1.2 EMERGENCY EQUIPMENT

F.2.1.2.1 COMMUNICATIONS EQUIPMENT

Telephones are available for summoning aid. The general location of these phones is shown on Figure F-1. A notice listing the location and phone number of the nearest medical emergency treatment facility is posted in the plant control room and office areas. A cellular telephone is maintained at the facility to summon outside assistance during an emergency and/or evacuation situation.

F.2.1.2.2 WARNING OR ALARM SYSTEM

Electrically powered internal alarms to notify employees of an on-site emergency or the need for evacuation are provided. Alarm activators are located as noted on Figure F-1.

The following additional alarm systems are installed at the facility.

All storage tanks in the treatment facility are equipped with level gauging systems and/or high-level alarms. This system is connected to a main control system located in the Control

Room. Should an overfill situation occur, on-site personnel will be alerted via an alarm displayed on the plant computer system.

F.2.1.2.3 SAFETY SHOWER AND EYEWASH

An emergency shower and an eye-wash fountain are provided in the carbon reactivation area and an emergency shower and an eye-wash fountain are provided in the spent carbon storage area.

F.2.1.2.4 FIRST-AID

One first-aid cabinet has been provided. It is routinely stocked by a medical service firm or appropriate on-site personnel. This cabinet is located in the Employee Lunchroom.

F.2.1.2.5 FIRE EXTINGUISHERS

Dry chemical fire extinguishers are located in marked boxes throughout the facility. The locations of these extinguishers are identified on Figure F-1. All extinguishers are routinely serviced by a fire prevention service firm.

F.2.1.2.6 SPILL CONTROL EQUIPMENT

The following types of spill control equipment are available on-site in case of emergency:

1. Inert adsorbents
2. Shovels
3. Neutralizing agents (caustic soda, lime)
4. Wet/dry shop vacuum cleaner
5. Absorbent pads and spill booms.

The location of the spill control equipment is identified on Figure F-1.

F.2.1.2.7 DECONTAMINATION EQUIPMENT

The following types of decontamination equipment may be used, as appropriate, after spills have been cleaned up:

1. Detergents (for oil removal)
2. Steam cleaning equipment
3. Pressure washing equipment.

F.2.1.3 EQUIPMENT TESTS

Applicable facility emergency equipment will be inspected and maintained as necessary to ensure its proper operation in time of emergency. If the equipment fails in use or a problem is detected during routine inspections, the problem will be remedied as soon as practical. A schedule for equipment inspection, testing, and maintenance is presented in the General Inspection Schedule (see Appendix XII).

F.2.2 SECURITY MEASURES

F.2.2.1 SITE SURVEILLANCE

The site is staffed 24 hours per day. The site is totally enclosed by fencing, with locked gates. These additional access control measures are discussed below.

F.2.2.2 GATES

Three gates, two vehicle gates and one coded man-gate, are provided for site access and exit and are located as shown in Figure F-1. During the day shift and the night shift, the drive gates and the man-gate are locked when not in use.

F.2.2.3 FENCING

A minimum of six foot high chain link fence surrounds the entire facility. The gates are also chain link.

F.2.2.4 WARNING SIGNS

Signs are posted at all gates and fences on all sides of the facility in sufficient number to be seen from any approach. The signs are visible and legible from a distance of 25 feet and contain the following notice:

“CAUTION – UNAUTHORIZED PERSONS KEEP OUT”

AND

“CUIDADO – SE PROHIBE LA ENTRADA A PERSONAS SIN AUTHORIZACION

Smoking is prohibited at most locations within the facility and is permitted only in those areas so designated by a "Smoking Permitted" sign. “No smoking” signs are posted at each entrance to the facility.

F.2.2.5 LIGHTING

Floodlights are provided for illuminating the treatment and storage tank areas, when necessary. These lights are controlled from the MCC room.

F.2.3 WATER SUPPLY

F.2.3.1 ADEQUACY

An adequate supply of water for cleaning equipment and sanitation is provided from the Colorado River Indian Tribes Water System. An adequate supply is also available for fire fighting. Fire hydrants are located along the Mutahar Street utility right-of-way. The nearest hydrant is located near the entrance to the fenced hazardous waste storage area as shown on Figure F-1.

F.2.3.2 PREVENTION OF CONTAMINATION

The facility employs backflow preventers on the potable water supply to prevent contamination. Bottled water is supplied to employees for drinking.

F.3 INSPECTION SCHEDULE AND PROCEDURES

F.3.1 GENERAL INSPECTION SCHEDULE AND CHECKLISTS

To protect human health and the environment and to ensure all equipment is in good working condition, an inspection schedule has been developed for the facility in compliance with the requirements of 40 CFR 264.15. Any deterioration or malfunction discovered during the inspections will be corrected as soon as possible. Records of inspections are maintained at the SII facility for a period of at least three years. Appendix XII contains example copies of the facility's Inspection Schedule and Checklists. The Inspection Schedule lists the equipment, devices and structures to be inspected and the frequency with which the inspections are to be performed. Appendix XII also contains inspection checklists to be used to implement the Inspection Schedule. The facility may add inspection parameters to its checklists in addition to those discussed in this schedule. Such additional parameters are for the facility's internal use and are not intended to fall within the scope of 40 CFR 264.15

F.3.1.1 DESCRIPTION OF EQUIPMENT LISTED ON INSPECTION SCHEDULE

The following sections describe the equipment listed on the Inspection Schedule.

F.3.1.1.1 OPERATING EQUIPMENT (EXCEPT THERMAL TREATMENT SYSTEMS)

Waste Feed Cut-Off Systems. This equipment is used to stop the feed of spent carbon into the reactivation unit and will be visually inspected daily to ensure proper operation.

Monitoring Equipment. Equipment used to monitor process operations will be visually inspected daily to ensure that accurate data is being collected.

Transfer Equipment. Transfer equipment includes the equipment used to transfer spent carbon from containers and tank trucks to the spent carbon storage tanks, and from the spent carbon storage tanks to the reactivation unit feed hopper, and from the reactivation unit feed hopper to the reactivation unit. This includes pumps, valves, piping, and unloading stations. This equipment is to be visually inspected daily for signs of corrosion and/or leaks and for proper operation.

Carbon Adsorbers. Carbon adsorbers are used on certain process systems to ensure against the release of organic vapors. Engineering calculations have been made to conservatively predict each adsorbers carbon life. Monthly monitoring, using EPA Method 21, is used to verify the adequacy of the carbon adsorber change-out schedule.

Pumps. Pumps are inspected daily to ensure that they are free of leaks and that they are operating properly.

F.3.1.1.2 THERMAL TREATMENT SYSTEMS

Furnace/Air Pollution Control Systems. The reactivation unit, air pollution control equipment and ancillary equipment (pumps, valves, pipes) will be visually inspected daily to ensure the absence of leaks, spills, fugitive emissions, and signs of unauthorized tampering.

CEMS Results. The calibration data from the continuous emission monitoring systems will be checked daily to ensure the CEMS are operating within proper parameters.

Alarms. Alarms used to notify the operator that an operating parameter is outside of a predetermined set point will be tested monthly to ensure proper operation.

Automatic Waste Feed Cutoff System. The control system includes an automatic waste feed cutoff (AWFCO) system that stops the feed of spent activated carbon when operating conditions are at or near limits necessary to comply with specific permit conditions. In addition, the spent activated carbon feed is automatically stopped if the range of the a regulatory compliance measurement instrument is exceeded or if there is a malfunction of the continuous monitoring system. If any of these parameters deviates from the established limit, an electronic signal from the control system will stop the carbon weigh belt feeder.

On a monthly basis, during RF operations, the AWFCO system will be tested. Each of the regulatory AWFCOs will be tested by using a control system console to input a software value which corresponds to an exceedance of the permit limit. The feed to RF-2 will be shut down. Verification will then be made that the control system, in response to the test input, sends out a signal to trigger AWFCOs. It should be noted that during the brief period of time when the AWFCO parameters are being tested, regulatory AWFCOs will be precluded. A maximum time limit of one minute per test for each parameter will be imposed so as to minimize AWFCO downtime. Non-regulatory AWFCOs will not be affected by the test.

F.3.1.1.3 STRUCTURAL AND STORAGE FACILITIES

Containers. Containers used to transport and store spent carbon will be visually inspected weekly to ensure the absence of corrosion and/or leaks as per 40 CFR 264.174.

Container Storage Area. The area used to store containerized spent carbon prior to introduction into the process will be visually inspected weekly to ensure the integrity of the secondary containment system. The containment system is to be inspected for cracks and surface erosions per 40 CFR 264.174.

Loading/Unloading Area. The area used to load/unload containerized and bulk spent carbon will be visually inspected weekly for cracks and spills.

Spent Carbon Storage Tank Systems. The spent carbon storage tank systems, including any valves and piping associated with these tank systems, will be visually inspected daily for leaks, cracks, and external corrosion. The overfill protection systems and valve position and level monitoring systems will also be visually inspected daily for proper operation. Pursuant to the requirements of 40 CFR 264.195(b)(1), these inspections will occur in addition to the procedures established in Section F.3.3 below.

Secondary Containment. This area includes the construction materials and the general area immediately surrounding the secondary containment area associated with the storage tanks and reactivation process. This area is to be visually inspected daily to ensure the integrity of the construction materials and the secondary containment system and to determine whether any liquids have accumulated. Pursuant to the requirements of 40 CFR 264.195(b)(3), the containment system is to be visually inspected for cracks, surface erosion and signs of leakage.

F.3.1.1.4 SAFETY/SECURITY

Fire Extinguishers - Fire extinguisher tank pressure will be visually checked monthly.

Telephones - Telephones will be inspected daily for proper operation.

Cellular Telephone - The Cellular Telephone will be inspected daily for proper operation.

Security Lighting - Outdoor security lights will be visually inspected daily.

Fences/Gates - The fence surrounding the hazardous waste storage and treatment areas of the facility will be visually inspected monthly.

Warning Signs - Warning Signs on the fence (“Danger” and “No Smoking”) will be visually inspected monthly.

First Aid Cabinet - The contents of the first aid cabinet will be checked weekly to ensure it is fully stocked. It will also be checked for accessibility.

Self-Contained Breathing Apparatus (SCBA) - SCBAs will be visually inspected weekly to ensure proper condition. Tank pressures will be checked monthly. Spare SCBA tanks will also be inspected weekly.

Eye Wash/Shower - The emergency eye wash and shower stations will be tested monthly to ensure proper water pressure and visually inspected monthly to ensure accessibility and operability.

Emergency Alarm - The emergency alarm to notify employees of an on-site emergency will be tested monthly.

Respirators - A respirator component inventory inspection will be conducted monthly to ensure availability.

Spill Control/Decontamination Equipment - Adsorbents and the spill boom located on-site will be visually inspected monthly for deterioration, accessibility, and inventory control.

Protective Clothing - Protective Clothing used for spill control and decontamination will be visually inspected monthly for deterioration, accessibility, and inventory control.

Emergency Lighting - Emergency lighting will be inspected monthly for proper operation.

Fire Protection System - The alarms associated with the fire protection system will be checked monthly for accessibility and proper operation. The system water pressure will also be checked monthly.

F.3.1.2 TYPES OF PROBLEMS

The types of problems that may be discovered during the scheduled inspections are summarized on the Inspection Schedule (see Appendix XII).

F.3.1.3 FREQUENCY OF INSPECTION

The frequency of inspection for each system, area, and equipment type is presented in the Inspection Schedule (see Appendix XII).

F.3.1.4 INSPECTION CHECKLISTS

Daily, weekly, monthly, and 18-month inspection checklists have been developed. Example copies of these checklists can be found in Appendix XII. The most up to date copies of these checklists are maintained at the facility. These checklists will be completed during each inspection. Each item on the checklist must be marked either satisfactory or unsatisfactory.

F.3.2 RETENTION OF WRITTEN SCHEDULE, CHECKLISTS AND INSPECTION RECORDS

All inspection reports will be filed in the facility's operating record. All reports will be maintained for at least three years from the date of the inspection.

F.3.3 SCHEDULE AND PROCEDURES FOR ASSESSING THE CONDITION OF EACH TANK

The spent carbon storage tanks (T-1, T-2, T-5, T-6 and T-18) will be inspected externally on a daily basis as specified in Section F.3.1.1.3. They will also be ultrasonically tested on a periodic basis. Tank inspection and testing procedures are as follows:

1. Visually inspect tank walls and pad for wetness, cracks, holes, etc.
2. Check for leaks around valve areas, couplings, and threaded nipples, as applicable.
3. Check tank markings for weathering and proper identification of tank contents.
4. Check external tank walls for signs of corrosion and pitting.
5. Annually, the tanks will be ultrasonically tested at the point of maximum stress (near the bottom of the straight side section) and at the previous locations of minimum shell thickness, to ensure adequate thickness.
6. Every five (5) years, each tank will be ultrasonically tested along a grid pattern overlaid on the entire accessible tank surface.

SECTION G

CONTINGENCY PLAN

Evoqua Water Technologies
2523 Mutahar Street
Parker, Arizona 85344

Revision 2
May 2014

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Appendix

G.1 INTRODUCTION

The Evoqua Water Technologies facility is designed, constructed, maintained and operated to minimize the possibility of a fire, explosion or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil or surface water which could threaten human health or the environment.

The Contingency Plan, which can be found in Appendix XIII is designed to minimize hazards to human health or the environment in the event of such fires, explosions or unplanned sudden or non-sudden releases of hazardous waste or hazardous waste constituents to air, soil or surface water. The provisions of the plan will be carried out immediately whenever such an emergency occurs.

The contents of the Contingency Plan are based upon, and meet all criteria set forth in, 40 CFR Part 264, Subpart D.

SECTION H

PERSONNEL TRAINING PROGRAM

Siemens Industry, Inc.
2523 Mutahar Street
Parker, Arizona 85344

April 2012
Revision 1

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H.1 INTRODUCTION

This section presents an overall description of the personnel training program established for handling of hazardous wastes at the Siemens Industry, Inc. (SII) facility. This facility will meet the personnel training requirements of 40 CFR 270.14(b)(12) and 264.16. Employees will complete the introductory training program for their particular job description within six months after they are hired or promoted, and will not be assigned to unsupervised positions which would require them to handle hazardous wastes until they have completed the introductory training. Continuing training will also be administered to all employees on a cumulative or annual basis. Training may be given in-house or by a contractor specifically retained for that purpose.

The entire training program including this description, a training syllabus outline, and supporting information are kept on file at the facility and are reviewed and updated as necessary to accommodate changes in procedures and regulations and to ensure compliance with the requirements found in 40 CFR 264.16.

H.2 TRAINING PROGRAM METHODS

The training program will be given using various media, which may include, but are not limited to, classroom discussions, CD-ROMs, video, written manuals, practical demonstrations, and other methods. Training on required subjects will be given on an introductory and continuing basis.

H.3 INTRODUCTORY TRAINING

Introductory Training required by 40 CFR 264.16 will include the following, at a minimum:

(i) Procedures for using, inspecting, repairing, and replacing facility emergency and monitoring equipment.

(ii) Key parameters for automatic waste feed cut-off systems.

(iii) Communications and alarm systems.

(iv) Responses to fires and explosions.

(v) Prevention and responses to groundwater contamination incidents.

(vi) Shut down of operations.

(vii) Contingency Plan implementation.

(viii) Proper management of hazardous waste at the facility.

In addition, waste sampling training is provided to personnel who may be required to collect samples of the incoming spent activated carbon shipments or the in-process material.

A training syllabus outline is included as Appendix XIV. Appendix XIV describes the typical training content that is available for SII employees managing hazardous waste at the facility. Each RCRA topic is typically addressed in the training program.

H.4 CONTINUING TRAINING

The continuing training will consist of an annual review of subjects listed under introductory training, as required by 40 CFR 264.16.

All facility employees will take part in the continuing training program. The annual review will incorporate a review of all introductory RCRA topics. Requirements for waste treatment, storage, and/or disposal, and emergency and contingency procedures may be discussed. Any accidents or incidents during the past year may be reviewed, and any unsatisfactory conditions noted on inspection reports will be discussed. Employees will also be asked to provide comments and suggestions about the training program.

H.5 TRAINING RELEVANCE UNDER 40 CFR 270.14(b)(12)

Examples of operations and procedures that occur within the facility will be utilized to explain how RCRA training topics apply. Such examples may include, but are not limited to, analysis and explanations regarding the facility's piping and instrument diagrams (P&IDs), alarm and communication systems, maintenance procedures for RCRA waste management units, standard operating procedures for equipment operations, fire protection equipment, procedures for notifying management regarding potential contamination incidents, and operational shutdowns.

H.6 JOB SPECIFIC TRAINING

The introductory and continuing training required, as well as the extent of training needed in each subject, is dependent upon the employee's specific job responsibilities. Employees will receive continuing training for all topics that were covered in the introductory training program. The extent of training required for each job title is presented in Table H-1.

If additional job titles are added, the training for each new job title will be maintained at the facility with a description of the applicable training.

TABLE H-1 Job Titles – Introductory and Continuing Training Requirements							
Job Title	Procedures for Using/Inspecting/ Repairing/Replac-ing Emergency and Monitoring Systems	Key Parameters for Automatic Waste Feed Cut-Off Systems	Communication and Alarm Systems	Prevention and Responses to Fire and Explosions	Responses to Ground Water Contamination Incidents	Shut Down of Operations	Contingency Plan Implementation
Plant Manager	X	X	X	X	X	X	X
EH&S Specialist/ Profile Chemist	X	X	X	X	X		X
Plant Operator(s)	X	X	X	X	X	X	X
Asst. Plant Operator(s)	X	X	X	X	X	X	X
Transportation Coordinator	X	X	X	X	X	X	X
Material Handlers	X	X	X	X	X	X	X
Electrician/Millwright	X	X	X	X	X	X	X
Admin. Assistant			X				

H.7 ADMINISTRATION OF TRAINING

The Environmental, Health, and Safety (EH&S) Manager is responsible for the implementation and management of the training program. The EH&S Manager is to be thoroughly familiar with all aspects of the training subjects contained in the training outline, Appendix XIV, and the Contingency Plan.

H.8 TRAINING PROGRAM IMPLEMENTATION

The training program will be implemented as described in Chapters H.2 through H.5 of this section and will ensure the following:

1. Facility personnel will complete the training program within six months after date of employment, or change of duties, that results in a need for additional training.

2. Facility personnel will work only in supervised positions, until they successfully complete training.

3. Facility personnel will participate in continuing training.

H.9 JOB TITLES, REQUISITE QUALIFICATIONS, AND DESCRIPTIONS

Job Titles, Requisite Qualifications. Applicable information for each job title related to hazardous waste management is listed in Table H-2. The most current information for each job title related to hazardous waste management is maintained at the facility. An example job description is listed in Table H-3. The most current job descriptions for each job title related to hazardous waste management are maintained at the facility.

Table H-2 Job Titles and Corresponding Education & Experience

Job Title	Required Education and Experience
Plant Manager	B.S. in Engineering and/or 5 years Experience in Hazardous Waste/Materials Management and Plant-Supervisory Experience.
EH&S Specialist/Profile Chemist	High School Graduate or GED with college degree or Appropriate Experience
Plant Operator(s)	High School Graduate or GED and Appropriate Experience
Asst. Plant Operator(s)	High School Graduate or GED
Electrician/Millwright	High School Graduate or GED and Appropriate Experience
Material Handler(s)	High School Graduate or GED
Traffic Controller	High School Graduate or GED and Appropriate Experience
Administrative Assistant	High School Graduate or GED and Data Entry and Typing Experience

Job Descriptions. An example job description appears in Table H-3.

TABLE H-3 EXAMPLE JOB DESCRIPTION
PLANT MANAGER - The Plant Manager (PM) is responsible for overall management and production at the facility. The PM ensures that the waste handling operations are safely and correctly performed and that all regulatory requirements are met. The PM will ensure that the Contingency Plan is kept up to date and RCRA training is occurring. The PM will review all plant records, including the operating log and records of inspections and will ensure that this documentation is correctly performed and that records are maintained as specified by the permit and other applicable regulations.

H.10 TRAINING DOCUMENTATION AND RECORDS RETENTION

Training documentation - Documentation will be completed and maintained by completion of the example training documentation form as contained in Appendix XIV. In the event that regulatory requirements or additional training is needed, the form used for documentation may be a revised version. However, at least the minimum information, as listed in the original form, will be retained on any subsequent form.

Records Retention Time Frame. Training documentation on current personnel will be retained at the facility until it closes. Records on former personnel will be retained for at least three years from the date the employee last worked at the SII Facility.

H.11 FACILITY STAFFING DESCRIPTION

Approximately fourteen employees may be present at the hazardous waste facility during the day shift. Fewer employees will be present at other times of the day and on weekends. Adequate staffing is provided to ensure that at least one person is present at all times who is knowledgeable in all facility operations. Normal staffing will consist of the following:

Job Title		Number of Employees
Plant Manager		1
Administrative Assistant		1
EH&S Specialist/Profile Chemist		1
Transportation Coordinator		1
Plant Operator(s)		4
Assistant Plant Operator(s)		4
Electrician/Mill Wright		2
Material Handler(s)		5
	TOTAL	19
Product Material Handler (Non RCRA Regulated Position)		2

SECTION
I

CLOSURE PLAN,
CLOSURE COST ESTIMATE
AND FINANCIAL ASSURANCE

Evoqua Water Technologies
2523 Mutahar Street
Parker, Arizona 85344

Revision 2
June 2014

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Appendix

I.1 INTRODUCTION

The Evoqua Water Technologies (EWT) facility accepts spent activated carbon in containers (drums and bulk) from various customers. The spent activated carbon is identified as both hazardous and non-hazardous waste and is managed at the facility in the container storage area, five storage tanks (T1, T2, T5, T6, and T18), and ultimately in the carbon reactivation unit (RF-2). Previously, the spent activated carbon was reactivated using carbon reactivation unit (RF-1), which is now inactive.

The facility, including RF-1, began construction in 1991 and operations commenced in August 1992. The RF-1 unit treated spent activated carbon exclusively during the time of operation. The RF-1 unit was shut down, after wastes were removed, in June of 1996 to allow for the final construction phase and startup of RF-2 in July 1996 to full interim status capacity.

Currently RF-1 does not share any equipment with RF-2. With a few exceptions, all RF-1 equipment (which includes the reactivation furnace, APC equipment/piping, and fan) remains on site. RF-1 is not currently and will not in the future be operational.

EWT has prepared two separate closure plans; one for RF-1 and one for the overall facility (including RF-2).

The RF-1 Closure Plan can be found in Appendix XVI, and covers only the partial closure activities associated with the inactive RF-1 unit. The RCRA Facility Closure Plan can be found in Appendix XV, and covers activities related to the eventual closure of all other hazardous waste portions of the facility, including RF-2 and all hazardous waste management units (HWMUs) described in the facility's Part A application.

The contents of the Closure Plans are based upon, and meet all the criteria set forth in 40 CFR Part 264, Subparts G and H. A sampling and Analysis Plan and a Quality Assurance Project Plan, applicable to both closure plans have been developed and are included in Appendix XVII.

Activities associated with closure of the HWMUs will include treatment and/or removal of all hazardous waste inventory, decontamination of storage and treatment equipment and paved surfaces, sampling and analysis to ensure that decontamination is adequate, sampling and analysis to determine if soil contamination has occurred and certification of closure by the facility owner and/or operator and a registered professional engineer. The Closure Plans also includes a cost estimate and financial assurance mechanism for the closure activities. The financial assurance instrument can be found in Appendix XVIII.

There are no underground storage tanks or other treatment and disposal units at the facility that require the submittal of a contingent post-closure plan per 40 CFR 264.118.

SECTION
J

SOLID WASTE MANAGEMENT UNITS (SWMUs), HAZARDOUS WASTE MANAGEMENT UNITS (HWMUs), AND AREAS OF CONCERN (AOCs)

Evoqua Water Technologies
2523 Mutahar Street
Parker, Arizona 85344

December 2014
Revision 4

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SOLID WASTE MANAGEMENT UNITS, HAZARDOUS WASTE MANAGEMT UNITS, AND AREAS OF CONCERN

This section identifies each of the known solid waste management units (SWMUs), hazardous waste management units (HWMUs) and Areas of Concern (AOCs) at the facility and provides the information required by 270.14(d)(1) and (2).

The following definitions are found in EPA regulations, guidance, and preambles to RCRA rulemaking notices.

- A "**Solid Waste Management Unit**" is "[a]ny discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a facility at which solid wastes have been routinely and systematically released." [61 Fed. Reg. 19,432, 19,442-19,443 (May 1, 1996); *accord* EPA, Call Center Questions and Answers (Mar. 1, 2004)]. Examples of SWMUs include container storage areas, tanks, surface impoundment, waste piles, land treatment units, landfills, incinerators, underground injection wells and other physical, chemical and biological treatment units, stormwater retention ponds containing contaminated sediments, industrial sewers designed to collect wastes, wood preservative kickback areas.

- A **Hazardous Waste Management Unit** is a "contiguous area of land on or in which hazardous waste is placed, or the largest area in which there is significant likelihood of mixing hazardous waste constituents in the same area." [40 C.F.R. § 260.10.] Examples of HWMUs include "a surface impoundment, a waste pile, a land treatment area, a landfill cell, an incinerator, a tank and its associated piping and underlying containment system and a container storage area." [*Id*].

- An **Area of Concern** is "any area of a facility under the control or ownership of an owner or operator where a release to the environment of hazardous wastes or hazardous constituents has occurred, is suspected to have occurred, or may occur, regardless of the frequency or duration." [63 Fed. Reg. 56710, 56715, n.1 (Oct. 22, 1998).] Areas of concern include areas that have experienced one-time spills of hazardous waste or hazardous constituents that have not been adequately cleaned up. [61 Fed. Reg. 19,432, 19,443 (May 1, 1996).]

J.1 Characterization of the Solid Waste Management Units

The facility has identified three operating areas and one past operating area on the facility containing SWMUs, HWMUs, and AOCs. The areas containing these units are:

1) The container storage area,
2) The storage tank and unloading area, consisting of tanks T-1, T-2, T-5, T-6, and T-18, and the Hopper H-1,
3) The carbon reactivation furnace and associated emission control equipment (RF-2), and
4) The inactive carbon reactivation furnace and associated emission control equipment (RF-1) as well as T-8.

Within these areas, a list of SWMUs, HWMUs, and AOCs has been compiled for inclusion with this Part B Permit Application. Tables J-1, J-2 and J-3 list the identified SWMUs, HWMUs, and AOCs, respectively. The SWMU and HWMU tables provide the following information for each identified unit:

1) The designation of each type of unit (name, description);
2) The general dimensions and structural description of each unit;
3) The date each unit was first operated; and
4) Specification of all wastes that have been managed in each unit, to the extent available.

The location of each SWMU, HWMU, and AOC is shown on a series of drawings designated as Figures J-1 through J-7.

J.2 Releases

Any leaks, drips, or spills from any of the solid waste management units identified in Section J-1, above, are routinely cleaned up as soon as practical and the area decontaminated to remove any hazardous wastes or hazardous waste constituents. The facility has experienced four reportable releases of hazardous wastes or hazardous waste constituents from the solid waste management units, as follows:

Nov 10, 1994 – Facility Lift Station Overflow – Reported to NRC, CRIT, LEPC – overflow caused by a power outage.

April 17, 1995 - Facility Lift Station Overflow – Reported to NRC, CRIT, LEPC – overflow caused by power outage.

February 15, 1996 - Facility discharge line was accidentally cut by Southwest Gas contractor relocating natural gas line - Reported to NRC, CRIT, LEPC.

September 26, 1998 – Spill of recycle water from a trailer outside the facility gate - Reported to NRC, CRIT, LEPC.

For each release, a complete investigation and report has been compiled and is kept at the facility. The following information, at a minimum, is recorded for any release from a solid waste management unit identified in Section J.1 above:

1) Date, type, quantity, and nature of any release;
2) Groundwater monitoring and other analytical data;
3) Physical evidence of stressed vegetation;
4) Historical evidence of any releases;
5) Any state, federal, or local enforcement action to address releases;
6) Any public citizen complaints that indicate a release; and
7) Any other information showing the migration of a release.

Because these spills have been cleaned up, the spill areas are not included as AOCs, in accordance with the definitions provided above.

TABLE J-1. SOLID WASTE MANAGEMENT UNIT IDENTIFICATION

No.	SWMU Type/Designation	Location	General Dimensions and Structural Description	Date Unit was First Operated	Identification of Wastes Managed in Unit	Releases from Unit
1	Bermed containment in process area	East of Warehouse	Approx 180’ x 55’; concrete	August 1992	Spent activated carbon. See Part A Application for list of applicable waste codes	None
2	Sump by H-1	South of H-1	3’-4“ square; concrete	July 1996	Spent activated carbon. See Part A Application for list of applicable waste codes	None
3	Sump by storage tank, T–9	East of warehouse in between T-9 and RF-2	3’-4” square sump; U-drain 30’ long x 16”wide; concrete	August 1992 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
4	Recycled motive water storage tank, T–9	East of warehouse on containment	10,500 gal 316 series stainless steel	1996 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
5	Rainwater and motive water storage tank, T–12	East of warehouse on containment	25,080 gal Mild steel	1992. Removed from service in 2002.	Spent activated carbon. See Part A Application for list of applicable waste codes	None

TABLE J-1. SOLID WASTE MANAGEMENT UNIT IDENTIFICATION

No.	SWMU Type/Designation	Location	General Dimensions and Structural Description	Date Unit was First Operated	Identification of Wastes Managed in Unit	Releases from Unit
6	Wastewater storage tank, T–11 System	East of the warehouse and south of RF -2	10' Dia x 20' H; Approx 12,000 gal fiberglass	August 1992 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
7	Sump by cooling screw under Venturi scrubber tank	East of warehouse beside RF-2	3'-4" square; concrete	July 1996 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
8	RF–2 scrubber water equalization tank, T-19	Under RF-2 Structure	Approx. 1000 gal Fiberglass	July 1996 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
9	Hazardous waste debris bin	North of warehouse on containment by H-1	20 - 40 cubic yards Mild steel	August 1992 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
10	Spent carbon storage warehouse grated trenches and sump	Warehouse in containment area	Trench 3 ft, 4 in square sump U-drain 50 ft long, 16 in wide; cross drain sections 40 ft long 16 in wide Concrete	1992 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None

TABLE J-1. SOLID WASTE MANAGEMENT UNIT IDENTIFICATION

No.	SWMU Type/Designation	Location	General Dimensions and Structural Description	Date Unit was First Operated	Identification of Wastes Managed in Unit	Releases from Unit
11	Hopper containment pad	Outside H-1 structure	Approx 60' x 44'; concrete	July 1996	Spent activated carbon. See Part A Application for list of applicable waste codes	None
12	WWTP	Inside warehouse	Fiberglass, mild steel modular water treatment system. Separate containment.	October 2003 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
13	Wastewater lift station and piping system (old)	At the end of access road to plant. Old piping from Tank T-11 to the Lift Station	Approx. height 15 ft; outside diameter 5 ft Lift Station: mild steel/concrete/fiberglass Old piping system PVC.	1992 to 1996	Spent activated carbon. See Part A Application for list of applicable waste codes	None
14	Spent carbon unloading/transfer area containment pad	North area of facility	Approx. 44 ft by 80 ft	August 1992 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
15	Satellite Accumulation Area	North side of warehouse	≤ 55 gallons (metal or plastic)	August 1992 to present	Various Debris	None
16	Satellite Accumulation Area	South side of drum containment	≤ 55 gallons (metal or plastic)	August 1992 to present	Various Debris	None
17	Satellite Accumulation Area	East of Control Room	≤ 55 gallons (metal or plastic)	August 1992 to present	Various Debris	None

TABLE J-1. SOLID WASTE MANAGEMENT UNIT IDENTIFICATION

No.	SWMU Type/Designation	Location	General Dimensions and Structural Description	Date Unit was First Operated	Identification of Wastes Managed in Unit	Releases from Unit
18	Satellite Accumulation Area	Laboratory in Admin Building	≤ 55 gallons (metal or plastic)	August 1996 to present	Laboratory Debris and laboratory Testing	None
19	Satelliite Accumulation Area	Underneath Spent Carbon Baghouse	≤ 55 gallons (metal or plastic)	August 1992 to present	Spent Carbon Dust from Baghouse	

TABLE J-2. HAZARDOUS WASTE MANAGEMENT UNIT IDENTIFICATION

No.	HWMU Type/Designation	Location	General Dimensions and Structural Description	Date Unit was First Operated	Identification of Wastes Managed in Unit	Releases from Unit

TABLE J-2. HAZARDOUS WASTE MANAGEMENT UNIT IDENTIFICATION

No.	HWMU Type/Designation	Location	General Dimensions and Structural Description	Date Unit was First Operated	Identification of Wastes Managed in Unit	Releases from Unit
	Spent carbon reactivation furnace - RF-1 and Associated Equipment (Dewater screw)	South of RF-2	Furnace shell – carbon steel; internal firebrick lining and block insulation; hearths and furnace roof constructed with firebrick; furnace roof is comprised of firebrick backed with block insulation and castable insulation; bottom hearth is insulated with block insulation and castable insulation	August 1992; Shut down in 1996	Spent activated carbon. See Part A Application for list of applicable waste codes	None

TABLE J-2. HAZARDOUS WASTE MANAGEMENT UNIT IDENTIFICATION

No.	HWMU Type/Designation	Location	General Dimensions and Structural Description	Date Unit was First Operated	Identification of Wastes Managed in Unit	Releases from Unit
2	Spent carbon reactivation furnace RF-2 and Associated Equipment (Dewater Screw, Weigh Belt)	East of warehouse	Furnace shell – carbon steel; internally lined with firebrick and block insulation; hearths and furnace roof constructed with firebrick; furnace roof is comprised of firebrick backed with block insulation and castable insulation; bottom hearth is insulated with block insulation and castable insulation; continuously seal welded internally to assure an air-tight assembly. Dewatering screw length 17 ft; diameter 8 in.	July 1996 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None

TABLE J-2. HAZARDOUS WASTE MANAGEMENT UNIT IDENTIFICATION

No.	HWMU Type/Designation	Location	General Dimensions and Structural Description	Date Unit was First Operated	Identification of Wastes Managed in Unit	Releases from Unit
3	3 RF–1 Air pollution control equipment					
	Afterburner	RF-1 structure	Refractory lined steel	1992 to 1996	Spent activated carbon. See Part A Application for list of applicable waste codes	None
	Venturi scrubber	RF-1 structure	Hastelloy C	1992 to 1996	Spent activated carbon. See Part A Application for list of applicable waste codes	None
	Packed bed scrubber	RF-1 structure	Fiberglass	1992 to 1996	Spent activated carbon. See Part A Application for list of applicable waste codes	None
	Emissions stack	RF-1 structure	Mild steel	1992 to 1996	Spent activated carbon. See Part A Application for list of applicable waste codes	None
4	RF–2 Air pollution control equipment					
	Afterburner	RF-2 structure	Refractory lined steel cylinder chamber	1996 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None

TABLE J-2. HAZARDOUS WASTE MANAGEMENT UNIT IDENTIFICATION

No.	HWMU Type/Designation	Location	General Dimensions and Structural Description	Date Unit was First Operated	Identification of Wastes Managed in Unit	Releases from Unit
	Venturi scrubber	RF-2 structure	Hastelloy C	1996 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
	Packed bed scrubber	RF-2 structure	Fiberglass	1996 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
	Wet electrostatic precipitator	RF-2 structure	Fiberglass/AL6XN	1996 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
	Induced draft fan	RF-2 structure	300-series SS	1996 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
	Emissions stack	RF-2 structure	Fiberglass surrounded by a mild steel shell	1996 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None

TABLE J-2. HAZARDOUS WASTE MANAGEMENT UNIT IDENTIFICATION

No.	HWMU Type/Designation	Location	General Dimensions and Structural Description	Date Unit was First Operated	Identification of Wastes Managed in Unit	Releases from Unit
5	Spent carbon unloading hopper H-1	North end of facility on containment	5000 lb capacity; mild steel	1996 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
6	Spent carbon unloading hopper H-2	Inside warehouse facing east wall	500 lb capacity; mild steel	August 1992 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
7	Hopper air pollution control equipment piping and baghouse	North end of facility on containment	Ducting, baghouse and fan are mild steel	1992 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
8	Spent carbon slurry and recycle water transfer system	Inside warehouse on containment	4” pipes hopper to tank; 3” pipes T-tank to furnace feed tank; 300-series SS	1992 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
9	Spent carbon storage warehouse	Inside warehouse	80 ft by 80 ft concrete/ metal	1992 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None

TABLE J-2. HAZARDOUS WASTE MANAGEMENT UNIT IDENTIFICATION

No.	HWMU Type/Designation	Location	General Dimensions and Structural Description	Date Unit was First Operated	Identification of Wastes Managed in Unit	Releases from Unit
10	Spent carbon slurry storage tank, T–1	East of warehouse within containment	8319 gal design capacity	Used tank (1956); 1992 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
11	Spent carbon slurry storage tank, T–2	East of warehouse within containment	8319 gal design capacity	Used tank (1956); 1992 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
12	Spent carbon slurry storage tank, T–5	East of warehouse within containment	8319 gal design capacity	Used tank (1956); 1992 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
13	Spent carbon slurry storage tank, T–6	East of warehouse within containment	8319 gal design capacity	Used tank (1956); 1992 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
14	Furnace Feed System Tank T-8 and Ancillary Equipment	RF–1 Structure	905 gal 300 series SS	August 1992 to 1996	Spent activated carbon. See Part A Application for list of applicable waste codes	None

TABLE J-2. HAZARDOUS WASTE MANAGEMENT UNIT IDENTIFICATION

No.	HWMU Type/Designation	Location	General Dimensions and Structural Description	Date Unit was First Operated	Identification of Wastes Managed in Unit	Releases from Unit
15	T-18 and Ancillary Equipment	RF-2 structure	6500 gal 300-series SS	July 1996 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
16	Wastewater conveyance piping to wastewater treatment tank	East of RF-2 structure	3” PVC piping	August 1992	Spent activated carbon. See Part A Application for list of applicable waste codes	None
17	Spent carbon storage warehouse barrel washer	Next to H-2 in warehouse	2 ft by 3 ft 300 series stainless steel	1992 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
18	Carbon adsorber - PV1000	North of Containment Pad for Storage Tanks	1000 lb carbon capacity; mild steel.	August 1992	Spent activated carbon. See Part A Application for list of applicable waste codes	None
19	Carbon adsorber WS-1	Beside spent carbon storage tank	2 x 2000 lb carbon capacity. Mild steel	1992 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None

TABLE J-2. HAZARDOUS WASTE MANAGEMENT UNIT IDENTIFICATION

No.	HWMU Type/Designation	Location	General Dimensions and Structural Description	Date Unit was First Operated	Identification of Wastes Managed in Unit	Releases from Unit
20	Carbon adsorber WS-2	Beside H-1	5000 lb carbon capacity Fiberglass	1992 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	None
21	Carbon adsorber WS-3	Beside RF–2	1000 lb carbon capacity Mild steel	1996 to present	Spent activated carbon. See Part A Application for list of applicable waste codes	See Section J.2
22	Slurry transfer inclined plate settler tank	Adjacent to the venturi scrubber	Mild steel	1992 to 1994	Spent activated carbon. See Part A Application for list of applicable waste codes	See Section J.2
23	Scrubber recycle tank T-17	Beside RF-1	Mild steel	1992 to 1996	Spent activated carbon. See Part A Application for list of applicable waste codes	None
24	Filter press	Next to scrubber system for RF-1	Mild steel with polypropylene plates	1992 to 1994	Spent activated carbon. See Part A Application for list of applicable waste codes	None

TABLE J-2. HAZARDOUS WASTE MANAGEMENT UNIT IDENTIFICATION

No.	HWMU Type/Designation	Location	General Dimensions and Structural Description	Date Unit was First Operated	Identification of Wastes Managed in Unit	Releases from Unit
25	New Facility Discharge Piping System	New piping bypasses Lift Station to POTW	6" PVC	February 1996	Spent activated carbon. See Part A Application for list of applicable waste codes	None

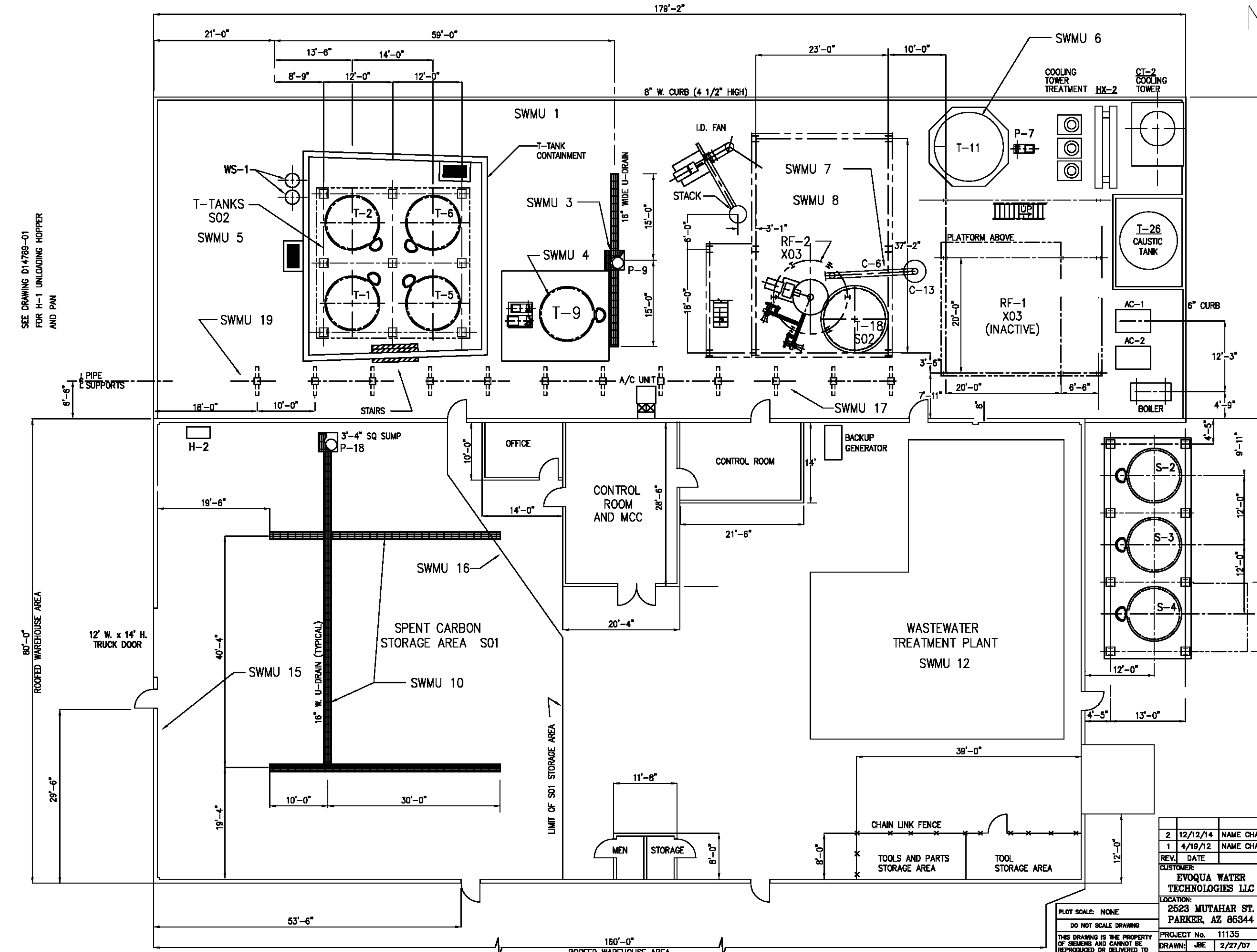
TABLE J-3. AREA OF CONCERN IDENTIFICATION

No.	AOC Type/Designation/Location	Management Requirements at Closure
1	Spent carbon unloading and transfer area.	Sampling. See Closure Plan Tank Area and Unloading Area Sample Locations 5 & 7.
2	Tank area concrete containment pad	Sampling. See Closure Plan Tank Area and Unloading Area Sample Location 3.
3	Receiving area/pad	Sampling. See Closure Plan Tank Area and Unloading Area Sample Location 8.
4	Hopper H-1 loading/unloading area	Sampling. See Closure Plan Tank Area and Unloading Area Sample Locations 4 & 5.
5	Hopper H-2 loading/unloading area	Sampling. See Closure Plan Container Area Sample Locations 1 & 2.
6	Spent carbon storage warehouse	Sampling. See Closure Plan Container Area Sample Locations 1, 2, & 3.
7	Furnace feed systems	Sampling. See Closure Plan RF-1 and RF-2 Process Area Sample Locations 1 & 2
8	Recycled motive water tank T-9	Sampling. See Closure Plan Tank Area and Unloading Area Sample Location 6.

TABLE J-3. AREA OF CONCERN IDENTIFICATION

No.	AOC Type/Designation/Location	Management Requirements at Closure
9	Rainwater, dewatering screw, and motive water tank T-12	Sampling. See Closure Plan Tank Area and Unloading Area Sample Location 2.
10	Spent carbon storage warehouse barrel washer	Sampling. See Closure Plan Container Area Sample Locations 1, 2, & 3.
11	Bermed containment area in process area	Sampling. See Closure Plan RF-1 and RF-2 Process Area Sample Locations 1, 2, & 3.
12	Sump by unloading hopper H-1	Sampling. See Closure Plan Tank Area and Unloading Area Sample Location 4.
13	Sump by tank T-9	Sampling. See Closure Plan Tank Area and Unloading Area Sample Location 6.
14	Spent carbon storage tanks and carbon adsorbers	Sampling. See Closure Plan Tank Area and Unloading Area Sample Locations 1, 2, & 3.

DWG: D14789-10



Solid Waste Management Units

1. Bermed containment in process area.
2. Sump by H-1.
3. Sump by storage tank, T-9.
4. Recycle water tank, T-9.
5. Rainwater/Recycle water tank, T-12.
6. Wastewater tank, T-11 system.
7. Sump by cooling screw.
8. RF-2 Scrubber water equalization tank, T-19.
9. Hazardous waste debris bin.
10. Spent carbon storage warehouse grated trenches and sump.
11. Hopper containment pad
12. WWTP.
13. Wastewater lift station and piping system (old).
14. Spent carbon unloading area containment pad.
15. Satellite Accumulation Area
16. Satellite Accumulation Area
17. Satellite Accumulation Area
18. Satellite Accumulation Area
19. Satellite Accumulation Area

NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
2	12/12/14	NAME CHANGED TO EVOQUA WATER TECH., UPDATE SWMUs	JBE		
1	4/19/12	NAME CHANGED TO SIEMENS INDUSTRY, INC., UPDATE SWMUs	JBE	KEM	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: EVOQUA WATER TECHNOLOGIES LLC

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No. 11135

DRAWN: JBE 2/27/07

CHK'D: KEM 2/27/07

ENG'R:

EVOQUA WATER TECHNOLOGIES LLC
Parker, AZ

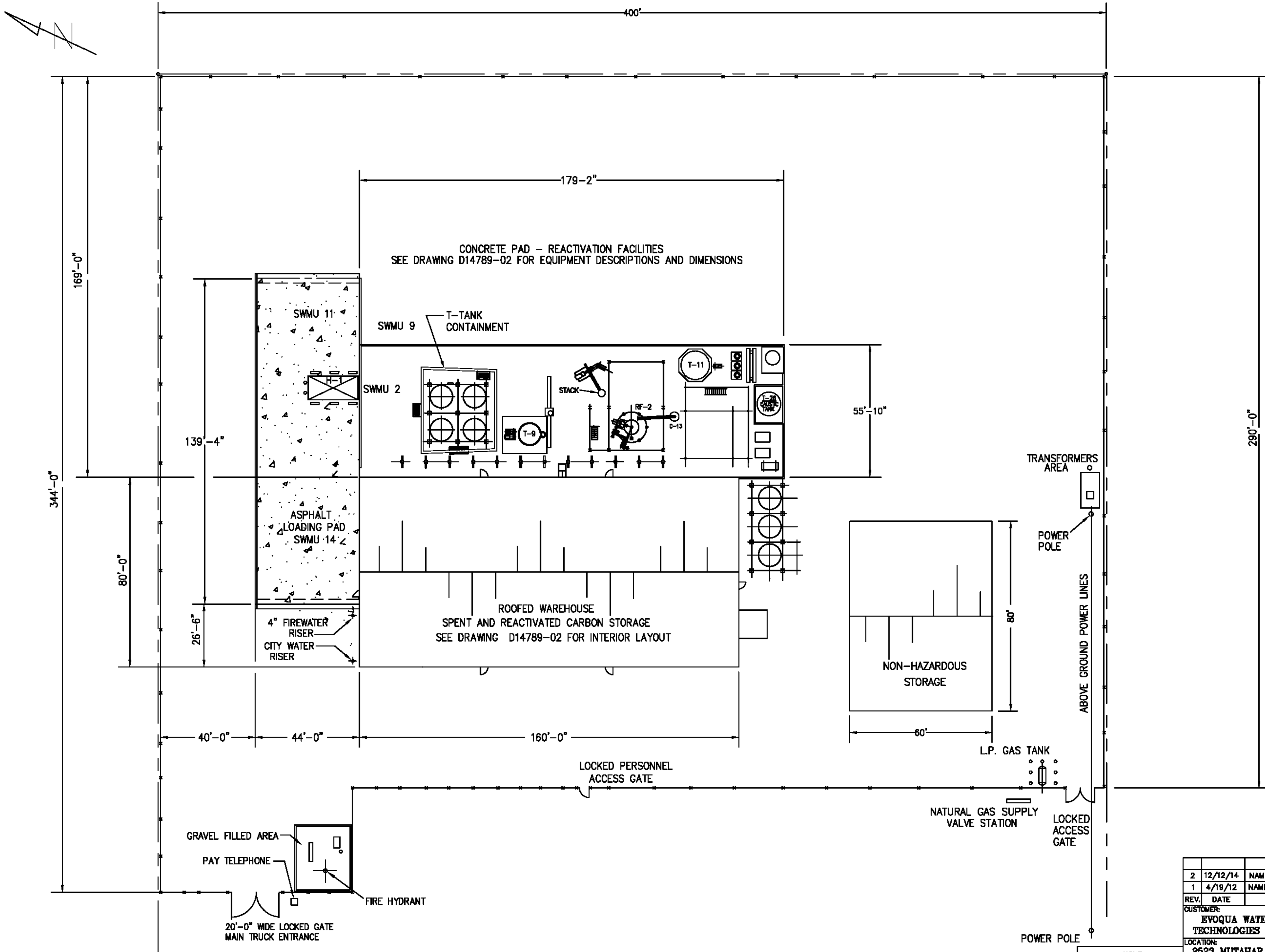
TITLE: REACTIVATION FACILITY SWMU LOCATION – FIGURE J-1

PART No.

DWG No. D14789-10 REV. 2

PRINT DATE: 12/15/14

DWG: D14789-11



Solid Waste Management Units

1. Bermed containment in process area.
2. Sump by H-1.
3. Sump by storage tank, T-9.
4. Recycle water tank, T-9.
5. Rainwater/Recycle water tank, T-12.
6. Wastewater tank, T-11 system.
7. Sump by cooling screw.
8. RF-2 Scrubber water equalization tank, T-19.
9. Hazardous waste debris bin.
10. Spent carbon storage warehouse grated trenches and sump.
11. Hopper containment pad
12. WWTP.
13. Wastewater lift station and piping system (old).
14. Spent carbon unloading area containment pad.
15. Satellite Accumulation Area
16. Satellite Accumulation Area
17. Satellite Accumulation Area
18. Satellite Accumulation Area
19. Satellite Accumulation Area

NOTES:

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SEE SITE PLAN DRAWING D14789-08

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
2	12/12/14	NAME CHANGED TO EVOQUA WATER TECH., UPDATE SWMUs	JBE		
1	4/19/12	NAME CHANGED TO SIEMENS INDUSTRY, INC., UPDATE SWMUs	JBE	KEM	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: EVOQUA WATER TECHNOLOGIES LLC

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No.

DRAWN:	JBE	2/27/07
CHK'D:	KEM	2/27/07
ENG'R:		

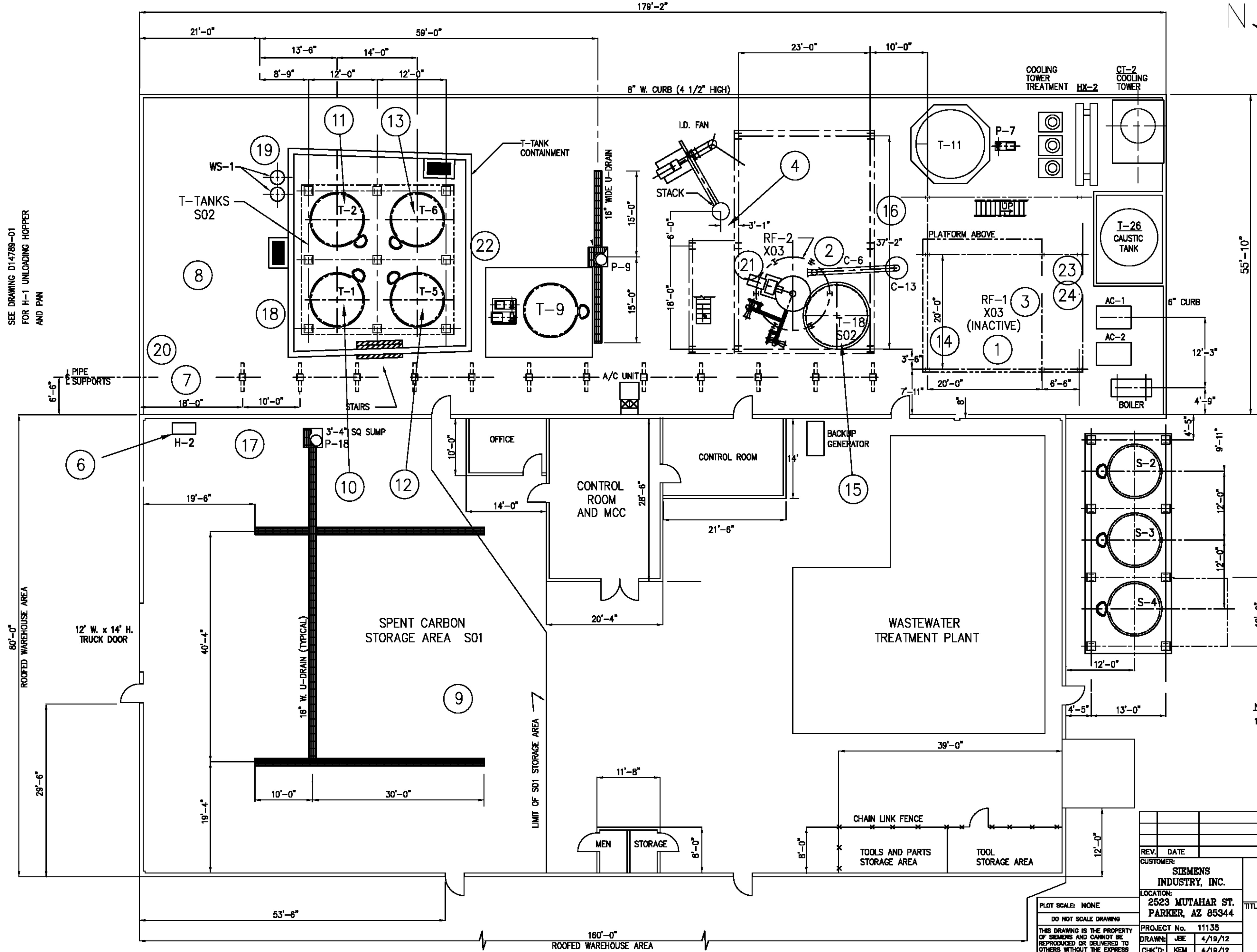
EVOQUA WATER TECHNOLOGIES LLC
Parker, AZ

TITLE: REACTIVATION FACILITY SWMU LOCATION – FIGURE J-2

PART No.   DWG No. D14789-11   REV. 2

PRINT DATE: 12/15/14

DWG: D14789-12



Hazardous Waste Management Units

1. Spent carbon reactivation furnace – RF-1 and Associated Equipment (Dewater screw).
2. Spent carbon reactivation furnace RF-2 and Associated Equipment (Dewater Screw, Weigh Belt).
3. Afterburner, Venturi scrubber, Packed bed scrubber, Emissions stack.
4. Afterburner, Venturi scrubber, Packed bed scrubber, Wet electrostatic precipitator, Induced draft fan, Emissions stack.
5. Spent carbon unloading hopper H-1.
6. Spent carbon unloading hopper H-2.
7. Hopper air pollution control equipment piping and baghouse.
8. Spent carbon slurry and recycle water transfer system.
9. Spent carbon storage warehouse.
10. Spent carbon slurry storage tank, T-1.
11. Spent carbon slurry storage tank, T-2.
12. Spent carbon slurry storage tank, T-5.
13. Spent carbon slurry storage tank, T-6.
14. Furnace Feed System Tank T-8, and Ancillary Equipment
15. T-18 and Ancillary Equipment.
16. Wastewater conveyance piping to wastewater treatment tank.
17. Spent carbon storage warehouse barrel washer.
18. Carbon adsorber – PV1000.
19. Carbon adsorber WS-1.
20. Carbon adsorber WS-2.
21. Carbon adsorber WS-3.
22. Slurry transfer inclined plate settler tank.
23. Scrubber recycle tank T-17
24. Filter press.
25. New Facility Discharge Piping System.

NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No. 11135

DRAWN: JBE 4/19/12

CHK'D: KEM 4/19/12

ENG'R:

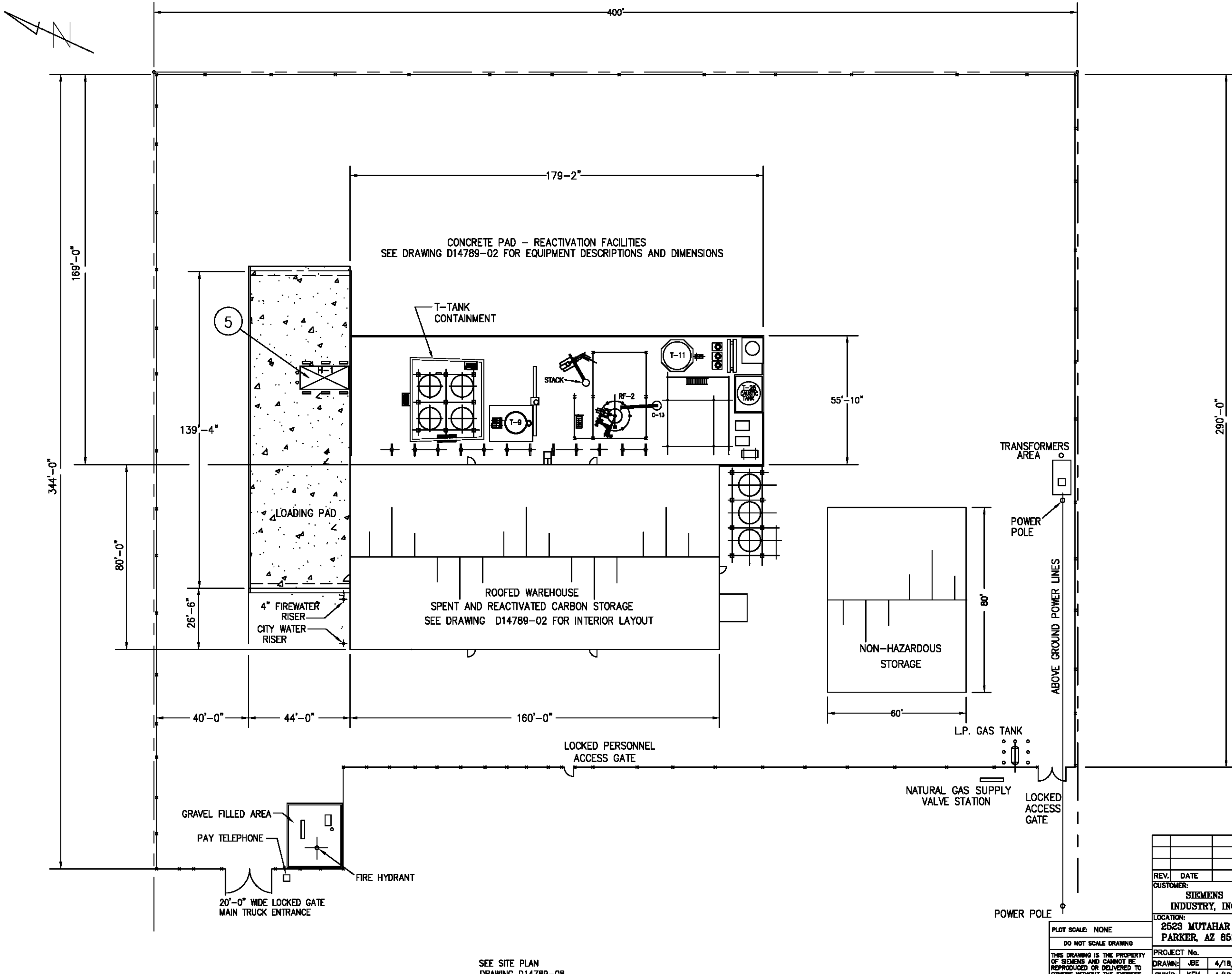
SIEMENS INDUSTRY, INC.
Parker, AZ

TITLE: REACTIVATION FACILITY HWMU LOCATION – FIGURE J-3

PART No.

DWG No. D14789-12 REV. 0

PRINT DATE: 4/19/12



DWG: D14789-13

Hazardous Waste Management Units

1. Spent carbon reactivation furnace – RF-1 and Associated Equipment (Dewater screw).
2. Spent carbon reactivation furnace RF-2 and Associated Equipment (Dewater Screw, Weigh Belt).
3. Afterburner, Venturi scrubber, Packed bed scrubber, Emissions stack.
4. Afterburner, Venturi scrubber, Packed bed scrubber, Wet electrostatic precipitator, Induced draft fan, Emissions stack.
5. Spent carbon unloading hopper H-1.
6. Spent carbon unloading hopper H-2.
7. Hopper air pollution control equipment piping and baghouse.
8. Spent carbon slurry and recycle water transfer system.
9. Spent carbon storage warehouse.
10. Spent carbon slurry storage tank, T-1.
11. Spent carbon slurry storage tank, T-2.
12. Spent carbon slurry storage tank, T-5.
13. Spent carbon slurry storage tank, T-6.
14. Furnace Feed System Tank T-8, and Ancillary Equipment
15. T-18 and Ancillary Equipment.
16. Wastewater conveyance piping to wastewater treatment tank.
17. Spent carbon storage warehouse barrel washer.
18. Carbon adsorber – PV1000.
19. Carbon adsorber WS-1.
20. Carbon adsorber WS-2.
21. Carbon adsorber WS-3.
22. Slurry transfer inclined plate settler tank.
23. Scrubber recycle tank T-17
24. Filter press.
25. New Facility Discharge Piping System.

NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No.

DRAWN:	JBE	4/18/12
CHK'D:	KEM	4/18/12
ENG'R:		

SIEMENS INDUSTRY, INC.
Parker, AZ

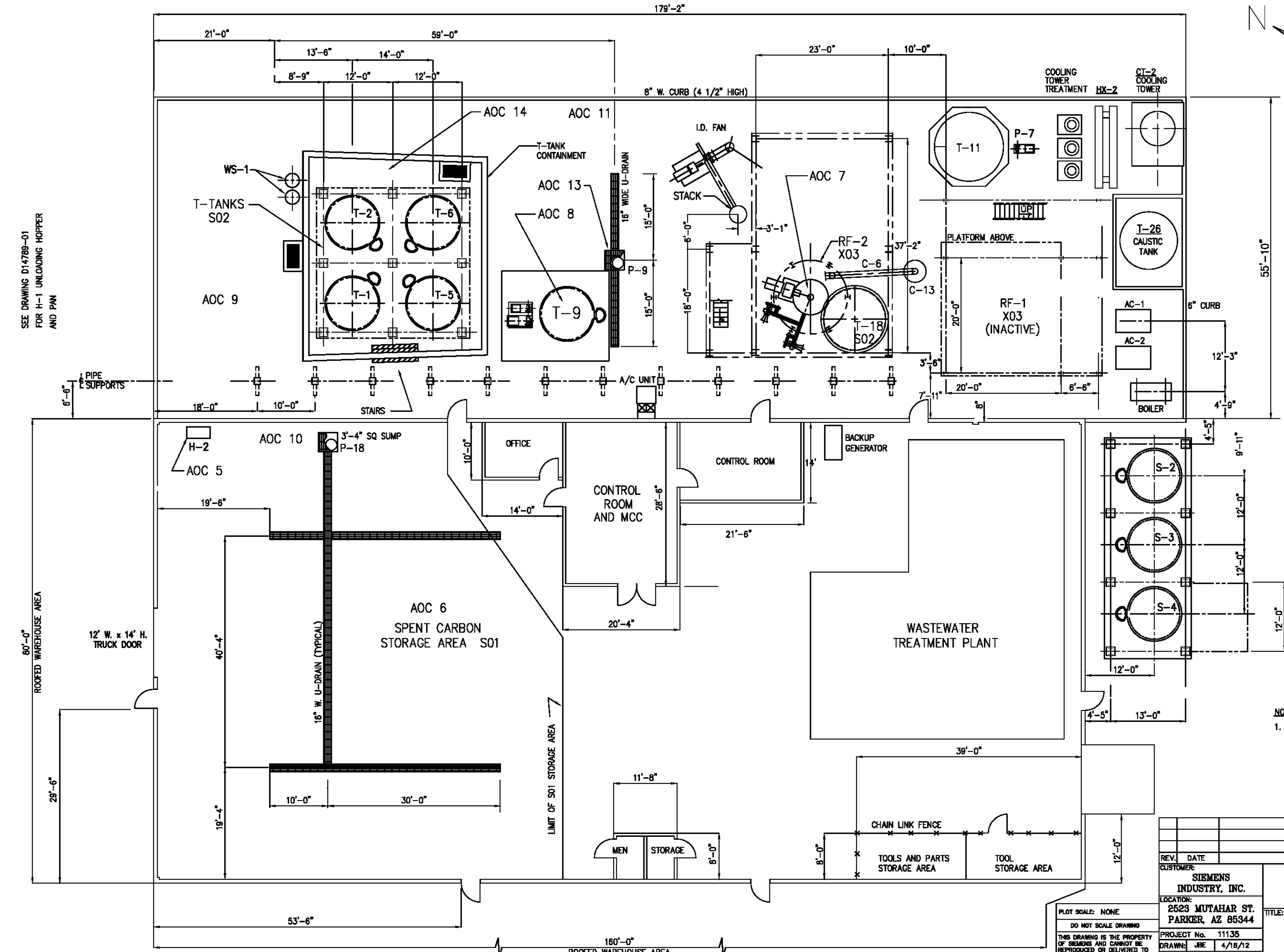
TITLE: REACTIVATION FACILITY HWMU LOCATION – FIGURE J-4

PART No.

DWG No. D14789-13 REV. 0

PRINT DATE: 4/18/12

DWG: D14789-14



Areas of Concern

1. Spent carbon unloading and transfer area.
2. Tank area concrete containment pad.
3. Receiving area/pad.
4. Hopper H-1 loading/unloading area.
5. Hopper H-2 loading/unloading area.
6. Spent carbon storage warehouse.
7. Furnace feed systems.
8. Recycled motive water tank T-9.
9. Rainwater, dewatering screw, and motive water tank T-12.
10. Spent carbon storage warehouse barrel washer.
11. Bermed containment area in process area.
12. Sump by unloading hopper H-1.
13. Sump by tank T-9.
14. Spent carbon storage tanks and carbon adsorbers.

NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No. 11135

DRAWN:	JBE	4/18/12
CHK'D:	KEM	4/18/12
ENG'R:		

SIEMENS INDUSTRY, INC.
Parker, AZ

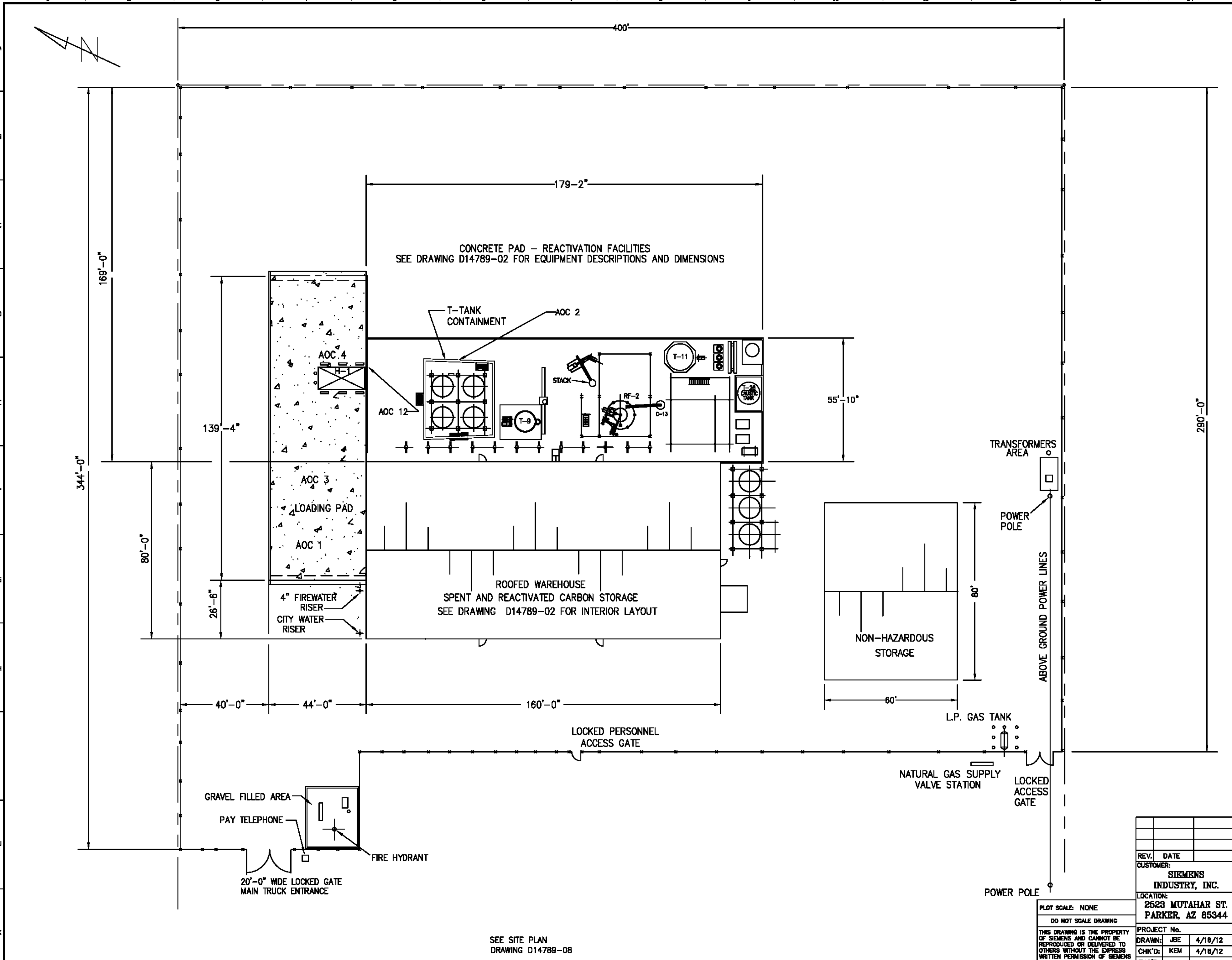
TITLE: REACTIVATION FACILITY
AOC LOCATION – FIGURE J-5

PART No.

DWG No. D14789-14 REV. 0

PRINT DATE: 4/18/12

DWG: D14789-15



Areas of Concern

1. Spent carbon unloading and transfer area.
2. Tank area concrete containment pad.
3. Receiving area/pad.
4. Hopper H-1 loading/unloading area.
5. Hopper H-2 loading/unloading area.
6. Spent carbon storage warehouse.
7. Furnace feed systems.
8. Recycled motive water tank T-9.
9. Rainwater, dewatering screw, and motive water tank T-12.
10. Spent carbon storage warehouse barrel washer.
11. Bermed containment area in process area.
12. Sump by unloading hopper H-1.
13. Sump by tank T-9.
14. Spent carbon storage tanks and carbon adsorbers.

NOTES:

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REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No.

DRAWN:	JBE	4/18/12
CHK'D:	KEM	4/18/12
ENG'R:		

SIEMENS INDUSTRY, INC..
Parker, AZ

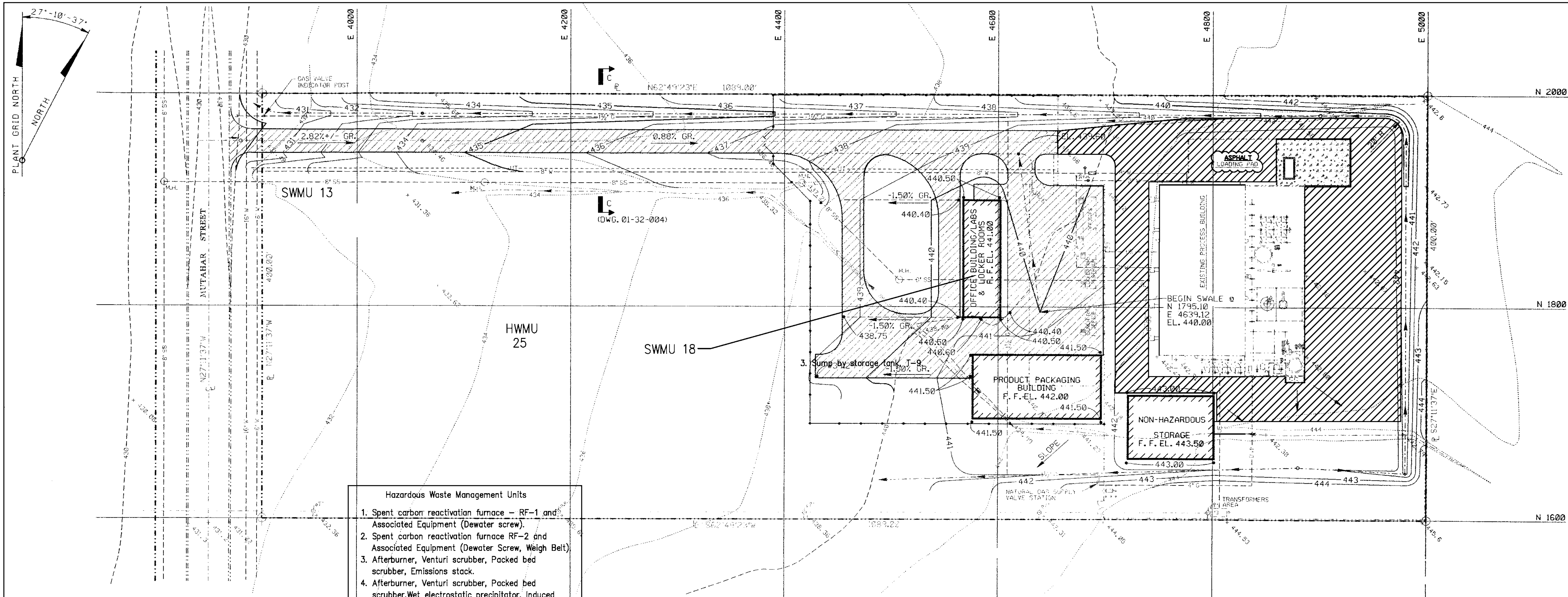
TITLE: REACTIVATION FACILITY AOC LOCATION – FIGURE J-6

PART No.

DWG No. D14789-15 REV. 0

PRINT DATE: 4/18/12

DWG: D14789-16



Hazardous Waste Management Units

1. Spent carbon reactivation furnace – RF-1 and Associated Equipment (Dewater screw).
2. Spent carbon reactivation furnace RF-2 and Associated Equipment (Dewater Screw, Weigh Belt).
3. Afterburner, Venturi scrubber, Packed bed scrubber, Emissions stack.
4. Afterburner, Venturi scrubber, Packed bed scrubber, Wet electrostatic precipitator, Induced draft fan, Emissions stack.
5. Spent carbon unloading hopper H-1.
6. Spent carbon unloading hopper H-2.
7. Hopper air pollution control equipment piping and baghouse.
8. Spent carbon slurry and recycle water transfer system.
9. Spent carbon storage warehouse.
10. Spent carbon slurry storage tank, T-1.
11. Spent carbon slurry storage tank, T-2.
12. Spent carbon slurry storage tank, T-5.
13. Spent carbon slurry storage tank, T-6.
14. Furnace Feed System Tank T-8, and Ancillary Equipment
15. T-18 and Ancillary Equipment.
16. Wastewater conveyance piping to wastewater treatment tank.
17. Spent carbon storage warehouse barrel washer.
18. Carbon adsorber – PV1000.
19. Carbon adsorber WS-1.
20. Carbon adsorber WS-2.
21. Carbon adsorber WS-3.
22. Slurry transfer inclined plate settler tank.
23. Scrubber recycle tank T-17
24. Filter press.
25. New Facility Discharge Piping System.

Solid Waste Management Units

1. Bermed containment in process area.
2. Sump by H-1.
3. Sump by storage tank, T-9.
4. Recycle water tank, T-9.
5. Rainwater/Recycle water tank, T-12.
6. Wastewater tank, T-11 system.
7. Sump by cooling screw.
8. RF-2 Scrubber water equalization tank, T-19.
9. Hazardous waste debris bin.
10. Spent carbon storage warehouse grated trenches and sump.
11. Hopper containment pad
12. WWTP.
13. Wastewater lift station and piping system (old).
14. Spent carbon unloading area containment pad.
15. Satellite Accumulation Area
16. Satellite Accumulation Area
17. Satellite Accumulation Area
18. Satellite Accumulation Area
19. Satellite Accumulation Area

Areas of Concern

1. Spent carbon unloading and transfer area.
2. Tank area concrete containment pad.
3. Receiving area/pad.
4. Hopper H-1 loading/unloading area.
5. Hopper H-2 loading/unloading area.
6. Spent carbon storage warehouse.
7. Furnace feed systems.
8. Recycled motive water tank T-9.
9. Rainwater, dewatering screw, and motive water tank T-12.
10. Spent carbon storage warehouse barrel washer.
11. Bermed containment area in process area.
12. Sump by unloading hopper H-1.
13. Sump by tank T-9.
14. Spent carbon storage tanks and carbon adsorbers.

100'
SCALE

NOTES:

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2. THIS DRAWING IS BASED ON PARKER FACILITY DRAWING 01-32-002P

NO	DWN	CK'D	APP	REVISIONS	DATE
1	JBE			CHANGE TO EVOQUA, UPDATE SWMUs	12/12/14

CBE CHAVOND-BARRY ENGINEERING CORP.
400 Route 518 • P.O. Box 205 • Blawenburg, New Jersey 08504

EVOQUA WATER TECHNOLOGIES LLC
PARKER, AZ

REACTIVATION FACILITY
SWMU, HWMU, AND AOC LOCATION
FIGURE J-7

DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
JBE	4/18/12	KEM	4/18/12		

SCALE	DWG. NO.	REV.
AS SHOWN	D14789-16	1

PRINT DATE: 12/15/14

SECTION
K

OTHER FEDERAL LAWS

Siemens Industry, Inc.
2523 Mutahar Street
Parker, Arizona 85344

Revision 1
April 2012

TABLE OF CONTENTS

K.1 OTHER FEDERAL LAWS

A list of Federal laws that may apply to the issuance of a RCRA Treatment, Storage, and Disposal Facility Permit is listed in 40 CFR Part 270.3, Considerations under Federal Law. The list is as follows.

1. The Wild and Scenic Rivers Act. 16 U.S.C. 1273 et seq.
2. The National Historic Preservation Act of 1966. 16 U.S.C. 470 et seq.
3. The Endangered Species Act. 16 U.S.C. 1531 et seq.
4. The Coastal Zone Management Act. 16 U.S.C. 1451 et seq.
5. The Fish and Wildlife Coordination Act 16 U.S.C. 661 et seq.

From this list, only the National Historic Preservation Act applies to the Siemens Industry, Inc. Parker facility. The Agency is currently in the process of finalizing the “Area of Potential Effect” and will make a determination if the facility or the Agency’s permitting decision will have an impact on historic properties.

The National Environmental Policy Act (40 CFR 1500-1508) has also been applied to this facility, and an Environmental Assessment was conducted resulting in a “Finding of No Significant Impact”.

SECTION
L

CERTIFICATION

Evoqua Water Technologies
2523 Mutahar Street
Parker, Arizona 85344

Revision 3
April 2016

TABLE OF CONTENTS

Section **Page**

L.1 CERTIFICATION

This section meets the requirements for signatories to permit applications as specified by 40 CFR 270.11.

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Evoqua Water Technologies LLC — AZD 982 441 263

Facility Name — USEPA Identification Number

March 17, 2016

(Owner/Operator Signature) — (Date signed)

Christopher Rinaldi, Vice President & General Manager
(Name and Official Title, print or type)

The Colorado River Indian Tribes certifies under penalty of law that it understands that this application is being submitted for the purpose of obtaining a permit to operate a facility to receive, store, treat, recycle, repackage and subsequently transport hazardous waste. I understand fully that the Colorado River Indian Tribes, as the beneficial landowner pursuant to P.L. 88-302, and Evoqua Water Technologies LLC, the lessee of the land and owner of certain fixtures located thereon, are jointly and severally responsible for compliance with applicable provisions of RCRA, its implementing regulation and any permit issued pursuant to the application and those regulations.

(Property Owner Signature) — (Date signed)

(Name and Official Title, print or type)

COLORADO RIVER INDIAN TRIBES

Colorado River Indian Reservation

26600 MOHAVE ROAD
PARKER, ARIZONA 85344
TELEPHONE (928) 669-1220
FAX (928) 669-1216

April 25, 2016

United States Environmental Protection Agency
Region IX
Jeff Scott, Land Division Director
75 Hawthorne Street
San Francisco, CA 94105-3901

RE: Evoqua Water Technologies, LLC RCRA Hazardous Waste Permit

Dear Mr. Scott:

The Colorado River Indian Tribes (CRIT) writes to inform the U.S. Environmental Protection Agency (EPA or Agency) that it has approved the endorsement of its 2009 signature on the RCRA Hazardous Waste Part B Permit Application Certification for the Evoqua Water Technologies, LLC facility in Parker, AZ. The resolution of Tribal Council endorsing the prior signature is attached along with a copy of the original Part B Permit Application Certification signature page. CRIT expects the EPA to continue to maintain regular communications and government-to-government consultation with CRIT regarding the status of the RCRA permit as outlined in your letter of March 7, 2016. If you have any questions regarding this letter please contact Rebecca A. Loudbear, Attorney General, at (928) 669-1271.

Sincerely,

COLORADO RIVER INDIAN TRIBES

Dennis Patch
Chairman

cc: CRIT Tribal Council
Rebecca A. Loudbear, CRIT Attorney General
Wilfred Nabahe, CRIT EPO Director
MimiNewton, EPA Region 9 Assistant Regional Counsel (via email)

Resolution No. **138-16**

RESOLUTION

COLORADO RIVER TRIBAL COUNCIL

A Resolution to Endorse Previous Signature on Evoqua Water Technologies, LLC RCRA Part B Permit Application

Be it resolved by the Tribal Council of the Colorado River Indian Tribes, in *special* meeting assembled

on April 8, 2016.

WHEREAS, the Colorado River Indian Tribes (hereinafter "CRIT" or "Tribe") is a federally recognized Indian Tribe, duly organized with a tribal governing body known as the Tribal Council according to the provisions contained in the Indian Reorganization Act of June 18, 1934; and

WHEREAS, Article VI, Section 1(e) of the Constitution of the Colorado River Indian Tribes authorizes the Tribal Council to negotiate and enter into business contracts and ventures for the economic benefit of the Tribe; and

WHEREAS, On October 26, 2009, the Tribal Council adopted Resolution No. 303-09 approving an Indemnification Agreement with Siemens Water Technologies Corporation, now Evoqua Water Technologies, LLC ("Evoqua"), through its predecessors, and the Tribes have previously entered into a business lease under which Evoqua has leased a parcel of land in the Tribe's Industrial Park for the purpose of operating a carbon reactivation plant ("Facility") that reactivates spent carbon; and

WHEREAS, the Facility is subject to regulation by the United States under the Resources Conservation and Recovery Act and its implementing regulations ("RCRA"); and

WHEREAS, the Facility has been operating in interim status under RCRA and pursuant to those requirements, Evoqua has completed and is prepared to submit a permit application under Part B of the RCRA; and

The foregoing resolution was on April 8, 2016 duly approved by a vote of 6 for, 0 against and 0 abstaining, by the Tribal Council of the Colorado River Indian Tribes, pursuant to authority vested in it by Sections 1.e., Article VI of the Constitution and By laws of the Tribes, ratified by the Tribes on March 1, 1975 and approved by the Secretary of the Interior on May 29, 1975, pursuant to Section 16 of the Act of June 18, 1934, (46 Stat. 984). This resolution is effective as of the date of its adoption.

COLORADO RIVER TRIBAL COUNCIL

By

____
Chairman Acting

____
Secretary Acting

WHEREAS, the Tribe as landowner, must certify the permit application before it can be submitted to the United States Environmental Protection Agency ("EPA"); and

WHEREAS, the Facility is subject to concurrent regulation under the federal RCRA and the Tribes' Environmental Protection Agency ("EPA"); and

WHEREAS, the Tribal Council has executed an Indemnification Agreement with Evoqua and Agreement By and Between Evoqua Water Technologies LLC and CRIT as authorized by Resolution No. 92-16.

NOW, THEREFORE, BE IT RESOLVED by the Tribal Council of the Colorado River Indian Tribes to endorse the previous December 9, 2009 signature on the Evoqua Water Technologies, LLC RCRA Part B Permit Application; and

BE IT FURTHER RESOLVED Evoqua has executed an Indemnification Agreement, to defend and hold harmless the Tribes against certain legal actions that may be brought by the EPA; and

BE IT FURTHER AND FINALLY RESOLVED the Tribal Council Chairman or Secretary, or their designated representatives, are hereby authorized and directed to execute any and all documents necessary to implement this Resolution.

L.1 CERTIFICATION

This section meets the requirements for signatories to permit applications as specified by 40 CFR 270.11.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Facility Name	**USEPA Identification Number**
Siemens Water Technologies Corporation	AZD 982 441 263

(Owner/Operator Signature) (Date signed)

(Name and Official Title, print or type)

The Colorado River Indian Tribes certifies under penalty of law that it understands that this application is being submitted for the purpose of obtaining a permit to operate a facility to receive, store, treat, recycle, repackage and subsequently transport hazardous waste. I understand fully that the Colorado River Indian Tribes, as the beneficial landowner pursuant to P.L. 88-302, and Siemens Water Technologies Corporation, the lessee of the land and owner of certain fixtures located thereon, are jointly and severally responsible for compliance with applicable provisions of RCRA, its implementing regulations and any permit issued pursuant to the application and those regulations.

12/09/09

(Property Owner Signature) (Date signed)

ELDRED ENAS TRIBAL CHAIRMAN

(Name and Official Title, print or type)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

CERTIFIED US MAIL: 7000 0520 0025 3714 5177
RETURN RECEIPT REQUESTED

MAR 07 2016

Chairman Dennis Patch
Colorado River Indian Tribes
26600 Mohave Road,
Parker, Arizona 85344
dennis.patch@crit-nsn.gov

Dear Chairman Patch:

During August 2014, the U.S. Environmental Protection Agency (EPA or Agency) initiated tribal consultation with the Colorado River Indian Tribes (CRIT) with respect to the RCRA Hazardous Waste Permit Application submitted to EPA for a carbon regeneration facility on CRIT land, which is operated by Evoqua Water Technologies, LLC (Evoqua).

Signature Request

The enclosed letter pertains to the status of the Evoqua RCRA Hazardous Waste Permit Application and is directed to both CRIT and Evoqua. Briefly, it requests both parties submit signatures, which constitute the final pieces of the Part B Permit Application. For CRIT, we understand CRIT's desire to wait until all the other pieces of the application were in place before providing either its endorsement of the signature previously provided in 2009 or a renewed signature. We recognize that CRIT could also decide neither to endorse its previous signature nor sign the application anew.

Without the signatures of both the land "owner" and facility "operator," the Permit Application is incomplete. Therefore, the enclosed letter formally requests these outstanding pieces of the Permit Application from CRIT and Evoqua. We are seeking the information no later than April 25, 2016 so that we may proceed to the next phase of the permitting process.

If the final pieces of the RCRA Part B Permit Application are received within the requested time period, EPA can make a "completeness determination" for the Permit Application in accordance with Title 40 of the Code of Federal Regulations (40 CFR) Section 270.10(c). If EPA determines that the application is complete, EPA will publish the availability of the entire Permit Application to the public in accordance with 40 CFR Section 124.32(b). However, if the Permit Application is determined to be incomplete, the Agency may determine that it is appropriate to propose a denial of the application in accordance with 40 CFR Section 124.3(d).

Once a proposed permit decision to either grant or deny the permit application is published, a 45-day public comment period will begin. During that time CRIT, Evoqua, and the public at large can review the proposed permit decision and EPA's Administrative Record supporting it. EPA will host a Public Meeting and a Public Hearing for the community to answer questions and hear comments on the proposed permit decision.

Status of EPA Consultation with CRIT

EPA regards its formal consultation with CRIT as a critical part of the RCRA permitting process for the Evoqua facility. CRIT's status as the beneficial landowner of the trust land on which the facility is located makes that consultation process all the more significant. We hope that our efforts to reach out to CRIT through its Council, its Environmental Protection Office, and its Attorney General's Office have been meaningful and that the Agency has been responsive in answering the questions and concerns that Tribal representatives have raised.

Since EPA initiated formal Tribal consultation in the letter dated August 28, 2014, EPA made two presentations about the facility and the Permit Application to the CRIT Council, one on September 22, 2014, and another on March 12, 2015. CRIT and the Agency have corresponded about the facility in letters from EPA to CRIT dated January 27, 2015, February 12, 2015, March 5, 2015 and April 16, 2015, as well as in letters from CRIT to EPA dated February 19, 2015 and October 20, 2015. EPA staff have also had monthly calls with the CRIT Environmental Protection Office and periodic communication with the CRIT Attorney General's office.

On March 12, 2015 EPA reached out to the Tribal and Parker communities by holding an informational public meeting at the Parker Community Senior Center. EPA answered questions and provided the audience with information on how to get involved during the public comment period and public meeting/public hearing that will be held after the agency announces the draft permit decision.

As we near the time to make a "completeness determination" on the RCRA Part B Permit Application, we would like to bring this phase of the formal consultation process with CRIT to a close by April 25, 2016. The meetings and letters that have to date formed our formal consultation have resulted in EPA's understanding that the Council is reserving its decision regarding endorsement of the application, either through submittal of a new Tribal signature, endorsement of the 2009 signature, or declining to sign the permit application. The enclosed letter requests that CRIT make this decision and inform EPA of its decision by no later than April 25, 2016.

I want to reassure you that EPA and CRIT's lines of communication concerning this facility will remain open beyond the closeout of the current formal Tribal consultation. Per the March 5, 2015 letter, a separate formal consultation will occur in advance of a final permit decision. If a permit is issued, EPA will continue regular communication and coordination regarding hazardous waste management at the facility with the Tribal Council. We suggest that together we plan for EPA representatives to brief the Council regarding the Evoqua facility at least annually.

If there are pending technical or procedural questions that CRIT feels remain unanswered by EPA, we encourage CRIT to communicate those issues to the Agency as soon as possible. We will continue to address any and all matters raised by CRIT with respect to this facility, both during the consultation process and as issues, decisions or questions arise.

If you have any questions about this letter, please feel free to contact me at (415) 972-3311 or contact Barbara Gross, Manager of the Permits Section, at (415) 972-3972.

Sincerely,

for Jeff Scott,
Director, Land Division

cc: Keith Moses, Vice Chairman, CRIT Tribal Council (via email)
Amanda Barerra, Secretary, CRIT Tribal Council (via email)
Valerie Welsh-Tahbo, Treasurer, CRIT Tribal Council (via email)
Johnny Hill, Jr., Council Member, CRIT Tribal Council (via email)
Johnson Fisher, Council Member, CRIT Tribal Council (via email)
Amelia Flores, Council Member, CRIT Tribal Council (via email)
Herman Laffoon, Council Member, CRIT Tribal Council (via email)
Granthum Stevens, Council Member, CRIT Tribal Council (via email)
Wilfred Nabahe, Director, CRIT Environmental Protection Office (via email)
Rebecca Loudbear, Attorney General, CRIT (via email)
Tom Huetteman (via email)
Barbara Gross (via email)

SECTION
M

SUBPART AA PROCESS VENTS

Siemens Industry, Inc.
2523 Mutahar Street
Parker, Arizona 85344

Revision 1
April 2012

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Section **Page**

M.1 SUBPART AA PROCESS VENTS

Siemens Industry, Inc. does not have any hazardous waste management units with process vents subject to the requirements of 264 Subpart AA and 270.24 (Air Emission Standards for Process Vents). Therefore, this section of the RCRA Part B Permit Application is not applicable.

SECTION
N

SUBPART BB EQUIPMENT LEAKS

Siemens Industry, Inc.
2523 Mutahar Street
Parker, Arizona 85344

Revision 1
April 2012

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LIST OF CITED APPENDICES

Appendix

N.1 SUBPART BB EQUIPMENT LEAKS

The Subpart BB regulations are applicable to equipment that contains or contacts hazardous wastes with organic concentrations of at least ten (10) percent by weight.

The Subpart BB regulations further define equipment as being in light liquid service, gas/vapor service, and heavy liquid service. The Parker facility has determined that the Subpart BB requirements are not applicable, based on the characteristics of the spent carbon managed at the facility. This determination is based on review of waste profile information, in accordance with the requirements of 264.1063(d)(2).

A RCRA Subpart BB Compliance Plan is included in Appendix XIX of the Part B Permit Application.

SECTION O

SUBPART CC AIR EMISSION STANDARDS

Evoqua Water Technologies
2523 Mutahar Street
Parker, Arizona 85344

Revision 2
July 2014

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LIST OF CITED APPENDICES

O.1 SUBPART CC AIR EMISSION STANDARDS

The Evoqua Water Technologies Parker facility manages all tanks and containers regulated by the requirements of Subpart CC as specified in Section O. The Subpart CC Compliance Plan is located in Appendix XX.

SECTION P

EXPOSURE INFORMATION

Siemens Industry, Inc.
2523 Mutahar Street
Parker, Arizona 85344

Revision 1
April 2012

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LIST OF CITED APPENDICES

Appendix

P.1 INTRODUCTION

40 CFR 270.10(j) requires the submittal of information on the potential for the public to be exposed to releases. At a Minimum, this must include:

- Reasonably foreseeable potential releases
- Potential pathways of human exposure
- Potential magnitude and nature of exposure

While the federal requirement only applies to surface impoundments and land disposal units, which are not part of the SII Parker facility, the EPA has required SII to conduct human health and ecological risk assessments on emissions from the facility.

These assessments were conducted utilizing the results of the Performance Demonstration Testing that has been conducted at the facility. The approved risk assessment results are included in Appendix XI.

SECTION Q

SUBPART FF BENZENE NESHAP COMPLIANCE

Evoqua Water Technologies
2523 Mutahar Street
Parker, Arizona 85344

Revision 1
March 2014

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LIST OF CITED APPENDICES

Appendix

O.1 SUBPART CC AIR EMISSION STANDARDS

The Evoqua Water Technologies Parker facility manages all tanks and containers regulated by the requirements of Subpart CC as specified in Section O. The Subpart CC Compliance Plan is located in Appendix XX.

APPENDIX I

RCRA PART A

PERMIT APPLICATION

FOR

SIEMENS INDUSTRY, INC.

PARKER REACTIVATION FACILITY

PARKER, ARIZONA

Revision 1
April 2012

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TAB

REVISED RCRA PART A PERMIT APPLICATION

WESTATES carbon

ARIZONA

PARKER, ARIZONA

OCTOBER 1996

REVISED RCRA

PART A

PERMIT APPLICATION

FOR

WESTATES CARBON - ARIZONA, INC.

PARKER REACTIVATION FACILITY

PARKER, ARIZONA

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1.0 INTRODUCTION

WCAI is submitting a revised Part A permit application to reflect current facility operations.

Revisions include the following.

1 .Revision of the process flow diagram (Drawing No. 11135-002) to reflect recent facility modifications.

   a. Addition of existing overflow lines, from spent carbon storage tanks (T-1, T-2, T-5, and T-6) to Recycle Water Tank (T-12), to the process flow diagram (Drawing No. 11135-002). These overflow lines were installed during the initial construction of the facility, but were inadvertently omitted from the process flow diagram.

   b. Proposed addition of a water treatment system for recycle water as part of the facility's exempt wastewater treatment system. This system constitutes a wastwater treatment unit that is exempt from the requirements of Parts 264 and 265 in accordance with 40 CFR Part 264, §264.1(g)(6) and 40 CFR Part 265, §265.1(c)(10).

   c. Proposed addition of a third spent carbon feed hopper.

2. The reference to the process flow diagram number on page 3 of 7 (Section XI) of the Part A application form and the Index Attachments found at Tab 5 have been corrected to read 11135-002.

3. Revision of the general facility layout to indicate the change in designation of some of the equipment. While the function of the equipment has not changed, the new designations better describe their functions. The new designations are listed in Table 1.

   The redesignation of the Rainwater Collection Tank reflects the fact that rainwater collected in the tank is used as recycle water.

4. Submittal of a current photograph of Reactivation Unit No. 1 (RF-1), identified as Process Code T04 on page 4 of 7 (Section XII) of the Part A application form. The photograph is included in Attachment D (Tab 7).

TABLE 1	
Old Designation	Current Designation
Carbon Regeneration Unit No. 1 (CRU-1)	Carbon Reactivation Unit No. 1 (RF-1)
Carbon Regeneration Unit No. 1 (CRU-2)	Carbon Reactivation Unit No. 2 (RF-2)
Water Storage Tank (T-9)	Recycle Water Storage Tank (T-9)
Rainwater Collection Tank (T-12)	Recycle Water Storage Tank (T-12)
Industrial Sewer Surge Tank (T-11)	Equalization Tank (T-11)
Process Feed Tank (T-1)	Spent Carbon Storage Tank (T-1)
Process Feed Tank (T-2)	Spent Carbon Storage Tank (T-2)
Process Feed Tank (T-5)	Spent Carbon Storage Tank (T-5)
Process Feed Tank (T-6)	Spent Carbon Storage Tank (T-6)
Process Feed Tank (T-8)	Reactivation Unit No. 1 Feed Tank (T-8)

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GSA No. 0246-EPA-OT

For EPA Regional Use Only

Date Received

Month | Day | Year

EPA

United States Environmental Protection Agency
Washington, DC 20460

Hazardous Waste Permit Application Part A

(Read the Instructions before starting)

For State Use Only

I. ID Number(s)

A. EPA ID Number: A Z D 9 8 2 4 4 1 2 6 3

B. Secondary ID Number *(if applicable)*:

II. Name of Facility: W E S T A T E S C A R B O N - A R I Z O N A I N C .

III. Facility Location *(Physical address not P.O. Box or Route Number)*

A. Street: 2 5 2 3 M U T A H A R S T R E E T

Street *(continued)*:

City or Town: P A R K E R | **State**: A Z | **ZIP Code**: 8 5 3 4 4 - 4 0 0 5

County Code *(if known)*: | **County Name**: L A P A Z

B. Land Type *(enter code)*: I

C. Geographic Location
LATITUDE (degrees, minutes, & seconds): 3 4 0 7 5 0 N
LONGITUDE (degrees, minutes, & seconds): 1 1 4 1 6 2 2 W

D. Facility Existence Date Month: 0 8 Day: 0 5 Year: 9 1

IV. Facility Mailing Address

Street or P. O. Box: P O B O X E

City or Town: P A R K E R | **State**: A Z | **ZIP Code**: 8 5 3 4 4 - 4 0 0 5

V. Facility Contact *(Person to be contacted regarding waste activities at facility)*

Name *(last)*: M c C U E | *(first)*: M O N T E

Job Title: P L A N T M A N A G E R | **Phone Number** *(area code and number)*: 6 0 2 - 6 6 9 - 5 7 5 8

V. Facility Contact Address *(See Instructions)*

Contract Address *Location*: | *Mailing*: X

B. Street or P. O. Box:

City or Town: | **State**: | **ZIP Code**:

Please print or type with ELITE type (12 characters per inch) in the unshaded areas only

EPA I.D. Number *(enter from page 1)*: A Z D 9 8 2 4 4 1 2 6 3

Secondary ID Number *(enter from page 1)*:

VII. Operator Information *(see Instructions)*

Name of Operator: WESTATES CARBON-ARIZONA INC.

Street or P.O. Box: 2523 MUTAHAR STREET

City or Town: PARKER | **State**: AZ | **Zip Code**: 85344-4005

Phone Number *(area code and number)*: 602-669-5758

B. Operator Type: P

C. Change of Operator Indicator: Yes [ ] No [X]

Date Changed (Month / Day / Year):

VIII. Facility Owner *(see Instructions)*

A. Name of Facility's Legal Owner: SEE ATTACHMENT A

Street or P.O. Box:

City or Town: | **State**: | **Zip Code**: -

Phone Number *(area code and number)*:

B. Owner Type:

C. Change of Owner Indicator: Yes [ ] No [ ]

Date Changed (Month / Day / Year):

IX. SIC Codes *(4-digit, in order of significance)*

Primary	*(description)*	Secondary	*(description)*
4953	REFUSE SYSTEMS	9999	OTHERWISE UNCLASSIFIABLE ESTABLISHMENTS

X. Other Environmental Permits *(see Instructions)*

A. Permit Type *(enter code)*	B. Permit Number	C. Description
E	1001-93	Municipal Indust. Sewer Dischg. Permit
P	EXEMPT	PSD Permit (Minor Source)
E	B1122-CR 30.7	CRIT BUSINESS LEASE

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GSA No. 0246-EPA-OT

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EPA I.D. Number *(enter from page 1)*: A Z D 9 8 2 4 4 1 2 6 3

Secondary ID Number *(enter from page 1)*:

XI. Nature of Business *(provide a brief description)*

Westates Carbon-Arizona, Inc. receives spent (used) activated carbon from its customers. These spent carbons arrive at the Parker facility in a variety of DOT approved containers; including: barrels, drums, portable tanks, bulk-bags, and bulk truck units. Some, but not all, spent carbons are received as manifested hazardous waste materials.

Received spent carbons are thermally reactivated in one of two furnaces. Reactivated carbons are certified non-hazardous and then shipped for recycling and/or reuse. This reactivation process is sketched in a Schematic Block Process Flow Diagram attached as Drawing No. 11135-002.

Incidental to the reactivation process is the management of container storage (area S01); spent carbon storage tanks (area S02); reactivation and reactivation off-gas treatment (area T04); and the non-hazardous slurry transfer water (recycle water) system, wastewater treatment system, rainwater collection system, and reactivated carbon product storage and shipping.

XII. Process - Codes and Design Capacities

A. PROCESS CODE - *Enter the code from the list of process codes below that best describes each process to be used at the facility. Twelve lines are provided for entering codes. If more lines are needed, attach a separate sheet of paper with the additional information. If a process will be used that is not included in the list of codes below, then describe the process (including its design capacity) in the space provided in Item XIII.*

B. PROCESS DESIGN CAPACITY - *For each code entered in column A, enter the capacity of the process.*

1. AMOUNT - *Enter the amount. In a case where design capacity is not applicable (such as in a closure/post-closure or enforcement action) enter the total amount of waste for that process unit.*
2. UNIT OF MEASURE - *For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.*

C. PROCESS TOTAL NUMBER OF UNITS - *Enter the total number of units used with the corresponding process code.*

PROCESS CODE	PROCESS	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
	DISPOSAL:	
D79	INJECTION WELL	GALLONS; LITERS; GALLONS PER DAY; OR LITERS PER DAY
D80	LANDFILL	ACRE-FEET OR HECTARE-METER
D81	LAND APPLICATION	ACRES OR HECTARES
D82	OCEAN DISPOSAL	GALLONS PER DAY OR LITERS PER DAY
D83	SURFACE IMPOUNDMENT	GALLONS OR LITERS
	STORAGE:	
S01	CONTAINER (barrel, drum, etc.)	GALLONS OR LITERS
S02	TANK	GALLONS OR LITERS
S03	WASTE PILE	CUBIC YARDS OR CUBIC METERS
S04	SURFACE IMPOUNDMENT	GALLONS OR LITERS
	TREATMENT:	
T01	TANK	GALLONS PER DAY OR LITERS PER DAY
T02	SURFACE IMPOUNDMENT	GALLONS PER DAY OR LITERS PER DAY
T03	INCINERATOR	SHORT TONS PER HOUR; METRIC TONS PER HOUR; GALLONS PER HOUR; LITERS PER HOUR; OR BTUS PER HOUR
T04	OTHER TREATMENT (Use for physical, chemical, thermal or biological treatment processess not occurring in tanks, surface impoindment or incinerators. Describe the processes in the space provided in Item XIII.)	GALLONS PER DAY; LITERS PER DAY; POUNDS PER HOUR; SHORT TONS PER HOUR; KILOGRAMS PER HOUR; METRIC TONS PER DAY; METRIC TONS PER HOUR; OR SHORT TONS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
GALLONS PER HOUR	E
GALLONS PER DAY	U
LITERS	L
LITERS PER HOUR	H
LITERS PER DAY	V
SHORT TONS PER HOUR	D
METRIC TONS PER HOUR	W
SHORT TONS PER DAY	N
METRIC TONS PER DAY	S
POUNDS PER HOUR	J
KILOGRAMS PER HOUR	R
CUBIC YARDS	Y
CUBIC METERS	C
ACRES	B
ACRE-FEET	A
HECTARES	Q
HECTARE-METER	F
BTUS PER HOUR	K

EPA I.D. Number ***(enter from page 1)***: A Z D 9 8 2 4 4 1 2 6 3

Secondary ID Number ***(enter from page 1)***:

XII. Process - Codes and Design Capacities *(continued)*

EXAMPLE FOR COMPLETING ITEM XII (shown in line numbers X-1 and X-2 below): A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons. The facility also has an incinerator that can burn up to 20 gallons per hour.

Line Number		A. PROCESS CODE (from list above)			B. PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	2. UNIT OF MEASURE (enter code)	C. PROCESS TOTAL NUMBERS OF UNITS			FOR OFFICIAL USE ONLY				
X	1	S	0	2	600	G	0	0	2					
X	2	T	0	3	20	E	0	0	1					
	1	S	0	1	200,000	G	0	0	2					
	2	S	0	2	35,000	G	0	0	5					
	3	T	0	4	4,140	J	0	0	2					
	4													
	5													
	6													
	7													
	8													
	9													
	0													
1	1													
1	2													

NOTE: If you need to list more than 12 process codes, attach an additional sheet(s) with the information in the same format as above. Number the lines sequentially, taking into account any lines that will be used for additional treatment processes in Item XIII.

XIII. Additional Treatment Processes *(follow instructions from Item XII)*

Line Number (enter numbers in sequence with Item XII)		A. PROCESS CODE			B. TREATMENT PROCESS DESIGN CAPACITY 1. AMOUNT (specify)	2. UNIT OF MEASURE (enter code)	C. PROCESS TOTAL NUMBER OF UNITS			D. DESCRIPTION OF PROCESS
		T	0	4						
		T	0	4						
		T	0	4						
		T	0	4						

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GSA No. 0246-EPA-OT

EPA I.D. Number ***(enter from page 1)***

A Z D 9 8 2 4 4 1 2 6 3

Secondary ID Number ***(enter from page 1)***

XIV. Description of Hazardous Wastes

A. EPA HAZARDOUS WASTE NUMBER - *Enter the four-digit number from 40 CFR, Part 261 Subpart D of each listed hazardous waste you will handle. For hazardous wastes which are not listed in 40 CFR, Part 261 Subpart D, enter the four-digit number(s) from 40 CFR, Part 261 Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.*

B. ESTIMATED ANNUAL QUANTITY - *For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.*

C. UNIT OF MEASURE - *For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:*

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed hazardous waste: For each listed hazardous entered in column A select the code(s) from the list of process codes contained in Item XII A. on page 3 to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non-listed hazardous waste: For each characteristic or toxic contaminant entered in column A select the code(s) from the list of process codes contained in Item XII A. on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed hazardous wastes that processes that characteristic or toxic contaminant.

NOTE: THREE SPACES ARE PROVIDED FOR ENTERING PROCESS CODES. IF MORE ARE NEEDED:
1. Enter the first two as described above.
2. Enter "000" in the extreme right box of Item XIV-D(I).
3.space provided on page 7, Item XIV-E, the line number and the additional code(s).

2. PROCESS DESCRIPTION: *a code is not listed for a process that will be used, describe the proces in the space provided on the form (D(2)).*

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER - Hazardous wastes that can be described by more than one EPA Hazardous Waste Number shall be described on the form as follows:
1. Select one of the EPA Hazardous Waste Numbers and enter it in column A. On the same line complete columns B,C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2.line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In column D(2) on that line enter "included with above" and make no other entries on that line.
3each EPA Hazardous Waste Number that can be used to describe the hazardous waste.

COMPLETING ITEM XIV (shown in line numbers X-1, X-2, X-3, and X-4 below) - A facility will treat and dispose of an ounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

Line Number		A. EPA HAZARD WASTE NO. (enter code)				B.ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter	D. PROCESS (1) PROCESS CODES (enter) code)									(2) PROCESS DESCRIPTION (if a code is not entered in D(1)
X	1	K	0	5	4	900	P	7	0	3	D	8	0				
X	2	D	0	0	2	400	P	7	0	3	D	8	0				
X	3	D	0	0	1	100	P	7	0	3	D	8	0				
X	4	D	0	0			2										

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GSA No. 0246-EPA-OT

EPA I.D. Number (enter from page 1)	Secondary ID Number (enter from page 1)
A Z D 9 8 2 4 4 1 2 6 3	

XIV. Description of Hazardous Wastes (continued)

Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES (1) PROCESS CODES (enter)			(2) PROCESS DESCRIPTION (if a code is not entered in D(1)
1	D001	5,000	P	S01	S02	T04	
2	D004	5,000	P	S01	S02	T04	
3	D005	5,000	P	S01	S02	T04	
4	D006	5,000	P	S01	S02	T04	
5	D007	5,000	P	S01	S02	T04	
6	D008	5,000	P	S01	S02	T04	
7	D009	5,000	P	S01	S02	T04	
8	D010	5,000	P	S01	S02	T04	
9	D011	5,000	P	S01	S02	T04	
10	D012	5,000	P	S01	S02	T04	
11	D013	5,000	P	S01	S02	T04	
12	D014	5,000	P	S01	S02	T04	
13	D015	5,000	P	S01	S02	T04	
14	D016	5,000	P	S01	S02	T04	
15	D017	5,000	P	S01	S02	T04	
16	D018	500,000	P	S01	S02	T04	
17	D019	5,000	P	S01	S02	T04	
18	D020	5,000	P	S01	S02	T04	
19	D021	5,000	P	S01	S02	T04	
20	D022	100,000	P	S01	S02	T04	
21	D023	5,000	P	S01	S02	T04	
22	D024	5,000	P	S01	S02	T04	
23	D025	5,000	P	S01	S02	T04	
24	D026	5,000	P	S01	S02	T04	
25	D027	5,000	P	S01	S02	T04	
26	D028	50,000	P	S01	S02	T04	
27	D029	100,000	P	S01	S02	T04	
28	D030	5,000	P	S01	S02	T04	
29	D031	5,000	P	S01	S02	T04	
30	D032	5,000	P	S01	S02	T04	
31	D033	5,000	P	S01	S02	T04	
32	D034	5,000	P	S01	S02	T04	
33	D035	100,000	P	S01	S02	T04	

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GSA No. 0246-EPA-OT

EPA I.D. Number (enter from page 1): A Z D 9 8 2 4 4 1 2 6 3

Secondary ID Number (enter from page 1):

XIV. Description of Hazardous Wastes (continued)

Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES (1) PROCESS CODES (enter)			D. PROCESSES (2) PROCESS DESCRIPTION (if a code is not entered in D(1)
1	D036	5,000	P	S01	S02	T04	
2	D037	5,000	P	S01	S02	T04	
3	D038	5,000	P	S01	S02	T04	
4	D039	500,000	P	S01	S02	T04	
5	D040	500,000	P	S01	S02	T04	
6	D041	5,000	P	S01	S02	T04	
7	D042	5,000	P	S01	S02	T04	
8	D043	50,000	P	S01	S02	T04	
9	F001	2,000,000	P	S01	S02	T04	
10	F002	5,000	P	S01	S02	T04	
11	F003	1,500,000	P	S01	S02	T04	
12	F004	5,000	P	S01	S02	T04	
13	F005	1,500,000	P	S01	S02	T04	
14	F006	5,000	P	S01	S02	T04	
15	F012	5,000	P	S01	S02	T04	
16	F019	5,000	P	S01	S02	T04	
17	F025	5,000	P	S01	S02	T04	
18	F032	5,000	P	S01	S02	T04	
19	F035	5,000	P	S01	S02	T04	
20	F037	5,000	P	S01	S02	T04	
21	F038	5,000	P	S01	S02	T04	
21	F039	5,000	P	S01	S02	T04	
23	K001	5,000	P	S01	S02	T04	
24	K002	5,000	P	S01	S02	T04	
25	K003	5,000	P	S01	S02	T04	
26	K004	5,000	P	S01	S02	T04	
27	K005	5,000	P	S01	S02	T04	
28	K006	5,000	P	S01	S02	T04	
29	K007	5,000	P	S01	S02	T04	
30	K008	5,000	P	S01	S02	T04	
31	K009	5,000	P	S01	S02	T04	
32	K010	5,000	P	S01	S02	T04	
33	K014	5,000	P	S01	S02	T04	

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GSA No. 0246-EPA-OT

EPA I.D. Number (enter from page 1)												Secondary ID Number (enter from page 1)
A	Z	D	9	8	2	4	4	1	2	6	3	

XIV. Description of Hazardous Wastes (continued)

Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES (1) PROCESS CODES (enter)			(2) PROCESS DESCRIPTION (if a code is not entered in D(1)
1	K065	5,000	P	S01	S02	T04	
2	K066	5,000	P	S01	S02	T04	
3	K071	5,000	P	S01	S02	T04	
4	K073	5,000	P	S01	S02	T04	
5	K083	5,000	P	S01	S02	T04	
6	K084	5,000	P	S01	S02	T04	
7	K085	5,000	P	S01	S02	T04	
8	K086	5,000	P	S01	S02	T04	
9	K087	5,000	P	S01	S02	T04	
10	K088	5,000	P	S01	S02	T04	
11	K090	5,000	P	S01	S02	T04	
12	K091	5,000	P	S01	S02	T04	
13	K093	5,000	P	S01	S02	T04	
14	K094	5,000	P	S01	S02	T04	
15	K095	5,000	P	S01	S02	T04	
16	K096	5,000	P	S01	S02	T04	
17	K097	5,000	P	S01	S02	T04	
18	K098	5,000	P	S01	S02	T04	
19	K100	5,000	P	S01	S02	T04	
20	K101	5,000	P	S01	S02	T04	
21	K102	5,000	P	S01	S02	T04	
22	K103	5,000	P	S01	S02	T04	
23	K104	5,000	P	S01	S02	T04	
24	K105	5,000	P	S01	S02	T04	
25	K106	5,000	P	S01	S02	T04	
26	K112	5,000	P	S01	S02	T04	
27	K113	5,000	P	S01	S02	T04	
28	K114	5,000	P	S01	S02	T04	
29	K115	5,000	P	S01	S02	T04	
30	K116	5,000	P	S01	S02	T04	
31	K117	5,000	P	S01	S02	T04	
32	K118	5,000	P	S01	S02	T04	
33	K125	5,000	P	S01	S02	T04	

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EPA I.D. Number (enter from page 1): A Z D 9 8 2 4 4 1 2 6 3

Secondary ID Number (enter from page 1):

XIV. Description of Hazardous Wastes (continued)

Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES (1) PROCESS CODES (enter)			D. PROCESSES (2) PROCESS DESCRIPTION (if a code is not entered in D(1))
1	K015	5,000	P	S01	S02	T04	
2	K016	5,000	P	S01	S02	T04	
3	K017	5,000	P	S01	S02	T04	
4	K018	5,000	P	S01	S02	T04	
5	K019	5,000	P	S01	S02	T04	
6	K020	5,000	P	S01	S02	T04	
7	K022	5,000	P	S01	S02	T04	
8	K023	5,000	P	S01	S02	T04	
9	K024	5,000	P	S01	S02	T04	
10	K025	5,000	P	S01	S02	T04	
11	K026	5,000	P	S01	S02	T04	
12	K029	5,000	P	S01	S02	T04	
13	K030	5,000	P	S01	S02	T04	
14	K031	5,000	P	S01	S02	T04	
15	K032	5,000	P	S01	S02	T04	
16	K033	5,000	P	S01	S02	T04	
17	K034	5,000	P	S01	S02	T04	
18	K035	5,000	P	S01	S02	T04	
19	K036	5,000	P	S01	S02	T04	
20	K037	5,000	P	S01	S02	T04	
21	K038	5,000	P	S01	S02	T04	
22	K039	5,000	P	S01	S02	T04	
23	K040	5,000	P	S01	S02	T04	
24	K041	5,000	P	S01	S02	T04	
25	K042	5,000	P	S01	S02	T04	
26	K046	5,000	P	S01	S02	T04	
27	K048	5,000	P	S01	S02	T04	
28	K049	5,000	P	S01	S02	T04	
29	K050	5,000	P	S01	S02	T04	
30	K051	5,000	P	S01	S02	T04	
31	K052	5,000	P	S01	S02	T04	
32	K061	5,000	P	S01	S02	T04	
33	K064	5,000	P	S01	S02	T04	

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GSA No. 0246-EPA-OT

EPA I.D. Number (enter from page 1): A Z D 9 8 2 4 4 1 2 6 3

Secondary ID Number (enter from page 1):

XIV. Description of Hazardous Wastes (continued)

Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES (1) PROCESS CODES (enter)	D. PROCESSES (2) PROCESS DESCRIPTION (if a code is not entered in D(1)
1	K 1 2 6	5,000	P	S 0 1 S 0 2 T 0 4	
2	P 0 0 1	5,000	P	S 0 1 S 0 2 T 0 4	
3	P 0 0 2	5,000	P	S 0 1 S 0 2 T 0 4	
4	P 0 0 3	5,000	P	S 0 1 S 0 2 T 0 4	
5	P 0 0 4	5,000	P	S 0 1 S 0 2 T 0 4	
6	P 0 0 5	5,000	P	S 0 1 S 0 2 T 0 4	
7	P 0 0 7	5,000	P	S 0 1 S 0 2 T 0 4	
8	P 0 0 8	5,000	P	S 0 1 S 0 2 T 0 4	
9	P 0 1 0	5,000	P	S 0 1 S 0 2 T 0 4	
1 0	P 0 1 1	5,000	P	S 0 1 S 0 2 T 0 4	
1 1	P 0 1 2	5,000	P	S 0 1 S 0 2 T 0 4	
1 2	P 0 1 3	5,000	P	S 0 1 S 0 2 T 0 4	
1 3	P 0 1 4	5,000	P	S 0 1 S 0 2 T 0 4	
1 4	P 0 1 5	5,000	P	S 0 1 S 0 2 T 0 4	
1 5	P 0 1 6	5,000	P	S 0 1 S 0 2 T 0 4	
1 6	P 0 1 7	5,000	P	S 0 1 S 0 2 T 0 4	
1 7	P 0 1 8	5,000	P	S 0 1 S 0 2 T 0 4	
1 8	P 0 2 0	5,000	P	S 0 1 S 0 2 T 0 4	
1 9	P 0 2 1	5,000	P	S 0 1 S 0 2 T 0 4	
2 0	P 0 2 2	5,000	P	S 0 1 S 0 2 T 0 4	
2 1	P 0 2 3	5,000	P	S 0 1 S 0 2 T 0 4	
2 2	P 0 2 4	5,000	P	S 0 1 S 0 2 T 0 4	
2 3	P 0 2 6	5,000	P	S 0 1 S 0 2 T 0 4	
2 4	P 0 2 7	5,000	P	S 0 1 S 0 2 T 0 4	
2 5	P 0 2 8	5,000	P	S 0 1 S 0 2 T 0 4	
2 6	P 0 2 9	5,000	P	S 0 1 S 0 2 T 0 4	
2 7	P 0 3 0	5,000	P	S 0 1 S 0 2 T 0 4	
2 8	P 0 3 1	5,000	P	S 0 1 S 0 2 T 0 4	
2 9	P 0 3 3	5,000	P	S 0 1 S 0 2 T 0 4	
3 0	P 0 3 4	5,000	P	S 0 1 S 0 2 T 0 4	
3 1	P 0 3 6	5,000	P	S 0 1 S 0 2 T 0 4	
3 2	P 0 3 7	5,000	P	S 0 1 S 0 2 T 0 4	
3 3	P 0 3 8	5,000	P	S 0 1 S 0 2 T 0 4	

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GSA No. 0246-EPA-OT

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EPA I.D. Number (enter from page 1): A Z D 9 8 2 4 4 1 2 6 3

Secondary ID Number (enter from page 1):

XIV. Description of Hazardous Wastes (continued)

Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES (1) PROCESS CODES (enter)	D. PROCESSES (2) PROCESS DESCRIPTION (if a code is not entered in D(1)
1	P039	5,000	P	S01 S02 T04	
2	P040	5,000	P	S01 S02 T04	
3	P041	5,000	P	S01 S02 T04	
4	P042	5,000	P	S01 S02 T04	
5	P043	5,000	P	S01 S02 T04	
6	P044	5,000	P	S01 S02 T04	
7	P045	5,000	P	S01 S02 T04	
8	P046	5,000	P	S01 S02 T04	
9	P047	5,000	P	S01 S02 T04	
10	P048	5,000	P	S01 S02 T04	
11	P049	5,000	P	S01 S02 T04	
12	P050	5,000	P	S01 S02 T04	
13	P051	5,000	P	S01 S02 T04	
14	P054	5,000	P	S01 S02 T04	
15	P056	5,000	P	S01 S02 T04	
16	P057	5,000	P	S01 S02 T04	
17	P058	5,000	P	S01 S02 T04	
18	P059	5,000	P	S01 S02 T04	
19	P060	5,000	P	S01 S02 T04	
20	P062	5,000	P	S01 S02 T04	
21	P063	5,000	P	S01 S02 T04	
22	P064	5,000	P	S01 S02 T04	
23	P066	5,000	P	S01 S02 T04	
24	P067	5,000	P	S01 S02 T04	
25	P068	5,000	P	S01 S02 T04	
26	P069	5,000	P	S01 S02 T04	
27	P070	5,000	P	S01 S02 T04	
28	P071	5,000	P	S01 S02 T04	
29	P072	5,000	P	S01 S02 T04	
30	P073	5,000	P	S01 S02 T04	
31	P074	5,000	P	S01 S02 T04	
32	P075	5,000	P	S01 S02 T04	
33	P077	5,000	P	S01 S02 T04	

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GSA No. 0246-EPA-OT

EPA I.D. Number (enter from page 1): A Z D 9 8 2 4 4 1 2 6 3

Secondary ID Number (enter from page 1):

XIV. Description of Hazardous Wastes (continued)

Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES (1) PROCESS CODES (enter)	D. PROCESSES (2) PROCESS DESCRIPTION (if a code is not entered in D(1)
1	P078	5,000	P	S01 S02 T04	
2	P082	5,000	P	S01 S02 T04	
3	P084	5,000	P	S01 S02 T04	
4	P085	5,000	P	S01 S02 T04	
5	P087	5,000	P	S01 S02 T04	
6	P088	5,000	P	S01 S02 T04	
7	P089	5,000	P	S01 S02 T04	
8	P092	5,000	P	S01 S02 T04	
9	P093	5,000	P	S01 S02 T04	
10	P094	5,000	P	S01 S02 T04	
11	P095	5,000	P	S01 S02 T04	
12	P096	5,000	P	S01 S02 T04	
13	P097	5,000	P	S01 S02 T04	
14	P098	5,000	P	S01 S02 T04	
15	P099	5,000	P	S01 S02 T04	
16	P101	5,000	P	S01 S02 T04	
17	P102	5,000	P	S01 S02 T04	
18	P103	5,000	P	S01 S02 T04	
19	P104	5,000	P	S01 S02 T04	
20	P105	5,000	P	S01 S02 T04	
21	P106	5,000	P	S01 S02 T04	
22	P108	5,000	P	S01 S02 T04	
23	P109	5,000	P	S01 S02 T04	
24	P110	5,000	P	S01 S02 T04	
25	P113	5,000	P	S01 S02 T04	
26	P114	5,000	P	S01 S02 T04	
27	P115	5,000	P	S01 S02 T04	
28	P116	5,000	P	S01 S02 T04	
29	P118	5,000	P	S01 S02 T04	
30	P119	5,000	P	S01 S02 T04	
31	P120	5,000	P	S01 S02 T04	
32	P121	5,000	P	S01 S02 T04	
33	P123	5,000	P	S01 S02 T04	

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GSA No. 0246-EPA-OT

EPA I.D. Number (enter from page 1)

A	Z	D	9	8	2	4	4	1	2	6	3

Secondary ID Number (enter from page 1)

XIV. Description of Hazardous Wastes (continued)

Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)				B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES (1) PROCESS CODES (enter)									(2) PROCESS DESCRIPTION (if a code is not entered in D(1)
1	U	0	0	1	5,000	P	S	0	1	S	0	2	T	0	4	
2	U	0	0	2	5,000	P	S	0	1	S	0	2	T	0	4	
3	U	0	0	3	5,000	P	S	0	1	S	0	2	T	0	4	
4	U	0	0	4	5,000	P	S	0	1	S	0	2	T	0	4	
5	U	0	0	5	5,000	P	S	0	1	S	0	2	T	0	4	
6	U	0	0	7	5,000	P	S	0	1	S	0	2	T	0	4	
7	U	0	0	8	5,000	P	S	0	1	S	0	2	T	0	4	
8	U	0	0	9	5,000	P	S	0	1	S	0	2	T	0	4	
9	U	0	1	0	5,000	P	S	0	1	S	0	2	T	0	4	
10	U	0	1	1	5,000	P	S	0	1	S	0	2	T	0	4	
11	U	0	1	2	5,000	P	S	0	1	S	0	2	T	0	4	
12	U	0	1	4	5,000	P	S	0	1	S	0	2	T	0	4	
13	U	0	1	5	5,000	P	S	0	1	S	0	2	T	0	4	
14	U	0	1	6	5,000	P	S	0	1	S	0	2	T	0	4	
15	U	0	1	7	5,000	P	S	0	1	S	0	2	T	0	4	
16	U	0	1	8	5,000	P	S	0	1	S	0	2	T	0	4	
17	U	0	1	9	5,000	P	S	0	1	S	0	2	T	0	4	
18	U	0	2	1	5,000	P	S	0	1	S	0	2	T	0	4	
19	U	0	2	2	5,000	P	S	0	1	S	0	2	T	0	4	
20	U	0	2	4	5,000	P	S	0	1	S	0	2	T	0	4	
21	U	0	2	5	5,000	P	S	0	1	S	0	2	T	0	4	
22	U	0	2	6	5,000	P	S	0	1	S	0	2	T	0	4	
23	U	0	2	7	5,000	P	S	0	1	S	0	2	T	0	4	
24	U	0	2	8	5,000	P	S	0	1	S	0	2	T	0	4	
25	U	0	2	9	5,000	P	S	0	1	S	0	2	T	0	4	
26	U	0	3	0	5,000	P	S	0	1	S	0	2	T	0	4	
27	U	0	3	1	5,000	P	S	0	1	S	0	2	T	0	4	
28	U	0	3	2	5,000	P	S	0	1	S	0	2	T	0	4	
29	U	0	3	4	5,000	P	S	0	1	S	0	2	T	0	4	
30	U	0	3	5	5,000	P	S	0	1	S	0	2	T	0	4	
31	U	0	3	6	5,000	P	S	0	1	S	0	2	T	0	4	
32	U	0	3	7	5,000	P	S	0	1	S	0	2	T	0	4	
33	U	0	3	8	5,000	P	S	0	1	S	0	2	T	0	4	

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GSA No. 0246-EPA-OT

EPA I.D. Number (enter from page 1)	Secondary ID Number (enter from page 1)
A Z D 9 8 2 4 4 1 2 6 3	

XIV. Description of Hazardous Wastes (continued)

Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES (1) PROCESS CODES (enter)			D. PROCESSES (2) PROCESS DESCRIPTION (if a code is not entered in D(1)
1	U039	5,000	P	S01	S02	T04	
2	U041	5,000	P	S01	S02	T04	
3	U042	5,000	P	S01	S02	T04	
4	U043	5,000	P	S01	S02	T04	
5	U044	5,000	P	S01	S02	T04	
6	U045	5,000	P	S01	S02	T04	
7	U046	5,000	P	S01	S02	T04	
8	U047	5,000	P	S01	S02	T04	
9	U048	5,000	P	S01	S02	T04	
10	U049	5,000	P	S01	S02	T04	
11	U050	5,000	P	S01	S02	T04	
12	U051	5,000	P	S01	S02	T04	
13	U052	5,000	P	S01	S02	T04	
14	U053	5,000	P	S01	S02	T04	
15	U055	5,000	P	S01	S02	T04	
16	U056	5,000	P	S01	S02	T04	
17	U057	5,000	P	S01	S02	T04	
18	U058	5,000	P	S01	S02	T04	
19	U059	5,000	P	S01	S02	T04	
20	U060	5,000	P	S01	S02	T04	
21	U061	5,000	P	S01	S02	T04	
22	U062	5,000	P	S01	S02	T04	
23	U063	5,000	P	S01	S02	T04	
24	U064	5,000	P	S01	S02	T04	
25	U066	5,000	P	S01	S02	T04	
26	U067	5,000	P	S01	S02	T04	
27	U068	5,000	P	S01	S02	T04	
28	U069	5,000	P	S01	S02	T04	
29	U070	5,000	P	S01	S02	T04	
30	U071	5,000	P	S01	S02	T04	
31	U072	5,000	P	S01	S02	T04	
32	U073	5,000	P	S01	S02	T04	
33	U074	5,000	P	S01	S02	T04	

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GSA No. 0246-EPA-OT

EPA I.D. Number (enter from page 1): A Z D 9 8 2 4 4 1 2 6 3

Secondary ID Number (enter from page 1):

XIV. Description of Hazardous Wastes (continued)

Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES (1) PROCESS CODES (enter)	D. PROCESSES (2) PROCESS DESCRIPTION (if a code is not entered in D(1)
1	U075	5,000	P	S01 S02 T04	
2	U076	5,000	P	S01 S02 T04	
3	U077	5,000	P	S01 S02 T04	
4	U078	5,000	P	S01 S02 T04	
5	U079	5,000	P	S01 S02 T04	
6	U080	5,000	P	S01 S02 T04	
7	U081	5,000	P	S01 S02 T04	
8	U082	5,000	P	S01 S02 T04	
9	U083	5,000	P	S01 S02 T04	
10	U084	5,000	P	S01 S02 T04	
11	U085	5,000	P	S01 S02 T04	
12	U086	5,000	P	S01 S02 T04	
13	U087	5,000	P	S01 S02 T04	
14	U088	5,000	P	S01 S02 T04	
15	U089	5,000	P	S01 S02 T04	
16	U090	5,000	P	S01 S02 T04	
17	U091	5,000	P	S01 S02 T04	
18	U092	5,000	P	S01 S02 T04	
19	U093	5,000	P	S01 S02 T04	
20	U094	5,000	P	S01 S02 T04	
21	U095	5,000	P	S01 S02 T04	
22	U097	5,000	P	S01 S02 T04	
23	U098	5,000	P	S01 S02 T04	
24	U099	5,000	P	S01 S02 T04	
25	U101	5,000	P	S01 S02 T04	
26	U102	5,000	P	S01 S02 T04	
27	U103	5,000	P	S01 S02 T04	
28	U105	5,000	P	S01 S02 T04	
29	U106	5,000	P	S01 S02 T04	
30	U107	5,000	P	S01 S02 T04	
31	U108	5,000	P	S01 S02 T04	
32	U109	5,000	P	S01 S02 T04	
33	U110	5,000	P	S01 S02 T04	

Please print or type with ELITE type (12 characters per inch) in the unshaded areas only

EPA I.D. Number (enter from page 1)

A	Z	D	9	8	2	4	4	1	2	6	3

Secondary ID Number (enter from page 1)

XIV. Description of Hazardous Wastes (continued)

Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)				B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES (1) PROCESS CODES (enter)									(2) PROCESS DESCRIPTION (if a code is not entered in D(1))
1	U	1	1	1	5,000	P	S	0	1	S	0	2	T	0	4	
2	U	1	1	2	5,000	P	S	0	1	S	0	2	T	0	4	
3	U	1	1	3	5,000	P	S	0	1	S	0	2	T	0	4	
4	U	1	1	4	5,000	P	S	0	1	S	0	2	T	0	4	
5	U	1	1	5	5,000	P	S	0	1	S	0	2	T	0	4	
6	U	1	1	6	5,000	P	S	0	1	S	0	2	T	0	4	
7	U	1	1	7	5,000	P	S	0	1	S	0	2	T	0	4	
8	U	1	1	8	5,000	P	S	0	1	S	0	2	T	0	4	
9	U	1	1	9	5,000	P	S	0	1	S	0	2	T	0	4	
10	U	1	2	0	5,000	P	S	0	1	S	0	2	T	0	4	
11	U	1	2	1	5,000	P	S	0	1	S	0	2	T	0	4	
12	U	1	2	2	5,000	P	S	0	1	S	0	2	T	0	4	
13	U	1	2	4	5,000	P	S	0	1	S	0	2	T	0	4	
14	U	1	2	5	5,000	P	S	0	1	S	0	2	T	0	4	
15	U	1	2	6	5,000	P	S	0	1	S	0	2	T	0	4	
16	U	1	2	7	5,000	P	S	0	1	S	0	2	T	0	4	
17	U	1	2	8	5,000	P	S	0	1	S	0	2	T	0	4	
18	U	1	2	9	5,000	P	S	0	1	S	0	2	T	0	4	
19	U	1	3	0	5,000	P	S	0	1	S	0	2	T	0	4	
20	U	1	3	1	5,000	P	S	0	1	S	0	2	T	0	4	
21	U	1	3	2	5,000	P	S	0	1	S	0	2	T	0	4	
22	U	1	3	5	5,000	P	S	0	1	S	0	2	T	0	4	
23	U	1	3	6	5,000	P	S	0	1	S	0	2	T	0	4	
24	U	1	3	7	5,000	P	S	0	1	S	0	2	T	0	4	
25	U	1	3	8	5,000	P	S	0	1	S	0	2	T	0	4	
26	U	1	4	0	5,000	P	S	0	1	S	0	2	T	0	4	
27	U	1	4	1	5,000	P	S	0	1	S	0	2	T	0	4	
28	U	1	4	2	5,000	P	S	0	1	S	0	2	T	0	4	
29	U	1	4	3	5,000	P	S	0	1	S	0	2	T	0	4	
30	U	1	4	4	5,000	P	S	0	1	S	0	2	T	0	4	
31	U	1	4	5	5,000	P	S	0	1	S	0	2	T	0	4	
32	U	1	4	6	5,000	P	S	0	1	S	0	2	T	0	4	
33	U	1	4	7	5,000	P	S	0	1	S	0	2	T	0	4	

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GSA No. 0246-EPA-OT

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EPA I.D. Number (enter from page 1): A Z D 9 8 2 4 4 1 2 6 3

Secondary ID Number (enter from page 1):

XIV. Description of Hazardous Wastes (continued)

Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES (1) PROCESS CODES (enter)	D. PROCESSES (2) PROCESS DESCRIPTION (if a code is not entered in D(1)
1	U148	5,000	P	S01 S02 T04	
2	U149	5,000	P	S01 S02 T04	
3	U150	5,000	P	S01 S02 T04	
4	U151	5,000	P	S01 S02 T04	
5	U152	5,000	P	S01 S02 T04	
6	U153	5,000	P	S01 S02 T04	
7	U154	5,000	P	S01 S02 T04	
8	U155	5,000	P	S01 S02 T04	
9	U156	5,000	P	S01 S02 T04	
10	U157	5,000	P	S01 S02 T04	
11	U158	5,000	P	S01 S02 T04	
12	U159	5,000	P	S01 S02 T04	
13	U161	5,000	P	S01 S02 T04	
14	U162	5,000	P	S01 S02 T04	
15	U163	5,000	P	S01 S02 T04	
16	U164	5,000	P	S01 S02 T04	
17	U165	5,000	P	S01 S02 T04	
18	U166	5,000	P	S01 S02 T04	
19	U167	5,000	P	S01 S02 T04	
20	U168	5,000	P	S01 S02 T04	
21	U169	5,000	P	S01 S02 T04	
22	U170	5,000	P	S01 S02 T04	
23	U171	5,000	P	S01 S02 T04	
24	U172	5,000	P	S01 S02 T04	
25	U173	5,000	P	S01 S02 T04	
26	U174	5,000	P	S01 S02 T04	
27	U176	5,000	P	S01 S02 T04	
28	U177	5,000	P	S01 S02 T04	
29	U178	5,000	P	S01 S02 T04	
30	U179	5,000	P	S01 S02 T04	
31	U180	5,000	P	S01 S02 T04	
32	U181	5,000	P	S01 S02 T04	
33	U182	5,000	P	S01 S02 T04	

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GSA No. 0246-EPA-OT

EPA I.D. Number (enter from page 1): A Z D 9 8 2 4 4 1 2 6 3

Secondary ID Number (enter from page 1):

XIV. Description of Hazardous Wastes (continued)

Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES (1) PROCESS CODES (enter)	D. PROCESSES (2) PROCESS DESCRIPTION (if a code is not entered in D(1)
1	U183	5,000	P	S01 S02 T04	
2	U184	5,000	P	S01 S02 T04	
3	U185	5,000	P	S01 S02 T04	
4	U186	5,000	P	S01 S02 T04	
5	U187	5,000	P	S01 S02 T04	
6	U188	5,000	P	S01 S02 T04	
7	U190	5,000	P	S01 S02 T04	
8	U191	5,000	P	S01 S02 T04	
9	U192	5,000	P	S01 S02 T04	
10	U193	5,000	P	S01 S02 T04	
11	U194	5,000	P	S01 S02 T04	
12	U196	5,000	P	S01 S02 T04	
13	U197	5,000	P	S01 S02 T04	
14	U200	5,000	P	S01 S02 T04	
15	U201	5,000	P	S01 S02 T04	
16	U202	5,000	P	S01 S02 T04	
17	U203	5,000	P	S01 S02 T04	
18	U204	5,000	P	S01 S02 T04	
19	U206	5,000	P	S01 S02 T04	
20	U207	5,000	P	S01 S02 T04	
21	U208	5,000	P	S01 S02 T04	
22	U209	5,000	P	S01 S02 T04	
23	U210	5,000	P	S01 S02 T04	
24	U211	5,000	P	S01 S02 T04	
25	U213	5,000	P	S01 S02 T04	
26	U214	5,000	P	S01 S02 T04	
27	U215	5,000	P	S01 S02 T04	
28	U216	5,000	P	S01 S02 T04	
29	U217	5,000	P	S01 S02 T04	
30	U218	5,000	P	S01 S02 T04	
31	U219	5,000	P	S01 S02 T04	
32	U220	5,000	P	S01 S02 T04	
33	U221	5,000	P	S01 S02 T04	

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GSA No. 0246-EPA-OT

EPA I.D. Number (enter from page 1): A Z D 9 8 2 4 4 1 2 6 3

Secondary ID Number (enter from page 1):

XIV. Description of Hazardous Wastes (continued)

Line Number	A. EPA HAZARDOUS WASTE NO. (enter code)				B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES (1) PROCESS CODES (enter)									D. PROCESSES (2) PROCESS DESCRIPTION (if a code is not entered in D(1)
1	U	2	2	2	5,000	P	S	0	1	S	0	2	T	0	4	
2	U	2	2	5	5,000	P	S	0	1	S	0	2	T	0	4	
3	U	2	2	6	5,000	P	S	0	1	S	0	2	T	0	4	
4	U	2	2	7	5,000	P	S	0	1	S	0	2	T	0	4	
5	U	2	2	8	5,000	P	S	0	1	S	0	2	T	0	4	
6	U	2	3	5	5,000	P	S	0	1	S	0	2	T	0	4	
7	U	2	3	6	5,000	P	S	0	1	S	0	2	T	0	4	
8	U	2	3	7	5,000	P	S	0	1	S	0	2	T	0	4	
9	U	2	3	8	5,000	P	S	0	1	S	0	2	T	0	4	
10	U	2	3	9	5,000	P	S	0	1	S	0	2	T	0	4	
11	U	2	4	0	5,000	P	S	0	1	S	0	2	T	0	4	
12	U	2	4	3	5,000	P	S	0	1	S	0	2	T	0	4	
13	U	2	4	4	5,000	P	S	0	1	S	0	2	T	0	4	
14	U	2	4	6	5,000	P	S	0	1	S	0	2	T	0	4	
15	U	2	4	7	5,000	P	S	0	1	S	0	2	T	0	4	
16	U	2	4	8	5,000	P	S	0	1	S	0	2	T	0	4	
17	U	2	4	9	5,000	P	S	0	1	S	0	2	T	0	4	
18	U	3	2	8	5,000	P	S	0	1	S	0	2	T	0	4	
19	U	3	5	3	5,000	P	S	0	1	S	0	2	T	0	4	
20	U	3	5	9	5,000	P	S	0	1	S	0	2	T	0	4	
21																
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Form Approved, OMB No. 2050-0034 Expires 9-30-96
GSA No. 0248-EPA-OT

EPA I.D. Number *(Enter from page 1)*: A Z D 9 8 2 4 4 1 2 6 3

Secondary ID Number *(Enter from page 1)*:

XV. Map

Attach to this application a topographic map, or other equivalent map, of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in this map area. See instructions for precise requirements.

XVI. Facility Drawing

All existing facilities must include a scale drawing of the facility (see instructions for more detail).

XVII. Photographs

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas (see instructions for more detail).

XVIII. Certification(s)

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Operator Signature * [signature]	Date Signed 10-9-96
Name and Official Title (Type or print) Gregor E. Norgaard, Vice President, U.S. Filter Recovery Services, Inc. (Facility Owner)	
Owner Signature [signature]	Date Signed 10-16-96
Name and Official Title (Type or print) Daniel Eddy, Jr., Chairman, Colorado River Indian Tribes (Property Owner)	
Operator Signature	Date Signed
Name and Official Title (Type or print)	
Operator Signature	Date Signed
Name and Official Title (Type or print)	

XIX. Comments

Received spent carbons are thermally reactivated in one of two furnaces. Reactivated carbons are certified non-hazardous and then shipped for recycling and/or reuse. This reactivation process is sketched in a Schematic Block-Process Flow Diagram attached as Drawing No. 11135-002.

Incidental to the reactivation process is the management of container storage (area S01); spent carbon storage tanks (area S02); reactivation and reactivation off-gas treatment (area T04); and the non-hazardous slurry transfer water (recycle water) system, wastewater treatment system, rainwater collection system, and reactivated carbon product storage and shipping.

*(Footnote to Section XVIII) EPA currently has a Part A that is signed by Westates Carbon-Arizona, Inc. This Part A is signed on behalf of the company which has agreed to aquire the shares of Westates Carbon-Arizona, Inc.

Note: Mail completed form to the appropriate EPA Regional or State Office. (Refer to instructions for more information)

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EPA I.D. Number *(enter from page 1)*												Secondary ID Number *(enter from page 1)*
A	Z	D	9	8	2	4	4	1	2	6	3	

XIV. Description of Hazardous Waste *(continued)*

E. USE THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM ITEM D(1) ON PAGE 6.

Line Number	Additional Process Codes (enter)

XV. Map

Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in this map area. See Instructions for precise requirements.

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Owner Signature (Property Owner)	Date Signed
Name and Official Title *(type or print)*	
Operator Signature (Facility Owner)	Date Signed
Name and Official Title *(type or print)*	

XIX. Comments

Index of Attachments follows this page.

Note: Mail completed form to the appropriate EPA Regional or State Office. (refer to Instructions for more information)

INDEX OF ATTACHMENTS

ATTACHMENTS	DESCRIPTION
A	ITEM VIII -- Facility Owner
B	ITEM XV -- Map
	1. Drawing No. C-100604 Sheet 1 of 2 (Rev. 0) Topographical Map 1 - Plant Site
	2. Drawing No. C-100604 Sheet 2 of 2 (Rev. 0) Topographical Map 2 - Adjacent Lands
C	ITEM XVI -- Facility Drawing
	1. Scale Drawing of Property Layout
	2. Scale Drawing of Facility Layout (Equipment Location)
	3. Drawing No. 11135-002 (Rev. 1) Schematic Process Flow Diagram
D	ITEM XVII -- Photographs
	1. Site Photographs
	2. Site Aerial Photograph

ATTACHMENT A

ITEM VIII -- FACILITY OWNER

ADDITIONAL INFORMATION

EPA ID NUMBER: AZD982441263

ATTACHMENT A -- ITEM VIII

FACILITY OWNER

NAME OF FACILITY'S LEGAL OWNER

WESTATES CARBON-ARIZONA, INC.
2523 MUTAHAR STREET
PARKER, ARIZONA 85344-4005
TELEPHONE: 602-669-5758

OWNER TYPE - P

NAME OF PROPERTY OWNER:

COLORADO RIVER INDIAN TRIBES
RT - 1, BOX 23 - B
PARKER, ARIZONA 85344
TELEPHONE: 602-669-9211

OWNER TYPE - I

ATTACHMENT B

ITEM XV -- MAP

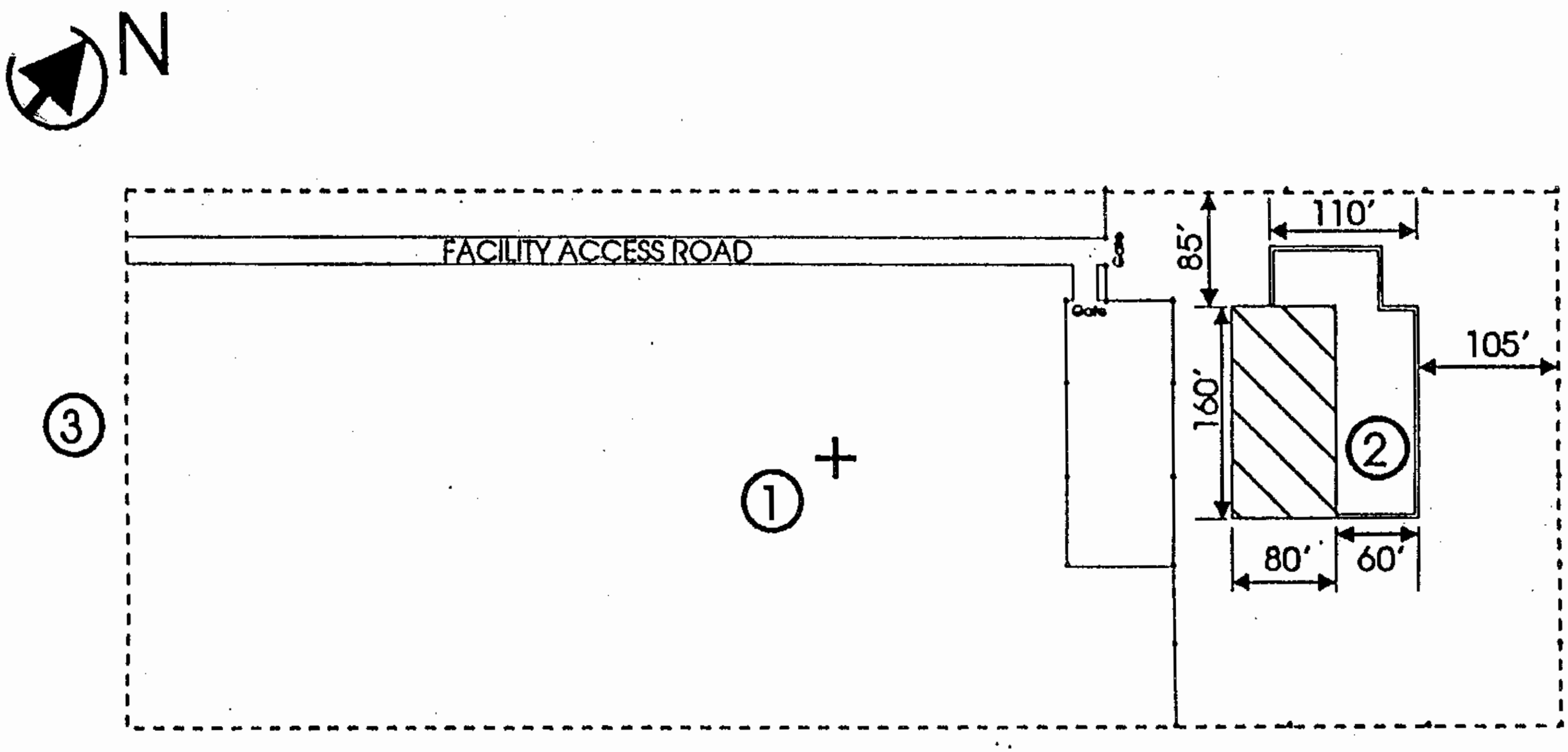
1. DRAWING NO. C-100604 SHEET 1 OF 2 (REV. 0)
   TOPOGRAPHICAL MAP 1 - PLANT SITE

2. DRAWING NO. C-100604 SHEET 2 OF 2 (REV. 0)
   TOPOGRAPHICAL MAP 2 - ADJACENT LANDS

ATTACHMENT C

ITEM XVII -- FACILITY DRAWING

1. SCALE DRAWING OF PROPERTY LAYOUT
2. SCALE DRAWING OF FACILITY LAYOUT (EQUIPMENT LOCATION)
3. DRAWING NO. 11135-002 -- SCHEMATIC PROCESS FLOW DIAGRAM



LEGEND:

① Center of Property is Approximately N 34°-07'-50" X W 114°-16'-22"

② Uncovered Reactivation Facilities

③ Mutahar Street

- - - - - - Property Line

Covered Storage and Maintenance Facilities

Fence Line

WESTATES CARBON - ARIZONA
Parker, Arizona

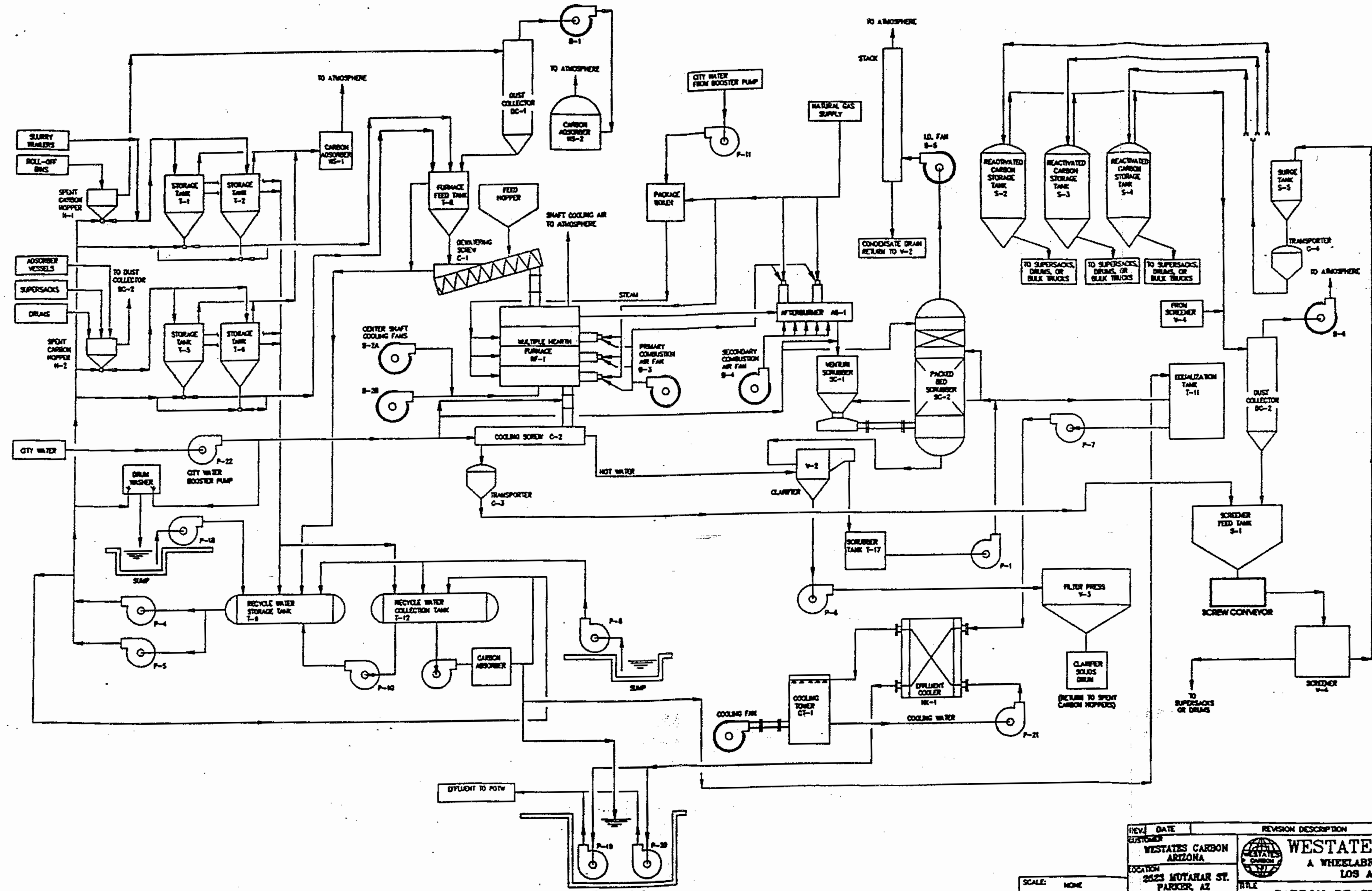
General Property Layout
Reactivation Facilities

Scale 1"=150'

Location:
2523 Mutahar Street
Parker, Arizona 85344

LIST OF COMPONENTS | DWG.# 11135-002

ITEM	QTY	DWG/PART No.	DESCRIPTION



REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R	MGR.

CUSTOMER: WESTATES CARBON ARIZONA

LOCATION: 2623 MUTAHAR ST. PARKER, AZ

SCALE: NONE

THIS DRAWING IS THE PROPERTY OF WESTATES CARBON INC. AND CANNOT BE REPRODUCED OR DELIVERED TO OTHERS WITHOUT THE EXPRESS WRITTEN PERMISSION OF WESTATES CARBON INC.

DO NOT SCALE DRAWING

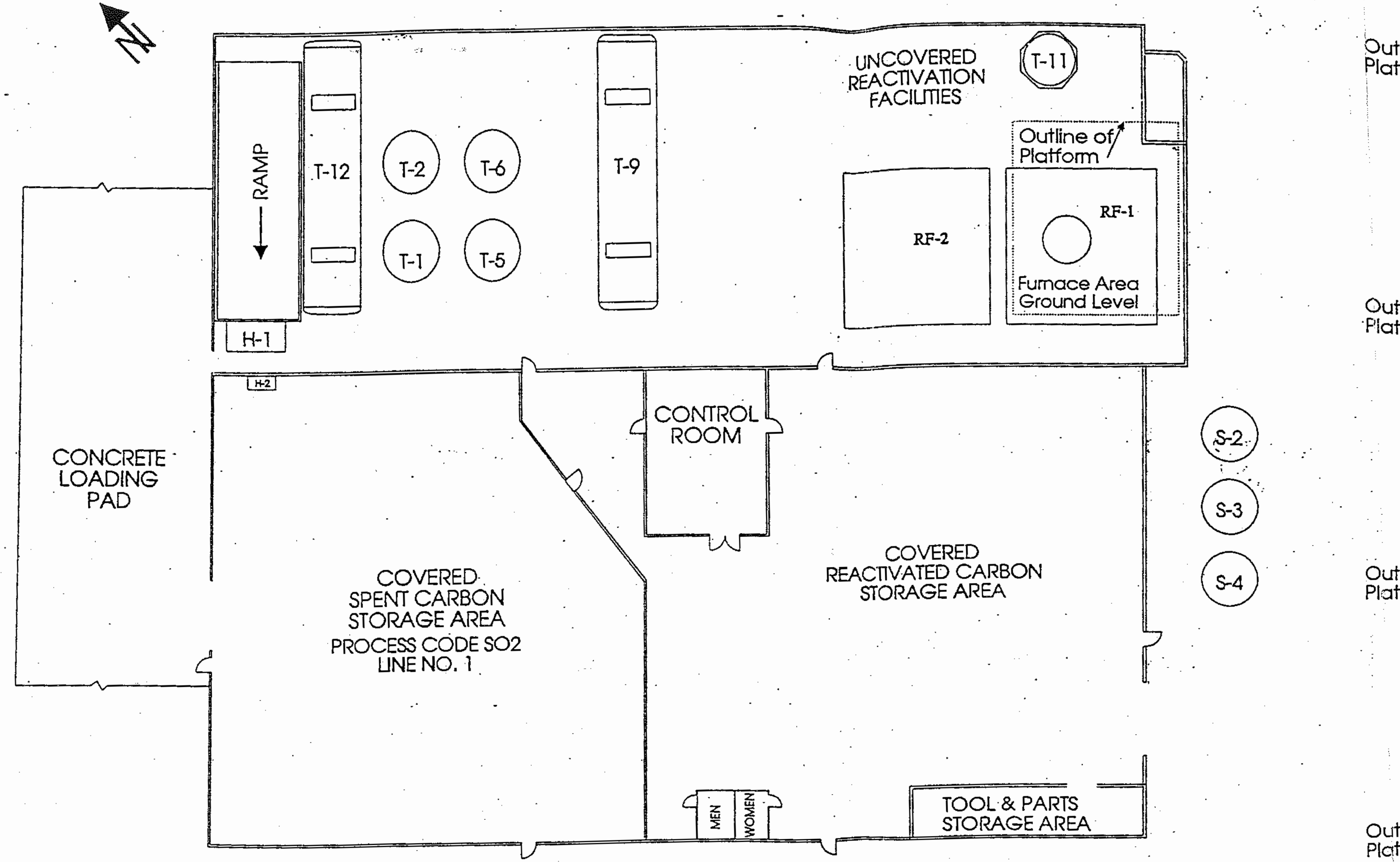
DRAWN	R. MONK	10-29-93
CHK'D		
ENG'R		
MGR.		

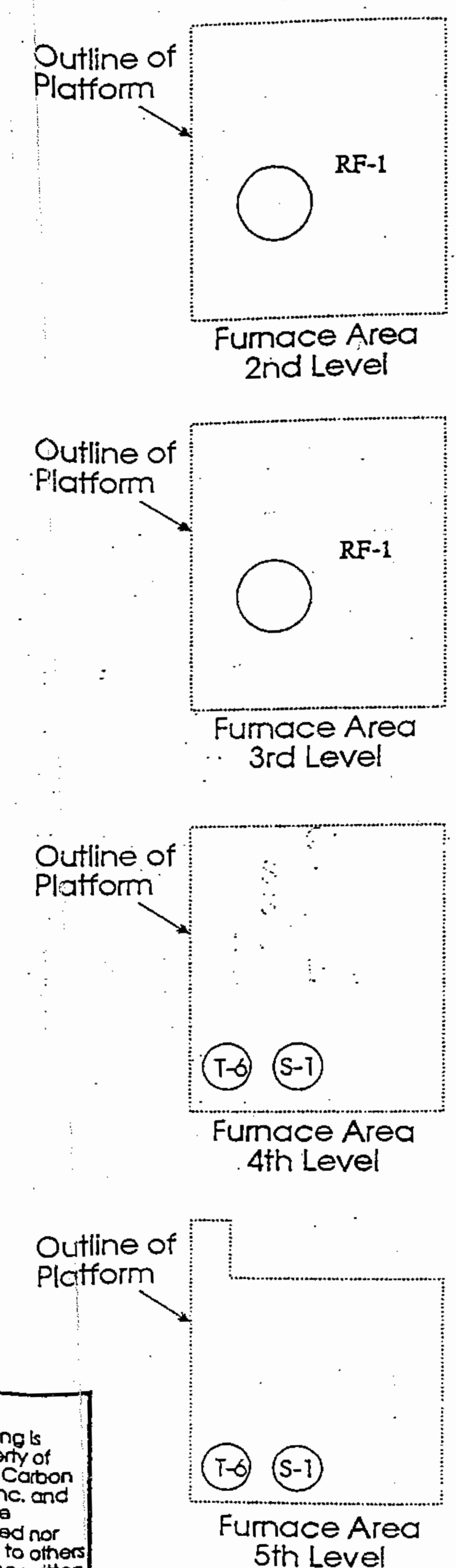
WESTATES CARBON, INC
A WHEELABRATOR TECHNOLOGIES CO.
LOS ANGELES, CA 90040

TITLE: CARBON REACTIVATION FACILITY FLOW DIAGRAM

CODE: CA | DWG #: 11135-002 | REV. 1

PROJECT #: 11135





LEGEND

T-1 - Spent Carbon Storage Tank (Process Code SO2; Line No. 2)
T-2 - Spent Carbon Storage Tank (Process Code SO2; Line No. 2)
T-5 - Spent Carbon Storage Tank (Process Code SO2; Line No. 2)
T-6 - Spent Carbon Storage Tank (Process Code SO2; Line No. 2)
T-8 - Reactivation Unit No. 1 Feed Tank (Process Code SO2; Line No. 2)
T-9 - Recycle Water Storage Tank
T-11 - Equalization Tank
T-12 - Recycle Water Tank
RF-1 - Reactivation Unit No. 1 (Process Code T04; Line No. 3)
RF-2 - Yet to be Completed Carbon Reactivation Unit No. 2 (Process Code T04; Line No. 3)

S-2 - Reactivated Carbon Storage Tank
S-3 - Reactivated Carbon Storage Tank
S-4 - Reactivated Carbon Storage Tank
H-1 - Roll-off Bin Unloading Hopper
H-2 - Container Unloading Hopper

WESTATES CARBON ARIZONA, INC.	GENERAL FACILITY LAYOUT	This drawing is the property of Westates Carbon Arizona, Inc. and cannot be reproduced nor delivered to others without the written permission of Westates Carbon Arizona, Inc.
LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344	REACTIVATION FACILITIES	
	SCALE: 1/4"=5'	

ATTACHMENT D

ITEM XVII -- PHOTOGRAPHS

1. SITE PHOTOGRAPHS

2. SITE AERIAL PHOTOGRAPHS

Process Code S02
(Identified as Line Number 2 in Section XII)

Spent Carbon Storage Feed Tanks
(Tank No. T-1 and T-2)

October 1996

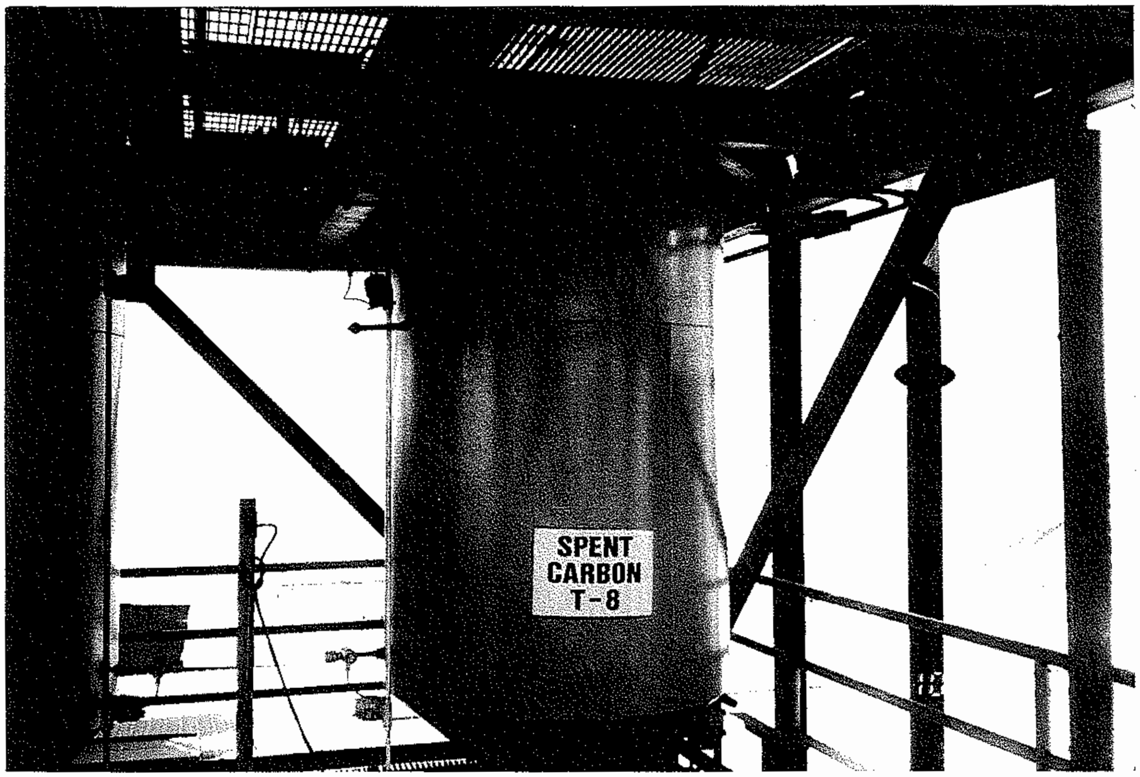
Process Code S02
(Identified as Line Number 2 in Section XII)

Spent Carbon Storage Feed Tanks
(Tank No. T-5 and T-6)

October 1996

Process Code S02
(Identified as Line Number 2 in Section XII)

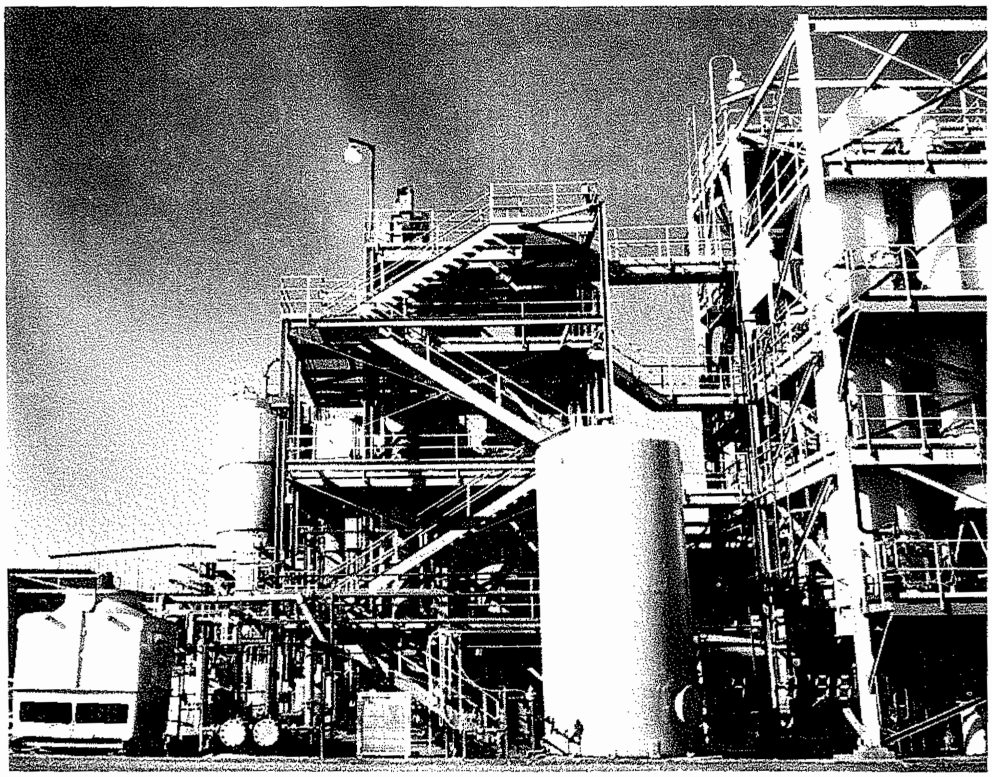
Spent Carbon Storage Feed Tanks
(Tank No. T-8)



October 1996

Process Code T04
(Identified as Line Number 3 in Section XII)

Carbon Reactivation Unit No.1 (RF-1)
(1 of 2)



October 1996

Process Code T04
(Identified as Line Number 3 in Section XII)

Carbon Reactivation Unit No.2 (RF-2)
(2 of 2)

October 1996

Process Code S01
(Identified as Line Number 1 in Section XII)

Spent Carbon Storage (Warehouse)

October 1996

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, Ca. 94105

MAR 25 1992

Mr. Robert Babbitt
Project Manager
Westates Carbon - Arizona, Inc.
2250 Tubeway Avenue
Los Angeles, CA 90040

Dear Mr. Babbitt:

The United States Environmental Protection Agency ("EPA") has reviewed the information you provided in a letter dated February 14, 1992, regarding the interim status eligibility of Westates Carbon-Arizona, Inc. ("Westates") (ID# AZD982441263), located on the Colorado River Indian Reservation near Parker, Arizona.

The documentation you provided verifies that construction of the Westates facility had commenced before the effective date (August 21, 1991) of the boiler and industrial furnace (BIF) rule, thereby confirming Westates' status as an existing facility, pursuant to 40 CFR 260.10 and Section 3005(e)(1)(A)(ii) of RCRA. EPA hereby confirms that you have met the requirements as an interim status facility.

EPA will "call-in" your Part B permit application at a later date considering the relative hazard to human health and environment that Westates poses compared to other storage, treatment, and disposal facilities within the Director's purview. If you have any questions regarding this matter, please contact Chris Heppe at (415) 744-2027.

Sincerely,

Paula Bisson

Paula Bisson, Chief
Arizona, Nevada, Pacific Island Section

cc: Daniel Eddy, Jr., Chairman
Colorado Indian Tribe

Revised Part A Forms

Provided for Information Purposes Only

SEND COMPLETED FORM TO: The Appropriate State or EPA Regional Office.	United States Environmental Protection Agency **RCRA SUBTITLE C SITE IDENTIFICATION FORM**	

1. Reason for Submittal (See instructions on page 14.) MARK ALL BOX(ES) THAT APPLY	**Reason for Submittal:** ❑ To provide Initial Notification of Regulated Waste Activity (to obtain an EPA ID Number for hazardous waste, universal waste, or used oil activities) ❑ To provide Subsequent Notification of Regulated Waste Activity (to update site identification information) ❑ As a component of a First RCRA Hazardous Waste Part A Permit Application ❑ As a component of a Revised RCRA Hazardous Waste Part A Permit Application (Amendment #_______) ❑ As a component of the Hazardous Waste Report			
2. Site EPA ID Number (page 15)	**EPA ID Number** |___|___|___| |___|___|___| |___|___|___| |___|___|___|			
3. Site Name (page 15)	**Name:**			
4. Site Location Information (page 15)	**Street Address:**			
	City, Town, or Village:			**State:**
	County Name:			**Zip Code:**
5. Site Land Type (page 15)	**Site Land Type:** ❑ Private ❑ County ❑ District ❑ Federal ❑ Indian ❑ Municipal ❑ State ❑ Other			
6. North American Industry Classification System (NAICS) Code(s) for the Site (page 15)	**A.** |___|___|___|___|___|___|		**B.** |___|___|___|___|___|___|	
	C. |___|___|___|___|___|___|		**D.** |___|___|___|___|___|___|	
7. Site Mailing Address (page 16)	**Street or P. O. Box:**			
	City, Town, or Village:			
	State:			
	Country:			**Zip Code:**
8. Site Contact Person (page 16)	**First Name:**	**MI:**		**Last Name:**
	Phone Number:	**Extension:**		**Email address:**
9. Operator and Legal Owner of the Site (pages 16 and 17)	**A. Name of Site's Operator:**			**Date Became Operator (mm/dd/yyyy):**
	Operator Type: ❑ Private ❑ County ❑ District ❑ Federal ❑ Indian ❑ Municipal ❑ State ❑ Other			
	B. Name of Site's Legal Owner:			**Date Became Owner (mm/dd/yyyy):**
	Owner Type: ❑ Private ❑ County ❑ District ❑ Federal ❑ Indian ❑ Municipal ❑ State ❑ Other			

EPA ID NO: I___I___I___I I___I___I___I I___I___I___I I___I___I___I OMB#: 2050-0034 Expires 11/30/2005

9. Legal Owner (Continued) Address	Street or P. O. Box:	
	City, Town, or Village:	
	State:	
	Country:	Zip Code:

10. Type of Regulated Waste Activity
Mark "Yes" or "No" for all activities; complete any additional boxes as instructed. (See instructions on pages 18 to 21.)

A. Hazardous Waste Activities
Complete all parts for 1 through 6.

Y ❑ N ❑ 1. **Generator of Hazardous Waste**
If "Yes", choose only one of the following - a, b, or c.

❑ a. LQG: Greater than 1,000 kg/mo (2,200 lbs./mo.) of non-acute hazardous waste; or

❑ b. SQG: 100 to 1,000 kg/mo (220 - 2,200 lbs./mo.) of non-acute hazardous waste; or

❑ c. CESQG: Less than 100 kg/mo (220 lbs./mo.) of non-acute hazardous waste

In addition, indicate other generator activities.

Y ❑ N ❑ d. United States Importer of Hazardous Waste

Y ❑ N ❑ e. Mixed Waste (hazardous and radioactive) Generator

Y ❑ N ❑ 2. **Transporter of Hazardous Waste**

Y ❑ N ❑ 3. **Treater, Storer, or Disposer of Hazardous Waste (at your site)** Note: A hazardous waste permit is required for this activity.

Y ❑ N ❑ 4. **Recycler of Hazardous Waste (at your site)**

Y ❑ N ❑ 5. **Exempt Boiler and/or Industrial Furnace**
If "Yes", mark each that applies.
❑ a. Small Quantity On-site Burner Exemption
❑ b. Smelting, Melting, and Refining Furnace Exemption

Y ❑ N ❑ 6. **Underground Injection Control**

B. Universal Waste Activities

Y ❑ N ❑ 1. **Large Quantity Handler of Universal Waste (accumulate 5,000 kg or more) [refer to your State regulations to determine what is regulated]. Indicate types of universal waste generated and/or accumulated at your site. If "Yes", mark all boxes that apply:**

	Generate	Accumulate
a. Batteries	❑	❑
b. Pesticides	❑	❑
c. Thermostats	❑	❑
d. Lamps	❑	❑
e. Other (specify) ________________	❑	❑
f. Other (specify) ________________	❑	❑
g. Other (specify) ________________	❑	❑

Y ❑ N ❑ 2. **Destination Facility for Universal Waste**
Note: A hazardous waste permit may be required for this activity.

C. Used Oil Activities
Mark all boxes that apply.

Y ❑ N ❑ 1. **Used Oil Transporter**
If "Yes", mark each that applies.
❑ a. Transporter
❑ b. Transfer Facility

Y ❑ N ❑ 2. **Used Oil Processor and/or Re-refiner**
If "Yes", mark each that applies.
❑ a. Processor
❑ b. Re-refiner

Y ❑ N ❑ 3. **Off-Specification Used Oil Burner**

Y ❑ N ❑ 4. **Used Oil Fuel Marketer**
If "Yes", mark each that applies.
❑ a. Marketer Who Directs Shipment of Off-Specification Used Oil to Off-Specification Used Oil Burner
❑ b. Marketer Who First Claims the Used Oil Meets the Specifications

11. Description of Hazardous Wastes (See instructions on page 22.)

A. Waste Codes for Federally Regulated Hazardous Wastes. Please list the waste codes of the Federal hazardous wastes handled at your site. List them in the order they are presented in the regulations (e.g., D001, D003, F007, U112). Use an additional page if more spaces are needed.

B. Waste Codes for State-Regulated (i.e., non-Federal) Hazardous Wastes. Please list the waste codes of the State-regulated hazardous wastes handled at your site. List them in the order they are presented in the regulations. Use an additional page if more spaces are needed for waste codes.

12. Comments (See instructions on page 22.)

13. Certification. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.
For the RCRA Hazardous Waste Part A Permit Application, all operator(s) and owner(s) must sign (see 40 CFR 270.10 (b) and 270.11). **(See instructions on page 22.)**

Signature of operator, owner, or an authorized representative	Name and Official Title (type or print)	Date Signed (mm/dd/yyyy)

EPA ID NO: I___I___I___I I___I___I___I I___I___I___I I___I___I___I

OMB #: 2050-0034 Expires 11/30/2005

United States Environmental Protection Agency

HAZARDOUS WASTE PERMIT INFORMATION FORM

1. Facility Permit Contact (See instructions on page 23)	**First Name:**	**MI:**	**Last Name:**
	Phone Number:		**Phone Number Extension:**
2. Facility Permit Contact Mailing Address (See instructions on page 23)	**Street or P.O. Box:**		
	City, Town, or Village:		
	State:		
	Country:		**Zip Code:**
3. Operator Mailing Address and Telephone Number (See instructions on page 23)	**Street or P.O. Box:**		
	City, Town, or Village:		
	State:		
	Country:	**Zip Code:**	**Phone Number**
4. Legal Owner Mailing Address and Telephone Number (See instructions on page 23)	**Street or P.O. Box:**		
	City, Town, or Village:		
	State:		
	Country:	**Zip Code:**	**Phone Number**
5. Facility Existence Date (See instructions on page 24)	**Facility Existence Date (mm/dd/yyyy):**		

6. Other Environmental Permits (See instructions on page 24)

A. Permit Type ***(Enter code)***	**B. Permit Number**	**C. Description**

7. Nature of Business (Provide a brief description; see instructions on page 24)

8. Process Codes and Design Capacities (See instructions on page 24) - Enter information in the Sections on Form Page 3.

A. PROCESS CODE - *Enter the code from the list of process codes in the table below that best describes each process to be used at the facility. Fifteen lines are provided for entering codes. If more lines are needed, attach a separate sheet of paper with the additional information. For "other" processes (i.e., D99, S99, T04 and X99), enter the process information in Item 9 (including a description).*

B. PROCESS DESIGN CAPACITY- *For each code entered in Section A, enter the capacity of the process.*

1. AMOUNT - *Enter the amount. In a case where design capacity is not applicable (such as in a closure/post-closure or enforcement action) enter the total amount of waste for that process.*

2. UNIT OF MEASURE - *For each amount entered in Section B(1), enter the code in Section B(2) from the list of unit of measure codes below that describes the unit of measure used. Select only from the units of measure in this list.*

C. PROCESS TOTAL NUMBER OF UNITS - *Enter the total number of units for each corresponding process code.*

PROCESS CODE	PROCESS	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
	Disposal:	
D79	Underground Injection Well Disposal	Gallons; Liters; Gallons Per Day; or Liters Per Day
D80	Landfill	Acre-feet; Hectare-meter; Acres; Cubic Meters; Hectares; Cubic Yards
D81	Land Treatment	Acres or Hectares
D82	Ocean Disposal	Gallons Per Day or Liters Per Day
D83	Surface Impoundment Disposal	Gallons; Liters; Cubic Meters; or Cubic Yards
D99	Other Disposal	Any Unit of Measure in Code Table Below
	Storage:	
S01	Container	Gallons; Liters; Cubic Meters; or Cubic Yards
S02	Tank Storage	Gallons; Liters; Cubic Meters; or Cubic Yards
S03	Waste Pile	Cubic Yards or Cubic Meters
S04	Surface Impoundment Storage	Gallons; Liters; Cubic Meters; or Cubic Yards
S05	Drip Pad	Gallons; Liters; Acres; Cubic Meters; Hectares; or Cubic Yards
S06	Containment Building Storage	Cubic Yards or Cubic Meters
S99	Other Storage	Any Unit of Measure in Code Table Below
	Treatment:	
T01	Tank Treatment	Gallons Per Day; Liters Per Day
T02	Surface Impoundment Treatment	Gallons Per Day; Liters Per Day
T03	Incinerator	Short Tons Per Hour; Metric Tons Per Hour; Gallons Per Hour; Liters Per Hour; Btu Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Gallons Per Day; Liters Per Day; Metric Tons Per Hour; or Million Btu Per Hour
T04	Other Treatment	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; Btu Per Hour; Gallons Per Day; Liters Per Hour; or Million Btu Per Hour
T80	Boiler	Gallons; Liters; Gallons Per Hour; Liters Per Hour; Btu Per Hour; or Million Btu Per Hour

PROCESS CODE	PROCESS	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
	Treatment (continued):	
T81	Cement Kiln	For T81-T93:
T82	Lime Kiln	
T83	Aggregate Kiln	Gallons Per Day; Liters Per Day; Pounds
T84	Phosphate Kiln	Per Hour; Short Tons Per Hour; Kilograms
T85	Coke Oven	Per Hour; Metric Tons Per Day; Metric
T86	Blast Furnace	Tons Per Hour; Short Tons Per Day; Btu Per
T87	Smelting, Melting, or Refining Furnace	Hour; Liters Per Hour; Kilograms Per Hour; or Million Btu Per Hour
T88	Titanium Dioxide Chloride Oxidation Reactor	
T89	Methane Reforming Furnace	
T90	Pulping Liquor Recovery Furnace	
T91	Combustion Device Used In The Recovery Of Sulfur Values From Spent Sulfuric Acid	
T92	Halogen Acid Furnaces	
T93	Other Industrial Furnaces Listed In 40 CFR §260.10	
T94	Containment Building - Treatment	Cubic Yards; Cubic Meters; Short Tons Per Hour; Gallons Per Hour; Liters Per Hour; Btu Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Metric Tons Per Day; Gallons Per Day; Liters Per Day; Metric Tons Per Hour; or Million Btu Per Hour
	Miscellaneous (Subpart X):	
X01	Open Burning/Open Detonation	Any Unit of Measure in Code Table Below
X02	Mechanical Processing	Short Tons Per Hour; Metric Tons Per Hour; Short Tons Per Day; Metric Tons Per Day; Pounds Per Hour; Kilograms Per Hour; Gallons Per Hour; Liters Per Hour; or Gallons Per Day
X03	Thermal Unit	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; Btu Per Hour; or Million Btu Per Hour
X04	Geologic Repository	Cubic Yards; Cubic Meters; Acre-feet; Hectare-meter; Gallons; or Liters
X99	Other Subpart X	Any Unit of Measure Listed Below

UNIT OF MEASURE	UNIT OF MEASURE CODE
Gallons	G
Gallons Per Hour	E
Gallons Per Day	U
Liters	L
Liters Per Hour	H
Liters Per Day	V

UNIT OF MEASURE	UNIT OF MEASURE CODE
Short Tons Per Hour	D
Metric Tons Per Hour	W
Short Tons Per Day	N
Metric Tons Per Day	S
Pounds Per Hour	J
Kilograms Per Hour	R
Million Btu Per Hour	X

UNIT OF MEASURE	UNIT OF MEASURE CODE
Cubic Yards	Y
Cubic Meters	C
Acres	B
Acre-feet	A
Hectares	Q
Hectare-meter	F
Btu Per Hour	I

8. Process Codes and Design Capacities (Continued)

EXAMPLE FOR COMPLETING Item 8 (shown in line number X-1 below): A facility has a storage tank, which can hold 533.788 gallons.

Line Number		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	B. (2) Unit of Measure (Enter code)	C. Process Total Number of Units	For Official Use Only
X	1	S	0	2	5 3 3 . 7 8 8	G	0 0 1	
	1				.			
	2				.			
	3				.			
	4				.			
	5				.			
	6				.			
	7				.			
	8				.			
	9				.			
1	0				.			
1	1				.			
1	2				.			
1	3				.			
1	4				.			
1	5				.			

NOTE: If you need to list more than 15 process codes, attach an additional sheet(s) with the information in the same format as above. Number the lines sequentially, taking into account any lines that will be used for "other" processes (i.e., D99, S99, T04 and X99) in Item 9.

9. Other Processes (*See instructions on page 25 and follow instructions from Item 8 for D99, S99, T04 and X99 process codes*)

Line Number (Enter #s in sequence with Item 8)		A. Process Code (From list above)			B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	B. (2) Unit of Measure (Enter code)	C. Process Total Number of Units	D. Description of Process
X	2	T	0	4	1 0 0 . 0 0 0	U	0 0 1	In-situ Vitrification
					.			
					.			
					.			
					.			
					.			

10. Description of Hazardous Wastes (See instructions on page 25) - Enter information in the Sections on Form Page 5.

A. EPA HAZARDOUS WASTE NUMBER - ***Enter the four-digit number from 40 CFR, Part 261 Subpart D of each listed hazardous waste you will handle. For hazardous wastes which are not listed in 40 CFR, Part 261 Subpart D, enter the four-digit number(s) from 40 CFR Part 261, Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.***

B. ESTIMATED ANNUAL QUANTITY - ***For each listed waste entered in Section A, estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in Section A, estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.***

C. UNIT OF MEASURE - ***For each quantity entered in Section B, enter the unit of measure code. Units of measure which must be used and the appropriate codes are:***

ENGLISH UNIT OF MEASURE	*CODE*	*METRIC UNIT OF MEASURE*	*CODE*
POUNDS	*P*	*KILOGRAMS*	*K*
TONS	*T*	*METRIC TONS*	*M*

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure, taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed hazardous waste: For each listed hazardous waste entered in Section A, select the code(s) from the list of process codes contained in Items 8A and 9A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all the listed hazardous wastes.

For non-listed hazardous waste: For each characteristic or toxic contaminant entered in Section A, select the code(s) from the list of process codes contained in Items 8A and 9A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed hazardous wastes that possess that characteristic or toxic contaminant.

NOTE: THREE SPACES ARE PROVIDED FOR ENTERING PROCESS CODES. IF MORE ARE NEEDED:

1. ***Enter the first two as described above.***
2. ***Enter "000" in the extreme right box of Item 10.D(1).***
3. ***Use additional sheet, enter line number from previous sheet, and enter additional code(s) in Item 10.E.***

2. PROCESS DESCRIPTION: ***If a code is not listed for a process that will be used, describe the process in Item 10.D(2) or in Item 10.E(2).***

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER - Hazardous wastes that can be described by more than one EPA Hazardous Waste Number shall be described on the form as follows:

1. ***Select one of the EPA Hazardous Waste Numbers and enter it in Section A. On the same line complete Sections B, C and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.***
2. ***In Section A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In Section D(2) on that line enter "included with above" and make no other entries on that line.***
3. ***Repeat step 2 for each EPA Hazardous Waste Number that can be used to describe the hazardous waste.***

EXAMPLE FOR COMPLETING Item 10 (shown in line numbers X-1, X-2, X-3, and X-4 below) - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operations. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)									(2) PROCESS DESCRIPTION- (If a code is not entered in D(1))
X	1	K	0	5	4	900	P	T	0	3	D	8	0				
X	2	D	0	0	2	400	P	T	0	3	D	8	0				
X	3	D	0	0	1	100	P	T	0	3	D	8	0				
X	4	D	0	0	2												Included With Above

10. Description of Hazardous Wastes (Continued. Use the Additional Sheet(s) as necessary; number pages as 5 a, etc.)

Line Number	*A. EPA Hazardous Waste No. (Enter code)*	*B. Estimated Annual Quantity of Waste*	*C. Unit of Measure (Enter code)*	*D. PROCESSES (1) PROCESS CODES (Enter code)*	*D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in D(1))*
1					
2					
3					
4					
5					
6					
7					
8					
9					
1 0					
1 1					
1 2					
1 3					
1 4					
1 5					
1 6					
1 7					
1 8					
1 9					
2 0					
2 1					
2 2					
2 3					
2 4					
2 5					
2 6					
2 7					
2 8					
2 9					
3 0					
3 1					
3 2					
3 3					
3 4					
3 5					
3 6					
3 7					
3 8					
3 9					

10. Description of Hazardous Wastes (Continued. Use this Additional Sheet(s) as necessary; number as 5 a, etc.)

Line Number		*A. EPA Hazardous Waste No. (Enter code)*	*B. Estimated Annual Quantity of Waste*	*C. Unit of Measure (Enter code)*	*E. PROCESSES (1) PROCESS CODES (Enter code)*	*(2) PROCESS DESCRIPTION (If a code is not entered in E(1))*
4	0					

10. Description of Hazardous Wastes (Continued. Use this Additional Sheet (s) as necessary; munber as 5a, etc.)

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	E. PROCESSES (1) PROCESS CODES (Enter code)									(2) PROCESS DESCRIPTION (If a code is not entered in E(1))
7	9	K	0	3	1	5,000	P	S	0	1	S	0	2	X	0	3	
8	0	K	0	3	2	5,000	P	S	0	1	S	0	2	X	0	3	
8	1	K	0	3	3	5,000	P	S	0	1	S	0	2	X	0	3	
8	2	K	0	3	4	5,000	P	S	0	1	S	0	2	X	0	3	
8	3	K	0	3	5	5,000	P	S	0	1	S	0	2	X	0	3	
8	4	K	0	3	6	5,000	P	S	0	1	S	0	2	X	0	3	
8	5	K	0	3	7	5,000	P	S	0	1	S	0	2	X	0	3	
8	6	K	0	3	8	5,000	P	S	0	1	S	0	2	X	0	3	
8	7	K	0	3	9	5,000	P	S	0	1	S	0	2	X	0	3	
8	8	K	0	4	0	5,000	P	S	0	1	S	0	2	X	0	3	
8	9	K	0	4	1	5,000	P	S	0	1	S	0	2	X	0	3	
9	0	K	0	4	1	5,000	P	S	0	1	S	0	2	X	0	3	
9	1	K	0	4	6	5,000	P	S	0	1	S	0	2	X	0	3	
9	2	K	0	4	8	5,000	P	S	0	1	S	0	2	X	0	3	
9	3	K	0	4	9	5,000	P	S	0	1	S	0	2	X	0	3	
9	4	K	0	5	0	5,000	P	S	0	1	S	0	2	X	0	3	
9	5	K	0	5	1	5,000	P	S	0	1	S	0	2	X	0	3	
9	6	K	0	5	2	5,000	P	S	0	1	S	0	2	X	0	3	
9	7	K	0	6	1	5,000	P	S	0	1	S	0	2	X	0	3	
9	8	K	0	6	4	5,000	P	S	0	1	S	0	2	X	0	3	
9	9	K	0	6	5	5,000	P	S	0	1	S	0	2	X	0	3	
10	0	K	0	6	6	5,000	P	S	0	1	S	0	2	X	0	3	
10	1	K	0	7	1	5,000	P	S	0	1	S	0	2	X	0	3	
10	2	K	0	7	3	5,000	P	S	0	1	S	0	2	X	0	3	
10	3	K	0	8	3	5,000	P	S	0	1	S	0	2	X	0	3	
10	4	K	0	8	4	5,000	P	S	0	1	S	0	2	X	0	3	
10	5	K	0	8	5	5,000	P	S	0	1	S	0	2	X	0	3	
10	6	K	0	8	6	5,000	P	S	0	1	S	0	2	X	0	3	
10	7	K	0	8	7	5,000	P	S	0	1	S	0	2	X	0	3	
10	8	K	0	8	8	5,000	P	S	0	1	S	0	2	X	0	3	
10	9	K	0	9	0	5,000	P	S	0	1	S	0	2	X	0	3	
11	0	K	0	9	1	5,000	P	S	0	1	S	0	2	X	0	3	
11	1	K	0	9	3	5,000	P	S	0	1	S	0	2	X	0	3	
11	2	K	0	9	4	5,000	P	S	0	1	S	0	2	X	0	3	
11	3	K	0	9	5	5,000	P	S	0	1	S	0	2	X	0	3	
11	4	K	0	9	6	5,000	P	S	0	1	S	0	2	X	0	3	
11	5	K	0	9	7	5,000	P	S	0	1	S	0	2	X	0	3	
11	6	K	0	9	8	5,000	P	S	0	1	S	0	2	X	0	3	
11	7	K	1	0	0	5,000	P	S	0	1	S	0	2	X	0	3	

10. Description of Hazardous Wastes (Continued. Use this Additional Sheet (s) as necessary; munber as 5a, etc.)

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	E. PROCESSES (1) PROCESS CODES (Enter code)									(2) PROCESS DESCRIPTION (If a code is not entered in E(1))
11	8	K	1	0	1	5,000	P	S	0	1	S	0	2	X	0	3	
11	9	K	1	0	2	5,000	P	S	0	1	S	0	2	X	0	3	
12	0	K	1	0	3	5,000	P	S	0	1	S	0	2	X	0	3	
12	1	K	1	0	4	5,000	P	S	0	1	S	0	2	X	0	3	
12	2	K	1	0	5	5,000	P	S	0	1	S	0	2	X	0	3	
12	3	K	1	0	6	5,000	P	S	0	1	S	0	2	X	0	3	
12	4	K	1	1	2	5,000	P	S	0	1	S	0	2	X	0	3	
12	5	K	1	1	3	5,000	P	S	0	1	S	0	2	X	0	3	
12	6	K	1	1	4	5,000	P	S	0	1	S	0	2	X	0	3	
12	7	K	1	1	5	5,000	P	S	0	1	S	0	2	X	0	3	
12	8	K	1	1	6	5,000	P	S	0	1	S	0	2	X	0	3	
12	9	K	1	1	7	5,000	P	S	0	1	S	0	2	X	0	3	
13	0	K	1	1	8	5,000	P	S	0	1	S	0	2	X	0	3	
13	1	K	1	2	5	5,000	P	S	0	1	S	0	2	X	0	3	
13	2	K	1	2	6	5,000	P	S	0	1	S	0	2	X	0	3	
13	3	P	0	0	1	5,000	P	S	0	1	S	0	2	X	0	3	
13	4	P	0	0	2	5,000	P	S	0	1	S	0	2	X	0	3	
13	5	P	0	0	3	5,000	P	S	0	1	S	0	2	X	0	3	
13	6	P	0	0	4	5,000	P	S	0	1	S	0	2	X	0	3	
13	7	P	0	0	5	5,000	P	S	0	1	S	0	2	X	0	3	
13	8	P	0	0	7	5,000	P	S	0	1	S	0	2	X	0	3	
13	9	P	0	0	8	5,000	P	S	0	1	S	0	2	X	0	3	
14	0	P	0	1	0	5,000	P	S	0	1	S	0	2	X	0	3	
14	1	P	0	1	1	5,000	P	S	0	1	S	0	2	X	0	3	
14	2	P	0	1	2	5,000	P	S	0	1	S	0	2	X	0	3	
14	3	P	0	1	3	5,000	P	S	0	1	S	0	2	X	0	3	
14	4	P	0	1	4	5,000	P	S	0	1	S	0	2	X	0	3	
14	5	P	0	1	5	5,000	P	S	0	1	S	0	2	X	0	3	
14	6	P	0	1	6	5,000	P	S	0	1	S	0	2	X	0	3	
14	7	P	0	1	7	5,000	P	S	0	1	S	0	2	X	0	3	
14	8	P	0	1	8	5,000	P	S	0	1	S	0	2	X	0	3	
14	9	P	0	2	0	5,000	P	S	0	1	S	0	2	X	0	3	
15	0	P	0	2	1	5,000	P	S	0	1	S	0	2	X	0	3	
15	1	P	0	2	2	5,000	P	S	0	1	S	0	2	X	0	3	
15	2	P	0	2	3	5,000	P	S	0	1	S	0	2	X	0	3	
15	3	P	0	2	4	5,000	P	S	0	1	S	0	2	X	0	3	
15	4	P	0	2	6	5,000	P	S	0	1	S	0	2	X	0	3	
15	5	P	0	2	7	5,000	P	S	0	1	S	0	2	X	0	3	
15	6	P	0	2	8	5,000	P	S	0	1	S	0	2	X	0	3	

10. Description of Hazardous Wastes (Continued. Use this Additional Sheet (s) as necessary; munber as 5a, etc.)																	
Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	E. PROCESSES (1) PROCESS CODES (Enter code)									(2) PROCESS DESCRIPTION (If a code is not entered in E(1))
15	7	P	0	2	9	5,000	P	S	0	1	S	0	2	X	0	3	
15	8	P	0	3	0	5,000	P	S	0	1	S	0	2	X	0	3	
15	9	P	0	3	1	5,000	P	S	0	1	S	0	2	X	0	3	
16	0	P	0	3	3	5,000	P	S	0	1	S	0	2	X	0	3	
16	1	P	0	3	4	5,000	P	S	0	1	S	0	2	X	0	3	
16	2	P	0	3	6	5,000	P	S	0	1	S	0	2	X	0	3	
16	3	P	0	3	7	5,000	P	S	0	1	S	0	2	X	0	3	
16	4	P	0	3	8	5,000	P	S	0	1	S	0	2	X	0	3	
16	5	P	0	3	9	5,000	P	S	0	1	S	0	2	X	0	3	
16	6	P	0	4	0	5,000	P	S	0	1	S	0	2	X	0	3	
16	7	P	0	4	1	5,000	P	S	0	1	S	0	2	X	0	3	
16	8	P	0	4	2	5,000	P	S	0	1	S	0	2	X	0	3	
16	9	P	0	4	3	5,000	P	S	0	1	S	0	2	X	0	3	
17	0	P	0	4	4	5,000	P	S	0	1	S	0	2	X	0	3	
17	1	P	0	4	5	5,000	P	S	0	1	S	0	2	X	0	3	
17	2	P	0	4	6	5,000	P	S	0	1	S	0	2	X	0	3	
17	3	P	0	4	7	5,000	P	S	0	1	S	0	2	X	0	3	
17	4	P	0	4	8	5,000	P	S	0	1	S	0	2	X	0	3	
17	5	P	0	4	9	5,000	P	S	0	1	S	0	2	X	0	3	
17	6	P	0	5	0	5,000	P	S	0	1	S	0	2	X	0	3	
17	7	P	0	5	1	5,000	P	S	0	1	S	0	2	X	0	3	
17	8	P	0	5	4	5,000	P	S	0	1	S	0	2	X	0	3	
17	9	P	0	5	6	5,000	P	S	0	1	S	0	2	X	0	3	
18	0	P	0	5	7	5,000	P	S	0	1	S	0	2	X	0	3	
18	1	P	0	5	8	5,000	P	S	0	1	S	0	2	X	0	3	
18	2	P	0	5	9	5,000	P	S	0	1	S	0	2	X	0	3	
18	3	P	0	6	0	5,000	P	S	0	1	S	0	2	X	0	3	
18	4	P	0	6	2	5,000	P	S	0	1	S	0	2	X	0	3	
18	5	P	0	6	3	5,000	P	S	0	1	S	0	2	X	0	3	
18	6	P	0	6	4	5,000	P	S	0	1	S	0	2	X	0	3	
18	7	P	0	6	6	5,000	P	S	0	1	S	0	2	X	0	3	
18	8	P	0	6	7	5,000	P	S	0	1	S	0	2	X	0	3	
18	9	P	0	6	8	5,000	P	S	0	1	S	0	2	X	0	3	
19	0	P	0	6	9	5,000	P	S	0	1	S	0	2	X	0	3	
19	1	P	0	7	0	5,000	P	S	0	1	S	0	2	X	0	3	
19	2	P	0	7	1	5,000	P	S	0	1	S	0	2	X	0	3	
19	3	P	0	7	2	5,000	P	S	0	1	S	0	2	X	0	3	
19	4	P	0	7	3	5,000	P	S	0	1	S	0	2	X	0	3	
19	5	P	0	7	4	5,000	P	S	0	1	S	0	2	X	0	3	

10. Description of Hazardous Wastes (Continued. Use this Additional Sheet (s) as necessary; munber as 5a, etc.)																			
Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	E. PROCESSES (1) PROCESS CODES (Enter code)											(2) PROCESS DESCRIPTION (If a code is not entered in E(1))
19	6	P	0	7	5	5,000	P	S	0	1	S	0	2	X	0	3			
19	7	P	0	7	7	5,000	P	S	0	1	S	0	2	X	0	3			
19	8	P	0	7	8	5,000	P	S	0	1	S	0	2	X	0	3			
19	9	P	0	8	2	5,000	P	S	0	1	S	0	2	X	0	3			
20	0	P	0	8	4	5,000	P	S	0	1	S	0	2	X	0	3			
20	1	P	0	8	5	5,000	P	S	0	1	S	0	2	X	0	3			
20	2	P	0	8	7	5,000	P	S	0	1	S	0	2	X	0	3			
20	3	P	0	8	8	5,000	P	S	0	1	S	0	2	X	0	3			
20	4	P	0	8	9	5,000	P	S	0	1	S	0	2	X	0	3			
20	5	P	0	9	2	5,000	P	S	0	1	S	0	2	X	0	3			
20	6	P	0	9	3	5,000	P	S	0	1	S	0	2	X	0	3			
20	7	P	0	9	4	5,000	P	S	0	1	S	0	2	X	0	3			
20	8	P	0	9	5	5,000	P	S	0	1	S	0	2	X	0	3			
20	9	P	0	9	6	5,000	P	S	0	1	S	0	2	X	0	3			
21	0	P	0	9	7	5,000	P	S	0	1	S	0	2	X	0	3			
21	1	P	0	9	8	5,000	P	S	0	1	S	0	2	X	0	3			
21	2	P	0	9	9	5,000	P	S	0	1	S	0	2	X	0	3			
21	3	P	1	0	1	5,000	P	S	0	1	S	0	2	X	0	3			
21	4	P	1	0	2	5,000	P	S	0	1	S	0	2	X	0	3			
21	5	P	1	0	3	5,000	P	S	0	1	S	0	2	X	0	3			
21	6	P	1	0	4	5,000	P	S	0	1	S	0	2	X	0	3			
21	7	P	1	0	5	5,000	P	S	0	1	S	0	2	X	0	3			
21	8	P	1	0	8	5,000	P	S	0	1	S	0	2	X	0	3			
21	9	P	1	0	9	5,000	P	S	0	1	S	0	2	X	0	3			
22	0	P	1	1	0	5,000	P	S	0	1	S	0	2	X	0	3			
22	1	P	1	1	3	5,000	P	S	0	1	S	0	2	X	0	3			
22	2	P	1	1	4	5,000	P	S	0	1	S	0	2	X	0	3			
22	3	P	1	1	5	5,000	P	S	0	1	S	0	2	X	0	3			
22	4	P	1	1	6	5,000	P	S	0	1	S	0	2	X	0	3			
22	5	P	1	1	8	5,000	P	S	0	1	S	0	2	X	0	3			
22	6	P	1	1	9	5,000	P	S	0	1	S	0	2	X	0	3			
22	7	P	1	2	0	5,000	P	S	0	1	S	0	2	X	0	3			
22	8	P	1	2	1	5,000	P	S	0	1	S	0	2	X	0	3			
22	9	P	1	2	3	5,000	P	S	0	1	S	0	2	X	0	3			
23	0	U	0	0	1	5,000	P	S	0	1	S	0	2	X	0	3			
23	1	U	0	0	2	5,000	P	S	0	1	S	0	2	X	0	3			
23	2	U	0	0	3	5,000	P	S	0	1	S	0	2	X	0	3			
23	3	U	0	0	4	5,000	P	S	0	1	S	0	2	X	0	3			
23	4	U	0	0	5	5,000	P	S	0	1	S	0	2	X	0	3			

10. Description of Hazardous Wastes (Continued. Use this Additional Sheet (s) as necessary; munber as 5a, etc.)

Line Number		*A. EPA Hazardous Waste No. (Enter code)*				*B. Estimated Annual Quantity of Waste*	*C. Unit of Measure (Enter code)*	*E. PROCESSES (1) PROCESS CODES (Enter code)*									*E. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in E(1))*
23	5	U	0	0	7	5,000	P	S	0	1	S	0	2	X	0	3	
23	6	U	0	0	8	5,000	P	S	0	1	S	0	2	X	0	3	
23	7	U	0	0	9	5,000	P	S	0	1	S	0	2	X	0	3	
23	8	U	0	1	0	5,000	P	S	0	1	S	0	2	X	0	3	
23	9	U	0	1	1	5,000	P	S	0	1	S	0	2	X	0	3	
24	0	U	0	1	2	5,000	P	S	0	1	S	0	2	X	0	3	
24	1	U	0	1	4	5,000	P	S	0	1	S	0	2	X	0	3	
24	2	U	0	1	5	5,000	P	S	0	1	S	0	2	X	0	3	
24	3	U	0	1	6	5,000	P	S	0	1	S	0	2	X	0	3	
24	4	U	0	1	7	5,000	P	S	0	1	S	0	2	X	0	3	
24	5	U	0	1	8	5,000	P	S	0	1	S	0	2	X	0	3	
24	6	U	0	1	9	5,000	P	S	0	1	S	0	2	X	0	3	
24	7																Intentionally blank
24	8	U	0	2	2	5,000	P	S	0	1	S	0	2	X	0	3	
24	9	U	0	2	4	5,000	P	S	0	1	S	0	2	X	0	3	
25	0	U	0	2	5	5,000	P	S	0	1	S	0	2	X	0	3	
25	1	U	0	2	6	5,000	P	S	0	1	S	0	2	X	0	3	
25	2	U	0	2	7	5,000	P	S	0	1	S	0	2	X	0	3	
25	3	U	0	2	8	5,000	P	S	0	1	S	0	2	X	0	3	
25	4	U	0	2	9	5,000	P	S	0	1	S	0	2	X	0	3	
25	5	U	0	3	0	5,000	P	S	0	1	S	0	2	X	0	3	
25	6	U	0	3	1	5,000	P	S	0	1	S	0	2	X	0	3	
25	7	U	0	3	2	5,000	P	S	0	1	S	0	2	X	0	3	
25	8	U	0	3	4	5,000	P	S	0	1	S	0	2	X	0	3	
25	9	U	0	3	5	5,000	P	S	0	1	S	0	2	X	0	3	
26	0	U	0	3	6	5,000	P	S	0	1	S	0	2	X	0	3	
26	1	U	0	3	7	5,000	P	S	0	1	S	0	2	X	0	3	
26	2	U	0	3	8	5,000	P	S	0	1	S	0	2	X	0	3	
26	3	U	0	3	9	5,000	P	S	0	1	S	0	2	X	0	3	
26	4	U	0	4	1	5,000	P	S	0	1	S	0	2	X	0	3	
26	5	U	0	4	2	5,000	P	S	0	1	S	0	2	X	0	3	
26	6	U	0	4	3	5,000	P	S	0	1	S	0	2	X	0	3	
26	7	U	0	4	4	5,000	P	S	0	1	S	0	2	X	0	3	
26	8	U	0	4	5	5,000	P	S	0	1	S	0	2	X	0	3	
26	9	U	0	4	6	5,000	P	S	0	1	S	0	2	X	0	3	
27	0	U	0	4	7	5,000	P	S	0	1	S	0	2	X	0	3	
27	1	U	0	4	8	5,000	P	S	0	1	S	0	2	X	0	3	
27	2	U	0	4	9	5,000	P	S	0	1	S	0	2	X	0	3	
27	3	U	0	5	0	5,000	P	S	0	1	S	0	2	X	0	3	

10. Description of Hazardous Wastes (Continued. Use this Additional Sheet (s) as necessary; munber as 5a, etc.)																		
Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	E. PROCESSES (1) PROCESS CODES (Enter code)										(2) PROCESS DESCRIPTION (If a code is not entered in E(1))
27	4	U	0	5	1	5,000	P	S	0	1	S	0	2	X	0	3	
27	5	U	0	5	2	5,000	P	S	0	1	S	0	2	X	0	3	
27	6	U	0	5	3	5,000	P	S	0	1	S	0	2	X	0	3	
27	7	U	0	5	5	5,000	P	S	0	1	S	0	2	X	0	3	
27	8	U	0	5	6	5,000	P	S	0	1	S	0	2	X	0	3	
27	9	U	0	5	7	5,000	P	S	0	1	S	0	2	X	0	3	
28	0	U	0	5	8	5,000	P	S	0	1	S	0	2	X	0	3	
28	1	U	0	5	9	5,000	P	S	0	1	S	0	2	X	0	3	
28	2	U	0	6	0	5,000	P	S	0	1	S	0	2	X	0	3	
28	3	U	0	6	1	5,000	P	S	0	1	S	0	2	X	0	3	
28	4	U	0	6	2	5,000	P	S	0	1	S	0	2	X	0	3	
28	5	U	0	6	3	5,000	P	S	0	1	S	0	2	X	0	3	
28	6	U	0	6	4	5,000	P	S	0	1	S	0	2	X	0	3	
28	7	U	0	6	6	5,000	P	S	0	1	S	0	2	X	0	3	
28	8	U	0	6	7	5,000	P	S	0	1	S	0	2	X	0	3	
28	9	U	0	6	8	5,000	P	S	0	1	S	0	2	X	0	3	
29	0	U	0	6	9	5,000	P	S	0	1	S	0	2	X	0	3	
29	1	U	0	7	0	5,000	P	S	0	1	S	0	2	X	0	3	
29	2	U	0	7	1	5,000	P	S	0	1	S	0	2	X	0	3	
29	3	U	0	7	2	5,000	P	S	0	1	S	0	2	X	0	3	
29	4	U	0	7	3	5,000	P	S	0	1	S	0	2	X	0	3	
29	5	U	0	7	4	5,000	P	S	0	1	S	0	2	X	0	3	
29	6	U	0	7	5	5,000	P	S	0	1	S	0	2	X	0	3	
29	7	U	0	7	6	5,000	P	S	0	1	S	0	2	X	0	3	
29	8	U	0	7	7	5,000	P	S	0	1	S	0	2	X	0	3	
29	9	U	0	7	8	5,000	P	S	0	1	S	0	2	X	0	3	
30	0	U	0	7	9	5,000	P	S	0	1	S	0	2	X	0	3	
30	1	U	0	8	0	5,000	P	S	0	1	S	0	2	X	0	3	
30	2	U	0	8	1	5,000	P	S	0	1	S	0	2	X	0	3	
30	3	U	0	8	2	5,000	P	S	0	1	S	0	2	X	0	3	
30	4	U	0	8	3	5,000	P	S	0	1	S	0	2	X	0	3	
30	5	U	0	8	4	5,000	P	S	0	1	S	0	2	X	0	3	
30	6	U	0	8	5	5,000	P	S	0	1	S	0	2	X	0	3	
30	7	U	0	8	6	5,000	P	S	0	1	S	0	2	X	0	3	
30	8	U	0	8	7	5,000	P	S	0	1	S	0	2	X	0	3	
30	9	U	0	8	8	5,000	P	S	0	1	S	0	2	X	0	3	
31	0	U	0	8	9	5,000	P	S	0	1	S	0	2	X	0	3	
31	1	U	0	9	0	5,000	P	S	0	1	S	0	2	X	0	3	
31	2	U	0	9	1	5,000	P	S	0	1	S	0	2	X	0	3	

10. Description of Hazardous Wastes (Continued. Use this Additional Sheet (s) as necessary; munber as 5a, etc.)																	
Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	E. PROCESSES (1) PROCESS CODES (Enter code)									(2) PROCESS DESCRIPTION (If a code is not entered in E(1))
31	3	U	0	9	2	5,000	P	S	0	1	S	0	2	X	0	3	
31	4	U	0	9	3	5,000	P	S	0	1	S	0	2	X	0	3	
31	5	U	0	9	4	5,000	P	S	0	1	S	0	2	X	0	3	
31	6	U	0	9	5	5,000	P	S	0	1	S	0	2	X	0	3	
31	7	U	0	9	7	5,000	P	S	0	1	S	0	2	X	0	3	
31	8	U	0	9	8	5,000	P	S	0	1	S	0	2	X	0	3	
31	9	U	0	9	9	5,000	P	S	0	1	S	0	2	X	0	3	
32	0	U	1	0	1	5,000	P	S	0	1	S	0	2	X	0	3	
32	1	U	1	0	2	5,000	P	S	0	1	S	0	2	X	0	3	
32	2	U	1	0	3	5,000	P	S	0	1	S	0	2	X	0	3	
32	3	U	1	0	5	5,000	P	S	0	1	S	0	2	X	0	3	
32	4	U	1	0	6	5,000	P	S	0	1	S	0	2	X	0	3	
32	5	U	1	0	7	5,000	P	S	0	1	S	0	2	X	0	3	
32	6	U	1	0	8	5,000	P	S	0	1	S	0	2	X	0	3	
32	7	U	1	0	9	5,000	P	S	0	1	S	0	2	X	0	3	
32	8	U	1	1	0	5,000	P	S	0	1	S	0	2	X	0	3	
32	9	U	1	1	1	5,000	P	S	0	1	S	0	2	X	0	3	
33	0	U	1	1	2	5,000	P	S	0	1	S	0	2	X	0	3	
33	1	U	1	1	3	5,000	P	S	0	1	S	0	2	X	0	3	
33	2	U	1	1	4	5,000	P	S	0	1	S	0	2	X	0	3	
33	3	U	1	1	5	5,000	P	S	0	1	S	0	2	X	0	3	
33	4	U	1	1	6	5,000	P	S	0	1	S	0	2	X	0	3	
33	5	U	1	1	7	5,000	P	S	0	1	S	0	2	X	0	3	
33	6	U	1	1	8	5,000	P	S	0	1	S	0	2	X	0	3	
33	7	U	1	1	9	5,000	P	S	0	1	S	0	2	X	0	3	
33	8	U	1	2	0	5,000	P	S	0	1	S	0	2	X	0	3	
33	9	U	1	2	1	5,000	P	S	0	1	S	0	2	X	0	3	
34	0	U	1	2	2	5,000	P	S	0	1	S	0	2	X	0	3	
34	1	U	1	2	4	5,000	P	S	0	1	S	0	2	X	0	3	
34	2	U	1	2	5	5,000	P	S	0	1	S	0	2	X	0	3	
34	3	U	1	2	6	5,000	P	S	0	1	S	0	2	X	0	3	
34	4	U	1	2	7	5,000	P	S	0	1	S	0	2	X	0	3	
34	5	U	1	2	8	5,000	P	S	0	1	S	0	2	X	0	3	
34	6	U	1	2	9	5,000	P	S	0	1	S	0	2	X	0	3	
34	7	U	1	3	0	5,000	P	S	0	1	S	0	2	X	0	3	
34	8	U	1	3	1	5,000	P	S	0	1	S	0	2	X	0	3	
34	9	U	1	3	2	5,000	P	S	0	1	S	0	2	X	0	3	
35	0	U	1	3	5	5,000	P	S	0	1	S	0	2	X	0	3	
35	1	U	1	3	6	5,000	P	S	0	1	S	0	2	X	0	3	

10. Description of Hazardous Wastes (Continued. Use this Additional Sheet (s) as necessary; munber as 5a, etc.)

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	E. PROCESSES (1) PROCESS CODES (Enter code)									E. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in E(1))
35	2	U	1	3	7	5,000	P	S	0	1	S	0	2	X	0	3	
35	3	U	1	3	8	5,000	P	S	0	1	S	0	2	X	0	3	
35	4	U	1	4	0	5,000	P	S	0	1	S	0	2	X	0	3	
35	5	U	1	4	1	5,000	P	S	0	1	S	0	2	X	0	3	
35	6	U	1	4	2	5,000	P	S	0	1	S	0	2	X	0	3	
35	7	U	1	4	3	5,000	P	S	0	1	S	0	2	X	0	3	
35	8	U	1	4	4	5,000	P	S	0	1	S	0	2	X	0	3	
35	9	U	1	4	5	5,000	P	S	0	1	S	0	2	X	0	3	
36	0	U	1	4	6	5,000	P	S	0	1	S	0	2	X	0	3	
36	1	U	1	4	7	5,000	P	S	0	1	S	0	2	X	0	3	
36	2	U	1	4	8	5,000	P	S	0	1	S	0	2	X	0	3	
36	3	U	1	4	9	5,000	P	S	0	1	S	0	2	X	0	3	
36	4	U	1	5	0	5,000	P	S	0	1	S	0	2	X	0	3	
36	5	U	1	5	1	5,000	P	S	0	1	S	0	2	X	0	3	
36	6	U	1	5	2	5,000	P	S	0	1	S	0	2	X	0	3	
36	7	U	1	5	3	5,000	P	S	0	1	S	0	2	X	0	3	
36	8	U	1	5	4	5,000	P	S	0	1	S	0	2	X	0	3	
36	9	U	1	5	5	5,000	P	S	0	1	S	0	2	X	0	3	
37	0	U	1	5	6	5,000	P	S	0	1	S	0	2	X	0	3	
37	1	U	1	5	7	5,000	P	S	0	1	S	0	2	X	0	3	
37	2	U	1	5	8	5,000	P	S	0	1	S	0	2	X	0	3	
37	3	U	1	5	9	5,000	P	S	0	1	S	0	2	X	0	3	
37	4	U	1	6	1	5,000	P	S	0	1	S	0	2	X	0	3	
37	5	U	1	6	2	5,000	P	S	0	1	S	0	2	X	0	3	
37	6	U	1	6	3	5,000	P	S	0	1	S	0	2	X	0	3	
37	7	U	1	6	4	5,000	P	S	0	1	S	0	2	X	0	3	
37	8	U	1	6	5	5,000	P	S	0	1	S	0	2	X	0	3	
37	9	U	1	6	6	5,000	P	S	0	1	S	0	2	X	0	3	
38	0	U	1	6	7	5,000	P	S	0	1	S	0	2	X	0	3	
38	1	U	1	6	8	5,000	P	S	0	1	S	0	2	X	0	3	
38	2	U	1	6	9	5,000	P	S	0	1	S	0	2	X	0	3	
38	3	U	1	7	0	5,000	P	S	0	1	S	0	2	X	0	3	
38	4	U	1	7	1	5,000	P	S	0	1	S	0	2	X	0	3	
38	5	U	1	7	2	5,000	P	S	0	1	S	0	2	X	0	3	
38	6	U	1	7	3	5,000	P	S	0	1	S	0	2	X	0	3	
38	7	U	1	7	4	5,000	P	S	0	1	S	0	2	X	0	3	
38	8	U	1	7	6	5,000	P	S	0	1	S	0	2	X	0	3	
38	9	U	1	7	7	5,000	P	S	0	1	S	0	2	X	0	3	
39	0	U	1	7	8	5,000	P	S	0	1	S	0	2	X	0	3	

10. Description of Hazardous Wastes (Continued. Use this Additional Sheet (s) as necessary; munber as 5a, etc.)																		
Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	E. PROCESSES (1) PROCESS CODES (Enter code)										(2) PROCESS DESCRIPTION (If a code is not entered in E(1))
39	1	U	1	7	9	5,000	P	S	0	1	S	0	2	X	0	3	
39	2	U	1	8	0	5,000	P	S	0	1	S	0	2	X	0	3	
39	3	U	1	8	1	5,000	P	S	0	1	S	0	2	X	0	3	
39	4	U	1	8	2	5,000	P	S	0	1	S	0	2	X	0	3	
39	5	U	1	8	3	5,000	P	S	0	1	S	0	2	X	0	3	
39	6	U	1	8	4	5,000	P	S	0	1	S	0	2	X	0	3	
39	7	U	1	8	5	5,000	P	S	0	1	S	0	2	X	0	3	
39	8	U	1	8	6	5,000	P	S	0	1	S	0	2	X	0	3	
39	9	U	1	8	7	5,000	P	S	0	1	S	0	2	X	0	3	
40	0	U	1	8	8	5,000	P	S	0	1	S	0	2	X	0	3	
40	1	U	1	9	0	5,000	P	S	0	1	S	0	2	X	0	3	
40	2	U	1	9	1	5,000	P	S	0	1	S	0	2	X	0	3	
40	3	U	1	9	2	5,000	P	S	0	1	S	0	2	X	0	3	
40	4	U	1	9	3	5,000	P	S	0	1	S	0	2	X	0	3	
40	5	U	1	9	4	5,000	P	S	0	1	S	0	2	X	0	3	
40	6	U	1	9	6	5,000	P	S	0	1	S	0	2	X	0	3	
40	7	U	1	9	7	5,000	P	S	0	1	S	0	2	X	0	3	
40	8	U	2	0	0	5,000	P	S	0	1	S	0	2	X	0	3	
40	9	U	2	0	1	5,000	P	S	0	1	S	0	2	X	0	3	
41	0	U	2	0	2	5,000	P	S	0	1	S	0	2	X	0	3	
41	1	U	2	0	3	5,000	P	S	0	1	S	0	2	X	0	3	
41	2	U	2	0	4	5,000	P	S	0	1	S	0	2	X	0	3	
41	3	U	2	0	6	5,000	P	S	0	1	S	0	2	X	0	3	
41	4	U	2	0	7	5,000	P	S	0	1	S	0	2	X	0	3	
41	5	U	2	0	8	5,000	P	S	0	1	S	0	2	X	0	3	
41	6	U	2	0	9	5,000	P	S	0	1	S	0	2	X	0	3	
41	7	U	2	1	0	5,000	P	S	0	1	S	0	2	X	0	3	
41	8	U	2	1	1	5,000	P	S	0	1	S	0	2	X	0	3	
41	9	U	2	1	3	5,000	P	S	0	1	S	0	2	X	0	3	
42	0	U	2	1	4	5,000	P	S	0	1	S	0	2	X	0	3	
42	1	U	2	1	5	5,000	P	S	0	1	S	0	2	X	0	3	
42	2	U	2	1	6	5,000	P	S	0	1	S	0	2	X	0	3	
42	3	U	2	1	7	5,000	P	S	0	1	S	0	2	X	0	3	
42	4	U	2	1	8	5,000	P	S	0	1	S	0	2	X	0	3	
42	5	U	2	1	9	5,000	P	S	0	1	S	0	2	X	0	3	
42	6	U	2	2	0	5,000	P	S	0	1	S	0	2	X	0	3	
42	7	U	2	2	1	5,000	P	S	0	1	S	0	2	X	0	3	
42	8	U	2	2	2	5,000	P	S	0	1	S	0	2	X	0	3	
42	9	U	2	2	5	5,000	P	S	0	1	S	0	2	X	0	3	

EPA ID NO: AZD982441263 OMB #: 2050-0034 Expires 11/30/2005

10. Description of Hazardous Wastes (Continued. Use this Additional Sheet (s) as necessary; munber as 5a, etc.)																		
		A.				*B.*	*C.*	*E. PROCESSES*										
Line Number		*EPA Hazardous Waste No. (Enter code)*				*Estimated Annual Quantity of Waste*	*Unit of Measure (Enter code)*	*(1) PROCESS CODES (Enter code)*										*(2) PROCESS DESCRIPTION (If a code is not entered in E(1))*
43	0	U	2	2	6	5,000	P	S	0	1	S	0	2	X	0	3	
44	1	U	2	2	7	5,000	P	S	0	1	S	0	2	X	0	3	
44	2	U	2	2	8	5,000	P	S	0	1	S	0	2	X	0	3	
44	3	U	2	3	5	5,000	P	S	0	1	S	0	2	X	0	3	
44	4	U	2	3	6	5,000	P	S	0	1	S	0	2	X	0	3	
44	5	U	2	3	7	5,000	P	S	0	1	S	0	2	X	0	3	
44	6	U	2	3	8	5,000	P	S	0	1	S	0	2	X	0	3	
44	7	U	2	3	9	5,000	P	S	0	1	S	0	2	X	0	3	
44	8	U	2	4	0	5,000	P	S	0	1	S	0	2	X	0	3	
44	9	U	2	4	3	5,000	P	S	0	1	S	0	2	X	0	3	
45	0	U	2	4	4	5,000	P	S	0	1	S	0	2	X	0	3	
45	1	U	2	4	6	5,000	P	S	0	1	S	0	2	X	0	3	
45	2	U	2	4	7	5,000	P	S	0	1	S	0	2	X	0	3	
45	3	U	2	4	8	5,000	P	S	0	1	S	0	2	X	0	3	
45	4	U	2	4	9	5,000	P	S	0	1	S	0	2	X	0	3	
45	5	U	3	2	8	5,000	P	S	0	1	S	0	2	X	0	3	
45	6	U	3	5	3	5,000	P	S	0	1	S	0	2	X	0	3	
45	7	U	3	5	9	5,000	P	S	0	1	S	0	2	X	0	3	
45	8																
45	9																
46	0																
46	1																
46	2																
46	3																
46	4																
46	5																
46	6																
46	7																
46	8																
46	9																
47	0																
47	1																
47	2																
47	3																
47	4																
47	5																
47	6																
47	7																
47	8																

11. Map (See instructions on pages 25 and 26)

Attach to this application a topographic map, or other equivalent map, of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in this map area. See instructions for precise requirements.

12. Facility Drawing (See instructions on page 26)

All existing facilities must include a scale drawing of the facility (see instructions for more detail).

13. Photographs (See instructions on page 26)

All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas (see instructions for more detail).

14. Comments (See instructions on page 26)

ATTACHMENT A – Item 9 – Facility Owner Information

EPA ID NUMBER: AZD982441236

NAME OF FACILITY'S LEGAL OWNER (Owner Type P):

SIEMENS INDUSTRY, INC.
2523 MUTAHAR STREET
PARKER, ARIZONA 85344-4005
TELEPHONE: (928) 669-5758

CORPORATE HEADQUARTERS OF FACILITY'S LEGAL OWNER:

SIEMENS INDUSTRY, INC.
181 THORN HILL ROAD
WARRENDALE, PENNSYLVANIA 15086
TELEPHONE: (724) 772-1402

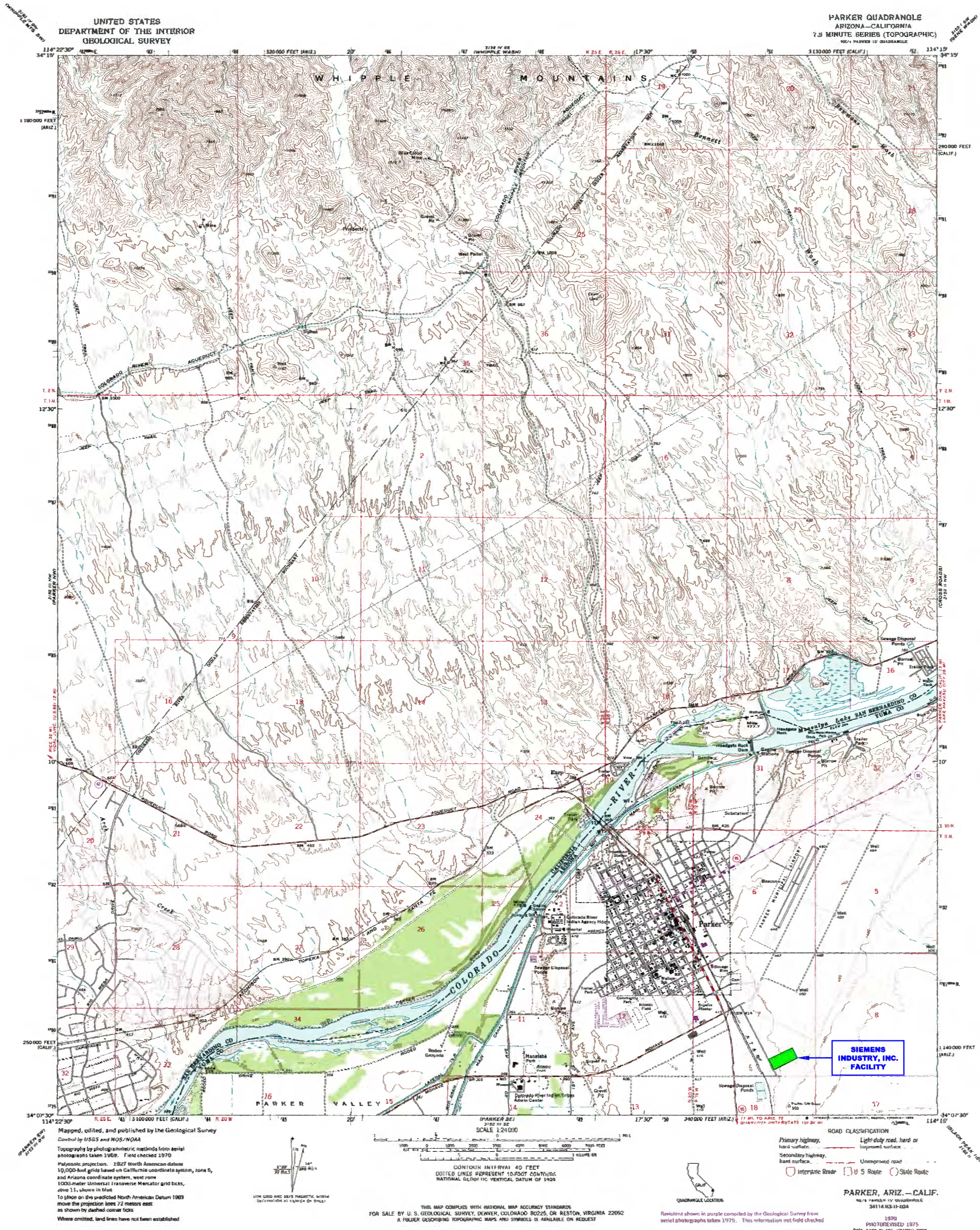
NAME OF PROPERTY OWNER (Owner Type I):

COLORADO RIVER INDIAN TRIBES
RT – 1, BOX 23 – B
PARKER, ARIZONA 85344
TELEPHONE: (928) 669-9211

ATTACHMENT B – Item 11 – Topographic Map

DRAWING NO. C-100604 SHEET 1 OF 2 (REV. 0)
TOPOGRAPHICAL MAP 1 – PLANT SITE

DRAWING NO. C-100604 SHEET 2OF 2 (REV. 0)
TOPOGRAPHICAL MAP 2 – ADJACENT LANDS



NOTES:

1. SEE ATTACHED SIEMENS INDUSTRY, INC. DRAWING D-14789-02 FOR DETAILED LOCATION OF S01, S02, AND X03.
2. THERE ARE NO INJECTION WELLS ASSOCIATED WITH THIS FACILITY.
3. THERE ARE NO SPRINGS, DRINKING WATER WELLS, NOR SURFACE WATER BODIES LOCATED WITHIN 1/4 MILE OF THIS FACILITY.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
1	3/15/12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	

PLOT SCALE: AS NOTED

DO NOT SCALE DRAWING

THIS DRAWING IS THE PROPERTY OF SIEMENS AND CANNOT BE REPRODUCED OR DELIVERED TO OTHERS WITHOUT THE EXPRESS WRITTEN PERMISSION OF SIEMENS INDUSTRY, INC.

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No.

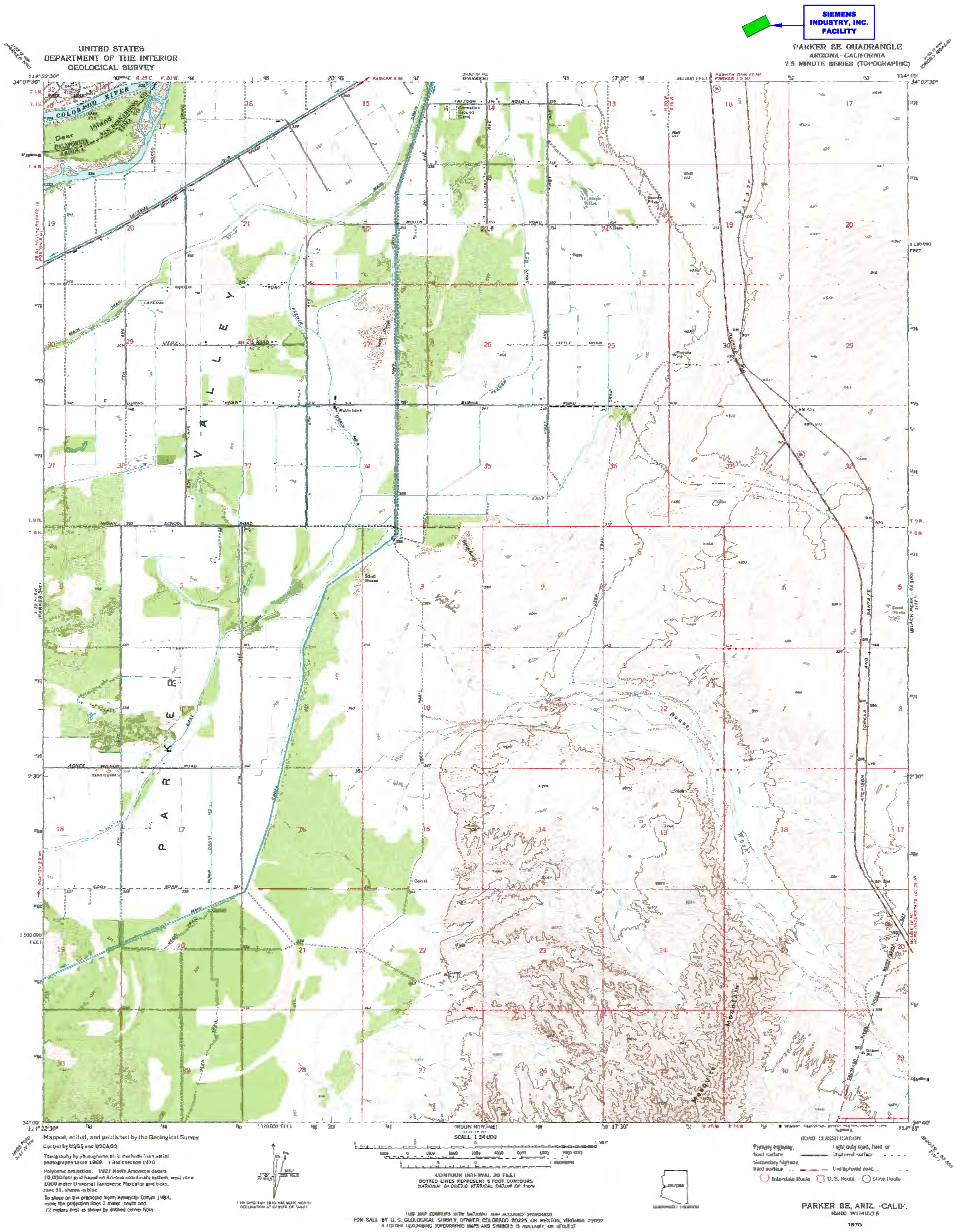
DRAWN:	JBE	1/22/07
CHK'D:	KEM	1/22/07
ENG'R:		

SIEMENS INDUSTRY, INC.
Parker, AZ

TITLE: U.S.G.S. SURVEY – PARKER, AZ TOPOGRAPHIC MAP

DWG No. C–100604 | SHEET No. 1 of 2 | REV. 1

PRINT DATE: 4/19/12



NOTES:

1. SEE ATTACHED SIEMENS WATER TECHNOLOGIES CORP. DRAWING D-14789-02 FOR DETAILED LOCATION OF S01, S02, AND X03.
2. THERE ARE NO INJECTION WELLS ASSOCIATED WITH THIS FACILITY.
3. THERE ARE NO SPRINGS, DRINKING WATER WELLS, NOR SURFACE WATER BODIES LOCATED WITHIN 1/4 MILE OF THIS FACILITY.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
1	3/15/12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	

PLOT SCALE: AS NOTED

DO NOT SCALE DRAWING

THIS DRAWING IS THE PROPERTY OF SIEMENS AND CANNOT BE REPRODUCED OR DELIVERED TO OTHERS WITHOUT THE EXPRESS WRITTEN PERMISSION OF SIEMENS INDUSTRY, INC.

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No.:

DRAWN: JBE 1/22/07

CHK'D: KEM 1/22/07

ENG'R:

SIEMENS INDUSTRY, INC.
Parker, AZ

TITLE: U.S.G.S. SURVEY – PARKER SE, AZ TOPOGRAPHIC MAP

DWG No. C-100604 | SHEET No. 2 of 2 | REV. 1

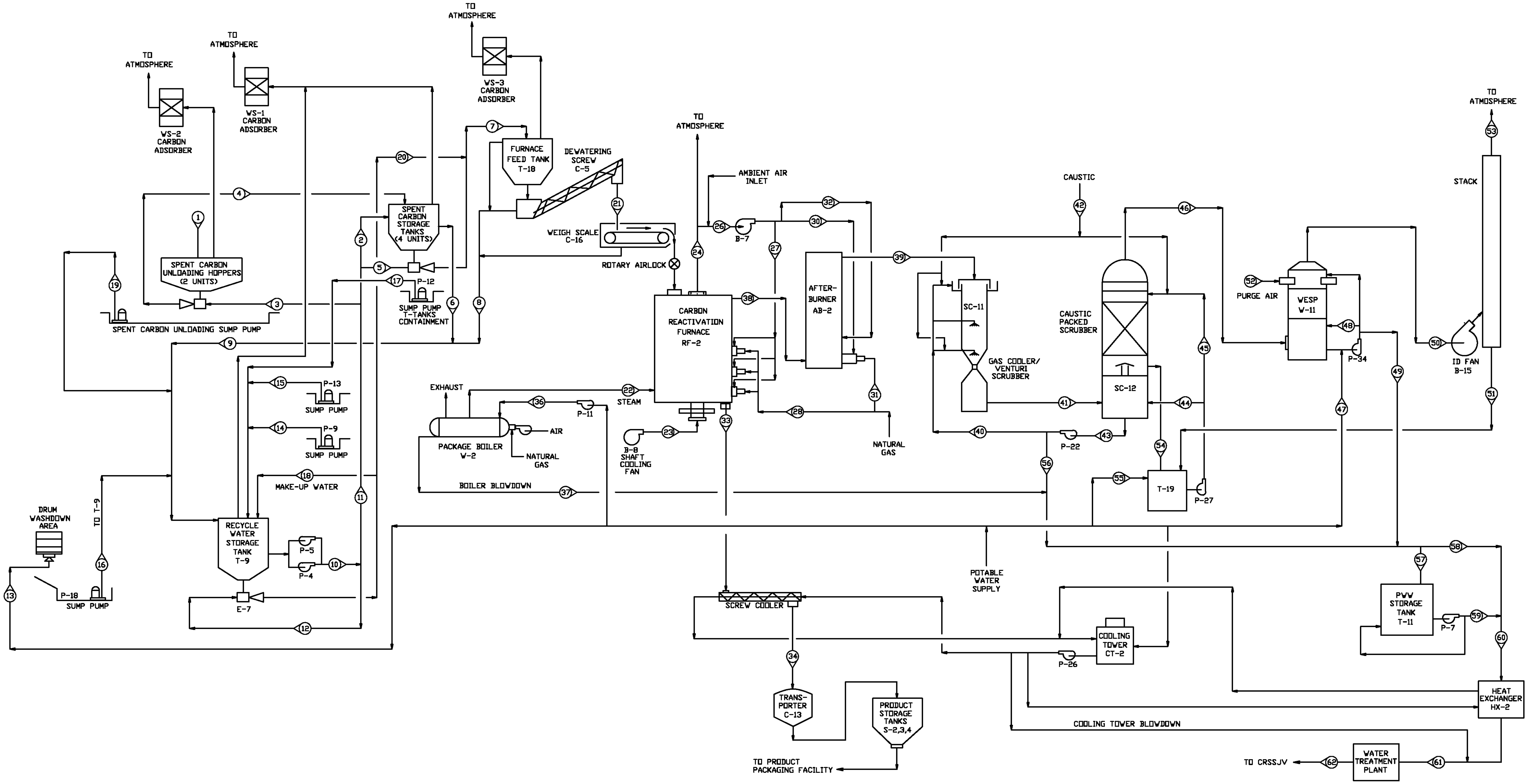
PRINT DATE: 4/19/12

ATTACHMENT C – Item 12 – Facility Drawing

SCALE DRAWING OF PROPERTY LAYOUT

SCALE DRAWING OF FACILITY LAYOUT (EQUIPMENT LOCATION)

SCHEMATIC PROCESS FLOW DIAGRAM



NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

NO	DWN	CK'D	APP	REVISIONS	DATE
2	JBE	KEM		NAME CHANGED TO SIEMENS INDUSTRY	3-15-12
1	JBE	KEM		UPDATED FOR PERMIT SUBMITTAL	2-8-07

CBE CHAVOND-BARRY ENGINEERING CORP.
400 Route 518 • P.O. Box 205 • Blawenburg, New Jersey 08504

SIEMENS INDUSTRY, INC.
2523 MUTAHAR STREET, PARKER, AZ 85344

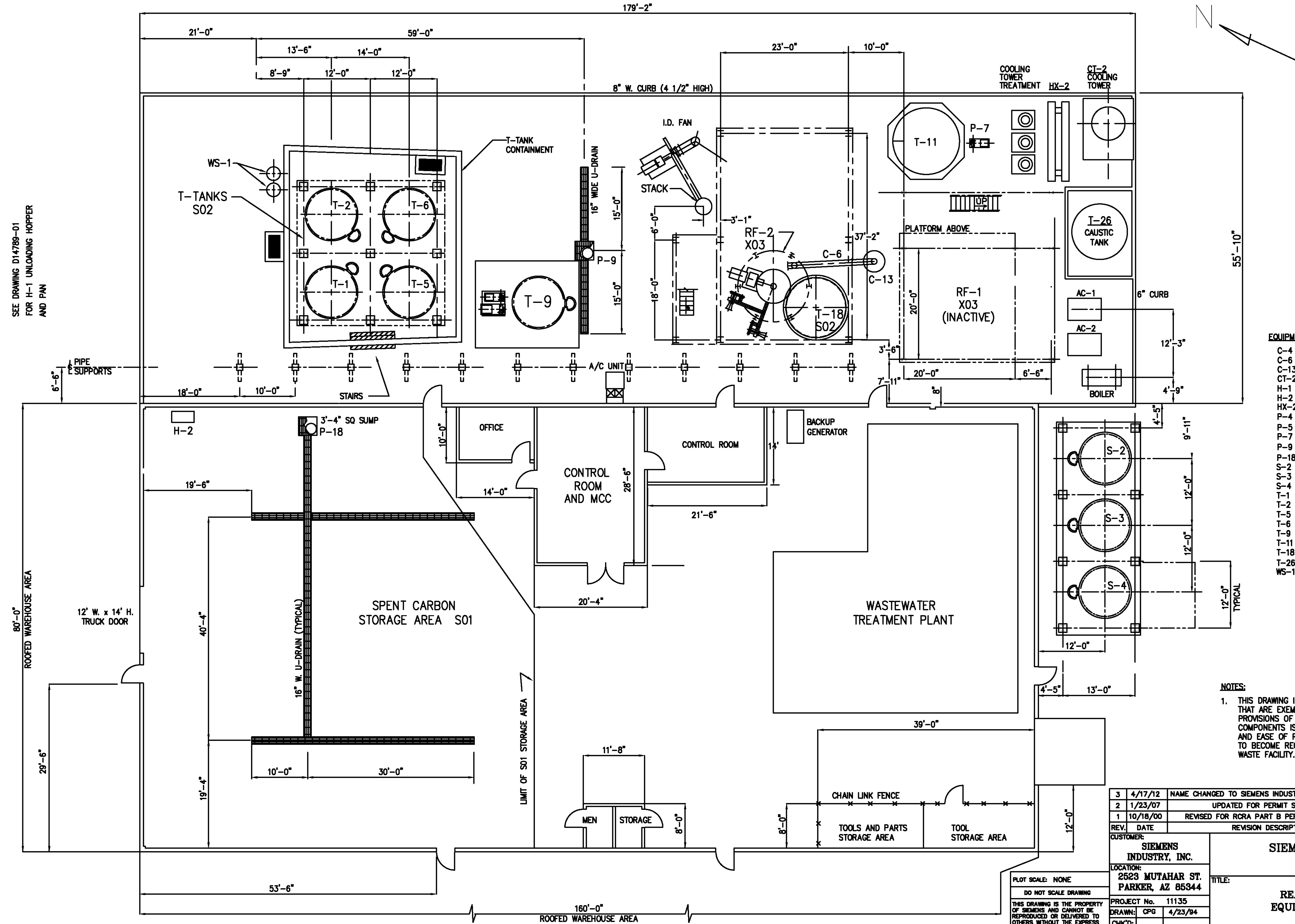
FACILITY PROCESS FLOW DIAGRAM

DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
AJW	11/27/96	KEM	11/27/96		

SCALE	DWG. NO.	REV.
NONE	1525-PR-001	2

PRINT DATE: 4/19/12

DWG: D14789-02



EQUIPMENT LIST:

C-4	TRANSPORTER
C-6	PRODUCT COOLING SCREW
C-13	TRANSPORTER
CT-2	COOLING TOWER
H-1	CARBON HOPPER
H-2	CARBON HOPPER
HX-2	HEAT EXCHANGER
P-4	RECYCLE WATER PUMP
P-5	RECYCLE WATER PUMP
P-7	PROCESS WW PUMP
P-9	SUMP PUMP
P-18	SUMP PUMP
S-2	CARBON STORAGE TANK
S-3	CARBON STORAGE TANK
S-4	CARBON STORAGE TANK
T-1	SPENT CARBON STORAGE TANK
T-2	SPENT CARBON STORAGE TANK
T-5	SPENT CARBON STORAGE TANK
T-6	SPENT CARBON STORAGE TANK
T-9	RECYCLE WATER STORAGE TANK
T-11	PROCESS WW STORAGE TANK
T-18	FURNACE FEED TANK
T-26	CAUSTIC TANK
WS-1	ACTIVATED CARBON ADSORBER

NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
3	4/17/12	NAME CHANGED TO SIEMENS INDUSTRY, INC., MOVE WS-1	JBE	KEM	
2	1/23/07	UPDATED FOR PERMIT SUBMITTAL	JBE	KEM	
1	10/18/00	REVISED FOR RCRA PART B PERMIT APPLICATION	JBE	---	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No. 11135

DRAWN: CPG 4/23/94

CHK'D:

ENG'R:

SIEMENS INDUSTRY, INC.
Parker, AZ

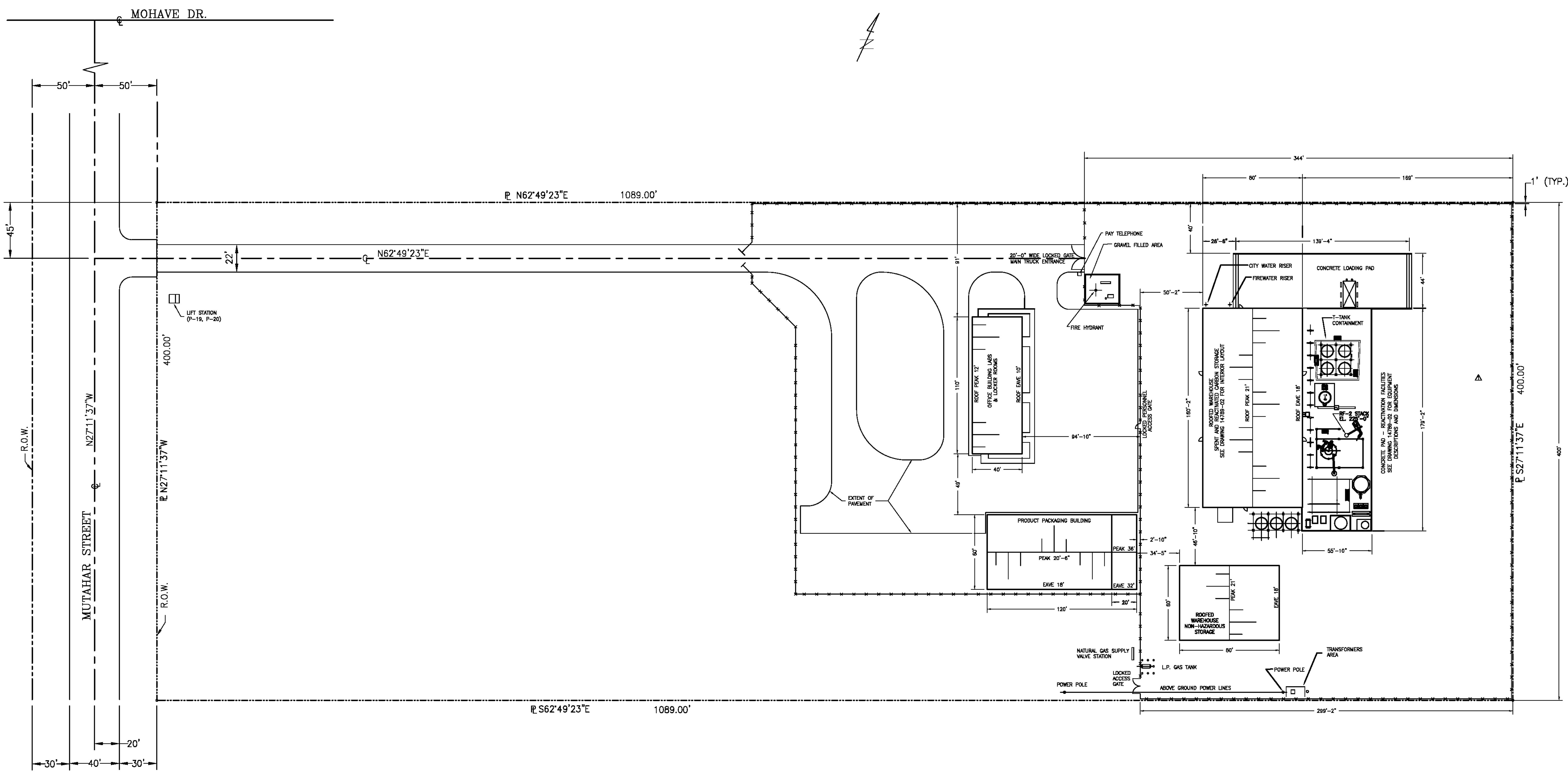
TITLE: REACTIVATION FACILITY EQUIPMENT ARRANGEMENT

PART No.

DWG No. D14789-02 REV. 3

PRINT DATE: 4/19/12

DWG: D14789-08



NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
3	3/16/12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	
2	1/18/07	UPDATED FOR PERMIT SUBMITTAL	JBE	KEM	
⚠	6/21/02	REMOVED DUMPSTER PAD	CPG	KEM	

PLOT SCALE: 1"=40'

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No.

DRAWN:	CPG	3/01/02
CHK'D:	KEM	3/01/02
ENG'R:		

SIEMENS INDUSTRY, INC..
Parker, AZ

TITLE:

REACTIVATION FACILITY
SITE PLAN

PART No. | DWG No. D14789-08 | REV. 3

PRINT DATE: 4/19/12

ATTACHMENT D – Item 13 – Photographs

SITE PHOTOGRAPHS

SITE AERIAL PHOTOGRAPHS

AERIAL PHOTOGRAPHS OF THE FACILTY

PROCESS CODE S01
(Identified as Line Number 1)

Spent Carbon Warehouse

PROCESS CODE S02
(Identified as Line Number 2)

Spent Carbon Storage Feed Tanks
(Tank No. T-1 and T-2)

PROCESS CODE S02
(Identified as Line Number 2)

Spent Carbon Storage Feed Tanks
(Tank No. T-2, T-5 and T-6)

PROCESS CODE X03
(Identified as Line Number 3)

Carbon Reactivation Furnace RF-2

APPENDIX II

TOPOGRAPHIC MAP

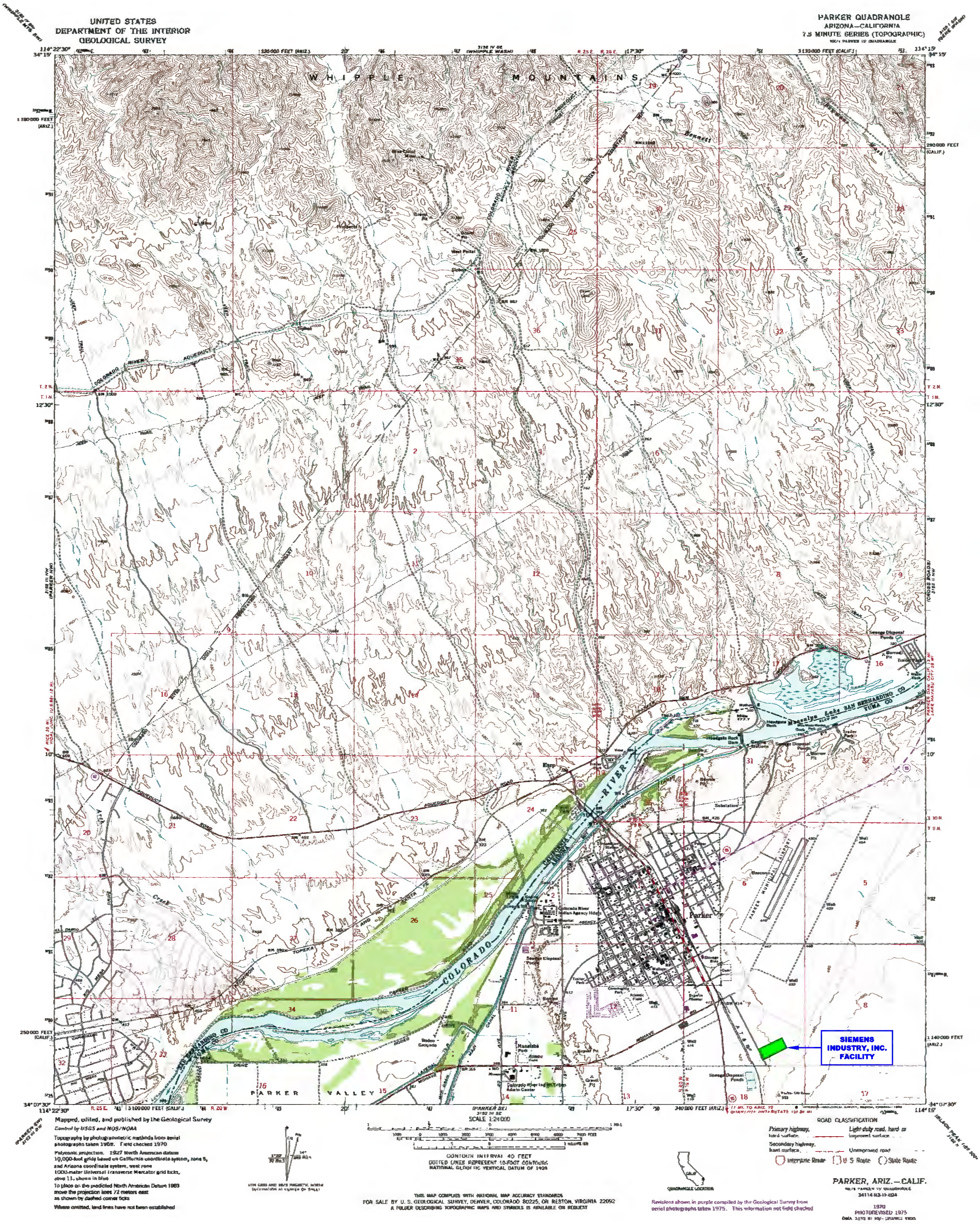
FLOOD INSURANCE MAP FOR THE COLORADO RIVER INDIAN RESERVATION

PERIPHERAL LAND USE STUDY DIAGRAM FOR THE COLORADO RIVER INDIAN TRIBE LANDS

WIND ROSE

LEGAL BOUNDARIES

Revision 1
April 2012



NOTES:

1. SEE ATTACHED SIEMENS INDUSTRY, INC. DRAWING D-14789-02 FOR DETAILED LOCATION OF S01, S02, AND X03.
2. THERE ARE NO INJECTION WELLS ASSOCIATED WITH THIS FACILITY.
3. THERE ARE NO SPRINGS, DRINKING WATER WELLS, NOR SURFACE WATER BODIES LOCATED WITHIN 1/4 MILE OF THIS FACILITY.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
1	3/15/12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	

PLOT SCALE: AS NOTED

DO NOT SCALE DRAWING

THIS DRAWING IS THE PROPERTY OF SIEMENS AND CANNOT BE REPRODUCED OR DELIVERED TO OTHERS WITHOUT THE EXPRESS WRITTEN PERMISSION OF SIEMENS INDUSTRY, INC.

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No.

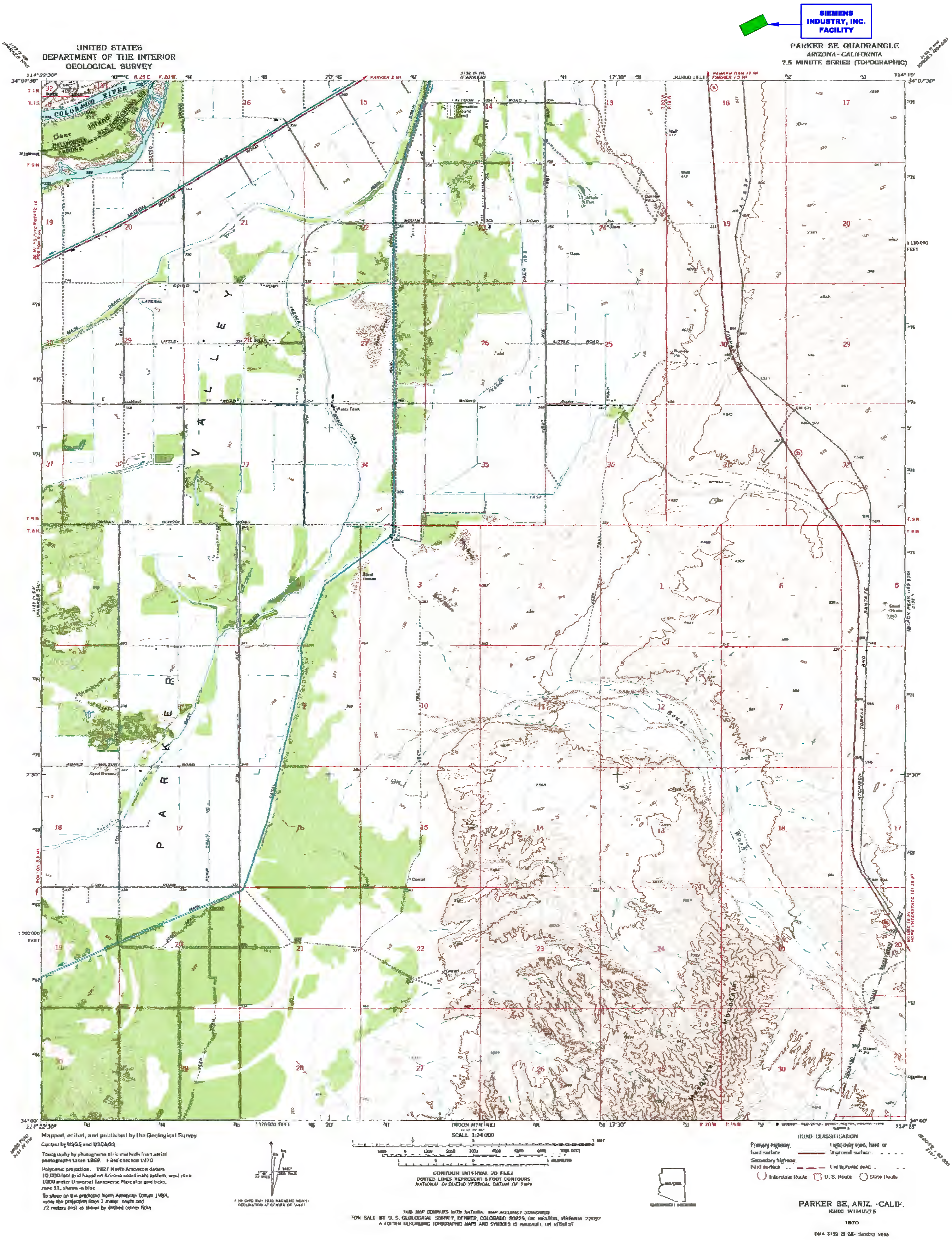
DRAWN:	JBE	1/22/07
CHK'D:	KEM	1/22/07
ENG'R:		

SIEMENS INDUSTRY, INC.
Parker, AZ

TITLE: U.S.G.S. SURVEY – PARKER, AZ TOPOGRAPHIC MAP

DWG No. C-100604 SHEET No. 1 of 2 REV. 1

PRINT DATE: 4/19/12



NOTES:

1. SEE ATTACHED SIEMENS WATER TECHNOLOGIES CORP. DRAWING D-14789-02 FOR DETAILED LOCATION OF S01, S02, AND X03.
2. THERE ARE NO INJECTION WELLS ASSOCIATED WITH THIS FACILITY.
3. THERE ARE NO SPRINGS, DRINKING WATER WELLS, NOR SURFACE WATER BODIES LOCATED WITHIN 1/4 MILE OF THIS FACILITY.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
1	3/15/12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	

PLOT SCALE: AS NOTED

DO NOT SCALE DRAWING

THIS DRAWING IS THE PROPERTY OF SIEMENS AND CANNOT BE REPRODUCED OR DELIVERED TO OTHERS WITHOUT THE EXPRESS WRITTEN PERMISSION OF SIEMENS INDUSTRY, INC.

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No.

DRAWN:	JBE	1/22/07
CHK'D:	KEM	1/22/07
ENG'R:		

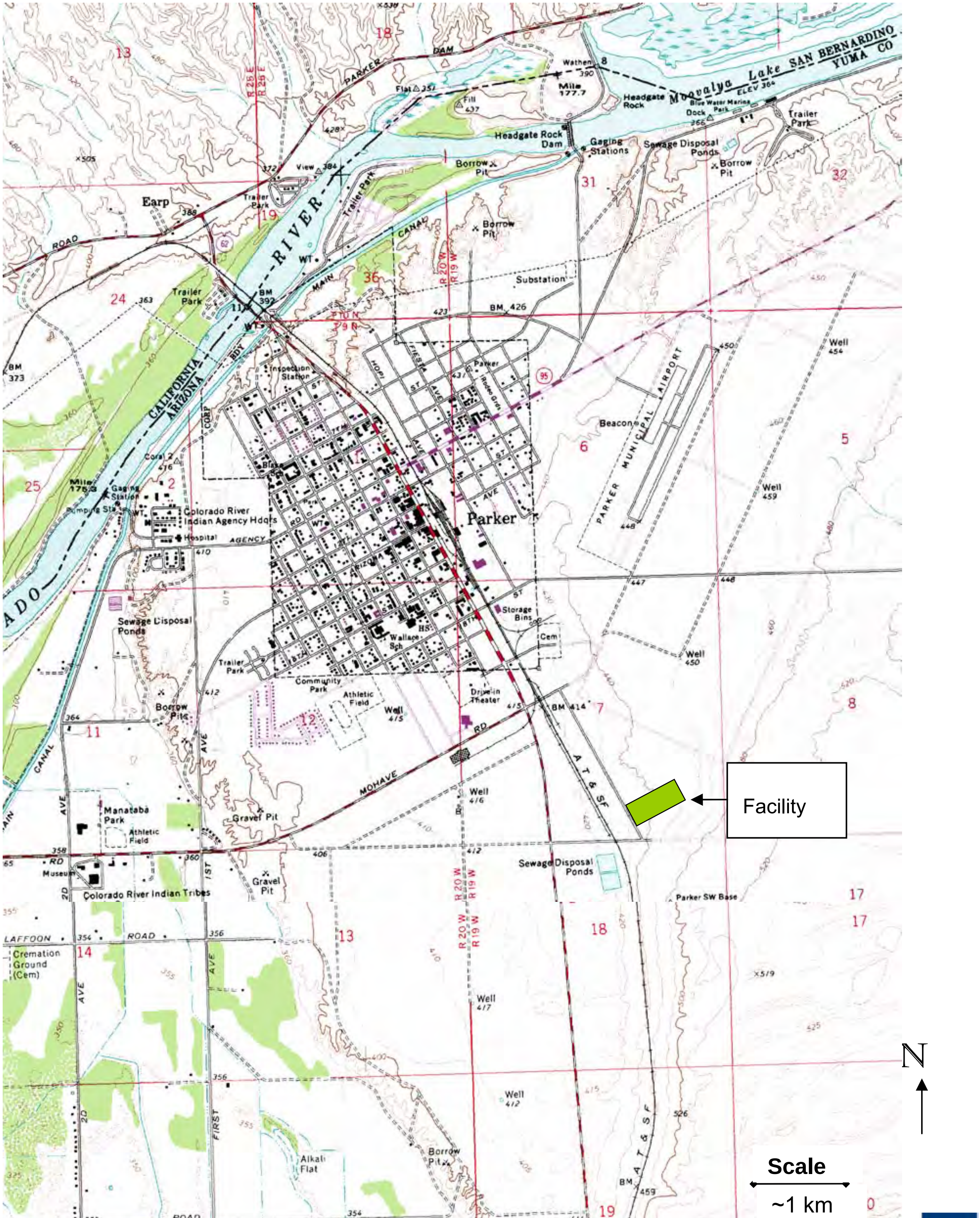
SIEMENS INDUSTRY, INC.
Parker, AZ

TITLE: U.S.G.S. SURVEY – PARKER SE, AZ TOPOGRAPHIC MAP

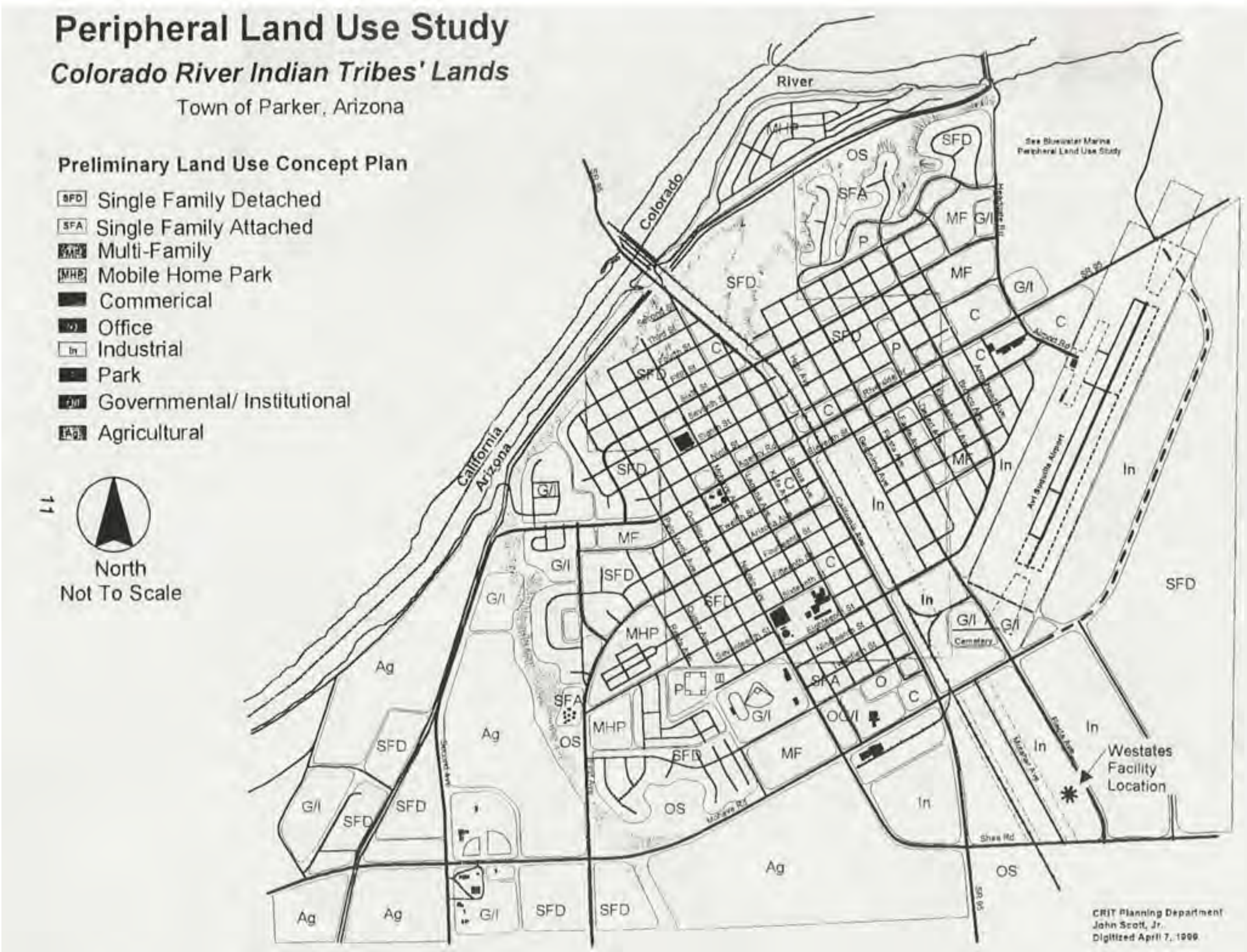
DWG No. C-100604 | SHEET No. 2 of 2 | REV. 1

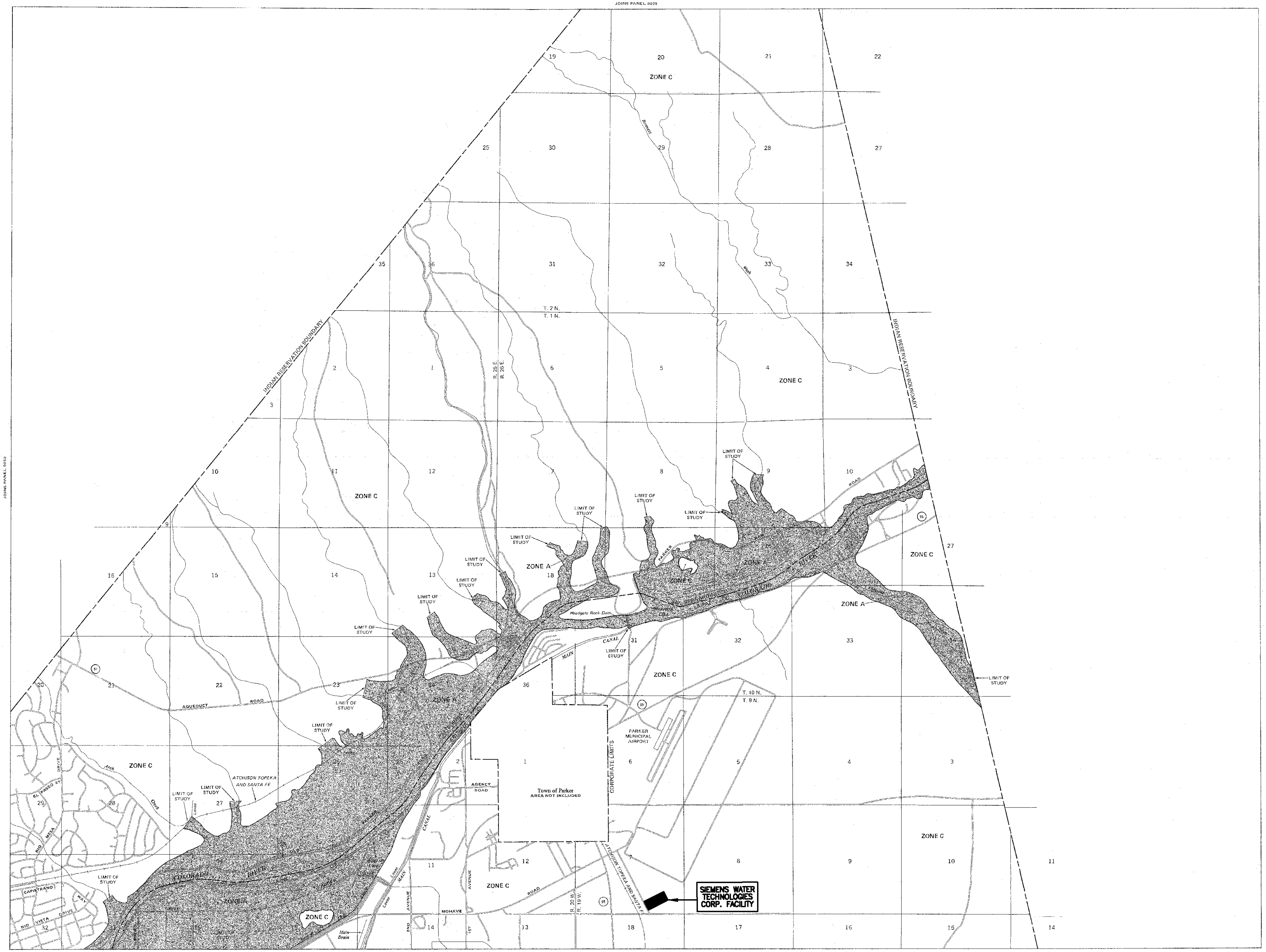
PRINT DATE: 4/15/12

Facility Location



Peripheral Land Use Study: Colorado River Indian Tribes Lands





KEY TO MAP

Zone Designations*	ZONE C / ZONE A / ZONE C
Base Flood Elevation Line With Elevation In Feet**	513
Base Flood Elevation in Feet Where Uniform Within Zone**	(EL 987)
Elevation Reference Mark	RM7×
Zone D Boundary	
River Mile	•M1.5

**Referenced to the National Geodetic Vertical Datum of 1929

EXPLANATION OF ZONE DESIGNATIONS

ZONE	EXPLANATION
A	Areas of 100-year flood; base flood elevations and flood hazard factors not determined.
A0	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; average depths of inundation are shown, but no flood hazard factors are determined.
AH	Areas of 100-year shallow flooding where depths are between one (1) and three (3) feet; base flood elevations are shown, but no flood hazard factors are determined.
A1-A30	Areas of 100-year flood; base flood elevations and flood hazard factors determined.
A99	Areas of 100-year flood to be protected by flood protection system under construction; base flood elevations and flood hazard factors not determined.
B	Areas between limits of the 100-year flood and 500-year flood; or certain areas subject to 100-year flooding with average depths less than one (1) foot or where the contributing drainage area is less than one square mile; or areas protected by levees from the base flood. (Medium shading)
C	Areas of minimal flooding. (No shading)
D	Areas of undetermined, but possible, flood hazards.
V	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors not determined.
V1-V30	Areas of 100-year coastal flood with velocity (wave action); base flood elevations and flood hazard factors determined.

NOTES TO USER

Certain areas not in the special flood hazard areas (zones A and V) may be protected by flood control structures.

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside special flood hazard areas.

Coastal base flood elevations apply only landward of the shoreline shown on this map.

For adjoining map panels, see separately printed Index To Map Panels.

INITIAL IDENTIFICATION:
MAY 4, 1987

FLOOD HAZARD BOUNDARY MAP REVISIONS:

FLOOD INSURANCE RATE MAP EFFECTIVE:
MAY 4, 1987

FLOOD INSURANCE RATE MAP REVISIONS:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE date shown on this map to determine when actuarial rates apply to structures in the zones where elevations or depths have been established.

To determine if flood insurance is available in this community, contact your insurance agent, or call the National Flood Insurance Program, at (800) 638-6620.

N

APPROXIMATE SCALE IN FEET
2000 0 2000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

COLORADO RIVER INDIAN RESERVATION, ARIZONA

PANEL 75 OF 275
(SEE MAP INDEX FOR PANELS NOT PRINTED)

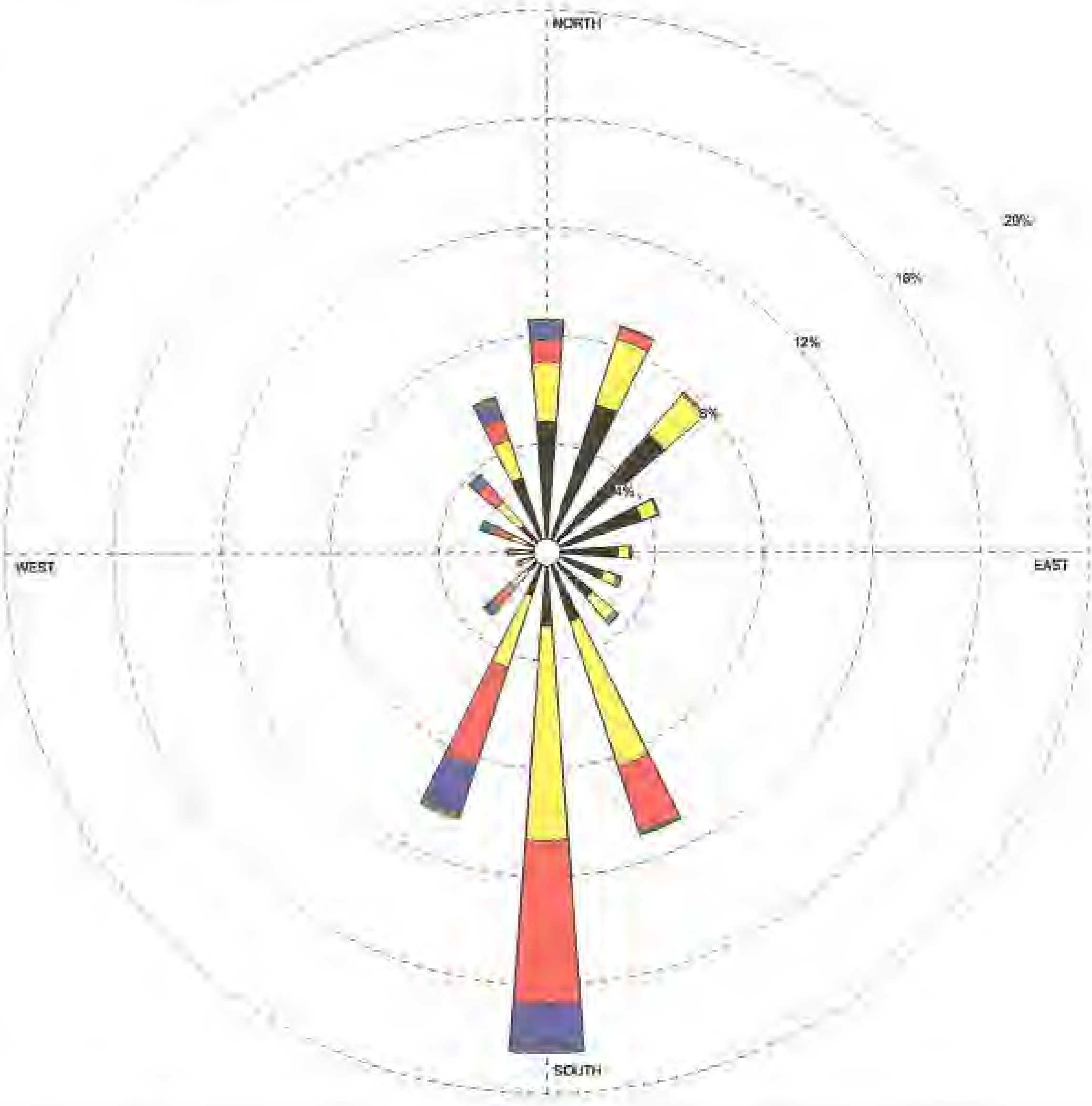
COMMUNITY-PANEL NUMBER
040123 0075 A

EFFECTIVE DATE:
MAY 4, 1987

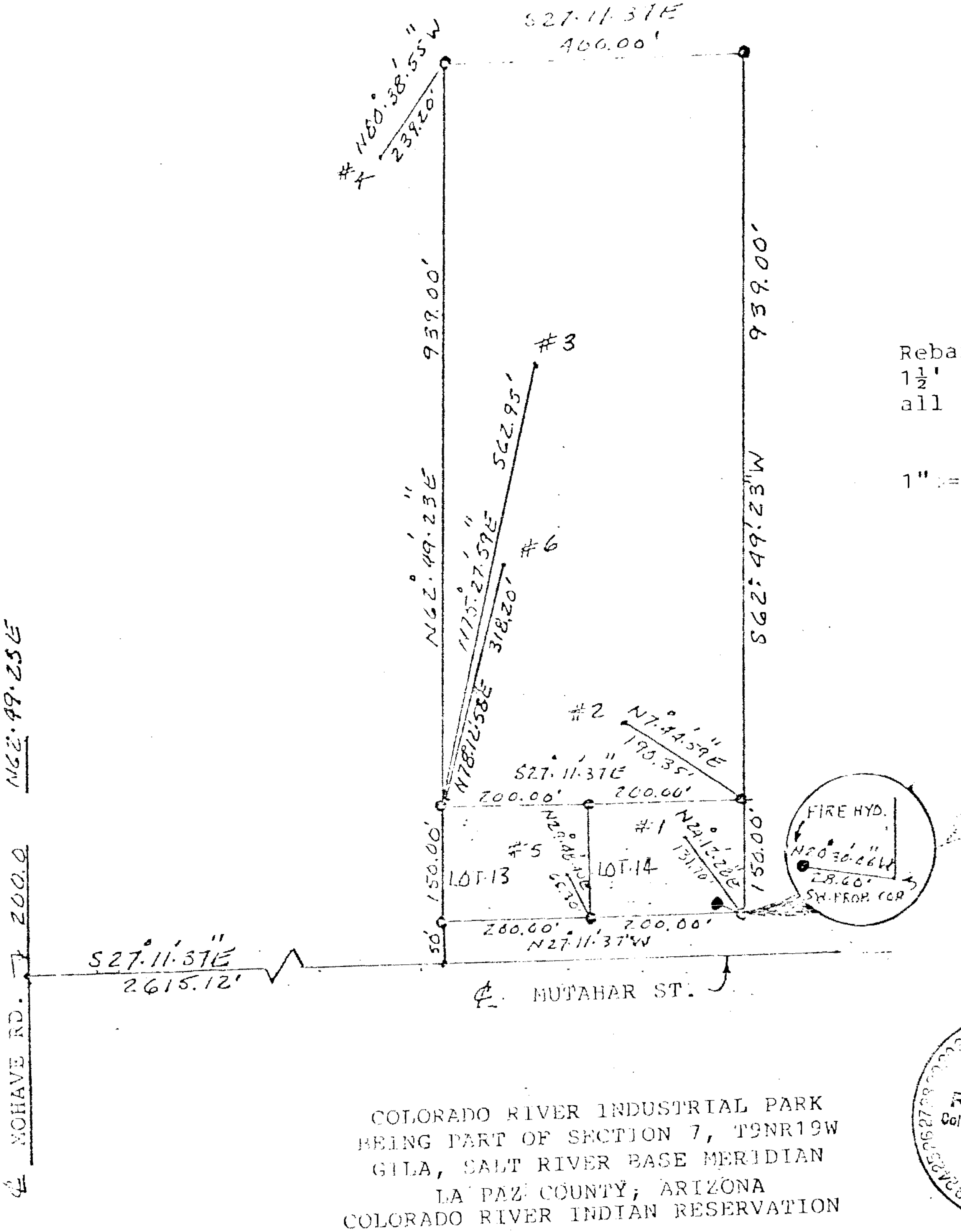
Federal Emergency Management Agency

WIND ROSE PLOT

FIGURE 2. Windrose for Parker, Arizona 1997 - 2001



MODELER **CHV**		COMPANY NAME **Focus Environmental, Inc.**
DISPLAY **Wind Speed**	UNIT **m/s**	SOURCE **Arizona Meteorological Network (AZMET) - Parker, Arizona**
AVG. WIND SPEED **2.64 m/s**	CALM WINDS **2.01%**	
ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **97 98 99 00 01** **January 1 - December 31** **Midnight - 11 PM**	PROJECT/PLOT NO. **FIGURE 2**



Rebar, ½" Diameter, 1½' long, set at all corner points.

1" = 200 feet

603-119-91

COLORADO RIVER INDUSTRIAL PARK
BEING PART OF SECTION 7, T9NR19W
GILA, SALT RIVER BASE MERIDIAN
LA PAZ COUNTY, ARIZONA
COLORADO RIVER INDIAN RESERVATION

3·2·90

March 2, 1990

COLORADO RIVER INDUSTRIAL PARK
BEING PART OF SECTION 7, T9N, R19W
GILA, SALT RIVER BASE MERIDIAN
COLORADO RIVER INDIAN RESERVATION

Starting from the intersection point of Mohave Road and Mutahar Street, existing survey monuments, Thence S27°.11'.37"E; 2615.12 feet. Thence N62°.49'.23"E, 50.00 feet to the Northwest corner Lot 13, and point of beginning. Thence N62°.49'.23"E, 150.00 feet, to the Northeast corner Lot 13. Thence S27°.11'.37"E, 200.00 feet to the Southeast corner Lot 13. Thence S27°.11'.37"E, 200.00 feet to the Southeast corner Lot 14, Thence S62°.49'.23"W, 150.00 feet to the Southwest corner Lot 14. Thence N27°.11'.37"W, 200.00 feet, along road right away, to the Northwest corner Lot 14. Thence N27°.11'.37"W, 200.00 feet, along right away, to point of beginning. The area contains a calculated area of 1.38 acres.

Thence from the Northeast corner Lot 13, N62°.49'.23"E, 939.00 feet, to the Northeast corner, 8.62 acre lot. Thence S27°.11'.37"E, 400 feet to the Southeast corner, 8.62 acre lot. Thence S62°.49'.23"W, 939.00 feet to the Southeast corner, Lot 14. The area contains a calculated area of 8.62 acres.

Thence from the Northeast corner Lot 13, soil sample number 3, bears N75°.27'.59"E, 562.95 feet. Soil sample number 6 bears N78°.12'.58"E, 318.20 feet.

Thence from the Northeast corner, 8.62 acre lot, soil sample number 4, bears N80°.38'.55"W, 239.20 feet.

Thence from the Southeast corner Lot 14, soil sample number 2, bears N7°.44'.59"E, 190.35 feet.

Thence from the Southwest corner Lot 14, soil sample number 1, bears N24°.12'.28"E, 131.70 feet. Fire hydrant bears N20°.30'.06"W, 28.60 feet.

Thence from the Northwest corner Lot 14, soil sample number 5, bears N29°.48'.40"E, 65.30 feet.

ENGINEER"S CERTIFICATE: I certify that I have examined this plot of the Survey and found that it confirms with the data from which it was drawn and that I am satisfied the map is technically correct.

603-11-9-91

APPENDIX III

SITE DIAGRAMS

FOR

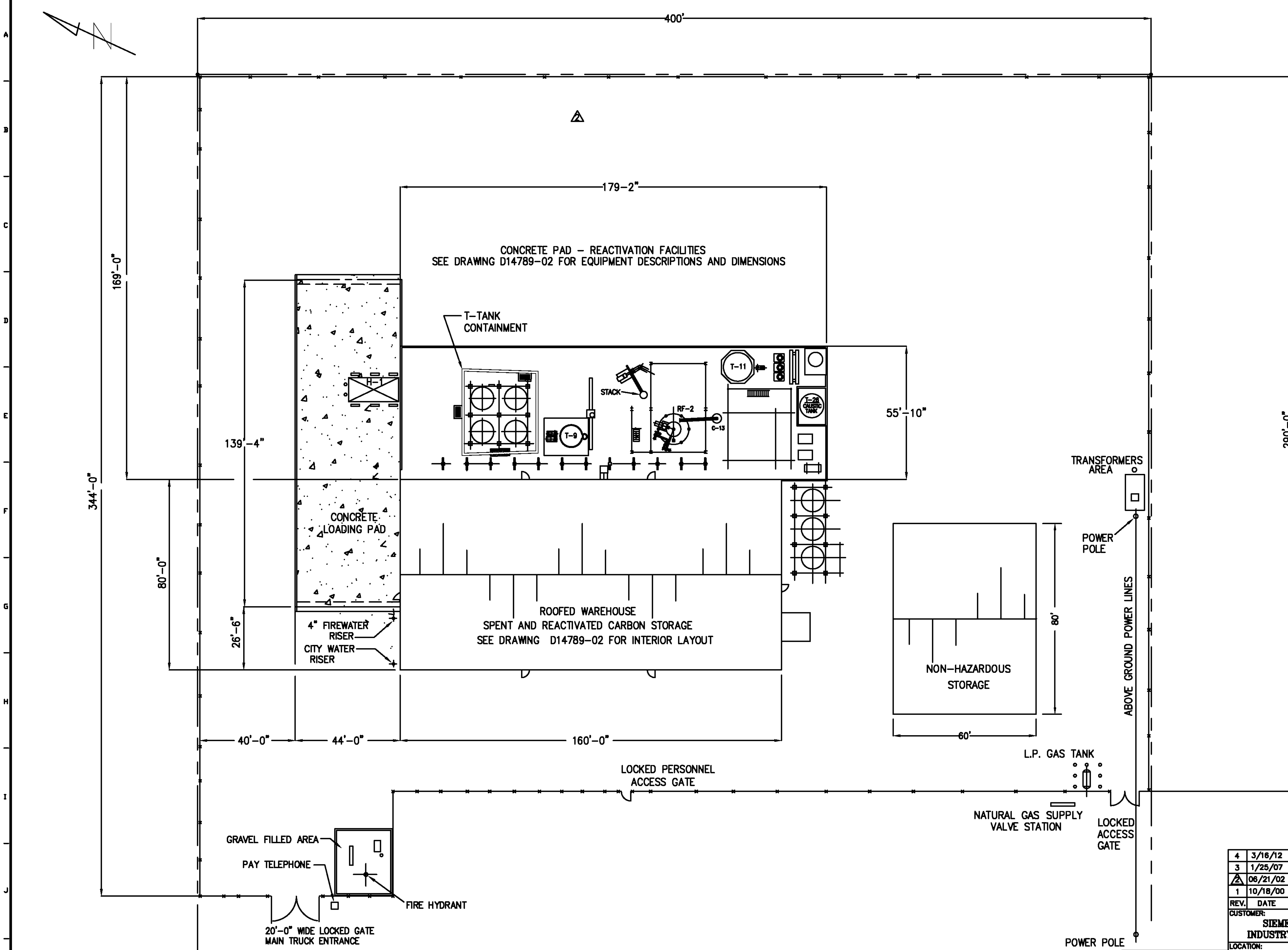
SIEMENS INDUSTRY, INC.

PARKER REACTIVATION FACILITY

PARKER, ARIZONA

Revision 1
April 2012

TABLE OF CONTENTS



SEE SITE PLAN
DRAWING D14789-08

NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
4	3/16/12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	
3	1/25/07	UPDATED FOR PERMIT SUBMITTAL	JBE	KEM	
2	06/21/02	REMOVED DUMPSTER PAD	CPG	KEM	
1	10/18/00	REVISED FOR RCRA PART B PERMIT APPLICATION	JBE	---	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No.

DRAWN: CPG 5/16/94

CHK'D:

ENG'R:

SIEMENS INDUSTRY, INC.
Parker, AZ

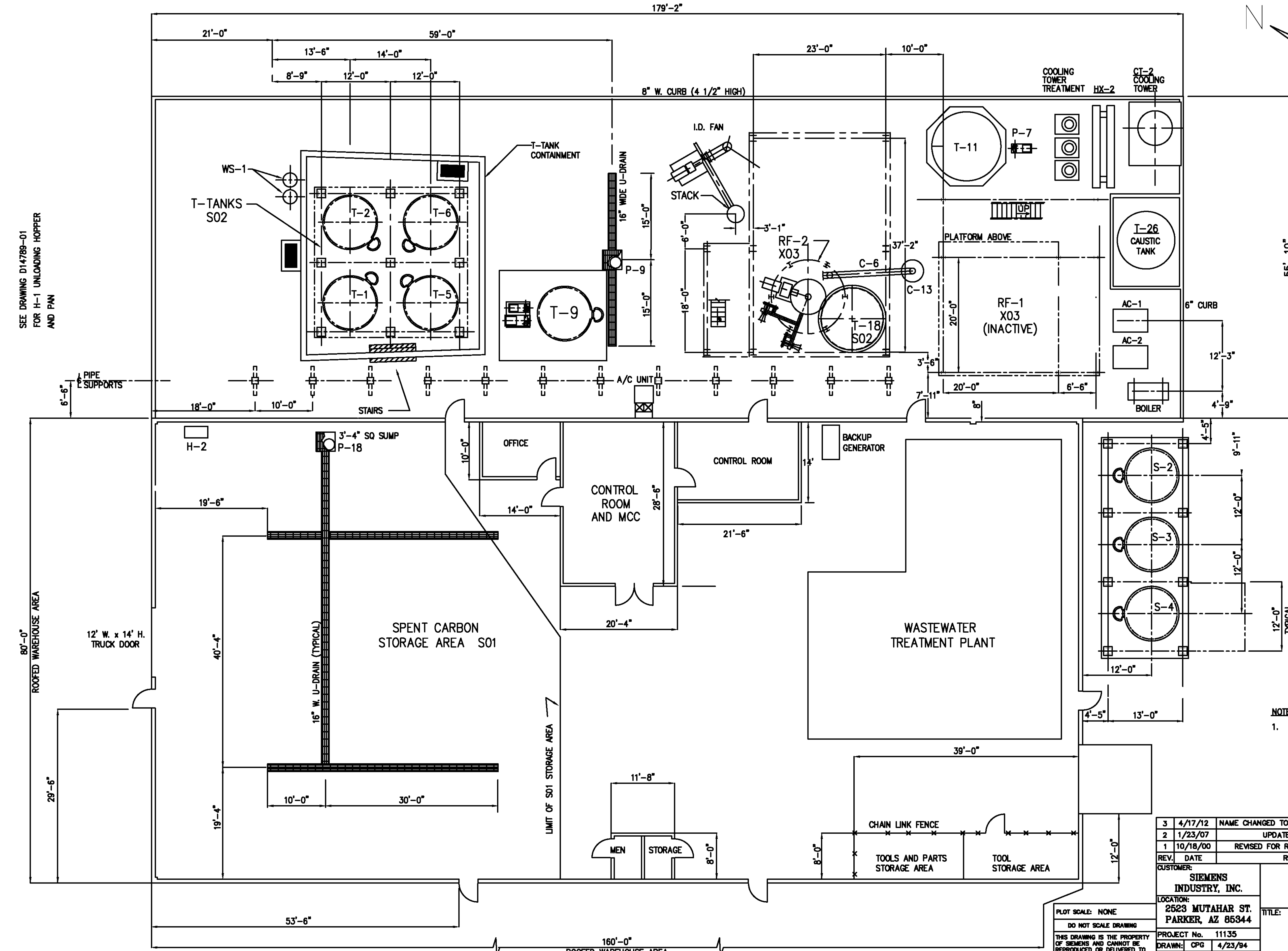
TITLE:

REACTIVATION FACILITY
SITE PLAN

PART No. | DWG No. D14789-01 | REV. 4

PRINT DATE: 4/19/12

DWG: D14789-02



EQUIPMENT LIST:

C-4	TRANSPORTER
C-6	PRODUCT COOLING SCREW
C-13	TRANSPORTER
CT-2	COOLING TOWER
H-1	CARBON HOPPER
H-2	CARBON HOPPER
HX-2	HEAT EXCHANGER
P-4	RECYCLE WATER PUMP
P-5	RECYCLE WATER PUMP
P-7	PROCESS WW PUMP
P-9	SUMP PUMP
P-18	SUMP PUMP
S-2	CARBON STORAGE TANK
S-3	CARBON STORAGE TANK
S-4	CARBON STORAGE TANK
T-1	SPENT CARBON STORAGE TANK
T-2	SPENT CARBON STORAGE TANK
T-5	SPENT CARBON STORAGE TANK
T-6	SPENT CARBON STORAGE TANK
T-9	RECYCLE WATER STORAGE TANK
T-11	PROCESS WW STORAGE TANK
T-18	FURNACE FEED TANK
T-26	CAUSTIC TANK
WS-1	ACTIVATED CARBON ADSORBER

NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
3	4/17/12	NAME CHANGED TO SIEMENS INDUSTRY, INC., MOVE WS-1	JBE	KEM	
2	1/23/07	UPDATED FOR PERMIT SUBMITTAL	JBE	KEM	
1	10/18/00	REVISED FOR RCRA PART B PERMIT APPLICATION	JBE	---	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No. 11135

DRAWN: CPG 4/23/94

CHK'D:

ENG'R:

SIEMENS INDUSTRY, INC.
Parker, AZ

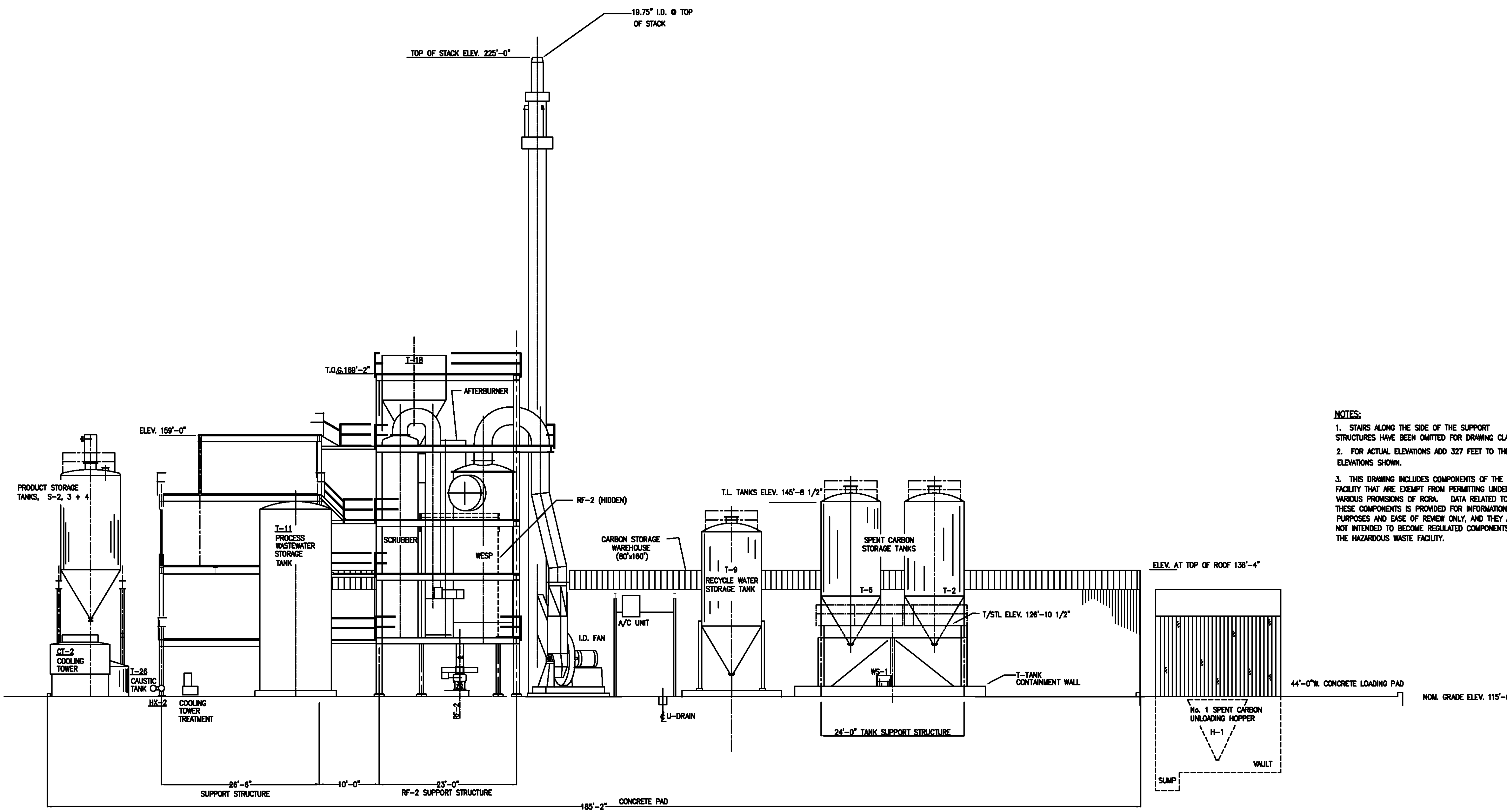
TITLE: REACTIVATION FACILITY EQUIPMENT ARRANGEMENT

PART No.

DWG No. D14789-02 REV. 3

PRINT DATE: 4/19/12

DWG: D14789-03



OVERALL SITE VIEW LOOKING SOUTHWEST

NOTES:

1. STAIRS ALONG THE SIDE OF THE SUPPORT STRUCTURES HAVE BEEN OMITTED FOR DRAWING CLARITY.
2. FOR ACTUAL ELEVATIONS ADD 327 FEET TO THE ELEVATIONS SHOWN.
3. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
3	3/16/12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	
2	1/18/07	UPDATED FOR PERMIT SUBMITTAL	JBE	KEM	
1	7/24/02	REVISED FOR RCRA PART B PERMIT APPLICATION	CPG	KEM	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No.

DRAWN:	CPG	4/21/94
CHK'D:		
ENG'R:		

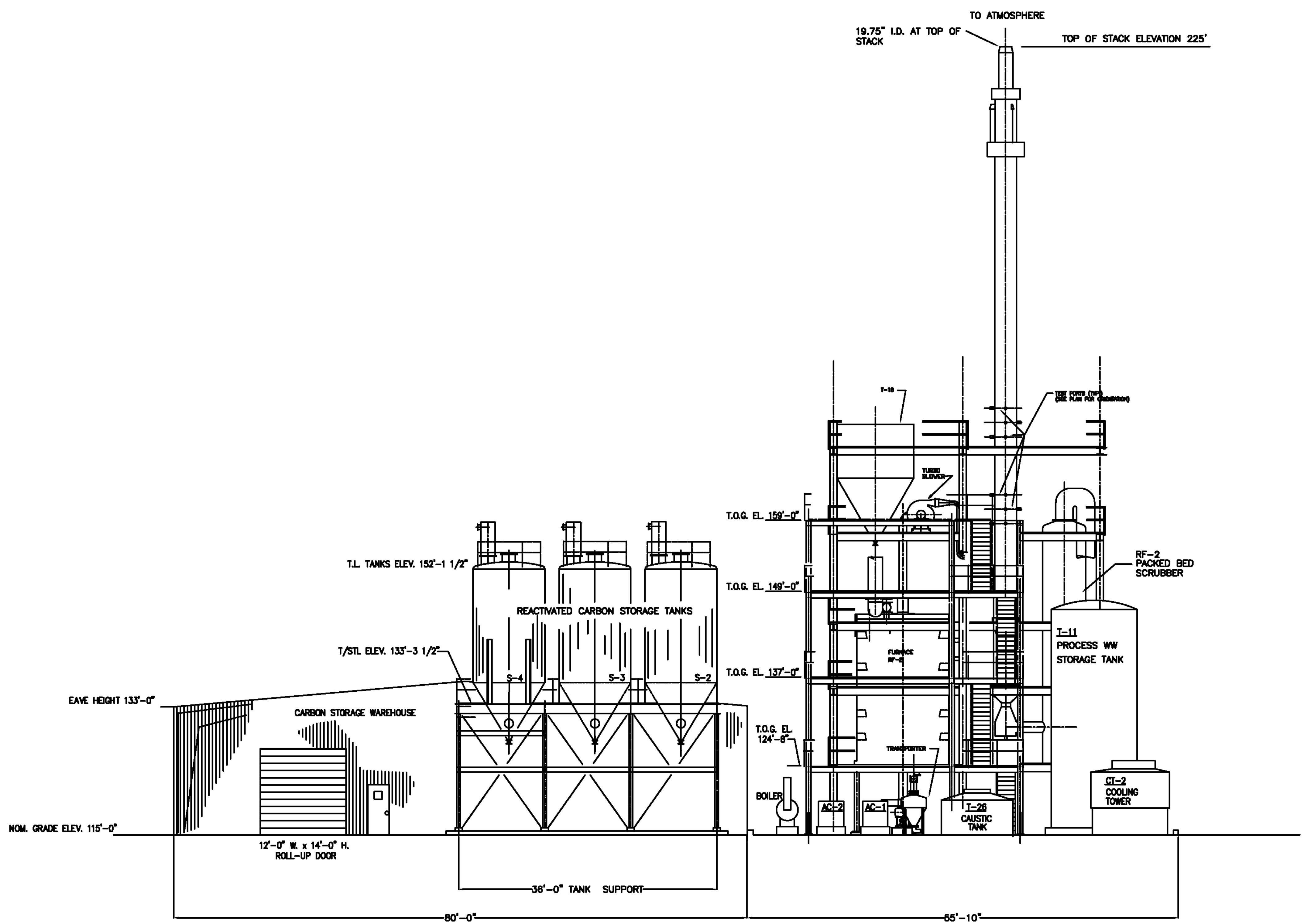
SIEMENS INDUSTRY, INC.
Parker, AZ

TITLE: REACTIVATION FACILITY SITE VIEW OVERALL ARRANGEMENTS

PART No. | DWG No. D14789-03 | REV. 3

PRINT DATE: 4/19/12

DWG: D14789-04



OVERALL SITE VIEW LOOKING NORTHWEST

NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIVED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.
2. FOR ACTUAL ELEVATIONS ADD 327 FEET TO THE ELEVATIONS SHOWN.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
3	3/16/12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	
2	1/18/07	UPDATED FOR PERMIT SUBMITTAL	JBE	KEM	
1	7/16/02	REVISED FOR RCRA PART B PERMIT APPLICATION	STA	KEM	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No.	11135	
DRAWN:	CPG	4/21/94
CHK'D:		
ENG'R:		

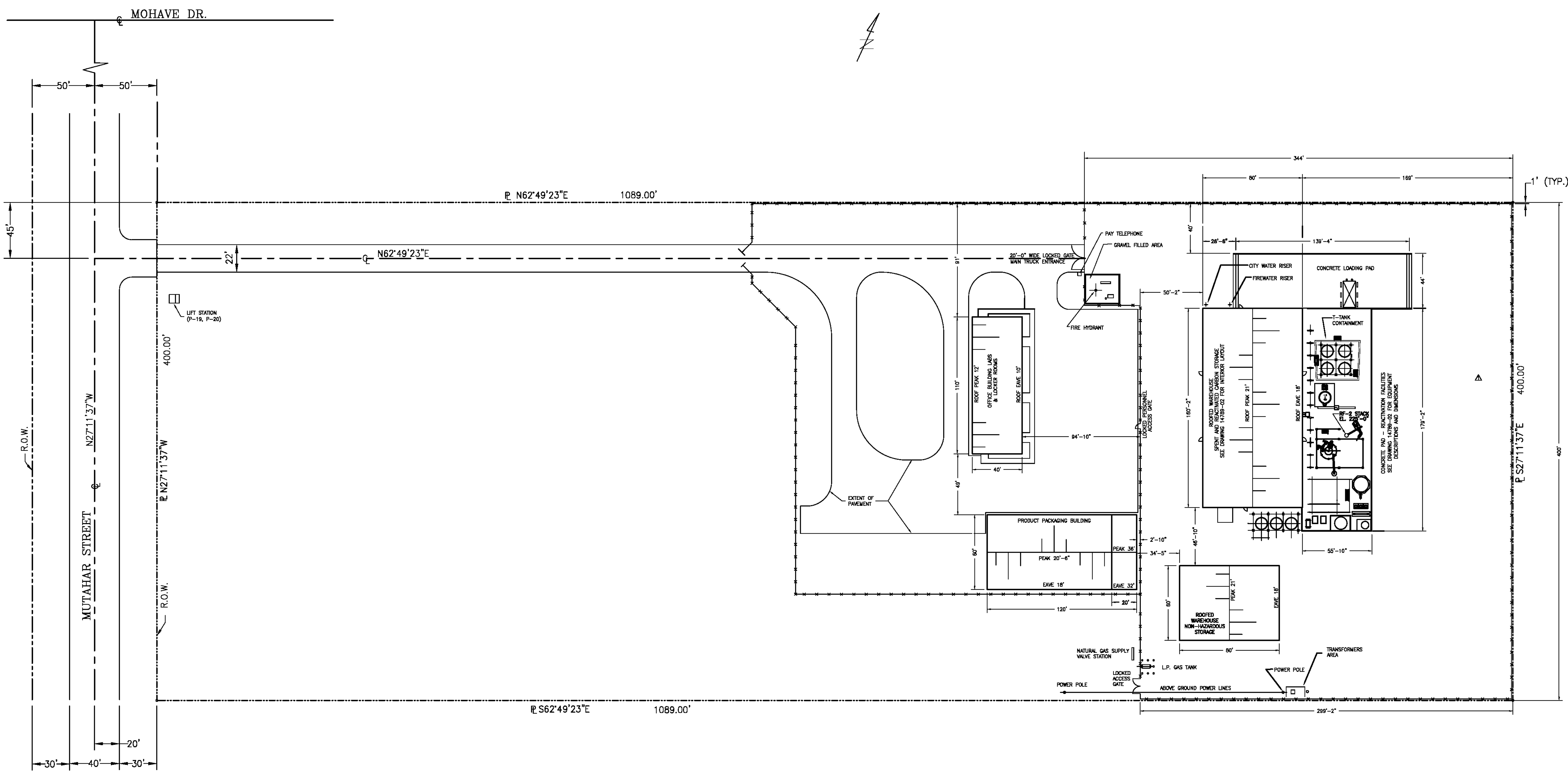
SIEMENS INDUSTRY INC.
Parker, AZ

TITLE: REACTIVATION FACILITY OVERALL ARRANGEMENTS

PART No.

DWG No. D14789-04 REV. 3

PRINT DATE: 4/19/12



NOTES:

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REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
3	3/16/12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	
2	1/18/07	UPDATED FOR PERMIT SUBMITTAL	JBE	KEM	
⚠	6/21/02	REMOVED DUMPSTER PAD	CPG	KEM	

PLOT SCALE: 1"=40'

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No.

DRAWN:	CPG	3/01/02
CHK'D:	KEM	3/01/02
ENG'R:		

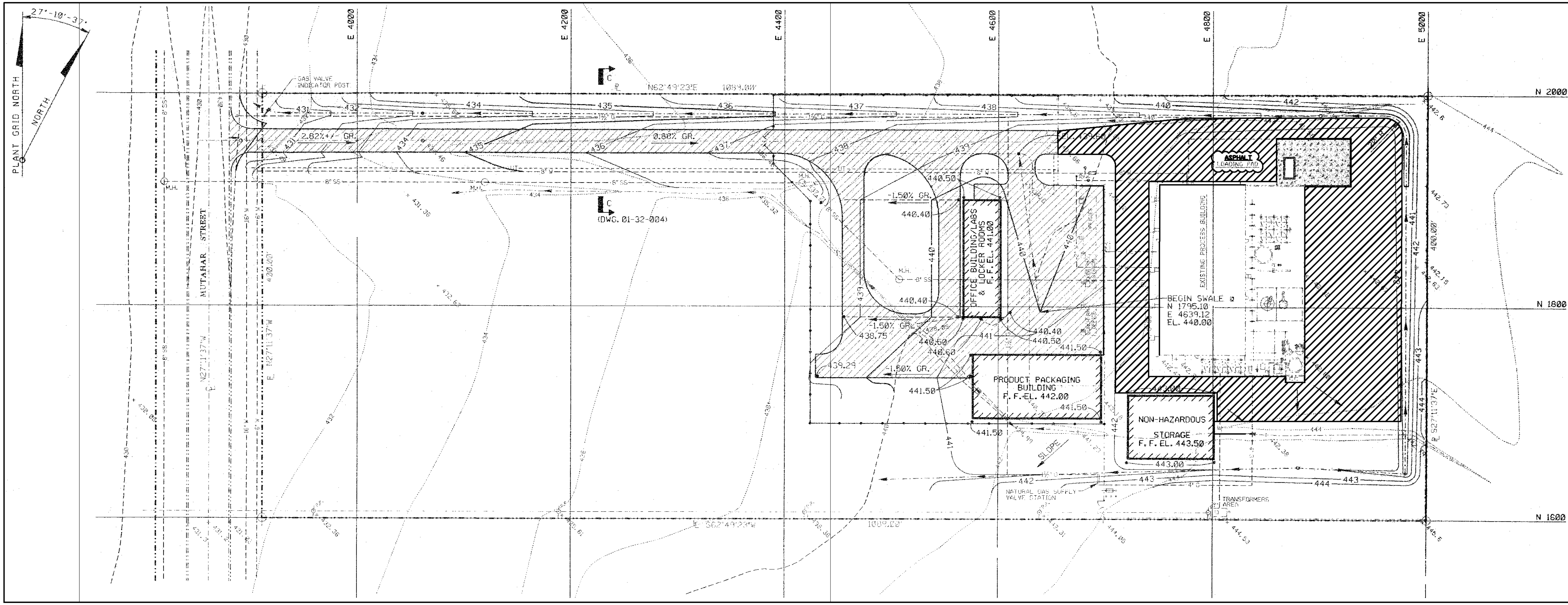
SIEMENS INDUSTRY, INC..
Parker, AZ

TITLE: REACTIVATION FACILITY SITE PLAN

PART No.

DWG No. D14789-08 REV. 3

PRINT DATE: 4/19/12



100'

SCALE

NOTES:

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2. THIS DRAWING IS BASED ON PARKER FACILITY DRAWING 01-32-002P

NO	DWN	CK'D	APP	REVISIONS	DATE
1	JBE	KEM		NAME CHANGED TO SIEMENS INDUSTRY	3/15/12

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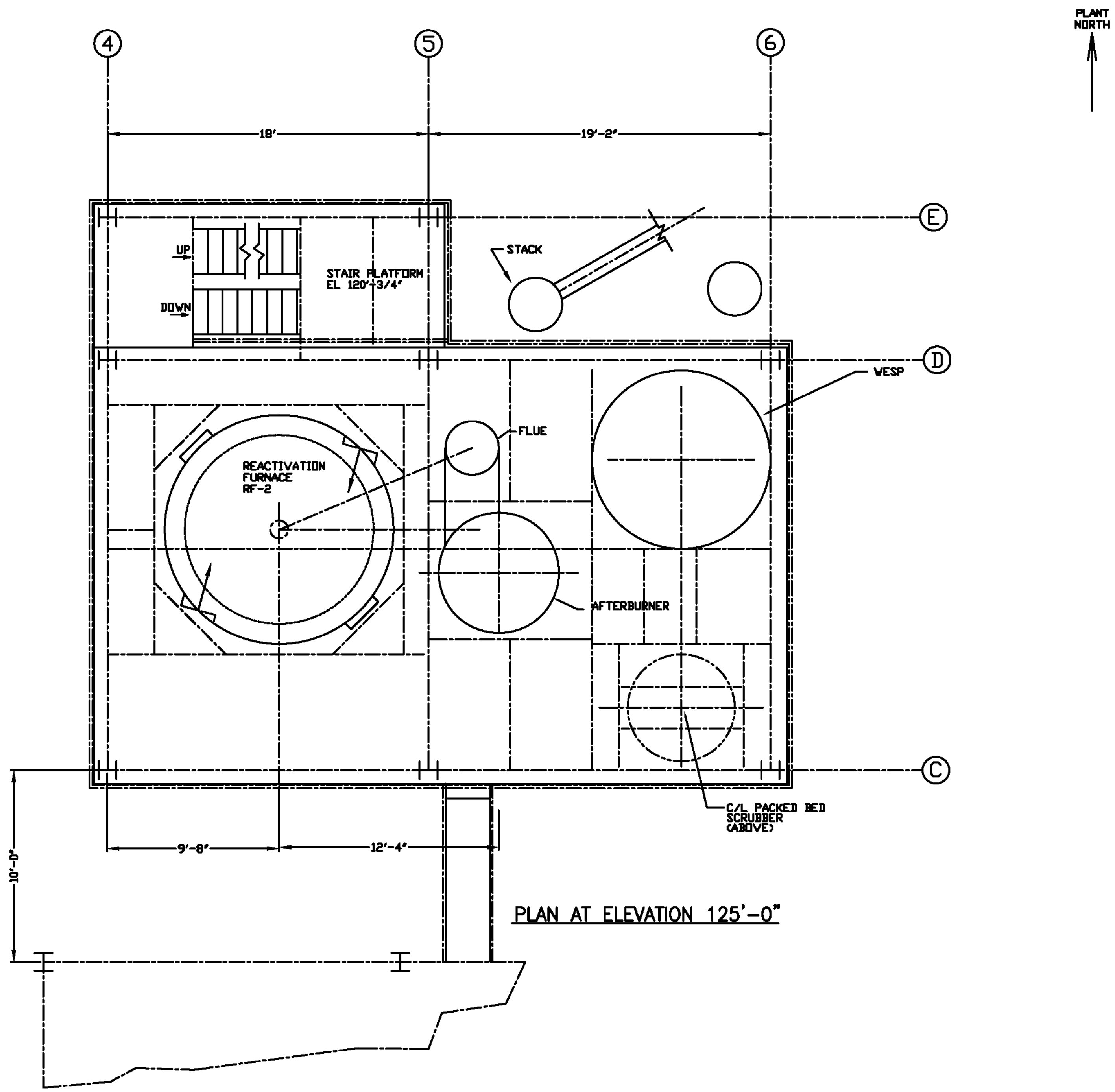
SIEMENS INDUSTRY, INC.
2523 MUTAHAR STREET, PARKER, AZ 85344

SITE CONTOUR MAP

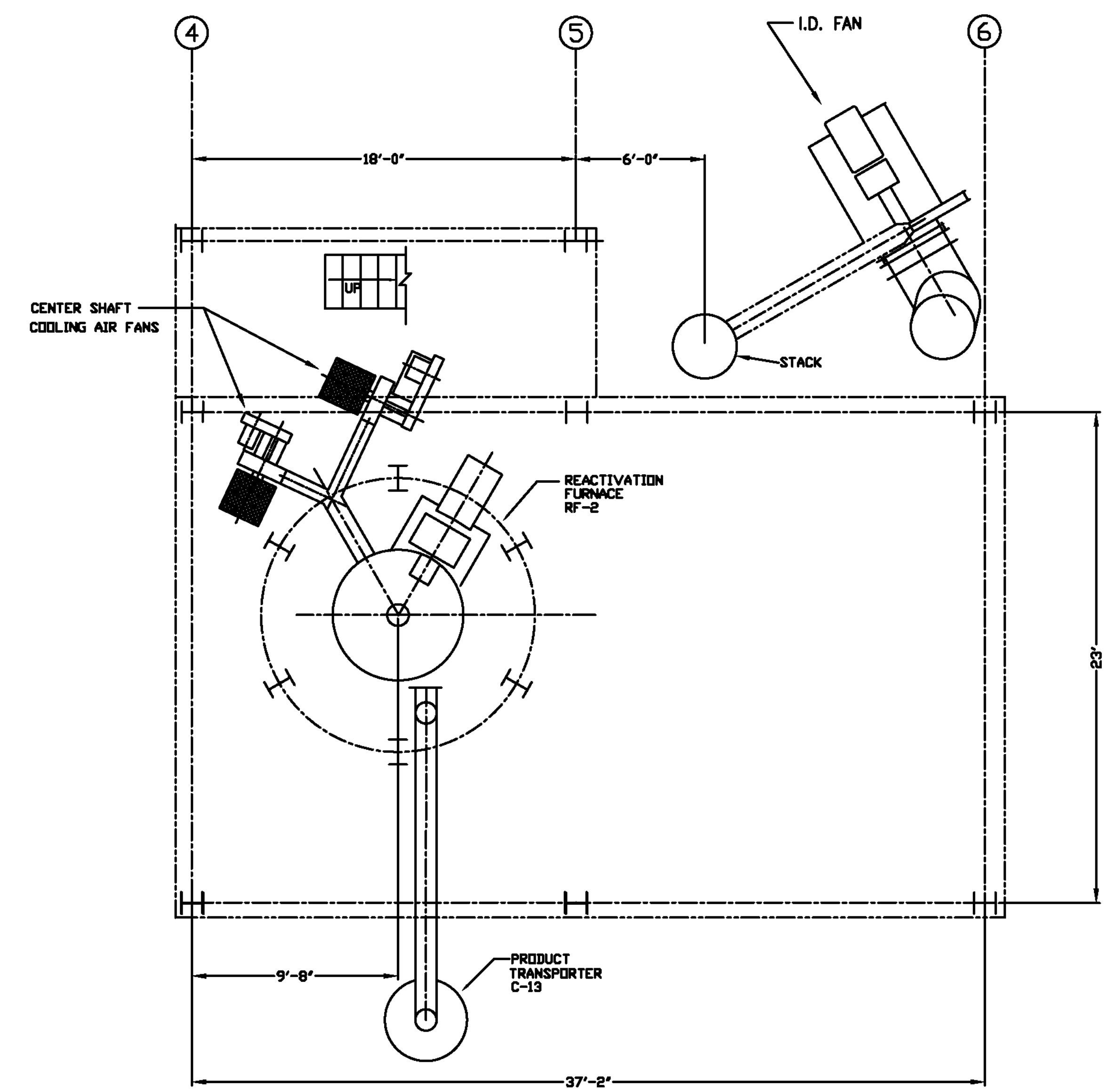
DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
JBE	1/25/07	KEM	1/25/07		

SCALE	DWG. NO.	REV.
AS SHOWN	1541-CM-001	1

PRINT DATE: 4/19/12



PLAN AT ELEVATION 125'-0"



PLAN AT ELEVATION 115'-0"

NOTES:

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4'-0"

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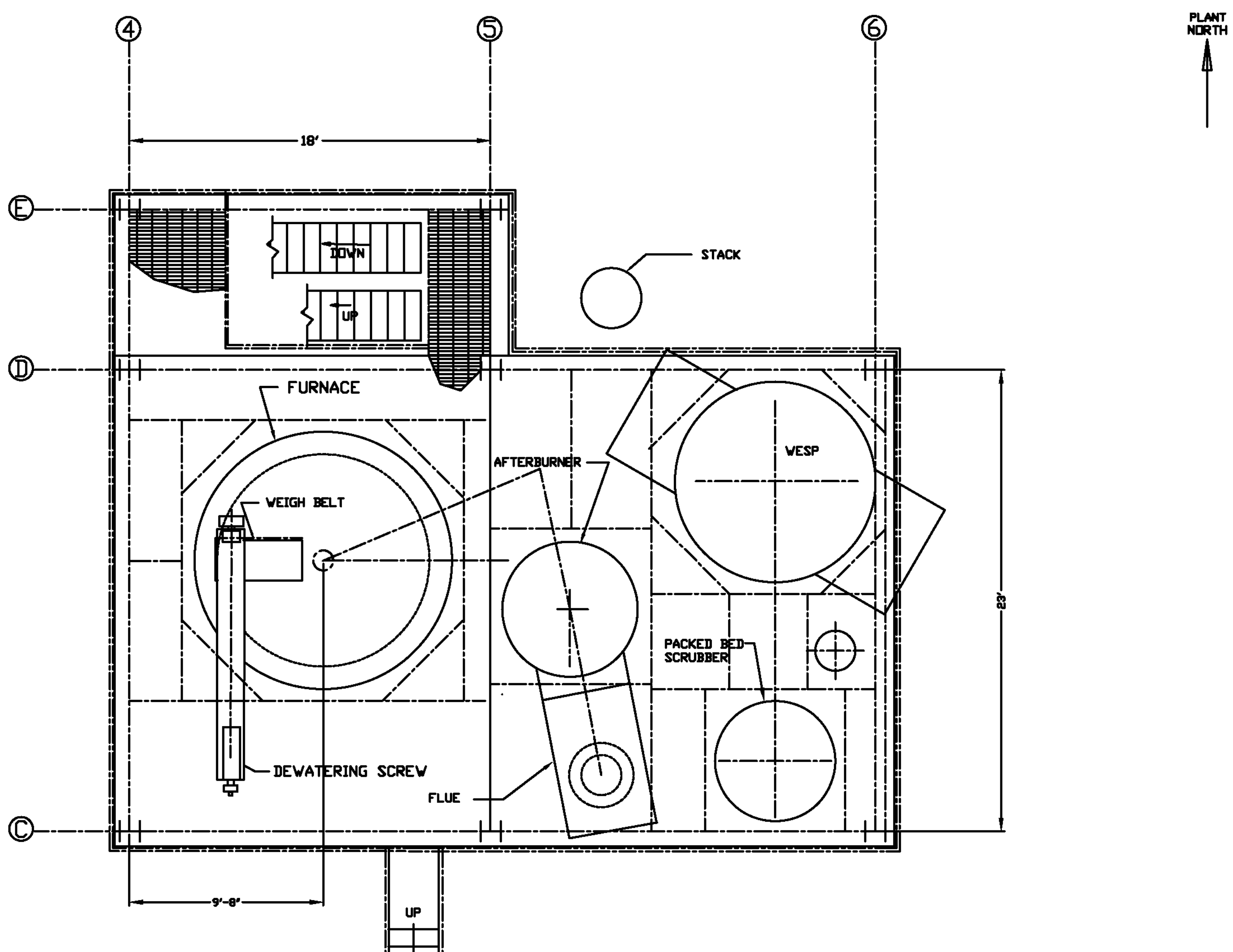
SIEMENS INDUSTRY, INC.
2523 MUTAHAR STREET, PARKER, AZ 85344
CARBON REGENERATION SYSTEM

PLAN VIEWS

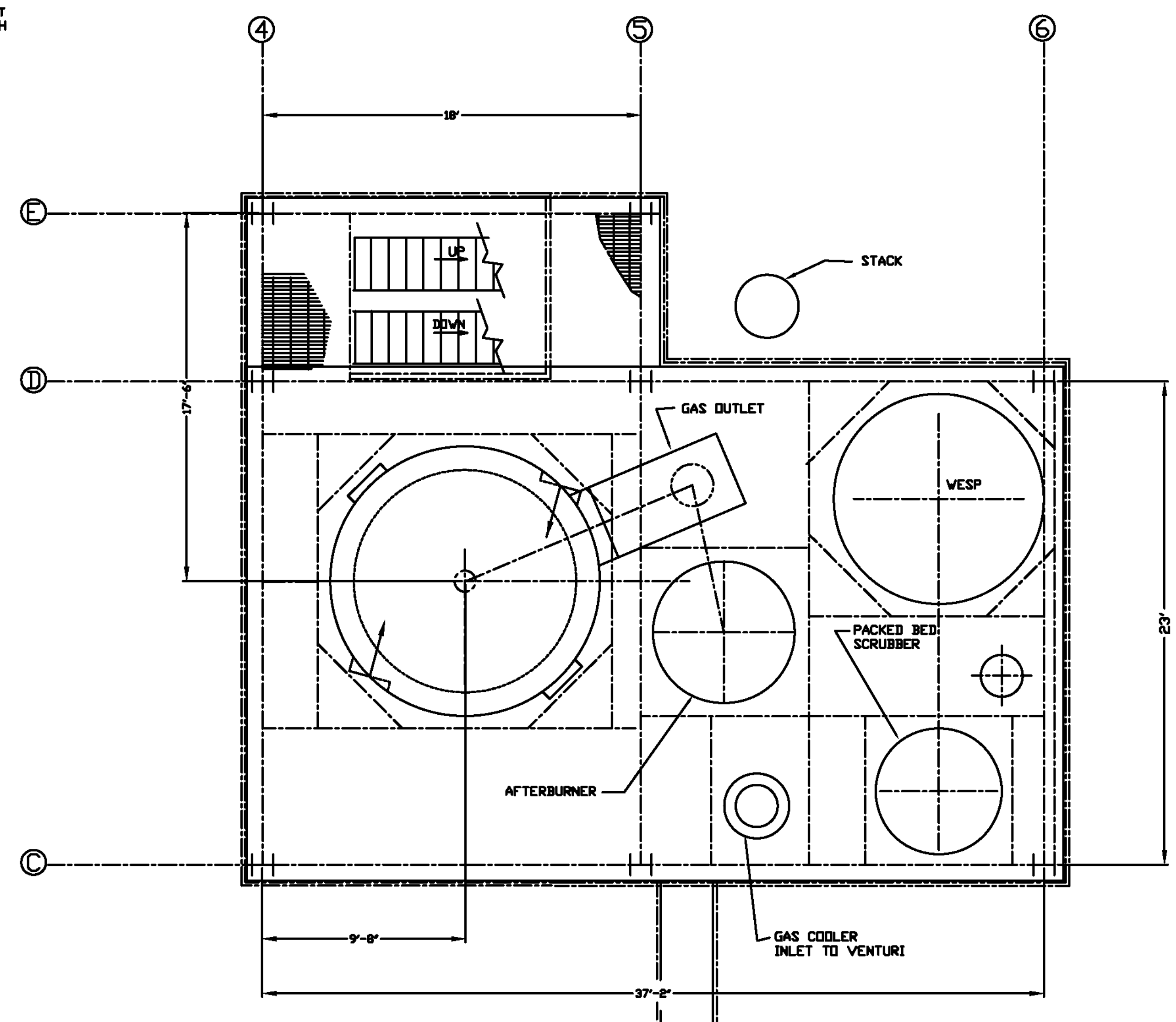
DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
CPG	5/12/94	KEM	5/13/94		

SCALE	DWG. NO.	REV.
1/4"=1'-0"	1478-P-001	1

PRINT DATE: 4/19/12



PLAN AT ELEVATION 144'-8"



PLAN AT ELEVATION 135'-8"

NOTES:

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4'-0"

NO	DWN	CK'D	APP	REVISIONS	DATE
1	JBE	KEM		NAME CHANGED TO SIEMENS INDUSTRY	3/15/12

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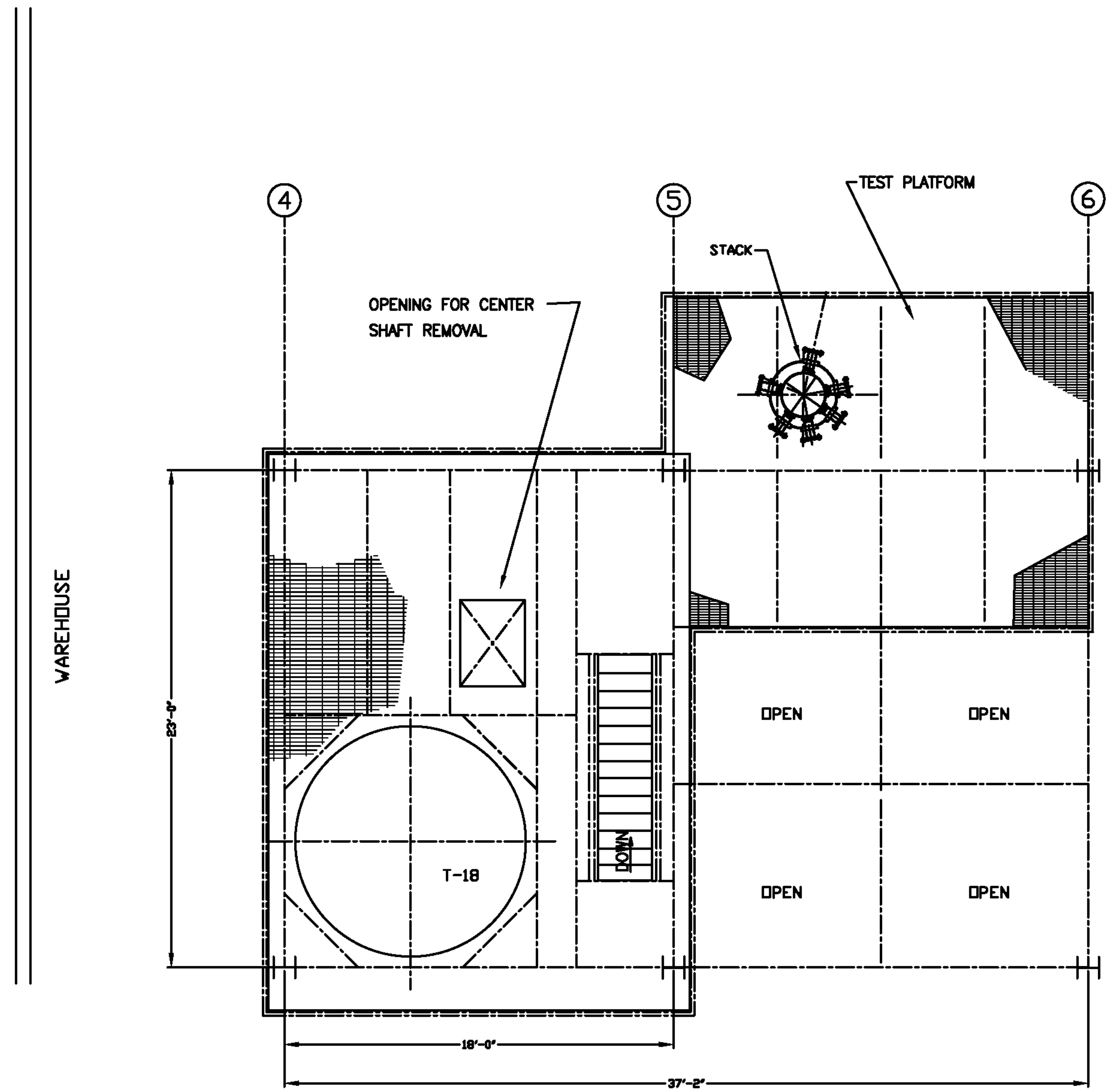
CARBON REGENERATION SYSTEM

PLAN VIEWS

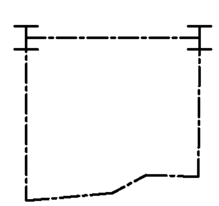
DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
CPG	5/12/94	KEM	5/13/94		

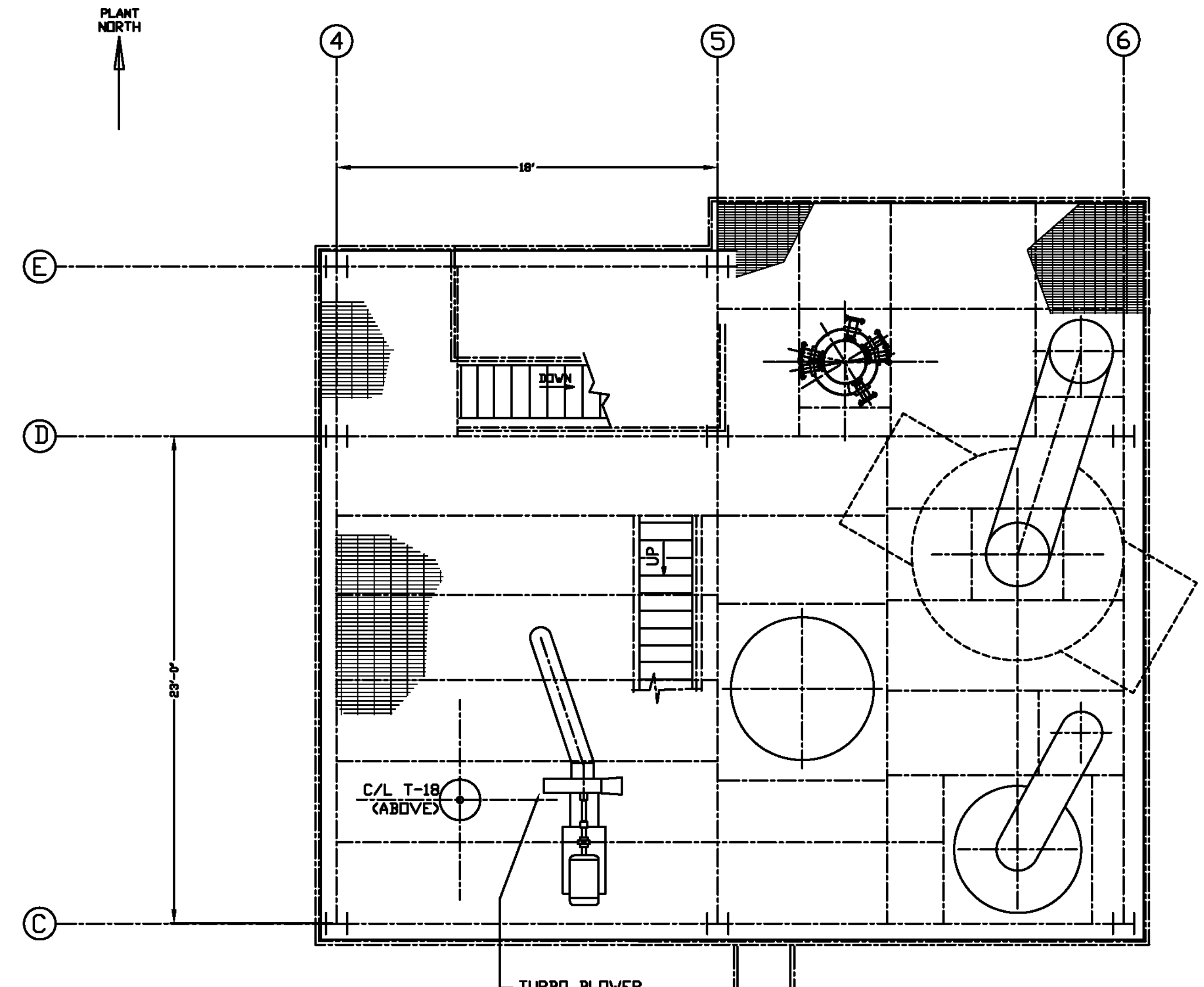
SCALE	DWG. NO.	REV.
1/4"=1'-0"	1478-P-002	1

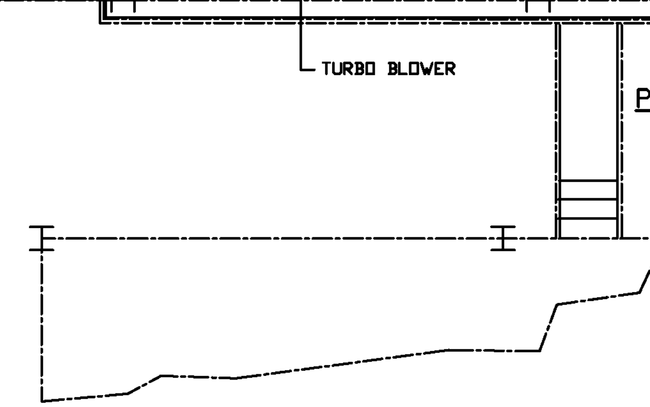
PRINT DATE: 4/19/12



PLAN AT T.O.G. ELEVATION 169'-2"







PLAN AT T.O.G. ELEVATION 157'-2"

NOTES:

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4'-0"

NO	DWN	CK'D	APP	REVISIONS	DATE
1	JBE	KEM		NAME CHANGED TO SIEMENS INDUSTRY	3/15/12

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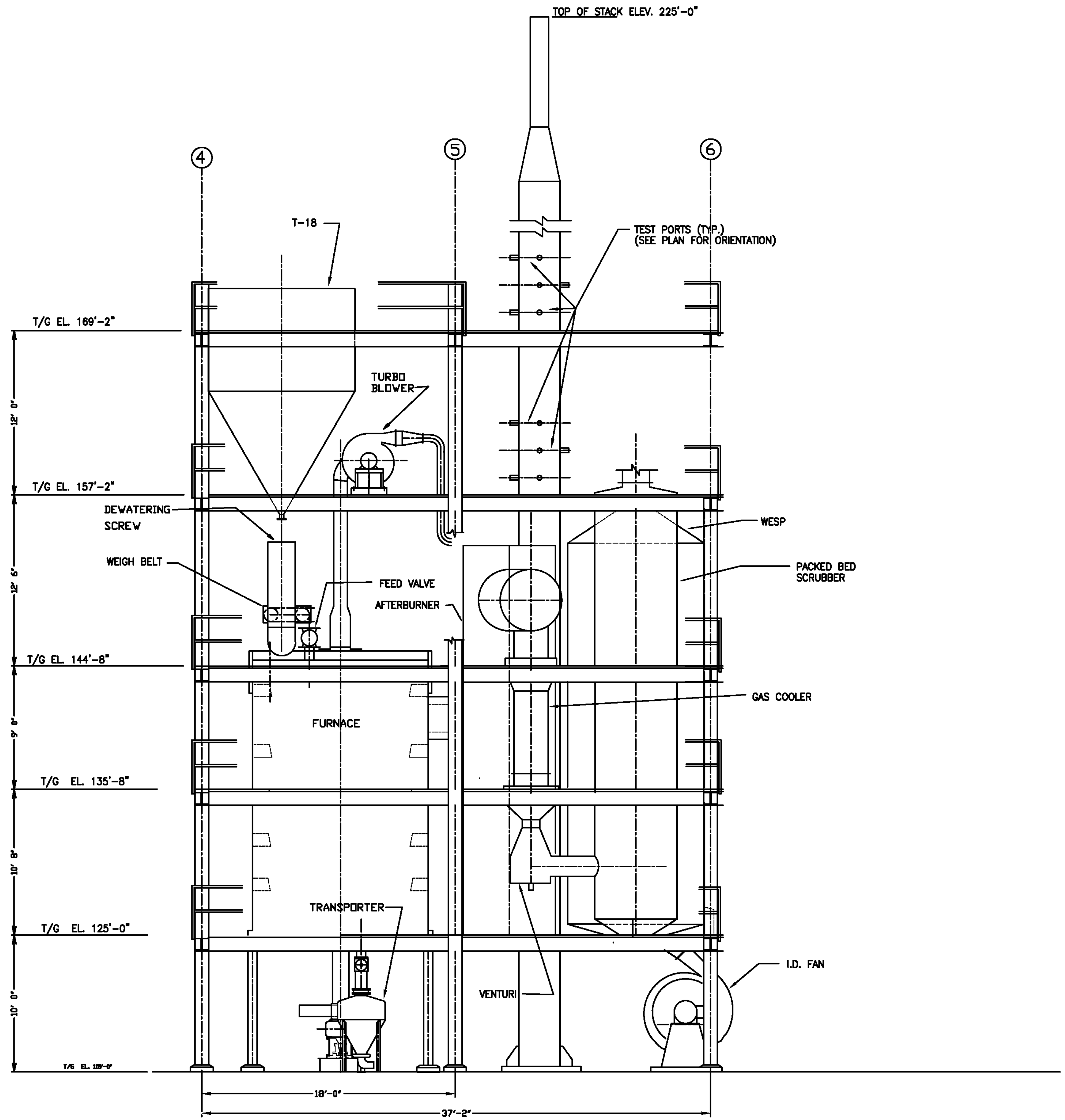
SIEMENS INDUSTRY, INC.
2523 MUTAHAR STREET, PARKER, AZ 85344
CARBON REGENERATION SYSTEM

PLAN VIEWS

DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
CPG	5/12/94	KEM	5/13/94		

SCALE 1/4"=1'-0" | DWG. NO. 1478-P-003 | REV. 1

PRINT DATE: 4/19/12



NOTES:

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2. FOR ACTUAL ELEVATIONS ADD 327 FEET TO THE ELEVATIONS SHOWN.

4'-0"

NO	DWN	CK'D	APP	REVISIONS	DATE
1	JBE	KEM		NAME CHANGED TO SIEMENS INDUSTRY	3/15/12

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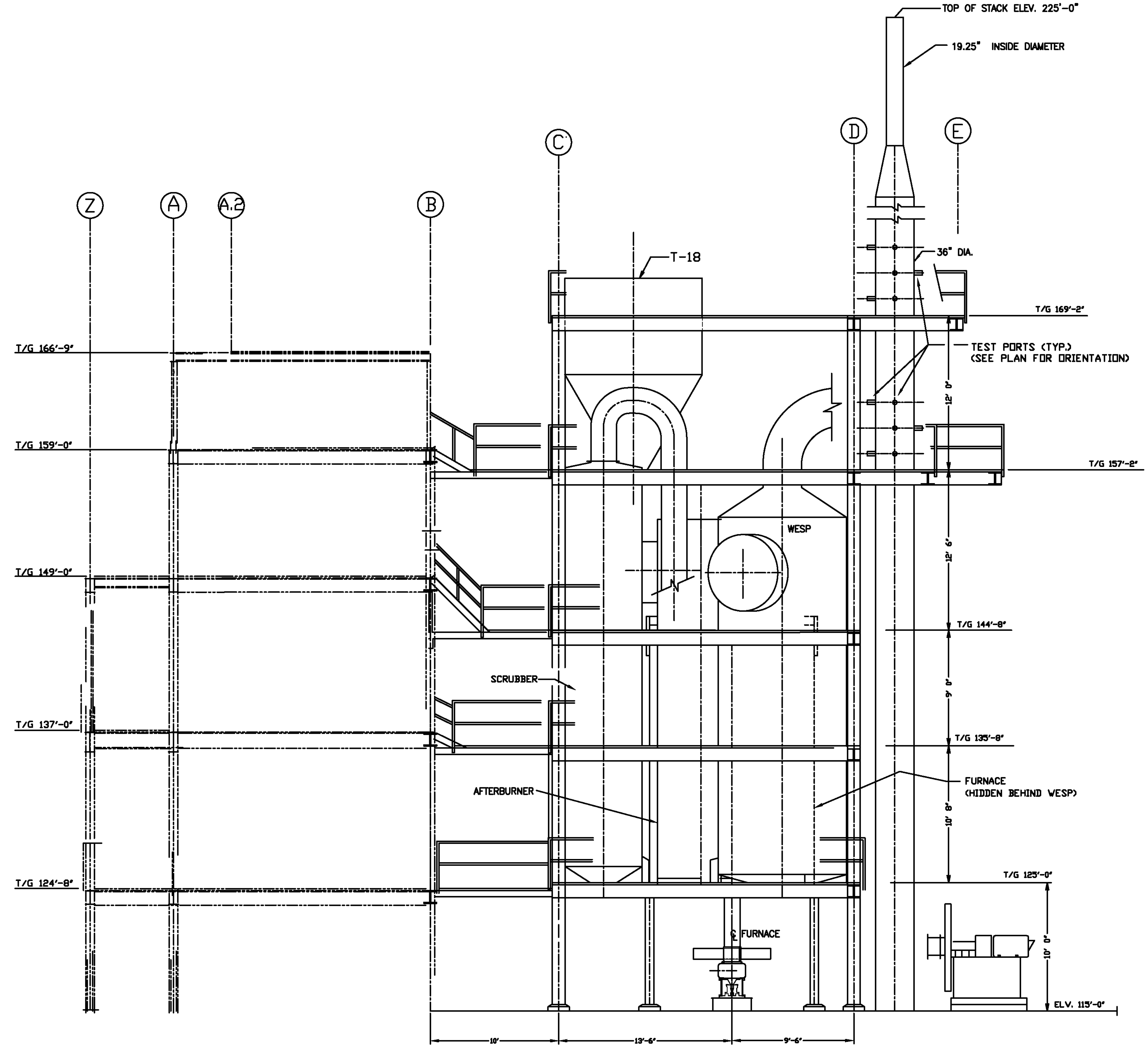
SIEMENS INDUSTRY, INC.
2523 MUTAHAR STREET, PARKER, AZ 85344
CARBON REGENERATION SYSTEM

ELEVATION LOOKING NORTH

DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
CPG	5/12/94	KEM	5/13/94		

SCALE	DWG. NO.	REV.
1/4"=1'-0"	1478-P-004	1

PRINT DATE: 4/19/12



NOTES:

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2. STAIRS ALONG THE SIDE OF THE SUPPORT STRUCTURES HAVE BEEN OMITTED FOR DRAWING CLARITY.
3. FOR ACTUAL ELEVATIONS ADD 327 FEET TO THE ELEVATIONS SHOWN.

4'-0"

NO	DWN	CK'D	APP	REVISIONS	DATE
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SIEMENS INDUSTRY, INC.
2523 MUTAHAR STREET, PARKER, AZ 85344
CARBON REGENERATION SYSTEM

ELEVATION LOOKING WEST

DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
CPG	5/12/94	KEM	5/13/94		

SCALE	DWG. NO.	REV.
1/4"= 1'-0"	1478-P-005	1

PRINT DATE: 4/19/12

APPENDIX IV

WASTE ANALYSIS PLAN

Evoqua Water Technologies
2523 Mutahar Street
Parker, Arizona 85344
928-669-5758

March 2016
Revision 2

TABLE OF CONTENTS

Section **Page No.**

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

Note that the appendices are included with the WAP for informational purposes, and represent examples of the types of information contained in these documents. The actual documents may be modified from time to time as deemed necessary by the facility, without changing the WAP.

1.0 INTRODUCTION

This Waste Analysis Plan has been prepared for the Evoqua Water Technologies (EWT) carbon reactivation facility located in Parker, Arizona. It is intended to comply with the waste analysis requirements found in 40 CFR Part 264.13 and 265.13. A description of the facility can be found in Section D of the facility's RCRA Part B permit application. This Waste Analysis Plan applies only to spent carbon that is classified as hazardous waste in accordance with 40 CFR Part 261.

The procedures and information that make up this document establish EWT's policy for the acceptance of spent carbon classified as hazardous waste and the analysis of spent carbon. The forms contained in this Waste Analysis Plan are offered to establish the general information to be documented. The format and wording of these forms may be changed from time to time without modifying the Waste Analysis Plan. EWT will provide copies of these forms to EPA as they are revised.

All records are retained in accordance with the recordkeeping requirements of 40 CFR 264.73. EWT's records retention requirements are summarized in Appendix XXI.

2.0 INFORMATION SUPPLIED BY HAZARDOUS WASTE GENERATORS

Spent carbon processed at the EWT facility will be received only after it is pre-approved for processing by EWT as described below.

The prospective generator (originator) of a source of spent carbon will begin the approval process by making application to EWT using a Spent Carbon Profile Form (SCPF). The generator will complete the SCPF in accordance with the guidance supplied with each form. The information supplied by the generator must be from analysis of a sample which is representative of the spent carbon being profiled. An example of a SCPF can be found in Appendix A.

Section 3 of the SCPF provides space for the generator to provide a specific description of the process generating the spent carbon including constituents being treated. A copy of the analytical data must be included with the SCPF.

EWT will perform a completeness review on each SCPF. Should any deficiencies be found, EWT will work with the generator to ensure the SCPF is complete before proceeding with the pre-acceptance process.

In order to ensure proper storage and treatment of the spent carbon, at a minimum, the pre-acceptance parameters listed in Table 4-1 will be determined for all samples before final profile approval is given. Table 4-1 also lists the rationale for the analyses chosen as well as the analytical methods to be used. EWT will make a determination of what additional analyses, if any, will be performed based on the information supplied on the SCPF. As part of the profiling process, the generator must make a determination and indicate in the space provided on the SCPF that based on analytical data of the waste stream and/or their knowledge of the process producing the spent carbon whether the spent carbon is a hazardous waste as defined by 40 CFR Part 261. In all cases where a determination has been made that the spent carbon is a RCRA hazardous waste, the generator is required to provide analytical data for characterization.

Based on the information supplied on the SCPF and the results of the spent carbon analysis, the generator's spent carbon will either be approved or rejected for treatment at the Parker facility. The decision to approve or reject a generator's spent carbon will be made by EWT plant management. The generator will be advised of the determination. If the spent carbon is approved for treatment, the spent carbon will be assigned a spent carbon approval number.

The generator is required to submit a revised SCPF (including appropriate analytical data) whenever there is reason to believe that the nature of the spent carbon has changed (e.g., from process or operational modifications). At a minimum, each generator must submit an updated SCPF and current analytical data at least every two years. Analytical data submitted with the profile information must be no more than 6 months old.

In the case where EWT discovers that a shipment of spent carbon exhibits a significant discrepancy from the waste profile information, the generator will be required to re-characterize the waste and may also be required to develop a new waste profile (including appropriate analytical data), before the shipment will be accepted for treatment.

3.0 PROCEDURES USED TO INSPECT SPENT CARBON RECEIVED

Upon arrival at the facility, each load will be inspected by a Material Handler or other qualified person to ensure the material is spent carbon and that the quantity of spent carbon agrees with the quantity stated on each manifest. For loads of containerized spent carbon, the drums or other containers will be counted to ensure that the quantity agrees with the manifest. Each container will be checked to ensure that a correctly completed hazardous waste label is present and that the label agrees with the contents stated on the manifest. After the quantity check, samples of the containerized spent carbon will be obtained as described in Section 5.

Bulk shipments will also be inspected. The manways or "domes" will be opened and the depth of the carbon will be visually inspected. The estimated quantity or volume in the truck will be compared with the quantity listed on the Hazardous Waste Manifest. After the quantity check, samples of the tank contents will be obtained as described in Section 5.

In the event further testing is required to make a decision or characterize the spent carbon, the facility may temporarily store the material pending analytical results.

An Incoming Spent Carbon Tally Sheet/On-Site Screening Report (see Appendix B) will be completed for each load by a Material Handler or other qualified person. This form will be filed and maintained as part of the facility's Operating Record.

4.0 CONFIRMATION OF COMPOSITION OF SPENT CARBON RECEIVED

As discussed in Section 2 of this document, the spent carbon generator is required to provide certain characterization and analytical data to SWT, prior to waste acceptance at the facility. Analytical data to be provided by the generator, including the rationale for the analysis, and the appropriate analytical methods, are described in Table 4-1.

The remainder of this section describes how facility personnel confirm that the materials received correspond to the pre-acceptance data supplied by the generator, and how facility personnel sample and analyze the incoming materials to confirm compliance with feed rate restrictions on the carbon reactivation unit. The locations within the facility and the carbon reactivation process where samples are collected are shown schematically in Figure 4-1.

4.1 CONTAINERIZED SPENT CARBON

Each container of spent carbon will be opened by a Material Handler or other qualified person, and the contents of the container will be visually inspected for foreign matter. The general appearance of the carbon will be observed. As described in the sampling procedure (see Section 5) representative samples will be obtained. A composite of the spent carbon samples from each load from each generator, or a single sample if only one container was received from the generator, will be subjected to the on-site screening tests listed in Table 4-2.

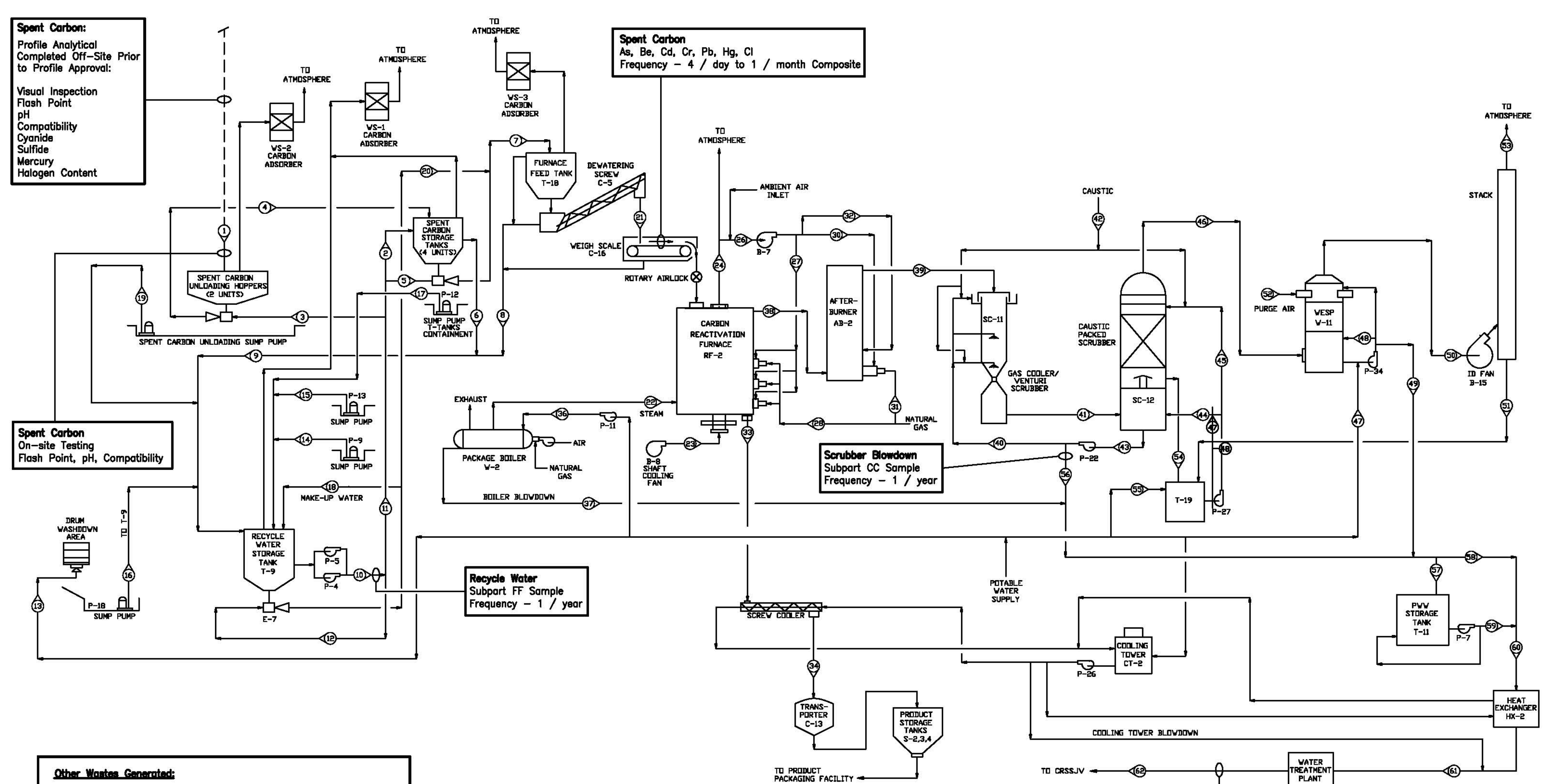
4.2 BULK SPENT CARBON

Each bulk load of spent carbon will be sampled by a Material Handler or other qualified person, as described in Section 5. Representative samples of the bulk load will be obtained as described in the sampling procedure in Section 5.0. The samples will be visually inspected for general appearance and the presence of foreign matter. A composite of the spent carbon samples will be subjected to the on-site screening tests listed in Table 4-2.

4.3 ON-SITE SCREENING

The composite samples obtained from each load from each generator's containerized spent carbon shipment and from bulk loads will be subjected to the on-site screening analyses listed in Table 4-2. EWT's procedures for on-site screening are provided in Appendix C to the WAP. The results of the analyses will be recorded on the Incoming Spent Carbon Waste Tally Sheet and On-Site Screening Report (see Appendix B) by trained personnel and reviewed by plant management. If the spent carbon is accepted, the spent carbon will be transferred into a designated storage tank or container storage area.

If, based on the visual inspection and the on-site screening analyses, the spent carbon is different than that described on the customer Spent Carbon Profile Form and/or the



Other Wastes Generated:

1. Misc. Debris – Weekly – All Waste Codes Facility has received. Not Currently Tested. Put in 90 day bin for incineration
2. WWTP Filter Press Cake – All Waste Codes Facility has received. Not Currently Tested. Put in 90 day bin for incineration

Wastewater Discharge
POTW COD/TSS Sample
Frequency – 2 / month

Wastewater Discharge
CWT Sample
Frequency – 2 / year

Wastewater Discharge
POTW TTO Sample
Frequency – 1 / year

NOTES:

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NO	DWN	CK'D	APP	REVISIONS	DATE

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SIEMENS INDUSTRY, INC.
2523 MUTAHAR STREET, PARKER, AZ 85344

SAMPLE LOCATIONS

DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
JBE	7/6/11	KEM	7/7/11		

SCALE	DWG. NO.	REV.
NONE	WAP-001	0

PRINT DATE: 4/19/12

Hazardous Waste Manifest, the generator will be notified of the discrepancy. If the discrepancy cannot be immediately resolved, the spent carbon may be retained on-site while the investigation of the discrepancy continues. If the discrepancy cannot be resolved, the spent carbon will be rejected and directed back to the generator or an alternate facility per generator direction. If the discrepancy cannot be resolved within 15 days, EWT will notify EPA as required by 40 CFR 264.72(b) and (c).

4.4 RATIONALE FOR ANALYSES SELECTED FOR ON-SITE SCREENING

The rationale for the analysis selected to be performed as part of the on-site screening is given in Table 4-2.

4.5 ANALYSES PERFORMED FOR PERMIT COMPLIANCE

The RF-2 carbon reactivation furnace conducted a Performance Demonstration Test and established feed rate limits for the following constituents as a result of that test:

- Mercury
- Semi volatile metals (cadmium, lead)
- Low volatility metals (arsenic, beryllium, chromium)
- Total chlorine/chloride.

In order to continuously demonstrate compliance with those feed rate limits, the most recent analytical results (designated as the “analysis of record”) are recorded in the process computer system. A rolling average feed rate of each regulated constituent is computed and recorded based on the analysis of record and the measured mass feed rate of spent activated carbon.

A grab sample of the feed spent activated carbon is collected four times daily (twice each shift) when the process is operating. These samples are collected by the process operators from the weigh belt. The four daily grab samples are stored in the on-site laboratory. At the end of each approximately 15 to 20 day period (selected such that the samples will not exceed the 28 day holding time for Hg analysis), the samples collected from that time period are combined and then sub-sampled to form a composite feed sample. This composite is analyzed using the methods described in Table 4-3.

Following receipt of the feed composite sample analyses, the data are entered into a spreadsheet where the most recent 12 months of analytical results are averaged. When each new analytical result is entered, the 12 month average is updated. The most recent 12 month average result is designated as the “analysis of record” for purposes of calculating the constituent feed rate values used for permit compliance demonstration.

While EWT’s contract laboratory matrix spike recovery results are routinely within the method limits, EPA has expressed concern that analyte recovery may be problematic in activated carbon samples. EWT has agreed to review the results of matrix spike recoveries for the regulatory compliance analyses (metals and total chlorine) and to adjust the analytical result using the spike recovery if the recovery falls below the method limits. The following equation will be used if such analytical result adjustment is needed:

$$C_{corr} = C_{unc} \times \frac{100}{Spike\ Recovery\ \%}$$

Where:

C_{corr} = Corrected analytical result
C_{unc} = Uncorrected analytical result

TABLE 4-1
SUMMARY OF PRE-ACCEPTANCE ANALYTICAL PARAMETERS, RATIONALE, AND TEST METHODS

PARAMETER	RATIONALE	METHODS	USES
Visual Inspection	Verify that the material is spent carbon, and used to identify the obvious presence or absence of free liquid and/or debris, coloration, and whether the spent carbon is a vapor phase or liquid phase carbon, etc. The initial characterization of a particular spent carbon will be used for comparison against each subsequent load of that same spent carbon received at the facility.	Visual Inspection	Pre-acceptance
Flash-point (1)	Indicates whether the free liquid or solid portion of the spent carbon exhibits the characteristics of ignitability. This information is used to determine the storage requirements for the spent carbon prior to treatment. Liquids with a flash point <140°F will not be accepted into the facility.	SW-846 Method 1010M, 1010, or ASTM D3278	Pre-acceptance
pH (2)	Identifies materials that have the potential to corrode pipes, tanks and ancillary equipment.	SW-846 Method 9041, 9040, or 9045 depending on free moisture in sample	Pre-acceptance
Compatibility	Identifies materials that have the potential to be incompatible.	ASTM D5058 (Method C) or IM-101S	Pre-acceptance
Cyanide	Identifies potentially reactive spent carbon. Spent carbon with reactive cyanide >250ppm will not be accepted at the facility.	SW-846 Method 9010	Pre-acceptance
Sulfide	Identifies potentially reactive spent carbon. Spent carbon with reactive sulfide >500ppm will not be accepted at the facility.	SW-846 Method 9030	Pre-acceptance
Mercury	Process information.	SW-846 Method 7471 (Cold Vapor Technique)	Pre-acceptance
Halogen Content	Process information.	SW-846 Method 5050 (bomb combustion) SW-846 Method 9020 or 9056	Pre-acceptance

Notes:
1. If fingerprinting with an open flame is positive then run one of the methods.
2. Analysis performed on free liquids retained in incoming spent carbon samples or on a 1:1 mixture of the incoming vapor phase carbon sample and deionized water. Initial screening is performed using Method 9041. Should Method 9041 indicate the sample is potentially corrosive, Method 9040 or Method 9045 is used for final confirmation that a material is corrosive.
3. All method numbers are shown without suffix. The latest promulgated method will be used.
4. SW-846 refers to *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* USEPA, latest update. ASTM refers to *Annual Book of ASTM Standards*, ASTM International.

Table 4-2
SUMMARY OF ON-SITE SCREENING ANALYTICAL PARAMETERS, RATIONALE AND TEST METHODS

PARAMETER	RATIONALE	METHODS	USES
Visual Inspection	Verify that the material is spent carbon, and used to identify the obvious presence or absence of free liquid and/or debris, coloration, and whether the spent carbon is a vapor phase or liquid phase carbon.	Visual	On-site screening; Must conform to physical description on profile
Ignitability(1)	Indicates whether the carbon will support a flame at ambient conditions. This information is used to determine the storage requirements for the spent carbon prior to treatment, and to verify ignitability information provided by the generator.	Open ignition in controlled environment	On-site screening; Diluted sample must not support combustion
pH	Identifies materials that have the potential to corrode pipes, tanks and ancillary equipment.	Add DI water 1:1 and check pH using test strips. (Reference: EPA Method 9041M/9045M)	On-site screening; Must be within range on profile
Compatibility	Identifies materials that have the potential to be incompatible with water.	ASTM D5058 (Test Method C – Water Compatibility) or IM-101S	On-site screening; Must not show adverse reaction with water

Notes:

(1) Fingerprinting is conducted by applying a flame to the carbon sample in a controlled environment. If the carbon supports a flame under these conditions, the sample is mixed 1:1 with deionized water and the procedure is repeated. The test is positive if the diluted sample supports combustion above the water surface.

Method numbers are shown without suffix. The latest promulgated methods will be used.

SW-846 refers to *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* USEPA, latest update.
ASTM refers to *Annual Book of ASTM Standards*, ASTM International.

TABLE 4-3
SUMMARY OF PERMIT COMPLIANCE ANALYTICAL PARAMETERS, RATIONALE, AND TEST METHODS

PARAMETER	RATIONALE & FREQUENCY	METHODS	USES
Arsenic, Beryllium, Cadmium, Chromium, Lead	Demonstrate compliance with RF-2 constituent feed rate limits. Four daily samples combined and sub-sampled into ~15 to 20 day composite. Analysis of each composite to form 12-month rolling average.	SW-846 Method 3050 (acid digestion) SW-846 Method 6010 (ICP)	Calculation of constituent feed rate; comparison to permit limit.
Mercury	Demonstrate compliance with RF-2 constituent feed rate limits. Four daily samples combined and sub-sampled into ~15 to 20 day composite. Analysis of each composite to form 12-month rolling average.	SW-846 Method 3050 (acid digestion) SW-846 Method 7471 (CVAAS)	Calculation of constituent feed rate; comparison to permit limit.
Total chlorine	Demonstrate compliance with RF-2 constituent feed rate limits. Four daily samples combined and sub-sampled into ~15 to 20 day composite. Analysis of each composite to form 12-month rolling average.	SW-846 Method 5050 (bomb combustion) SW-846 Method 9056	Calculation of constituent feed rate; comparison to permit limit.

Note: method numbers are shown without suffix. The latest promulgated methods will be used.

SW-846 refers to *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,* USEPA, latest update.

5.0 PROCEDURES USED TO OBTAIN A REPRESENTATIVE SAMPLE OF SPENT CARBON

Sampling of spent carbon will be employed as part of the on-site screening process and permit compliance as described below.

5.1 BULK LOADS

A representative sample of each bulk load will be obtained using either a shovel or scoop. The sampling instrument will be rinsed with water after every sampling event. The sample from each bulk shipment will be taken to the laboratory for screening analyses.

5.2 CONTAINERS

Each container will be opened for the purpose of inspection and sampling. The lid or top on each container will be left loosely in place unless sampling or inspection of the container is actually occurring. A Material Handler or another designated employee will obtain one sample from each randomly selected container using the following selection strategy.

1. The number of containers chosen for random selection from each spent carbon generator will equal the square root plus one of the total shipped by the generator in each load. Thus, if a generator shipped one container, that container would be sampled. If a generator shipped sixteen containers, five would be sampled. If the square root is not an integer, it will be rounded to the next highest number. The waste tally sheet and EWT internal labels are generated by computer and perform the random sampling calculations. Printed tally sheets and labels designate which containers are to be sampled.

2. If any container contains a spent carbon which either is visually different from the profiled spent carbon, or a composite of the individual samples fails the on-site screening process described in Section 4, each container from that spent carbon generator may be sampled and subjected to the on-site screening analyses listed in Table 4-2.

Each representative sample will be obtained using the appropriate adaptation of the general methodology listed in ASTM Standard D346. The sample will be placed in clean sample jars, covered with an appropriate lid, and immediately taken to the facility laboratory for analysis. A label will be placed on each jar, indicating the profile number and the date of the sample. After sampling, the lid will be replaced on each container and it will be sealed if it is going to be stored. A composite sample will be analyzed from each load of spent carbon received from each generator. The composite sample will be prepared by combining equal amounts of carbon from each grab sample that was collected from the randomly selected containers in the load.

5.3 CARBON FEED

Four times daily, the access cover of the weigh belt will be opened for the purpose of sampling. An operator or another designated employee will obtain one grab sample of the feed carbon, and place the sample into a clean sample jar.

At the end of each day, the four grab samples will be stored in the on-site laboratory.

At the end of each approximately 15 to 20 day period, the daily feed samples will be opened and an equal amount will be removed from each jar and placed into a clean sample jar, to form a carbon feed composite sample.

A label will be placed on the composite sample jar, indicating the date range of the sample, and the sample will be sent to an off-site laboratory for the analyses listed in Table 4-3.

5.4 MAINTAINING AND DECONTAMINATING SAMPLING EQUIPMENT

Equipment used to obtain representative samples will be inspected as per the facility's inspection schedule to ensure it is in proper working order. Sampling equipment will be decontaminated by rinsing with water after each sampling event.

5.5 SAMPLING QA/QC PROCEDURES

Sampling equipment is decontaminated between sampling events or is disposed of to minimize the possibility of cross contamination. The equipment is decontaminated using a method appropriate to the type of material sampled. For example, scoops are generally rinsed with water to remove solids. New sampling equipment that is known to be clean will not be decontaminated prior to use.

6.0 METHODS TO ENSURE COMPATIBILITY WITH HANDLING METHODS

The spent carbon testing procedures outlined in this Waste Analysis Plan have been developed with cognizance of the spent carbon storage and handling procedures at the Parker facility. The facility is designed to safely store, transfer and reactivate spent carbon, which is contaminated with wastes that are toxic and/or ignitable. The Parker facility takes the necessary precautions to prevent the accidental ignition of ignitable spent carbon. As shown in Table 4-1, the facility pre-acceptance procedures include compatibility testing to identify materials that have the potential to be incompatible. The facility will not receive spent carbon which is characterized by the generator as reactive or corrosive, or spent carbon identified by waste codes which are not authorized for receipt at the facility.

7.0 METHODS TO ENSURE WASTE ANALYSIS PLAN IS KEPT UP-TO-DATE

The Plant Manager, Environmental Health and Safety Specialist or another designated person shall review the Waste Analysis Plan at least every two calendar years to determine if it is in compliance with current RCRA regulations and otherwise meets the needs of the facility. A statement that the plan was reviewed will be maintained in the permanent files at the facility.

If the WAP is revised as a result of the review process, a copy of the revised document will be provided to EPA.

8.0 LAND DISPOSAL RESTRICTION NOTIFICATION FORMS

Generators of spent carbon that is restricted from land disposal pursuant to 40 CFR 268 will be required to provide appropriate documentation.

At the time of spent carbon receipt, EWT will receive and review the forms, which must accompany the first shipment of spent carbon that is subject to land ban restrictions. EWT will file the completed forms with the Treatment Storage and Disposal copy of the hazardous waste manifest as part of the facility operating record.

9.0 SPECIAL PROCEDURAL REQUIREMENTS

This section provides discussion on special procedural requirements applicable to the facility. These include 40 CFR 264 Subpart BB and Subpart CC applicability.

9.1 Subpart BB

In accordance with the requirements of 40 CFR 264 Subpart BB, the Waste Analysis Plan is to contain determinations on the applicability of the 40 CFR 264 Subpart BB requirements. The Subpart BB regulations are applicable to equipment that contains or contacts hazardous wastes with organic concentrations of at least ten (10) percent by weight.

The Subpart BB regulations further define equipment as being in light liquid service, gas/vapor service, and heavy liquid service. The facility Subpart BB Compliance Plan is included in Appendix XIX of the Part B Application.

9.2 Subpart CC

The EWT Parker facility manages all tanks and containers regulated by the requirements of Subpart CC as specified in Section O. The Subpart CC Compliance Plan is located in Appendix XVI. The carbon absorber change out schedules are based on engineering calculations found in 40 CFR, Subpart FF Compliance Plan.

9.3 Wastes Generated On-Site

EWT generates several regulated waste streams as part of its operations. These include debris, filter cake from the wastewater treatment operations, used personnel protective equipment, and spent activated carbon used for tank vent control in compliance with Subpart CC and FF. Of these wastes, all are manifested and sent off site for disposal, with the exception of the spent activated carbon used for tank vent control. This spent activated carbon is similar to the spent carbon received at the EWT facility, as it is derived from the treatment and storage of those carbon streams, and is treated by EWT in the same manner as the spent carbon received from off-site.

WASTE ANALYSIS PLAN

APPENDIX A

WASTE PROFILE FORMS

Revision 2
March 2016

PROFILE INSTRUCTIONS

1. ***Generator information*** The generator of the spent carbon must provide all requested contact information. Completely fill in the mailing address of the generator of the spent carbon. The mailing address is where the manifest will be mailed and must match the manifest mailing address. Completely fill in the name of person responsible for completing the Profile Form and who can be contacted with questions concerning the Profile Form and/or shipment(s). The Site EPA Identification Number must be included if the spent carbon is hazardous.

2. ***Consultant information*** If a consultant or subcontractor is providing the profile information on behalf of the generator, the consultant information must be filled out entirely. Completely fill in the street address of the site location of the spent carbon if it is different from 1(a). The address must match the information for the EPA ID Number. If generator, site and/or consultant are the same, please indicate "same". If none, please state "none or n/a".

3. ***Properties and Composition of the Spent Carbon*** In addition to a specific description of the process generating the spent carbon enter the specific constituents on the carbon. Please be specific when entering the data in this field, see the examples below.

Example of unacceptable description of constituents: VOC's from soil vapor extraction, halogenated hydrocarbons, and other VOC's, etc.

Example of acceptable description of constituents: Groundwater remediation to remove benzene or BTEX from a LUST, groundwater remediation for tetrachloroethylene in the vicinity of a dry cleaner, etc. Please list the source of the contamination if known.

4. ***Existing Profile Number*** If there is an existing profile number for the spent carbon include the previous approved profile number and expiration date in this section.

5. ***Type of Spent Carbon*** Select the applicable carbon type vapor or aqua phased.

6. ***Foreign Material*** If the carbon contains any foreign materials such as dirt, rocks or other foreign materials, a representative sample must be sent to the Parker facility at the Arizona physical address for evaluation. A one pound sample is adequate. If nothing is present, please check off "no."

7. ***Handling*** Indicate the container in which the carbon will be shipped. Note: containers containing hazardous materials must meet general packaging requirements DOT 49 CFR 173.24. (a)(b).

8. ***Free Liquid Range*** An estimated range of free liquid accompanying the spent carbon must be selected.

9. ***Liquid Flashpoint*** If the flashpoint range of the free liquid has not yet been determined, please send a sample to SWT for analysis.

10. ***pH Range*** If the pH has not yet been determined, please send a sample to the SWT for analysis.

11. ***Strong Odor*** If the carbon contains a strong odor a sample must be sent to the Parker facility at the Arizona physical address for evaluation. A one pound sample is adequate.

12. ***Superfund Site*** If the spent carbon is from a Superfund site please check the "yes" box. A Superfund site is identified by the Comprehensive Environmental Response, Compensation and Liability Act of 1980, or the Superfund Amendments and Reauthorization Act of 1986 (SARA).

13. ***Benzene NESHAP*** If the spent carbon comes from a process meeting the requirements of 40 CFR 61.341, please check the "yes" box. The BWON Addendum must be completed and attached to the Profile Form. Total benzene analysis is required on BWON waste streams.

14. ***Carbon Containing the Following*** If the spent carbon contains any contaminants listed in items A-I on the Profile Form please check the appropriate box "yes".

Revised October 2014

- **A.** If the spent carbon contains PCBs the Addendum for Non-Regulated PCB Waste must be completed and attached to the Profile Form. Please note the required analysis for each shipment.
- **B.** Dioxins and/or furans will not be accepted at either the Parker or Red Bluff facility.
- **C.** If the spent carbon contains DBCP additional analysis and a review will be required before the profile can be approved.
- **D.** Sulfide or Cyanide will not be accepted at either the Parker or Red Bluff facility.
- **E.** Explosives, pyrophoric or radioactive material will not be accepted at either the Parker or Red Bluff facility.
- **F.** Infectious materials will not be accepted at either the Parker or Red Bluff facility.
- **G.** Shock sensitive material will not be accepted at either the Parker or Red Bluff facility.
- **H.** Oxidizers will not be accepted at either the Parker or Red Bluff facility.
- **I.** Heavy metals must to be identified and totals, not TCLP, metals analysis must be conducted and attached to the Profile Form.

15. ***Generator Classification*** Indicate if the spent carbon is considered a hazardous waste under federal RCRA regulations. List all applicable waste codes. (Please see 40 CFR Part 261.31- 261.33 for listed waste codes and 40 CFR Part 261.21 – 261.24 for characteristic waste codes). The federal EPA and many states provide that a spent carbon may be classified as "sludge" when generated from an air pollution control facility municipal, commercial, or industrial wastewater treatment plant or a water supply treatment plant and the spent carbon contains no listed hazardous waste. To qualify for this exemption, the spent carbon must be returned to a reactivation facility where the spent carbon is reclaimed and the spent carbon must be generated in a state whose regulations provide for the classification of such spent carbon as a "sludge." If the spent carbon meets the requirements of 40 CFR 261.2(c)(3)) and the state where it is generated, an Addendum for Sludge Exemption must be completed and submitted with the Profile Form. Note: It is the generator's responsibility to classify the spent carbon.

16. ***Generator Classification*** Indicate if the spent carbon is considered a hazardous waste under regulations of the state in which it is generated. If so, list all applicable state waste codes. Note: It is the generator's responsibility to classify the spent carbon.

17. ***Land disposal restriction notification*** The USEPA Hazardous Waste Land Disposal Restrictions require that every generator of restricted hazardous waste send a notification that describes the waste and its status under the Land Ban regulations. 40 CFR 268.

18. ***Estimated annual carbon usage*** Indicate an estimate of the annual carbon usage, in pounds per year, for the specific profile.

ANALYTICAL REQUIREMENTS

Analytical data on the spent carbon are required with each new Profile Form and with each renewal Profile Form even if the waste stream has not changed. Spent carbon should be analyzed for the constituents being treated in the waste stream. Analysis must have been performed within the last six (6) months by a state-certified laboratory, such as the Evoqua Water Technologies laboratory.

RCRA Profiles only
RCRA hazardous profiles require additional testing; "11 RCRA Tests". A one-pint sample of the spent carbon must be submitted to Evoqua Water Technologies,. Attn: Lab, 5375 S. Boyle Ave., Los Angeles, CA 90058. It is recommended the "11 RCRA Tests" be performed at by the EWT lab in Vernon, CA because internal test methods are required. A completed and signed LDR is required to be submitted prior to profile approval.

PROFILE APPROVAL
Submit the completed electronic Profile Form and all required Addenda via email to your Evoqua Sales representative along with spent carbon samples for testing. Notification of approval will be forwarded to the consultant (if listed) or the generator via email. Upon receipt of your profile approval letter, contact your EWT Sales Representative to schedule service and transportation.

Evoqua Water Technologies LLC

Arizona Facility: 2523 Mutahar Street • P.O. Box 3308 • Parker, AZ 85344
(928) 669-5758 • FAX (928) 669-5775 EPA ID: AZD 982 441 263

California Facility: 11711 Reading Road • Red Bluff, CA 96080
(530) 527-2664 • FAX (530) 527-0544 EPA ID: CAR 000 058 784

SPENT CARBON PROFILE FORM

GENERATOR INFORMATION

1. a) Generator: ______________________ b) Site: ______________________
Address: ______________________

Mailing Address: ______________________ ______________________
(Manifest Return) ______________________ ______________________
____

c) Contact Name: ______________________ d) EPA ID#: ______________________

e) Phone No: ______________________ f) Fax No: ______________________

CONSULTANT INFORMATION

2. a) Consultant: ______________________ b) Contact: ______________________

Mailing Address: ______________________ c) Phone: ______________________

______________________ d) Fax: ______________________

______________________ e) Email: ______________________

PROPERTIES AND COMPOSITION OF THE SPENT CARBON

3. Provide a specific description of the process generating the spent carbon <u>including constituents</u> being treated. *(Please note if application is for potable water or food processing)*

____
____
____
____

4. If this is a Renewal, Provide the Existing Profile Approval Number: ______________________

5. Type of Spent Carbon: ☐ Aqueous ☐ Vapor

6. Foreign Material: ☐ Yes ☐ No (rocks, dirt, sand, etc.)

7. Handling: ☐ Bulk ☐ Drum ☐ Adsorber ☐ Bulk Bag ☐ Other ______________

8. Free Liquid Range: ☐ 0 ☐ 1 – 15%

9. Liquid Flashpoint: ☐< 140°F ☐ >140°F ☐ N/A Vapor

10. pH Range: ☐ <2 ☐ 2-4 ☐ 4.1-10.5 ☐ >10.5

11. Strong Odor? ☐ Yes ☐ No If yes, please Describe______________________

12. Is spent carbon generated from a Superfund Site? ☐ Yes ☐ No

13. Is the Spent Carbon generated from any activity at a chemical manufacturing plant, petroleum refinery or coke by-product recovery plant, i.e., a facility subject to Subpart FF (the Benzene Waste NESHAP)? ☐ Yes ☐ No
If yes, complete BWON Addendum.

14. Is the Spent Carbon generated from any activity at an ethylene manufacturing process unit subject to 40 CFR Part 63, Subpart XX (Ethylene MACT)? *If yes, complete the Ethylene MACT Addendum* ☐ Yes ☐ No

15. Does the spent carbon contain any of the following?

A.	Polychlorinated Biphenyls (PCBs)	☐ Yes	☐ No
B.	Dioxins and/or Furans	☐ Yes	☐ No
C.	Dibromochloropropane (DBCP)	☐ Yes	☐ No
D.	Sulfide or Cyanide	☐ Yes	☐ No
E.	Explosive, Pyrophoric and/or Radioactive material	☐ Yes	☐ No
F.	Infectious material	☐ Yes	☐ No
G.	Shock Sensitive material	☐ Yes	☐ No
H.	Oxidizer	☐ Yes	☐ No
I.	Heavy Metals	☐ Yes	☐ No

GENERATOR CLASSIFICATION

16. Is the Spent Carbon a **RCRA** Hazardous Waste? ☐ Yes ☐ No
If yes, list waste code(s) below:
RCRA Hazardous Waste requires "11 RCRA" Analysis

_______________ _______________ _______________ _______________

_______________ _______________ _______________ _______________

17. Is the Spent Carbon a **State** Hazardous Waste? ☐ Yes ☐ No
If yes, list waste code(s) below:

_______________ _______________ _______________ _______________

GENERATOR CERTIFICATION

I hereby certify that all information on this and all attached documents are true and that this information accurately describes the subject spent carbon. I further certify that all samples and analyses submitted are representative of the subject spent carbon in accordance with the procedures established in 40 CFR 261 Appendix I or by using an equivalent method. All relevant information regarding known or suspected hazards in the possession of the generator has been disclosed. I authorize Evoqua Water Technologies LLC to obtain a sample from any waste shipment for purposes of confirmation or further investigation. If I am a consultant signing on behalf of the generator, I have their proper approval.

______________________________	______________________________
Printed Name	**Signature**
______________________________	______________________________
Title	**Date**

NOTE: A completed and signed LDR must be submitted prior to profile approval for RCRA-regulated spent carbon.

For Internal Use Only
:

______________________	______________________
Profile Approval Number	Valid Through

Reset Form Print Form

Evoqua Water Technologies LLC

Arizona Facility: 2523 Mutahar Street • P.O. Box 3308 • Parker, AZ 85344
(928) 669-5758 • FAX (928) 669-5775 EPA ID: AZD 982 441 263

PROFILE ADDENDUM FOR SLUDGE EXEMPTION

Generator: ______________________________

Site Address: ______________________________ **City/State:** ____________________

The following information must be provided before approval of the profile if the generator requests that the spent carbon be classified as a non-hazardous sludge for reclamation in accordance with 40 CFR 261.2.

1. Is the subject spent carbon a sludge, as defined at 40 CFR 260.10?
☐**Yes** ☐**No**

2. Was the subject spent carbon generated from a municipal, commercial, or industrial wastewater treatment plant or water supply treatment plant or air pollution control facility?
☐**Yes** ☐**No**

3. Is the subject spent carbon a RCRA listed waste?
☐**Yes** ☐**No**

4. Was the subject spent carbon ever placed in contact with, or used to treat, a RCRA **listed** waste?
☐**Yes** ☐**No**

5. Was the subject spent carbon generated by a RCRA regulated treatment, storage or disposal facility?
☐**Yes** ☐**No**

6. If question 5 is checked YES, does it "contain" or is it "derived from" a RCRA listed waste?
☐**Yes** ☐**No**

7. Is the subject spent carbon exempt from hazardous waste regulation in the state of generation?
☐**Yes** ☐**No**

I certify that the information on this form is true and accurately describes the subject spent carbon on the attached spent carbon profile form. I further certify that the subject spent carbon is exempt from regulation as a hazardous waste.

______________________________ ______________________________
Printed Name **Signature**

______________________________ ______________________________
Title **Date**

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Evoqua Water Technologies LLC

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(530) 527-2664 • FAX (530) 527-0544 EPA ID: CAR 000 058 784

PROFILE ADDENDUM LISTED WASTE APPLICABILITY

Generator: ______________________________

Site Address: ______________________________ **City/State:** ____________________

1. Does the spent carbon contain constituents from a pure product release or tank vent?

☐**Yes** ☐**No** ☐ **Unknown ****

2. Is the spent carbon from a cleanup of PCE, TCE or other spent solvents from a dry cleaner or from degreasing or other cleaning operations?

☐**Yes** ☐**No** ☐ **Unknown ****

3. Is the original process generating the waste an F, K, P or U-listed process?

☐**Yes** ☐**No** ☐ **Unknown ****

** Check the "Unknown" box if this material is generated from remediation activities and the historical processes have not been determined.

I certify that the information on this form is true and accurately describes the subject spent carbon on the attached spent carbon profile form.

______________________________ ______________________________
Printed Name **Signature**

______________________________ ______________________________
Title **Date**

Reset Form Print Form

Evoqua Water Technologies LLC

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(928) 669-5758 • FAX (928) 669-5775 EPA ID: AZD 982 441 263

PROFILE ADDENDUM FOR BENZENE WASTE OPERATIONS NESHAP (BWON) 40 CFR PART 61, SUBPART FF

Generator: ______________________________

Site Address: ______________________________ **City/State:** ________________

1. Is the Spent Carbon generated from any activity at a chemical manufacturing plant, petroleum refinery or coke by-product recovery plant, i.e., a facility subject to Subpart FF (the Benzene Waste NESHAP)?

☐**Yes** ☐**No**

2. If Yes, does the spent carbon contain any benzene?

☐**Yes** ☐**No**

If Yes, the Generator must provide analytical data for total benzene concentration that is representative of the waste stream, consistent with 40 CFR § 61.355.

3. If Yes, does the Spent Carbon contain benzene which is required to be managed and treated in accordance with the provisions of Subpart FF?

☐**Yes** ☐**No**

If Yes, the Generator agrees that it will:

(i) send a notice with each shipment of Spent Carbon that is subject to Subpart FF stating that the shipment contains benzene and must be managed and treated in accordance with Subpart FF [40 CFR § 61.342(f)(2)]; and

(ii) Prior to each shipment, test each container of Spent Carbon subject to Subpart FF test requirements to confirm no detectable emissions using EPA Method 21 upon initial use of the container [40CFR § 61.345(a)(1)(i)].

In addition to certification on the attached Spent Carbon Profile Form, I further certify that all information on this Addendum is true and accurate, and that all samples and analyses submitted are representative of the subject spent carbon in accordance with the procedures established in 40 CFR § 61.355.

______________________________ ______________________________
Printed Name **Signature**

______________________________ ______________________________
Title **Date**

Revised January 2014

Reset Form Print Form

Evoqua Water Technologies LLC

Arizona Facility: 2523 Mutahar Street • P.O. Box 3308 • Parker, AZ 85344
(928) 669-5758 • FAX (928) 669-5775 EPA ID: AZD 982 441 263
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(530) 527-2664 • FAX (530) 527-0544 EPA ID: CAR 000 058 784

PROFILE ADDENDUM FOR NON-REGULATED PCB WASTE

Generator: ______________________________

Site Address: ______________________________ **City/State:** ____________________

1. Does the subject spent carbon contain < 50 ppm PCBs?

☐**Yes** ☐**No**

2. Does the influent from the subject spent carbon contain < 50 ppm PCBs?

☐**Yes** ☐**No**

3. Is the subject spent carbon regulated under 40 CFR Part 761?

☐**Yes** ☐**No**

I certify that the information on this form is true and accurately describes the subject spent carbon on the attached spent carbon profile form. I further certify that any PCBs (Polychlorinated Biphenyls) on the carbon is non-regulated under 40 CFR Part 761 (non TSCA regulated). I will submit PCB analytical results of the carbon prior to each shipment.

______________________________ ______________________________
Printed Name **Signature**

______________________________ ______________________________
Title **Date**

Revised January 2014

Reset Form Print Form

Evoqua Water Technologies LLC

Arizona Facility: 2523 Mutahar Street • P.O. Box 3308 • Parker, AZ 85344
(928) 669-5758 • FAX (928) 669-5775 EPA ID: AZD 982 441 263

PROFILE ADDENDUM FOR ETHYLENE MANUFACTURING PROCESS UNIT WASTES MACT 40 CFR PART 63, SUBPART XX

Generator: ______________________________

Site Address: ______________________________ **City/State:** ________________

1. Is the Spent Carbon generated from any activity at an ethylene manufacturing process unit subject to 40 CFR Part 63, Subpart XX (the Ethylene MACT)?

☐ **Yes** ☐ **No**

2. If Yes to Q. 1, does the spent carbon contain any benzene which is required to be managed and treated in accordance with the provisions of the Ethylene MACT?

☐ **Yes** ☐ **No**

3. A. If Yes to Q. 1, does the spent carbon contain any 1,3-butadiene which is required to be managed and treated in accordance with the provisions of the Ethylene MACT?

☐ **Yes** ☐ **No**

B. For carbon that contains any 1,3-butadiene, was the carbon used to manage and/or treat a continuous butadiene waste stream that contained greater than or equal to 10 ppmw 1,3-butadiene and with a flow rate greater than or equal to 0.02 liters/minute?

☐ **Yes** ☐ **No**

If Yes, the Generator agrees that it will:

(i) send a notice with each shipment of spent carbon that is subject to the Ethylene MACT stating that the shipment contains organic HAPs that are required to be treated in accordance with the Ethylene MACT, 40 CFR Part 63, Subpart XX; and

(ii) Prior to each shipment, test each container of spent carbon subject to the Ethylene MACT test requirements to confirm no detectable emissions using EPA Method 21 upon initial use of the container [40CFR § 61.345(a)(1)(i)].

In addition to certification on the attached Spent Carbon Profile Form, I further certify that all information on this Addendum is true and accurate, and that all samples and analyses submitted are representative of the subject spent carbon in accordance with the procedures established in 40 CFR §§ 63.1095 and 61.355.

______________________________ ______________________________
Printed Name **Signature**

______________________________ ______________________________
Title **Date**

Revised Janaury 2014

WASTE ANALYSIS PLAN

APPENDIX B

EXAMPLE SPENT CARBON TALLY SHEET

Revision 2
March 2016

Siemens Industry Inc.

Incoming Spent Carbon Waste Tally and On-site Screening Report

CC

Generator Name			Approval #
SAMPLE WASTE TALLY			W120000RH
Container Type	**Quantity**	**Manifest #**	**Samples**
Bag	5	123456	

On-site Screening Report

Results taken from containers were:

Ignitable Solid		Compatable		Composite PH (4.1 to 10.5)
Yes	No	Yes	No	
On-Site Screening Completed By (Sign Below)				**Date**

Container	% Full	* Sealed? (see note below)	Material	Sample
1				☑
2				☑
3				☑
4				☑
5				☐

*** For FF and CC Containers a check under Sealed, shall mean a visual inspection of the container has been completed and there are no visible cracks, holes, gaps or other open spaces into the interior of the container when the cover and closure device is secured in the closed position. If the inspection is unsatisfactory, the containers will either be overpacked or transferred to the spent carbon storage tank within the first 24 hours of receipt.**

WASTE ANALYSIS PLAN

APPENDIX C

ON-SITE SCREENING PROCEDURES

Revision 2
March 2016

Siemens Industry, Inc.

Standard Methods for Screening Incoming Spent Carbon

Scope and Application
Siemens Industry, Inc. (SII) will screen all incoming RCRA hazardous spent carbon to assure that the parameters in the fingerprint tests corresponds to the approved profile.

Safety and Waste Handling
Procedures shall be carried out in a manner that protects the health and safety of all Siemens employees. When handling samples safety glasses and appropriate gloves must be worn. Gloves that have been contaminated will be removed and discarded. Exposure to chemicals must be maintained as low as reasonably achievable, therefore all samples must be opened and prepared in a fume hood. Waste containers will be kept closed unless transfers are being made.

Since the ignitability test requires the use of an open flame, keep the area clear of all other flammable materials.

All work must be stopped in the event of a known or potential compromise to the health and safety of Siemens employees.

Summary of Methods
Fingerprinting tests include; physical inspection, ignitability, pH and compatibility of RCRA hazardous incoming spent carbon.

Procedures
<u>Physical Inspection</u>
Samples are visually inspected for the presence of material other than carbon such as rocks, debris, etc. Technician will determine if the carbon is aqua phase or vapor phase and document findings on the waste tally sheet.

<u>pH test</u>
In a beaker add a volume of deionized water that is equal to that of the carbon. Stir and let it stand for five seconds. Measure the pH using pH test strips. The color change is compared to the chart on the box and the value is documented on the waste tally sheet for review by plant management. If the pH is <3 or > 11, or outside the pH range of the profile notify your supervisor.

Compatibility Test
After taking the pH of the carbon sample let the mixture stand for one minute and observe for reaction such as smoke, vapors or for an exothermal reaction. Results of this test are documented on the waste tally sheet for review by plant management. If any reaction occurs notify your supervisor.

Ignitability test
Check the ignitability of carbon by using a multi-purpose lighter and applying a flame directly to the carbon for 5 seconds. If the carbon burns and continues to sustain a flame it may be considered ignitable. If this occurs, mix the sample 50/50 with deionized water and reapply a flame for 5 seconds. If the liquid sustains a flame, the carbon will be deemed ignitable. Results of this test our documented on the waste tally sheet for review by plant management.

Documentation and Record Keeping
Results are recorded on a waste tally sheet and signed by the technician performing the procedures. Plant management reviews results to determine if carbon is acceptable to be received into the plant. Samples are stored in the warehouse for (30) days.

CARBON REACTIVATION FURNACE RF-2 PERFORMANCE DEMONSTRATION TEST REPORT

PREPARED FOR:

SIEMENS WATER TECHNOLOGIES, CORP.
2523 MUTAHAR STREET
PARKER, ARIZONA 85344

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PREPARED BY:

Focus Environmental, Inc.
ENGINEERING SOLUTIONS TO ENVIRONMENTAL PROBLEMS

FOCUS ENVIRONMENTAL, INC
9050 EXECUTIVE PARK DRIVE.,
SUITE A202
KNOXVILLE, TENNESSEE 37923
(865) 694-7517

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C. Feed and Process Volatiles	H6D030205 Carbon & Process VOC.pdf
D. Feed and Process Semivolatiles	H6D030246 Carbon & Process SVOC.pdf
E. Feed and Process Metals	H6D040213 Carbon & Process Metals.pdf

Stack Gas Data Packages	**File Name**
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ACRONYMS AND ABBREVIATIONS

acfm	Actual cubic feet per minute
APC	Air pollution control
ASTM	American Society for Testing and Materials
AWFCO	Automatic waste feed cutoff
B.P.	Boiling point
Btu	British thermal unit
CAR	Corrective Action Request
CAA	Clean Air Act
CARB	California Air Resources Board
CEM or CEMS	Continuous emission monitor or Continuous emission monitoring system
CFR	Code of Federal Regulations
cm	Centimeters
CO	Carbon monoxide
COPCs	Compounds of potential concern
CRIT	Colorado River Indian Tribes
cu. ft.	Cubic foot
CVAAS	Cold vapor atomic absorption spectroscopy
DC	Direct current
DOT	Department of Transportation
DQO	Data Quality Objective
DRE	Destruction and removal efficiency
dscf	Dry standard cubic foot
dscfm	Dry standard cubic feet per minute
dscm	Dry standard cubic meters
EPA	United States Environmental Protection Agency
FID	Flame ionization detector
ft	Feet
g	Gram
GC/FID	Gas chromatography/flame ionization detector
GC/MS	Gas chromatography/mass spectrometry
gpm	U.S. Gallons per minute
gr	Grain (equals 1/7000 pound)
GRAV	Gravimetric
HAP	Hazardous air pollutant
HCl	Hydrogen chloride
HPLC	High performance liquid chromatography
hr	Hour
HRGC/HRMS	High resolution gas chromatography/high resolution mass spectrometry
HWC MACT	Hazardous Waste Combustor Maximum Achievable Control Technology regulations
ICP	Inductively coupled plasma spectroscopy
in	Inch
in w.c.	Inches of water column (pressure measurement)
kg	Kilogram
L	Liter
lb	Pound
lpm	Liters per minute
m	Meter
mg	Milligram
ml	Milliliter
MTEC	Maximum theoretical emission concentration
NDIR	Non-dispersive infrared

ng	Nanogram
NVOC	Nonvolatile organic compound
P&ID	Piping and instrumentation diagram
PAH	Polyaromatic hydrocarbon
PCB	Polychlorinated biphenyl
PCDD/PCDF	Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo furans
PDT	Performance Demonstration Test
PDTP	Performance Demonstration Test Plan
PFD	Process flow diagram
PIC	Product of incomplete combustion
PLC	Programmable logic controller
POHC	Principal organic hazardous constituent
POTW	Publicly owned treatment works
ppm	Parts per million
ppmv	Parts per million by volume
ppmvd	Parts per million by volume, dry basis
psig	Pounds per square inch, gauge
QA	Quality assurance
QAPP	Quality Assurance Project Plan
QC	Quality control
RCRA	Resource Conservation and Recovery Act
RF	Reactivation Furnace
s	Second
scfm	Standard cubic feet per minute
SOP	Standard operating procedure
sq. ft.	Square feet
SQL	Sample quantitation limit
SVOC	Semivolatile organic compound
TCDD	Tetrachloro dibenzo-p-dioxin
TCO	Total chromatographable organics
TEQ	Toxicity equivalent (related to 2,3,7,8-TCDD)
THC	Total hydrocarbons
TIC	Tentatively identified compound
TOE	Total organic emissions
TSCA	Toxic Substances Control Act
ug	Microgram
VOA	Volatile organic analysis
VOC	Volatile organic compound
VOST	Volatile organic sampling train
WESP	Wet electrostatic precipitator
w.c.	Water column
XAD	Brand name for Amberlite XAD-2 adsorbent resin

1.0 EXECUTIVE SUMMARY

A Performance Demonstration Test (PDT) of the Carbon Reactivation Furnace RF-2 at the Siemens Water Technologies Corp. (formerly known as U.S. Filter Westates) Facility located in the Colorado River Indian Tribes (CRIT) Industrial Park near Parker, Arizona was conducted in March 2006.

The facility treats spent activated carbon that has been used by industry, state and federal government agencies, and municipalities for the removal of organic compounds from liquid and vapor phase process waste streams. Once the carbon has been used and is spent, it must be either disposed of or reactivated at a facility such as Siemens Water Technologies Corp.. A Carbon Reactivation Furnace (designated as RF-2) is used by Siemens Water Technologies Corp. to reactivate the spent carbon. Some of the carbon received at the Parker facility is designated as a hazardous waste under the Resource Conservation and Recovery Act (RCRA) regulations. Much of the carbon received at the facility is not a RCRA hazardous waste, as it is either not a characteristic or listed waste. The RF is not a hazardous waste incinerator. "Hazardous waste incinerator" is defined in 40 CFR Part 63, Subpart EEE as a "device defined as an incinerator in § 260.10 of this chapter and that burns hazardous waste at any time." (40 CFR 63.1201). "Incinerator" is defined in 40 CFR 260.10 as "any enclosed device that: (1) Uses controlled flame combustion and neither meets the criteria for classification as a boiler, sludge dryer or <u>carbon regeneration unit</u>, nor is listed as an industrial furnace; or (2) Meets the definition of infrared incinerator or plasma arc incinerator. (emphasis supplied)" The RF-2 unit does not qualify as an incinerator and instead is designated by Subpart X of the RCRA regulations as a Miscellaneous Unit. According to 40 CFR 264.601 of the Subpart X regulations, permit terms and provisions for a Miscellaneous Unit must include appropriate requirements of 40 CFR Subparts I through O and Subparts AA through CC, 40 CFR 270, 40 CFR 63 Subpart EEE, and 40 CFR 146.

Based on 40 CFR 264.601, Siemens Water Technologies Corp. tested the RF-2 unit to demonstrate performance and to establish operating parameter limits in accordance with the standards of 40 CFR 63 Subpart EEE. The emission standards of 40 CFR 63 Subpart EEE are more stringent than the RCRA hazardous waste incinerator emission standards of 40 CFR 264 Subpart O. The regulations at 40 CFR 63 Subpart EEE are often referred to as the Hazardous Waste Combustor Maximum Achievable Control Technology (HWC MACT) standards. This terminology will be used in this document.

The testing was conducted in accordance with the requirements of the HWC MACT standards and the approved PDT plan. The testing consisted of a Performance Demonstration Test of the RF-2 unit and a Continuous Emissions Monitoring Systems (CEMS) test. The CEMS testing was conducted just prior to the RF-2 PDT. The formal PDT was conducted on March 27 through March 30, 2006.

The carbon reactivation process consists of a multiple hearth reactivation furnace, a natural gas fired afterburner used to destroy organic contaminants released from the carbon, a wet quench, venturi scrubber, packed bed scrubber, and wet electrostatic precipitator.

The purpose of the PDT was to:

1. Demonstrate Compliance with Applicable USEPA Regulatory Performance Standards (Based on HWC MACT Standards for Existing Hazardous Waste Incinerators):
   - Demonstrate a DRE of greater than or equal to 99.99% for the selected principal organic hazardous constituents (POHCs) chlorobenzene and tetrachloroethene.
   - Demonstrate stack gas carbon monoxide concentration less than or equal to 100 ppmv, dry basis, corrected to 7% oxygen.
   - Demonstrate stack gas hydrocarbon concentration of less than or equal to 10 ppmv, as propane, dry basis, corrected to 7% oxygen.
   - Demonstrate a stack gas particulate concentration less than or equal to 34 mg/dscm (0.015 gr/dscf) corrected to 7% oxygen.
   - Demonstrate that the stack gas concentration of hydrogen chloride (HCl) and chlorine (Cl_2) are no greater than 77 ppmv, dry basis, corrected to 7% oxygen, expressed as HCl equivalents.
   - Demonstrate that the stack gas mercury concentration is less than or equal to 130 μg/dscm, corrected to 7% oxygen.
   - Demonstrate that the stack gas concentration of semivolatile metals (cadmium and lead, combined) is less than or equal to 240 μg/dscm, corrected to 7% oxygen.
   - Demonstrate that the stack gas concentration of low volatility metals (arsenic, beryllium, and chromium, combined) is less than or equal to 97 μg/dscm, corrected to 7% oxygen.
   - Demonstrate that the stack gas concentration of dioxins and furans does not exceed 0.40 ng/dscm, corrected to 7% oxygen, expressed as toxic equivalents of 2,3,7,8-TCDD (TEQ). This is the applicable standard since the gas temperature entering the first particulate matter control device is less than 400°F.

2. Establish Permit Operating Limits
   - Demonstrate maximum feed rate for spent activated carbon.
   - Demonstrate minimum afterburner gas temperature
   - Demonstrate maximum combustion gas velocity (or a suitable surrogate indicator)
   - Demonstrate maximum total chlorine/chloride feed rate
   - Establish a Maximum Theoretical Emission Concentration (MTEC) limit for mercury
   - Demonstrate system removal efficiency (SRE) for semivolatile and low volatility metals so feed rate limits can be developed by extrapolation from test results.
   - Establish appropriate operating limits for the air pollution control system components.

3. Gather Information for Use in a Site-Specific Risk Assessment
   - Measure emissions of metals, including hexavalent chromium
   - Measure emissions of specific volatile and semivolatile products of incomplete combustion (PICs)
   - Measure emissions of polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans (PCDD/PCDF)
   - Measure emissions of polychlorinated biphenyls (PCBs)
   - Measure emissions of specific organochlorine pesticides
   - Measure emissions of total volatile, semivolatile, and nonvolatile organics
   - Determine the stack gas particle size distribution.

A summary of the PDT performance and emission results is presented in Table 1-1. A summary of the process operating conditions for each run is presented in Table 1-2.

The PDT results indicate that the RF-2 unit meets the applicable performance requirements. Specific conclusions drawn from the PDT are as follows:

- The RF-2 system operated reliably during each PDT run, and was able to maintain operating conditions which were consistent with the target values stated in the PDT Plan. The test results are suitable for establishing operating parameter limits.
- DRE requirements of 99.99% or greater were met for both POHCs (monochlorobenzene and tetrachloroethene). Minimum temperature limits and maximum flue gas flow rate limits can be appropriately established from the test results.
- PCDD/PCDF emission standards were met.
- Particulate matter emission standards were met.
- Metal emission standards were met for mercury, semivolatile metals, and low volatility metals. Maximum metal feed rates can be reliably determined using the test results.
- Stack gas CO and THC concentration standards were met in all test runs.
- Stack gas HCl/Cl_2 emission requirements were met. Maximum total chlorine and chloride feed rate limits can be appropriately established from the test results.
- Emissions data to support the estimates of risk in a site-specific multi-pathway human health and ecological risk assessment were gathered successfully.

Continued operation of the Siemens Water Technologies Corp. Carbon Reactivation Furnace RF-2 under the conditions established by the PDT will result in effective destruction of organic compounds, and control of emissions in accordance with the applicable performance requirements.

2.0 TEST PROGRAM SUMMARY

2.1 SUMMARY OF TEST PLAN AND OBJECTIVES

In order to accomplish the PDT objectives, (i.e., demonstrating that the unit will meet all applicable environmental performance standards) a single test condition representing “worst case” operations of minimum temperature, maximum combustion gas velocity (minimum residence time), and maximum spent activated carbon feed rate was performed. The test consisted of three replicate sampling runs.

A summary description of the planned testing conditions, analytical parameters, and sampling methods follows:

Test Condition 1 (”Worst-Case” Operations)
Sampling and monitoring protocols that were planned for the performance test are summarized as follows:

- Spent Activated Carbon Feed - total chlorine/chloride, elemental (C, H, N, O, S, moisture), volatile organics, semivolatile organics, and total metals (Al, Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Hg, Ni, Se, Ag, Tl, V, Zn)
- Makeup Water - volatile organics, semivolatile organics, and total metals (Al, Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Hg, Ni, Se, Ag, Tl, V, Zn)
- Caustic feed to APC - volatile organics, semivolatile organics, and total metals (Al, Sb, As, Ba, Be, Cd, Cr, Cu, Co, Pb, Hg, Ag, Tl, Se, Ni, V, Zn)
- Scrubber Blowdown - volatile organics, semivolatile organics, and total metals (Al, Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Hg, Ni, Se, Ag, Tl, V, Zn)
- Wastewater Discharge to POTW - volatile organics, semivolatile organics, and total metals (Al, Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Hg, Ni, Se, Ag, Tl, V, Zn)
- Stack gas particulate, HCl, and Cl_2 using EPA Method 26A
- Stack gas target volatile organics using VOST, SW-846 Method 0030
- Stack gas target semivolatile organics and organochlorine pesticides using SW-846 Method 0010
- Stack gas PAHs and PCBs using a separate SW-846 Method 0010 sampling train
- Stack gas PCDD/PCDF using SW-846 Method 0023A
- Stack gas total volatile organics using SW-846 Method 0040
- Stack gas total semivolatile and nonvolatile organics using SW-846 Method 0010
- Stack gas metals (Al, Sb, As, Ba, Be, Cd, total Cr, Co, Cu, Pb, Hg, Ni, Se, Ag, Tl, V, and Zn) using EPA Method 29
- Stack gas hexavalent chromium using SW-846 Method 0061
- Stack gas particle size distribution using a cascade impactor

- Stack gas CO and O_2 by permanently installed CEM according to the protocols in the Appendix to 40 CFR 63, Subpart EEE; Performance Specification 4B of 40 CFR 60, Appendix B.
- Stack gas total hydrocarbons (as propane) by temporary CEM according to EPA Method 25A and the protocols in the Appendix to 40 CFR 63, Subpart EEE.

Tables 2-1 and 2-2 present the planned PDT sampling and analytical protocol in greater detail. Figure 2-1 shows the location of sampling points in the RF-2 system.

2.2 DEVELOPMENT OF PERMIT LIMITS

Siemens Water Technologies Corp. is required to establish operating limits (applicable whenever hazardous waste is in the combustion chamber) in its permit to ensure that the RF-2 system complies with the applicable USEPA environmental performance standards at all times. Under the HWC MACT, the regulations establish a comprehensive list of regulated parameters at 40 CFR 63.1209 (j) through (p) which are used to ensure continuing regulatory compliance.

Considering the configuration of the RF-2 system and the characteristics of the spent activated carbon to be fed, Siemens Water Technologies Corp. anticipated establishing process operational limits on the following parameters, and operated the system accordingly during the PDT:

- Minimum afterburner gas temperature
- Maximum spent activated carbon feed rate
- Maximum total chlorine and chloride feed rate
- Maximum feed rate of mercury (based on MTEC)
- Maximum feed rate of semivolatile metals (total combined lead and cadmium)
- Maximum feed rate of low volatility metals (total combined arsenic, beryllium, and chromium)
- Minimum venturi scrubber pressure differential
- Minimum quench/venturi scrubber total liquid flow rate
- Minimum packed bed scrubber pH
- Minimum packed bed scrubber pressure differential
- Minimum packed bed scrubber liquid flow rate
- Minimum scrubber blowdown flow rate
- Minimum WESP secondary voltage
- Maximum stack gas flow rate (indicator of combustion gas velocity).

These operating limits have been established as described in the HWC MACT regulations and in the approved Performance Demonstration Test Plan, and are more fully described in Section 7.0 of this test report.

As part of EPA's approval of the PDT Plan, Siemens Water Technologies Corp. was also required to establish both a minimum and maximum temperature limit for Hearth #5 of the reactivation furnace. Since both a minimum and maximum temperature could not be demonstrated in the single test condition approved for the test, Siemens Water Technologies Corp. operated Hearth #5 at a maximum temperature during the PDT and will conduct a separate minimum temperature test outside of the formal PDT period.

2.3 TEST IMPLEMENTATION SUMMARY

Overall, the PDT was executed in substantial conformance with the approved protocols contained in the PDT Plan and Quality Assurance Project Plan (QAPP). This section presents an account of the PDT implementation.

The Performance Demonstration Test of the Siemens Water Technologies Corp. carbon reactivation furnace RF-2 located in the Colorado River Indian Tribes Industrial Park near Parker, Arizona was conducted during the week of March 27 - 31, 2006. Actual emissions sampling was conducted on March 28 through March 30. All planned testing for the PDT was completed.

All process operating conditions were within the operating envelope defined by the specifications provided in the PDT Plan. All sampling and analysis was performed as described in the PDT Plan and QAPP, with minor deviations as described in Section 2.3.2 below.

The PDT was conducted in compliance with the PDT Plan approved by the US Environmental Protection Agency (EPA) and CRIT. The PDT program was conducted under the overall direction of Siemens Water Technologies Corp. personnel. Mr. Monte McCue was the overall CPT Manager for Siemens Water Technologies Corp.. Mr. Willard (Drew) Bolyard of Siemens Water Technologies Corp. oversaw plant personnel and operations during the PDT. Ms. Mary Blevins, Ms. Stacy Braye, Mr. Steven Arman, Mr. Robert Fitzgerald, Mr. Michael Svizzero, and Ms. Karen Scheuerman of USEPA were on-site to observe portions of the PDT. Mr. Hector Duran observed the PDT as a representative of CRIT. Mr. Marty Jones and Mr. Chase McLaughlin of Arcadis also observed the PDT as consultants to CRIT. Process operations were conducted by Siemens Water Technologies Corp. personnel, with the assistance of Mr. Karl Monninger of Chavond Barry Engineering. Mr. Anthony Eicher, of Focus Environmental, Inc. (Focus), coordinated and oversaw all technical aspects of the test program, and acted as the PDT

Manager. Mr. Eicher was also responsible for the preparation of this report, and provided overall QA/QC for the project. Ms. Teresa White, of Focus, acted as the on-site sample coordinator for the test. She also served as the Quality Assurance Officer for the PDT analytical activities, and performed data validation of the process sample and emissions results. Process samples were collected by Focus and Siemens Water Technologies Corp. personnel, under the direction of Focus. A number of process samples were provided as split samples to Ms. Kathy Baylor of EPA, who was on site to coordinate the collection and packaging of the split samples. All stack gas samples were collected by Airtech Environmental Services, Inc. (Airtech), under the direction of Mr. Pat Clark. Waste feed spiking services were provided by Engineered Spiking Solutions, Inc. (ESS), under the direction of Dr. William Schofield, with field spiking services provided by Mr. Scott Neal. PDT sample analyses were performed by the following laboratories:

1. Airtech conducted the analysis of stack gas particulate matter samples and provided on-site analytical services for the determination of total volatile organics. Airtech also operated a temporary CEM systems for THC during the PDT.

2. Severn-Trent Laboratories of Knoxville, Tennessee, under the direction of Dr. William Anderson, performed the analyses for all process and stack gas samples, with the exception of the stack gas particulate matter and particle size distribution.

3. MVA, Inc. of Atlanta, Georgia, conducted the stack gas particle size determination, under sub-contract to Severn-Trent Laboratories.

2.3.1 Test Run Chronology

The test team arrived on-site and set up equipment for the test on March 27, 2006. Coordination meetings were held between the test team members to ensure that all were familiar with the test protocols and that operators understood the desired test conditions.

During the initial meetings with the test team, a number of minor modifications to the test plan were discussed based on comments received from EPA after approval of the plan, and based on input from the other test team members based on observations during preliminary testing and subsequent sample analysis. The majority of these items have been documented through the use of Corrective Action Requests (CARs) as provided for in the approved Quality Assurance Project Plan (QAPP) and are discussed in detail in later section of this report. CARs were reviewed and approved by appropriate members of the team during the course of the PDT.

The test team arrived on site at or before 07:00 on March 28, 2006. The RF-2 system was near the target operating conditions when the team arrived. POHC spiking was started at 07:30 and spiking of the organic surrogate mixture and metals started at 07:50. The entire RF-2 unit experienced a shutdown at

07:56 due to over-amperage of the ID fan. All spiking was stopped immediately. The plant recovered quickly from the shutdown and spiking operations were re-started at 08:59. Preliminary stack gas flow traverses were conducted and final preparations were made for the beginning of testing.

PDT Run 1 was started at 12:10 on March 28, 2006.

PDT Run 1 was completed at 16:44 on March 28, 2006, without interruption. All stack gas sampling trains were successfully leak checked prior to the start of sampling, during port changes, and upon completion of sampling and were recovered once the run was complete.

On March 29, 2006, the testing crew arrived on-site at 08:00 and began setting up for PDT Run 2. Spiking operations were started at 08:58. Plant personnel made a number of adjustments to the furnace in order to maintain the stack gas flow rate near the desired conditions.

PDT Run 2 was started at 11:15 on March 29, 2006.

As the Method 0023A sampling train was being moved to the last traverse point in the first half of the run, the glass probe liner broke. The sampling team and regulatory observers noticed the break immediately when it occurred, and the sampling team shut down the sample pump. Since it was known when the break occurred and sampling was immediately stopped, it was decided to recover both parts of the broken probe liner, replace the probe, and continue sampling. All parties were aware of the situation and approved of the action taken.

PDT Run 2 was completed at 17:00 on March 29, 2006, without further sampling difficulties. All stack gas sampling trains were successfully leak checked prior to the start of sampling, during port changes, and upon completion of sampling and were recovered once the run was complete. There were no process interruptions during the run.

On March 30, 2006, the testing team arrived at or before 08:00 and began setting up for PDT Run 3. All process conditions were at their target values, and spiking started at 08:50.

At 08:58 a weld on the nipple attached to the carbon feed chute used for spiking material injection was noticed to be cracked. Spiking was immediately stopped and the weld was repaired. Spiking resumed at 10:13 on March 30, 2006.

PDT Run 3 was started at 11:50 on March 30, 2006.

All sampling activities were placed on hold at 12:39 when it was noted that the organic surrogate mixture was not flowing correctly through the spiking system. The other spiking systems continued to operate and process conditions were maintained while the problem with the organic surrogate mixture spiking system was identified and corrected.

Organic surrogate spiking was resumed at 14:43 and all sampling was resumed at 15:30 on March 30, 2006.

PDT Run 3 was completed at 19:16 on March 30, 2006. As the PSD sampling train was being recovered it was noted that the filter had gotten wet, thus potentially compromising the sample. Another PSD sample was collected as quickly as possible and finished at 19:59. Since all other samples had finished at 19:16, all parties involved in testing decided to designate 19:16 as the official run completion time. All stack gas sampling trains were successfully leak checked prior to the start of sampling, during port changes, and upon completion of sampling and were recovered once the run was complete. There were no process interruptions during the run.

On March 31, 2006 the test team dismantled all testing and spiking equipment, packaged samples for shipment to the laboratory, and departed the site. Sample packaging and shipping were handled by Focus and Airtech personnel.

2.3.2 Deviations from the Test Plan

Siemens Water Technologies Corp. conducted preliminary testing prior to the formal PDT in order to ensure that all process, spiking, sampling, and analytical systems and procedures were appropriate, and that the test team could identify and resolve any major issues prior to the formal PDT. During the preliminary testing and subsequent planning activities, several items were identified and corrective actions were initiated. These were documented through Corrective Action Requests (CARs) as provided for in the QAPP. Additionally, EPA provided Siemens Water Technologies Corp. with certain data submittal requests in the test plan approval letter, and also required Siemens Water Technologies Corp. to establish additional operating parameters (Hearth #5 minimum and maximum temperature) that were not addressed in the approved test plan. Additionally, conditions during the test dictated that several field directives be given; some of which warranted documentation through the CAR process.

A total of eight CARs were generated during the PDT and are shown in Appendix C. Additional verbal directives were given in the field and to the laboratory during the course of the PDT program. Each corrective action and verbal directive is discussed fully in Section 5.0, and is summarized below:

1. The selected laboratory for the performance test has a slightly different target analyte list compared to those presented in the original test plan. Revised target analyte lists were presented to EPA and were approved for use in the test. This is documented as CAR-001.

2. The original test plan calls for an organic surrogate mixture to be added to the spent activated carbon feed. That mixture was specified to contain 1,1,1-Trichloroethane, however the compound is not available because it is an ozone depleting substance. Methylene chloride was substituted for 1,1,1-trichloroethane. This is documented as CAR-002.

3. Based on observations made during preliminary testing, it was believed that the high stack gas moisture content and low particulate matter concentration would not be conducive to the use of a Cascade Impactor, which was originally planned for collection of particle size distribution data. Therefore, a Method 5 train, employing a smooth filter media was used to collect particulate matter samples, followed by scanning electron microscope examination of the particles to determine the particle size distribution. This is documented as CAR-003.

4. Prior to the test, the analytical laboratory expressed concern that analytical surrogate compounds placed onto the adsorbent resin in some of the sampling trains might be stripped off unless sampling is conducted at very low sampling rates. In order to address this concern, all semivolatile organic sampling trains were operated for a nominal sampling run time of 4 hours instead of the planned nominal sampling time of three hours. The same nominal volume of sample was collected over the four hour period that would have been collected in three hours. This represents a very conservative approach to the issue, and is documented as CAR-004.

5. EPA indicated that a minimum temperature limit must be established for Hearth #5 in the reactivation furnace. This condition was not anticipated, nor was it addressed in the Performance Demonstration Test Plan. After discussions with EPA, it was decided that a separate test will be conducted outside the formal PDT test period where a minimum Hearth #5 temperature will be maintained and the resulting reactivated carbon will be analyzed for organics. This is documented as CAR-005.

6. Several modifications to the target operating conditions and anticipated permit limits were made after approval of the Performance Demonstration Test Plan. Most of these changes were made as a result of preliminary testing. Additionally, EPA included with their test plan approval letter a table of information and process data that they wanted included in the test report. Revised operating condition targets and the list of data requested by EPA are documented as CAR-006.

7. During Run 2 of the PDT, the glass probe liner on the M0023A train was broken due to high winds swinging the sampling train as it was being moved from one traverse point to another. The stack sampling crew and regulatory observers noted the break and immediately stopped sampling. Upon investigation, it was found that both pieces of the broken probe liner could be retrieved and that the sampling train leak-checked from the break through the remainder of the train. All parties agreed that there was no impact on sample integrity, so the broken probe liner pieces were caped, taken to the recovery area and rinsed. The probe liner was replaced and the train was used to complete the sampling run. The rinse of the broken probe liner pieces was combined with the final train rinse to capture the entire sample. This is documented as CAR-007.

8. In order to maximize the stack gas flow rate (minimize the gas residence time) for the performance test, a source of additional air was needed beyond what is normally supplied by the combustion air fan. The access door on Hearth #1 was opened to allow additional air to be drawn into the system and to pass through the combustion and air pollution control portions of the system. This is documented as CAR-008.

9. Makeup water samples were planned to be collected only once, at the beginning of the test. Siemens Water Technologies Corp. personnel were concerned however, that the quality of the makeup water could change significantly over time, thus makeup water samples were collected at the beginning of each test run. This modification increased the number and frequency of makeup water samples.

10. In order to keep any water droplets and particulate matter from entering the M0040 sampling train, a glass wool plug was inserted into the sample probe. This was not described in the test plan, but was deemed to be a good operating practice for this train.

11. At the end of Run 1, the Test Manager noticed that the silica gel in the M0061 train was quite wet. The sampling team was directed to add an additional silica gel impinger to the M0061 train to prevent this situation from occurring again. A check of the moisture determination from the M0061 train used in Run 1 was compared to the moisture determinations from the other Run 1 trains, and found to be consistent. Thus there was no adverse impact on the Run 1 M0061 sample.

12. It was noted that Siemens Water Technologies Corp.'s installed stack gas flow rate monitor was not corresponding with the Pitot tube readings of the stack sampling team. Further investigation indicated that some type of fault in the stack gas flow rate monitor was being experienced, however it was not able to be corrected during the course of the PDT. All parties were informed of the situation, and a decision was made to complete the PDT and to use the average of the stack gas sampling train flow rate determinations from each run to set the maximum stack gas flow rate operating limit for the system. Siemens Water Technologies Corp. will need to correct the fault in the stack gas flow rate monitoring system in order to demonstrate continuing compliance with the operating limit.

All other testing and process operations were conducted in conformance with the approved PDT Plan and QAPP. EPA also requested that split samples of the process feed materials and effluents be provided. Additional sample volume was collected accordingly, and samples were split with EPA.

A few analytical quality control determinations showed non-conformances with the target data quality objectives. However, none of these non-conformances are deemed to have had a significant negative impact on the PDT results or conclusions. These items are discussed in Section 5.0 of the report and in the Data Validation Report in Appendix H.

3.0 PROCESS OPERATIONS

3.1 PROCESS OPERATING CONDITIONS

Key process operating parameters were continuously monitored and recorded during each test run by the process computer system. Process operating data were stored on magnetic disk at one-minute intervals during each test run. Appendix A presents complete printouts of the process operating data from each test run.

Manual logs were kept during the PDT to record the times when sampling runs were started, stopped, and/or interrupted. The PDT Manager's manual log is included in Appendix B. Tables 3-1 through 3-3 summarize key operating data collected during each PDT run.

Key process instruments were calibrated prior to the PDT. The CEM system underwent a Performance Specification Test prior to the PDT, and underwent daily calibration checks during the PDT. The Performance Specification Test and each daily calibration check showed the CEM system to be operating within specifications. A copy of the CEMS Performance Specification Test Report is included in Appendix K. Process instrument calibration data is presented in Appendix L.

3.2 FEED MATERIAL CHARACTERISTICS AND CONSTITUENT FEED RATES

The spent activated carbon feed to RF-2 was sampled at 15-minute intervals and composited during each PDT run. Makeup water samples were collected at the beginning of each run. Caustic used in the APC system was sampled once for the PDT program. Feed sampling logs, as well as other sampling information, are summarized in Appendix D. A list of samples is presented in Appendix E. Analyses of the feed samples, as well as summaries of all CPT analytical results are shown in Appendix F. Feed material physical/chemical characteristics are presented in Table 3-4. Constituent feed rate information (e.g., total chlorine/chloride, metals, and each POHC) is presented in Table 3-5. Table 3-6 presents volatile organic feed data. Semivolatile organic feed data are presented in Table 3-7. Example calculations are presented in Appendix G. (Note that the complete sampling report and full analytical data packages have been submitted as separate volumes.)

3.3 SPENT ACTIVATED CARBON FEED SPIKING

Monochlorobenzene and tetrachloroethene (perchloroethylene) were the designated POHCs, and were spiked onto the spent activated carbon feed in all PDT runs. Lead and chromium were spiked onto the spent activated carbon feed during each run to represent semivolatile, and low volatility metals, respectively. Additionally an organic surrogate mixture of methylene chloride, toluene, naphthalene, and ethylene glycol was added to the spent activated carbon to increase the organic loading and to provide a variety of compounds for the formation of a broad array of emission products. Spiking was conducted downstream of the feed sampling point, using metering pumps and mass flow meters, backed up by calibrated electronic scales. Spiking rates are summarized in Table 3-8. A complete spiking report is presented in Appendix J. The spiking report contains copies of all field data sheets, calibrations and spiking material composition certifications.

3.4 MAKEUP AND EFFLUENT CHARACTERISTICS

Makeup water and caustic solution are added to the scrubbing system. Effluent streams are the scrubber blowdown water and POTW discharge. Results of the makeup and effluent material analyses are summarized in Table 3-9. Summaries of all analyses are presented in Appendix F. Complete analytical data packages have been submitted as separate volumes.

4.0 COMPLIANCE RESULTS

Using the process operating data and analytical results from the PDT program, the performance of the Siemens Water Technologies Corp. Carbon Reactivation Furnace RF-2 system was determined and compared to the performance requirements specified for the facility. The PDT demonstrated the RF-2 unit's ability to meet all regulatory requirements. Table 4-1 presents performance results for each key parameter during the PDT, and compares the performance results with target criteria. Example calculations for each performance determination are shown in Appendix G.

Stack gas sampling was conducted by Airtech Environmental Services, Inc. Summaries of the sampling conditions are presented in each table of stack emission results. A complete report of Airtech's sampling results, including all field data sheets, calibration records, and calculations is presented in Appendix I. Example calculations for each PDT determination are presented in Appendix G. Analytical summaries are presented in Appendix F. Complete analytical data packages are presented in separate volumes.

4.1 POHC DESTRUCTION AND REMOVAL EFFICIENCY

Monochlorobenzene and tetrachloroethene were designated as the POHCs for the test. DRE results are summarized in Table 4-2. The PDT demonstrated that the RF-2 unit achieved a DRE of greater than 99.99% for each POHC in all runs.

4.2 DIOXIN AND FURAN EMISSIONS

Dioxin and furan sampling results and emission concentrations are presented in Tables 4-3 through 4-5. The data presented show the PCDD/PCDF emissions are in compliance with the HWC MACT standard of 0.40 ng TEQ/dscm corrected to 7% O_2 applicable to existing systems with a temperature at the entrance to the primary particulate matter control device of 400°F or less. [40 CFR 63.1203(a)(1)(ii)].

4.3 PARTICULATE EMISSIONS

Particulate matter sampling results and emission concentrations are shown in Tables 4-6 through 4-8. Particulate matter concentrations met the regulatory requirement for the PDT in all runs.

4.4 HYDROGEN CHLORIDE AND CHLORINE EMISSIONS

Tables 4-6 through 4-8 presents the results of HCl and Cl_2 emissions determinations during the PDT. HCl/Cl_2 emission concentrations were significantly below the performance criteria in all runs.

4.5 METALS EMISSIONS

Metal sampling and emissions results are presented in Tables 4-9 through 4-11. The results indicate that the system met the applicable emission standards for volatile metals (mercury), semivolatile metals (the sum of lead and cadmium emissions), and low volatility metals (the sum of arsenic, beryllium, and chromium emissions).

Further, data from the test were used to develop a system removal efficiency (SRE) for the low volatility metal group. These values are used along with the feed rates of spiked low volatility metal during the test to develop an extrapolated low volatility metals feed rate limit in accordance with 40 CFR 63.1209(n)(2)(ii) and the approved PDT Plan. The actual feed rate of mercury and semivolatile metals demonstrated during the test were used to establish feed rate limits for these metals, without extrapolation. Detailed information regarding the establishment of metals feed rate limits and other process operating limits is presented in Section 6.0 of the report.

4.6 STACK GAS OXYGEN, CARBON MONOXIDE, AND TOTAL HYDROCARBONS

Siemens Water Technologies Corp.'s CEM system was used to monitor the stack gas O_2, and CO concentrations during the PDT. A temporary CEM was operated by Airtech during the PDT for THC measurements. These CEM readings were used to demonstrate regulatory compliance and to make corrections to specific stack gas concentration values that are reported on a 7% O_2 corrected basis. Both the carbon monoxide and total hydrocarbon concentrations met the regulatory requirements in all test runs as indicated in Table 4-1. The CEM data are summarized with the process operating data in Tables 3-1 through 3-3, and in Appendix A. In addition, Airtech used CEM oxygen and carbon dioxide data to determine the stack gas molecular weight for use in emissions calculations. The oxygen and carbon dioxide data results are shown in the summary tables for each sampling train and are presented in Airtech's Stack Sampling Report in Appendix I.

5.0 QUALITY ASSURANCE/QUALITY CONTROL RESULTS

The PDT QAPP specifies procedures to be followed to assure the quality of data generated from the test program. Target data quality objectives (DQOs) and specific QA/QC procedures are presented in the QAPP for the following:

- Sample collection
- Sample analysis
- Process instrument calibration
- Stack sampling equipment calibration
- Laboratory analytical instrument calibration.

This section presents an overview of the QA/QC activities implemented during the PDT to ensure and assess the quality of the data gathered. This section also presents the QA/QC results for the PDT, and an assessment of the quality of the data gathered.

5.1 QA/QC ACTIVITIES AND IMPLEMENTATION

Siemens Water Technologies Corp. personnel were involved in all phases of project planning including the development of Data Quality Objectives (DQOs), the selection of sampling and analysis methods, the selection of contractors, and the development and review of project controlling documents. Primary references for the selection of methods and setting DQOs included:

- USEPA SW-846, Test Methods for Evaluating Solid Waste
- 40 CFR 266 Appendix IX and the Appendix to 40 CRF 63, Subpart EEE, Performance Specifications for Continuous Emission Monitoring Systems
- USEPA QAMS-005/80, Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans
- EPA/625/6-89/023, Quality Assurance/Quality Control (QA/QC) Procedures for Hazardous Waste Incineration
- EPA/600/4-77-027b, Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods
- 40 CFR 60 Appendix A, Test Methods and Procedures, New Source Performance Standards
- 40 CFR 61 Appendix B, Test Methods.

5.1.1 QA Surveillance

Part of the overall program QA/QC is the coordination of process operations and sampling activities during the test. This coordination effort is intended to identify potential operating upsets or sampling problems in the field, and to institute corrective actions as required. These field actions include holding, stopping, and/or repeating test runs as needed to ensure the collection of adequate and representative data. A log is kept by the PDT Manager to document performance test activities and noteworthy occurrences that may be beneficial to the reconstruction of events or to the evaluation of PDT results. Appendix B contains a copy of the PDT Manager's manual log.

During the PDT, there were no process-related interruptions to sampling activities. There were two interruptions in sampling which occurred due to other causes.

During Run 2 as the Method 0023A sampling train was being moved to the last traverse point in the first half of the run, the glass probe liner broke. The sampling team and regulatory observers noticed the break immediately when it occurred, and the sampling team shut down the sample pump. Since it was known when the break occurred and sampling was immediately stopped, it was decided to recover both parts of the broken probe liner, replace the probe, and continue sampling. All parties were aware of the situation and approved of the action taken.

During Run 3, a problem developed with the organic surrogate mixture spiking system. All sampling was placed on hold while the problem was corrected. All process operations and other spiking activities continued without interruption. Once the organic surrogate mixture spiking system was returned to service, all sampling was resumed, and the run finished without further interruption.

No negative impact on sampling or analysis occurred as a result of these interruptions, nor were there any other occurrences noted that would impact the PDT results or conclusions.

Several items were identified throughout the course of the PDT program (including preliminary testing conducted by Siemens Water Technologies Corp. in preparation for the formal PDT) which could either be classified as noncomformances with the test methods or specifications of the project controlling documents, or as potential areas for improvement. Where modifications to the protocols or field activities were necessary, they were implemented through field directives and/or the issuance of a Corrective Action Request (CAR). Copies of each CAR are included in Appendix C. The sections below discuss the PDT activities and include a description of any QA/QC observations, procedural modifications, or CARs issued.

5.1.2 Sample Collection

Feed, effluent, and stack gas samples were collected and analyzed as part of the PDT program. Sampling QA/QC objectives are considered to be met if sampling activities follow the standard methods described in the PDT Plan and QAPP. During this test, sampling activities followed the prescribed procedures of the PDT Plan and QAPP, with the following exceptions:

1. Based on observations made during preliminary testing, it was believed that the high stack gas moisture content and low particulate matter concentration would not be conducive to the use of a Cascade Impactor, which was originally planned for collection of particle size distribution data. Therefore, a Method 5 train, employing a smooth filter media was used to collect particulate matter samples, followed by scanning electron microscope examination of the particles to determine the particle size distribution. This is documented as CAR-003.

2. Prior to the test, the analytical laboratory expressed concern that analytical surrogate compounds placed onto the adsorbent resin in some of the sampling trains might be stripped off unless sampling is conducted at very low sampling rates. In order to address this concern, all semivolatile organic sampling trains were operated for a nominal sampling run time of 4 hours instead of the planned nominal sampling time of three hours. The same nominal volume of sample was collected over the four hour period that would have been collected in three hours. This represents a very conservative approach to the issue, and is documented as CAR-004.

3. During Run 2 of the PDT, the glass probe liner on the M0023A train was broken due to high winds swinging the sampling train as it was being moved from one traverse point to another. The stack sampling crew and regulatory observers noted the break and immediately stopped sampling. Upon investigation, it was found that both pieces of the broken probe liner could be retrieved and that the sampling train leak-checked from the break through the remainder of the train. All parties agreed that there was no impact on sample integrity, so the broken probe liner pieces were caped, taken to the recovery area and rinsed. The probe liner was replaced and the train was used to complete the sampling run. The rinse of the broken probe liner pieces was combined with the final train rinse to capture the entire sample. This is documented as CAR-007.

4. Makeup water samples were collected at the beginning of each run rather than being collected only once at the beginning of the test program. This change was made based on plant personnel's recommendations and concerns that the makeup water quality could potentially change over time. This modification is viewed as an improvement to the original test protocol.

5. In order to keep any water droplets and particulate matter from entering the M0040 sampling train, a glass wool plug was inserted into the sample probe. This was not described in the test plan, but was deemed to be a good operating practice for this train.

6. At the end of Run 1, the Test Manager noticed that the silica gel in the M0061 train was quite wet. The sampling team was directed to add an additional silica gel impinger to the M0061 train to prevent this situation from occurring again. A check of the moisture determination from the M0061 train used in Run 1 was compared to the moisture determinations from the other Run 1 trains, and found to be consistent. Thus there was no adverse impact on the Run 1 M0061 sample.

7. EPA requested that split samples of the process feed materials and effluents be provided. Additional sample volume was collected accordingly, and samples were split with EPA.

Prior to the CPT, a database of all expected field samples was developed and cross-referenced with the analyses planned for each sample. A master list of samples generated from the database was used as a field QC checklist to help ensure that all samples were collected and shipped to the laboratory. Sample collection activities were recorded on log sheets, samples were labeled, packaged, and shipped to the analytical laboratory using traceability procedures described in the QAPP. Included with the samples were request-for-analysis forms specifying the required analyses for each sample. Copies of the process sample collection logs are included in Appendix D. Copies of the chain-of-custody records, and an index of sample numbers and identifications are included in the analytical data packages. Stack gas sample collection sheets are included with the full stack sampling report in Appendix I of this report. A review of the sample collection log sheets indicates that samples were collected as required, all applicable data were recorded, and sampling equipment conditions and operating parameters (particularly applicable to stack sampling activities) were within the requirements of the applicable methods.

5.1.3 Sample Analysis

Analytical data quality was determined through the analysis of blanks, duplicates, spiked samples, and reference materials, as prescribed by the QAPP. In large measure, the analytical data quality objectives for the PDT program were met. Section 5.2, below, and the data validation report in Appendix H, present more detailed results for each analytical data quality determination. Other observations and notes regarding sample analysis are provided in the next several paragraphs.

1. The selected laboratory for the performance test has a slightly different target analyte list compared to those presented in the original test plan. Revised target analyte lists were presented to EPA and were approved for use in the test. This is documented as CAR-001.

2. Several analytical results for the POHCs in the stack gas were above the upper calibration range of the analytical instrument. Since these analyses totally consume the sample, there was no opportunity to conduct a dilution and reanalyze the samples. The laboratory therefore reported estimated values. When this situation came to the attention of the PDT Manager and QA Manager, the laboratory was asked if anything could be done to qualify these estimates to ensure that they were valid. The laboratory set up an extended calibration curve for the affected compounds and requantified the samples as discussed in the case narrative of the VOST analytical data package. The requantified results were all less than the original reported results, therefore the original results are considered to be biased high. In order to be conservative in the use of these data, the original high emission values were used for calculating Destruction and Removal Efficiency, thus resulting in a conservatively low DRE.

5.1.4 Operations and Process Instrumentation

Process monitoring systems were calibrated prior to the PDT. Calibration data is presented in Appendix L. All process instrumentation met the performance criteria, and were deemed to produce reliable data, with one exception. While the stack gas flow rate monitoring system showed acceptable calibration results prior to the test, it was noted during the course of the PDT, that Siemens Water Technologies Corp.'s installed stack gas flow rate monitor was not corresponding with the Pitot tube readings of the stack sampling team. Further investigation indicated that some type of fault in the stack gas flow rate monitor was being experienced, however it was not able to be corrected during the course of the PDT. All parties were informed of the situation, and a decision was made to complete the PDT and to use the average of the stack gas sampling train flow rate determinations from each run to set the maximum stack gas flow rate operating limit for the system. Siemens Water Technologies Corp. will need to correct the fault in the stack gas flow rate monitoring system in order to demonstrate continuing compliance with the operating limit.

A CEMS Performance Specification Test was conducted prior to the PDT, and the emissions monitors met the applicable performance requirements. A CEMS Performance Specification Test Report is presented in Appendix K. Daily calibration of stack gas continuous emissions monitoring systems was conducted during the PDT. Each monitor met the calibration criteria during each day of testing.

The original test plan calls for an organic surrogate mixture to be added to the spent activated carbon feed. That mixture was specified to contain 1,1,1-Trichloroethane, however the compound is not available because it is an ozone depleting substance. Methylene chloride was substituted for 1,1,1-trichloroethane. This is documented as CAR-002.

Several modifications to the target operating conditions and anticipated permit limits were made after approval of the Performance Demonstration Test Plan. Most of these changes were made as a result of preliminary testing. Additionally, EPA included with their test plan approval letter a table of information and process data that they wanted included in the test report. Revised operating condition targets and the list of data requested by EPA are documented as CAR-006.

In order to maximize the stack gas flow rate (minimize the gas residence time) for the performance test, a source of additional air was needed beyond what is normally supplied by the combustion air fan. The access door on Hearth #1 was opened to allow additional air to be drawn into the system and to pass through the combustion and air pollution control portions of the system. This is documented as CAR-008.

5.1.5 Stack Sampling Equipment

All stack sampling equipment was calibrated according to the protocols given in the applicable sampling methods. Each sampling system passed the calibration criteria. Stack sampling equipment calibration records are included in the Stack Sampling Report in Appendix I, of this report.

5.1.6 Laboratory Analytical Instrumentation

QA/QC procedures, as specified by the analytical methods and summarized in the PDT Plan and QAPP, were conducted and documented during the test. Analytical instrument calibration records and all raw analytical data are presented in the analytical data packages, submitted as separate volumes. No calibration problems were identified by the laboratories.

5.2 AUDITS AND DATA VALIDATION

The following audits were provided for in the QAPP:

- Field audits
- Performance Evaluations
- Office Audits
- Laboratory Audits.

A field audit was used to ensure that work was performed in accordance with the various project controlling documents and associated standard operating procedures. This audit was conducted throughout the test by the PDT Manager through observation of process operations and sample collection. It is the opinion of the PDT Manager, based on field observations, that all work was performed in substantial compliance with the specifications contained in the PDT Plan and QAPP.

VOST audit samples (spiked Tenax resin) were provided by the regulatory agencies. An initial set of VOST audit tubes were received from EPA's contract laboratory and were analyzed with the samples from the PDT. These initial audit samples, however were received without proper documentation and preservation, and were thus deemed to be of suspect validity. EPA was informed of the issue and another set of VOST audit tubes were received from EPA's contract laboratory (this time with proper documentation and preservation). These audit samples were submitted to the laboratory for analysis, but the timing was such that they were not analyzed with the actual PDT samples. Results for all of the audit sample received are presented in Table 5-1. The test team participants do not know the true value of the audit samples, so the analytical results are reported here for review by the regulatory agencies.

The preparation of this report was conducted under the office QA/QC program in place at Focus. All records, correspondence, calculations, data, and reports are maintained in designated files for future reference. Reports, numerical tabulations, drawings, and calculations are checked for completeness and technical correctness, and documented prior to release in final form to the client.

Laboratory audits were provided for in the PDT Plan and the QAPP as an option to be exercised, if necessary, during the test program. No situations arose through the course of the test program which suggested the need for a laboratory audit.

Data validation consisted of a thorough check of all calculations involved in reducing sampling and analysis data. Subsequently, the data were compared to expected values and were investigated for consistency within and between test runs. For example, comparisons were made of stack gas flow rates, process operating temperatures, and sampling equipment operating conditions. Analytical data were reviewed to identify variations between duplicate measurements of the same parameter, either from multiple analyses of the same sample or from analyses between replicate test runs. Finally, QA/QC results were compared to the target data quality objectives defined in the QAPP and in the laboratory standard operating procedures (SOPs). During the project, 12,491 analytical data quality indicators were evaluated. Over 93 percent of the data quality objectives were completed and met. The data compare well within and between runs, and the measurements agree well with the expected values. The data are technically sound and are usable for their intended purpose. A data validation report is presented in Appendix H.

5.3 CALCULATIONS

Where applicable, the RF-2 system's performance and/or emissions were calculated using formulas presented in appropriate regulations. Other calculations followed generally accepted practice for thermal treatment process operations and performance test reporting. Many calculations were made using spreadsheets specifically designed by Focus for performance test data reduction and reporting, while other calculations were made by hand. Appendix G documents how all calculations were made for performance determination during this test program.

5.4 CONCLUSIONS

Overall, the PDT was executed in substantial conformance to the requirements and specifications of the project controlling documents. Any anomalies observed have been documented and corrective actions have been implemented as necessary. The impact of these anomalies has been thoroughly reviewed and assessed. In the judgment of the PDT Manager, those anomalies do not have a discernible negative impact on data quality or the utility of the data gathered to serve their intended purpose as defined in the PDT Plan and QAPP.

6.0 OPERATING PARAMETER LIMITS

The Siemens Water Technologies Corp. Carbon Reactivation Furnace RF-2 system demonstrated compliance with all applicable regulatory requirements during the PDT program. Operating parameter limits and associated automatic waste feed cutoff setpoints (as applicable) will be established as described in the approved PDT Plan and in the appropriate regulations of 40 CFR 63 Subpart EEE. Most operating parameter limits are based on demonstrations made during the PDT. For some parameters, such as maximum stack gas CO concentration, and minimum packed bed scrubber pressure differential, either regulation, guidance, or equipment manufacturer's recommendations (rather than the PDT demonstrated values) are used as the basis for the limit.

6.1 DEVELOPMENT OF OPERATING LIMITS

Limits on a number of operational control parameters must be maintained as an indication that the RF-2 system continues to operate in compliance with the applicable emission standards. Table 6-1 summarizes the discussion of the operational parameter limits for the RF-2 unit. To facilitate review, the operating parameters are grouped into the following categories:

- Group A1 parameters are continuously monitored and recorded, and are interlocked with the automatic waste feed cutoff system. Group A1 parameter limits are established from test operating data, and are used to ensure that system operating conditions are equal to or are more rigorous than those demonstrated during the test.
- Group A2 parameters are continuously monitored and recorded, and are interlocked with the automatic waste feed cutoff system. Group A2 parameter limits are established based on regulatory requirements rather than on the test operating conditions, e.g., the maximum stack CO concentration.
- Group B parameters are continuously monitored and recorded, but are not required to be interlocked with the automatic waste feed cutoff system. Operating records are required to ensure that established limits for these parameters are not exceeded. The Group B parameter limits are established based on the operation of the system during the test.
- Group C parameters are continuously monitored and recorded, but are not required to be interlocked with the automatic waste feed cutoff system. Group C parameter limits are based on manufacturer's recommendations, operational safety, and good operating practice considerations rather than on the test operating conditions, e.g., the minimum packed bed scrubber pressure differential.

6.2 SPECIFIC OPERATING PARAMETERS

Operating parameter limits for each of the control parameters have been established as specified in the HWC MACT regulations given in 40 CFR 63.1209 and the approved PDT plan. The following sections describe how each operating parameter limit has been established.

In addition to establishing specific operating limits, Siemens Water Technologies Corp. anticipates having limits on the types of waste that can be treated in RF-2. Since Siemens Water Technologies Corp. has demonstrated greater than 99.99% DRE during the PDT while treating chlorobenzene, a Class 1 (most thermally stable) compound, it is expected that Siemens Water Technologies Corp. will be permitted to treat all of the materials represented by the waste codes in the facility's most recent RCRA Part A permit application. Specific prohibitions are anticipated in the site's permit, for feed materials containing greater than 50 ppm of PCBs and those listed with the waste codes F020, F021, F022, F023, F026 or F027.

6.2.1 Parameters Demonstrated During the Test (Group A1 Limits)

Group A1 parameter limits are based on the results of the testing. The following operating parameters will be established as Group A1 parameters for the RF-2 system.

6.2.1.1 Maximum Spent Carbon Feed Rate

The PDT was conducted in order to demonstrate the maximum feed rate of spent carbon. The spent carbon feed rate is monitored on a continuous basis. The maximum allowable spent carbon feed rate has been established as a block hour average limit from the average of feed rates demonstrated during each of the three runs of the PDT.

6.2.1.2 Minimum Afterburner Temperature

The PDT was conducted at the minimum afterburner temperature with maximized combustion gas flow rate (minimum residence time), since these are the conditions least favorable for DRE. Organic emissions were also measured under these conditions for risk assessment purposes. Based on successful demonstration of DRE during the PDT, the minimum temperature limit has been established as an hourly rolling average equal to the average of the demonstrated test run average values.

6.2.1.3 Minimum and Maximum Hearth #5 Temperature

As part of EPA's approval of the PDT Plan, Siemens Water Technologies Corp. was required to establish both a minimum and maximum temperature limit for Hearth #5 of the reactivation furnace. Since both a minimum and maximum temperature could not be demonstrated in the single test condition approved for the test, Siemens Water Technologies Corp. operated Hearth #5 at a maximum temperature during the PDT and will conduct a separate minimum temperature test outside of the formal PDT period.

The maximum Hearth #5 temperature limit has been established as an hourly rolling average equal to the average of the demonstrated test run averages.

6.2.1.4 Minimum Venturi Scrubber Differential Pressure

The performance test was conducted to demonstrate the minimum venturi scrubber differential pressure. Venturi scrubber differential pressure is monitored on a continuous basis. Based on successful demonstration of particulate and metals control during the performance test, the minimum venturi scrubber differential pressure limit has been established as the average of the hourly rolling average values demonstrated during each run of the performance test. The permit limit is also expected to be an hourly rolling average value.

6.2.1.5 Minimum Quench/Venturi Scrubber Recycle Liquid Flow Rate

The performance test was conducted to demonstrate the minimum quench/venturi scrubber recycle flow and maximum stack gas flow, thus establishing a *de facto* minimum liquid to gas ratio. Quench/Venturi scrubber flow and stack gas flow are both monitored on a continuous basis. Based on successful demonstration during the performance test, the minimum quench/venturi scrubber recycle liquid flow rate limit has been established based on the average of the hourly rolling average values demonstrated during each run of the performance test. This limit will be established as an hourly rolling average.

6.2.1.6 Minimum Packed Bed Scrubber pH

The performance test was conducted to demonstrate the minimum packed bed scrubber pH at maximum total chlorine/chloride feed rate. Scrubber pH is monitored on a continuous basis. Based on successful demonstration of HCl and Cl_2 control during the performance test, the minimum packed bed scrubber pH limit has been established as the average of the hourly rolling average pH values demonstrated during each run of the performance test. The permit limit will be administered as an hourly rolling average.

6.2.1.7 Minimum Packed Bed Scrubber Recycle Liquid Flow Rate

The performance test was conducted to demonstrate the minimum packed bed scrubber recycle flow rate and maximum stack gas flow, thus establishing a *de facto* minimum liquid to gas ratio. Packed bed scrubber recycle flow and stack gas flow are both monitored on a continuous basis. Based on successful demonstration of HCl and Cl_2 control during the performance test, the minimum packed bed scrubber recycle liquid flow rate limit has been established as the average of the hourly rolling average values demonstrated during each run of the performance test. This limit will also be administered on an hourly rolling average basis.

6.2.1.8 Minimum Scrubber Blowdown Flow Rate

The performance test demonstrated a minimum scrubber blowdown flow rate, in order to demonstrate worst case conditions for solids buildup in the scrubbing system. In order to conserve water, Siemens Water Technologies Corp. recycles most of the liquid from the air pollution control system. However, in order to prevent the buildup of dissolved solids in the recycled water, a certain amount of the water must be purged (or blown down) from the system. As water is purged from the system, fresh makeup water is added. The minimum scrubber blowdown flow rate limit has been based on the average of the hourly rolling average values demonstrated during each run of the performance test. This limit will be administered as an hourly rolling average.

6.2.1.9 Minimum WESP Secondary Voltage

Although the HWC MACT regulations do not require any indicator of performance in an electrically enhanced emissions control device, Siemens Water Technologies Corp. believes that it is appropriate to establish a performance indicator. Accordingly, WESP secondary voltage (expressed as KVDC) is used as the indicator of continuing WESP performance. The minimum value has been established as the average of the minimum hourly rolling average secondary voltage values demonstrated during each run of the performance test. The secondary voltage limit will be based on an hourly rolling average.

6.2.1.10 Maximum Combustion Gas Velocity (Stack Gas Flow Rate)

The stack gas flow rate (expressed as actual cubic feet per minute) is used as the indicator of combustion gas velocity. The maximum stack gas flow rate was planned to be established from the mean of the maximum hourly rolling average stack gas flow rates measured by Siemens Water Technologies Corp.'s stack gas flow rate monitor during each run of the performance test. As stated in earlier sections of this report, the stack gas flow rate monitor experienced difficulties during the PDT such that the measurements were not reliable. Each isokinetic sampling system used for stack gas emissions measurements during the PDT also included the measurement of stack gas flow rate. Thus, the average stack gas flow rate determinations for each run, derived from the stack gas sampling systems, has been used to establish a maximum stack gas flow rate limit. The maximum stack gas flow rate limit will be administered as an hourly rolling average.

6.2.2 Group A2 Parameters

6.2.2.1 Maximum Stack Gas CO Concentration

The maximum hourly rolling average stack gas CO concentration was maintained at or below 100 ppmv corrected to 7% oxygen (dry basis) during the test. An operating parameter limit for maximum stack gas carbon monoxide concentration of 100 ppmv hourly rolling average corrected to 7% oxygen will be established.

6.2.2.2 Fugitive Emissions Control

The HWC MACT regulations require controlling combustion system leaks. By design (no open feed systems), the combustion chamber constitutes a sealed system. There are no locations for combustion system leaks to occur. Therefore, the RF-2 system is in compliance with 40 CFR 63.1206(c)(5)(i)(A).

6.2.3 Group B Parameters

6.2.3.1 Maximum Total Chlorine/Chloride Feed Rate

During the PDT, Siemens Water Technologies Corp. maximized the feed rate of total chlorine/chloride through the spiking of tetrachloroethene and other chlorinated organic compounds. Since the HCl and Cl_2 emissions measured during the PDT were less than the applicable standard, the limit for total chlorine/chloride feed rate has been set as a 12-hour rolling average, equal to the average of the average total chlorine/chloride feed rate during the three runs of the PDT. Total chlorine/chloride includes the native chlorine/chloride in the spent activated carbon feed plus the spiked chlorine/chloride. Records of feed analyses, and the calculated 12-hour rolling average total chlorine/chloride feed rate values will be maintained to demonstrate compliance with the chlorine/chloride feed rate limit.

6.2.3.2 Maximum Mercury Feed Rate

Due to the low amounts of mercury expected in the spent activated carbon, Siemens Water Technologies Corp. has elected to comply with the mercury standard by calculating and complying with a 12-hour rolling average Maximum Theoretical Emission Concentration (MTEC), conservatively assuming no mercury removal across the APC system. The MTEC is complied with as a maximum mercury feed rate limit. This limit has been calculated from the performance test data by using the stack gas flow rate and oxygen concentration, and the maximum allowable stack gas mercury concentration based on the HWC MACT regulations. The feed rate limit is determined assuming that all mercury is emitted, and is complied with as a maximum 12-hour rolling average mercury feed rate limit.

6.2.3.3 Maximum Semivolatile Metals Feed Rate

Siemens Water Technologies Corp. demonstrated compliance with the semivolatile metal emission standard while spiking lead during the test. Therefore, the permitted feed rate limit for semivolatile metals (total cadmium plus lead) has been set as a 12-hour rolling average value equal to the average semivolatile metal feed rate demonstrated during the three runs of the PDT. Records of feed analyses, and the calculated 12-hour rolling average semivolatile metal feed rate values will be maintained to demonstrate compliance with the semivolatile metal feed rate limit.

6.2.3.4 Maximum Low Volatility Metals Feed Rate

Siemens Water Technologies Corp. demonstrated compliance with the low volatility metal emission standard while spiking chromium during the test. The emissions measured during the test were significantly lower than the allowable limit. Therefore, the permitted feed rate limit for low volatility metals (total arsenic, plus beryllium, plus chromium) will be set as a 12-hour rolling average extrapolated upward to the HWC MACT standard based on the average low volatility metal feed rate and the average low volatility metal System removal Efficiency (SRE) during the three runs of the CPT. Extrapolation has been conducted as described in the approved PDT Plan. Records of feed analyses, and the calculated 12-hour rolling average low volatility metal feed rate values will be maintained to demonstrate compliance with the low volatility metal feed rate limit.

6.2.4 Group C3 Parameters

Group C parameter limits are based on manufacturer's recommendations, operational safety and good operating practice considerations. The following parameters are proposed as Group C parameters.

6.2.4.1 Minimum Packed bed Scrubber Pressure Differential

The minimum packed bed scrubber pressure differential is based on past operating experience. This limit has been established as an hourly rolling average limit.

6.3 EXTRAPOLATION OF METALS FEED RATE LIMITS

Siemens Water Technologies Corp. spiked lead and chromium into RF-2 during the PDT. Lead and chromium are representative of the semivolatile and low volatility metal groups, respectively. Since the lead emissions were very close to the applicable standard during the PDT, Siemens Water Technologies Corp. has established the maximum semivolatile metal feed rate as the average feed rate that was demonstrated during the three runs of the PDT. The emissions of low volatility metals however, were substantially below the standard during the PDT, thus Siemens Water Technologies Corp. has extrapolated the test results upward to establish a low volatility metals feed rate limit. PDT data has been used to calculate a system removal efficiency (SRE) for chromium, which can then be applied to the LVM metal volatility group. System removal efficiency is shown in Table 6-2, and was calculated using the following equation:

$$SRE_i = \left[1 - \frac{\dot{m}_{i,out}}{\dot{m}_{i,in}}\right] \times 100\%$$

where:

$\dot{m}_{i,in}$ = mass feed rate of metal i.

$\dot{m}_{i,out}$ = mass emission rate of metal i.

SRE_i = demonstrated system removal efficiency of metal i.

The demonstrated system removal efficiency for chromium can be used to establish a mass feed rate limit for low volatility metals using the following equation:

$$\dot{m}_{g,in,\max} = \frac{\dot{m}_{g,out,MACT}}{\left(1 - \frac{SRE_i}{100}\right)}$$

where:

$\dot{m}_{g,in,\max}$ = maximum allowable mass feed rate of metal group g

$\dot{m}_{g,out,MACT}$ = maximum allowable mass emission rate of metal group g based on the MTEC analysis

SRE_i = demonstrated system removal efficiency of metal i designated to be the metal representative of metal group g.

7.0 EMISSIONS DATA TO SUPPORT THE SITE SPECIFIC RISK ASSESSMENT

Siemens Water Technologies Corp. collected emissions data to support the site specific risk assessment under "worst-case" conditions rather than conducting a separate "risk burn" under less aggressive "typical" conditions. Siemens Water Technologies Corp. therefore believes that the emissions presented represent conservative values which are higher than during typical operation. The following section presents the emission data and discusses interpretation of the data where appropriate.

7.1 DETECTION LIMITS

Method detection limits (MDLs) were determined for each of the stack gas analyses conducted. MDLs were determined statistically for non-isotope dilution methods following the requirements of 40 CFR Part 136, Appendix B. MDLs for isotope dilution methods were determined following the promulgated method requirements. Isotope dilution method MDLs were calculated based on 2.5 times the background noise. All reported MDLs, including condensate analyses, are matrix specific and reflect any dilutions, splits, or concentrations applied during the extraction or analysis of the samples. As such, laboratory-supplied MDL's for these stack gas analyses appear to meet the definition of sample quantitation limit (SQL) referenced in several sources of risk assessment guidance.

7.2 METALS

EPA Method 29 was used to sample stack gas multiple-metals emissions during the PDT. Metals emission data were collected in addition to the metals feed rate data, and are presented with the compliance data in Section 4.0. Emission results for the multiple-metals trains are repeated here in Tables 7-1 through 7-3. Mercury speciation data for the risk assessment are presented in Table 7-4.

A separate SW-846 Method 0061 sampling train was operated during each run of the PDT to determine the emission of hexavalent chromium. Sampling conditions and emission results for hexavalent chromium are presented in Tables 7-5 through 7-7.

7.3 HYDROGEN CHLORIDE AND CHLORINE

HCl and Cl_2 emissions were determined using EPA Method 26A during the PDT and are presented with the compliance results in Section 4.0. They are repeated here in Tables 7-8 through 7-10.

7.4 PARTICLE SIZE DISTRIBUTION

Particle size distribution data were collected using EPA Method 5 followed by scanning electron microscope evaluation of the particles collected on the filters. Particle size distribution results are presented in Table 7-11.

7.5 SPECIATED VOLATILE ORGANICS

Stack gas volatile organic samples were collected using SW-846 Method 0030, and analyzed for a list of target analytes, as specified in the PDT Plan, as well as for tentatively identified compounds (TICs). Sampling conditions and results are presented in Tables 7-12 through 7-14.

7.6 SPECIATED SEMIVOLATILE ORGANICS

An SW-846 Method 0010 sampling train was used to sample the stack gases for a list of target semivolatile organics, as specified in the PDT Plan, as well as for tentatively identified compounds (TICs). The sampling conditions and results are summarized in Tables 7-15 through 7-17.

7.7 TOTAL VOLATILE ORGANICS, SEMIVOLATILE ORGANICS, AND NONVOLATILE ORGANICS

Determination of these emissions was conducted according to the procedures presented in EPA/600/R-96/036, and are reported in three fractions:

1 Total volatile organics, expressed as total mass of C_1 through C_7 n-alkanes (Tables 7-18 through 7-20).

2 Total chromatographable organics (TCO), representing compounds with a boiling point range of 100°C to 300°C (Tables 7-21 through 7-23).

3 Total nonvolatile organics (GRAV), representing compounds with a boiling point above 300°C (Tables 7-21 through 7-23).

7.8 DIOXINS AND FURANS

Stack gases were sampled using SW-846 Method 0023A for PCDD/PCDF emissions during each PDT run. Analyses were performed to identify the total mass of the tetra- through octa-chlorinated PCDD and

PCDF congeners, as well as the mass of each individual 2,3,7,8-substituted PCDD and PCDF congener. In order to evaluate the potential risk posed by emissions of a variety of PCDD/PCDF compounds, each 2,3,7,8-substituted isomer is assigned a "toxic equivalence factor" which is used to equate the toxicity of that compound to the toxicity of 2,3,7,8-TCDD. A summary of the sampling conditions and emission results is provided with the compliance results in Section 4.0, and are repeated here as Tables 7-24 through 7-26. Analytical results for each of the 2,3,7,8-substituted PCDD and PCDF isomers, and their corresponding emissions, expressed as 2,3,7,8-TCDD toxic equivalents are presented in Tables 7-27 through 7-29.

7.9 SPECIATED PAHS

Polyaromatic hydrocarbons were analyzed on the same sampling train used for speciated semivolatile organic compound determinations. Analyses for PAHs followed CARB Method 429. Sampling conditions and emission results are presented in Tables 7-30 through 7-32.

7.10 POLYCHLORINATED BIPHENYLS (PCBS)

PCBs were analyzed on the same sampling train used for speciated semivolatile organic compound determinations. Analyses for PCBs followed EPA Method 1668. Sampling conditions and emission results are presented in Tables 7-33 through 7-35.

7.11 ORGANOCHLORINE PESTICIDES

Organochlorine pesticide compounds were sampled using SW-846 Method 0010. Sampling conditions and emission results are presented in Tables 7-36 through 7-38.

TABLES

Analytical Notation Legend

Notation	Meaning
B	Method blank contamination. The associated method blank contains the analyte at a reportable level.
C	Co-eluting isomer
COL	Greater than 40% RPD between primary and confirmatory column. Reported lower value.
E	Estimated – Exceeds calibration range
J	Estimated result. Result is less than the reporting limit.
M	Result measured against nearest internal standard, assuming a response factor of 1.
N	Estimated. Tentatively identified compound.
NA	Not analyzed or Not applicable
ND or U	Not detected
Q	Estimated maximum possible concentration (EMPC)

Table 1-1. Regulatory Compliance Performance and Emissions Summary

Parameter	Units	Test Objective	Run 1	Run 2	Run 3	Test Average
DRE - Chlorobenzene	%	> 99.99	> 99.9914	> 99.9970	99.9940	> 99.9941
DRE - Tetrachloroethene	%	> 99.99	> 99.9951	> 99.9982	> 99.9976	> 99.9970
Stack gas filterable particulate matter concentration (b)	mg/dscm (gr/dscf)	< 34 < 0.015	21 0.0090	10 0.0046	18 0.0079	16 0.0072
Stack gas PCDD/PCDF (b)	ng TEQ/dscm	< 0.40	0.065	0.052	0.062	0.060
Stack gas mercury (b)	ug/dscm	< 130	< 6.1	< 5.8	< 7.5	< 6.5
Stack gas semivolatile metals (Cd + Pb) concentration (b)	ug/dscm	< 240	210	130	360	230
Stack gas low volatility metals (As + Be + Cr) concentration (b)	ug/dscm	< 97	< 35	< 12	< 21	< 23
Stack gas HCl/Cl_2 (b)	ppmv as HCl	< 77	5.4	3.2	3.0	3.9
Stack gas carbon monoxide concentration (b)	ppmv	< 100	11.5	10.4	15.6	12.5
Stack gas total hydrocarbon concentration (b)	ppmv, as propane	< 10	< 0.6	< 0.6	< 0.6	< 0.6
Stack gas oxygen concentration	vol%, dry	NA	9.8	8.9	9.3	9.3

(a) Stack gas THC and O_2 data were obtained using Airtech's temporary CEMS.

(b) Corrected to 7% oxygen, dry basis.

Note: Compliance with regulatory standards is based on the arithmetic average of the three test runs, except for DRE, where each run must meet the specified criteria [see 40 CFR 63.1206(b)(12)(ii)]. All values are reported to two significant figures.

Table 1-2. Summary of Process Operating Conditions [a]

		PDT	Actual			
Parameter	Units	Target	Run 1	Run 2	Run 3	Average
Spent carbon feed rate (1-min avg)	lb/hr	3000	3071	3022	3053	3049
Total chlorine/chloride feed rate	lb/hr	75 – 80	59.5	62.0	58.6	60.0
Mercury feed rate	lb/hr	3.0E-04	4.0E-05	4.2E-05	7.0E-05	5.1E-05
Total semivolatile metals feed rate (Cd+Pb)	lb/hr	1.1E-01	1.0E-01	1.0E-01	1.0E-01	1.0E-01
Total low volatility metals feed rate (As+Be+Cr)	lb/hr	3.9E-01	3.6E-01	3.8E-01	3.7E-01	3.7E-01
Monochlorobenzene feed rate	lb/hr	33 – 37	34.8	35.0	35.0	35.0
Tetrachloroethene feed rate	lb/hr	33 – 37	35.0	35.0	34.8	35.0
Organic surrogate mixture feed rate	lb/hr	40 – 42	40.9	40.9	40.7	40.8
Hearth #5 temperature	ºF	1650	1650	1650	1650	1650
Afterburner temperature	ºF	1750	1763	1767	1751	1760
Venturi scrubber pressure differential	in w.c.	≥ 15	19.2	17.7	18.0	18.3
Quench/venturi scrubber total liquid flow rate	gpm	70 – 75	74.6	77.0	73.2	74.9
Packed bed scrubber pH	pH	≥ 4	4.82	4.62	3.68	4.37
Packed bed scrubber liquid flow rate	gpm	≥ 60	63.6	63.1	62.9	63.2
Wet scrubber bowdown flow rate	gpm	60	59.8	57.2	56.9	58.0
WESP secondary voltage	kVDC	≥ 14	24.3	22.1	21.7	22.7
Stack gas flow rate	acfm	9,000	11,297	8,506	8,846	9,550
Stack gas carbon monoxide [b]	ppmv	≤ 100	11.5	10.4	15.6	12.5
Stack gas total hydrocarbons (as propane) [c]	ppmv	≤ 10	< 0.6	< 0.6	< 0.6	< 0.6
Stack gas oxygen [d]	vol %	NA	10.1	9.2	9.4	9.6

Note: HRA = Hourly rolling average.
(a) All values are averages. All but constituent feed rates and stack gas flow rates are taken from control room instruments. Spiking rates have been added to spent activated carbon feed rates, since spiking occurred downstream of the spent activated carbon mass feed rate measurement system. Stack gas flow rates are the average from all isokinetic sampling trains from each run. Stack gas flow monitor was not working properly during the test.
(b) 60-minute rolling average, corrected to 7% O_2, dry basis.
(c) Corrected to 7% O_2, dry basis.
(d) Dry basis.

Table 2-1. Summary of Planned Sampling Locations, Equipment, and Methods

Location[a]	Sample Name (Number)	Access	Equipment	Sample Size	General Procedure/Frequency	Reference Method[b]
1	Spent Activated Carbon (1-Volatiles) (1-Semivolatiles) (1 – Metals) (1 - Properties) (1-Archive)	Conveyor	Teflon scoop 4L glass jug, 250 ml jar (VOA) 1L glass bottles with teflon lined lids	1 scoop per grab; 250 ml volatiles 1L semivolatiles 1L properties 1L metals 1L archive	Collect a grab sample at each 15-minute interval during each test run. Grab samples will be combined in a glass jug to build run composite. Collect four 1-lter samples and one 250 ml VOA jar of the homogenized composite at the end of the test run.	SW-846, Vol. II, Chapter 9, Section 9.3
2	Makeup water (2-Volatiles) (1-Semivolatiles) (1 – Metals) (1-Archive)	Tap	40 ml vials; 4L glass jug, 1L glass bottles with teflon lined lids	40 ml VOA 1L semivolatiles 1L metals 1L archive	Collect one pair of 40 ml VOA vials at the beginning of the test; Fill 4L bottle at beginning of test. Fill three 1-liter samples from the 4L bottle.	SW-846, Vol. II, Chapter 9, Section 9.2
3	Caustic (2-Volatiles) (1-Semivolatiles) (1 – Metals) (1-Archive)	Tap	40 ml vials; 4L glass jug, 1L glass bottles with teflon lined lids	40 ml VOA 1L semivolatiles 1L metals 1L archive	Collect one pair of 40 ml VOA vials at the beginning of the test; Fill 4L bottle at beginning of test. Fill three 1-liter samples from the 4L bottle.	SW-846, Vol. II, Chapter 9, Section 9.2
4	Scrubber Blowdown (2-Volatiles) (1-Semivolatiles) (1 – Metals) (1-Archive)	Tap	40 ml vials; 4L glass jug, 1L glass bottles with teflon lined lids	40 ml VOA ~200 ml per grab; 1L semivolatiles 1L metals 1L archive	Collect one pair of 40 ml VOA vials at each 30 minute interval; Collect a ~200 ml grab sample at each 30-minute interval during each test run. Grab samples will be combined in a glass jug to build run composite. Collect three 1-liter samples of the homogenized composite at the end of the test run.	SW-846, Vol. II, Chapter 9, Section 9.2

Table 2-1. Summary of Planned Sampling Locations, Equipment, and Methods

Location[a]	Sample Name (Number)	Access	Equipment	Sample Size	General Procedure/Frequency	Reference Method[b]
5	POTW Discharge (2-Volatiles) (1-Semivolatiles) (1 – Metals) (1-Archive)	Tap	40 ml vials; 4L glass jug, 1L glass bottles with teflon lined lids	40 ml VOA ~200 ml per grab; 1L semivolatiles 1L metals 1L archive	Collect one pair of 40 ml VOA vials at each 30 minute interval; Collect a ~200 ml grab sample at each 30-minute interval during each test run. Grab samples will be combined in a glass jug to build run composite. Collect three 1-liter samples of the homogenized composite at the end of the test run.	SW-846, Vol. II, Chapter 9, Section 9.2
Stack (6)	Stack gas M29	Port	EPA Method 29 multiple metals sampling train	Minimum 120 minutes[c,d]	Collect integrated sample for metals and moisture. Measure stack gas velocity, pressure, and temperature. Collect bag samples or use CEM for oxygen and carbon dioxide.	EPA Methods 1 through 5, and 29.
Stack (6)	Stack gas M0061	Port	SW-846 Method 0061 hexavalent chromium sampling train	Minimum 120 minutes[c,d]	Collect integrated samples for hexavalent chromium and moisture. Measure stack gas velocity, pressure, and temperature. Collect bag samples or use CEM for oxygen and carbon dioxide.	EPA Methods 1 through 5; SW846-0061
Stack (6)	Stack gas M26A	Port	EPA Method 26A sampling train	Minimum 120 minutes[c,d]	Collect integrated sample for particulate, hydrogen chloride, and chlorine. Measure stack gas velocity, pressure, and temperature. Collect bag samples or use CEM for oxygen and carbon dioxide.	EPA Methods 1 through 5, and 26A
Stack (6)	Stack gas M0010-SV	Port	SW-846 Method 0010 sampling train	Minimum 3 dry standard cubic meters[c,d]	Collect integrated sample for semivolatile organics, organochlorine pesticides, and moisture. Measure stack gas velocity, pressure, and temperature. Collect bag samples or use CEM for oxygen and carbon dioxide.	EPA Methods 1 through 5; SW846-0010.

Table 2-1. Summary of Planned Sampling Locations, Equipment, and Methods

Location[a]	Sample Name (Number)	Access	Equipment	Sample Size	General Procedure/Frequency	Reference Method[b]
Stack (6)	Stack gas M0010-P	Port	Combined SW-846 Method 0010, EPA CARB Method 429 sampling train	Minimum 3 dry standard cubic meters[c,d]	Collect integrated sample for PAHs, PCBs, and moisture. Measure stack gas velocity, pressure, and temperature. Collect bag samples or use CEM for oxygen and carbon dioxide.	EPA Methods 1 through 5; SW846-0010; CARB Method 429.
Stack (6)	Stack gas M0010-TOE	Port	SW-846 Method 0010 sampling train	Minimum 3 dry standard cubic meters[c,d]	Collect integrated samples for total semivolatile organics, total nonvolatile organics, and moisture. Measure stack gas velocity, pressure, and temperature. Collect bag samples or use CEM for oxygen and carbon dioxide.	EPA Methods 1 through 5; SW846-0010; EPA TOE Guidance
Stack (6)	Stack gas M0023A	Port	SW-846 Method 0023A sampling train	Minimum 3 hours and 2.5 dry standard cubic meters[c,d]	Collect integrated sample for PCDD/PCDFs, and moisture. Measure stack gas velocity, pressure, and temperature. Collect bag samples or use CEM for oxygen and carbon dioxide.	EPA Methods 1 through 5; SW846-0023A.
Stack (6)	Stack gas M0030	Port	SW-846 Method 0030 volatile organic sampling train	4 tube pairs per run; 40 minutes per tube pair. Up to 20 liters of stack gas per tube pair	Collect four pairs of sorbent tubes and stack gas condensate for volatile organcs during each run.	SW846-0030 (VOST)
Stack (6)	Stack gas M0040	Port	SW-846 Method 0040 sampling train	25 – 50 liters	Collect representative sample through a heated sample probe and filter; through a condenser and into a Tedlar bag. Transport dried sample and condensate to GC/FID.	EPA Methods 1 through 5; SW846-0040; EPA TOE Guidance.
Stack (6)	Stack gas PSD	Port	Cascade impactor	As required	Collect particle size distribution samples on multiple substrates	Cascade impactor mfgr. instructions
Stack (6)	Stack gas CEMS	Port	Temporary CEMS THC	Continuous	Continuously monitor stack gas for total hydrocarbons during each run	EPA Method 25A

Table 2-1. Summary of Planned Sampling Locations, Equipment, and Methods

Location[a]	Sample Name (Number)	Access	Equipment	Sample Size	General Procedure/Frequency	Reference Method[b]
Stack (7)	Stack gas CEMS	Port	Installed CEMS CO	Continuous	Continuously monitor stack gas carbon monoxide during each run.	40 CFR 63 Subpart EEE Appendix; PS 4B
Stack (7)	Stack gas CEMS	Port	Installed CEMS O_2	Continuous	Continuously monitor stack gas oxygen during each run.	40 CFR 63 Subpart EEE Appendix; PS 4B

a Refer to Figure 2-1.

b "SW846" refers to Test Methods for Evaluating Solid Waste, Third Edition, November 1986, and Updates.
"EPA Method" refers to New Source Performance Standards, Test Methods and Procedures, Appendix A, 40 CFR 60.
"CARB" refers to California Air Resources Board Methods.
"PS 4B" refers to Performance Specification 4B, 40 CFR 60.

c The exact volume of gas sampled will depend on the isokinetic sampling rate.

d Isokinetic sampling trains include:

- Collecting one set of bag samples (or using CEM) for oxygen and carbon dioxide analysis to determine stack gas molecular weight (EPA Method 3)
- Performing stack gas velocity, pressure, and temperature profile measurement for each sampling location (EPA Method 2)
- Determining the moisture content of the stack gas for each sampling train (EPA Method 4)

Table 2-2. Summary of Planned Performance Test Analytical Procedures and Methods

Sample Name	Analysis	Samples per Run	Total Field Samples for Analysis	Preparation Method (See Note 1)	Analytical Method (See Note 1)
Spent Activated Carbon	Volatile Organics	1	3	Purge & Trap (SW846-5035)	GC/MS (SW846-8260)
	Organics	1	3	Solvent extraction (SW846-3542)	GC/MS (SW846-8270)
	Chloride	1	3	SW846-5050	Ion chromatography (SW846-9056)
	Total metals	1	3	Acid digestion (SW846-3050)	ICP (SW846-6020) & CVAAS (SW846-7470 for Hg)
Semivolatile	Elemental	1	3	NA	(ASTM D5373) with (ASTM D3176) as an alternate
Makeup Water	Volatile Organics	1	3	Purge & Trap (SW846-5035)	GC/MS (SW846-8260)
	Organics	1	3	Solvent extraction (SW846-3542)	GC/MS (SW846-8270)
	Total metals	1	3	Acid digestion (SW846-3020)	ICP (SW846-6020) & CVAAS (SW846-7470 for Hg)
Caustic	Volatile Organics	1	3	Purge & Trap (SW846-5035)	GC/MS (SW846-8260)
Semivolatile	Organics	1	3	Solvent extraction (SW846-3542)	GC/MS (SW846-8270)
	Total metals	1	3	Acid digestion (SW846-3020)	ICP (SW846-6020) & CVAAS (SW846-7470 for Hg)
Scrubber Blowdown	Volatile Organics	1	3	Purge & Trap (SW846-5035)	GC/MS (SW846-8260)
Semivolatile	Organics	1	3	Solvent extraction (SW846-3542)	GC/MS (SW846-8270)
	Total metals	1	3	Acid digestion (SW846-3020)	ICP (SW846-6020) & CVAAS (SW846-7470 for Hg)

Semivolatile

Table 2-2. Summary of Planned Performance Test Analytical Procedures and Methods

Sample Name	Analysis	Samples per Run	Total Field Samples for Analysis	Preparation Method (See Note 1)	Analytical Method (See Note 1)
POTW Discharge	Volatile Organics	1	3	Purge & Trap (SW846-5035)	GC/MS (SW846-8260)
	Organics	1	3	Solvent extraction (SW846-3542)	GC/MS (SW846-8270)
	Total metals	1	3	Acid digestion (SW846-3020)	ICP (SW846-6020) & CVAAS (SW846-7470 for Hg)
Stack gas M0030 Semivolatile	VOCs + TICs (tenax + tenax/charcoal tubes) (Note 2)	(Note 3)	(Note 3)	Thermal desorption, trap (SW846-5041A)	GC/MS (SW846-8260)
	VOCs + TICs (condensate) (Note 2)	1	3	Purge and trap	GC/MS (SW846-8260)
Stack gas M0040	Total VOCs	1	3	Purge and trap for condensate Direct injection for gas	GC/FID (Guidance for Total Organics, App. A and E)
Stack gas M0010-SV (low res analysis)	Semivolatile Organics & TICs (Note 4)	1	3	Solvent extraction (SW846-3542)	GC/MS (SW846-8270)
	OCP (Note 5)	1	3	Solvent extraction (SW846-3542)	GC (SW-846-8081)
	Moisture	1	3	NA	Gravimetric (EPA Method 4)
	Temperature	1	3	NA	Thermocouple (EPA Method 2)
	Velocity	NA	NA	NA	Pitot tube (EPA Method 2)
	Oxygen, Carbon dioxide	(Note 6)	(Note 6)	NA	Orsat or CEM (EPA Method 3)

Table 2-2. Summary of Planned Performance Test Analytical Procedures and Methods

Sample Name	Analysis	Samples per Run	Total Field Samples for Analysis	Preparation Method (See Note 1)	Analytical Method (See Note 1)
Stack gas M0010-P (high res analysis)	PCB (Note 7)	1	3	Solvent extraction (SW846-3542)	GC/MS (EPA Method 1668)
	PAH (Note 8)	1	3	Solvent extraction (CARB 429)	GC/MS (CARB 429)
	Moisture	1	3	NA	Gravimetric (EPA Method 4)
	Temperature	1	3	NA	Thermocouple (EPA Method 2)
	Velocity	NA	NA	NA	Pitot tube (EPA Method 2)
	Oxygen, Carbon dioxide	(Note 6)	(Note 6)	NA	Orsat or CEM (EPA Method 3)
Stack gas M0010-TOE	Total SVOCs	1	3	Solvent extraction (SW846-3542)	TOC GC/FID (Guidance for Total Organics, Appendix C)
	Total NVOCs	1	3	Solvent extraction (SW846-3542)	Gravimetric Method (Guidance for Total Organics, Appendix D)
	Moisture	1	3	NA	Gravimetric (EPA Method 4)
	Temperature	1	3	NA	Thermocouple (EPA Method 2)
	Velocity	NA	NA	NA	Pitot tube (EPA Method 2)
	Oxygen, Carbon dioxide	(Note 6)	(Note 6)	NA	Orsat or CEM (EPA Method 3)
Stack gas M0023A	PCDD/PDCF	1	3	Solvent extraction (SW846-3500)	GC/MS (SW-846 Method 8290)
	Moisture	1	3	NA	Gravimetric (EPA Method 4)
	Temperature	1	3	NA	Thermocouple (EPA Method 2)
	Velocity	NA	NA	NA	Pitot tube (EPA Method 2)
	Oxygen, Carbon dioxide	(Note 6)	(Note 6)	NA	Orsat or CEM (EPA Method 3)

Table 2-2. Summary of Planned Performance Test Analytical Procedures and Methods

Sample Name	Analysis	Samples per Run	Total Field Samples for Analysis	Preparation Method (See Note 1)	Analytical Method (See Note 1)
Stack gas M29	Metals (Note 9)	1	3	Acid digestion (SW846-3050)	ICP (SW846-6020) & CVAAS (SW846-7470 for Hg)
	Moisture	1	3	NA	Gravimetric (EPA Method 4)
	Temperature	1	3	NA	Thermocouple (EPA Method 2)
	Velocity	NA	NA	NA	Pitot tube (EPA Method 2)
	Oxygen, Carbon dioxide	(Note 6)	(Note 6)	NA	Orsat or CEM (EPA Method 3)
Stack gas M0061	Hexavalent chromium	1	3	NA	Ion chromatography, post-column reactor (SW846-7199)
	Moisture	1	3	NA	Gravimetric (EPA Method 4)
	Temperature	1	3	NA	Thermocouple (EPA Method 2)
	Velocity	NA	NA	NA	Pitot tube (EPA Method 2)
	Oxygen, Carbon dioxide	(Note 6)	(Note 6)	NA	Orsat or CEM (EPA Method 3)
Stack gas M26A	Hydrogen chloride/Chlorine	1	3	NA	Ion chromatography (SW846-9057)
	Particulate	1	1	NA	Gravimetric (EPA Method 5)
	Moisture	1	3	NA	Gravimetric (EPA Method 4)
	Temperature	1	3	NA	Thermocouple (EPA Method 2)
	Velocity	NA	NA	NA	Pitot tube (EPA Method 2)
	Oxygen, Carbon dioxide	(Note 6)	(Note 6)	NA	Orsat or CEM (EPA Method 3)
Stack gas M00023A	PCDD/PCDF	1	3	Solvent extraction (SW846-8290)	GC/MS (SW846-8290; & SW846-0023A)
	Moisture	1	3	NA	Gravimetric (EPA Method 4)
	Temperature	1	3	NA	Thermocouple (EPA Method 2)
	Flow rate	NA	NA	NA	Pitot tube (EPA Method 2)
	Oxygen, Carbon dioxide	(Note 6)	(Note 6)	NA	Orsat or CEM (EPA Method 3)
Stack gas PSD	Particle size distribution	NA	NA	NA	Cascade impactor manufacturer's instructions

Table 2-2. Summary of Planned Performance Test Analytical Procedures and Methods

Sample Name	Analysis	Samples per Run	Total Field Samples for Analysis	Preparation Method (See Note 1)	Analytical Method (See Note 1)
Stack gas temporary CEMS	Total hydrocarbons	(Note 10)	(Note 10)	NA	Extractive Analyzers, EPA Method 25A
Stack gas Installed CEMs	Carbon Monoxide	(Note 10)	(Note 10)	NA	Extractive Analyzers, 40CFR 63 Appendix
	Oxygen	(Note 10)	(Note 10)	NA	Extractive Gas Analyzers, 40 CFR 63 Appendix

Note 1: "ASTM" refers to American Society for Testing and Materials, Annual Book of ASTM Standards, Annual Series.
"SW846" refers to Test Methods for Evaluating Solid Waste, Third Edition, November 1986, and updates.
"EPA Methods" (Methods 1 through 5 and 23) refer to New Source Performance Standards, Test Methods and Procedures,, App. A, 40CFR 60.
"CARB" refers to California Air Resources Board methodology adopted January 27, 1987.
"Guidance for Total Organics" refers to EPA/600/R-96/036, March, 1996.

Note 2: Volatile Target Compounds as listed in this Test Plan, plus tentatively identified compounds.

Note 3: During each sampling run, 4 pairs of VOST tubes (8 samples) will be collected, but only 3 pairs (6 samples) will be analyzed. The extra tube pair provides a contingency in case of breakage or other event that could require analysis of the extra tube pair. Analysis of each tube in each tube pair will be conducted separately.

Note 4: Semivolatile Target Compounds as listed in this Test Plan, plus tentatively identified compounds.

Note 5: Organochlorinated pesticide (OCP) target compounds as listed in this Test Plan.

Note 6: One set of gas bag samples collected during each stack traverse for Orsat analysis, or CEM.

Note 7: Polychlorinated Biphenyl (PCB) target compounds target compounds as listed in the Plan

Note:8 Polycyclic Aromatic Hydrocarbon (PAH) target compounds as listed in this Plan

Note 9: Metal Target Compounds as listed in this Test Plan.

Note 10: Installed CEMs sampling and analysis is continuous during each run.

Table 3-1. Process Operating Data Summary - Run 1[a]

Parameter	Units	No. of Readings	Mean	Minimum	Maximum	Std. Dev.
Spent carbon feed rate (1-min avg)	lb/hr	274	3071	0	3555	706
Hearth #5 temperature	ºF	274	1650	1649	1650	0.4
Afterburner temperature	ºF	274	1763	1762	1764	0.5
Venturi scrubber pressure differential	in w.c.	274	19.2	17.3	19.9	0.8
Quench/venturi scrubber total liquid flow rate	gpm	274	74.6	74.3	74.8	0.1
Packed bed scrubber pH	pH	274	4.82	4.42	5.22	0.2
Packed bed scrubber liquid flow rate	gpm	274	63.6	63.2	63.9	0.2
Wet scrubber bowdown flow rate	gpm	274	59.8	58.0	61.8	1.0
WESP secondary voltage	kVDC	274	24.3	24.2	24.5	0.1
Stack gas flow rate	acfm	274	8626	8182	8894	204
Stack gas carbon monoxide [b]	ppmv	274	11.5	9.8	12.7	0.8
Stack gas oxygen (1-min avg) [c]	vol %	274	10.1	9.0	11.1	0.4

a All values are taken from process instrument logs presented in Appendix A, and are 60-minure rolling averages, except as noted.
b 60-minute rolling average, corrected to 7% O_2, dry basis.
c Dry basis.

Table 3-2. Process Operating Data Summary - Run 2[a]

Parameter	Units	No. of Readings	Mean	Minimum	Maximum	Std. Dev.
Spent carbon feed rate (1-min avg)	lb/hr	345	3022	47	3583	573
Hearth #5 temperature	ºF	345	1650	1648	1652	0.6
Afterburner temperature	ºF	345	1767	1765	1770	1.3
Venturi scrubber pressure differential	in w.c.	345	17.7	16.5	18.7	0.6
Quench/venturi scrubber total liquid flow rate	gpm	345	77.0	76.7	77.7	0.4
Packed bed scrubber pH	pH	345	4.62	4.23	4.98	0.2
Packed bed scrubber liquid flow rate	gpm	345	63.1	62.9	63.2	0.1
Wet scrubber bowdown flow rate	gpm	345	57.2	56.6	58.6	0.4
WESP secondary voltage	kVDC	345	22.1	21.8	22.3	0.1
Stack gas flow rate	acfm	345	7101	6935	7415	128
Stack gas carbon monoxide [b]	ppmv	345	10.4	8.3	12.9	1.3
Stack gas oxygen (1-min avg) [c]	vol %	345	9.2	8.6	10.7	0.4

a All values are taken from process instrument logs presented in Appendix A, and are 60-minure rolling averages, except as noted.
b 60-minute rolling average, corrected to 7% O_2, dry basis.
c Dry basis.

Table 3-3. Process Operating Data Summary - Run 3[a]

Parameter	Units	No. of Readings	Mean	Minimum	Maximum	Std. Dev.
Spent carbon feed rate (1-min avg)	lb/hr	275	3053	109	4211	744
Hearth #5 temperature	ºF	275	1650	1648	1652	0.8
Afterburner temperature	ºF	275	1751	1750	1754	0.6
Venturi scrubber pressure differential	in w.c.	275	18.0	17.3	19.2	0.5
Quench/venturi scrubber total liquid flow rate	gpm	275	73.2	72.4	75.9	0.7
Packed bed scrubber pH	pH	275	3.68	3.46	4.16	0.2
Packed bed scrubber liquid flow rate	gpm	275	62.9	62.7	63.9	0.2
Wet scrubber bowdown flow rate	gpm	275	56.9	55.4	58.5	0.7
WESP secondary voltage	kVDC	275	21.7	21.3	22.8	0.4
Stack gas flow rate	acfm	275	7049	6832	7380	109
Stack gas carbon monoxide [b]	ppmv	275	15.6	12.0	19.5	1.7
Stack gas oxygen (1-min avg) [c]	vol %	275	9.4	7.6	10.9	0.6

a All values are taken from process instrument logs presented in Appendix A, and are 60-minure rolling averages, except as noted.
b 60-minute rolling average, corrected to 7% O_2, dry basis.
c Dry basis.

Table 3-4. Feed Material Physical/Chemical Characteristics

		Spent Activated Carbon			
Characteristics	Units	Run 1	Run 2	Run 3	Average
Carbon content	wt%	61.3	67.6	60.2	63.0
Hydrogen content [a]	wt%	4.1	2.9	3.9	3.6
Oxygen content [a]	wt%	33.9	28.8	35.2	32.6
Nitrogen content	wt%	< 0.5	< 0.5	< 0.5	< 0.5
Sulfur content	wt%	< 0.2	< 0.2	< 0.2	< 0.2

(a) Hydrogen and oxygen content includes moisture. Oxygen determined by difference. Oxygen could not be analyzed due to a matrix interferrence.

Table 3-5. Feed Composition and Constituent Feed Rates (Chloride, Metals, POHCs)

Stream Name	Feed Rate (lb/hr)			
	Run 1	Run 2	Run 3	Average
Spent Activated Carbon	3071	3022	3053	3049
Monochlorobenzene Spike	34.82	35.05	35.05	34.97
Tetrachloroethene Spike	35.05	35.03	34.85	34.98
Lead Spike	19.83	20.15	19.88	19.95
Chrome Spike	19.83	20.15	19.88	19.95
Organic Surrogate Mixture Spike	40.87	40.88	40.73	40.83

Table 3-5. Feed Composition and Constituent Feed Rates (Chloride, Metals, POHCs), continued

Properties/Constituents	Units	Analytical Result								
		Spent Activated Carbon			Monochlorobenzene Spike			Tetrachloroethene Spike		
		Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3
Chlorine/chloride	mg/kg	3860 J	4740 J	3650 J	315548	315548	315548	855199	855199	855199
Metals										
Aluminum	mg/kg	4.33E+02	8.32E+02	7.85E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Antimony	mg/kg	6.00E+00 ND	6.00E+00 ND	6.00E+00 ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Arsenic	mg/kg	1.40E+00 B	1.40E+00 B	1.60E+00 B	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Barium	mg/kg	2.11E+01	3.50E+01	3.73E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Beryllium	mg/kg	2.20E-01 B	4.20E-01 B	5.40E-01 B	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cadmium	mg/kg	1.60E-01 B	1.40E-01 B	2.40E-01 B	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chromium	mg/kg	3.70E+00	5.90E+00	5.70E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cobalt	mg/kg	1.60E+00 B	1.80E+00 B	2.00E+00 B	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Copper	mg/kg	1.11E+01	1.74E+01	1.24E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	mg/kg	7.50E-01 B	8.80E-01 B	1.10E+00 B	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manganese	mg/kg	2.78E+02	2.70E+02	1.79E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	mg/kg	1.30E-02 B	1.40E-02 B	2.30E-02 B	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nickel	mg/kg	9.50E+00	5.08E+01	2.89E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	mg/kg	6.10E-01 B	5.50E-01 B	4.80E-01 B	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	mg/kg	3.00E+00 ND	3.00E+00 ND	3.00E+00 ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thallium	mg/kg	3.50E+00 ND	3.50E+00 ND	3.50E+00 ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vanadium	mg/kg	2.70E+00	2.90E+00	6.20E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	mg/kg	1.44E+01 J	1.68E+01 J	1.68E+01 J	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
POHCs										
Monochlorobenzene	mg/kg	0	0	0	999976	999976	999976	0	0	0
Tetrachloroethene	mg/kg	0	0	0	0	0	0	999740	999740	999740

Properties/Constituents	Units	Analytical Result								
		Lead Spike			Chrome Spike			Organic Surrogate Mixture Spike		
		Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3
Chlorine/chloride	mg/kg	0	0	0	0	0	0	162966	162966	162966
Metals										
Aluminum	mg/kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Antimony	mg/kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Arsenic	mg/kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Barium	mg/kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Beryllium	mg/kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cadmium	mg/kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chromium	mg/kg	0.00E+00	0.00E+00	0.00E+00	1.75E+04	1.75E+04	1.75E+04	0.00E+00	0.00E+00	0.00E+00
Cobalt	mg/kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Copper	mg/kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	mg/kg	5.00E+03	5.00E+03	5.00E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manganese	mg/kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	mg/kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nickel	mg/kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	mg/kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	mg/kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thallium	mg/kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vanadium	mg/kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	mg/kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
POHCs										
Monochlorobenzene	mg/kg	0	0	0	0	0	0	0	0	0
Tetrachloroethene	mg/kg	0	0	0	0	0	0	0	0	0

Table 3-5. Feed Composition and Constituent Feed Rates (Chloride, Metals, POHCs), continued

Resultant Feed Rates (lb/hr)												
	Spent Activated Carbon				Monochlorobenzene Spike				Tetrachloroethene Spike			
	Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average
Chlorine/chloride	1.19E+01	1.43E+01	1.11E+01	1.24E+01	1.10E+01	1.11E+01	1.11E+01	1.10E+01	3.00E+01	3.00E+01	2.98E+01	2.99E+01
Metals												
Aluminum	1.33E+00	2.51E+00	2.40E+00	2.08E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Antimony	< 1.84E-02	< 1.81E-02	< 1.83E-02	1.83E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Arsenic	4.30E-03	4.23E-03	4.88E-03	4.47E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Barium	6.48E-02	1.06E-01	1.14E-01	9.48E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Beryllium	6.76E-04	1.27E-03	1.65E-03	1.20E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cadmium	4.91E-04	4.23E-04	7.33E-04	5.49E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chromium	1.14E-02	1.78E-02	1.74E-02	1.55E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cobalt	4.91E-03	5.44E-03	6.11E-03	5.49E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Copper	3.41E-02	5.26E-02	3.79E-02	4.15E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	2.30E-03	2.66E-03	3.36E-03	2.77E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manganese	8.54E-01	8.16E-01	5.46E-01	7.39E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	3.99E-05	4.23E-05	7.02E-05	5.08E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nickel	2.92E-02	1.54E-01	8.82E-02	9.03E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	1.87E-03	1.66E-03	1.47E-03	1.67E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	< 9.21E-03	< 9.07E-03	< 9.16E-03	9.15E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thallium	< 1.07E-02	< 1.06E-02	< 1.07E-02	1.07E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vanadium	8.29E-03	8.76E-03	1.89E-02	1.20E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	4.42E-02	5.08E-02	5.13E-02	4.88E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
POHCs												
Monochlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.48E+01	3.50E+01	3.50E+01	3.50E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.50E+01	3.50E+01	3.48E+01	3.50E+01

Resultant Feed Rates (lb/hr)												
	Lead Spike				Chrome Spike				Organic Surrogate Mixture Spike			
	Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average
Chlorine/chloride	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.66E+00	6.66E+00	6.64E+00	6.65E+00
Metals												
Aluminum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Antimony	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Arsenic	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Barium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cadmium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Chromium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.48E-01	3.53E-01	3.48E-01	3.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cobalt	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Copper	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Lead	9.91E-02	1.01E-01	9.94E-02	9.97E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Manganese	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mercury	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Nickel	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Selenium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Silver	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Thallium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Vanadium	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Zinc	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
POHCs												
Monochlorobenzene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tetrachloroethene	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 3-5. Feed Composition and Constituent Feed Rates (Chloride, Metals, POHCs), continued

Resultant Feed Rates (lb/hr)				
	Grand Total			
	Run 1	Run 2	Run 3	Average
Chlorine/chloride	5.95E+01	6.20E+01	5.86E+01	6.00E+01
Metals				
Aluminum	1.33E+00	2.51E+00	2.40E+00	2.08E+00
Antimony	1.84E-02	1.81E-02	1.83E-02	1.83E-02
Arsenic	4.30E-03	4.23E-03	4.88E-03	4.47E-03
Barium	6.48E-02	1.06E-01	1.14E-01	9.48E-02
Beryllium	6.76E-04	1.27E-03	1.65E-03	1.20E-03
Cadmium	4.91E-04	4.23E-04	7.33E-04	5.49E-04
Chromium	3.59E-01	3.71E-01	3.66E-01	3.65E-01
Cobalt	4.91E-03	5.44E-03	6.11E-03	5.49E-03
Copper	3.41E-02	5.26E-02	3.79E-02	4.15E-02
Lead	1.01E-01	1.03E-01	1.03E-01	1.03E-01
Manganese	8.54E-01	8.16E-01	5.46E-01	7.39E-01
Mercury	3.99E-05	4.23E-05	7.02E-05	5.08E-05
Nickel	2.92E-02	1.54E-01	8.82E-02	9.03E-02
Selenium	1.87E-03	1.66E-03	1.47E-03	1.67E-03
Silver	9.21E-03	9.07E-03	9.16E-03	9.15E-03
Thallium	1.07E-02	1.06E-02	1.07E-02	1.07E-02
Vanadium	8.29E-03	8.76E-03	1.89E-02	1.20E-02
Zinc	4.42E-02	5.08E-02	5.13E-02	4.88E-02
POHCs				
Monochlorobenzene	3.48E+01	3.50E+01	3.50E+01	3.50E+01
Tetrachloroethene	3.50E+01	3.50E+01	3.48E+01	3.50E+01
Metal Volatility Groups				
SVM	1.02E-01	1.04E-01	1.03E-01	1.03E-01
LVM	3.64E-01	3.77E-01	3.72E-01	3.71E-01

Note: If not detected, metals, ash, and chlorine are considered to be present at their detection limit, for purposes of determining constituent feed rate.

Table 3-6. Waste Feed Volatile Organic Compound Concentration

Constituent	Units	Spent Activated Carbon Feed			
		Run 1	Run 2	Run 3	Average
Acetone	ug/kg	3.50E+03	3.60E+03	2.40E+03	3.17E+03
Acrylonitrile	ug/kg	< 3.80E+03	< 3.80E+03	< 3.80E+03	< 3.80E+03
Benzene	ug/kg	3.80E+03	1.70E+03	1.00E+03	2.17E+03
Bromobenzene	ug/kg	< 2.60E+02	< 2.60E+02	< 2.60E+02	< 2.60E+02
Bromochloromethane	ug/kg	< 1.70E+02	< 1.70E+02	< 1.70E+02	< 1.70E+02
Bromodichloromethane	ug/kg	< 1.20E+02	< 1.20E+02	< 1.20E+02	< 1.20E+02
Bromoform	ug/kg	< 2.10E+02	< 2.10E+02	< 2.10E+02	< 2.10E+02
Bromomethane	ug/kg	7.40E+02	7.50E+02	< 1.70E+02	< 5.53E+02
2-Butanone (MEK)	ug/kg	1.40E+04	3.20E+03	1.20E+03	6.13E+03
n-Buytlbenzene	ug/kg	< 3.80E+02	< 3.80E+02	< 3.80E+02	< 3.80E+02
sec-Butylbenzene	ug/kg	< 3.80E+02	< 3.80E+02	< 3.80E+02	< 3.80E+02
tert-Butylbenzene	ug/kg	< 3.40E+02	< 3.40E+02	< 3.40E+02	< 3.40E+02
Carbon disulfide	ug/kg	< 1.50E+02	< 1.50E+02	< 1.50E+02	< 1.50E+02
Carbon tetrachloride	ug/kg	< 1.20E+02	< 1.20E+02	< 1.20E+02	< 1.20E+02
Chlorobenzene	ug/kg	< 1.30E+02	< 1.30E+02	< 1.30E+02	< 1.30E+02
Chlorodibromomethane	ug/kg	< 1.20E+02	< 1.20E+02	< 1.20E+02	< 1.20E+02
Chloroethane	ug/kg	< 2.80E+02	< 2.80E+02	< 2.80E+02	< 2.80E+02
Chloroform	ug/kg	1.90E+03	1.30E+03	1.10E+03	1.43E+03
Chloromethane	ug/kg	< 1.00E+03	2.30E+03	< 1.00E+03	< 1.43E+03
2-Chlorotoluene	ug/kg	< 3.00E+02	< 3.00E+02	< 3.00E+02	< 3.00E+02
4-Chlorotoluene	ug/kg	< 3.00E+02	< 3.00E+02	< 3.00E+02	< 3.00E+02
1,2-Dibromo-3-chloropropane	ug/kg	< 1.40E+02	< 1.40E+02	< 1.40E+02	< 1.40E+02
1,2-Dibromoethane	ug/kg	< 1.80E+02	< 1.80E+02	< 1.80E+02	< 1.80E+02
Dibromomethane	ug/kg	< 1.20E+02	< 1.20E+02	< 1.20E+02	< 1.20E+02
1,2-Dichlorobenzene	ug/kg	< 3.20E+02	< 3.20E+02	< 3.20E+02	< 3.20E+02
1,3-Dichlorobenzene	ug/kg	< 3.30E+02	< 3.30E+02	< 3.30E+02	< 3.30E+02
1,4-Dichlorobenzene	ug/kg	< 3.30E+02	< 3.30E+02	< 3.30E+02	< 3.30E+02
Dichlorodifluoromethane	ug/kg	< 1.60E+02	< 1.60E+02	< 1.60E+02	< 1.60E+02
1,1-Dichloroethane	ug/kg	1.50E+02	3.60E+02	2.60E+02	2.57E+02
1,2-Dichloroethane	ug/kg	6.00E+02	1.50E+02	2.10E+02	3.20E+02
cis-1,2-Dichloroethene	ug/kg	3.20E+02	1.70E+02	1.50E+02	2.13E+02
trans-1,2-Dichloroethene	ug/kg	< 1.90E+02	< 1.90E+02	< 1.90E+02	< 1.90E+02
1,1-Dichloroethene	ug/kg	5.00E+02	6.70E+02	8.40E+02	6.70E+02
1,2-Dichloropropane	ug/kg	< 1.80E+02	< 1.80E+02	< 1.80E+02	< 1.80E+02
1,3-Dichloropropane	ug/kg	< 2.20E+02	< 2.20E+02	< 2.20E+02	< 2.20E+02
2,2-Dichloropropane	ug/kg	< 1.20E+02	< 1.20E+02	< 1.20E+02	< 1.20E+02
cis-1,3-Dichloropropene	ug/kg	< 1.20E+02	< 1.20E+02	< 1.20E+02	< 1.20E+02
trans-1,3-Dichloropropene	ug/kg	< 1.50E+02	< 1.50E+02	< 1.50E+02	< 1.50E+02
1,1-Dichloropropene	ug/kg	< 1.20E+02	< 1.20E+02	< 1.20E+02	< 1.20E+02
Ethylbenzene	ug/kg	< 2.40E+02	< 2.40E+02	< 2.40E+02	< 2.40E+02
Hexachlorobutadiene	ug/kg	< 5.50E+02	< 5.50E+02	< 5.50E+02	< 5.50E+02
2-Hexanone	ug/kg	< 8.00E+02	< 8.00E+02	< 8.00E+02	< 8.00E+02
Iodomethane	ug/kg	5.50E+02	5.50E+02	5.50E+02	5.50E+02
Isopropylbenzene	ug/kg	< 2.80E+02	< 2.80E+02	< 2.80E+02	< 2.80E+02
p-Isopropyltoluene	ug/kg	< 4.20E+02	< 4.20E+02	< 4.20E+02	< 4.20E+02
Methylene chloride	ug/kg	< 4.20E+02	< 4.20E+02	< 4.20E+02	< 4.20E+02
4-Methyl-2-pentanone	ug/kg	< 8.00E+02	< 8.00E+02	< 8.00E+02	< 8.00E+02
Naphthalene	ug/kg	< 2.40E+02	< 2.40E+02	6.00E+02	< 3.60E+02
n-Propylbenzene	ug/kg	< 3.60E+02	< 3.60E+02	< 3.60E+02	< 3.60E+02
Styrene	ug/kg	< 2.40E+02	< 2.40E+02	< 2.40E+02	< 2.40E+02
1,1,1,2-Tetrachloroethane	ug/kg	< 1.60E+02	< 1.60E+02	< 1.60E+02	< 1.60E+02
1,1,2,2,-Tetrachloroethane	ug/kg	< 2.10E+02	< 2.10E+02	< 2.10E+02	< 2.10E+02
Tetrachloroethene	ug/kg	1.60E+03	2.30E+03	1.10E+03	1.67E+03
Tetrahydrofuran	ug/kg	2.70E+03	1.10E+03	< 1.00E+03	< 1.60E+03
Toluene	ug/kg	3.20E+02	7.70E+02	2.10E+02	4.33E+02
1,2,3-Trichlorobenzene	ug/kg	< 3.60E+02	< 3.60E+02	< 3.60E+02	< 3.60E+02
1,2,4-Trichlorobenzene	ug/kg	< 3.40E+02	< 3.40E+02	< 3.40E+02	< 3.40E+02
1,1,1-Trichloroethane	ug/kg	5.60E+03	1.40E+04	1.10E+04	1.02E+04
1,1,2-Trichloroethane	ug/kg	< 1.80E+02	< 1.80E+02	< 1.80E+02	< 1.80E+02
Trichloroethene	ug/kg	4.30E+04	3.20E+04	2.00E+04	3.17E+04
Trichlorofluoromethane	ug/kg	< 3.20E+02	< 3.20E+02	< 3.20E+02	< 3.20E+02
1,2,3-Trichloropropane	ug/kg	< 2.70E+02	< 2.70E+02	< 2.70E+02	< 2.70E+02
1,1,2-Trichloro-1,2,2-trifluoroethane	ug/kg	1.70E+03	1.60E+03	1.10E+03	1.47E+03
1,2,4-Trimethylbenzene	ug/kg	< 3.20E+02	< 3.20E+02	< 3.20E+02	< 3.20E+02
1,2,5-Trimethylbenzene	ug/kg	< 3.10E+02	< 3.10E+02	< 3.10E+02	< 3.10E+02
Vinyl acetate	ug/kg	< 6.00E+02	< 6.00E+02	< 6.00E+02	< 6.00E+02
Vinyl chloride	ug/kg	< 1.40E+02	< 1.40E+02	< 1.40E+02	< 1.40E+02
m- & p- Xylene	ug/kg	< 4.80E+02	< 4.80E+02	< 4.80E+02	< 4.80E+02
o-Xylene	ug/kg	< 2.10E+02	< 2.10E+02	< 2.10E+02	< 2.10E+02
Total xylenes	ug/kg	< 7.00E+02	< 7.00E+02	< 7.00E+02	< 7.00E+02

Table 3-7. Waste Feed Semivolatile Organic Compound Concentration

Constituent	Units	Spent Activated Carbon Feed			
		Run 1	Run 2	Run 3	Average
Acenaphthene	ug/kg	5.70E+02	5.60E+02	7.80E+02	6.37E+02
Acenaphthylene	ug/kg	1.30E+03	1.20E+03	1.60E+03	1.37E+03
Aniline	ug/kg	< 1.60E+02	< 1.60E+02	< 1.60E+02	< 1.60E+02
Anthracene	ug/kg	2.00E+02	2.40E+02	2.40E+02	2.27E+02
Benz(a)anthracene	ug/kg	< 1.00E+02	< 1.00E+02	< 1.00E+02	< 1.00E+02
Benzidine	ug/kg	< 4.20E+03	< 4.20E+03	< 4.20E+03	< 4.20E+03
Benzo(b)fluoranthene	ug/kg	< 2.60E+02	< 2.60E+02	< 2.60E+02	< 2.60E+02
Benzo(k)fluoranthene	ug/kg	< 1.20E+02	< 1.20E+02	< 1.20E+02	< 1.20E+02
Benzoic acid	ug/kg	< 8.50E+02	< 8.50E+02	< 8.50E+02	< 8.50E+02
Benzo(g,h,i)perylene	ug/kg	< 1.00E+02	< 1.00E+02	< 1.00E+02	< 1.00E+02
Benzo(a)pyrene	ug/kg	< 2.00E+02	< 2.00E+02	< 2.00E+02	< 2.00E+02
Benzyl alcohol	ug/kg	< 3.40E+02	< 3.40E+02	< 3.40E+02	< 3.40E+02
bis(2-Chloroethoxy)methane	ug/kg	< 3.40E+02	< 3.40E+02	< 3.40E+02	< 3.40E+02
bis(2-Chloroethyl)ether	ug/kg	< 9.50E+01	< 9.50E+01	< 9.50E+01	< 9.50E+01
bis(2-Ethylhexyl)phthalate	ug/kg	< 3.20E+02	< 3.20E+02	4.10E+02	< 3.50E+02
4-Bromophenyl-phenylether	ug/kg	< 3.40E+02	< 3.40E+02	< 3.40E+02	< 3.40E+02
Butyl benzyl phthalate	ug/kg	< 1.40E+02	< 1.40E+02	< 1.40E+02	< 1.40E+02
Carbazole	ug/kg	< 1.40E+02	< 1.40E+02	< 1.40E+02	< 1.40E+02
4-Chloroaniline	ug/kg	< 3.40E+02	< 3.40E+02	< 3.40E+02	< 3.40E+02
4-Chloro-3-Methylphenol	ug/kg	< 3.40E+02	< 3.40E+02	< 3.40E+02	< 3.40E+02
2-Chloronaphthalene	ug/kg	< 9.50E+01	< 9.50E+01	< 9.50E+01	< 9.50E+01
2-Chlorophenol	ug/kg	< 1.20E+02	< 1.20E+02	< 1.20E+02	< 1.20E+02
4-Chlorophenyl-phenylether	ug/kg	< 1.30E+02	< 1.30E+02	< 1.30E+02	< 1.30E+02
Chrysene	ug/kg	< 1.00E+02	< 1.00E+02	< 1.00E+02	< 1.00E+02
Dibenz(a,h)anthracene	ug/kg	< 3.40E+02	< 3.40E+02	< 3.40E+02	< 3.40E+02
Dibenzofuran	ug/kg	< 1.10E+02	< 1.10E+02	< 1.10E+02	< 1.10E+02
Di-n-butylphthalate	ug/kg	< 1.60E+02	< 1.60E+02	< 1.60E+02	< 1.60E+02
1,2-Dichlorobenzene	ug/kg	2.60E+04	2.30E+04	2.70E+04	2.53E+04
1,3-Dichlorobenzene	ug/kg	< 8.50E+01	< 8.50E+01	< 8.50E+01	< 8.50E+01
1,4-Dichlorobenzene	ug/kg	1.90E+03	1.70E+03	2.10E+03	1.90E+03
3,3'-Dichlorobenzidine	ug/kg	< 3.40E+02	< 3.40E+02	< 3.40E+02	< 3.40E+02
2,4-Dichlorophenol	ug/kg	< 9.50E+01	< 9.50E+01	< 9.50E+01	< 9.50E+01
Diethylphthalate	ug/kg	< 8.50E+01	< 8.50E+01	< 8.50E+01	< 8.50E+01
2,4-Dimethylphenol	ug/kg	< 3.40E+02	< 3.40E+02	< 3.40E+02	< 3.40E+02
Dimethylphthalate	ug/kg	< 1.20E+02	< 1.20E+02	< 1.20E+02	< 1.20E+02
1,3-Dinitrobenzene	ug/kg	< 9.50E+01	< 9.50E+01	< 9.50E+01	< 9.50E+01
4,6-Dinitro-2-methylphenol	ug/kg	< 8.50E+02	< 8.50E+02	< 8.50E+02	< 8.50E+02
2,4-Dinitrophenol	ug/kg	< 8.00E+02	< 8.00E+02	< 8.00E+02	< 8.00E+02
2,4-Dinitrotoluene	ug/kg	< 3.40E+02	< 3.40E+02	< 3.40E+02	< 3.40E+02
2,6-Dinitrotoluene	ug/kg	< 3.40E+02	< 3.40E+02	< 3.40E+02	< 3.40E+02
Di-n-octyl phthalate	ug/kg	< 1.50E+02	< 1.50E+02	< 1.50E+02	< 1.50E+02
Diphenylamine	ug/kg	< 1.50E+02	< 1.50E+02	< 1.50E+02	< 1.50E+02
1,2-Diphenylhydrazine	ug/kg	< 1.20E+02	< 1.20E+02	< 1.20E+02	< 1.20E+02
Fluoranthene	ug/kg	1.40E+02	1.60E+02	1.30E+02	1.43E+02
Fluorene	ug/kg	7.30E+02	7.10E+02	1.00E+03	8.13E+02
Hexachlorobenzene	ug/kg	< 9.00E+01	< 9.00E+01	< 9.00E+01	< 9.00E+01
Hexachlorobutadiene	ug/kg	< 8.50E+01	< 8.50E+01	< 8.50E+01	< 8.50E+01
Hexachlorocyclopentadiene	ug/kg	< 8.50E+02	< 8.50E+02	< 8.50E+02	< 8.50E+02
Hexachloroethane	ug/kg	< 1.10E+02	< 1.10E+02	< 1.10E+02	< 1.10E+02
Indeno(1,2,3-c,d)pyrene	ug/kg	< 9.00E+01	< 9.00E+01	< 9.00E+01	< 9.00E+01
Isophorone	ug/kg	< 3.40E+02	< 3.40E+02	< 3.40E+02	< 3.40E+02
2-Methylnaphthalene	ug/kg	7.70E+03	7.60E+03	1.10E+04	8.77E+03
2-Methylphenol	ug/kg	< 1.00E+02	< 1.00E+02	< 1.00E+02	< 1.00E+02
3 & 4-Methylphenol	ug/kg	< 2.20E+02	3.10E+02	< 2.20E+02	< 2.50E+02
Naphthalene	ug/kg	6.50E+03	5.90E+03	8.70E+03	7.03E+03
2-Nitroaniline	ug/kg	< 1.60E+02	< 1.60E+02	< 1.60E+02	< 1.60E+02
3-Nitroaniline	ug/kg	< 9.50E+01	< 9.50E+01	< 9.50E+01	< 9.50E+01
4-Nitroaniline	ug/kg	< 3.40E+02	< 3.40E+02	< 3.40E+02	< 3.40E+02
Nitrobenzene	ug/kg	< 3.40E+02	< 3.40E+02	< 3.40E+02	< 3.40E+02
2-Nitrophenol	ug/kg	< 3.40E+02	< 3.40E+02	< 3.40E+02	< 3.40E+02
4-Nitrophenol	ug/kg	< 8.50E+02	< 8.50E+02	< 8.50E+02	< 8.50E+02
N-Nitrosodimethylamine	ug/kg	< 8.50E+01	< 8.50E+01	< 8.50E+01	< 8.50E+01
N-Nitrosodiphenylamine	ug/kg	< 1.20E+02	< 1.20E+02	< 1.20E+02	< 1.20E+02
N-Nitroso-di-n-propylamine	ug/kg	< 3.40E+02	< 3.40E+02	< 3.40E+02	< 3.40E+02
Pentachlorophenol	ug/kg	< 8.50E+02	< 8.50E+02	< 8.50E+02	< 8.50E+02
Phenanthrene	ug/kg	9.20E+02	1.00E+03	1.10E+03	1.01E+03
Phenol	ug/kg	2.00E+03	7.10E+02	4.50E+02	1.05E+03
2,2'-oxybis(1-Chloropropane)	ug/kg	< 8.50E+01	< 8.50E+01	< 8.50E+01	< 8.50E+01
Pyrene	ug/kg	2.10E+02	2.50E+02	2.20E+02	2.27E+02
Pyridine	ug/kg	< 8.50E+01	< 8.50E+01	< 8.50E+01	< 8.50E+01
1,2,4-Trichlorobenzene	ug/kg	2.00E+03	2.00E+03	3.00E+03	2.33E+03
2,4,5-Trichlorophenol	ug/kg	< 3.40E+02	< 3.40E+02	< 3.40E+02	< 3.40E+02
2,4,6-Trichlorophenol	ug/kg	< 3.40E+02	< 3.40E+02	< 3.40E+02	< 3.40E+02

Table 3-8. Summary of Spiking Materials and Rates

Run 1						
Constituent	Compound	Constituent	Spike Material wt % Constituent	Spike Material Feed Rate (lb/hr)	Constituent Feed Rate (lb/hr)	Constituent Feed Rate (g/hr)
Lead	$Pb(NO_3)_2$	Pb	0.4998%	19.83	9.91E-02	4.50E+01
Chromium	$Cr(NO_3)_3 \cdot 9H_2O$	Cr	1.753%	19.83	3.48E-01	1.58E+02
Monochlorobenzene	C_6H_5Cl	C_6H_5Cl	99.9976%	34.82	34.82	1.58E+04
Tetrachloroethene	C_2Cl_4	C_2Cl_4	99.974%	35.05	35.04	1.59E+04
Organic Surrogate Mixture						
Methylene chloride	CH_2Cl_2	CH_2Cl_2	19.51%	40.87	7.97	3.62E+03
Ethylene glycol	$C_2H_6O_2$	$C_2H_6O_2$	19.51%	40.87	7.97	3.62E+03
Toluene	$C_6H_5CH_3$	$C_6H_5CH_3$	41.44%	40.87	16.94	7.68E+03
Naphthalene	$C_{10}H_8$	$C_{10}H_8$	19.50%	40.87	7.97	3.62E+03

Run 2						
Constituent	Compound	Constituent	Spike Material wt % Constituent	Spike Material Feed Rate (lb/hr)	Constituent Feed Rate (lb/hr)	Constituent Feed Rate (g/hr)
Lead	$Pb(NO_3)_2$	Pb	0.4998%	20.15	1.01E-01	4.57E+01
Chromium	$Cr(NO_3)_3 \cdot 9H_2O$	Cr	1.753%	20.15	3.53E-01	1.60E+02
Monochlorobenzene	C_6H_5Cl	C_6H_5Cl	99.9976%	35.05	35.05	1.59E+04
Tetrachloroethene	C_2Cl_4	C_2Cl_4	99.974%	35.03	35.02	1.59E+04
Organic Surrogate Mixture						
Methylene chloride	CH_2Cl_2	CH_2Cl_2	19.51%	40.88	7.98	3.62E+03
Ethylene glycol	$C_2H_6O_2$	$C_2H_6O_2$	19.51%	40.88	7.98	3.62E+03
Toluene	$C_6H_5CH_3$	$C_6H_5CH_3$	41.44%	40.88	16.94	7.68E+03
Naphthalene	$C_{10}H_8$	$C_{10}H_8$	19.50%	40.88	7.97	3.62E+03

Run 3						
Constituent	Compound	Constituent	Spike Material wt % Constituent	Spike Material Feed Rate (lb/hr)	Constituent Feed Rate (lb/hr)	Constituent Feed Rate (g/hr)
Lead	$Pb(NO_3)_2$	Pb	0.4998%	19.88	9.94E-02	4.51E+01
Chromium	$Cr(NO_3)_3 \cdot 9H_2O$	Cr	1.753%	19.88	3.48E-01	1.58E+02
Monochlorobenzene	C_6H_5Cl	C_6H_5Cl	99.9976%	35.05	35.05	1.59E+04
Tetrachloroethene	C_2Cl_4	C_2Cl_4	99.974%	34.86	34.85	1.58E+04
Organic Surrogate Mixture						
Methylene chloride	CH_2Cl_2	CH_2Cl_2	19.51%	40.73	7.95	3.60E+03
Ethylene glycol	$C_2H_6O_2$	$C_2H_6O_2$	19.51%	40.73	7.95	3.60E+03
Toluene	$C_6H_5CH_3$	$C_6H_5CH_3$	41.44%	40.73	16.88	7.66E+03
Naphthalene	$C_{10}H_8$	$C_{10}H_8$	19.50%	40.73	7.94	3.60E+03

Table 3-9. Makeup Water, Caustic, and Scrubber Purge POHC Concentration

Constituent	Makeup Water (ug/L)				Caustic (ug/L)				Scrubber Blowdown (ug/L)				POTW Discharge (ug/L)			
	Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average
Metals																
Aluminum	< 1.10E+02	< 1.10E+02	< 1.10E+02	< 1.10E+02	< 4.40E+02	NA	NA	< 4.40E+02	1.37E+04	1.17E+04	1.76E+04	1.43E+04	1.14E+02	< 1.10E+02	1.48E+02	< 1.24E+02
Antimony	< 1.40E+01	< 1.40E+01	< 1.40E+01	< 1.40E+01	< 5.60E+01	NA	NA	< 5.60E+01	< 1.40E+01	< 1.40E+01	1.77E+01	< 1.52E+01	< 1.40E+01	< 1.40E+01	< 1.40E+01	< 1.40E+01
Arsenic	< 5.10E+00	5.90E+00	< 5.10E+00	< 5.37E+00	< 2.04E+01	NA	NA	< 2.04E+01	3.67E+01	2.61E+01	3.93E+01	3.40E+01	1.37E+01	1.26E+01	1.19E+01	1.27E+01
Barium	5.12E+01	5.19E+01	4.92E+01	5.08E+01	3.63E+02	NA	NA	3.63E+02	8.74E+02	7.65E+02	1.13E+03	9.23E+02	2.47E+02	2.26E+02	2.38E+02	2.37E+02
Beryllium	< 1.80E+00	< 1.80E+00	< 1.80E+00	< 1.80E+00	< 7.20E+00	NA	NA	< 7.20E+00	3.80E+00	3.70E+00	5.40E+00	4.30E+00	< 1.80E+00	< 1.80E+00	< 1.80E+00	< 1.80E+00
Cadmium	< 8.20E-01	< 8.20E-01	< 8.20E-01	< 8.20E-01	< 3.30E+00	NA	NA	< 3.30E+00	1.13E+01	1.17E+01	1.37E+01	1.22E+01	< 8.20E-01	< 8.20E-01	2.40E+00	< 1.35E+00
Chromium	< 3.90E+00	< 3.90E+00	< 3.90E+00	< 3.90E+00	3.64E+02	NA	NA	3.64E+02	1.72E+03	1.75E+03	2.90E+03	2.12E+03	2.46E+01	1.30E+01	2.51E+01	2.09E+01
Cobalt	< 2.20E+00	< 2.20E+00	< 2.20E+00	< 2.20E+00	< 8.80E+00	NA	NA	< 8.80E+00	3.15E+01	2.64E+01	4.05E+01	3.28E+01	< 2.20E+00	< 2.20E+00	< 2.20E+00	< 2.20E+00
Copper	< 7.00E+00	< 7.00E+00	< 7.00E+00	< 7.00E+00	< 2.80E+01	NA	NA	< 2.80E+01	1.78E+03	9.65E+02	6.69E+02	1.14E+03	< 7.00E+00	< 7.00E+00	< 7.00E+00	< 7.00E+00
Lead	< 3.70E+00	< 3.70E+00	< 3.70E+00	< 3.70E+00	9.75E+01	NA	NA	9.75E+01	7.21E+02	5.92E+02	1.51E+03	9.41E+02	< 3.70E+00	< 3.70E+00	< 3.70E+00	< 3.70E+00
Manganese	1.54E+01	1.85E+01	1.40E+01	1.60E+01	7.48E+01	NA	NA	7.48E+01	3.38E+03	3.10E+03	4.32E+03	3.60E+03	1.15E+02	6.12E+01	8.59E+01	8.74E+01
Mercury	< 6.00E-02	< 6.00E-02	< 6.00E-02	< 6.00E-02	3.50E+00	NA	NA	3.50E+00	3.50E-01	4.20E-01	4.50E-01	4.07E-01	< 6.00E-02	< 6.00E-02	< 6.00E-02	< 6.00E-02
Nickel	< 3.80E+00	< 3.80E+00	< 3.80E+00	< 3.80E+00	1.50E+02	NA	NA	1.50E+02	4.33E+02	3.97E+02	4.05E+02	4.12E+02	< 3.80E+00	< 3.80E+00	4.80E+00	< 4.13E+00
Selenium	< 4.30E+00	< 4.30E+00	< 4.30E+00	< 4.30E+00	< 1.72E+01	NA	NA	< 1.72E+01	1.19E+01	8.80E+00	1.21E+01	1.09E+01	1.10E+01	1.00E+01	9.00E+00	1.00E+01
Silver	< 9.70E+00	< 9.70E+00	< 9.70E+00	< 9.70E+00	5.30E+01	NA	NA	5.30E+01	< 9.70E+00	< 9.70E+00	< 9.70E+00	< 9.70E+00	< 9.70E+00	< 9.70E+00	< 9.70E+00	< 9.70E+00
Thallium	< 1.00E+01	< 1.00E+01	< 1.00E+01	< 1.00E+01	< 4.00E+01	NA	NA	< 4.00E+01	< 1.00E+01	< 1.00E+01	< 1.00E+01	< 1.00E+01	< 1.00E+01	< 1.00E+01	< 1.00E+01	< 1.00E+01
Vanadium	< 5.00E+00	< 5.00E+00	< 5.00E+00	< 5.00E+00	< 2.00E+01	NA	NA	< 2.00E+01	8.43E+01	5.81E+01	1.09E+02	8.38E+01	2.56E+01	1.66E+01	2.10E+01	2.11E+01
Zinc	< 3.80E+00	< 3.80E+00	< 3.80E+00	< 3.80E+00	2.04E+02	NA	NA	2.04E+02	7.65E+02	5.64E+02	6.45E+02	6.58E+02	< 3.80E+00	< 3.80E+00	< 3.80E+00	< 3.80E+00
Volatile Organics																
Acetone	4.40E+00	3.80E+00	4.50E+00	4.23E+00	4.50E+00	NA	NA	4.50E+00	ND	4.10E+00	3.60E+00	3.85E+00	3.70E+00	3.70E+00	4.80E+00	4.07E+00
Bromobenzene	ND	ND	ND	ND	1.80E-01	NA	NA	1.80E-01	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	3.20E+00	4.10E+00	2.50E+00	3.27E+00	8.60E-01	NA	NA	8.60E-01	ND	ND	ND	ND	ND	8.90E-01	1.00E+00	9.45E-01
Bromoform	4.00E+01	3.20E+01	2.80E+01	3.33E+01	2.80E+00	NA	NA	ND	9.90E-01	9.20E-01	1.00E+00	9.70E-01	2.00E+00	2.00E+00	2.10E+00	2.03E+00
Carbon disulfide	ND	ND	ND	ND	ND	NA	NA	ND	ND	ND	ND	ND	ND	ND	1.60E-01	1.60E-01
Chlorodibromomethane	1.30E+01	1.30E+01	8.90E+00	1.16E+01	1.00E+00	NA	NA	1.00E+00	9.20E-01	8.70E-01	8.90E-01	8.93E-01	1.40E+00	1.30E+00	1.40E+00	1.37E+00
Chloroform	5.60E-01	6.40E-01	6.20E-01	6.07E-01	1.70E-01	NA	NA	1.70E-01	ND	ND	ND	ND	1.40E-01	1.50E-01	1.40E-01	1.43E-01
1,2-Dichloroethane	ND	1.30E-01	1.20E-01	1.25E-01	1.30E-01	NA	NA	1.30E-01	ND	ND	ND	ND	ND	ND	ND	ND
Iodomethane	ND	ND	ND	ND	ND	NA	NA	ND	5.50E-01	ND	ND	5.50E-01	ND	ND	ND	ND
Methylene chloride	5.50E-01	2.40E+00	2.00E+00	1.65E+00	5.30E-01	NA	NA	ND	ND	2.30E+00	8.40E-01	1.57E+00	3.50E-01	2.00E+00	6.50E-01	1.00E+00
Tetrachloroethene	3.30E-01	3.10E-01	4.50E-01	3.63E-01	2.40E-01	NA	NA	2.40E-01	ND	ND	ND	ND	1.30E-01	ND	ND	1.30E-01
Toluene	ND	4.10E-01	3.10E-01	3.60E-01	ND	NA	NA	ND	ND	4.10E-01	ND	4.10E-01	ND	4.30E-01	1.20E-01	2.75E-01
Seimvolatile Organics																
bis(2-ethylhexyl)phthalate	ND	ND	ND	ND	4.10E+01	NA	NA		ND	ND	ND	ND	ND	ND	ND	ND

Note: Only detected organics shown on this table.

Table 4-1. Regulatory Compliance Summary

Parameter	Units	Test Objective	Run 1	Run 2	Run 3	Test Average
DRE - Chlorobenzene	%	> 99.99	> 99.9914	> 99.9970	99.9940	> 99.9941
DRE - Tetrachloroethene	%	> 99.99	> 99.9951	> 99.9982	> 99.9976	> 99.9970
Stack gas filterable particulate matter concentration (b)	mg/dscm (gr/dscf)	< 34 < 0.015	21 0.0090	10 0.0046	18 0.0079	16 0.0072
Stack gas PCDD/PCDF (b)	ng TEQ/dscm	< 0.40	0.065	0.052	0.062	0.060
Stack gas mercury (b)	ug/dscm	< 130	< 6.1	< 5.8	< 7.5	< 6.5
Stack gas semivolatile metals (Cd + Pb) concentration (b)	ug/dscm	< 240	210	130	360	230
Stack gas low volatility metals (As + Be + Cr) concentration (b)	ug/dscm	< 97	< 35	< 12	< 21	< 23
Stack gas HCl/Cl_2 (b)	ppmv as HCl	< 77	5.4	3.2	3.0	3.9
Stack gas carbon monoxide concentration (b)	ppmv	< 100	11.5	10.4	15.6	12.5
Stack gas total hydrocarbon concentration (b)	ppmv, as propane	< 10	< 0.6	< 0.6	< 0.6	< 0.6
Stack gas oxygen concentration	vol%, dry	NA	9.8	8.9	9.3	9.3

(a) Stack gas THC and O_2 data were obtained using Airtech's temporary CEMS.

(b) Corrected to 7% oxygen, dry basis.

Note: Compliance with regulatory standards is based on the arithmetic average of the three test runs, except for DRE, where each run must meet the specified criteria [see 40 CFR 63.1206(b)(12)(ii)]. All values are reported to two significant figures.

Table 4-2. POHC Feed Rates, Emissions Rates, and DREs

		Test Results			
Parameter	Units	Run 1	Run 2	Run 3	Average
Monochlorobenzene feed rate	lb/hr	34.81	35.05	35.05	34.97
Tetrachloroethene feed rate	lb/hr	35.04	35.02	34.84	34.97
Monochlorobenzene emission rate	lb/hr	< 2.99E-03	< 1.05E-03	2.09E-03	< 2.04E-03
Tetrachloroethene emission rate	lb/hr	< 1.73E-03	< 6.26E-04	< 8.35E-04	< 1.06E-03
Monochlorobenzene DRE	%	> 99.9914	> 99.9970	99.9940	> 99.9941
Tetrachloroethene DRE	%	> 99.9951	> 99.9982	> 99.9976	> 99.9970

Table 4-3. PCDD/PCDF Emission Summary – Run 1

Parameter	Units		Measured Value
Stack Sampling Parameters			
Net sampling time	minutes		240
Stack gas flow rate	dscfm		5,290
	acfm		11,760
Stack gas temperature	°F		176
Stack gas velocity	ft/min		3,744
Stack gas sample volume	dscf		139.210
	dscm		3.943
Isokinetic	%		101.2
Stack gas moisture content	vol%		45.2
Stack gas carbon dioxide	vol %, dry		6.4
Stack gas oxygen	vol %, dry		9.8
PCDD/PCDF			
Total PCDD/PCDF	pg/sample	<	12288
Stack gas PCDD/PCDF concentration	ng/dscm	<	3.12E+00
Stack gas PCDD/PCDF concentration	ng/dscm @7% O_2	<	3.90E+00
PCDD/PCDF emission rate	g/s	<	7.78E-09
PCDD/PCDF Toxic Equivalents as 2,3,7,8-TCDD			
Stack gas PCDD/PCDF concentration	ng/dscm	<	5.23E-02
Stack gas PCDD/PCDF concentration	ng/dscm @7% O_2	<	6.53E-02
PCDD/PCDF emission rate	g/s	<	1.30E-10

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 4-4. PCDD/PCDF Emission Summary – Run 2

Parameter	Units		Measured Value
Stack Sampling Parameters			
Net sampling time	minutes		240
Stack gas flow rate	dscfm		3,780
	acfm		8,320
Stack gas temperature	°F		175
Stack gas velocity	ft/min		2,646
Stack gas sample volume	dscf		119.220
	dscm		3.376
Isokinetic	%		100.9
Stack gas moisture content	vol%		44.4
Stack gas carbon dioxide	vol %, dry		7.2
Stack gas oxygen	vol %, dry		8.9
PCDD/PCDF			
Total PCDD/PCDF	pg/sample	<	7223.8
Stack gas PCDD/PCDF concentration	ng/dscm	<	2.12E+00
Stack gas PCDD/PCDF concentration	ng/dscm @7% O_2	<	2.45E+00
PCDD/PCDF emission rate	g/s	<	3.78E-09
PCDD/PCDF Toxic Equivalents as 2,3,7,8-TCDD			
Stack gas PCDD/PCDF concentration	ng/dscm	<	4.52E-02
Stack gas PCDD/PCDF concentration	ng/dscm @7% O_2	<	5.23E-02
PCDD/PCDF emission rate	g/s	<	8.07E-11

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 4-5. PCDD/PCDF Emission Summary – Run 3

Parameter	Units		Measured Value
Stack Sampling Parameters			
Net sampling time	minutes		240
Stack gas flow rate	dscfm		4,040
	acfm		8,850
Stack gas temperature	°F		175
Stack gas velocity	ft/min		2,820
Stack gas sample volume	dscf		126.180
	dscm		3.573
Isokinetic	%		99.9
Stack gas moisture content	vol%		44.5
Stack gas carbon dioxide	vol %, dry		7.1
Stack gas oxygen	vol %, dry		9.3
PCDD/PCDF			
Total PCDD/PCDF	pg/sample	<	9067.1
Stack gas PCDD/PCDF concentration	ng/dscm	<	2.49E+00
Stack gas PCDD/PCDF concentration	ng/dscm @7% O_2	<	2.98E+00
PCDD/PCDF emission rate	g/s	<	4.75E-09
PCDD/PCDF Toxic Equivalents as 2,3,7,8-TCDD			
Stack gas PCDD/PCDF concentration	ng/dscm	<	5.23E-02
Stack gas PCDD/PCDF concentration	ng/dscm @7% O_2	<	6.25E-02
PCDD/PCDF emission rate	g/s	<	9.96E-11

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 4-6. Particulate Matter, Hydrogen Chloride, and Chlorine Emissions Summary – Run 1

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	5,030
	acfm	11,320
	dscm/min	142.45
Stack gas temperature	°F	175
Stack gas velocity	ft/min	3,606
Stack gas sample volume	dscf	72.660
	dscm	2.058
Isokinetic	%	93.7
Stack gas moisture content	vol %	45.9
Stack gas carbon dioxide content	vol %, dry	6.3
Stack gas oxygen content	vol %, dry	9.6
Hydrogen chloride and chlorine		
HCl collected	mg	11.8
Cl_2 collected	mg	1.95
Stack gas HCl concentration	mg/dscm	5.73E+00
	mg/dscm @7% O_2	7.04E+00
Stack gas HCl emission rate	lb/h	1.08E-01
	kg/h	4.90E-02
	g/s	1.36E-02
Stack gas Cl_2 concentration	mg/dscm	9.48E-01
	mg/dscm @7% O_2	1.16E+00
Stack gas Cl_2 emission rate	lb/h	1.79E-02
	kg/h	8.10E-03
	g/s	2.25E-03
Stack gas HCl+Cl_2 concentration expressed as HCl equivalents	ppmv, dry	4.42E+00
	ppmv, dry @7% O_2	5.43E+00
Particulate		
Particulate matter collected	mg	34.3
Particulate concentration	gr/dscf	7.29E-03
	gr/dscf @ 7% O_2	8.95E-03
	mg/dscm	1.67E+01
	mg/dscm @ 7% O_2	2.05E+01
Particulate emission rate	lb/h	3.14E-01
	kg/h	1.42E-01
	g/s	3.96E-02

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 4-7. Particulate Matter, Hydrogen Chloride, and Chlorine Emissions Summary – Run 2

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	3,850
	acfm	8,580
	dscm/min	109.03
Stack gas temperature	°F	174
Stack gas velocity	ft/min	2,730
Stack gas sample volume	dscf	74.990
	dscm	2.124
Isokinetic	%	96.0
Stack gas moisture content	vol %	45.1
Stack gas carbon dioxide content	vol %, dry	7.0
Stack gas oxygen content	vol %, dry	8.9
Hydrogen chloride and chlorine		
HCl collected	mg	6.95
Cl_2 collected	mg	2.01
Stack gas HCl concentration	mg/dscm	3.27E+00
	mg/dscm @7% O_2	3.79E+00
Stack gas HCl emission rate	lb/h	4.72E-02
	kg/h	2.14E-02
	g/s	5.95E-03
Stack gas Cl_2 concentration	mg/dscm	9.46E-01
	mg/dscm @7% O_2	1.10E+00
Stack gas Cl_2 emission rate	lb/h	1.37E-02
	kg/h	6.19E-03
	g/s	1.72E-03
Stack gas HCl+Cl_2 concentration expressed as HCl equivalents	ppmv, dry	2.80E+00
	ppmv, dry @7% O_2	3.24E+00
Particulate		
Particulate matter collected	mg	19.4
Particulate concentration	gr/dscf	3.99E-03
	gr/dscf @ 7% O_2	4.62E-03
	mg/dscm	9.13E+00
	mg/dscm @ 7% O_2	1.06E+01
Particulate emission rate	lb/h	1.32E-01
	kg/h	5.98E-02
	g/s	1.66E-02

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 4-8. Particulate Matter, Hydrogen Chloride, and Chlorine Emissions Summary – Run 3

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	4,090
	acfm	8,970
	dscm/min	115.83
Stack gas temperature	°F	174
Stack gas velocity	ft/min	2,856
Stack gas sample volume	dscf	79.290
	dscm	2.246
Isokinetic	%	95.7
Stack gas moisture content	vol %	44.8
Stack gas carbon dioxide content	vol %, dry	7.0
Stack gas oxygen content	vol %, dry	9.3
Hydrogen chloride and chlorine		
HCl collected	mg	6.49
Cl_2 collected	mg	1.94
Stack gas HCl concentration	mg/dscm	2.89E+00
	mg/dscm @7% O_2	3.46E+00
Stack gas HCl emission rate	lb/h	4.43E-02
	kg/h	2.01E-02
	g/s	5.58E-03
Stack gas Cl_2 concentration	mg/dscm	8.64E-01
	mg/dscm @7% O_2	1.03E+00
Stack gas Cl_2 emission rate	lb/h	1.32E-02
	kg/h	6.00E-03
	g/s	1.67E-03
Stack gas HCl+Cl_2 concentration expressed as HCl equivalents	ppmv, dry	2.49E+00
	ppmv, dry @7% O_2	2.98E+00
Particulate		
Particulate matter collected	mg	33.6
Particulate concentration	gr/dscf	6.54E-03
	gr/dscf @ 7% O_2	7.83E-03
	mg/dscm	1.50E+01
	mg/dscm @ 7% O_2	1.79E+01
Particulate emission rate	lb/h	2.29E-01
	kg/h	1.04E-01
	g/s	2.89E-02

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 4-9. Metals Emission Summary – Run 1

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	4,970
	acfm	11,260
	dscm/min	140.75
Stack gas temperature	°F	176
Stack gas velocity	ft/min	3,582
Stack gas sample volume	dscf	76.790
	dscm	2.175
Isokinetic	%	98.2
Stack gas moisture content	vol %	46.2
Stack gas carbon dioxide content	vol %, dry	6.3
Stack gas oxygen content	vol %, dry	9.6
Aluminum		
Metal collected	ug	132.3
Metal concentration	ug/dscm	6.08E+01
	ug/dscm @ 7% O_2	7.47E+01
Metal emission rate	lb/h	1.13E-03
	g/s	1.43E-04
Antimony		
Metal collected	ug	< 5.3
Metal concentration	ug/dscm	< 2.44E+00
	ug/dscm @ 7% O_2	< 2.99E+00
Metal emission rate	lb/h	< 4.54E-05
	g/s	< 5.72E-06
Arsenic		
Metal collected	ug	< 5.9
Metal concentration	ug/dscm	< 2.73E+00
	ug/dscm @ 7% O_2	< 3.35E+00
Metal emission rate	lb/h	< 5.08E-05
	g/s	< 6.40E-06
Barium		
Metal collected	ug	10.2
Metal concentration	ug/dscm	4.69E+00
	ug/dscm @ 7% O_2	5.76E+00
Metal emission rate	lb/h	8.73E-05
	g/s	1.10E-05
Beryllium		
Metal collected	ug	< 0.4
Metal concentration	ug/dscm	< 1.75E-01
	ug/dscm @ 7% O_2	< 2.15E-01
Metal emission rate	lb/h	< 3.25E-06
	g/s	< 4.10E-07
Cadmium		
Metal collected	ug	12.1
Metal concentration	ug/dscm	5.56E+00
	ug/dscm @ 7% O_2	6.83E+00
Metal emission rate	lb/h	1.04E-04
	g/s	1.31E-05
Chromium		
Metal collected	ug	56.0
Metal concentration	ug/dscm	2.58E+01
	ug/dscm @ 7% O_2	3.16E+01
Metal emission rate	lb/h	4.79E-04
	g/s	6.04E-05
Cobalt		
Metal collected	ug	< 1.1
Metal concentration	ug/dscm	< 5.15E-01
	ug/dscm @ 7% O_2	< 6.32E-01
Metal emission rate	lb/h	< 9.59E-06
	g/s	< 1.21E-06
Copper		
Metal collected	ug	167.1
Metal concentration	ug/dscm	7.68E+01
	ug/dscm @ 7% O_2	9.44E+01
Metal emission rate	lb/h	1.43E-03
	g/s	1.80E-04
Lead		
Metal collected	ug	356.8
Metal concentration	ug/dscm	1.64E+02
	ug/dscm @ 7% O_2	2.01E+02
Metal emission rate	lb/h	3.05E-03
	g/s	3.85E-04
Manganese		
Metal collected	ug	65.8
Metal concentration	ug/dscm	3.03E+01
	ug/dscm @ 7% O_2	3.72E+01
Metal emission rate	lb/h	5.63E-04
	g/s	7.10E-05
Mercury		
Metal collected	ug	< 10.8
Metal concentration	ug/dscm	< 4.98E+00
	ug/dscm @ 7% O_2	< 6.11E+00
Metal emission rate	lb/h	< 9.26E-05
	g/s	< 1.17E-05
Nickel		
Metal collected	ug	12.0
Metal concentration	ug/dscm	5.52E+00
	ug/dscm @ 7% O_2	6.78E+00
Metal emission rate	lb/h	1.03E-04
	g/s	1.29E-05
Selenium		
Metal collected	ug	4.5
Metal concentration	ug/dscm	2.07E+00
	ug/dscm @ 7% O_2	2.54E+00
Metal emission rate	lb/h	3.85E-05
	g/s	4.85E-06
Silver		
Metal collected	ug	2.6
Metal concentration	ug/dscm	1.20E+00
	ug/dscm @ 7% O_2	1.47E+00
Metal emission rate	lb/h	2.23E-05
	g/s	2.80E-06
Thallium		
Metal collected	ug	< 11.0
Metal concentration	ug/dscm	< 5.06E+00
	ug/dscm @ 7% O_2	< 6.21E+00
Metal emission rate	lb/h	< 9.42E-05
	g/s	< 1.19E-05
Vanadium		
Metal collected	ug	< 3.0
Metal concentration	ug/dscm	< 1.38E+00
	ug/dscm @ 7% O_2	< 1.69E+00
Metal emission rate	lb/h	< 2.57E-05
	g/s	< 3.24E-06
Zinc		
Metal collected	ug	218.4
Metal concentration	ug/dscm	1.00E+02
	ug/dscm @ 7% O_2	1.23E+02
Metal emission rate	lb/h	1.87E-03
	g/s	2.36E-04

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 4-10. Metals Emission Summary – Run 2

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	3,860
	acfm	8,600
	dscm/min	109.32
Stack gas temperature	°F	175
Stack gas velocity	ft/min	2,736
Stack gas sample volume	dscf	79.370
	dscm	2.248
Isokinetic	%	102.9
Stack gas moisture content	vol %	45.1
Stack gas carbon dioxide content	vol %, dry	7.0
Stack gas oxygen content	vol %, dry	8.9
Aluminum		
Metal collected	ug	123.2
Metal concentration	ug/dscm	5.48E+01
	ug/dscm @ 7% O_2	6.34E+01
Metal emission rate	lb/h	7.93E-04
	g/s	9.99E-05
Antimony		
Metal collected	ug	< 4.8
Metal concentration	ug/dscm	< 2.14E+00
	ug/dscm @ 7% O_2	< 2.47E+00
Metal emission rate	lb/h	< 3.09E-05
	g/s	< 3.89E-06
Arsenic		
Metal collected	ug	< 2.7
Metal concentration	ug/dscm	< 1.21E+00
	ug/dscm @ 7% O_2	< 1.41E+00
Metal emission rate	lb/h	< 1.76E-05
	g/s	< 2.21E-06
Barium		
Metal collected	ug	9.0
Metal concentration	ug/dscm	4.00E+00
	ug/dscm @ 7% O_2	4.63E+00
Metal emission rate	lb/h	5.79E-05
	g/s	7.30E-06
Beryllium		
Metal collected	ug	< 0.4 ND
Metal concentration	ug/dscm	< 1.60E-01 ND
	ug/dscm @ 7% O_2	< 1.85E-01 ND
Metal emission rate	lb/h	< 2.32E-06 ND
	g/s	< 2.92E-07 ND
Cadmium		
Metal collected	ug	7.9
Metal concentration	ug/dscm	3.51E+00
	ug/dscm @ 7% O_2	4.07E+00
Metal emission rate	lb/h	5.08E-05
	g/s	6.40E-06
Chromium		
Metal collected	ug	20.2
Metal concentration	ug/dscm	8.99E+00
	ug/dscm @ 7% O_2	1.04E+01
Metal emission rate	lb/h	1.30E-04
	g/s	1.64E-05
Cobalt		
Metal collected	ug	< 1.0 ND
Metal concentration	ug/dscm	< 4.45E-01 ND
	ug/dscm @ 7% O_2	< 5.15E-01 ND
Metal emission rate	lb/h	< 6.43E-06 ND
	g/s	< 8.11E-07 ND
Copper		
Metal collected	ug	108.1
Metal concentration	ug/dscm	4.81E+01
	ug/dscm @ 7% O_2	5.56E+01
Metal emission rate	lb/h	6.95E-04
	g/s	8.76E-05
Lead		
Metal collected	ug	250.4
Metal concentration	ug/dscm	1.11E+02
	ug/dscm @ 7% O_2	1.29E+02
Metal emission rate	lb/h	1.61E-03
	g/s	2.03E-04
Manganese		
Metal collected	ug	42.0
Metal concentration	ug/dscm	1.87E+01
	ug/dscm @ 7% O_2	2.16E+01
Metal emission rate	lb/h	2.70E-04
	g/s	3.40E-05
Mercury		
Metal collected	ug	< 11.3
Metal concentration	ug/dscm	< 5.02E+00
	ug/dscm @ 7% O_2	< 5.81E+00
Metal emission rate	lb/h	< 7.26E-05
	g/s	< 9.15E-06
Nickel		
Metal collected	ug	11.4
Metal concentration	ug/dscm	5.07E+00
	ug/dscm @ 7% O_2	5.87E+00
Metal emission rate	lb/h	7.33E-05
	g/s	9.24E-06
Selenium		
Metal collected	ug	4.0
Metal concentration	ug/dscm	1.78E+00
	ug/dscm @ 7% O_2	2.06E+00
Metal emission rate	lb/h	2.57E-05
	g/s	3.24E-06
Silver		
Metal collected	ug	5.7
Metal concentration	ug/dscm	2.54E+00
	ug/dscm @ 7% O_2	2.93E+00
Metal emission rate	lb/h	3.67E-05
	g/s	4.62E-06
Thallium		
Metal collected	ug	< 10.6
Metal concentration	ug/dscm	< 4.72E+00
	ug/dscm @ 7% O_2	< 5.46E+00
Metal emission rate	lb/h	< 6.82E-05
	g/s	< 8.59E-06
Vanadium		
Metal collected	ug	< 1.6
Metal concentration	ug/dscm	< 7.12E-01
	ug/dscm @ 7% O_2	< 8.24E-01
Metal emission rate	lb/h	< 1.03E-05
	g/s	< 1.30E-06
Zinc		
Metal collected	ug	136.2
Metal concentration	ug/dscm	6.06E+01
	ug/dscm @ 7% O_2	7.01E+01
Metal emission rate	lb/h	8.76E-04
	g/s	1.10E-04

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 4-11. Metals Emission Summary – Run 3

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	4,000
	acfm	8,920
	dscm/min	113.28
Stack gas temperature	°F	175
Stack gas velocity	ft/min	2,838
Stack gas sample volume	dscf	82.610
	dscm	2.340
Isokinetic	%	103.2
Stack gas moisture content	vol %	45.5
Stack gas carbon dioxide content	vol %, dry	7.0
Stack gas oxygen content	vol %, dry	9.3
Aluminum		
Metal collected	ug	125.2
Metal concentration	ug/dscm	5.35E+01
	ug/dscm @ 7% O_2	6.40E+01
Metal emission rate	lb/h	8.02E-04
	g/s	1.01E-04
Antimony		
Metal collected	ug	< 4.9
Metal concentration	ug/dscm	< 2.09E+00
	ug/dscm @ 7% O_2	< 2.51E+00
Metal emission rate	lb/h	< 3.14E-05
	g/s	< 3.95E-06
Arsenic		
Metal collected	ug	< 3.7
Metal concentration	ug/dscm	< 1.59E+00
	ug/dscm @ 7% O_2	< 1.91E+00
Metal emission rate	lb/h	< 2.39E-05
	g/s	< 3.01E-06
Barium		
Metal collected	ug	10.8
Metal concentration	ug/dscm	4.62E+00
	ug/dscm @ 7% O_2	5.52E+00
Metal emission rate	lb/h	6.92E-05
	g/s	8.72E-06
Beryllium		
Metal collected	ug	< 0.4 ND
Metal concentration	ug/dscm	< 1.54E-01 ND
	ug/dscm @ 7% O_2	< 1.84E-01 ND
Metal emission rate	lb/h	< 2.31E-06 ND
	g/s	< 2.91E-07 ND
Cadmium		
Metal collected	ug	9.7
Metal concentration	ug/dscm	4.15E+00
	ug/dscm @ 7% O_2	4.97E+00
Metal emission rate	lb/h	6.22E-05
	g/s	7.84E-06
Chromium		
Metal collected	ug	36.5
Metal concentration	ug/dscm	1.56E+01
	ug/dscm @ 7% O_2	1.87E+01
Metal emission rate	lb/h	2.34E-04
	g/s	2.95E-05
Cobalt		
Metal collected	ug	< 1.0 ND
Metal concentration	ug/dscm	< 4.27E-01 ND
	ug/dscm @ 7% O_2	< 5.11E-01 ND
Metal emission rate	lb/h	< 6.40E-06 ND
	g/s	< 8.07E-07 ND
Copper		
Metal collected	ug	112.4
Metal concentration	ug/dscm	4.80E+01
	ug/dscm @ 7% O_2	5.75E+01
Metal emission rate	lb/h	7.20E-04
	g/s	9.07E-05
Lead		
Metal collected	ug	694.2
Metal concentration	ug/dscm	2.97E+02
	ug/dscm @ 7% O_2	3.55E+02
Metal emission rate	lb/h	4.45E-03
	g/s	5.60E-04
Manganese		
Metal collected	ug	41.4
Metal concentration	ug/dscm	1.77E+01
	ug/dscm @ 7% O_2	2.12E+01
Metal emission rate	lb/h	2.65E-04
	g/s	3.34E-05
Mercury		
Metal collected	ug	< 14.7
Metal concentration	ug/dscm	< 6.28E+00
	ug/dscm @ 7% O_2	< 7.52E+00
Metal emission rate	lb/h	< 9.42E-05
	g/s	< 1.19E-05
Nickel		
Metal collected	ug	9.4
Metal concentration	ug/dscm	4.02E+00
	ug/dscm @ 7% O_2	4.81E+00
Metal emission rate	lb/h	6.02E-05
	g/s	7.59E-06
Selenium		
Metal collected	ug	3.9
Metal concentration	ug/dscm	1.68E+00
	ug/dscm @ 7% O_2	2.02E+00
Metal emission rate	lb/h	2.52E-05
	g/s	3.18E-06
Silver		
Metal collected	ug	< 1.9 ND
Metal concentration	ug/dscm	< 8.29E-01 ND
	ug/dscm @ 7% O_2	< 9.92E-01 ND
Metal emission rate	lb/h	< 1.24E-05 ND
	g/s	< 1.57E-06 ND
Thallium		
Metal collected	ug	< 10.7
Metal concentration	ug/dscm	< 4.57E+00
	ug/dscm @ 7% O_2	< 5.47E+00
Metal emission rate	lb/h	< 6.85E-05
	g/s	< 8.64E-06
Vanadium		
Metal collected	ug	< 2.0
Metal concentration	ug/dscm	< 8.55E-01
	ug/dscm @ 7% O_2	< 1.02E+00
Metal emission rate	lb/h	< 1.28E-05
	g/s	< 1.61E-06
Zinc		
Metal collected	ug	133.3
Metal concentration	ug/dscm	5.70E+01
	ug/dscm @ 7% O_2	6.82E+01
Metal emission rate	lb/h	8.54E-04
	g/s	1.08E-04

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 5-1. VOST Audit Sample Results

Compound	Units	Original Audit Samples (No Ice)						Final Audit Samples (Ice)		
		#1	#2	#3	#4	#5	#6	#1	#2	#3
Acetone	ug	0.31	0.39	0.39	0.26	0.18	ND	0.22 B	0.24 B	0.17 B
Benzene	ug	0.054	0.058	0.057	0.058	0.063	0.059	0.064	0.069	0.068
2-Butanone	ug	0.082 J	0.091 J	0.084 J	0.068 J	0.046 J	ND	0.044 J	0.053 J	ND
Carbon Disulfide	ug	0.015	0.016	0.016	0.016	0.015	0.016	0.017	0.018	0.018
Carbon Tetrachloride	ug	0.041	0.046	0.045	0.046	0.047	0.049	0.049	0.053	0.052
Chlorobenzene	ug	ND	ND	0.0013 J	0.0016 J	0.0029 J	0.0044 J	ND	ND	ND
Chloroform	ug	0.065	0.074	0.069	0.072	0.076	0.074	0.078	0.086	0.089
Methylene Chloride	ug	0.075	0.077	0.072	0.075	0.076	0.075	0.099	0.12	0.12
Tetrachloroethene	ug	0.14	0.16	0.16	0.16	0.14	0.16	0.15	0.15	0.14
Tetrahydrofuran	ug	ND	ND	ND	ND	0.034 J	ND	ND	0.036 J	0.054 J
Toluene	ug	0.0032 J	0.0035 J	0.0033 J	0.0033 J	0.003 J	0.0034 J	0.0036 J	0.0034 J	0.0032 J

Table 6-1. Proposed Operating Parameter Limits

Control Parameters[a]	**Anticipated Permit Limit**	**Comments**[b]
GROUP A1 PARAMETERS		
Maximum spent carbon feed rate (lb/hr)	3049	Block hour AWFCO
Minimum afterburner temperature (^oF)	1760	Hourly rolling average AWFCO
Maximum hearth #5 temperature (^oF)	1650	Hourly rolling average AWFCO
Minimum hearth #5 temperature (^oF)	TBD	Hourly rolling average AWFCO
Minimum venturi scrubber pressure differential (in. w.c.)	18	Hourly rolling average AWFCO
Minimum quench/venturi scrubber total liquid flow rate (gpm)	75	Hourly rolling average AWFCO
Minimum packed bed scrubber pH	4.4	Hourly rolling average AWFCO
Minimum packed bed scrubber liquid flow rate (gpm)	63	Hourly rolling average AWFCO
Minimum wet scrubber blowdown flow rate (gpm)	58	Hourly rolling average AWFCO
Minimum WESP secondary voltage (kVDC)	22	Hourly rolling average AWFCO
Maximum stack gas flow rate acfm	9,550	Hourly rolling average AWFCO
GROUP A2 PARAMETERS		
Maximum stack gas carbon monoxide (ppmvd, @7% oxygen)[c]	100	Hourly rolling average AWFCO
GROUP B PARAMETERS		
Allowable hazardous constituents	All except dioxin wastes and TSCA PCBs	Class 1 POHC demonstrated
Maximum total chlorine and chloride feed rate (lb/hr)	60	12-hour rolling average
Maximum mercury feed rate (lb/hr)	1.8E-03	12-hour rolling average
Maximum semivolatile metal (Cd + Pb) feed rate (lb/hr)	1.0E-01	12-hour rolling average
Maximum low volatility metal (As + Be + Cr) feed rate (lb/hr)	1.5E+00	12-hour rolling average
GROUP C PARAMETERS		
Minimum packed bed scrubber pressure differential (in. w.c.)	0.1	Hourly rolling average

(a) Group A1 parameters are continuously monitored and recorded, and are interlocked with the automatic waste feed cutoff system. The values for the Group A1 parameters are based on the performance demonstration test operating conditions.

Group A2 parameters are continuously monitored and recorded, and are interlocked with the automatic waste feed cutoff system. The values for the Group A2 parameters are based on regulatory standards or good operating practice rather than performance demonstration test operating conditions.

Group B parameters are continuously monitored and recorded, but are not interlocked with the automatic waste feed cutoff system. Values for the group B parameters are based on the performance demonstration test operating conditions.

Group C parameters are continuously monitoring and recording, but are not interlocked with the automatic waste feed cutoff system. The values for the Group C parameters are based on manufacturer’s specifications and/or operational and safety considerations rather than performance demonstration test operating conditions.

(b) AWFCO = Automatic waste feed cutoff.

(c) AWFCO interlock will not be active during the daily CEM calibration period.

Table 6-2. Metals System Removal Efficiency

Run 1

Metal	Feed Rate (lb/hr)	Feed Rate (g/hr)	Emission Rate (lb/hr)	Emission Rate (g/hr)	SRE (%)
Chromium	3.59E-01	1.63E+02	4.79E-04	2.17E-01	99.87%

Run 2

Metal	Feed Rate (lb/hr)	Feed Rate (g/hr)	Emission Rate (lb/hr)	Emission Rate (g/hr)	SRE (%)
Chromium	3.71E-01	1.68E+02	1.30E-04	5.90E-02	99.96%

Run 3

Metal	Feed Rate (lb/hr)	Feed Rate (g/hr)	Emission Rate (lb/hr)	Emission Rate (g/hr)	SRE (%)
Chromium	3.66E-01	1.66E+02	2.34E-04	1.06E-01	99.94%

Table 7-1. Metals Emission Summary – Run 1

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	4,970
	acfm	11,260
	dscm/min	140.75
Stack gas temperature	°F	176
Stack gas velocity	ft/min	3,582
Stack gas sample volume	dscf	76.790
	dscm	2.175
Isokinetic	%	98.2
Stack gas moisture content	vol %	46.2
Stack gas carbon dioxide content	vol %, dry	6.3
Stack gas oxygen content	vol %, dry	9.6
Aluminum		
Metal collected	ug	132.3
Metal concentration	ug/dscm	6.08E+01
	ug/dscm @ 7% O_2	7.47E+01
Metal emission rate	lb/h	1.13E-03
	g/s	1.43E-04
Antimony		
Metal collected	ug	< 5.3
Metal concentration	ug/dscm	< 2.44E+00
	ug/dscm @ 7% O_2	< 2.99E+00
Metal emission rate	lb/h	< 4.54E-05
	g/s	< 5.72E-06
Arsenic		
Metal collected	ug	< 5.9
Metal concentration	ug/dscm	< 2.73E+00
	ug/dscm @ 7% O_2	< 3.35E+00
Metal emission rate	lb/h	< 5.08E-05
	g/s	< 6.40E-06
Barium		
Metal collected	ug	10.2
Metal concentration	ug/dscm	4.69E+00
	ug/dscm @ 7% O_2	5.76E+00
Metal emission rate	lb/h	8.73E-05
	g/s	1.10E-05
Beryllium		
Metal collected	ug	< 0.4
Metal concentration	ug/dscm	< 1.75E-01
	ug/dscm @ 7% O_2	< 2.15E-01
Metal emission rate	lb/h	< 3.25E-06
	g/s	< 4.10E-07
Cadmium		
Metal collected	ug	12.1
Metal concentration	ug/dscm	5.56E+00
	ug/dscm @ 7% O_2	6.83E+00
Metal emission rate	lb/h	1.04E-04
	g/s	1.31E-05
Chromium		
Metal collected	ug	56.0
Metal concentration	ug/dscm	2.58E+01
	ug/dscm @ 7% O_2	3.16E+01
Metal emission rate	lb/h	4.79E-04
	g/s	6.04E-05
Cobalt		
Metal collected	ug	< 1.1
Metal concentration	ug/dscm	< 5.15E-01
	ug/dscm @ 7% O_2	< 6.32E-01
Metal emission rate	lb/h	< 9.59E-06
	g/s	< 1.21E-06
Copper		
Metal collected	ug	167.1
Metal concentration	ug/dscm	7.68E+01
	ug/dscm @ 7% O_2	9.44E+01
Metal emission rate	lb/h	1.43E-03
	g/s	1.80E-04
Lead		
Metal collected	ug	356.8
Metal concentration	ug/dscm	1.64E+02
	ug/dscm @ 7% O_2	2.01E+02
Metal emission rate	lb/h	3.05E-03
	g/s	3.85E-04
Manganese		
Metal collected	ug	65.8
Metal concentration	ug/dscm	3.03E+01
	ug/dscm @ 7% O_2	3.72E+01
Metal emission rate	lb/h	5.63E-04
	g/s	7.10E-05
Mercury		
Metal collected	ug	< 10.8
Metal concentration	ug/dscm	< 4.98E+00
	ug/dscm @ 7% O_2	< 6.11E+00
Metal emission rate	lb/h	< 9.26E-05
	g/s	< 1.17E-05
Nickel		
Metal collected	ug	12.0
Metal concentration	ug/dscm	5.52E+00
	ug/dscm @ 7% O_2	6.78E+00
Metal emission rate	lb/h	1.03E-04
	g/s	1.29E-05
Selenium		
Metal collected	ug	4.5
Metal concentration	ug/dscm	2.07E+00
	ug/dscm @ 7% O_2	2.54E+00
Metal emission rate	lb/h	3.85E-05
	g/s	4.85E-06
Silver		
Metal collected	ug	2.6
Metal concentration	ug/dscm	1.20E+00
	ug/dscm @ 7% O_2	1.47E+00
Metal emission rate	lb/h	2.23E-05
	g/s	2.80E-06
Thallium		
Metal collected	ug	< 11.0
Metal concentration	ug/dscm	< 5.06E+00
	ug/dscm @ 7% O_2	< 6.21E+00
Metal emission rate	lb/h	< 9.42E-05
	g/s	< 1.19E-05
Vanadium		
Metal collected	ug	< 3.0
Metal concentration	ug/dscm	< 1.38E+00
	ug/dscm @ 7% O_2	< 1.69E+00
Metal emission rate	lb/h	< 2.57E-05
	g/s	< 3.24E-06
Zinc		
Metal collected	ug	218.4
Metal concentration	ug/dscm	1.00E+02
	ug/dscm @ 7% O_2	1.23E+02
Metal emission rate	lb/h	1.87E-03
	g/s	2.36E-04

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 7-2. Metals Emission Summary – Run 2

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	3,860
	acfm	8,600
	dscm/min	109.32
Stack gas temperature	°F	175
Stack gas velocity	ft/min	2,736
Stack gas sample volume	dscf	79.370
	dscm	2.248
Isokinetic	%	102.9
Stack gas moisture content	vol %	45.1
Stack gas carbon dioxide content	vol %, dry	7.0
Stack gas oxygen content	vol %, dry	8.9
Aluminum		
Metal collected	ug	123.2
Metal concentration	ug/dscm	5.48E+01
	ug/dscm @ 7% O_2	6.34E+01
Metal emission rate	lb/h	7.93E-04
	g/s	9.99E-05
Antimony		
Metal collected	ug	< 4.8
Metal concentration	ug/dscm	< 2.14E+00
	ug/dscm @ 7% O_2	< 2.47E+00
Metal emission rate	lb/h	< 3.09E-05
	g/s	< 3.89E-06
Arsenic		
Metal collected	ug	< 2.7
Metal concentration	ug/dscm	< 1.21E+00
	ug/dscm @ 7% O_2	< 1.41E+00
Metal emission rate	lb/h	< 1.76E-05
	g/s	< 2.21E-06
Barium		
Metal collected	ug	9.0
Metal concentration	ug/dscm	4.00E+00
	ug/dscm @ 7% O_2	4.63E+00
Metal emission rate	lb/h	5.79E-05
	g/s	7.30E-06
Beryllium		
Metal collected	ug	< 0.4 ND
Metal concentration	ug/dscm	< 1.60E-01 ND
	ug/dscm @ 7% O_2	< 1.85E-01 ND
Metal emission rate	lb/h	< 2.32E-06 ND
	g/s	< 2.92E-07 ND
Cadmium		
Metal collected	ug	7.9
Metal concentration	ug/dscm	3.51E+00
	ug/dscm @ 7% O_2	4.07E+00
Metal emission rate	lb/h	5.08E-05
	g/s	6.40E-06
Chromium		
Metal collected	ug	20.2
Metal concentration	ug/dscm	8.99E+00
	ug/dscm @ 7% O_2	1.04E+01
Metal emission rate	lb/h	1.30E-04
	g/s	1.64E-05
Cobalt		
Metal collected	ug	< 1.0 ND
Metal concentration	ug/dscm	< 4.45E-01 ND
	ug/dscm @ 7% O_2	< 5.15E-01 ND
Metal emission rate	lb/h	< 6.43E-06 ND
	g/s	< 8.11E-07 ND
Copper		
Metal collected	ug	108.1
Metal concentration	ug/dscm	4.81E+01
	ug/dscm @ 7% O_2	5.56E+01
Metal emission rate	lb/h	6.95E-04
	g/s	8.76E-05
Lead		
Metal collected	ug	250.4
Metal concentration	ug/dscm	1.11E+02
	ug/dscm @ 7% O_2	1.29E+02
Metal emission rate	lb/h	1.61E-03
	g/s	2.03E-04
Manganese		
Metal collected	ug	42.0
Metal concentration	ug/dscm	1.87E+01
	ug/dscm @ 7% O_2	2.16E+01
Metal emission rate	lb/h	2.70E-04
	g/s	3.40E-05
Mercury		
Metal collected	ug	< 11.3
Metal concentration	ug/dscm	< 5.02E+00
	ug/dscm @ 7% O_2	< 5.81E+00
Metal emission rate	lb/h	< 7.26E-05
	g/s	< 9.15E-06
Nickel		
Metal collected	ug	11.4
Metal concentration	ug/dscm	5.07E+00
	ug/dscm @ 7% O_2	5.87E+00
Metal emission rate	lb/h	7.33E-05
	g/s	9.24E-06
Selenium		
Metal collected	ug	4.0
Metal concentration	ug/dscm	1.78E+00
	ug/dscm @ 7% O_2	2.06E+00
Metal emission rate	lb/h	2.57E-05
	g/s	3.24E-06
Silver		
Metal collected	ug	5.7
Metal concentration	ug/dscm	2.54E+00
	ug/dscm @ 7% O_2	2.93E+00
Metal emission rate	lb/h	3.67E-05
	g/s	4.62E-06
Thallium		
Metal collected	ug	< 10.6
Metal concentration	ug/dscm	< 4.72E+00
	ug/dscm @ 7% O_2	< 5.46E+00
Metal emission rate	lb/h	< 6.82E-05
	g/s	< 8.59E-06
Vanadium		
Metal collected	ug	< 1.6
Metal concentration	ug/dscm	< 7.12E-01
	ug/dscm @ 7% O_2	< 8.24E-01
Metal emission rate	lb/h	< 1.03E-05
	g/s	< 1.30E-06
Zinc		
Metal collected	ug	136.2
Metal concentration	ug/dscm	6.06E+01
	ug/dscm @ 7% O_2	7.01E+01
Metal emission rate	lb/h	8.76E-04
	g/s	1.10E-04

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 7-3. Metals Emission Summary – Run 3

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	4,000
	acfm	8,920
	dscm/min	113.28
Stack gas temperature	°F	175
Stack gas velocity	ft/min	2,838
Stack gas sample volume	dscf	82.610
	dscm	2.340
Isokinetic	%	103.2
Stack gas moisture content	vol %	45.5
Stack gas carbon dioxide content	vol %, dry	7.0
Stack gas oxygen content	vol %, dry	9.3
Aluminum		
Metal collected	ug	125.2
Metal concentration	ug/dscm	5.35E+01
	ug/dscm @ 7% O_2	6.40E+01
Metal emission rate	lb/h	8.02E-04
	g/s	1.01E-04
Antimony		
Metal collected	ug	< 4.9
Metal concentration	ug/dscm	< 2.09E+00
	ug/dscm @ 7% O_2	< 2.51E+00
Metal emission rate	lb/h	< 3.14E-05
	g/s	< 3.95E-06
Arsenic		
Metal collected	ug	< 3.7
Metal concentration	ug/dscm	< 1.59E+00
	ug/dscm @ 7% O_2	< 1.91E+00
Metal emission rate	lb/h	< 2.39E-05
	g/s	< 3.01E-06
Barium		
Metal collected	ug	10.8
Metal concentration	ug/dscm	4.62E+00
	ug/dscm @ 7% O_2	5.52E+00
Metal emission rate	lb/h	6.92E-05
	g/s	8.72E-06
Beryllium		
Metal collected	ug	< 0.4 ND
Metal concentration	ug/dscm	< 1.54E-01 ND
	ug/dscm @ 7% O_2	< 1.84E-01 ND
Metal emission rate	lb/h	< 2.31E-06 ND
	g/s	< 2.91E-07 ND
Cadmium		
Metal collected	ug	9.7
Metal concentration	ug/dscm	4.15E+00
	ug/dscm @ 7% O_2	4.97E+00
Metal emission rate	lb/h	6.22E-05
	g/s	7.84E-06
Chromium		
Metal collected	ug	36.5
Metal concentration	ug/dscm	1.56E+01
	ug/dscm @ 7% O_2	1.87E+01
Metal emission rate	lb/h	2.34E-04
	g/s	2.95E-05
Cobalt		
Metal collected	ug	< 1.0 ND
Metal concentration	ug/dscm	< 4.27E-01 ND
	ug/dscm @ 7% O_2	< 5.11E-01 ND
Metal emission rate	lb/h	< 6.40E-06 ND
	g/s	< 8.07E-07 ND
Copper		
Metal collected	ug	112.4
Metal concentration	ug/dscm	4.80E+01
	ug/dscm @ 7% O_2	5.75E+01
Metal emission rate	lb/h	7.20E-04
	g/s	9.07E-05
Lead		
Metal collected	ug	694.2
Metal concentration	ug/dscm	2.97E+02
	ug/dscm @ 7% O_2	3.55E+02
Metal emission rate	lb/h	4.45E-03
	g/s	5.60E-04
Manganese		
Metal collected	ug	41.4
Metal concentration	ug/dscm	1.77E+01
	ug/dscm @ 7% O_2	2.12E+01
Metal emission rate	lb/h	2.65E-04
	g/s	3.34E-05
Mercury		
Metal collected	ug	< 14.7
Metal concentration	ug/dscm	< 6.28E+00
	ug/dscm @ 7% O_2	< 7.52E+00
Metal emission rate	lb/h	< 9.42E-05
	g/s	< 1.19E-05
Nickel		
Metal collected	ug	9.4
Metal concentration	ug/dscm	4.02E+00
	ug/dscm @ 7% O_2	4.81E+00
Metal emission rate	lb/h	6.02E-05
	g/s	7.59E-06
Selenium		
Metal collected	ug	3.9
Metal concentration	ug/dscm	1.68E+00
	ug/dscm @ 7% O_2	2.02E+00
Metal emission rate	lb/h	2.52E-05
	g/s	3.18E-06
Silver		
Metal collected	ug	< 1.9 ND
Metal concentration	ug/dscm	< 8.29E-01 ND
	ug/dscm @ 7% O_2	< 9.92E-01 ND
Metal emission rate	lb/h	< 1.24E-05 ND
	g/s	< 1.57E-06 ND
Thallium		
Metal collected	ug	< 10.7
Metal concentration	ug/dscm	< 4.57E+00
	ug/dscm @ 7% O_2	< 5.47E+00
Metal emission rate	lb/h	< 6.85E-05
	g/s	< 8.64E-06
Vanadium		
Metal collected	ug	< 2.0
Metal concentration	ug/dscm	< 8.55E-01
	ug/dscm @ 7% O_2	< 1.02E+00
Metal emission rate	lb/h	< 1.28E-05
	g/s	< 1.61E-06
Zinc		
Metal collected	ug	133.3
Metal concentration	ug/dscm	5.70E+01
	ug/dscm @ 7% O_2	6.82E+01
Metal emission rate	lb/h	8.54E-04
	g/s	1.08E-04

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 7-4. Mercury Speciation

	Sample results					Speciation Calculations			
	Vapor Phase Ionic Mercury (ug)	Particulate Phase Ionic Mercury (ug)	Total Ionic Mercury (ug)	Elemental Mercury (ug)	Total Mercury (ug)	Vapor phase Ionic Mercury (%)	Particulate Phase Ionic Merciry (%)	Total Ionic Mercury (%)	Elemental Mercury (%)
Run 1	1.30	0.06	1.36	9.46	10.82	12.01%	0.55%	12.57%	87.43%
Run 2	1.70	0.06	1.76	9.53	11.29	15.06%	0.53%	15.59%	84.41%
Run 3	4.30	0.06	4.36	10.34	14.70	29.25%	0.41%	29.66%	70.34%
Average	2.43	0.06	2.49	9.78	12.27	19.83%	0.49%	20.32%	79.68%

Vapor Phase Ionic Mercury (Acidified Peroxide Liquid)
Particulate Phase Ionic Mercury (Filter and Front Half Rinse)
Elemental Mercury (Components Downstrean of Peroxide Impinger, includes Permanganate Liquid and Rinse)

Table 7-5. Hexavalent Chromium Emission Summary – Run 1

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	5,120
	acfm	11,160
	dscm/min	145.00
Stack gas temperature	°F	176
Stack gas velocity	ft/min	3,552
Stack gas sample volume	dscf	76.040
	dscm	2.153
Isokinetic	%	93.6
Stack gas moisture content	vol %	44.0
Stack gas carbon dioxide content	vol %, dry	6.3
Stack gas oxygen content	vol %, dry	9.6
Hexavalent chromium		
Metal collected	ug	5.6
Metal concentration	ug/dscm	2.60E+00
	ug/dscm @ 7% O_2	3.19E+00
Metal emission rate	lb/h	4.99E-05
	g/s	6.28E-06

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 7-6. Hexavalent Chromium Emission Summary – Run 2

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	3,780
	acfm	8,470
	dscm/min	107.05
Stack gas temperature	°F	175
Stack gas velocity	ft/min	2,694
Stack gas sample volume	dscf	75.030
	dscm	2.125
Isokinetic	%	101.1
Stack gas moisture content	vol %	45.3
Stack gas carbon dioxide content	vol %, dry	7.0
Stack gas oxygen content	vol %, dry	8.9
Hexavalent chromium		
Metal collected	ug	5.9
Metal concentration	ug/dscm	2.78E+00
	ug/dscm @ 7% O_2	3.21E+00
Metal emission rate	lb/h	3.93E-05
	g/s	4.95E-06

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 7-7. Hexavalent Chromium Emission Summary – Run 3

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	3,890
	acfm	8,770
	dscm/min	110.17
Stack gas temperature	°F	176
Stack gas velocity	ft/min	2,796
Stack gas sample volume	dscf	78.620
	dscm	2.227
Isokinetic	%	103.1
Stack gas moisture content	vol %	46.1
Stack gas carbon dioxide content	vol %, dry	7.0
Stack gas oxygen content	vol %, dry	9.3
Hexavalent chromium		
Metal collected	ug	7.5
Metal concentration	ug/dscm	3.37E+00
	ug/dscm @ 7% O_2	4.03E+00
Metal emission rate	lb/h	4.91E-05
	g/s	6.18E-06

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 7-8. Particulate Matter, Hydrogen Chloride, and Chlorine Emissions Summary – Run 1

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	5,030
	acfm	11,320
	dscm/min	142.45
Stack gas temperature	°F	175
Stack gas velocity	ft/min	3,606
Stack gas sample volume	dscf	72.660
	dscm	2.058
Isokinetic	%	93.7
Stack gas moisture content	vol %	45.9
Stack gas carbon dioxide content	vol %, dry	6.3
Stack gas oxygen content	vol %, dry	9.6
Hydrogen chloride and chlorine		
HCl collected	mg	11.8
Cl_2 collected	mg	1.95
Stack gas HCl concentration	mg/dscm	5.73E+00
	mg/dscm @7% O_2	7.04E+00
Stack gas HCl emission rate	lb/h	1.08E-01
	kg/h	4.90E-02
	g/s	1.36E-02
Stack gas Cl_2 concentration	mg/dscm	9.48E-01
	mg/dscm @7% O_2	1.16E+00
Stack gas Cl_2 emission rate	lb/h	1.79E-02
	kg/h	8.10E-03
	g/s	2.25E-03
Stack gas HCl+Cl_2 concentration expressed as HCl equivalents	ppmv, dry	4.42E+00
	ppmv, dry @7% O_2	5.43E+00
Particulate		
Particulate matter collected	mg	34.3
Particulate concentration	gr/dscf	7.29E-03
	gr/dscf @ 7% O_2	8.95E-03
	mg/dscm	1.67E+01
	mg/dscm @ 7% O_2	2.05E+01
Particulate emission rate	lb/h	3.14E-01
	kg/h	1.42E-01
	g/s	3.96E-02

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 7-9. Particulate Matter, Hydrogen Chloride, and Chlorine Emissions Summary – Run 2

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	3,850
	acfm	8,580
	dscm/min	109.03
Stack gas temperature	°F	174
Stack gas velocity	ft/min	2,730
Stack gas sample volume	dscf	74.990
	dscm	2.124
Isokinetic	%	96.0
Stack gas moisture content	vol %	45.1
Stack gas carbon dioxide content	vol %, dry	7.0
Stack gas oxygen content	vol %, dry	8.9
Hydrogen chloride and chlorine		
HCl collected	mg	6.95
Cl_2 collected	mg	2.01
Stack gas HCl concentration	mg/dscm	3.27E+00
	mg/dscm @7% O_2	3.79E+00
Stack gas HCl emission rate	lb/h	4.72E-02
	kg/h	2.14E-02
	g/s	5.95E-03
Stack gas Cl_2 concentration	mg/dscm	9.46E-01
	mg/dscm @7% O_2	1.10E+00
Stack gas Cl_2 emission rate	lb/h	1.37E-02
	kg/h	6.19E-03
	g/s	1.72E-03
Stack gas HCl+Cl_2 concentration expressed as HCl equivalents	ppmv, dry	2.80E+00
	ppmv, dry @7% O_2	3.24E+00
Particulate		
Particulate matter collected	mg	19.4
Particulate concentration	gr/dscf	3.99E-03
	gr/dscf @ 7% O_2	4.62E-03
	mg/dscm	9.13E+00
	mg/dscm @ 7% O_2	1.06E+01
Particulate emission rate	lb/h	1.32E-01
	kg/h	5.98E-02
	g/s	1.66E-02

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 7-10. Particulate Matter, Hydrogen Chloride, and Chlorine Emissions Summary – Run 3

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	4,090
	acfm	8,970
	dscm/min	115.83
Stack gas temperature	°F	174
Stack gas velocity	ft/min	2,856
Stack gas sample volume	dscf	79.290
	dscm	2.246
Isokinetic	%	95.7
Stack gas moisture content	vol %	44.8
Stack gas carbon dioxide content	vol %, dry	7.0
Stack gas oxygen content	vol %, dry	9.3
Hydrogen chloride and chlorine		
HCl collected	mg	6.49
Cl_2 collected	mg	1.94
Stack gas HCl concentration	mg/dscm	2.89E+00
	mg/dscm @7% O_2	3.46E+00
Stack gas HCl emission rate	lb/h	4.43E-02
	kg/h	2.01E-02
	g/s	5.58E-03
Stack gas Cl_2 concentration	mg/dscm	8.64E-01
	mg/dscm @7% O_2	1.03E+00
Stack gas Cl_2 emission rate	lb/h	1.32E-02
	kg/h	6.00E-03
	g/s	1.67E-03
Stack gas HCl+Cl_2 concentration expressed as HCl equivalents	ppmv, dry	2.49E+00
	ppmv, dry @7% O_2	2.98E+00
Particulate		
Particulate matter collected	mg	33.6
Particulate concentration	gr/dscf	6.54E-03
	gr/dscf @ 7% O_2	7.83E-03
	mg/dscm	1.50E+01
	mg/dscm @ 7% O_2	1.79E+01
Particulate emission rate	lb/h	2.29E-01
	kg/h	1.04E-01
	g/s	2.89E-02

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 7-11. Particle Size Distribution

Particle Size (um)	Wt%
0.1 - 0.5	6.9
0.5 – 1.0	2.4
1.0 – 5.0	34.8
5.0 – 10.0	17.9
10.0 – 100.0	38.0
>100.0	0.0
Total	100.0

Average particle size distribution. Values calculated as the weighted average of the filter and acetone probe rinse particles for each run.

Table 7-12. Speciated Volatile Organic Compound Emissions – Run 1

Parameter	Units	Tube Set A	Tube Set B	Tube Set C	Tube Set D
Net sampling time	min	40	40	40	40
Corrected sample volume	liters,dry std.	19.6512	19.521	18.9404	18.9631
Corrected sample volume	dscf	0.694	0.689	0.669	0.670
Corrected sample volume	dscm	0.0197	0.0195	0.0189	0.0190
Analyzed (Y/N)	-	N	Y	Y	Y

Total volume sampled	dscf	2.722
Total volume sampled	dscm	0.0771
Number of tube pairs analyzed	-	3
Total condensate volume	ml	84
Stack gas flow rate	acfm	10,770
Stack gas flow rate	dscfm	4,870

VOST Compound	Mass VOC Compound (ug)					Mass VOC Compound (ug)	Stack Conc. (a,c) (ug/dscm)	Mass Emission Rate (a,b,c) (lb/hr)	Mass Emission Rate (a,b,c) (g/s)
	Tube Set A	Tube Set B	Tube Set C	Tube Set D	Condensate (ug/L)				
Standard Target Analytes									
Acetone	0	< 0.183 J,B	0.55 B	0.554 J,B	4.8 J	< 1.69E+00	< 2.76E+01	< 5.04E-04	< 6.35E-05
Acrylonitrile	0	< 0.152 ND	< 0.152 ND	< 0.152 ND	< 2.7 ND	< 6.83E-01 ND	< 1.09E+01	< 1.99E-04	< 2.50E-05
Benzene	0	0.0139 J	0.0552 J	< 0.0064 ND	< 0.1 ND	< 8.39E-02	< 1.42E+00	< 2.60E-05	< 3.27E-06
Bromodichloromethane	0	0.05	< 0.0246	< 0.0032 ND	2.2	< 2.63E-01	< 3.75E+00	< 6.85E-05	< 8.63E-06
Bromoform	0	< 0.1366	0.115 J	< 0.0145 J	< 0.14 ND	< 2.78E-01	< 4.79E+00	< 8.73E-05	< 1.10E-05
Bromomethane	0	< 0.064 J,B	< 0.065 J,B	< 0.052 J,B	< 0.38 ND	< 2.13E-01	< 3.57E+00	< 6.51E-05	< 8.20E-06
2-Butanone	0	< 0.07 ND	< 0.07 ND	< 0.07 ND	< 0.75 ND	< 2.73E-01 ND	< 4.47E+00	< 8.16E-05	< 1.03E-05
Carbon Disulfide	0	0.0091 J	< 0.0087 J	< 0.0028 J	< 0.1 ND	< 2.90E-02	< 4.68E-01	< 8.53E-06	< 1.08E-06
Carbon Tetrachloride	0	0.0127 J	< 0.0045 J	< 0.0022 ND	< 0.12 ND	< 2.95E-02	< 4.69E-01	< 8.55E-06	< 1.08E-06
Chlorobenzene	0	5.818 E	3.556 E	0.0323 J	< 0.1 ND	< 9.41E+00	< 1.64E+02	< 2.99E-03	< 3.77E-04
Chlorodibromomethane	0	< 0.096	< 0.073	< 0.02 ND	1	< 2.73E-01	< 4.38E+00	< 7.99E-05	< 1.01E-05
Chloroethane	0	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.24 ND	< 8.02E-02 ND	< 1.31E+00	< 2.38E-05	< 3.00E-06
Chloroform	0	0.023 J	0.0183 J	0.0542 J	6.1	6.08E-01	8.31E+00	1.52E-04	1.91E-05
Chloromethane	0	0.4087 J	< 0.5132	< 0.3032	< 0.12 ND	< 1.24E+00	< 2.16E+01	< 3.92E-04	< 4.93E-05
Dibromomethane	0	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.21 ND	< 7.76E-02 ND	< 1.27E+00	< 2.32E-05	< 2.93E-06
Dichlorodifluoromethane	0	< 0.0131 J	< 0.015 J	< 0.195	< 0.15 ND	< 2.36E-01	< 4.05E+00	< 7.39E-05	< 9.31E-06
1,1-Dichloroethane	0	< 0.0038 ND	< 0.0038 ND	< 0.0038 ND	< 0.1 ND	< 1.98E-02 ND	< 3.08E-01	< 5.61E-06	< 7.07E-07
1,2-Dichloroethane	0	< 0.0044 ND	< 0.0044 ND	< 0.0044 ND	0.14 J	< 2.50E-02	< 3.82E-01	< 6.98E-06	< 8.79E-07
1,1-Dichloroethene	0	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.1 ND	< 2.22E-02 ND	< 3.49E-01	< 6.37E-06	< 8.03E-07
cis-1,2-Dichloroethene	0	< 0.005 ND	< 0.005 ND	< 0.0054 J	< 0.12 ND	< 2.55E-02	< 3.99E-01	< 7.28E-06	< 9.17E-07
trans-1,2-Dichloroethene	0	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.1 ND	< 1.86E-02 ND	< 2.87E-01	< 5.23E-06	< 6.59E-07
1,2-Dichloropropane	0	< 0.0054 ND	< 0.0054 ND	< 0.0054 ND	< 0.1 ND	< 2.46E-02 ND	< 3.91E-01	< 7.13E-06	< 8.99E-07
cis-1,3-Dichloropropene	0	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.1 ND	< 2.64E-02 ND	< 4.22E-01	< 7.71E-06	< 9.71E-07
trans-1,3-Dichloropropene	0	< 0.004 ND	< 0.004 ND	< 0.004 ND	< 0.11 ND	< 2.12E-02 ND	< 3.29E-01	< 6.00E-06	< 7.56E-07
Ethylbenzene	0	< 0.0026 ND	< 0.0026 ND	< 0.0062 J	< 0.1 ND	< 1.98E-02	< 3.08E-01	< 5.61E-06	< 7.07E-07
2-Hexanone	0	< 0.0198 ND	< 0.0198 ND	< 0.0198 ND	< 0.76 ND	< 1.23E-01 ND	< 1.86E+00	< 3.40E-05	< 4.28E-06
Iodomethane	0	< 0.0156 J,B	< 0.0166 J,B	< 0.0166 J,B	< 0.12 ND	< 5.89E-02	< 9.81E-01	< 1.79E-05	< 2.25E-06
Methylene Chloride	0	0.084 J	< 0.039	0.146	2.3	< 4.62E-01	< 7.19E+00	< 1.31E-04	< 1.65E-05
4-Methyl-2-pentanone (MIBK)	0	< 0.047	< 0.028 ND	< 0.028 ND	< 0.4 ND	< 1.37E-01	< 2.23E+00	< 4.07E-05	< 5.13E-06
Styrene	0	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.1 ND	< 1.86E-02 ND	< 2.87E-01	< 5.23E-06	< 6.59E-07
1,1,2,2-Tetrachloroethane	0	< 0.022 ND	< 0.022 ND	< 0.022 ND	< 0.15 ND	< 7.86E-02 ND	< 1.31E+00	< 2.40E-05	< 3.02E-06
Tetrachloroethene	0	4.733 E	0.696	< 0.008 J	< 0.1 ND	< 5.45E+00	< 9.48E+01	< 1.73E-03	< 2.18E-04
Toluene	0	0.0847 J	0.0936 J	< 0.0302	0.19 J	< 2.24E-01	< 3.84E+00	< 7.00E-05	< 8.82E-06
1,1,1-Trichloroethane	0	< 0.0032 ND	< 0.0032 ND	< 0.0032 ND	< 0.1 ND	< 1.80E-02 ND	< 2.76E-01	< 5.04E-06	< 6.35E-07
1,1,2-Trichloroethane	0	< 0.01 ND	< 0.01 ND	< 0.01 ND	< 0.25 ND	< 5.10E-02 ND	< 7.95E-01	< 1.45E-05	< 1.83E-06
Trichloroethene	0	0.0231 J	0.02 J	0.043	0.57 J	1.34E-01	2.12E+00	3.87E-05	4.87E-06
Trichlorofluoromethane	0	< 0.0098 ND	< 0.0098 ND	0.052 J	< 0.12 ND	< 8.17E-02	< 1.38E+00	< 2.51E-05	< 3.17E-06
1,2,3-Trichloropropane	0	< 0.0162 ND	< 0.0162 ND	< 0.0162 ND	< 0.36 ND	< 7.88E-02 ND	< 1.24E+00	< 2.26E-05	< 2.85E-06
Vinyl Acetate	0	< 0.024 ND	< 0.024 ND	< 0.024 ND	< 0.24 ND	< 9.22E-02 ND	< 1.52E+00	< 2.76E-05	< 3.48E-06
Vinyl Chloride	0	< 0.0064 ND	< 0.0064 ND	< 0.0097 J	< 0.24 ND	< 4.27E-02	< 6.53E-01	< 1.19E-05	< 1.50E-06
Xylenes (total)	0	< 0.0097 J	< 0.0096 ND	< 0.0238 J	< 0.3 ND	< 6.83E-02	< 1.08E+00	< 1.97E-05	< 2.48E-06
Special Target Analytes									
Bromobenzene	0	< 0.0072 ND	< 0.0072 ND	< 0.0072 ND	< 0.11 ND	< 3.08E-02 ND	< 4.96E-01	< 9.05E-06	< 1.14E-06
Bromochloromethane	0	< 0.024 ND	< 0.024 ND	< 0.024 ND	< 0.24 ND	< 9.22E-02 ND	< 1.52E+00	< 2.76E-05	< 3.48E-06
n-Butylbenzene	0	< 0.0094 ND	< 0.0094 ND	< 0.0094 ND	< 0.1 ND	< 3.66E-02 ND	< 6.00E-01	< 1.09E-05	< 1.38E-06
sec-Butylbenzene	0	< 0.0072 ND	< 0.0072 ND	< 0.0072 ND	< 0.1 ND	< 3.00E-02 ND	< 4.86E-01	< 8.86E-06	< 1.12E-06
tert-Butylbenzene	0	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.24 ND	< 3.82E-02 ND	< 5.75E-01	< 1.05E-05	< 1.32E-06
2-Chlorotoluene	0	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.24 ND	< 3.40E-02 ND	< 5.02E-01	< 9.16E-06	< 1.15E-06
4-Chlorotoluene	0	< 0.004 ND	< 0.004 ND	< 0.004 ND	< 0.21 ND	< 2.96E-02 ND	< 4.38E-01	< 7.99E-06	< 1.01E-06
1,2-Dibromo-3-chloropropane	0	< 0.04 ND	< 0.04 ND	< 0.04 ND	< 0.45 ND	< 1.58E-01 ND	< 2.58E+00	< 4.71E-05	< 5.93E-06
1,2-Dibromoethane	0	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.24 ND	< 8.02E-02 ND	< 1.31E+00	< 2.38E-05	< 3.00E-06
1,2-Dichlorobenzene	0	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.1 ND	< 2.64E-02 ND	< 4.22E-01	< 7.71E-06	< 9.71E-07
1,3-Dichlorobenzene	0	< 0.0062 ND	< 0.0062 ND	< 0.0062 ND	< 0.1 ND	< 2.70E-02 ND	< 4.33E-01	< 7.90E-06	< 9.95E-07
1,4-Dichlorobenzene	0	< 0.0086 ND	< 0.0086 ND	< 0.0086 ND	< 0.12 ND	< 3.59E-02 ND	< 5.80E-01	< 1.06E-05	< 1.33E-06
1,3-Dichloropropane	0	< 0.0036 ND	< 0.0036 ND	< 0.0036 ND	< 0.17 ND	< 2.51E-02 ND	< 3.73E-01	< 6.81E-06	< 8.58E-07
2,2-Dichloropropane	0	< 0.003 ND	< 0.003 ND	< 0.003 ND	< 0.11 ND	< 1.82E-02 ND	< 2.77E-01	< 5.05E-06	< 6.36E-07
1,1-Dichloropropene	0	< 0.002 ND	< 0.002 ND	< 0.002 ND	< 0.1 ND	< 1.44E-02 ND	< 2.13E-01	< 3.89E-06	< 4.91E-07
Hexachlorobutadiene	0	< 0.0096 ND	< 0.0096 ND	< 0.0096 ND	< 0.12 ND	< 3.89E-02 ND	< 6.32E-01	< 1.15E-05	< 1.45E-06
Isopropyl benzene	0	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.1 ND	< 2.22E-02 ND	< 3.49E-01	< 6.37E-06	< 8.03E-07
p-Isopropyltoluene	0	< 0.0076 ND	< 0.0076 ND	< 0.0076 ND	< 0.1 ND	< 3.12E-02 ND	< 5.06E-01	< 9.23E-06	< 1.16E-06
Naphthalene	0	< 0.02 ND	< 0.02 ND	< 0.021 J	< 0.17 ND	< 7.53E-02	< 1.25E+00	< 2.28E-05	< 2.87E-06
n-Propylbenzene	0	< 0.0058 ND	< 0.0058 ND	< 0.0058 ND	< 0.1 ND	< 2.58E-02 ND	< 4.12E-01	< 7.52E-06	< 9.47E-07
1,1,1,2-Tetrachloroethane	0	< 0.0038 J	< 0.002 ND	< 0.002 ND	< 0.12 ND	< 1.79E-02	< 2.67E-01	< 4.86E-06	< 6.13E-07
Tetrahydrofuran	0	< 0.062 ND	< 0.062 ND	< 0.062 ND	< 1.2 ND	< 2.87E-01 ND	< 4.55E+00	< 8.30E-05	< 1.05E-05
1,2,3-Trichlorobenzene	0	< 0.028 ND	< 0.028 ND	< 0.028 ND	< 0.23 ND	< 1.03E-01 ND	< 1.71E+00	< 3.13E-05	< 3.94E-06
1,2,4-Trichlorobenzene	0	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.15 ND	< 3.06E-02 ND	< 4.77E-01	< 8.70E-06	< 1.10E-06
1,1,2-Trichloro-1,2,2-trifluoroethane	0	< 0.0036 ND	< 0.0036 ND	< 0.0036 ND	< 0.13 ND	< 2.17E-02 ND	< 3.30E-01	< 6.02E-06	< 7.58E-07
1,2,4-Trimethylbenzene	0	< 0.0096 ND	< 0.0096 ND	< 0.0096 ND	< 0.11 ND	< 3.80E-02 ND	< 6.21E-01	< 1.13E-05	< 1.43E-06
1,3,5-Trimethylbenzene	0	< 0.0056 ND	< 0.0056 ND	< 0.0056 ND	< 0.1 ND	< 2.52E-02 ND	< 4.02E-01	< 7.33E-06	< 9.23E-07
m- & p-Xylene	0	< 0.0083 J	< 0.008 J	< 0.0184 J	< 0.2 ND	< 5.15E-02	< 8.22E-01	< 1.50E-05	< 1.89E-06
o-Xylene	0	< 0.0034 ND	< 0.0034 ND	< 0.0053 J	< 0.14 ND	< 2.39E-02	< 3.63E-01	< 6.63E-06	< 8.35E-07
Tentatively Identified Compounds (TICs)									
Unknown	0	0.068 NJ	0.051 NJ	0	0	1.19E-01	2.07E+00	3.78E-05	4.76E-06
Benzaldehyde	0	0	0.087 NJ	0.078 NJ	0	1.65E-01	2.87E+00	5.24E-05	6.60E-06

(a) Stack gas sample volume (analyzed tubes only) — 2.0277 dry std cubic feet; 0.05743 dry std cubic meters

(b) Stack gas flow rate — 10770 actual cubic feet per minute; 5.08355 actual cubic meters per second; 4870 dry std cubic feet per minute; 2.29869 dry std cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using the detection limit.

Table 7-13. Speciated Volatile Organic Compound Emissions – Run 2

Parameter	Units	Tube Set A	Tube Set B	Tube Set C	Tube Set D
Net sampling time	min	40	40	40	40
Corrected sample volume	liters,dry std.	19.453	20.2233	19.3709	19.3709
Corrected sample volume	dscf	0.687	0.714	0.684	0.684
Corrected sample volume	dscm	0.0195	0.0202	0.0194	0.0194
Analyzed (Y/N)	-	N	Y	Y	Y

Total volume sampled	dscf	2.769
Total volume sampled	dscm	0.0784
Number of tube pairs analyzed	-	3
Total condensate volume	ml	84
Stack gas flow rate	acfm	8,580
Stack gas flow rate	dscfm	3,880

VOST Compound	Mass VOC Compound (ug)					Mass VOC Compound (ug)	Stack Conc. (a,c) (ug/dscm)	Mass Emission Rate (a,b,c) (lb/hr)	Mass Emission Rate (a,b,c) (g/s)
	Tube Set A	Tube Set B	Tube Set C	Tube Set D	Condensate (ug/L)				
Standard Target Analytes									
Acetone	0	0.697 J,B	0.56 B	0.444 J,B	4.7 J	2.10E+00	3.39E+01	4.92E-04	6.21E-05
Acrylonitrile	0	< 0.152 ND	< 0.152 ND	< 0.152 ND	< 2.7 ND	< 6.83E-01 ND	< 1.06E+01	< 1.54E-04	< 1.95E-05
Benzene	0	< 0.0094 J	< 0.0126 J	< 0.0312	< 0.1 ND	< 6.16E-02	< 1.01E+00	< 1.47E-05	< 1.85E-06
Bromodichloromethane	0	< 0.0416	< 0.0346	< 0.0406	< 0.1 ND	< 1.25E-01	< 2.09E+00	< 3.03E-05	< 3.82E-06
Bromoform	0	< 0.1766	< 0.1466	0.194 J	< 0.14 ND	< 5.29E-01	< 8.92E+00	< 1.30E-04	< 1.63E-05
Bromomethane	0	< 0.05 J,B	< 0.052 J,B	< 0.046 J,B	< 0.38 ND	< 1.80E-01	< 2.92E+00	< 4.24E-05	< 5.34E-06
2-Butanone	0	< 0.07 ND	< 0.07 ND	< 0.07 ND	< 0.75 ND	< 2.73E-01 ND	< 4.36E+00	< 6.34E-05	< 7.99E-06
Carbon Disulfide	0	< 0.0106 J	< 0.009 J	0.0171 J	< 0.1 ND	< 4.51E-02	< 7.30E-01	< 1.06E-05	< 1.34E-06
Carbon Tetrachloride	0	< 0.006 J	< 0.0056 J	< 0.006 J	< 0.12 ND	< 2.77E-02	< 4.27E-01	< 6.21E-06	< 7.82E-07
Chlorobenzene	0	1.6028 J	< 0.6513	2.012	< 0.1 ND	< 4.27E+00	< 7.25E+01	< 1.05E-03	< 1.33E-04
Chlorodibromomethane	0	< 0.13	< 0.106	0.131 J	< 0.2 ND	< 3.84E-01	< 6.44E+00	< 9.36E-05	< 1.18E-05
Chloroethane	0	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.24 ND	< 8.02E-02 ND	< 1.27E+00	< 1.85E-05	< 2.33E-06
Chloroform	0	0.0349 J	< 0.0239	< 0.0289	< 0.1 ND	< 9.61E-02	< 1.59E+00	< 2.32E-05	< 2.92E-06
Chloromethane	0	< 0.0642	< 0.3232	< 0.0212 J	< 0.12 ND	< 4.19E-01	< 7.06E+00	< 1.03E-04	< 1.29E-05
Dibromomethane	0	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.21 ND	< 7.76E-02 ND	< 1.24E+00	< 1.81E-05	< 2.28E-06
Dichlorodifluoromethane	0	< 0.023 J	< 0.0113 J	< 0.015 J	< 0.15 ND	< 6.19E-02	< 9.97E-01	< 1.45E-05	< 1.83E-06
1,1-Dichloroethane	0	< 0.0038 ND	< 0.0038 ND	< 0.0038 ND	< 0.1 ND	< 1.98E-02 ND	< 3.00E-01	< 4.37E-06	< 5.50E-07
1,2-Dichloroethane	0	< 0.0044 ND	< 0.0044 ND	< 0.0044 ND	0.12 J	< 2.33E-02	< 3.52E-01	< 5.12E-06	< 6.45E-07
1,1-Dichloroethene	0	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.1 ND	< 2.22E-02 ND	< 3.41E-01	< 4.96E-06	< 6.25E-07
cis-1,2-Dichloroethene	0	< 0.005 ND	< 0.005 ND	< 0.005 ND	< 0.12 ND	< 2.51E-02 ND	< 3.83E-01	< 5.57E-06	< 7.01E-07
trans-1,2-Dichloroethene	0	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.1 ND	< 1.86E-02 ND	< 2.80E-01	< 4.07E-06	< 5.13E-07
1,2-Dichloropropane	0	< 0.0054 ND	< 0.0054 ND	< 0.0054 ND	< 0.1 ND	< 2.46E-02 ND	< 3.82E-01	< 5.55E-06	< 6.99E-07
cis-1,3-Dichloropropene	0	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.1 ND	< 2.64E-02 ND	< 4.12E-01	< 5.99E-06	< 7.55E-07
trans-1,3-Dichloropropene	0	< 0.004 ND	< 0.004 ND	< 0.004 ND	< 0.11 ND	< 2.12E-02 ND	< 3.21E-01	< 4.67E-06	< 5.88E-07
Ethylbenzene	0	< 0.0026 ND	< 0.0026 ND	< 0.0026 ND	< 0.1 ND	< 1.62E-02 ND	< 2.39E-01	< 3.48E-06	< 4.38E-07
2-Hexanone	0	< 0.0198 ND	< 0.0198 ND	< 0.0198 ND	< 0.76 ND	< 1.23E-01 ND	< 1.82E+00	< 2.65E-05	< 3.34E-06
Iodomethane	0	< 0.0156 J,B	< 0.0166 J,B	< 0.0156 J,B	< 0.12 ND	< 5.79E-02	< 9.39E-01	< 1.37E-05	< 1.72E-06
Methylene Chloride	0	0.059 J	< 0.026 ND	< 0.026 ND	1.1 J	< 2.03E-01	< 3.06E+00	< 4.45E-05	< 5.61E-06
4-Methyl-2-pentanone (MIBK)	0	< 0.028 ND	< 0.028 ND	< 0.028 ND	< 0.4 ND	< 1.18E-01 ND	< 1.85E+00	< 2.69E-05	< 3.39E-06
Styrene	0	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.1 ND	< 1.86E-02 ND	< 2.80E-01	< 4.07E-06	< 5.13E-07
1,1,2,2-Tetrachloroethane	0	< 0.022 ND	< 0.022 ND	< 0.022 ND	< 0.15 ND	< 7.86E-02 ND	< 1.28E+00	< 1.86E-05	< 2.34E-06
Tetrachloroethene	0	< 0.2321	< 0.0891	< 0.1421	< 0.1 ND	< 4.72E-01	< 7.96E+00	< 1.16E-04	< 1.46E-05
Toluene	0	0.1734 J	0.0158 J	< 0.0232	0.15 J	< 2.25E-01	< 3.76E+00	< 5.47E-05	< 6.89E-06
1,1,1-Trichloroethane	0	< 0.0032 ND	< 0.0032 ND	< 0.0032 ND	< 0.1 ND	< 1.80E-02 ND	< 2.70E-01	< 3.92E-06	< 4.94E-07
1,1,2-Trichloroethane	0	< 0.01 ND	< 0.01 ND	< 0.01 ND	< 0.25 ND	< 5.10E-02 ND	< 7.77E-01	< 1.13E-05	< 1.42E-06
Trichloroethene	0	0.0146 J	< 0.016	0.0135 J	< 0.1 ND	< 5.25E-02	< 8.55E-01	< 1.24E-05	< 1.57E-06
Trichlorofluoromethane	0	< 0.0098 ND	< 0.0098 ND	< 0.0098 ND	< 0.12 ND	< 3.95E-02 ND	< 6.27E-01	< 9.12E-06	< 1.15E-06
1,2,3-Trichloropropane	0	< 0.0162 ND	< 0.0162 ND	< 0.0162 ND	< 0.36 ND	< 7.88E-02 ND	< 1.21E+00	< 1.76E-05	< 2.22E-06
Vinyl Acetate	0	< 0.024 ND	< 0.024 ND	< 0.024 ND	< 0.24 ND	< 9.22E-02 ND	< 1.48E+00	< 2.15E-05	< 2.71E-06
Vinyl Chloride	0	< 0.0064 ND	< 0.0064 ND	< 0.0064 ND	< 0.24 ND	< 3.94E-02 ND	< 5.83E-01	< 8.47E-06	< 1.07E-06
Xylenes (total)	0	< 0.0121 J	< 0.0102 J	< 0.0116 J	< 0.3 ND	< 5.91E-02	< 8.96E-01	< 1.30E-05	< 1.64E-06
Special Target Analytes									
Bromobenzene	0	< 0.0072 ND	< 0.0072 ND	< 0.0072 ND	< 0.11 ND	< 3.08E-02 ND	< 4.84E-01	< 7.04E-06	< 8.87E-07
Bromochloromethane	0	< 0.024 ND	< 0.024 ND	< 0.024 ND	< 0.24 ND	< 9.22E-02 ND	< 1.48E+00	< 2.15E-05	< 2.71E-06
n-Butylbenzene	0	< 0.0094 ND	< 0.0094 ND	< 0.0094 ND	< 0.1 ND	< 3.66E-02 ND	< 5.85E-01	< 8.51E-06	< 1.07E-06
sec-Butylbenzene	0	< 0.0072 ND	< 0.0072 ND	< 0.0072 ND	< 0.1 ND	< 3.00E-02 ND	< 4.73E-01	< 6.88E-06	< 8.67E-07
tert-Butylbenzene	0	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.24 ND	< 3.82E-02 ND	< 5.62E-01	< 8.17E-06	< 1.03E-06
2-Chlorotoluene	0	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.24 ND	< 3.40E-02 ND	< 4.91E-01	< 7.14E-06	< 8.99E-07
4-Chlorotoluene	0	< 0.004 ND	< 0.004 ND	< 0.004 ND	< 0.21 ND	< 2.96E-02 ND	< 4.28E-01	< 6.23E-06	< 7.85E-07
1,2-Dibromo-3-chloropropane	0	< 0.04 ND	< 0.04 ND	< 0.04 ND	< 0.45 ND	< 1.58E-01 ND	< 2.52E+00	< 3.66E-05	< 4.61E-06
1,2-Dibromoethane	0	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.24 ND	< 8.02E-02 ND	< 1.27E+00	< 1.85E-05	< 2.33E-06
1,2-Dichlorobenzene	0	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.1 ND	< 2.64E-02 ND	< 4.12E-01	< 5.99E-06	< 7.55E-07
1,3-Dichlorobenzene	0	< 0.0062 ND	< 0.0062 ND	< 0.0062 ND	< 0.1 ND	< 2.70E-02 ND	< 4.23E-01	< 6.14E-06	< 7.74E-07
1,4-Dichlorobenzene	0	< 0.0086 ND	< 0.0086 ND	< 0.0086 ND	< 0.12 ND	< 3.59E-02 ND	< 5.66E-01	< 8.23E-06	< 1.04E-06
1,3-Dichloropropane	0	< 0.0036 ND	< 0.0036 ND	< 0.0036 ND	< 0.17 ND	< 2.51E-02 ND	< 3.65E-01	< 5.31E-06	< 6.69E-07
2,2-Dichloropropane	0	< 0.003 ND	< 0.003 ND	< 0.003 ND	< 0.11 ND	< 1.82E-02 ND	< 2.70E-01	< 3.93E-06	< 4.95E-07
1,1-Dichloropropene	0	< 0.002 ND	< 0.002 ND	< 0.002 ND	< 0.1 ND	< 1.44E-02 ND	< 2.09E-01	< 3.04E-06	< 3.83E-07
Hexachlorobutadiene	0	< 0.0096 ND	< 0.0096 ND	< 0.0096 ND	< 0.12 ND	< 3.89E-02 ND	< 6.17E-01	< 8.97E-06	< 1.13E-06
Isopropyl benzene	0	< 0.0046 ND	< 0.0046 ND	< 0.0046 J	< 0.1 ND	< 2.22E-02	< 3.41E-01	< 4.96E-06	< 6.25E-07
p-Isopropyltoluene	0	< 0.0076 ND	< 0.0076 ND	< 0.0076 ND	< 0.1 ND	< 3.12E-02 ND	< 4.94E-01	< 7.18E-06	< 9.04E-07
Naphthalene	0	< 0.02 ND	< 0.028 J	< 0.02 J	< 0.17 ND	< 8.23E-02	< 1.34E+00	< 1.94E-05	< 2.45E-06
n-Propylbenzene	0	< 0.0058 ND	< 0.0058 ND	< 0.0058 ND	< 0.1 ND	< 2.58E-02 ND	< 4.02E-01	< 5.85E-06	< 7.37E-07
1,1,1,2-Tetrachloroethane	0	< 0.002 ND	< 0.002 ND	< 0.002 ND	< 0.12 ND	< 1.61E-02 ND	< 2.30E-01	< 3.35E-06	< 4.22E-07
Tetrahydrofuran	0	< 0.062 ND	< 0.062 ND	< 0.062 ND	< 1.2 ND	< 2.87E-01 ND	< 4.44E+00	< 6.45E-05	< 8.13E-06
1,2,3-Trichlorobenzene	0	< 0.028 ND	< 0.028 ND	< 0.028 ND	< 0.23 ND	< 1.03E-01 ND	< 1.67E+00	< 2.43E-05	< 3.06E-06
1,2,4-Trichlorobenzene	0	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.15 ND	< 3.06E-02 ND	< 4.66E-01	< 6.77E-06	< 8.53E-07
1,1,2-Trichloro-1,2,2-trifluoroethane	0	< 0.0036 ND	< 0.0036 ND	< 0.0036 ND	< 0.13 ND	< 2.17E-02 ND	< 3.22E-01	< 4.69E-06	< 5.90E-07
1,2,4-Trimethylbenzene	0	< 0.0096 ND	< 0.0096 ND	< 0.0096 ND	< 0.11 ND	< 3.80E-02 ND	< 6.06E-01	< 8.81E-06	< 1.11E-06
1,3,5-Trimethylbenzene	0	< 0.0056 ND	< 0.0056 ND	< 0.0056 ND	< 0.1 ND	< 2.52E-02 ND	< 3.92E-01	< 5.70E-06	< 7.18E-07
m- & p-Xylene	0	< 0.0107 J	< 0.0088 J	< 0.0102 J	< 0.2 ND	< 4.65E-02	< 7.18E-01	< 1.04E-05	< 1.31E-06
o-Xylene	0	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.14 ND	< 2.20E-02 ND	< 3.23E-01	< 4.69E-06	< 5.91E-07
Tentatively Identified Compounds (TICs)									
Benzaldehyde	0	0	0.04 NJ	0	0	4.00E-02	6.78E-01	9.86E-06	1.24E-06

(a) Stack gas sample volume (analyzed tubes only) — 2.0821 dry std cubic feet; 0.05897 dry std cubic meters

(b) Stack gas flow rate — 8580 actual cubic feet per minute; 4.04984 actual cubic meters per second; 3880 dry std cubic feet per minute; 1.8314 dry std cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using the detection limit.

Table 7-14. Speciated Volatile Organic Compound Emissions – Run 3

Parameter	Units	Tube Set A	Tube Set B	Tube Set C	Tube Set D
Net sampling time	min	40	40	40	40
Corrected sample volume	liters,dry std.	20.1214	18.4533	18.3004	18.4533
Corrected sample volume	dscf	0.711	0.652	0.646	0.652
Corrected sample volume	dscm	0.0201	0.0185	0.0183	0.0185
Analyzed (Y/N)	-	Y	Y	Y	Y

Total volume sampled	dscf	2.660
Total volume sampled	dscm	0.0753
Number of tube pairs analyzed	-	4
Total condensate volume	ml	84
Stack gas flow rate	acfm	8,850
Stack gas flow rate	dscfm	4,080

VOST Compound	Mass VOC Compound (ug)					Mass VOC Compound (ug)	Stack Conc. (a,c) (ug/dscm)	Mass Emission Rate (a,b,c) (lb/hr)	Mass Emission Rate (a,b,c) (g/s)
	Tube Set A	Tube Set B	Tube Set C	Tube Set D	Condensate (ug/L)				
Standard Target Analytes									
Acetone	< 0.245	0.56 B	0.64 B	0.458 J,B	5.9 J	< 2.40E+00	< 3.18E+01	< 4.87E-04	< 6.13E-05
Acrylonitrile	< 0.152 ND	< 0.152 ND	< 0.152 ND	< 0.152 ND	< 2.7 ND	< 8.35E-01 ND	< 1.11E+01	< 1.69E-04	< 2.13E-05
Benzene	0.0135 J	< 0.0115 J	< 0.0086 J	< 0.0101 J	< 0.1 ND	< 5.21E-02	< 6.92E-01	< 1.06E-05	< 1.33E-06
Bromodichloromethane	< 0.0396	< 0.0426	< 0.0376	< 0.0416	< 0.1 ND	< 1.70E-01	< 2.25E+00	< 3.45E-05	< 4.34E-06
Bromoform	< 0.1266	< 0.1666	< 0.1566	< 0.1366	< 0.14 ND	< 5.98E-01	< 7.94E+00	< 1.21E-04	< 1.53E-05
Bromomethane	< 0.044 ND	< 0.047 J,B	< 0.048 J,B	< 0.049 J,B	< 0.38 ND	< 2.20E-01	< 2.92E+00	< 4.46E-05	< 5.62E-06
2-Butanone	< 0.07 ND	< 0.07 ND	< 0.07 ND	< 0.07 ND	< 0.75 ND	< 3.43E-01 ND	< 4.55E+00	< 6.96E-05	< 8.77E-06
Carbon Disulfide	0.0124 J	0.0151 J	0.0128 J	0.0187 J	< 0.1 ND	< 6.74E-02	< 8.95E-01	< 1.37E-05	< 1.72E-06
Carbon Tetrachloride	< 0.0049 J	< 0.005 J	< 0.0042 J	< 0.0048 J	< 0.12 ND	< 2.90E-02	< 3.85E-01	< 5.88E-06	< 7.41E-07
Chlorobenzene	2.349 E	3.409 E,J	3.1048 E,J	1.4077 J	< 0.1 ND	< 1.03E+01	< 1.36E+02	< 2.09E-03	< 2.63E-04
Chlorodibromomethane	< 0.11	< 0.13	< 0.11	0.121 J	< 0.2 ND	< 4.88E-01	< 6.48E+00	< 9.90E-05	< 1.25E-05
Chloroethane	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.24 ND	< 1.00E-01 ND	< 1.33E+00	< 2.03E-05	< 2.56E-06
Chloroform	< 0.0289	< 0.0299	0.0244 J	< 0.0269	< 0.1 ND	< 1.19E-01	< 1.57E+00	< 2.40E-05	< 3.03E-06
Chloromethane	< 0.2532	< 0.0862	< 0.0242 J	< 0.0542	< 0.12 ND	< 4.28E-01	< 5.68E+00	< 8.68E-05	< 1.09E-05
Dibromomethane	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.21 ND	< 9.76E-02 ND	< 1.30E+00	< 1.98E-05	< 2.50E-06
Dichlorodifluoromethane	< 0.0127 J	< 0.0126 J	< 0.0114 J	< 0.0149 J	< 0.15 ND	< 6.42E-02	< 8.52E-01	< 1.30E-05	< 1.64E-06
1,1-Dichloroethane	< 0.0038 ND	< 0.0038 ND	< 0.0038 ND	< 0.0038 ND	< 0.1 ND	< 2.36E-02 ND	< 3.13E-01	< 4.79E-06	< 6.03E-07
1,2-Dichloroethane	< 0.0044 ND	< 0.0044 ND	< 0.0044 ND	< 0.0044 ND	0.11 J	< 2.68E-02	< 3.56E-01	< 5.45E-06	< 6.86E-07
1,1-Dichloroethene	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.1 ND	< 2.68E-02 ND	< 3.56E-01	< 5.44E-06	< 6.85E-07
cis-1,2-Dichloroethene	< 0.005 ND	< 0.005 ND	< 0.005 ND	< 0.005 ND	< 0.12 ND	< 3.01E-02 ND	< 3.99E-01	< 6.10E-06	< 7.69E-07
trans-1,2-Dichloroethene	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.1 ND	< 2.20E-02 ND	< 2.92E-01	< 4.46E-06	< 5.62E-07
1,2-Dichloropropane	< 0.0054 ND	< 0.0054 ND	< 0.0054 ND	< 0.0054 ND	< 0.1 ND	< 3.00E-02 ND	< 3.98E-01	< 6.09E-06	< 7.67E-07
cis-1,3-Dichloropropene	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.1 ND	< 3.24E-02 ND	< 4.30E-01	< 6.57E-06	< 8.28E-07
trans-1,3-Dichloropropene	< 0.004 ND	< 0.004 ND	< 0.004 ND	< 0.004 ND	< 0.11 ND	< 2.52E-02 ND	< 3.35E-01	< 5.12E-06	< 6.45E-07
Ethylbenzene	< 0.0031 J	< 0.0026 ND	< 0.0026 ND	< 0.0026 ND	< 0.1 ND	< 1.93E-02	< 2.56E-01	< 3.92E-06	< 4.93E-07
2-Hexanone	< 0.0198 ND	< 0.0198 ND	< 0.0198 ND	< 0.0198 ND	< 0.76 ND	< 1.43E-01 ND	< 1.90E+00	< 2.90E-05	< 3.66E-06
Iodomethane	< 0.0032 ND	< 0.0156 J,B	< 0.0156 J,B	< 0.0156 J,B	0.56 J,B	< 9.70E-02	< 1.29E+00	< 1.97E-05	< 2.48E-06
Methylene Chloride	0.183 J	0.48	0.161	0.295	1.2 J	1.22E+00	1.62E+01	2.47E-04	3.12E-05
4-Methyl-2-pentanone (MIBK)	< 0.028 ND	< 0.028 ND	< 0.028 ND	< 0.028 ND	< 0.4 ND	< 1.46E-01 ND	< 1.93E+00	< 2.95E-05	< 3.72E-06
Styrene	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.1 ND	< 2.20E-02 ND	< 2.92E-01	< 4.46E-06	< 5.62E-07
1,1,2,2-Tetrachloroethane	< 0.022 ND	< 0.022 ND	< 0.022 ND	< 0.022 ND	< 0.15 ND	< 1.01E-01 ND	< 1.34E+00	< 2.04E-05	< 2.57E-06
Tetrachloroethene	0.2332 J	< 2.4021 E	1.1097 J	0.3624 J	< 0.1 ND	< 4.12E+00	< 5.46E+01	< 8.35E-04	< 1.05E-04
Toluene	0.072 J	0.3743 J	0.1233 J	0.1925 J	0.12 J	7.72E-01	1.03E+01	1.57E-04	1.97E-05
1,1,1-Trichloroethane	< 0.0032 ND	< 0.0032 ND	< 0.0032 ND	< 0.0032 ND	< 0.1 ND	< 2.12E-02 ND	< 2.81E-01	< 4.30E-06	< 5.42E-07
1,1,2-Trichloroethane	< 0.01 ND	< 0.01 ND	< 0.01 ND	< 0.01 ND	< 0.25 ND	< 6.10E-02 ND	< 8.10E-01	< 1.24E-05	< 1.56E-06
Trichloroethene	0.0189 J	0.0217 J	< 0.0122 J	< 0.0117 J	< 0.1 ND	< 7.29E-02	< 9.68E-01	< 1.48E-05	< 1.86E-06
Trichlorofluoromethane	< 0.0098 ND	< 0.0098 ND	< 0.0098 ND	< 0.0098 ND	< 0.12 ND	< 4.93E-02 ND	< 6.54E-01	< 1.00E-05	< 1.26E-06
1,2,3-Trichloropropane	< 0.0162 ND	< 0.0162 ND	< 0.0162 ND	< 0.0162 ND	< 0.36 ND	< 9.50E-02 ND	< 1.26E+00	< 1.93E-05	< 2.43E-06
Vinyl Acetate	< 0.024 ND	< 0.024 ND	< 0.024 ND	< 0.024 ND	< 0.24 ND	< 1.16E-01 ND	< 1.54E+00	< 2.36E-05	< 2.97E-06
Vinyl Chloride	< 0.0064 ND	< 0.0064 ND	< 0.0064 ND	< 0.0064 ND	< 0.24 ND	< 4.58E-02 ND	< 6.07E-01	< 9.28E-06	< 1.17E-06
Xylenes (total)	< 0.0148 J	< 0.0113 J	< 0.0109 J	< 0.0097 J	< 0.3 ND	< 7.19E-02	< 9.54E-01	< 1.46E-05	< 1.84E-06
Special Target Analytes									
Bromobenzene	< 0.0072 ND	< 0.0072 ND	< 0.0072 ND	< 0.0072 ND	< 0.11 ND	< 3.80E-02 ND	< 5.05E-01	< 7.72E-06	< 9.72E-07
Bromochloromethane	< 0.024 ND	< 0.024 ND	< 0.024 ND	< 0.024 ND	< 0.24 ND	< 1.16E-01 ND	< 1.54E+00	< 2.36E-05	< 2.97E-06
n-Butylbenzene	< 0.0094 ND	< 0.0094 ND	< 0.0094 ND	< 0.0094 ND	< 0.1 ND	< 4.60E-02 ND	< 6.11E-01	< 9.33E-06	< 1.18E-06
sec-Butylbenzene	< 0.0072 ND	< 0.0072 ND	< 0.0072 ND	< 0.0072 ND	< 0.1 ND	< 3.72E-02 ND	< 4.94E-01	< 7.56E-06	< 9.51E-07
tert-Butylbenzene	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.24 ND	< 4.42E-02 ND	< 5.86E-01	< 8.96E-06	< 1.13E-06
2-Chlorotoluene	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.24 ND	< 3.86E-02 ND	< 5.12E-01	< 7.82E-06	< 9.86E-07
4-Chlorotoluene	< 0.004 ND	< 0.004 ND	< 0.004 ND	< 0.004 ND	< 0.21 ND	< 3.36E-02 ND	< 4.47E-01	< 6.83E-06	< 8.60E-07
1,2-Dibromo-3-chloropropane	< 0.04 ND	< 0.04 ND	< 0.04 ND	< 0.04 ND	< 0.45 ND	< 1.98E-01 ND	< 2.63E+00	< 4.01E-05	< 5.06E-06
1,2-Dibromoethane	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.24 ND	< 1.00E-01 ND	< 1.33E+00	< 2.03E-05	< 2.56E-06
1,2-Dichlorobenzene	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.1 ND	< 3.24E-02 ND	< 4.30E-01	< 6.57E-06	< 8.28E-07
1,3-Dichlorobenzene	< 0.0062 ND	< 0.0062 ND	< 0.0062 ND	< 0.0062 ND	< 0.1 ND	< 3.32E-02 ND	< 4.41E-01	< 6.74E-06	< 8.49E-07
1,4-Dichlorobenzene	< 0.0086 ND	< 0.0086 ND	< 0.0086 ND	< 0.0086 ND	< 0.12 ND	< 4.45E-02 ND	< 5.90E-01	< 9.03E-06	< 1.14E-06
1,3-Dichloropropane	< 0.0036 ND	< 0.0036 ND	< 0.0036 ND	< 0.0036 ND	< 0.17 ND	< 2.07E-02 ND	< 3.81E-01	< 5.82E-06	< 7.33E-07
2,2-Dichloropropane	< 0.003 ND	< 0.003 ND	< 0.003 ND	< 0.003 ND	< 0.11 ND	< 2.12E-02 ND	< 2.82E-01	< 4.31E-06	< 5.43E-07
1,1-Dichloropropene	< 0.002 ND	< 0.002 ND	< 0.002 ND	< 0.002 ND	< 0.1 ND	< 1.64E-02 ND	< 2.18E-01	< 3.33E-06	< 4.19E-07
Hexachlorobutadiene	< 0.0096 ND	< 0.0096 ND	< 0.0096 ND	< 0.0096 ND	< 0.12 ND	< 4.85E-02 ND	< 6.44E-01	< 9.84E-06	< 1.24E-06
Isopropyl benzene	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.1 ND	< 2.68E-02 ND	< 3.56E-01	< 5.44E-06	< 6.85E-07
p-Isopropyltoluene	< 0.0076 ND	< 0.0076 ND	< 0.0076 ND	< 0.0076 ND	< 0.1 ND	< 3.88E-02 ND	< 5.15E-01	< 7.87E-06	< 9.92E-07
Naphthalene	< 0.02 ND	< 0.043	< 0.17	< 0.079	< 0.17 ND	< 3.26E-01	< 4.33E+00	< 6.62E-05	< 8.34E-06
n-Propylbenzene	< 0.0058 ND	< 0.0058 ND	< 0.0058 ND	< 0.0058 ND	< 0.1 ND	< 3.16E-02 ND	< 4.19E-01	< 6.41E-06	< 8.08E-07
1,1,1,2-Tetrachloroethane	< 0.002 ND	< 0.002 ND	< 0.002 ND	< 0.002 ND	< 0.12 ND	< 1.81E-02 ND	< 2.40E-01	< 3.67E-06	< 4.62E-07
Tetrahydrofuran	< 0.062 ND	< 0.062 ND	< 0.062 ND	< 0.062 ND	< 1.2 ND	< 3.49E-01 ND	< 4.63E+00	< 7.08E-05	< 8.92E-06
1,2,3-Trichlorobenzene	< 0.028 ND	< 0.028 ND	< 0.028 ND	< 0.028 ND	< 0.23 ND	< 1.31E-01 ND	< 1.74E+00	< 2.66E-05	< 3.36E-06
1,2,4-Trichlorobenzene	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.15 ND	< 3.66E-02 ND	< 4.86E-01	< 7.43E-06	< 9.36E-07
1,1,2-Trichloro-1,2,2-trifluoroethane	< 0.0036 ND	< 0.0036 ND	< 0.0036 ND	< 0.0036 ND	< 0.13 ND	< 2.53E-02 ND	< 3.36E-01	< 5.14E-06	< 6.47E-07
1,2,4-Trimethylbenzene	< 0.0096 ND	< 0.0096 ND	< 0.0096 ND	< 0.0096 ND	< 0.11 ND	< 4.76E-02 ND	< 6.32E-01	< 9.67E-06	< 1.22E-06
1,3,5-Trimethylbenzene	< 0.0056 ND	< 0.0056 ND	< 0.0056 ND	< 0.0056 ND	< 0.1 ND	< 3.08E-02 ND	< 4.09E-01	< 6.25E-06	< 7.87E-07
m- & p-Xylene	< 0.0125 J	< 0.0099 J	< 0.0095 J	< 0.0083 J	< 0.2 ND	< 5.70E-02	< 7.57E-01	< 1.16E-05	< 1.46E-06
o-Xylene	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.14 ND	< 2.54E-02 ND	< 3.37E-01	< 5.15E-06	< 6.48E-07
Tentatively Identified Compounds (TICs)									
Nonane	0.06 NJ	0	0	0	0	6.00E-02	7.96E-01	1.22E-05	1.53E-06
Benzaldehyde	0	0.074 NJ	0.063 NJ	0.041 NJ	0	1.78E-01	2.36E+00	3.61E-05	4.55E-06

(a) Stack gas sample volume (analyzed tubes only) — 2.6599 dry std cubic feet; 0.07533 dry std cubic meters

(b) Stack gas flow rate — 8850 actual cubic feet per minute; 4.17729 actual cubic meters per second; 4080 dry std cubic feet per minute; 1.9258 dry std cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using the detection limit.

Table 7-15. Speciated Semivolatile Organic Compound Emissions – Run 1

Semivolatile Compound	Front Half Analytical Result (ug/sample)	Back Half Analytical Result (ug/sample)	Condensate Analytical Result (ug/sample)	Stack (a,b,c) Concentration (ug/dscm)	Emission Rate (g/s)
Standard Target Analytes					
Acenaphthene	0.5 ND	0.5 ND	1.8 ND	< 8.04E-01	< 1.85E-06
Acenaphthylene	0.5 ND	0.5 ND	1.5 ND	< 7.18E-01	< 1.65E-06
Benzyl alcohol	35 ND	35 ND	1.8 ND	< 2.06E+01	< 4.74E-05
Bis(2-chloroethoxy) methane	0.59 ND	0.5 ND	1.8 ND	< 8.30E-01	< 1.91E-06
Bis-(2-chloroethyl) ether	0.76 ND	0.56 ND	1.5 ND	< 8.10E-01	< 1.86E-06
Bis(2-ethylhexyl) phthalate	5.7 J	10 ND	18 J	< 9.68E+00	< 2.22E-05
4-Bromophenyl-phenyl ether	0.53 ND	0.5 ND	1.3 ND	< 6.69E-01	< 1.54E-06
Butylbenzylphthalate	1.1 ND	0.61 ND	2.1 ND	< 1.09E+00	< 2.51E-06
4-Chloroaniline	1.2 ND	6 ND	7.3 ND	< 4.16E+00	< 9.57E-06
4-Chloro-3-methylphenol	1 ND	0.62 ND	6 ND	< 2.19E+00	< 5.03E-06
2-Chloronaphthalene	0.5 ND	0.5 ND	1.3 ND	< 6.60E-01	< 1.52E-06
2-Chlorophenol	0.98 ND	0.5 ND	1.5 ND	< 8.56E-01	< 1.97E-06
4-Chlorophenyl-phenyl ether	0.51 ND	0.5 ND	2.9 ND	< 1.12E+00	< 2.58E-06
Dibenzofuran	0.53 ND	0.5 ND	2.7 ND	< 1.07E+00	< 2.46E-06
Di-n-butylphthalate	0.71 ND	10 ND	2.1 ND	< 3.68E+00	< 8.45E-06
1,2-Dichlorobenzene	0.84 ND	0.51 ND	1.6 ND	< 8.47E-01	< 1.95E-06
1,3-Dichlorobenzene	1.2 ND	0.57 ND	1.3 ND	< 8.81E-01	< 2.03E-06
1,4-Dichlorobenzene	1.1 ND	0.53 ND	1.9 ND	< 1.01E+00	< 2.33E-06
3,3'-Dichlorobenzidine	2.7 ND	7.4 ND	7.1 ND	< 4.94E+00	< 1.14E-05
2,4-Dichlorophenol	1.5 ND	0.5 ND	2.1 ND	< 1.18E+00	< 2.71E-06
Diethyl phthalate	1.5 ND	0.73 ND	1.3 ND	< 1.01E+00	< 2.33E-06
2,4-Dimethylphenol	2.9 ND	6.3 ND	1.4 ND	< 3.04E+00	< 7.00E-06
Dimethylphthalate	0.63 ND	0.5 ND	1.2 ND	< 6.69E-01	< 1.54E-06
4,6-Dinitro-2-methylphenol	5 ND	8.7 ND	1.3 ND	< 4.31E+00	< 9.90E-06
2,4-Dinitrophenol	5.9 ND	22 ND	3.7 ND	< 9.07E+00	< 2.09E-05
2,4-Dinitrotoluene	1.6 ND	0.5 ND	2.5 ND	< 1.32E+00	< 3.04E-06
2,6-Dinitrotoluene	1.3 ND	0.5 ND	1.9 ND	< 1.06E+00	< 2.44E-06
Di-n-octyl phthalate	2.1 ND	0.56 ND	2.3 ND	< 1.42E+00	< 3.27E-06
Hexachlorobenzene	0.56 ND	0.5 ND	2.4 ND	< 9.93E-01	< 2.28E-06
Hexachlorobutadiene	1.4 ND	0.74 ND	1.8 ND	< 1.13E+00	< 2.60E-06
Hexachlorocyclo-pentadiene	10 ND	10 ND	6 ND	< 7.46E+00	< 1.72E-05
Hexachloroethane	2.5 ND	0.54 ND	1.8 ND	< 1.39E+00	< 3.19E-06
Isophrone	0.66 ND	0.5 ND	1.6 ND	< 7.92E-01	< 1.82E-06
2-Methylphenol	2.3 ND	3 ND	1.9 ND	< 2.07E+00	< 4.75E-06
2-Nitroaniline	0.56 ND	0.5 ND	2.6 ND	< 1.05E+00	< 2.42E-06
3-Nitroaniline	3.8 ND	2 ND	4.3 ND	< 2.90E+00	< 6.67E-06
4-Nitroaniline	2.3 ND	2 ND	3.5 ND	< 2.24E+00	< 5.15E-06
Nitrobenzene	0.73 ND	0.5 ND	1.5 ND	< 7.84E-01	< 1.80E-06
2-Nitrophenol	3.2 ND	0.5 ND	2.4 ND	< 1.75E+00	< 4.03E-06
4-Nitrophenol	3.3 ND	3.3 ND	3.5 ND	< 2.90E+00	< 6.67E-06
N-Nitrosodiphenylamine	0.6 ND	0.87 ND	1.3 ND	< 7.95E-01	< 1.83E-06
N-Nitroso-di-n-propylamine	0.73 ND	0.5 ND	2.1 ND	< 9.56E-01	< 2.20E-06
2,2'-oxybis (1-Chloropropane)	1 ND	0.76 ND	1.6 ND	< 9.65E-01	< 2.22E-06
Pentachlorophenol	25 ND	25 ND	3.2 ND	< 1.53E+01	< 3.51E-05
Phenol	1.1 ND	0.9 ND	2 ND	< 1.15E+00	< 2.64E-06
1,2,4-Trichlorobenzene	0.73 ND	0.59 ND	2 ND	< 9.53E-01	< 2.19E-06
2,4,5-Trichlorophenol	2.3 ND	1.3 ND	2 ND	< 1.61E+00	< 3.70E-06
2,4,6-Trichlorophenol	1.4 ND	0.75 ND	2.3 ND	< 1.28E+00	< 2.94E-06
Special Target Analytes					
Acetophenone	0.77 ND	3.9 J	2.4 ND	< 2.03E+00	< 4.67E-06
Aniline	0.96 ND	7.3 ND	17 ND	< 7.25E+00	< 1.67E-05
Anthracene	0.51 ND	0.5 ND	1.5 ND	< 7.21E-01	< 1.66E-06
Benzaldehyde	2.6 ND	6.4 J	2 ND	< 3.16E+00	< 7.26E-06
Benzidine	51 ND	51 ND	60 ND	< 4.65E+01	< 1.07E-04
Benzo(a)anthracene	0.82 ND	0.58 ND	1.6 ND	< 8.61E-01	< 1.98E-06
Benzo(b)fluoranthene	1.4 ND	1.1 ND	3.9 ND	< 1.84E+00	< 4.22E-06
Benzo(k)fluoranthene	2.1 ND	1.6 ND	2.7 ND	< 1.84E+00	< 4.22E-06
Benzoic acid	42 ND	46 ND	8.7 ND	< 2.78E+01	< 6.38E-05
Benzonitrile	2.4 ND	1.7 ND	2.4 ND	< 1.87E+00	< 4.29E-06
Benzo(ghi)perylene	2.8 ND	0.62 ND	2 ND	< 1.56E+00	< 3.58E-06
Benzo(a)pyrene	1 ND	0.5 ND	1.6 ND	< 8.90E-01	< 2.05E-06
Carbazole	0.76 ND	0.64 ND	2 ND	< 9.76E-01	< 2.24E-06
Chrysene	0.88 ND	0.64 ND	1.2 ND	< 7.81E-01	< 1.80E-06
Dibenz(ah)anthracene	2 ND	0.6 ND	2.6 ND	< 1.49E+00	< 3.43E-06
1,3-Dinitrobenzene	0.59 ND	0.52 ND	2.7 ND	< 1.09E+00	< 2.51E-06
Diphenylamine	0.5 ND	0.5 ND	2.7 ND	< 1.06E+00	< 2.44E-06
1,2-Diphenylhydrazine	0.63 ND	0.5 ND	1.3 ND	< 6.98E-01	< 1.60E-06
Fluoranthene	0.5 ND	0.5 ND	1.6 ND	< 7.46E-01	< 1.72E-06
Fluorene	0.51 ND	0.5 ND	2.5 ND	< 1.01E+00	< 2.32E-06
Indeno(1,2,3-cd)pyrene	2.1 ND	0.54 ND	2.1 ND	< 1.36E+00	< 3.13E-06
2-Methylnaphthalene	0.56 ND	0.5 ND	2.1 ND	< 9.07E-01	< 2.09E-06
3 & 4-Methylphenol	2.3 ND	2 ND	2 ND	< 1.81E+00	< 4.16E-06
Naphthalene	0.5 ND	0.6 ND	1.6 ND	< 7.75E-01	< 1.78E-06
N-Nitrosodimethylamine	0.72 ND	0.5 ND	2 ND	< 9.24E-01	< 2.13E-06
Pentachlorobenzene	0.52 ND	0.5 ND	2.1 ND	< 8.96E-01	< 2.06E-06
Pentachloronitrobenzene	0.76 ND	0.5 ND	2.4 ND	< 1.05E+00	< 2.42E-06
Phenanthrene	0.51 ND	0.5 ND	1.7 ND	< 7.78E-01	< 1.79E-06
Pyrene	0.74 ND	0.53 ND	1.3 ND	< 7.38E-01	< 1.70E-06
Pyridine	0.89 ND	0.74 ND	4.9 ND	< 1.87E+00	< 4.31E-06
1,2,4,5-Tetrachlorobenzene	0.87 ND	0.5 ND	2 ND	< 9.68E-01	< 2.22E-06
Tentatively Identified Compounds					
3-Penten-2-one, 4-methyl-	95 NJ	0	230 NJ	9.33E+01	2.14E-04
Unknown (2.5254)	4.5 NJ	0	40 NJ	1.28E+01	2.94E-05
Unknown (2.7017)	7.4 NJ	0	0	2.12E+00	4.88E-06
Unknown (2.7428)	52 NJ	0	0	1.49E+01	3.43E-05
Unknown (2.9132)	5.3 NJ	0	0	1.52E+00	3.50E-06
Unknown (2.1494)	0	70 NJ	0	2.01E+01	4.62E-05
Toluene	0	26 NJ	0	7.46E+00	1.72E-05
Methane, dibromochloro-	0	9.7 NJ	0	2.78E+00	6.40E-06
Tetrachloroethylene	0	75 NJ	0	2.15E+01	4.95E-05
Unknown (2.6018)	0	4.1 NJ	0	1.18E+00	2.71E-06
Unknown (2.6547)	0	9.3 NJ	0	2.67E+00	6.14E-06
Heptane, 2,5-dimethyl-	0	18 NJ	24 NJ	1.21E+01	2.77E-05
Unknown (2.7781)	0	590 NJ	1400 NJ	5.71E+02	1.31E-03
Benzene, chloro-	0	420 NJ	0	1.21E+02	2.77E-04
Methane, tribromo-	0	10 NJ	0	2.87E+00	6.60E-06
Benzaldehyde, 4-ethyl-	0	5.9 NJ	0	1.69E+00	3.89E-06
Phosphine imide, P,P,P-triphen	0	4.8 NJ	0	1.38E+00	3.17E-06
3-Penten-2-one, (E)-	0	0	22 NJ	6.32E+00	1.45E-05
Unknown (2.5724)	0	0	18 NJ	5.17E+00	1.19E-05
Octane, 2-methyl-	0	0	13 NJ	3.73E+00	8.58E-06
Unknown (4.5642)	0	0	47 NJ	1.35E+01	3.10E-05

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume: 122.990 dry standard cubic feet; 3.48 dry standard cubic meters

(b) Stack gas flow rate: 4,870 dry standard cubic feet per minute; 2.30 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using the detection limit.

Table 7-16. Speciated Semivolatile Organic Compound Emissions – Run 2

Semivolatile Compound	Front Half Analytical Result (ug/sample)	Back Half Analytical Result (ug/sample)	Condensate Analytical Result (ug/sample)	Stack (a,b,c) Concentration (ug/dscm)	Emission Rate (g/s)
Standard Target Analytes					
Acenaphthene	0.5 ND	0.5 ND	1.7 ND	< 8.11E-01	< 1.49E-06
Acenaphthylene	0.5 ND	0.5 ND	1.4 ND	< 7.21E-01	< 1.32E-06
Benzyl alcohol	35 ND	35 ND	1.7 ND	< 2.15E+01	< 3.94E-05
Bis(2-chloroethoxy) methane	0.59 ND	0.5 ND	1.7 ND	< 8.38E-01	< 1.53E-06
Bis-(2-chloroethyl) ether	0.76 ND	0.56 ND	1.4 ND	< 8.17E-01	< 1.50E-06
Bis(2-ethylhexyl) phthalate	3.3 ND	10 ND	29	< 1.27E+01	< 2.33E-05
4-Bromophenyl-phenyl ether	0.53 ND	0.5 ND	1.2 ND	< 6.70E-01	< 1.23E-06
Butylbenzylphthalate	1.1 ND	0.61 ND	1.9 ND	< 1.08E+00	< 1.99E-06
4-Chloroaniline	1.2 ND	6 ND	6.8 ND	< 4.21E+00	< 7.70E-06
4-Chloro-3-methylphenol	1 ND	0.62 ND	5.6 ND	< 2.17E+00	< 3.97E-06
2-Chloronaphthalene	0.5 ND	0.5 ND	1.2 ND	< 6.61E-01	< 1.21E-06
2-Chlorophenol	0.98 ND	0.5 ND	1.4 ND	< 8.65E-01	< 1.58E-06
4-Chlorophenyl-phenyl ether	0.51 ND	0.5 ND	2.7 ND	< 1.11E+00	< 2.04E-06
Dibenzofuran	0.53 ND	0.5 ND	2.5 ND	< 1.06E+00	< 1.94E-06
Di-n-butylphthalate	0.71 ND	10 ND	1.9 ND	< 3.79E+00	< 6.94E-06
1,2-Dichlorobenzene	0.84 ND	0.51 ND	1.5 ND	< 8.56E-01	< 1.57E-06
1,3-Dichlorobenzene	1.2 ND	0.57 ND	1.2 ND	< 8.92E-01	< 1.63E-06
1,4-Dichlorobenzene	1.1 ND	0.53 ND	1.7 ND	< 1.00E+00	< 1.83E-06
3,3'-Dichlorobenzidine	2.7 ND	7.4 ND	6.6 ND	< 5.02E+00	< 9.19E-06
2,4-Dichlorophenol	1.5 ND	0.5 ND	2 ND	< 1.20E+00	< 2.20E-06
Diethyl phthalate	1.5 ND	0.73 ND	1.2 ND	< 1.03E+00	< 1.89E-06
2,4-Dimethylphenol	2.9 ND	6.3 ND	1.3 ND	< 3.15E+00	< 5.78E-06
Dimethylphthalate	0.63 ND	0.5 ND	1.1 ND	< 6.70E-01	< 1.23E-06
4,6-Dinitro-2-methylphenol	5 ND	8.7 ND	1.2 ND	< 4.48E+00	< 8.20E-06
2,4-Dinitrophenol	5.9 ND	22 ND	3.4 ND	< 9.40E+00	< 1.72E-05
2,4-Dinitrotoluene	1.6 ND	0.5 ND	2.3 ND	< 1.32E+00	< 2.42E-06
2,6-Dinitrotoluene	1.3 ND	0.5 ND	1.8 ND	< 1.08E+00	< 1.98E-06
Di-n-octyl phthalate	2.1 ND	0.56 ND	2.1 ND	< 1.43E+00	< 2.62E-06
Hexachlorobenzene	0.56 ND	0.5 ND	2.3 ND	< 1.01E+00	< 1.85E-06
Hexachlorobutadiene	1.4 ND	0.74 ND	1.6 ND	< 1.12E+00	< 2.06E-06
Hexachlorocyclo-pentadiene	10 ND	10 ND	5.6 ND	< 7.69E+00	< 1.41E-05
Hexachloroethane	2.5 ND	0.54 ND	1.7 ND	< 1.42E+00	< 2.61E-06
Isophrone	0.66 ND	0.5 ND	1.5 ND	< 7.99E-01	< 1.46E-06
2-Methylphenol	2.3 ND	3 ND	1.8 ND	< 2.13E+00	< 3.91E-06
2-Nitroaniline	0.56 ND	0.5 ND	2.4 ND	< 1.04E+00	< 1.90E-06
3-Nitroaniline	3.8 ND	2 ND	4 ND	< 2.94E+00	< 5.39E-06
4-Nitroaniline	2.3 ND	2 ND	3.3 ND	< 2.28E+00	< 4.18E-06
Nitrobenzene	0.73 ND	0.5 ND	1.4 ND	< 7.90E-01	< 1.45E-06
2-Nitrophenol	3.2 ND	0.5 ND	2.3 ND	< 1.80E+00	< 3.30E-06
4-Nitrophenol	3.3 ND	3.3 ND	3.3 ND	< 2.97E+00	< 5.45E-06
N-Nitrosodiphenylamine	0.6 ND	0.87 ND	1.2 ND	< 8.02E-01	< 1.47E-06
N-Nitroso-di-n-propylamine	0.73 ND	0.5 ND	2 ND	< 9.70E-01	< 1.78E-06
2,2'-oxybis (1-Chloropropane)	1 ND	0.76 ND	1.5 ND	< 9.79E-01	< 1.79E-06
Pentachlorophenol	25 ND	25 ND	2.9 ND	< 1.59E+01	< 2.91E-05
Phenol	1.1 ND	0.9 ND	1.8 ND	< 1.14E+00	< 2.09E-06
1,2,4-Trichlorobenzene	0.73 ND	0.59 ND	1.8 ND	< 9.37E-01	< 1.72E-06
2,4,5-Trichlorophenol	2.3 ND	1.3 ND	1.8 ND	< 1.62E+00	< 2.97E-06
2,4,6-Trichlorophenol	1.4 ND	0.75 ND	2.1 ND	< 1.28E+00	< 2.34E-06
Special Target Analytes					
Acetophenone	0.77 ND	4 J	2.2 ND	< 2.09E+00	< 3.83E-06
Aniline	0.95 ND	7.3 ND	16 ND	< 7.28E+00	< 1.33E-05
Anthracene	0.51 ND	0.5 ND	1.4 ND	< 7.24E-01	< 1.33E-06
Benzaldehyde	2.6 ND	5.1 J	1.8 ND	< 2.85E+00	< 5.23E-06
Benzidine	51 ND	51 ND	56 ND	< 4.75E+01	< 8.69E-05
Benzo(a)anthracene	0.82 ND	0.58 ND	1.5 ND	< 8.71E-01	< 1.60E-06
Benzo(b)fluoranthene	1.4 ND	1.1 ND	3.6 ND	< 1.83E+00	< 3.36E-06
Benzo(k)fluoranthene	2.1 ND	1.6 ND	2.5 ND	< 1.86E+00	< 3.41E-06
Benzoic acid	42 ND	46 ND	8 ND	< 2.88E+01	< 5.28E-05
Benzonitrile	2.4 ND	1.7 ND	2.2 ND	< 1.89E+00	< 3.47E-06
Benzo(ghi)perylene	2.8 ND	0.62 ND	1.8 ND	< 1.57E+00	< 2.87E-06
Benzo(a)pyrene	1 ND	0.5 ND	1.5 ND	< 9.01E-01	< 1.65E-06
Carbazole	0.76 ND	0.64 ND	1.9 ND	< 9.91E-01	< 1.82E-06
Chrysene	0.88 ND	0.64 ND	1.1 ND	< 7.87E-01	< 1.44E-06
Dibenz(ah)anthracene	2 ND	0.6 ND	2.4 ND	< 1.50E+00	< 2.75E-06
1,3-Dinitrobenzene	0.59 ND	0.52 ND	2.5 ND	< 1.08E+00	< 1.99E-06
Diphenylamine	0.5 ND	0.5 ND	2.5 ND	< 1.05E+00	< 1.93E-06
1,2-Diphenylhydrazine	0.63 ND	0.5 ND	1.2 ND	< 7.00E-01	< 1.28E-06
Fluoranthene	0.5 ND	0.5 ND	1.5 ND	< 7.51E-01	< 1.38E-06
Fluorene	0.51 ND	0.5 ND	2.3 ND	< 9.94E-01	< 1.82E-06
Indeno(1,2,3-cd)pyrene	2.1 ND	0.54 ND	1.9 ND	< 1.36E+00	< 2.50E-06
2-Methylnaphthalene	0.56 ND	0.5 ND	1.9 ND	< 8.89E-01	< 1.63E-06
3 & 4-Methylphenol	2.3 ND	2 ND	1.9 ND	< 1.86E+00	< 3.41E-06
Naphthalene	0.5 ND	0.6 ND	1.5 ND	< 7.81E-01	< 1.43E-06
N-Nitrosodimethylamine	0.72 ND	0.5 ND	1.9 ND	< 9.37E-01	< 1.72E-06
Pentachlorobenzene	0.52 ND	0.5 ND	1.9 ND	< 8.77E-01	< 1.61E-06
Pentachloronitrobenzene	0.76 ND	0.5 ND	2.2 ND	< 1.04E+00	< 1.90E-06
Phenanthrene	0.51 ND	0.5 ND	1.6 ND	< 7.84E-01	< 1.44E-06
Pyrene	0.74 ND	0.53 ND	1.2 ND	< 7.42E-01	< 1.36E-06
Pyridine	0.89 ND	0.74 ND	4.5 ND	< 1.84E+00	< 3.37E-06
1,2,4,5-Tetrachlorobenzene	0.87 ND	0.5 ND	1.8 ND	< 9.52E-01	< 1.74E-06
Tentatively Identified Compounds					
Furan, 2,5-dimethyl-	4.6 NJ	0	0	1.38E+00	2.53E-06
Unknown (1.9671)	5.4 NJ	0	0	1.62E+00	2.97E-06
Unknown (2.5253)	4.8 NJ	0	38 NJ	1.29E+01	2.35E-05
Unknown (2.6545)	8.6 NJ	0	0	2.58E+00	4.73E-06
Heptane, 2,5-dimethyl-	18 NJ	12 NJ	11 NJ	1.23E+01	2.26E-05
Unknown (2.7485)	82 NJ	0	0	2.46E+01	4.51E-05
3-Hexene-2,5-dione	5.2 NJ	0	0	1.56E+00	2.86E-06
Unknown (2.1492)	0	54 NJ	0	1.62E+01	2.97E-05
Toluene	0	20 NJ	0	6.01E+00	1.10E-05
Methane, dibromochloro-	0	8 NJ	0	2.40E+00	4.40E-06
Octane, 2-methyl-	0	6.1 NJ	0	1.83E+00	3.36E-06
Unknown (2.7721)	0	550 NJ	0	1.65E+02	3.03E-04
Benzene, chloro-	0	82 NJ	0	2.46E+01	4.51E-05
Methane, tribromo-	0	10 NJ	0	3.00E+00	5.50E-06
Benzoic acid, methyl ester	0	4.4 NJ	0	1.32E+00	2.42E-06
Benzaldehyde, 3-ethyl-	0	5.9 NJ	0	1.77E+00	3.25E-06
Unknown (2.0259)	0	0	21 NJ	6.31E+00	1.16E-05
3-Hexen-2-one	0	0	620 NJ	1.86E+02	3.41E-04
Unknown (2.7486)	0	0	400 NJ	1.20E+02	2.20E-04
Unknown (2.9542)	0	0	17 NJ	5.11E+00	9.35E-06
Unknown (3.1657)	0	0	11 NJ	3.30E+00	6.05E-06
Unknown (4.8579)	0	0	16 NJ	4.81E+00	8.80E-06

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume: 117.540 dry standard cubic feet; 3.33 dry standard cubic meters

(b) Stack gas flow rate: 3,880 dry standard cubic feet per minute; 1.83 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using the detection limit.

Table 7-17. Speciated Semivolatile Organic Compound Emissions – Run 3

Semivolatile Compound	Front Half Analytical Result (ug/sample)	Back Half Analytical Result (ug/sample)	Condensate Analytical Result (ug/sample)		Stack (a,b,c) Concentration (ug/dscm)		Emission Rate (g/s)
Standard Target Analytes							
Acenaphthene	0.5 ND	0.5 ND	1.7 ND	<	7.58E-01	<	1.46E-06
Acenaphthylene	0.5 ND	0.5 ND	1.5 ND	<	7.02E-01	<	1.35E-06
Benzyl alcohol	35 ND	35 ND	1.8 ND	<	2.02E+01	<	3.88E-05
Bis(2-chloroethoxy) methane	0.59 ND	0.5 ND	1.8 ND	<	8.12E-01	<	1.56E-06
Bis-(2-chloroethyl) ether	0.76 ND	0.56 ND	1.5 ND	<	7.92E-01	<	1.53E-06
Bis(2-ethylhexyl) phthalate	3.3 ND	10 ND	16 J	<	8.23E+00	<	1.58E-05
4-Bromophenyl-phenyl ether	0.53 ND	0.5 ND	1.3 ND	<	6.54E-01	<	1.26E-06
Butylbenzylphthalate	1.1 ND	0.61 ND	2 ND	<	1.04E+00	<	2.01E-06
4-Chloroaniline	1.2 ND	6 ND	7.1 ND	<	4.02E+00	<	7.74E-06
4-Chloro-3-methylphenol	1 ND	0.62 ND	5.8 ND	<	2.08E+00	<	4.01E-06
2-Chloronaphthalene	0.5 ND	0.5 ND	1.2 ND	<	6.18E-01	<	1.19E-06
2-Chlorophenol	0.98 ND	0.5 ND	1.5 ND	<	8.37E-01	<	1.61E-06
4-Chlorophenyl-phenyl ether	0.51 ND	0.5 ND	2.8 ND	<	1.07E+00	<	2.06E-06
Dibenzofuran	0.53 ND	0.5 ND	2.6 ND	<	1.02E+00	<	1.96E-06
Di-n-butylphthalate	0.71 ND	10 ND	2 ND	<	3.57E+00	<	6.88E-06
1,2-Dichlorobenzene	0.84 ND	0.51 ND	1.5 ND	<	8.01E-01	<	1.54E-06
1,3-Dichlorobenzene	1.2 ND	0.57 ND	1.3 ND	<	8.62E-01	<	1.66E-06
1,4-Dichlorobenzene	1.1 ND	0.53 ND	1.8 ND	<	9.63E-01	<	1.86E-06
3,3'-Dichlorobenzidine	2.7 ND	7.4 ND	6.9 ND	<	4.78E+00	<	9.20E-06
2,4-Dichlorophenol	1.5 ND	0.5 ND	2.1 ND	<	1.15E+00	<	2.22E-06
Diethyl phthalate	1.5 ND	0.73 ND	1.2 ND	<	9.63E-01	<	1.86E-06
2,4-Dimethylphenol	2.9 ND	6.3 ND	1.4 ND	<	2.98E+00	<	5.73E-06
Dimethylphthalate	0.63 ND	0.5 ND	1.2 ND	<	6.54E-01	<	1.26E-06
4,6-Dinitro-2-methylphenol	5 ND	8.7 ND	1.3 ND	<	4.21E+00	<	8.11E-06
2,4-Dinitrophenol	5.9 ND	22 ND	3.6 ND	<	8.85E+00	<	1.70E-05
2,4-Dinitrotoluene	1.6 ND	0.5 ND	2.4 ND	<	1.26E+00	<	2.43E-06
2,6-Dinitrotoluene	1.3 ND	0.5 ND	1.8 ND	<	1.01E+00	<	1.95E-06
Di-n-octyl phthalate	2.1 ND	0.56 ND	2.2 ND	<	1.37E+00	<	2.63E-06
Hexachlorobenzene	0.56 ND	0.5 ND	2.4 ND	<	9.72E-01	<	1.87E-06
Hexachlorobutadiene	1.4 ND	0.74 ND	1.7 ND	<	1.08E+00	<	2.08E-06
Hexachlorocyclo-pentadiene	10 ND	10 ND	5.8 ND	<	7.25E+00	<	1.40E-05
Hexachloroethane	2.5 ND	0.54 ND	1.7 ND	<	1.33E+00	<	2.56E-06
Isophrone	0.66 ND	0.5 ND	1.6 ND	<	7.75E-01	<	1.49E-06
2-Methylphenol	2.3 ND	3 ND	1.9 ND	<	2.02E+00	<	3.89E-06
2-Nitroaniline	0.56 ND	0.5 ND	2.5 ND	<	1.00E+00	<	1.93E-06
3-Nitroaniline	3.8 ND	2 ND	4.2 ND	<	2.81E+00	<	5.41E-06
4-Nitroaniline	2.3 ND	2 ND	3.4 ND	<	2.16E+00	<	4.17E-06
Nitrobenzene	0.73 ND	0.5 ND	1.5 ND	<	7.67E-01	<	1.48E-06
2-Nitrophenol	3.2 ND	0.5 ND	2.4 ND	<	1.71E+00	<	3.30E-06
4-Nitrophenol	3.3 ND	3.3 ND	3.4 ND	<	2.81E+00	<	5.41E-06
N-Nitrosodiphenylamine	0.6 ND	0.87 ND	1.2 ND	<	7.50E-01	<	1.44E-06
N-Nitroso-di-n-propylamine	0.73 ND	0.5 ND	2.1 ND	<	9.35E-01	<	1.80E-06
2,2'-oxybis (1-Chloropropane)	1 ND	0.76 ND	1.6 ND	<	9.44E-01	<	1.82E-06
Pentachlorophenol	25 ND	25 ND	3.1 ND	<	1.49E+01	<	2.87E-05
Phenol	1.1 ND	0.9 ND	1.9 ND	<	1.10E+00	<	2.11E-06
1,2,4-Trichlorobenzene	0.73 ND	0.59 ND	1.9 ND	<	9.04E-01	<	1.74E-06
2,4,5-Trichlorophenol	2.3 ND	1.3 ND	1.9 ND	<	1.54E+00	<	2.98E-06
2,4,6-Trichlorophenol	1.4 ND	0.75 ND	2.2 ND	<	1.22E+00	<	2.35E-06
Special Target Analytes							
Acetophenone	0.77 ND	5.1 J	2.3 ND	<	2.29E+00	<	4.42E-06
Aniline	0.95 ND	7.3 ND	16 ND	<	6.81E+00	<	1.31E-05
Anthracene	0.51 ND	0.5 ND	1.5 ND	<	7.05E-01	<	1.36E-06
Benzaldehyde	2.6 ND	6.9 J	1.9 ND	<	3.20E+00	<	6.17E-06
Benzidine	51 ND	51 ND	58 ND	<	4.49E+01	<	8.66E-05
Benzo(a)anthracene	0.82 ND	0.58 ND	1.5 ND	<	8.15E-01	<	1.57E-06
Benzo(b)fluoranthene	1.4 ND	1.1 ND	3.8 ND	<	1.77E+00	<	3.41E-06
Benzo(k)fluoranthene	2.1 ND	1.6 ND	2.6 ND	<	1.77E+00	<	3.41E-06
Benzoic acid	42 ND	46 ND	8.4 ND	<	2.71E+01	<	5.21E-05
Benzonitrile	2.4 ND	1.7 ND	2.3 ND	<	1.80E+00	<	3.46E-06
Benzo(ghi)perylene	2.8 ND	0.62 ND	1.9 ND	<	1.49E+00	<	2.88E-06
Benzo(a)pyrene	1 ND	0.5 ND	1.6 ND	<	8.71E-01	<	1.68E-06
Carbazole	0.76 ND	0.64 ND	2 ND	<	9.55E-01	<	1.84E-06
Chrysene	0.88 ND	0.64 ND	1.2 ND	<	7.64E-01	<	1.47E-06
Dibenz(ah)anthracene	2 ND	0.6 ND	2.5 ND	<	1.43E+00	<	2.76E-06
1,3-Dinitrobenzene	0.59 ND	0.52 ND	2.6 ND	<	1.04E+00	<	2.01E-06
Diphenylamine	0.5 ND	0.5 ND	2.6 ND	<	1.01E+00	<	1.95E-06
1,2-Diphenylhydrazine	0.63 ND	0.5 ND	1.3 ND	<	6.83E-01	<	1.31E-06
Fluoranthene	0.5 ND	0.5 ND	1.6 ND	<	7.30E-01	<	1.41E-06
Fluorene	0.51 ND	0.5 ND	2.5 ND	<	9.86E-01	<	1.90E-06
Indeno(1,2,3-cd)pyrene	2.1 ND	0.54 ND	2 ND	<	1.30E+00	<	2.51E-06
2-Methylnaphthalene	0.56 ND	0.5 ND	2 ND	<	8.60E-01	<	1.66E-06
3 & 4-Methylphenol	2.3 ND	2 ND	2 ND	<	1.77E+00	<	3.41E-06
Naphthalene	0.5 ND	9.9 J	1.6 ND	<	3.37E+00	<	6.49E-06
N-Nitrosodimethylamine	0.72 ND	0.5 ND	1.9 ND	<	8.76E-01	<	1.69E-06
Pentachlorobenzene	0.52 ND	0.5 ND	2 ND	<	8.48E-01	<	1.63E-06
Pentachloronitrobenzene	0.76 ND	0.5 ND	2.3 ND	<	1.00E+00	<	1.93E-06
Phenanthrene	0.51 ND	0.5 ND	1.7 ND	<	7.61E-01	<	1.47E-06
Pyrene	0.74 ND	0.53 ND	1.3 ND	<	7.22E-01	<	1.39E-06
Pyridine	0.89 ND	0.74 ND	4.7 ND	<	1.78E+00	<	3.42E-06
1,2,4,5-Tetrachlorobenzene	0.87 ND	0.5 ND	1.9 ND	<	9.18E-01	<	1.77E-06
Tentatively Identified Compounds							
Unknown (2.7427)	23 NJ	0	0		6.46E+00		1.24E-05
9-Octadecenamide, (Z)-	14 NJ	0	0		3.93E+00		7.57E-06
Unknown (12.701)	5.7 NJ	0	0		1.60E+00		3.08E-06
Unknown (2.1492)	0	70 NJ	0		1.97E+01		3.79E-05
Toluene	0	55 NJ	0		1.54E+01		2.98E-05
Methane, dibromochloro-	0	9.9 NJ	0		2.78E+00		5.36E-06
Tetrachloroethylene	0	21 NJ	0		5.90E+00		1.14E-05
Unknown (2.7779)	0	630 NJ	0		1.77E+02		3.41E-04
Benzene, chloro-	0	260 NJ	0		7.30E+01		1.41E-04
Methane, tribromo-	0	14 NJ	0		3.93E+00		7.57E-06
Benzaldehyde, 3-ethyl-	0	7.2 NJ	0		2.02E+00		3.89E-06
3-Penten-2-one, 4-methyl-	0	0	120 NJ		3.37E+01		6.49E-05
Unknown (2.5254)	0	0	37 NJ		1.04E+01		2.00E-05
Unknown (2.7428)	0	0	34 NJ		9.55E+00		1.84E-05

NOTE: All concentrations in this table are uncorrected for oxygen concentration.
(a) Stack gas sample volume — 125.710 dry standard cubic feet; 3.56 dry standard cubic meters
(b) Stack gas flow rate — 4,080 dry standard cubic feet per minute; 1.93 dry standard cubic meters per second
(c) For non-detects, stack concentrations and emissions are calculated using the detection limit.

Table 7-18. Total Volatile Organic Compound Emissions (C1 – C7) – Run 1

Volatile Compound	Bag Analytical Result (ppmv, dry)	Condensate Analytical Result (ug/sample)	Stack (a,b,c) Concentration (ppmv, dry)	Stack (a,b,c) Concentration (ug/dscm)	Emission Rate (g/s)
Total C1	1.72	0	1.72E+00	1.15E+03	2.76E-03
Total C2	0.083 ND	0	< 8.30E-02	< 1.04E+02	< 2.49E-04
Total C3	0.11 ND	0	< 1.10E-01	< 2.02E+02	< 4.85E-04
Total C4	0.08 ND	0.042 ND	< 8.08E-02	< 1.96E+02	< 4.69E-04
Total C5	0.14 ND	0.02436 J,B	< 1.40E-01	< 4.22E+02	< 1.01E-03
Total C6	0.13 ND	0.03108 J	< 1.30E-01	< 4.68E+02	< 1.12E-03
Total C7	0.18 ND	0.0042 ND	< 1.80E-01	< 7.52E+02	< 1.80E-03
Total Volatile Organics	< 2.443	0.10164	< 2.44E+00	< 3.29E+03	< 7.90E-03

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume 0.759 dry standard cubic feet
0.02 dry standard cubic meters

(b) Stack gas flow rate 5,080 dry standard cubic feet per minute
2.40 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using the detection limit.

Table 7-19. Total Volatile Organic Compound Emissions (C1 – C7) – Run 2

Volatile Compound	Bag Analytical Result (ppmv, dry)	Condensate Analytical Result (ug/sample)	Stack (a,b,c) Concentration (ppmv, dry)	Stack (a,b,c) Concentration (ug/dscm)	Emission Rate (g/s)
Total C1	1.76	0	1.76E+00	1.18E+03	2.14E-03
Total C2	0.083 ND	0	< 8.30E-02	< 1.04E+02	< 1.89E-04
Total C3	0.11 ND	0	< 1.10E-01	< 2.02E+02	< 3.68E-04
Total C4	0.08 ND	0.042 ND	< 8.07E-02	< 1.95E+02	< 3.56E-04
Total C5	0.14 ND	0.01386 J,B	< 1.40E-01	< 4.21E+02	< 7.68E-04
Total C6	0.13 ND	0.03654 J	< 1.30E-01	< 4.68E+02	< 8.53E-04
Total C7	0.18 ND	0.0042 ND	< 1.80E-01	< 7.52E+02	< 1.37E-03
Total Volatile Organics	< 2.483	0.0966	< 2.48E+00	< 3.32E+03	< 6.05E-03

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume 0.894 dry standard cubic feet
0.03 dry standard cubic meters

(b) Stack gas flow rate 3,860 dry standard cubic feet per minute
1.82 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using the detection limit.

Table 7-20. Total Volatile Organic Compound Emissions (C1 – C7) – Run 3

Volatile Compound	Bag Analytical Result (ppmv, dry)	Condensate Analytical Result (ug/sample)	Stack (a,b,c) Concentration (ppmv, dry)	Stack (a,b,c) Concentration (ug/dscm)	Emission Rate (g/s)
Total C1	1.68	0	1.68E+00	1.12E+03	2.15E-03
Total C2	0.083 ND	0	< 8.30E-02	< 1.04E+02	< 1.99E-04
Total C3	0.11 ND	0	< 1.10E-01	< 2.02E+02	< 3.87E-04
Total C4	0.08 ND	0.042 ND	< 8.06E-02	< 1.95E+02	< 3.74E-04
Total C5	0.14 ND	0.0126 J,B	< 1.40E-01	< 4.21E+02	< 8.07E-04
Total C6	0.13 ND	0.03906 J	< 1.30E-01	< 4.68E+02	< 8.97E-04
Total C7	0.18 ND	0.0042 ND	< 1.80E-01	< 7.52E+02	< 1.44E-03
Total Volatile Organics	< 2.403	0.09786	< 2.40E+00	< 3.26E+03	< 6.26E-03

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume 1.065 dry standard cubic feet
0.03 dry standard cubic meters

(b) Stack gas flow rate 4,060 dry standard cubic feet per minute
1.92 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using the detection limit.

Table 7-21. Total Semivolatile and Nonvolatile Organic Emissions – Run 1

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	240
Stack gas flow rate	dscfm	5,080
	acfm	11,370
	dscm/min	143.87
Stack gas temperature	°F	175
Stack gas velocity	ft/min	3,618
Stack gas sample volume	dscf	134.440
	dscm	3.807
Isokinetic	%	97.7
Stack gas moisture content	vol %	45.5
Stack gas carbon dioxide content	vol %, dry	6.4
Stack gas oxygen content	vol %, dry	9.8
Total Semivolatile Organics by TCO		
Total semivolatiles collected	ug	5320
TCO concentration	ug/dscm	1.40E+03
	ug/dscm @7% O_2	1.75E+03
TCO emission rate	lb/h	2.66E-02
	kg/h	1.21E-02
	g/s	3.35E-03
Total Nonvolatile Organics by GRAV		
Total nonvolatiles collected	ug	3050
GRAV concentration	ug/dscm	8.01E+02
	ug/dscm @7% O_2	1.00E+03
GRAV emission rate	lb/h	1.52E-02
	kg/h	6.92E-03
	g/s	1.92E-03

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 7-22. Total Semivolatile and Nonvolatile Organic Emissions – Run 2

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	240
Stack gas flow rate	dscfm	3,860
	acfm	8,610
	dscm/min	109.32
Stack gas temperature	°F	174
Stack gas velocity	ft/min	2,742
Stack gas sample volume	dscf	120.300
	dscm	3.407
Isokinetic	%	98.9
Stack gas moisture content	vol %	45.1
Stack gas carbon dioxide content	vol %, dry	7.2
Stack gas oxygen content	vol %, dry	8.9
Total Semivolatile Organics by TCO		
Total semivolatiles collected	ug	2830
TCO concentration	ug/dscm	8.31E+02
	ug/dscm @7% O_2	9.61E+02
TCO emission rate	lb/h	1.20E-02
	kg/h	5.45E-03
	g/s	1.51E-03
Total Nonvolatile Organics by GRAV		
Total nonvolatiles collected	ug	2260
GRAV concentration	ug/dscm	6.63E+02
	ug/dscm @7% O_2	7.68E+02
GRAV emission rate	lb/h	9.59E-03
	kg/h	4.35E-03
	g/s	1.21E-03

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 7-23. Total Semivolatile and Nonvolatile Organic Emissions – Run 3

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	240
Stack gas flow rate	dscfm	4,060
	acfm	8,890
	dscm/min	114.98
Stack gas temperature	°F	175
Stack gas velocity	ft/min	2,832
Stack gas sample volume	dscf	125.030
	dscm	3.541
Isokinetic	%	97.7
Stack gas moisture content	vol %	44.5
Stack gas carbon dioxide content	vol %, dry	7.1
Stack gas oxygen content	vol %, dry	9.3
Total Semivolatile Organics by TCO		
Total semivolatiles collected	ug	1924
TCO concentration	ug/dscm	5.43E+02
	ug/dscm @7% O_2	6.50E+02
TCO emission rate	lb/h	8.26E-03
	kg/h	3.75E-03
	g/s	1.04E-03
Total Nonvolatile Organics by GRAV		
Total nonvolatiles collected	ug	2250
GRAV concentration	ug/dscm	6.35E+02
	ug/dscm @7% O_2	7.60E+02
GRAV emission rate	lb/h	9.66E-03
	kg/h	4.38E-03
	g/s	1.22E-03

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 7-24. PCDD/PCDF Emission Summary – Run 1

Parameter	Units		Measured Value
Stack Sampling Parameters			
Net sampling time	minutes		240
Stack gas flow rate	dscfm		5,290
	acfm		11,760
Stack gas temperature	°F		176
Stack gas velocity	ft/min		3,744
Stack gas sample volume	dscf		139.210
	dscm		3.943
Isokinetic	%		101.2
Stack gas moisture content	vol%		45.2
Stack gas carbon dioxide	vol %, dry		6.4
Stack gas oxygen	vol %, dry		9.8
PCDD/PCDF			
Total PCDD/PCDF	pg/sample	<	12288
Stack gas PCDD/PCDF concentration	ng/dscm	<	3.12E+00
Stack gas PCDD/PCDF concentration	ng/dscm @7% O_2	<	3.90E+00
PCDD/PCDF emission rate	g/s	<	7.78E-09
PCDD/PCDF Toxic Equivalents as 2,3,7,8-TCDD			
Stack gas PCDD/PCDF concentration	ng/dscm	<	5.23E-02
Stack gas PCDD/PCDF concentration	ng/dscm @7% O_2	<	6.53E-02
PCDD/PCDF emission rate	g/s	<	1.30E-10

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 7-25. PCDD/PCDF Emission Summary – Run 2

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	240
Stack gas flow rate	dscfm	3,780
	acfm	8,320
Stack gas temperature	°F	175
Stack gas velocity	ft/min	2,646
Stack gas sample volume	dscf	119.220
	dscm	3.376
Isokinetic	%	100.9
Stack gas moisture content	vol%	44.4
Stack gas carbon dioxide	vol %, dry	7.2
Stack gas oxygen	vol %, dry	8.9
PCDD/PCDF		
Total PCDD/PCDF	pg/sample	< 7223.8
Stack gas PCDD/PCDF concentration	ng/dscm	< 2.12E+00
Stack gas PCDD/PCDF concentration	ng/dscm @7% O_2	< 2.45E+00
PCDD/PCDF emission rate	g/s	< 3.78E-09
PCDD/PCDF Toxic Equivalents as 2,3,7,8-TCDD		
Stack gas PCDD/PCDF concentration	ng/dscm	< 4.52E-02
Stack gas PCDD/PCDF concentration	ng/dscm @7% O_2	< 5.23E-02
PCDD/PCDF emission rate	g/s	< 8.07E-11

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 7-26. PCDD/PCDF Emission Summary – Run 3

Parameter	Units		Measured Value
Stack Sampling Parameters			
Net sampling time	minutes		240
Stack gas flow rate	dscfm		4,040
	acfm		8,850
Stack gas temperature	°F		175
Stack gas velocity	ft/min		2,820
Stack gas sample volume	dscf		126.180
	dscm		3.573
Isokinetic	%		99.9
Stack gas moisture content	vol%		44.5
Stack gas carbon dioxide	vol %, dry		7.1
Stack gas oxygen	vol %, dry		9.3
PCDD/PCDF			
Total PCDD/PCDF	pg/sample	<	9067.1
Stack gas PCDD/PCDF concentration	ng/dscm	<	2.49E+00
Stack gas PCDD/PCDF concentration	ng/dscm @7% O_2	<	2.98E+00
PCDD/PCDF emission rate	g/s	<	4.75E-09
PCDD/PCDF Toxic Equivalents as 2,3,7,8-TCDD			
Stack gas PCDD/PCDF concentration	ng/dscm	<	5.23E-02
Stack gas PCDD/PCDF concentration	ng/dscm @7% O_2	<	6.25E-02
PCDD/PCDF emission rate	g/s	<	9.96E-11

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Table 7-27. PCDD/PCDF Congener and TEQ Emissions – Run 1

Congener No.	PCDD/PCDF Compound	Analytical Result (pg/sample) Front Half	Back Half	Stack (a,b,c) Concentration (ng/dscm)	2,3,7,8-TCDD Toxicity Equivalence Factor	Stack Concentration Toxic Equivalents (ng/dscm)	Emission Rate as 2,3,7,8-TCDD (g/s)
			PCDDs				
1	2,3,7,8-TCDD	10 ND	19 Q	< 4.82E-03	1	< 4.82E-03	< 1.20E-11
	Other TCDD	0	1681	4.26E-01			
	Total TCDD	4 Q,J	1700 Q	4.32E-01			
2	1,2,3,7,8-PeCDD	50 ND	33 J	< 8.37E-03	0.5	< 4.19E-03	< 1.05E-11
	Other PeCDD	0	547	1.39E-01			
	Total PeCDD	8.2 Q,J	580 Q	1.49E-01			
3	1,2,3,4,7,8-HxCDD	50 ND	11 J	< 2.79E-03	0.1	< 2.79E-04	< 6.97E-13
4	1,2,3,6,7,8-HxCDD	50 ND	9.6 J	< 2.43E-03	0.1	< 2.43E-04	< 6.08E-13
5	1,2,3,7,8,9-HxCDD	50 ND	16 J	< 4.06E-03	0.1	< 4.06E-04	< 1.01E-12
	Other HxCDD	0	123.4	3.13E-02			
	Total HxCDD	6.3 Q,J	160 Q	4.22E-02			
6	1,2,3,4,6,7,8-HpCDD	6.7 J	24 B,J	7.79E-03	0.01	7.79E-05	1.94E-13
	Other HpCDD	4.3	20	6.16E-03			
	Total HpCDD	11 J	44 J,B	1.40E-02			
7	OCDD	22 Q,B,J	27 B,J	1.24E-02	0.001	1.24E-05	3.10E-14
Total PCDDs(d)		< 51.5	2511	< 6.50E-01		< 1.00E-02	< 2.50E-11
			PCDFs				
8	2,3,7,8-TCDF	2.4 Q,J	230 Q	5.89E-02	0.1	5.89E-03	1.47E-11
	Other TCDF	12.6	5770	1.47E+00			
	Total TCDF	15 Q,J	6000 Q	1.53E+00			
9	1,2,3,7,8-PeCDF	3.3 Q,J	170 Q	4.40E-02	0.05	2.20E-03	5.49E-12
10	2,3,4,7,8-PeCDF	2.9 Q,J	190	4.89E-02	0.5	2.45E-02	6.11E-11
	Other PeCDF	22.8	2240	5.74E-01			
	Total PeCDF	29 Q	2600 Q	6.67E-01			
11	1,2,3,4,7,8-HxCDF	5.7 Q,J	200 Q	5.22E-02	0.1	5.22E-03	1.30E-11
12	1,2,3,6,7,8-HxCDF	3.7 Q,J	100	2.63E-02	0.1	2.63E-03	6.57E-12
13	2,3,4,6,7,8-HxCDF	2.7 B,J	47 B,J	1.26E-02	0.1	1.26E-03	3.15E-12
14	1,2,3,7,8,9-HxCDF	50 ND	5.5 B,J	< 1.40E-03	0.1	< 1.40E-04	< 3.48E-13
	Other HxCDF	0	477.5	1.21E-01			
	Total HxCDF	21 Q,J,B	830 Q,B	2.16E-01			
15	1,2,3,4,6,7,8-HpCDF	8 Q,B,J	150 B	4.01E-02	0.01	4.01E-04	1.00E-12
16	1,2,3,4,7,8,9-HpCDF	50 ND	10 Q,J	< 2.54E-03	0.01	< 2.54E-05	< 6.33E-14
	Other HpCDF	0	40	1.01E-02			
	Total HpCDF	8 Q,B,J	200 B,Q	5.28E-02			
17	OCDF	8.5 Q,B,J	14 B,J	5.71E-03	0.001	5.71E-06	1.43E-14
Total PCDFs(e)		< 81.5	9644	< 2.47E+00		< 4.22E-02	< 1.05E-10
Total PCDD/PCDF		< 133	12155	< 3.12E+00		< 5.23E-02	< 1.30E-10

NOTE: All concentrations in this table are uncorrected for oxygen concentration.
(a) Stack gas sample volume 139.210 dry standard cubic feet
3.94 dry standard cubic meters
(b) Stack gas flow rate 5,290 dry standard cubic feet per minute
2.50 dry standard cubic meters per second
(c) For non-detects, stack concentrations and emissions are calculated using zero.
If the sum of the detection limits of the individual isomers for a given dioxin or furan exceeded the detection limit of the total it was assumed that these individual isomers, when added, constituted the entire total so that any contribution to the total by "other" isomers would be zero.
(d) Total PCDDs = Total TCDD + Total PeCDD + Total HxCDD + Total HpCDD + OCDD
(e) Total PCDFs = Total TCDF + Total PeCDF + Total HxCDF + Total HpCDF + OCDF

Table 7-28. PCDD/PCDF Congener and TEQ Emissions – Run 2

Congener No.	PCDD/PCDF Compound	Analytical Result (pg/sample) Front Half	Back Half	Stack (a,b,c) Concentration (ng/dscm)	2,3,7,8-TCDD Toxicity Equivalence Factor	Stack Concentration Toxic Equivalents (ng/dscm)	Emission Rate as 2,3,7,8-TCDD (g/s)
			PCDDs				
1	2,3,7,8-TCDD	10 ND	9.2 Q,J	< 2.72E-03	1	< 2.72E-03	< 4.86E-12
	Other TCDD	0	490.8	1.45E-01			
	Total TCDD	10 ND	500 Q	< 1.48E-01			
2	1,2,3,7,8-PeCDD	50 ND	18 J	< 5.33E-03	0.5	< 2.67E-03	< 4.76E-12
	Other PeCDD	0	232	6.87E-02			
	Total PeCDD	1.3 Q,J	250 Q	7.44E-02			
3	1,2,3,4,7,8-HxCDD	50 ND	8.2 J	< 2.43E-03	0.1	< 2.43E-04	< 4.33E-13
4	1,2,3,6,7,8-HxCDD	50 ND	8.5 J	< 2.52E-03	0.1	< 2.52E-04	< 4.49E-13
5	1,2,3,7,8,9-HxCDD	50 ND	13 J	< 3.85E-03	0.1	< 3.85E-04	< 6.87E-13
	Other HxCDD	0	90.3	2.67E-02			
	Total HxCDD	50 ND	120 Q,J	< 3.55E-02			
6	1,2,3,4,6,7,8-HpCDD	50 ND	23 B,J	< 6.81E-03	0.01	< 6.81E-05	< 1.22E-13
	Other HpCDD	0	19	5.63E-03			
	Total HpCDD	2.2 Q,J	42 J,B	1.31E-02			
7	OCDD	17 B,J	24 B,J	1.21E-02	0.001	1.21E-05	2.17E-14
Total PCDDs(d)		< 80.5	936	< 2.83E-01		< 6.35E-03	< 1.13E-11
			PCDFs				
8	2,3,7,8-TCDF	10 ND	130 Q	< 3.85E-02	0.1	< 3.85E-03	< 6.87E-12
	Other TCDF	0	2970	8.80E-01			
	Total TCDF	10 ND	3100 Q	< 9.18E-01			
9	1,2,3,7,8-PeCDF	50 ND	140	< 4.15E-02	0.05	< 2.07E-03	< 3.70E-12
10	2,3,4,7,8-PeCDF	50 ND	150	< 4.44E-02	0.5	< 2.22E-02	< 3.96E-11
	Other PeCDF	0	1710	5.06E-01			
	Total PeCDF	0.8 Q,J	2000 Q	5.93E-01			
11	1,2,3,4,7,8-HxCDF	2.1 Q,J	190	5.69E-02	0.1	5.69E-03	1.02E-11
12	1,2,3,6,7,8-HxCDF	1.6 Q,J	98	2.95E-02	0.1	2.95E-03	5.26E-12
13	2,3,4,6,7,8-HxCDF	50 ND	47 B,J	< 1.39E-02	0.1	< 1.39E-03	< 2.48E-12
14	1,2,3,7,8,9-HxCDF	50 ND	6 Q,B,J	< 1.78E-03	0.1	< 1.78E-04	< 3.17E-13
	Other HxCDF	0	489	1.45E-01			
	Total HxCDF	5.3 J,Q	830 B,Q	2.47E-01			
15	1,2,3,4,6,7,8-HpCDF	3.7 Q,B,J	160 B	4.85E-02	0.01	4.85E-04	8.65E-13
16	1,2,3,4,7,8,9-HpCDF	50 ND	18 J	< 5.33E-03	0.01	< 5.33E-05	< 9.51E-14
	Other HpCDF	0	52	1.54E-02			
	Total HpCDF	3.7 Q,B,J	230 B	6.92E-02			
17	OCDF	4.5 Q,B,J	23 B,J	8.14E-03	0.001	8.14E-06	1.45E-14
Total PCDFs(e)		< 24.3	6183	< 1.84E+00		< 3.89E-02	< 6.94E-11
Total PCDD/PCDF		< 104.8	7119	< 2.12E+00		< 4.52E-02	< 8.07E-11

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume 119.220 dry standard cubic feet
3.38 dry standard cubic meters

(b) Stack gas flow rate 3,780 dry standard cubic feet per minute
1.78 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using zero.
If the sum of the detection limits of the individual isomers for a given dioxin or furan exceeded the detection limit of the total it was assumed that these individual isomers, when added, constituted the entire total so that any contribution to the total by "other" isomers would be zero.

(d) Total PCDDs = Total TCDD + Total PeCDD + Total HxCDD + Total HpCDD + OCDD

(e) Total PCDFs = Total TCDF + Total PeCDF + Total HxCDF + Total HpCDF + OCDF

Table 7-29. PCDD/PCDF Congener and TEQ Emissions – Run 3

Congener No.	PCDD/PCDF Compound	Analytical Result (pg/sample) Front Half	Back Half	Stack (a,b,c) Concentration (ng/dscm)	2,3,7,8-TCDD Toxicity Equivalence Factor	Stack Concentration Toxic Equivalents (ng/dscm)	Emission Rate as 2,3,7,8-TCDD (g/s)
PCDDs							
1	2,3,7,8-TCDD	10 ND	12 Q	< 3.36E-03	1	< 3.36E-03	< 6.40E-12
	Other TCDD	0	398	1.11E-01			
	Total TCDD	10 ND	410 Q	< 1.15E-01			
2	1,2,3,7,8-PeCDD	50 ND	22 J	< 6.16E-03	0.5	< 3.08E-03	< 5.87E-12
	Other PeCDD	0	228	6.38E-02			
	Total PeCDD	50 ND	250 Q	< 7.00E-02			
3	1,2,3,4,7,8-HxCDD	50 ND	7.3 Q,J	< 2.04E-03	0.1	< 2.04E-04	< 3.90E-13
4	1,2,3,6,7,8-HxCDD	50 ND	9.7 Q,J	< 2.71E-03	0.1	< 2.71E-04	< 5.18E-13
5	1,2,3,7,8,9-HxCDD	50 ND	16 J	< 4.48E-03	0.1	< 4.48E-04	< 8.54E-13
	Other HxCDD	0	97	2.71E-02			
	Total HxCDD	50 ND	130 Q,J	< 3.64E-02			
6	1,2,3,4,6,7,8-HpCDD	2.2 J	26 B,J	7.89E-03	0.01	7.89E-05	1.50E-13
	Other HpCDD	0	24	6.72E-03			
	Total HpCDD	2.2 J	50 J,B	1.46E-02			
7	OCDD	18 B,J	26 B,J	1.23E-02	0.001	1.23E-05	2.35E-14
Total PCDDs(d)		< 130.2	866	< 2.48E-01		< 7.45E-03	< 1.42E-11
PCDFs							
8	2,3,7,8-TCDF	10 ND	160 Q	< 4.48E-02	0.1	< 4.48E-03	< 8.54E-12
	Other TCDF	0	3840	1.07E+00			
	Total TCDF	10 ND	4000 Q	< 1.12E+00			
9	1,2,3,7,8-PeCDF	50 ND	190	< 5.32E-02	0.05	< 2.66E-03	< 5.07E-12
10	2,3,4,7,8-PeCDF	50 ND	180	< 5.04E-02	0.5	< 2.52E-02	< 4.80E-11
	Other PeCDF	0	2230	6.24E-01			
	Total PeCDF	2 Q,J	2600	7.28E-01			
11	1,2,3,4,7,8-HxCDF	50 ND	230	< 6.44E-02	0.1	< 6.44E-03	< 1.23E-11
12	1,2,3,6,7,8-HxCDF	50 ND	130	< 3.64E-02	0.1	< 3.64E-03	< 6.94E-12
13	2,3,4,6,7,8-HxCDF	50 ND	56 B	< 1.57E-02	0.1	< 1.57E-03	< 2.99E-12
14	1,2,3,7,8,9-HxCDF	50 ND	8.4 B,J	< 2.35E-03	0.1	< 2.35E-04	< 4.48E-13
	Other HxCDF	0	675.6	1.89E-01			
	Total HxCDF	50 ND	1100 B	< 3.08E-01			
15	1,2,3,4,6,7,8-HpCDF	3.5 Q,B,J	190 B	5.41E-02	0.01	5.41E-04	1.03E-12
16	1,2,3,4,7,8,9-HpCDF	50 ND	21 J	< 5.88E-03	0.01	< 5.88E-05	< 1.12E-13
	Other HpCDF	0	69	1.93E-02			
	Total HpCDF	3.5 Q,B,J	280 B	7.93E-02			
17	OCDF	3.4 Q,B,J	22 B,J	7.11E-03	0.001	7.11E-06	1.36E-14
Total PCDFs(e)		< 68.9	8002	< 2.24E+00		< 4.48E-02	< 8.54E-11
Total PCDD/PCDF		< 199.1	8868	< 2.49E+00		< 5.23E-02	< 9.96E-11

NOTE: All concentrations in this table are uncorrected for oxygen concentration.
(a) Stack gas sample volume 126.180 dry standard cubic feet
3.57 dry standard cubic meters
(b) Stack gas flow rate 4,040 dry standard cubic feet per minute
1.91 dry standard cubic meters per second
(c) For non-detects, stack concentrations and emissions are calculated using zero.
If the sum of the detection limits of the individual isomers for a given dioxin or furan exceeded the detection limit of the total it was assumed that these individual isomers, when added, constituted the entire total so that any contribution to the total by "other" isomers would be zero.
(d) Total PCDDs = Total TCDD + Total PeCDD + Total HxCDD + Total HpCDD + OCDD
(e) Total PCDFs = Total TCDF + Total PeCDF + Total HxCDF + Total HpCDF + OCDF

Table 7-30. PAH Compound Emissions – Run 1

PAH Compound	Front Half Analytical Result (ng/sample)	Back Half Analytical Result (ng/sample)	Condensate Analytical Result (ng/sample)	Stack (a,b,c) Concentration (ug/dscm)	Emission Rate (g/s)
Standard Target Analytes					
Acenaphthene	3.4 BJ	3.5 BJ	1.5 J	2.29E-03	5.51E-09
Acenaphthylene	9.1 J	14 J	0.29 ND	< 6.39E-03	< 1.53E-08
Anthracene	4 J	28	7.8 J	1.09E-02	2.61E-08
Benzo(a)anthracene	1.7 BJ	5.4 J	0.48 ND	< 2.07E-03	< 4.97E-09
Benzo(b)fluoranthene	4.2 BJ	40 B	5.8 J	1.37E-02	3.28E-08
Benzo(k)fluoranthene	3.1 BJ	4.3 J	5.5 J	3.52E-03	8.46E-09
Benzo(g,h,i)perylene	5.6 J	4 J	15 BJ	6.72E-03	1.61E-08
Benzo(a)pyrene	2.7 BJ	2.2 BJ	3.4 BJ	2.27E-03	5.45E-09
Benzo(e)pyrene	4.5 BJ	4.4 BJ	5.1 BJ	3.82E-03	9.18E-09
Chrysene	3.5 BJ	18 J	4.7 BJ	7.15E-03	1.72E-08
Dibenzo(a,h)anthracene	0.32 ND	0.5 ND	0.65 ND	< 4.01E-04	< 9.64E-10
Fluoranthene	27 B	100 B	26 B	4.18E-02	1.00E-07
Fluorene	15 BJ	11 BJ	3.3 J	8.00E-03	1.92E-08
Indeno(1,2,3-cd)pyrene	3.3 BJ	3.8 J	4.7 BJ	3.22E-03	7.74E-09
2-Methylnaphthalene	31 BJ	80 BJ	13 BJ	3.39E-02	8.13E-08
Naphthalene	40 BJ	880 B	30 BJ	2.59E-01	6.23E-07
Phenanthrene	140 B	300 B	39 BJ	1.31E-01	3.14E-07
Pyrene	25 BJ	110 B	20 BJ	4.23E-02	1.02E-07
Special Target Analytes					
Perylene	0.91 ND	3.5 BJ	1.7 ND	< 1.67E-03	< 4.01E-09
Total PAHs	< 324.33	1612.6	187.92	< 5.80E-01	< 1.39E-06

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume — 129.310 dry standard cubic feet; 3.66 dry standard cubic meters

(b) Stack gas flow rate — 5,090 dry standard cubic feet per minute; 2.40 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using the detection limit.

Table 7-31. PAH Compound Emissions – Run 2

PAH Compound	Front Half Analytical Result (ng/sample)	Back Half Analytical Result (ng/sample)	Condensate Analytical Result (ng/sample)		Stack (a,b,c) Concentration (ug/dscm)		Emission Rate (g/s)
Standard Target Analytes							
Acenaphthene	1.1 BJ	3.3 BJ	1.5 J		1.67E-03		3.05E-09
Acenaphthylene	0.28 ND	7.8 J	0.23 ND	<	2.35E-03	<	4.29E-09
Anthracene	0.44 ND	8.1 J	3.5 J	<	3.41E-03	<	6.22E-09
Benzo(a)anthracene	0.36 ND	0.35 ND	0.45 ND	<	3.28E-04	<	5.99E-10
Benzo(b)fluoranthene	0.83 ND	55 B	3.9 J	<	1.69E-02	<	3.09E-08
Benzo(k)fluoranthene	1.1 ND	4.6 J	1.2 ND	<	1.95E-03	<	3.57E-09
Benzo(g,h,i)perylene	0.75 ND	4.4 J	18 BJ	<	6.55E-03	<	1.20E-08
Benzo(a)pyrene	1.4 ND	1.7 ND	2.7 BJ	<	1.64E-03	<	3.00E-09
Benzo(e)pyrene	1.1 ND	1.5 ND	5.3 BJ	<	2.23E-03	<	4.08E-09
Chrysene	0.39 ND	21	3.1 BJ	<	6.93E-03	<	1.27E-08
Dibenzo(a,h)anthracene	0.41 ND	0.92 ND	0.45 ND	<	5.04E-04	<	9.20E-10
Fluoranthene	4.4 BJ	32 B	18 BJ		1.54E-02		2.81E-08
Fluorene	3.3 BJ	10 BJ	2.8 J		4.55E-03		8.32E-09
Indeno(1,2,3-cd)pyrene	0.76 ND	1.4 ND	5.3 BJ	<	2.11E-03	<	3.86E-09
2-Methylnaphthalene	12 BJ	52 BJ	13 BJ		2.18E-02		3.98E-08
Naphthalene	23 BJ	1900 B	34 BJ		5.54E-01		1.01E-06
Phenanthrene	25 BJ	96 B	27 BJ		4.19E-02		7.65E-08
Pyrene	6.4 BJ	30 BJ	15 BJ		1.45E-02		2.66E-08
Special Target Analytes							
Perylene	1.4 ND	1.6 ND	1.3 ND	<	1.22E-03	<	2.22E-09
Total PAHs	< 84.42	2231.67	156.73	<	7.00E-01	<	1.28E-06

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume	124.810	dry standard cubic feet
	3.53	dry standard cubic meters
(b) Stack gas flow rate	3,870	dry standard cubic feet per minute
	1.83	dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using the detection limit.

Table 7-32. PAH Compound Emissions – Run 3

PAH Compound	Front Half Analytical Result (ng/sample)	Back Half Analytical Result (ng/sample)	Condensate Analytical Result (ng/sample)		Stack (a,b,c) Concentration (ug/dscm)		Emission Rate (g/s)
Standard Target Analytes							
Acenaphthene	2 BJ	6.5 BJ	1.3 ND	<	2.87E-03	<	5.22E-09
Acenaphthylene	3.3 J	5.9 J	0.32 ND	<	2.79E-03	<	5.07E-09
Anthracene	0.37 ND	11 J	0.41 ND	<	3.45E-03	<	6.27E-09
Benzo(a)anthracene	0.21 ND	6.1 J	0.37 ND	<	1.96E-03	<	3.56E-09
Benzo(b)fluoranthene	4.1 BJ	40 B	2.3 J		1.36E-02		2.47E-08
Benzo(k)fluoranthene	1.1 ND	3.9 J	4.7 J	<	2.84E-03	<	5.16E-09
Benzo(g,h,i)perylene	7.5 J	3.7 J	0.67 ND	<	3.48E-03	<	6.32E-09
Benzo(a)pyrene	4.3 BJ	1.1 ND	1.9 ND	<	2.14E-03	<	3.89E-09
Benzo(e)pyrene	3.2 BJ	2.5 BJ	1.6 ND	<	2.14E-03	<	3.89E-09
Chrysene	0.23 ND	5.7 J	0.43 ND	<	1.86E-03	<	3.39E-09
Dibenzo(a,h)anthracene	0.35 ND	0.72 ND	0.65 ND	<	5.04E-04	<	9.16E-10
Fluoranthene	7.3 BJ	25 B	3.4 BJ		1.05E-02		1.90E-08
Fluorene	6.4 BJ	11 BJ	1.8 J		5.63E-03		1.02E-08
Indeno(1,2,3-cd)pyrene	4.1 BJ	3.1 J	0.68 J		2.31E-03		4.20E-09
2-Methylnaphthalene	17 BJ	67 BJ	15 BJ		2.90E-02		5.27E-08
Naphthalene	35 BJ	17000 B	72 BJ		5.01E+00		9.11E-06
Phenanthrene	49 B	65 B	5.8 BJ		3.51E-02		6.38E-08
Pyrene	5 BJ	28 BJ	3.1 BJ		1.06E-02		1.92E-08
Special Target Analytes							
Perylene	1.1 ND	66 B	1.8 ND	<	2.02E-02	<	3.67E-08
Total PAHs	< 151.56	17352.22	118.23	<	5.16E+00	<	9.38E-06

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume	120.520	dry standard cubic feet
	3.41	dry standard cubic meters
(b) Stack gas flow rate	3,850	dry standard cubic feet per minute
	1.82	dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using the detection limit.

Table 7-33. PCB Emissions – Run 1

PCB Compound	Front Half Analytical Result (ng/sample)	Back Half Analytical Result (ng/sample)	Condensate Analytical Result (ng/sample)	Stack (a,b,c) Concentration (ng/dscm)	Emission Rate (g/s)
Co-Planar PCBs					
3,4,3',4'-Tetrachlorobiphenyl (IUPAC 77)	0.03 QB	0.36	0.021 QJ	1.12E-01	2.70E-10
3,4,4',5-Tetrachlorobiphenyl (IUPAC 81)	0.0083 ND	0.06 QJ	0.01 ND	< 2.14E-02	< 5.14E-11
2,3,4,3',4'-Pentachlorobiphenyl (IUPAC 105)	0.022 QJ	0.067 J	0.035 BJ	3.39E-02	8.13E-11
2,3,4,5,4'-Pentachlorobiphenyl (IUPAC 114)	0.0069 ND	0.011 ND	0.0065 ND	< 6.66E-03	< 1.60E-11
2,4,5,3',4'-Pentachlorobiphenyl (IUPAC 118)	0.087 J	0.13 J	0.078 QBJ	8.06E-02	1.94E-10
3,4,5,2',4'-Pentachlorobiphenyl (IUPAC 123)	0.0075 ND	0.022 J	0.0067 ND	< 9.88E-03	< 2.37E-11
3,4,5,3',4'-Pentachlorobiphenyl (IUPAC 126)	0.0073 ND	0.091 QJ	0.0072 ND	< 2.88E-02	< 6.92E-11
2,3,4,5,3',4'-Hexachlorobiphenyl (IUPAC 156)	0.01 ND	0.061 QCJ	0.013 ND	< 2.29E-02	< 5.51E-11
2,3,4,3',4',5'-Hexachlorobiphenyl (IUPAC 157)	0.01 ND	0.061 QCJ	0.013 ND	< 2.29E-02	< 5.51E-11
2,4,5,3',4',5'-Hexachlorobiphenyl (IUPAC 167)	0.0073 ND	0.027 J	0.0091 ND	< 1.19E-02	< 2.85E-11
3,4,5,3',4',5'-Hexachlorobiphenyl (IUPAC 169)	0.0073 ND	0.02 ND	0.0098 ND	< 1.01E-02	< 2.43E-11
2,3,4,5,3',4',5'-Heptachlorobiphenyl (IUPAC 189)	0.0066 ND	0.013 ND	0.0061 ND	< 7.02E-03	< 1.69E-11
Total PCB Homologs					
Total Monochlorobiphenyls	0.67 B	6 B	0.23 BJ	1.88E+00	4.53E-09
Total Dichlorobiphenyls	9.6 QB	9.8 QB	2 BQ	5.84E+00	1.40E-08
Total Trichlorobiphenyls	11 QB	8 QB	3.8 BQ	6.23E+00	1.50E-08
Total Tetrachlorobiphenyls	2.2 QB	4 BQ	2.5 BQ	2.38E+00	5.71E-09
Total Pentachlorobiphenyls	0.49 QJB	1 QB	0.75 JQB	6.12E-01	1.47E-09
Total Hexachlorobiphenyls	0.093 QJ	0.33 QBJ	0.23 QBJ	1.78E-01	4.28E-10
Total Heptachlorobiphenyls	0.21 ND	0.13 QJ	0.024 QBJ	< 9.94E-02	< 2.39E-10
Total Octachlorobiphenyls	0.1 ND	0.16 ND	0.14 ND	< 1.09E-01	< 2.62E-10
Total Nonachlorobiphenyls	0.029 ND	0.054 ND	0.05 ND	< 3.63E-02	< 8.73E-11
Total Decachlorobiphenyl	0.0096 ND	0.016 ND	0.025 ND	< 1.38E-02	< 3.32E-11
Total PCBs	< 24.4016	29.49	9.749	< 1.74E+01	< 4.18E-08

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume — 129.310 dry standard cubic feet; 3.66 dry standard cubic meters

(b) Stack gas flow rate — 5,090 dry standard cubic feet per minute; 2.40 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using the detection limit.

Table 7-34. PCB Emissions – Run 2

PCB Compound	Front Half Analytical Result (ng/sample)	Back Half Analytical Result (ng/sample)	Condensate Analytical Result (ng/sample)	Stack (a,b,c) Concentration (ng/dscm)	Emission Rate (g/s)
Co-Planar PCBs					
3,4,3',4'-Tetrachlorobiphenyl (IUPAC 77)	0.0073 ND	0.17 J	0.018 QJ	< 5.53E-02	< 1.01E-10
3,4,4',5-Tetrachlorobiphenyl (IUPAC 81)	0.0068 ND	0.019 QJ	0.0058 ND	< 8.94E-03	< 1.63E-11
2,3,4,3',4'-Pentachlorobiphenyl (IUPAC 105)	0.0061 ND	0.049 QJ	0.039 BJ	< 2.66E-02	< 4.86E-11
2,3,4,5,4'-Pentachlorobiphenyl (IUPAC 114)	0.0058 ND	0.01 ND	0.0075 QJ	< 6.59E-03	< 1.20E-11
2,4,5,3',4'-Pentachlorobiphenyl (IUPAC 118)	0.018 QJ	0.097 QJ	0.076 BJ	5.40E-02	9.87E-11
3,4,5,2',4'-Pentachlorobiphenyl (IUPAC 123)	0.0063 ND	0.01 ND	0.0036 ND	< 5.63E-03	< 1.03E-11
3,4,5,3',4'-Pentachlorobiphenyl (IUPAC 126)	0.0062 ND	0.069 J	0.0041 ND	< 2.24E-02	< 4.10E-11
2,3,4,5,3',4'-Hexachlorobiphenyl (IUPAC 156)	0.0091 ND	0.048 CJ	0.0069 ND	< 1.81E-02	< 3.31E-11
2,3,4,3',4',5'-Hexachlorobiphenyl (IUPAC 157)	0.0091 ND	0.048 CJ	0.0069 ND	< 1.81E-02	< 3.31E-11
2,4,5,3',4',5'-Hexachlorobiphenyl (IUPAC 167)	0.0063 ND	0.024 J	0.0049 ND	< 9.96E-03	< 1.82E-11
3,4,5,3',4',5'-Hexachlorobiphenyl (IUPAC 169)	0.0062 ND	0.019 ND	0.006 ND	< 8.83E-03	< 1.61E-11
2,3,4,5,3',4',5'-Heptachlorobiphenyl (IUPAC 189)	0.006 ND	0.011 ND	0.0034 ND	< 5.77E-03	< 1.05E-11
Total PCB Homologs					
Total Monochlorobiphenyls	0.061 QBJ	1.2 B	0.24 BJ	4.25E-01	7.76E-10
Total Dichlorobiphenyls	1.5 QB	6.4 QB	1.6 QB	2.69E+00	4.91E-09
Total Trichlorobiphenyls	1.6 BJQ	5.5 QB	2.9 BQ	2.83E+00	5.17E-09
Total Tetrachlorobiphenyls	0.38 QJB	2.8 BQ	2.1 BQ	1.49E+00	2.73E-09
Total Pentachlorobiphenyls	0.03 QJ	0.74 JQB	0.74 JQB	4.27E-01	7.80E-10
Total Hexachlorobiphenyls	0.028 QJ	0.43 BJQ	0.27 BJQ	2.06E-01	3.76E-10
Total Heptachlorobiphenyls	0.19 ND	0.16 QJ	0.03 JQB	< 1.08E-01	< 1.96E-10
Total Octachlorobiphenyls	0.089 ND	0.014 QJ	0.0099 QJ	< 3.19E-02	< 5.83E-11
Total Nonachlorobiphenyls	0.028 ND	0.039 ND	0.027 ND	< 2.66E-02	< 4.86E-11
Total Decachlorobiphenyl	0.0082 ND	0.02 QJ	0.011 ND	< 1.11E-02	< 2.03E-11
Total PCBs	< 3.9142	17.303	7.9279	< 8.25E+00	< 1.51E-08

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume	124.810 dry standard cubic feet
	3.53 dry standard cubic meters
(b) Stack gas flow rate	3,870 dry standard cubic feet per minute
	1.83 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using the detection limit.

Table 7-35. PCB Emissions – Run 3

PCB Compound	Front Half Analytical Result (ng/sample)	Back Half Analytical Result (ng/sample)	Condensate Analytical Result (ng/sample)	Stack (a,b,c) Concentration (ng/dscm)	Emission Rate (g/s)
Co-Planar PCBs					
3,4,3',4'-Tetrachlorobiphenyl (IUPAC 77)	0.017 QJ	0.12 QJ	0.0071 ND	< 4.22E-02	< 7.67E-11
3,4,4',5-Tetrachlorobiphenyl (IUPAC 81)	0.0079 ND	0.061 ND	0.0064 ND	< 2.21E-02	< 4.01E-11
2,3,4,3',4'-Pentachlorobiphenyl (IUPAC 105)	0.0069 ND	0.093 J	0.017 QBJ	< 3.42E-02	< 6.22E-11
2,3,4,5,4'-Pentachlorobiphenyl (IUPAC 114)	0.0066 ND	0.012 ND	0.0081 QJ	< 7.82E-03	< 1.42E-11
2,4,5,3',4'-Pentachlorobiphenyl (IUPAC 118)	0.031 J	0.16 J	0.023 QBJ	6.27E-02	1.14E-10
3,4,5,2',4'-Pentachlorobiphenyl (IUPAC 123)	0.0069 ND	0.012 ND	0.017 QBJ	< 1.05E-02	< 1.91E-11
3,4,5,3',4'-Pentachlorobiphenyl (IUPAC 126)	0.0074 ND	0.043 QJ	0.0053 ND	< 1.63E-02	< 2.97E-11
2,3,4,5,3',4'-Hexachlorobiphenyl (IUPAC 156)	0.0091 ND	0.056 CJ	0.012 QCJ	< 2.26E-02	< 4.10E-11
2,3,4,3',4',5'-Hexachlorobiphenyl (IUPAC 157)	0.0091 ND	0.056 CJ	0.012 QCJ	< 2.26E-02	< 4.10E-11
2,4,5,3',4',5'-Hexachlorobiphenyl (IUPAC 167)	0.0067 ND	0.021 QJ	0.0058 ND	< 9.81E-03	< 1.78E-11
3,4,5,3',4',5'-Hexachlorobiphenyl (IUPAC 169)	0.0078 ND	0.021 ND	0.0083 ND	< 1.09E-02	< 1.98E-11
2,3,4,5,3',4',5'-Heptachlorobiphenyl (IUPAC 189)	0.0065 ND	0.013 ND	0.0045 ND	< 7.03E-03	< 1.28E-11
Total PCB Homologs					
Total Monochlorobiphenyls	0.18 QBJ	0.91 B	0.19 BJ	3.75E-01	6.81E-10
Total Dichlorobiphenyls	2.6 BQ	4.9 QB	0.68 QBJ	2.40E+00	4.36E-09
Total Trichlorobiphenyls	2.6 BQ	6.1 BQ	0.88 QBJ	2.81E+00	5.10E-09
Total Tetrachlorobiphenyls	0.51 QBJ	2.9 BQ	0.73 JQB	1.21E+00	2.20E-09
Total Pentachlorobiphenyls	0.058 QJ	0.95 JQB	0.28 QJB	3.77E-01	6.86E-10
Total Hexachlorobiphenyls	0.047 JQ	0.47 QBJ	0.1 QBJ	1.81E-01	3.29E-10
Total Heptachlorobiphenyls	0.2 ND	0.15 QJ	0.21 ND	< 1.64E-01	< 2.98E-10
Total Octachlorobiphenyls	0.094 ND	0.15 ND	0.1 ND	< 1.01E-01	< 1.83E-10
Total Nonachlorobiphenyls	0.03 ND	0.052 ND	0.032 ND	< 3.34E-02	< 6.07E-11
Total Decachlorobiphenyl	0.0086 ND	0.015 ND	0.013 ND	< 1.07E-02	< 1.95E-11
Total PCBs	< 6.3276	16.597	3.215	< 7.66E+00	< 1.39E-08

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume	120.520	dry standard cubic feet
	3.41	dry standard cubic meters
(b) Stack gas flow rate	3,850	dry standard cubic feet per minute
	1.82	dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using the detection limit.

Table 7-36. Organochlorine Pesticide Emissions – Run 1

OCP Compound	Front Half Analytical Result (ug/sample)	Back Half Analytical Result (ug/sample)	Condensate Analytical Result (ug/sample)	Stack (a,b,c) Concentration (ug/dscm)	Emission Rate (g/s)
Standard Target Analytes					
Aldrin	0.036 ND	0.014 ND	0.034 ND	< 2.41E-02	< 5.54E-08
a-BHC	0.026 ND	0.022 ND	0.016 ND	< 1.84E-02	< 4.22E-08
b-BHC	0.033 ND	0.063 ND	0.034 ND	< 3.73E-02	< 8.58E-08
g-BHC (Lindane)	0.014 ND	0.014 ND	0.012 ND	< 1.15E-02	< 2.64E-08
d-BHC	0.015 ND	0.022 J,COL	0.025 ND	< 1.78E-02	< 4.09E-08
a-Chlordane	0.013 ND	0.021 J,COL	0.014 ND	< 1.38E-02	< 3.17E-08
g-Chlordane	0.078 ND	0.043 ND	0.018 ND	< 3.99E-02	< 9.17E-08
4,4'-DDD	0.083 ND	0.093 ND	0.14 ND	< 9.07E-02	< 2.09E-07
4,4'-DDE	0.039 ND	0.052 J	0.028 ND	< 3.42E-02	< 7.85E-08
4,4'-DDT	0.023 ND	0.063 J,COL	0.026 J	< 3.22E-02	< 7.39E-08
Dieldrin	0.013 ND	0.015 ND	0.012 ND	< 1.15E-02	< 2.64E-08
Endosulfan I	0.013 ND	0.018 ND	0.014 ND	< 1.29E-02	< 2.97E-08
Endosulfan II	0.014 ND	0.06 J,COL	0.018 ND	< 2.64E-02	< 6.07E-08
Endosulfan sulfate	0.023 ND	0.013 ND	0.016 ND	< 1.49E-02	< 3.43E-08
Endrin	0.05 ND	0.063 ND	0.051 ND	< 4.71E-02	< 1.08E-07
Heptachlor	0.016 ND	0.013 ND	0.02 J,COL	< 1.41E-02	< 3.23E-08
Methoxychlor	0.038 ND	0.11 ND	0.037 ND	< 5.31E-02	< 1.22E-07
Special Target Analytes					
Chlorobenzilate	0.083 ND	0.093 ND	0.15 J,COL	< 9.36E-02	< 2.15E-07
Endrin aldehyde	0.018 ND	0.04 ND	0.02 J,B,COL	< 2.24E-02	< 5.15E-08
Endrin ketone	0.017 ND	0.017 ND	0.025 ND	< 1.69E-02	< 3.89E-08
Heptachlor epoxide	0.015 ND	0.042 J,COL	0.012 ND	< 1.98E-02	< 4.55E-08
Diallate	11 ND	9.7 ND	0.78 ND	< 6.17E+00	< 1.42E-05

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume — 122.990 dry standard cubic feet; 3.48 dry standard cubic meters

(b) Stack gas flow rate — 4,870 dry standard cubic feet per minute; 2.30 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using the detection limit.

Table 7-37. Organochlorine Pesticide Emissions – Run 2

OCP Compound	Front Half Analytical Result (ug/sample)	Back Half Analytical Result (ug/sample)	Condensate Analytical Result (ug/sample)	Stack (a,b,c) Concentration (ug/dscm)	Emission Rate (g/s)
Standard Target Analytes					
Aldrin	0.036 ND	0.014 ND	0.034 ND	< 2.52E-02	< 4.62E-08
a-BHC	0.026 ND	0.022 ND	0.023 J	< 2.13E-02	< 3.91E-08
b-BHC	0.033 ND	0.063 ND	0.052 J,COL	< 4.45E-02	< 8.14E-08
g-BHC (Lindane)	0.014 ND	0.014 ND	0.012 ND	< 1.20E-02	< 2.20E-08
d-BHC	0.015 ND	0.019 ND	0.11 COL	< 4.33E-02	< 7.92E-08
a-Chlordane	0.013 ND	0.028 J,COL	0.014 ND	< 1.65E-02	< 3.03E-08
g-Chlordane	0.078 ND	0.043 ND	0.018 ND	< 4.18E-02	< 7.65E-08
4,4'-DDD	0.083 ND	0.093 ND	0.14 ND	< 9.49E-02	< 1.74E-07
4,4'-DDE	0.039 ND	0.052 J	0.028 ND	< 3.57E-02	< 6.55E-08
4,4'-DDT	0.023 ND	0.012 ND	0.022 ND	< 1.71E-02	< 3.14E-08
Dieldrin	0.013 ND	0.015 ND	0.012 ND	< 1.20E-02	< 2.20E-08
Endosulfan I	0.013 ND	0.018 ND	0.014 ND	< 1.35E-02	< 2.48E-08
Endosulfan II	0.014 ND	0.023 ND	0.018 ND	< 1.65E-02	< 3.03E-08
Endosulfan sulfate	0.023 ND	0.013 ND	0.016 ND	< 1.56E-02	< 2.86E-08
Endrin	0.05 ND	0.063 ND	0.051 ND	< 4.93E-02	< 9.02E-08
Heptachlor	0.016 ND	0.013 ND	0.11 COL	< 4.18E-02	< 7.65E-08
Methoxychlor	0.038 ND	0.11 ND	0.035 ND	< 5.50E-02	< 1.01E-07
Special Target Analytes					
Chlorobenzilate	0.083 ND	0.093 ND	0.13 ND	< 9.19E-02	< 1.68E-07
Endrin aldehyde	0.018 ND	0.04 ND	0.18 B,COL	< 7.15E-02	< 1.31E-07
Endrin ketone	0.017 ND	0.017 ND	0.025 ND	< 1.77E-02	< 3.25E-08
Heptachlor epoxide	0.015 ND	0.015 ND	0.025 J,COL	< 1.65E-02	< 3.03E-08
Diallate	11 ND	9.7 ND	0.78 ND	< 6.45E+00	< 1.18E-05

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume	117.540	dry standard cubic feet
	3.33	dry standard cubic meters
(b) Stack gas flow rate	3,880	dry standard cubic feet per minute
	1.83	dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using the detection limit.

Table 7-38. Organochlorine Pesticide Emissions – Run 3

OCP Compound	Front Half Analytical Result (ug/sample)	Back Half Analytical Result (ug/sample)	Condensate Analytical Result (ug/sample)	Stack (a,b,c) Concentration (ug/dscm)	Emission Rate (g/s)
Standard Target Analytes					
Aldrin	0.036 ND	0.014 ND	0.034 ND	< 2.36E-02	< 4.54E-08
a-BHC	0.026 ND	0.022 ND	0.016 ND	< 1.80E-02	< 3.46E-08
b-BHC	0.033 ND	0.074 J,COL	0.035 J,COL	< 3.99E-02	< 7.68E-08
g-BHC (Lindane)	0.014 ND	0.014 ND	0.012 ND	< 1.12E-02	< 2.16E-08
d-BHC	0.015 ND	0.019 ND	0.078 J,COL	< 3.15E-02	< 6.06E-08
a-Chlordane	0.013 ND	0.016 ND	0.014 ND	< 1.21E-02	< 2.33E-08
g-Chlordane	0.078 ND	0.043 ND	0.018 ND	< 3.90E-02	< 7.52E-08
4,4'-DDD	0.083 ND	0.26 J,COL	0.14 ND	< 1.36E-01	< 2.61E-07
4,4'-DDE	0.039 ND	0.047 ND	0.028 ND	< 3.20E-02	< 6.17E-08
4,4'-DDT	0.023 ND	0.021 ND	0.023 ND	< 1.88E-02	< 3.62E-08
Dieldrin	0.013 ND	0.015 ND	0.012 ND	< 1.12E-02	< 2.16E-08
Endosulfan I	0.013 ND	0.018 ND	0.014 ND	< 1.26E-02	< 2.43E-08
Endosulfan II	0.014 ND	0.023 ND	0.018 ND	< 1.54E-02	< 2.98E-08
Endosulfan sulfate	0.023 ND	0.013 ND	0.016 ND	< 1.46E-02	< 2.81E-08
Endrin	0.05 ND	0.063 ND	0.051 ND	< 4.61E-02	< 8.87E-08
Heptachlor	0.016 ND	0.013 ND	0.056 J,COL	< 2.39E-02	< 4.60E-08
Methoxychlor	0.038 ND	0.11 ND	0.037 ND	< 5.20E-02	< 1.00E-07
Special Target Analytes					
Chlorobenzilate	0.083 ND	0.097 J,COL	0.14 ND	< 8.99E-02	< 1.73E-07
Endrin aldehyde	0.018 ND	0.04 ND	0.022 J,B,COL	< 2.25E-02	< 4.33E-08
Endrin ketone	0.017 ND	0.017 ND	0.025 ND	< 1.66E-02	< 3.19E-08
Heptachlor epoxide	0.015 ND	0.015 ND	0.013 J,COL	< 1.21E-02	< 2.33E-08
Diallate	11 ND	9.7 ND	0.78 ND	< 6.03E+00	< 1.16E-05

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume	125.710	dry standard cubic feet
	3.56	dry standard cubic meters
(b) Stack gas flow rate	4,080	dry standard cubic feet per minute
	1.93	dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using the detection limit.

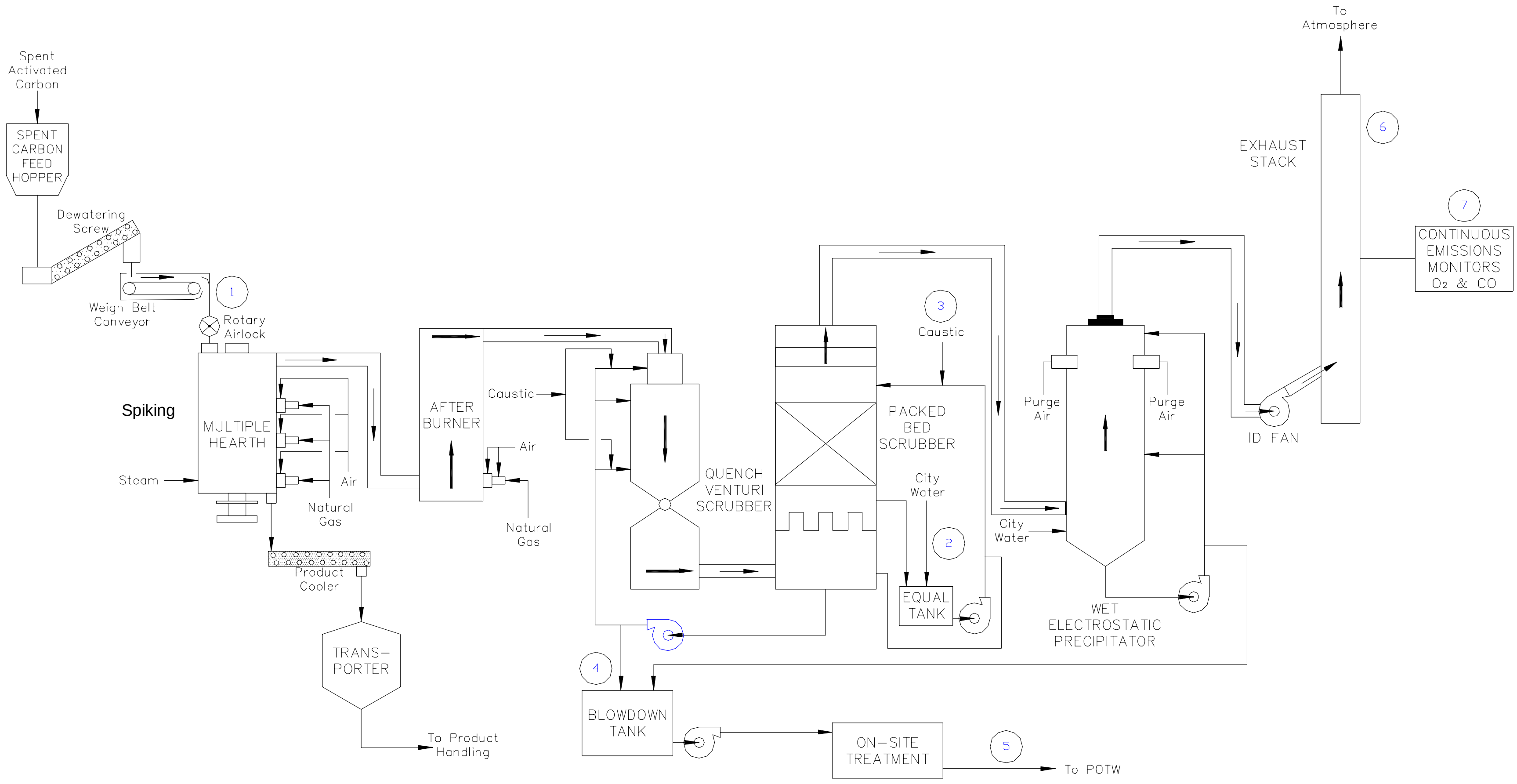


Figure 2-1. Sampling Locations.

APPENDIX VI

PROCESS FLOW DIAGRAMS AND PIPING AND INSTRUMENTATION DIAGRAMS

FOR

SIEMENS INDUSTRY, INC.

PARKER REACTIVATION FACILITY

PARKER, ARIZONA

Revision 1
April 2012

TABLE OF CONTENTS

D11135-217	Reactivation Facility Furnace #2 Precipitator & Exhaust Piping & Instrumentation Diagram
D11135-218	Reactivation Facility Product Handling System Piping & Instrumentation Diagram

SIEMENS INDUSTRY, INC. VAPOR PHASE CARBON - PROCESS FLOW DIAGRAM PR-003 - BALANCE FOR RF-2

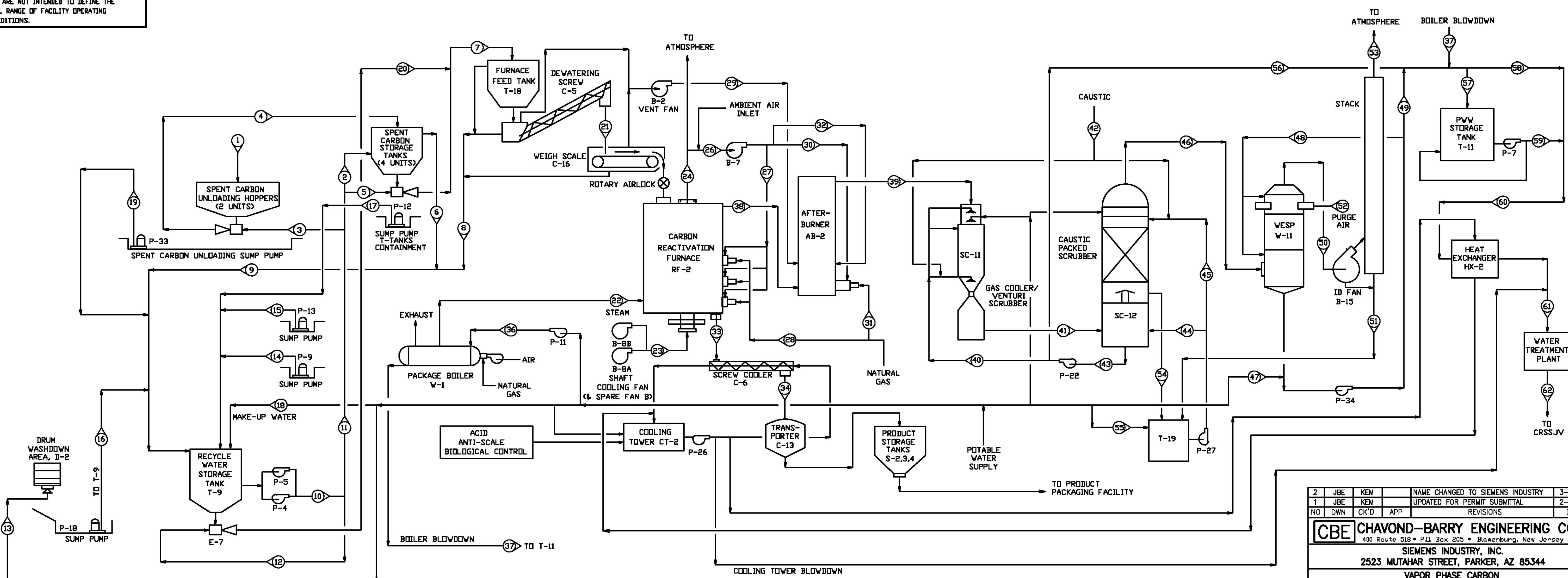
LINE NO.	1	2	3	4	5	6	7	8	9	10	11	12	13
MATERIAL	SPENT CARBON	RECYCLE WATER	RECYCLE WATER	CARBON SLURRY	RECYCLE WATER	RECYCLE WATER	CARBON SLURRY	RECYCLE WATER	RECYCLE WATER	RECYCLE WATER	RECYCLE WATER	RECYCLE WATER	POTABLE WATER
NON-CHLORINATED CARBON AVERAGE FLOWS (LBS/HR)													
CARBON	1237			1237			1237						
WATER	75	91	13154	13229	18786	10472	21634	20470	30942	32031	32031	0	0
ORGANICS	186			186			186						
AIR													
NAT. GAS													
CARBON DIOXIDE													
NITROGEN													
OXYGEN													
SULFUR DIOXIDE													
HYDROGEN CHLORIDE													
TOTAL	1498	91	13154	14652	18786	10472	23057	20470	30942	32031	32031	0	0
GPM	0.15	0.18	26.29	26.44	37.54	20.93	43.23	40.91	61.83	64.01	64.01	0.00	0.00
SCFM													
ACFM													
PRESSURE - PSIG	ATM.	70	70	24	70	GRAVITY	24	GRAVITY	GRAVITY	80	80	80	20
TEMPERATURE - °F	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT
pH													
DISSOLVED SOLIDS - MG/L													
SUSPENDED SOLIDS - MG/L													
CHLORINATED CARBON BLEND AVERAGE FLOWS (LBS/HR)													
CARBON	1237			1237			1237						
WATER	76	90	13435	13511	19186	10693	22094	20905	31598	32711	32711	0	0
ORGANICS	216			216			216						
AIR													
NAT. GAS													
CARBON DIOXIDE													
NITROGEN													
OXYGEN													
SULFUR DIOXIDE													
HYDROGEN CHLORIDE													
TOTAL	1529	90	13435	14964	19186	10693	23547	20905	31598	32711	32711	0	0
GPM	0.15	0.18	26.85	27.00	38.34	21.37	44.15	41.78	63.15	65.37	65.37	0.00	0.00
SCFM													
ACFM													
PRESSURE - PSIG	ATM.	70	70	24	70	GRAVITY	24	GRAVITY	GRAVITY	80	80	80	20
TEMPERATURE - °F	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT
pH													
DISSOLVED SOLIDS - MG/L													
SUSPENDED SOLIDS - MG/L													

LINE NO.	14	15	16	17	18	19	20	21	22	23	24	26	27	28
MATERIAL	RECYCLE WATER	RECYCLE WATER	RECYCLE WATER	RECYCLE WATER	POTABLE WATER	RECYCLE WATER	CARBON SLURRY	SPENT CARBON	STEAM	COOLING AIR	COOLING AIR	WARM AIR	BURNER AIR	NATURAL GAS
NON-CHLORINATED CARBON AVERAGE FLOWS (LBS/HR)														
CARBON							0	1237						
WATER	0	0	0	0	1089	0	0	1164	1200					
ORGANICS							0	186						
AIR										11441	11441	9066	3739	
NAT. GAS														92
CARBON DIOXIDE														
NITROGEN														
OXYGEN														
SULFUR DIOXIDE														
HYDROGEN CHLORIDE														
TOTAL	0	0	0	0	1089	0	0	2587	1200	11441	11441	9066	3739	92
GPM	0.00	0.00	0.00	0.00	2.18	0.00	0.00	2.33						
SCFM										2500	2500	1981	817	33
ACFM											4135			
PRESSURE - PSIG					20			GRAVITY	15	0.36	ATM.	1	1	1
TEMPERATURE - °F					AMBIENT			AMBIENT	250	AMBIENT	400	350	350	AMBIENT
pH					7									
DISSOLVED SOLIDS - MG/L					550									
SUSPENDED SOLIDS - MG/L					10									
CHLORINATED CARBON BLEND AVERAGE FLOWS (LBS/HR)														
CARBON							0	1237						
WATER	0	0	0	0	1113	0	0	1189	1200					
ORGANICS							0	216						
AIR										11441	11441	8963	3733	
NAT. GAS														82
CARBON DIOXIDE														
NITROGEN														
OXYGEN														
SULFUR DIOXIDE														
HYDROGEN CHLORIDE														
TOTAL	0	0	0	0	1113	0	0	2642	1200	11441	11441	8963	3733	82
GPM	0.00	0.00	0.00	0.00	2.22	0.00	0.00	2.38						
SCFM										2500	2500	1958	815	30
ACFM											4135			
PRESSURE - PSIG					20			GRAVITY	15	0.36	ATM.	1	1	1
TEMPERATURE - °F					AMBIENT			AMBIENT	250	AMBIENT	400	350	350	AMBIENT
pH					7									
DISSOLVED SOLIDS - MG/L					550									
SUSPENDED SOLIDS - MG/L					10									

LINE NO.	29	30	31	32	33	34	36	37	38	39	40	41	42	43	44	45
MATERIAL	VENT AIR	BURNER AIR	NATURAL GAS	PROCESS AIR	REGEN CARBON	REGEN CARBON	POTABLE WATER	BLOW DOWN	FURNACE EXHAUST	AB EXHAUST	PROCESS WATER	VENTURI EXHAUST	CAUSTIC 50%NAOH	PROCESS WATER	PROCESS WATER	PROCESS WATER
NON-CHLORINATED CARBON AVERAGE FLOWS (LBS/HR)																
CARBON					1200	1200			37	9		0				
WATER							1248	48	2704	3203	57546	9213	0.46	69467	16941	115092
ORGANICS									18	0		0				
AIR	53	3765		1562					0	0		0				
NAT. GAS			160						0	0		0				
CARBON DIOXIDE									808	1322		1322				
NITROGEN									2851	6955		6955				
OXYGEN									0	469		469				
SULFUR DIOXIDE									0	0		0.37				
HYDROGEN CHLORIDE									0	0		0				
TOTAL	53	3765	160	1562	1200	1200	1248	48	6418	11958	57641	17959	0.92	69581	16951	115162
GPM							2.49	0.10			115.00			138.82	33.85	230.00
SCFM	12	823	58	341					1752	2977		5086				
ACFM									4662	13502		6858				
PRESSURE - PSIG	1	1	1	1	ATM.	ATM.	20	15	ATM.	ATM.	20	-1.16	50	GRAVITY	20	20
TEMPERATURE - °F	AMBIENT	350	AMBIENT	350	1600	250	AMBIENT	250	900	1850	171	186	AMBIENT	171	171	171
pH							7	10.5			7		14	7	7	7
DISSOLVED SOLIDS - MG/L							550	7961			850		500000	850	598	598
SUSPENDED SOLIDS - MG/L							10	0			793		0	793	10	10
CHLORINATED CARBON BLEND AVERAGE FLOWS (LBS/HR)																
CARBON					1200	1200			37	9		0				
WATER							1248	48	2716	3208	57546	9191	12	71225	18687	115092
ORGANICS									20	0		0				
AIR	53	3591		1639					0	0		0				
NAT. GAS			152						0	0		0				
CARBON DIOXIDE									827	1323		1323				
NITROGEN									2846	6875		6875				
OXYGEN									0	464		464				
SULFUR DIOXIDE									3	3		3				
HYDROGEN CHLORIDE									8	8		8				
TOTAL	53	3591	152	1639	1200	1200	1248	48	6457	11890	57710	17864	25	71428	18717	115275
GPM							2.49	0.10			115.00			142.34	37.34	230.00
SCFM	12	785	56	358					1763	2961		5062				
ACFM									4691	13433		6826				
PRESSURE - PSIG	1	1	1	1	ATM.	ATM.	20	15	ATM.	ATM.	20	-1.16	50	GRAVITY	20	20
TEMPERATURE - °F	AMBIENT	350	AMBIENT	350	1600	250	AMBIENT	250	900	1850	171	186	AMBIENT	171	171	171
pH							7	10.5			7		14	7	7	7
DISSOLVED SOLIDS - MG/L							550	7961			2159		500000	2159	1581	1581
SUSPENDED SOLIDS - MG/L							10	0			692		0	692	10	10

LINE NO.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62
MATERIAL	SCRUBBER EXHAUST	POTABLE WATER	PROCESS WATER	WESP DRAIN	ID FAN INLET	STACK DRAIN	PURGE AIR	STACK EXHAUST	SCRUBBER DRAIN	POTABLE WATER	PROCESS WATER	PROCESS WATER	PROCESS WATER	PROCESS WATER	PROCESS WATER	PROCESS WATER	WATER TO CRSSJV
NON-CHLORINATED CARBON AVERAGE FLOWS (LBS/HR)																	
CARBON	0				0			0									
WATER	8223	368	196	440	8151	0		8151	115093	16940	11921	12409	0	12409	12409	12457	12457
ORGANICS	0				0			0									
AIR	0				0		4577	0									
NAT. GAS	0				0			0									
CARBON DIOXIDE	1322				1322			1322									
NITROGEN	6955				10470			10470									
OXYGEN	469				1531			1531									
SULFUR DIOXIDE	0				0			0									
HYDROGEN CHLORIDE	0				0			0									
TOTAL	16969	368	196	440	21474	0	4577	21474	115163	16949	11940	12428	0	12428	12428	12476	12476
GPM		0.74	0.39	0.88					230.00	33.85	23.82	24.8	0.00	24.8	24.8	24.89	24.89
SCFM	4739				5714		1000	5714									
ACFM	6450				7768			7294									
PRESSURE - PSIG	-1.34	20	20	20	-1.52		ATM.	ATM.	GRAVITY	20	20	20		40	40	GRAVITY	GRAVITY
TEMPERATURE - °F	184	AMBIENT	112	112	174		AMBIENT	193	171	AMBIENT	171	171		171	171	120	118
pH		7	7	7					7	7	7	7		7	7	7	
DISSOLVED SOLIDS - MG/L		550	550	550					606	550	850	830		830	830	857	
SUSPENDED SOLIDS - MG/L		10	10	10					10	10	793	752		752	752	750	
CHLORINATED CARBON BLEND AVERAGE FLOWS (LBS/HR)																	
CARBON	0				0			0									
WATER	8216	368	196	439	8145	0		8145	115109	18670	13679	14166	0	14166	14166	14214	14214
ORGANICS	0				0			0									
AIR	0				0		4577	0									
NAT. GAS	0				0			0									
CARBON DIOXIDE	1323				1323			1323									
NITROGEN	6875				10390			10390									
OXYGEN	464				1526			1526									
SULFUR DIOXIDE	0				0			0									
HYDROGEN CHLORIDE	0				0			0									
TOTAL	16878	368	196	439	21384	0	4577	21384	115311	18680	13718	14205	0	14205	14205	14254	14254
GPM		0.74	0.39	0.88					230.03	37.31	27.34	28.31	0.00	28.31	28.31	28.41	28.41
SCFM	4718				5693		1000	5693									
ACFM	6423				7741			7269									
PRESSURE - PSIG	-1.34	20	20	20	-1.52		ATM.	ATM.	GRAVITY	20	20	20		40	40	GRAVITY	GRAVITY
TEMPERATURE - °F	184	AMBIENT	112	112	174		AMBIENT	193	171	AMBIENT	171	171		171	171	120	118
pH		7	7	7					7	7	7	7		7	7	7	
DISSOLVED SOLIDS - MG/L		550	550	489					1748	550	2159	2081		2081	2081	1550	
SUSPENDED SOLIDS - MG/L		10	10	9					10	10	692	661		661	661	659	

THE DATA PRESENTED ABOVE ARE OFFERED TO DESCRIBE A TYPICAL OPERATING CONDITION AND ARE NOT INTENDED TO DEFINE THE FULL RANGE OF FACILITY OPERATING CONDITIONS.



NO	DWN	CK'D	APP	REVISIONS	DATE
2	JBE	KEM		NAME CHANGED TO SIEMENS INDUSTRY	3-16-12
1	JBE	KEM		UPDATED FOR PERMIT SUBMITTAL	2-12-07

CBE CHAVOND-BARRY ENGINEERING CORP.
400 Route 518 • P.O. Box 205 • Blawenburg, New Jersey 08504

SIEMENS INDUSTRY, INC.
2523 MUTAHAR STREET, PARKER, AZ 85344

VAPOR PHASE CARBON
PROCESS FLOW DIAGRAM
BALANCE FOR RF-2

DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
JBE	1/10/01	KEM	1/18/07		

SCALE	DWG. NO.	REV.
NONE	PC-1466-PR-003	2

PRINT DATE: 4/19/12

NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

SIEMENS INDUSTRY, INC.   LIQUID PHASE CARBON - PROCESS FLOW DIAGRAM PR-004 - BALANCE FOR RF-2

LINE NO.	1	2	3	4	5	6	7	8	9	10	11	12
MATERIAL	SPENT CARBON	RECYCLE WATER	RECYCLE WATER	CARBON SLURRY	RECYCLE WATER	RECYCLE WATER	CARBON SLURRY	RECYCLE WATER	RECYCLE WATER	RECYCLE WATER	RECYCLE WATER	RECYCLE WATER
NON-CHLORINATED CARBON AVERAGE FLOWS (LBS/HR)												
CARBON	1237			1237			1237					
WATER	1175	90	10904	12079	17153	9569	19753	18690	28259	28147	28147	0
ORGANICS	62			62			62					
AIR												
NAT. GAS												
CARBON DIOXIDE												
NITROGEN												
OXYGEN												
SULFUR DIOXIDE												
HYDROGEN CHLORIDE												
TOTAL	2474	90	10904	13378	17153	9569	21052	18690	28259	28147	28147	0
GPM	2.35	0.18	21.79	24.14	34.28	19.12	39.47	37.35	56.47	56.25	56.25	0.00
SCFM												
ACFM												
PRESSURE - PSIG	ATM.	20	70	24	70	GRAVITY	24	GRAVITY	GRAVITY	80	80	
TEMPERATURE - °F	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	
pH												
DISSOLVED SOLIDS - MG/L												
SUSPENDED SOLIDS - MG/L												
CHLORINATED CARBON AVERAGE FLOWS (LBS/HR)												
CARBON	1237			1237			1237					
WATER	1231	90	11423	12654	17969	10020	20692	19579	29599	29482	29482	0
ORGANICS	124			124			124					
AIR												
NAT. GAS												
CARBON DIOXIDE												
NITROGEN												
OXYGEN												
SULFUR DIOXIDE												
HYDROGEN CHLORIDE												
TOTAL	2592	90	11423	14015	17969	10020	22053	19579	29599	29482	29482	0
GPM	2.46	0.18	22.83	25.29	35.91	20.02	41.35	39.13	59.15	58.92	58.92	0.00
SCFM												
ACFM												
PRESSURE - PSIG	ATM.	20	70	24	70	GRAVITY	24	GRAVITY	GRAVITY	80	80	
TEMPERATURE - °F	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	AMBIENT	
pH												
DISSOLVED SOLIDS - MG/L												
SUSPENDED SOLIDS - MG/L												

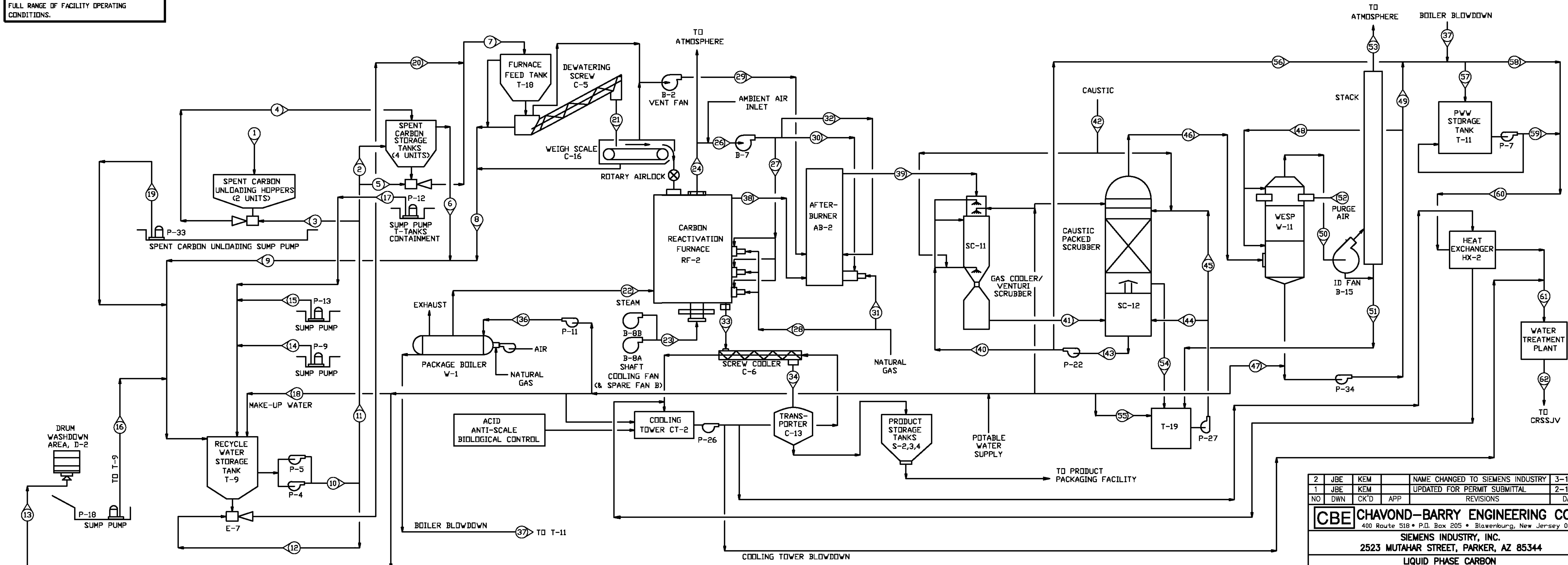
LINE NO.	13	14	15	16	17	18	19	20	21	22	23	24
MATERIAL	POTABLE WATER	RECYCLE WATER	RECYCLE WATER	RECYCLE WATER	RECYCLE WATER	POTABLE WATER	RECYCLE WATER	CARBON SLURRY	SPENT CARBON	STEAM	COOLING AIR	COOLING AIR
NON-CHLORINATED CARBON AVERAGE FLOWS (LBS/HR)												
CARBON								0	1237			
WATER	0	0	0	0	0	0	0	0	1063	1200		
ORGANICS								0	62			
AIR											11441	11441
NAT. GAS												
CARBON DIOXIDE												
NITROGEN												
OXYGEN												
SULFUR DIOXIDE												
HYDROGEN CHLORIDE												
TOTAL	0	0	0	0	0	0	0	0	2362	1200	11441	11441
GPM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.12			
SCFM											2500	2500
ACFM												4135
PRESSURE - PSIG									GRAVITY	15	0.36	ATM.
TEMPERATURE - °F									AMBIENT	250	AMBIENT	400
pH												
DISSOLVED SOLIDS - MG/L												
SUSPENDED SOLIDS - MG/L												
CHLORINATED CARBON AVERAGE FLOWS (LBS/HR)												
CARBON								0	1237			
WATER	0	0	0	0	0	0	0	0	1113	1200		
ORGANICS								0	124			
AIR											11441	11441
NAT. GAS												
CARBON DIOXIDE												
NITROGEN												
OXYGEN												
SULFUR DIOXIDE												
HYDROGEN CHLORIDE												
TOTAL	0	0	0	0	0	0	0	0	2474	1200	11441	11441
GPM	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.22			
SCFM											2500	2500
ACFM												4135
PRESSURE - PSIG									GRAVITY	15	0.36	ATM.
TEMPERATURE - °F									AMBIENT	250	AMBIENT	400
pH												
DISSOLVED SOLIDS - MG/L												
SUSPENDED SOLIDS - MG/L												

LINE NO.	26	27	28	29	30	31	32	33	34	36	37
MATERIAL	WARM AIR	BURNER AIR	NATURAL GAS	VENT AIR	BURNER AIR	NATURAL GAS	PROCESS AIR	REGEN CARBON	REGEN CARBON	POTABLE WATER	BLOW DOWN
NON-CHLORINATED CARBON AVERAGE FLOWS (LBS/HR)											
CARBON								1200	1200		
WATER										1248	48
ORGANICS											
AIR	10292	3513		53	6174		605				
NAT. GAS			167			262					
CARBON DIOXIDE											
NITROGEN											
OXYGEN											
SULFUR DIOXIDE											
HYDROGEN CHLORIDE											
TOTAL	10292	3513	167	53	6174	262	605	1200	1200	1249	48
GPM										2.49	0.10
SCFM	2248	767	61	12	1349	96	132				
ACFM											
PRESSURE - PSIG	1	1	1	1	1	1	1	ATM.	ATM.	20	15
TEMPERATURE - °F	350	350	AMBIENT	AMBIENT	350	AMBIENT	350	1600	250	AMBIENT	250
pH										7	10.5
DISSOLVED SOLIDS - MG/L										550	7961
SUSPENDED SOLIDS - MG/L										10	0
CHLORINATED CARBON AVERAGE FLOWS (LBS/HR)											
CARBON								1200	1200		
WATER										1248	48
ORGANICS											
AIR	9876	3564		53	5393		919				
NAT. GAS			138			229					
CARBON DIOXIDE											
NITROGEN											
OXYGEN											
SULFUR DIOXIDE											
HYDROGEN CHLORIDE											
TOTAL	9876	3564	138	53	5393	229	919	1200	1200	1249	48
GPM										2.49	0.10
SCFM	2157	779	50	12	1178	83	201				
ACFM											
PRESSURE - PSIG	1	1	1	1	1	1	1	ATM.	ATM.	20	15
TEMPERATURE - °F	350	350	AMBIENT	AMBIENT	350	AMBIENT	350	1600	250	AMBIENT	250
pH										7	10.5
DISSOLVED SOLIDS - MG/L										550	7961
SUSPENDED SOLIDS - MG/L										10	0

LINE NO.	38	39	40	41	42	43	44	45	46	47	48	49
MATERIAL	FURNACE EXHAUST	AB EXHAUST	PROCESS WATER	VENTURI EXHAUST	CAUSTIC 50%NAOH	PROCESS WATER	PROCESS WATER	PROCESS WATER	SCRUBBER EXHAUST	POTABLE WATER	PROCESS WATER	WESP DRAIN
NON-CHLORINATED CARBON AVERAGE FLOWS (LBS/HR)												
CARBON	37	9		0					0			
WATER	2702	3313	57546	9844	0.15	69441	17500	115092	8918	368	196	439
ORGANICS	1	0		0					0			
AIR	0	0		0					0			
NAT. GAS	0	0		0					0			
CARBON DIOXIDE	616	1384		1384					1384			
NITROGEN	2686	7902		7902					7902			
OXYGEN	0	528		528					528			
SULFUR DIOXIDE	0	0		0.12					0			
HYDROGEN CHLORIDE	0	0		0					0			
TOTAL	6042	13136	57640	19658	0.30	69554	17510	115158	18732	368	196	439
GPM			115.00			138.77	34.97	230.00		0.74	0.39	0.88
SCFM	1648	3250		5542					5217			
ACFM	4384	14741		7462					7093			
PRESSURE - PSIG	ATM.	ATM.	20	-1.16	50	GRAVITY	20	20	-1.34	20	20	20
TEMPERATURE - °F	900	1850	170	185	AMBIENT	170	170	170	183	AMBIENT	112	112
pH			7		14	7	7	7		7	7	7
DISSOLVED SOLIDS - MG/L			832		500000	832	565	565		550	550	550
SUSPENDED SOLIDS - MG/L			795		0	795	10	10		10	10	10
CHLORINATED CARBON AVERAGE FLOWS (LBS/HR)												
CARBON	37	9		0					0			
WATER	2714	3291	57546	9663	12.36	71198	19097	115092	8736	368	196	439
ORGANICS	7	0		0					0			
AIR	0	0		0					0			
NAT. GAS	0	0		0					0			
CARBON DIOXIDE	685	1370		1370					1370			
NITROGEN	2722	7581		7581					7581			
OXYGEN	0	508		508					508			
SULFUR DIOXIDE	3	3		3					0			
HYDROGEN CHLORIDE	8	8		8					0			
TOTAL	6176	12770	57711	19133	24.72	71403	19127	115272	18195	368	196	439
GPM			115.00			142.28	38.16	230.00		0.74	0.39	0.88
SCFM	1685	3165		5402					5075			
ACFM	4483	14357		7277					6903			
PRESSURE - PSIG	ATM.	ATM.	20	-1.16	50	GRAVITY	20	20	-1.34	20	20	20
TEMPERATURE - °F	900	1850	171	186	AMBIENT	170	171	171	183	AMBIENT	112	112
pH			7		14	7	7	7		7	7	7
DISSOLVED SOLIDS - MG/L			2177		500000	2117	1557	1557		550	550	550
SUSPENDED SOLIDS - MG/L			694		0	694	10	10		10	10	10

LINE NO.	50	51	52	53	54	55	56	57	58	59	60	61	62
MATERIAL	ID FAN INLET	STACK DRAIN	PURGE AIR	STACK EXHAUST	SCRUBBER DRAIN	POTABLE WATER	PROCESS WATER	PROCESS WATER	PROCESS WATER	PROCESS WATER	PROCESS WATER	PROCESS WATER	WATER TO CRSSJV
NON-CHLORINATED CARBON AVERAGE FLOWS (LBS/HR)													
CARBON	0			0									
WATER	8847	0		8847	115092	17500	11895	12382	0	12382	12382	12430	12430
ORGANICS	0			0									
AIR	0		4577	0									
NAT. GAS	0			0									
CARBON DIOXIDE	1384			1384									
NITROGEN	11417			11417									
OXYGEN	1590			1590									
SULFUR DIOXIDE	0			0									
HYDROGEN CHLORIDE	0			0									
TOTAL	23238	0	4577	23238	115159	17510	11915	12402	0	12402	12402	12450	12450
GPM					230.00	34.97	23.77	24.79	0.00	24.79	24.79	24.88	24.88
SCFM	6192		1000	6192									
ACFM	8420			7906									
PRESSURE - PSIG	-1.52		ATM.	ATM.	GRAVITY	20	20	20		40	40	GRAVITY	GRAVITY
TEMPERATURE - °F	174		AMBIENT	193	170	AMBIENT	170	170		170	170	120	
pH					7	7	7	7		7	7	7	
DISSOLVED SOLIDS - MG/L					568	550	832	805		805	805	832	
SUSPENDED SOLIDS - MG/L					10	10	795	753		753	753	750	
CHLORINATED CARBON AVERAGE FLOWS (LBS/HR)													
CARBON	0			0									
WATER	8665	0		8665	115109	19080	13652	14139	0	14139	14139	14187	14187
ORGANICS	0			0									
AIR	0		4577	0									
NAT. GAS	0			0									
CARBON DIOXIDE	1370			1370									
NITROGEN	11096			11096									
OXYGEN	1570			1570									
SULFUR DIOXIDE	0			0									
HYDROGEN CHLORIDE	0			0									
TOTAL	22701	0	4577	22701	115309	19091	13691	14178	0	14178	14178	14226	14226
GPM					230.03	38.13	27.28	28.26	0.00	28.26	28.26	28.35	28.35
SCFM	6050		1000	6050									
ACFM	8228			7726									
PRESSURE - PSIG	-1.52		ATM.	ATM.	GRAVITY	20	20	20		20	20	GRAVITY	GRAVITY
TEMPERATURE - °F	174		AMBIENT	193	171	AMBIENT	171	171		171	171	120	
pH					7	7	7	7		7	7	7	
DISSOLVED SOLIDS - MG/L					1723	550	2177	2081		2081	2081	1550	
SUSPENDED SOLIDS - MG/L					10	10	694	662		662	662	660	

THE DATA PRESENTED ABOVE ARE OFFERED TO DESCRIBE A TYPICAL OPERATING CONDITION AND ARE NOT INTENDED TO DEFINE THE FULL RANGE OF FACILITY OPERATING CONDITIONS.



NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

NO	DWN	CK'D	APP	REVISIONS	DATE
2	JBE	KEM		NAME CHANGED TO SIEMENS INDUSTRY	3-16-12
1	JBE	KEM		UPDATED FOR PERMIT SUBMITTAL	2-12-07

CBE CHAVOND-BARRY ENGINEERING CORP.
400 Route 518 • P.O. Box 205 • Blawenburg, New Jersey 08504

SIEMENS INDUSTRY, INC.
2523 MUTAHAR STREET, PARKER, AZ 85344

LIQUID PHASE CARBON PROCESS FLOW DIAGRAM BALANCE FOR RF-2

DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
AJL	11/06/95	KEM	11/06/95		

SCALE	DWG. NO.	REV.
NONE	PC-1466-PR-004	2

PRINT DATE: 4/19/12

DWG: D11135-200

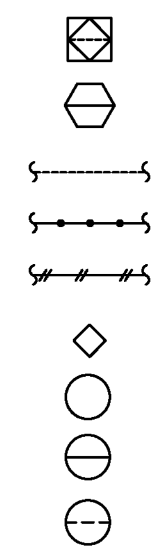
INSTRUMENT I.D. LETTERS

LETTER	VARIABLE TYPES	FUNCTION CODES
A	ANALYSIS	ALARM
B	BURNER FLAME	BYPASS
C		CONTROLLER
D		DIFFERENTIAL
E	VOLTAGE	ELEMENT (PRIMARY)
F	FLOW	RATIO (FRACTION)
G	GAUGING (DIMENSIONS)	GLASS/GAUGE
H	HAND ACTUATED	HIGH
I	CURRENT	INDICATOR
J	POWER (WATTS)	MULTIPOINT (SCAN)
K	TIME	CONTROL STATION
L	LEVEL	LIGHT/LOW
M		MIDDLE
N		
O		ORIFICE (RESTRICTION)
P	PRESSURE/VACUUM	POINT
Q	QUANTITY/NUMBER	TOTALIZER
R	RUN	RECORDER
S	SPEED/FREQUENCY	SAFETY/SWITCH
T	TEMPERATURE	TRANSMITTER
U	MULTIVARIABLE	MALFUNCTION
V	VIBRATION	VALVE
W	WEIGHT	WELL
X	UNCLASSIFIED	SHUTDOWN/INTERLOCK
Y	EVENT	RELAY
Z	POSITION	DRIVE/ACTUATE

PARKER PERMIT APPLICATION DRAWING INDEX

D11135-200 - LEGEND & SPECIALTY ITEMS
D11135-201 - SPENT CARBON STORAGE / H-1
D11135-202 - SPENT CARBON STORAGE / H-2
D11135-203 - RECYCLE WATER
D11135-205 - PROCESS WATER DISCHARGE TO POTW
D11135-211 - UTILITIES - PW - NG - STM
D11135-213 - FURNACE # 2 FEED SYSTEM
D11135-214 - REACTIVATION FURNACE # 2
D11135-215 - FURNACE # 2 PRODUCT HANDLING SYSTEM
D11135-216 - FURNACE # 2 OFF GAS SCRUBBER
D11135-217 - FURNACE # 2 PROCESS WATER

INSTRUMENT SYMBOLS



= PLC I/O
= OPERATOR INTERFACE
= INSTRUMENT HARDWIRED SIGNAL
= INSTRUMENT SOFTWARE INTERCONNECT
= INSTRUMENT PNEUMATIC SIGNAL
= INTERLOCK IDENTIFIER
= FIELD INSTRUMENT
= PANEL INSTRUMENT ACCESSIBLE TO OPERATOR
= PANEL INSTRUMENT NOT NORMALLY ACCESSIBLE TO OPERATOR

NOTE:

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REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
5	3/15/12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	
4	2/22/07	UPDATED FOR PERMIT SUBMITTAL	JBE	KEM	
3	7/17/02	REVISED FOR RCRA PART B PERMIT APPLICATION	STA	KEM	
2	7/17/96	AS BUILT	CHJ		
1	3/27/96	GENERAL REVISIONS	AJL	KEM	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No. 11135

DRAWN: AJL 1/02/96

CHK'D: KEM 1/02/96

ENG'R:

SIEMENS INDUSTRY, INC.
Parker, AZ

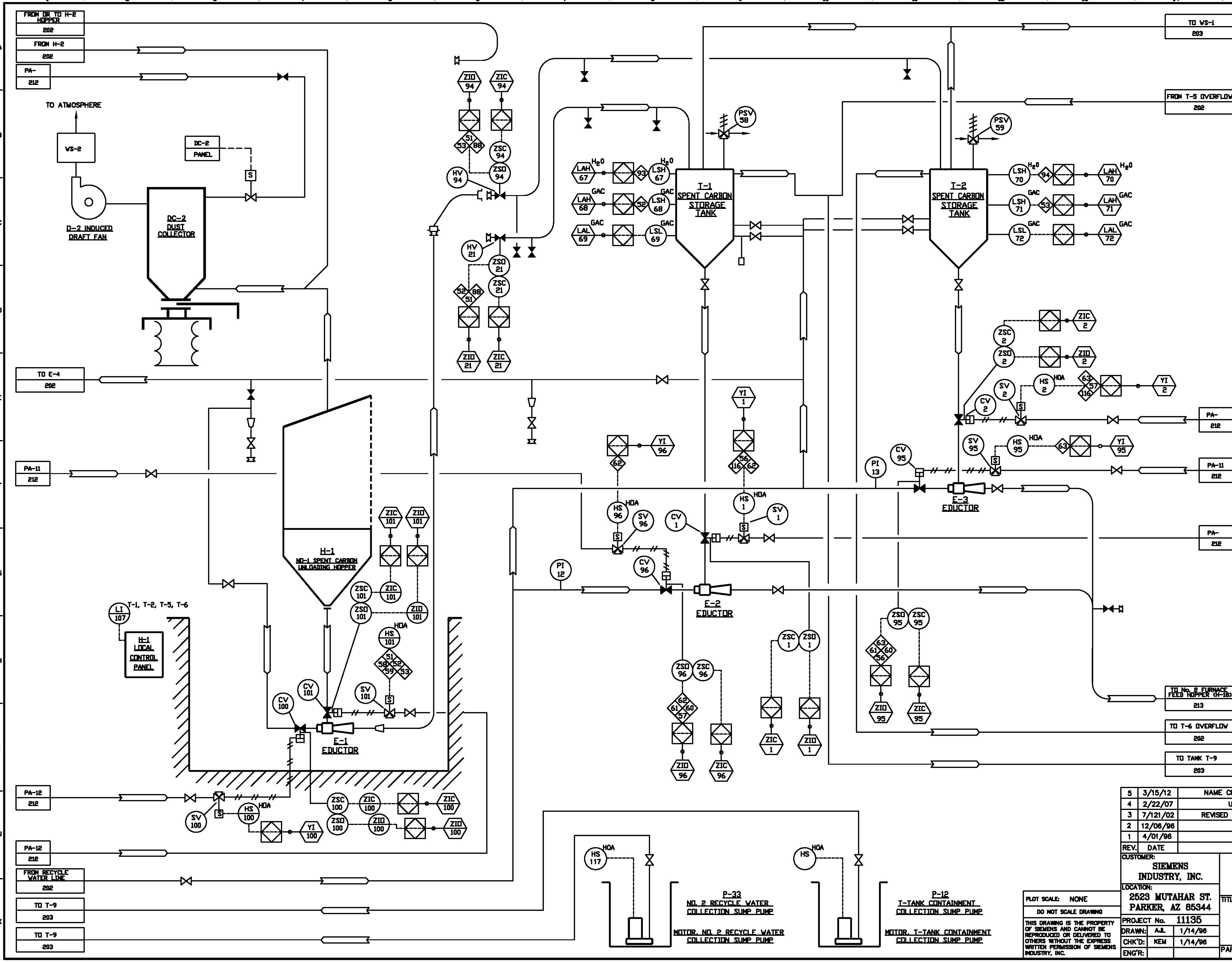
TITLE: REACTIVATION FACILITY LEGEND & SPECIALTY ITEMS PIPING & INSTRUMENTATION DIAGRAM

PART No.

DWG No. D11135-200 REV. 5

PRINT DATE: 4/19/12

DWG: D11135-201



INTERLOCK NOTES

- (51) = TRANSFER FROM H-1 TO T-1, 2, 5, OR 6: EITHER HV-21, HV-94, HV-33, OR HV-23 MUST BE OPEN FOR CV-101 TO OPEN.
- (52) = SLURRY TRANSFER FROM H-1 OR H-2 TO T-1 IS PREVENTED IF CARBON LEVEL REACHES LSH-68.
- (53) = SLURRY TRANSFER FROM H-1 OR H-2 TO T-2 IS PREVENTED IF CARBON LEVEL REACHES LSH-71.
- (56) = PREVENTION OF DOUBLE SLURRY FROM T-1: CV-1 WILL BE HELD SHUT IF CV-95, CV-24, OR CV-97 ARE OPEN.
- (57) = PREVENTION OF DOUBLE SLURRY FROM T-2: CV-2 WILL BE HELD SHUT IF CV-96, CV-24, OR CV-97 ARE OPEN.
- (58) = SEE NOTE ON DWG. 202
- (59) = SEE NOTE ON DWG. 202
- (60) = SEE NOTE ON DWG. 202
- (61) = SEE NOTE ON DWG. 202
- (88) = SEE NOTE ON DWG. 202.
- (116) = SEE NOTE ON DWG. 213.

NOTE:

THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
5	3/15/12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	
4	2/22/07	UPDATED FOR PERMIT SUBMITTAL	JBE	KEM	
3	7/121/02	REVISED FOR RCRA PART B PERMIT APPLICATION	STA	KEM	
2	12/06/96	AS BUILT	TGB		
1	4/01/96	GENERAL REVISIONS	AJL	KEM	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No.	11135	
DRAWN:	AJL	1/14/96
CHK'D:	KEM	1/14/96
ENG'R:		

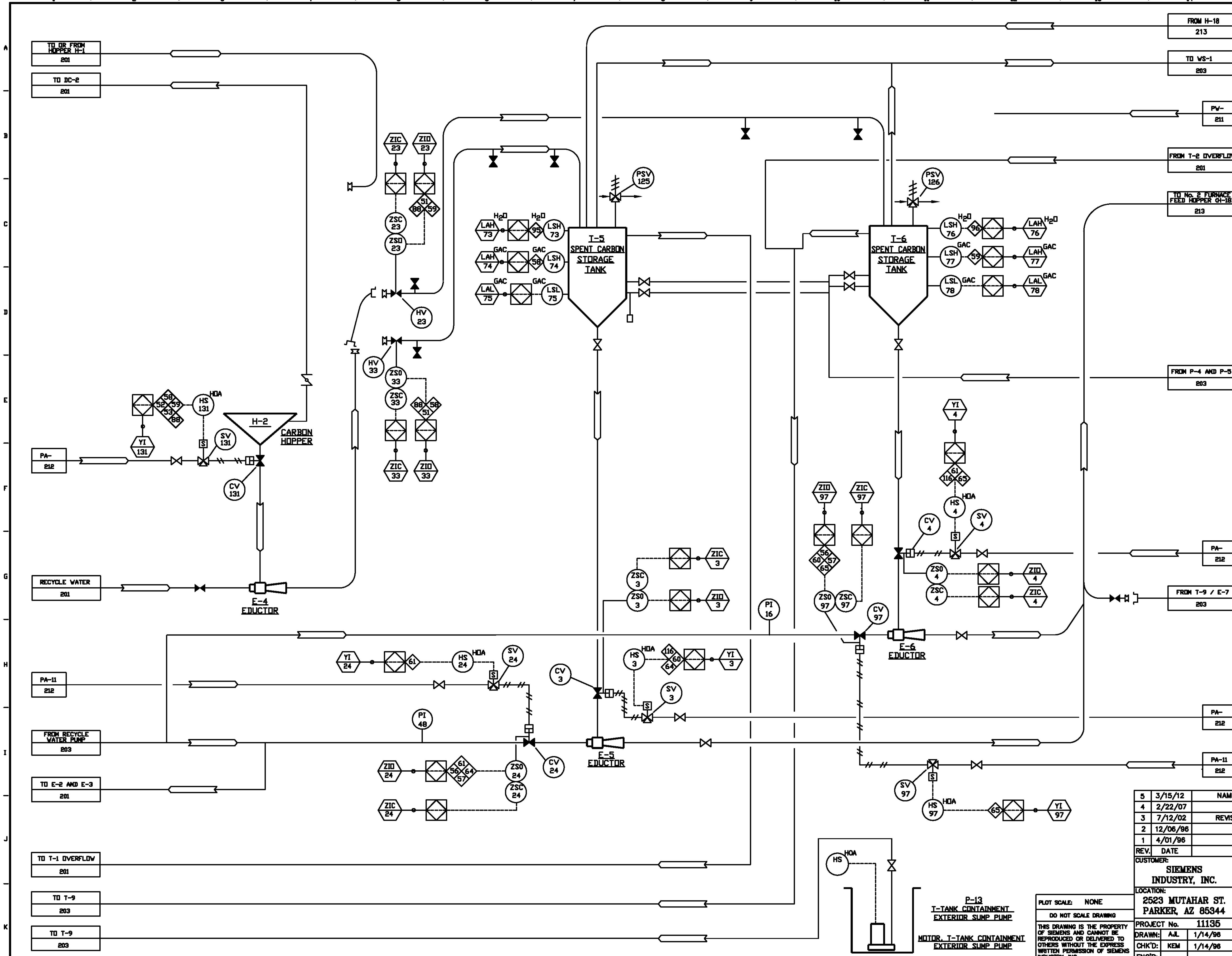
SIEMENS INDUSTRY, INC.
Parker, AZ

TITLE: REACTIVATION FACILITY SPENT CARBON STORAGE / H-1 PIPING & INSTRUMENTATION DIAGRAM

PART No. | DWG No. D11135-201 | REV. 5

PRINT DATE: 4/19/12

DWG: D11135-202



INTERLOCK NOTES

- (51) = SEE NOTE ON DWG. 201
- (52) = SEE NOTE ON DWG. 201
- (53) = SEE NOTE ON DWG. 201
- (56) = SEE NOTE ON DWG. 201
- (57) = SEE NOTE ON DWG. 201
- (58) = SLURRY TRANSFER FROM H-1 OR H-2 TO T-5 IS PREVENTED IF CARBON LEVEL REACHES LSH-74.
- (59) = SLURRY TRANSFER FROM H-1 OR H-2 TO T-6 IS PREVENTED IF CARBON LEVEL REACHES LSH-77.
- (60) = PREVENTION OF DOUBLE SLURRY FROM T-5: CV-3 WILL BE HELD SHUT IF CV-95, CV-96, OR CV-97 ARE OPEN.
- (61) = PREVENTION OF DOUBLE SLURRY FROM T-6: CV-4 WILL BE HELD SHUT IF CV-95, CV-96, OR CV-24 ARE OPEN.
- (88) = TRANSFER FROM H-2 TO T-1, 2, 5, OR 6: EITHER HV-21, HV-94, HV-33, OR HV-23 MUST BE OPEN FOR CV-131 TO OPEN.
- (116) = SEE NOTE ON DWG. 213.

NOTE:

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REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
5	3/15/12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	
4	2/22/07	UPDATED FOR PERMIT SUBMITTAL	JBE	KEM	
3	7/12/02	REVISED FOR RCRA PART B PERMIT APPLICATION	STA	KEM	
2	12/06/96	AS BUILT	TGB		
1	4/01/96	GENERAL REVISIONS	AJL	KEM	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No. 11135

DRAWN: AJL 1/14/96

CHK'D: KEM 1/14/96

ENG'R:

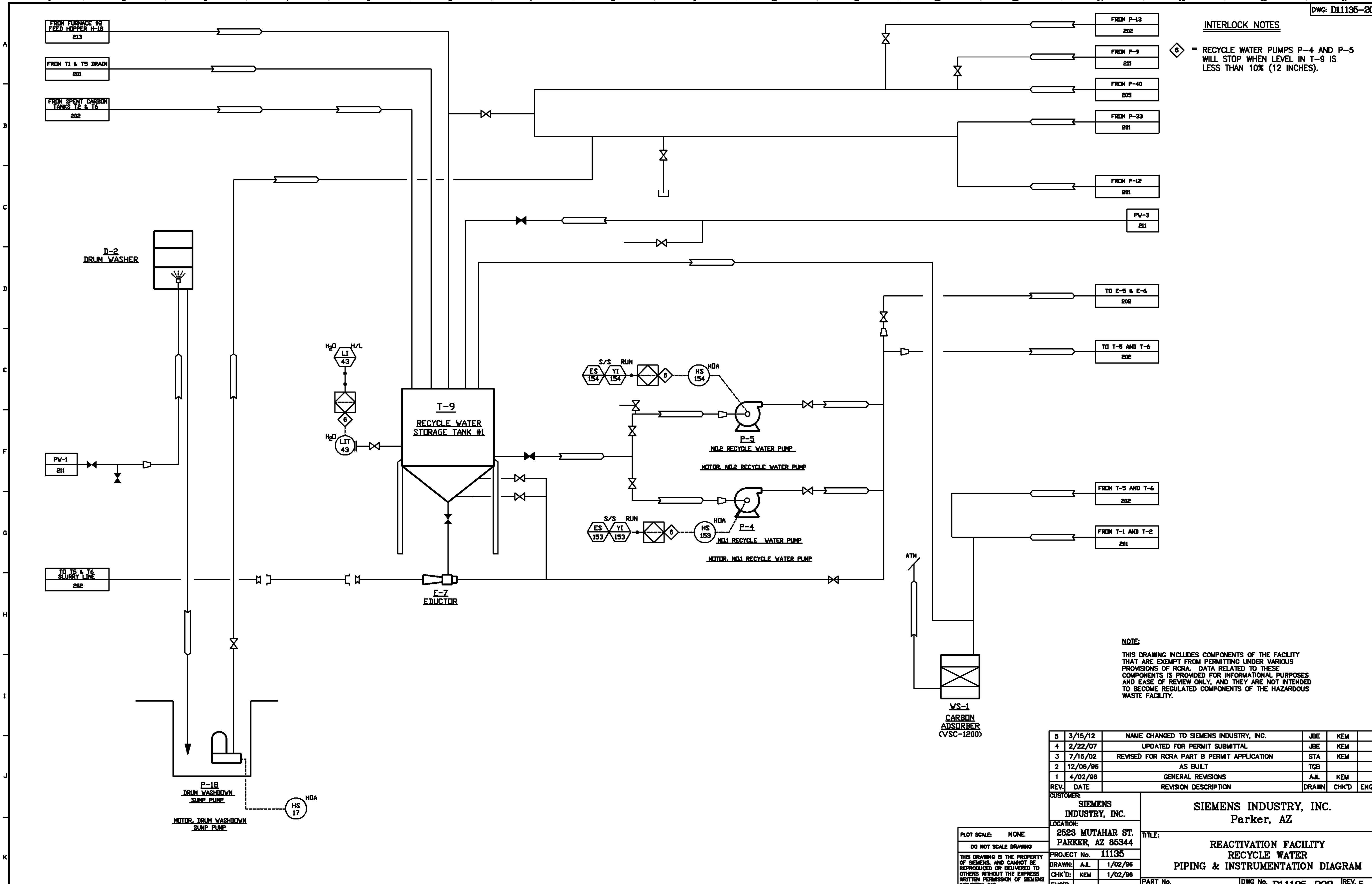
SIEMENS INDUSTRY, INC.
Parker, AZ

TITLE: REACTIVATION FACILITY SPENT CARBON STORAGE / H-2 PIPING & INSTRUMENTATION DIAGRAM

PART No.

DWG No. D11135-202 REV. 5

PRINT DATE: 4/19/12


DWG: D11135-203
FROM FURNACE #2 FEED HOPPER H-18
213
FROM T1 & T5 DRAIN
201
FROM SPENT CARBON TANKS T2 & T6
202
FROM P-13
202
FROM P-9
211
FROM P-40
205
FROM P-33
201
FROM P-12
201
PW-3
211
TO E-5 & E-6
202
TO T-5 AND T-6
202
FROM T-5 AND T-6
202
FROM T-1 AND T-2
201
INTERLOCK NOTES
6 = RECYCLE WATER PUMPS P-4 AND P-5 WILL STOP WHEN LEVEL IN T-9 IS LESS THAN 10% (12 INCHES).
D-2
DRUM WASHER
PW-1
211
TO T5 & T6 SLURRY LINE
202
LI 43
H/L
LIT 43
T-9
RECYCLE WATER STORAGE TANK #1
S/S
RUN
ES 154
YI 154
HS 154
HOA
P-5
NO.2 RECYCLE WATER PUMP
MOTOR, NO.2 RECYCLE WATER PUMP
ES 153
YI 153
HS 153
P-4
NO.1 RECYCLE WATER PUMP
MOTOR, NO.1 RECYCLE WATER PUMP
E-7
EDUCTOR
ATM
WS-1
CARBON ADSORBER
(VSC-1200)
P-18
DRUM WASHDOWN SUMP PUMP
MOTOR, DRUM WASHDOWN SUMP PUMP
HS 17
NOTE:
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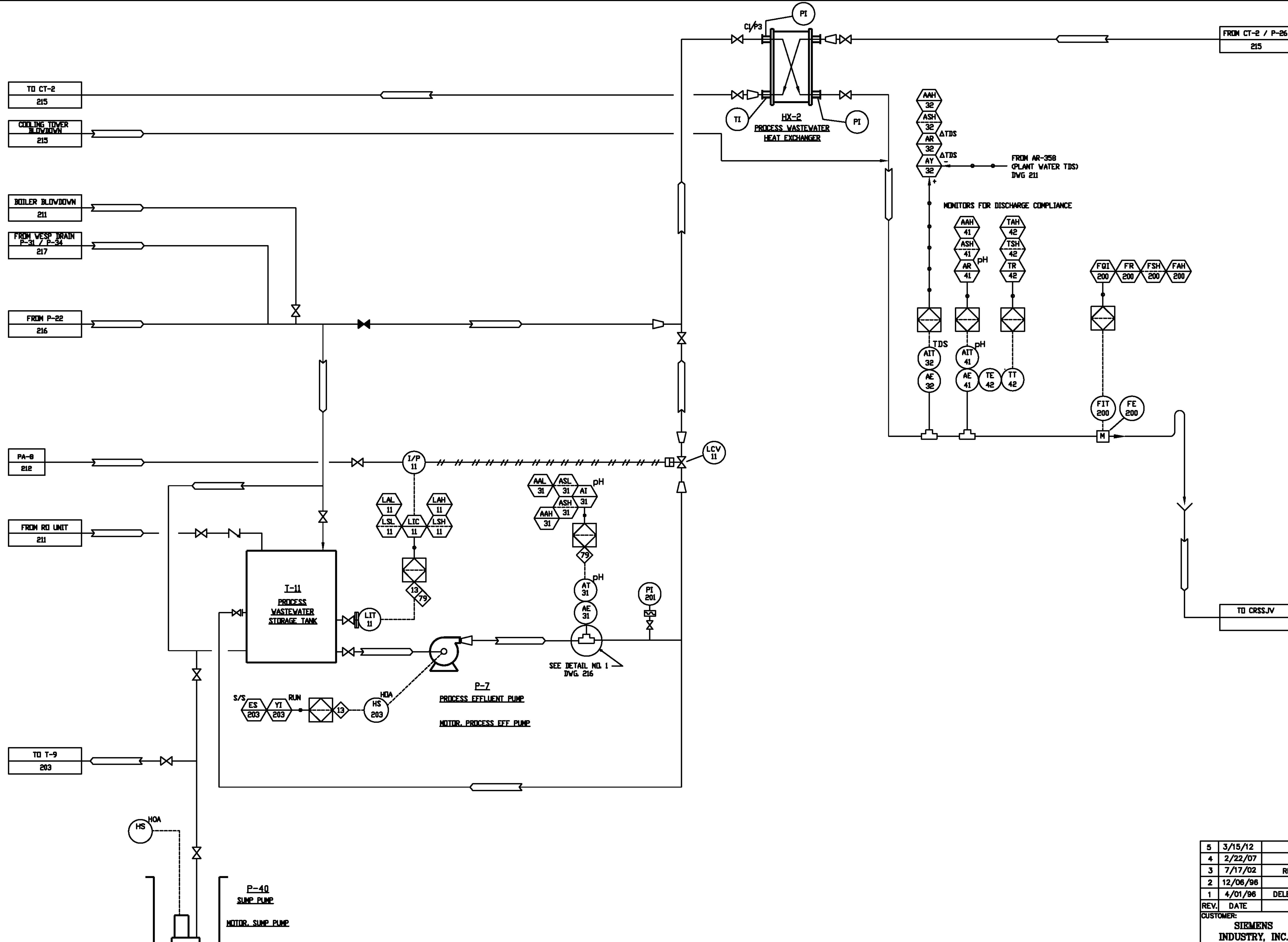
5 | 3/15/12 | NAME CHANGED TO SIEMENS INDUSTRY, INC. | JBE | KEM
4 | 2/22/07 | UPDATED FOR PERMIT SUBMITTAL | JBE | KEM
3 | 7/16/02 | REVISED FOR RCRA PART B PERMIT APPLICATION | STA | KEM
2 | 12/06/96 | AS BUILT | TGB
1 | 4/02/96 | GENERAL REVISIONS | AJL | KEM
REV. | DATE | REVISION DESCRIPTION | DRAWN | CHK'D | ENG'R
PLOT SCALE: NONE
DO NOT SCALE DRAWING
THIS DRAWING IS THE PROPERTY OF SIEMENS, AND CANNOT BE REPRODUCED OR DELIVERED TO OTHERS WITHOUT THE EXPRESS WRITTEN PERMISSION OF SIEMENS INDUSTRY, INC.
CUSTOMER: SIEMENS INDUSTRY, INC.
LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344
PROJECT No. 11135
DRAWN: AJL 1/02/96
CHK'D: KEM 1/02/96
ENG'R:
SIEMENS INDUSTRY, INC.
Parker, AZ
TITLE: REACTIVATION FACILITY RECYCLE WATER PIPING & INSTRUMENTATION DIAGRAM
PART No.
DWG No. D11135-203
REV. 5
PRINT DATE: 4/19/12



DWG: D11135-205

INTERLOCK NOTES

13 = WHEN LEVEL IN TANK T-11 REACHES ONE FOOT, PUMP P-7 WILL SHUT-OFF.

79 = pH OUT OF RANGE CLOSES LCV-11, UNLESS LSH-11 IS HIGH.

NOTE:

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REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
5	3/15/12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	
4	2/22/07	UPDATED FOR PERMIT SUBMITTAL	JBE	KEM	
3	7/17/02	REVISED FOR RCRA PART B PERMIT APPLICATION	STA	KEM	
2	12/06/96	AS BUILT	TGB		
1	4/01/96	DELETED EFFLUENT LIFT STATION, GENERAL REVISIONS	AJL	KEM	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No. 11135

DRAWN: AJW 1/14/96

CHK'D: KEM 1/14/96

ENG'R:

SIEMENS INDUSTRY, INC.
Parker, AZ

TITLE:

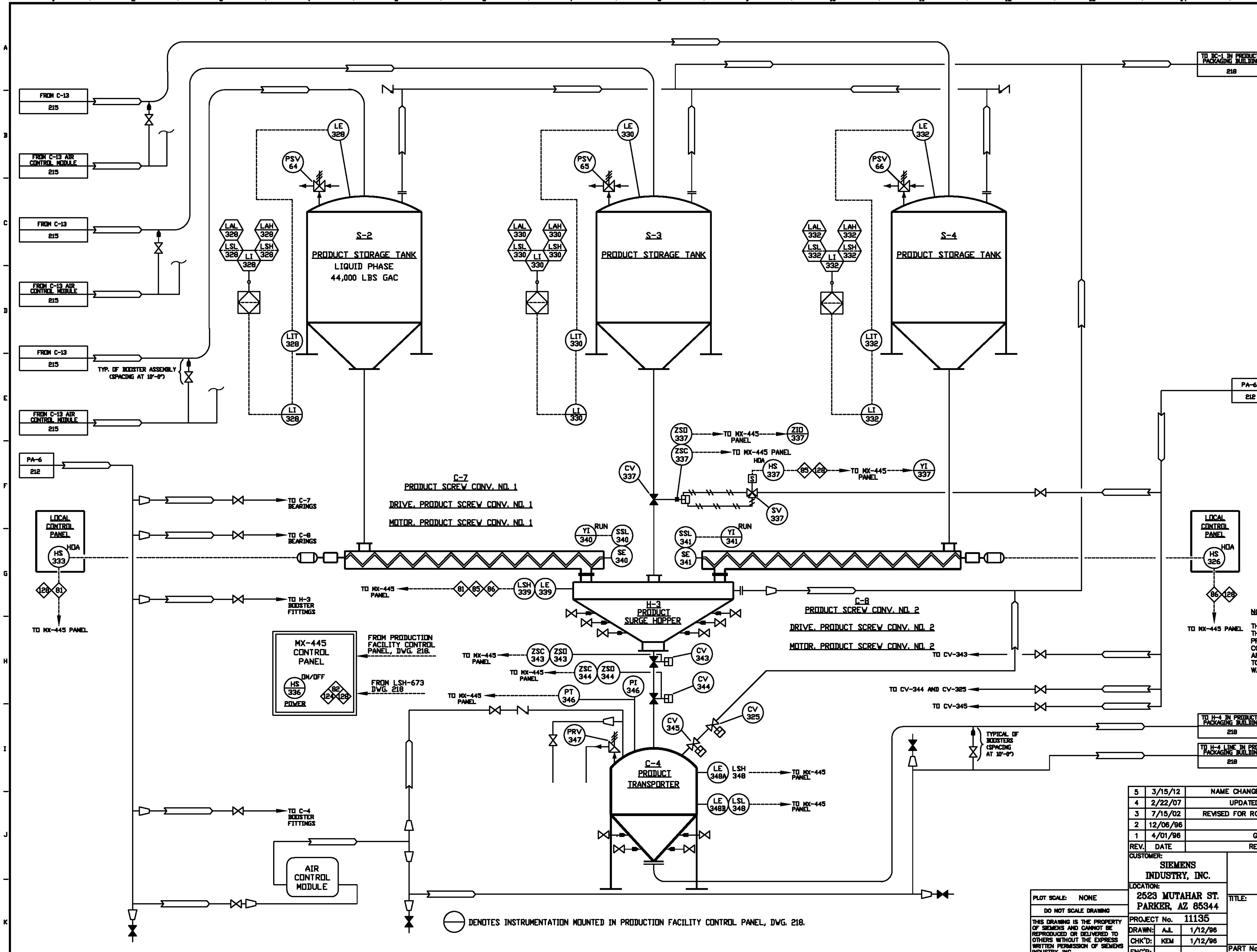
REACTIVATION FACILITY
PROCESS WATER DISCHARGE TO POTW
PIPING & INSTRUMENTATION DIAGRAM

PART No.

DWG No. D11135-205 REV. 5

PRINT DATE: 4/19/12

DWG: D11135-210



DENOTES INSTRUMENTATION MOUNTED IN PRODUCTION FACILITY CONTROL PANEL, DWG. 218.

INTERLOCK NOTES

- (81) = IF S-2 STORAGE TANK IS SELECTED, CONVEYOR C-7 STARTS WHEN CARBON LEVEL IN H-3 SURGE HOPPER FALLS BELOW LSH-339 AND C-7 STOPS WHEN CARBON LEVEL IN H-3 REACHES LSH-339.
- (82) = CARBON TRANSFER FROM C-4 PRODUCT TRANSPORTER TO H-4 RECEIVING HOPPER IS INITIATED WHEN CARBON LEVEL FALLS BELOW LSH-673 IN H-4.
- (85) = IF S-3 STORAGE TANK IS SELECTED, CV-337 OPENS WHEN CARBON LEVEL IN H-3 SURGE HOPPER FALLS BELOW LSH-339 UNLESS C-4 TRANSPORTER LOADING CYCLE IS IN PROGRESS. CV-337 CLOSES WHEN CARBON LEVEL IN H-3 REACHES LSH-339.
- (86) = IF S-4 STORAGE TANK IS SELECTED, CONVEYOR C-8 STARTS WHEN CARBON LEVEL IN H-3 SURGE HOPPER FALLS BELOW LSH-339 AND C-8 STOPS WHEN CARBON LEVEL IN H-3 REACHES LSH-339.
- (124) = SEE NOTE ON DWG. 218.
- (128) = SEE NOTE ON DWG. 218.

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REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
5	3/15/12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	
4	2/22/07	UPDATED FOR PERMIT SUBMITTAL	JBE	KEM	
3	7/15/02	REVISED FOR RCRA PART B PERMIT APPLICATION	STA	KEM	
2	12/06/96	AS BUILT	TGB		
1	4/01/96	GENERAL REVISIONS	AJL	KEM	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No. 11135

DRAWN: AJL 1/12/96

CHK'D: KEM 1/12/96

ENG'R:

SIEMENS INDUSTRY, INC.. Parker, AZ

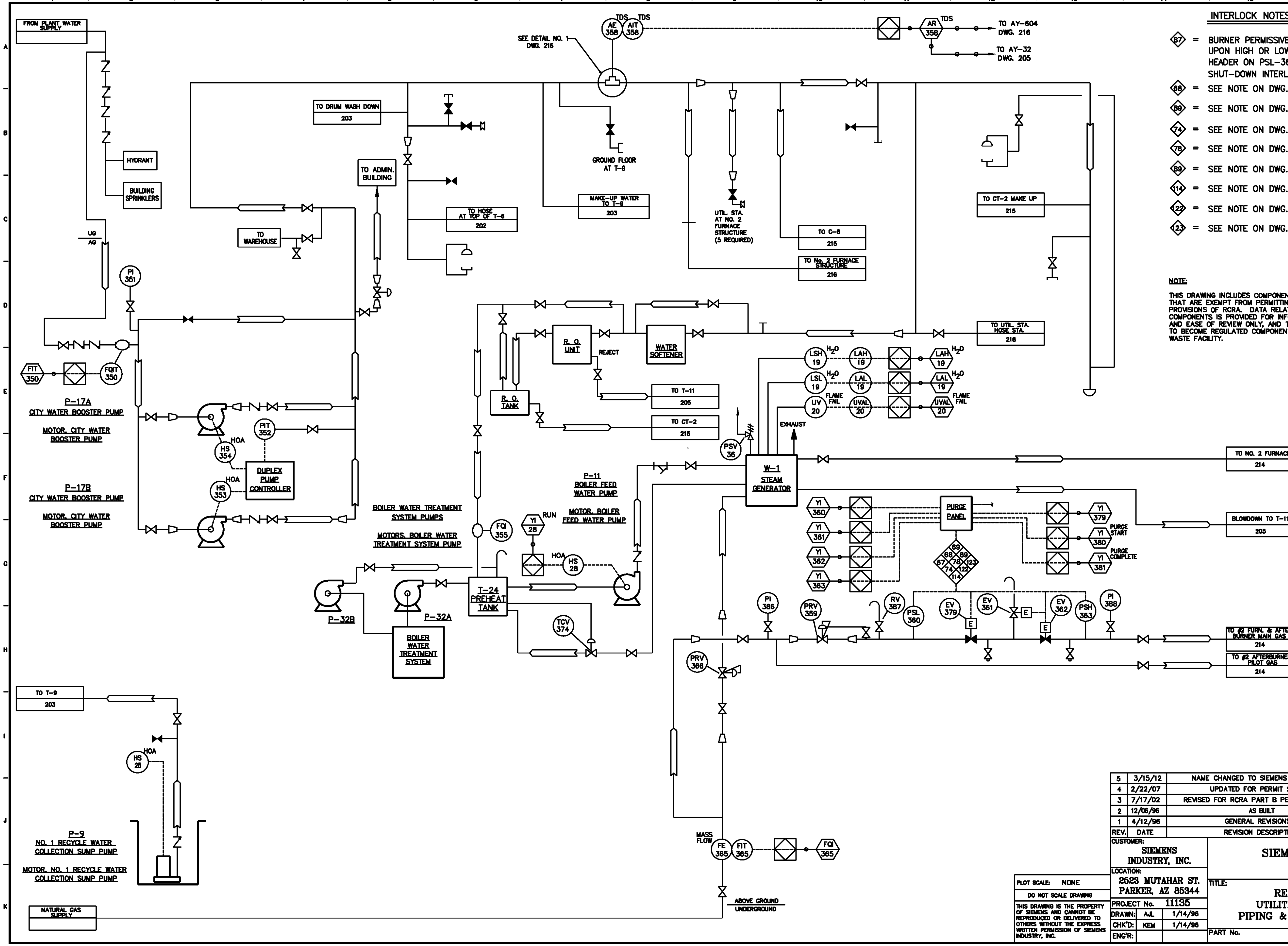
TITLE: REACTIVATION FACILITY REACTIVATED CARBON STORAGE PIPING & INSTRUMENTATION DIAGRAM

PART No.

DWG No. D11135-210 REV. 5

PRINT DATE: 4/19/12

DWG: D11135-211



INTERLOCK NOTES

- 87 = BURNER PERMISSIVE. BURNER SYSTEM SHUT-DOWN UPON HIGH OR LOW GAS PRESSURE AT UTILITY HEADER ON PSL-360 OR PSH-363 INITIATES RF-2 SHUT-DOWN INTERLOCK 121, (SEE NOTE ON DWG. 214).
- 88 = SEE NOTE ON DWG. 214.
- 89 = SEE NOTE ON DWG. 214.
- 74 = SEE NOTE ON DWG. 214.
- 78 = SEE NOTE ON DWG. 214.
- 89 = SEE NOTE ON DWG. 214.
- 114 = SEE NOTE ON DWG. 214.
- 122 = SEE NOTE ON DWG. 214.
- 123 = SEE NOTE ON DWG. 216.

NOTE:

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REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
5	3/15/12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	
4	2/22/07	UPDATED FOR PERMIT SUBMITTAL	JBE	KEM	
3	7/17/02	REVISED FOR RCRA PART B PERMIT APPLICATION	STA	KEM	
2	12/06/96	AS BUILT	TGB		
1	4/12/96	GENERAL REVISIONS	AJL	KEM	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No. 11135

DRAWN: AJL 1/14/96

CHK'D: KEM 1/14/96

ENG'R:

SIEMENS INDUSTRY, INC.
Parker, AZ

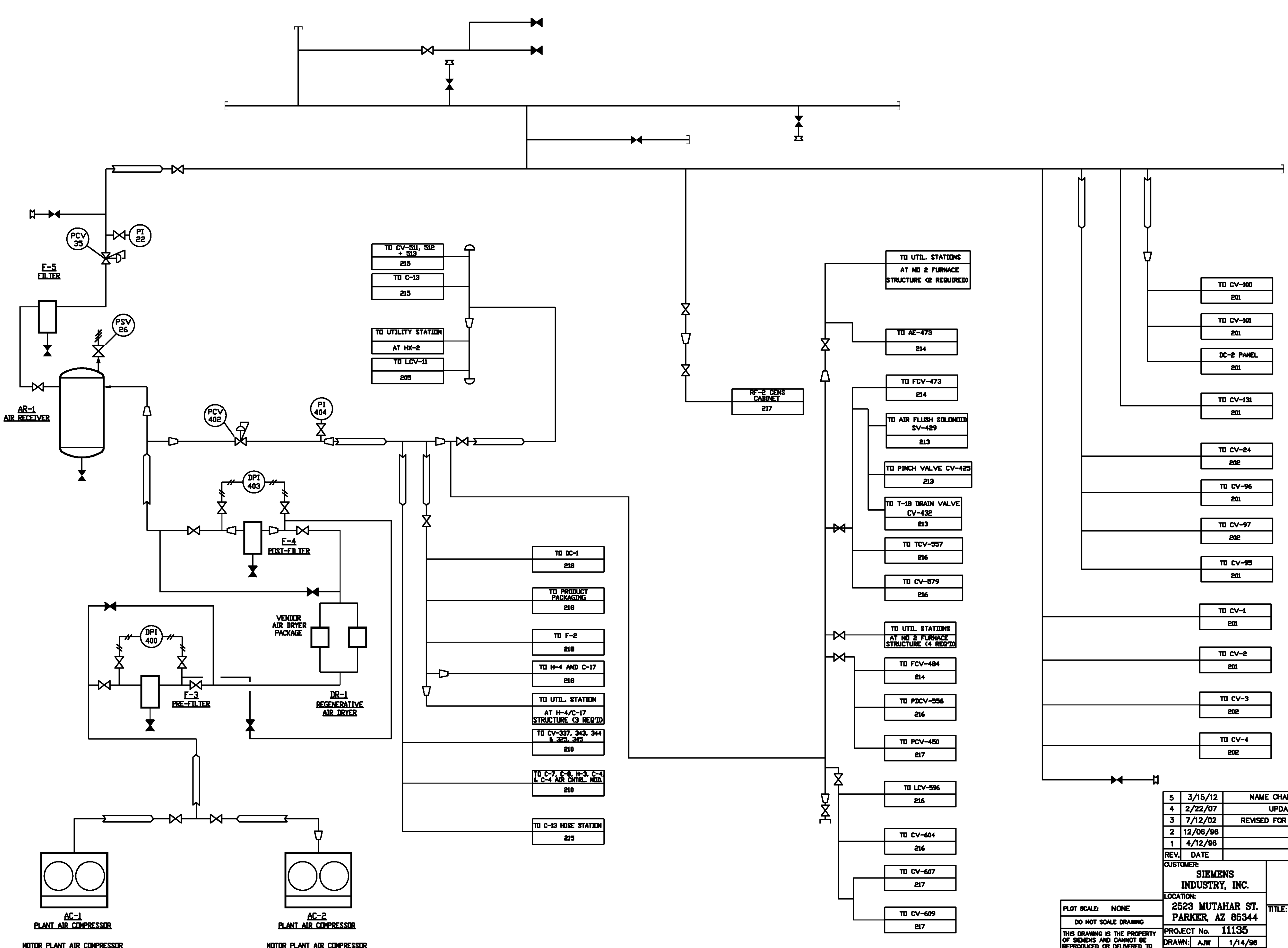
TITLE: REACTIVATION FACILITY UTILITIES – NG – PW – STM PIPING & INSTRUMENTATION DIAGRAM

PART No.

DWG No. D11135-211 REV. 5

PRINT DATE: 4/19/12

DWG: D11135-212



REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
5	3/15/12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	
4	2/22/07	UPDATED FOR PERMIT SUBMITTAL	JBE	KEM	
3	7/12/02	REVISED FOR RCRA PART B PERMIT APPLICATION	STA	KEM	
2	12/06/96	AS BUILT	TGB		
1	4/12/96	GENERAL REVISIONS	AJL	KEM	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No. 11135

DRAWN: AJW 1/14/96

CHK'D: KEM 1/14/96

ENG'R:

SIEMENS INDUSTRY, INC..
Parker, AZ

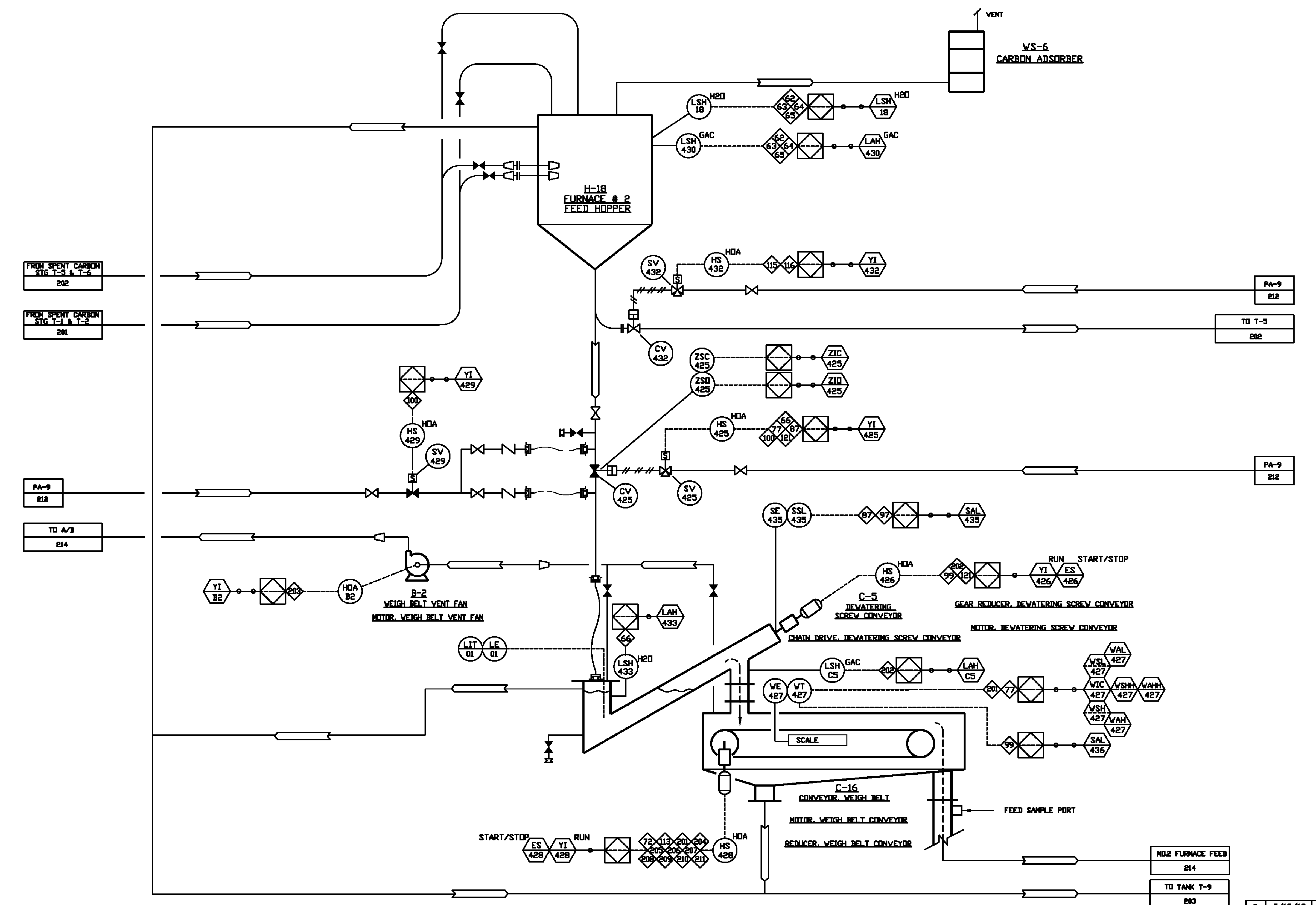
TITLE:

REACTIVATION FACILITY
UTILITIES – COMPRESSED AIR
PIPING & INSTRUMENTATION DIAGRAM

PART No.

DWG No. D11135-212 REV. 5

PRINT DATE: 4/19/12



INTERLOCK NOTES

- 86 = HIGH WATER LEVEL IN C-5: WHEN THE WATER LEVEL IN THE DEWATERING SCREW REACHES LSH-433, CV-425 IS HELD SHUT.
- 72 = LOW-LOW AFTERBURNER TEMPERATURE ON SELECTED TSLL-463, 464, OR 466 DISABLES C-16 AND STOPS FEED TO RF-2.
- 77 = FEED RATE CONTROL: WHEN THE FEED RATE VARIES OUT OF RANGE, WIC-427 ALTERS THE TIME THAT CV-425 IS OPEN.
- 87 = CV-425 IS HELD SHUT WHEN C-5 IS NOT RUNNING.
- 97 = SEE NOTE ON DWG. 203.
- 99 = C-5 IS DISABLED UNLESS C-16 IS RUNNING.
- 100 = SV-429 OPENS FOR 3 SECOND DURATION TO FLUSH LINE PRIOR TO CV-425 OPENING AND AFTER CV-425 CLOSES.
- 113 = C-16 IS DISABLED UNLESS RF-2 ROTARY AIRLOCK AND CENTER SHAFT ARE RUNNING.
- 115 = RF-2 CENTER SHAFT STOPPED ON SSL-458 FOR GREATER THAN 30 MINUTES OPENS CV-432 TO DRAIN RF-2 FEED HOPPER H-18.
- 116 = CARBON SLURRY TRANSFER TO H-18 FROM T-1, T-2, T-5 AND T-6 IS DISABLED IF CV-432 IS OPEN.
- 121 = SEE NOTE ON DWG. 214.
- 201 = HIGH-HIGH SPENT CARBON FEED RATE ON WSHH-427 DISABLES C-16 AND STOPS FEED TO RF-2.
- 202 = WHEN CARBON LEVEL IN C-5 DROP CHUTE REACHES LSH-C5, C5 IS STOPPED. RESTART AFTER CONDITION IS CLEARED BY OPERATOR.
- 203 = I.D. FAN B-15 MUST BE RUNNING FOR B-2 TO RUN IN AUTO. STOPS IF B-15 SHUTS OFF.
- 204 = LOW-LOW VENTURI SCRUBBER DIFFERENTIAL PRESSURE ON PDLL-556 DISABLES C-16 AND STOPS FEED TO RF-2.
- 205 = LOW-LOW QUENCH/VENTURI TOTAL LIQUID FLOW RATE ON FSLL-562 DISABLES C-16 AND STOPS FEED TO RF-2.
- 206 = LOW-LOW PACKED BED SCRUBBER PH ON ASLL-590 DISABLES C-16 AND STOPS FEED TO RF-2.
- 207 = LOW-LOW PACKED BED SCRUBBER LIQUID FLOW RATE ON FSLL-552 DISABLES C-16 AND STOPS FEED TO RF-2.
- 208 = LOW-LOW WET SCRUBBER BLOWDOWN RATE ON FSLL-605 DISABLES C-16 AND STOPS FEED TO RF-2.
- 209 = LOW-LOW WESP SECONDARY VOLTAGE ON ESLL-558 DISABLES C-16 AND STOPS FEED TO RF-2.
- 210 = HIGH-HIGH STACK GAS FLOW RATE ON FSHH-700 DISABLES C-16 AND STOPS FEED TO RF-2.
- 211 = HIGH-HIGH STACK GAS CARBON MONOXIDE CONCENTRATION ON ASHH-575 DISABLES C-16 AND STOPS FEED TO RF-2.

NOTE:

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3	7/12/02	REVISED FOR RCRA PART B PERMIT APPLICATION	STA	KEM	
2	12/06/96	AS BUILT	TGB		
1	4/01/96	GENERAL REVISIONS	AJL	KEM	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No. 11135

DRAWN:	AJL	1/14/96
CHK'D:	KEM	1/14/96
ENG'R:		

SIEMENS INDUSTRY, INC.
Parker, AZ

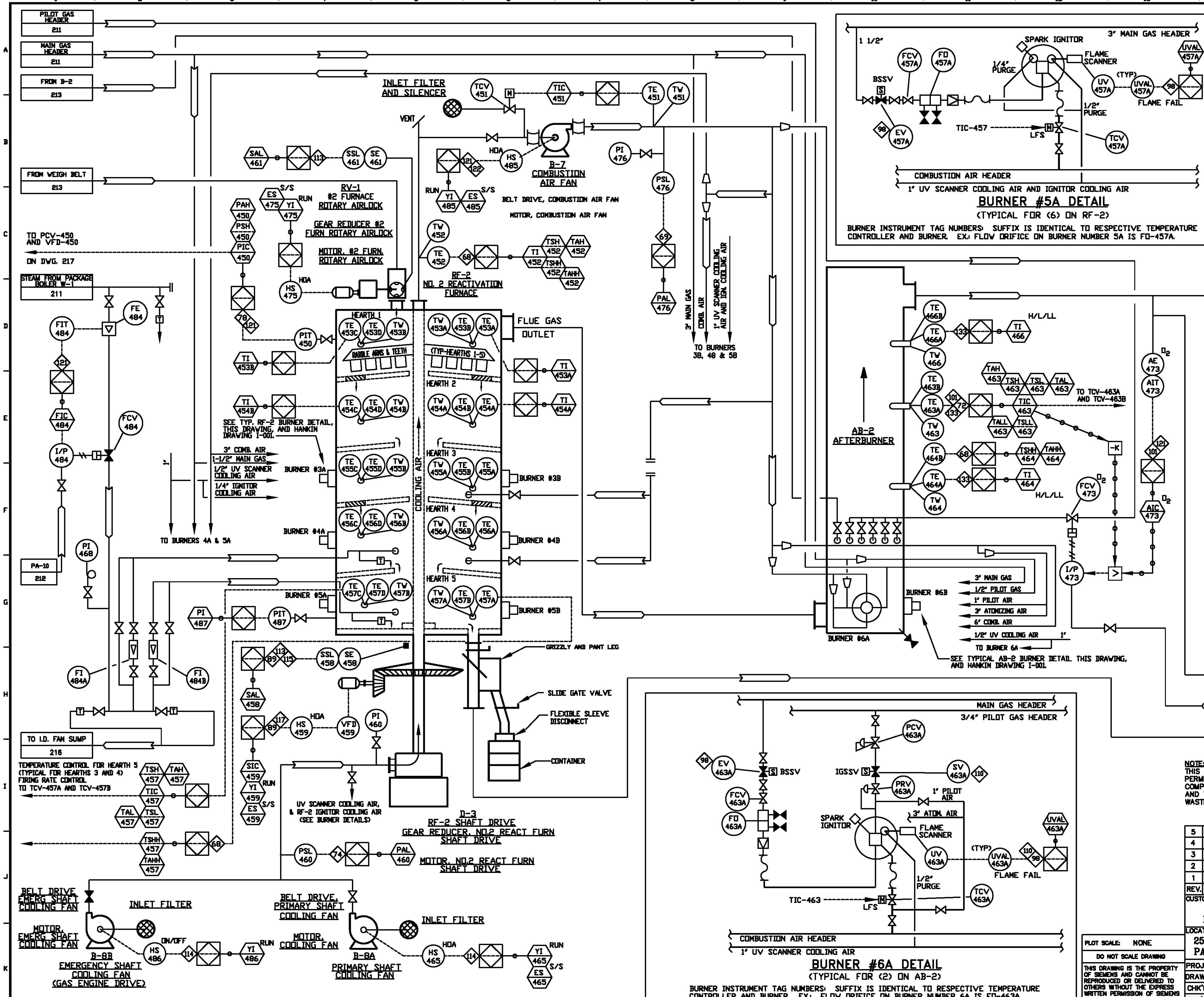
TITLE:

REACTIVATION FACILITY
FURNACE # 2 FEED SYSTEM
PIPING & INSTRUMENTATION DIAGRAM

PART No.

DWG No. D11135-213 REV. 5

PRINT DATE: 4/19/12



DWG: D11135-214

INTERLOCK NOTES

- 68 = BURNER PERMISSIVE. BURNER SYSTEM SHUT-DOWN UPON HIGH-HIGH TEMPERATURE ON TSHH-452, TSHH-455, TSHH-456, TSHH-457, TSHH-464 OR TSHH-557, INITIATES RF-2 SHUT-DOWN INTERLOCK 121.
- 69 = BURNER PERMISSIVE. BURNER SYSTEM SHUT-DOWN UPON LOW COMBUSTION AIR PRESSURE ON PSL-476, INITIATES RF-2 SHUT-DOWN INTERLOCK 121.
- 72 = SEE NOTE ON DWG. 213.
- 74 = BURNER PERMISSIVE. BURNER SYSTEM SHUT-DOWN UPON LOW CENTER SHAFT COOLING AIR PRESSURE FOR 5 MINUTES ON PSL-460 INITIATES RF-2 SHUT-DOWN INTERLOCK 121.
- 78 = BURNER PERMISSIVE. BURNER SYSTEM SHUT-DOWN UPON HIGH FURNACE PRESSURE ON PSH-450 FOR 5 MINUTES INITIATES RF-2 SHUT-DOWN INTERLOCK 121.
- 89 = BURNER PERMISSIVE. BURNER SYSTEM SHUT-DOWN UPON CENTER SHAFT STOPPED ON SSL-458 OR LOSS OF VFD-459 FOR 15 MINUTES INITIATES RF-2 SHUT-DOWN INTERLOCK 121.
- 98 = BURNER SAFETY SHUT-OFF VALVES CLOSE ON BURNER STOP, FLAME FAILURE, LOSS OF BURNER PERMISSIVES OR POWER OUTAGE.
- 101 = AFTERBURNER TEMPERATURE ABOVE CONTROL SETPOINT WITH BURNERS 6A & 6B AT LOW FIRE INITIATES REVERSE PROPORTIONAL CONTROL OF FCV-473 FROM TIC-463.
- 110 = IGNITOR SAFETY SHUT-OFF VALVES CLOSE ON BURNER STOP, FLAME FAILURE, LOSS OF BURNER PERMISSIVES OR POWER OUTAGE AND AFTER AB-2 BSSVs OPEN DURING IGNITION SEQUENCE.
- 113 = SEE NOTE ON DWG. 213.
- 114 = BURNER PERMISSIVE. BURNER SYSTEM SHUT-DOWN UPON LOSS OF BLOWER B-8A UNLESS B-8B IS STARTED WITHIN 5 MINUTES INITIATES RF-2 SHUT-DOWN INTERLOCK 121.
- 115 = SEE NOTE ON DWG. 213.
- 117 = PRODUCT COOLING SCREW C-6 MUST BE RUNNING TO ENABLE VFD-459.
- 121 = RF-2 SHUT-DOWN INTERLOCK:
  1) STOP C-5 DEWATERING SCREW.
  2) CLOSE CV-425.
  3) CLOSE FCV-467.
  4) IF RF-2 HIGH PRESSURE ON PSH-450 OR B-15 ID FAN TRIPPED:
     A) CLOSE FCV-484
     B) SHUT-DOWN B-7
     C) CLOSE FCV-473
- 122 = BURNER PERMISSIVE. BURNER SYSTEM SHUT-DOWN UPON LOSS OF BLOWERS B-7 OR B-15 INITIATES RF-2 SHUT-DOWN INTERLOCK 121.
- 123 = SEE NOTE ON DWG. 216.
- 133 = OPERATOR CAN SELECT FROM TE-464, TE-463, TE-466 FOR AFTERBURNER FIRING RATE AND AWFCO SWITCH.

NOTE:
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3	7/15/02	REVISED FOR RCRA PART B PERMIT APPLICATION	STA	KEM	
2	12/06/96	AS BUILT	TGB		
1	4/02/96	GENERAL REVISIONS	AJL	KEM	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No. 11135

DRAWN:	AJL	1/14/96
CHK'D:	KEM	1/14/96
ENG'R:		

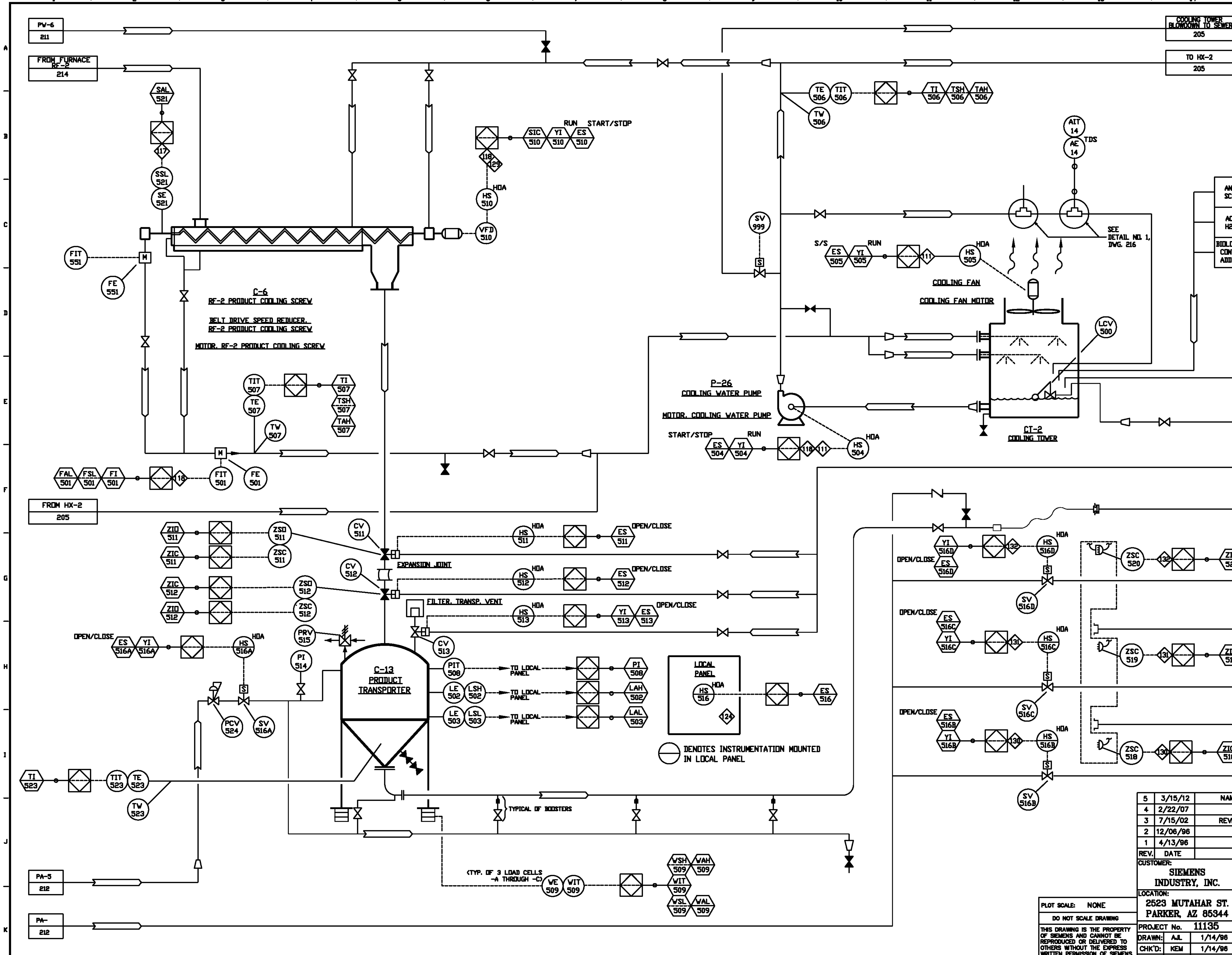
SIEMENS INDUSTRY, INC.
Parker, AZ

TITLE:
REACTIVATION
REACTIVATION FURNACE # 2
PIPING & INSTRUMENTATION DIAGRAM

PART No.

DWG No. D11135-214 REV. 5

PRINT DATE: 4/19/12



INTERLOCK NOTES

- 11 = COOLING TOWER FAN MUST RUN TO START P-26.
- 17 = SEE NOTE ON DWG. 214.
- 18 = C-6 IS DISABLED UNLESS P-26 IS RUNNING AND FI-501 SHOWS FLOW.
- 124 = SEE NOTE ON DWG. 218.
- 129 = HIGH-HIGH CARBON TEMPERATURE ON TSHH-523 DISABLES C-6.
- 130 = SV-516B IS DISABLED UNLESS ZSC-518 IS MADE.
- 131 = SV-516C IS DISABLED UNLESS ZSC-519 IS MADE.
- 132 = SV-516D IS DISABLED UNLESS ZSC-520 IS MADE.

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3	7/15/02	REVISED FOR RCRA PART B PERMIT APPLICATION	STA	KEM	
2	12/06/96	AS BUILT	TGB		
1	4/13/96	GENERAL REVISIONS	AJL	KEM	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No. 11135

DRAWN: AJL 1/14/96

CHK'D: KEM 1/14/96

ENG'R:

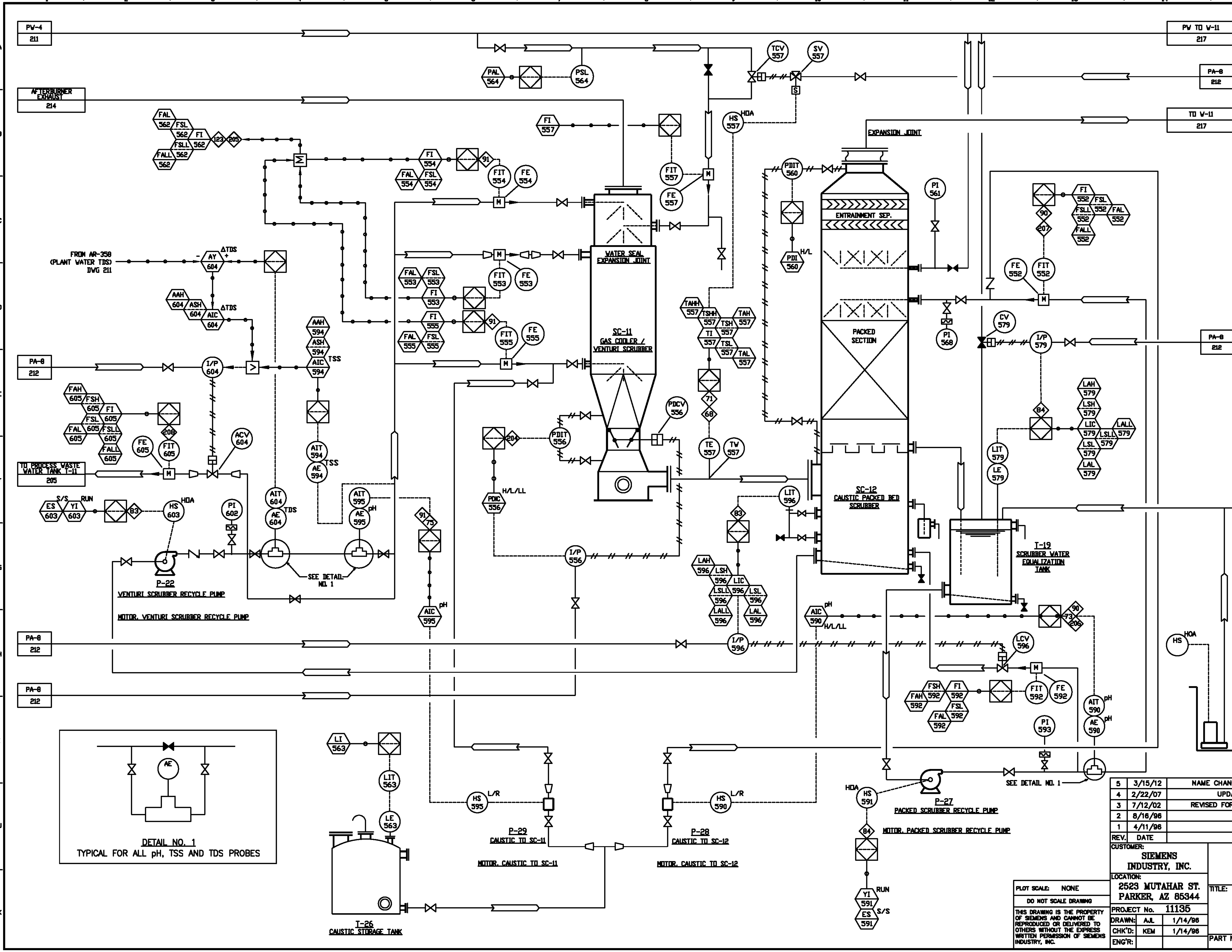
SIEMENS INDUSTRY, INC.. Parker, AZ

TITLE: REACTIVATION FURNACE # 2 PRODUCT HANDLING PIPING & INSTRUMENTATION DIAGRAM

PART No.

DWG No. D11135-215 REV. 5

PRINT DATE: 4/19/12



INTERLOCK NOTES

- (68) = SEE NOTE ON DWG. 214.
- (71) = TCV-557 OPENS UPON HIGH-HIGH SCRUBBER GAS TEMPERATURE ON TSHH-557.
- (73) = LOW pH TURNS ON CAUSTIC PUMP P-28. HIGH pH TURNS OFF P-28.
- (75) = LOW pH TURNS ON CAUSTIC PUMP P-29. HIGH pH TURNS OFF P-29.
- (83) = P-22 IS DISABLED UPON LOW-LOW LEVEL IN SC-12 ON LSLL-596.
- (84) = P-27 IS DISABLED UPON LOW-LOW LEVEL IN T-19 ON LSLL-579.
- (90) = FI-552 MUST SHOW FLOW TO ENABLE CAUSTIC PUMP P-28.
- (91) = BOTH FI-554 AND FI-555 MUST SHOW FLOW TO ENABLE CAUSTIC PUMP P-29.
- (123) = BURNER PERMISSIVE. BURNER SYSTEM SHUT-DOWN UPON LOW-LOW SCRUBBER WATER FLOW FOR 5 MINUTES ON FSLL-562 INITIATES RF-2 SHUT-DOWN INTERLOCK 121.
- (204) = SEE NOTE ON DWG. 213.
- (205) = SEE NOTE ON DWG. 213.
- (206) = SEE NOTE ON DWG. 213.
- (207) = SEE NOTE ON DWG. 213.
- (208) = SEE NOTE ON DWG. 213.

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4	2/22/07	UPDATED FOR PERMIT SUBMITTAL	JBE	KEM	
3	7/12/02	REVISED FOR RCRA PART B PERMIT APPLICATION	STA	KEM	
2	8/16/96	AS BUILT	CHJ		
1	4/11/96	GENERAL REVISIONS	AJL	KEM	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No. 11135

DRAWN:	AJL	1/14/96
CHK'D:	KEM	1/14/96
ENG'R:		

SIEMENS INDUSTRY, INC.
Parker, AZ

TITLE:

REACTIVATION FACILITY
FURNACE #2 OFF GAS SCRUBBER
PIPING & INSTRUMENTATION DIAGRAM

PART No. DWG No. D11135-216 REV. 5

PRINT DATE: 4/19/12

DWG: D11135-217

NOTE:

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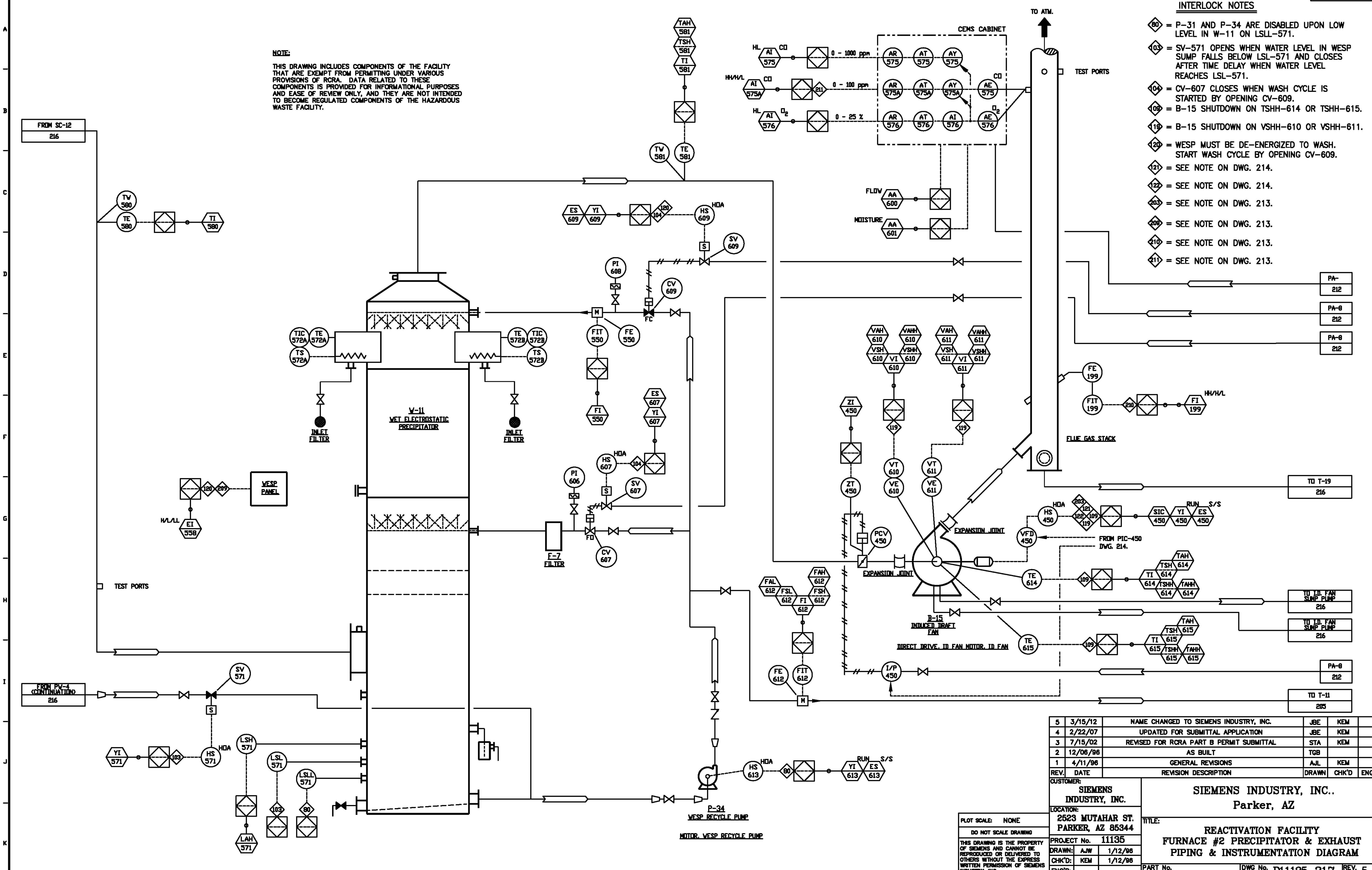
INTERLOCK NOTES

- 80 = P-31 AND P-34 ARE DISABLED UPON LOW LEVEL IN W-11 ON LSLL-571.
- 103 = SV-571 OPENS WHEN WATER LEVEL IN WESP SUMP FALLS BELOW LSL-571 AND CLOSES AFTER TIME DELAY WHEN WATER LEVEL REACHES LSL-571.
- 104 = CV-607 CLOSES WHEN WASH CYCLE IS STARTED BY OPENING CV-609.
- 109 = B-15 SHUTDOWN ON TSHH-614 OR TSHH-615.
- 119 = B-15 SHUTDOWN ON VSHH-610 OR VSHH-611.
- 120 = WESP MUST BE DE-ENERGIZED TO WASH. START WASH CYCLE BY OPENING CV-609.
- 121 = SEE NOTE ON DWG. 214.
- 122 = SEE NOTE ON DWG. 214.
- 203 = SEE NOTE ON DWG. 213.
- 208 = SEE NOTE ON DWG. 213.
- 210 = SEE NOTE ON DWG. 213.
- 211 = SEE NOTE ON DWG. 213.



REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
5	3/15/12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	
4	2/22/07	UPDATED FOR SUBMITTAL APPLICATION	JBE	KEM	
3	7/15/02	REVISED FOR RCRA PART B PERMIT SUBMITTAL	STA	KEM	
2	12/06/96	AS BUILT	TGB		
1	4/11/96	GENERAL REVISIONS	AJL	KEM	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No. 11135

DRAWN: AJW 1/12/96

CHK'D: KEM 1/12/96

ENG'R:

SIEMENS INDUSTRY, INC.. Parker, AZ

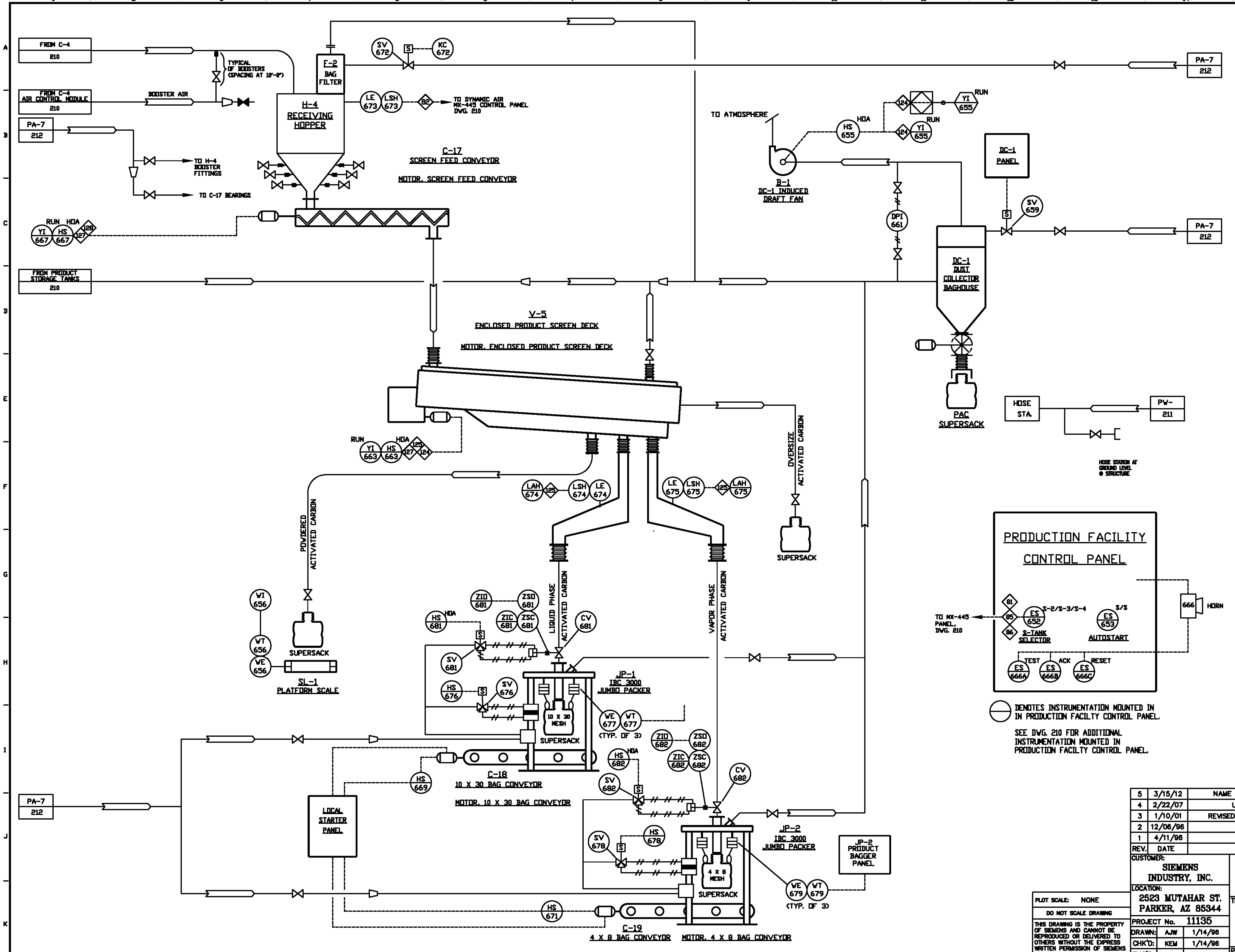
TITLE: REACTIVATION FACILITY FURNACE #2 PRECIPITATOR & EXHAUST PIPING & INSTRUMENTATION DIAGRAM

PART No.

DWG No. D11135-217 REV. 5

PRINT DATE: 4/19/12

DWG: D11135-218



INTERLOCK NOTES

81 = SEE NOTE ON DWG. 210.
82 = SEE NOTE ON DWG. 210.
85 = SEE NOTE ON DWG. 210.
86 = SEE NOTE ON DWG. 210.
124 = B-1 MUST BE RUNNING TO ENABLE SCREEN DECK V-5, JP-1, JP-2, AND CARBON TRANSPORT FROM C-4 TO H-4.
125 = HIGH CARBON LEVEL IN PRODUCT CHUTES ON LSH-674 OR LSH-675 STOPS V-5.
127 = V-5 MUST BE RUNNING TO ENABLE C-17.
128 = PRODUCTION FACILITY AUTO-START.

NOTE:

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4	2/22/07	UPDATED FOR PERMIT SUBMITTAL	JBE	KEM	
3	1/10/01	REVISED FOR RCRA PART B PERMIT SUBMITTAL	JBE	---	
2	12/06/96	AS BUILT	TGB		
1	4/11/96	GENERAL REVISIONS	AJL	KEM	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No. 11135

DRAWN: AJW 1/14/96

CHK'D: KEM 1/14/96

ENG'R:

SIEMENS INDUSTRY, INC.
Parker, AZ

TITLE: REACTIVATION FACILITY PRODUCT HANDLING SYSTEM PIPING & INSTRUMENTATION DIAGRAM

PART No.

DWG No. D11135-218 REV. 5

PRINT DATE: 4/19/12

APPENDIX VII

CONTAINER STORAGE AREA CONCRETE PAD ENGINEERING EVALUATION

FOR

SIEMENS INDUSTRY, INC.

PARKER REACTIVATION FACILITY

PARKER, ARIZONA

Revision 1
April 2012

SIEMENS WATER TECHNOLOGIES CORP.
PARKER, AZ

WAREHOUSE CONTAINMENT
INDOORS

5" HIGH WALL (CONTAINMENT WALL & FOUNDATION WALL)

AREAS:	L	W	H	VOLUME CF	VOLUME GALLONS
	73.54	42.17	0.42	1292	9,665
	51.50	9.33	0.42	200	1,498
	51.50	26.00	0.42	558	4,173
	21.54	13.00	0.42	117	873
			TOTAL:	2167	16,208

PYRAMIDAL VOLUMES:

(SEE DRAWING D100601-S-3V, Rev "B")
FLOOR SLOPES TO DRAIN:
FLOOR SLOPE = 1/8" IN 12" OVER APPR. 19.375'
FLOOR DEPTH AT TOP OF TRENCH = 2.375" = 0.2'
TRENCH VOLUME NOT INCLUDED.

CONSIDER EACH SLOPED END AS 1/2 OF A PYRAMID,
(BASE UP) 1 END PARTIALLY COVERED WITH WALL.
PYRAMID 2.375" HIGH, WITH BASES 38.75' ON A SIDE.
ESTIMATE AT 1.5 PYRAMIDAL VOLUMES, V= 1/3 AH

QUAN	1/3	L	H	CF	GALLONS
1.5	0.33	38.75	0.20	150	1,123

BETWEEN PYRAMIDAL ENDS:

40' + 32' (APPROX.) = 72' OF A TRIANGULAR SHAPED VOLUME
2.275" HIGH TRIAGULAR AREA WITH A 38.75' WIDE BASE
V= 1/2 WHL

QUAN (L)	1/2	W	H	CF	GALLONS
72	0.50	38.75	0.20	279	2,087

TOTAL CONTAINMENT VOLUME, GALLONS: **19,418**

REQUIRED VOLUME, GALLONS: **10,000**

LuMar Engineering

Memorandum

To: Mike Troup
From: J. Dunlea

16 January, 1994

Subject: Westates Carbon Inc.
Carbon Reactivation Facility, Parker, AZ.
Part B Certification.

The followings items are statements and notes required for the application. The items numbers reference your "Regulatory completeness checklist".

PART D - PROCESS INFORMATION

Warehouse Storage Area:
=====================

D-1a(1): Basic Design Parameters.

Base design and materials of construction:

The warehouse slab-on-grade is designed for secondary containment. The construction is 5" thick reinforced concrete (3000 psi) slab on 2" sand on 6 mil visqueen vapor barrier on 4" compacted gravel base. All construction and control joints in the slab are sealed with a sealant.

Eng. evaluation of structural integrity of base:

The slab is designed for warehouse storage use and light forklift traffic.

D-1a(2): Description of how design promotes drainage.....:

Grading of base:

The slab is sloped 1/8"/ft. to trench drains.

Drainage design and removal system:

The slab slope is from the perimeter to the interior trench drains (1' X 1' min.). The trench drains slope to a sump (3' X 3' X 3') for removal. Any spills within the containment area will drain to the sump. In addition a 5" high curb is provided continuously around the entire building.

GENERAL NOTES

GENERAL

1. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND JOB CONDITIONS BEFORE STARTING WORK. NOTIFY THE ENGINEER OF ANY DISCREPANCIES. VERIFY ALL REQUIRED CLEARANCES AND TAKE MEASUREMENTS FOR BUILT-IN ITEMS ON THE JOB SITE.

2. NOTES AND DETAILS ON THE DRAWINGS TAKE PRECEDENCE OVER THESE GENERAL NOTES AND THE TYPICAL DETAILS.

3. DIMENSIONS TAKE PRECEDENCE OVER SCALES SHOWN ON THE DRAWINGS.

4. ALL WORK SHALL CONFORM TO THE MINIMUM STANDARDS OF THE FOLLOWING :
   * BUILDING CODE - UBC 1988 EDITION.
   * REGULATING AGENCIES WHICH HAVE AUTHORITY OVER ANY ANY PORTION OF THE WORK.
   * CODES AND STANDARDS (LATEST EDITION) LISTED IN THESE NOTES AND SPECIFICATIONS.

5. COORDINATE WITH THE MECHANICAL. PLUMBING. AND ELECTRICAL. METAL BUILDING AND EQUIPMENT DRAWINGS.

6. THE STRUCTURAL DRAWINGS AND SPECIFICATIONS DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL PROTECT THE STRUCTURE DURING CONSTRUCTION AND PROVIDE BRACING AND SHORING FOR LOADS DUE TO CONSTRUCT ION EQUIPMENT, ETC.

EQUIPMENT AND OPENING LOCATIONS

1. VERIFY ALL DIMENSIONS LOCATING MECHANICAL EQUIPMENT. OPENINGS AND SUPPORT BEAMS FOR EQUIPMENT. COORDINATE WITH EQUIPMENT SUPPLIERS, MECHANICAL CONTRACTOR AND MECHANICAL DRAWINGS. VERIFY CLEARANCES TO EXISTING AND NEW CONSTRUCTION.

2. COORDINATE SIZE OF EACH OPENING WITH MECHANICAL CONTRACTOR AND MECHANICAL DRAWINGS. VERIFY CLEARANCES TO EXISTING AND NEW CONSTRUCTION.

3. DO NOT FABRICATE STEEL UNTIL ALL NECESSARY VERIFICATION AND COORDINATION IS COMPLETED.

4. VERIFY EQUIPMENT AND METAL BUILDING ANCHOR BOLT LOCATIONS. SIZES AND DIMENSIONS WITH CERTIFIED DRAWINGS.

1

FOUNDATIONS

1. FOR SUBSURFACE CONDITIONS AND FOUNDATION RECOMMENDATIONS REFER TO REPORT NO. 91-0086 DATED MAY 28. 1991 PREPARED BY GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS INC.

2. FOUNDATION DESIGN BASED ON :
   SOIL BEARING PRESSURE = 2000 PSF.
   MIN. DEPTH TO BOTTOM OF FOOTING = 18 INS.

3. BACKFILL FOR FOOTINGS AND UTILITY TRENCHES WITHIN BUILDING AREA SHALL BE MECHANICALLY COMPACTED IN LAYERS TO 95 PERCENT MAXIMUM DRY DENSITY PER ASTM D698 A (STANDARD PROCTOR).

4. REMOVE ALL ABANDONED FOOTINGS, UTILITIES, ETC., THAT INTERFERE WITH NEW CONSTRUCTION. NEW FOOTINGS MUST EXTEND INTO BEARING SOILS AS SPECIFIED IN THE SOILS REPORT.

5. RECOMMENDATIONS CONTAINED IN THE SOILS REPORT ARE PART OF THESE SPECIFICATIONS. ALL EXCAVATIONS FOR FOOTINGS TO BE INSPECTED AND APPROVED BY SOILS ENGINEER PRIOR TO PLACING CONCRETE.

6. COMPLY WITH OSHA REQUIREMENTS AND PROVIDE FOR DESIGN AND INSTALLATION OF ALL CRIBBING, SHEATHING, AND SHORING REQUIRED TO SAFELY RETAIN EXCAVATIONS.

REINFORCING STEEL

1. DETAIL AND PLACE ALL REINFORCING STEEL IN ACCORDANCE WITH THE 'SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS' (ACI 301) AND THE 'MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES' (ACI 315)

2. REINFORCING BARS: ASTM A-615 GRADE 60.
   WELDED WIRE FABRIC: ASTM A-185.

3. BEND BARS COLD. SPLICE REINFORCING ONLY WHERE INDICATED ON THE DRAWINGS.

4. MAKE DOWELS BETWEEN FOOTINGS AND WALLS OR COLUMNS THE SAME GRADE, SIZE AND SPACING (OR NUMBER) AS THE VERTICAL BARS IN THE WALL OR COLUMN.

5. LAP WELDED WIRE FABRIC 6 INCHES OR ONE FULL MESH. WHICHEVER IS LARGER.

6. WELDING OF REINFORCING BARS, WHERE INDICATED, SHALL BE IN ACCORDANCE AWS D1.4.

CONCRETE

1. CONCRETE CONSTRUCTION SHALL CONFORM TO THE 'BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE' (ACI 318) AND ACI 301.

2. SCHEDULE OF STRUCTURAL CONCRETE 28-DAY STRENGTHS AND TYPES:

   FOOTINGS ....3000 PSI (DESIGN Fc=2500 PSI)
   SLABS ON GRADE ....3000 PSI

   (NO SPECIAL INSPECTION IS REQUIRED FOR CONCRETE WORK)

3. PORTLAND CEMENT: ASTM C-150. TYPE 1 OR TYPE 11. USE TYPE 11 CEMENT FOR ALL SLABS ON GRADE.

4. AGGREGATE FOR HARDROCK CONCRETE: ASTM C-33. TRANSIT MIX CONCRETE: ASTM C-94.

5. PLACEMENT VIBRATION AND CURING OF CONCRETE: CONFORM TO ACI 301. ROUGHEN ALL CONCRETE SURFACES AGAINST WHICH FRESH CONCRETE IS TO BE PLACED.

6. CLEAR COVERAGE OF CONCRETE OVER OUTER REINFORCING BARS SHALL BE AS FOLLOWS:

   A. CONCRETE CAST AGAINST EARTH..........3 INCHES

   B. CONCRETE EXPOSED TO EARTH OR WEATHER
      NO. 6 THROUGH NO. 18 BAR..........2 INCHES
      NO. 5 BAR AND SMALLER.........1 1/2 INCHES

   C. CONCRETE NOT EXPOSED TO EARTH OR WEATHER
      SLABS, WALL AND JOISTS..........3/4 INCHES
      BEAMS AND COLUMNS.............1 1/2 INCHES

7. ALL REINFORCING BARS, ANCHOR BOLTS AND OTHER CONCRETE INSERTS SHALL BE WELL SECURED IN POSITION PRIOR TO PLACING CONCRETE. VERIFY ANCHOR BOLT SIZES AND LOCATIONS WITH CERTIFIED BUILDING AND EQUIPMENT DRAWINGS.

8. PROVIDE SLEEVES FOR PLUMBING AND ELECTRICAL OPENINGS BEFORE PLACING CONCRETE. DO NOT CUT ANY REINFORCING WHICH MAY CONFLICT. CORING IN CONCRETE IS NOT PERMITTED UNLESS SHOWN. NOTIFY THE ENGINEER IN ADVANCE OF CONDITIONS NOT SHOWN ON THE DRAWINGS.

9. PROJECTING CORNERS OF BEAMS, WALLS, COLUMNS, ETC., SHALL BE FORMED WITH A 3/4" CHAMFER, UNLESS OTHERWISE NOTED.

10. PROVIDE A LIGHT BROOM, NONSKID, FINISH ON ALL INTERIOR AND EXTERIOR SLABS.

11. EXPANSION JOINT FILLER: APPROVED, ASPHALT IMPREGNATED PREMOLDED FILLER, ASTM D1751.

12. JOINT SEALANT: SUBMIT MANUFACTURERS DATA FOR APPROVAL. USE 2-PART GUN GRADE POLYURETHANE SEALANT FOR EXTERIOR JOINTS, 1-PART ACRYLIC TRYPOLYMER SEALANT MAY BE USED FOR INTERIOR JOINTS. USE PRIMER AND BACKER RODS AS REQUIRED AND INSTALL PER MANUFACTURERS PRINTED INSTRUCTIONS.

STRUCTURAL STEEL

1. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED, AND ERECTED IN ACCORDANCE THE AISC 'SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS' (LATEST EDITION).

2. STRUCTURAL STEEL SHAPES AND PLATES: ASTM A-36
   PIPES: ASTM A-53 GRADE 'B'.
   STEEL TUBES: ASTM A500 GRADE B.
   BOLTS: ASTM A-325N

3. WELDING: E70XX ELECTRODES, STRUCTURAL WELDING CODE (AWS D1.1-84).

4. BOLT HOLES SHALL BE 1/16 IN. LARGER THAN NOMINAL DIA. OF BOLT USED, EXCEPT AS NOTED.

5. SET COLUMN ANCHOR BOLTS WITH TEMPLATES. GROUT OR DRYPACK BASES WITH MASTER BUILDERS EMBECO 153 OR AS APPROVED.

6. SET DESIGN AND NATURAL CAMBER IN BEAMS UP.

7. CUT ALL OPENINGS AND HOLES, REQUIRED FOR OTHER TRADES, IN THE SHOP. DO NOT FIELD CUT ANY OPENINGS OR HOLES WITHOUT PRIOR APPROVAL FROM THE ENGINEER.

8. FOR WELDS NOT DETAILED USE CONTINUOUS FILLET WELDS AND SIZE PER AISC TABLE 1.17.2A.

9. STRUCTURAL STEEL SURFACES ENCASED IN CONCRETE OR MASONRY SHALL BE LEFT UNPAINTED.

10. PAINT ALL EXPOSED STEEL WITH SHOP PRIMER AND FINISH COAT. HOT DIP GALVANIZE, AFTER FABRICATION, ALL STEEL GRATING AND EMBEDDED TRENCH ANGLES.

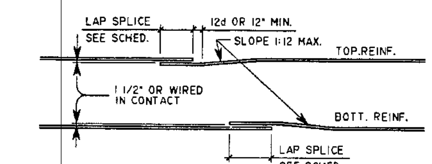
12. SUBMIT SHOP DRAWINGS FOR ENGINEERS REVIEW.

SCHEDULE "A"

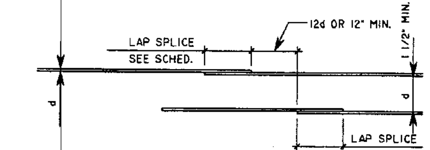
LOCATION IN STRUCT.	CONC. f'c	STEEL GRADE	3	4	5	6	7	8	9	10	11
			LAP SPLICE - INCHES								
BOTT. BARS OF BEAMS. JOISTS AND SPANDRELS SLAB BARS * VERT. WALL STEEL	3000	40	12	12	13	17	23	30	38	48	58
		60	16	16	20	25	34	45	57	72	89
	4000	40	12	12	13	16	20	26	33	42	51
		60	16	16	20	24	30	39	49	63	77
	5000	40	12	12	13	16	18	23	30	37	45
		60	16	16	20	24	27	35	44	56	69

SCHEDULE "B"

LOCATION IN STRUCT.	CONC. f'c	STEEL GRADE	3	4	5	6	7	8	9	10	11
			LAP SPLICE - INCHES								
TOP BARS * OF BEAMS JOISTS AND SPANDRELS HORIZ. WALL STEEL	3000	40	12	15	18	23	32	42	53	68	82
		60	16	22	27	35	48	63	80	101	124
	4000	40	12	15	18	22	28	37	46	59	71
		60	16	22	27	33	41	55	69	88	108
	5000	40	12	15	18	22	26	33	41	52	64
		60	16	22	27	33	38	49	62	78	96



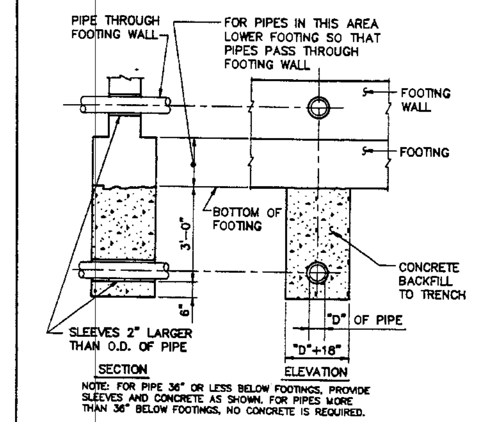
BEAM SPLICE DETAIL



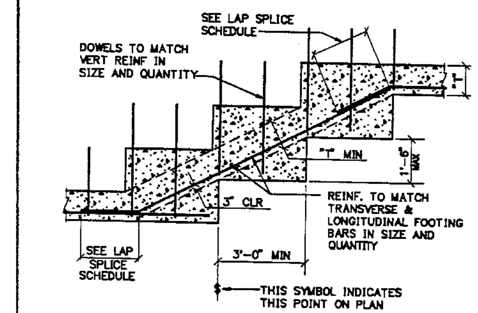
WALL OR SLAB SPLICE DETAIL

NOTES:
1. THE SCHEDULE ON THIS SHEET APPLY TO REGULAR WEIGHT CONCRETE, 145-150#/CU. FT.
2. ALL SPLICES SHALL BE STAGGERED AS SHOWN. IF MORE THAN 50% OF THE REINFORCING IS LAP SPLICED WITHIN THE REQUIRED LAP SPLICE LENGTH. THE LAP SPLICE LENGTH SHALL BE INCREASED 33%.
3. LAP SPLICES LISTED IN THE SCHEDULES ARE CLASS "B" LAPS.
4. SMALLER BAR LAP LENGTH SHALL BE USED WHEN SPLICING DIFFERENT SIZE BARS.
5. LAP LENGTHS SPECIFICALLY DETAILED ON DRAWINGS SHALL GOVERN IN LIEU OF LAP LENGTHS SCHEDULED.
6. CONTRACTOR MAY AT HIS OPTION USE A BUTT WELDED SPLICE IN LIEU OF THE LAP SPLICE SHOWN.
7. TOP BARS ARE HORIZONTAL BARS SO PLACED THAT 12" OR MORE OF CONCRETE IS CAST IN MEMBER BELOW THE BAR. USE SCHEDULE "B" FOR LAP LENGTHS FOR TOP SLAB BARS WHERE MORE THAN 12" OF CONCRETE CAST BELOW THEM.
8. ALL DETAILING AND PLACING OF REINFORCING SHALL COMPLY WITH THE SPLICE LAP SCHEDULE AND DETAILS UNLESS SPECIFICALLY DETAILED ON THE DRAWINGS.
9. BUNDLED BAR SPLICES:
   A. INDIVIDUAL BAR SPLICES WITHIN THE BUNDLE SHALL NOT OVERLAP EACH OTHER.
   B. INCREASE LAP LENGTH 20% FOR A 3 BAR BUNDLE.
   C. INCREASE LAP LENGTH 33% FOR A 4 BAR BUNDLE.
10. LAP SPLICED BARS SHALL NOT BE SPACED TRANSVERSELY FURTHER APART THAN 20% OF THE REQUIRED LAP LENGTH NOT MORE THAN 6".

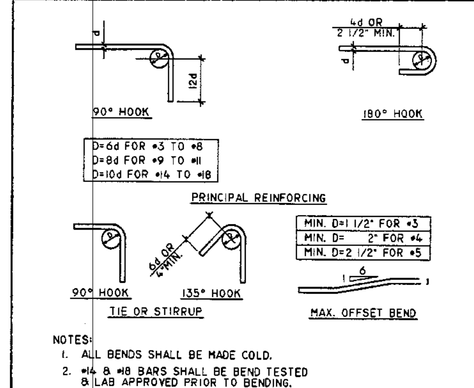
REGULAR WEIGHT CONCRETE REINF. LAP SPLICE SCHEDULE (5)



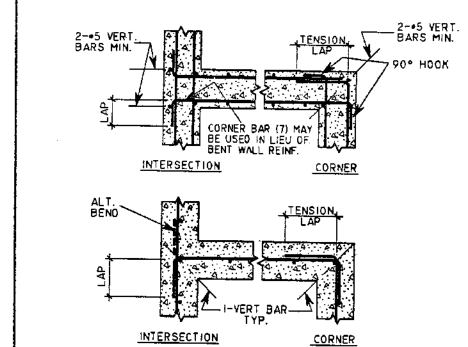
PIPE PENETRATION THRU FOOTING (1)



STEPPED FOOTING (2)



BAR BENDS (3)



REINFORCING AT WALL INTERSECTION (4)

A	06/24/91	ISSUED FOR PLAN CHECK	GBF	JMP	JMP
REV.	DATE	REVISION DESCRIPTION	DFT.	CHK.	ENG'R

SCALE: NONE

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:
FRACTIONS ± DECIMALS .X= .XX= .XXX= ANGLES ±

DO NOT SCALE DRAWING

CUSTOMER: WESTATES CARBON ARIZONA, INC.
LOCATION: 2523 MUTAHAR ST. PARKER, ARIZONA 85334

DRWN	GBF	06-24-91
CHK'D	JMP	06-24-91
ENG'R	JMP	06-24-91

WESTATES CARBON
LOS ANGELES, CA 90040

TITLE: GENERAL NOTES & STANDARD DETAILS
CODE | DWG No: D-100601 | REV. A
PROJECT No: 1118 | SHEET S-2

NOTES:
1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

PLOT SCALE: 1"=40'

DO NOT SCALE DRAWING

A1	3/16/12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	
REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R

CUSTOMER: SIEMENS INDUSTRY, INC.
LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344
PROJECT No.

DRAWN:	JBE	2/8/07
CHK'D:	KEM	2/8/07
ENG'R:		

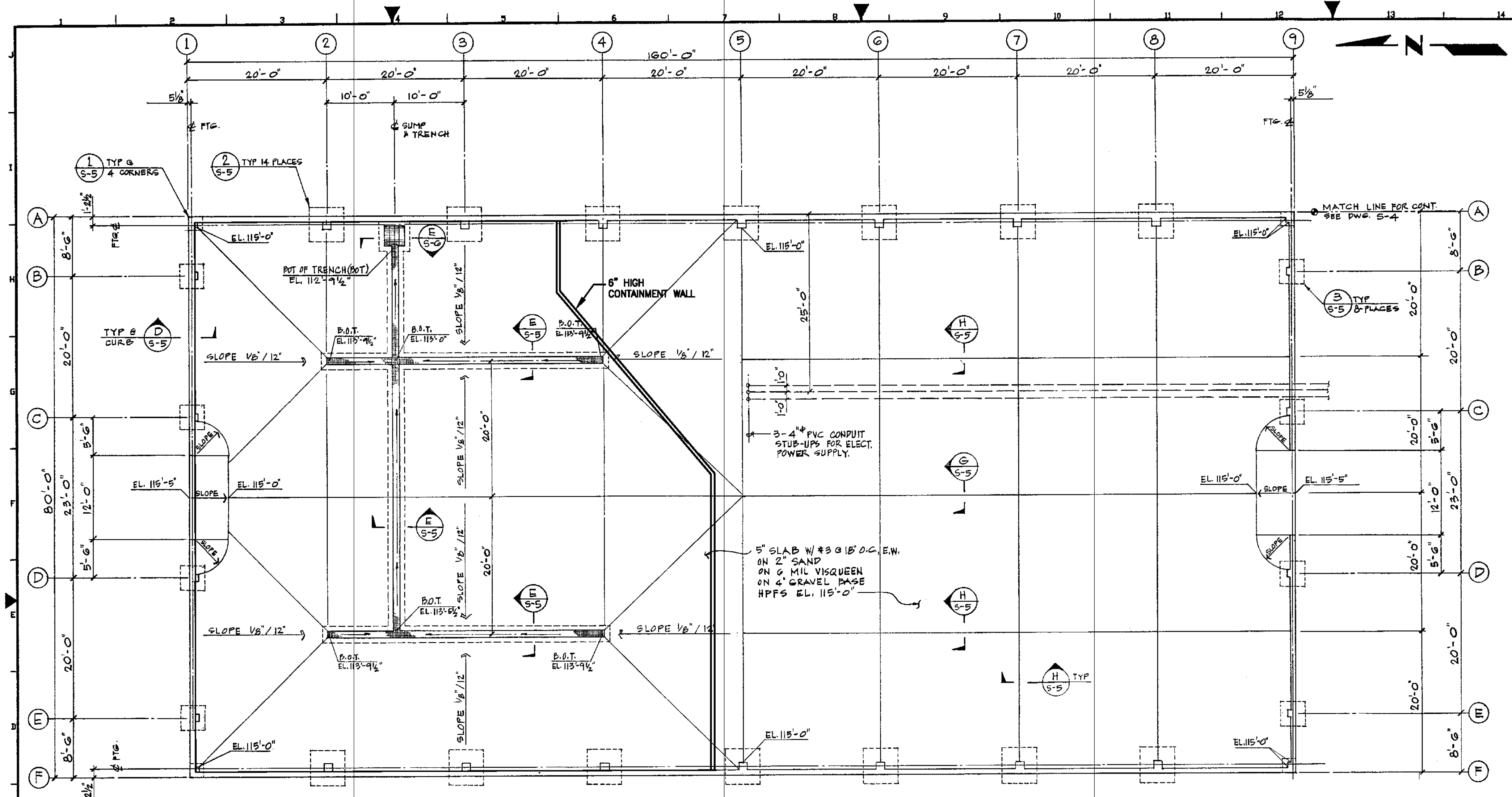
SIEMENS INDUSTRY, INC.
Parker, AZ

TITLE: WAREHOUSE BUILDING GENERAL NOTES & STANDARD DETAILS

PART No. | DWG No. D100601-S-2 | REV. A1

PRINT DATE: 4/19/12

DWG: D100601-S-3



BUILDING FOUNDATION AND SLAB PLAN

NOTE: FOR ANCHOR BOLT SETTING PLAN SEE VARCO PRUDEN DWG. № 1 TITLED "ANCHOR BOLT LAYOUT".

REV.	DATE	REVISION DESCRIPTION	DFT.	CHK.	ENG'R
A	06/24/91	ISSUED FOR PLAN CHECK	GBF	JMD	JMD

SCALE: 1/8" = 1'-0"

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:

FRACTIONS ± DECIMALS .X= .XX= .XXX= ANGLES ±

DO NOT SCALE DRAWING

CUSTOMER: WESTATES CARBON ARIZONA, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, ARIZONA 85334

DRWN	G.B.F.	6-24-91
CHK'D	JMD	6-24-91
ENG'R	JMD	6-24-91

WESTATES CARBON
LOS ANGELES, CA 90040

TITLE: BUILDING FOUNDATION AND SLAB PLAN

CODE | DWG No: D-100601 | REV. A → B

PROJECT No: 11118 | SHEET S-3

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
B1	3-16-12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	
B	2-21-07	ADD CONTAINMENT WALL TO WESTATES DRAWING	JBE	KEM	

NOTES:

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PLOT SCALE: 1"=40'

DO NOT SCALE DRAWING

THIS DRAWING IS THE PROPERTY OF SIEMENS AND CANNOT BE REPRODUCED OR DELIVERED TO OTHERS WITHOUT THE EXPRESS WRITTEN PERMISSION OF SIEMENS INDUSTRY, INC.

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No.

DRAWN:	JBE	2/01/07
CHK'D:	KEM	2/01/07
ENG'R:		

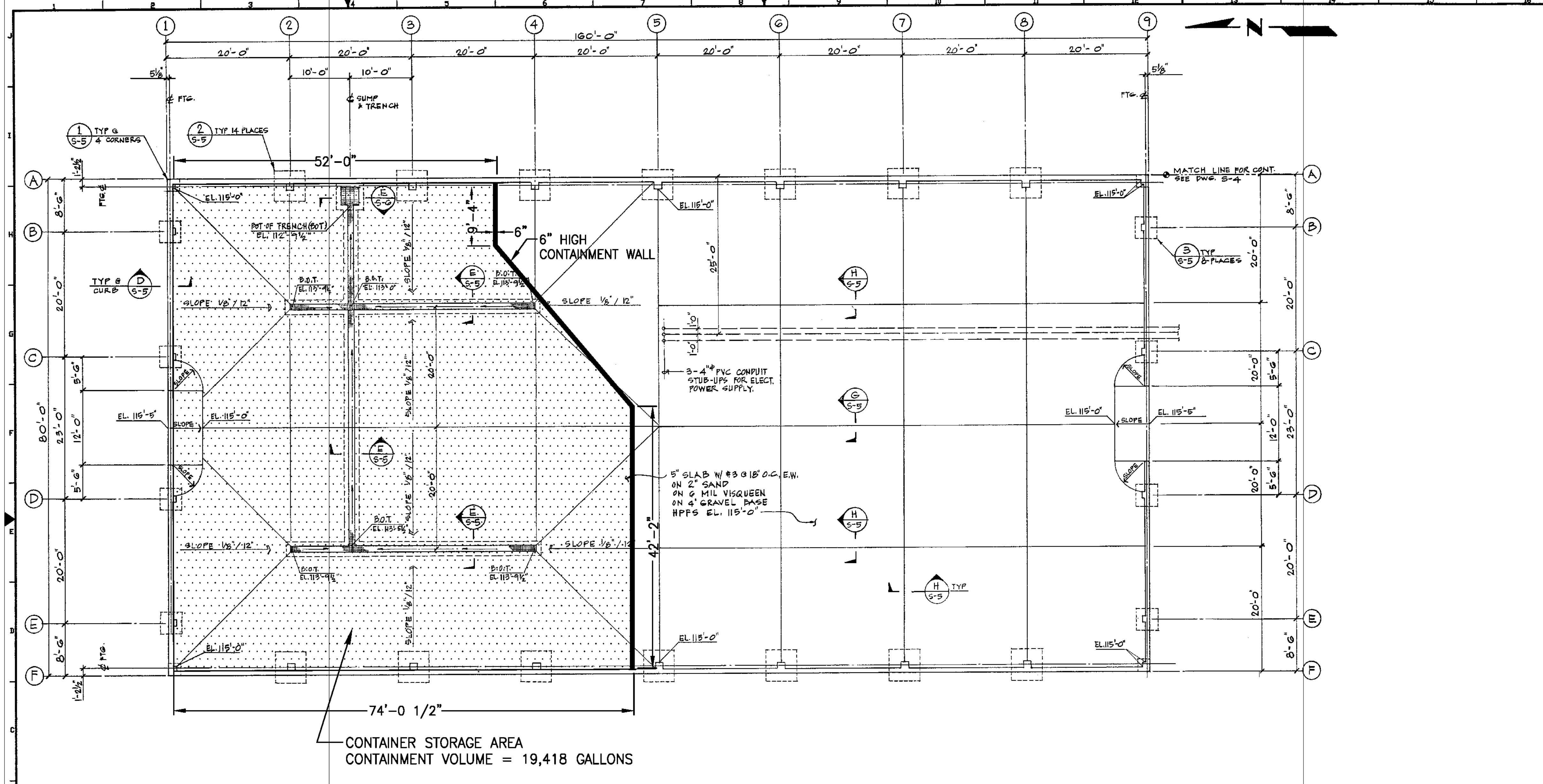
SIEMENS INDUSTRY, INC.
Parker, AZ

TITLE: WAREHOUSE BUILDING
BUILDING FOUNDATION AND SLAB PLAN

PART No. | DWG No. D100601-S-3 | REV. B1

PRINT DATE: 4/19/12

DWG: D100601-S-3



BUILDING FOUNDATION AND SLAB PLAN

NOTE: FOR ANCHOR BOLT SETTING PLAN SEE VARCO PRUDEN DWG. No 1 TITLED "ANCHOR BOLT LAYOUT".

REV.	DATE	REVISION DESCRIPTION	DFT.	CHK.	ENG'R
A	06/24/91	ISSUED FOR PLAN CHECK	GBF	JMD	JMD

SCALE: 1/8" = 1'-0"

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS ± DECIMALS .X= .XX= .XXX= ± ANGLES ±

DO NOT SCALE DRAWING

CUSTOMER: WESTATES CARBON ARIZONA, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, ARIZONA 85334

DRWN	G.B.F.	06-24-91
CHK'D	JMD	06-24-91
ENG'R	JMD	06-24-91

WESTATES CARBON
LOS ANGELES, CA 90040

TITLE: BUILDING FOUNDATION AND SLAB PLAN

CODE | DWG No: D-100601 | REV. A → B

PROJECT No: 11118 | SHEET S-3

NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
B1	3-16-12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	
B	2-21-07	ADD CONTAINMENT WALL TO WESTATES DRAWING	JBE	KEM	

PLOT SCALE: 1"=40'

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No.

DRAWN:	JBE	2/01/07
CHK'D:	KEM	2/01/07
ENG'R:		

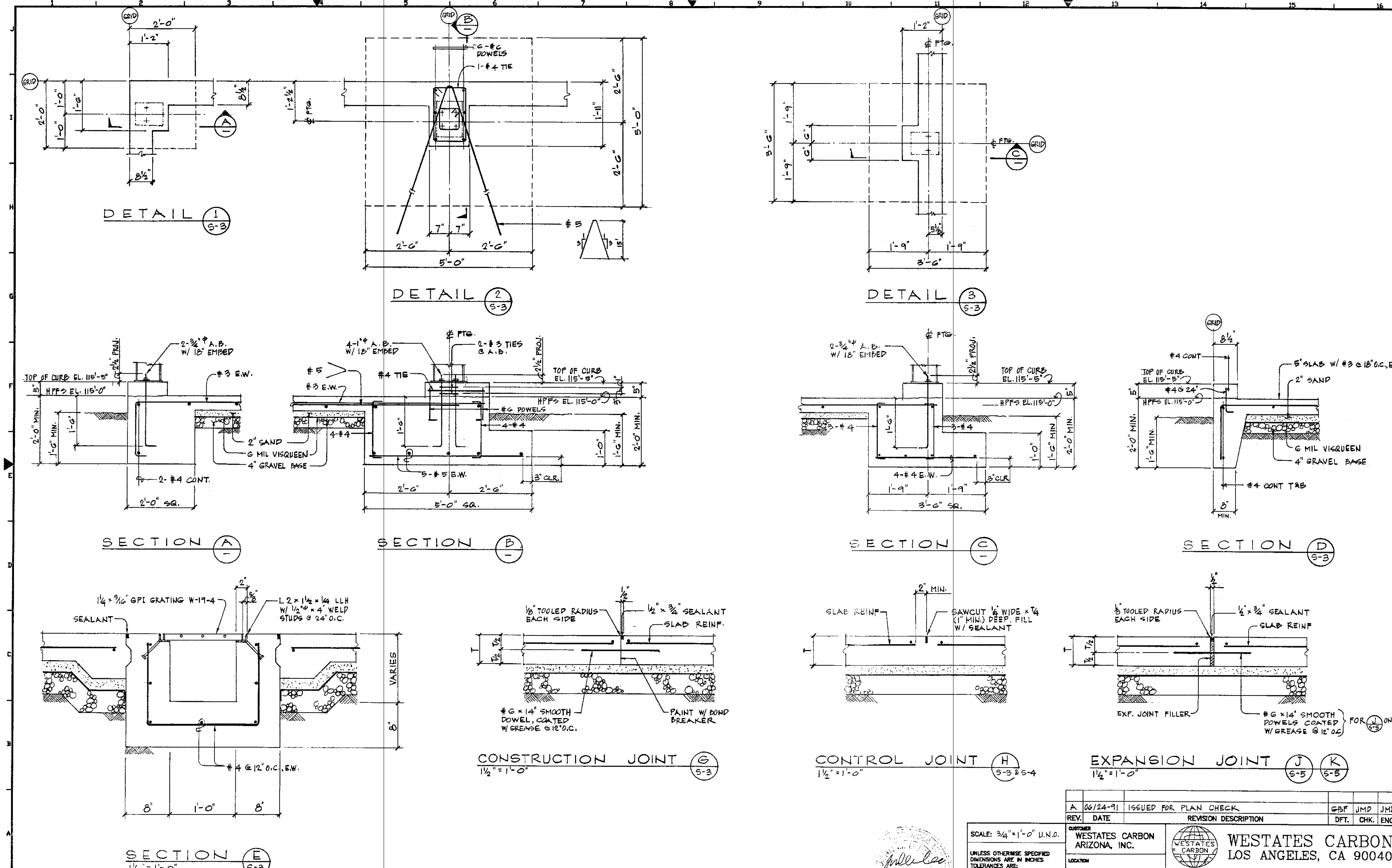
SIEMENS INDUSTRY, INC.
Parker, AZ

TITLE: WAREHOUSE BUILDING
CONTAINER STORAGE AREA LAYOUT & VOLUME

PART No. | DWG No. D100601-S-3V | REV. B1

PRINT DATE: 4/19/12

DWG: D100601-S-5



A	06/24-91	ISSUED FOR PLAN CHECK	GBF	JMD	JMD
REV.	DATE	REVISION DESCRIPTION	DFT.	CHK.	ENG'R

SCALE: 3/4" = 1'-0" U.N.O.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:

FRACTIONS ± DECIMALS .X= .XX= .XXX= ANGLES ±

DO NOT SCALE DRAWING

CUSTOMER: WESTATES CARBON ARIZONA, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, ARIZONA 85334

WESTATES CARBON LOS ANGELES, CA 90040

TITLE: SECTIONS AND DETAILS

DRWN	GBF	06-24-91
CHK'D	JMD	06-24-91
ENG'R	JMD	06-24-91

CODE | DWG No: D-100601 | REV. A

PROJECT No: 11118 | SHEET S-5

A1	3-16-12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	
REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R

NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

PLOT SCALE: 1"=40'

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No.

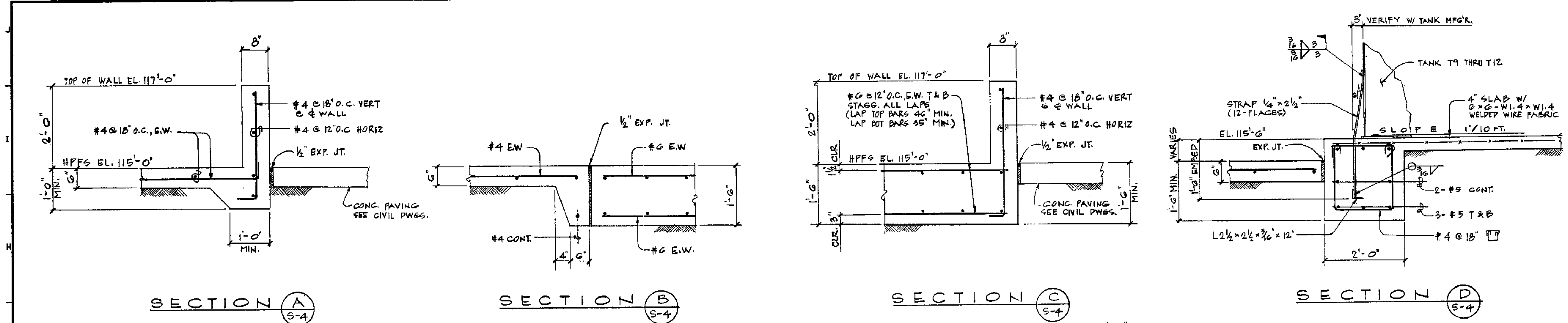
DRAWN:	JBE	2/8/07
CHK'D:	KEM	2/8/07
ENG'R:		

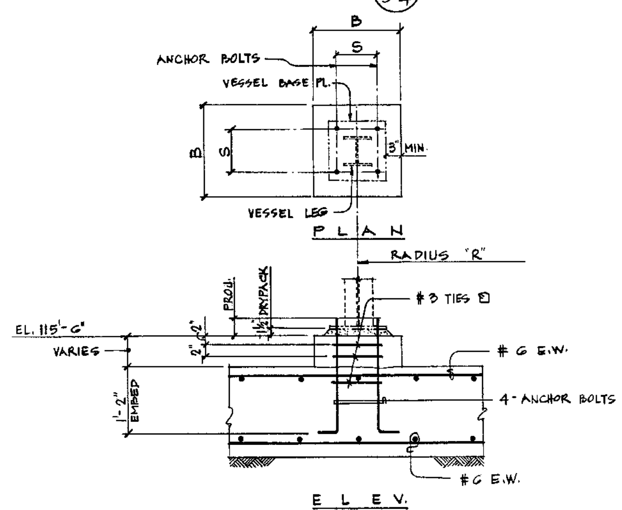
SIEMENS INDUSTRY, INC.
Parker, AZ

TITLE: WAREHOUSE BUILDING SECTIONS AND DETAILS

PART No. | DWG No. D100601-S-5 | REV. A1

PRINT DATE: 4/19/12

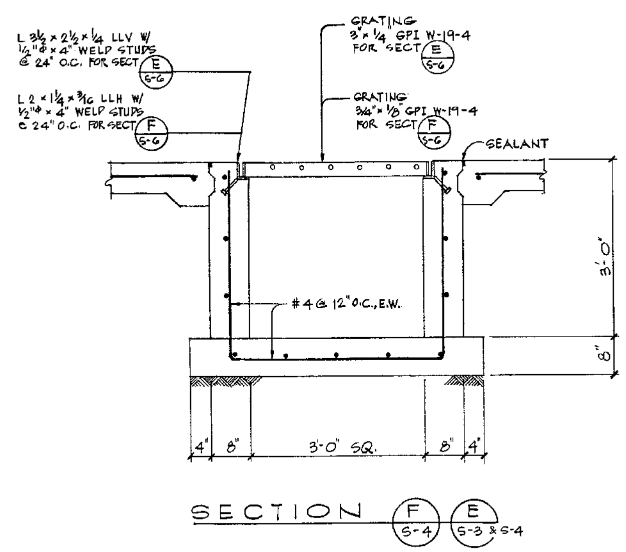


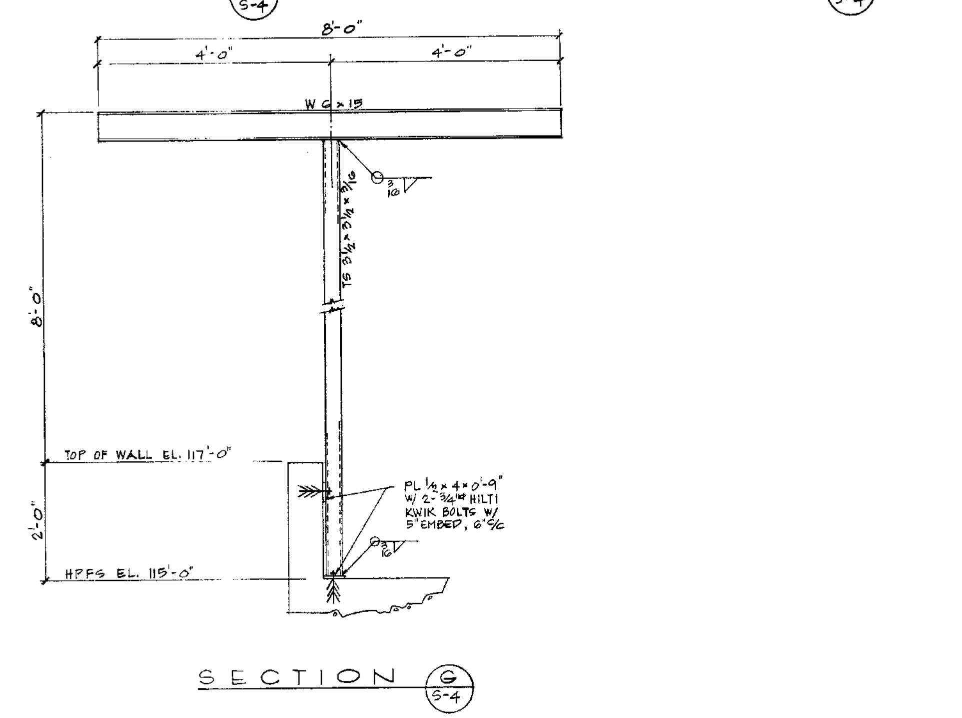


TANK MARK	A. BOLT SIZE	A. BOLT PROJ.	R	B	S
T1	1"φ	6"	6'-8½"		12"
T2	1"φ	6"	6'-8½"		12"
T3	1"φ	6"	5'-1½"		12"
T4	1"φ	6"	5-1½"		12"
T5	¾"φ	5"	4'-4"		9"
T6	¾"φ	5"	4'-4"		9"
T7	¾"φ	5"	4'-4"		9"

NOTE: VERIFY ALL ANCHOR BOLT DETAILS AND DIMENSIONS WITH CERTIFIED VESSEL DWGS.

DETAIL 1 S-4





A	06/24/91	ISSUED FOR PLAN CHECK	GBF	JMD	JMD
REV.	DATE	REVISION DESCRIPTION	DFT.	CHK.	ENG'R

SCALE: 3/4" = 1'-0"

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE:
FRACTIONS ± DECIMALS .X= .XX= .XXX= ANGLES ±

DO NOT SCALE DRAWING

CUSTOMER: WESTATES CARBON ARIZONA, INC.
LOCATION: 2523 MUTAHAR ST. PARKER, ARIZONA 85334

DRWN	GBF	06-24-91
CHK'D	JMD	06-24-91
ENG'R	JMD	06-24-91

WESTATES CARBON
LOS ANGELES, CA 90040

TITLE: SECTIONS AND DETAILS

CODE | DWG No: D-100601 | REV. A
PROJECT No: 11118 | SHEET S-6

NOTES:
1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

PLOT SCALE: 1"=40'

DO NOT SCALE DRAWING

A1	3-18-12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	
REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R

CUSTOMER: SIEMENS INDUSTRY, INC.
LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344
PROJECT No.

DRAWN:	JBE	2/8/07
CHK'D:	KEM	2/8/07
ENG'R:		

SIEMENS INDUSTRY, INC.
Parker, AZ

TITLE: WAREHOUSE BUILDING SECTIONS AND DETAILS

PART No. | DWG No. D100601-S-6 | REV. A1

PRINT DATE: 4/19/12

APPENDIX VIII

SPENT CARBON CONTAINER SPECIFICATIONS

FOR

SIEMENS INDUSTRY, INC.

PARKER REACTIVATION FACILITY

PARKER, ARIZONA

Revision 2
April 2012

TABLE OF CONTENTS

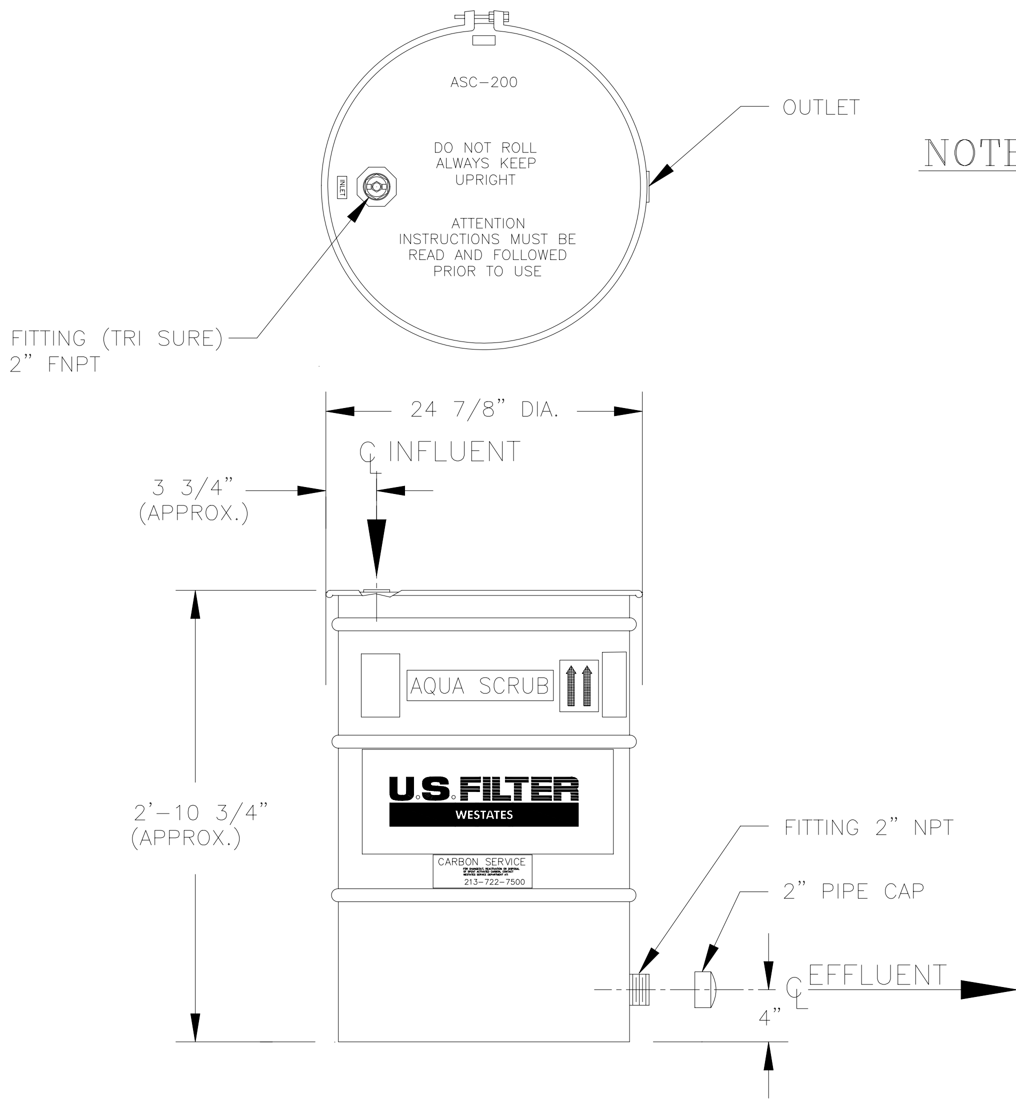
Table of Container Volumes

Table of Container Volumes

Container Type	**Volume (ft^3)**	**Volume (US Gallons)**
VSC/ASC 200/Drums	7.9	59
VSC/ASC 400	17.5	131
VSC/ASC 1000	44.9	336
VSC/ASC 2000	82.0	614
VSC 3000	164	1228
PV1000	44.9	336
PV2000	82.0	614
“Supersack”	Up to 67	Up to 500

This table represents information for the major types of containers managed at the facility. Other containers of various volume and configuration are also received, however, these miscellaneous containers fall within the range of volumes shown.

STD: 2-0600-8X11A | INTL REF:



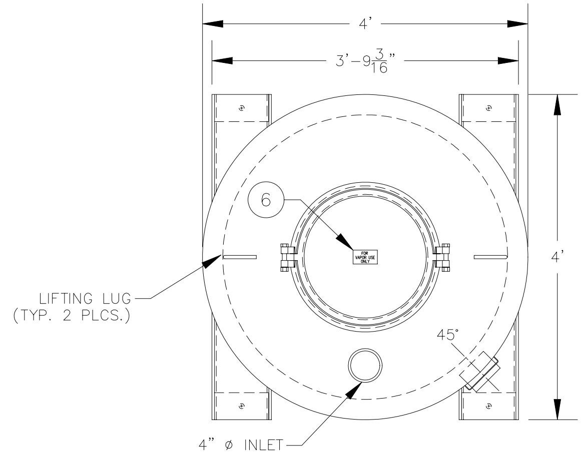
NOTES:

1. CARBON:
   AS REQUIRED.
2. MATERIALS OF CONSTRUCTION:
   VESSEL: ....CARBON STEEL
   EXTERNAL COATING: ....HIGH GLOSS PAINT, WESTATES BLUE
   INTERNAL COATING: ....CURED EPOXY
   INTERNAL DISTRIBUTION: ....PVC
3. SPECIFICATIONS:
   FLOW * – GPM (MAX): 10
   PRESSURE – PSIG (MAX): 15
   TEMPERATURE – DEG F (MAX): 140
   CARBON FILL VOLUME – CU FT: 6.9
   CROSS SECTION – SQ FT: 2.8
   SHIPPING WEIGHT – LBS: (APPROX,) 250
   OPERATING WEIGHT – LBS: (APPROX,) 500

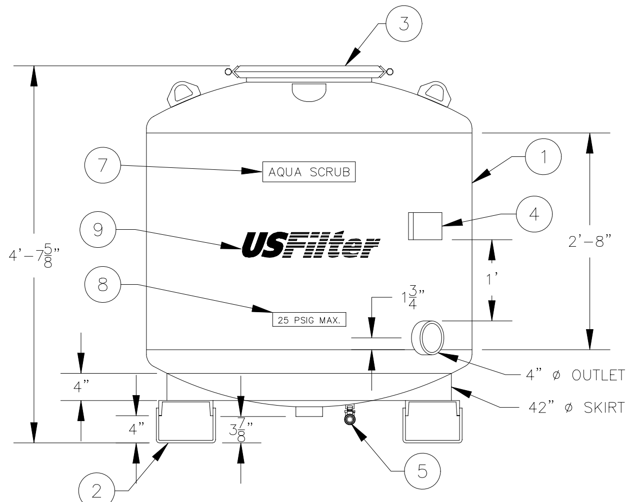
* NOTE: ACTUAL DESIGN SHOULD BE BASED ON SUPERFICIAL BED VELOCITY (SBV) AS REQUIRED FOR SPECIFIC CONTAMINANTS.

DESIGNER AJA	DATE 2-13-01	TITLE ASC 200 GENERAL ASSEMBLY
CHECKER	DATE	CLIENT
ENGINEER	DATE	
MANAGER	DATE	USFilter — USFILTER/WESTATES RED BLUFF, CA 1-800-795-2664
FILE:		
SCALE: NONE		PROJECT / DRAWING ASC200GENASSY / SHEET OF / REV

STD: 2-0600-8X11A | INTL REF:



PLAN VIEW



ELEVATION VIEW

LIST OF COMPONENTS

ITEM	QTY	DESCRIPTION
1	1	TANK ASSEMBLY
2	1	SKID ASSEMBLY
3	1	MANWAY ASSEMBLY, 18" DIA.
4	1	PLATE, I.D. & SERIAL NUMBER
5	1	BRONZE BALL VALVE, 3/4"
6	1	DECAL, "FOR WATER USE ONLY", 2 1/2" x 4 1/4"
7	2	DECAL, "AQUA-SCRUB", WHITE MYLAR
8	2	DECAL, "25 PSIG MAX", WHITE MYLAR
9	2	DECAL, "USFILTER/WESTATES" WHITE MYLAR W/BLUE LETTERS

NOTES:

1. DESIGN DATA:
   48" DIAMETER PRESSURE VESSEL-25 PSIG(MAX)
   @ 120°F-NOT ASME CODE STAMPED FOR AQUA USE ONLY
   600 CFM
   1000 LBS. ACTIVATED CARBON

2. MATERIAL:
   HEADS - SA 36-HR
   SHELL - SA 36-HR
   SKID - SA 36-HR

3. SURFACE PREPARATION:
   INTERIOR:
   SANDBLAST: SSPC-SP-5 WHITE METAL
   ABRASIVE: GARNET OR GRIT - PROFILE: 1.5-2 MILS
   COATING: 3M BRAND SCOTCHKOTE 134
   THICKNESS: 10-15 DFMT - COLOR: GREEN
   EXTERIOR:
   SANDBLAST: SSPC-SP-10 NEAR WHITE METAL
   ABRASIVE: GARNET OR GRIT - PROFILE: 1.5-2 MILS
   PRIMER COAT: RUST PREVENTATIVE EPOXY PRIMER (CARBOLINE 893)
   THICKNESS: 4-6 DFMT - COLOR: RED
   FINISH COAT: HIGH BUILD POLYURETHANE (CARBOLINE 134HG)
   THICKNESS: 3-4 DFMT - COLOR: WHITE (FED. I.D.#17925)

4. LIFTING REQUIREMENTS:
   5200 LBS. MINIMUM RATING.
   EST. WEIGHTS:
   890 LBS. - EMPTY VESSEL
   1890 LBS. - WITH CARBON
   4280 LBS. - OPERATING

DESIGNER	DATE
AJA	10-8-01
CHECKER	DATE
ENGINEER	DATE
MANAGER	DATE
FILE:	
SCALE: NONE	

TITLE ASC1000
GENERAL ASSEMBLY

CLIENT

USFILTER/WESTATES
RED BLUFF, CA
1-800-795-2664

PROJECT	DRAWING	SHEET	REV
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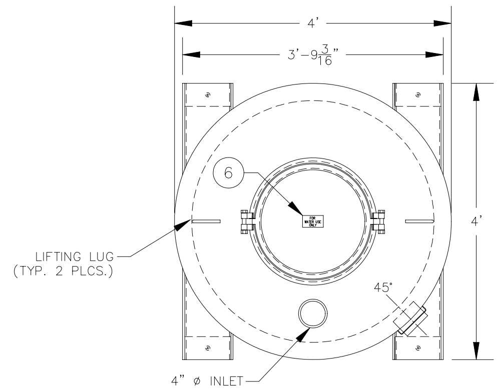
STD: 2-0600-8X11A	INTL REF:



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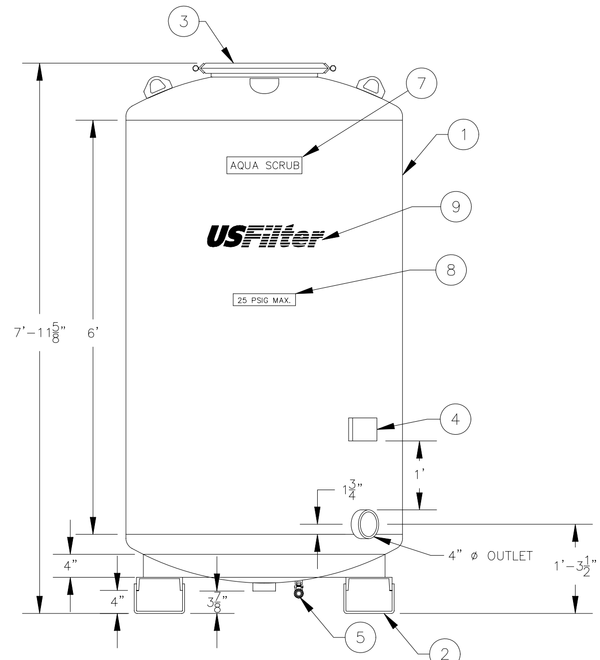


ELEVATION VIEW

LIST OF COMPONENTS

ITEM	QTY	DESCRIPTION
1	1	TANK ASSEMBLY
2	1	SKID ASSEMBLY
3	1	MANWAY ASSEMBLY, 18" DIA.
4	1	PLATE, I.D. & SERIAL NUMBER
5	1	BRONZE BALL VALVE, 3/4"
6	1	DECAL, "FOR WATER USE ONLY", 2 1/2" x 4 1/4"
7	2	DECAL, "AQUA-SCRUB", WHITE MYLAR
8	2	DECAL, "25 PSIG MAX", WHITE MYLAR
9	2	DECAL, "USFILTER/WESTATES" WHITE MYLAR W/BLUE LETTERS

NOTES:

1. DESIGN DATA:
   48" DIAMETER PRESSURE VESSEL-25 PSIG (MAX)
   @ 120°F-NOT ASME CODE STAMPED FOR WATER USE ONLY
   50 GPM
   2000 LBS. ACTIVATED CARBON

2. MATERIAL:
   HEADS – SA 36-HR
   SHELL – SA 36-HR
   SKID – SA 36-HR

3. SURFACE PREPARATION:
   INTERIOR:
   SANDBLAST: SSPC-SP-5 WHITE METAL
   ABRASIVE: GARNET OR GRIT – PROFILE: 1.5-2 MILS
   COATING: 3M BRAND SCOTCHKOTE 134
   THICKNESS: 10-15 DFMT – COLOR: GREEN
   EXTERIOR:
   SANDBLAST: SSPC-SP-10 NEAR WHITE METAL
   ABRASIVE: GARNET OR GRIT – PROFILE: 1.5-2 MILS
   PRIMER COAT: RUST PREVENTATIVE EPOXY PRIMER
   (CARBOLINE 893)
   THICKNESS: 4-6 DFMT – COLOR: RED
   FINISH COAT: HIGH BUILD POLYURETHANE (CARBOLINE 134HG)
   THICKNESS: 3-4 DFMT – COLOR: WHITE (FED. I.D.#17925)

4. LIFTING REQUIREMENTS:
   5200 LBS. MINIMUM RATING.
   EST. WEIGHTS:
   1190 LBS. – EMPTY VESSEL
   3190 LBS. – WITH CARBON
   7317 LBS. – OPERATING

DESIGNER	DATE
AJA	10-8-01
CHECKER	DATE
ENGINEER	DATE
MANAGER	DATE
FILE:	
SCALE: NONE	

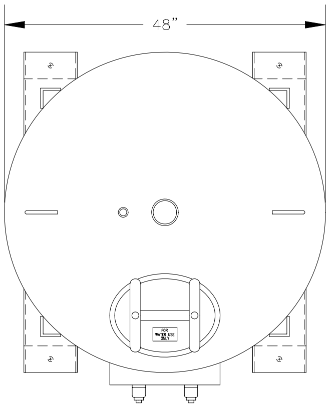
TITLE ASC2000
GENERAL ASSEMBLY

CLIENT

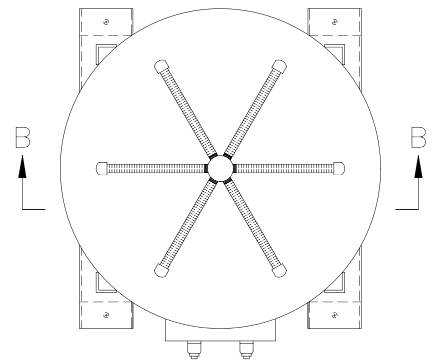
USFILTER/WESTATES
RED BLUFF, CA
1-800-795-2664

PROJECT	DRAWING	SHEET	REV
	ASC2000SHEET1.DWG	1 OF 5	

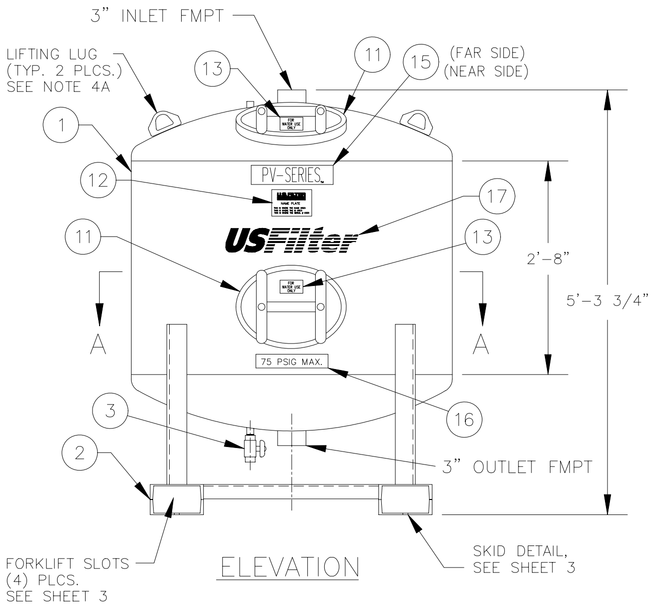
STD: 2-0600-8X11A | INTR_REF_NO



PLAN VIEW



SECTION "A–A"



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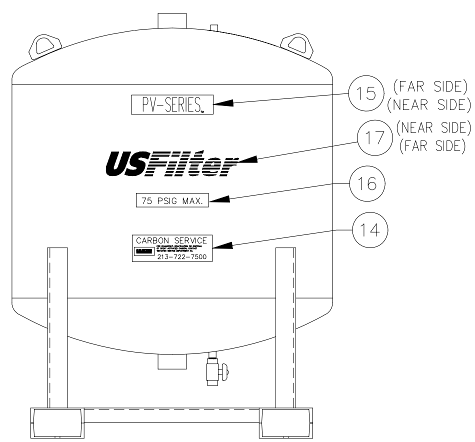
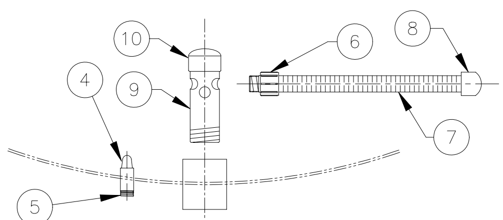


REAR ELEVATION



ENLARGED SECTION VIEW B–B

UNDERDRAIN ASSEMBLY–(SEPARATED)

LIST OF COMPONENTS

ITEM	QTY	DESCRIPTION
1		TANK ASSEMBLY DWG. # PV1000SHEET2
2		SKID ASSEMBLY DWG. # PV1000SHEET3
3	1	BRONZE BALL VALVE, 3/4"
4	1	POLY SCREEN ORTHOS PART# N5 R–3/4", MPT
5	1	CLOSE NIPPLE, SCHD 40 304 SS, 3/4"
6	6	MALE ADAPTER, SCH 80 PVC, 1"
7	6	PIPE, SLOTTED SCH 80 PVC, 1" x 15" LG
8	6	CAP, SCH 80 PVC, SLIP, 1"
9	1	UNDERDRAIN HUB, 3" DIA x 10 1/2" LG, SCH 80 PVC
10	1	CAP, SCH 80 PVC, SLIP, 3"
11	2	MANWAY ASSEMBLY, 11" x 15"
12	1	PLATE, I.D. & SERIAL NUMBER
13	2	DECAL, "FOR WATER USE ONLY", 2 1/2" x 4 1/4"
14	1	DECAL, "CARBON SERVICE" WHITE MYLAR W/BLUE LETTERS, 4" x 12"
15	2	DECAL, "PV–SERIES", WHITE MYLAR
16	2	DECAL, "75 PSIG MAX", WHITE MYLAR
17	2	DECAL, "USFILTER/WESTATES" WHITE MYLAR W/BLUE LETTERS

NOTES:

1. DESIGN DATA:
   48" DIAMETER PRESSURE VESSEL–75 PSIG(MAX)
   @ 150°F–NOT ASME CODE STAMPED
   FOR WATER USE ONLY
   MAXIMUM FLOW RATE: 50 GPM
   MAXIMUM CARBON CAPACITY: 1000 LBS. ACTIVATED CARBON

2. MATERIAL:
   HEADS: STD. F & D NON CODE 3/16" THICKNESS C.S.
   SHELL: 3/16" THK. 48" OD x 32" LONG C.S.
   SKID: SA 36–HR

3. SURFACE PREPARATION:
   INTERIOR:
   SANDBLAST: SSPC–SP–5 WHITE METAL
   ABRASIVE: GARNET OR GRIT – PROFILE: 1.5–2 MILS
   COATING: 3M BRAND SCOTCHKOTE 134
   THICKNESS: 10–15 DFMT – COLOR: GREEN
   EXTERIOR:
   SANDBLAST: SSPC–SP–10 NEAR WHITE METAL
   ABRASIVE: GARNET OR GRIT – PROFILE: 1.5–2 MILS
   PRIMER COAT: RUST PREVENTATIVE EPOXY PRIMER (CARBOLINE 893)
   THICKNESS: 4–6 DFMT – COLOR: RED
   FINISH COAT: HIGH BUILD POLYURETHANE (CARBOLINE 134HG)
   THICKNESS: 3–4 DFMT – COLOR: BLUE (FED. I.D.#15052)

4. LIFTING REQUIREMENTS:
   3,700 LBS. MINIMUM RATING.
   EST. WEIGHTS:
   910 LBS. – EMPTY VESSEL
   1910 LBS. – WITH CARBON
   4300 LBS. – OPERATING

DESIGNER	DATE
AJA	9–11–01
CHECKER	DATE
ENGINEER	DATE
MANAGER	DATE
FILE:	
SCALE: NONE	

TITLE PV1000 GENERAL ASSEMBLY

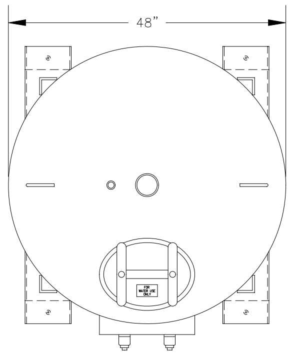
CLIENT

USFilter

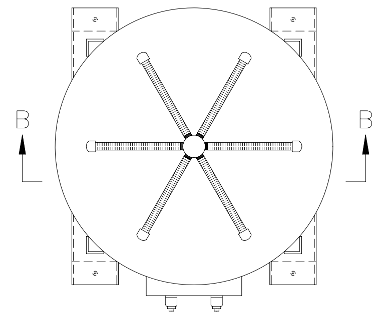
USFILTER/WESTATES
RED BLUFF, CA
1–800–795–2664

PROJECT	DRAWING	SHEET	REV
	PV1000SHEET1	1 OF 5	

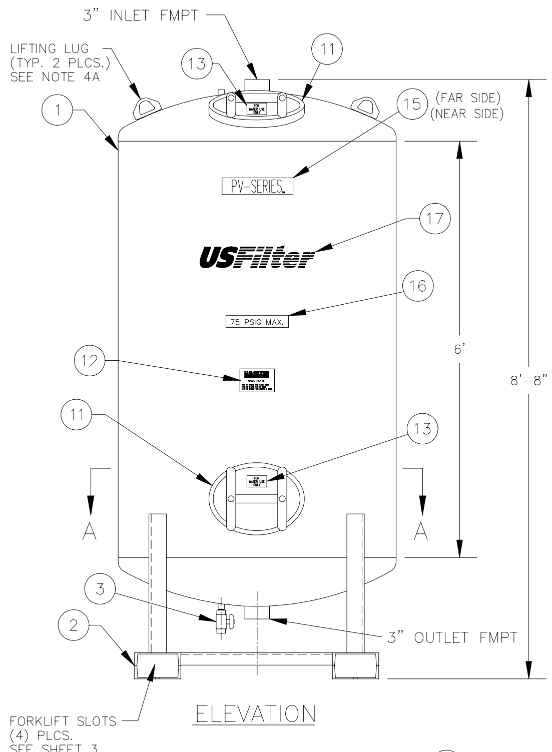
STD: 2-0600-8X11A | INTR_REF_NO



PLAN VIEW



SECTION "A-A"



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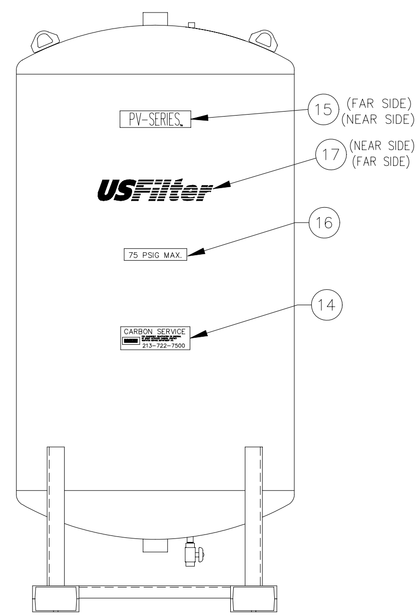
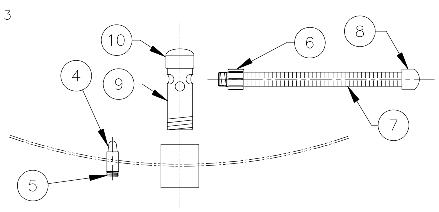


REAR ELEVATION



ENLARGED SECTION VIEW B-B
UNDERDRAIN ASSEMBLY-(SEPARATED)

LIST OF COMPONENTS

ITEM	QTY	DESCRIPTION
1		TANK ASSEMBLY DWG. # PV2000SHEET2
2		SKID ASSEMBLY DWG. # PV2000SHEET3
3	1	BRONZE BALL VALVE, 3/4"
4	1	POLY SCREEN ORTHOS PART# N5 R-3/4", MPT
5	1	CLOSE NIPPLE, SCHD 40 304 SS, 3/4"
6	6	MALE ADAPTER, SCH 80 PVC, 1"
7	6	PIPE, SLOTTED SCH 80 PVC, 1" x 15" LG
8	6	CAP, SCH 80 PVC, SLIP, 1"
9	1	UNDERDRAIN HUB, 3" DIA x 10 1/2" LG, SCH 80 PVC
10	1	CAP, SCH 80 PVC, SLIP, 3"
11	2	MANWAY ASSEMBLY, 11" x 15"
12	1	PLATE, I.D. & SERIAL NUMBER
13	2	DECAL, "FOR WATER USE ONLY", 2 1/2" x 4 1/4"
14	1	DECAL, "CARBON SERVICE" WHITE MYLAR W/BLUE LETTERS, 4" x 12"
15	2	DECAL, "PV-SERIES", WHITE MYLAR
16	2	DECAL, "75 PSIG MAX", WHITE MYLAR
17	2	DECAL, "USFILTER/WESTATES" WHITE MYLAR W/BLUE LETTERS

NOTES:

1. DESIGN DATA:
   48" DIAMETER PRESSURE VESSEL-75 PSIG(MAX)
   @ 150°F-NOT ASME CODE STAMPED
   FOR WATER USE ONLY
   MAXIMUM FLOW RATE: 100 GPM
   MAXIMUM CARBON CAPACITY: 2000 LBS. ACTIVATED CARBON

2. MATERIAL:
   HEADS: STD. F & D NON CODE 3/16" THICKNESS C.S.
   SHELL: 3/16" THK. 48" OD x 72" LONG C.S.
   SKID: SA 36-HR

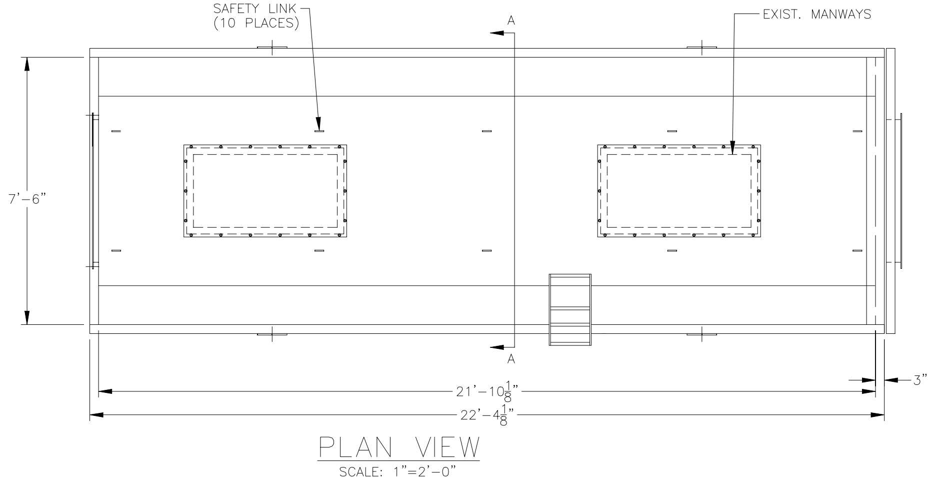
3. SURFACE PREPARATION:
   INTERIOR:
   SANDBLAST: SSPC-SP-5 WHITE METAL
   ABRASIVE: GARNET OR GRIT - PROFILE: 1.5-2 MILS
   COATING: 3M BRAND SCOTCHKOTE 134
   THICKNESS: 10-15 DFMT - COLOR: GREEN
   EXTERIOR:
   SANDBLAST: SSPC-SP-10 NEAR WHITE METAL
   ABRASIVE: GARNET OR GRIT - PROFILE: 1.5-2 MILS
   PRIMER COAT: RUST PREVENTATIVE EPOXY PRIMER (CARBOLINE 893)
   THICKNESS: 4-6 DFMT - COLOR: RED
   FINISH COAT: HIGH BUILD POLYURETHANE (CARBOLINE 134HG)
   THICKNESS: 3-4 DFMT - COLOR: BLUE (FED. I.D.#15052)

4. LIFTING REQUIREMENTS:
   5,200 LBS. MINIMUM RATING.
   EST. WEIGHTS:
   1190 LBS. - EMPTY VESSEL
   3190 LBS. - WITH CARBON
   7717 LBS. - OPERATING

DESIGNER: AJA	DATE: 9-11-01	TITLE: PV2000 GENERAL ASSEMBLY
CHECKER	DATE	CLIENT
ENGINEER	DATE	
MANAGER	DATE	USFilter — USFILTER/WESTATES, RED BLUFF, CA, 1-800-795-2664
FILE:		
SCALE: NONE		

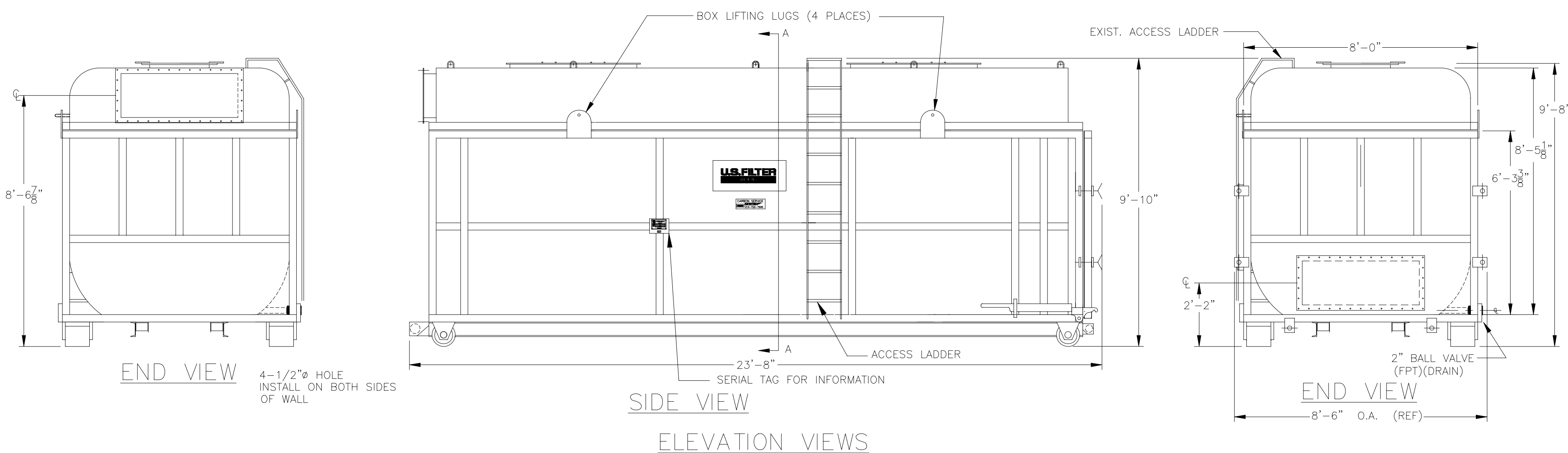
PROJECT	DRAWING	SHEET	REV
	PV2000SHEET1	1 OF 5	

STD: 2-0600-8X11A | INTL REF:



NOTES:

1. DESIGN DATA:
   14 INCHES W.G.
2. MATERIAL:
   CARBON STEEL
3. SURFACE PREPARATION:
   (A) PRIMER: (2) PART EPOXY PRIMER
   (B) FINISH: POLYURETHANE, BLUE
4. APPROXIMATE WEIGHTS:
   EMPTY: (NO CARBON)
   ROOF:................. 1,400 LBS
   BOX:.................. 8,100 LBS
   TOTAL:............... 9,500 LBS



DESIGNER	DATE
LLR	5-21-01
CHECKER	DATE
ENGINEER	DATE
MANAGER	DATE
FILE:	
SCALE: NONE	

TITLE RB20
GENERAL ASSEMBLY

CLIENT

USFilter

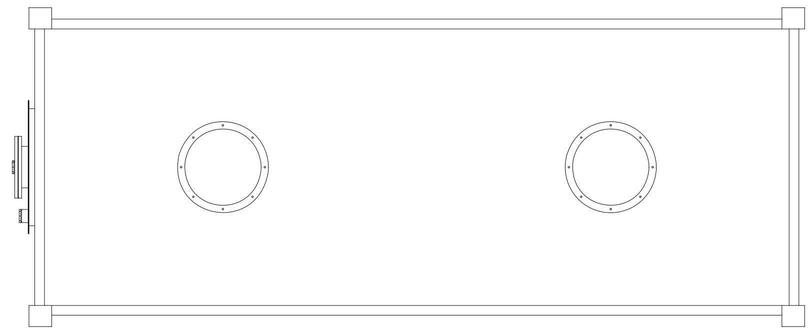
USFILTER/WESTATES
RED BLUFF, CA
1-800-795-2664

PROJECT	DRAWING	SHEET	REV
	RB20 OS A SIZE.DWG	1 OF 1	

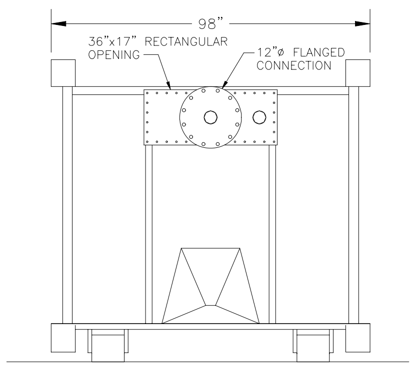
STD: 2-0600-8X11A | INTL REF:

NOTES:

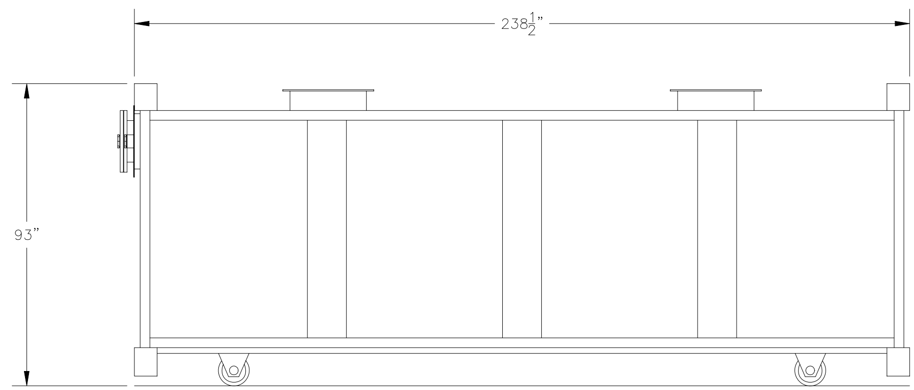
1. CARBON CAPACITY 12000 LB
2. FLOW RATE 8000CFM MAX.
3. MAX. PRESSURE 28 " W.C. / 2" W.C. VACUUM
4. EMPTY WEIGHT 9500 LB.
5. INLET/ OUT LET 12"X36".
6. MAX TEMPERATURE 140°F



TOP VIEW



END VIEW



SIDE VIEW

DESIGNER LLR	DATE 5-9-01
CHECKER	DATE
ENGINEER	DATE
MANAGER	DATE
FILE:	
SCALE: NONE	

TITLE RB10 OS GENERAL ASSEMBLY

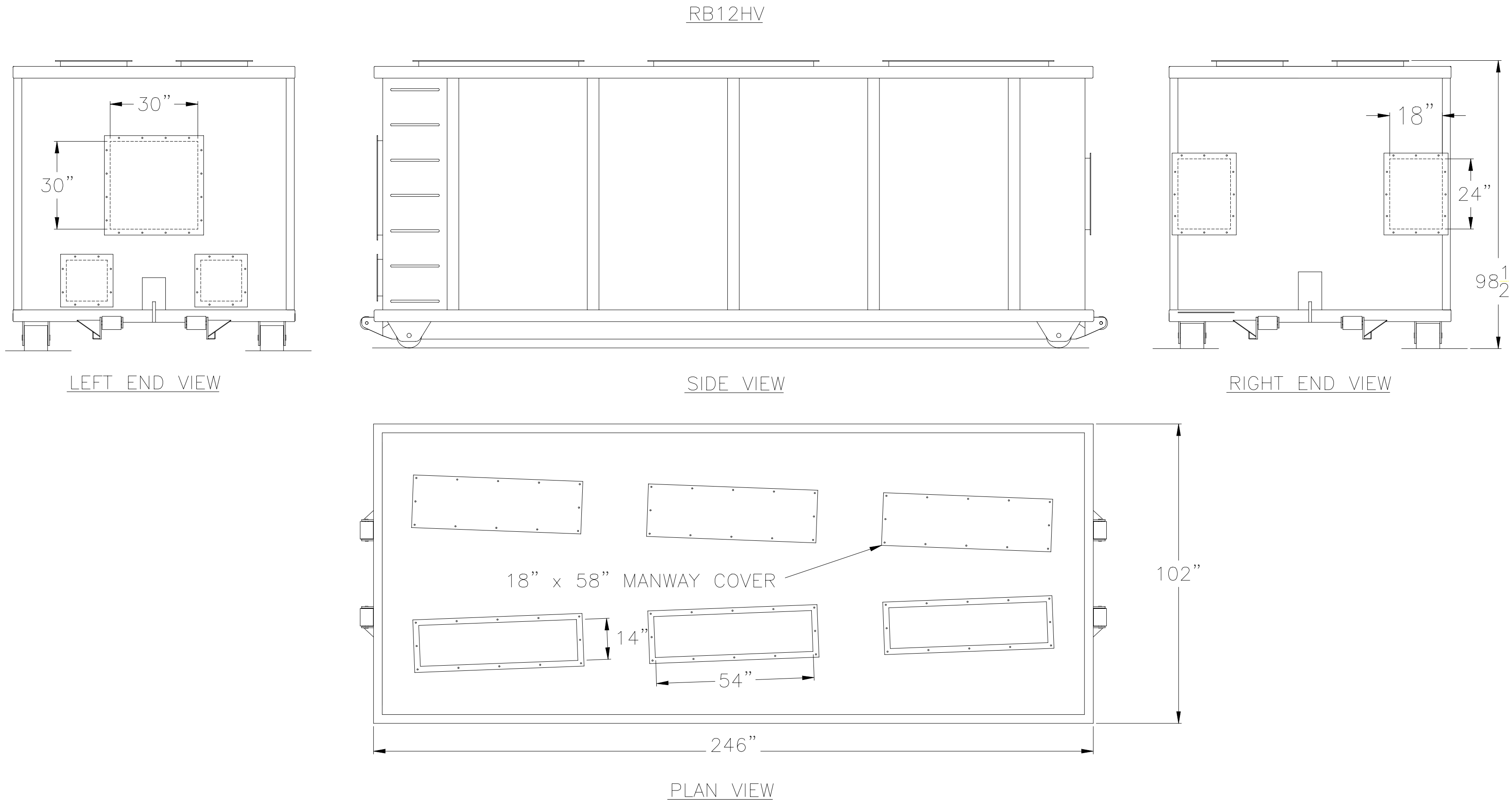
CLIENT

USFilter

USFILTER/WESTATES
RED BLUFF, CA
1-800-795-2664

PROJECT	DRAWING	SHEET	REV
	RB10 OSGENASSY	OF	

STD: 2-0600-8X11A | INTL REF:



SPECIFICATIONS:

1. 20,000 SCFM MAX FLOW RATE
2. 12,000 LBS ACTIVATED CARBON
3. 30" X 30" INLET, 2-18" X 24" OUTLETS.
4. PRIMED AND PAINTED
5. RIBBED CARBON STEEL CONSTRUCTION
6. 8" GROUND ROLLERS FOR HANDLING EASE
7. 18" x 58" MANWAYS
8. BOXES TO BE GROUNDED BY BRAIDED COPPER #4
9. SHIPPING WEIGHT (WITH CARBON) APPROX.= 22,000 LB
10. PROVIDE SAMPLE PORTS 1/2" BALL VALVE WITH HOSE FITTING.

DESIGNER LLR	DATE 4-8-01
CHECKER	DATE
ENGINEER	DATE
MANAGER	DATE
FILE:	
SCALE: NONE	

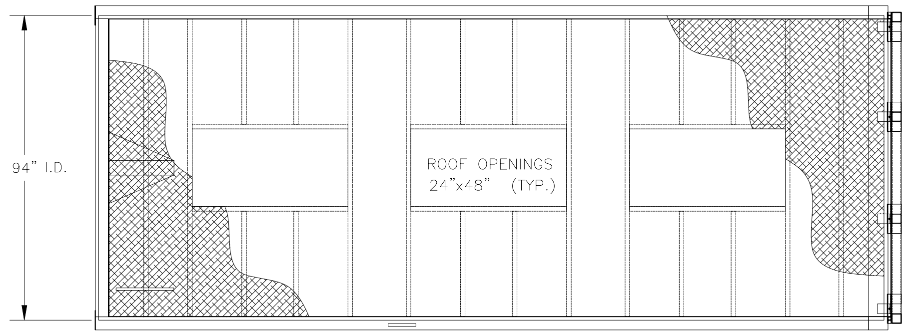
TITLE RB12HV GENERAL ASSEMBLY

CLIENT

USFilter

USFILTER/WESTATES
RED BLUFF, CA
1-800-795-2664

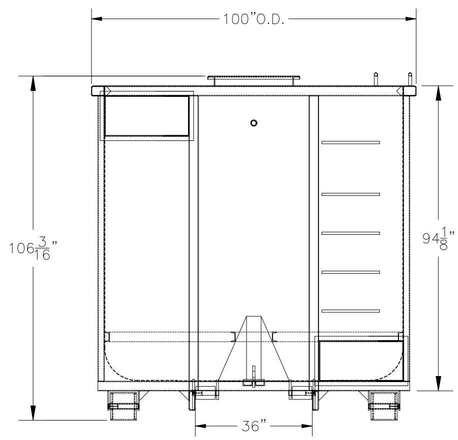
PROJECT	DRAWING	SHEET	REV
	RB12HVGENASSY	OF	



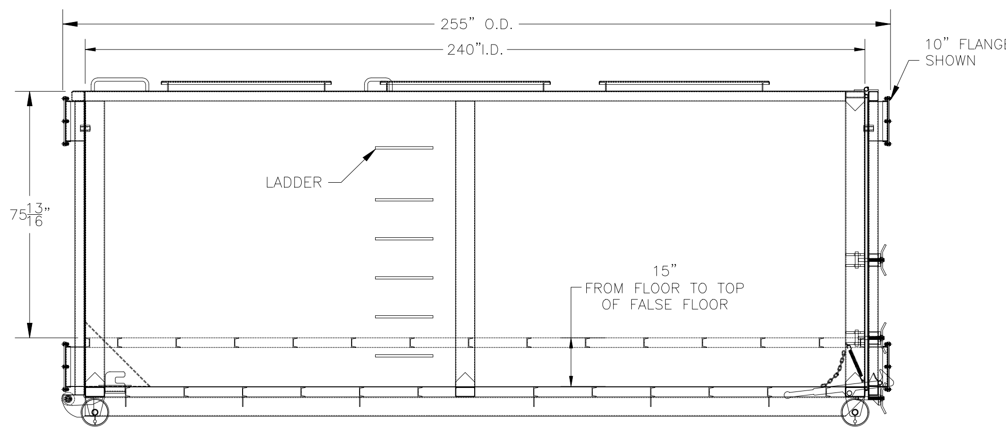
PLAN VIEW

NOTES :

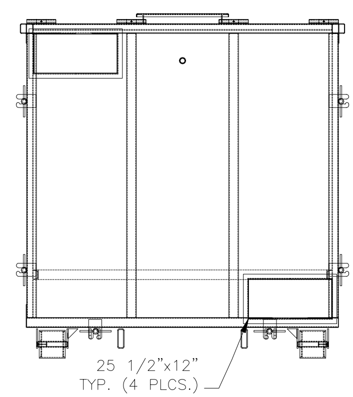
1. CONTINUOUS WELDED CONSTRUCTION.
2. EPOXY PRIMED INTERIOR AND EXTERIOR PRIMED AND FINISHED WITH POLYURETHANE.
3. TOP HINGED TAILGATE.
4. VESSEL WEIGHT: 10,500 LBS.
5. VESSEL WEIGHT W/ CARBON: 30,500 LBS.
7. FLOWRATE 12,000 CFM MAX.



FRONT VIEW



SIDE VIEW



REAR VIEW

DESIGNER ESP	DATE 4-9-01	TITLE	RB20 GENERAL ASSEMBLEY
CHECKER LLR	DATE 4-9-01	CLIENT	
ENGINEER	DATE		
MANAGER	DATE	USFilter	USFILTER/WESTATES RED BLUFF, CA 1-800-795-2664
FILE:			
SCALE: NONE			

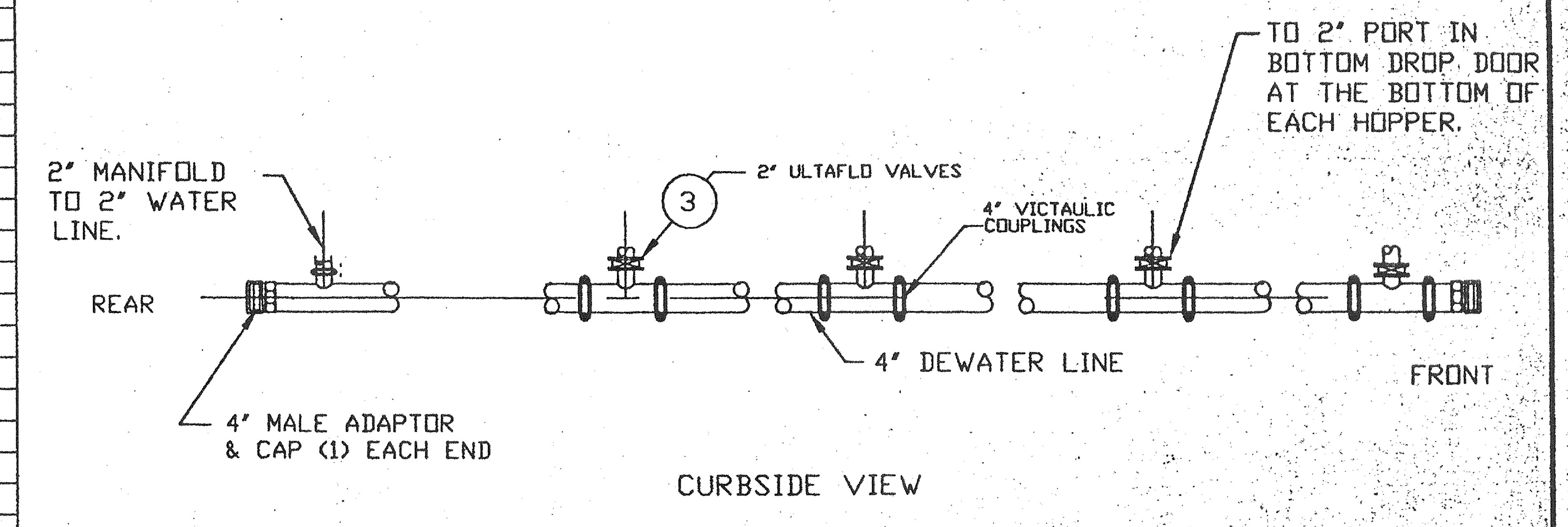
PROJECT	DRAWING	SHEET	REV
	RB20 8X11	OF	

New drawing

ITEM	QTY	DESCRIPTION
1	1	BODY & FRAME SEE DRG. #2220A (BODY MAT-.188/.203)
2	4	KNAPPCO LM20 DOMES W/ BUNA-N GASKETS - HINGE TO
–	–	STREETSIDE
3	11	2" ULTRAFLO VALVES- (7) IN WATER LINE & (4) IN DEWATER
–	–	LINE.- MODEL 400 W/ NITRILE SEATS
4	2	3" ULTRAFLO VALVES- MODEL 400 W/NITRILE SEATS
5	1	2" BAYCO PRESSURE RELIEF VALVE SET AR 15 P.S.I
6	1	3" ALUM. TOP AIR PIPE
7	1	3" COUPLER & PLUG STREETSIDE
8	1	3" MALE ADAPTOR DUMMY CURBSIDE
9	1	HOSE HOOK- ADJUSTABLE
10	2	3" KNAPPCO SWING CHECK VALVES
11	2	4" STL. STEEL LONG RADIUS WELD 90° ELBOWS
12	1	2" MALE ADAPTOR & CAP AT END OF 2" WATER LINE
13	8	2" VICTAULIC COUPLINGS W/ BUNA-N GASKETS
14	–	2" SCH. 40 ALUM. PIPE WATER LINE
15	14	4" VICTAULIC COUPLINGS W/ BUNA-N GASKETS
16	–	4" SCH. 40 ALUM. PIPE
17	1	4" TOP LOAD LINE TO ENTER EACH OF 3-COMPTS. AT
		TOP CURBSIDE (SEE DRWG. #2220C)
18	4	12" BOTTOM DROP ASSY. SEE DRWG. #2220D
19	4	5" ULTRAFLO VALVES W/NITRILE SEATS
20	4	5" X 5" PENTRON TEES W/OUT DOORS - W/ VIC. ENDS
21	7	5" VICTAULIC COUPLERS W/ BUNA-N GASKETS
22	–	5" SCH 40 DISCHARGE PIPE TO REAR UNDER AXLE
23	2	5" X 4" REDUCERS W/ (2) 4" MALE ADAPTORS & CAPS
		(1) EACH FRONT AND REAR ON DISCHARGE LINE.

ITEM	QTY	DESCRIPTION
24	1	2" MANIFOLD ALUM. PIPE SEE DRWG. #2220C
25	4	4" ULTRAFLO VALVES-MODEL 400 W/ NITRILE SEATS
26	4	4" MALE ADAPTORS & CAPS ON END OF 4" LOAD LINE &
		4" DEWATER LINE
27	1	4" ALUM. SCH. 40 PIPE DEWATER LINE SEE VIEW B - B
28	1	LANDING GEAR- 2 SPEED-S/S CRANK #LPR-30-444
29	2	SUSPENSION- HENDRICKSON-TURNER HT-230-17-004
		17" RIDE HT.
30	2	AXLES- DANA 5" RD.- 1/2" WALL- 71 1/2" TRACK
	–	W/CHICAGO RAWHIDE OIL SEALS
	4	5½" GUNITE AUTOMATIC SLACKS
	4	OUTBOARD CENTRIFUSE DRUMS- ALUM. HUBS
	4	30/30 COMBO MGM BRAKE CHAMBERS
31	8	WHEELS- ALCOA ALUM.- 8.25 X 24.5
32	8	TIRES- 285/75R24.5 BRIDGESTONE R-194
33	2	ALUM. LIGHT HOUSINGS PER STD.- 605
34	2	TOE RAILS W/ 1" ALUM. PIPE FULL LENGTH
35	–	NON-SLIP PAINT BETWEEN TOE RAILS FULL LENGTH
36	1	ALUM. LADDER W/ 1" PIPE & 4 3/4" GRIP STRUT STEPS
37	1	GRIPSTRUT PLATFORM 24" WIDE X 36" LG. USE (2)
		11 3/4" WIDE GRIPSTRUT PIECES
38	4	HOSE TUBE- 7" X 20'-0", 2 EA. SIDE-DOORS EA. END
39	4	AIR PRESSURE GAUGES (2) 1N (2) ALUM. BOXES W/ LIGHT-
		3½" DIA. LIQUID FILLED. 0 TO 30 P.S.I.(TANK & LINE)
40	1	KINGPIN PLATE PER STD,- 419
41	2	ALUM. FRONT FENDERS W/ RADIUS
42	2	ALUM. TANDEM FENDERS

ITEM	QTY	DESCRIPTION
43	4	TRUCK LITE STOP/TAIL/TURN RED LIGHTS
44	6	TRUCK LITE MARKER LIGHTS (2) RED & (4) AMBER
45	1	TRUCK LITE I. D. CLUSTER
46	3	INTERNAL RINGS - 3" X 3/8" FLAT BARS ON EDGE.
		BARS ARE PERPENDICULAR TO SHELL
47	2	SANITARY BULKHEADS- 0.250" ALUM.
48	1	TOOL BOX- 24" H. X 36" L. X 24" DP. - STREETSIDE
		SEE DRWG. #2220B
49	4	2" N.P.T. NIPPLES INSIDE TANK -EXTEND INTO TANK
		3 TO 4"
50	1	ROCKWELL WABCO 4S/2M ABS KIT W/ STOP LIGHT CONTROL.
51	1	BETTS PS-1 DOCUMENT HOLDER
52	4	PLACARD HOLDERS- SLIDE IN STYLE- LOCATE (1) EACH END
		AND (1) EACH SIDE AT CENTER.
53	1	WIRING HARNES KIT W/ 7-WAY RECEPTACLE USA #602001
54	4	BEALL MUD FLAPS
55	–	PAINT STEEL PARTS WHEELABRATOR BLUE PAINTONE MATCHING
		SYSTEM #286,C 100,M 60, K 6
56	1	3" VICTAULIC COUPLING W/ BUNA-N GASKETS



CURBSIDE VIEW

VIEW B - B

125° MAXIMUM TEMPERATURE

CUSTOMER APPROVAL
DATE:
BY:

NOTE:
GRIND ALL INTERIOR BUTT WELDS SMOOTH IN PREPARATION FOR A LINER.

(50) ABS KIT

(53) WIRING HARNESS KIT

(55) PAINT

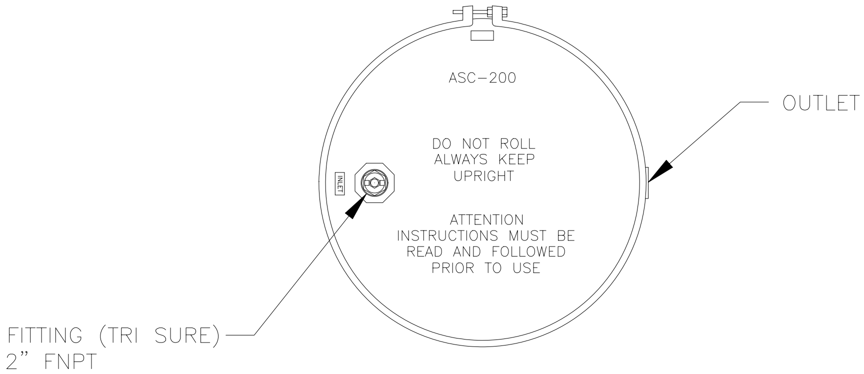
DOT SPECIFICATION:	SERIAL NUMBER:
N/A	PS27472 &PS27473

Beall Trailers of Oregon, Inc.

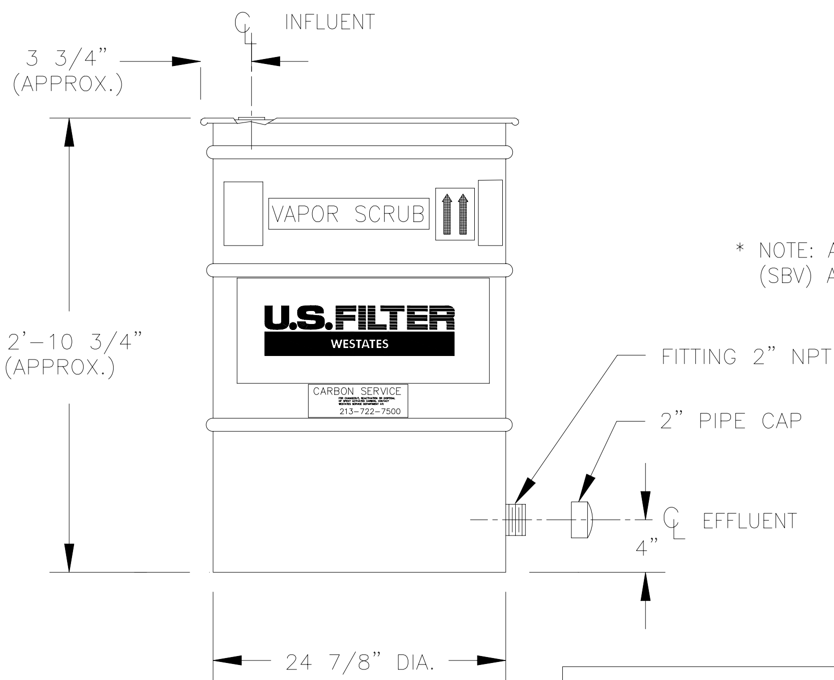
WHEELABRATOR CLEAN AIR SYSTEMS F.O. #27472 & 27473-95	SCALE 1:20	DRAWN BY LA / APPROVED BY [signature]
TITLE 1800 CU. FT. ALUMINUM PNEUMATIC SEMI		
REFERENCE	DATE 10-25-95	DRAWING NUMBER 2220

DATE	SYM	REVISION RECORD	BY
	–	THRU CHANGE ORDER #2	LA

STD: 2-0600-8X11A | INTL REF:



PLAN VIEW



PLAN VIEW

NOTES:

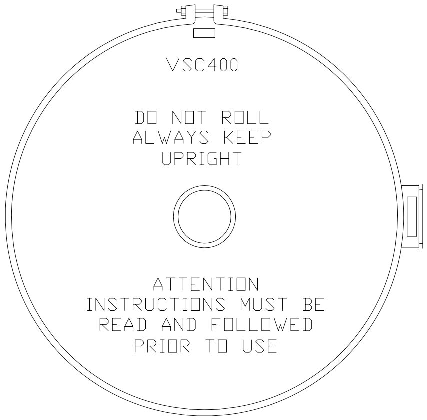
1. CARBON:
   AS REQUIRED.
2. MATERIALS OF CONSTRUCTION:
   VESSEL: ....CARBON STEEL
   EXTERNAL COATING: ....HIGH GLOSS PAINT, WESTATES BLUE
   INTERNAL COATING: ....CURED EPOXY
   INTERNAL DISTRIBUTION: ....PVC
3. SPECIFICATIONS:
   FLOW * – CFM (MAX): 100
   PRESSURE – PSIG (MAX): 10
   TEMPERATURE – DEG F (MAX): 140
   CARBON FILL VOLUME – CU FT: 6.9
   CROSS SECTION – SQ FT: 2.8
   SHIPPING WEIGHT – LBS: (APPROX,) 250
   OPERATING WEIGHT – LBS: (APPROX,) 500

* NOTE: ACTUAL DESIGN SHOULD BE BASED ON SUPERFICIAL BED VELOCITY (SBV) AS REQUIRED FOR SPECIFIC CONTAMINANTS.

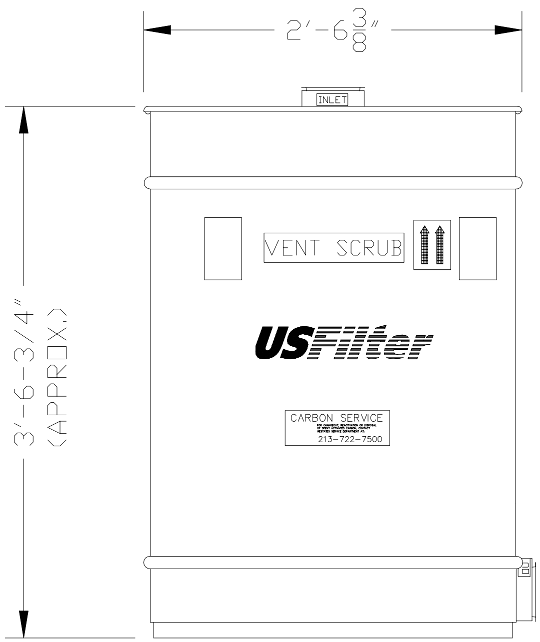
DESIGNER LLR	DATE 4-8-01	TITLE VSC200 GENERAL ASSEMBLY	
CHECKER	DATE	CLIENT TBD	
ENGINEER	DATE		
MANAGER	DATE	USFilter	USFILTER/WESTATES RED BLUFF, CA 1-800-795-2664
FILE:			
SCALE: NONE		PROJECT	DRAWING VSC200GENASSY

SHEET OF | REV

STD: 2-0600-8X11A | INTL REF:



PLAN



ELEVATION

NOTES:

1. CARBON:
   AS REQUIRED.
2. MATERIALS OF CONSTRUCTION:
   VESSEL: ....CARBON STEEL
   EXTERNAL COATING: ....HIGH GLOSS PAINT, WESTATES BLUE
   INTERNAL COATING: ....CURED EPOXY
   INTERNAL DISTRIBUTION: ....PVC
3. SPECIFICATIONS:
   FLOW * – CFM (MAX): 300
   PRESSURE – PSIG (MAX): 6
   TEMPERATURE – DEG F (MAX): 140
   CARBON FILL VOLUME – CU FT: 14.0
   CROSS SECTION – SQ FT: 4.9
   SHIPPING WEIGHT – LBS: (APPROX,) 480
   OPERATING WEIGHT – LBS: (APPROX,) 480

* NOTE: ACTUAL DESIGN SHOULD BE BASED ON SUPERFICIAL BED VELOCITY (SBV) AS REQUIRED FOR SPECIFIC CONTAMINANTS.

DESIGNER: AJA	DATE: 5-2-01
CHECKER	DATE
ENGINEER	DATE
MANAGER	DATE
FILE:	
SCALE:	

TITLE: VSC400 GENERAL ASSEMBLY

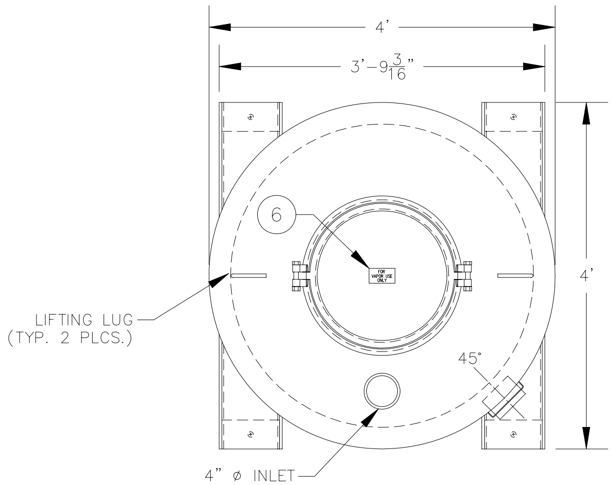
CLIENT:

USFilter

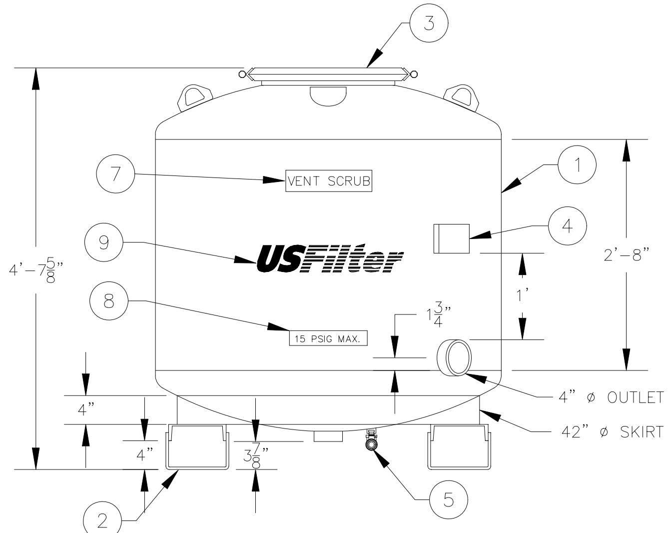
USFILTER/WESTATES
RED BLUFF, CA
1-800-795-2664

PROJECT	DRAWING	SHEET	REV
	VSC400.DWG	1 OF 1	

STD: 2-0600-8X11A | INTL REF:



PLAN VIEW



ELEVATION VIEW

LIST OF COMPONENTS

ITEM	QTY	DESCRIPTION
1	1	TANK ASSEMBLY
2	1	SKID ASSEMBLY
3	1	MANWAY ASSEMBLY, 18" DIA.
4	1	PLATE, I.D. & SERIAL NUMBER
5	1	BRONZE BALL VALVE, 3/4"
6	1	DECAL, "FOR VAPOR USE ONLY", 2 1/2" x 4 1/4"
7	2	DECAL, "VENT-SCRUB", WHITE MYLAR
8	2	DECAL, "15 PSIG MAX", WHITE MYLAR
9	2	DECAL, "USFILTER/WESTATES" WHITE MYLAR W/BLUE LETTERS

NOTES:

1. DESIGN DATA:
   48" DIAMETER PRESSURE VESSEL–15 PSIG(MAX)
   VACUUM RATING – 15" HG
   @ 120°F–NOT ASME CODE STAMPED FOR VAPOR USE ONLY
   600 CFM
   1000 LBS. ACTIVATED CARBON

2. MATERIAL:
   HEADS – SA 36–HR
   SHELL – SA 36–HR
   SKID – SA 36–HR

3. SURFACE PREPARATION:
   INTERIOR:
   SANDBLAST: SSPC–SP–5 WHITE METAL
   ABRASIVE: GARNET OR GRIT – PROFILE: 1.5–2 MILS
   COATING: 3M BRAND SCOTCHKOTE 134
   THICKNESS: 10–15 DFMT – COLOR: GREEN
   EXTERIOR:
   SANDBLAST: SSPC–SP–10 NEAR WHITE METAL
   ABRASIVE: GARNET OR GRIT – PROFILE: 1.5–2 MILS
   PRIMER COAT: RUST PREVENTATIVE EPOXY PRIMER (CARBOLINE 893)
   THICKNESS: 4–6 DFMT – COLOR: RED
   FINISH COAT: HIGH BUILD POLYURETHANE (CARBOLINE 134HG)
   THICKNESS: 3–4 DFMT – COLOR: WHITE (FED. I.D.#17925)

4. LIFTING REQUIREMENTS:
   5200 LBS. MINIMUM RATING.
   EST. WEIGHTS:
   890 LBS. – EMPTY VESSEL
   1890 LBS. – WITH CARBON

DESIGNER: AJA	DATE: 10-8-01
CHECKER:	DATE:
ENGINEER:	DATE:
MANAGER:	DATE:
FILE:	
SCALE: NONE	

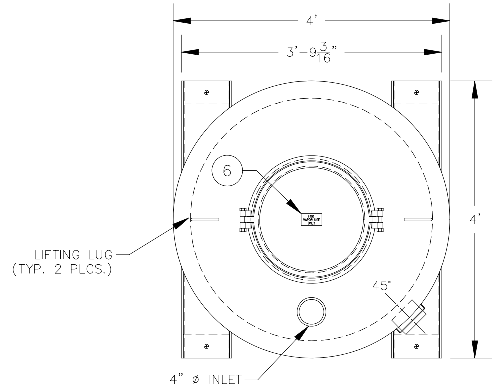
TITLE: VSC1000 GENERAL ASSEMBLY

CLIENT:

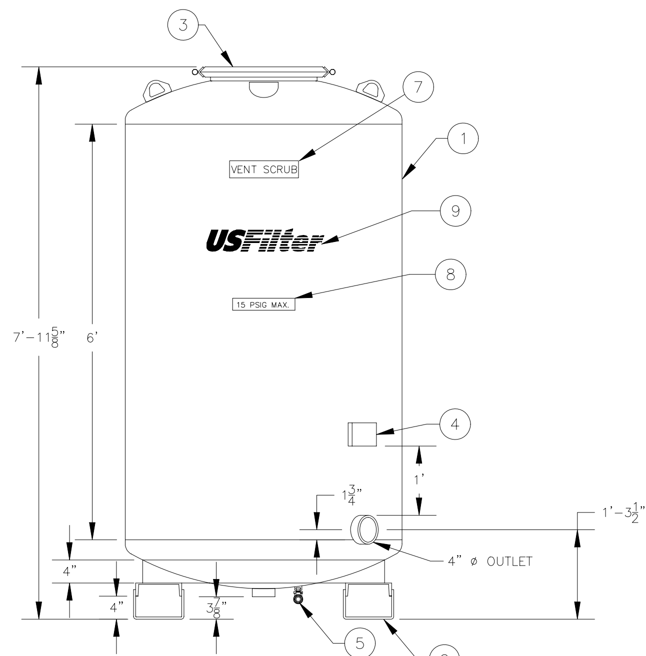
USFilter
USFILTER/WESTATES
RED BLUFF, CA
1-800-795-2664

PROJECT	DRAWING	SHEET	REV
	VSC1000SHEET1.DWG	1 OF 2	

STD: 2-0600-8X11A | INTL REF:



PLAN VIEW



ELEVATION VIEW

LIST OF COMPONENTS

ITEM	QTY	DESCRIPTION
1	1	TANK ASSEMBLY
2	1	SKID ASSEMBLY
3	1	MANWAY ASSEMBLY, 18" DIA.
4	1	PLATE, I.D. & SERIAL NUMBER
5	1	BRONZE BALL VALVE, 3/4"
6	1	DECAL, "FOR VAPOR USE ONLY", 2 1/2" x 4 1/4"
7	2	DECAL, "VENT -SCRUB", WHITE MYLAR
8	2	DECAL, "15 PSIG MAX", WHITE MYLAR
9	2	DECAL, "USFILTER/WESTATES" WHITE MYLAR W/BLUE LETTERS

NOTES:

1. DESIGN DATA:
   48" DIAMETER PRESSURE VESSEL-15 PSIG(MAX)
   VACUUM RATING - 15" HG
   @ 120°F-NOT ASME CODE STAMPED FOR VAPOR USE ONLY
   600 CFM
   2000 LBS. ACTIVATED CARBON

2. MATERIAL:
   HEADS - SA 36-HR
   SHELL - SA 36-HR
   SKID - SA 36-HR

3. SURFACE PREPARATION:
   INTERIOR:
   SANDBLAST: SSPC-SP-5 WHITE METAL
   ABRASIVE: GARNET OR GRIT - PROFILE: 1.5-2 MILS
   COATING: 3M BRAND SCOTCHKOTE 134
   THICKNESS: 10-15 DFMT - COLOR: GREEN
   EXTERIOR:
   SANDBLAST: SSPC-SP-10 NEAR WHITE METAL
   ABRASIVE: GARNET OR GRIT - PROFILE: 1.5-2 MILS
   PRIMER COAT: RUST PREVENTATIVE EPOXY PRIMER
   (CARBOLINE 893)
   THICKNESS: 4-6 DFMT - COLOR: RED
   FINISH COAT: HIGH BUILD POLYURETHANE (CARBOLINE 134HG)
   THICKNESS: 3-4 DFMT - COLOR: WHITE (FED. I.D.#17925)

4. LIFTING REQUIREMENTS:
   5200 LBS. MINIMUM RATING.
   EST. WEIGHTS:
   1190 LBS. - EMPTY VESSEL
   3190 LBS. - WITH CARBON

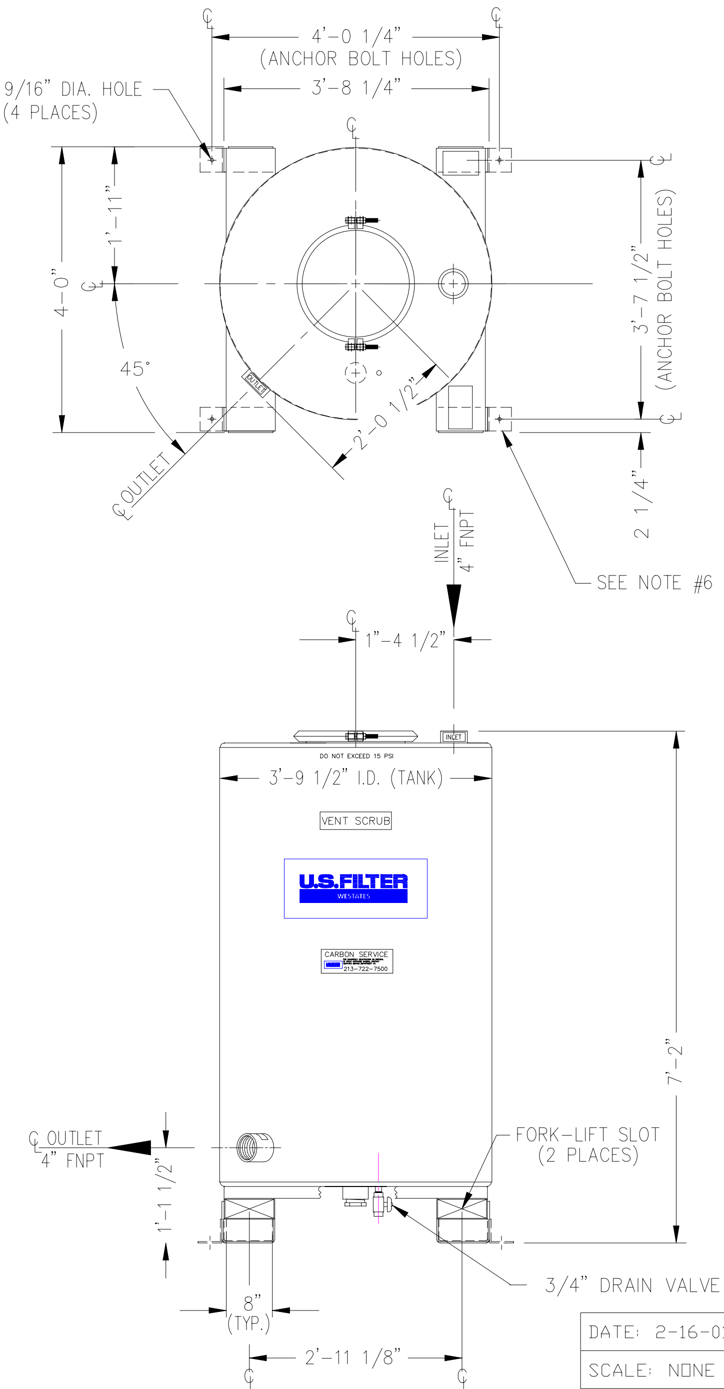
DESIGNER: AJA	DATE: 10-8-01
CHECKER	DATE
ENGINEER	DATE
MANAGER	DATE
FILE:	
SCALE: NONE	

TITLE VSC2000
GENERAL ASSEMBLY

CLIENT

USFilter
USFILTER/WESTATES
RED BLUFF, CA
1-800-795-2664

PROJECT	DRAWING	SHEET	REV
	VSC2000SHEET1.DWG	1 OF 5	



NOTES:

1. DESIGN DATA:
   45 1/2" DIAMETER PRESSURE VESSEL – 15 PSIG (MAX)
   @ 120°F – NOT ASME CODE STAMPED
   FOR VAPOR USE ONLY, MAX. FLOW = 500 CFM
   63 CU. FT. ACTIVATED CARBON
   VACUUM = 6.0 INCH HG

2. MATERIAL:
   HEADS – 7 GA. CARBON STEEL
   SHELL – 10 GA. CARBON STEEL
   SKID – CARBON STEEL

3. SURFACE PREPARATION:
   INTERIOR COATING: FUSION BONDED EPOXY

   EXTERIOR COATING: PRIMER: (2) PART EPOXY PRIMER
   FINISH: ALIPHATIC POLYURETHANE FINISH, WHITE

4. APPROXIMATE WEIGHT:
   EMPTY VESSEL: .... 740 LBS

5. THIS VESSEL COMPLIES WITH UN 11A.

6. SHOWN WITH OPTIONAL SEIZMIC ZONE 4 HOLD-DOWN LUGS. (PART #A11098)

REV.	DATE		REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R

CUSTOMER:
XXXXXXXXX
XXXXXXXXX

LOCATION:

PROJECT No.

DRAWN: AJA

CHK'D:

ENG'R:

DATE: 2-16-01

SCALE: NONE

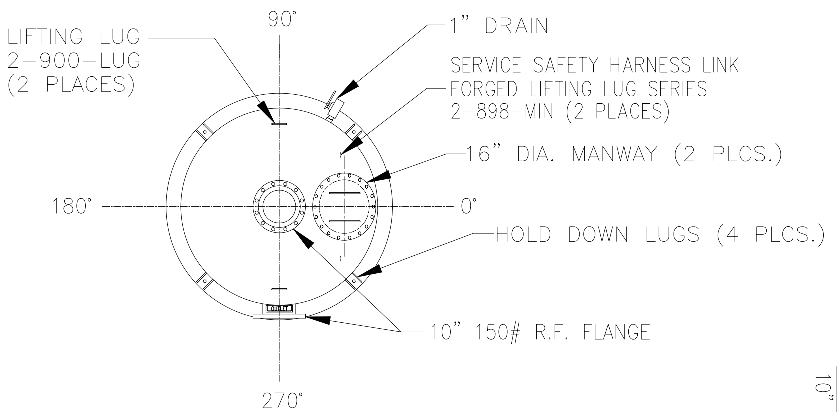
U.S.FILTER
WESTATES
11711 Reading Road
Red Bluff. CA 96080

TITLE:
VAPOR SCRUB ASSEMBLY
VSC 2000

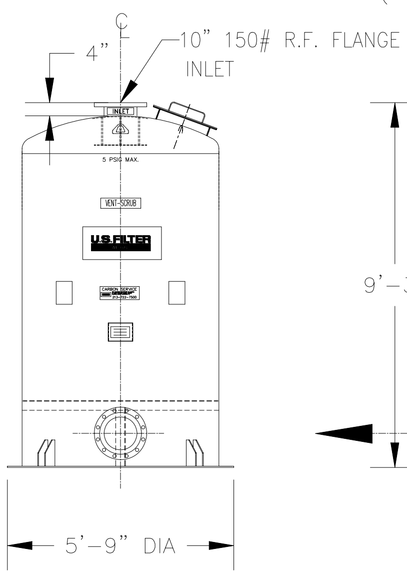
DWG No. VSC2000GENASSY.DWG

REV.

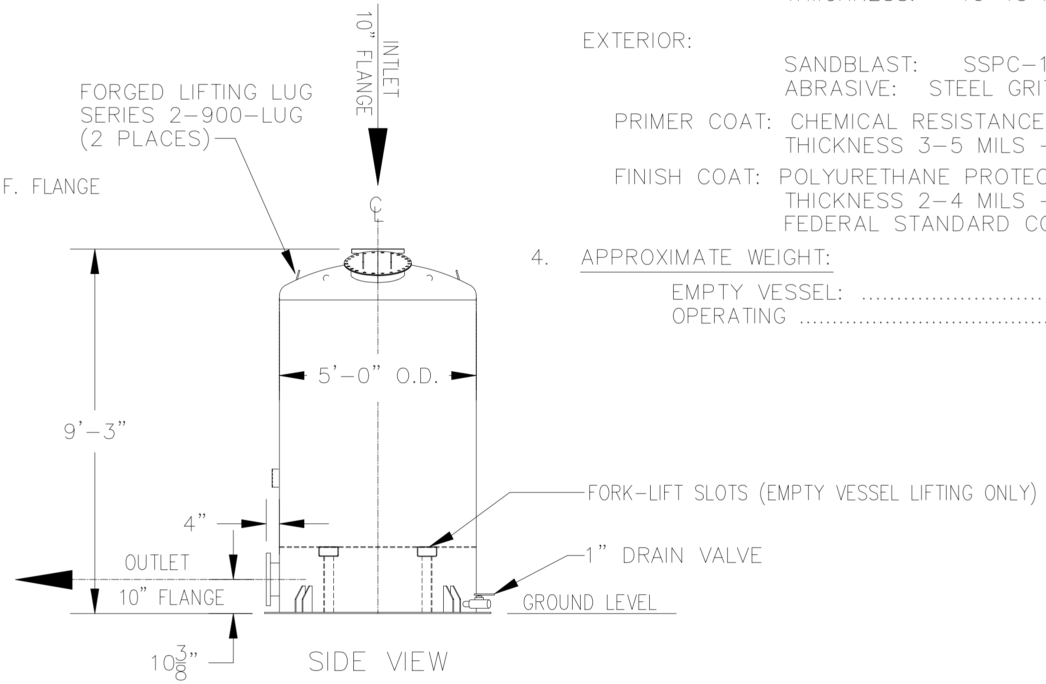
STD: 2-0600-8X11A | INTL REF:



PLAN VIEW



ELEVATION VIEW



SIDE VIEW

NOTES:

1. DESIGN DATA:

   60" DIAMETER PRESSURE VESSEL – 5 PSIG (MAX.)
   @ 120°F – NOT ASME CODE STAMPED
   FOR VAPOR USE ONLY, MAX. FLOW = 1,500 CFM
   102 CU. FT. ACTIVATED CARBON

2. MATERIAL:

   CARBON STEEL

3. SURFACE PREPARATION:

   INTERIOR:
   SANDBLAST: SSPC-5 WHITE METAL
   ABRASIVE: STEEL GRIT – PROFILE 1.5-2.5 MILS
   COATING: CARBOLINE 891
   THIICKNESS: 10-15 MILLS – COLOR: WHITE

   EXTERIOR:
   SANDBLAST: SSPC-10 NEAR WHITE METAL
   ABRASIVE: STEEL GRIT – PROFILE 1.5-2.5 MILS
   PRIMER COAT: CHEMICAL RESISTANCE CATALYZED EPOXY COATING
   THICKNESS 3-5 MILS – COLOR: GREY
   FINISH COAT: POLYURETHANE PROTECTIVE FINISH
   THICKNESS 2-4 MILS – COLOR: WHITE
   FEDERAL STANDARD COLOR 17925

4. APPROXIMATE WEIGHT:

   EMPTY VESSEL: .... 4,400 LBS
   OPERATING .... 7,400 LBS

DESIGNER: LLR	DATE: 7-6-01
CHECKER	DATE
ENGINEER	DATE
MANAGER	DATE
FILE:	
SCALE: NONE	

TITLE VSC3000 GENERAL ASSEMBLY

CLIENT

USFilter
USFILTER/WESTATES
RED BLUFF, CA
1-800-795-2664

PROJECT	DRAWING	SHEET	REV
	VSC3000GENASSY	OF	

APPENDIX IX

HAZARDOUS WASTE TANK SYSTEM ASSESSMENT, DESIGN DRAWINGS, AND CONTAINMENT CALCULATIONS

FOR

SIEMENS INDUSTRY, INC.

PARKER REACTIVATION FACILITY

PARKER, ARIZONA

Revision 1
April 2012

TABLE OF CONTENTS

APPENDIX IX

TAB 1

Assessment of Tank Systems
T-1, T-2, T-5, and T-6

Revision 1
April 2012

CBE CHAVOND-BARRY ENGINEERING CORP.

400 County Route 518 • P.O. Box 205
Blawenburg, New Jersey 08504-0205

Tel:(609)466-4900
Fax: (609)466-1231

Tank System Engineering Assessment

I have reviewed the information relating to the above ground tank systems identified in the document *Assessment of Tanks T-1, T-2, T-5 and T-6*, attached as Exhibit A, which are installed at the Siemens Industry, Inc. facility in Parker, Arizona, and my assessment allows me to draw the following conclusions in accordance with 40 CFR 264.192(a):

1. The tank system has sufficient structural integrity and is acceptable for the storing and treating of hazardous waste.

2. The tank system foundation, structural support, seams, connections and pressure controls (where applicable) are adequately designed.

3. The tank system has sufficient structural strength, compatibility with the wastes to be stored or treated, and corrosion protection, to ensure that it will not collapse, rupture or fail.

My assessment has been based, in part, on my review of the following information, which is provided in the attached document:

A. Results of visual inspection and ultrasonic thickness testing for the tank systems.

B. Hazardous characteristics of the wastes stored in the tank system.

C. Structural calculations and design standards for the tank systems .

In accordance with 40 CFR 264.192(a) and 40 CFR 270.11(d), I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Christopher M. Doelling, P.E.

April 23, 2012

STATE OF NEW JERSEY
CHRISTOPHER M. DOELLING
LICENSED PROFESSIONAL ENGINEER

Attachment: Exhibit A - Assessment of Tank Systems T-1, T-2, T-5 and T-6

CBE

CHAVOND-BARRY ENGINEERING CORP.

400 County Route 518 • P.O. Box 205
Blawenburg, New Jersey 08504-0205

Tel:(609)466-4900
Fax: (609)466-1231

EXHIBIT A

ASSESSMENT OF TANK SYSTEMS T-1, T-2, T-5 AND T-6

40 CFR 264.192

Prepared for:

Siemens Industry, Inc.
25323 Mutahar Street
Parker, Arizona 85344

Prepared by:

Karl E. Monninger
Vice President
Chavond-Barry Engineering Corp.

April 2012

ASSESSMENT OF TANK SYSTEMS T-1, T-2, T-5 AND T-6

Table of Contents

Appendices

ASSESSMENT OF TANK SYSTEMS
T-1, T-2, T-5, and T-6

In order to comply with the requirements of EPA 40 CFR, Subpart J, § 264.192, the visual inspections and ultrasonic thickness measurements were performed on the exterior of subject tank systems February 21, 2011 through February 25, 2011. Ancillary equipment including pipelines, fittings, flanges, valves, pumps and supports were also examined and visually inspected during this period. The results of the ultrasonic thickness measurements taken are shown in Appendix A. The following comments are made in conjunction with the EPA requirements:

1. <u>Tank Systems Description</u>

   A. The Siemens Industry, Inc. identification numbers for the tanks are T-1, T-2, T-5, and T-6. Each tank is 10'-0" in diameter with a 16'-0" straight side wall height, 8'-0" high nominal 62° bottom cone and umbrella roof (top head). Dimensioned drawings of the tanks are provided in Appendix A.

   B. All tanks are located outdoors on the east side of the control room and warehouse building. Each tank is supported by a carbon steel skirt and anchored to a common, elevated support structure. A caged ladder is installed on each tank for access to the roof.

   The tanks and support structure are located within a secondary containment area that has sumps routed to the recycle water storage tank T-9 (not part of this evaluation). A portion of the tank system piping is also within this secondary containment area. The recycle water pumps, tank T-9 and the remainder of the tank system piping are located outside of the secondary containment area.

   C. The material of construction for the roof, cylindrical side wall and conical bottom of all tanks is 300 series stainless steel, specific grade unknown.

   The material of construction for the stiffener rings and support skirt on all tanks is carbon steel. The exposed surfaces of the stiffener angle rings and both sides of the support skirt for each tank are painted.

The material of construction for pipelines and valves used for spent carbon slurry transport is stainless steel, grade 316L.

D. All four tanks were fabricated by Wyatt M&B Works, Inc. in 1956 and put into service at Parker, AZ facility during August of 1992.

E. All tanks operate at atmospheric pressure and at a maximum temperature of 150°F; therefore, the ASME code stamp is not required. A 4-inch diameter vent is provided on the roof of each tank and connected by CPVC piping to a common granular activated carbon (GAC) adsorption system (WS-1) for VOC control. A 3-inch diameter pressure relief safety valve with vacuum breaker is also installed on the roof of each tank. All of these safety valves are set at 8 ounces for pressure relief and at 6 ounces to break the vacuum.

F. Each spent carbon storage tank has a design capacity of 8,319 gallons (31.49 cubic meters). A high carbon level sensor is located 4'-6" below the top of the cylindrical wall for each tank. An automatic safety valve on each of the two spent carbon unloading hoppers cuts off feed to the eductor system when spent carbon reaches the level sensor to ensure each of the tanks cannot be filled above the high level sensor. A 4" diameter overflow nozzle is located 1'-2" below the top of the cylindrical wall for each tank and directs excess recycle water to tank T-9 by gravity piping.

G. The design standards and construction drawings for the tanks and ancillary equipment are not available.

2. <u>Characteristics of Stored Chemicals and Compatibility with Tank Materials</u>

A. The spent carbon storage tanks (T-1, T-2, T-5, and T-6) are used to store spent activated carbon and recycle water in slurry form. The material is transferred into and out of the tanks by using eductors and a recycle water pump with a discharge pressure of approximately 85 psig.

The recycle water is maintained at a neutral pH (between 6 and 8) to minimize the corrosion.

B. The spent activated carbon stored in these tanks is contaminated with various chemicals in low concentration, as listed in Appendix B. The waste contaminants on the spent carbon treated at this facility vary in the range from < 1 to 300,000 ppmwd on average.

C. The spent carbon storage tanks are constructed of 300 series stainless steel, specific grade unknown, resistant to all of the chemicals listed in Appendix B, and not susceptible to corrosion.

All four tanks were internally lined with Plasite 7122 HAR during the construction phase of this plant prior to startup during August of 1992. The Plasite lining is a cross-linked epoxy-phenolic cured with an alkaline curing agent. Although originally installed for its resistance to abrasion and a wide range of chemicals (acids, alkalis, and solvents), the Plasite lining is not required to protect the tank systems since 300 series stainless steel is compatible with all of the waste codes and hazardous constituents listed in Appendix B. Portions of the lining have likely been damaged during tank maintenance activities or worn away due to abrasion since the tanks were put into service; the existing condition and integrity of any remaining Plasite lining is unknown.

D. All pipelines, valves and fittings used for the transfer of the spent carbon and recycle water slurry are constructed of stainless steel, grade 316L, resistant to all of the chemicals listed in Appendix B, and not susceptible to corrosion.

3. <u>Results of Ultrasonic Testing and Visual Inspection</u>

A. To check the integrity of the tanks, ultrasonic testing (U/T) was performed on the exterior surfaces of the cylindrical wall, umbrella roof, cone bottom and support skirt for each tank to measure the shell thickness. Shell and cone bottom thickness readings were taken at a height of every two feet on each 90° quadrant. The results of the thickness readings obtained for tanks T-1, T-2, T-5, and T-6 are tabulated in Appendix A.

A Model NDT-715 ultrasonic thickness gauge (s/n 733351) and 5.0MHz dual element transducer (s/n AG766) were used for all thickness measurements; the manufacturer's calibration data for this test equipment are provided in Appendix A. Prior to each use (whenever the instrument was turned on) the sound-velocity for the material to be measured was set (0.233 in/μ-sec for carbon steel and 0.223 in/μ-sec for stainless steel) and a probe zero conducted. To ensure the accuracy of all measurements, no thickness reading was recorded unless at least 6 of 8 bars were displayed by the gauge's Stability Indicator. Paint was removed from the test areas on the support skirt of each tank prior to thickness measurements.

B. All four tanks were visually inspected from the exterior during plant operation and the following observations recorded:

1) Tank T-1

The tank's exterior surfaces and weld seams are in good condition with the exception of several small areas located adjacent to welds for carbon steel attachments where minor pitting and slight corrosion attack was evident. An area approximately 12" high x 8" wide is dented slightly inward at the 2-foot elevation on the west side of the cylindrical shell above a nozzle with a blanked off carbon steel elbow and valved city water piping connection. Two unused swirl jet nozzles located on the lower east side of the cylindrical shell are blanked off with carbon steel blind flanges. A carbon steel plate approximately 4" in diameter is welded to the cylindrical shell at the 8.5-foot elevation for closure of a nozzle that was previously removed. Four carbon steel support brackets, no longer in use have been cut off from the north side of the cylindrical shell but not completely removed by grinding. Unused nozzles and inspection/access ports on the top head of tank T-1 are sealed with stainless steel caps and carbon steel blind flanges.

As previously reported in the 1994 Tank Assessment, the two carbon steel stiffener angle rings (2-1/2" x 2-1/2" x 1/4") located at the bottom and 8-foot elevation on the cylindrical shell are corroded. In several areas, portions of the top horizontal flange on both stiffeners are disconnected from the remainder of the angle at the 90° bend. At other locations, the stiffeners are corroded at the bottom of the vertical flange of the angle. However, in all locations for both angle stiffeners at least 50% of the original material remains intact and the structural analyses performed (based upon a 2" x 1/4" flat bar) indicate they have sufficient strength. Exposed surfaces of the two stiffener angle rings and both sides of the support skirt are painted.

The minimum shell thickness for tank T-1 was determined to be 0.180 inches at the 0-foot elevation on the west side of the cylindrical shell.

2) Tank T-2

The tank's outside surfaces and weld seams are in good condition with the exception of slight corrosion attack in a few small areas located adjacent to carbon steel attachments on the shell. An area approximately 6" wide is dented slightly inward at the 10-foot elevation on the south side of the cylindrical shell. A carbon steel plate approximately 4" in diameter is welded to the cylindrical shell at the 8.5-foot elevation for closure of a nozzle that was previously removed. A carbon steel blind flange is used to blank off an unused nozzle located on the lower east side of the tank. Two swirl jet nozzles on the lower west side of the cylindrical shell are connected to the recycle water supply piping. Nozzles and inspection/access ports on the top head of tank T-2 are sealed with stainless and carbon steel blind flanges.

As previously reported in the 1994 Tank Assessment, the two carbon steel stiffener angle rings (2-1/2" x 2-1/2" x 1/4") located at the bottom and 8-foot elevation on the cylindrical shell are corroded. In several areas, portions of the top horizontal flange on both stiffeners are disconnected from the remainder of the angle at the 90° bend. At other locations, the stiffeners are corroded at the bottom of the vertical flange of the angle. However, in all locations for both angle stiffeners at least 50% of the original material remains intact and the structural analyses performed (based upon a 2" x 1/4" flat bar) indicate they have sufficient strength. Exposed surfaces of the two stiffener angle rings and both sides of the support skirt are painted.

The minimum shell thickness for tank T-2 was determined to be 0.183 inches at the 0.5-foot elevation on the north side of the cylindrical shell.

3) Tank T-5

The tank's exterior surfaces and weld seams are in good condition with the exception of several small areas located adjacent to welds for carbon steel attachments where minor pitting and slight corrosion attack was evident. A carbon steel plate approximately 4" in diameter is welded to the cylindrical shell at the 8.5-foot elevation for closure of a nozzle that was previously removed. A carbon steel blind flange is used to blank off an unused nozzle located on the lower west side of the cylindrical shell. Two swirl jet nozzles located on the lower south side of the cylindrical shell are connected to the recycle water supply piping. Nozzles and inspection/access ports on the top head of tank T-5 are sealed with stainless and carbon steel blind flanges.

As previously reported in the 1994 Tank Assessment, the two carbon steel stiffener angle rings (2-1/2" x 2-1/2" x 1/4") located at the bottom and 8-foot elevation on the cylindrical shell are corroded. In several areas, portions of the top horizontal flange on both stiffeners are disconnected from the remainder of the angle at the 90° bend. At other locations, the stiffeners are corroded at the bottom of the vertical flange of the angle. However, in all locations for both angle stiffeners at least 50% of the original material remains intact and the structural analyses performed (based upon a 2" x 1/4" flat bar) indicate they have sufficient strength. Exposed surfaces of the two stiffener angle rings and both sides of the support skirt are painted.

The minimum shell thickness for tank T-5 was determined to be 0.167 inches on the south side of the cone bottom at location 1, approximately 1-foot below the cone/cylinder intersection.

4) Tank T-6

The tank's outside surfaces and weld seams are in good condition with the exception of slight corrosion attack in a few small areas located adjacent to carbon steel attachments on the shell. A stainless steel plate approximately 4" in diameter is welded to the cylindrical shell at the 8.5-foot elevation for closure of a nozzle that was previously removed. A stainless steel blind flange is used to blank off an unused nozzle located on the lower east side of the cylindrical shell. Two swirl jet nozzles located on the lower south side of the cylindrical shell are connected to the recycle water supply piping. Two small rectangular stainless steel patches are welded to the cylindrical shell at 1.3 and 2.5-foot elevations on both the northeast and southwest sides of the tank. The patches range in size from 5" x 5" to 9" x 9" and were used to close holes previously created to aid in raising and supporting the tank during the repair of the bottom cone. Nozzles and inspection/access ports on the top head of tank T-6 are sealed with stainless and carbon steel blind flanges.

The original bottom cone section of tank T-6 has been replaced with a new cone fabricated from 1/4" thick type 304 stainless steel. The bottom three quarters of the old cone was removed and the new cone continuously seal welded to the remaining upper portion of the original cone from the inside of the tank.

As previously reported in the 1994 Tank Assessment, the two carbon steel stiffener angle rings (2-1/2" x 2-1/2" x 1/4") located at the bottom and 8-foot elevation on the cylindrical shell are corroded. In several areas, portions of the top horizontal flange on both stiffeners are disconnected from the remainder of the angle at the 90° bend. At other locations, the stiffeners are corroded at the bottom of the vertical flange of the angle. However, in all locations for both angle stiffeners at least 50% of the original material remains intact and the structural analyses performed (based upon a 2" x 1/4" flat bar) indicate they have sufficient strength. Exposed surfaces of the two stiffener angle rings and both sides of the support skirt are painted.

The minimum shell thickness for tank T-6 was determined to be 0.176 inches at the 16-foot elevation on the east side of the cylindrical shell.

5) Additional Information

Each tank is supported by a carbon steel skirt and anchored to an elevated structure at eight locations using 1-inch diameter structural grade bolts and nuts. The columns of the elevated support structure for the tanks are grounded by connection to underground grounding cable grids located beneath the secondary containment pad.

No structural defects, settling or distortion of the elevated support structure or foundation for the tank systems was observed.

The bottom of each of the four T-tanks are located approximately 6'- 0" above the secondary containment pad. The bottom of each of the six support columns for elevated structure are located 1' - 4" above the secondary containment pad. None of the external tank shells or any external metal component of the tank system is in contact with soil or water.

The existing pressure/vacuum relief valves for tanks T-1, T-2, T-5, and T-6 were replaced with new valves on May 11, 2011. The new valves (same model and type) are set at 8 ounces for pressure relief and at 6 ounces to break the vacuum.

Two new carbon steel vacuum stiffener angle rings (2-1/2" x 2-1/2" x 3/16") were attached to the cylindrical shell of each tank approximately 21-1/2" above the location of the original stiffeners. Installation and painting of the new stiffeners on the four tanks was completed on June 29, 2011.

D. Ancillary Equipment

1) The nozzle connections and piping for spent carbon slurry, recycle water, city water and vent were carefully examined during the inspection of each tank system and indicated no leaks.

2) Each of the two recycle water pumps (located adjacent to tank T-9 and outside of the secondary containment area) were found to leak at the packing seal for the pump drive shaft during operation. The leaks are intentional and comprised of city water used for cooling and flushing the seal gland of each pump.

3) The exterior surfaces of stainless steel pipelines and fittings are not painted and showed no signs of corrosion.

4) Pipelines are supported throughout by hanger supports and steel bridge supports, and are guided using "U" bolts.

4. <u>Structural Calculations</u>

A. A finite element analysis (FEA) of the tanks was performed for the operating condition (1.5 specific gravity slurry to fill line) and based on the minimum shell metal thicknesses measured for each of the major components (top head, cylindrical wall and bottom cone) on any of the four tanks with wind and seismic loadings calculated from the latest edition of the International Building Code. The calculated FEA stress results are all less than allowable stresses from AWWA D100-05.

In addition to the FEA/AWWA evaluation, a second analysis was performed base on the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1. The Section VIII, Division 1 analysis was conservatively based on an internal pressure of 15 psig plus the hydrostatic pressure of the spent carbon slurry and shows that the basic Code limits are satisfied.

A complete copy of the structural calculations and analyses is provided in Appendix C. Both analyses demonstrate that tanks T-1, T-2, T-5 and T-6 are acceptable for the atmospheric storage of spent carbon slurry.

Stresses due to seismic loading are higher than the stresses from wind loading, but the seismic stresses for the tanks are well below the allowable limits and relatively low when compared to those attributable to the weight/hydrostatic pressure. The structural analyses indicate that the critical component is the thickness of the cylindrical side wall of the tank at the cone/cylinder intersection where the hydrostatic loading produces a localized compressive hoop stress of 6,126 psi, which is 85% of the allowable local buckling stress of 7,209 psi (from AWWA D100-05) for a 10' - 0" diameter cylindrical wall that is 0.176" thick.

Note that the minimum actual thicknesses of the cylindrical wall for each of the four tanks at the cone/cylinder intersection is greater than the 0.176" thickness used in the FEA calculations as follows: 0.180" (T-1), 0.190" (T-2), 0.192" (T-5) and 0.208" (T-6). Since the allowable local buckling compressive stress is a function of the cylindrical wall thickness/radius ratio, the allowable stress at the cone/cylinder intersection for each tank increases such that the actual stress of 6126 psi calculated for the operating condition ranges from 73% to 80% of the allowable local buckling stress from AWWA D100-05.

For any of the four tanks, the maximum allowable stress at the cone/cylinder intersection will be equal to the calculated compressive stress if the cylindrical shell wall thickness decreases to 0.157" at that location. The maximum decrease in the tank cylindrical shell wall thicknesses since the 1993 measurements was found to be 0.028" (on the west side of T-2 at 2' elevation) and yields a maximum "thinning" rate 0.00156" per year. If the thickness of the T-1 cylindrical shell at the cone/cylinder intersection decreases at this accelerated rate, the remaining useful life of T-1 would be 15 years.

B. The corroded vacuum stiffener ring located at the bottom of the cylindrical shell of each tanks is adequate for the shell to cone junction reinforcement. The calculations are based on 2" x 1/4" flat bars in lieu of the two corroded 2-1/2" x 2-1/2" x 1/4" stiffener angles on each tank.

C. Piping drawings showing the thicknesses, layout dimensions, and the supports are not available, but based upon visual inspection, excessive stresses due to thermal expansion, settlement, and vibrations were not observed. All pipelines appeared adequately supported and guided. Therefore the piping systems do not appear to cause any threat of leakage.

D. All tanks are supported on the elevated structure, which was designed by LuMar Engineering Co. of Pasadena, California. The structural and foundation drawings are provided in Appendix D.

Each of tanks T-1, T-2, T-5, and T-6 are supported by a continuous skirt support which give uniform load distribution to the W12x26, W21x44, and W24x55 braced beams by means of eight point loads and all structural columns are supported on a mat foundation that is 2' - 6" deep per the LuMar drawings.

Based upon the absence of any observed defects, settling or distortion of the elevated support structure or foundation that have been in continuous service since 1994, the structural support and foundation for the tanks appear to be adequate.

5. <u>Deficiencies</u>

No deficiencies that would compromise the integrity of the tanks for the atmospheric storage of spent carbon slurry were found.

6. <u>Recommendations</u>

A. Continue daily monitoring and visual inspections of the spent carbon storage tanks and ancillary equipment for compliance with RCRA requirements.

B. Conduct annual ultrasonic thickness testing at the bottom of the cylindrical wall above the cone/cylinder intersection and at the previous locations of minimum shell thickness readings for each major component (top head, cylindrical wall, bottom cone and support skirt) on each of the four tanks.

C. Conduct comprehensive ultrasonic thickness testing every 5 years for each major component (top head, cylindrical wall, bottom cone and support skirt) on each of tanks T-1, T-2, T-5, and T-6.

D. Remove from service and repair or replace any tank with a cylindrical wall thickness that is less than or equal to 0.157 inches.

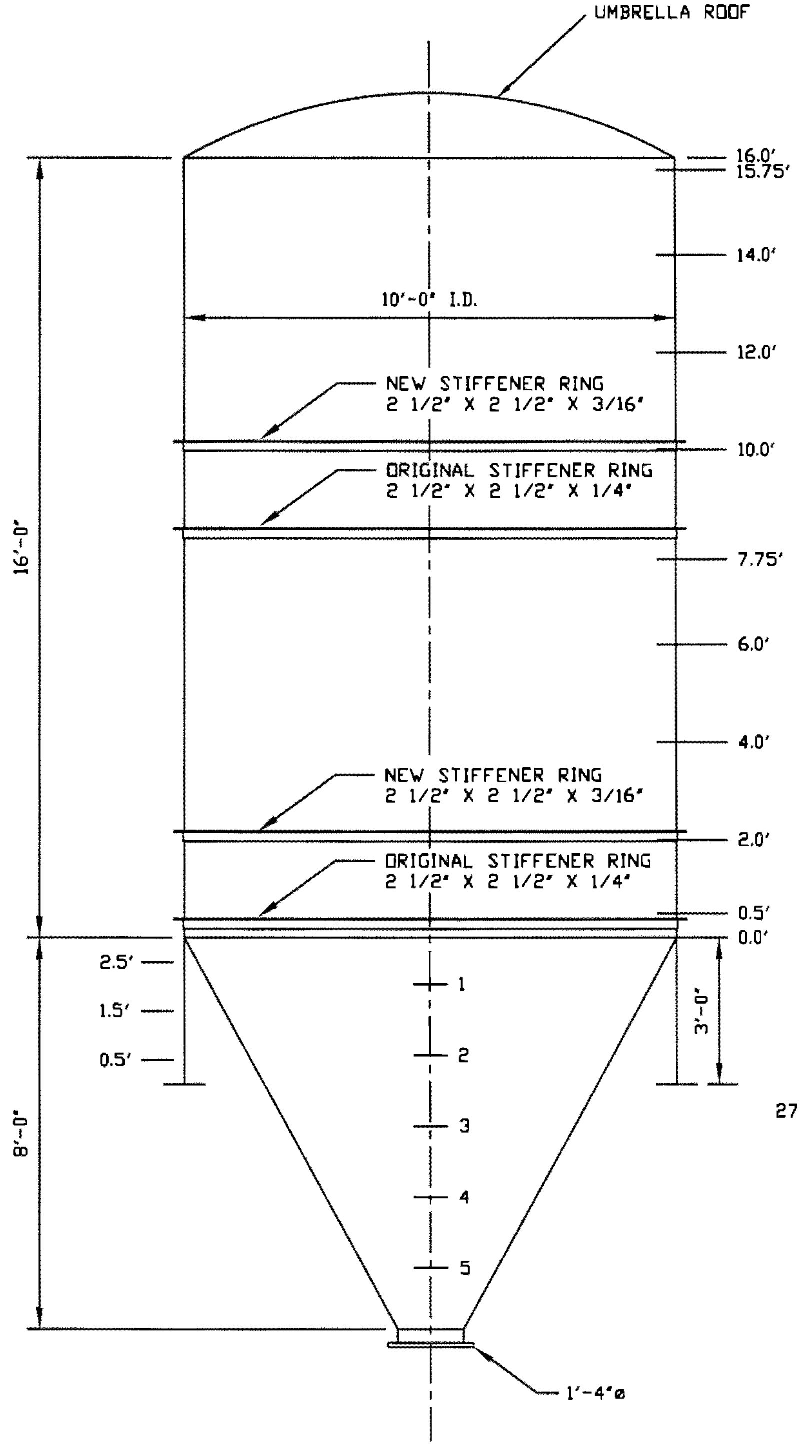
E. Maintain paint coating on exterior surfaces of all tank system components that are carbon steel by repainting if visual observation indicates that 20% or greater of the components paint coating is damaged.

F. Replace all carbon steel components and fittings of the tank system that are in direct contact with the spent carbon and recycle water slurry with 300 series stainless steel components and fittings prior to performing the next set of comprehensive ultrasonic thickness testing measurements.

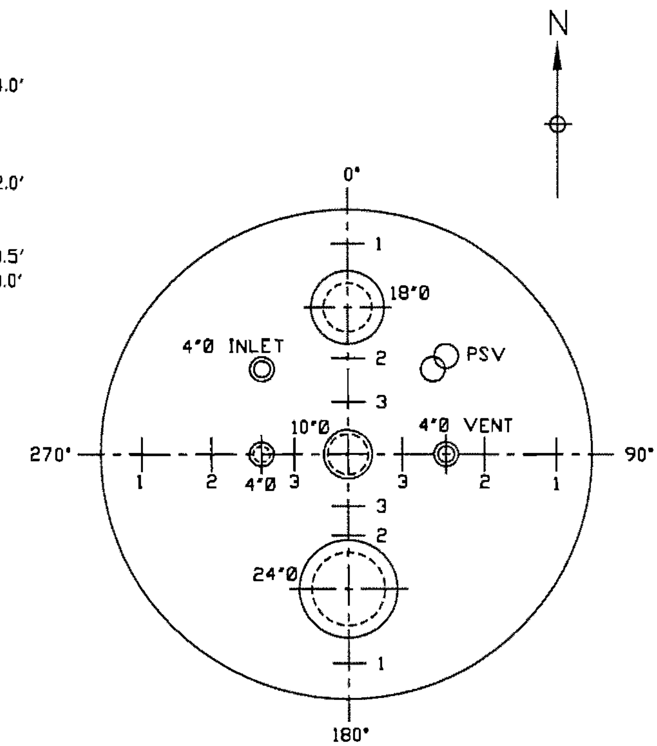
APPENDIX A

TANK DIAGRAMS
AND
ULTRASONIC TEST
READINGS

TANK NO: T-1



SHELL ELEVATION



ROOF - TOP VIEW

2'-0"

TANK ELEVATION AND ORIENTATION FOR U/T READINGS TANK T-1						
DRAWN		CHECKED		APPROVED		
	DATE		DATE		DATE	
JBE	10/24/11	KEM	10/24/11	KEM	10/24/11	
SCALE 1/4"=1'-0"	DWG. NO. 1541-SK-11001					REV. 0

NO	DWN	CK'D	APP	REVISIONS	DATE

CBE CHAVOND-BARRY ENGINEERING CORP.
NJ Certificate of Authorization Number: 24GA27984700
400 Route 518 • P.O. Box 205 • Blawenburg, New Jersey 08504

SIEMENS INDUSTRY, INC.
2523 MUTAHAR STREET
PARKER, ARIZONA 85344

Apr 17, 2012 - 3:05pm

SIEMENS INDUSTRY, INC.
PARKER, ARIZONA
TANK INSPECTION
CBE - February 2011

TANK NO: **T-1**
SERVICE: Spent Carbon Storage Tank
LOCATION: Outdoors on elevated structure,
NW quadrant of secondary containment

CYLINDRICAL SHELL U/T READINGS TAKEN OUTSIDE (INCHES)				
ELEV. (FT)	0° (North)	90° (East)	180° (South)	270° (West)
0.0	0.186	N/A	N/A	**0.180**
0.5	0.189	0.192	0.190	0.184
2.0	0.207	0.222	0.198	0.200
4.0	0.207	0.208	0.196	0.208
6.0	0.204	0.203	0.196	0.193
7.75	0.191	0.200	0.183	0.193
10.0	0.209	0.221	0.197	0.201
12.0	0.218	0.195	0.200	0.204
14.0	0.218	0.191	0.191	0.193
15.75	0.191	0.191	0.198	0.187
16.0	0.193	0.200	0.201	0.185

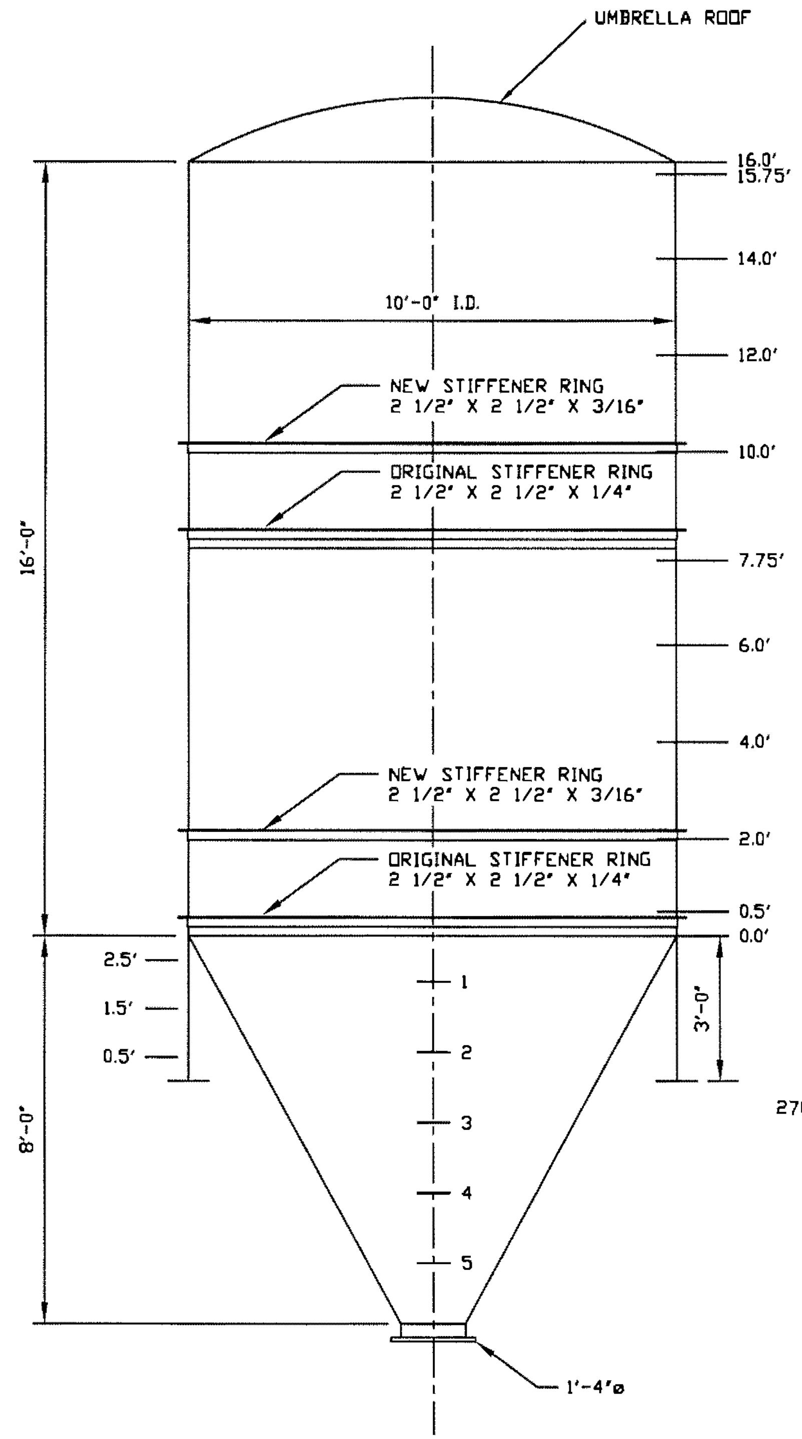
CONICAL BTM U/T READINGS TAKEN OUTSIDE (INCHES)				
LOCATION	0° (North)	90° (East)	180° (South)	270° (West)
1	0.190	0.200	0.194	0.197
2	0.195	0.196	0.194	0.194
3	0.190	0.204	0.196	0.200
4	.199/**.189**	0.192	0.192	**0.189**
5	0.188	0.193	0.195	0.186

TOP UMBRELLA ROOF HEAD U/T READINGS TAKEN OUTSIDE (INCHES)				
LOCATION	0° (North)	90° (East)	180° (South)	270° (West)
1	0.184	0.186	0.188	0.186
2	.187/.187	0.185	.186/.200	0.193
3	**0.183**	0.187	0.198	0.184

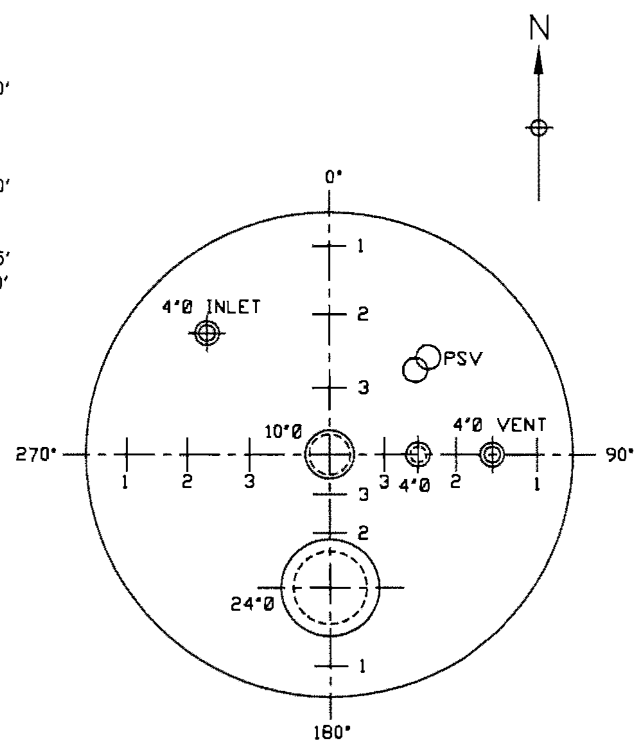
SKIRT U/T READINGS TAKEN OUTSIDE (INCHES)				
ELEV. (FT)	0° (North)	90° (East)	180° (South)	270° (West)
0.5	0.254	0.250	0.247	**0.243**
1.5	0.249	0.249	0.269	**0.243**
2.5	0.251	0.255	0.253	0.263

U/T = ULTRASONIC TESTING

TANK NO: T-2



SHELL ELEVATION



ROOF - TOP VIEW

TANK ELEVATION AND ORIENTATION FOR U/T READINGS TANK T-2			
DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
JBE	10/24/11	KEM	10/24/11	KEM	10/24/11
SCALE 1/4"=1'-0"	DWG. NO. 1541-SK-11002	REV. 0			

NO	DWN	CK'D	APP	REVISIONS	DATE

CBE CHAVOND-BARRY ENGINEERING CORP.
NJ Certificate of Authorization Number: 24GA27984700
400 Route 518 • P.O. Box 205 • Blawenburg, New Jersey 08504

SIEMENS INDUSTRY, INC.
2523 MUTAHAR STREET
PARKER, ARIZONA 85344

SIEMENS INDUSTRY, INC.
PARKER, ARIZONA
TANK INSPECTION
CBE - February 2011

TANK NO: **T-2**
SERVICE: Spent Carbon Storage Tank
LOCATION: Outdoors on elevated structure
NE quadrant of secondary containment

CYLINDRICAL SHELL U/T READINGS TAKEN OUTSIDE (INCHES)				
ELEV. (FT)	0° (North)	90° (East)	180° (South)	270° (West)
0.0	0.190	0.190	0.193	N/A
0.5	**0.183**	0.190	0.202	0.197
2.0	0.196	0.206	0.208	0.193
4.0	0.205	0.218	0.226	0.204
6.0	0.189	0.201	0.216	0.193
7.75	0.181	0.194	0.194	0.187
10.0	0.210	0.216	0.208	0.207
12.0	0.231	0.214	0.212	0.220
14.0	0.205	0.213	0.207	0.213
15.75	0.190	0.206	0.196	0.196
16.0	0.194	0.203	0.192	0.196

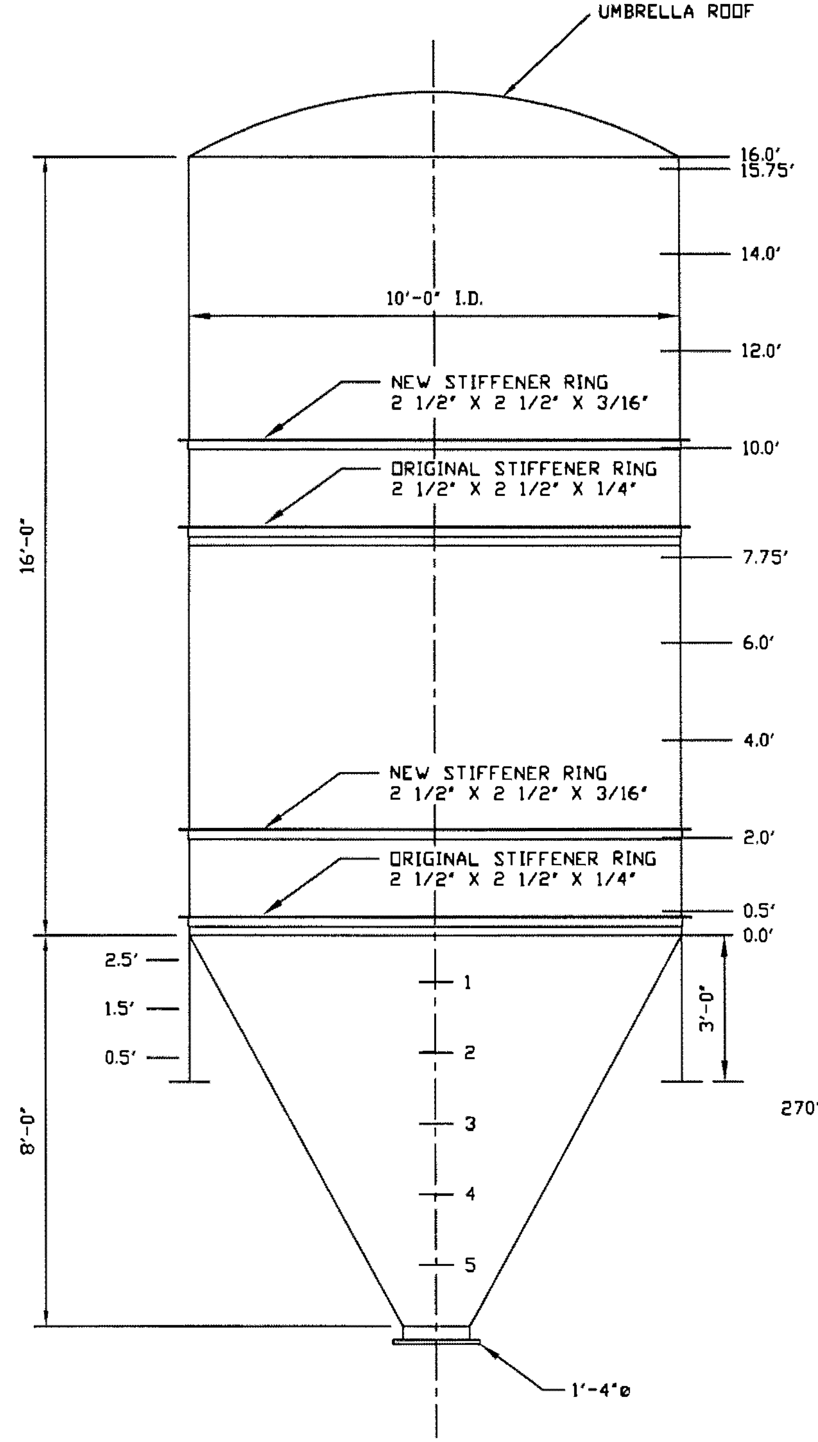
CONICAL BTM U/T READINGS TAKEN OUTSIDE (INCHES)				
LOCATION	0° (North)	90° (East)	180° (South)	270° (West)
1	0.201	0.202	0.208	0.191
2	.200/.192	0.205	0.203	0.192
3	0.199	0.197	0.203	**0.190**
4	0.202	0.196	0.196	**0.190**
5	0.196	0.197	0.204	0.192

TOP UMBRELLA ROOF HEAD U/T READINGS TAKEN OUTSIDE (INCHES)				
LOCATION	0° (North)	90° (East)	180° (South)	270° (West)
1	0.189	0.189	0.190	0.193
2	**0.188**	.197/.193	.188/.193	0.199
3	0.189	0.200	0.208	0.196

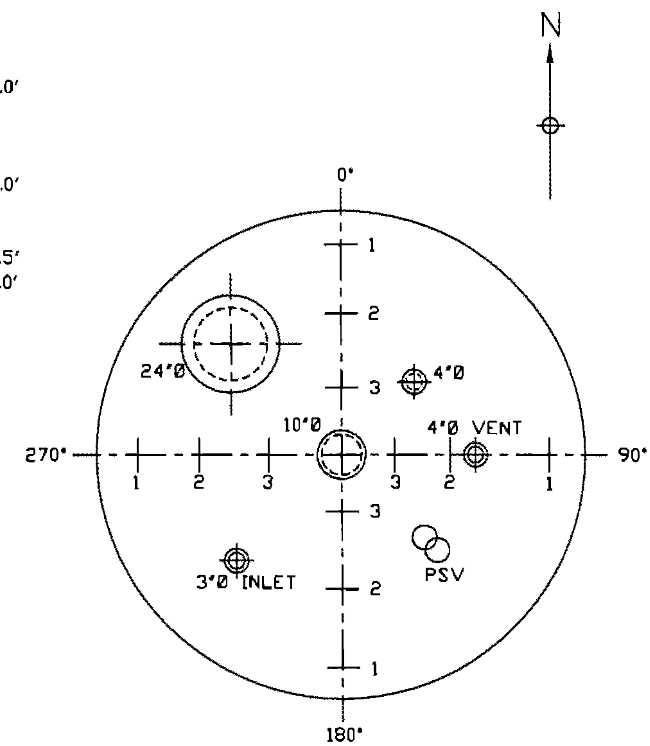
SKIRT U/T READINGS TAKEN OUTSIDE (INCHES)				
ELEV. (FT)	0° (North)	90° (East)	180° (South)	270° (West)
0.5	0.245	0.277	0.255	0.252
1.5	0.243	**0.238**	0.257	0.253
2.5	0.247	0.243	0.259	0.248

U/T = ULTRASONIC TESTING

TANK NO: T-5



SHELL ELEVATION



ROOF - TOP VIEW

2'

TANK ELEVATION AND ORIENTATION FOR U/T READINGS TANK T-5					
DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
JBE	10/24/11	KEM	10/24/11	KEM	10/24/11
SCALE 1/4"=1'-0"	DWG. NO. 1541-SK-11003			REV. 0	

NO	DWN	CK'D	APP	REVISIONS	DATE

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NJ Certificate of Authorization Number: 24GA27984700
400 Route 518 • P.O. Box 205 • Blawenburg, New Jersey 08504

SIEMENS INDUSTRY, INC.
2523 MUTAHAR STREET
PARKER, ARIZONA 85344

Apr 17, 2012 - 3:09pm

SIEMENS INDUSTRY, INC.
PARKER, ARIZONA
TANK INSPECTION
CBE - February 2011

TANK NO: **T-5**
SERVICE: Spent Carbon Storage Tank
LOCATION: Outdoors on elevated structure
SW quadrant of secondary containment

CYLINDRICAL SHELL U/T READINGS TAKEN OUTSIDE (INCHES)				
ELEV. (FT)	0° (North)	90° (East)	180° (South)	270° (West)
0.0	N/A	N/A	N/A	N/A
0.5	0.197	0.192	0.200	0.203
2.0	0.198	0.197	0.214	0.197
4.0	0.201	0.197	0.210	0.205
6.0	0.205	0.199	0.209	0.204
7.75	**0.182**	0.201	0.187	0.189
10.0	0.196	0.192	0.203	0.195
12.0	0.200	0.190	0.207	0.194
14.0	0.201	0.188	0.201	0.194
15.75	0.194	0.190	0.189	0.186
16.0	0.192	0.190	0.192	0.186

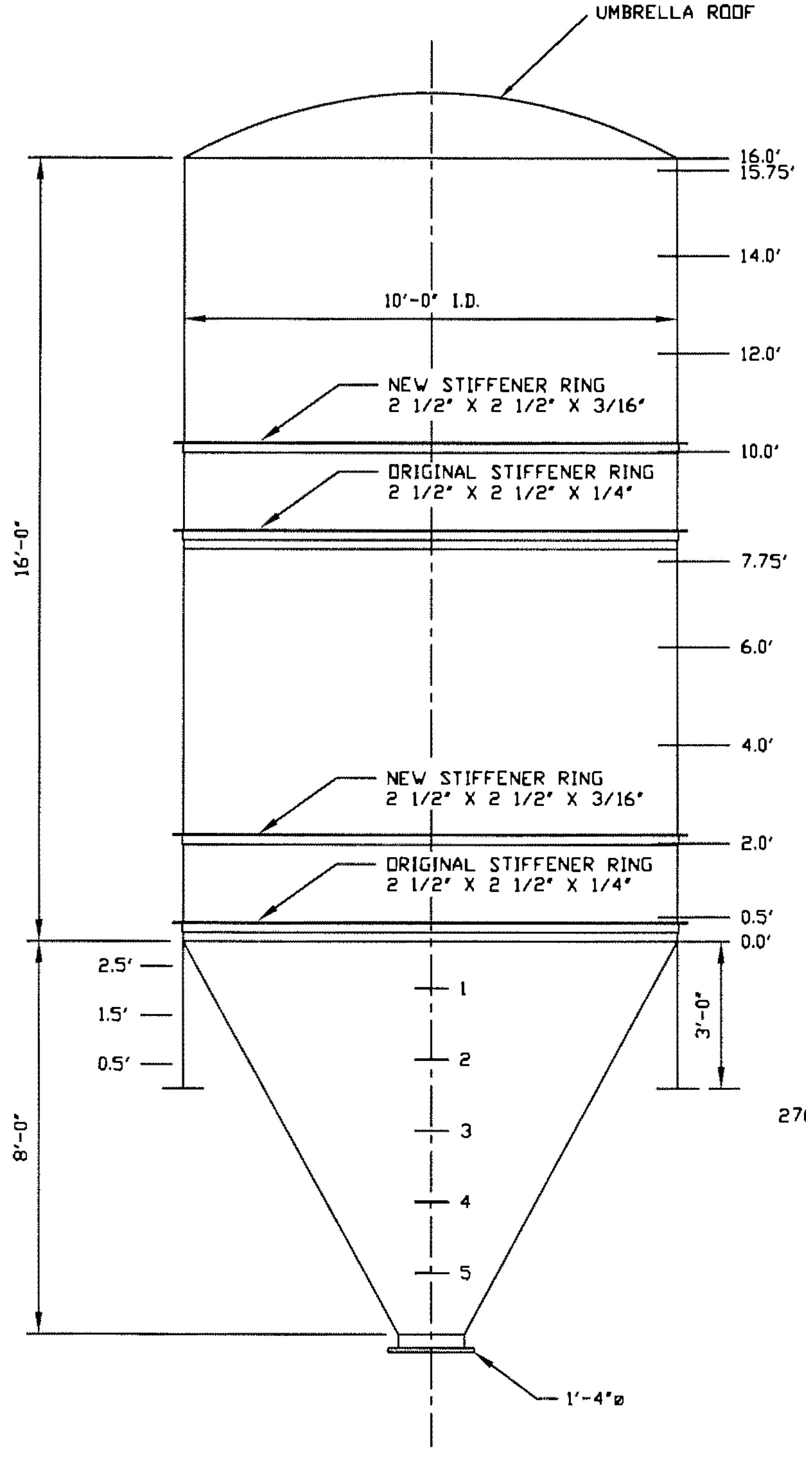
CONICAL BTM U/T READINGS TAKEN OUTSIDE (INCHES)				
LOCATION	0° (North)	90° (East)	180° (South)	270° (West)
1	0.191	0.191	**0.167**	0.186
2	0.192	0.190	0.181	0.190
3	0.188	0.192	0.180	0.184
4	0.186	0.190	0.182	0.188
5	0.185	0.185	0.183	0.188

TOP UMBRELLA ROOF HEAD U/T READINGS TAKEN OUTSIDE (INCHES)				
LOCATION	0° (North)	90° (East)	180° (South)	270° (West)
1	**0.188**	0.192	0.191	0.192
2	0.190	0.192	0.190	0.190
3	0.193	**0.188**	0.189	0.196

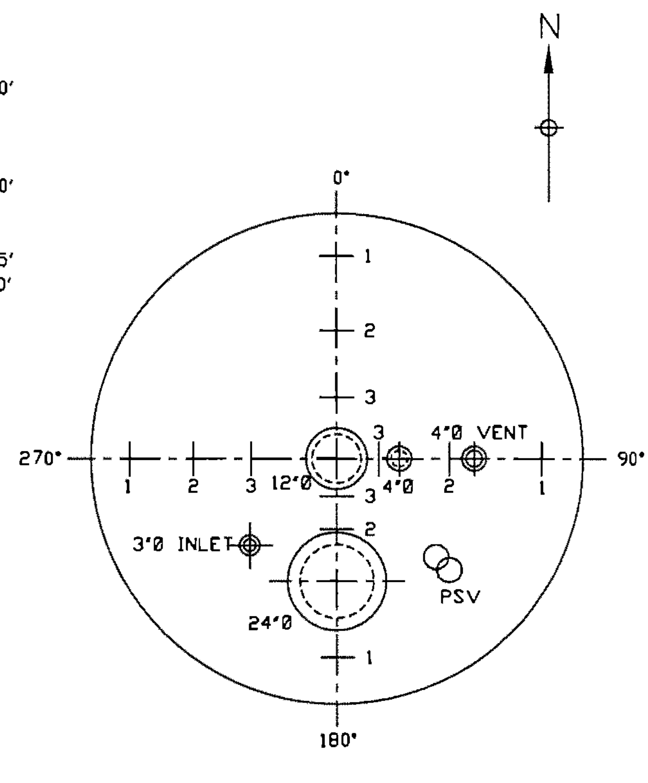
SKIRT U/T READINGS TAKEN OUTSIDE (INCHES)				
ELEV. (FT)	0° (North)	90° (East)	180° (South)	270° (West)
	2011	*2011*	*2011*	*2011*
0.5	**0.237**	0.253	0.260	0.256
1.5	0.240	0.251	0.257	0.255
2.5	**0.237**	0.253	0.255	0.251

U/T = ULTRASONIC TESTING

TANK NO: T-6



SHELL ELEVATION



ROOF - TOP VIEW

2'

TANK ELEVATION AND ORIENTATION FOR U/T READINGS TANK T-6					
DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
JBE	10/24/11	KEM	10/24/11	KEM	10/24/11
SCALE 1/4"=1'-0"	DWG. NO. 1541-SK-11004				REV. 0

NO	DWN	CK'D	APP	REVISIONS	DATE

CBE CHAVOND-BARRY ENGINEERING CORP.
NJ Certificate of Authorization Number: 24GA27984700
400 Route 518 • P.O. Box 205 • Blawenburg, New Jersey 08504

SIEMENS INDUSTRY, INC.
2523 MUTAHAR STREET
PARKER, ARIZONA 85344

Apr 17, 2012 - 3:11pm

SIEMENS INDUSTRY, INC.
PARKER, ARIZONA
TANK INSPECTION
CBE - February 2011

TANK NO:	**T-6**
SERVICE:	Spent Carbon Storage Tank
LOCATION:	Outdoors on elevated structure SE quadrant of secondary containment

CYLINDRICAL SHELL U/T READINGS TAKEN OUTSIDE (INCHES)				
ELEV. (FT)	0° (North)	90° (East)	180° (South)	270° (West)
0.0	0.208	0.222	N/A	N/A
0.5	0.192	0.180	0.197	0.195
2.0	0.206	0.193	0.200	0.200
4.0	0.202	0.202	0.199	0.208
6.0	0.202	0.194	0.196	0.208
7.75	0.196	0.189	0.200	0.198
10.0	0.194	0.198	0.199	0.199
12.0	0.210	0.204	0.212	0.203
14.0	0.202	0.202	0.210	0.200
15.75	0.182	0.184	0.202	0.196
16.0	0.178	**0.176**	0.195	0.202

CONICAL BTM U/T READINGS TAKEN OUTSIDE (INCHES)**				
LOCATION	0° (North)	90° (East)	180° (South)	270° (West)
	2011	*2011*	*2011*	*2011*
1	0.198	0.195	0.212	**0.191**
2	0.382	0.380	0.383	0.381
3	0.383	0.386	0.386	0.379
4	0.384	0.400	0.380	0.382
5	0.386	0.399	0.380	0.377

TOP UMBRELLA ROOF HEAD U/T READINGS TAKEN OUTSIDE (INCHES)				
LOCATION	0° (North)	90° (East)	180° (South)	270° (West)
	2011	*2011*	*2011*	*2011*
1	0.189	0.191	**0.187**	**0.187**
2	0.190	0.222	.193/.189	**0.187**
3	0.190	0.191	0.193	**0.187**

SKIRT U/T READINGS TAKEN OUTSIDE (INCHES)				
ELEV. (FT)	0° (North)	90° (East)	180° (South)	270° (West)
	2011	*2011*	*2011*	*2011*
0.5	0.260	0.255	0.246	0.251
1.5	0.258	0.260	**0.245**	0.249
2.5	0.249	0.251	0.247	0.250

U/T = ULTRASONIC TESTING
** = "new" bottom cone (locations 2-5)

NDT

NDT INTERNATIONAL, INC.
711 S. CREEK ROAD
WEST CHESTER, PA 19382

Tel: 610.793.1700 Fax: 610.793.1702
E-mail: info@ndtint.com

CERTIFICATE of CALIBRATION

Certificate No. UT-0217-11

Customer: Chavond-Barry Engineering Corporation
400 County Road 518
Blawenburg, NJ 08504

Order No. Universal Technical Equipment, Inc.

Instrument: Model NDT-715 Ultrasonic Thickness Gauge, Serial No. 733351

This instrument has been checked and calibrated in accordance with our operational verification procedure NDT-715-STD using the standard ¼″ diameter 5.0 MHz dual element transducer (P/N T-102-2000) provided with this gauge. This instrument meets all range and accuracy requirements (± 0.002″ from 0.040″ to 1.000″ and ±1% greater than 1.000″). An annual calibration cycle is recommended.

Equipment and standards referenced are maintained in accordance with our written procedure controlling measuring and test equipment and to provide traceability to NIST standards.

Steel thickness reference blocks used in this calibration were Serial Numbers 6997, A02295 and 95-6046.

Date of Calibration: February 17, 2011

Verified by:

David L. Kailer, Quality Assurance Manager

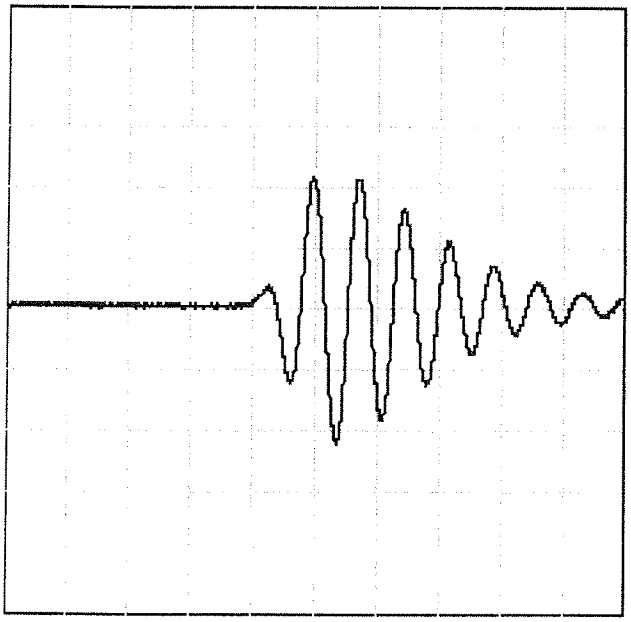
Actual Thickness	Measured Thickness
0.040″	0.042″
0.100″	0.099″
0.200″	0.199″
0.250″	0.250″
0.300″	0.300″
0.400″	0.400″
0.500″	0.500″
0.750″	0.751″
1.000″	1.000″
2.000″	2.004″
4.000″	4.023″
6.000″	6.026″

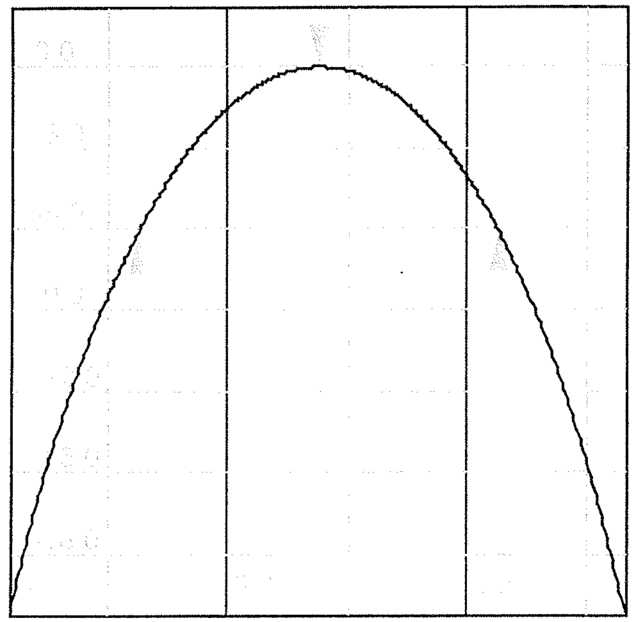
Next calibration is due by February 17, 2012

NOTE: NDT International's Quality program meets the requirements of MIL-STD-45662A.

Dakota Ultrasonics

Transducer Performance Documentation





Transducer Details

Part Number:	T-102-2000
Serial Number:	AG766
Class/Type:	SIDP
Nominal Freq:	5 MHz
Diameter(in):	0.250"
Connector Type:	LEMO 00

Test Conditions

Tester Initials:	CD
Date:	Aug 11, 2010
Test Target:	1.00"
Test Material:	4340 steel
Cable Type:	4' Potted

Measurement Results

Peak Frequency(MHz):	5.4 MHz
-6 dB Bandwidth	1.5 MHz
-6 dB Lo(MHz)	4.6 MHz
-6 dB Hi(MHz)	6.1 MHz
Volts/Div:	500.0 mv
Time/Div:	250.0 ns

Pulser/Receiver Settings

Manufacturer:	Panametrics
Model/Serial:	500PR / 281
Damping:	0
Pulse Height:	high
High Pass Filter:	in
Gain:	45dB

APPENDIX B

HAZARDOUS WASTE CHARACTERISTICS

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
D001	A SOLID WASTE THAT EXHIBITS THE CHARACTERISTIC OF IGNITABILITY
D004	ARSENIC
D005	BARIUM
D006	CADMIUM
D007	CHROMIUM
D008	LEAD
D009	MERCURY
D010	SELENIUM
D011	SILVER
D012	ENDRIN
D013	LINDANE
D014	METHOXYCHLOR
D015	TOXAPHENE
D016	2,4-D
D017	2,4,5-(SILVEX)
D018	BENZENE
D019	CARBON TETRACHLORIDE
D020	CHLORDANE
D021	CHLOROBENZENE
D022	CHLOROFORM
D023	O-CRESOL
D024	M-CRESOL
D025	P-CRESOL
D026	CRESOL
D027	1,4-DICHLOROBENZENE
D028	1,2-DICHLOROETHANE
D029	1,1-DICHLOROETHYLENE
D030	2,4-DITROTOLUENE
D031	HEPTACHLOR (AND ITS EPOXIDE)
D032	HEXACHLOROBENZENE
D033	HEXACHLOROBUTADIENE
D034	HEXACHLOROETHANE
D035	METHYL ETHYL KETONE
D036	NITROBENZENE
D037	PENTRACHLOROPHENOL

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
D038	PYRIDINE
D039	TETRACHLOROETHYLENE
D040	TRICHLOROETHYLENE
D041	2,4,5-TRICHLOROPHENOL
D042	2,4,6-TRICHLOROPHENOL
D043	VINYL CHLORIDE
F001	SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLOROETHYLENE, METHYLENE CHLORIDE, 1,1,1 TRICHLOROETHANE, CARBON TETRACHLORIDE, CHLORINATED FLUOROCARBONS; AND MIXTURES/BLENDS CONTAINING A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) BEFORE USE OF ONE OR MORE OF THE ABOVE SOLVENTS OR SOLVENTS LISTED IN F002, F004 AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF SPENT SOLVENTS AND MIXTURES
F002	TETRACHLOROETHYLENE, METHYLENE CHLORIDE, TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE, CHLOROBENZENE, 1,1,2-TRICHLOROETHANE; AND MIXTURES/BLENDS CONTAINING A TOTAL OF 10% OR MORE (BY VOLUME) BEFORE USE OF ONE OR MORE OF THE ABOVE SOLVENTS OR SOLVENTS LISTED IN F002, F004 AND F005 AND STILL BOTTOMS FROM RECOVERY OF SPENT SOLVENTS AND MIXTURES
F003	XYLENE, ACETONE ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANANE, METHANOL; MIXTURES/BLENDS OF ABOVE; AND 10% OR MORE (BY VOLUME) OF F001, F002, F004, F005; AND STILL BOTTOMS FROM RECOVERY OF SPENT SOLVENTS
F004	CRESOLS AND CRESYLIC ACID, NOTROBENZENE; SOLVENT MIXTURES/BLENDS OF 10% OR MORE BEFORE USE OF ONE OR MORE OF ABOVE OR F001, F002, F005; STILL BOTTOMS FROM RECOVERY OF SPENT SOLVENTS
F005	TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, 2-NITROPROPANE; MIXTURES/BLENDS OF 10% OR MORE (BY VOLUME) OF ABOVE OR SOLVENTS LISTED IN F001, F002, F004 AND STILL BOTTOMS FROM RECOVERY OF SOLVENTS
F006	WASTEWATER TREATMENT SLUDGES FROM ELECTROPLATING OPERATIONS EXCEPT FROM SULFURIC ACID ANODIZING OF ALUMINUM; TIN PLATING ON CARBON STEEL; ZINC PLATING ON CARBON STEEL; ALUMINUM, ZINC ALUMINUM PLATING ON CARBON STEEL; CLEANING/STRIPPING ASSOCIATED WITH TIN, ZINC AND ALUMINUM PLATING ON CARBON STEEL; AND CHEMICAL ETCHING AND MILLING OF ALUMINUM
F012	QUENCHING WASTEWATER TREATMENT SLUDGES FROM METAL HEAT TREATING OPERATIONS WHERE CYANIDES ARE USED
F019	WASTEWATER TREATMENT SLUDGES FROM CHEMICAL CONVERSION COATING OF ALUMINUM EXCEPT ZIRCONIUM PHOSPHATING IN ALUMINUM CAN WASHING

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
F025	CONDENSED LIGHT ENDS, SPENT FILTERS AND AIDS, SPENT DESICCANT WASTES FROM PRODUCTION OF CERTAIN CHLORINATED ALIPHATIC HYDROCARBONS (HAVING CARBON CHAIN LENGTHS RANGING FROM 1-5 WITH VARYING AMOUNTS AND POSITIONS OF CHLORINE SUBSTITUTION) BY FREE RADICAL CATALYZED PROCESSES.
F035	WASTEWATERS, PROCESS RESIDUALS, PRESERVATIVE DRIPPAGE, AND SPENT FORMULATIONS FORM WOOD PRESERVING PROCESS GENERATED AT PLANTS THAT USE INORGANIC PRESERVATIVES CONTAINING ARSENIC OR CHROMIUM. DOES NOT INCLUDE K001 BOTTOM SEDIMENT SLUDGE FROM TREATMENT OF WASTEWATER FROM WOOD PRESERVING PROCESSES USING CREOSOTE AND/OR PENTACHLOROPHENOL
F037	PETROLEUM REFINERY PRIMARY OIL/WATER/SOLIDS SEPARATION SLUDGE. SLUDGE FROM GRAVITATIONAL SEPARATION OF OIL/WATER/SOLIDS DURING STORAGE OR TREATMENT OF PROCESS WASTEWATERS AND OILY COOLING WASTEWATERS FROM PETROLEUM REFINERIES. (OIL/WATER/SOLIDS SEPARATORS; TANKS AND IMPOUNDMENTS; DITCHES/CONVEYANCES; SUMPS; STORMWATER UNITS. SLUDGES FROM NON-CONTACT ONCE-THROUGH COOLING WATERS, SLUDG3ES FROM AGRESSIVE BIOLOGICAL TREATMENT UNITS, K051 WASTES
F038	PETROLEUM REFINERY SECONDARY (EMULSIFIED) OIL/WATER/SOLIDS SEPARATION SLUDGE-ANY SLUDGE AND/OR FLOAT GENERATED FROM THE PHYSICAL AND/OR CHEMICAL SEPARATION OF OIL/WATER/SOLIDS IN PROCESS WASTEWATERS AND OILY COOLING WASTEWATERS FROM PETROLEUM REFINERIES. SUCH WASTES INCLUDE, BUT ARE NOT LLIMITED TO, ALL SLUDGES AND FLOATS GENERATED IN: INDUCED AIR FLOTATION (IAF) UNITS, TANKS AND IMPOUNDMENTS, AND ALL SLUDGES GENERATED IN DAF UNITS. SLUDGES GENERATED IN STORMWATER UNITS THAT DO NBOT RECEIVE DRY WEATHER FLOW, SLUDGES GENERATED FROM NON-CONTACT ONCE-THROUGH COOLING WATERS SEGREGATED FOR TREATMENT FROM OTHER PROCESS OR OILY COOLING WATERS, SLUDGES AND FLOATS GENERATED IN AGRESSIVE BIOLOGICAL TREATMENT UNITS (INCLUDING SLUDGES AND FLOATS GENERATED IN ONE OR MORE ADDITIONAL UNITS AFTER WASTEWATERS HAVE BEEN TREATED IN AGGRESSIVE GIOLOGICAL TREATMENT UNITS) AND F037,K048, AND K051 WASTES ARE NOT INCLUDED IN THIS LISTING.
F039	LEACHATE FROM DISPOSAL OF MORE THAN ONE RESTRICTED WASTE (HAZARDOUS UNDER SUBPART D; RESULTING FROM THE DISPOSAL OF ONE OR MORE OF EPA HAZARDOUS WASTES: F020, F021, F022, F026, F027, AND/OR F028)
K001	WASTEWATER TREATMENT SLUDGE BOTTOM SEDIMENT THAT USE CREOSOTE AND/OR PENTACHLOROPHENOL
K002	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF CHROME YELLOW AND ORANGE PIGMENTS
K003	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF MOLYBDATE ORANGE PIGMENTS
K004	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF ZINC YELLOW PIGMENTS

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
K005	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF CHROME GREEN PIGMENTS
K006	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF CHROME OXIDE GREEN PIGMENTS (ANHYDROUS AND HYDRATED)
K007	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF IRON BLUE PIGMENTS
K008	OVEN RESIDUE FROM PRODUCTION OF CHROME OXIDE GREEN PIGMENTS
K009	DISTILLATION BOTTOMS FROM THE PRODUCTION OF ACETALDEHYDE FROM ETHYLENE
K010	DISTILLATION SIDE CUTS FROM PRODUCTION OF ACETALDEHYDE FROM ETHYLENE
K014	VICINALS FROM THE PURIFICATION OF TOLUENEDIAMINE IN THE PRODUCTION OF TOLUENEDIAMINE VIA THE HYDROGENATION OF DINITROTOLUENE
K015	STILL BOTTOMS FROM DISTILLATION OF BENZYL CHLORIDE
K016	HEAVY ENDS OR DISTILLATION RESIDUES FROM PRODUCTION OF CARBON TETRACHLORIDE
K017	HEAVY ENDS (STILL BOTTOMS) FROM PURIFICATION COLUMN IN PRODUCTION OF EPICHLOROHYDRIN
K018	HEAVY ENDS FROM FRACTIONATION COLUMN IN ETHYL CHLORIDE PRODUCTION
K019	HEAVY ENDS FORM THE DISTILLATION OF ETHYLENE DICHLORIDE IN ETHYLENE DICHLORIDE PRODUCTION
K020	HEAVY ENDS FROM DISTILLATION OF VINYL CHLORIDE IN VINYL CHLORIDE MONOMER PRODUCTION
K022	DISTILLATION BOTTOM TARS FROM PRODUCTION OF PHENOL/ACETONE FROM CUMENE
K023	DISTILLATION LIGHT ENDS FROM PRODUCTION OF PHTHALIC ANHYDRIDE FROM NAPHTHALENE
K024	DISTILLATION BOTTOMS FROM PRODUCTION OF PHTHALIC ANHYDRIDE FROM NAPHTHALENE
K025	DISTILLATION BOTTOMS FROM THE PRODUCTION OF NITROBENZENEBY THE NITRATION OF BENZENE
K026	STRIPPING STILL TAILS FROM PRODUCTION OF METHY ETHYL PYRIDINES
K029	WASTE FROM PRODUCT STEAM STRIPPER IN PRODUCTION OF 1,1,1-TRICHLOROETHANE
K030	COLUMN BOTTOMS OR HEAVY ENDS FROM COMBINED PRODUCTION OF TRICHLOROETHYLENE AND PERCHLOROETHYLENE
K031	BY-PRODUCT SALTS GENERATED IN PRODUCTION OF MSMA AND CACODYLIC ACID
K032	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF CHLORDANE
K033	WASTEWATER TREATMENT AND SCRUB WATER FROM CHLORINATION OF CYCLOPENTADIENE IN PRODUCTION OF CHLORDANE

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
K034	FILTER SOLIDS FROM FILTRATION OF HEXACHLOROCYCLOPENTADIENE IN PRODUCTION OF CHLORDANE
K035	WASTEWATER TREATMENT SLUDGES GENERATED IN PRODUCTION OF CREOSOTE
K036	STILL BOTTOMS FROM TOLUENE RECLAMATION DISTILLATION IN PRODUCTION OF DISULFOTON
K037	WASTEWATER TREATMENT SLUDGES FROM PRODUCTION DISULFOTON
K038	WASTEWATER FROM WASHING AND STRIPPING OF PHORATE PRODUCTION
K039	FILTER CAKE FROM FILTRATIN OF DIETHYLPHOSPHORODITHIOIC ACID IN PRODUCTION OF PHORATE
K040	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF PHORATE
K041	WASTEWATER TREATMENT SLUDGE FORM PRODUCTION OF TOXAPHENE
K042	HEAVY ENDS OR DISTILLATION RESIDUES FROM DISTILLATION OF TETRACHLOROBENZENE IN PRODUCTION OF 2,4,5-T
K046	WASTEWATER TREATMENT SLUDGES FROM THE MANUFACTURING, FORMULATION AND LOADING OF LEAD-BASED INTIATING COMPOUNDS.
K048	DISSOLVED AIR FLOTATION FLOAT FROM PETROLEUM REFINING INDUSTRY
K049	SLOP OIL EMULSION SOLIDS FROM PETROLEUM REFINING INDUSTRY
K050	HEAT EXCHANGER BUNDLE CLEANING SLUDGE FROM PETROLEUM REFINING INDUSTRY
K051	API SEPARATOR SLUDGE FROM PETROLEUM REFINING INDUSTRY
K052	TANK BOTTOMS (LEADED) FROM PETROLEUM REFINING INDUSTRY
K061	EMISSION CONTROL DUST/SLUDGE FROM PRIMARY PRODUCTION OF STEEL IN ELECTRIC FURNACES
K064	ACID PLANT BLOWDOWN SLURRY/SLUDGE RESULTING FROM THE THICKENING OF BLOWDOWN SLURRY FROM PRIMARY COPPER PRODUCTION
K065	SURFACE IMPOUNDMENT SOLIDS CONTAINED IN AND DREDGED FROM SURFACE IMPOUNDMENTS AT PRIMARY LEAD SMELTING FACILITIES.
K066	SLUDGE FROM TREATMENT OF PROCESS WASTEWATER AND/OR ACID PLANT BLOWDOWN FROM PRIMARY ZINC PRODUCTION
K071	BRINE PURIFICATION MUDS FROM MERCURY CELL PROCESS IN CHLORINE PRODUCTION WHERE SEPARATELY PREPURIFIED BRINE IS NOT USED
K073	CHLORINATED HYDROCARBON WASTE FROM PURIFICAITON STEP OF THE DIAPHRAGM CELL PROCESS USING GRAPHITE ANODES IN CHLORINE PRODUCTION
K083	DISTILLATION BOTTOMS FROM ANILINE PRODUCTION
K084	WASTEWATER TREATMENT SLUDGES GENERATED DURING PRODUCTION OF VETERINARY PHARMACEUTICALS FROM ARSENIC OR ORGANO-ARSENIC COMPOUNDS
K085	DISTILLATION OR FRACTIONATION COLUMN BOTTOMS FROM PRODUCTION OF CHLOROBENZENES

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
K086	SOLVENT WASHES AND SLUDGES, CAUSTIC WASHES AND SLUDGES, OR WATER WASHES AND SLUDGES FROM CLEANING TUBS AND EQUIPMENT USED IN FORMULATION OF INK FROM PIGMENTS, DRIERS, SOAPS, STABILIZERS CONTAINING CHROMIUM AND LEAD
K087	DECANTER TANK TAR SLUGE FROM COKING
K088	SPENT POTLINERS FROM PRIMARY ALUMINUM REDUCTION
K090	EMISSION CONTROL DUST OR SLUDGE FROM FERROCHROMIUMSILICON PRODUCTION
K091	EMISSION CONTROL DUST OR SLUDGE FROM FERROCHROMIUM PRODUCTION
K093	DISTILLAION LIGHT ENDS FROM PRODUCTION OF PHTHALIC ANHYDRIDE FROM ORTHO-XYLENE
K094	DISTILLATION BOTTOMS FROM PRODUCTION OF PHTHALIC ANHYDRIDE FROM ORTHO-XYLENE
K095	DISTILLAION BOTTOMS FROM PRODUCTION OF 1,1,1-TRICHLOROETHANE
K096	HEAVY ENDS FROM HEAVY ENDS COLUMN FROM PRODUCTION OF 1,1,1-TRICHLOROETHANE
K097	VACUUM STRIPPER DISCHARGE FROM CHLORDANE CHLORINATOR IN PRODUCTION OF CHLORDANE
K098	UNTREATED PROCESS WASTEWATER FROM PRODUCTION OF TOXAPHENE
K100	WASTE LEACHING SOLUTION FROM ACID LEACHING OF EMISSION CONTROL DUST/SLUDGE FROM SECONDARY LEAD SMELTING
K101	DISTILLATION TAR RESIDUES FROM DISTILLATIONOF ANILINE-BASED COMPOUNDS IN PRODUCTION OF VETERINARY PHARMACEUTICALS FROM ARSENIC OR ORGANO-ARSENIC COMPOUNDS
K102	RESIDUE FROM USE OF ACTIVATED CARBON FOR DECOLORIZATION IN PRODUCTION OF VETERINARY PHARMACEUTICALS FRO ARSENIC OR ORGANO-ARSENIC COMPOUNDS
K103	PROCESS RESIDUES FROM ANILINE EXTRACTION FROM PRODUCTIONOF ANILINE
K104	COMBINED WASTEWATER STREAMS GENERATED FROM NITROBENZENE/ANILINE PRODUCTION
K105	SEPARATED AQUEOUS STREAM FROM THE REACTOR PRODUCT WASHING STEP IN PRODUCTION OF CHLOROBENZENES
K106	WASTEWATER TREATMENT SLUDGE FROM MERCURY CELL PROCESS IN CHLORINE PRODUCTION
K112	REACTION BY-PRODUCT WATER FROM THE DRYING COLUMN IN PRODUCTION OF TOLUENEDIAMINE VIA HYDROGENATION OF DINITROTOLUENE
K113	CONDENSED LIQUID LIGHT ENDS FROM THE PURIFICATIONOF TOLUENEDIAMINE IN PRODUCTION OF TOLUENEDIAMINE VIA HYDROGENATION OF DINITROTOLUENE
K114	VICINALS FROM PURIFICAITON OF TOLUENEDIAMINE IN PRODUCTION OF TOLUENEDIAMINE VIA HYDROGENATION OF DINITROTOLUENE

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
K115	HEAVY ENDS FROM THE PURIFICATION OF TOLUENEDIAMINE IN PRODUCTION OF TOLUENEDIAMINE VIA HYDROGENATION OF DINITROTOLUENE
K116	ORGANIC CONDENSATE FROM SOLVENT RECOVERY COLUMN IN PRODUCTION OF TOLUENE DIISOCYANATE VIA PHOSGENATION OF TOLUENEDIAMINE
K117	WASTEWATER FROM THE REACTOR VENT GAS SCRUBBER IN PRODUCTION OF ETHYLENE DIBROMIDE VIA BROMINATION OF ETHENE
K118	SPENT ADSORBENT SOLIDS FROM PURIFICATION OF ETHYLENE DIBROMIDE IN PRODUCTION OF ETHYLENE DIBROMIDE VIA BROMINATION OF ETHENE
K125	FILTRATION, EVAPORATION, AND CENTRIFUGATION SOLIDS FROM THE PRODUCTION OF ETHYLENEBISDITHIOCARBAMIC ACID AND ITS SALTS.
K126	BAGHOUSE DUST AND FLOOR SWEEPINGS IN MILLING AND PACKAGING OPERATIONS FROM PRODUCTION OR FORMULATION OF ETHYLENE BIS DITHIOCARBAMIC ACID AND ITS SALTS
P001	2H-1-BENZOPYRAN-2-ONE, 4-HYDROXY-3-(3-OXO-1-PHENYLBUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3% WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRAIONS GREATER THAN 0.3%
P002	ACETAMINE, N-(AMINOTHIOXOMETHYL); Also known as 1-ACETYL-2-THIOUREA
P003	ACROLEIN; Also known as 2-PROPENAL
P004	ALDRIN; Also known as 1,4,5,8-DIMETHANONAPHTHALENE, 1,2,3,4,10,10-HEXA-CHLORO-1,4,4A,5,8,8A,-HEXAHYDRO, (ALPHA, 4ALPHA, 4 ABETA, 5 ALPHA, 8ALPHA, 8ABETA)-
P005	ALLYL ALCOHOL; Also known as 2-PROPEN-1-OL
P007	5-(AMINOMETHYL)-3-ISOXAZOLOL; Also known as 3(2H)-ISOXAZOLONE, 5-(AMINOMETHYL)-
P008	4-AMINOPYRIDINE; Also known as 4-PYRIDINAMINE
P010	ARSENIC ACID H_3ASO_4
P011	ARSENIC OXIDE AS_2O_5; Also known as ARSENIC PENTOXIDE
P012	ARSENIC OXIDE AS_2O_3; Also known as ARSENIC TRIOXIDE
P013	BARIUM CYANIDE
P014	BENZENETHIOL; Also known as THIOPHENOL
P015	BERYLLIUM
P016	DICHLOROMETHYL ETHER; Also known as METHANE, OXYBIS[CHLORO-
P017	BROMOACETONE; Also known as 2-PROPANONE, 1-BROMO-
P018	BRUCINE
P020	DIOSEB; Also known as PHENOL, 2-(1-METHYLPROPYL)-4,6-DINITRO-
P021	CALCIUM CYANIDE; Also known as CALCIUM CYANIDE $CA(CN)_2$
P022	CARBON DISULFIDE
P023	ACETALDEHYDE, CHLORO-; Also known as CHLOROACETALDEHYDE
P024	BENZENAMINE, 4-CHLORO-; Also known as P-CHLORANILINE

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	WASTE DESCRIPTION
P026	1-(O-CHLOROPHENYL)THIOUREA; Also known as THIOUREA, (2-CHLOROPHENYL)-
P027	PROPANENITRILE, 3-CHLORO-; Also known as 3-CHLOROPROPIONITRILE
P028	BENZENE, (CHLOROMETHYL)-; Also known as BENZYL CHLORIDE
P029	COPPER CYANIDE; Also known as COPPER CYANIDE CU(CN)
P030	CYANIDES (SOLUBLE CYANIDE SALTS), NOT OTHERWISE SPECIFIED
P031	CYANOGEN; Also known as ETHANEDINITRILE
P033	CYANOGEN CHLORIDE; Also known as CYANOGEN CHLORIDE (CN)CL
P034	2-CYCLOHEXYL-4,6-DINITROPHENOL; Also known as PHENOL, 2-CYCLOHEXYL-4,6-DINITRO-
P036	ARSONOUS DICHLORIDE, PHENYL-; Also known as DICHLOROPHENYLARSINE
P037	DIELDRIN; Also known as 2,7:3,6-DIMETHANONAPHTH[2,3-B]OXIRENE, 3,4,5,6,9,9-HEXACHLORO-1A,2,2A,3,6,6A,7,7A-OCTAHYDRO-, (1AALPHA, 2BETS, 2AALPHA, 3BETAK, 6BETA, 6AALPHA, 7BETA, 7AALPHA)-
P038	ARSINE, DIETHYL-; Also known as DIETHYLARSINE
P039	PHOSPHORODITHIOIC ACID, O,O-DIETHYL S-[2-(ETHYLTHIO)ETHYL]ESTER; Also known as DISULFOTON
P040	O,O-DIETHYL O-PYRAZINYL PHOSPHOROTHIOATE; Also known as PHOSPHOROTHIOIC ACID, O, O-DIMETHYL O-(4 NITROPHENYL) ESTER
P041	PHOSPHORIC ACID, DIETHYL 4-NITROPHENYL ESTER; Also known as DIETHYL-P-NITROPHENYL PHOSPHATE
P042	1,2-BENZENEDIOL, 4-[HYDROXY-2-(METHYLAMINO)ETHYL]-,(R)-; Also known as EPINEPHRINE
P043	DIISOPROPYLFLUOROPHOSPHATE (DFP); Also known as PHOSPHOROFLUORIDIC ACID, BIS (1-METHYLETHYL)ESTER
P044	DIMETHOATE; Also known as PHOSPHORODITHIOIC ACID,O, O-DIMETHYL S-[2-(METHYLAMINO)-2-OXOETHYL]ESTER
P045	2-BUTANONE, 3, 3-DIMETHYL-1-(METHYITHIO)-,O-[METHYLOAMINO)CARBONYL]OXIME; Also known as THIOFANOX
P046	BENZENEETHANAMINE, ALPHA,ALPHA-DIMETHYL-; Also known as ALPHA,ALPHA-DIMETHYLPHENETHYLAMINE
P047	4,6-DINITRO-O-CRESOL, & SALTS; Also known as PHENOL,2-METHYL-4,6-DINITRO-, & SALTS
P048	2,4-DINITROPHENOL; Also known as PHENOL, 2,4-DINITRO-
P049	DITHIOBIURET; Also known as THIOIMIDODICARBONIC DIAMIDE $[H_2N)C(S)]_2NH$
P050	ENDOSULFAN; Also known as 6M9-METHANO-2,4,3-BENZODIOXATHIEPIN, 6,7,8,9,10,1K0-HEXACHLORO-1,5,5A,6,9,91-HEXAHYDRO-,3-OXIDE

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
P051	2,7:3,6-DIMETHANONAPHTH [2,3-B]OXIRENE, 3,4,5,6,9,9-HEXACHLORO-1A,2,2A,3,6,6A,7,7A-OCTAHYDRO-, (1AALPHA, 2BETA, 2ABETA, 3ALPHA, 6ALPHA, 6ABETA, 7BETA, 7AALPHA)-, & METABOLITES; Also known as ENDRIN; Also known as ENDRIN, & METABOLITES
P054	AZIRIDINE; Also known as ETHYLENEIMINE
P056	FLUORINE
P057	ACETAMIDE, 2-FLUORO-; Also known as FLUOROACETAMIDE
P058	ACETIC ACID, FLUORO-,SODIUM SALT; Also known as FLUOROACETIC ACIDE, SODIUM SALT
P059	HEPTACHLOR; Also known as 4,7-METHANO-1H-INDENE, 1,4,5,6,7,8,-HEPTACHLORO-3A,4,7,7A-TETRAHYDRO-
P060	1,4,5,8-DIMETHANONAPHTHALENE,1,2,3,4,10,10-HEXA- CHLORO-1,4,4A,5,7,8,8A-HEXAHYDRO-(1ALPHA, 4ALPHA, 4ABETA, 5BETA,8BETA,8ABETA)-; Also known as ISODRIN
P062	HEXAETHYL TETRAPHOSPHATE; Also known as TETRAPHOSPHORIC ACID, HEXAETHYL ESTER
P063	HYDROCYANIC ACID; Also known as HYDROGEN CYANIDE
P064	METHANE, ISOCYANATO-
P066	ETHANIMIDOTHIOIC ACID, N-[[(METHYLAMINO)CARBONYL]OXY]-, METHYL ESTER; Also known as METHOMYL
P067	AZINIDINE, 2-METHYL; Also known as 1,2-PROPYLENIMINE
P068	HYDRAZINE, METHYL-; Also known as METHYL HYDRAZINE
P069	2-METHYLLACTONITRILE; Also known as PROPANENITRILE, 2-HYDROXY-2-METHYL-
P070	ALDICARB; Also known as PROPANAL, 2-METHYL-2-(METHYLTHIO)-, O-[(METHYLAMINO)CARBONYL]OXIME
P071	METHYL PARATHION; Also known as PHOSPHOROTHIOIC ACID, O, O,-DIMETHYL O-(4-NITROPHENYL)ESTER
P072	ALPHA-NAPHTHYLTHIOUREA; Also known as THIOUREA, 1-NAPHTHALENYL-
P073	NICKEL CARBONYL; Also known as NICKEL CARBONYL $NI(CO)_4$, (T-4)-
P074	NICKEL CYANIDE; Also known as NICKEL CYNAIDE $NI(CN)_2$
P075	NICOTINE, & SALTS; Also known as PYRIDINE, 3-(1-METHYL-2-PYRROLIDINYL)-, (S)-, & SALTS
P077	BENZENAMINE, 4-NITRO-; Also known as P-NITROANILINE
P078	NITROGEN DIOXIDE; Also known as NITROGEN OXIDE NO_2
P082	METHANAMINE, N-METHYL-N-NITROSO-; Also known as N-NITROSODIMETHYLAMINE
P084	N-NITROSOMETHYLVINYLAMINE; Also known as VINYLAMINE, N-METHYL-N-NITROSO-
P085	DIPHOSPHORAMIDE, OCTAMETHYL-; Also known as OCTAMETHYLPYROPHOSPHORAMIDE
P087	OSMIUM OXIDE OSO_4, (T-4)-; Also known as OSMIUM TETROXIDE

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
P088	ENDOTHALL; Also known as 7-OXABICYCLO[2.2.1]HEPTANE-2,3-DICARBOXYLIC ACID
P089	PARATHION; Also known as PHOSPHORIC ACID, O,O-DIETHYL O-(4-NITROPHENYL)ESTER
P092	MERCURY, (ACETATO-O)PHENYL-; Also known as PHENYLMERCURY ACETATE
P093	PHENYLTHIOUREA; Also known as THIOUREA, PHENYL-
P094	PHORATE; Also known as PHOSPHORODITHIOIC ACID, O,O-DIETHYL; Also known as S-[ETHYLTHIO)METHYL] ESTER
P095	CARBONIC DICHLORIDE; Also known as PHOSGENE
P096	HYDROGEN PHOSPHIDE; Also known as PHOSPHINE
P097	FAMPHUR; Also known as PHOSPHOTHIOIC ACID, O-[4-[(DIMETHYLAMINO)SULFONYL]PHENYL] O,O-DIMETHYL ESTER
P098	POTASSIUM CYANIDE
P099	ARGENTATE(1-), BIS(CYANO-C)-, POTASSIUM; Also known as POTASSIUM SILVER CYANIDE
P101	ETHYL CYANIDE; Also known as PROPANENITRILE
P102	PROPARGYL ALCOHOL; Also known as 1-PROPYN-1-OL
P103	SELENOUREA
P104	SILVER CYANIDE
P105	SODIUM AZIDE
P108	STRYCHNIDIN-10-ONE, & SALTS; Also known as STRYCHNINE, & SALTS
P109	TETRAETHYLDITHIOPYROPHOSPHATE; Also known as THIODIPHOSPHIRIC ACID, TETRAETHYL ESTER
P110	TETRAETHYL LEAD
P113	THALLIUM OXIDE TL_2O_3
P114	THALLIUM(L) SELENITE
P115	THALLIUM(L) SULFATE
P116	THIOSEMICARBAZIDE
P118	TRICHLOROMETHANETHIOL
P119	VANADIC ACID, AMMONIUM SALT
P120	VANADIUM PENTOXIDE
P121	ZINC CYANIDE
P123	TOXAPHENE
U001	ACETALDEHYDE (I); Also known as ETHANAL (I)
U002	ACETONE (I); Also known as 2-PROPANONE (I)
U003	ACETONITRILE (I,T)
U004	ACETONITRILE (I,T)

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	WASTE DESCRIPTION
U005	2, ACETYLAMINOFLUORENE; Also known as ACETAMIDE, N-9H-FLUOREN-2-YL-
U007	ACRYLAMIDE; Also known as 2-PROPENAMIDE
U008	ACRYLIC ACID (I); Also known as 2-PROPENOIC ACID (I)
U009	ACRYLONITRILE; Also known as 2-PROPENENITRILE
U010	AZIRINO[2',3':3,4]PYRROLO[1,2-a]INDOLE-4,7-DIONE,6-AMINO-8-[[(AMINOCARBONYL)OXY]METHYL]-1,1a,2,8,8a,8b-HEXAHYDRO-8a-METHOXY-5-METHYL-, [1aS-(1AALPHA, 8BETA, 8AALPHA, 8BALPHA)]-; Also known as MITOMYCIN C
U011	AMITROLE; Also known as 1H-1,2,-TRIAZOL-3-AMINE
U012	ANILINE (I,T); Also known as BENZENAMINE (I,T)
U014	AURAMINE; Also known as BENZENAMINE, 4,4'-CARBONIMIDOYLBIS[N,N-DIMETHYL-
U015	AZASERINE; Also known as L-SERINE, DIAZOACETATE (ESTER)
U016	BENZ[C]ACRIDINE
U017	BENZAL CHLORIDE; Also known as BENZENE,(DICHLOROMETHYL)-
U018	BENZ[A]ANTHRACENE
U019	BENZENE (I,T)
U022	BENZO[A]PYRENE
U024	DICHLOROMETHOXY ETHANE; Also known as ETHANE, 1,1'-[METHYLENEBIS(OXY)]BIS[2-CHLORO-
U025	DICHLOROETHYL ETHER; Also known as ETHANE,1,1'-OXYBIS[2-CHLORO-
U026	CHLORNAPHAZIN; Also known as NAPHTHALENAMINE, N,N'-BIS(2-CHLOROETHYL)-
U027	DICHLOROISOPROPYL ETHER; Also known as PROPANE, 2,2'-OXYBIS[2-CHLORO-
U028	1,2-BENZENEDICARBOXYLIC ACID, BIS(2-ETHYLHEXYL) ESTER; Also known as DIETHYLHEXYL PHTHALATE
U029	METHANE, BROMO-; Also known as METHYL BROMIDE
U030	BENZENE, 1-BROMO-4-PHENOXY-; Also known as 4-BROMOPHENYL PHENYL ETHER
U031	1-BUTANOL (I); Also known as N-BUTYL ALCOHOL (I)
U032	CHROMIC ACID H_2CRO_4, CALCIUM SALT; Also known as CALCIUM CHROMATE
U034	CHLORAL; Also known as ACETALDEHYDE, TRICHLORO-
U035	CHLORAMBUCIL; Also known as BENZENEBUTANOIC ACID, 4-[BIS(2-CHLOROETHYL)AMINO]-
U036	CHLORDANE, ALPHA & GAMMA ISOMERS; Also known as 4,7-METHANO-1H-INDENE, 1,2,4,5,6,7,8,8-OCTACHLORO-2,3,3A,4,7,7A-HEXAHYDRO-
U037	CHLOROBENZENE; Also known as BENZENE, CHLORO-
U038	CHLOROBENZILATE; Also known as BENZENEACETIC ACID, 4-CHLORO-ALPHA-(4-CHLOROPHENYL)-ALPHA-HYDROXY-, ETHYL ESTER
U039	P-CHLORO-M-CRESOL; Also known as PHENOL, 4-CHLORO-3-METHYL-
U041	EPICHLOROHYDRIN; Also known as OXIRANE, (CHLOROMETHYL)-

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
U042	2-CHLOROETHYL VINYL ETHER; Also known as ETHENE, (2-CHLOROETHOXY)-
U043	VINYL CHLORIDE; Also known as ETHENE, CHLORO-
U044	CHLOROFORM; Also known as METHANE, TRICHLORO-
U045	METHANE, CHLORO- (I,T); Also known as METHYL CHLORIDE (I,T)
U046	CHLOROMETHYL METHYL ETHER; Also known as METHANE, CHLOROMETHOXY-
U047	BETA-CHLORONAPHTHALENE; Also known as NAPHTHALENE, 2-CHLORO-
U048	O-CHLOROPHENOL; Also known as PHENOL, 2-CHLORO-
U049	4-CHLORO-O-TOLUIDINE, HYDROCHLORIDE; Also known as BENZENAMINE, 4-CHLORO-2-METHYL, HYDROCHLORIDE
U050	CHRYSENE
U051	CREOSOTE
U052	CRESOL (CRESYLIC ACID); Also known as PHENOL, METHYL-
U053	CROTONALDEHYDE; Also known as 2-BUTENAL
U055	CUMENE (I); Also known as BENZENE, (1-METHYLETHYL)- (I)
U056	BENZENE, HEXAHYDRO- (I); Also known as CYCLOHEXANE (I)
U057	CYCLOHEXANONE (I)
U058	CYCLOPHOSPHAMIDE; Also known as 2H-1,3,2-OXAZAPHOSPHORIN-2-AMINE, N,N-BIS (2-CHLOROETHYL)TETRAHYDRO-, 2-OXIDE
U059	DAUNOMYCIN; Also known as 5,12-NAPHTHACENEDIONE, 8-ACETYL-10-[(3-AMINO-2,3,6-TRIDEOXY)-ALPHS-L-LYXO-HEXOPYRANOSY)OXY]-7,8,9,10-TETRAHYDRO-6,8,11-TRIHYDROXY-1-METHOXY-, (8S-CIS)-
U060	DDD; Also known as BENZENE, 1,1'-(2,2-DICHLOROETHYLIDENE)BIS[4-CHLORO-
U061	DDT; Also known as BENZENE, 1,1'-(2,2,2-TRICHLOROETHYLIDENT)BIS[4-CHLORO-
U062	DIALLATE; Also known as CARBAMOTHIOIC ACID, BIS(1-METHYLETHYL)-, S-(2,3-DICHLORO-2-PROPENYL) ESTER
U063	DIBENZ[A,H]ANTHRACENE
U064	DIBENZO[A,I]PYRENE; Also known as BENZO[RST]PENTAPHENE
U066	1,2-DIBROMO-3-CHLOROPROPANE; Also known as PROPANE, 1,2-DIBROMO-3-CHLORO-
U067	ETHANE, 1,2-DIBROMO-; Also known as ETHYLENE DIBROMIDE
U068	METHANE, DIBROMO-; Also known as METHYLENE BROMIDE
U069	DIBUTYL PHTHALATE; Also known as 1,2-BENZENEDICARBOXYLIC ACID, DIBUTYL ESTER
U070	o-DICHLOROBENZENE; Also known as BENZENE, 1,2-DICHLORO-
U071	m-DICHLOROBENZENE; Also known as BENZENE, 1,3-DICHLORO-
U072	p-DICHLOROBENZENE; Also known as BENZENE, 1,4-DICHLORO-

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
U073	3,3'-DICHLOROBENZIDINE; Also known as [1,1'-BIPHENYL]-4,4'-DIAMINE, 3,3'DICHLORO-
U074	1,4-DICHLORO-2-BUTENE (I,T); Also known as 2-BUTENE, 1,4-DICHLORO- (I,T)
U075	DICHLORODIFLUOROMETHANE; Also known as METHANE, DICHLORODIFLUORO-
U076	ETHANE, 1,1-DICHLORO-; Also known as ETHYLIDENE DICHLORIDE
U077	ETHANE, 1,2-DICHLORO-; Also known as ETHYLENE DIBROMIDE
U078	1,1-DICHLOROETHYLENE; Also known as ETHENE, 1,1-DICHLORO-
U079	1,2-DICHLOROETHYLENE; Also known as ETHENE, 1,2-DICHLORO-, (E)
U080	METHANE, DICHLORO-; Also known as METHYLENE CHLORIDE
U081	2,4-DICHLOROPHENOL; Also known as PHENOL, 2,4-DICHLORO-
U082	2,6-DICHLOROPHENOL; Also known as PHENOL,2,6-DICHLORO-
U083	PROPANE, 1,2-DICHLORO-; Also known as PROPYLENE DICHLORIDE
U084	1,3-DICHLOROPROPENE; Also known as 1-PROPENE, 1,3-DICHLORO-
U085	1,2:3,4--DIEPOXYBUTANE (I,T); Also known as 2,2'-BIOXIRANE
U086	N,N'-DIETHYLHYDRAZINE; Also known as HYDRAZINE, 1,2,-DIETHYL-
U087	O,O-DIETHYL S-METHYL DITHIOPHOSPHATE; Also known as PHOSPHORODITHIOIC ACID, 0,0-DIETHYL S-METHYL ESTER
U088	DIETHYL PHTHALATE; Also known 1,2-BENZENEDICARBOXYLIC ACID, DIETHYL ESTER
U089	DIETHYLSTILBESTEROL; Also known as PHENOL, 4,4'-(1,2-DIETHYL-1,2-ETHENEDIYL)BIS-, (E)
U090	DIHYDROSAFROLE; Also known as 1,3-BENZODIOXOLE, 5-PROPYL-
U091	3,3'-DIMETHOXYBENZIDINE; Also known as [1,1'-BIPHENYL]-4,4'-DIAMINE, 3,3'DIMETHOXY-
U092	DIMETHYLAMINE (I); Also known as METHANAMINE, N-METHYL- (I)
U093	BENZENAMINE, N,N-DIMETHYL-4-(PHENYLAZO)-; Also known as P-DIMETHYLAMINOAZOBENZENE
U094	BENZ[A]ANTHRACENE, 7,12-DIMETHYL-; Also known as 7,12-DIMETHYLBENZ[A]ANTHRACENE
U095	3,3'-DIMETHYLBENZIDINE; Also known as [1,1'-BIPHENYL]-4,4'-DIAMINE, 3,3'DIMETHYL-
U097	DIMETHYLCARBAMOYL CHLORIDE; Also known as CARBAMIC CHLORIDE, DIMETHYL-
U098	1,1-DIMETHYLHYDRAZINE; Also known as HYDRAZINE, 1,1-DIMETHYL-
U099	1,2-DIMETHYLHYDRAZINE; Also known as HYDRAZINE, 1,2,-DIMETHYL-
U101	2,4-DIMETHYLPHENOL; Also known as PHENOL, 2,4-DIMETHYL-
U102	DIMETHYL PHTHALATE; Also known as 1,2-BENZENEDICARBOXYLIC ACID, DIMETHYL ESTER
U103	DIMETHYL SULFATE; Also known as SULFURIC ACID, DIMETHYL ESTER
U105	2,4-DINITROTOLUENE; Also known as BENZENE, 1-METHYL-2,4-DINITRO-

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	WASTE DESCRIPTION
U106	2,6-DINITROTOLUENE; Also known as BENZENE, 2-METHYL-1,3-DINITRO-
U107	DI-N-OCTYL PHTHALATE; Also known as 1,2-BENZENEDICARBOXYLIC ACID, DIOCTYL ESTER
U108	1,4-DIETHYLENEOXIDE; Also known as 1,4-DIOXANE
U109	1,2-DIPHENYLHYDRAZINE; Also known as HYDRAZINE, 1,2-DIPHENYL-
U110	DIPROPYLAMINE (I); Also known as 1-PROPANAMINE, N-PROPYL- (I)
U111	DI-N-PROPYLNITROSAMINE; Also known as 1-PROPANAMINE, N-NITROSO-N-PROPYL-
U112	ACETIC ACID ETHYL ESTER (I); Also known as ETHYL ACETATE (I)
U113	ETHYL ACRYLATE (I); Also known as 2-PROPENOIC ACID, ETHYL ESTER (I)
U114	ETHYLENEBISDITHIOCARBAMIC ACID, SALTS & ESTERS; Also known as CARBAMODITHIOIC ACID, 1,2- ETHANEDIYLBIS-, SALTS & ESTERS
U115	ETHYLENE OXIDE (I,T); Also known as OXIRANE (I,T)
U116	ETHYLENETHIOUREA; Also known as 2-IMIDAZOLIDINETHIONE
U117	ETHANE, 1,1'-OXYBIS-(I); Also known as ETHYL ETHER (I)
U118	ETHYL METHACRYLATE; Also known as 2-PROPENOIC ACID, 2-METHYL-, ETHYL ESTER
U119	ETHYL METHANESULFONATE; Also known as METHANESULFONIC ACID, ETHYL ESTER
U120	FLUORANTHENE
U121	TRICHLOROMONOFLUOROMETHANE; Also known as METHANE, TRICHLOROFLUORO-
U122	FORMALDEHYDE
U124	FURAN (I); Also known as FURFURAN (I)
U125	2-FURANCARBOXALDEHYDE (I); Also known as FURFURAL (I)
U126	GLYCIDYLALDEHYDE; Also known as OXIRANECARBOXYALDEHYDE
U127	HEXACHLOROBENZENE; Also known as BENZENE, HEXACHLORO-
U128	HEXACHLOROBUTADIENE; Also known as 1,3-BUTADIENE, 1,1,2,3,4,4-HEXACHLORO-
U129	LINDANE; Also known as CYCLOHEXANE, 1,2,3,4,5,6- HEXACHLORO-, (1ALPHA, 2ALPHA, 3BETA, 4ALPHA, 5ALPHA, 6BETA)-
U130	HEXACHLOROCYCLOPENTADIENE; Also known 1,3-CYCLOPENTADIENE, 1,2,3,4,5,5-HEXACHLORO-
U131	HEXACHLOROETHANE; Also known as ETHANE, HEXACHLORO-
U132	HEXACHLOROPHENE; Also known as PHENOL, 2,2'-METHYLENEBIS[3,4,6-TRICHLORO-
U135	HYDROGEN SULFIDE; Also known HYDROGEN SULFIDE H_2S
U136	ARSINIC ACID, DIMETHYL-; Also known as CACODYLIC ACID
U137	INDENO[1,2,3-CD]PYRENE
U138	METHANE, IODO-; Also known as METHYL IODIDE
U140	ISOBUTYL ALCOHOL, (I,T); Also known as 1-PROPANOL, 2-METHYL-, (I,T)

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	WASTE DESCRIPTION
U141	ISOSAFROLE; Also known as 1,3-BENZODIOXOLE, 5-(1-PROPENYL)-
U142	KEPONE; Also known as 1,3,4-METHENO-2H-CYCLOBUTA[CD]PENTALEN-2-ONE, 1,1A,3,3A,4,5,5A,5B,6- DECACHLOROOCTAHYDRO-
U143	LASIOCARPINE; Also known as 2-BUTENOIC ACID, 2-METHYL-, 7-[2,3-DIHYDROXY-2-(1-METHOXYETHYL)-3-METHYL-1- OXOBUTOXY]METHYL]-2,3,5,6A-TETRAHYDRO-1H-PYRROLIZIN-1-YL ESTER,[1S-1ALPHA(Z),7(2S*,3R*),7AALPHA]]-
U144	ACETIC ACID, LEAD(2+) SALT; Also known as LEAD ACETATE
U145	LEAD PHOSPHATE; PHOSPHORIC ACID, LEAD(2+) SALT (2:3)
U146	LEAD, BIS(ACETATO-O) TETRAHYDROXYTRI-; Also known as LEAD SUBACETATE
U147	MALEIC ANHYDRIDE; Also known as 2,5-FURANDIONE
U148	MALEIC HYDRAZIDE; Also known as 3,6-PYRIDAZINEDIONE, 1,2-DIHYDRO-
U149	MALONONITRILE; Also known as PROPANEDINITRILE
U150	MELPHALAN; Also known as L-PHENYLALANINE, 4-[BIS(2-CHLOROETHYL)AMINO]-
U151	MERCYR
U152	METHACRYLONITRILE (I,T); Also known as 2-PROPENENITRILW, 2-METHYL- (I,T)
U153	METHANETHIOL (I,T); Also known as THIOMETHANOL (I,T)
U154	METHANOL (I); Also known as METHYL ALCOHOL (I)
U155	METHAPYRILENE; Also known 1,2-ETHANEDIAMINE, N,N- DIMETHYL-N'-W-PYRIDINYL-N'-(2- THIENYLMETHYL)-
U156	METHYL CHLOROCARBONATE (I,T); Also known CARBONOCHLORIDIC ACID, METHYL ESTER (I,T)
U157	BENZ[I]ACEANTHRYLENE, 1,2-DIHYDRO-3-METHYL-; Also known as 3-METHYLCHOLANTHRENE
U158	BENZENAMINE, 4,4'METHYLENEBIS[2-CHLORO-; Also known as 4,4'-METHYLENEBIS(2-CHLOROANILINE)
U159	METHYL ETHYL KETONE (MEK) (I,T); Also known as 2-BUTANONE (I,T)
U161	METHYL ISOBUTYL KETONE (I); Also known as 4-METHYL-2-PENTANONE (I) and PENTANOL, 4-METHYL-
U162	METHYL METHACRYLATE (I,T); Also known as 2-PROPENOIC ACID, 2-METHYL-, METHYL ESTER (I,T)
U163	MNNG; Also known as GUANIDINE, N-METHYL-N'-NITRO-N- NITROSO-
U164	METHYLTHIOURACIL; Also known as 4(1H)-PYRIMIDINONE, 2,3-DIHYDRO-6-METHYL-2-THIOXO-
U165	NAPHTHALENE
U166	1,4-NAPHTHALENEDIONE; Also known as 1,4-NAPHTHOQUINONE
U167	1-NAPHTHALENAMINE; Also known as ALPHA-NAPHTHYLAMINE
U168	2-NAPHTHALENAMINE; Also known as BETA-NAPHTHYLAMINE

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	WASTE DESCRIPTION
U169	NITROBENZENE (I,T); Also known as BENZENE, NITRO-
U170	P-NITROPHENOL; Also known as PHENOL, 4-NITRO
U171	2-NITROPROPANE (I,T); Also known as PROPANE, 2-NITRO (I,T)
U172	N-NITROSODI-N-BUTYLAMINE; Also known as 1-BUTANAMINE, N-BUTYL-N-NITROSO-
U173	N-NITROSODIETHANOLAMINE; Also known as ETHANOL, 2,2'-(NITROSOIMINO)BIS-
U174	N-NITROSODIETHYLAMINE; Also known as ETHANAMINE, N-ETHYL-N-NITROSO-
U176	N-NITROSO-N-ETHYLUREA; Also known as UREA, N-ETHYL-N-NITROSO-
U177	N-NITROSO-N-METHYLUREA; Also known as UREA, N-METHYL-N-NITROSO-
U178	N-NITROSO-N-METHYLURETHANE; Also known as CARBAMIC ACID, METHYLNITROSO-,ETHYL ESTER
U179	N-NITROSOPIPERIDINE; Also known as PIPERIDINE, 1-NITROSO-
U180	N-NITROSOPYRROLIDINE; Also known as PYRROLIDINE, 1-NITROSO-
U181	BENZENAMINE, 2-METHYL-5-NITRO-; Also known as 5-NITRO-O-TOLUIDINE
U182	PARALDEHYDE; Also known as 1,3,5-TRIOXANE, 2,4,6- TRIMETHYL-
U183	PENTACHLOROBENZENE; Also known as BENZENE, PENTACHLORO-
U184	PENTACHLOROETHANE; Also known as ETHANE, PENTACHLORO-
U185	PENTACHLORONITROBENZENE (PCNB); Also known as BENZENE, PENTACHLORONITRO-
U186	1,3-PENTADIENE (I); Also known as 1-METHYLBUTADIENE (I)
U187	ACETAMIDE, N-(4-ETHOXYPHENYL)-; Also known as PHENACETIN
U188	PHENOL
U190	PHTHALIC ANHYDRIDE; Also known as 1,3-ISOBENZOFURANDIONE
U191	2-PICOLINE; Also known as PYRIDINE, 2-METHYL-
U192	BENZAMIDE,3,5-DICHLORO-N-(1,1-DIMETHYL-2-PROPYNYL)-; Also known as PRONAMIDE
U193	1,3-PROPANE SULTONE; Also known as 1,2-OXATHIOLANE, 2,2-DIOXIDE
U194	1-PROPANAMINE (I,T); Also known as N-PROPYLAMINE (I,T)
U196	PYRIDINE
U197	P-BENZOQUINONE; Also known as 2,5-CYCLOHEXADIENE-1,4-DIONE
U200	RESERPINE; Also known as YOHIMBAN-16-CARBOXYLIC ACID, 11,17-DIMETHOXY-18-[(3,4,5-TRIMETHOXYBENZOYL)OXY]-, METHYL ESTER, (3BETA, 16BETA, 17ALPHA, 18BETA, 20ALPHA)-
U201	RESORCINOL; Also known as 1,3-BENZENEDIOL
U202	SACCHARIN, & SALTS; Also known as 1,2-BENZISOTHIAZOL-3(2H)-ONE, 1,1-DIOXIDE, & SALTS
U203	SAFROLE; Also known as 1,3-BENZODIOXOLE, 5-(2- PROPENYL)-
U204	SELENIOUS ACID; Also known as SELENIUM DIOXIDE

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
U206	STREPTOZOTOCIN; Also known as GLUCOPYRANOSE, 2-DEOXY-2-(3-METHYL-3-NITROSOUREIDO)-, D-D-GLUCOSE, 2-DEOXY-2-[[(METHYLNITROSOAMINO)-CARBONYL]AMINO]-
U207	1,2,4,5-TETRACHLOROBENZENE; Also known as BENZENE, 1,2,4,5-TETRACHLORO-
U208	1,1,1,2-TETRACHLOROETHANE; Also known as ETHANE, 1,1,1,2-TETRACHLORO-
U209	1,1,2,2-TETRACHLOROETHANE; Also known as ETHANE, 1,1,2,2-TETRACHLORO-
U210	TETRACHLOROETHYLENE; Also known as ETHENE, TETRACHLORO-
U211	CARBON TETRACHLORIDE; Also known as METHANE, TETRACHLORO-
U213	TETRAHYDROFURAN (I); Also known as FURAN, TETRAHYDRO-(I)
U214	ACETIC ACID, THALLIUM(1+) SALT; Also known as THALLIUM(I) ACETATE
U215	THALLIUM(I) CARBONATE; Also known as CARBONIC ACID, DITHALLIUM(1+) SALT
U216	THALLIUM(I) CHLORIDE; Also known as THALLIUM CHLORIDE TLCL
U217	THALLIUM(I) NITRATE; Also known as NITRIC ACID, THALLIUM(1+) SALT
U218	THIOACETAMIDE; Also known as ETHANETHIOAMIDE
U219	THIOUREA
U220	TOLUENE; Also known as BENZENE, METHYL-
U221	TOLUENEDIAMINE; Also known as BENZENEDIAMINE, AR-METHYL-
U222	BENZENAMINE, 2-METHYL-, Also known as HYDROCHLORIDE O-TOLUIDINE HYDROCHLORIDE
U225	BROMOFORM; Also known as METHANE, TRIBROMO-
U226	ETHANE, 1,1,1-TRICHLORO-; Also known as METHYL CHLOROFORM
U227	1,1,2-TRICHLOROETHANE; Also known as ETHANE, 1,1,2-TRICHLORO-
U228	TRICHLOROETHYLENE; Also known as ETHENE, TRICHLORO-
U235	TRIS(2,3-DIBROMOPROPYL) PHOSPHATE; Also known as 1-PROPANOL, 2,3-DIBROMO-, PHOSPHATE (3:1)
U236	TRYPAN BLUE; Also known as 2,7-NAPHTHALENEDISULFONIC ACID, 3,3'-[(3,3'-DIMETHYL[1,1'-BIPHENYL]-4,4'- DIYL)BIS(AZO)BIS[5-AMINO-4-HYDROXY]-, TETRASODIUM SALT
U237	URACIL MUSTARD; Also known as 2,4-(1H,3H)-PYRIMIDINEDIONE, 5-[BIS(2-CHLOROETHYL)AMINO]-
U238	CARBAMIC ACID, ETHYL ESTER; Also known as ETHYL CARBAMATE (URETHANE)
U239	XYLENE (I); Also known as BENZENE, DIMETHYL- (I,T)
U240	ACETIC ACID, 92,4-DICHLOROPHENOXY)-, SALTS & ESTERS; Also known as 2,4-D, SALTS & ESTERS
U243	HEXACHLOROPROPENE; Also known as 1-PROPENE, 1,1,2,3,3,3- HEXACHLORO-
U244	THIOPEROXYDICARBONIC DIAMIDE $[(H_2N)C(S)]_2S_2$, TETRAMETHYL-; Also known as THIRAM
U246	CYANOGEN BROMIDE (CN)Br

TABLE C-1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
U247	BENZENE, 1,1'(2,2,2-TRICHLOROETHYLIDENE)BIS[4-METHOXY-; Also known as METHOXYCHLOR
U248	WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRATIONS OF 0.3% OR LESS; Also known as 2H-1-BENZOPYRAN-2-ONE, 4- HYDROXY-3-(3-OXO-1-PHENYL-BUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS OF 0.3% OR LESS
U249	ZINC PHOSPHIDE Zn_3P_2 WHEN PRESENT AT CONCENTRATIONS OF 10% OR LESS
U328	BENZENAMINE, 2-METHYL-; Also known as o-TOLUIDINE
U353	BENZENAMINE, 4-METHYL-; Also known as p-TOLUIDINE
U359	ETHANOL, 2-ETHOXY-; Also known as ETHYLENE GLYCOL MONOETHYL ETHER

Table C-2

Spent Activated Carbon Organic Constituent Data Summary				
Constituent	CAS NO.	Organics (lb constituent per lb spent activated carbon)		
		Minimum	Maximum	Average
1-Butanol	71-36-3	8.67E-04	8.67E-04	8.67E-04
1-Hexane	110-54-3	3.86E-04	8.45E-02	4.24E-02
1,1 Dichloroethane	75-34-3	9.00E-09	3.20E-02	9.71E-04
1,1 Dichloroethene	75-35-4	2.50E-10	2.94E-01	2.51E-03
1,1,1 Trichloroethane	71-55-6	2.50E-09	3.43E-01	1.31E-02
1,1,2 Trichloroethane	79-00-5	5.00E-07	1.41E-02	3.28E-03
1,1,2,2 Tetrachloroethane	79-34-5	1.45E-05	3.31E-04	2.29E-04
1,2 Dibromoethane	106-93-4	2.50E-08	1.98E-02	4.57E-03
1,2 Dichlorobenzene	95-50-1	2.05E-05	4.60E-03	9.99E-04
1,2 Dichloroethane	107-06-2	0.00E+00	1.39E-01	7.18E-03
1,2 Dichloroethene	540-59-0	2.50E-08	7.32E-03	2.13E-03
1,2 Dichloropropane	78-87-5	3.00E-09	5.30E-02	6.06E-03
1,2,3 Trichloropropane	96-18-4	3.72E-06	3.72E-06	3.72E-06
1,2,4 Trimethylbenzene	95-63-6	1.10E-07	4.80E-04	3.84E-04
1,2-Dichloroethene (cis)	156-59-2	1.00E-09	2.63E-03	1.39E-03
1,2-Dichloroethene (trans)	156-60-5	7.32E-05	5.44E-04	3.65E-04
1,3 Dichlorobenzene	541-73-1	7.40E-05	5.48E-04	1.70E-04
1,4 Dichlorobenzene	106-46-7	2.50E-08	3.44E-03	5.20E-04
2,3,4,6 Tetrachlorophenol	58-90-2	1.82E-05	1.82E-05	1.82E-05
2-Butanol	78-92-2	5.90E-04	5.90E-04	5.90E-04
2-Butoxyethanol	111-76-2	2.73E-03	2.73E-03	2.73E-03
2-ethyl-1-Methylbenzene	611-14-3	9.40E-05	9.40E-05	9.40E-05
2-methoxy-1-Propanol		6.24E-03	6.24E-03	6.24E-03
2-Methylnaphthalene	91-57-6	1.63E-05	1.34E-03	4.61E-04
2-Methylphenol (o-Cresol)	95-48-7	2.14E-05	2.14E-05	2.14E-05
3-/4-Methylphenol (m&p Cresol)	108-39-4 & 106-44-5	3.40E-05	3.40E-05	3.40E-05
4-ethyl-1-Methylbenzene		8.10E-05	8.10E-05	8.10E-05
Acenaphthalene	208-96-8	3.36E-05	6.26E-04	3.30E-04
Acenaphthene	83-32-9	2.81E-06	2.41E-05	1.09E-05
Acenaphthylene		1.18E-06	2.66E-06	1.92E-06
Acetone	67-64-1	4.51E-03	8.49E-03	6.50E-03
Acrylic Acid	79-10-7	2.50E-05	2.50E-05	2.50E-05
Acrylonitrile	107-13-1	9.30E-06	9.30E-06	9.30E-06
Aldrin	309-00-2	6.60E-07	6.60E-07	6.60E-07
Aniline	62-53-3	2.51E-05	4.26E-04	1.47E-04
Benzene	71-43-2	2.50E-10	9.25E-02	1.44E-03
Benzo(a)Anthracene	56-55-3	5.60E-07	2.10E-06	1.33E-06
Benzo(b)Fluoranthene	205-99-2	2.30E-07	4.00E-07	3.20E-07
Bromodichloromethane	75-27-46	3.00E-05	6.18E-04	4.06E-04
Butane	106-97-8	9.69E-06	9.69E-06	9.69E-06
Butyl Acetate	123-86-4	1.36E-02	1.36E-02	1.36E-02
Carbon Tetrachloride	56-23-5	3.00E-08	1.36E-02	5.39E-04
Chlorobenzene	108-90-7	2.50E-08	2.75E-03	4.76E-04
Chloroethane	75-00-3	3.89E-03	3.89E-03	3.89E-03

Table C-2

Spent Activated Carbon Organic Constituent Data Summary				
		Organics (lb constituent per lb spent activated carbon)		
Constituent	**CAS NO.**	Minimum	Maximum	Average
Chloroform	67-66-3	1.40E-08	2.08E-02	1.05E-02
Chloromethane	74-87-3	2.06E-04	2.06E-04	2.06E-04
Chrysene	218-01-9	6.40E-07	6.40E-07	6.40E-07
Cresol	1319-77-3	5.10E-05	1.74E-04	1.13E-04
Cumene	98-82-8	5.78E-06	1.65E-03	4.37E-04
Dibenzofuran	132-64-9	7.66E-06	2.61E-05	1.69E-05
Dicyclopentadiene	77-73-6	6.06E-04	6.49E-02	1.68E-02
Dioxane	123-91-1	1.16E-04	9.20E-04	5.18E-04
Ethanol	64-17-5	3.56E-04	3.56E-04	3.56E-04
Ethyl Acetate	141-78-6	5.87E-03	5.87E-03	5.87E-03
Ethylbenzene	100-41-4	5.00E-10	2.30E-02	1.14E-03
Ethylene Glycol	107-21-1	2.94E-01	2.94E-01	2.94E-01
Fluoranthene	206-44-0	3.11E-06	2.90E-05	1.61E-05
Freon 113	76-13-1	1.10E-09	1.10E-09	1.10E-09
Isobutane	75-28-5	1.42E-02	1.42E-02	1.42E-02
Isopar C		1.27E-03	5.48E-02	2.80E-02
Isopropyl Alcohol	67-63-0	7.00E-03	7.00E-03	7.00E-03
Lindane	58-89-9	1.54E-09	6.70E-06	1.28E-06
m&p-Xylenes	108-38-3 &106-42-3	7.20E-08	2.89E-03	5.90E-04
Methanol	67-56-1	1.36E-01	1.36E-01	1.36E-01
Methoxychlor	72-43-5	2.80E-06	2.80E-06	2.80E-06
Methyl ethyl ketone	78-93-3	1.20E-08	4.10E-03	1.40E-03
Methyl Isobutyl ketone	108-10-1	5.00E-06	4.24E-02	2.94E-03
Methyl methacrylate	80-62-6	2.50E-08	2.50E-08	2.50E-08
methyl tert-butyl ether	1634-04-4	1.22E-07	4.66E-02	5.86E-03
Methylene chloride	75-09-2	1.90E-08	1.30E-01	1.63E-03
Methylnaphthalene	28804-88-8	3.54E-06	5.03E-06	4.29E-06
Naphthalene	91-20-3	6.00E-09	4.93E-03	4.31E-04
n-Hexane	110-54-3	5.51E-04	8.25E-03	4.40E-03
Nitrobenzene	98-95-3	6.99E-06	3.14E-02	4.50E-03
o-Xylene	95-47-6	2.50E-09	9.00E-05	1.22E-05
Pentachlorophenol	87-86-5	1.00E-06	3.97E-03	7.36E-04
Phenanthrene	85-01-8	3.20E-07	2.95E-05	1.08E-05
Phenol	108-95-2	2.00E-07	4.03E-03	1.27E-03
Polychlorinated Biphenyls	1336-36-3	8.00E-07	3.50E-06	2.15E-06
Propylbenzene	103-65-1	9.00E-05	9.00E-05	9.00E-05
Propylene glycol monomethyl ether acetate	107-98-2	1.45E-02	1.45E-02	1.45E-02
Propylene oxide	75-56-9	4.30E-09	4.00E-03	1.00E-03
Styrene	100-42-5	2.50E-08	3.97E-02	3.57E-03
Tetrachloroethane	630-20-6 & 79-34-5	2.96E-03	2.96E-03	2.96E-03
Tetrachloroethylene	127-18-4	0.00E+00	1.59E-01	1.84E-02
Tetrahydrofuran	109-99-9	4.16E-04	4.16E-04	4.16E-04

Table C-2

Spent Activated Carbon Organic Constituent Data Summary				
Constituent	CAS NO.	Organics (lb constituent per lb spent activated carbon)		
		Minimum	Maximum	Average
Toluene	108-88-3	1.60E-09	1.30E-01	8.68E-03
Trichloroethylene	79-01-6	2.50E-09	2.17E-01	2.24E-03
Trichlorofluoromethane	75-69-4	1.00E-07	4.00E-02	1.42E-03
Triethylamine	121-44-8	9.54E-03	9.54E-03	9.54E-03
Tris(hydroxymethyl) Aminomethane		1.77E-02	1.77E-02	1.77E-02
Vinyl Chloride	75-01-4	2.30E-08	2.40E-05	2.58E-06
Xylene	1330-20-7	8.00E-10	1.59E-01	3.41E-03

All data reported on a dry carbon basis.

Note: The information presented in this table is considered typical but should not be considered limiting.

Table C-3
Spent Activated Carbon Characterization Summary

Stream Type: Solid
Stream Name: Spent Activated Carbon
Feed Method: Dewatering screw, conveyor belt and rotary airlock

Constituent/Property	Units	Value	
		Typical	Range
Organic Constituents (a)			
Total organics	wt%	3.1	2 - 4
Inorganic Constituents			
Water	wt%	43.5	30 - 50
RCRA Metals (a)			
Antimony	mg/kg	<10	<10
Arsenic	mg/kg	2.8	1.2 - 19
Barium	mg/kg	38.3	1 - 110
Beryllium	mg/kg	0.5	<0.1 - 0.7
Cadmium	mg/kg	0.7	<0.5 - 6.9
Chromium	mg/kg	11	3.1 - 240
Chromium (VI)	mg/kg	<0.9	<1
Lead	mg/kg	2.7	<2 - 25
Mercury	mg/kg	0.1	0 - 0.5
Nickel	mg/kg	21.3	7.5 - 140
Selenium	mg/kg	<2	<1 - 3.9
Silver	mg/kg	1	<0.5 - 1.6
Thallium	mg/kg	10.7	<5 - 29
Other Metals (a)			
Cobalt	mg/kg	4.8	2.1 - 19
Copper	mg/kg	31.4	12 - 60
Manganese	mg/kg	223	54 - 590
Vanadium	mg/kg	6.2	3.7 - 7.9
Zinc	mg/kg	35.4	22 - 44
Elemental Composition (b)			
Carbon (from spent carbon)	wt%	94.5	70 - 99
Carbon (from organic adsorbed on carbon)	wt%	2.9	1.6 - 25
Hydrogen	wt%	0.4	0.2 - 8
Oxygen	wt%	0.5	0.3 - 5
Nitrogen	wt%	0.1	0.06 - 0.5
Sulfur	wt%	0	<0.1
Phosphorous	wt%	0	<0.1
Chlorine/chloride	wt%	1.5	0 - 5
Bromine/bromide	wt%	0	<0.1
Fluorine/fluoride	wt%	0	<0.1
Iodine/iodide	wt%	0	<0.1

(a) - As fed basis (wet)
(b) - Dry basis (as received)

Note: The information presented in this table is considered typical but should not be considered limiting.

APPENDIX C

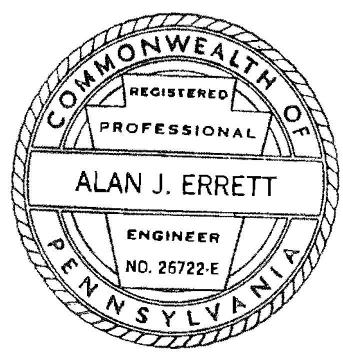
STRUCTURAL CALCULATIONS
FOR
TANKS T-1, T-2, T-5 AND T-6

DEAC-TR-1473

ANALYSIS OF ACTIVATED CARBON / WATER SLURRY STORAGE TANKS (T1, T2, T5, T6) AT SIEMENS WATER TREATMENT CORP. IN PARKER, ARIZONA

Prepared For:

Chavond-Barry Engineering Corp.
400 County Route 518
P.O. Box 205
Blawenburg, NJ 08504



Design Engineering Analysis Corporation
335 Morganza Road
Canonsburg, PA 15317
Phone: (724) 743-3322
Fax: (724) 743-0934

Prepared By

Alan J. Errett

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1.0 SUMMARY

At the Siemens facility in Parker, Arizona, four identical storage tanks, designated as T1, T2, T5, and T6, are used for storage of an activated carbon/water slurry. The 300 series stainless steel tanks were manufactured in 1956 and have been in service at the facility since August of 1992. The slurry, with a specific gravity of 1.5, is stored at atmospheric pressure and 150°F max.

Recent thickness measurements indicate that there has been some relatively minor thinning of the tanks (primarily in the bottom cone) since the previous analysis was performed in 1994. This report describes the analysis of the tanks based on the current measured minimum thicknesses, using wind and seismic loadings based on the latest edition of the International Building Code (Reference 1).

Current measured thickness data for the analysis were provided by Chavond-Barry Engineering Corp. The analysis is based on the minimum thickness of each of the major components (top head, cylindrical shell, bottom cone) for any of the four tanks. A description of the tank design and thickness data is provided in Section 2.

Since a design code has not been specified for the storage tanks, the analysis is based on a combination of several codes. The wind and seismic loads are calculated based on the 2012 Edition of IBC (Reference 1). These calculations are included in Appendix A. A finite element analysis is performed for the wind/weight/hydrostatic pressure load combination and for the seismic/weight/hydrostatic pressure load combination. The finite element stress results are compared to allowable stresses from AWWA D100-05 (Reference 2). The FEA model and methods are described in Section 3.0 and the results are presented and compared to AWWA D100-05 allowables in Section 4.0. It is shown that the calculated stresses meet the AWWA D100-005 allowable stresses.

In addition to the FEA/AWWA evaluation, a second analysis is performed based on the ASME Boiler and Pressure Vessel Code, Section VIII, Division 1 (Reference 3). This analysis is performed using the PV Elite pressure vessel design software (Reference 4), and is described in Section 5. The scope of the ASME Code is limited to vessels with a design pressure of at least 15 psig. The Section VIII, Div. 1 analysis is conservatively based on an internal pressure of 15 psig plus the hydrostatic pressure of the fill-level slurry with 1.5 specific gravity. It is shown that the basic Code limits are satisfied.

Both of the approaches outlined above demonstrate that, with the latest IBC wind/seismic loads and the minimum thickness data provided, the tanks are acceptable for atmospheric storage of the 1.5 SG slurry. The seismic load for the operating case (slurry to fill line) is more critical than the wind loading, but the seismic stresses in the tank are very low compared to the stresses due to weight/hydrostatic pressure. The critical component is the conical bottom, where the hydrostatic pressure loading produces local compressive stresses at the cone/cylinder intersection which are approximately 85% of the allowable local buckling stress from AWWA D100-05.

2.0 DESCRIPTION OF TANK DESIGN AND MEASURED THICKNESSES

The basic design features and current thickness data for the analysis of the tanks were proved to Design Engineering Analysis Corporation by Chavond-Barry Engineering in several e-mails. These e-mails are included in Appendix C. Figure 2-1 shows the tank design and thickness data provided.

As shown on Figure 2-1, the tanks have a 10' inside diameter and are approximately 25-1/2' in overall height. The tanks consist of a 16' cylindrical section with an umbrella roof and an 8' bottom cone. The tanks are supported by a 3' high skirt at the cylinder cone intersection. Minimum thicknesses for the major components are:

Cylinder: t_{min} = 0.176"

Roof: t_{min} = 0.183"

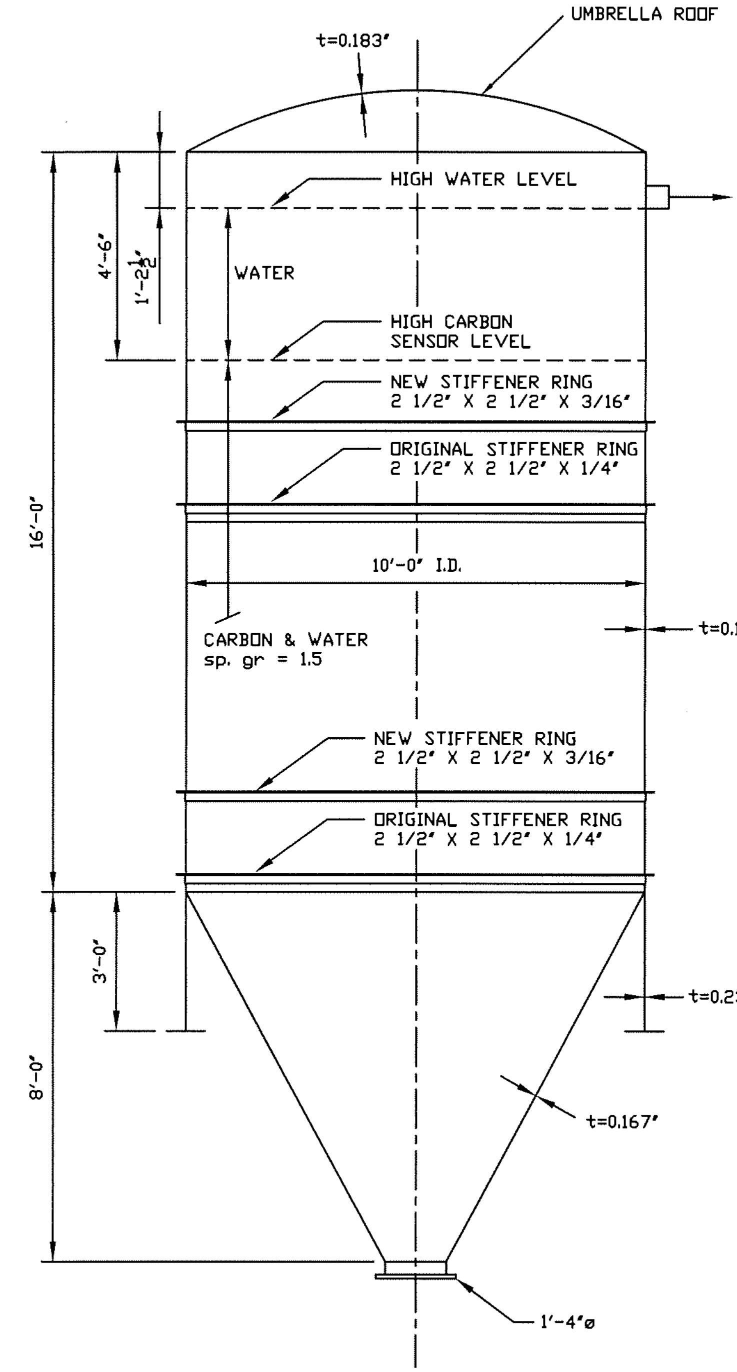
Cone: t_{min} = 0.167"

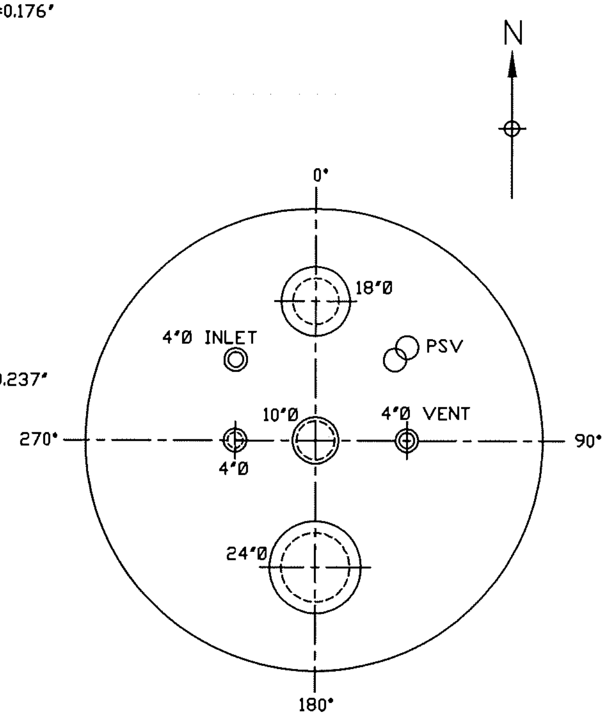
Skirt: t_{min} = 0.237"

There are two original stiffening rings and two added stiffening rings on the cylinder. Due to the corroded condition of the right angle bend, the original 2-1/2" x 2-1/2" x 1/4" carbon steel angle stiffeners are assumed to be reduced to 2" x 1/4" bars. The new carbon steel stiffeners are 2-1/2" x 2-1/2" x 3/16" angles.

The finite element model described in the following section is based on the dimensions and thickness data shown on Figure 2-1. Figure 2-1 also shows the carbon/water levels and specific gravity of the stored slurry. The analysis is conservatively based on a max slurry level 14.5" below the top of the cylinder. The water only portion of the contents is conservatively assumed to be slurry with the 1.5 specific gravity.

TANK MINIMUM THICKNESS DATA





TYPICAL SHELL ELEVATION

GEOMETRY & MINIMUM THICKNESS DATA
SHOWN FOR TANKS
T-1, T-2, T-5, AND T-6

TYPICAL ROOF VIEW

(TANK T-1 SHOWN)
REFER TO EACH TANK DRAWING
FOR DETAILS AND ORIENTATION

2'

TANK GEOMETRY AND MINIMUM THICKNESS DATA
T TANKS T-1, T-2, T-5, AND T-6

DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
JBE	10/24/11	KEM	10/24/11	KEM	10/24/11

SCALE	DWG. NO.	REV.
1/4"=1'-0"	1541-SK-11005	0

NO	DWN	CK'D	APP	REVISIONS	DATE

CBE CHAVOND-BARRY ENGINEERING CORP.
NJ Certificate of Authorization Number: 24GA27984700
400 Route 518 • P.O. Box 205 • Blawenburg, New Jersey 08504

SIEMENS WATER TECHNOLOGIES CORP.
2523 MUTAHAR STREET
PARKER, ARIZONA 85344

Figure 2-1

3.0 FINITE ELEMENT MODEL, METHODS AND ASSUMPTIONS

The tank design described in Section 2.0 is analyzed using a detailed finite element model. The modeling and analysis are performed using the ANSYS finite element program (Reference 5). All components, including the cylinder, umbrella roof, bottom cone, support skirt, and stiffening rings are modeled using ANSYS SHELL63 elements. Thickness input for the various components is per the minimum measured thickness data provided by Chavond-Barry Engineering and shown on Figure 2-1.

The ANSYS finite element model is shown on Figures 3-1 through 3-5. The colors shown on these figures represent the various real constants (thickness input). The specified thickness corresponding to each color is as shown on Figure 2-1. For the analysis studies, the model is supported at the base ring of the support skirt, and the following loadings are applied:

1) Weight (tank + contents) + Hydrostatic Pressure
2) Weight + Hydro Pressure + Wind
3) Weight + Hydro Pressure + Seismic

The weight/hydrostatic pressure load is conservatively based on a slurry level 14.5" below the top of the cylinder. As shown on Figure 2-1, this level includes the top 39.5" of water only. The hydrostatic pressure is based on a specific gravity of 1.5.

The wind and seismic loadings are based on IBC 2012. The detailed calculations are provided in Appendix A. The wind loading is based on the IBC design minimum pressure of 16 psf. This pressure loading is applied to all exposed surfaces of the tank and skirt. The calculated seismic loads of 0.185 g's horizontal and 0.049 vertical are applied as static g loads. A modal analysis is performed to verify that no additional wind or seismic analysis is required. The finite element analysis results are presented and evaluated in Section 4.0.

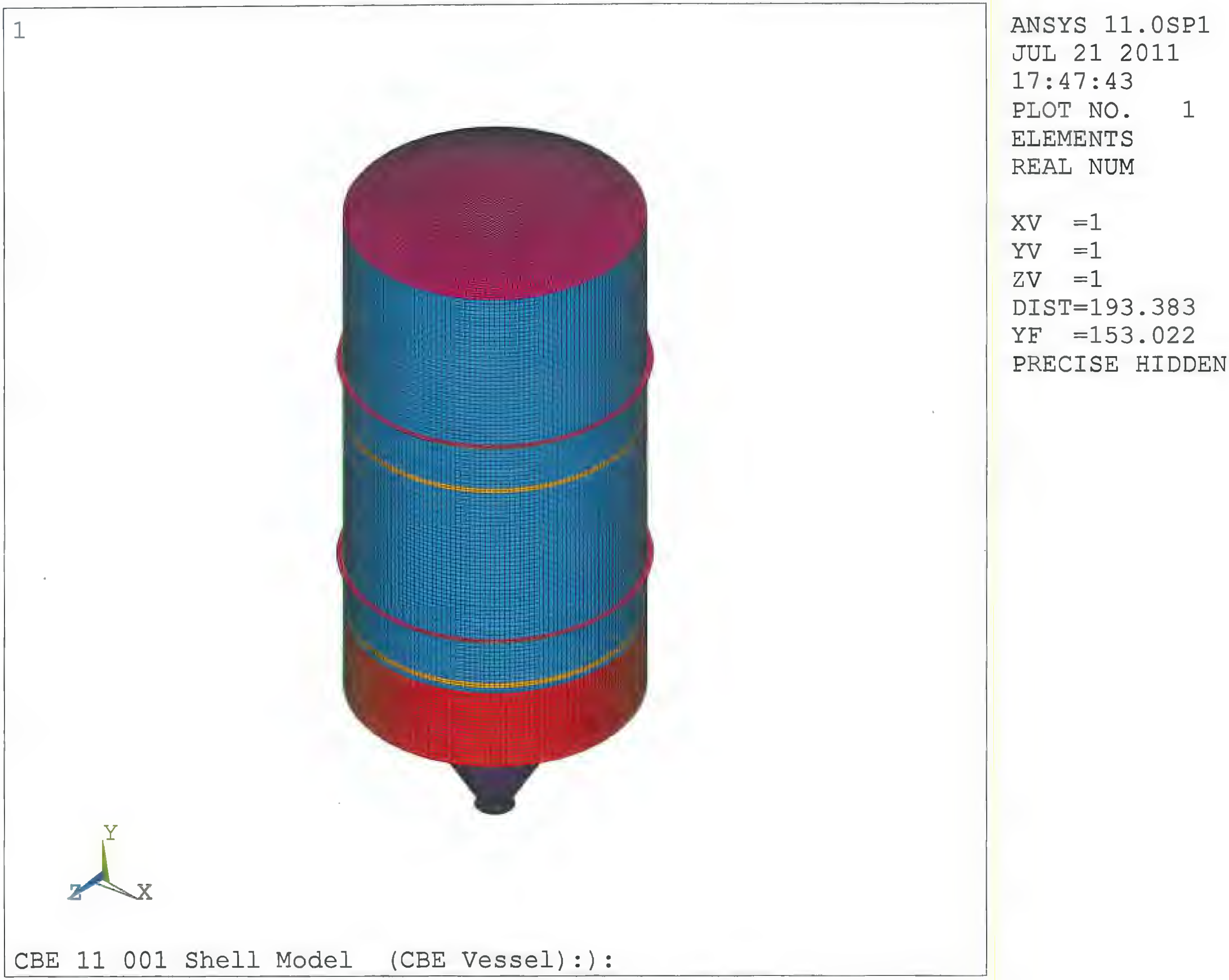


Figure 3-1 - ANSYS Finite Element Model of Storage Tank

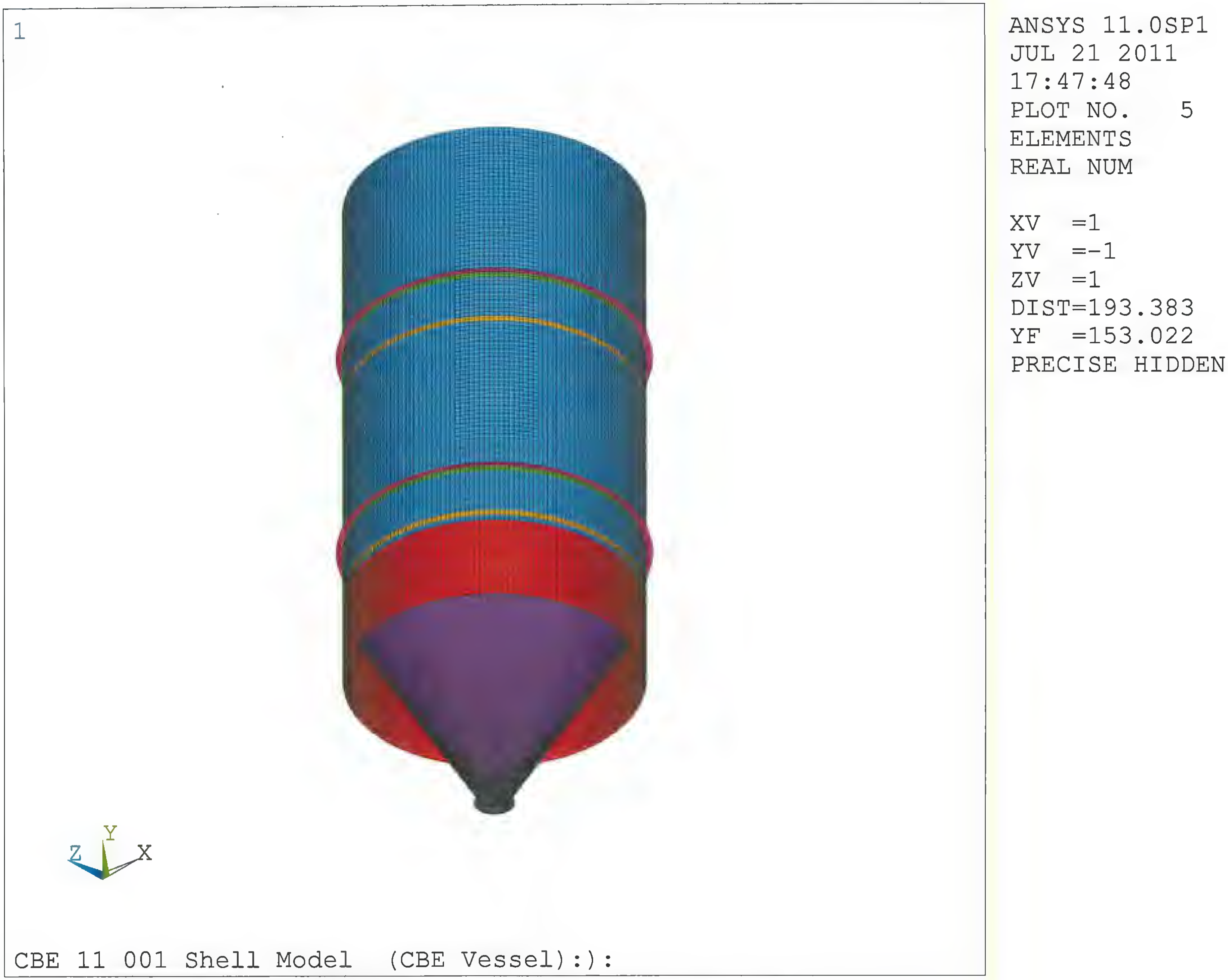


Figure 3-2 - ANSYS Finite Element Model of Storage Tank

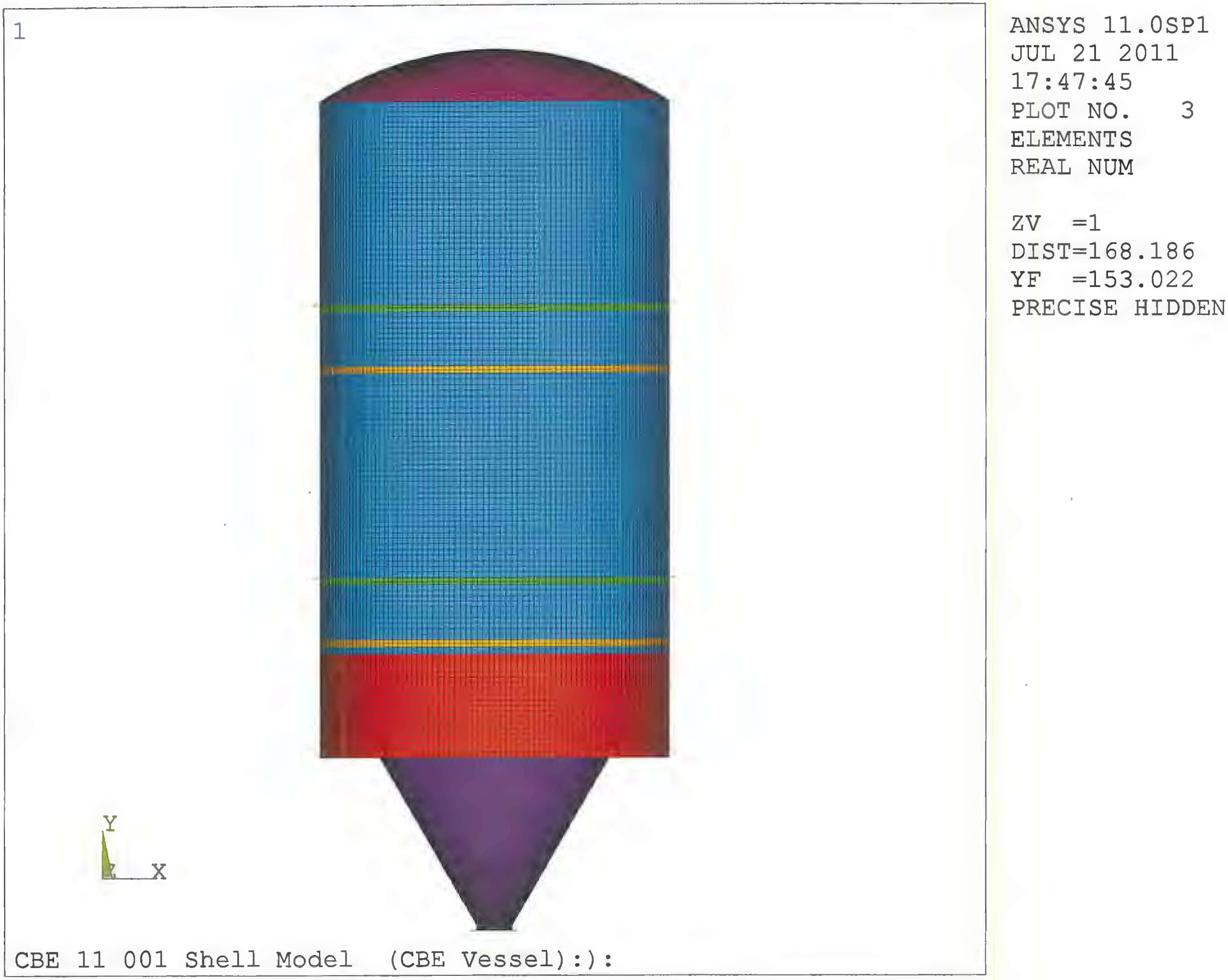


Figure 3-3 - ANSYS Finite Element Model of Storage Tank

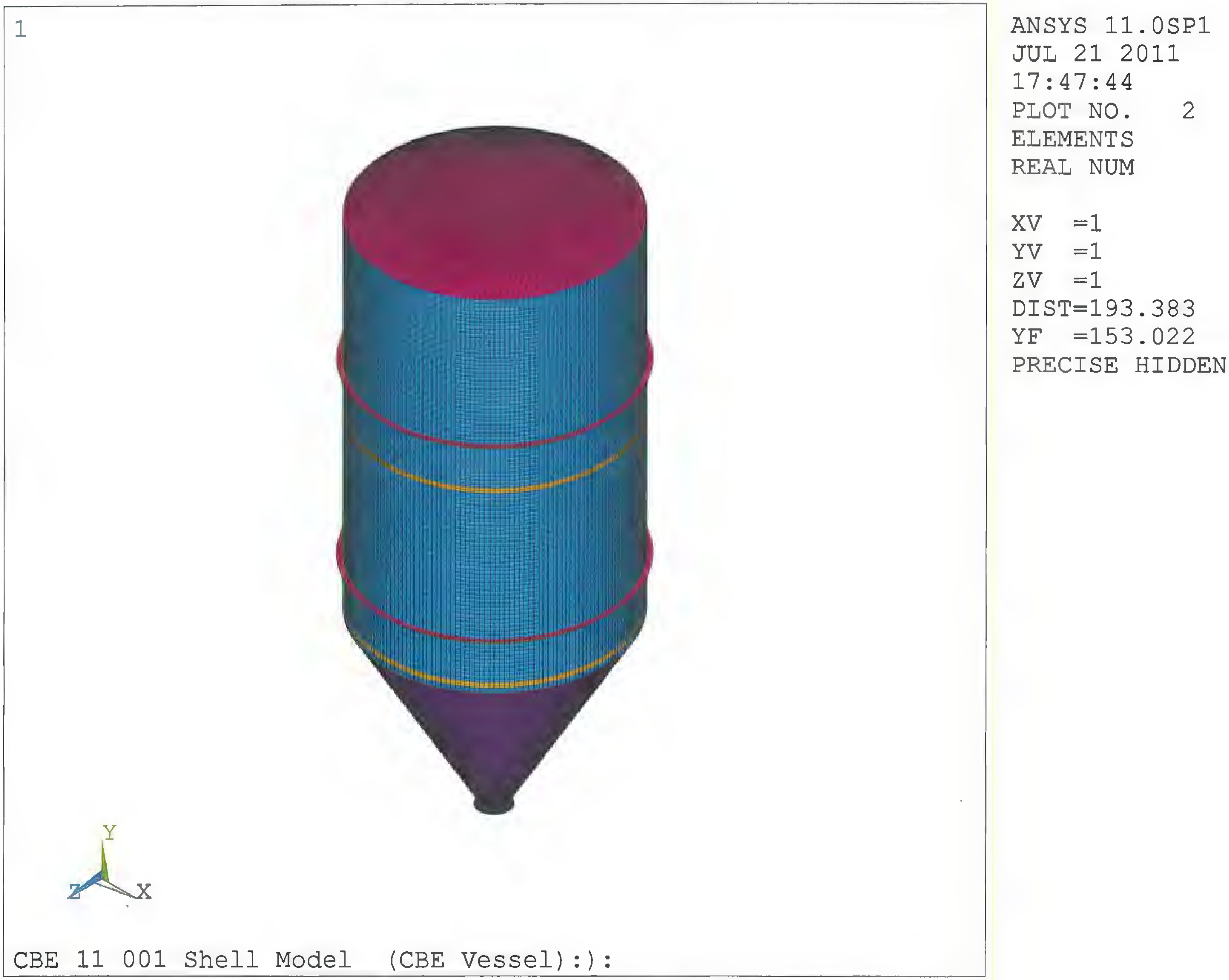


Figure 3-4 - ANSYS Finite Element Model of Storage Tank (Support Skirt Removed to Show Cone)

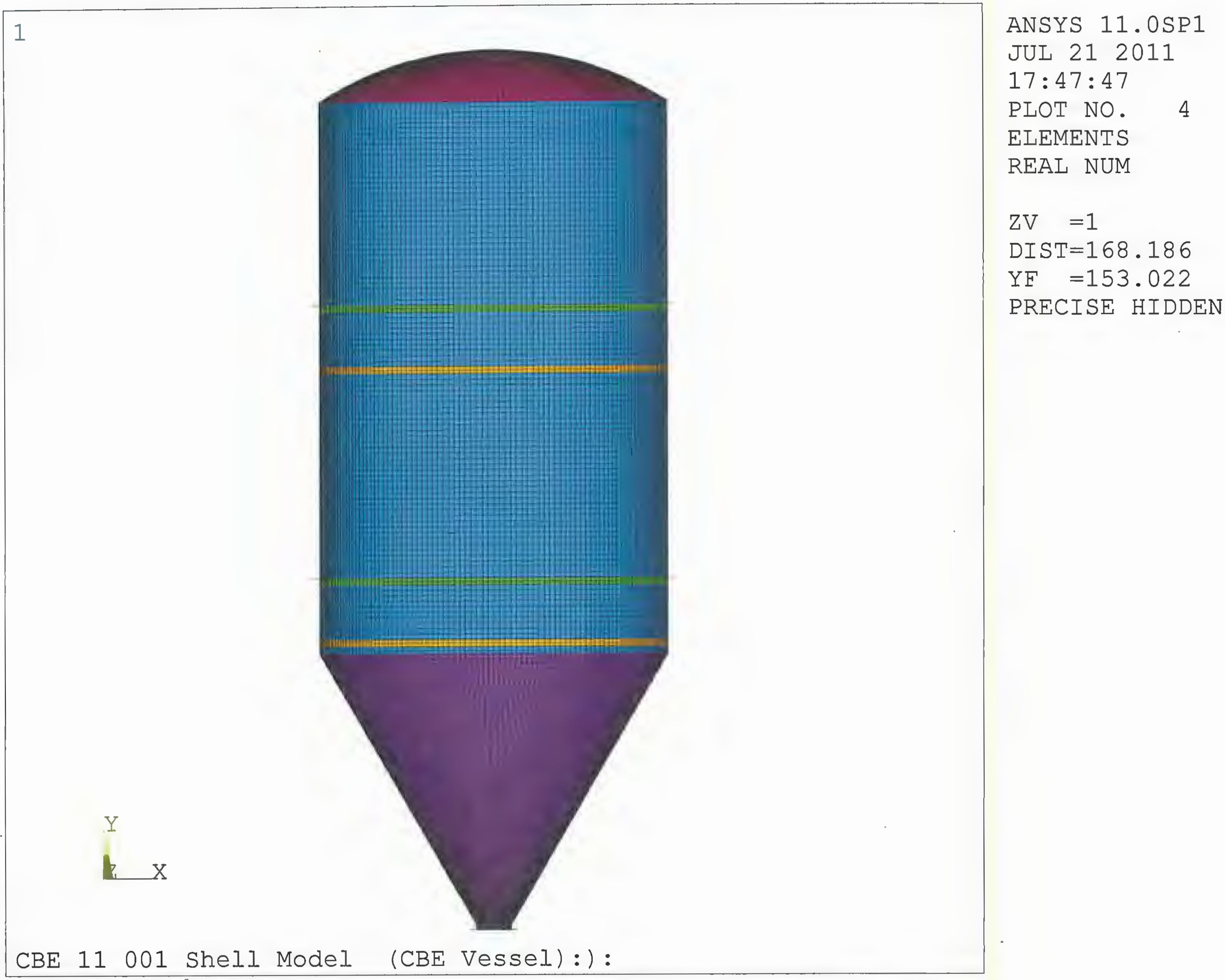


Figure 3-5 - ANSYS Finite Element Model of Storage Tank (Support Skirt Removed to Show Cone)

4.0 FEA RESULTS AND EVALUATION PER AWWA D100-05

The ANSYS finite element model described in Section 3.0 was used to perform both modal and stress analyses. Modal analyses were performed for both the empty tank and full tank conditions. Figure 4-1 shows the mode shape and frequency of the fundamental tank mode for the empty vessel condition. The natural frequency for the empty tank, shown as "FREQ=" in the plot legend, is 55.7 Hz. The fundamental mode shape plot for the full tank case, with a frequency of 12.2 Hz, is shown on Figure 4-2. These calculated natural frequencies agree very closely with the PV Elite calculation in Appendix B, and present no special problems in terms of either wind or seismic loadings.

Figures 4-3, 4-4 and 4-5 show maximum principal stress, minimum principal stress and Von Mises equivalent stress contours for the operating case, consisting of weight plus hydrostatic pressure with the tank full. The highest tensile stress (max principal stress) of 4.412 ksi is well below the AWWA allowable of .85 x 15 ksi = 12.75 ksi. The highest compressive stress, shown on the min principal stress plot (Figure 4-4) is 6.13 ksi. This is basically a very localized compressive hoop stress at the cone/cylinder intersection, due to the hydrostatic pressure loading. Table 4-1, taken from AWWA D100-05 shows the allowable local buckling compressive stress as a function of the thickness/radius ratio. For the tank t/r ratio of 0.0029, the allowable compressive stress is 7.209 ksi. The calculated stress of 6.13 ksi is below the applicable stress limit.

Figure 4-6 shows the axial stress contours due to the applied horizontal and vertical seismic loadings. The seismic loads produce a relatively low overall bending stress of 0.988 ksi. Figures 4-7, 4-8 and 4-9 show the maximum principal stress, minimum principal stress and Von Mises equivalent stress for the combination of operating (weight + hydrostatic pressure, full vessel) and seismic loading on the full tank. The maximum tension and compression stresses of 4.436 ksi and 6.418 ksi are only slightly higher than the stresses for the operating case. Since the allowables for the wind and seismic cases are increased by 33%, the seismic stresses easily satisfy the allowables.

The maximum principal stress, minimum principal stress and Von Mises equivalent stress for the operating + wind loading are shown on Figures 4-10, 4-11 and 4-12. The stresses due to wind loading are lower than the seismic stresses and easily satisfy the AWWA allowables.

It is concluded, based on the detailed finite element analysis results for the thickness data provided, that the T1, T2, T5 and T6 tanks are acceptable for continued atmospheric storage of the slurry.

As an additional check on the tanks, an ASME PV Code Section VIII analysis is performed as outlined in the following section.

TABLE 4-1
ALLOWABLE LOCAL COMPRESSIVE STRESS - FROM AWWA D-100-05

Table 10 Allowable local buckling compressive stress F_L for class 1 materials

t/R	F_L (*psi*)	F_L (*MPa*)	*t/R*	F_L (*psi*)	F_L (*MPa*)	*t/R*	F_L (*psi*)	F_L (*MPa*)
0.0001	175	1.2	0.0043	8,943	61.7	0.0085	12,048	83.1
0.0002	351	2.4	0.0044	9,022	62.2	0.0086	12,122	83.6
0.0003	527	3.6	0.0045	9,096	62.7	0.0087	12,196	84.1
0.0004	706	4.9	0.0046	9,170	63.2	0.0088	12,259	84.6
0.0005	888	6.1	0.0047	9,244	63.7	0.0089	12,343	85.1
0.0006	1,069	7.4	0.0048	9,317	64.3	0.0090	12,417	85.6
0.0007	1,255	8.7	0.0049	9,391	64.8	0.0091	12,491	86.1
0.0008	1,445	10.0	0.0050	9,465	65.3	0.0092	12,565	86.7
0.0009	1,639	11.3	0.0051	9,539	65.8	0.0093	12,638	87.2
0.0010	1,838	12.7	0.0052	9,613	66.3	0.0094	12,712	87.7
0.0011	2,041	14.1	0.0053	9,686	66.8	0.0095	12,786	88.2
0.0012	2,251	15.5	0.0054	9,760	67.3	0.0096	12,860	88.7
0.0013	2,467	17.0	0.0055	9,834	67.8	0.0097	12,934	89.2
0.0014	2,690	18.6	0.0056	9,908	68.3	0.0098	13,007	89.7
0.0015	2,920	20.1	0.0057	9,982	68.8	0.0099	13,081	90.2
0.0016	3,158	21.3	0.0058	10,055	69.3	0.0100	13,155	90.7
0.0017	3,405	23.5	0.0059	10,129	69.9	0.0101	13,229	91.2
0.0018	3,660	25.2	0.0060	10,203	70.4	0.0102	13,303	91.7
0.0019	3,925	27.1	0.0061	10,277	70.9	0.0103	13,376	92.3
0.0020	4,200	29.0	0.0062	10,351	71.4	0.0104	13,450	92.8
0.0021	4,485	30.9	0.0063	10,424	71.9	0.0105	13,524	93.3
0.0022	4,782	33.0	0.0064	10,498	72.4	0.0106	13,598	93.8
0.0023	5,090	35.1	0.0065	10,572	72.9	0.0107	13,672	94.3
0.0024	5,410	37.3	0.0066	10,646	73.4	0.0108	13,745	94.8
0.0025	5,742	39.6	0.0067	10,720	73.9	0.0109	13,819	95.3
0.0026	6,088	42.0	0.0068	10,793	74.4	0.0110	13,893	95.8
0.0027	6,447	44.5	0.0069	10,887	74.9	0.0111	13,967	96.3
0.0028	6,821	47.0	0.0070	10,941	75.5	0.0112	14,041	96.8
0.0029	7,209	49.7	0.0071	11,015	76.0	0.0113	14,114	97.3
0.0030	7,612	52.5	0.0072	11,089	76.5	0.0114	14,188	97.8
0.0031	8,032	55.4	0.0073	11,152	77.0	0.0115	14,262	98.4
0.0032	8,137	56.1	0.0074	11,236	77.5	0.0116	14,336	98.9
0.0033	8,210	56.6	0.0075	11,310	78.0	0.0117	14,410	99.4
0.0034	8,284	57.1	0.0076	11,384	78.5	0.0118	14,483	99.9
0.0035	8,358	57.5	0.0077	11,453	79.0	0.0119	14,557	100.4
0.0036	8,432	58.2	0.0078	11,531	79.5	0.0120	14,631	100.9
0.0037	8,505	58.7	0.0079	11,585	80.0	0.0121	14,705	101.4
0.0038	8,579	59.2	0.0080	11,679	80.5	0.0122	14,779	101.9
0.0039	8,653	59.7	0.0081	11,753	81.1	0.0123	14,852	102.4
0.0040	8,727	60.2	0.0082	11,827	81.5	0.0124	14,926	102.9
0.0041	8,801	60.7	0.0083	11,900	82.1	0.0125	15,000	103.4
0.0042	8,875	61.2	0.0084	11,974	82.5	>0.0125	15,000	103.4

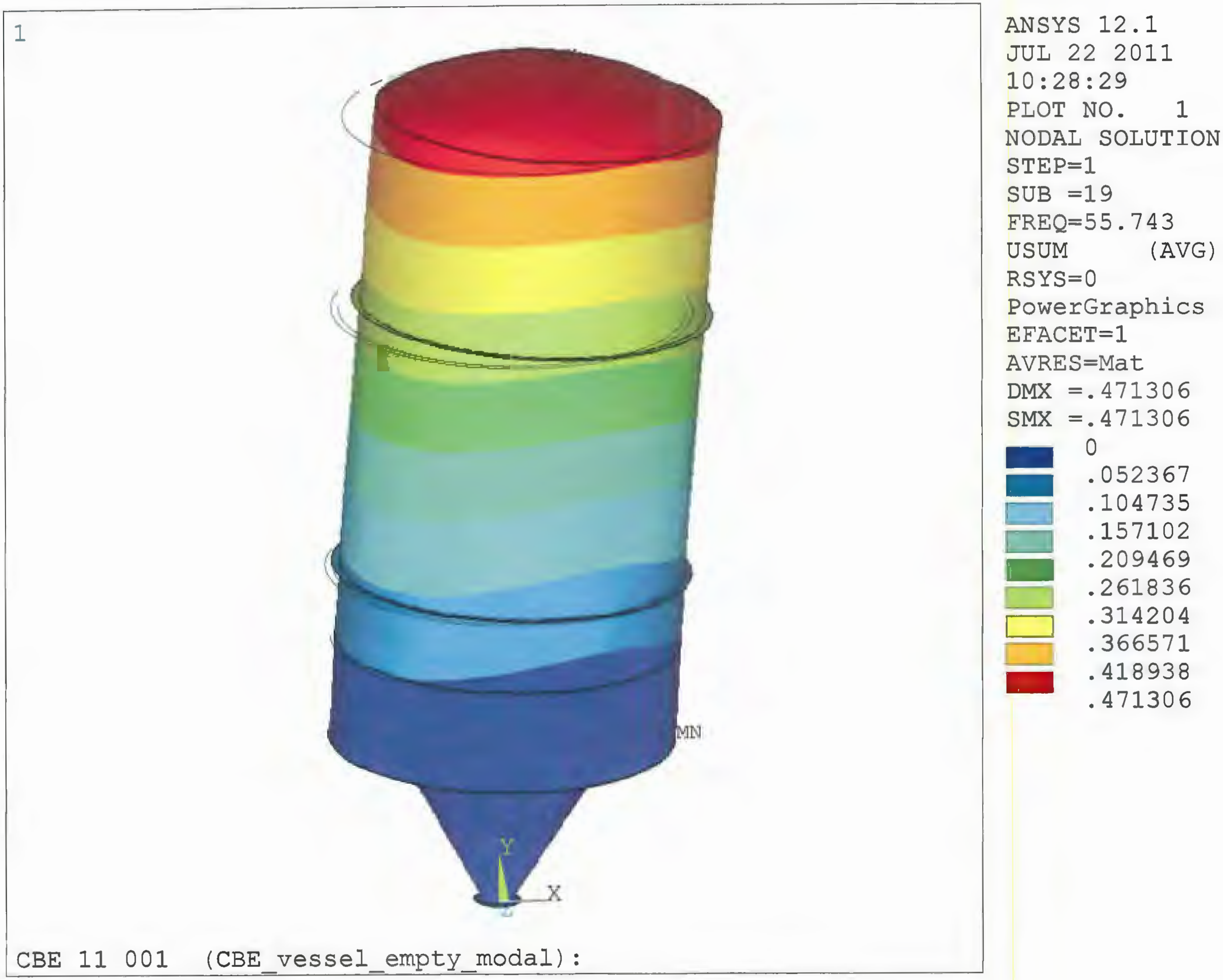


Figure 4-1 - Mode Shape Plot for Fundamental Tank Rocking Mode, Empty - f = 55.7 Hz

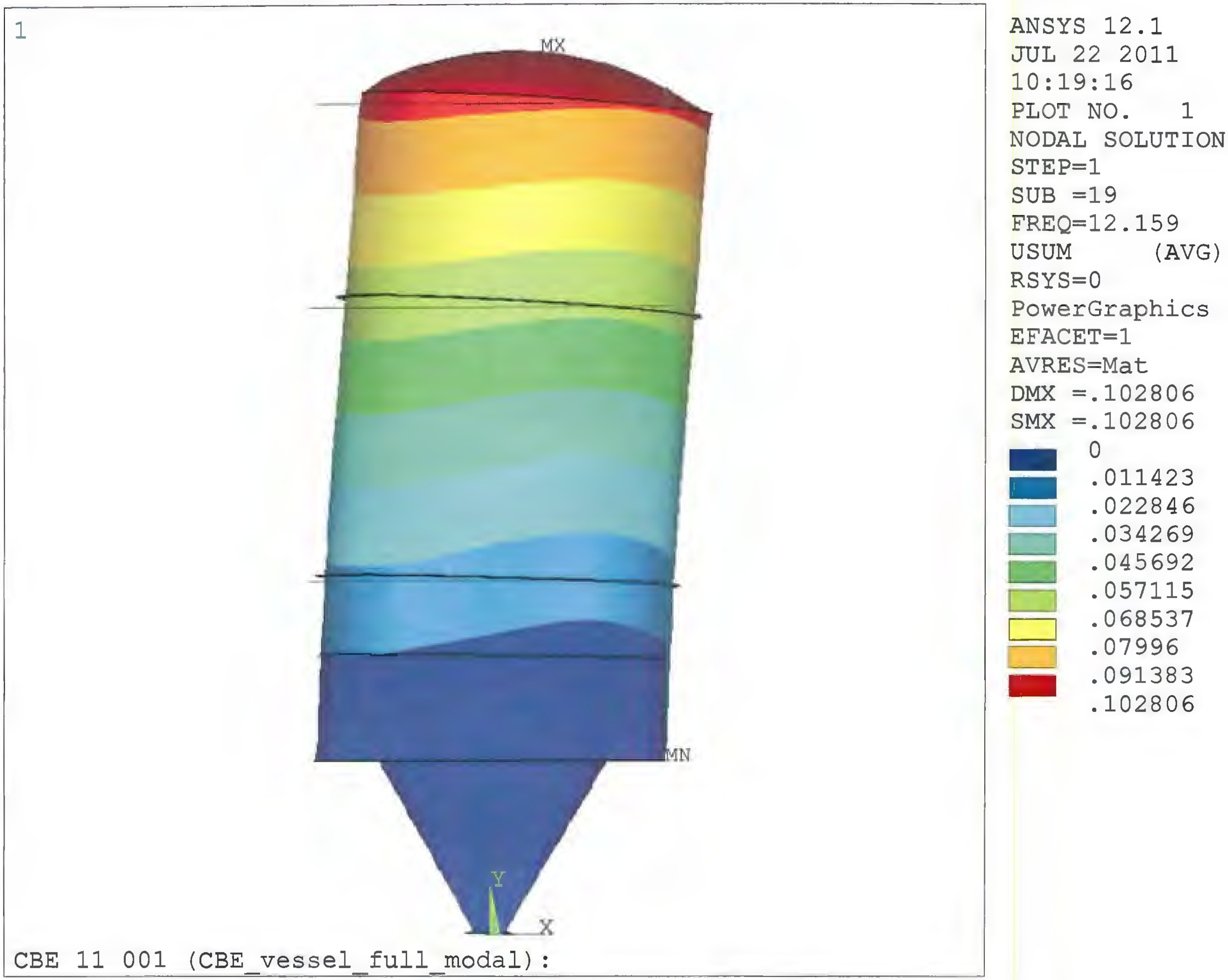


Figure 4-2 - Mode Shape Plot for Fundamental Tank Rocking Mode, Full - f = 12.2 Hz

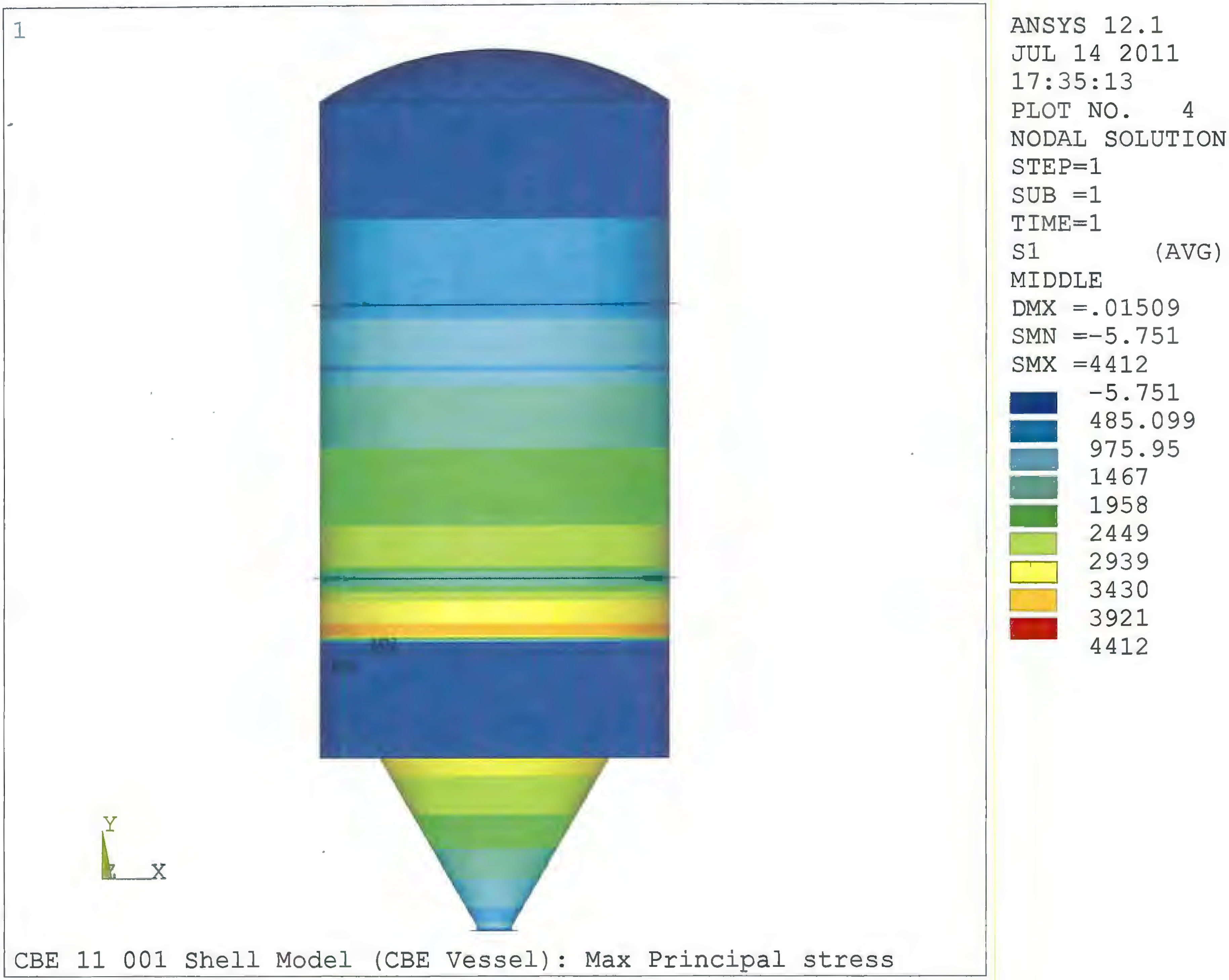


Figure 4-3 - Max Principal Stress for Operating Case - Weight + Hydrostatic Pressure (Full)

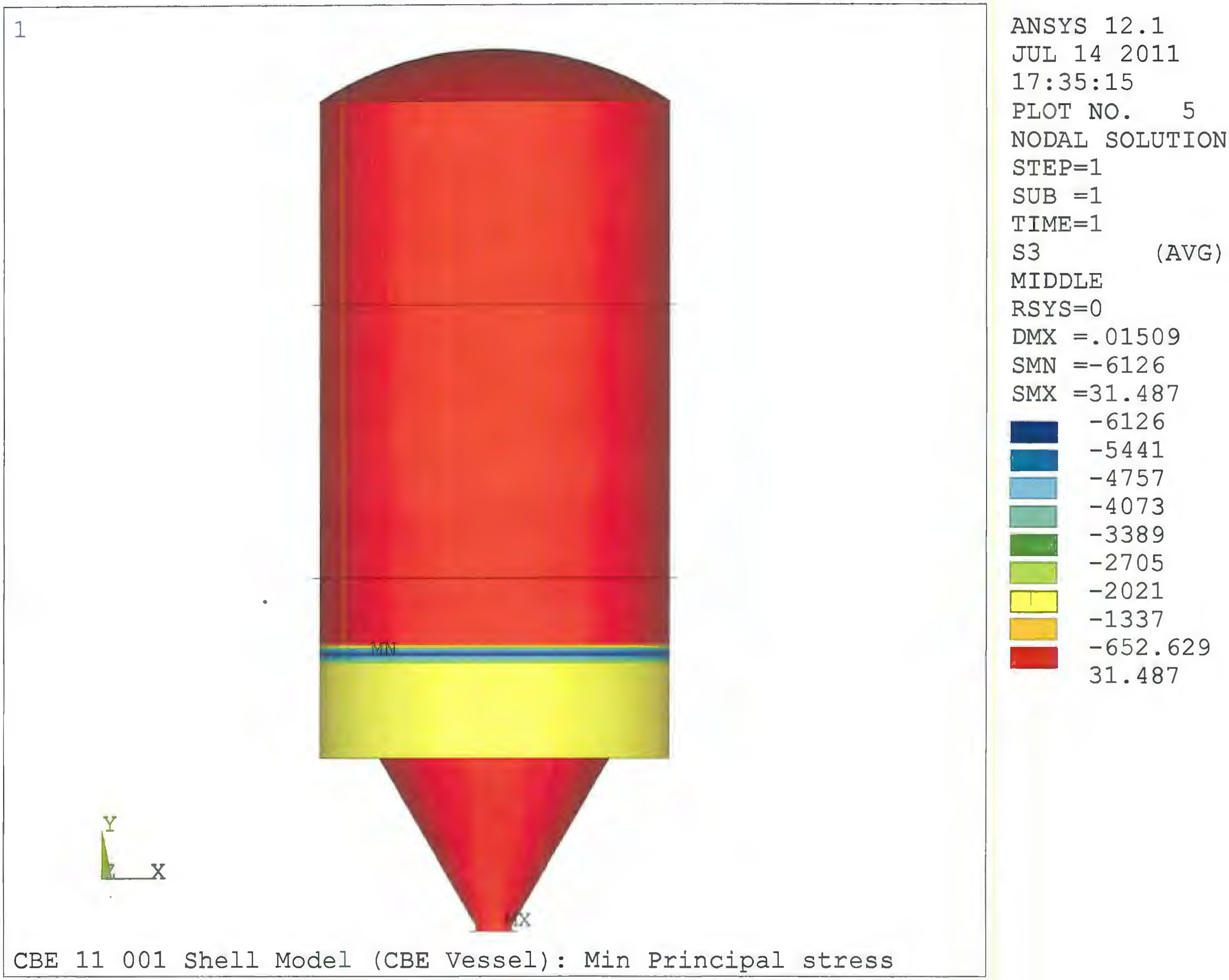


Figure 4-4 - Min Principal Stress for Operating Case - Weight + Hydrostatic Pressure (Full)

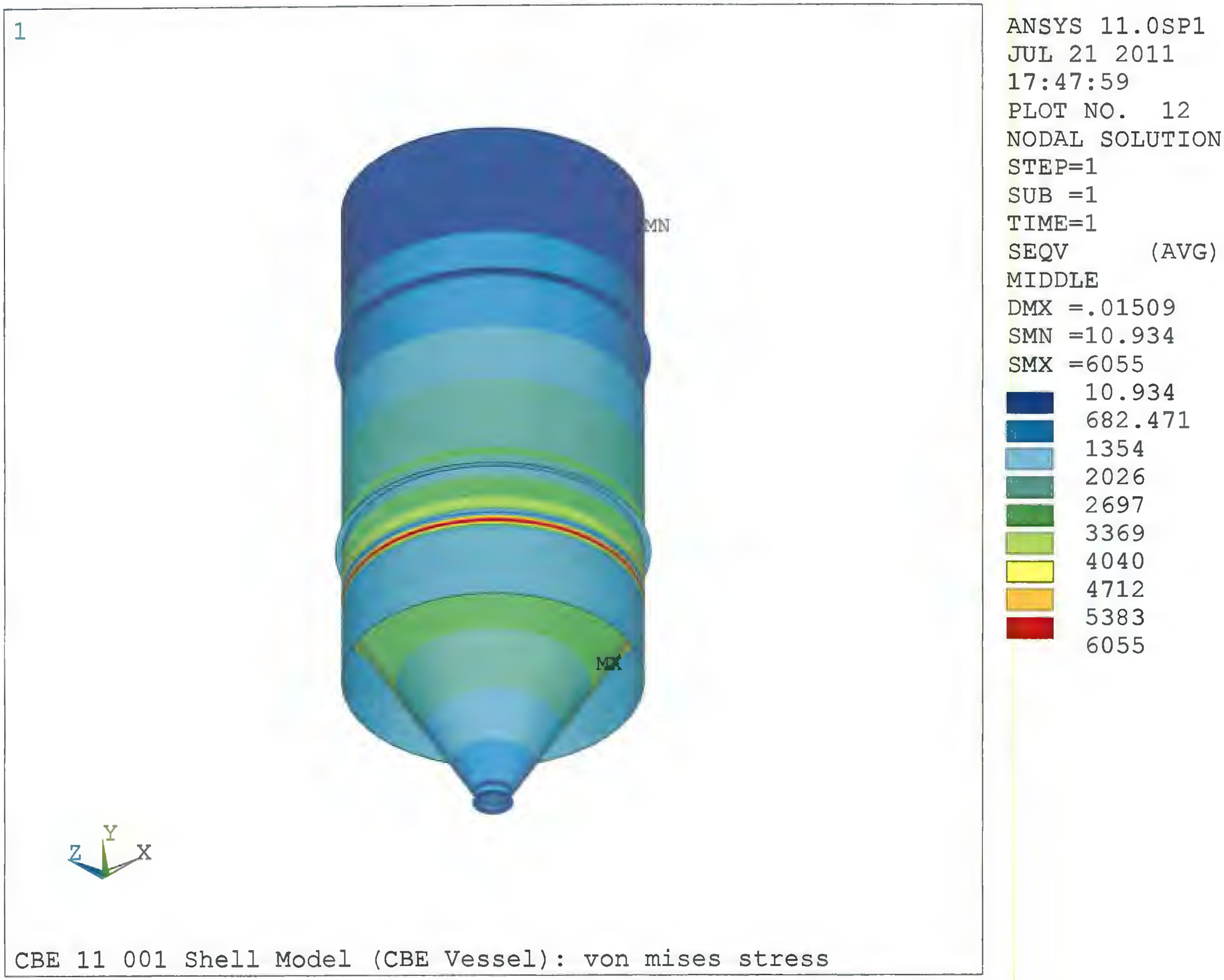


Figure 4-5 - Von Mises Equivalent Stress for Operating Case - Weight + Hydrostatic Pressure (Full)

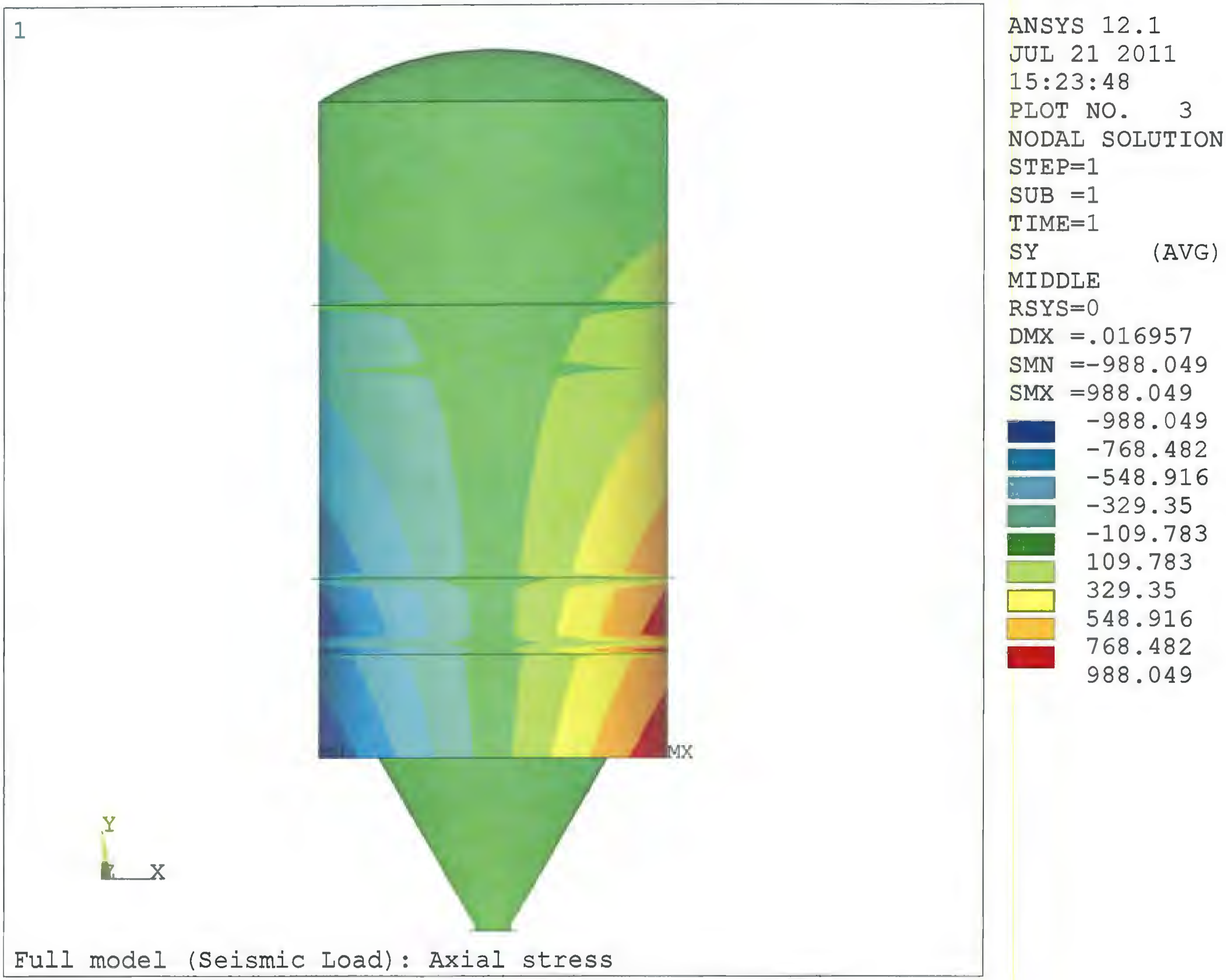


Figure 4-6 - Axial Stress Due to Seismic Loading

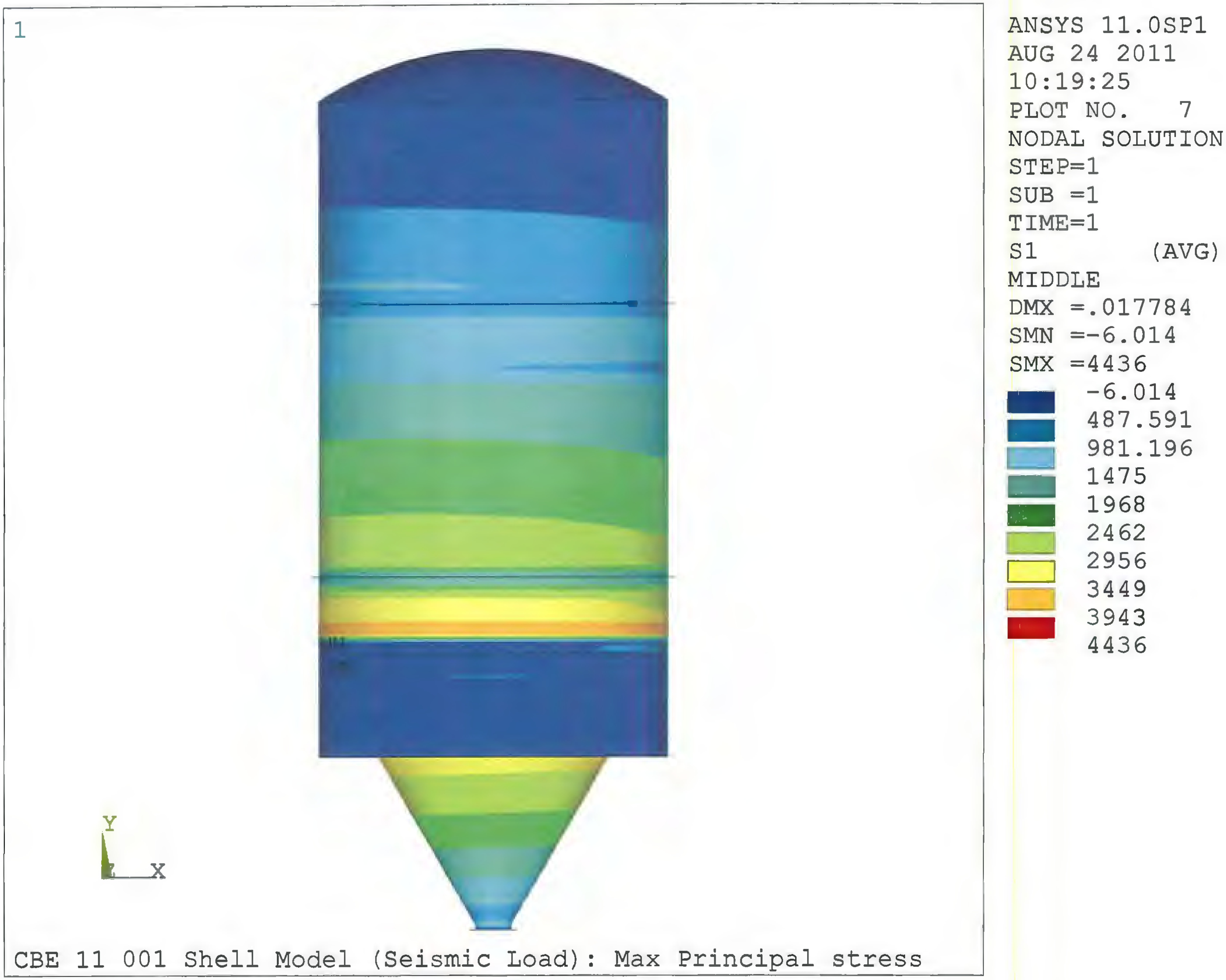


Figure 4-7 - Max Principal Stress Due to Operating (Weight + Hydrostatic Pressure) and Seismic Loading (Full)

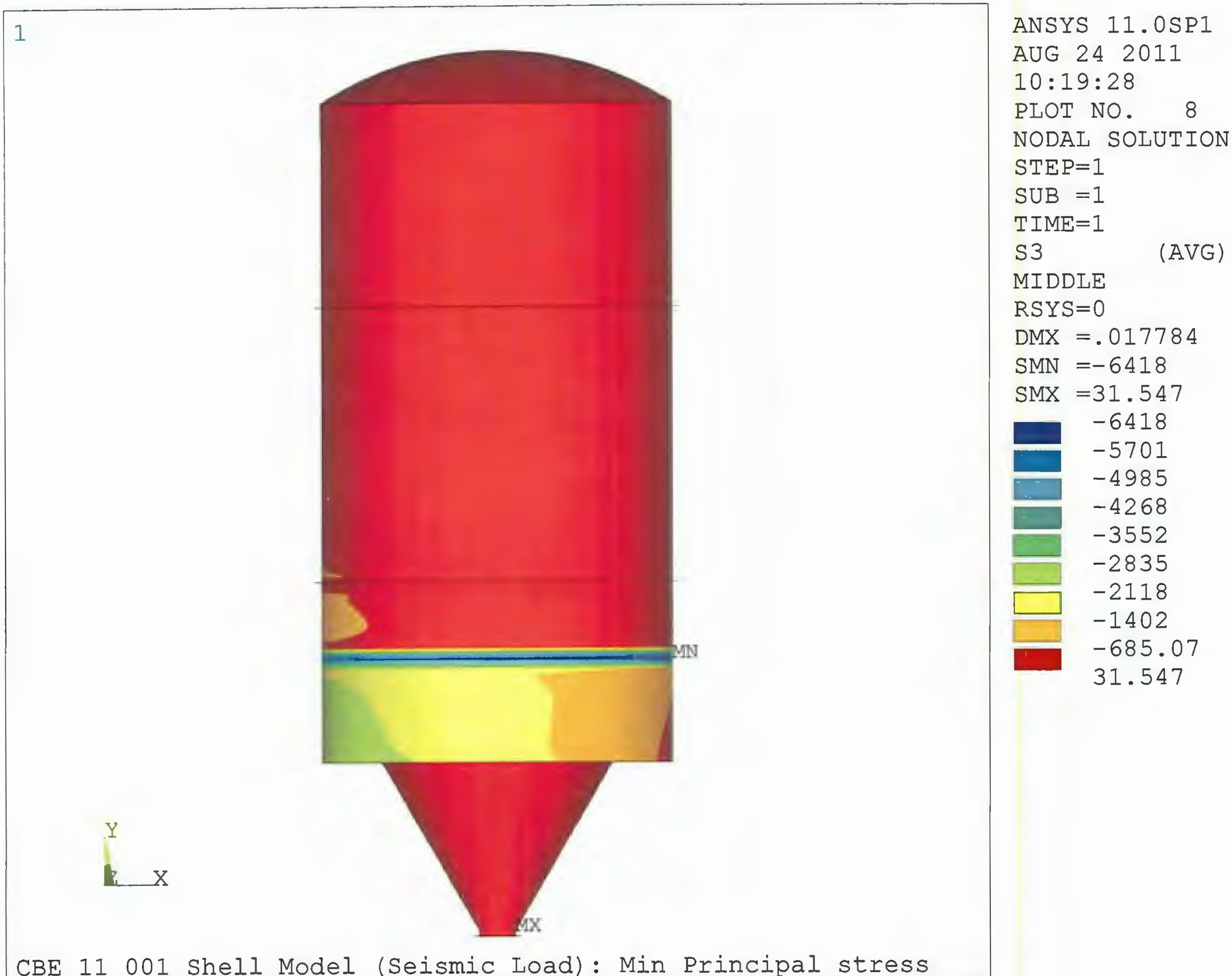


Figure 4-8 - Min Principal Stress Due to Operating (Weight + Hydrostatic Pressure) and Seismic Loading (Full)

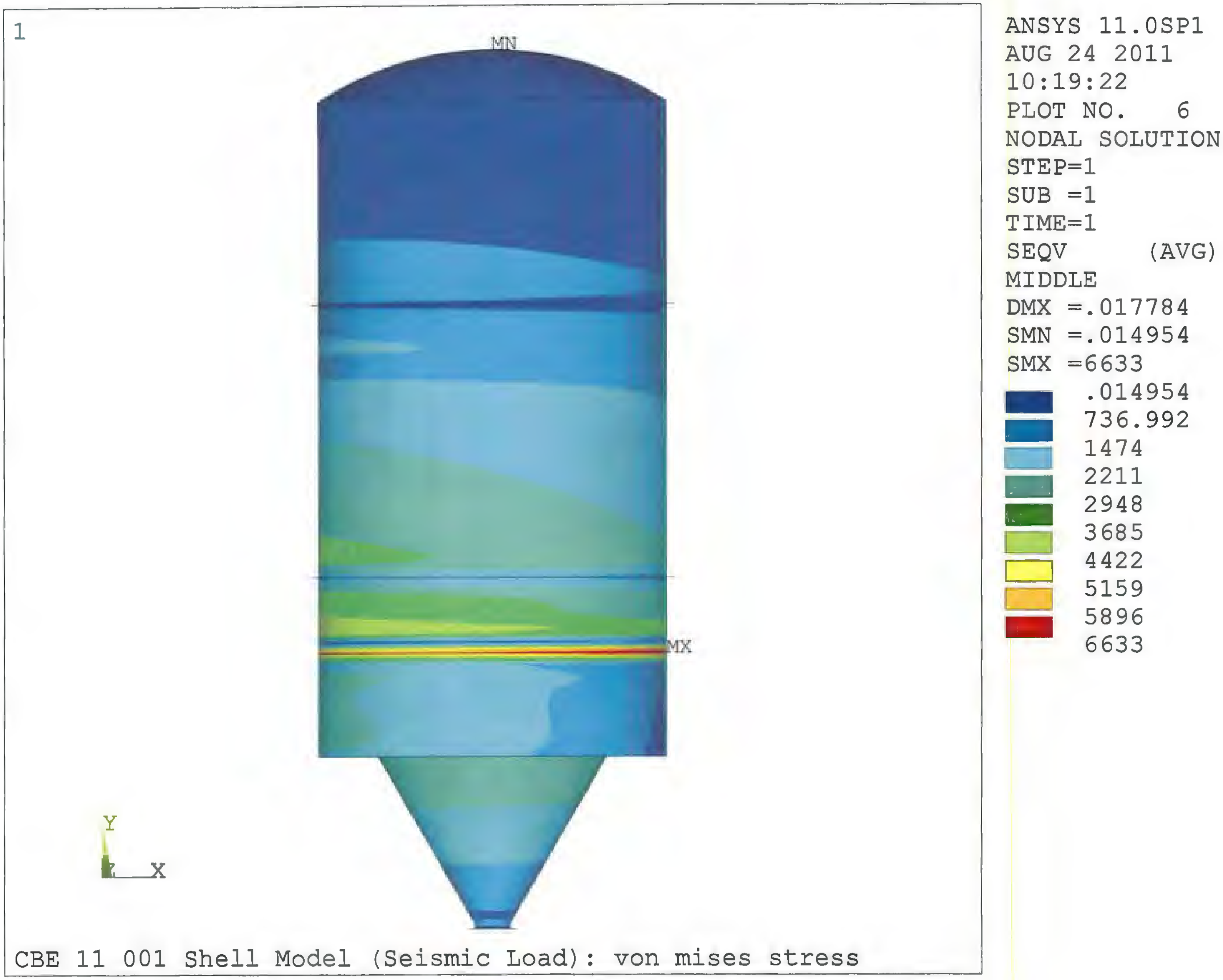


Figure 4-9 - Von Mises Equivalent Stress Due to Operating (Weight + Hydrostatic Pressure) and Seismic Loading (Full)

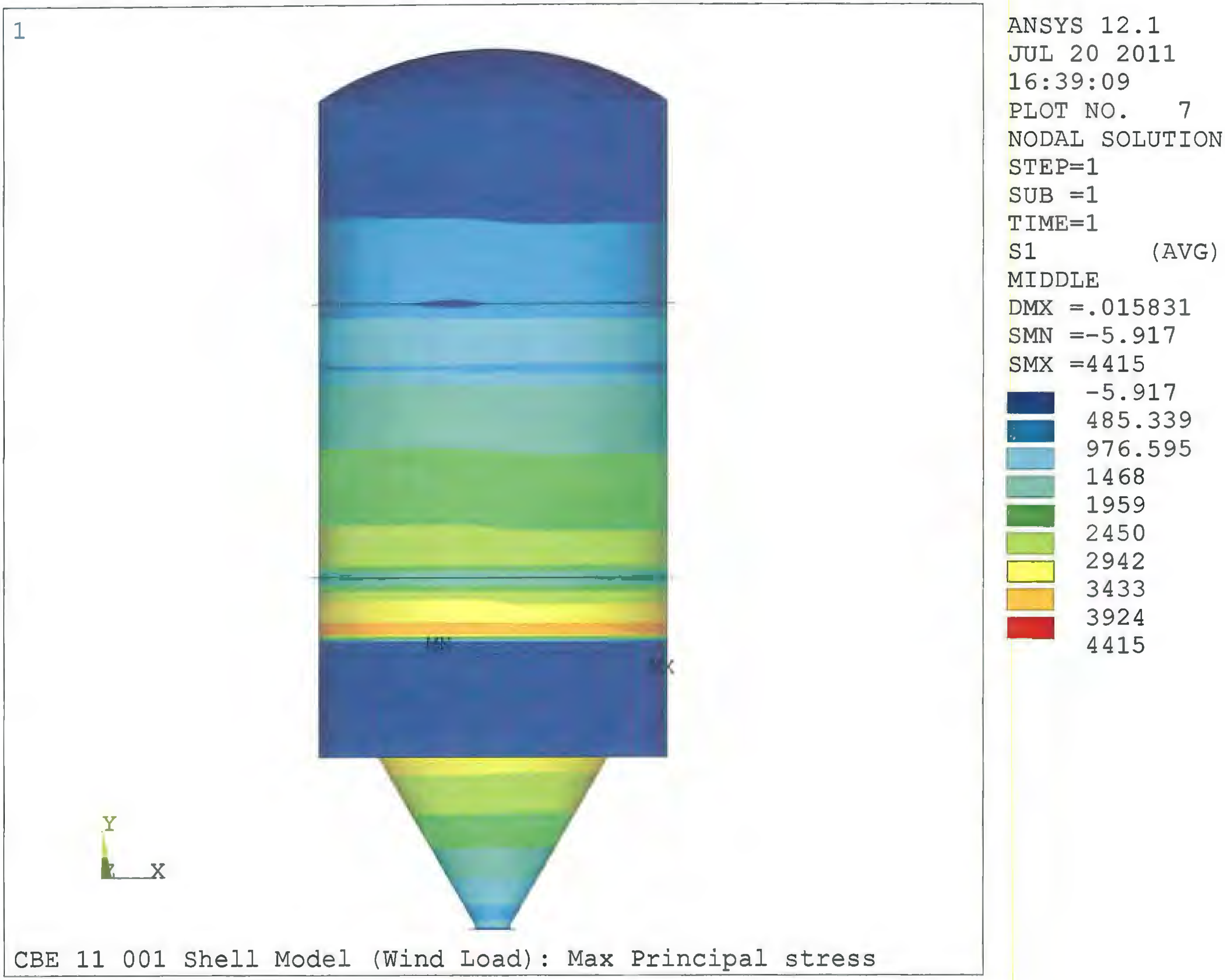


Figure 4-10 - Max Principal Stress Due to Operating (Full Weight + Hydrostatic Pressure) + Wind Loading

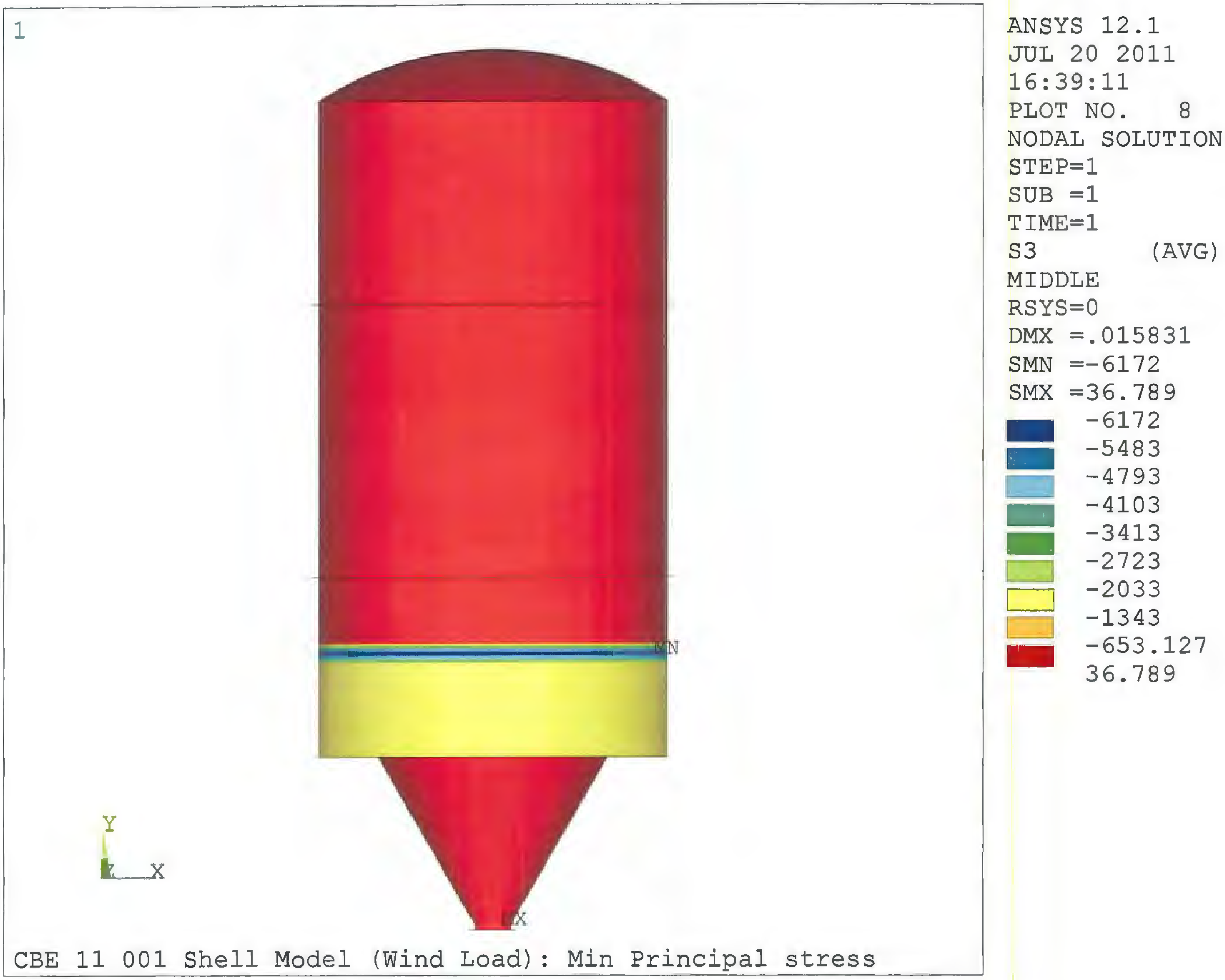


Figure 4-11 - Min Principal Stress Due to Operating (Full Weight + Hydrostatic Pressure) + Wind Loading

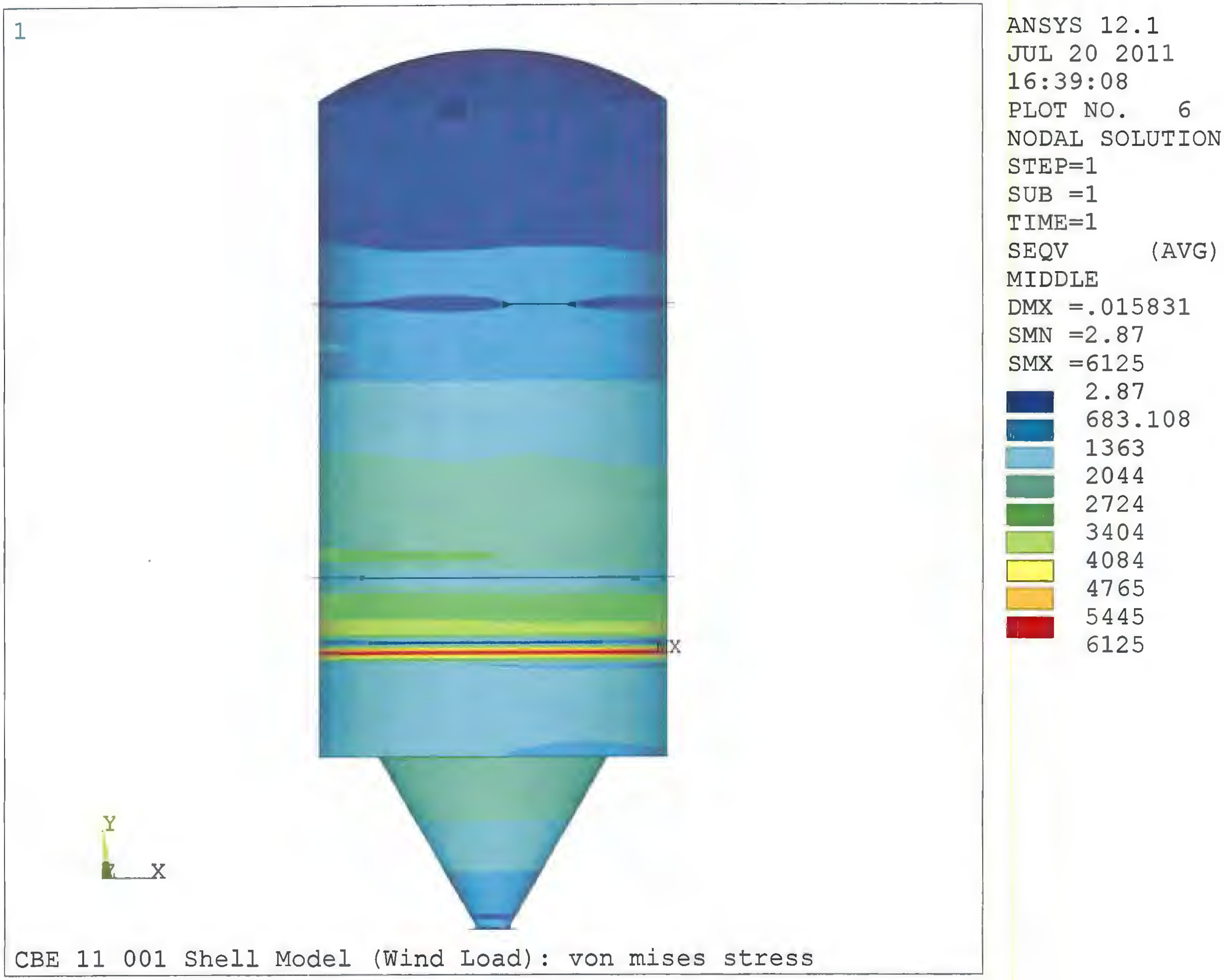


Figure 4-12 - Von Mises Equivalent Stress Due to Operating (Full Weight + Hydrostatic Pressure) + Wind Loading

5.0 ASME SECTION VIII, DIV. 1 CODE CALCS

The finite element analysis in the previous section demonstrated that, with the thickness data provided, the calculated stresses in the tank and support skirt due to operating, seismic and wind loadings satisfy the stress limits from AWWA D100-05. As an additional check on the integrity of the tanks, an ASME PV Code Section VIII analysis is performed using the PV Elite software package (Reference 4).

The scope of the ASME Code is limited to pressure vessels with a design pressure of 15 psig or greater. For the Code calculations, an internal pressure of 15 psig was specified, along with the hydrostatic pressure of the 1.5 SG contents at the water-only fill level.

The complete PV Elite report is included in Appendix B. The calculated frequencies for the empty and full tank are in very close agreement with the FEA results. The report shows that specified tank thicknesses satisfy the Code requirements, confirming the conclusions of the FEA study. Once again, it is concluded that, based on the thickness data provided, the tanks are acceptable for continued atmospheric storage of the slurry.

6.0 REFERENCES

1. International Building Code, 2012 Edition, International Code Council.
2. AWWA Standard D100-05, "Welded Carbon Steel Tanks for Water Storage," American Water Works Association, Denver, CO.
3. ASME Boiler and Pressure Vessel Code, Section VIII, Division 1, 2010 Edition.
4. PV Elite 2011, Intergraph CADWorx and Analysis Solutions, Inc., Houston, TX 77070.
5. ANSYS Finite Element Program, Release 12.1, ANSYS Inc., Southpointe, 275 Technology Drive, Canonsburg, PA 15317.

APPENDIX A

Wind and Seismic Loads

per IBC 2012

Wind Load Calculations per IBC 2012 & ASCE 7-10 as of 07/20/11
Project: CBE-11-001

D =	10.00	ft (outside diameter)
C_f =	0.70	Force Coefficient (Figure 29.5-1)
K_d =	0.95	Directionality Factor (Table 26.6-1)
K_{zt} =	1.00	Para.26.8.2 (minimum value shall be 1.00)
Category =	I	
Exposure =	C	
Velocity =	105	mph (Ultimate Wind Speed)
Velocity =	81	mph (Design Wind Speed - Eqn 16-33)
G =	0.85	Gust Effect Factor (Para 26.9-1)

TABLE 29.3-1

Velocity Pressure Exposure Coefficients K_z

z (ft)	B	C	D	Velocity Pressure q_z (psf)	Wind Pressure q_zGC_f (psf)	$D\sqrt{q_z}$ (Figure 29.5-1)
0-15	0.57	0.85	1.03	16.00	9.52	40.00
20	0.62	0.90	1.08	16.00	9.52	40.00
25	0.66	0.94	1.12	16.00	9.52	40.00
30	0.70	0.98	1.16	16.00	9.52	40.00
40	0.76	1.04	1.22	16.59	9.87	40.74
50	0.81	1.09	1.27	17.39	10.35	41.70
60	0.85	1.13	1.31	18.03	10.73	42.46
70	0.89	1.17	1.34	18.67	11.11	43.21
80	0.93	1.21	1.38	19.31	11.49	43.94

Notes:
1. z is height above ground level (ft)
2. $q_z = 0.00256 * K_z \cdot K_{zt} * K_d * V^2$ (psf) - Eqn 29.3-1
3. Minimum design pressure shall not be less than 16 psf (Para 29.8)
4. References are from ASCE 7-10 unless noted.

Static Seismic Factor per IBC 2012

Note: Table & Equation references on this page are taken from IBC 2012 Edition

---

Site Class = D	Per Section 1613.3.2 for unknown soil properties
$S_s := 0.23 \cdot g$	Values from "Structural Calculations ... Double Wall SS304 Carbon Filter Tank..."
$S_1 := 0.15 \cdot g$	

Risk Category = II — Table 1604.5 (Other structures)

From Section 1613:

$F_a := 1.6$		Table 1613.3.3(1)
$S_{MS} := F_a \cdot S_s$	$S_{MS} = 0.368$	(Equation 16-37)
$S_{DS} := \frac{2}{3} \cdot S_{MS}$	$S_{DS} = 0.245$	(Equation 16-39)
Seismic Design Category = B (0.167g<=S_{DS}<0.33g)		Table 1613.3.5(1)
$F_v := 2.2$		Table 1613.3.3(2)
$S_{M1} := F_v \cdot S_1$	$S_{M1} = 0.330$	(Equation 16-39)
$S_{D1} := \frac{2}{3} \cdot S_{M1}$	$S_{D1} = 0.220$	(Equation 16-40)
Seismic Design Category = D S_{D1}>0.20g)		Table 1616.3(2)

Static Seismic Factor per IBC 2012

Note: Table & Equation references on this page are taken from ASCE 7-10 Edition

$a_p := 2.50$	Table 13.6-1 (skirt-supported vessel)
$R_p := 2.50$	
$I_p := 1.0$	Section 13.1.3
$S_{DS} = 0.245$	S_{DS} calculated with IBC 2012 as shown above
let $z_0 := 10 \cdot ft$	Assumed elevation of skirt base relative to grade
let $z := 5 \cdot ft + z_0$	Height of skirt base relative to base of vessel
let $h := 24 \cdot ft + z_0$	Height of vessel relative to base of vessel
$\frac{z}{h} = 0.441$	Term used in Equation 13.3-1

$F_{p1} := \dfrac{0.4 \cdot a_p \cdot S_{DS} \cdot W_p}{\frac{R_p}{I_p}} \cdot \left(1 + 2 \cdot \frac{z}{h}\right)$	$F_{p1} = 0.185 \circ W_p$	(Equation 13.3-1)
$F_{p2} := 1.6 \cdot S_{DS} \cdot I_p \cdot W_p$	$F_{p2} = 0.393 \circ W_p$	Upper bound on seismic force (Equation 13.3-2)
$F_{p3} := 0.3 \cdot S_{DS} \cdot I_p \cdot W_p$	$F_{p3} = 0.074 \circ W_p$	Lower bound on seismic force (Equation 13.3-3)
$F_p := \max\left(\min\left(F_{p1}, F_{p2}\right), F_{p3}\right)$	$F_p = 0.185 \circ W_p$	Horizontal seismic design force

The total seismic load effect also includes a vertical component to be applied concurrently (Section 13.3.1):

$0.2 \cdot S_{DS} \cdot W_p = 0.049 \circ W_p$	Vertical seismic design force (plus or minus)

Conclusion: The structure will be analyzed with static seismic loads as shown above.

APPENDIX B

PV Elite Report for

ASME Code Calcs

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DESIGN CALCULATION

ASME Code Version : 2010

Analysis Performed by : DESIGN ENGINEERING ANALYSIS CORP.

Job File : F:\CBE-11-001\CodeCalc Files\Tank T-1(10-03-11).cci

Date of Analysis : Oct 3,2011

PV Elite 2011, January 2011

Input Echo, Component 1, Description: Top Head

```
 Design Internal Pressure                        P          15.00  psig
 Temperature for Internal Pressure                         150.00  F
 Design External Pressure                     PEXT           0.50  psig
 Temperature for External Pressure                         150.00  F
 External Pressure Chart Name                              HA-1

 Include Hydrostatic Head Components                          NO

 Material Specification                                SA-240 304
 Material UNS Number                                       S30400
 Material Form used                                         Plate
 Allowable Stress At Temperature                 S       20000.00  psi
 Allowable Stress At Ambient                    SA       20000.00  psi

*** Note: Allowable Stresses Modified as UTS > 70 ksi, per App. 1-4.

 Yield Stress At Temperature                    Sy       26700.00  psi
 Joint efficiency for Head Joint                 E           1.00

 Inside  Diameter of Torispherical Head          D        120.000  in.
 Minimum Thickness of Pipe or Plate              T         0.1830  in.

 Shell/Head Int. Corrosion Allowance            CA         0.0000  in.

 Inside Crown   Radius of Tori. Head             L        120.000  in.
 Inside Knuckle Radius of Tori. Head             r          7.500  in.
 Length of Straight Flange                 STRTFLG         1.5000  in.

 Skip UG-16(b) Min. thickness calculation                    NO

 Type of Element:                             Torispherical Head
```

Internal pressure results, Shell Number 1, Desc.: Top Head

ASME Code, Section VIII, Division 1, 2010

```
M factor for Torispherical Heads [M]:
  = (3+Sqrt((L+Ca)/(r+Ca)))/4 per Appendix 1-4 (b & d)
  = (3+SQRT((120.000 +0.0000 )/(7.500 +0.0000 )))/4
  = 1.7500

Thickness Due to Internal Pressure (Tr):
  = (P*(L+CA)*M) / (2*S*E-0.2*P) per Appendix 1-4(d)
  = (15.00*(120.0000+0.0000)*1.7500)/(2*20000.00*1.00-0.2*15.00)
  = 0.0788 + 0.0000 = 0.0788 in.

Max. All. Working Pressure at Given Thickness (MAWP):
  = (2*S*E*(T-CA-CAE)) / (M*(L+CA)+0.2*(T-CA-CAE)) per Appendix 1-4(d)
  = (2*20000.00*1.00*(0.1830))/(1.7500*(120.0000+0.0000)+0.2*(0.1830))
  = 34.85 psig

Maximum Allowable Pressure, New and Cold (MAPNC):
  = (2*SA*E*T) / (M*L+0.2*T) per Appendix 1-4 (d)
  = (2*20000.00*1.00*0.1830)/(1.7500*120.0000+0.2*0.1830)
```

= 34.85 psig

Actual stress at given pressure and thickness (Sact):
= (P*(M*(L+CA)+0.2*(T-CA-CAEXT))) / (2*E*(T-CA-CAEXT))
= (15.00*(1.7500*(120.0000+0.0000)+0.2*(0.1830)))/(2*1.00*(0.1830))
= 8608.06 psi

Appendix 1-4(f) Calculations (ts/L = 0.00153)

Note: Please check the temperature limit given in Table 1-4.3 of the code.
If the max. design temp. exceeds the temp. limit, see U-2(g).

r/D = 0.06250 : C1 = 0.49588 : C2 = 1.25000

Required Thickness Calculation:

Final iteration:

Elastic Buckling Stress (Se):
= C1 * Et * (ts/r)
= (0.496 * .27808E+08 * 0.018)
= 242601.281 psi

a	= 0.5 * D - r	=	52.500	in.
b	= L - r	=	112.500	in.
Beta	= COS(A/B)	=	1.085	rad.
Phl	= SQRT(L*ts) / r	=	0.531	rad.
c	= a / COS(Beta-Phi)	=	61.761	in.
Re	= c + r	=	69.261	in.

Buckling Internal Pressure (Pe):
= (Se * ts) / (C2 * Re * ((0.5 * Re / r) - 1.0))
= (242601.3*0.132)/(1.250*69.261*((0.5*69.261/7.500)-1.0))
= 102.215 psig

Yield Internal Pressure (Py):
= (Sy * ts) / (C2 * Re * ((0.5 * Re / r) - 1.0))
= (26700.0*0.132)/(1.250*69.261*((0.5*69.261/7.500)-1.0))
= 11.250 psig

Knuckle Failure Internal Pressure (Pck):
= 2.0 * Py
= 2.0 * 11.250
= 22.499 psig

Allowable Pressure (Pa):
= Pck / 1.5
= 22.499 / 1.5
= 15.000 psig

App 1-4(f) Calculated Required Thick. (TR) : 0.1320 in.

MAWP Calculation (ts/L = 0.00153)

```
Elastic Buckling Stress (Se):
  = C1 * Et * (ts/r)
  = (0.496 * .27808E+08 * 0.024 )
  = 336455.031 psi

 a    = 0.5 * D - r          =   52.500   in.
 b    = L - r                =  112.500   in.
 Beta = COS(A/B)             =    1.085  rad.
 Phl  = SQRT(L*ts) / r       =    0.625  rad.
 c    = a / COS(Beta-Phi)    =   58.604   in.
 Re   = c + r                =   66.104   in.

Buckling Internal Pressure (Pe):
  = (Se * ts) / (C2 * Re * ((0.5 * Re / r) - 1.0))
  = (336455.0*0.183)/(1.250*66.104*((0.5*66.104/7.500)-1.0))
  = 218.717 psig

Yield Internal Pressure (Py):
  = (Sy * ts) / (C2 * Re * ((0.5 * Re / r) - 1.0))
  = (26700.0*0.183)/(1.250*66.104*((0.5*66.104/7.500)-1.0))
  = 17.357 psig

Knuckle Failure Internal Pressure (Pck):
  = 2.0 * Py
  = 2.0 * 17.357
  = 34.713 psig

Maximum Allowable Working Pressure (MAWP):
  = Pck / 1.5
  = 34.713 / 1.5
  = 23.142 psig
```

<u>New & Cold Calculation (ts/L = 0.00153)</u>

```
Elastic Buckling Stress (Se):
  = C1 * Et * (ts/r)
  = (0.496 * .28300E+08 * 0.024 )
  = 342411.656 psi

 a    = 0.5 * D - r          =   52.500   in.
 b    = L - r                =  112.500   in.
 Beta = COS(A/B)             =    1.085  rad.
 Phl  = SQRT(L*ts) / r       =    0.625  rad.
 c    = a / COS(Beta-Phi)    =   58.604   in.
 Re   = c + r                =   66.104   in.

Buckling Internal Pressure (Pe):
  = (Se * ts) / (C2 * Re * ((0.5 * Re / r) - 1.0))
  = (342411.7*0.183)/(1.250*66.104*((0.5*66.104/7.500)-1.0))
  = 222.589 psig

Yield Internal Pressure (Py):
  = (Sy * ts) / (C2 * Re * ((0.5 * Re / r) - 1.0))
  = (30000.0*0.183)/(1.250*66.104*((0.5*66.104/7.500)-1.0))
  = 19.502 psig
```

```
Knuckle Failure Internal Pressure (Pck):
  = 2.0 * Py
  = 2.0 * 19.502
  = 39.004 psig

Maximum Allowable Pressure (MAPNC):
  = Pck / 1.5
  = 39.004 / 1.5
  = 26.003 psig
```

Final Internal Pressure Results:

```
Final Required Thickness (TR):
  = MAX[ UG16B, TR(App.1-4d) OR TR(UG32e), TR(App.1-4f) ]
  = MAX[ 0.0625 , 0.0788 , 0.1320 ]
  = 0.1320 in.

Final Maximum Allowable Working Pressure (MAWP):
  = MIN[ MAWP(App.1-4d) OR MAWP(UG32e), MAWP(App.1-4f) ]
  = MIN[ 34.85 , 23.14 ]
  = 23.1422 psig

Final Maximum Allowable Pressure, New and Cold (MAPNC):
  = MIN[ MAPNC(App.1-4d) OR MAPNC(UG32e), MAPNC(App.1-4f) ]
  = MIN[ 34.85 , 26.00 ]
  = 26.0025 psig
```

SUMMARY OF INTERNAL PRESSURE RESULTS:

Required Thickness plus Corrosion Allowance, Trca		0.1320	in.
Actual Thickness as Given in Input		0.1830	in.
Maximum Allowable Working Pressure	MAWP	23.142	psig
Maximum Allowable Pressure, NC	MAPNC	26.003	psig
Design Pressure as Given in Input	P	15.000	psig

Hydrostatic Test Pressures (Measured at High Point):

Hydrotest per UG-99(b); 1.3 * MAWP * Sa/S	30.08	psig
Hydrotest per UG-99(c); 1.3 * MAPNC	33.80	psig
Pneumatic per UG-100 ; 1.1 * MAWP * Sa/S	25.46	psig

Percent Elongation per UHA-44 (75 * tnom/Rf * (1-Rf/Ro)) 1.808 %
Note: Please Check Requirements of Table UHA-44 for Elongation limits.

External Pressure Results, Shell Number 1, Desc.: Top Head
ASME Code, Section VIII, Division 1, 2010

External Pressure Chart HA-1	at	150.00	F
Elastic Modulus for Material		27650000.00	psi

Results for Max. Allowable External Pressure (Emawp):

Corroded Thickness of Head	TCA	0.1830	in.
Outside Crown Radius	Ro	120.183	in.
Crown Rad / Thickness Ratio	(Ro/T)	656.7377	
Geometry Factor, A (.125/(Ro/T))	A	0.0001903	
Materials Factor, B, f(A, Chart)	B	2631.3777	psi

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Maximum Allowable Working Pressure		4.01	psig

EMAWP = B/(Ro/T) = 2631.3777 /656.7377 = 4.0067

Results for Reqd Thickness for Ext. Pressure (Tca):

Corroded Thickness of Head	TCA	0.0646	in.
Outside Crown Radius	Ro	120.183	in.
Crown Rad / Thickness Ratio	(Ro/T)	1859.0458	
Geometry Factor, A (.125/(Ro/T))	A	0.0000672	
Materials Factor, B, f(A, Chart)	B	929.5764	psi
Maximum Allowable Working Pressure		0.50	psig

EMAWP = B/(Ro/T) = 929.5764 /1859.0458 = 0.5000

Summary of External Pressure Results:

Allowable Pressure at Corroded thickness	4.01	psig
Required Pressure as entered by User	0.50	psig
Required Thickness including Corrosion all.	0.0646	in.
Actual Thickness as entered by User	0.1830	in.

Weight and Volume Results, No C.A. :

Volume of Shell Component	VOLMET	2575.9	in.^3
Weight of Shell Component	WMET	721.3	lb.
Inside Volume of Component	VOLID	141912.5	in.^3
Weight of Water in Component	WWAT	5737.2	lb.
Inside Vol. of 1.50 in. Straight	VOLSCA	16964.6	in.^3
Total Volume for Head + Straight	VOLTOT	158877.1	in.^3

Input Echo, Component 2, Description: Cylinder

Design Internal Pressure	P	15.00	psig
Temperature for Internal Pressure		150.00	F
Design External Pressure	PEXT	0.50	psig
Temperature for External Pressure		150.00	F
External Pressure Chart Name		HA-1	
Include Hydrostatic Head Components		YES	
Operating Liquid Density		93.600	lb./ft³
Height of Liquid Column (Operating)		192.00	in.
Height of Liquid Column (Hydrotest)		192.00	in.
Material Specification		SA-240 304	
Material UNS Number		S30400	
Material Form used		Plate	
Allowable Stress At Temperature	S	20000.00	psi
Allowable Stress At Ambient	SA	20000.00	psi
Yield Stress At Temperature	Sy	26700.00	psi
Joint efficiency for Shell Joint	E	0.70	
Design Length of Section	L	192.000	in.
Length of Cylinder for Volume Calcs.	CYLLEN	192.000	in.
Inside Diameter of Cylindrical Shell	D	120.000	in.
Minimum Thickness of Pipe or Plate	T	0.1760	in.
Shell/Head Int. Corrosion Allowance	CA	0.0000	in.
Skip UG-16(b) Min. thickness calculation		NO	
Type of Element:		Cylindrical Shell	

Internal pressure results, Shell Number 2, Desc.: Cylinder
ASME Code, Section VIII, Division 1, 2010

```
Thickness Due to Internal Pressure (Tr):
  = (P*(D/2+CA)) / (S*E-0.6*P) per UG-27 (c)(1)
  = (25.40*(120.0000/2+0.0000))/(20000.00*0.70-0.6*25.40)
  = 0.1090 + 0.0000 = 0.1090 in.

Max. All. Working Pressure at Given Thickness (MAWP):
Less Operating Hydrostatic Head Pressure of  10.40 psig
  = (S*E*(T-CA-CAE)) / ((D/2+CA)+0.6*(T-CA-CAE)) per UG-27 (c)(1)
  = (20000.00*0.70*(0.1760))/((120.0000/2+0.0000)+0.6*0.1760)
  = 40.99 - 10.40 = 30.59 psig

Maximum Allowable Pressure, New and Cold (MAPNC):
  = (SA*E*T) / (D/2+0.6*T) per UG-27 (c)(1)
  = (20000.00*0.70*0.1760)/(120.0000/2+0.6*0.1760)
  = 40.99 psig

Actual stress at given pressure and thickness (Sact):
  = (P*((D/2+CA)+0.6*(T-CA-CAE))) / (E*(T-CA-CAE))
  = (25.40*((120.0000/2+0.0000)+0.6*(0.1760)))/(0.70*(0.1760))
  = 12391.90 psi
```

SUMMARY OF INTERNAL PRESSURE RESULTS:

Required Thickness plus Corrosion Allowance, Trca		0.1090	in.
Actual Thickness as Given in Input		0.1760	in.
Maximum Allowable Working Pressure	MAWP	30.595	psig
Maximum Allowable Pressure, NC	MAPNC	40.995	psig
Design Pressure as Given in Input	P	15.000	psig

Hydrostatic Test Pressures (Measured at High Point):

Hydrotest per UG-99(b); 1.3 * MAWP * Sa/S	39.77	psig
Hydrotest per UG-99(c); 1.3 * MAPNC - Head (Hydro)	46.36	psig
Pneumatic per UG-100 ; 1.1 * MAWP * Sa/S	45.09	psig

Percent Elongation per UHA-44 (50 * tnom/Rf * (1-Rf/Ro)) 0.146 %
Note: Please Check Requirements of Table UHA-44 for Elongation limits.

External Pressure Results, Shell Number 2, Desc.: Cylinder
ASME Code, Section VIII, Division 1, 2010

External Pressure Chart HA-1	at	150.00	F
Elastic Modulus for Material		27650000.00	psi

Results for Max. Allowable External Pressure (Emawp):

Corroded Thickness of Shell	TCA	0.1760	in.
Outside Diameter of Shell	ODCA	120.352	in.
Design Length of Cylinder or Cone	SLEN	192.000	in.
Diameter / Thickness Ratio	(D/T)	683.8181	
Length / Diameter Ratio	LD	1.5953	
Geometry Factor, A f(DT,LD)	A	0.0000461	
Materials Factor, B, f(A, Chart)	B	636.8831	psi
Maximum Allowable Working Pressure		1.24	psig

EMAWP = (4*B)/(3*(D/T)) = (4 *636.8831)/(3 *683.8181) = 1.2418

Results for Reqd Thickness for Ext. Pressure (Tca):

Corroded Thickness of Shell	TCA	0.1224	in.
Outside Diameter of Shell	ODCA	120.352	in.
Design Length of Cylinder or Cone	SLEN	192.000	in.
Diameter / Thickness Ratio	(D/T)	983.2286	
Length / Diameter Ratio	LD	1.5953	
Geometry Factor, A f(DT,LD)	A	0.0000267	
Materials Factor, B, f(A, Chart)	B	368.7256	psi
Maximum Allowable Working Pressure		0.50	psig

EMAWP = (4*B)/(3*(D/T)) = (4 *368.7256)/(3 *983.2286) = 0.5000

Results for Maximum Length Between Stiffeners (Slen):

Corroded Thickness of Shell	TCA	0.1760	in.
Outside Diameter of Shell	ODCA	120.352	in.
Design Length of Cylinder or Cone	SLEN	473.745	in.
Diameter / Thickness Ratio	(D/T)	683.8181	
Length / Diameter Ratio	LD	3.9363	
Geometry Factor, A f(DT,LD)	A	0.0000185	
Materials Factor, B, f(A, Chart)	B	256.4535	psi
Maximum Allowable Working Pressure		0.50	psig

EMAWP = (4*B)/(3*(D/T)) = (4 *256.4535)/(3 *683.8181) = 0.5000

Summary of External Pressure Results:

Allowable Pressure at Corroded thickness	1.24	psig
Required Pressure as entered by User	0.50	psig
Required Thickness including Corrosion all.	0.1224	in.
Actual Thickness as entered by User	0.1760	in.
Maximum Length for Thickness and Pressure	473.745	in.
Actual Length as entered by User	192.00	in.

Weight and Volume Results, No C.A. :

Volume of Shell Component	VOLMET	12757.8	in.^3
Weight of Shell Component	WMET	3572.2	lb.
Inside Volume of Component	VOLID	2171469.0	in.^3
Weight of Water in Component	WWAT	78414.2	lb.

Input Echo, Cone Item 1, Description: Lower Cone

Design Internal Pressure	PINT	15.00	psig
Temperature for Internal Pressure	TEMPIN	150.00	F
Design External Pressure	PEXT	0.50	psig
Temperature for External Pressure	TEMPEX	150.00	F
Take Cone as Line of Support for External Pressure:		No	
Cone Material		SA-240 304	
Cone Material UNS Number		S30400	
Cone Allowable Stress at Temperature	SAC	20000.00	psi
Cone Allowable Stress At Ambient	SOC	20000.00	psi
Longitudinal Joint Efficiency of Cone	EC	0.7000	
Circumferential Joint Efficiency of Cone	ECC	0.8500	
Actual Thickness of Cone	TC	0.1670	in.
Corrosion Allowance for Cone	CAC	0.0000	in.
Diameter Basis for Cone and Cylinders	BASIS	ID	
Diameter of Small End of Cone	DS	16.000	in.
Diameter of Large End of Cone	DL	120.000	in.
Half Apex Angle for Cone	ANGLE	28.44	degrees
Axial Length of Cone	LC	96.000	in.
Small End Cylinder Material		SA-105	
Small End Cylinder Material UNS Number		K03504	
Small Cylinder Allowable Stress at Operating	SAS	20000.00	psi
Small Cylinder Allowable Stress At Ambient	SOS	20000.00	psi
Joint Efficiency of Small Cylinder	ES	0.7000	
Actual Thickness of Small Cylinder	TS	0.3750	in.
Corrosion Allowance for Small Cylinder	CAS	0.0000	in.
Axial Length of Small Cylinder	LS	4.000	in.
Large End Cylinder Material		SA-240 304	
Large End Cylinder Material UNS Number		S30400	
Large Cylinder Allowable Stress at Operating	SAL	20000.00	psi
Large Cylinder Allowable Stress At Ambient	SOL	20000.00	psi
Joint Efficiency of Large Cylinder	EL	0.7000	
Actual Thickness of Large Cylinder	TL	0.1760	in.
Corrosion Allowance for Large Cylinder	CAL	0.0000	in.
Axial Length of Large Cylinder	LL	6.000	in.
Type of Reinforcement at Large End of Cone:		None	
Large End Reinforcing/Knuckle Material		SA-240 304	
Large End Reinforcing/Knuckle Material UNS Num		S30400	
Large Reinforcing/Knuckle Allowable, Operating		20000.00	psi
Large Reinforcing/Knuckle Allowable, Ambient		20000.00	psi
Type of Reinforcement at Small End of Cone:		None	
Small End Reinforcing/Knuckle Material		SA-240 304	
Small End Reinforcing/Knuckle Material UNS Num		S30400	
Small Reinforcing/Knuckle Allowable, Operating		20000.00	psi
Small Reinforcing/Knuckle Allowable, Ambient		20000.00	psi

Internal Pressure Results, Cone Number 1, Description: Lower Cone
ASME Code, Section VIII, Division 1, 2010

INTERNAL PRESSURE CALCULATIONS for CONE:

```
Thickness Due to Internal Pressure (Tr):
  = (P*(D+2*CA/Cos(alpha))) / (2*Cos(alpha)*(S*E-0.6*P)) per App. 1-4(e)
  = (15.00*(120.0000+2*0.0000))/(2*0.8793*(20000.00*0.70-0.6*15.00))
  = 0.0732 + 0.0000 = 0.0732 in.

Max. All. Working Pressure at Given Thickness (MAWP):
  = (2*S*E*(T-CA-CAE)*COSA)/((D+2*CA/COSA)+1.2*(T-CA-CAEXT)*COSA) per App 1-4(e
  = (2*20000.00*0.70*(0.1670)*0.8793)/((120.0000+2*0.0000)+1.2*(0.1670)*0.8793)
  = 34.21 psig
```

INTERNAL PRESSURE CALCULATIONS for SMALL CYLINDER:

```
Thickness Due to Internal Pressure (Tr):
  = (P*(D/2+CA)) / (S*E-0.6*P) per UG-27 (c)(1)
  = (15.00*(16.0000/2+0.0000))/(20000.00*0.70-0.6*15.00)
  = 0.0086 + 0.0000 = 0.0086 in.

Max. All. Working Pressure at Given Thickness (MAWP):
  = (S*E*(T-CA-CAE)) / ((D/2+CA)+0.6*(T-CA-CAE)) per UG-27 (c)(1)
  = (20000.00*0.70*(0.3750))/((16.0000/2+0.0000)+0.6*0.3750)
  = 638.30 psig
```

INTERNAL PRESSURE CALCULATIONS for LARGE CYLINDER:

```
Thickness Due to Internal Pressure (Tr):
  = (P*(D/2+CA)) / (S*E-0.6*P) per UG-27 (c)(1)
  = (15.00*(120.0000/2+0.0000))/(20000.00*0.70-0.6*15.00)
  = 0.0643 + 0.0000 = 0.0643 in.

Max. All. Working Pressure at Given Thickness (MAWP):
  = (S*E*(T-CA-CAE)) / ((D/2+CA)+0.6*(T-CA-CAE)) per UG-27 (c)(1)
  = (20000.00*0.70*(0.1760))/((120.0000/2+0.0000)+0.6*0.1760)
  = 40.99 psig
```

SUMMARY of INT. PRESSURE RESULTS:

	Small Cyl	Cone	Large Cyl	
Required Thickness plus CA	0.0086	0.0732	0.0643	in.
Actual Given Thickness	0.3750	0.1670	0.1760	in.
Max. All. Working Pressure	638.30	34.21	40.99	psig
Design Pressure as Given	15.00	15.00	15.00	psig

External Pressure Results, Cone Number 1, Description: Lower Cone
ASME Code, Section VIII, Division 1, 2010

EXTERNAL PRESSURE CALCULATIONS for COMBINED CONE and CYLINDERS
Based on Diameter and Thickness of CONE:

```
External Pressure Chart     HA-1           at        150.00  F
Elastic Modulus for Material              27650000.00  psi
```

```
Results for Maximum Allowable External Pressure:
 Corroded Thickness of Shell              TCA        0.1670  in.
 Outside Diameter of Shell                 OD       120.334  in.
 Design Length of Cylinder or Cone       SLEN        106.00  in.
 Diameter / Thickness Ratio                DT      720.5629
 Length / Diameter Ratio                   LD        0.8809
 Geometry Factor, A f(DT,LD)                A     0.0000778
 Materials Factor, B, f(A, Chart)           B     1075.2955  psi
 Maximum Allowable Working Pressure                    1.99  psig
 EMAWP = (4*B)/(3*DT) = ( 4 *1075.296 )/( 3 *720.5629 ) = 1.9897

Results for Required Thickness for External Pressure:
 Corroded Thickness of Shell              TCA        0.0963  in.
 Outside Diameter of Shell                 OD       120.334  in.
 Design Length of Cylinder or Cone       SLEN        106.00  in.
 Diameter / Thickness Ratio                DT     1249.6322
 Length / Diameter Ratio                   LD        0.8809
 Geometry Factor, A f(DT,LD)                A     0.0000339
 Materials Factor, B, f(A, Chart)           B      468.6402  psi
 Maximum Allowable Working Pressure                    0.50  psig
 EMAWP = (4*B)/(3*DT) = ( 4 *468.640 )/( 3 *1249.6322 ) = 0.5000
```

Based on Diameter and Thickness at LARGE End:

```
 External Pressure Chart     HA-1           at       150.00  F
 Elastic Modulus for Material                   27650000.00  psi

Results for Maximum Allowable External Pressure:
 Corroded Thickness of Shell              TCA        0.1760  in.
 Outside Diameter of Shell                 OD       120.352  in.
 Design Length of Cylinder or Cone       SLEN        106.00  in.
 Diameter / Thickness Ratio                DT      683.8181
 Length / Diameter Ratio                   LD        0.8807
 Geometry Factor, A f(DT,LD)                A     0.0000842
 Materials Factor, B, f(A, Chart)           B     1163.8967  psi
 Maximum Allowable Working Pressure                    2.27  psig
 EMAWP = (4*B)/(3*DT) = ( 4 *1163.897 )/( 3 *683.8181 ) = 2.2694

Results for Required Thickness for External Pressure:
 Corroded Thickness of Shell              TCA        0.0963  in.
 Outside Diameter of Shell                 OD       120.352  in.
 Design Length of Cylinder or Cone       SLEN        106.00  in.
 Diameter / Thickness Ratio                DT     1249.7045
 Length / Diameter Ratio                   LD        0.8807
 Geometry Factor, A f(DT,LD)                A     0.0000339
 Materials Factor, B, f(A, Chart)           B      468.6704  psi
 Maximum Allowable Working Pressure                    0.50  psig
 EMAWP = (4*B)/(3*DT) = ( 4 *468.670 )/( 3 *1249.7045 ) = 0.5000
```

Based on Diameter and Thickness at SMALL End:

```
 External Pressure Chart     CS-2           at       150.00  F
 Elastic Modulus for Material                   29000000.00  psi

Results for Maximum Allowable External Pressure:
 Corroded Thickness of Shell              TCA        0.3750  in.
```

```
 Outside Diameter of Shell                    OD          16.750  in.
 Design Length of Cylinder or Cone          SLEN          106.00  in.
 Diameter / Thickness Ratio                   DT         44.6667
 Length / Diameter Ratio                      LD          6.3284
 Geometry Factor, A f(DT,LD)                   A       0.0006955
 Materials Factor, B, f(A, Chart)              B      10085.3379  psi
 Maximum Allowable Working Pressure                       301.05  psig
 EMAWP = (4*B)/(3*DT) = ( 4 *10085.338 )/( 3 *44.6667 ) = 301.0548

Results for Required Thickness for External Pressure:
 Corroded Thickness of Shell                 TCA          0.0291  in.
 Outside Diameter of Shell                    OD          16.750  in.
 Design Length of Cylinder or Cone          SLEN          106.00  in.
 Diameter / Thickness Ratio                   DT        576.1018
 Length / Diameter Ratio                      LD          6.3284
 Geometry Factor, A f(DT,LD)                   A       0.0000149
 Materials Factor, B, f(A, Chart)              B        216.0528  psi
 Maximum Allowable Working Pressure                         0.50  psig
 EMAWP = (4*B)/(3*DT) = ( 4 *216.053 )/( 3 *576.1018 ) = 0.5000
```

SUMMARY of EXT. PRESSURE RESULTS:

	Small Cyl	Cone	Large Cyl	
Reqd. Thickness + CA	0.0291	0.0963	0.0963	in.
Actual Given Thickness	0.3750	0.1670	0.1760	in.
Max. All. Working Pressure	301.05	1.99	2.27	psig
Design Pressure as Given	0.50	0.50	0.50	psig

Computing the Modulus of Elasticity per ASME table TM-1 :

Properties at Design External temperature (150.00 F) :

Elastic Modulus for Cone Material	27807692.00	psi
Elastic Modulus for Small Cylinder Material	29030770.00	psi
Elastic Modulus for Large Cylinder Material	27807692.00	psi
Elastic Modulus for Large End Reinforcement	27807692.00	psi
Elastic Modulus for Small End Reinforcement	27807692.00	psi

Properties at Design Internal temperature (150.00 F) :

Elastic Modulus for Cone Material	27807692.00	psi
Elastic Modulus for Small Cylinder Material	29030770.00	psi
Elastic Modulus for Large Cylinder Material	27807692.00	psi
Elastic Modulus for Large End Reinforcement	27807692.00	psi
Elastic Modulus for Small End Reinforcement	27807692.00	psi

REINFORCEMENT CALCULATIONS for CONE / LARGE CYLINDER:

```
REQUIRED AREA of REINFORCEMENT for LARGE END UNDER INTERNAL PRESSURE
 Large end ratio of pressure to allowable stress        0.00107
 Large end max. half apex angle w/o reinforcement        11.286  degrees
 Large end actual half apex angle                        28.440  degrees

Required Area of Reinforcement, Large End, Internal [Arl]:
  = (RKL*QL*RCLI/(SAL*EL))*(1-DELTA/ANGLE)*TANA
  = ( 1.00 * 450.000 * 60.0000 / ( 20000 * 0.70 ) ) *
    ( 1.0 - 11.29 / 28.44 ) * 0.5416
```

= 0.6300 in^2

Area of Reinforcement Available in Large End Shell [Ael]:
= (TLC - TREQL) * SQRT(RCLO * TLC) +
(TCC - TREQC) * SQRT(RCLO * TCC / COSA)
= (0.1760 - 0.0643) * SQRT(60.0000 * 0.1760) +
(0.1670 - 0.0732) * SQRT(60.0000 * 0.1670 / 0.8793)
= 0.6797 in^2

SUMMARY of REINFORCEMENT AREA, LARGE END, INTERNAL PRESSURE:

Area of reinforcement required per App. 1-5(1)	0.6300	in^2
Area of reinforcement in shell per App. 1-5(2)	0.6797	in^2
Area of reinforcement in stiffening ring	0.0000	in^2
Additional Area needed to satisfy requirements	0.0000	in^2

REQUIRED AREA of REINFORCEMENT for LARGE END UNDER EXTERNAL PRESSURE

Large end ratio of pressure to allowable stress	0.00004	
Large end max. half apex angle w/o reinforcement	0.089	degrees
Large end actual half apex angle	28.440	degrees

Area of Reinforcement Required in Large End Shell [Arl]:
= (RKLE*QL*RCLO*TAN(Alpha)*/(SOL*EL))*
(1.0-0.25*((PEXT*RCLO-QL)/QL)*(Delta/Angle)
= (1.0000 *15.0440 *60.1760 *0.542 /(20000 *0.70)) *
(1.0 - 0.25 * ((0.50 * 60.1760 - 15.0440) / 15.0440) *
(0.0893 / 28.4400)
= 0.0350 in^2

Area of Reinforcement Available in Large End Shell [Ael]:
= .55*(Dl*ts)$^{1/2}$ * (ts + tc/Cos(Alpha))
= .55 * (120.352 * 0.176)$^{1/2}$ * (0.176 + 0.167 / 0.879)
= 0.9263 in^2

SUMMARY of REINFORCEMENT AREA, LARGE END, EXTERNAL PRESSURE:

Area of reinforcement required per App. 1-8(1)	0.0350	in^2
Area of reinforcement in shell per App. 1-8(2)	0.9263	in^2
Area of reinforcement in stiffening ring	0.0000	in^2
Additional Area needed to satisfy requirements	0.0000	in^2

REINFORCEMENT CALCULATIONS for CONE / SMALL CYLINDER:

REQUIRED AREA of REINFORCEMENT for SMALL END under INTERNAL PRESSURE

Small end ratio of pressure to allowable stress	0.00107	
Small end max. half apex angle w/o reinforcement	4.000	degrees
Small end actual half apex angle	28.440	degrees

Required Area of Reinforcement, Small End, Internal [Ars]:
= (RKS * QS * RCSI / (SAS * ES)) * (1 - DELTA/ANGLE) * TanAlpha
= (1.00 * 60.000 * 8.0000 / (20000 * 0.70)) *
(1.0 - 4.00 / 28.44) * 0.5416
= 0.0160 in^2

Area of Reinforcement Available in Small End Shell [Aes]:
= .78*(Rs*Ts)$^{1/2}$ *((Ts-t)+(Tc-Tr)/Cos(alpha)))
= .78*(8.000 *0.375)$^{1/2}$ *((0.375 -0.009)+(0.167 -0.010)/0.88))
= 0.7366 in^2

SUMMARY of REINFORCEMENT AREA, SMALL END, INTERNAL PRESSURE:

Area of reinforcement required per App. 1-5(3)	0.0160	in²
Area of reinforcement in shell per App. 1-5(4)	0.7366	in²
Area of reinforcement in stiffening ring	0.0000	in²
Additional Area needed to satisfy requirements	0.0000	in²

REQUIRED AREA of REINFORCEMENT for SMALL END under EXTERNAL PRESSURE

Area of Reinforcement Required in Small End Shell [Ars]:
= (RKSE * QS * RCSI * Tan(Alpha) / (SOS*ES))
= (1.0440*2.0938*8.3750*0.5416/(20000*0.70))
= 0.0007 in²

Area of Reinforcement Available in Small End Shell [Aes]:
= .55*(Ds*ts)$^{1/2}$ *[(ts-t)+(tc-tr)/Cos(angle))]
= .55*(16.750 *0.375)$^{1/2}$ *[(0.375 -0.029)+(0.167 -0.025)/0.879)]
= 0.6987 in²

SUMMARY of REINFORCEMENT AREA, SMALL END, EXTERNAL PRESSURE:

Area of reinforcement required per App. 1-8(1)	0.0007	in²
Area of reinforcement in shell per App. 1-8(2)	0.6987	in²
Area of reinforcement in stiffening ring	0.0000	in²
Additional Area needed to satisfy requirements	0.0000	in²

Results for Discontinuity Stresses per Bednar p. 236 2nd Edition

Stress Type	Stress	Allowable	Location
Tensile Stress	432.88	60000.00	Small Cyl. Long.
Compres. Stress	-105.38	-60000.00	Small Cyl. Long.
Membrane Stress	843.96	30000.00	Small End Tang.
Tensile Stress	1775.18	60000.00	Cone Longitudinal
Compres. Stress	-938.85	-60000.00	Cone Longitudinal
Tensile Stress	1352.80	30000.00	Cone Tangential
Tensile Stress	31078.10	60000.00	Large Cyl. Long.
Compres. Stress	-25956.96	-60000.00	Large Cyl. Long.
Membrane Stress	-11484.08	-30000.00	Large End Tang.
Tensile Stress	34743.04	60000.00	Cone Longitudinal
Compres. Stress	-28605.18	-60000.00	Cone Longitudinal
Compres. Stress	-10467.35	-30000.00	Cone Tangential

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Equivalent Pressures used in Discontinuity Stress Calc:

Small end Total Equivalent Pressure :
= P + P_force_S = 15.000 + 0.000 = 15.000 psig

Large end Total Equivalent Pressure :
= P + P_force_L = 15.000 + 0.000 = 15.000 psig

Summary for shell/head, Div 1:

Description	MAPNC psig	MAWP psig	Min. T in.	Tr-int in.	Tr-ext in.	EMAWP psig
Top Head	26.003	23.142	0.183	0.132	0.065	4.007
Cylinder	40.995	30.595	0.176	0.109	0.122	1.242
Minimum MAWP	26.003	23.142				1.242

Note: Reqd. thk. reported above includes Corrosion Allowance.

Total Shell/Head weight is (New-Cold)	4293.4 lb.
Total Shell/Head weight is (Corroded)	4293.4 lb.
Total Shell/Head weight, filled with Water (New)	88444.8 lb.
Total Shell/Head volume is (New-Cold)	2330346.0 in.**3
Total Shell/Head volume is (Corroded)	2330346.0 in.**3

Conical Results Summary for Item 1 : Lower Cone

SUMMARY of INT. PRESSURE RESULTS:

	Small Cyl	Cone	Large Cyl	
Required Thickness plus CA	0.0086	0.0732	0.0643	in.
Actual Given Thickness	0.3750	0.1670	0.1760	in.
Max. All. Working Pressure	638.30	34.21	40.99	psig
Design Pressure as Given	15.00	15.00	15.00	psig

SUMMARY of EXT. PRESSURE RESULTS:

	Small Cyl	Cone	Large Cyl	
Reqd. Thickness + CA	0.0291	0.0963	0.0963	in.
Actual Given Thickness	0.3750	0.1670	0.1760	in.
Max. All. Working Pressure	301.05	1.99	2.27	psig
Design Pressure as Given	0.50	0.50	0.50	psig

Diameter [Small End] [Large End] 16.00 120.00 in.

	New/Cold	Corr	
Small End Weight [New/Cold], [Corr]	21.84	21.84	lb.
Large End Weight [New/Cold], [Corr]	112.83	112.83	lb.
Cone Weight [New/Cold], [Corr]	1105.34	1105.34	lb.

	New/Cold	Corr	
Small End Int. Volume [New/Cold], [Corr]	804.25	804.25	in.^{3}
Large End Int. Volume [New/Cold], [Corr]	67858.41	67858.41	in.^{3}
Cone Int. Volume [New/Cold], [Corr]	416600.34	416600.34	in.^{3}

Least MAWP and Overall Weight Results :
The Least MAWP (N C) for Top Head was 26.00 psig .
The Least MAWP (Cor) for Top Head was 23.14 psig .

The total sum of the Weights (N C) was 5533.43 lb. .
The total sum of the Weights (Cor) was 5533.43 lb. .

The Natural Frequencies for the vessel have been computed iteratively by solving a system of matrices. These matrices describe the mass and the stiffness of the vessel. This is the generalized eigenvalue/ eigenvector problem and is referenced in some mathematical texts.

The Natural Frequency for the Vessel (Empty.) is 51.7511 Hz.

The Natural Frequency for the Vessel (Ope...) is 12.6409 Hz.

The Natural Frequency for the Vessel (Filled) is 12.8081 Hz.

Note: Using the User Defined Wind Profile ...

Wind Vibration Calculations

This evaluation is based on work by Kanti Mahajan and Ed Zorilla

Nomenclature

```
Cf  - Correction factor for natural frequency
 D  - Average internal diameter of vessel ft.
Df  - Damping Factor < 0.75 Unstable,  > 0.95 Stable
Dr  - Average internal diameter of top half of vessel ft.
 f  - Natural frequency of vibration (Hertz)
f1  - Natural frequency of bare vessel based on a unit value of (D/L²)(10^(4))
 L  - Total height of structure ft.
Lc  - Total length of conical section(s) of vessel ft.
tb  - Uncorroded plate thickness at bottom of vessel in.
V30 - Design Wind Speed provided by user mile/hr
Vc  - Critical wind velocity mile/hr
Vw  - Maximum wind speed at top of structure mile/hr
W   - Total corroded weight of structure lb.
Ws  - Cor. vessel weight excl. weight of parts which do not effect stiff. lb.
 Z  - Maximum amplitude of vibration at top of vessel in.
Dl  - Logarithmic decrement ( taken as 0.03 for Welded Structures )
Vp  - Vib. Chance, <= 0.200E+02 (High); 0.200E+02 < 0.250E+02 (Probable)
P30 - wind pressure 30 feet above the base
```

Check other Conditions and Basic Assumptions:

```
#1 - Total Cone Length / Total Length < 0.5
     8.000 / 19.100 = 0.419

#2 - ( D / L² ) * 10^(4) < 8.0 (English Units)
   - ( 10.01 / 19.10² ) * 10^(4) = 274.341 [Geometry Violation]
```

Compute the vibration possibility. If Vp > 0.250E+02 no chance. [Vp]:

```
 = W / ( L * Dr²)
 = 133216 / ( 19.10 * 10.000² )
 = 0.69747E+02
```

Since Vp is > 0.250E+02 no further vibration analysis is required !

The Natural Frequency for the Vessel (Ope...) is 12.6409 Hz.

Wind Load Calculation

From	To	Wind Height ft.	Wind Diameter ft.	Wind Area sq.in.	Height Factor psf	Element Wind Load lb.
10	20	1.50000	10.0395	4337.06	16.0000	481.896
20	30	3.05000	5.69450	82.0008	16.0000	9.11120
30	40	3.35000	10.0293	722.112	16.0000	80.2347
40	50	4.35000	10.0293	2166.34	16.0000	240.704
50	60	7.97500	10.0293	8304.29	16.0000	922.699
60	70	11.9750	10.0293	3249.50	16.0000	361.056
70	80	14.1000	10.0293	2888.45	16.0000	320.939
80	90	16.1000	10.0293	2888.45	16.0000	320.939

90	100	17.3900	10.0293	837.650	16.0000	93.0722
100	110	18.2650	10.0293	1689.74	16.0000	187.749
110	120	19.6905	10.0305	2296.24	16.0000	255.138

The Natural Frequency for the Vessel (Empty.) is 51.7511 Hz.

Wind Load Calculation

From	To	Wind Height ft.	Wind Diameter ft.	Wind Area sq.in.	Height Factor psf	Element Wind Load lb.
10	20	1.50000	10.0395	4337.06	16.0000	481.896
20	30	3.05000	5.69450	82.0008	16.0000	9.11120
30	40	3.35000	10.0293	722.112	16.0000	80.2347
40	50	4.35000	10.0293	2166.34	16.0000	240.704
50	60	7.97500	10.0293	8304.29	16.0000	922.699
60	70	11.9750	10.0293	3249.50	16.0000	361.056
70	80	14.1000	10.0293	2888.45	16.0000	320.939
80	90	16.1000	10.0293	2888.45	16.0000	320.939
90	100	17.3900	10.0293	837.650	16.0000	93.0722
100	110	18.2650	10.0293	1689.74	16.0000	187.749
110	120	19.6905	10.0305	2296.24	16.0000	255.138

The Natural Frequency for the Vessel (Filled) is 12.8081 Hz.

Wind Load Calculation

From	To	Wind Height ft.	Wind Diameter ft.	Wind Area sq.in.	Height Factor psf	Element Wind Load lb.
10	20	1.50000	10.0395	4337.06	16.0000	481.896
20	30	3.05000	5.69450	82.0008	16.0000	9.11120
30	40	3.35000	10.0293	722.112	16.0000	80.2347
40	50	4.35000	10.0293	2166.34	16.0000	240.704
50	60	7.97500	10.0293	8304.29	16.0000	922.699
60	70	11.9750	10.0293	3249.50	16.0000	361.056
70	80	14.1000	10.0293	2888.45	16.0000	320.939
80	90	16.1000	10.0293	2888.45	16.0000	320.939
90	100	17.3900	10.0293	837.650	16.0000	93.0722
100	110	18.2650	10.0293	1689.74	16.0000	187.749
110	120	19.6905	10.0305	2296.24	16.0000	255.138

Earthquake Loading Specified in G's

Horizontal Acceleration factor	(GX)	0.185
Horizontal Acceleration factor	(GZ)	0.000
Vertical Acceleration factor	(GY)	0.049

Note: +Y Direction G loads should also be run in the negative direction.
to insure maximum support loads are calculated.

The Natural Frequency for the Vessel (Ope...) is 12.6409 Hz.

Earthquake Load Calculation

From	To	Earthquake Height ft.	Earthquake Weight lb.	Element Ope Load lb.	Element Emp Load lb.
10	20	1.50000	1262.61	233.582	233.582
20	30	3.05000	23698.6	4384.24	209.554
30	40	3.35000	115.617	21.3892	21.3892
40	50	4.35000	11373.8	2104.16	64.1688
50	60	7.97500	43699.8	8084.46	264.486
60	70	11.9750	17192.8	3180.67	120.678
70	80	14.1000	15265.2	2824.06	104.065
80	90	16.1000	15165.1	2805.55	85.5567
90	100	17.3900	4397.89	813.609	24.8114
100	110	18.2650	270.547	50.0513	50.0513
110	120	18.9750	774.160	143.220	143.220

The following table is for the Filled Case.

Cumulative Wind Shear and Bending Moment

From	To	Distance to Support ft.	Cummulative Wind Shear lb.	Wind Bending ft.lb.
10	20	1.50000	3273.54	33512.6
20	30	3.05000	2791.64	24414.8
30	40	3.35000	2782.53	24136.1
40	50	4.35000	2702.30	22764.9
50	60	7.97500	2461.59	18892.0
60	70	11.9750	1538.89	7390.56
70	80	14.1000	1177.84	4334.24
80	90	16.1000	856.898	2299.50
90	100	17.3900	535.959	906.647
100	110	18.2650	442.887	622.782
110	120	18.9750	255.138	214.437

The following table is for the Empty Case.

Wind/Earthquake Shear, Bending

From	To	Distance to Support ft.	Cummulative Wind Shear lb.	Earthquake Shear lb.	Wind Bending ft.lb.	Earthquake Bending ft.lb.
10	20	1.50000	3273.54	1321.56	33512.6	11905.2
20	30	3.05000	2791.64	1087.98	24414.8	8290.88
30	40	3.35000	2782.53	878.426	24136.1	8192.56
40	50	4.35000	2702.30	857.037	22764.9	7758.69
50	60	7.97500	2461.59	792.868	18892.0	6521.27
60	70	11.9750	1538.89	528.382	7390.56	2722.67
70	80	14.1000	1177.84	407.704	4334.24	1669.58
80	90	16.1000	856.898	303.639	2299.50	958.233
90	100	17.3900	535.959	218.082	906.647	436.512
100	110	18.2650	442.887	193.271	622.782	317.219
110	120	18.9750	255.138	143.220	214.437	120.372

The following table is for the Operating Case.

Wind/Earthquake Shear, Bending

From	To	Distance to Support ft.	Cummulative Wind Shear lb.	Earthquake Shear lb.	Wind Bending ft.lb.	Earthquake Bending ft.lb.
10	20	1.50000	3273.54	24645.0	33512.6	228381.
20	30	3.05000	2791.64	24411.4	24414.8	154796.
30	40	3.35000	2782.53	20027.2	24136.1	152574.
40	50	4.35000	2702.30	20005.8	22764.9	142566.
50	60	7.97500	2461.59	17901.6	18892.0	114135.
60	70	11.9750	1538.89	9817.15	7390.56	34443.8
70	80	14.1000	1177.84	6636.48	4334.24	15933.5
80	90	16.1000	856.898	3812.43	2299.50	5484.57
90	100	17.3900	535.959	1006.88	906.647	665.262
100	110	18.2650	442.887	193.271	622.782	317.219

110	120	18.9750	255.138	143.220	214.437	120.372

Wind Deflection Calculations:

The following table is for the Filled(test) Case.

Note: Test Case Deflections were computed using un-corr. section properties.

Wind Deflection

From	To	Cumulative Wind Shear lb.	Centroid Deflection in.	Elem. End Deflection in.	Elem. Ang. Rotation
10	20	1080.27	...	0.00002	...
20	30	921.242	0.00002	0.00002	...
30	40	918.235	0.00002	0.00002	...
40	50	891.758	0.00004	0.00005	...
50	60	812.325	0.00011327	0.00019580	...
60	70	507.835	0.00023127	0.00026798	...
70	80	388.686	0.00030141	0.00033538	...
80	90	282.776	0.00036974	0.00040437	...
90	100	176.867	0.00041444	0.00042452	...
100	110	146.153	0.00044489	0.00046528	...
110	120	84.1956	0.00046964	0.00047400	...

Allowable deflection at the Tower Top (Hyd)(6.000"/100ft. Criteria)
Allowable deflection : 1.146 Actual Deflection : 0.000 in.

The following table is for the Empty Case.

Wind Deflection

From	To	Cumulative Wind Shear lb.	Centroid Deflection in.	Elem. End Deflection in.	Elem. Ang. Rotation
10	20	3273.54	0.00001	0.00005	...
20	30	2791.64	0.00005	0.00006	...
30	40	2782.53	0.00006	0.00007	...
40	50	2702.30	0.00010719	0.00014651	...
50	60	2461.59	0.00034326	0.00059332	0.00001
60	70	1538.89	0.00070082	0.00081207	0.00001
70	80	1177.84	0.00091335	0.0010163	0.00001
80	90	856.898	0.0011204	0.0012253	0.00001
90	100	535.959	0.0012559	0.0012864	0.00001
100	110	442.887	0.0013482	0.0014099	0.00001
110	120	255.138	0.0014232	0.0014364	0.00001

Allowable deflection at the Tower Top (Emp)(6.000"/100ft. Criteria)
Allowable deflection : 1.146 Actual Deflection : 0.001 in.

The following table is for the Operating Case.

Wind Deflection

		Cumulative	Centroid	Elem. End	Elem. Ang.

From	To	Wind Shear lb.	Deflection in.	Deflection in.	Rotation
10	20	3273.54	0.00001	0.00005	...
20	30	2791.64	0.00005	0.00006	...
30	40	2782.53	0.00006	0.00007	...
40	50	2702.30	0.00010719	0.00014651	...
50	60	2461.59	0.00034326	0.00059332	0.00001
60	70	1538.89	0.00070082	0.00081207	0.00001
70	80	1177.84	0.00091335	0.0010163	0.00001
80	90	856.898	0.0011204	0.0012253	0.00001
90	100	535.959	0.0012559	0.0012864	0.00001
100	110	442.887	0.0013482	0.0014099	0.00001
110	120	255.138	0.0014232	0.0014364	0.00001

Critical Wind Velocity for Tower Vibration

From	To	1st Crit. Wind Speed mile/hr	2nd Crit. Wind Speed mile/hr
10	20	431.488	2696.80
20	30	244.744	1529.65
30	40	431.051	2694.07
40	50	431.051	2694.07
50	60	431.051	2694.07
60	70	431.051	2694.07
70	80	431.051	2694.07
80	90	431.051	2694.07
90	100	431.051	2694.07
100	110	431.051	2694.07
110	120	431.102	2694.38

Allowable deflection at the Tower Top (Ope)(6.000"/100ft. Criteria)
Allowable deflection : 1.146 Actual Deflection : 0.001 in.

Skirt Data :

Skirt Outside Diameter at Base	SOD	120.4740	in.
Skirt Thickness	STHK	0.2370	in.
Skirt Internal Corrosion Allowance	SCA	0.0000	in.
Skirt External Corrosion Allowance		0.0000	in.
Skirt Material		SA-240 304	

Basering Input: Type of Geometry: Simple Basering No Gussets

Thickness of Basering	TBA	0.5000	in.
Design Temperature of the Basering		100.00	F
Basering Matl		SA-36	
Basering Operating All. Stress	BASOPE	16600.00	psi
Basering Yield Stress		36000.00	psi
Inside Diameter of Basering	DI	114.0000	in.
Outside Diameter of Basering	DOU	126.0000	in.
Nominal Diameter of Bolts	BND	1.0000	in.
Bolt Corrosion Allowance	BCA	0.0625	in.
Bolt Material		SA-36	
Bolt Operating Allowable Stress	SA	16600.00	psi
Number of Bolts	RN	8	
Diameter of Bolt Circle	DC	124.0000	in.
Bolt Allowable Shear Stress		15000.000	psi
Are Gussets to be used (Yes/No)	GUSYN	N	
External Corrosion Allowance	CA	0.0000	in.
Dead Weight of Vessel	DW	7143.6	lb.
Operating Weight of Vessel	ROW	133216.1	lb.
Test Weight of Vessel	TW	105652.1	lb.
Earthquake Moment on Basering	EQMOM	228380.5	ft.lb.
Wind Moment on Basering	WIMOM	33512.6	ft.lb.
Test Moment on Basering	TM	75365.6	ft.lb.
Percent Bolt Preload	ppl	100.0	
Use AISC A5.2 Increase in Fc and Bolt Stress		No	
Use Allowable Weld Stress per AISC J2.5		No	
Factor for Increase of Allowables	Fact	1.0000	

Results for Basering Analysis : Analyze Option

Basering Thickness Calculation method used : Simplified (Steel on Steel)

Calculation of Load per Bolt [W/Bolt], Wind + Dead Weight Condition:
W = DW M = WIMOM

```
= (( 4 * M/DC ) - W ) / RN per Jawad & Farr, Eq. 12.3
= (( 4 * 402150 / 124.000 ) - 7143 ) / 8
= 728.6279 lb.
```

Required Area for Each Bolt, Based on Max Load	0.0439	sq.in.
Area Available in a Single Bolt (Corr)	0.3988	sq.in.
Area Available in all the Bolts (Corr)	3.1905	sq.in.
Bolt Stress Based on Simplified Analysis	1827.0	psi
Allowable Bolt Stress 16600.0 [Fact]	16600.00	psi

Shear Stress in a Single Bolt [taub]:
= Shear Force / (2 * Bolt Area * Number of Bolts)
= 24644 / (2 * 0.40 * 8)
= 3862.3 psi. Must be less than 15000.0 psi .

Concrete Contact Area of Base Ring	CCA	2261.95	sq.in.
Concrete Contact Section Modulus of Base Ring		64788.62	$in.^3$

Concrete Load (Simplified method), Earthquake in Operating Condition [Sc]:
= ((ppl/100*(Abt*Sa)+W)/Cca) + M/CZ per Jawad & Farr Eq. 12.1
= (1.000 (3.1905 *16600 +139743)/2261.95) + 2740566 /64788.62
= 127.49 psi

Allowable Stress on Concrete 1200.00 psi

Determine Maximum Bending Width of Basering Section [Rw1,Rw2]:
Rw1 = (Dou - SkirtOD)/2, Rw2 = (SkirtID - Di + 2*Sca)/2
Rw1 = (126.000 -120.474)/2, Rw2 = (120.000 -114.000 + 2*0.000)/2
Rw1 = 2.763 , Rw2 = 3.000 in.

Calculation of required Basering Thickness, (Simplified) [Tb]:
Allowable Bending Stress 1.5 Basope = 24900.000 psi
= Max(Rw1,Rw2) * (3 * Sc / S)½ + CA per Jawad & Farr Eq. 12.12
= Max(2.7630 ,3.0000) * (3 * 127.495 / 24900.000)½ + 0.0000
= 0.3718 in.

Basering Stress at given Thickness [Sb]
= 3 * Sc * (Max[Rw1, Rw2]/(Tb - Ca))²
= 3 * 127.495 * (Max[2.763 , 3.000]/(0.500 - 0.000))²
= 13769.441 , must be less than 24900.000 psi

Summary of Basering Thickness Calculations:

Required Basering Thickness (simplified)	0.3718	in.
Actual Basering Thickness as entered by user	0.5000	in.

Weld Size Calculations per Steel Plate Engineering Data - Vol. 2

Compute the Weld load at the Skirt/Base Junction [W]
= SkirtStress * (SkirtThickness - CA)
= 2435.571 * (0.237 - 0.000)
= 577.23 lb./in.

Results for Computed Minimum Basering Weld Size [BWeld]
= W / [(0.4 * Yield) * 2 * 0.707]
= 577 / [(0.4 * 26700) * 2 * 0.707]
= 0.038 in.

Summary of Required Weld Sizes:
Required Basering to Skirt Double Fillet Weld Size 0.1875 in.

APPENDIX C

E-Mails from

Chavond-Barry Engineering

Send reply to: **<kemonninger@chavond-barry.com>**
From: **"Karl Monninger" <kemonninger@chavond-barry.com>**
To: **"Al Errett" <Errett@DEAC.com>**
Subject: **Tank Structural Analysis RFP**
Date sent: **Fri, 6 May 2011 17:01:08 -0400**
Organization: **Chavond-Barry Engineering Corp.**

Al,

It was my pleasure to meet you over the phone today.

As discussed, I would like to obtain structural analysis for 4 identical storage tanks located at a facility in Parker, AZ (see attached sketches). The tanks were fabricated by Wyatt M&B works, Inc. in 1956 and the mat'l of construction is 300 series stainless steel (specific grade unknown). Minimum thickness of the cylindrical shell (0.176"), conical bottom (0.167"), umbrella roof (0.183") and support skirt (0.237") for all tanks were measured by ultrasonic testing. The two carbon steel stiffener angle rings (2-1/2" x 2-1/2" x 3/16") on the shell of each tank are new. The bottom of the carbon steel skirt support for each tank is anchored by means of eight 1-inch diameter bolts.

The tanks are used for storage of activated carbon/water slurry and operate at atmospheric pressure and a temperature of ?150°F. Each tank is equipped with a 4" diam. atmospheric vent and a 3" diam. pressure safety valve with vacuum breaker (set @ 8 oz for pressure relief & @ 6 oz. for vacuum).

The calculation should use current IBC criteria for wind (75 mph) and seismic loading (zone 2) and requires PE seal. If the minimum thickness for any of these tank components adversely impact tank integrity, we would require an additional calculation to determine the minimum acceptable thickness required for that component. Please provide us with a proposal for the calculations at your earliest convenience. Please contact me by phone or reply email if you should require additional information to determine cost and schedule.

Thanks,

Karl

Karl E. Monninger

Vice President

Chavond-Barry Engineering Corporation

400 County Route 518

P.O. Box 205

Blawenburg, New Jersey 08504

Phone: (609) 466-4900 x202

Fax: (609) 466-1231

Cell: (609) 468-0176

KEMonninger@Chavond-Barry.com

Alan Errett **Wednesday, June 29, 2011**

Send reply to: **<kemonninger@chavond-barry.com>**
From: **"Karl Monninger" <kemonninger@chavond-barry.com>**
To: **"'Alan Errett'" <errett@deac.com>**
Subject: **RE: Tank Structural Analysis RFP**
Date sent: **Wed, 29 Jun 2011 11:02:49 -0400**
Organization: **Chavond-Barry Engineering Corp.**

Alan,

Please proceed with structural calculations for the T-tanks. Attached for your reference are copies of the original calculations for T-1, T-2, T-5 and T-6 (revised 2/24/94), and more recent IBC and AWWA wind and seismic design loading calculations (dated 2/9/07) for another tank at the facility that is not part of the current evaluation.

The two existing carbon steel vacuum stiffener angle rings on each tank were originally rolled from 2-1/2" X 2-1/2" X 1/4" stock, not 3/16" thickness as indicated on the sketch sent with our RFP. Most of these existing rings are badly corroded at the top corner of the angle in several locations such that the material remaining with any hoop integrity is nominally 2-1/2" X 1/4". Use a 2" X 1/4" flat bar (0.5 in.^{2} CSA) in lieu of the 2-1/2" X 2-1/2" X 1/4" angle as per the 1994 calculations is still applicable (conservative). The new 2-1/2" X 2-1/2" X 3/16" carbon steel stiffener angle rings have been installed 21-1/2" above the existing stiffener rings on all tanks (see attached Revised T-Tank Sketch.pdf).

If you have any questions, please don't hesitate to contact me at your earliest convenience. Thank you.

Karl E. Monninger

Vice President

Chavond-Barry Engineering Corporation

400 County Route 518

P.O. Box 205

Blawenburg, New Jersey 08504

Phone: (609) 466-4900 x202

Fax: (609) 466-1231

Cell: (609) 468-0176

KEMonninger@Chavond-Barry.com

APPENDIX D

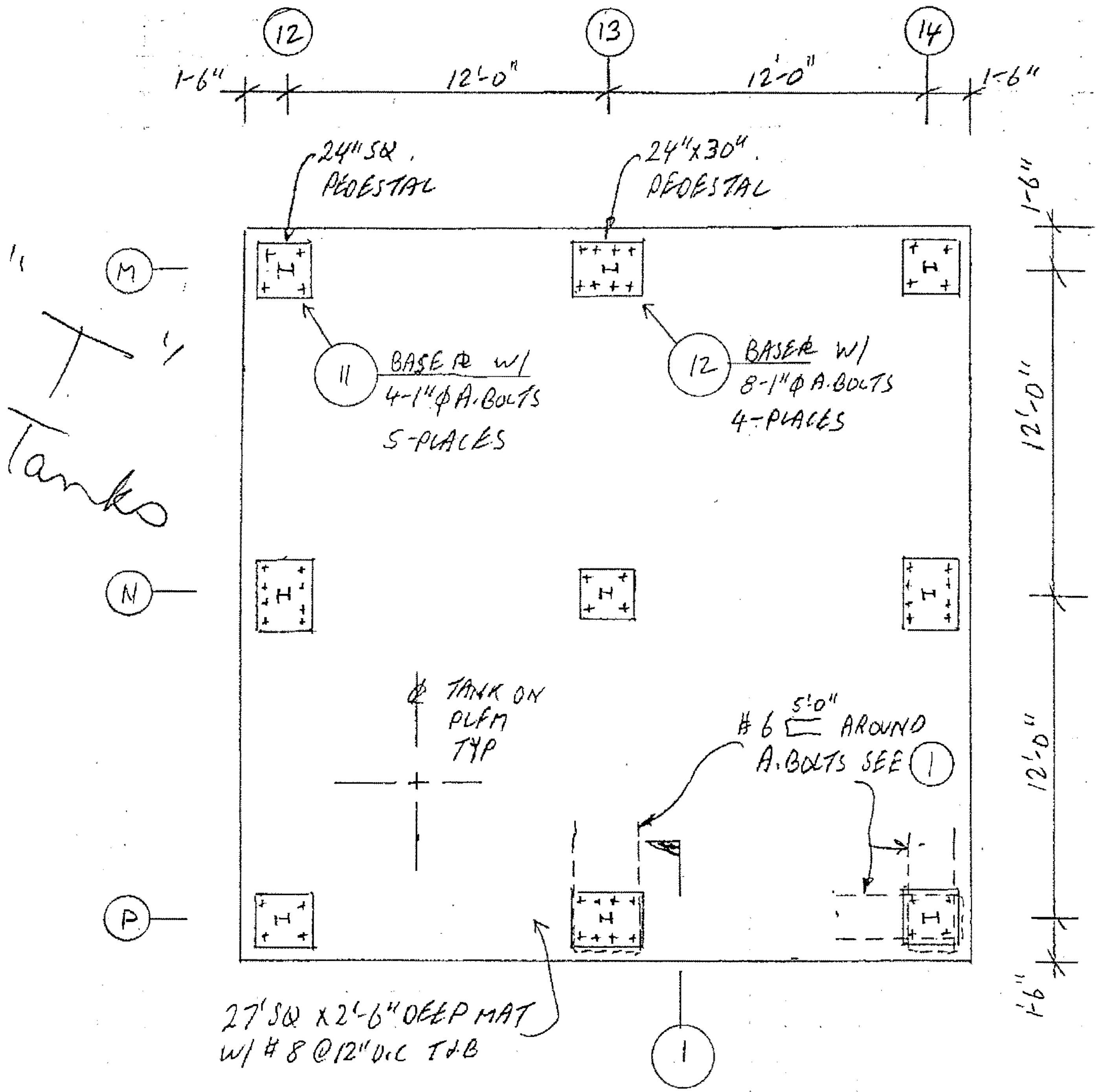
TANK SUPPORT STRUCTURE AND FOUNDATION DRAWINGS

LuMar Engineering
(818) 568-8553

... O E. DEL MAR BLVD. SUITE 108
PASADENA, CA. 91105

DATE 3-18-92 SUBJECT WESTATES 24' SQ PLFM SHEET NO. B1 of 6

BY JMD CHKD. JOB NO.



STORAGE TANKS PLFM FOUNDATION

(3/16" = 1 FT)

REF DWG D9201-201 REV A BY GMG

REV A 3/19/92

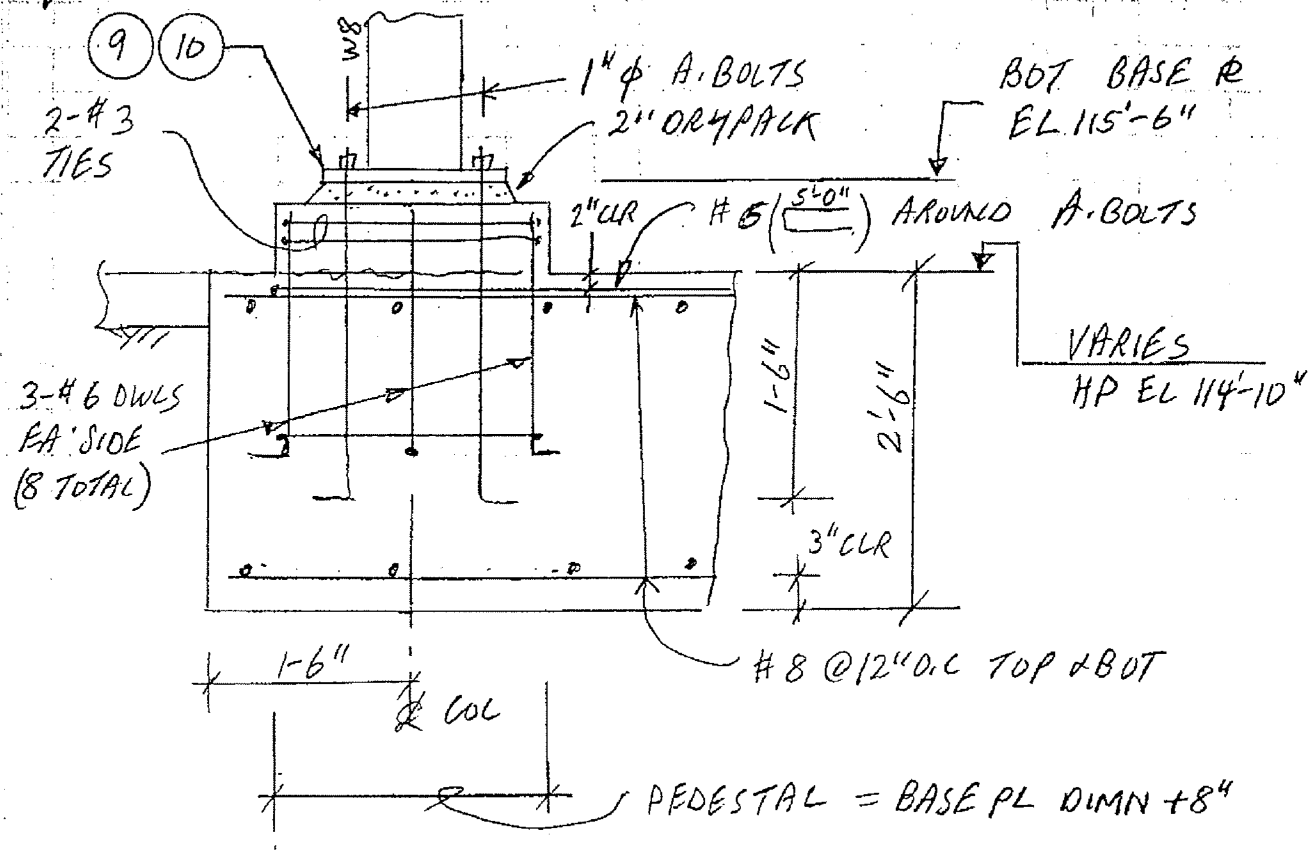
B1

LuMar Engineering
(818) 568-8553

'0 E. DEL MAR BLVD. SUITE 108
PASADENA, CA. 91105

DATE 3-18-92 SUBJECT WESTATES 24'SQ PLFM SHEET NO. B2 of 6

BY JMO CHKD. JOB NO.



1 3/4"=1FT

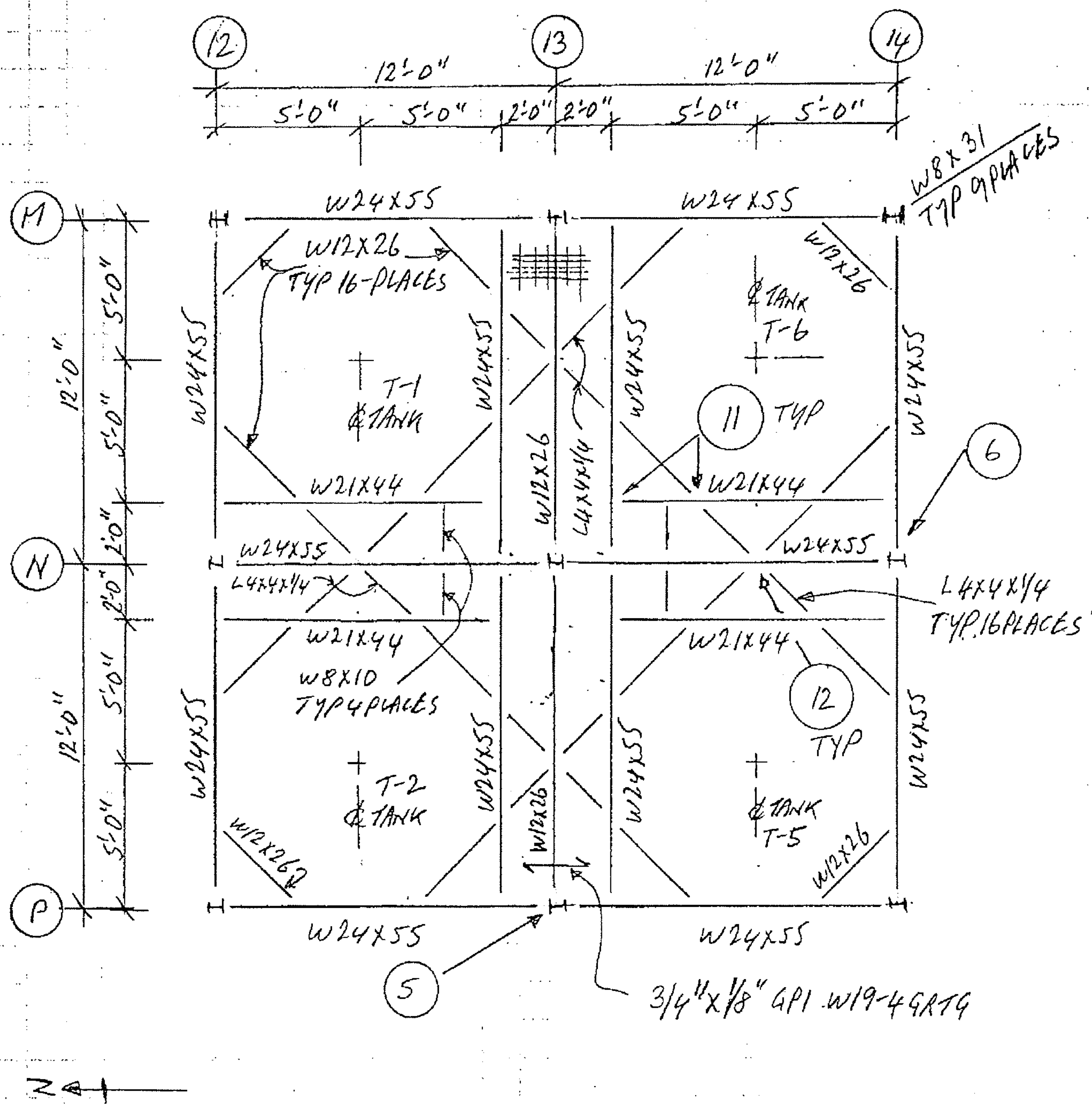
NOTES

1. SEE NOTES ON S-X DRAWINGS FOR BUILDING.
2. CONCRETE 3000 psi AT 28 DAYS (DESIGN f'c=2500)
3. REBAR ASTM A615 GRADE 60

REV A 3/19/92

LuMar Engineering
(818) 568-8553
'0 E. DEL MAR BLVD. SUITE 108
PASADENA, CA. 91105

DATE 3-16-92 SUBJECT WESTATES 24'JQ PLFM SHEET NO. B3 of 6
BY JW CHKD. JOB NO.



STORAGE TANKS PLFM
(3/16" = 1 FT)

PLFM EL 126'-11 1/4"
TOS EL 126'-10 1/2"

NOTE TANK OPER WT = 142,400#

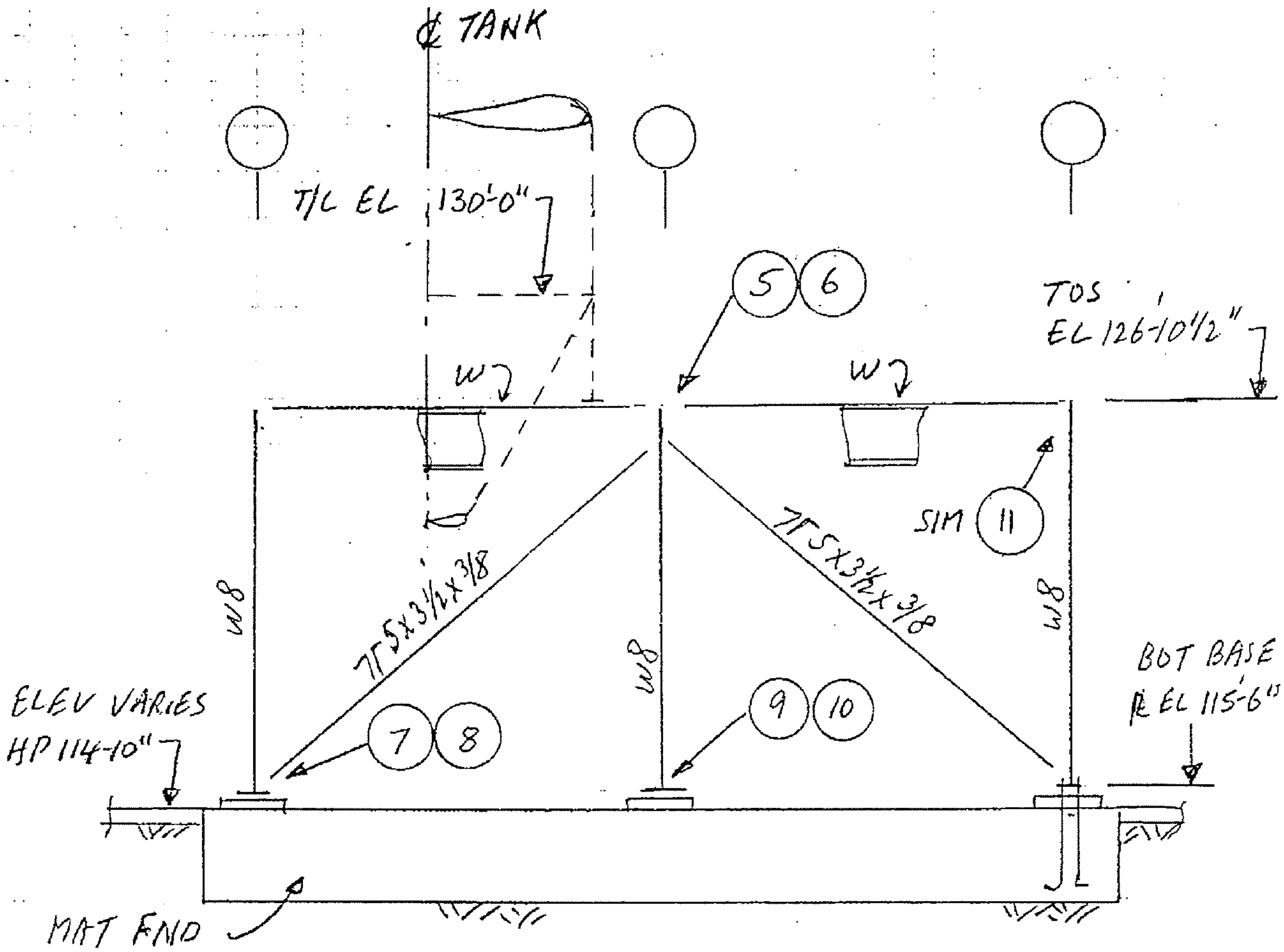
REV. A 3/19/92

REF DWG D9201-201 REV A BY GMG

LuMar Engineering
(818) 568-8553
…0 E. DEL MAR BLVD. SUITE 108
PASADENA, CA. 91105

DATE 3-18-92 SUBJECT WESTATES 24' SQ PLFM SHEET NO. B4 of 6

BY JMO CHKD. JOB NO.



BRACING ELEVATION LINES (12) (13) (14) (M) (N) (P)

NOTES

1. SEE NOTES ON S-X DRAWINGS FOR BUILDING
2. STEEL SHAPES & PLATES : ASTM A36
   BOLTS : ASTM A325.

REV A 3/19/92

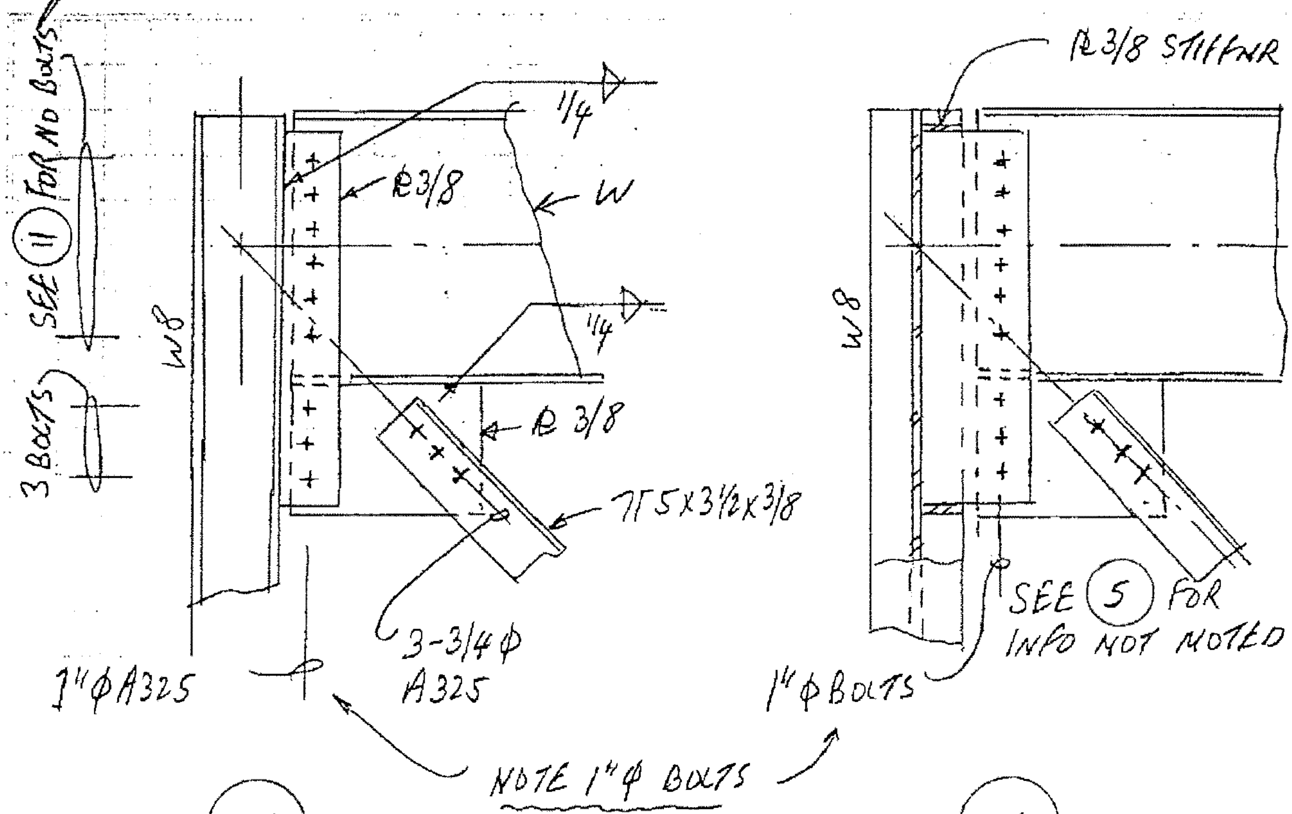
B4

LuMar Engineering
(818) 568-8553

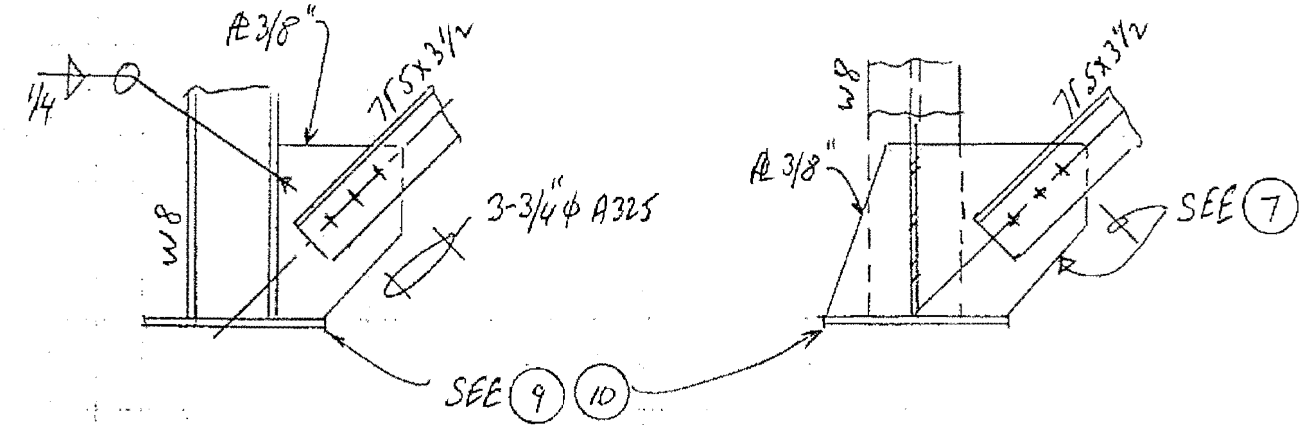
..00 E. DEL MAR BLVD. SUITE 108
PASADENA, CA. 91105

DATE 3-18-92 SUBJECT WESTATES 24' SQ PLFM SHEET NO. B5 of 6

BY JMO CHKD. JOB NO.



(5) (6)



(7) (8)

REV A 3/19/92

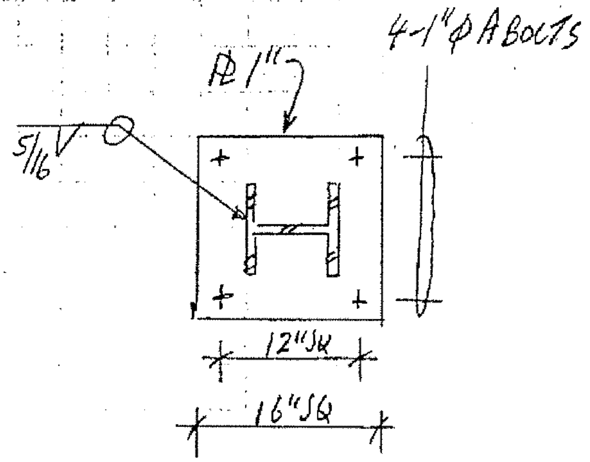
B5

LuMar Engineering
(818) 568-8553

?00 E. DEL MAR BLVD. SUITE 108
PASADENA, CA. 91105

DATE 3-28-92 SUBJECT WESTATES SHEET NO. B6 of 6

BY JM CHKD. JOB NO.



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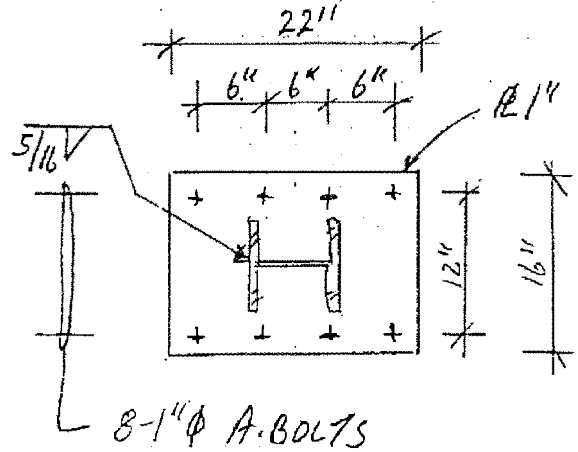
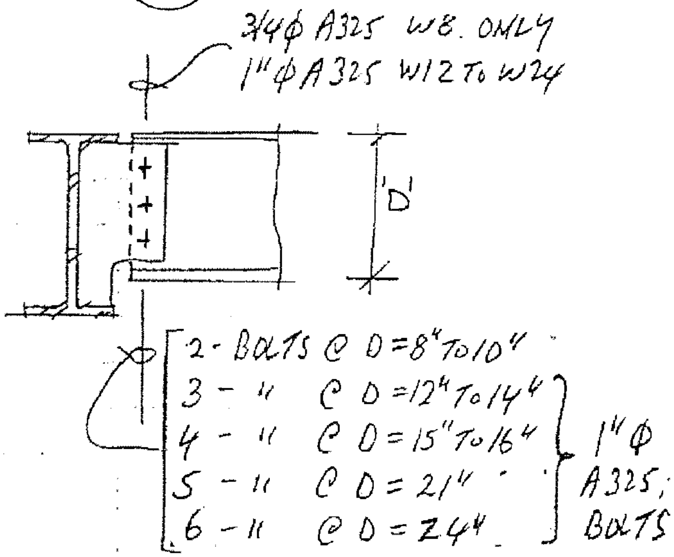
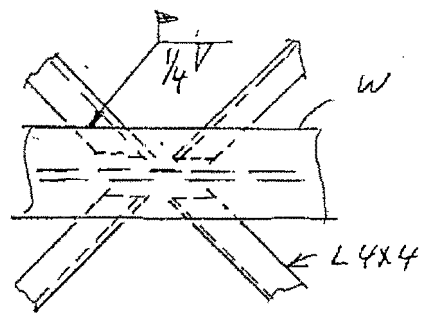


10

BASE PL AT
B-13, P-13
N-12 N-14





12

NOTE 1"φ BOLTS

11

REV A 3/19/92

B6

APPENDIX IX

TAB 2

Assessment of Tank System T-18

Revision 1
April 2012

NEW TANK SYSTEM ENGINEERING ASSESMENT
FOR
FURNACE FEED TANK T-18

LOCATED AT

SIEMENS WATER TECHNOLOGIES CORP.
25323 MUTAHAR ST.
PARKER, ARIZONA 85344

CBE

CHAVOND-BARRY ENGINEERING CORP.

400 County Route 518 • P.O. Box 205
Blawenburg, New Jersey 08504-0205

Tel:(609)466-4900
Fax: (609)466-1231

New Tank System Engineering Assessment

I have reviewed design information relating to the new above ground tank system shown as Furnace Feed Tank T-18 on the plans attached as Exhibit A, which is to be installed at the Siemens facility in Parker, Arizona, and my assessment allows me to draw the following conclusions in accordance with 40 CFR 264.192(a):

1. The tank system has sufficient structural integrity and is acceptable for the storing and treating of hazardous waste.

2. The tank system foundation, structural support, seams, connections and pressure controls (where applicable) are adequately designed.

3. The tank system has sufficient structural strength, compatibility with the wastes to be stored or treated, and corrosion protection, to ensure that it will not collapse, rupture or fail.

My assessment has been based, in part, on my review of the following information, which is attached as noted:

A. Design standards for tank system construction (Exhibit B).

B. Hazardous characteristics of the wastes to be handled in the tank system (Exhibit C).

C. Information that there will be no external metal component of the tank system that will be in contact with the soil or with water (Exhibit D).

D. Design considerations to ensure that (i) tank foundations will maintain the load of a full tank, (ii) anchoring will prevent flotation or dislodgment where the tank system is placed in a saturated zone or in a seismic fault zone subject to the standards of 40 CFR 264.18(a), and (iii) the tank system will withstand the effects of frost heave.

In accordance with 40 CFR 264.192(a) and 40 CFR 270.11(d), I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Louis T. Barry, P.E.

February 27, 2007

Attachments:

Exhibit A - Plans
Exhibit B - Design Standards
Exhibit C - Hazardous Waste Characteristics
Exhibit D - Information on Metal Components

SIEMENS WATER TECHNOLOGIES CORP.
PARKER, ARIZONA

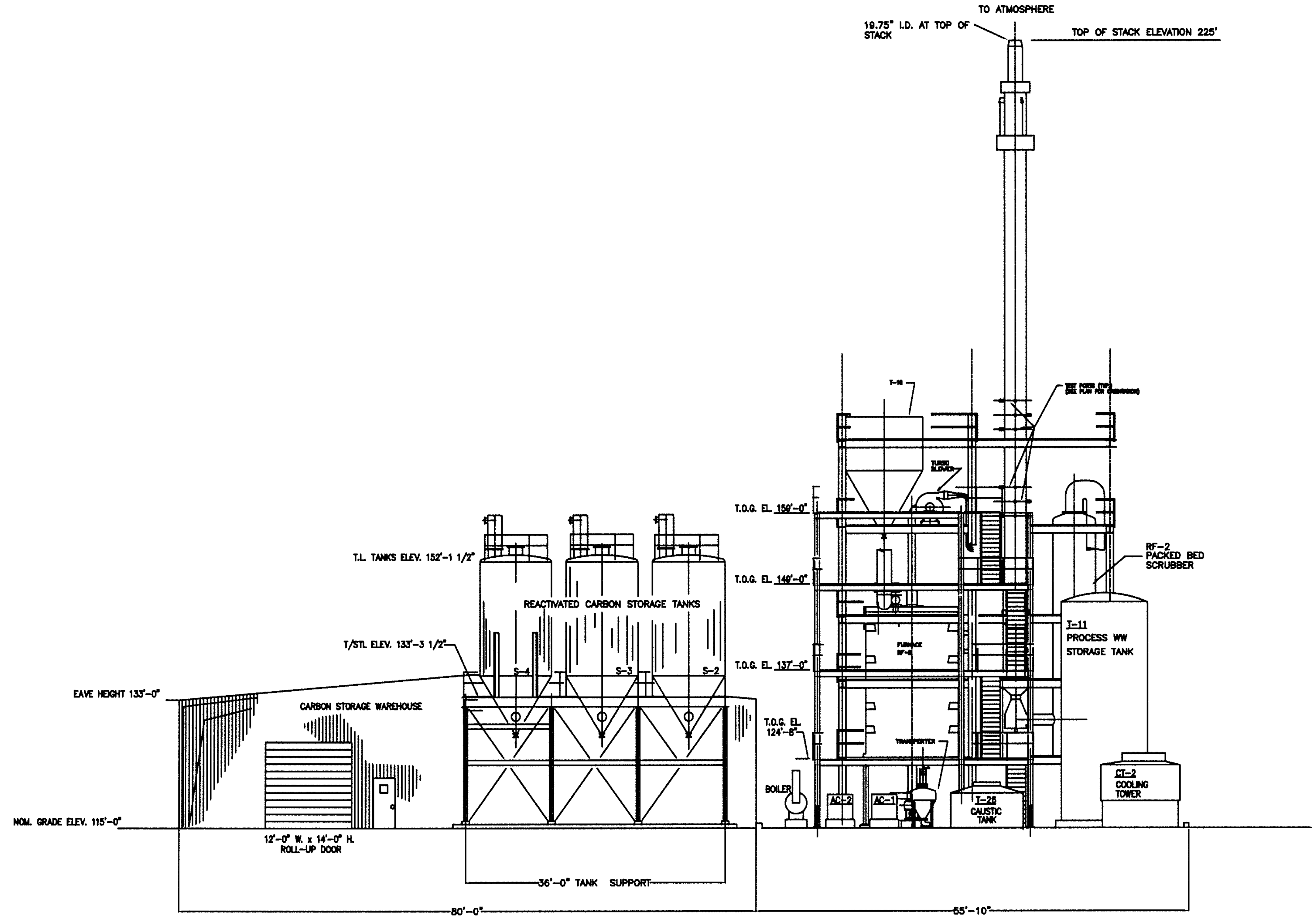
NEW TANK SYSTEM ENGINEERING ASSESMENT
FOR
FURNACE FEED TANK T-18

Attachments

1. Exhibit A - Plans
   - A. T-18 Plan and Elevation Drawings
   - B. T-18 Fabrication Drawings
   - C. T-18 Support Steel Drawings
2. Exhibit B - Design Standards
   - A. Structural Calculations for T-18
   - B. Structural Calculations for T-18 Support Steel
3. Exhibit C - Hazardous Waste Characteristics
   - A. Table 1 - EPA Listed Hazardous Wastes
   - B. Table 2 – Spent Activated Carbon Organic Constituents
   - C. Table 3 - Spent Activated Carbon Characterization
4. Exhibit D – Information on Metal Components

Exhibit A - Plans

T-18 Plan and Elevation Drawings



OVERALL SITE VIEW LOOKING NORTHWEST

NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIVED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.
2. FOR ACTUAL ELEVATIONS ADD 327 FEET TO THE ELEVATIONS SHOWN.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
2	1/18/07	UPDATED FOR PERMIT SUBMITTAL	JBE	KEM	
1	7/16/02	REVISED FOR RCRA PART B PERMIT APPLICATION	STA	KEM	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS WATER TECHNOLOGIES CORP

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No. 11135

DRAWN: CPG 4/21/94

CHK'D:

ENG'R:

SIEMENS WATER TEHNOLOGIES CORP.
Parker, AZ

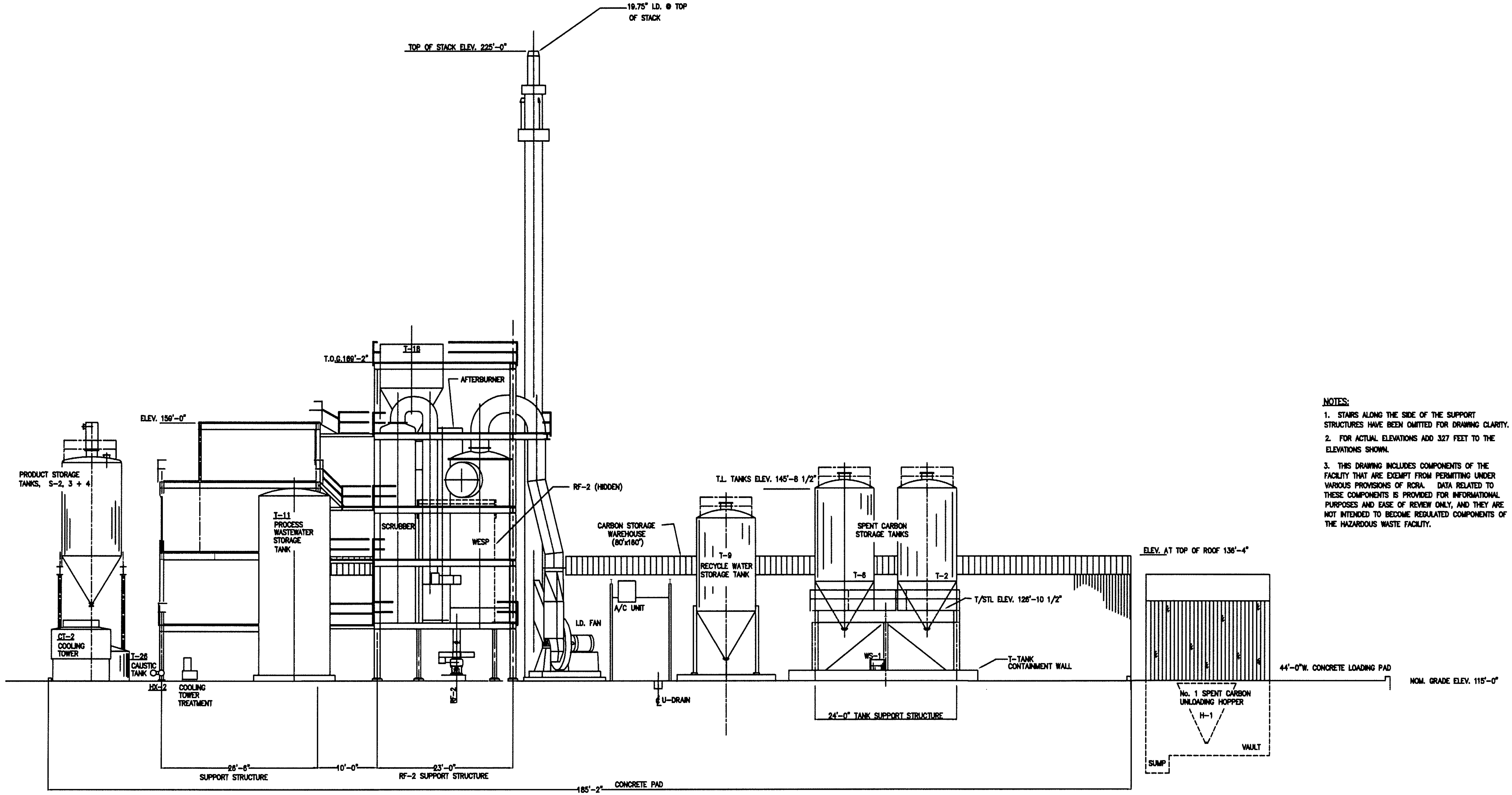
TITLE: REACTIVATION FACILITY OVERALL ARRANGEMENTS

PART No.

DWG No. D14789-04 REV. 2

PRINT DATE: 2/15/07

DWG: D14789-03



OVERALL SITE VIEW LOOKING SOUTHWEST

NOTES:

1. STAIRS ALONG THE SIDE OF THE SUPPORT STRUCTURES HAVE BEEN OMITTED FOR DRAWING CLARITY.
2. FOR ACTUAL ELEVATIONS ADD 327 FEET TO THE ELEVATIONS SHOWN.
3. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
2	1/18/07	UPDATED FOR PERMIT SUBMITTAL	JBE	KEM	
1	7/24/02	REVISED FOR RCRA PART B PERMIT APPLICATION	CPG	KEM	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS WATER TECHNOLOGIES CORP.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No.

DRAWN: CPG 4/21/94

CHK'D:

ENG'R:

SIEMENS WATER TECHNOLOGIES CORP.
Parker, AZ

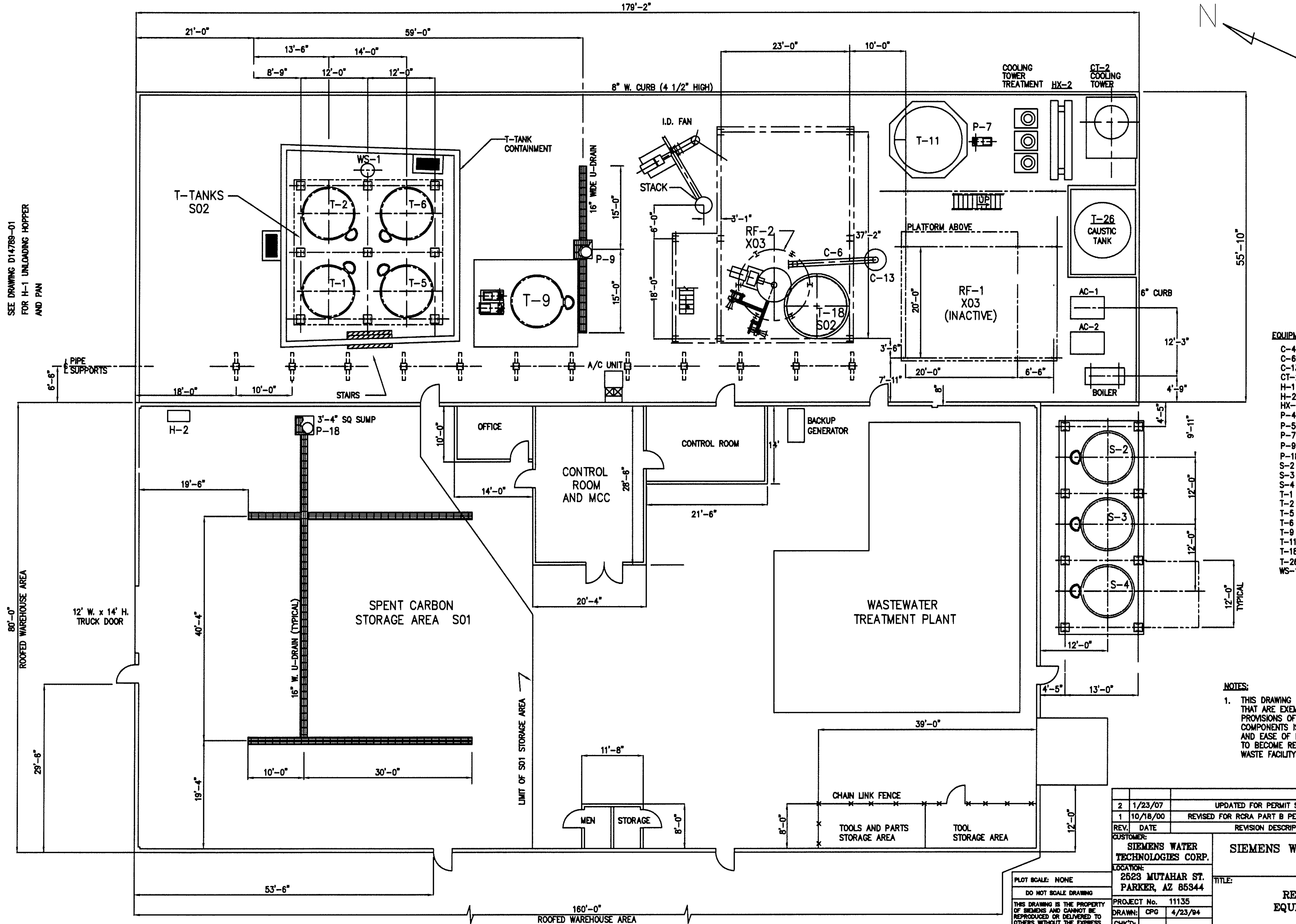
TITLE: REACTIVATION FACILITY SITE VIEW OVERALL ARRANGEMENTS

PART No.

DWG No. D14789-03 REV. 2

PRINT DATE: 2/15/07

DWG: D14789-02



EQUIPMENT LIST:

C-4	TRANSPORTER
C-6	PRODUCT COOLING SCREW
C-13	TRANSPORTER
CT-2	COOLING TOWER
H-1	CARBON HOPPER
H-2	CARBON HOPPER
HX-2	HEAT EXCHANGER
P-4	RECYCLE WATER PUMP
P-5	RECYCLE WATER PUMP
P-7	PROCESS WW PUMP
P-9	SUMP PUMP
P-18	SUMP PUMP
S-2	CARBON STORAGE TANK
S-3	CARBON STORAGE TANK
S-4	CARBON STORAGE TANK
T-1	SPENT CARBON STORAGE TANK
T-2	SPENT CARBON STORAGE TANK
T-5	SPENT CARBON STORAGE TANK
T-6	SPENT CARBON STORAGE TANK
T-9	RECYCLE WATER STORAGE TANK
T-11	PROCESS WW STORAGE TANK
T-18	FURNACE FEED TANK
T-26	CAUSTIC TANK
WS-1	ACTIVATED CARBON ADSORBER

NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
2	1/23/07	UPDATED FOR PERMIT SUBMITTAL	JBE	KEM	
1	10/18/00	REVISED FOR RCRA PART B PERMIT APPLICATION	JBE	---	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS WATER TECHNOLOGIES CORP.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No. 11135

DRAWN: CPG 4/23/94

CHK'D:

ENG'R:

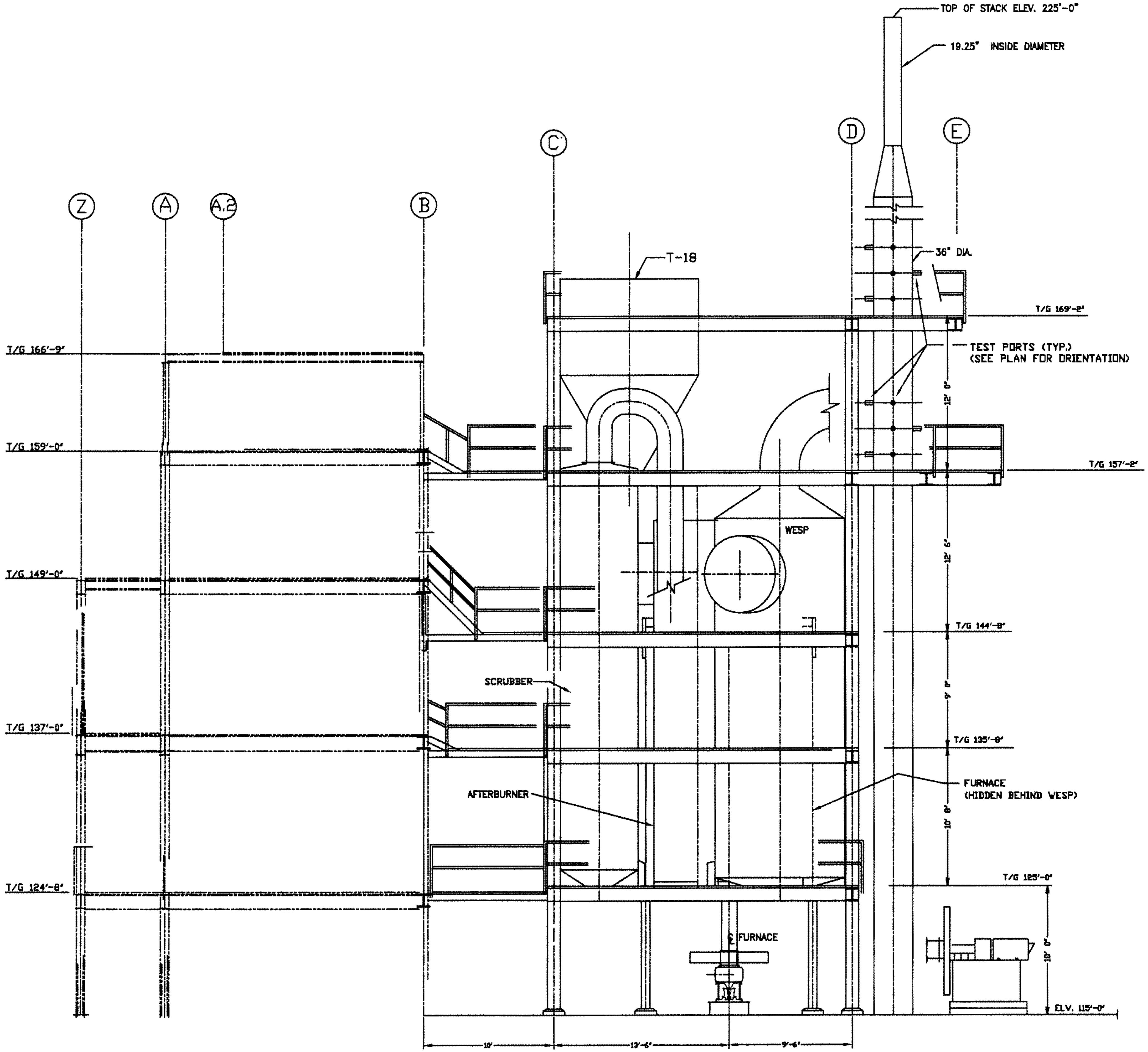
SIEMENS WATER TECHNOLOGIES CORP.
Parker, AZ

TITLE: REACTIVATION FACILITY EQUIPMENT ARRANGEMENT

PART No.

DWG No. D14789-02 REV. 2

PRINT DATE: 2/15/07



NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.
2. STAIRS ALONG THE SIDE OF THE SUPPORT STRUCTURES HAVE BEEN OMITTED FOR DRAWING CLARITY.
3. FOR ACTUAL ELEVATIONS ADD 327 FEET TO THE ELEVATIONS SHOWN.

4'-0"

NO	DWN	CK'D	APP	REVISIONS	DATE

CBE CHAVOND-BARRY ENGINEERING CORP.
400 Route 518 • P.O. Box 205 • Blawenburg, New Jersey 08504

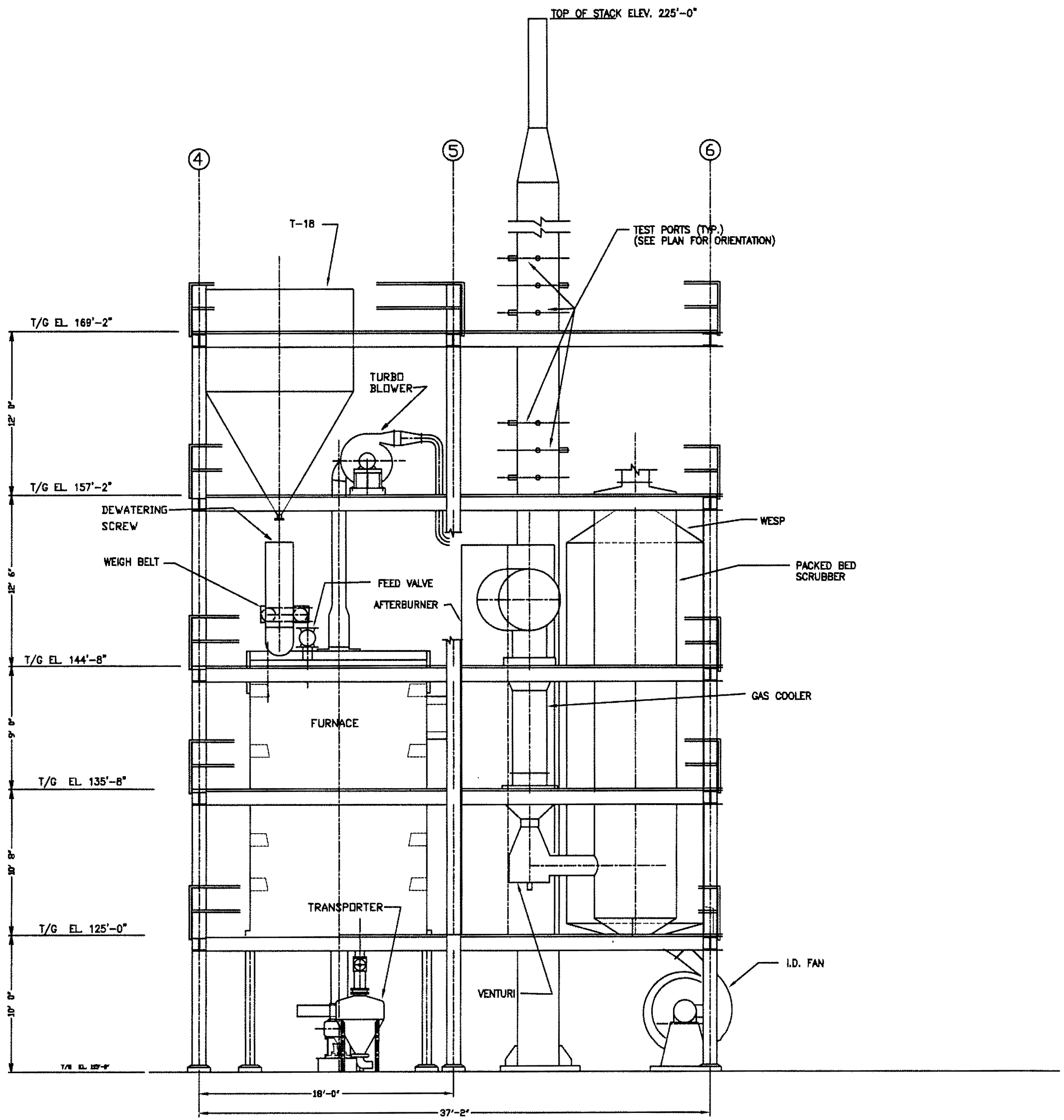
SIEMENS WATER TECHNOLOGIES CORP.
2523 MUTAHAR STREET, PARKER, AZ 85344
CARBON REGENERATION SYSTEM

ELEVATION LOOKING WEST

DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
CPG	5/12/94	KEM	5/13/94		

SCALE	DWG. NO.	REV.
1/4"= 1'-0"	1478-P-005	0

PRINT DATE: 2/15/07



NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.
2. FOR ACTUAL ELEVATIONS ADD 327 FEET TO THE ELEVATIONS SHOWN.

NO	DWN	CK'D	APP	REVISIONS	DATE

CBE CHAVOND-BARRY ENGINEERING CORP.
400 Route 518 • P.O. Box 205 • Blawenburg, New Jersey 08504

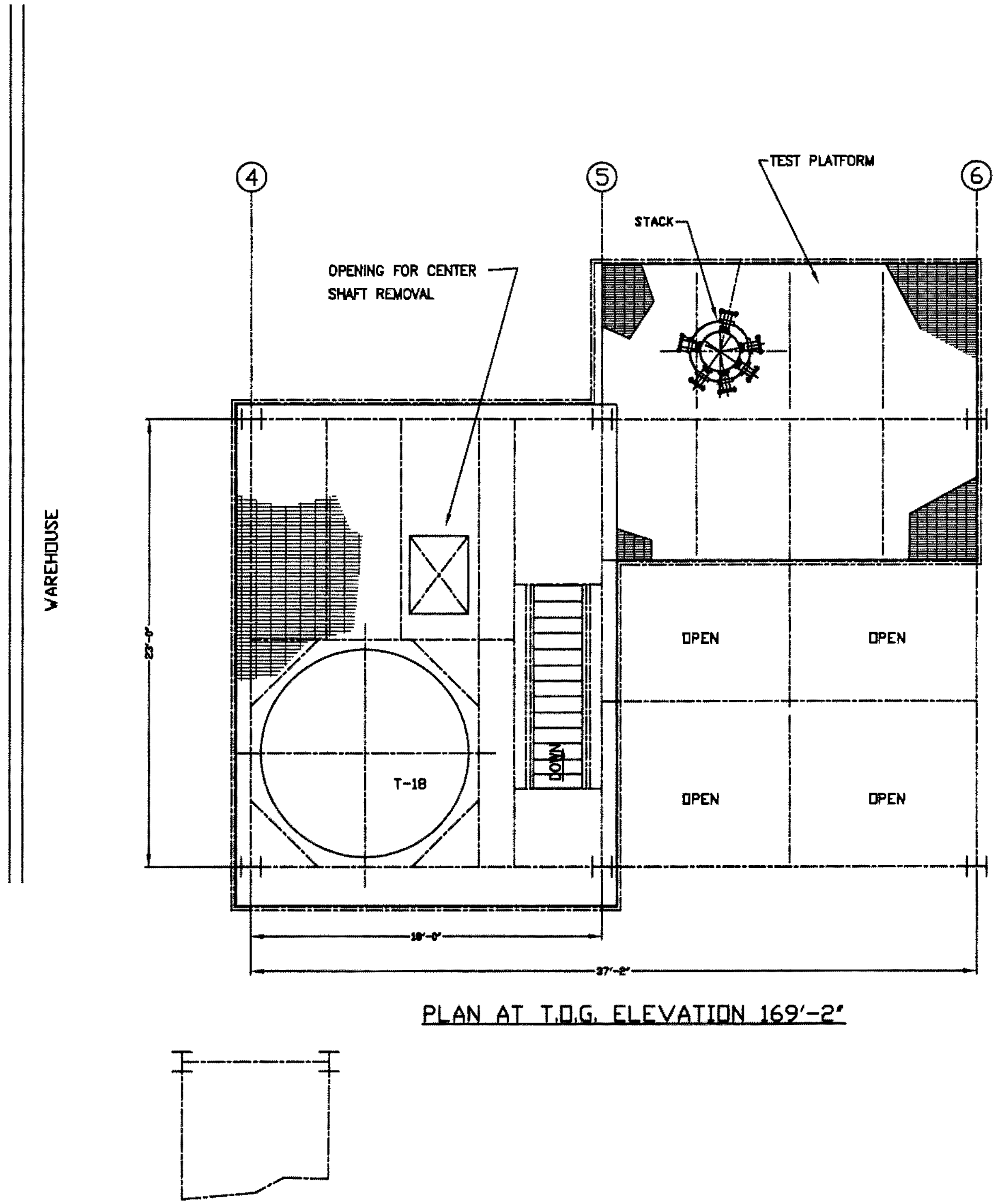
SIEMENS WATER TECHNOLOGIES CORP.
2523 MUTAHAR STREET, PARKER, AZ 85344
CARBON REGENERATION SYSTEM

ELEVATION LOOKING NORTH

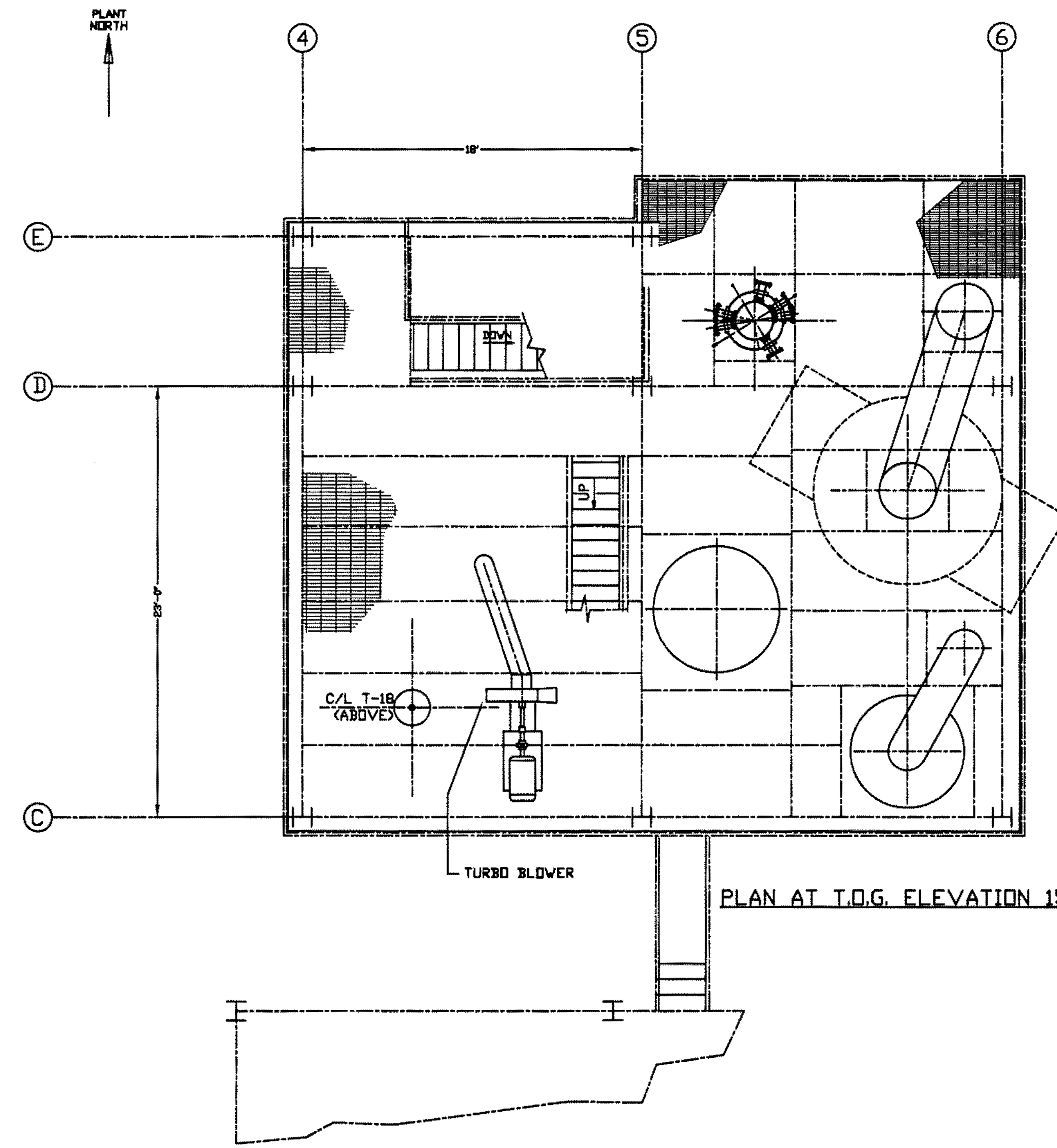
DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
CPG	5/12/94	KEM	5/13/94		

SCALE	DWG. NO.	REV.
1/4"=1'-0'	1478-P-004	0

PRINT DATE: 2/15/07



PLAN AT T.O.G. ELEVATION 169'-2"



PLAN AT T.O.G. ELEVATION 157'-2"

NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

4'-0"

NO	DWN	CK'D	APP	REVISIONS	DATE

CBE CHAVOND–BARRY ENGINEERING CORP.
400 Route 518 • P.O. Box 205 • Blawenburg, New Jersey 08504

SIEMENS WATER TECHNOLOGIES CORP.
2523 MUTAHAR STREET, PARKER, AZ 85344
CARBON REGENERATION SYSTEM

PLAN VIEWS

DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
CPG	5/12/94	KEM	5/13/94		

SCALE	DWG. NO.	REV.
1/4"=1'-0"	1478-P-003	0

PRINT DATE: 2/15/07

Exhibit A - Plans

T-18 Fabrication Drawings

GENERAL INFORMATION

		VESSEL EXTERIOR	VESSEL INTERIOR
SURFACE FINISH	SANDBLAST	BLAST TO CLEAN	CLEAN ONLY
	PRIMER	–	–
	MILS COAT	–	–
	TOTAL D.F.T.	–	–
	PAINT	–	–
	MILS COAT	–	–
	TOTAL D.F.T.	–	–
	COLOR	–	–

MISCELLANEOUS	ESTIMATED EMPTY WEIGHT	12,700 lbs.	APPROX. CAP.	6,400 GAL.
	EST. WT. FULL OF WATER	66,082 lbs.		
	INSULATION	NONE		
	REFERENCE DRAWINGS	–		
	CUSTOMER STANDARDS	–		
	SHIPPING FOOTPRINT	(LxWxH) 17'-6", 12'-6", 12'-6"		

DESIGN CODE		HOLD POINTS	
	PER BH TANK DWG. P-060-P4 REV.3		1. –
	–		2. –
			3. –
	–		4. –
	–		5. –

ADDITIONAL DESIGN CONDITIONS

–	–	–	
RADIOGRAPHY	PER AWWA D-100		
STRESS RELIEVE	NOT REQUIRED	IMPACT TESTING NOT REQUIRED	
SPECIFIC GRAVITY	–		
SEISMIC ZONE	–	IMPORTANCE FACTOR	–
INSPECTED BY: MODERN CUSTOM FABRICATION			
SHOP TEST	FILL WITH WATER		

NAT'L BD. NO.

NON-CODE

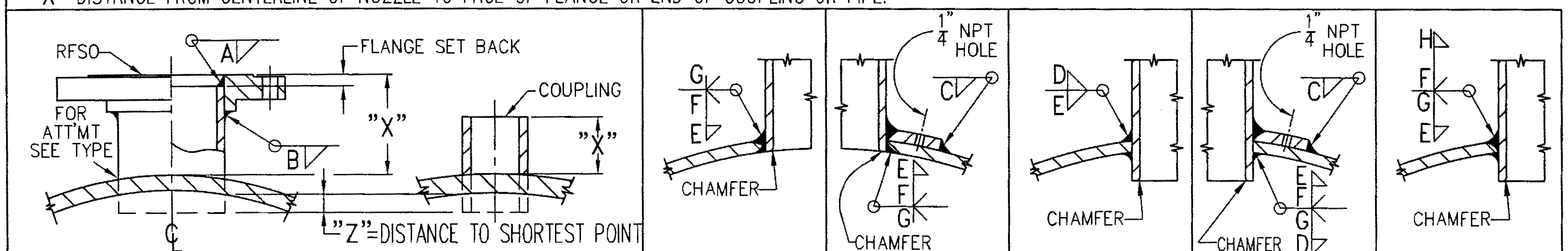
CERTIFIED BY

Modern Custom Fabrication, Inc.

FRESNO, CA

MAWP	ATMOS.	PSI AT	AMBT.	°F
MAEWP	–	PSI AT	–	°F
MDMT	AMBT.	°F AT	ATMOS.	PSI
MFG'S S/N	1601794	YEAR	2006	

"X"=DISTANCE FROM CENTERLINE OF NOZZLE TO FACE OF FLANGE OR END OF COUPLING OR PIPE.



VARIOUS TYPES OF OPENINGS | TYPE 1 | TYPE 2 | TYPE 3 | TYPE 4 | TYPE 5

WELD PROCEDURES	
A	1.05
B	2.03
C	3.06
D	4.03
E	5.03
F	–
–	–

NOZZLE MARK	QUANT. REQ'D.	SIZE (FLANGE OR COUPLING)	SERIES (FLANGE OR COUPLING)	DESCRIPTION (FLANGE OR COUPLING)	DESCRIPTION (NOZZLE NECK)	THK. (REINF. PAD)	REPAD WIDTH (REINF. PAD)	TYPE	COPED TO INTERIOR	DIM "X"	DIM "Z"	WELD A	WELD B	WELD C	WELD D	WELD E	WELD F	WELD G	WELD H	FLANGE SET BACK	NOZZLE SERVICE
K1–K4	4	4"	CL150	RFSO	SCH 40			1	YES	SEE DWG	SEE DWG					3/16		1/8"			SWIRL NOZZLES
J	1	3"	CL150	RFSO	SCH 40			1	NO	SEE DWG	SEE DWG					3/16		1/8"			DRAIN
I	1	1"	CL 3000	FULL COUPLING	SA105			1	YES	BAL	0"					3/16"		1/8"			LEAK TEST
H	1	1"	CL 3000	HALF COUPLING	SA105			1	NO	BAL	0"					3/16"		1/8"			LEAK TEST
G	1	1 1/2"	CL3000	HALF COUPLING	SCH 40			1	YES	BAL	0"		1/8"			3/16"		1/8"			LEVEL PROBE
F	1	1"	CL3000	HALF COUPLING	SCH 40			1	YES	BAL	0"		1/8"			3/16"		1/8"			
E	1	6"	CL150	RFSO	SCH 40			1	YES	SEE DWG.	0"	1/4"	1/4"			1/4"		3/16"		1/4"	OUTLET
D	1	8"	PLATE	1/4"	SCH 10			1	NO	6"	0"	3/16"	3/16"			3/16"		1/8"		3/16	WEIR INSPECTION PORT
C1–C2	2	4"	CL150	RFSO	SCH 40			3	NO	6"	6"	1/4"	1/4"			1/4"		1/8"		1/4"	FILL
B1–B2	2	4"	CL150	RFSO	SCH 40			1	NO	6"	0"	1/4"	1/4"			1/4"		1/8"		1/4"	VENT/SPARE W/BLIND
A	1	20"X20"	HINGED LID	SQUARE MANWAY	1/4" PLATE			1	NO	6"	0"					3/16		1/8"			ACCESS

ATTACHMENTS

SHOP NOTES

1. COVER ALL OPENINGS BEFORE SHIPPING.
2. STRADDLE CENTER LINES OF ALL FLANGES UNLESS OTHERWISE SPECIFIED.
3. GRIND & DEBURR ALL EDGES.

NO.	REVISION	DATE	BY
△	–	–	–

NO. REQUIRED (1) ONE | ITEM NO. NONE

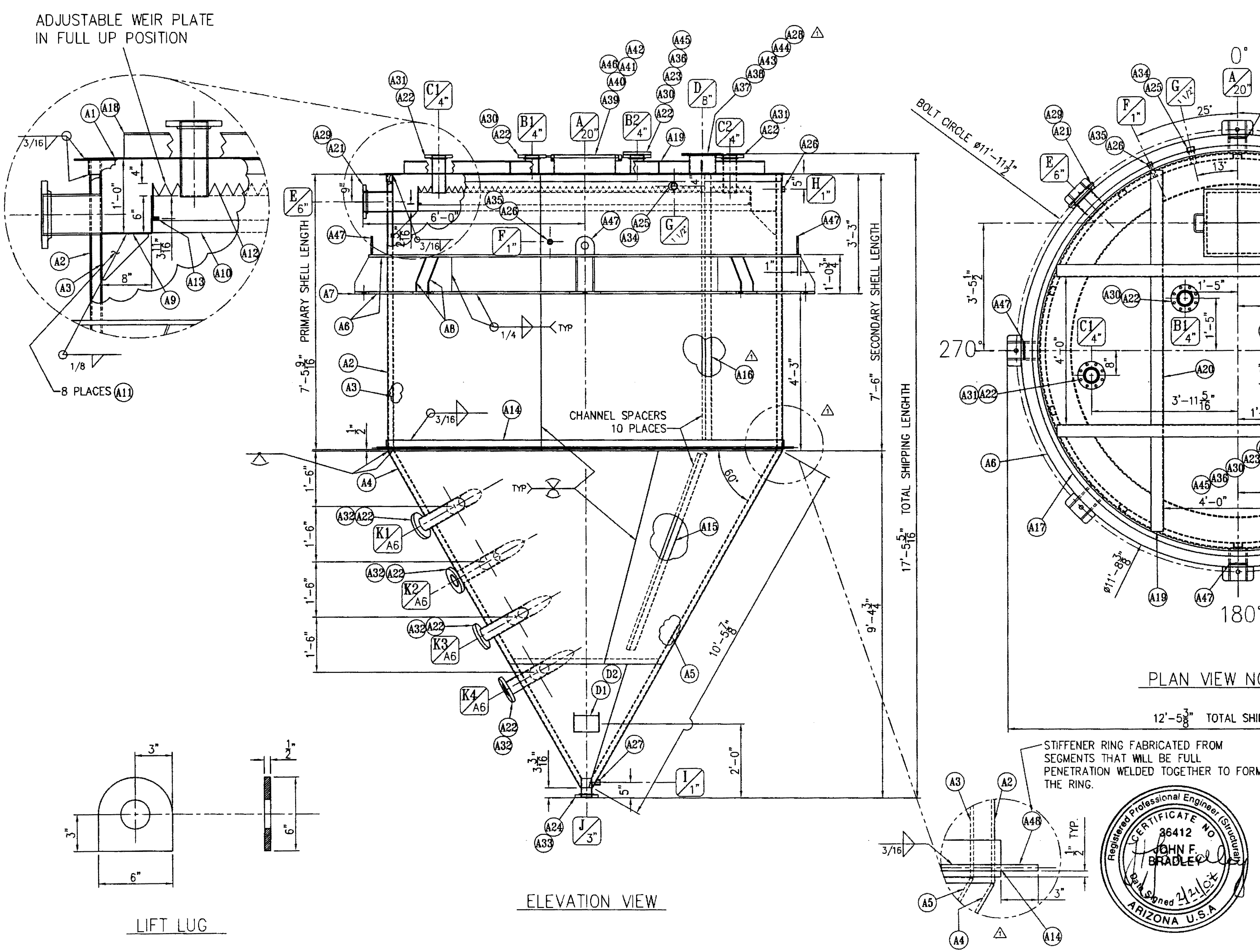
modern custom fabrication
fresno california
P.O. Box 11925 • 2421 E. California Ave. • Fresno, California 93721
Ph: (559) 264-4741 OR 800-800-TANK • Fax: (559) 237-3413

Prepared for

SIEMENS WATER TREATMENT TECH. CORP.

DOUBLE WALL STAINLESS FEED TANK
FLAT TOP CONE BOTTOM 7'-6" SIDE SHELL

DRAWN BY: RC	SCALE: NTS
CHECKED BY:	DATE: 12/7/06
DWG/JOB NO.: 1601794	SHT. 1 OF 5



NO.	REVISION	DATE	BY
△	ADDED STIFFENING RING CORRECTIONS	2-9-07	TCY

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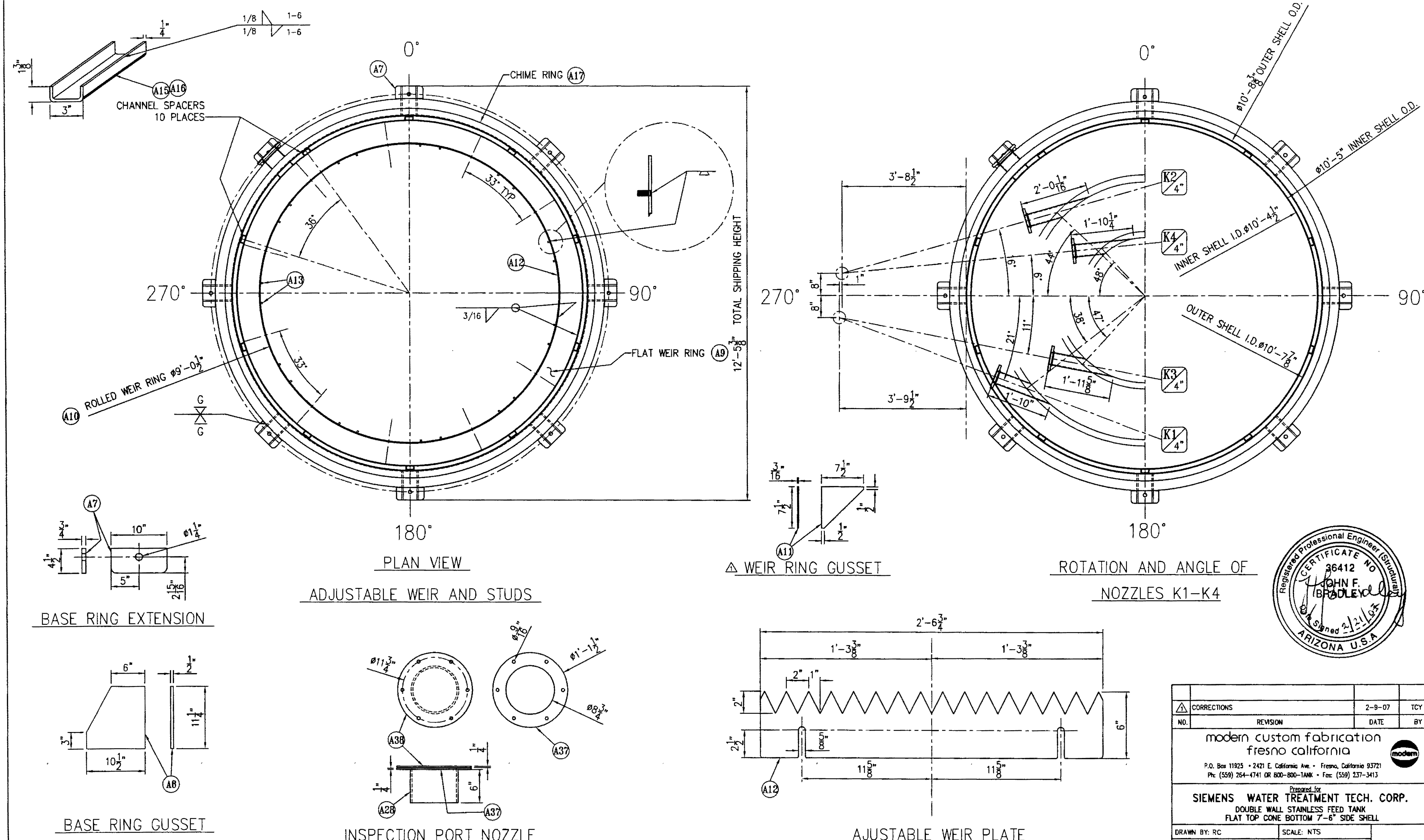
CHECKED BY:	DATE: 12/7/06
DWG/JOB NO.: 1601794	SHT. 2 OF 5



3	CORRECTIONS	2-9-07	TCY
NO.	REVISION	DATE	BY

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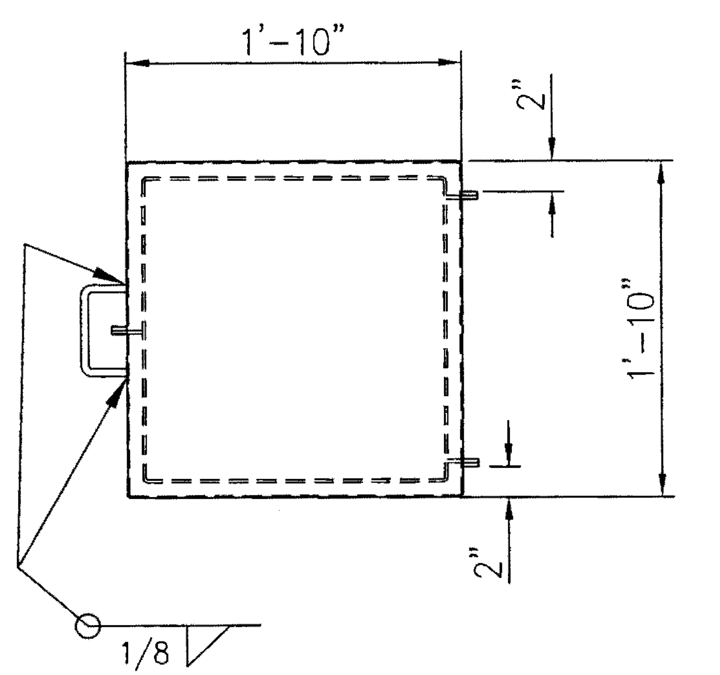
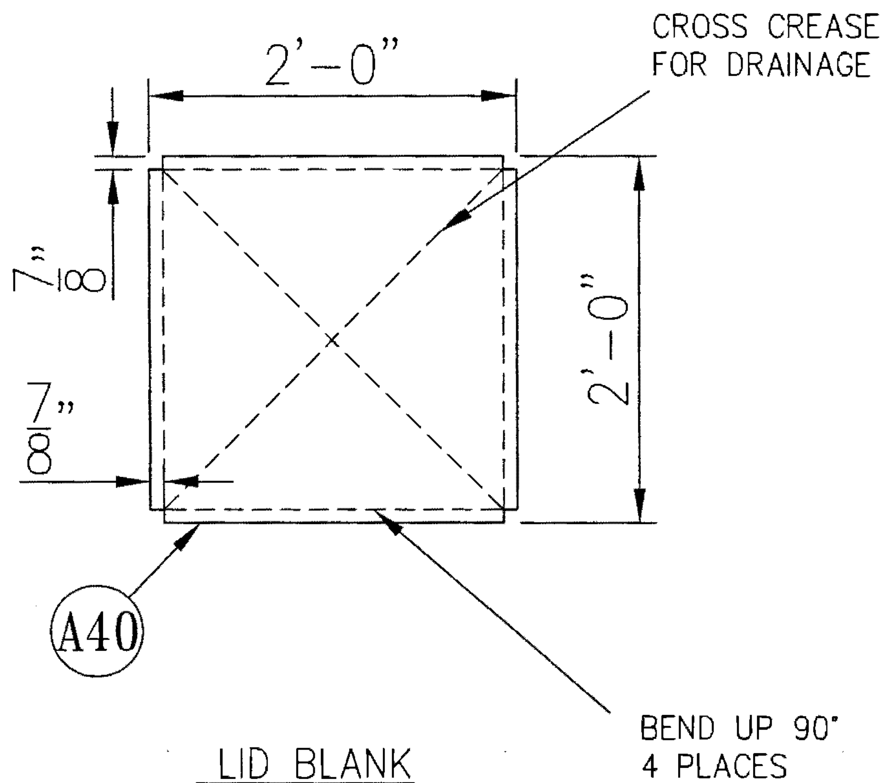
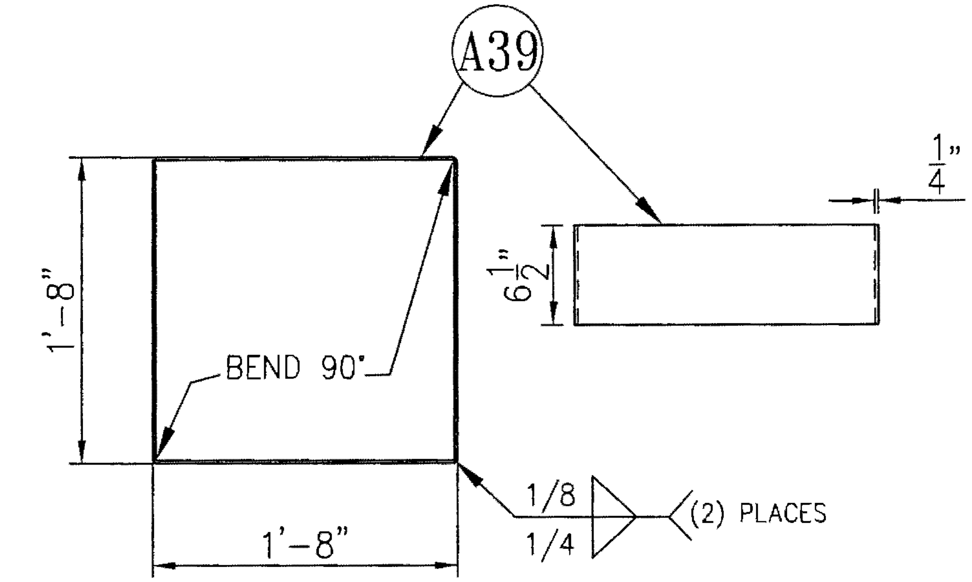
DRAWN BY: RC	SCALE: NTS
CHECKED BY:	DATE: 12/7/06
DWG/JOB NO.: 1601794	SHT. 3 OF 5



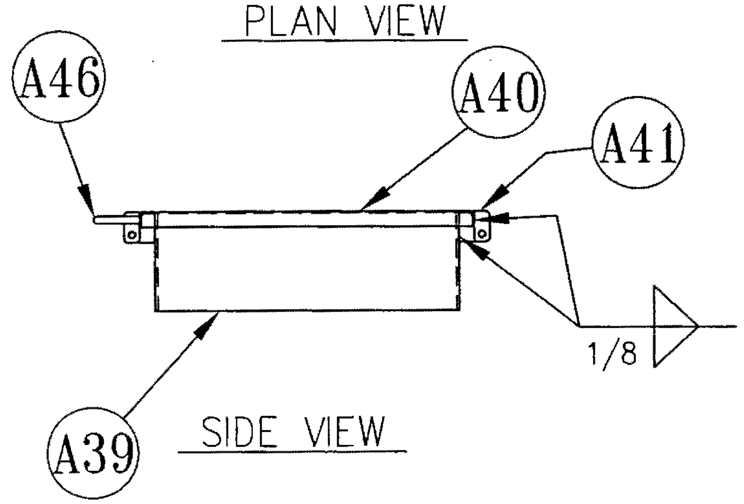
PLAN VIEW



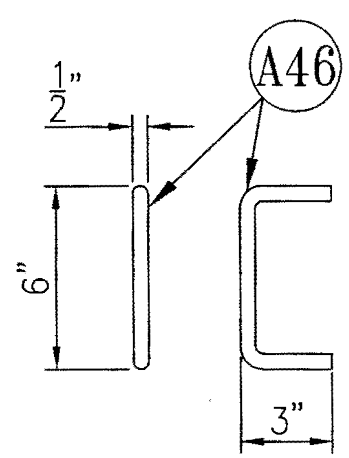
LID BLANK



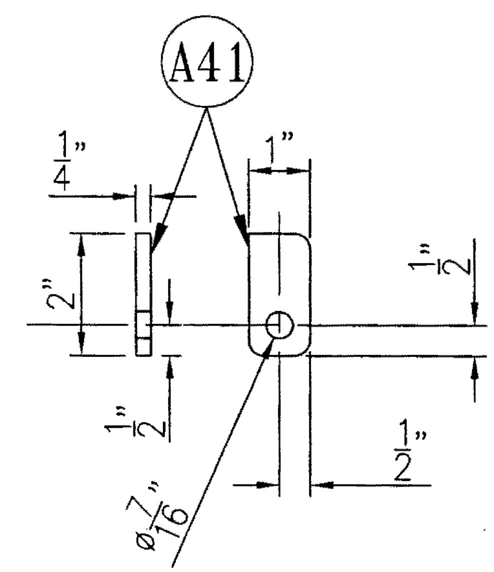
PLAN VIEW BOX



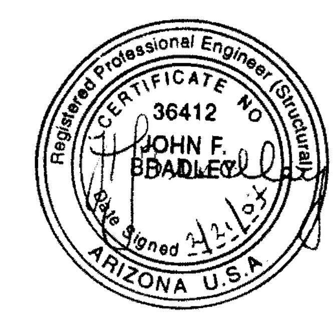
SIDE VIEW



HANDLE



HINGE AND HASP PARTS



NO.	REVISION	DATE	BY
△	-	-	-

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Prepared for
SIEMENS WATER TREATMENT TECH. CORP.
DOUBLE WALL STAINLESS FEED TANK
FLAT TOP CONE BOTTOM 7'-6" SIDE SHELL

DRAWN BY: RC	SCALE: NTS
CHECKED BY:	DATE: 12/7/06
DWG/JOB NO.: 1601794	SHT. 4 OF 5

1601794

ITEM	DESCRIPTION	PART NO.	MATERIAL SPEC.	SEE DETAIL	MTR'S REQ'D	PRE-ORDERED	WEIGHT PER PIECE IN LBS	SQ. FT.	QTY	TOTAL QTY
	CUSTOM BUYOUT MATERIAL									
A1	ROOF, PL 3/16" X 129 7/8" O.D.		SA240-TP304				705	92	1	1
A2	SHELL (OUTER), PL 1/4" X 90" X 33'-6 1/2"		SA240-TP304				2,568	253	1	1
A3	SHELL (INNER), PL 1/4" X 89 9/16" X 32'-7 15/16"		SA240-TP304				2,489	245	1	1
A4	CONE (OUTER), PL 1/4" X 259 1/4" O.D. X 178°		SA240-TP304				1,850	182	1	1
A5	CONE (INNER), PL 1/4" X 252 3/8" O.D. X 178°		SA240-TP304				1,754	172	1	1
A6	BASE RING, PL 3/4" X 140 3/8" O.D. X 128 3/8" I.D.		SA240-TP304				539	37	2	2
A7	BASE RING EXTENSION, PL 3/4" X 4 1/2" X 0'-10"		SA240-TP304				10	.5	8	8
A8	BASE RING GUSSET, PL 1/2" X 10 1/2" X 0'-11 1/4"		SA240-TP304				16	1	16	16
A9	WEIR RING (FLAT), PL 3/16" X 124 1/2" O.D. X 108 1/2" I.D.		SA240-TP304				156	21	1	1
A10	WEIR RING (ROLLED), PL 3/16" X 6" X 28'-4 1/2"		SA240-TP304				108	29	1	1
A11	WEIR RING GUSSET, PL 3/16" X 7 1/2" X 0'-7 1/2"		SA240-TP304				3	1	8	8
A12	ADJUSTABLE WEIR PLATE, PL 3/16" X 6" X 2'-6 3/4"		SA240-TP304				10	2	11	11
A13	WEIR PLATE STUDS, 1/2" X NC X 0'-1"		304 SS						22	22
A14	PERIMETER BAND, PL 1/2" X 3" X 23'-8 7/8"		SA240-TP304				280	6	1	1
A15	CHANNEL SPACER, PL 1/4" X 4 3/4" X 5'-9" (CONE)		SA240-TP304				24	2	10	10
A16	CHANNEL SPACER, PL 1/4" X 4 3/4" X 7'-2" (SHELL)		SA240-TP304				29	2	10	10
A17	CHIME RING, L 2 1/2" X 2 1/2" X 3/16" X 34'-3 1/8"		SA479-TP304				120		1	1
A18	ROOF STIFFENER, L 4" X 4" X 1/4" X 9'-9 1/4"		SA479-TP304				66		2	2
A19	ROOF STIFFENER, L 4" X 4" X 1/4" X 2'-10 1/4"		SA479-TP304				12		4	4
A20	ROOF STIFFENER, L 4" X 4" X 1/4" X 4'-0"		SA479-TP304				25		2	2
A21	FLANGE, 6" X CL150 X RFSO (E)		SA182-TP304				19		1	1
A22	FLANGE, 4" X CL150 X RFSO (B1,B2,C1,C2,K1-K4)		SA182-TP304				13		8	8
A23	BLIND FLANGE, 4" X CL150 X RF (B2)		SA182-TP304				17		1	1
A24	FLANGE, 3" X CL150 X RFSO		SA182-TP304				8		1	1
A25	HALF COUPLING, 1 1/2" X CL3000		SA182-TP304				1		1	1
A26	HALF COUPLING, 1" X CL3000		SA182-TP304				1		2	2
A27	FULL COUPLING, 1" X CL3000		SA182-TP304				1		1	1
A28	PIPE, 8" X SCH 10 X 0'-6 1/4" (D) △		SA312-TP304				7		1	1
A29	PIPE, 6" X SCH 40 X 0'-9 1/4" (E)		SA312-TP304				10		1	1
A30	PIPE, 4" X SCH 40 X 0'-6" (B1,B2)		SA312-TP304				6		2	2
A31	PIPE, 4" X SCH 40 X 1'-0" (C1,C2)		SA312-TP304				11		2	2
A32	PIPE, 4" X SCH 40 X 2'-0" (K1-K4)		SA312-TP304				11		4	4
A33	PIPE, 3" X SCH 40 X 0'-6 1/4" (J)		SA312-TP304				4		1	1
A34	PIPE, 1 1/2" X SCH 40 X 0'-4" (G)		SA312-TP304				1		1	1
A35	PIPE, 1" X SCH 40 X 0'-4" (F,H)		SA312-TP304				1		2	2
A36	HEX BOLTS, 5/8" X NC X 3 1/2" W/ NUTS (B2)	A193-B8-TP304	A194-B8-TP304				3		8	8
A37	PLATE FLANGE, PL 1/4" X 13 1/2" O.D. X 8 3/4" I.D. (D)		SA240-TP304				4	1	1	1
A38	PLATE BLIND FLANGE, PL 1/4" X 13 1/2" O.D. (D)		SA240-TP304				11	1	1	1

ITEM	DESCRIPTION	PART NO.	MATERIAL SPEC.	SEE DETAIL	MTR'S REQ'D	PRE-ORDERED	WEIGHT PER PIECE IN LBS	SQ. FT.	QTY	TOTAL QTY
A39	MANWAY BOX, PL 1/4" X 6 1/2" X 6'8" (A)		SA240-TP304				36	4	1	1
A40	MANWAY LID, PL 14 GA. X 24" X 2'-0"		SA240-TP304				12	4	1	1
A41	HINGE & HASP PARTS, PL 1/4" X 1" X 0'-2" (A)		SA240-TP304						6	6
A42	HEX BOLTS, 3/8" X NC X 1" W/LOCK NUTS (A)	A193-B8-TP304	A194-B8-TP304						2	2
A43	HEX BOLTS, 3/8" X NC X 1 1/4" W/NUTS (D)	A193-B8-TP304	A194-B8-TP304						6	6
A44	GASKET, TO FIT 8" PLATE FLANGE (D)		NEOPRENE						1	1
A45	GASKET, TO FIT 4" CL150 (B2)		NEOPRENE						1	1
A46	MANWAY HANDLE, BAR 1/2" ø X 0'-11"		SA479-TP304				1		1	1
A47	LIFT LUG, PL 1/2" X 6" X 0'-6"	△	SA240-TP304				5		4	4
A48	STIFFENEING RING, PL 1/2" X 129 3/8" I.D . X 135 3/8" O.D.	△	SA240-TP304				177		1	1
	STOCK SHELF MATERIAL									
D1	NAMEPLATE BRACKET	16MS04000	SA240-TP304				4	1	1	1
D2	NAMEPLATE		STAINLESS				2		1	1
			TOTAL WEIGHT				12,700 LBS.			

Registered Professional Engineer (Structural)
CERTIFICATE NO. 36412
JOHN F. BRADLEY
Date Signed
ARIZONA U.S.A.

NO.	REVISION	DATE	BY
△1	ADDED STIFFENING RING CORRECTIONS	2-9-07	TCY

NO. REQUIRED (1) ONE — ITEM NO. NONE

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fresno california

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Prepared for

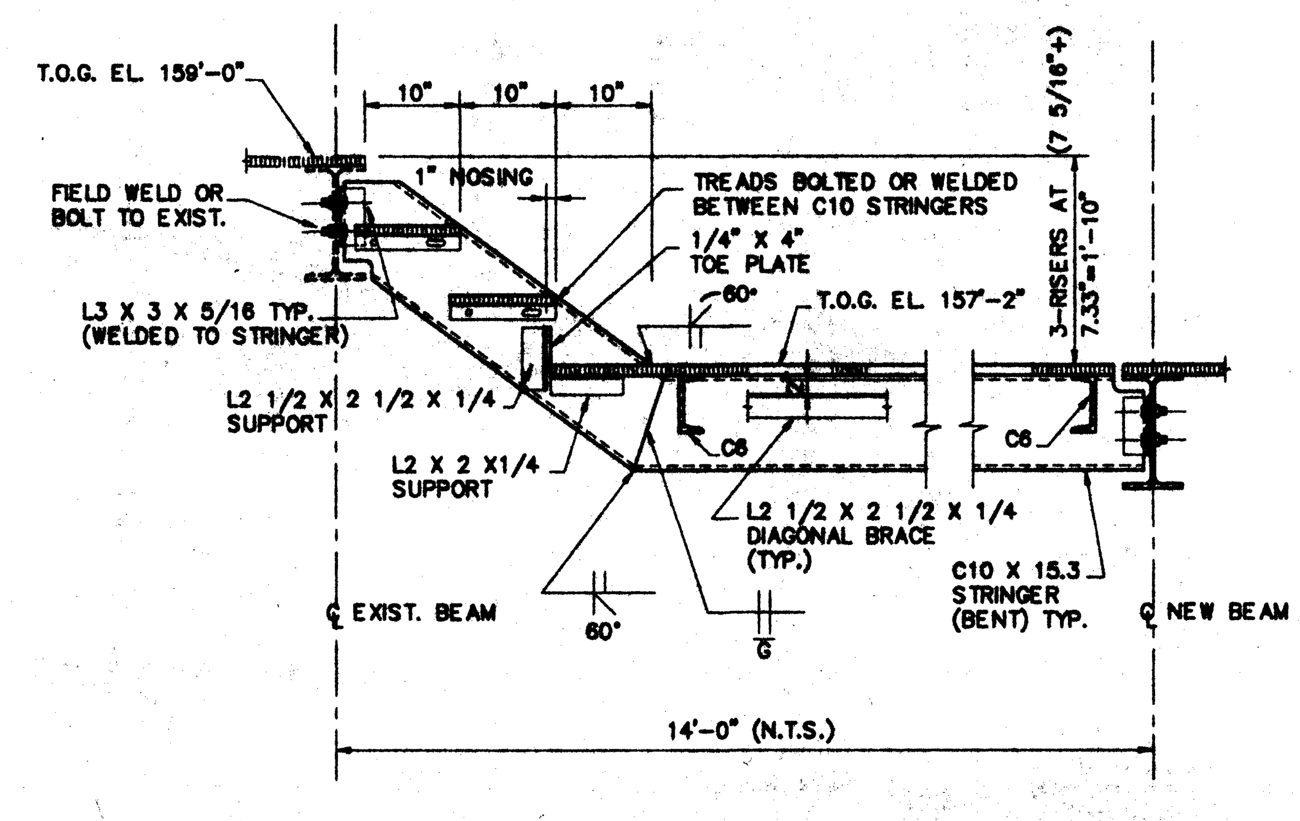
SIEMENS WATER TREATMENT TECH. CORP.

DOUBLE WALL STAINLESS FEED TANK
FLAT TOP CONE BOTTOM 7'-6" SIDE SHELL

DRAWN BY: RC — SCALE: NTS
CHECKED BY: — DATE: 12/7/06
DWG/JOB NO.: 1601794 — SHT. 5 OF 5

Exhibit A - Plans

T-18 Support Steel Drawings



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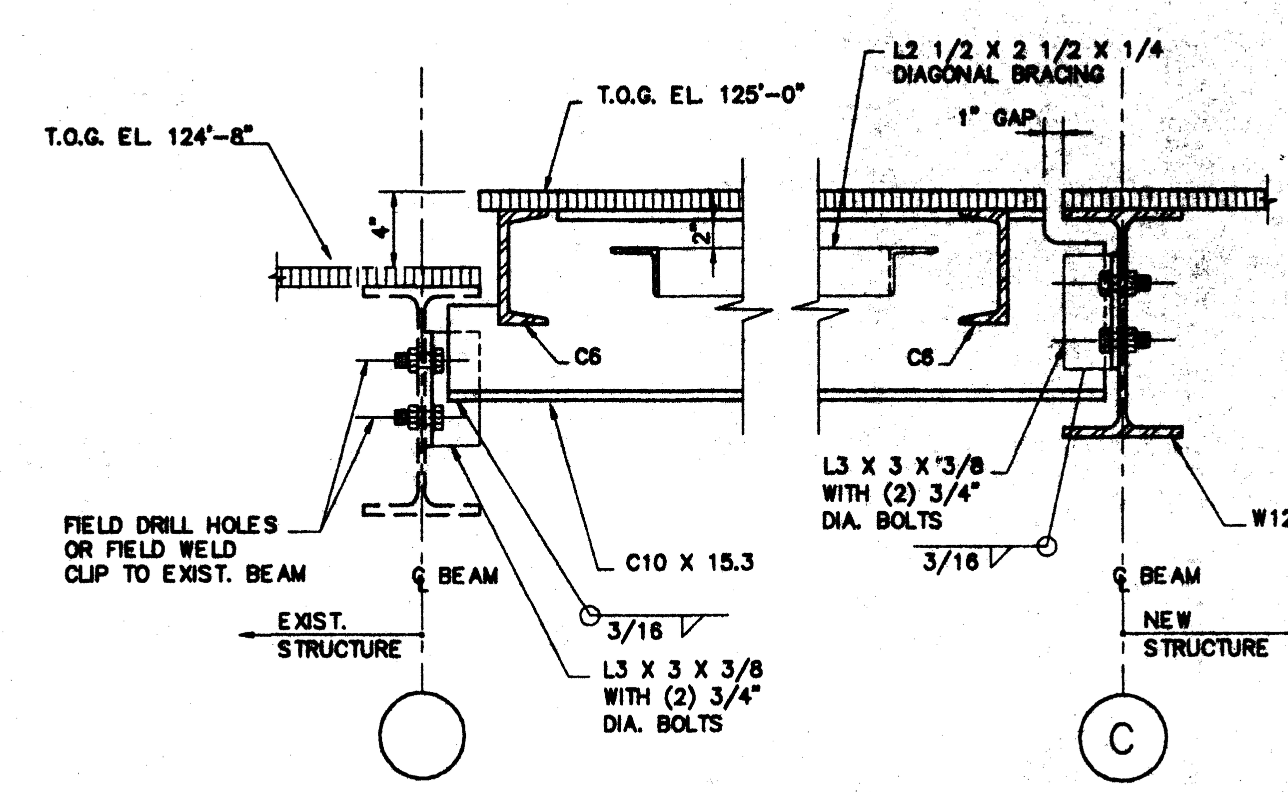

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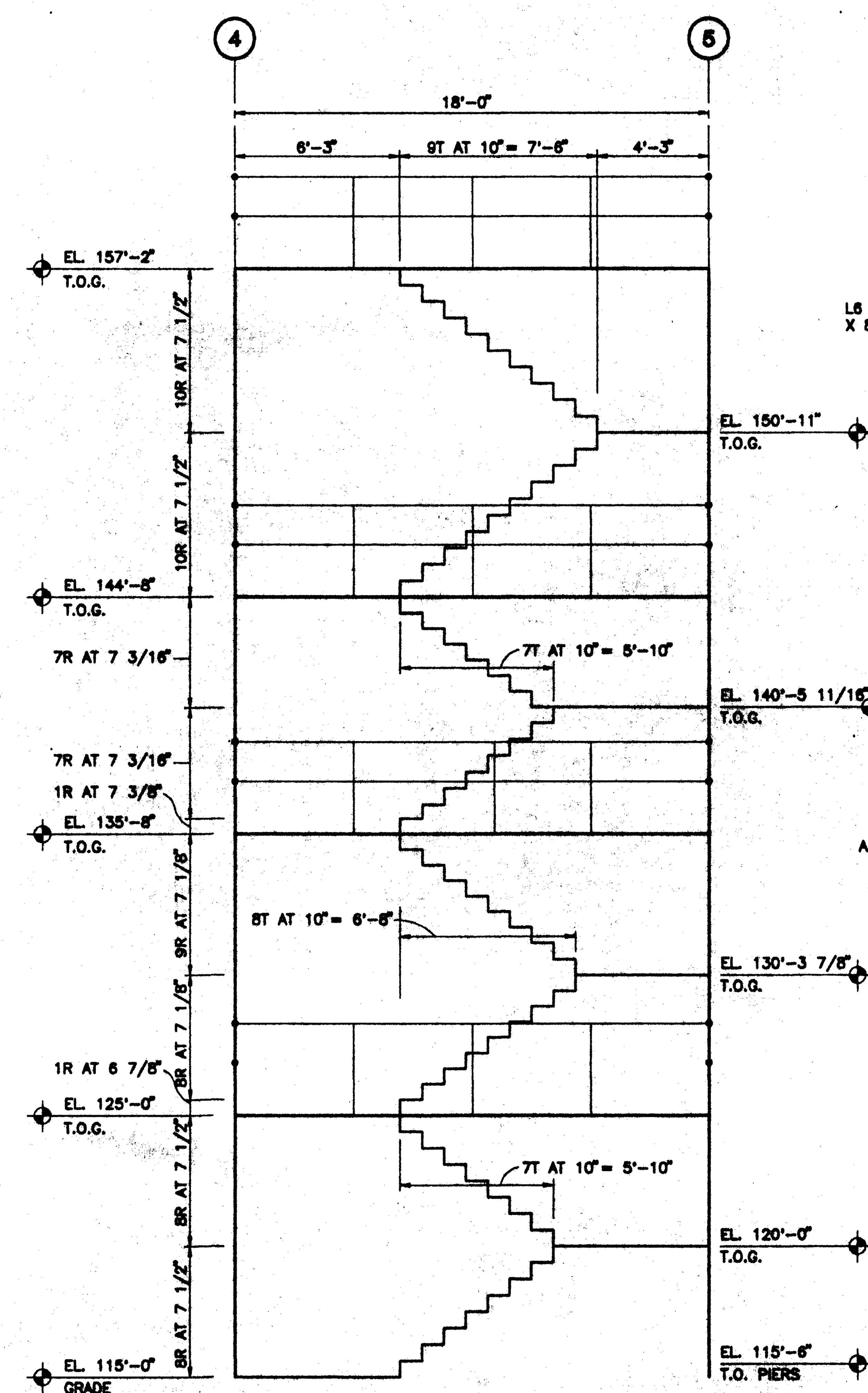
7



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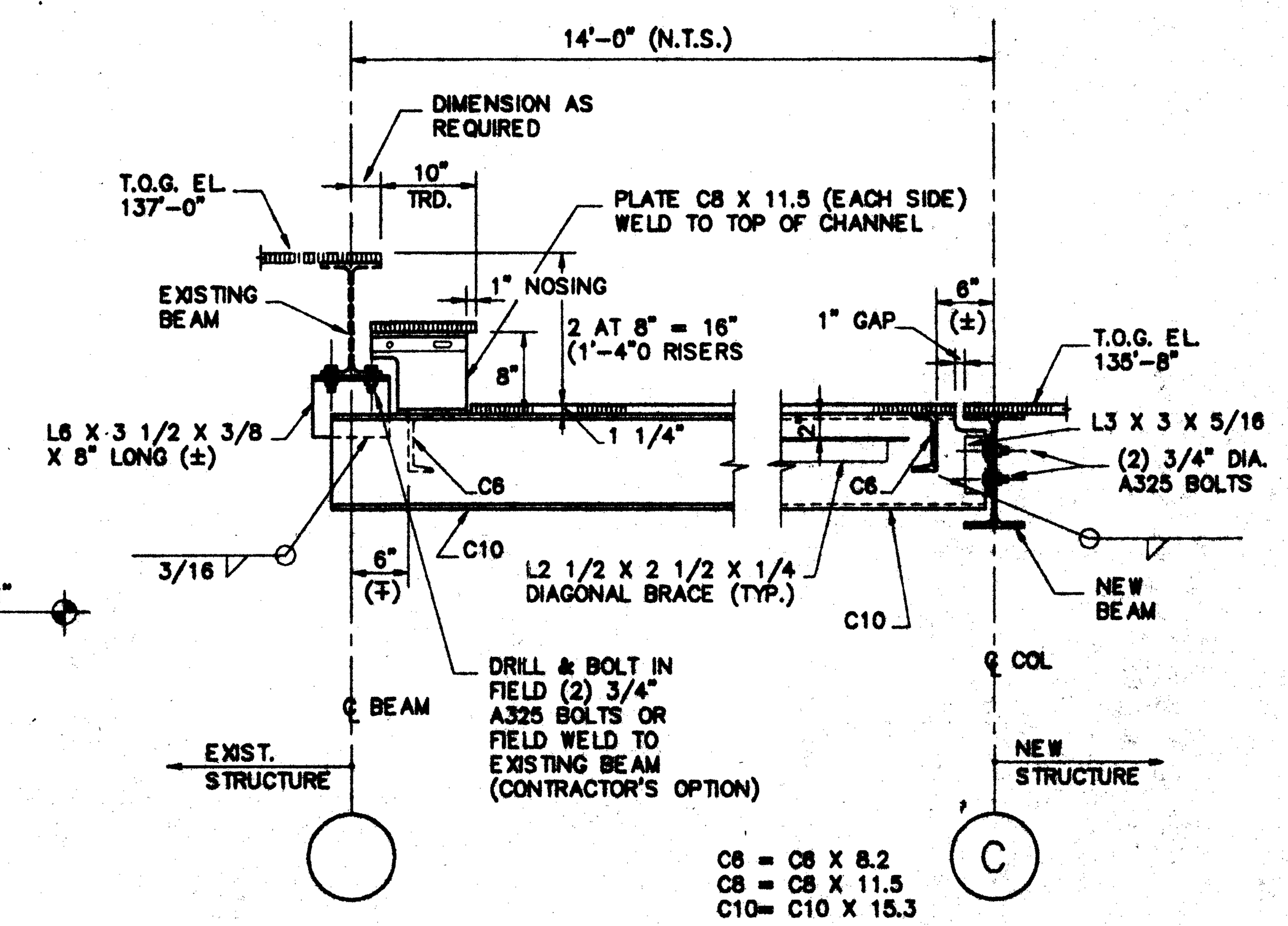
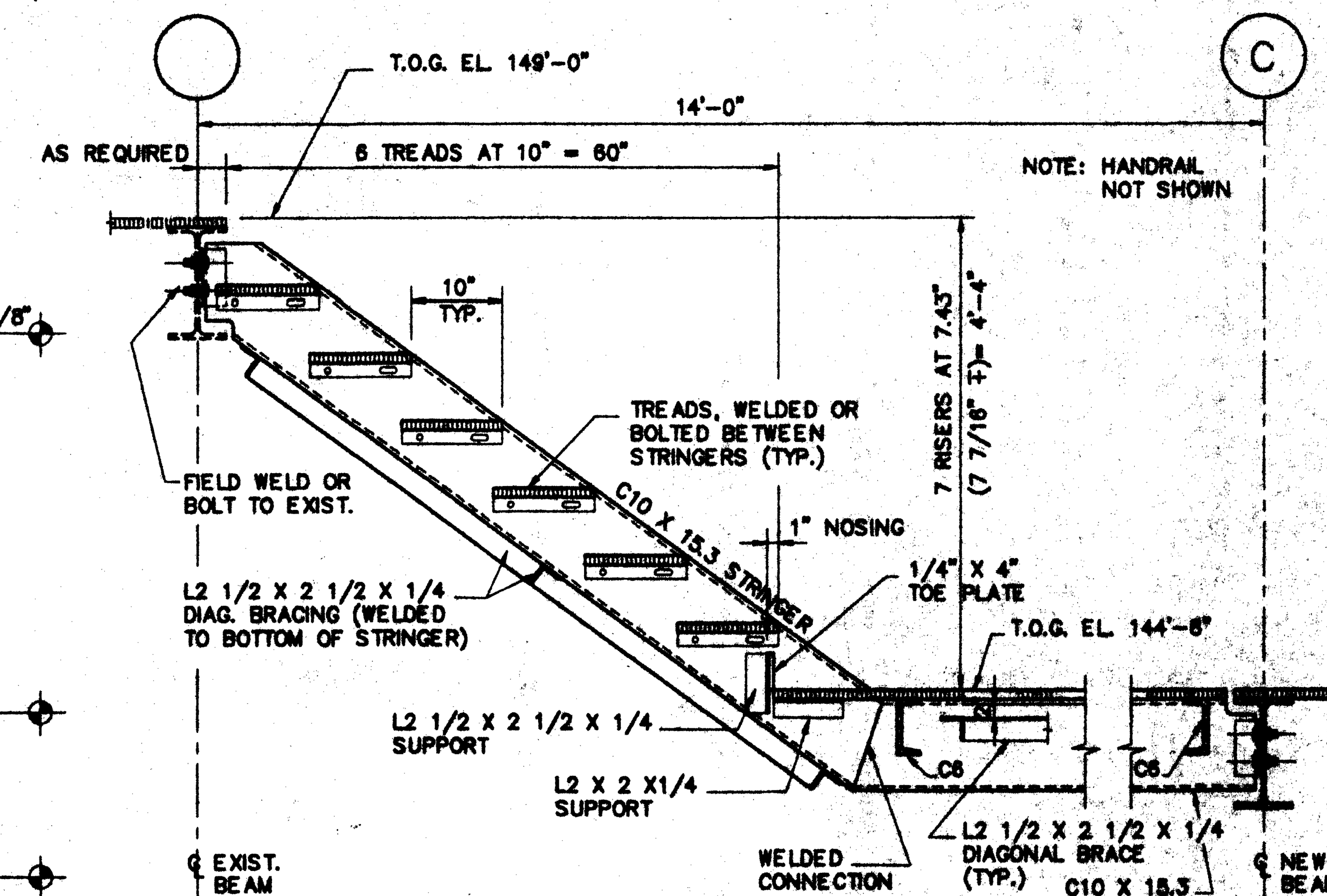


2

11

8



3

12

9

FEB - 9 1996

FEB 1 2 1996
CHAVOND-BARRY

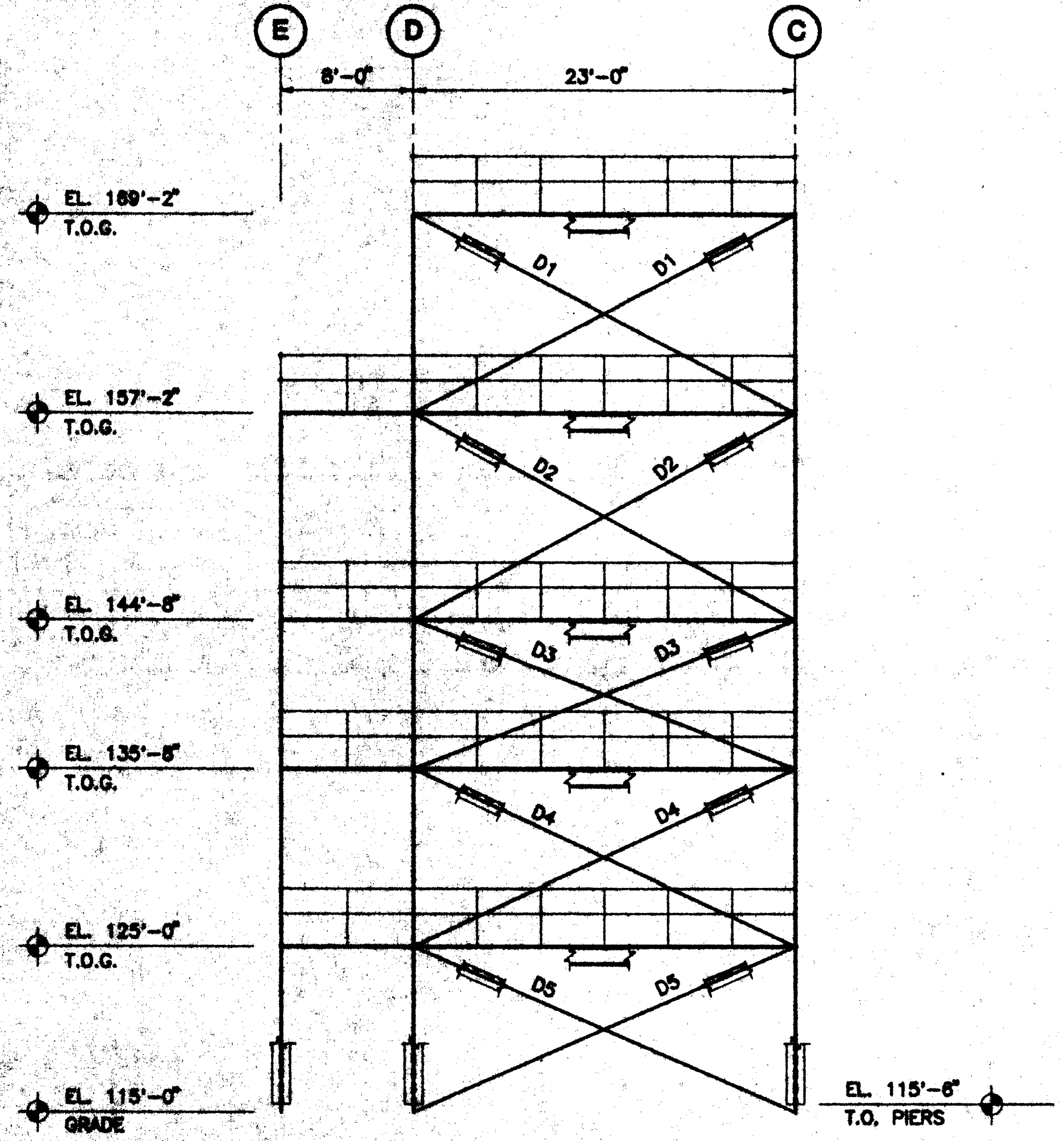
FEB 9 1996

REVISIONS

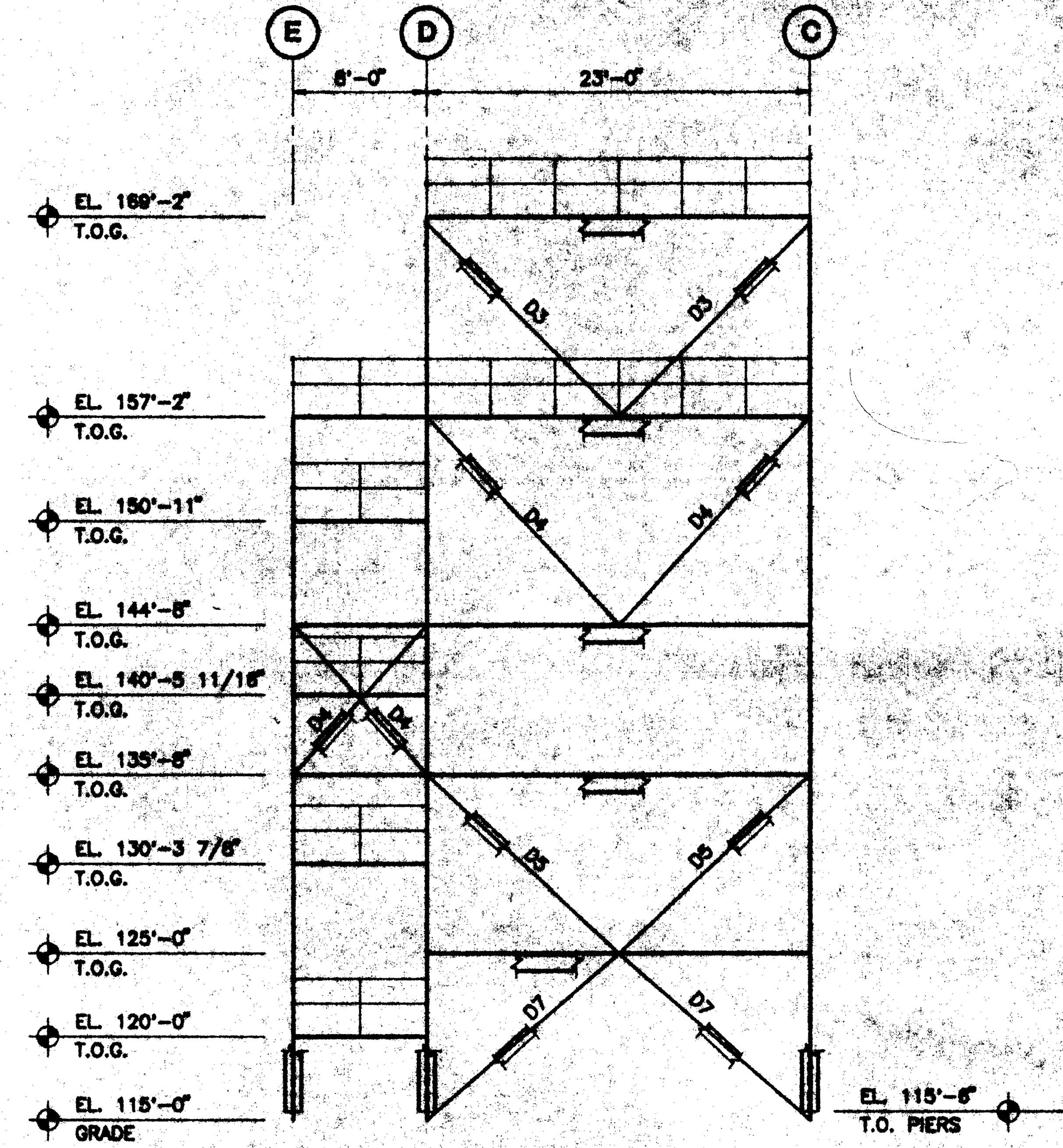
A.V.SCHWAN & ASSOC.,inc.
CONSULTING ENGINEERS
7000 E. CAMELBACK RD. STE. 220
SCOTTSDALE, ARIZONA 85251
(602) 265-4531 970-0468 (FAX)

HANKIN-NICHOLS CARBON REACTIVATION FURNACE
STAIR\BRIDGE DETAILS
FOR
HANKIN ENVIRONMENTAL SYSTEMS, INC.

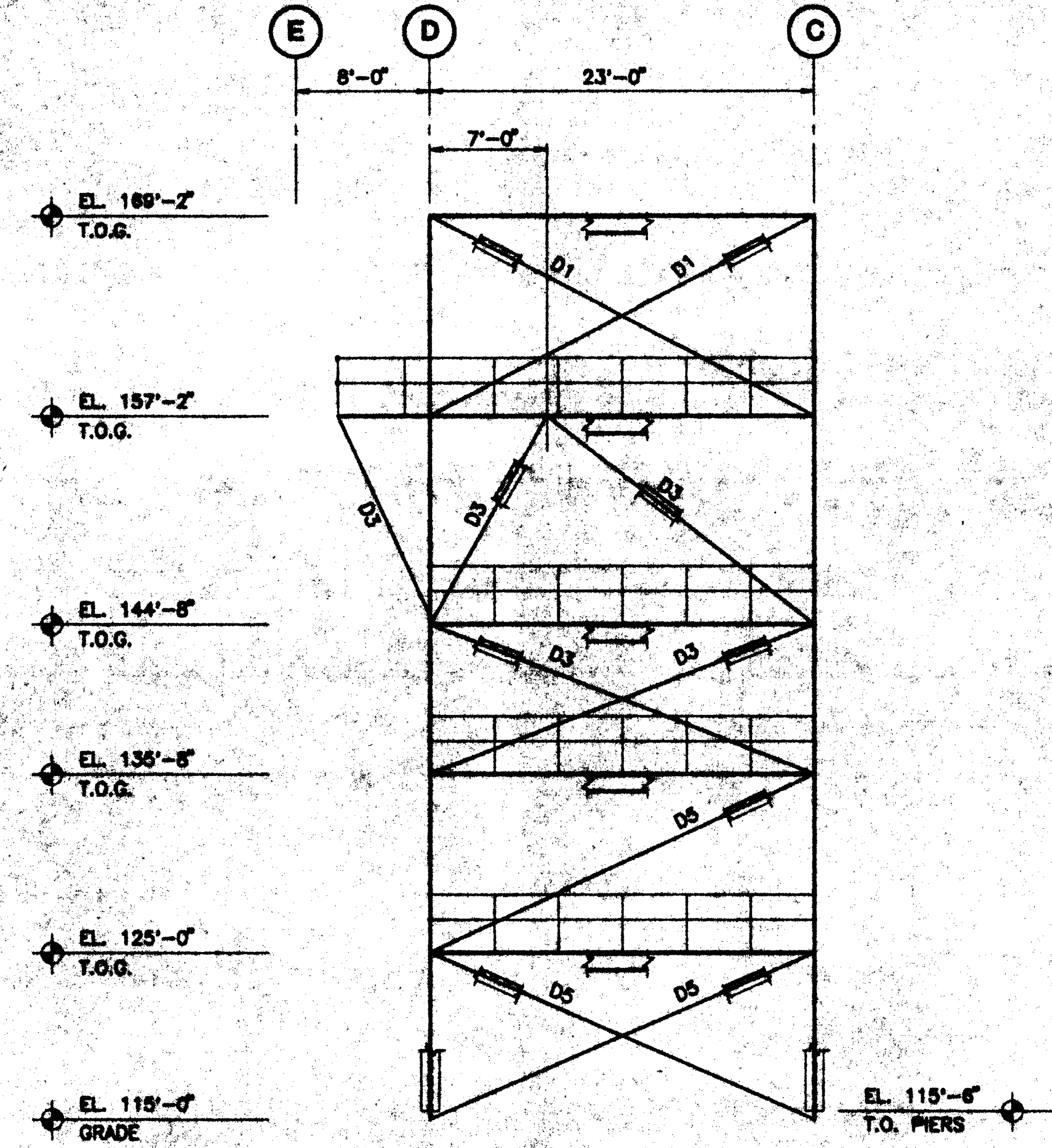
JOB NO.:
DRAWN:
DESIGNED:
APPROVED: AVS
DATE:
SHEET TITLE: FRAMING DETAILS
SHEET NUMBER: S6



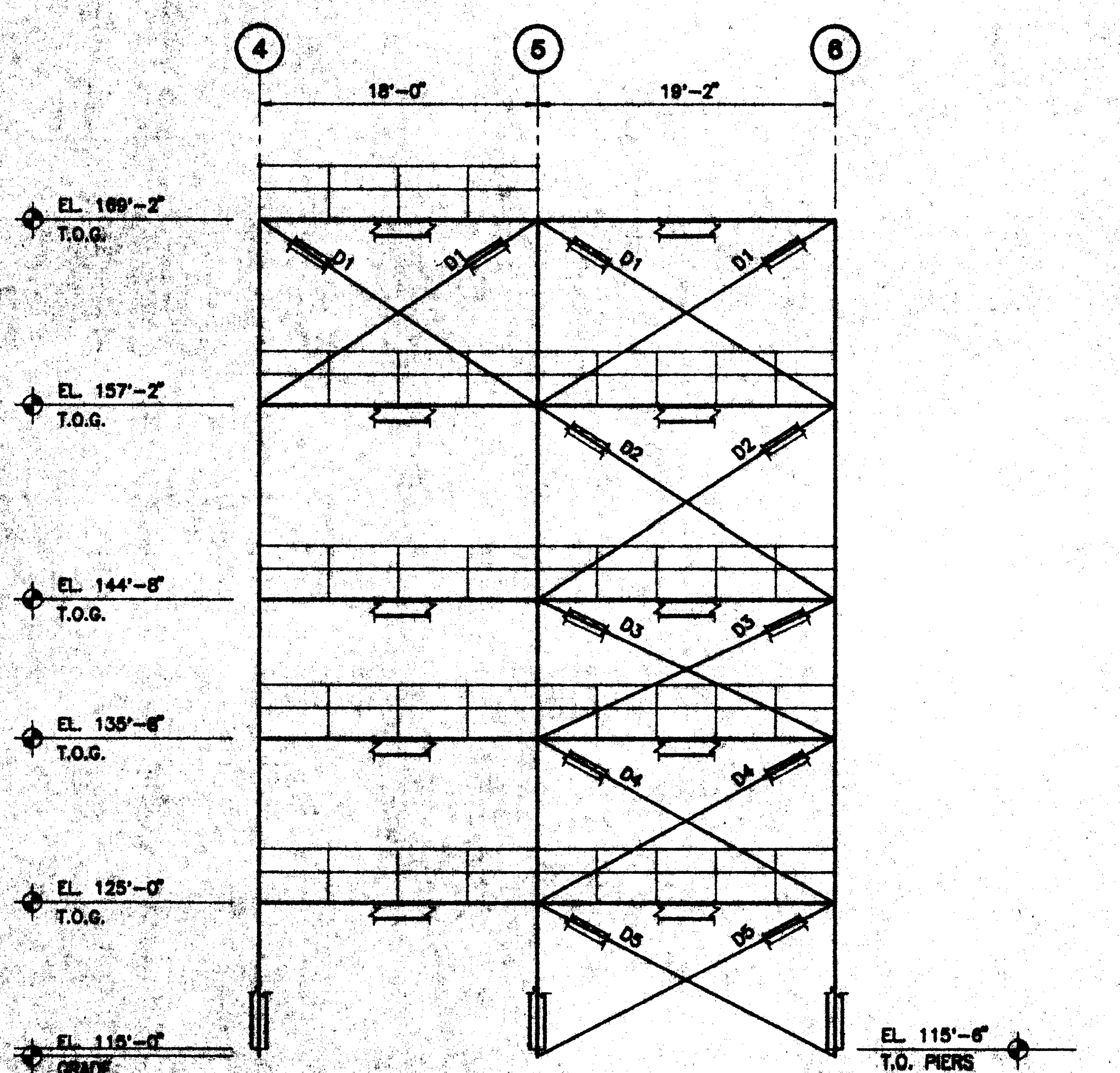
ELEV. ALONG GRID (4)
(LOOKING EAST) 1/8"=1'-0"



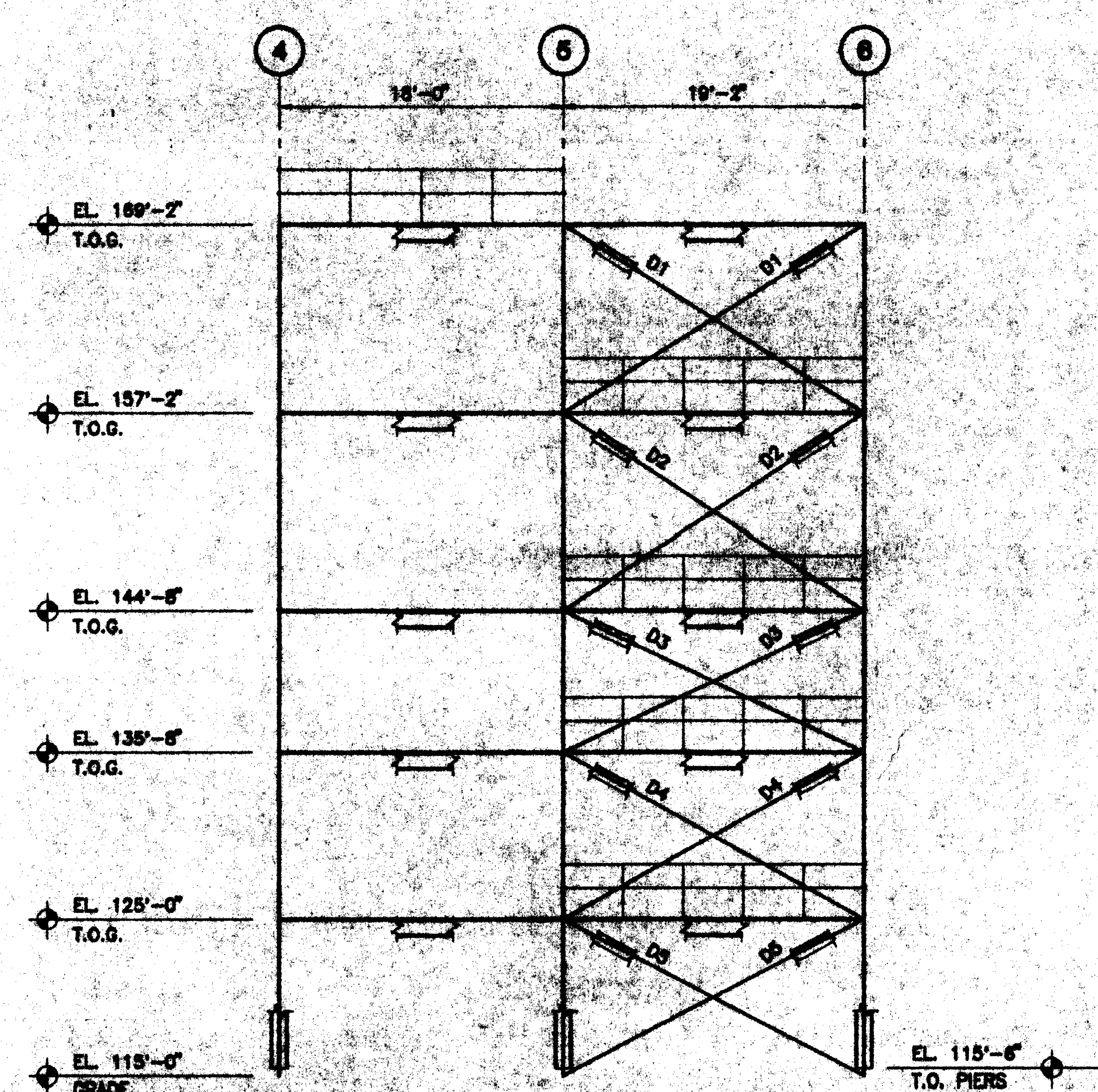
ELEV. ALONG GRID (5)
(LOOKING EAST) 1/8"=1'-0"



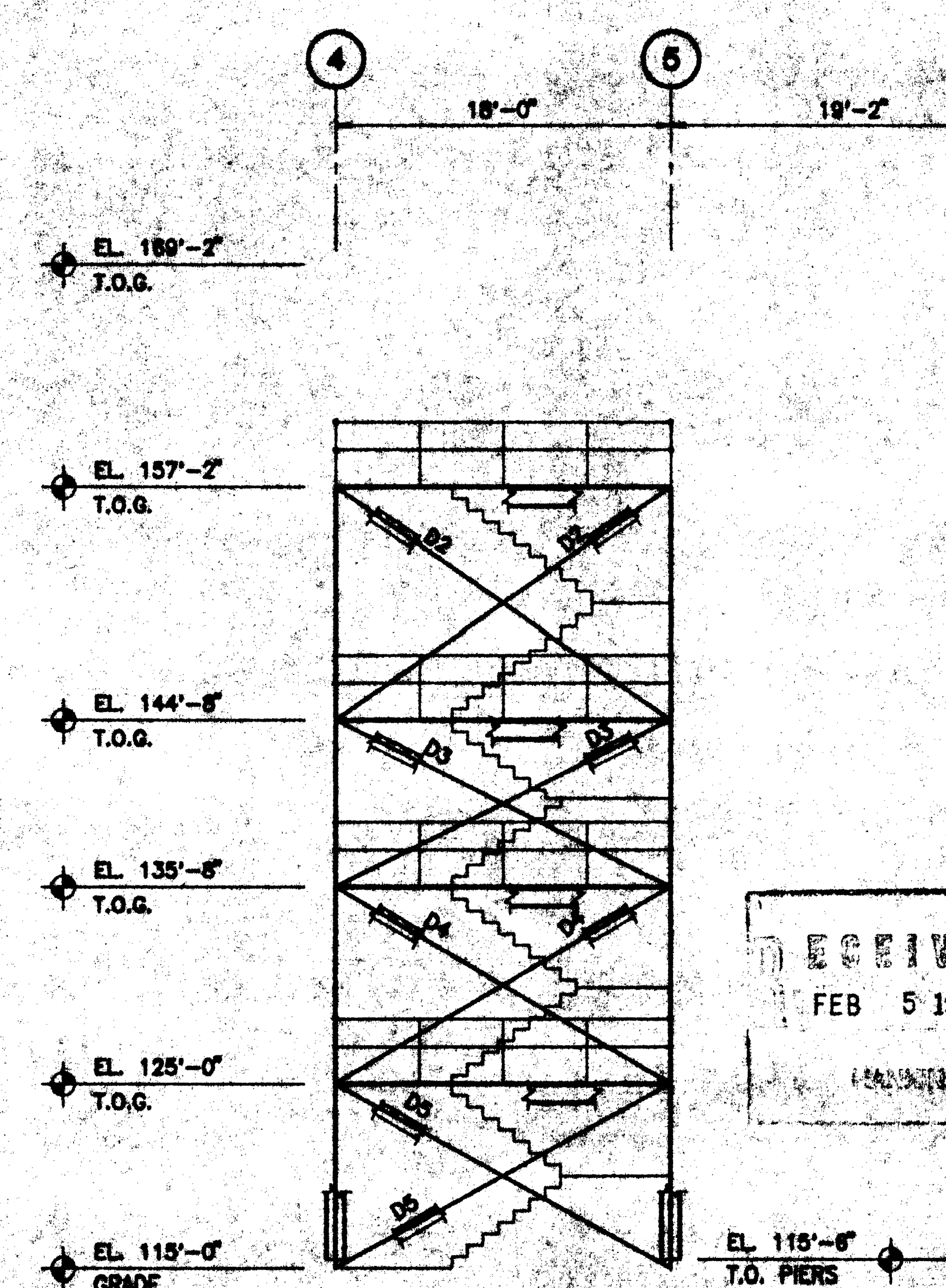
ELEV. ALONG GRID (6)
(LOOKING EAST) 1/8"=1'-0"



ELEV. ALONG GRID (C)
(LOOKING NORTH) 1/8"=1'-0"



ELEV. ALONG GRID (D)
(LOOKING NORTH) 1/8"=1'-0"



ELEV. ALONG GRID (E)
(LOOKING NORTH) 1/8"=1'-0"

CHA[redacted]

ISSUED
ENGINEERING DEPT
FEB 5 1996
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FEB 5 1996

BRACE SCHEDULE

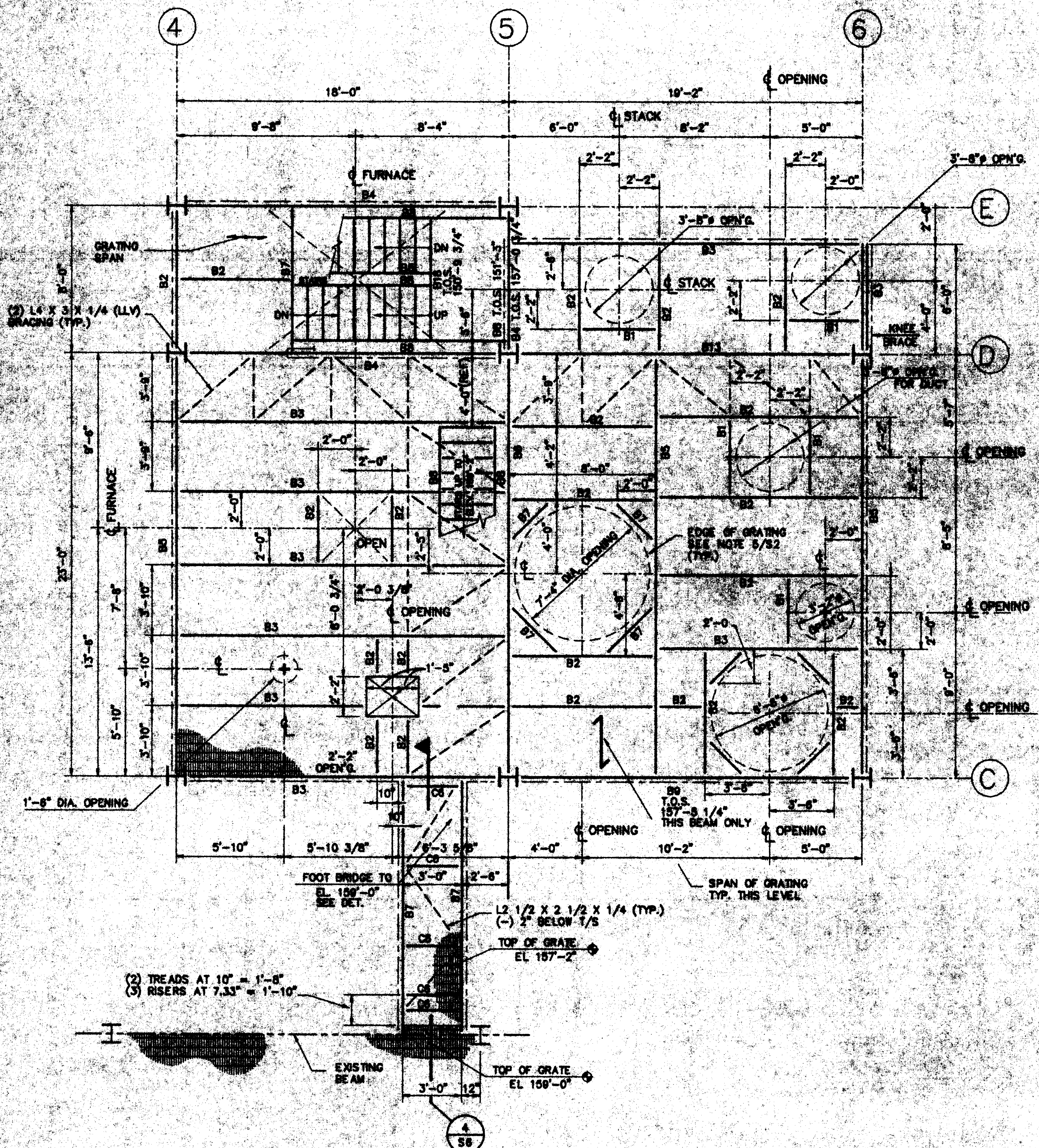
MARK	SIZE
D1	(2) L3 1/2 X 2 1/2 X 1/4
D2	(2) L3 1/2 X 3 X 1/4
D3	(2) L4 X 3 X 1/4
D4	(2) L4 X 3 1/2 X 1/4
D5	(2) L5 X 3 X 5/16
D6	NOT USED
D7	(2) L5 X 3 1/2 X 3/8

SCHEMATIC
NOT FOR CONSTRUCTION USE

A.V.SCHWAN & ASSOC.,Inc.
CONSULTING ENGINEERS

HANKIN-NICHOLS CARBON REACTIVATION FURNACE
STEEL BRACING ELEVATIONS
FOR
HANKIN ENVIRONMENTAL SYSTEMS INC.

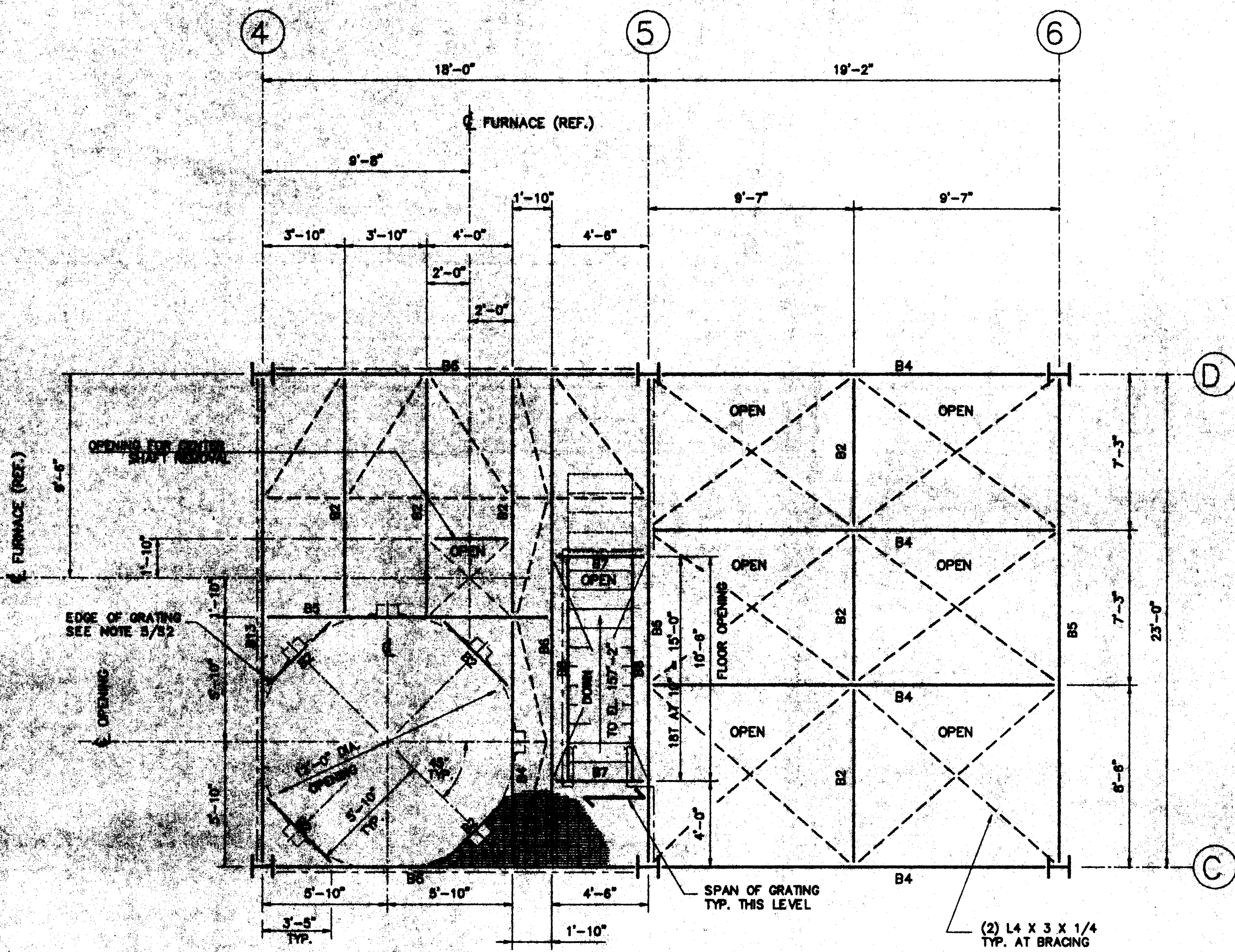
S5



FRAMING PLAN AT T.O.G. EL 157'-2"

T.O.S. AT -1 1/4" U.N.O.

1/4"=1'-0"



FRAMING PLAN AT T.O.G. EL 169'-2"

T.O.S. AT -1 1/4" U.N.O.

1/4"=1'-0"

BEAM SCHEDULE		BEAM SCHEDULE	
MARK	SIZE	MARK	SIZE
B1	W8 X 10	B10	NOT USED
B2	W10 X 12	B11	W12 X 26
B3	W12 X 14	B12	W12 X 35
B4	W14 X 22	B13	W21 X 44
B5	W16 X 26	B14	W24 X 68
B6	W18 X 35	B15	W24 X 76
B7	C10 X 15.3	B16	NOT USED
B8	MC12 X 10.6	B17	C8 X 10.5
B9	W16 X 40	B18	C8 X 11.5

FEB - 5 1996
CHAVOND-BARRY

ISSUED
ENGINEERING DEPT.
FEB 5 1996
HANKIN ENVIRONMENTAL SYSTEMS INC.

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FEB 5 1996
HANKIN

REVISIONS

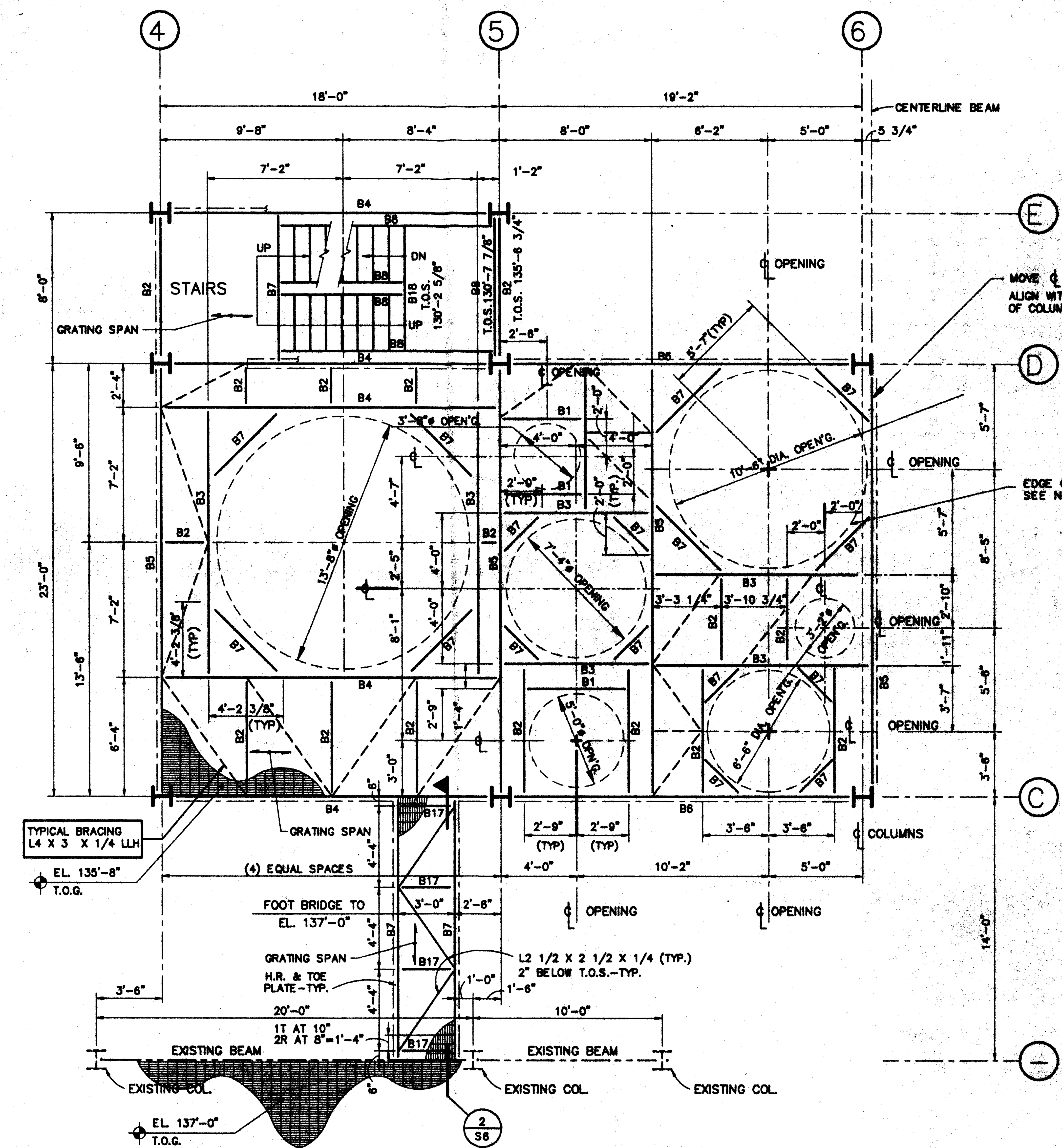
A.V.SCHWAN & ASSOC.,inc.
CONSULTING ENGINEERS
7000 E. CAMELBACK RD. STE. 220
SCOTTSDALE, ARIZONA 85251
(602) 285-4331 970-0493 (FAX)

HANKIN-NICHOLS CARBON REACTIVATION FURNACE
STEEL FRAMING PLANS
AT EL. 157'-2" & 169'-2"
FOR
HANKIN ENVIRONMENTAL SYSTEMS, INC.

JOB NO.: 5660
DRAWN: DMW
DESIGNED: FXS
APPROVED: AVS
DATE: 2/2/96

SHEET TITLE:
FRAMING PLANS

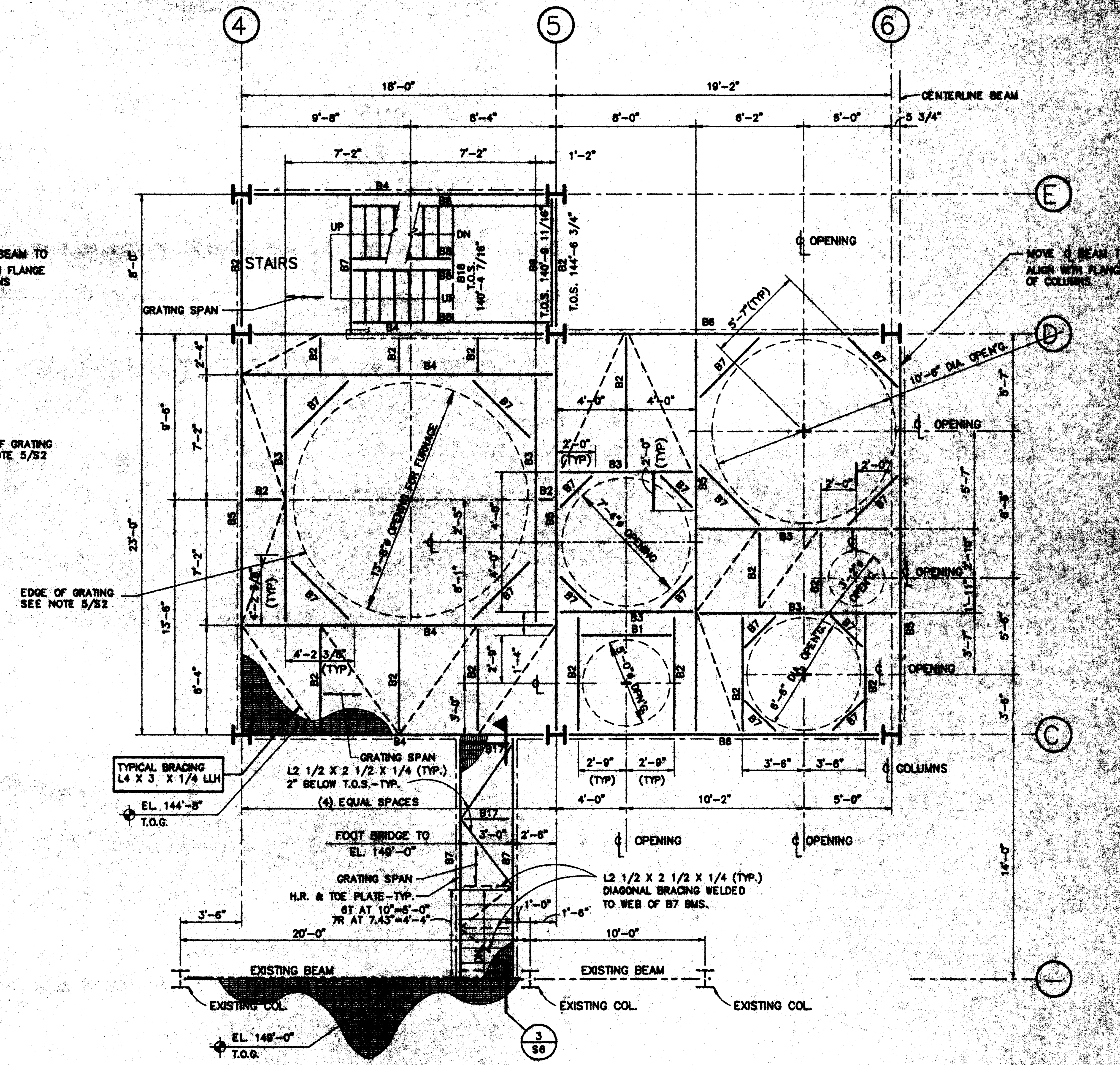
SHEET NUMBER:
S4



FRAMING PLAN AT T.O.G. EL 135'-8"

T.O.S. AT -1 1/4" U.N.O.

1/4"=1'-0"



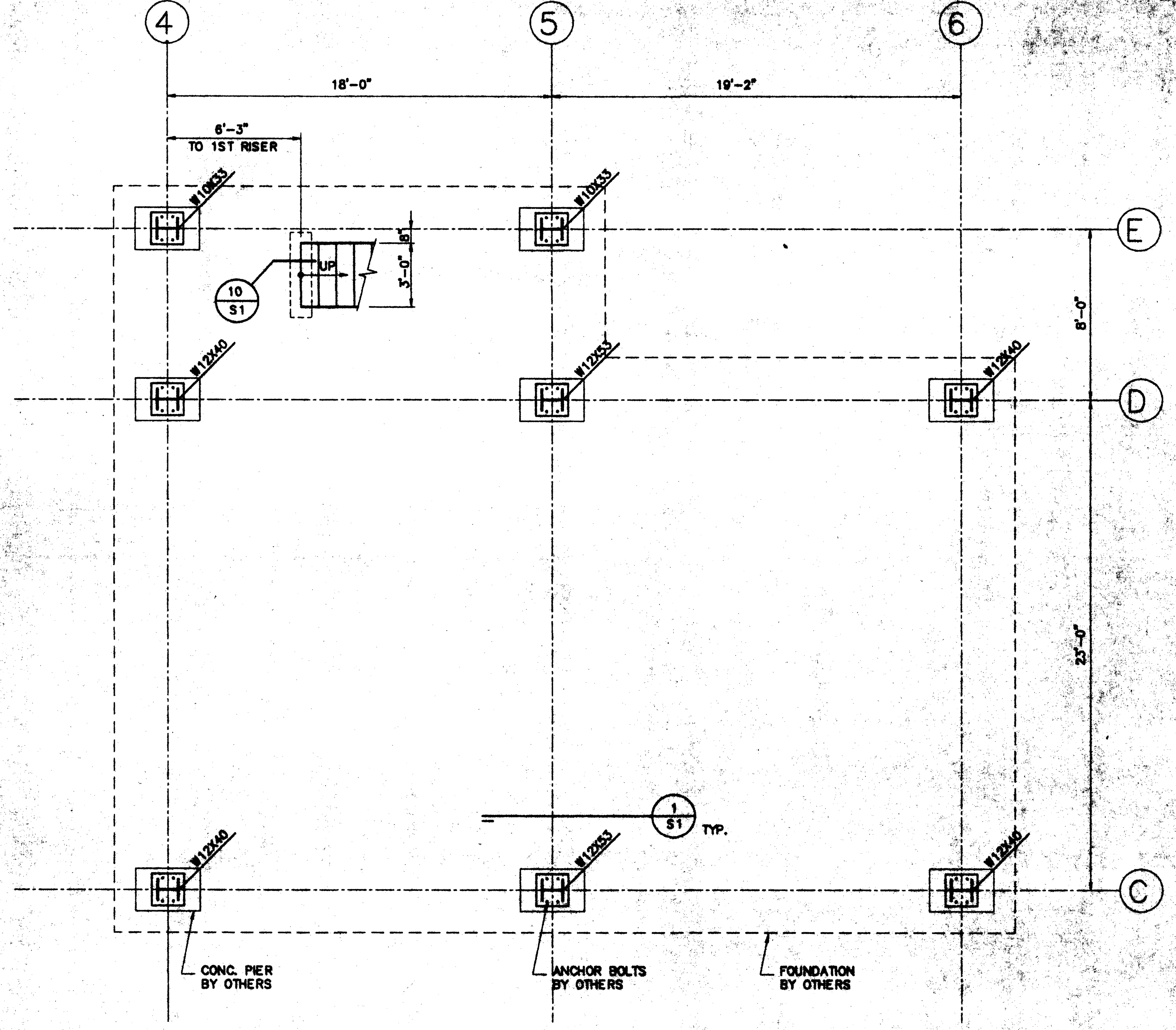
FRAMING PLAN AT T.O.G. EL 144'-8"

T.O.S. AT -1 1/4" U.N.O.

1/4"=1'-0"

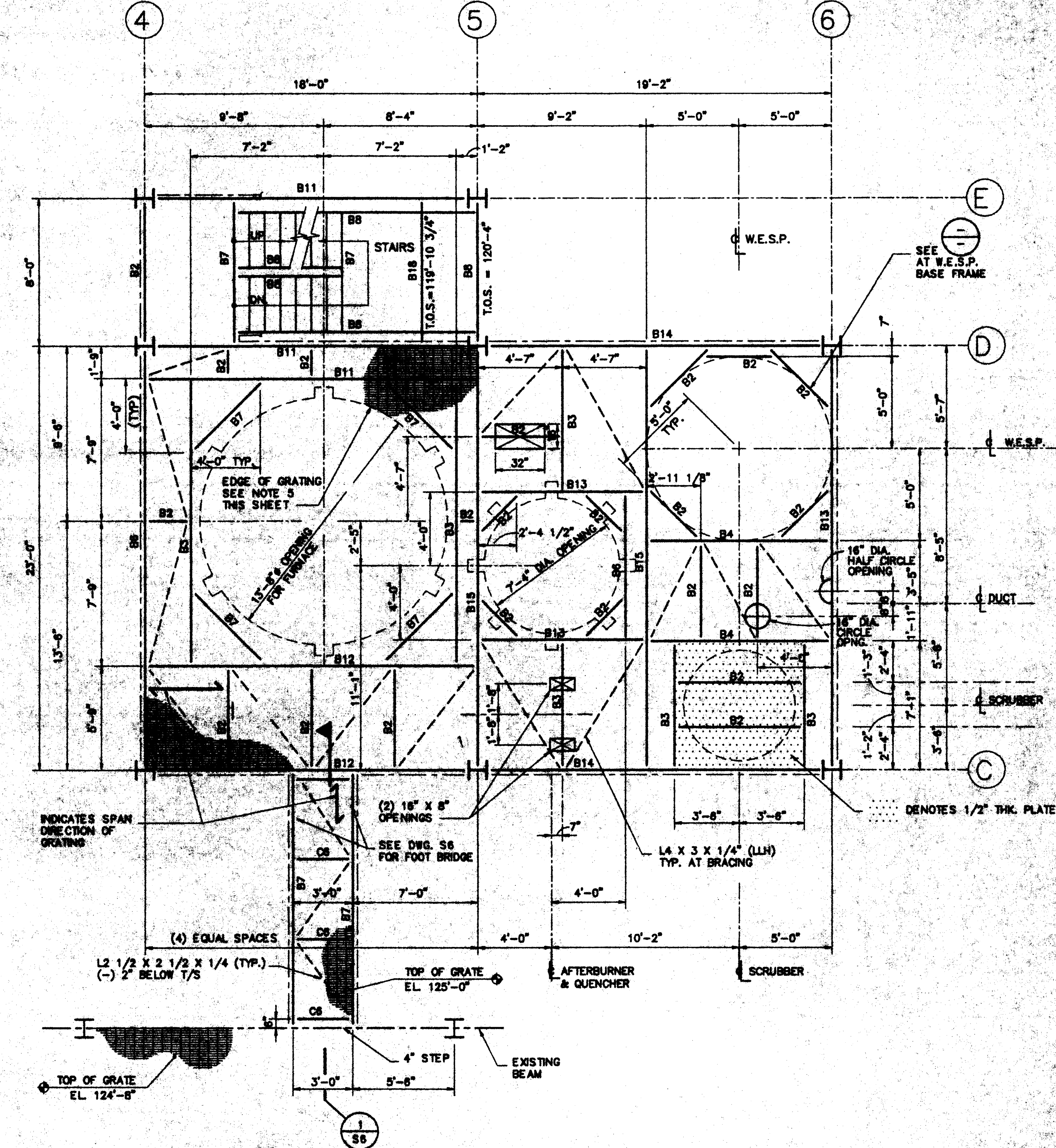
BEAM SCHEDULE

MARK	SIZE	MARK	SIZE
B1	W8 X 10	B10	NOT USED
B2	W10 X 12	B11	W12 X 26
B3	W12 X 14	B12	W12 X 35
B4	W14 X 22	B13	W21 X 44
B5	W16 X 26	B14	W24 X 68
B6	W18 X 35	B15	W24 X 76
B7	C10 X 15.3	B16	NOT USED
B8	MC12 X 10.6	B17	C6 X 10.5
B9	W16 X 40	B18	C8 X 11.2



FOUNDATION PLAN AT ELEV. 115'-0"

BOT. BASE PLATES AT ELEV. 115'-7 1/2" — 1/4"=1'-0"



FRAMING PLAN AT EL. T/G EL. 125'-0"

T/S (-) 1 1/4" U.N.O. — 1/4"=1'-0"

NOTES:

STRUCTURAL STEEL:

1. ALL STRUCTURAL STEEL TO BE ASTM A-36.
2. ALL GRATING TO BE RECTANGULAR STL. 1 1/4" X 3/16" X 1 3/16" O.C. BEARING BARS.
3. ALL BOLTS TO BE HIGH STRENGTH ASTM A-325 STEEL.
4. ALL WELDING TO CONFORM TO LATEST A.W.S. SPECS.
5. ALL OPENINGS IN GRATING SHALL BE BANDED.

PAINTING:

1. PRIOR TO APPLICATION OF ANY COATINGS, STEEL PARTS SHALL BE SANDBLASTED TO SSPC-6, COMMERCIAL BLAST CLEANING.
2. IMMEDIATELY THEREAFTER PARTS SHALL BE GIVEN (1) PRIME COAT OF VALSPER CORP. EPOXY PRIMER NO. 13F62, SHOP APPLIED, TO PREVENT RUST.
3. AN INTERMEDIATE COAT OF VALSPER CORP. HI-BUILD OPOXY 89 SERIES SHALL BE APPLIED AFTER PRIMER HAS DRYED FOR 24 HOURS. TINT COATING TP APPROXIMATE COLOR OF FINISH COAT.
4. ONE (1) FINISH COAT OF VALSPER CORP. URETHANE ENAMEL V40 SERIES SHALL BE FIELD APPLIED AFTER ERECTION OF PARTS. COLOR SHALL BE IN ACCORDANCE WITH COLOR CODE AS APPROVED BY OWNER.

BEAM SCHEDULE		BEAM SCHEDULE	
MARK	SIZE	MARK	SIZE
B1	W8 X 10	B10	NOT USED
B2	W10 X 12	B11	W12 X 26
B3	W12 X 14	B12	W12 X 35
B4	W14 X 22	B13	W21 X 44
B5	W16 X 26	B14	W24 X 68
B6	W18 X 35	B15	W24 X 76
B7	C10 X 15.3	B16	NOT USED
B8	MC12 X 10.6	B17	C8 X 10.5
B9	NOT USED	B18	C8 X 11.5

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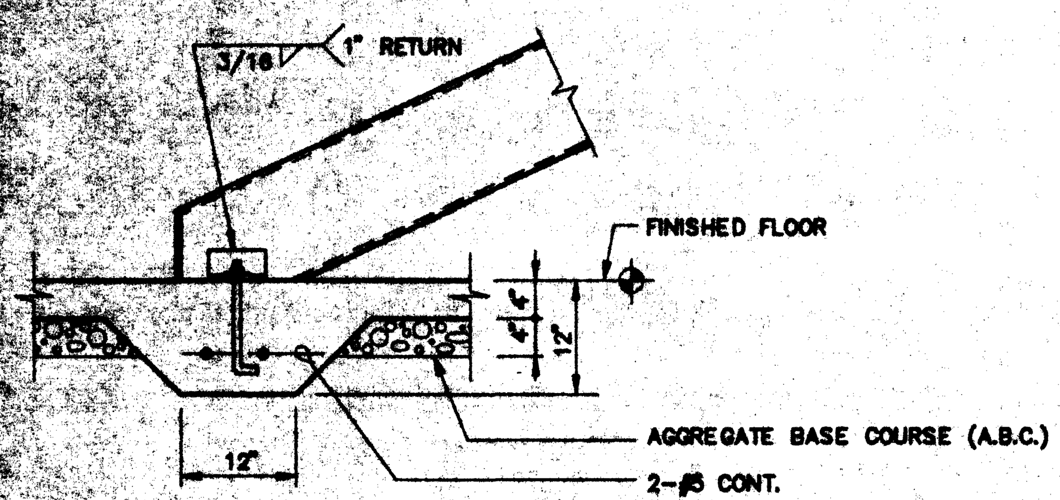
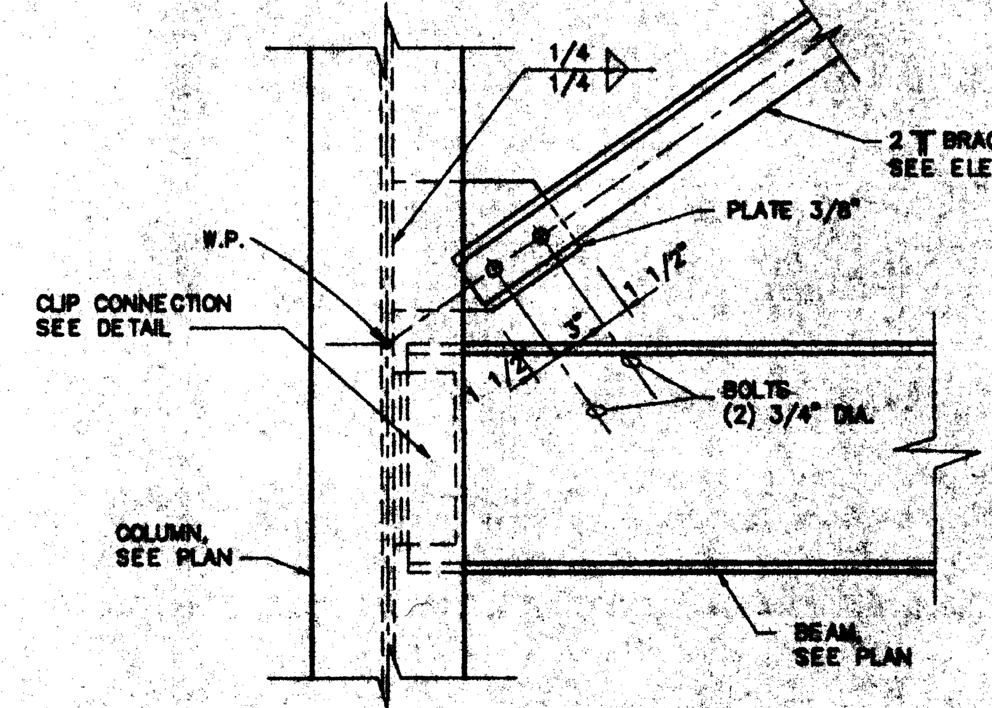
CONSULTING ENGINEERS

HANKIN-NICHOLS CARBON REACTIVATION FURNACE
FOUNDATION PLAN
AND STEEL FRAMING PLAN

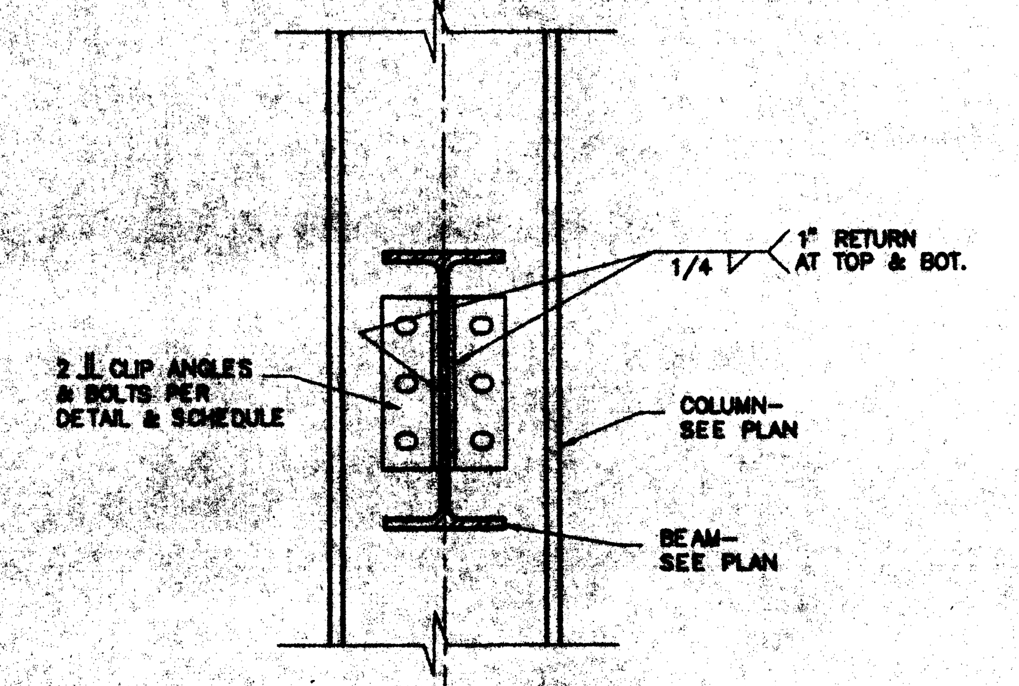
S2



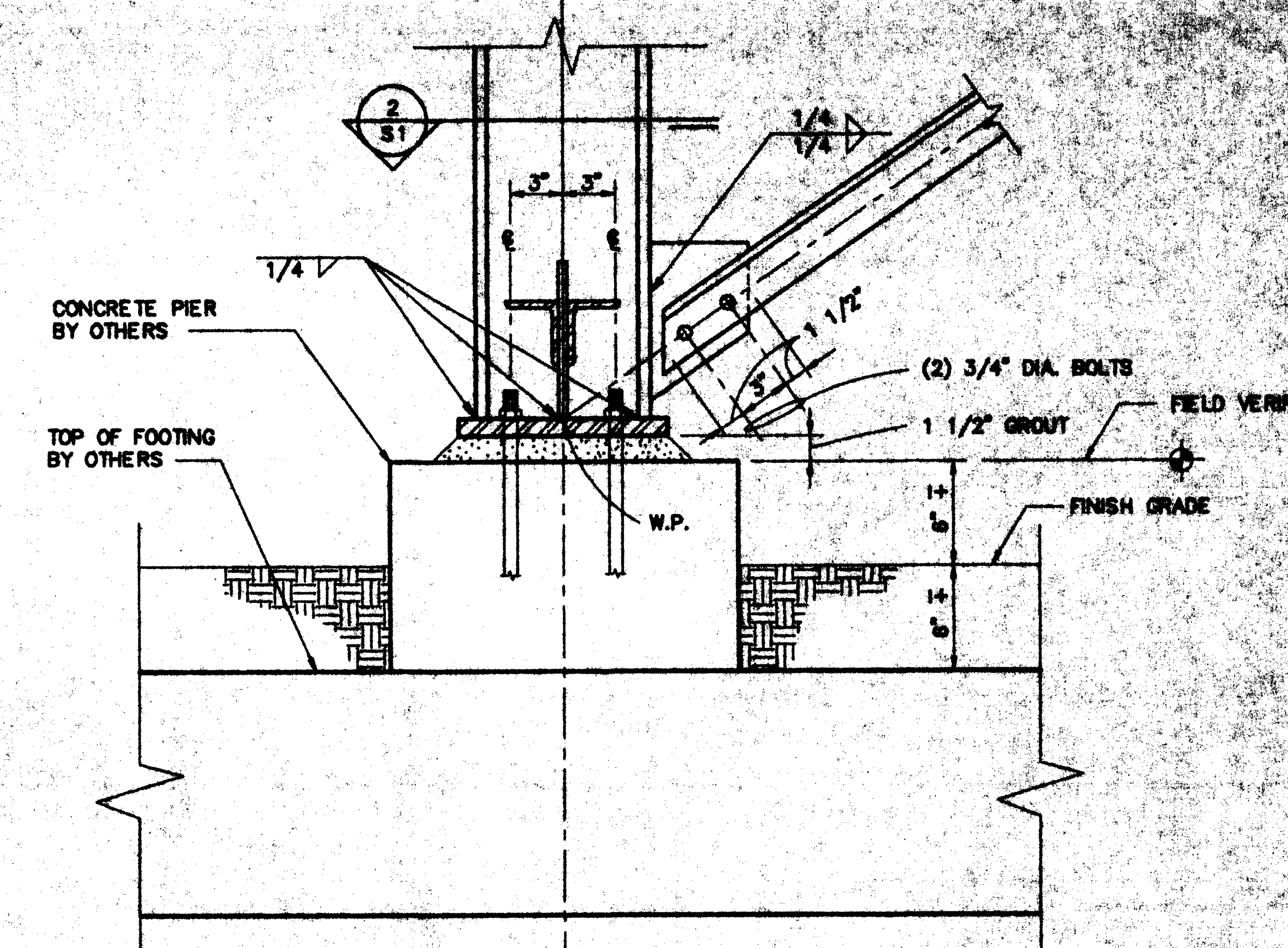
(10)



(7) BRACE BOT. AT COLUMN WEB

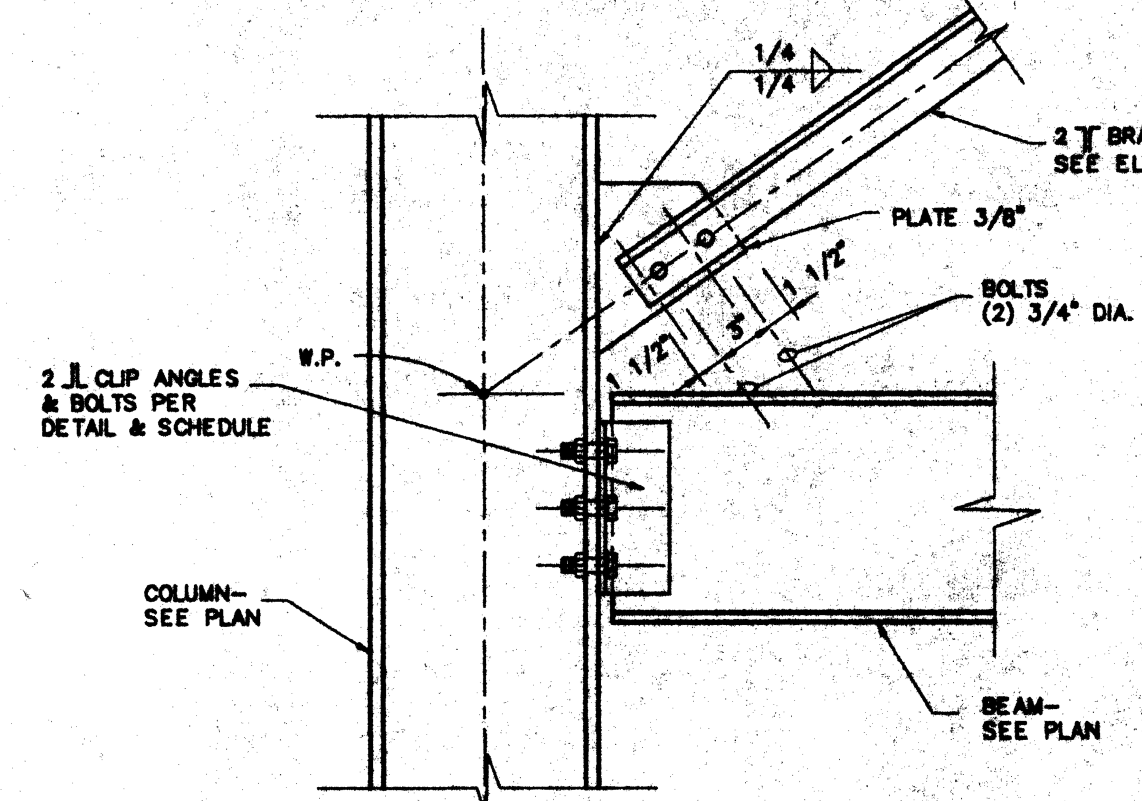


(4) BEAM TO COLUMN WEB

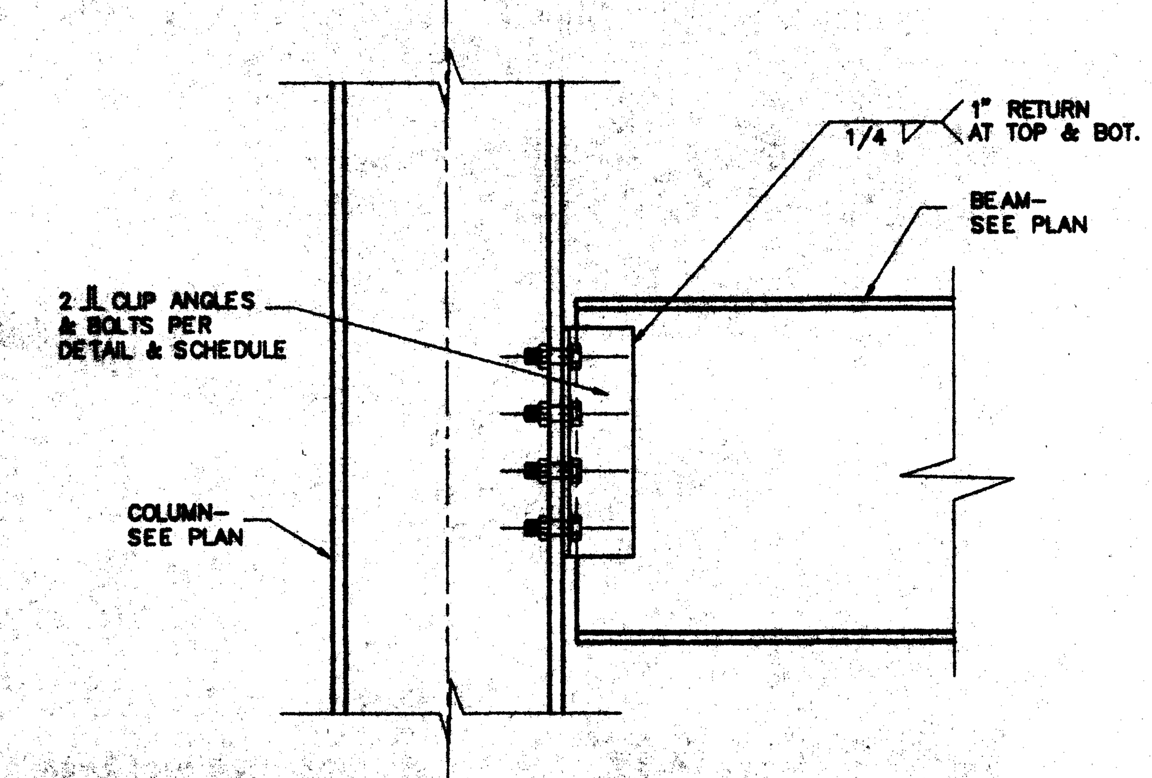


(1) COLUMN BASE DETAIL

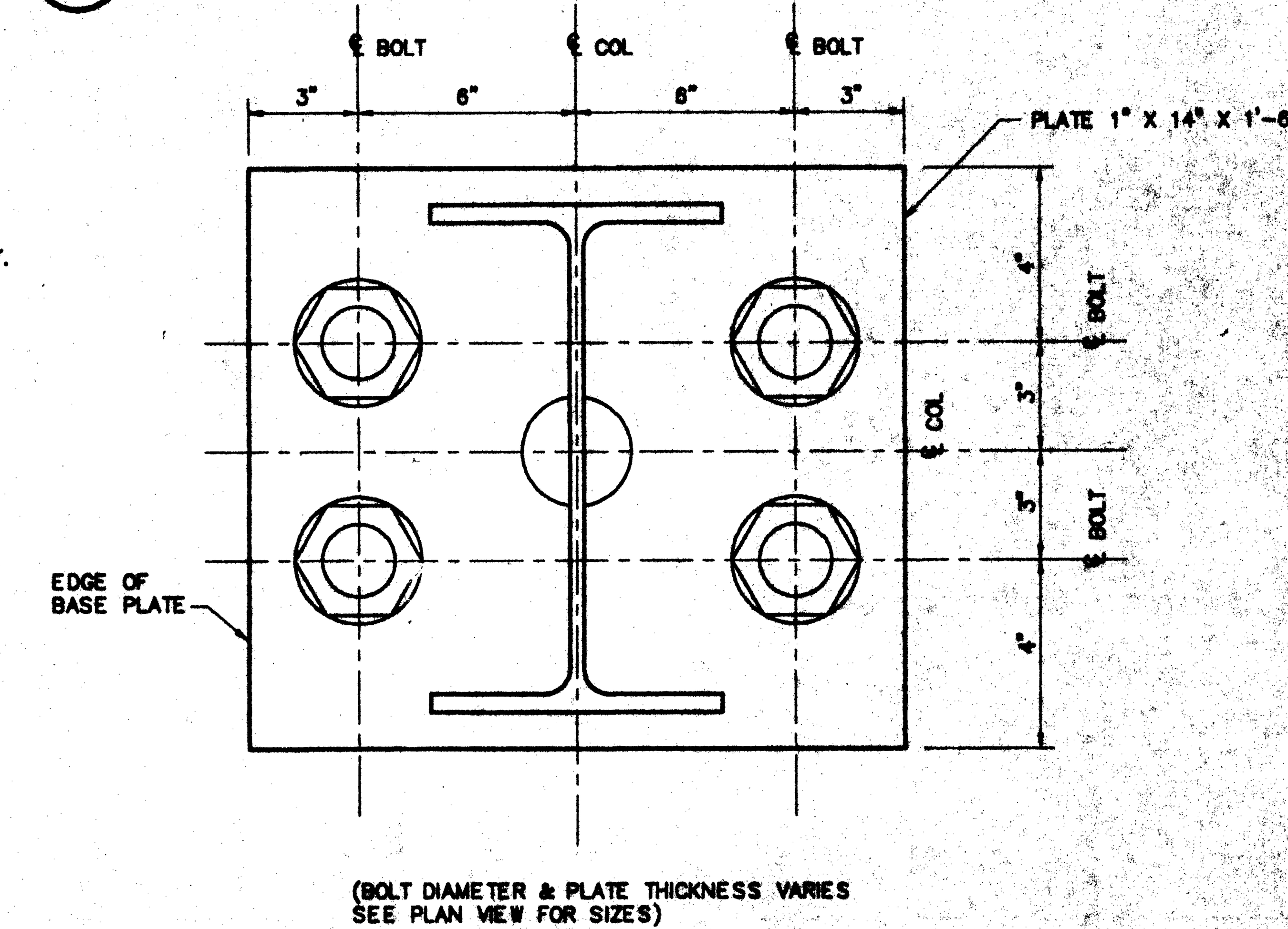
(11)



(8) BRACE BOT. AT COLUMN FLANGE



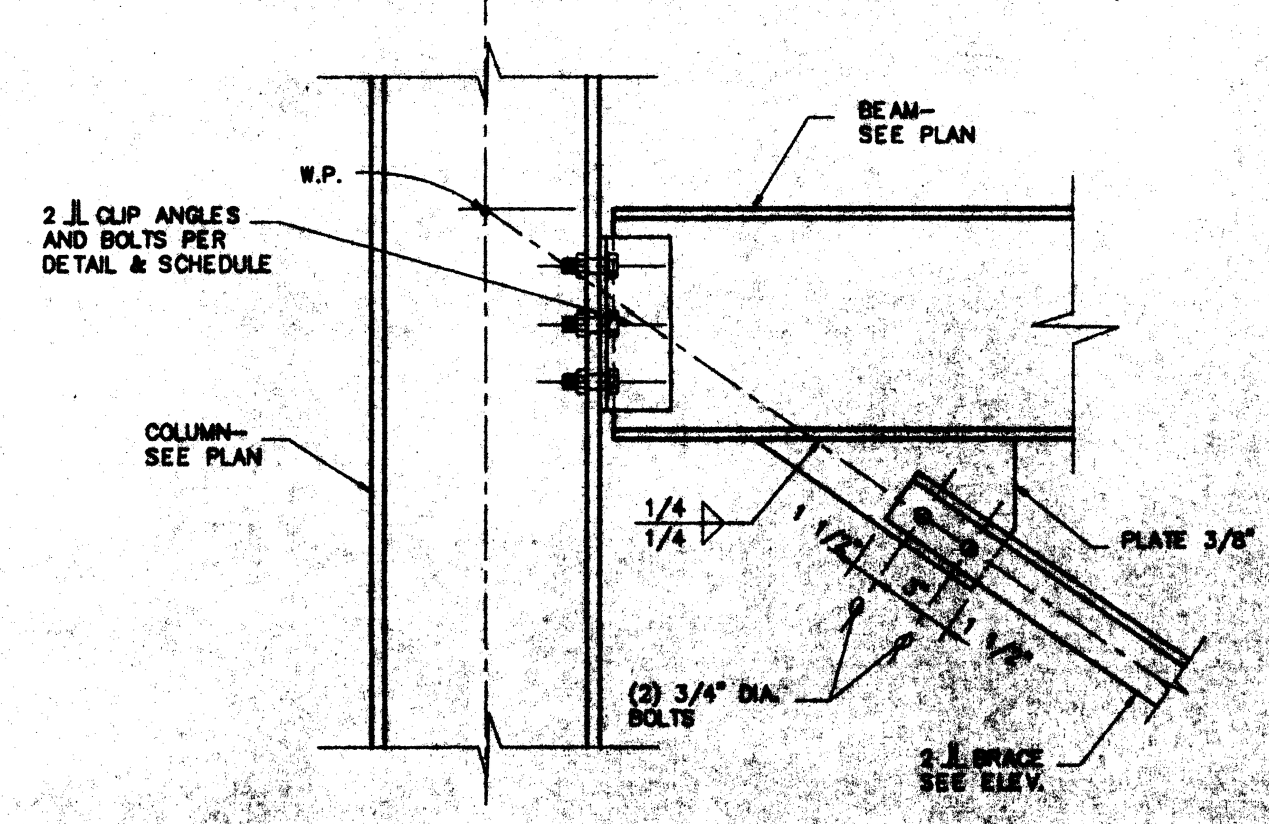
(5) BEAM TO COLUMN FLANGE



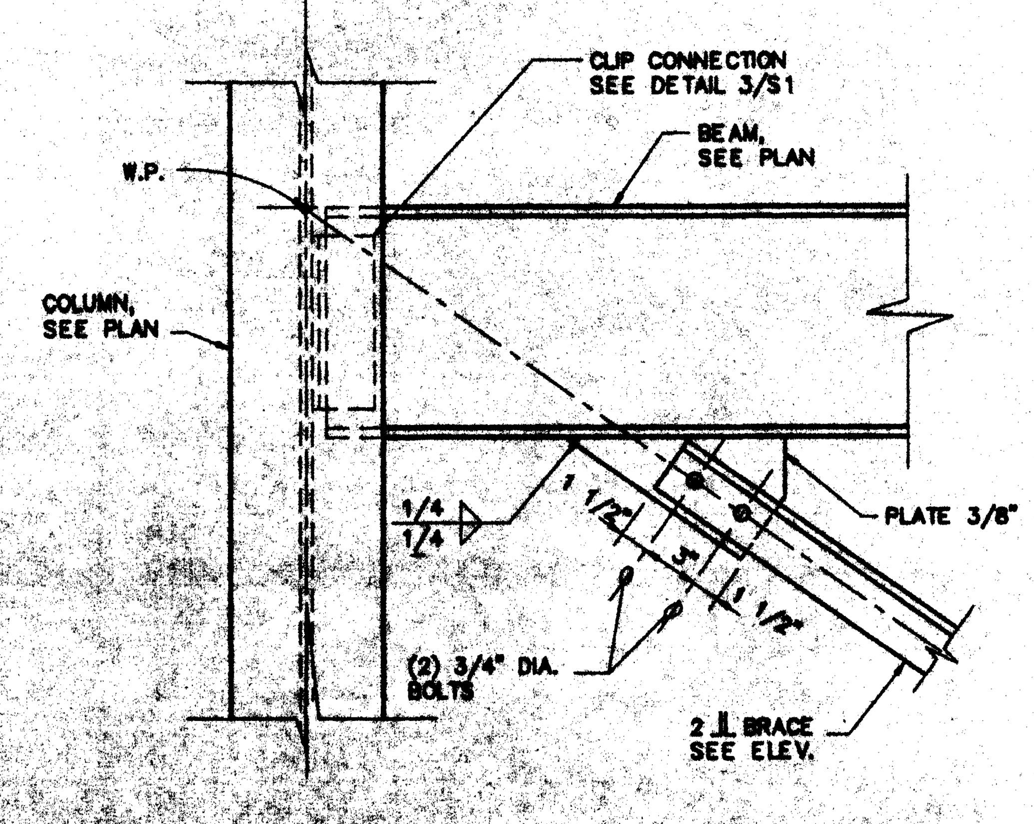
(BOLT DIAMETER & PLATE THICKNESS VARIES SEE PLAN VIEW FOR SIZES)

(2) COLUMN BASE PLATE

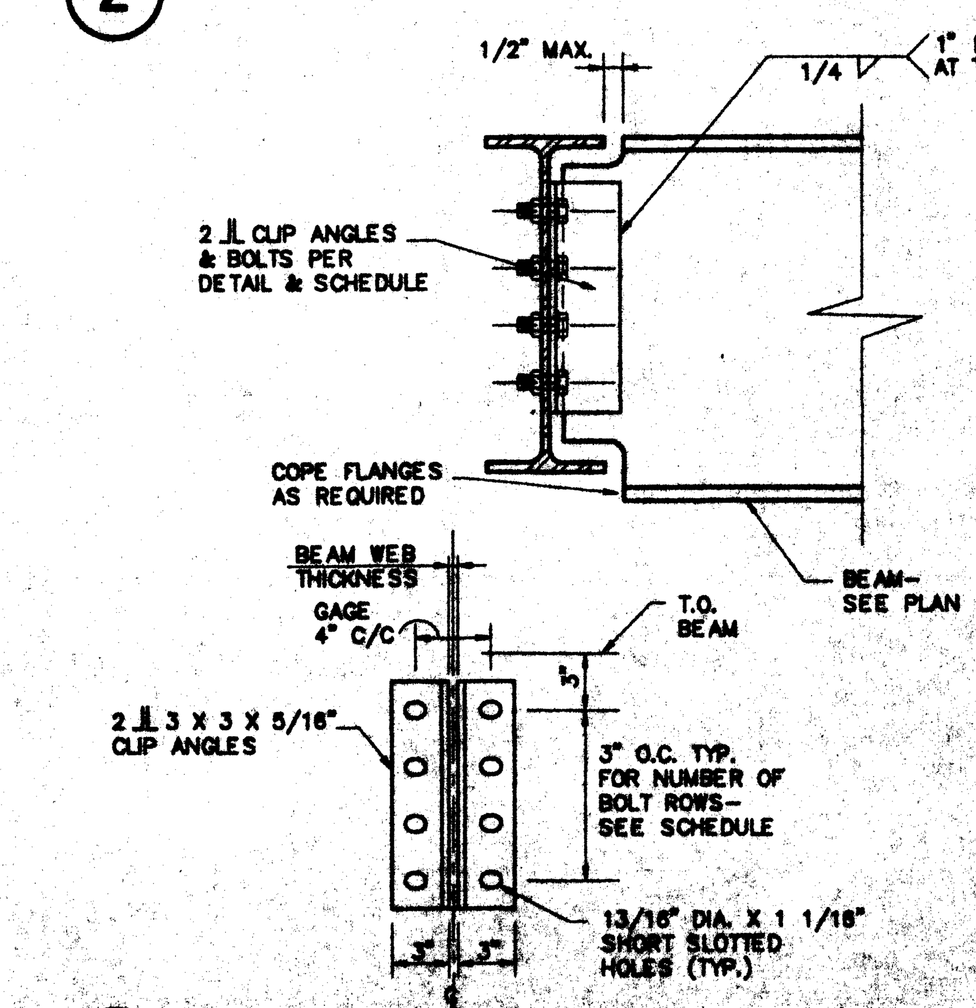
(12)



(9) BRACE TOP AT COLUMN FLANGE



(6) BRACE TOP AT COLUMN WEB



(3) BEAM TO BEAM CONN.

BOLT SCHEDULE	
DEPTH	BOLT ROWS
9" OR LESS	2
9" - 11"	2
11" - 13"	3
13" - 15"	3
15" - 17"	4
17" - 20"	5
20" - 23"	6
23" - 26"	7
26" - 29"	7
29" - 32"	8
32" - 35"	9
35" - 38"	10
38" OR MORE	12

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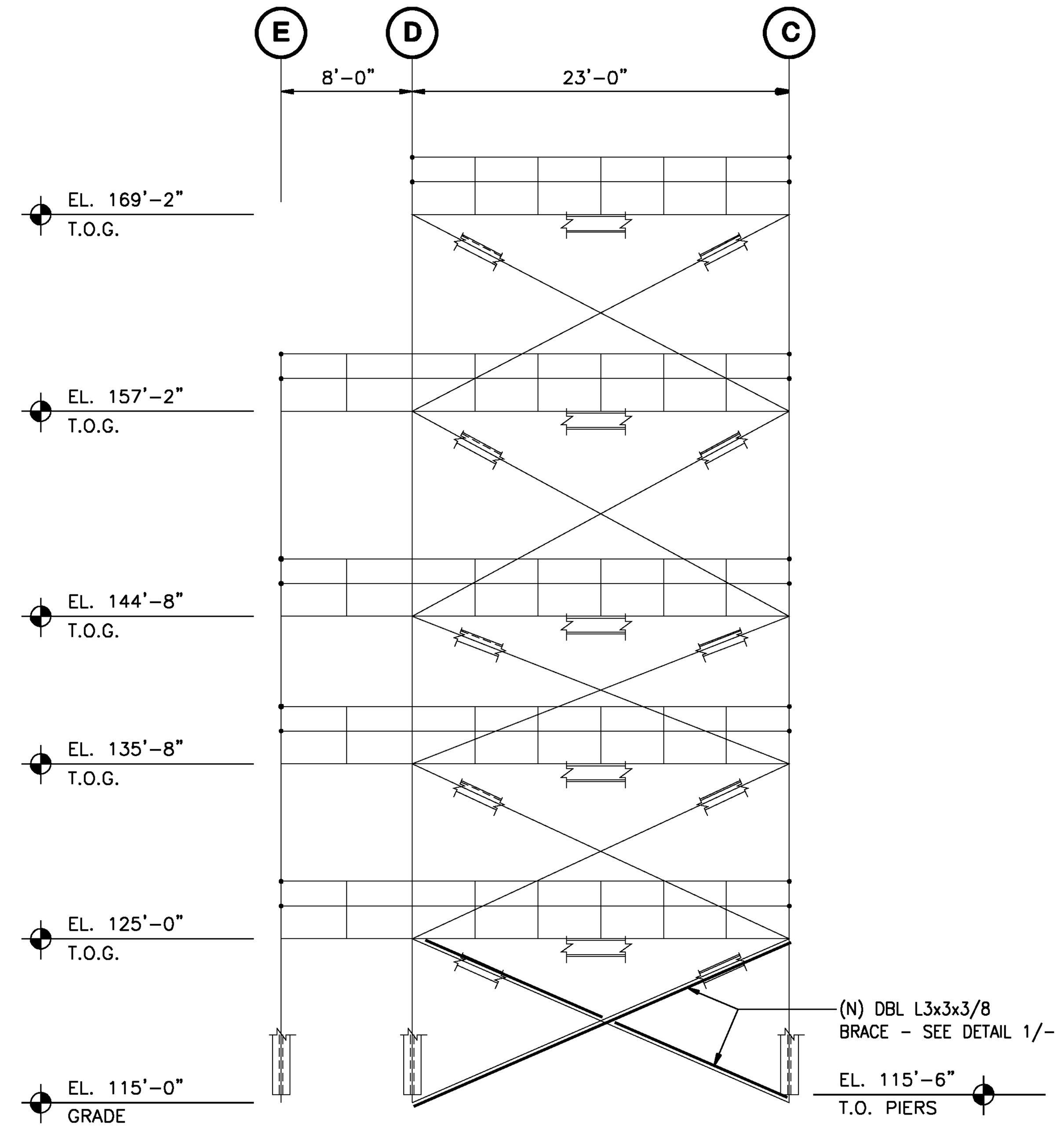
CHAVOND-BARRY

A.V.SCHWAN & ASSOC.,Inc.
CONSULTING ENGINEERS

HANCHEN-NICHOLS CARBON REACTIVATION FURNACE
TYPICAL DETAILS
FOR
[illegible] ENVIRONMENTAL SYSTEMS, INC.

SHEET TITLE: TYPICAL DETAILS

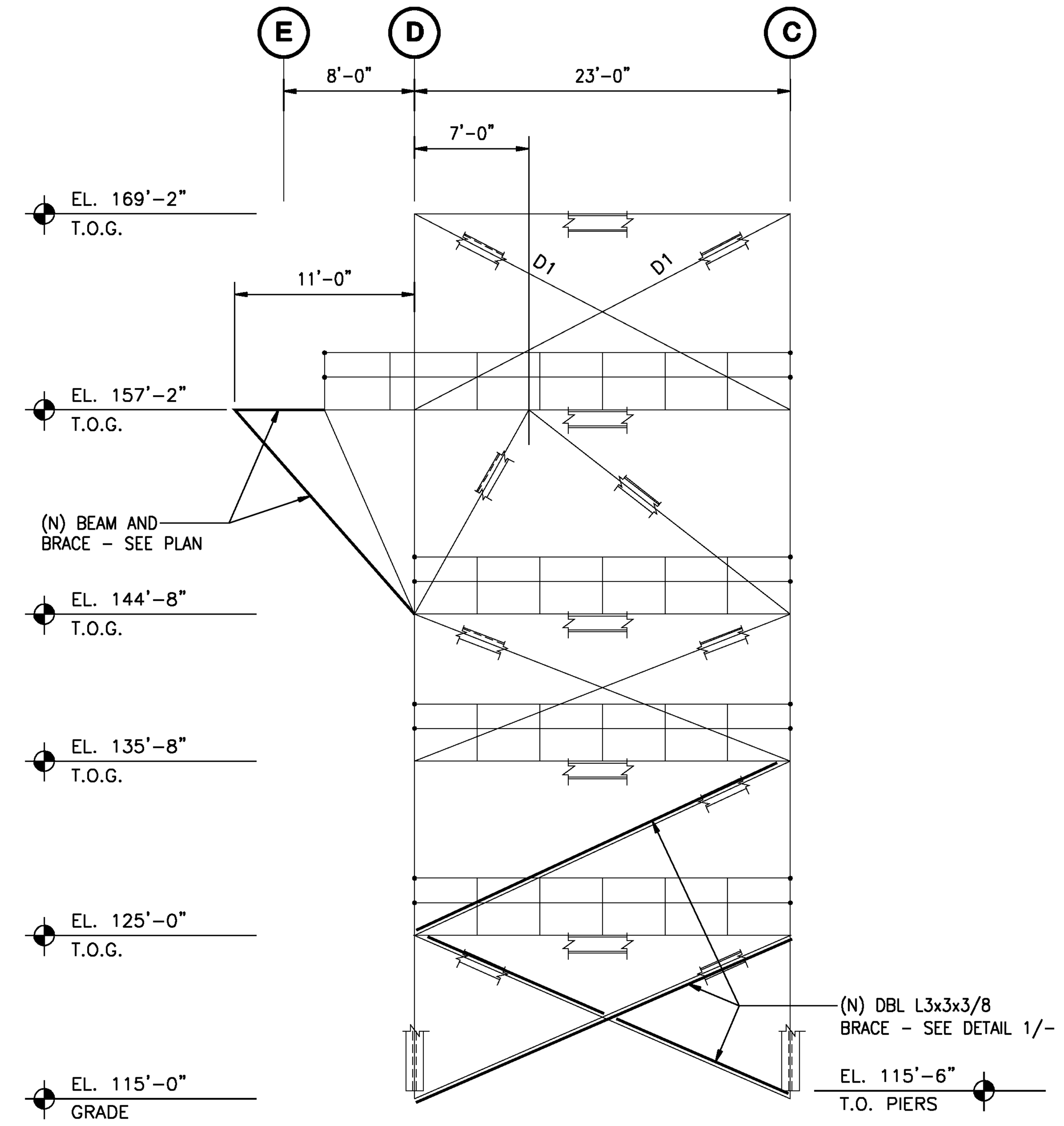
SHEET NUMBER: S1



EXISTING ELEV. ALONG GRID (4)

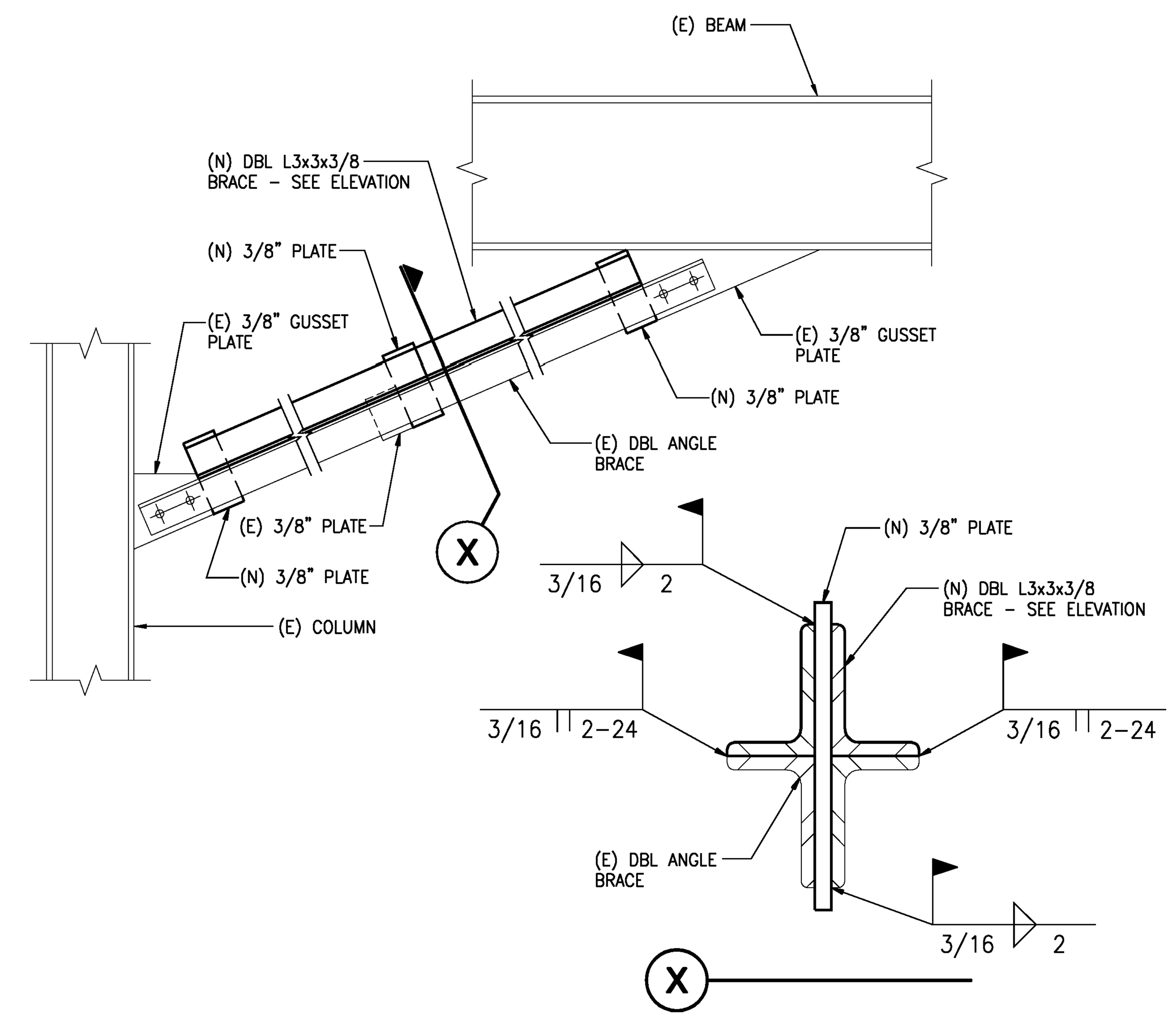
(LOOKING EAST) SCALE: 1/8"=1'-0"

NOTE: CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO FABRICATION AND ERECTION



EXISTING - ELEV. ALONG GRID (6)

(LOOKING EAST) SCALE: 1/8"=1'-0"



(1) —

REVISIONS

△	-

A.V.SCHWAN & ASSOC., Inc.
CONSULTING ENGINEERS
4700 E. THOMAS ROAD, STE. 100
PHOENIX, ARIZONA 85018
(602) 266-4331 622-1788 (FAX)

CARBON REACTIVATION FURNACE
STEEL BRACING ELEVATIONS
US FILTER WESTATES
P.O. BOX 3308
2523 MUTAHAR STREET
PARKER, AZ 85344

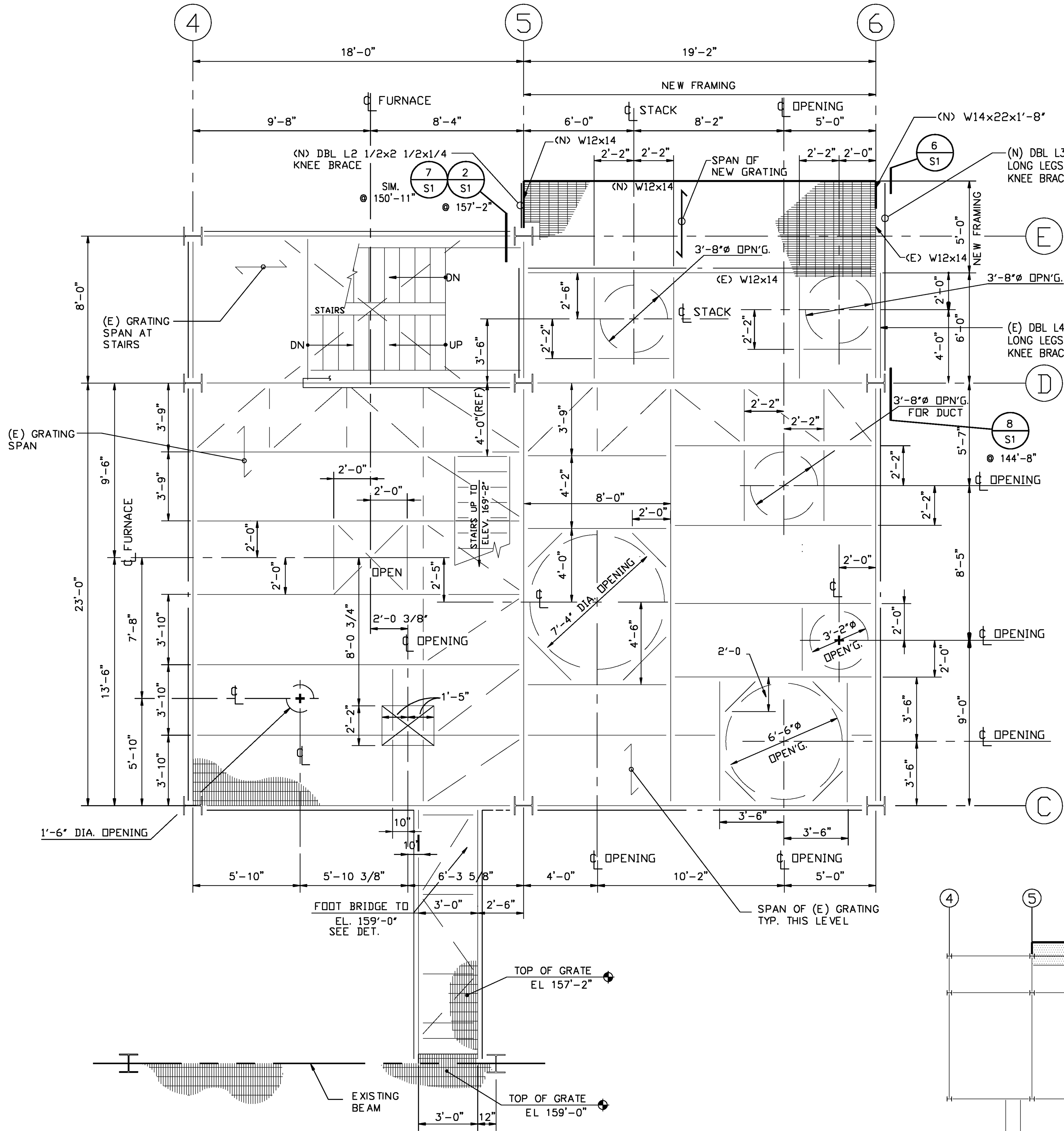
JOB NO.:	5094
DRAWN:	AKT
DESIGNED:	JG
APPROVED:	SAS
DATE:	8/28/02

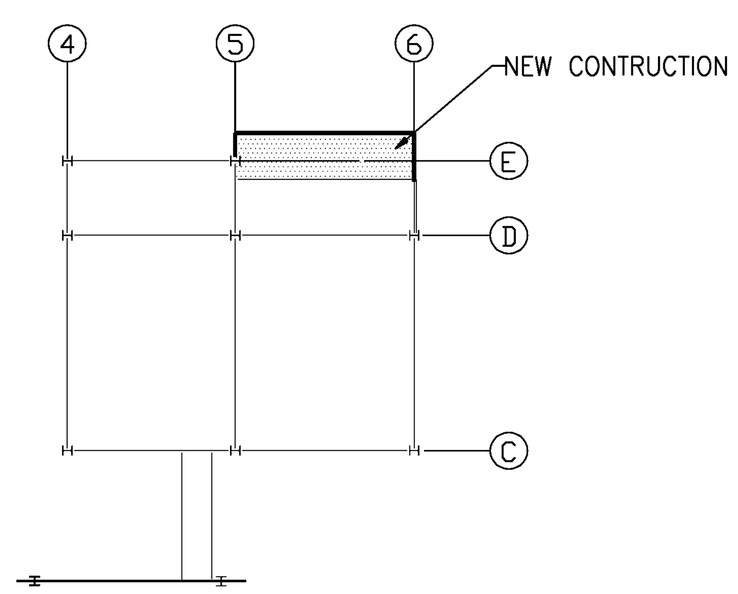
SHEET TITLE:

BRACING ELEVATIONS

SHEET NUMBER:

S3





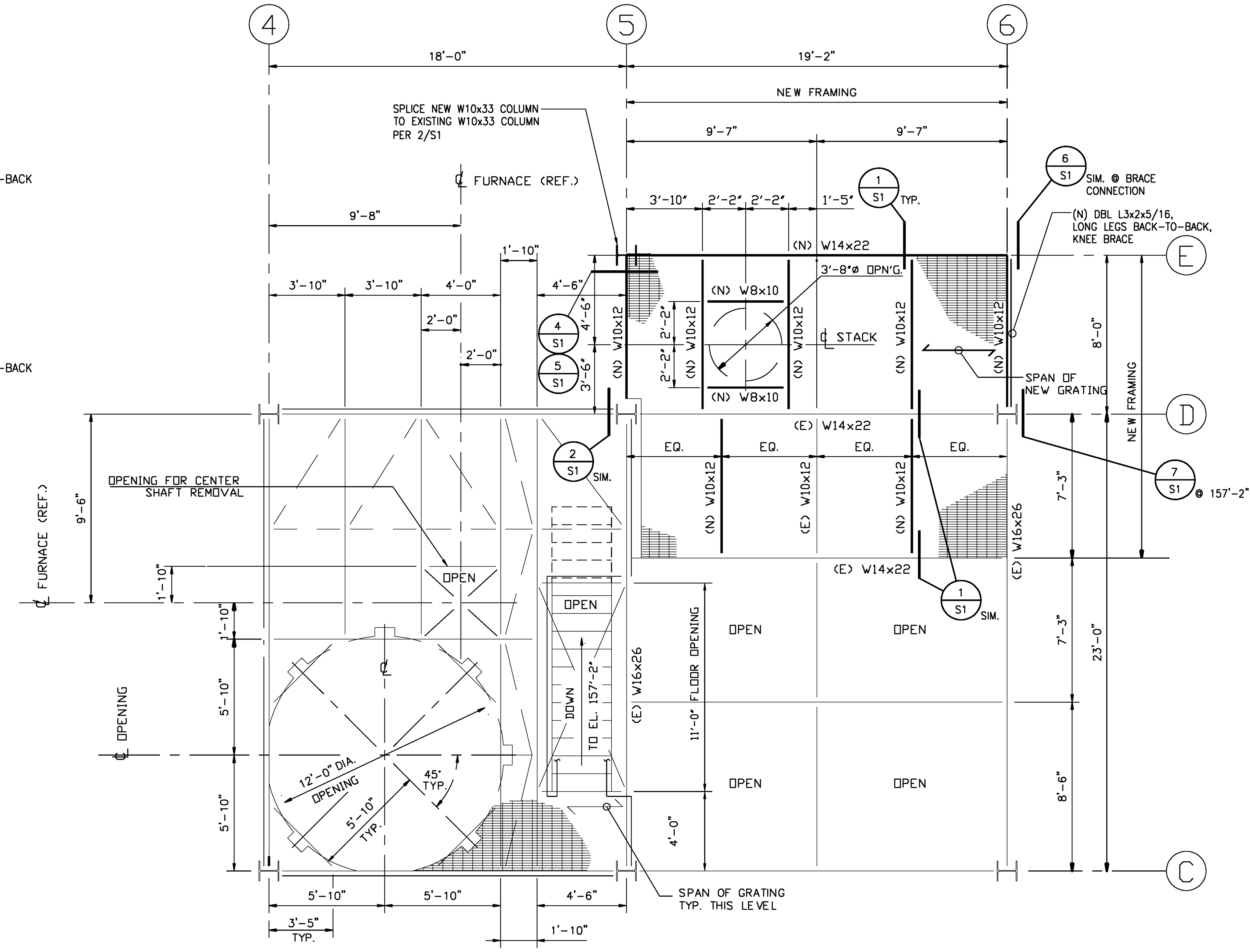
KEY PLAN

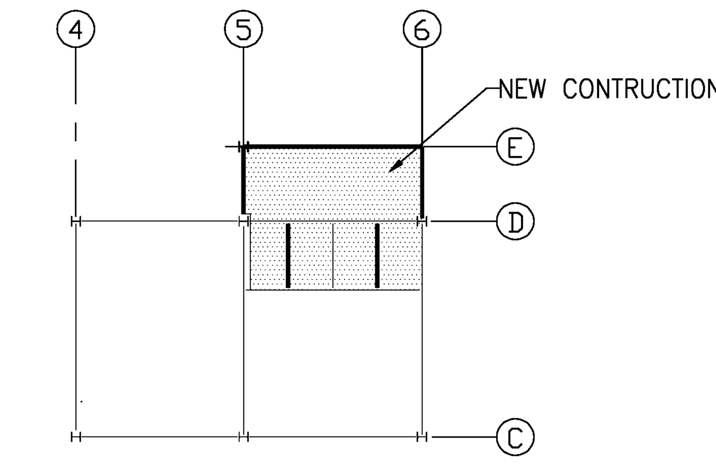
ELEV. 157'-2"

FRAMING PLAN AT T.O.G. EL 157'-2"

T.O.S. AT -1 1/4" U.N.O.

1/4"=1'-0"





KEY PLAN

ELEV. 169'-2"

FRAMING PLAN AT T.O.G. EL 169'-2"

T.O.S. AT -1 1/4" U.N.O.

1/4"=1'-0"

NOTE: CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS PRIOR TO FABRICATION AND ERECTION

NOTES:

STRUCTURAL STEEL:

1. ALL GRATING TO BE RECTANGULAR STL. 1 1/4" X 3/16" X 1 3/16" O.C. BEARING BARS.
2. ALL OPENINGS IN GRATING SHALL BE BANDED.

PAINTING:

1. PRIOR TO APPLICATION OF ANY COATINGS, STEEL PARTS SHALL BE SANDBLASTED TO SSPC-6, COMMERCIAL BLAST CLEANING.
2. IMMEDIATELY THEREAFTER PARTS SHALL BE GIVEN (1) PRIME COAT OF VALSPER CORP. EPOXY PRIMER NO. 13F62, SHOP APPLIED, TO PREVENT RUST.
3. AN INTERMEDIATE COAT OF VALSPER CORP. HI-BUILD OPOXY 89 SERIES SHALL BE APPLIED AFTER PRIMER HAS DRYED FOR 24 HOURS. TINT COATING TP APPROXIMATE COLOR OF FINISH COAT.
4. ONE (1) FINISH COAT OF VALSPAR CORP. URETHANE ENAMEL V40 SERIES SHALL BE FIELD APPLIED AFTER ERECTION OF PARTS. COLOR SHALL BE IN ACCORDANCE WITH COLOR CODE AS APPROVED BY OWNER.

REVISIONS

△	-

A.V.SCHWAN & ASSOC., Inc.
CONSULTING ENGINEERS
4700 E. THOMAS ROAD, STE. 100
PHOENIX, ARIZONA 85018
(602) 266-4331 622-1788 (FAX)

CARBON REACTIVATION FURNACE
STEEL FRAMING PLANS
AT EL. 157'-2" & 169'-2"
US FILTER WESTATES
P.O. BOX 3308
2523 MUTAHAR STREET
PARKER, AZ 85344

JOB NO.:	5094
DRAWN:	AKT
DESIGNED:	JG
APPROVED:	SAS
DATE:	8/28/02

SHEET TITLE:

FRAMING PLAN

SHEET NUMBER:

S2

GENERAL STRUCTURAL NOTES

I. DESIGN CRITERIA

A. BUILDING CODE:

1. CITY OF PARKER : UNIFORM BUILDING CODE, 1994

B. LOADINGS:

1. TYPICAL FLOOR LIVE LOAD = 100 PSF
2. SEISMIC - CITY OF PHOENIX, "Z" FACTOR = 0.25
3. WIND LOAD - 100 MPH ZONE - EXPOSURE C
4. SEISMIC ZONE 3: Z=0.30

II. MATERIALS:

A. STRUCTURAL AND MISCELLANEOUS STEEL:

1. MATERIAL PROPERTIES:

a. TO BE ASTM A 36 UNLESS NOTED OTHERWISE.

b. ALL STEEL TO BE DETAILED, FABRICATED AND ERECTED IN ACCORDANCE WITH A.I.S.C. SPECIFICATIONS, LATEST ADOPTION.

2. WELDING: FOR STRUCTURAL STEEL TO BE IN ACCORDANCE WITH A.W.S. REQUIREMENTS FOR E70XX ELECTRODES.

3. BOLTS:

a. ALL BOLTS TO BE 3/4" DIAMETER ASTM A 325-N T.C. UNLESS NOTED OTHERWISE.

III. EXECUTION:

A. GENERAL:

1. STRUCTURAL NOTES SHALL BE USED ALONG WITH THE SPECIFICATIONS. WHERE THE STRUCTURAL NOTES, DRAWINGS OR SPECIFICATIONS DISAGREE, THE CONTRACTOR MAY REQUEST A CLARIFI-

CATION DURING THE BIDDING PERIOD. OTHERWISE THE MORE STRINGENT REQUIREMENTS SHALL CONTROL.

2. PROVIDE ALL TEMPORARY BRACING, SHORING, GUYING OR OTHER MEANS TO AVOID EXCESSIVE STRESSES AND TO HOLD STRUCTURAL ELEMENTS IN PLACE DURING CONSTRUCTION. ESTABLISH AND VERIFY ALL OPENINGS AND INSERTS FOR MECHANICAL, ELECTRICAL AND PLUMBING WITH THE APPROPRIATE TRADES, DRAWINGS AND SUBCONTRACTORS PRIOR TO CONSTRUCTION.

3. STRUCTURAL DETAILS: DETAILS ARE APPLICABLE WHERE INDICATED BY SECTION CUT, BY NOTE OR BY DETAIL TITLE. PROVIDE SIMILAR DETAILS AT SIMILAR CONDITIONS UNLESS NOTED OTHERWISE. THE CONTRACTOR MAY REQUEST A CLARIFI-

CATION DURING THE BIDDING PERIOD OTHERWISE THE MORE STRINGENT REQUIREMENTS SHALL CONTROL.

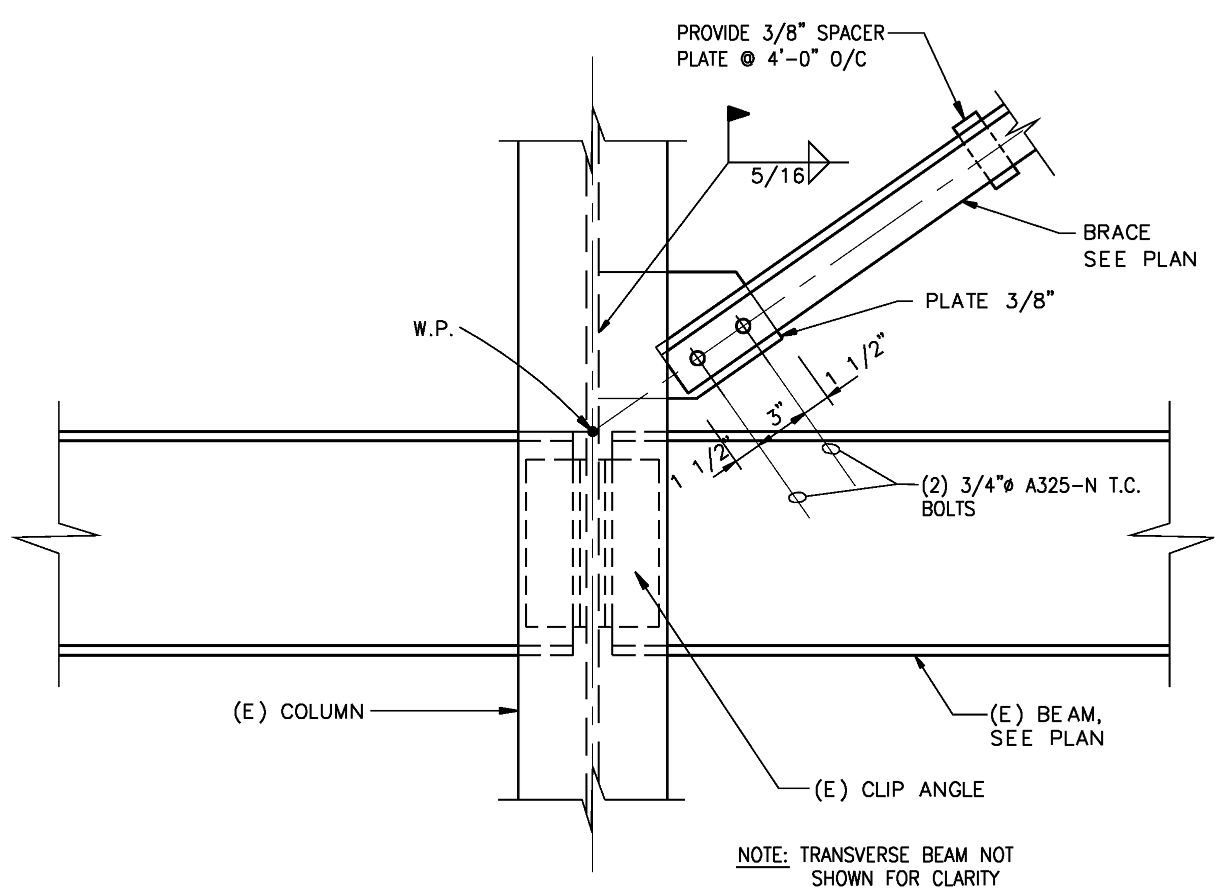
4. EXISTING CONDITIONS: CONTRACTOR SHALL VERIFY IN THE FIELD ALL DIMENSIONS AND CONDITIONS OF THE EXISTING STRUCTURE PRIOR TO BEGINNING ANY PERTINENT WORK. NOTIFY THE ARCHITECT/ENGINEER OF ANY DISCREPANCIES BETWEEN THE DRAWINGS AND ACTUAL CONDITIONS.

5. DEMOLITION:

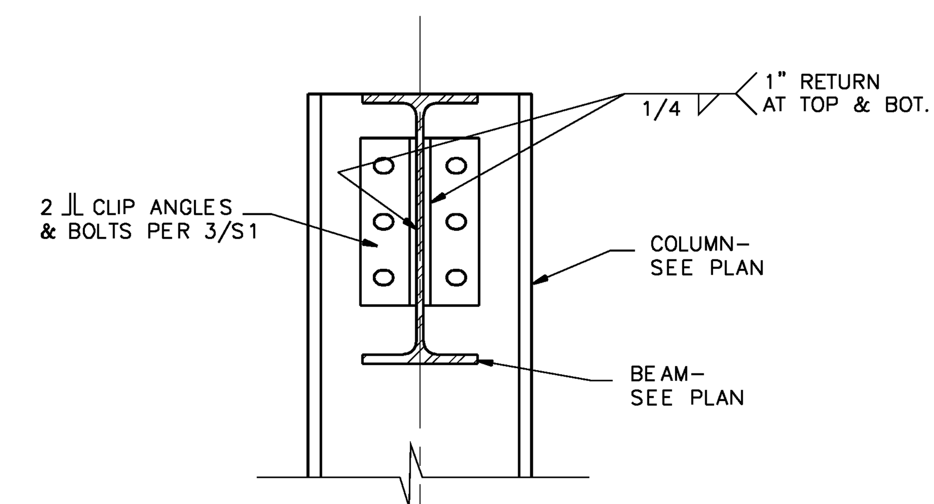
a. CONTRACTOR SHALL VERIFY IN THE FIELD ALL EXISTING CONDITIONS. ANY DISCREPANCIES BETWEEN THE DRAWINGS AND THE ACTUAL FIELD CONDITIONS SHALL BE REPORTED TO THE ARCHITECT/ENGINEER PRIOR TO CONTINUING ANY WORK.

b. CONTRACTOR SHALL EXERCISE EXTREME CARE DURING DEMOLITION TO AVOID DAMAGING THOSE PORTIONS OF THE STRUCTURE TO REMAIN. THE CONTRACTOR SHALL NOTIFY THE ARCHITECT/ENGINEER IMMEDIATELY OF ANY DAMAGE TO THE STRUCTURE TO REMAIN.

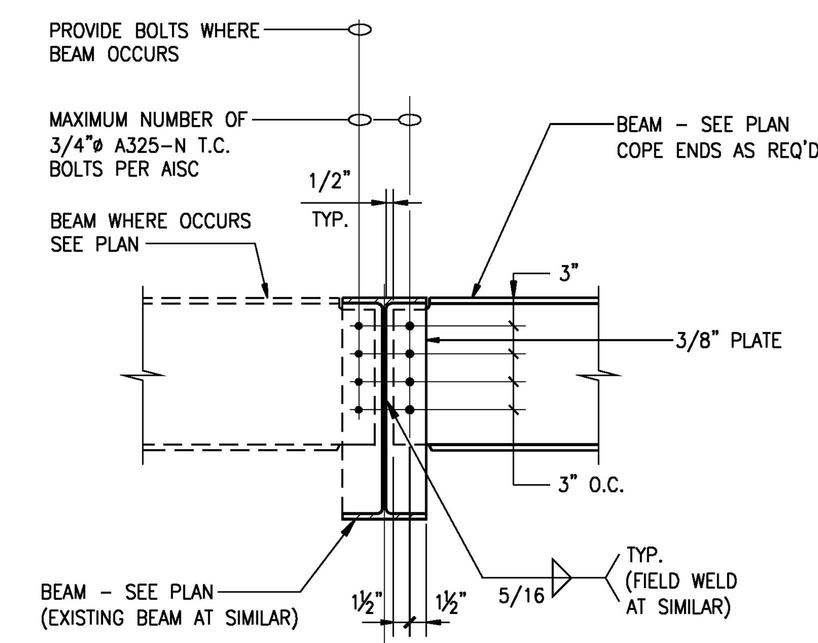
c. ALL METHODS USED SHALL BE CAREFULLY PLANNED AND SHALL BE APPROPRIATE TO THE WORK TO BE DONE. THE EXISTING STRUCTURE TO REMAIN SHALL NOT BE SUBJECTED TO ANY SUDDEN OR EXCESSIVE FORCES WHICH MIGHT ADVERSELY AFFECT THE INTEGRITY OF THE STRUCTURE.



7 BRACE BOT. AT COLUMN WEB



4 BEAM TO COLUMN WEB



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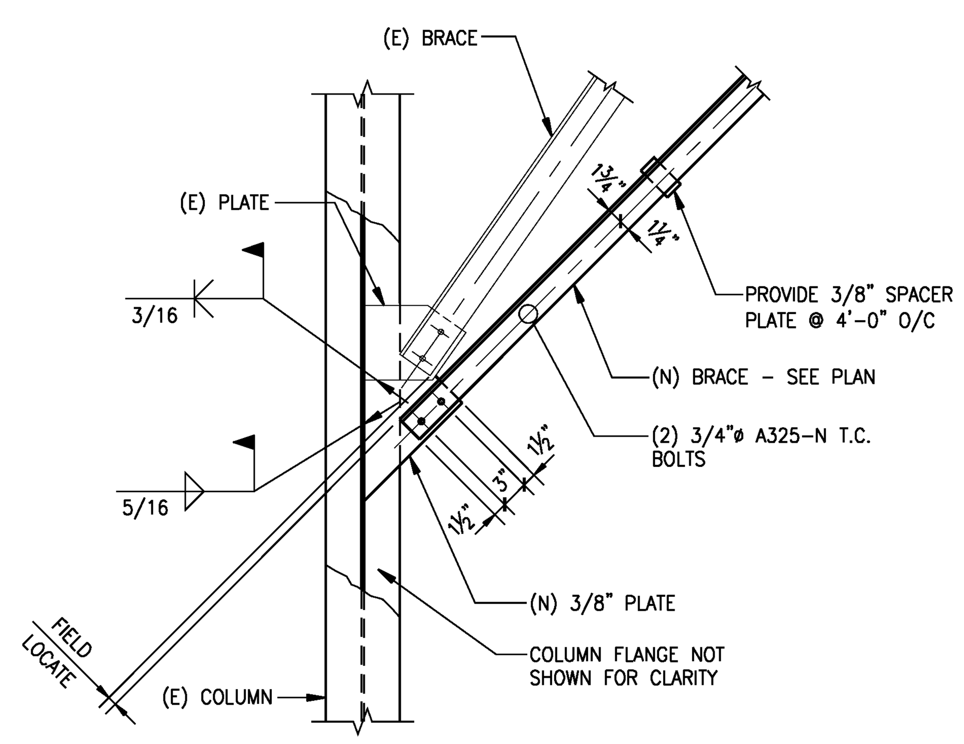
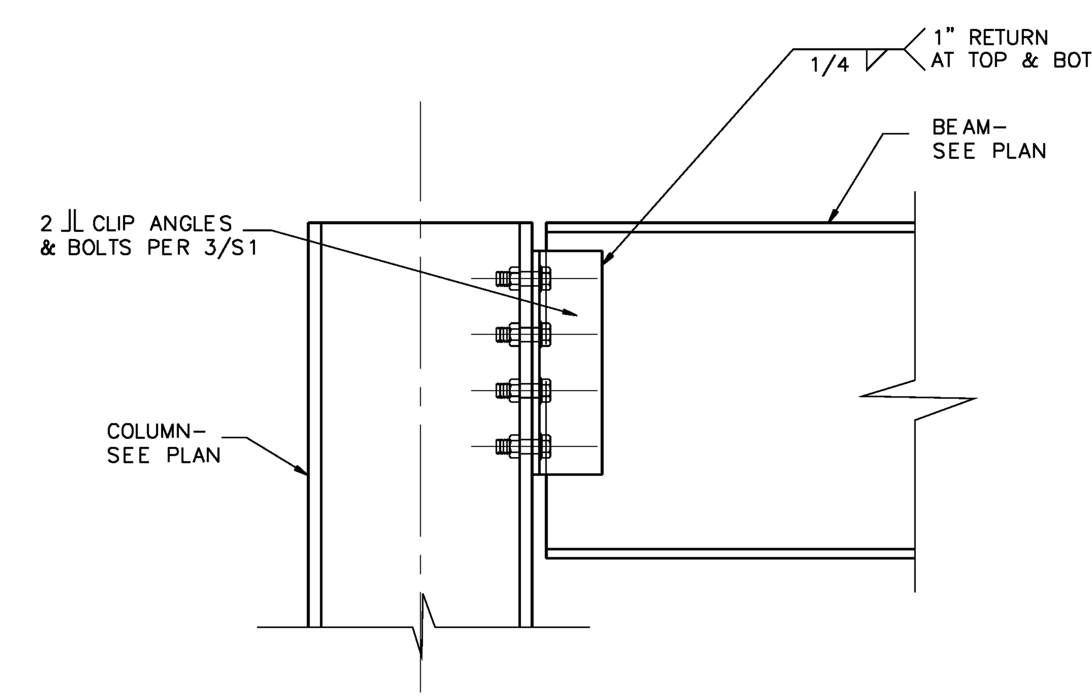
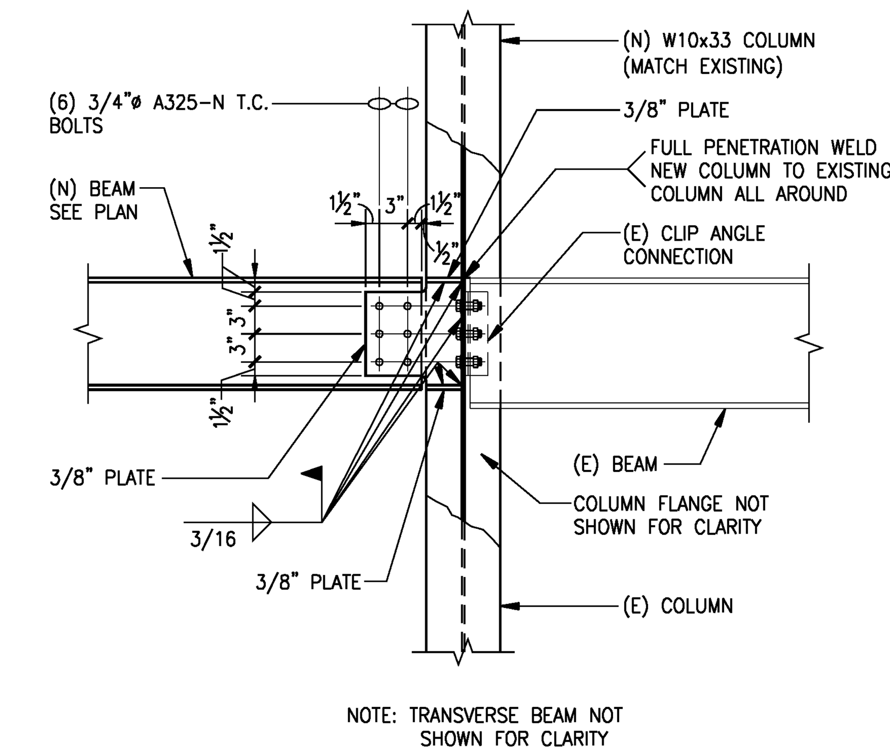


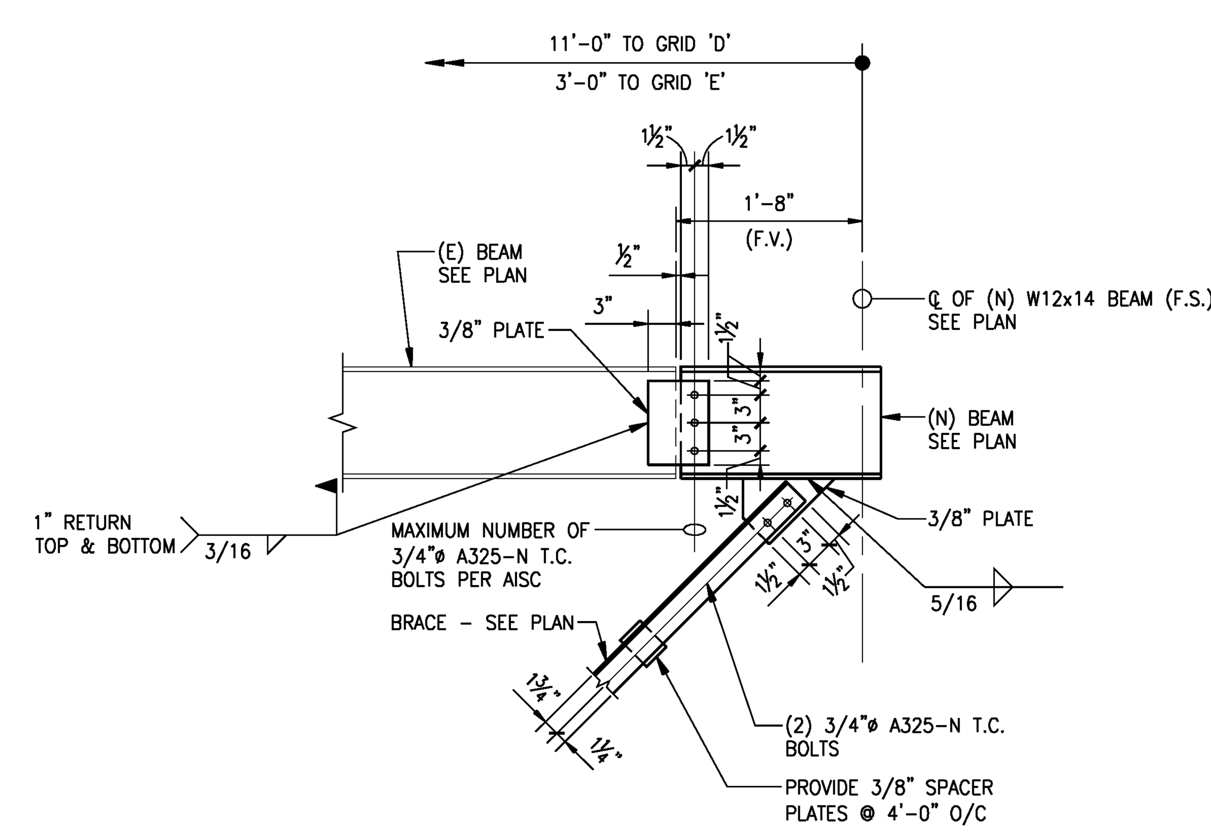
8 BRACE BOT. AT COLUMN FLANGE



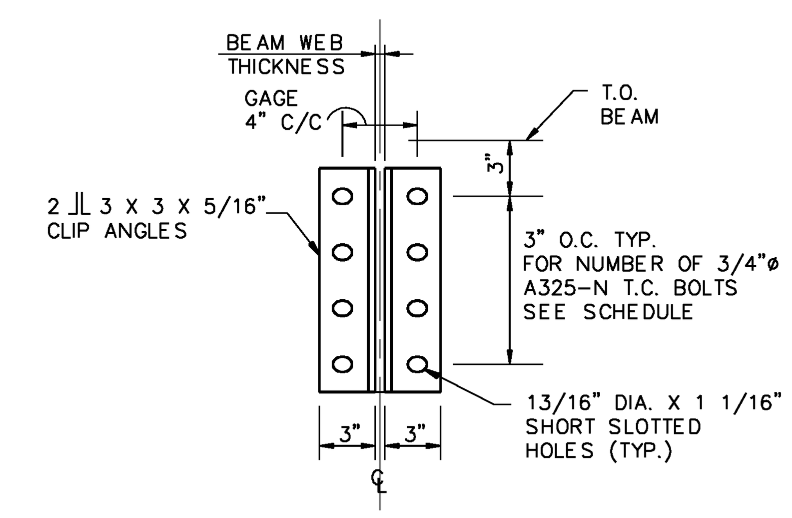
5 BEAM TO COLUMN FLANGE



2 –



6 BRACE TOP AT COLUMN WEB



BOLT SCHEDULE

DEPTH	BOLT ROWS
9" - 11"	2
11" - 13"	3
13" - 15"	3

3 TYPICAL CLIP-ANGLE CONNECTION

REVISIONS

△	-

A.V.SCHWAN & ASSOC., Inc.
CONSULTING ENGINEERS
4700 E. THOMAS ROAD, STE. 100
PHOENIX, ARIZONA 85018
(602) 266-4331 622-1788 (FAX)

CARBON REACTIVATION FURNACE
TYPICAL DETAILS
US FILTER WESTATES
P.O. BOX 3308
2523 MUTAHAR STREET
PARKER, AZ 85344

JOB NO.:	5094
DRAWN:	AKT
DESIGNED:	JG
APPROVED:	SAS
DATE:	8/28/02

SHEET TITLE: TYPICAL DETAILS

SHEET NUMBER: S1

Exhibit B - Design Standards

Structural Calculations for T-18

STRUCTURAL CALCULATIONS FOR

Siemens Water Treatment Tech. Corp.

Double Wall SS304 Carbon Filter Tank

10.67 ft Dia x 7.5 ft Cylindrical Shell Ht x 9.25 ft Tall Cone Bottom

6,400 Gallons

ELEVATED CONE BOTTOM w/ FLAT ROOF

REVISION 0

Dated February 09, 2007

(Original Calc Package)

LOCATED AT

Parker, Arizona

Registered Professional Engineer (Structural) CERTIFICATE NO 36412 JOHN F. BRADLEY Date Signed 2/21/07 ARIZONA U.S.A.

Vessel Manufactured By:

Modern Custom Fabrication

2421 E. California Avenue

Fresno, CA 93721

Ph (559) 264-4741, Fax (559) 237-3413

Modern Custom Fabrication, Inc.
Fresno, California
By: John F. Bradley, S.E.
February 9, 2007

Customer: Siemens Water Technologies Corp.
Location: Parker, Arizona
Double Wall SS304 Carbon Filter Tank
AWWA D100-05, IBC 2003

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Fresno, California
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Customer: Siemens Water Technologies Corp.
Location: Parker, Arizona
Double Wall SS304 Carbon Filter Tank
AWWA D100-05, IBC 2003

Design Summary

Product Stored:	Spent Activated Carbon Slurry
Specific Gravity:	1.50
Max Temperature:	150° F
Design Pressure:	Atmospheric
Design Codes:	1) AWWA D100-05
	2) IBC 2003 for Wind & Seismic
Wind Design:	IBC 2003 & AWWA: Basic Wind Speed = 90 mph (3-second gust), Exposure C, I_w = 1.15
Seismic Design:	IBC 2003 & AWWA: S_S = 0.23g, S_1 = 0.15g, I_e = 1.5, Site Class D

Description

This tank is a double-wall cylindrical upper tank with a double-wall conical bottom for use inside a water treatment plant near Parker, Arizona. Product is spent activated carbon slurry, i.e. a mix of granular carbon material and water. Material used for the tank construction is SS304 stainless steel. Inner shell is separated from outer shell by (10) evenly spaced bent plate channel spacers @ 1 3/8" tall. These spacers are attached to outside of inner shell. Both inner and outer shells are 1/4" plate.

Design Criteria

Specific gravity of slurry mix is provided by customer at 1.50 (conservative). Tank is designed for atmospheric pressure (no internal pressure of vacuum) and ambient temperature. Design codes specified for this tank are AWWA D100-05 and IBC 2003. There are no American codes that specifically address all components for elevated cone bottom tanks, so other codes & design procedures will be used as appropriate (e.g. API 620 for the cone bottom & compression girder). Allowable steel stresses are taken per AWWA D100-05. Wind and seismic loads are calculated both per AWWA and IBC, and governing cases are used for design. Load combinations are taken per IBC 2003. Seismic design values above are governing values from those provided by customer and those from USGS website for Parker, AZ.

Design Methodology

The Inner tank shell is the normal pressure boundary; the outer tank is used for leak containment. Under normal loading, inner tank transfers loads to the outer tank at discreet locations of spacers. In event of leak in inner tank, space between the two tanks may fill up, subjecting the outer shell to uniform product pressure. Tank load is supported at a continuous anchor ring about 4'-3" up from cone-cylinder junction.

Support structure and anchorage/attachment to supports are by others and are not included in these calculations. It is assumed that wind pressure can act on entire tank shell. For lateral load calculations, it is assumed that tank is a pendulum-type structure rigidly supported at anchor bolt circle. For seismic & wind OTM calculations, lateral resisting loads due to structure & contents above the anchor bolt circle are conservatively ignored. Design loads at anchorage locations for use by others to design tank support structure are provided as the last sheet in this calculation package.

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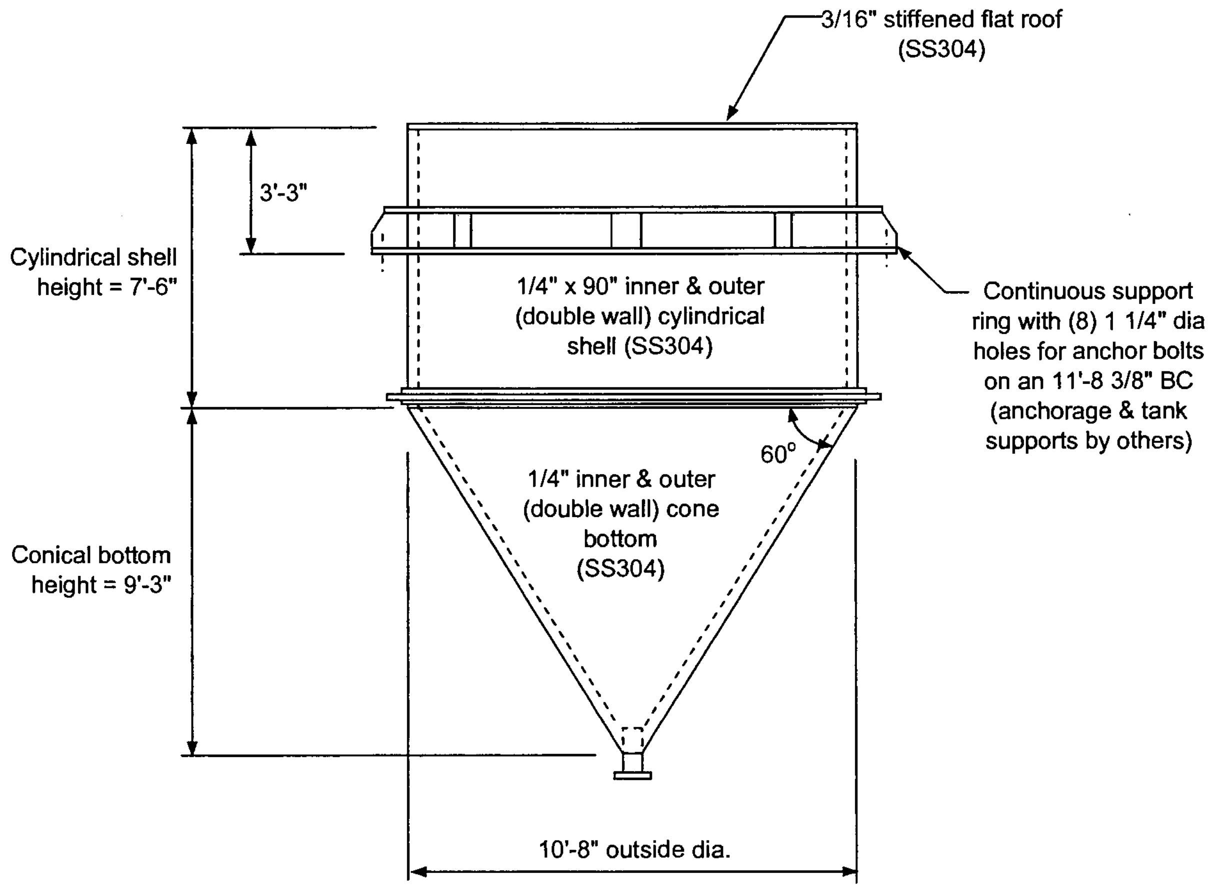
Design Criteria & Sketch

Product Stored:	Spent Activated Carbon Slurry
Specific Gravity:	1.50
Max Temperature:	200° F
Design Pressure:	Atmospheric
Design Codes:	1) AWWA D100-05
	2) IBC 2003 for Wind & Seismic
Wind Design:	IBC 2003 & AWWA: Basic Wind Speed = 90 mph (3-second gust), Exposure C, I_w = 1.15
Seismic Design:	IBC 2003 & AWWA: S_S = 0.23g, S_1 = 0.15g, I_e = 1.5, Site Class D



Weights: Empty Vessel = W_{empty} =	14.0	k
Product (full to top of outer tank) =	88.5	k
Tank + full product = W_{full} =	102.5	k
Outside Shell Diameter = Do =	128	in
Cylindrical Shell Thickness (inner & outer) = t_c =	0.25	in
Conical Bottom Thickness (inner & outer) = t_b =	0.25	in
Internal pressure =	0	psig
Internal vacuum =	0	psig

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Hydrostatic Design of Cylindrical Shell

Required shell plate thickness: (Per AWWA D100)

t = [2.6HDG]/(sE) + CA

Where: H = Height of liquid from top capacity level to bottom of shell course (= "Design Depth" below)
D = 10.7 ft (tank dia)
G = 1.50 (specific gravity tank contents)
s = 15000 psi
E = 0.85 (joint efficiency)
CA = 0 in

Factored hoop stress force = 42 pli/ft = 2.6DG = Hydrostatic hoop force in lbs/inch of shell circumference per ft of product depth

	DESIGN FOR STATIC PRODUCT - ONE FOOT METHOD										
	Ring No.	Ring Ht (in)	Material	Allowable Stress = sE (psi)	Design Depth (ft)	Design Pt Elevation (ft)	Hoop Force @ Des. Pt. (pli)	Min t req'd [incl. c.a.] (in)	Thickness Used (in)	Thk Status	Material Status
Top	1	90.0	SS304	12750	7.50	7.50	270	0.0245	0.25	OK	OK

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Check Cylindrical Shell for Radial Load @ Channel Spacers

Analysis of Bracket Load on Cylindrical Tank

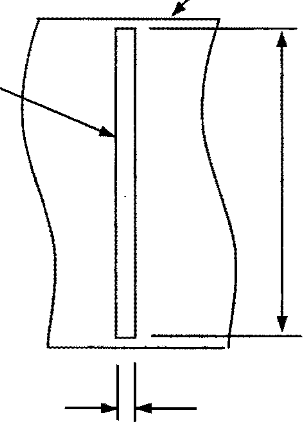
(Check radial thrust on outer shell due to load from inner shell concentrated @ channel spacer)

Tank Shell - Material & Dimensions

Tank Radius (R) =	64	in
Shell Thickness (t) =	0.250	in
Longitudinal Stress (S_L) =	50	psi
Hoop Stress (S_H) =	400	psi
Allowable Stress (S_m) =	12750	psi
Yield Stress (F_y) =	30000	psi
Alowable Stress Increase (k)=	1.00	
Tensile Stress =	75000	psi

Shell Bracket - Dimensions & Loads

Bracket Width (W) =	3.0	in
Bracket Length (L) =	86.0	in
Longitudinal Moment (M) =	0	in-lbs
Radial Load (Q) =	6270	lbs (Wt of 1/10th Vol of Cyl)



Allowable Loads

Max. allowable loading limiting longitudinal stress to $0.75F_y$:

$M_1 = (0.035WkF_yt^2)[6+6\beta L+(\beta L)^2] =$ 184087 in-lbs

$Q_1 = (0.208WkF_yt^2\beta)(2+\beta L) =$ 11136 lbs

Where: $\beta = 1.285/(Rt)^{1/2} =$ 0.3213

Max. allowable loading limiting circumferential stress to $0.75F_y$:

$M_2 = (0.063WkF_yt^2)[6+6\beta L+(\beta L)^2] =$ 331356 in-lbs

$Q_2 = (0.379WkFyt^2\beta)(2+\beta L) =$ 20291 lbs

Unity Checks

1)	$M/M_1 + Q/Q_1 =$	0.563		**< 1.0 OK!**
2)	$M/M_2 + Q/Q_2 =$	0.309		**< 1.0 OK!**
3)	$(M/M_1 + Q/Q_1)(0.75F_y)(k) + S_L =$	12719	**(psi)**	**< 3 Sm OK!**
4)	$(M/M_1)(0.75F_y)(k) + S_L =$	50	**(psi)**	**< 1.5 k Sm OK!**
5)	$(M/M_2 + Q/Q_2)(0.75F_y)(k) + S_L =$	7353	**(psi)**	**< 3 Sm OK!**
6)	$(M/M_2)(0.75F_y)(k) + S_L =$	400	**(psi)**	**< 1.5 k Sm OK!**

Where:

3 Sm = 38250 (psi) but not greater than 75000 (psi)
1.5 k Sm = 19125 (psi)

Therefore Outer Shell is OK for Radial Load Concentrated @ Channel Spacer

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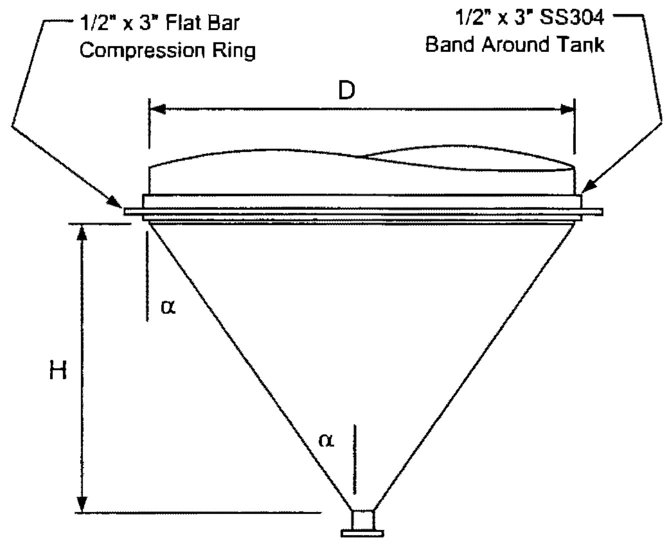
Cone Bottom & Compression Ring

Materials & Geometry

Cone Top Diameter (D) = 10.67 ft
Cone Height (H) = 9.25 ft
Cone Material = SS304
Water depth above top of cone = 7.50 ft
Specific Gravity of contents = 1.50
Cone plate thickness = t_c = 0.250 in
Corrosion allowance (cone) = c_c = 0.000 in
Cylindrical shell thickness = t_s = 0.250 in
Corrosion allowance (shell) = c_s = 0.000 in



Allowable Stress (ref AWWA D100)

Allowable Stress (s) = 15,000 psi
Joint Efficiency (E) = 0.85
Reduced Allowable Stress (sE) = 12,750 psi

Actual Stresses (per API 620 Sect. 5.10.2.5)

Longitudinal Force = $T_1 = (R_s/2\cos\alpha)[P+W/A_t]$ = 267 lbs/in
Hoop Force = $T_2 = (PR_s/\cos\alpha)$ = 360 lbs/in
Where: R_3 = shell radius = 64.00 in
α = 0.524 rad
P = 4.88 psi
W = 30190 lbs (weight of cone & contents)
A_t = 12868 sq in

Longitudinal stress = 1067 psi < Reduced Allowable Stress -- OK
Hoop Stress = 1441 psi < Reduced Allowable Stress -- OK

Compression Ring @ Cone to Shell Junction (per API 620 Sect. 5.12.4.2)

(This analysis assumes uniform inward radial load & compression around compression ring.)

Contributing length of shell = $w_s = 0.6[R_s(t_s-c_s)]^{0.5}$ = 2.40 in
Contributing length of bottom cone = $w_c = 0.6[R_c(t_c-c_c)]^{0.5}$ = 2.58 in
Where: R_s = 64.0 in
R_c = 73.9 in

Total circumferential force = $Q = T_2w_c + T_{2s}w_s - T_1R_s\sin\alpha$ = -6860 lbs (compression)
Where: T_{2s} = 312 lbs/in

Required area of compression ring region = Q/(sE) = 0.54 sq in
Actual area provided = $A_c = w_s(t_s-c_s)+w_c(t_c-c_c)+A_{\text{comp band \& girder}}$ = 4.24 sq in

Area of compression girder is adequate

Req'd moment of inertia of compression girder = $3QR^2/4E$ = 0.77 in4
Actual moment of inertia of comp ring region = 6.21 in4

Moment of Inertia of compression girder is adequate

Required projection of compression girder = $0.015R_s$ = 0.96 in (per API 620 Sect. 5.12.5.1)
Actual horz projection of compression ring region = 5.04 in (horz proj of cone bottom + 1/2" thk ring)

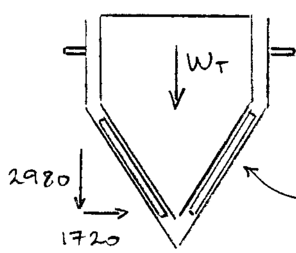
Projection of compression girder is adequate

COMPRESSION RING @ CONE-TO-SHELL JUNCTION

LOAD PATH: WEIGHT OF INNER TANK AND CONTENTS PASSES INTO THE OUTER BOTTOM CONE AT THE POINTS OF THE SPACERS BETWEEN THE TWO CONES. THEN THE LOAD IS CARRIED UP THROUGH THE OUTER TANK SHELL TO THE ANCHORAGE SUPPORT RING.

THIS CREATES DISCREET INWARD RADIAL THRUST LOADS ON THE OUTER TANK COMPRESSION RING AT EACH OF THE (10) SPACER LOCATIONS IN THE BOTTOM CONE.

CHECK COMPRESSION RING FOR THESE (10) EQUAL RADIAL LOADS EQUALLY SPACED



WT OF FULL INNER TANK SITS ON SPACERS. LOAD IS TRANSFERRED TO BOTTOM CONE AT THESE (10) LOCATIONS

W_T = WEIGHT OF TANK AND CONTENTS ≈ 100k

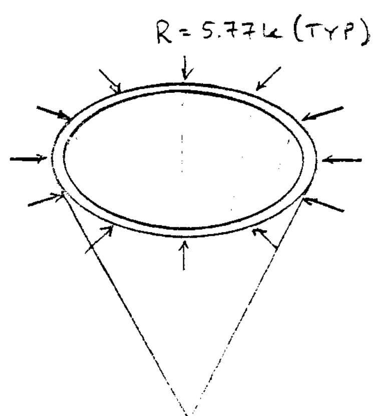
LOAD TRAVELLING UP THROUGH OUTER SHELL $= \dfrac{100k}{\pi(10.67')}$

$= 2980$ plf

RADIAL THRUST INWARD $= (2980 \text{ plf})(\tan 30°) = 1720$ plf

RADIAL LOAD ON COMPRESSION RING @ EACH OF (10) POINTS:

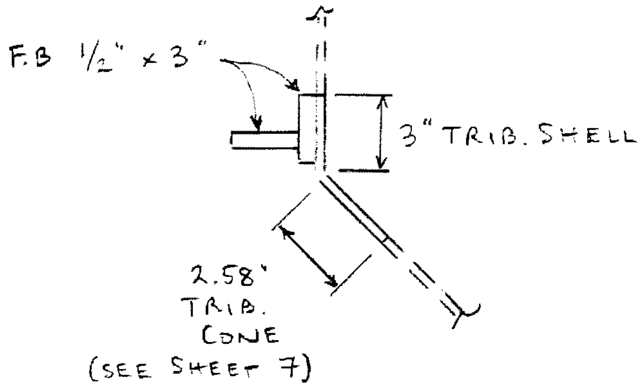
$$R = \frac{(1720 \text{ plf})(\pi)(10.67')}{10} = 5.77k$$



CHECK COMPRESSION RING FOR THIS LOAD CASE

COMPRESSION RING, CONT.

COMPRESSION RING REGION



SECTION PROPS (SEE NEXT SHEET)

$A = 4.395 \text{ in}^2$

$S = 2.15 \text{ in}^3$

THRUST/AXIAL STRESS IN RING:

$$f_a = \frac{T}{A} = \frac{(5.77k)(1.539)}{4.395 \text{ in}^2}$$

$$= 2.0 \text{ ksi (COMPRESSION)}$$

BENDING (AT POINT OF LOAD):

$$f_b = \frac{M}{S} = \frac{(0.0527)(5.77)(64")}{2.15 \text{ in}^3} = 9.1 \text{ ksi}$$

FOR CLASS 1 STEEL:

F_a = ALLOWABLE AXIAL STRESS = 15 ksi (AWWA D100-05 TABLE 6)

F_b = ALLOWABLE BENDING STRESS = 15 ksi (AWWA D100-05 TABLE 7)

$$\text{UNITY CHECK: } \frac{f_a}{F_a} + \frac{f_b}{F_b} = \frac{2.0}{15} + \frac{9.1}{15} = 0.74 < 1.0$$

✓ OK

∴ COMPRESSION GIRDER IS OK FOR AXIAL LOAD & BENDING DUE TO INWARD THRUST LOADS CONCENTRATED AT SPACERS

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Section Properties of Cone-to-Shell Junction

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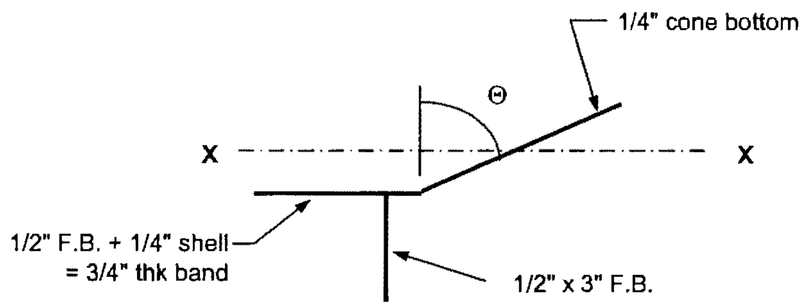

	Previous Area	b	d	Theta	a	h	AREA	Y	AY	AY^2	Io
1	-	0.5	3	0	0.000	3.000	1.500	1.500	2.25	3.4	1.13
2	1	3	0.75	0	3.000	3.750	2.250	3.375	7.59	25.6	0.11
3	2	0.25	2.58	60	3.750	5.040	0.645	4.395	2.83	12.5	0.09
4	3	0	0	0	5.040	5.040	0.000	5.040	0.00	0.0	0.00
5	4	0	0	0	5.040	5.040	0.000	5.040	0.00	0.0	0.00
6	5	0	0	0	5.040	5.040	0.000	5.040	0.00	0.0	0.00
7	6	0	0	0	5.040	5.040	0.000	5.040	0.00	0.0	0.00
8	7	0	0	0	5.040	5.040	0.000	5.040	0.00	0.0	0.00
9	8	0	0	0	5.040	5.040	0.000	5.040	0.00	0.0	0.00
10	9	0	0	0	5.040	5.040	0.000	5.040	0.00	0.0	0.00
					TOTAL AREA =		4.395 in^2		12.68		42.8

TOTAL DEPTH =	5.040 in
CENTROID (Y) = SUM(AY)/SUM(AREA) =	2.885 in
C1 = Y =	2.885 in
C2 = DEPTH - Ybar =	2.155 in
I(total)= [SUM(AY^2)+SUM(Io)]-(AREA)(Y)^2 =	6.211 in^4
Sx1 = I/C1 =	2.15 in^3
Sx2 = I/C2 =	2.88 in^3
Radius of gyration (r) = (I/A)^1/2=	1.189 in

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IBC Wind Design

IBC 2003 Wind Design Pressures

Per ASCE 7-02 Sect. 6.5.13

Lateral Wind Pressure: $P_{LAT} = q_zGC_f =$ **13.4 psf**

Where: Velocity Pressure $(q_z) = 0.00256K_zK_{zt}K_dV^2I =$ 21.29 psf

Height to Top of Structure (h) =	20.0	ft
Basic Wind Speed (V) =	90	mph (3-second gust)
Exposure =	C	
Importance Factor (I) =	1.15	
$K_z =$	0.94	
$K_{zt} = (1+K_1K_2K_3)^2 =$	1.0	
$K_1 =$	1.0	
$K_2 =$	1.0	
$K_3 =$	1.0	
$K_d =$	0.95	

Gust Effect Factor (G) = $0.925[(1+1.7g_QI_zQ)/(1+1.7g_vI_z)] =$ 0.896

$g_Q =$	3.4	
$g_v =$	3.4	
$I_z = c(33/z)^{1/6} =$	0.228	
$c =$	0.2	
$z =$	15	
$Q = [1/(1+0.63[(B+h)/L_z]^{0.63})]^{1/2} =$	0.945	
$B =$	10.67	ft (tank dia)
$L_z = \ell(z/33)^{\varepsilon} =$	427	
$\ell =$	500	
$\varepsilon =$	0.2	

Force Coefficient $(C_f) =$ 0.70 for round tanks

Governing design lateral wind pressure:

	P_w	
Calculated using AWWA D100-05	18.0 psf	(see next sheet)
Calculated per IBC 2003	13.4 psf	

Governing wind pressure: **18.0 psf**

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AWWA Wind Design

(ref AWWA D100-05 Sect. 3.1.4)

AWWA D100-05 Wind Design Pressures

Lateral Wind on Tank Shell:

Maximum of: q_zGC_{fs} = 15.6 psf
or $30C_{fs}$ = 18.0 psf
∴ Shell Wind Load (P_{ws}) = 18.0 psf

Lateral Wind on Cone Bottom:

Maximum of: q_zGC_{fr} = 13.0 psf
or $30C_{fr}$ = 15.0 psf
∴ Cone Bottom Wind Load (P_{wr}) = 15.0 psf

Where:

$q_z = 0.00256K_zIV^2$ = 26.0 psf
K_z = 1.09
I = 1.15
V = 90 mph (3-sec gust)
G = 1.0
C_{fs} = 0.6
C_{fr} = 0.5

Wind Base Shear: $V_{wind} = 1.1[P_{ws}DH_{cyl} + P_{wr}A_{xr}]$ = **2.4 k**

Where: A_{xr} = 49.3 ft^2

Wind OTM:

Overturning moment from wind pressure (conservatively ignore portion of tank above anchor bolt circle):

$M_w = 1.1[(P_{ws})(DH'^2_{cyl}/2) + (P_{wr})(A_{xr})(1/3H_{cone}+H'_{cyl})]$ = **7.9 ft-k**

Where: P_{ws} = 18.0 psf
P_{wr} = 15.0 psf
D = 10.7 ft
H_{cyl} = 7.5 ft
H'_{cyl} = 4.3 ft
H_{cone} = 9.3 ft

Wind OTM stability check: $M_{resist} = (0.6)(W_t)(D/2)$ = **45 ft-k, Therefore tank is stable**

Where: W_t = 14.0 k (empty tank weight less uplift due to int. pressure)

Required shell plate thickness to avoid intermediate shell girders:

$t = (P_whD^{1.5}/10625000)^{0.4}$

h = Distance from top of shell down to point under consideration

h' = Max height of unstiff. shell = $(10625000t_{avg})/[(P_w)(D/t_{avg})^{1.5}]$ = 529.5 ft
Actual Unstiffened Shell Height = 7.50 ft
Shell is stable up to max wind speed of = 847 mph (sustained load)
or = 1017 mph (3-second gust)

Average thickness checks below are corroded thicknesses; thk req'd & thk used are uncorroded thicknesses.
"Min t req'd" takes into account excess material available in rings above to resist wind loads.

Required Shell Thickness

Ring No.	Ring Ht (inches)	Design Point from Top of Tank (h, ft)	Allow. Ht w/o Wind Girder (ft)	Req'd Avg. Thickness this Ht (in)	Actual Avg Thk this Ht (in)	Min t req'd [incl. c.a.] (in)	Thickness Used (in)
1	90	7.50	529.5	0.0455	0.2500	0.0455	0.2500

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Natural Period of Vessel

Natural Period of Vessel:

The natural period of vibration for the vessel structure is calculated as though vessel is a pendulum fixed at anchor bolt circle (distributed mass cantilever). The mass is assumed to be distributed uniformly from the top to the bottom of the vessel. This is a conservative assumption and actual vessel period is shorter than that calculated below. These calculations consider vessel only and do not address support structure.

$\delta = wL^4/(8EI) =$ 0.00344 in

Where: $w =$ 100 lbs/in (virtual load)

$L =$ 201 in

$I = \pi(D_o^4 - D_i^4)/64 =$ 204684 in^4

$K = w/\delta =$ 29093 lbs/in/in

$m = (W_{empty}/L)/g =$ 0.1812 lb-in/sec^2

Circular natural frequency = $\omega = (K/m)^{1/2} =$ 400.70 sec^{-1}

Natural frequency = $f = \omega/2\pi =$ 63.77 Hz

Vessel natural period = $T = 1/f =$ 0.0157 sec

Since period is less than 0.06 sec, Rigid Structure formula ASCE 7-02 Eq. 9.14.5.2 applies

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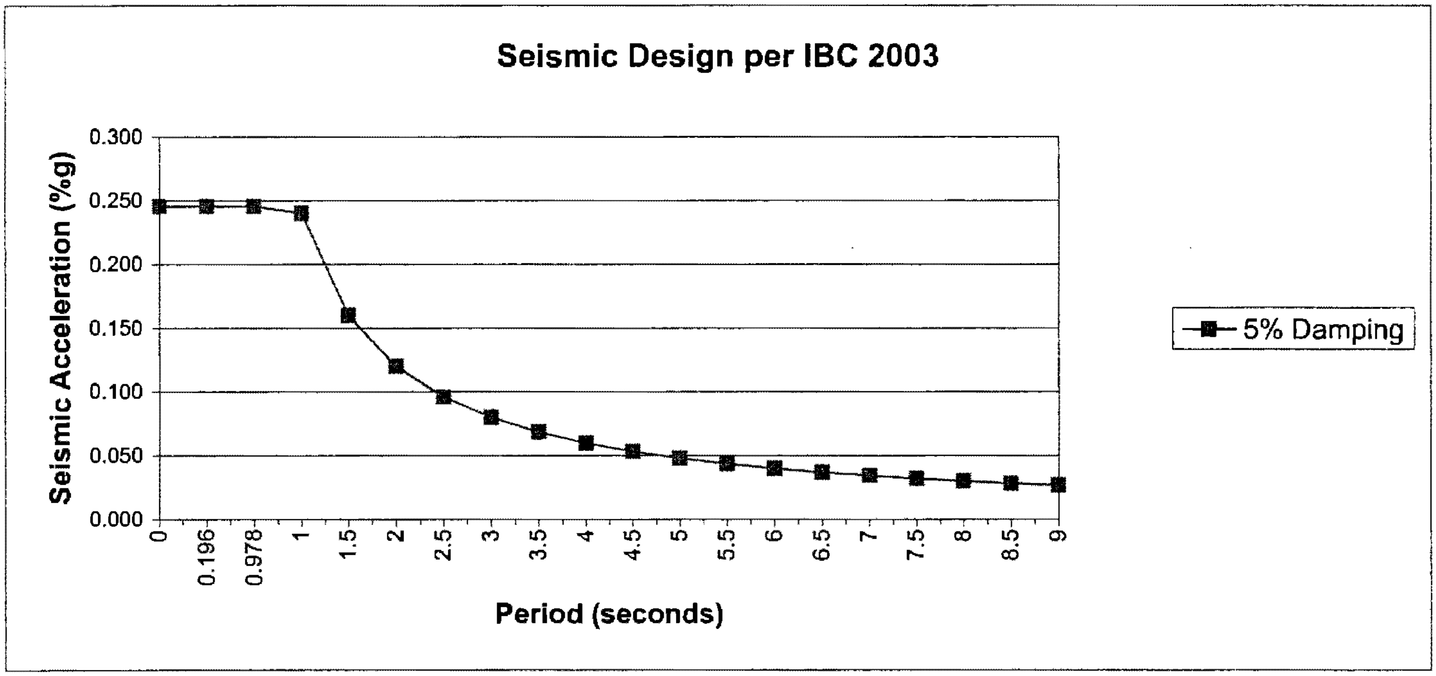
IBC 2003 Seismic Design Acceleration Values

Spent Activated Carbon Slurry Vessel for Siemens Water Treatment Tech. Corp.
(General Procedure)

IBC 2003 Seismic Design Parameters

S_S =	0.230 g	S_{DS} =	0.245 g	
S_1 =	0.150 g	S_{D1} =	0.240 g	
F_a =	1.60	T_O =	0.196 sec	
F_v =	2.40	T_S =	0.978 sec	
S_{MS} =	0.368 g		S_{DS}	S_{D1}
S_{M1} =	0.360 g	5% damped	0.245	0.240



Tank Periods

Impulsive (T_i) = 0.0157 sec

IBC/ASCE 7-02 Design Values: $A_i = C_s = S_{DS}I_e/R$ = 0.123 g

Where: Reduction Factor for Inelastic Design (R) = 3 (at anchorage of tank-to-supports)

I_e = 1.5 (Seismic Use Group III)

Check min. req'd seismic impulsive accelerations:

ASCE 7-02 Eq 9.14.5.1-1:	$A_{i(min)} = 0.14S_{DS}I_e$ =	0.052 g	< 0.123g -- Does not govern
Eq 9.14.5.1-2:	$A_{i(min)} = 0.8S_1I_e/R$ =	0.060 g	< 0.123g -- Does not govern
Eq 9.14.5.2:	$A_{i(min)} = 0.3S_{DS}I_e$ =	0.110 g	< 0.123g -- Does not govern

IBC 2003: Ai (impulsive acceleration) = 0.123 g

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By: John F. Bradley, S.E.
February 9, 2007

Customer: Siemens Water Technologies Corp.
Location: Parker, Arizona
Double Wall SS304 Carbon Filter Tank
AWWA D100-05, IBC 2003

IBC 2003 Seismic Design Loads

IBC 2003 Seismic Design Loads: (ref ASCE 7-02 Sect. 9.14 - Nonbuilding Structures)

Base Shear: (ref ASCE 7-02 Eq. 9.5.5.2-1)

Vessel full:	$V_{s\text{-}full} = A_iW_{full}/1.4 =$	**9.0 k**	GOVERNS
	Where: Design acceleration = $A_i = C_s =$	0.123 g	
	$W_{full} =$	102.5 k	
Vessel empty:	$V_{s\text{-}empty} = A_iW_{empty}/1.4 =$	**1.2 k**	
	$W_{empty} =$	14.0 k	

Overturning Moments:

Vessel full:	$M_{s\text{-}full} = (V_{s\text{-}full})(CG_{full}) =$	**35.9 ft-k**	GOVERNS
	Where: $CG_{full} =$	4.0 ft	
Vessel empty:	$M_{s\text{-}empty} = (V_{s\text{-}empty})(CG_{empty}) =$	**6.9 ft-k**	
	Where: $CG_{empty} =$	5.6 ft	

Notes:
Centers of gravity are distances below bolt circle.
Roof, product, and shell above bolt circle are conservatively ignored in CG calculations.

Resisting Moments:

Vessel full:	$M_{resist} = (0.6)(W_{full})(D/2) =$	**328 ft-k,**	**Therefore tank is stable**
Vessel empty:	$M_{resist} = (0.6)(W_{empty})(D/2) =$	**45 ft-k,**	**Therefore tank is stable**

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AWWA D100-05 Seismic Design Values

Tank Data

	$D =$	10.7 ft	Tank diameter
	$H =$	16.75 ft	Design liquid level

General Procedure Response Spectrum

$S_S =$	0.230 g	Max spectral response acceleration @ short periods (from USGS maps)
$S_1 =$	0.150 g	Max spectral response acceleration @ 1-sec period (from USGS maps)
Site Class =	D	Use Site Class D unless specified otherwise
Seismic Use Group:	3	Use Seismic Use Group III unless specified otherwise
$I_E =$	1.50	Seismic importance factor

Is tank anchored?	y	$R_i =$	3.0	Response modification factor, impulsive component
		$R_c =$	1.5	Response modification factor, convective component

$F_a =$	1.6	Acceleration-based site coefficient
$F_v =$	2.2	Velocity-based site coefficient
$S_{MS} = F_aS_S =$	0.368 g	Max spectral acceleration @ short periods, adjusted for site class effects
$S_{M1} = F_vS_1 =$	0.330 g	Max spectral response acceleration @ 1-sec period, adjusted for site class effects
$S_{DS} = US_{MS} =$	0.245 g	Design response spectra value for short periods
$S_{D1} = US_{M1} =$	0.220 g	Design response spectra value for 1-sec period
$U =$	0.667	Scaling factor

Design response value for impulsive components:

$T_i =$	N/A ($< T_S$)	Natural period of structure
$T_L =$	8.00	Region-dependent transition period for longer period ground motion (check maps)
$T_S = S_{D1}/S_{DS} =$	0.897 s	
$S_{ai} = S_{DS} =$	0.245 g	

Design response value for convective components:

$T_c =$ 1.885 s $= 2\pi\{D/[(3.68g)(\tanh(3.68H/D))]\}^{1/2}$

Design Accelerations

$A_i = S_{ai}I_E/1.4R_i =$	**0.088 g**	
$A_v = 0.14S_{DS} =$	**0.034 g**	ref Sect 13.3.3.6 or 13.5.4.3
$A_{i(min)} = 0.36S_1I_E/R_i =$	0.027 g	OK -- Doesn't govern

Freeboard

Group 3	$T_c < T_L$, $d =$	**0.93 ft**	$= 0.5DA_f$	REQUIRED
	$A_f = KS_{D1}/T_c =$	0.175 g	Convective design acceleration for sloshing	
	$K =$	1.5		

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AWWA D100-05 Seismic Design Loads

Seismic Base Shear (Shear at anchor bolt circle)

$V_{actual} = (A_i)(W_s+W_r+W_f+W_T) =$ **9.0 k**

Where: $A_i =$ 0.088 g (impulsive acceleration)

$W_s =$ 7.0 k (wt of double tank shell)

$W_r =$ 2.6 k (wt of tank roof & weir)

$W_f =$ 4.4 k (wt of tank double cone bottom)

$W_T =$ 89 k (wt of tank contents)

Seismic Overturning Moment: (OTM at anchor bolt circle)

Conservatively ignore roof and tank contents above anchor bolt circle.

$M_{actual} = (A_i)(W_sX_s+W_fX_f+W_TX_T) =$ **35.2 ft-k**

Where: $X_s =$ 2.13 ft

$X_f =$ 7.33 ft

$X_T =$ 4.00 ft

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Shell Tension Due to Wind & Seismic OTM per IBC 2003

(Load Combinations per IBC 2003, Allowable Stresses per AWWA)

Check Tension in Shell: Allowable Stress Design; gov. Load Combinations: (ref IBC 2003 Sect. 1605.3.1)
1) D + W
2) D + L + 0.7E

Check tank shell for tension due to OTM:
Critical case is at underside of anchor bolt circle due to rocking of tank.

Allowable tensile stress = F_t = 15 ksi x 0.85 x 1.33 = 17.0 ksi for wind & seismic loading
(ref AWWA D100-05, Sect 13.5.4.2.4)

Case 1: Wind OTM on empty tank

$f_{tw} = (W_{tank\text{-}empty})/A + (M_w/S) =$ 0.17 ksi
Where: $A = \pi t(D_o - t_{corr}) =$ 100.3 in^2
$S = \pi(D_o^4 - D_{i(corr)}^4)/(32D_o) =$ 3198 in^3
$M_w =$ 7.9 ft-k
$W_{tank\text{-}empty} =$ 14 k

Since actual shell tensile stress < allowable, shell is OK for Case 1

Case 2: Seismic OTM on full tank

$f_{ts} = (W_{tank\text{-}full})/A + (M_{s\text{-}full})/S =$ 1.16 ksi
Where: $M_s =$ 35.9 ft-k
$W_{tank\text{-}full} =$ 102.5 k

Since actual shell tensile stress < allowable, shell is OK for Case 2

Therefore Shell is OK for Tensile Loads due to Wind or Seismic

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Double Wall SS304 Carbon Filter Tank
AWWA D100-05, IBC 2003

Shell Compression Due to Wind & Seismic OTM per IBC 2003

(Loads & Load Combinations per IBC 2003, Allowable Stresses per AWWA D100-05)

Check Compression in Shell: Allowable Stress Design; gov. Load Combinations: 1) D + W
(ref IBC 2003 Sect. 1605.3.1) 2) D + L + 0.7E

Check tank shell for compression due to OTM:
Critical case is at top side of anchor bolt ring due to rocking of tank.

Allowable Stress:
Material = SS304 F_a = 8.65 ksi x 1.33 = 10.38 ksi for A36, wind & seismic loading
(ref AWWA 13.5.4.2.4)

Actual Stresses:

Wind:	$f_{cw} = (W_{upper\ tank})/A + M_w/S$ =	0.089 ksi	**< F_a - Shell is OK**
Seismic:	$f_{cs} = (W_{upper\ tank})/A + M_s/S$ =	0.195 ksi	**< F_a - Shell is OK**
	Where: M_w =	7.9 ft-k	
	M_s =	35.9 ft-k	

<u>Therefore Shell is OK for Wind & Seismic Overturning Compressive Loads</u>

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Double Wall SS304 Carbon Filter Tank
AWWA D100-05, IBC 2003

Stiffened Roof Design

Roof consists of 3/16" flat plate with L4x4x3/8 angles formed from SS304 plate.
Maximum actual stiffener spacing = 4'-0" o.c. Max allowable spacing = 7'-0" o.c. per AWWA D100-05 Sect. 3.6.1.7.

Roof Live Load (L) =	25	psf
Roof Plate Dead Load (D) =	8.42	psf
Self weight of angle (D) =	10.8	plf
Extra point load at center (P) =	200	lbs (nozzle, hatch, etc)
Length of stiffener (L_{raft}) =	9.25	ft

Allowable Bending Stress

Allowable bending stress (F_b) = **15000 psi** (ref. AWWA D100-05 Table 7, Class 1 material)

Actual Bending Stresses

Case 1: D + L

Allowable Stress Design; gov. Load Combination: 1) D + L (ref IBC 2003 Sect. 1605.3.1)

Maximum bending moment = $w_{(D+L)}L_{raft}^2/8 + PL_{raft}/4$ = 2008 ft-lbs

Where: $w_{(D+L)}$ = 144 plf

Actual bending stress (f_b) = M/S = **4678 psi -- OK**

Where: S = 5.15 in^3 (see sheet following)

Case 2: D + Ponding on Roof (Two 3/4" dia holes are drilled near bottom center sections of L4x4x3/8 rafters to prevent rain accumulation in 4' square center section of roof)

Actual rafter deflection per above loads = 0.072 in

Conservatively assume 1" of water on roof = 5.20 psf

Maximum bending moment = $w_{(D+Ponding)}L_{raft}^2/8 + PL_{raft}/4$ = 1161 ft-lbs

Where: $w_{(D+Ponding)}$ = 65 plf

Actual bending stress (f_b) = M/S = **2705 psi -- OK**

Since actual bending stress is less than allowable, roof & stiffeners are OK

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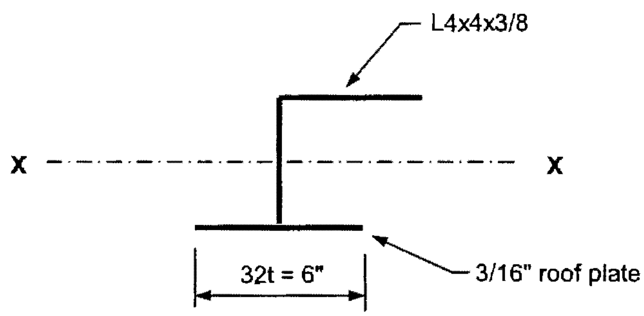
Section Properties of Composite Roof Stiffener

Section Properties of Stiffened Roof Section



	Previous Area	b	d	Theta	a	h	AREA	Y	AY	AY^2	Io
1	-	6	0.1875	0	0.000	0.188	1.125	0.094	0.11	0.0	0.00
2	1	0.375	3.625	0	0.188	3.813	1.359	2.000	2.72	5.4	1.49
3	2	4	0.375	0	3.813	4.188	1.500	4.000	6.00	24.0	0.02
4	3	0	0	0	4.188	4.188	0.000	4.188	0.00	0.0	0.00
5	4	0	0	0	4.188	4.188	0.000	4.188	0.00	0.0	0.00
6	5	0	0	0	4.188	4.188	0.000	4.188	0.00	0.0	0.00
7	6	0	0	0	4.188	4.188	0.000	4.188	0.00	0.0	0.00
8	7	0	0	0	4.188	4.188	0.000	4.188	0.00	0.0	0.00
9	8	0	0	0	4.188	4.188	0.000	4.188	0.00	0.0	0.00
10	9	0	0	0	4.188	4.188	0.000	4.188	0.00	0.0	0.00
					TOTAL AREA =		3.984 in^2		8.82		31.0

TOTAL DEPTH = 4.188 in
CENTROID (Y) = SUM(AY)/SUM(AREA) = 2.215 in
C1 = Y = 2.215 in
C2 = DEPTH - Ybar = 1.973 in

I(total)= [SUM(AY^2)+SUM(Io)]-(AREA)(Y)^2 = 11.41 in^4
Sx1 = I/C1 = 5.15 in^3
Sx2 = I/C2 = 5.79 in^3
Radius of gyration (r) = (I/A)^1/2= 1.693 in

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Fresno, California
By: John F. Bradley, S.E.
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Double Wall SS304 Carbon Filter Tank
AWWA D100-05, IBC 2003

Anchor Ring Design

Analysis of Bracket Load on Cylindrical Tank

Case 1: D + L

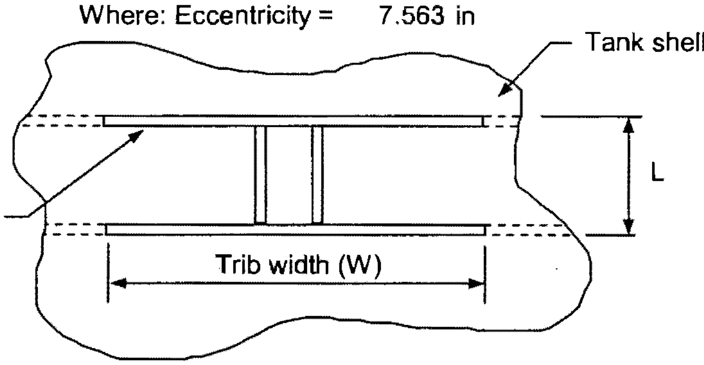
(Consider continuous anchorage ring as eight shell brackets of equivalent tributary width)

Tank Shell - Material & Dimensions

Tank Radius (R) =	64	in
Shell Thickness (t) =	0.250	in
Longitudinal Stress (S_L) =	50	psi
Hoop Stress (S_H) =	400	psi
Allowable Stress (S_m) =	12750	psi
Yield Stress (F_y) =	30000	psi
Alowable Stress Increase (k)=	1.00	
Tensile Stress =	75000	psi

Shell Bracket - Dimensions & Loads

Bracket Width (W) =	50.3	in (= 1/8 tank circ)
Bracket Length (L) =	12.75	in
Longitudinal Moment (M) =	95666	in-lbs = (W_{full})(eccent)/8
Radial Load (Q) =	0	lbs
Where: Eccentricity =	7.563	in



Allowable Loads

Max. allowable loading limiting longitudinal stress to $0.75F_y$:

$M_1 = (0.035WkF_yt^2)[6+6\beta L+(\beta L)^2] =$ 156200 in-lbs

$Q_1 = (0.208WkF_yt^2\beta)(2+\beta L) =$ 38390 lbs

Where: $\beta = 1.285/(Rt)^{1/2} =$ 0.3213

Max. allowable loading limiting circumferential stress to $0.75F_y$:

$M_2 = (0.063WkF_yt^2)[6+6\beta L+(\beta L)^2] =$ 281160 in-lbs

$Q_2 = (0.379WkFyt^2\beta)(2+\beta L) =$ 69951 lbs

Unity Checks

1)	$M/M_1 + Q/Q_1 =$	0.612		**< 1.0 OK!**
2)	$M/M_2 + Q/Q_2 =$	0.340		**< 1.0 OK!**
3)	$(M/M_1 + Q/Q_1)(0.75F_y)(k) + S_L =$	13830	**(psi)**	**< 3 Sm OK!**
4)	$(M/M_1)(0.75F_y)(k) + S_L =$	13830	**(psi)**	**< 1.5 k Sm OK!**
5)	$(M/M_2 + Q/Q_2)(0.75F_y)(k) + S_L =$	8056	**(psi)**	**< 3 Sm OK!**
6)	$(M/M_2)(0.75F_y)(k) + S_L =$	8056	**(psi)**	**< 1.5 k Sm OK!**

Where:

3 Sm = 38250 (psi) but not greater than 75000 (psi)

1.5 k Sm = 19125 (psi)

Therefore Anchor Bracket is OK for Case 1: D + L

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Anchor Ring Design, cont

Analysis of Bracket Load on Cylindrical Tank

Case 2: D + L + 0.7E

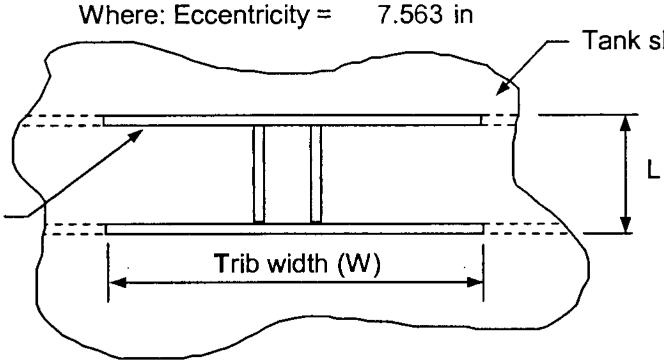
(Consider continuous anchorage ring as eight shell brackets of equivalent tributary width)

Tank Shell - Material & Dimensions

Tank Radius (R) =	64	in
Shell Thickness (t) =	0.250	in
Longitudinal Stress (S_L) =	1200	psi
Hoop Stress (S_H) =	400	psi
Allowable Stress (S_m) =	12750	psi
Yield Stress (F_y) =	30000	psi
Alowable Stress Increase (k)=	1.33	
Tensile Stress =	75000	psi

Shell Bracket - Dimensions & Loads

Bracket Width (W) =	50.3	in (= 1/8 tank circ)
Bracket Length (L) =	12.75	in
Longitudinal Moment (M) =	106666	in-lbs = (D+L+0.7E)(eccent)
Radial Load (Q) =	0	lbs
Where: Eccentricity =	7.563	in



Allowable Loads

Max. allowable loading limiting longitudinal stress to $0.75F_y$:

$M_1 = (0.035WkF_yt^2)[6+6\beta L+(\beta L)^2] =$ 207746 in-lbs

$Q_1 = (0.208WkF_yt^2\beta)(2+\beta L) =$ 51059 lbs

Where: $\beta = 1.285/(Rt)^{1/2} =$ 0.3213

Max. allowable loading limiting circumferential stress to $0.75F_y$:

$M_2 = (0.063WkF_yt^2)[6+6\beta L+(\beta L)^2] =$ 373942 in-lbs

$Q_2 = (0.379WkFyt^2\beta)(2+\beta L) =$ 93035 lbs

Unity Checks

1)	$M/M_1 + Q/Q_1 =$	0.513	**< 1.0 OK!**
2)	$M/M_2 + Q/Q_2 =$	0.285	**< 1.0 OK!**
3)	$(M/M_1 + Q/Q_1)(0.75F_y)(k) + S_L =$	16565 **(psi)**	**< 3 Sm OK!**
4)	$(M/M_1)(0.75F_y)(k) + S_L =$	16565 **(psi)**	**< 1.5 k Sm OK!**
5)	$(M/M_2 + Q/Q_2)(0.75F_y)(k) + S_L =$	8936 **(psi)**	**< 3 Sm OK!**
6)	$(M/M_2)(0.75F_y)(k) + S_L =$	8936 **(psi)**	**< 1.5 k Sm OK!**

Where:

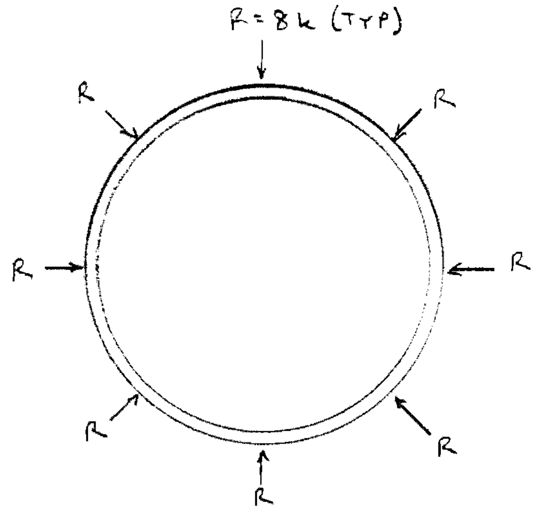
3 Sm = 38250 (psi) but not greater than 75000 (psi)

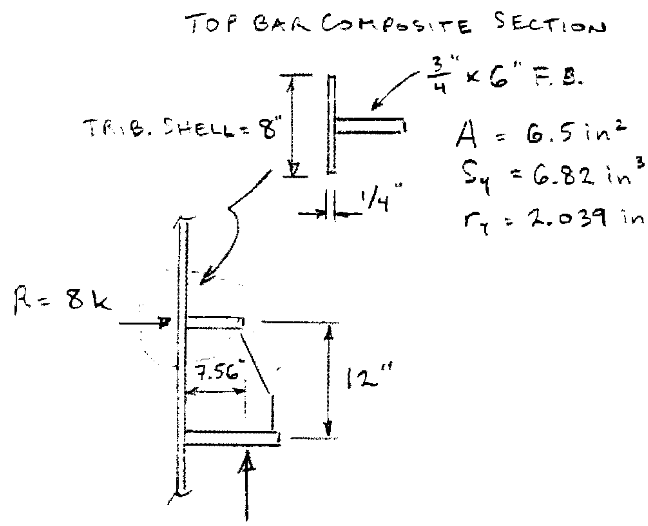
1.5 k Sm = 25436 (psi)

Therefore Anchor Bracket is OK for Case 2: D + L + 0.7E

ANCHOR RING, CONT.

CHECK TOP PL AS CONTINUOUS RING GIRDER
SUBJECT TO (8) EQUIVALENT RADIAL POINT LOADS.





$P_{D+L} = \frac{102.5}{8} = 12.8k$

[REF. ONLY – SEISMIC CASE DOESN'T GOVERN: $P_{seis} = \frac{4M}{nd} = \frac{4(50.3)}{(8)(11.96')} = 2.1k$

MAX STRESS DUE TO THRUST/AXIAL LOAD $= \frac{R}{A}$

$= \frac{(1.207)(8k)}{6.5 in^2}$

$= 1.49$ ksi

MAX STRESS DUE TO BENDING $= \frac{M}{S} = \frac{(0.066)(8k)(64")}{6.82 in^3}$
(@ PT. OF LOAD)

$= 4.95$ ksi

ALLOWABLE STRESSES:

$Kl/r = \frac{50.3"}{2.039"} = 25 \longrightarrow F_a = 15$ ksi

$F_b = 15$ ksi (AWWA D100-05 TABLE 7)

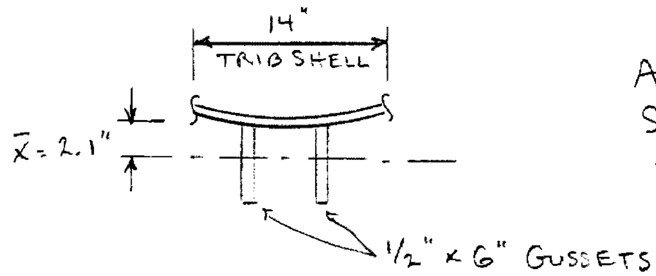
UNITY CHECK:

$\frac{f_a}{F_a} + \frac{f_b}{F_b} = \frac{1.49 + 4.95}{15} = 0.43 < 1.0$ ✓OK

∴ TOP PL IS OK FOR BENDING & THRUST DUE 8 EQUAL
RADIAL LOADS AT ANCHOR CHAIRS

ANCHOR RING, CONT

CHECK BUCKLING OF GUSSET PL's:



$A_x = 9.5 \text{ in}^2$
$S_x = 9.54 \text{ in}^3$
$r = 2.04 \text{ in}$

$$\text{AXIAL STRESS} = \frac{P}{A} = \frac{12.8k}{9.5 \text{ in}^2} = 1.4 \text{ ksi}$$

$$\text{BENDING STRESS} = \frac{M}{S_x} = \frac{(12.8k)(7.56" - 2.1")}{9.54 \text{ in}^3} = 7.3 \text{ ksi}$$

ALLOWABLE STRESSES:

$$\frac{K\ell}{r} = \frac{12"}{2.04"} = 6 \longrightarrow F_a = 15 \text{ ksi}$$

F_b = 15 ksi (AWWA D100-05, TABLE 7)

UNITY CHECK:

$$\frac{f_a}{F_a} + \frac{f_b}{F_b} = \frac{1.4 + 7.3}{15} = 0.58 < 1.0 \quad \checkmark \text{OK}$$

∴ GUSSET PLATES IN ANCHOR RING ARE OK

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By: John F. Bradley, S.E.
February 9, 2007

Customer: Siemens Water Technologies Corp.
Location: Parker, Arizona
Double Wall SS304 Carbon Filter Tank
AWWA D100-05, IBC 2003

Required Reinforcement @ Shell Penetration

Tank	
Tank Inside Diameter =	10.67 ft
Max liquid level in tank =	16.75 ft
Does hydrostatic load govern?	yes

Shell	
Shell Plate Material =	SS304
Allowable Stress =	15000 psi
Actual Shell Thickness @ Cutout =	0.25 in
Required Shell Thk @ Base of Ring =	0.025 in
Corrosion Allowance =	0 in

Nozzle		
Nozzle Description =	6" Weir Nozzle	
Type (manway = "M" or pipe = "P"):	p	
Outside Dia of Pipe =	6.625 in	
Nozzle elevation (above tank bott) =	195 in	
Nozzle Material =	SS304	
Allowable Stress =	15000 psi	
Corroded nozzle neck thickness =	0.28 in	Thickness to eliminate repad = 0 "
Design thk (reduced for underruns) =	0.2450 in	
Length of nozzle neck =	9.25 in	
Inside projection =	0 in	
Outside projection =	9 in	Use 0.98 in. = max allowed

Design

Method: Replace cross-sectional cutout area based on gross (g) or required (r) shell thickness? r

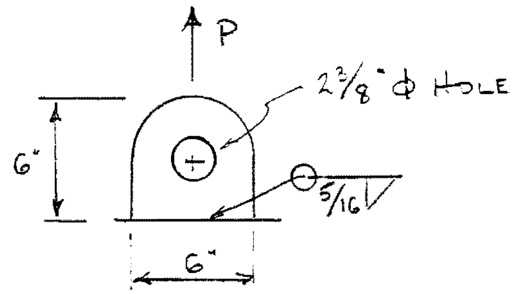
Required Shell Plate Area Cutout =	0.16 in^2	**Replace this cutout area with an equal amount of steel In the nozzle neck, excess shell plate, or repad per AWWA (ref AWWA Sect. 3.13).**
Excess shell area available =	1.49 in^2	
Nozzle neck area available =	0.60 in^2	
Total =	2.10 in^2	
Area to be provided by repad =	0.00	**Repad Not Req'd**

No Reinforcing Plate Required -- Sufficient Reinforcement Provided in Other Areas

Since nozzles in cone bottom are 4" or less, no additional reinforcing req'd per AWWA D100-05 Section 3.13

Drafting	
Weld of nozzle to shell =	1/4 " (min)

LIFT LUGS ($\frac{1}{2}$" PL)



ACTUAL LOAD PER LUG $= \frac{14k}{4} = 3.5\ k/\text{LUG}$

DESIGN FOR LIFT w/ FACTOR OF SAFETY = 5.0

LUG

CHECK ACTUAL VS. ASD ALLOWABLE:

$$f_v = \frac{3.5k}{(\frac{1}{2}")(1.81")} = 3.9\ ksi < F_v = 0.4(30) = 12\ ksi$$

✓ OK

CHECK LOAD × F.O.S. VS. YIELD:

$$f_v' = \frac{(3.5k)(5)}{(\frac{1}{2}")(1.81")} = 19.3\ ksi < F_y = 30\ ksi$$

✓ OK

ATTACHMENT WELD

F.O.S.

$$\text{STRESS IN WELD} = \frac{(3.5k)(5)}{(\frac{5}{16}")(0.707)(13")} = 6.1\ ksi$$ ✓ OK

∴ LIFT LUGS & ATTACHMENT WELDS ARE OK ✓

Modern Custom Fabrication, Inc.
Fresno, California
By: John F. Bradley, S.E.
February 9, 2007

Customer: Siemens Water Technologies Corp.
Location: Parker, Arizona
Double Wall SS304 Carbon Filter Tank
AWWA D100-05, IBC 2003

Support Structure Design Loads

Design Criteria:

Tank Outside Diameter =	**10.67**	ft
Maximum Product & Hydrotest Height =	**16.50**	ft
Product Specific Gravity =	**1.50**	
Roof Live Load =	**25**	psf

Shear at Anchor Bolt Circle:

Wind =	**2.4**	k
Seismic =	**9.0**	k

Overturning Moments at Anchor Bolt Circle:

Wind Overturning Design Moment (Tank Empty) =	**7.9**	ft-k
Seismic Overturning Design Moment (Tank Full) =	**35.9**	ft-k

Weights of Tank & Contents:

Weight of Empty Tank =	**14**	k	↓
Total Weight of Product in Full Inner Tank =	**83**	k	↓
Total Weight of Product in Full Inner + Outer Tank =	**89**	k	↓
Total Weight of Tank + Inner Shell Full of Product =	**97**	k	↓
Total Weight of Tank + Inner & Outer Shells Full of Product =	**103**	k	↓
Weight of Water in Tank =	**59**	k	↓

Anchor Bolt Design Loads: **Use (8) Anchor Bolts Around (Design by Others)**

Max Uplift due to Seismic OTM on Full Tank =	**1.7**	k/bolt	↑
Max Uplift due to Wind OTM =	**0.4**	k/bolt	↑
Max Shear due to Seismic Loads =	**1.1**	k/bolt	
Max Shear due to Wind Loads =	**0.3**	k/bolt	
Tank Dead Load Resisting Uplift =	**1.8**	k/bolt	↓
Tank + Inner Shell Full of Product Load Resisting Seismic Uplift =	**12.1**	k/bolt	↓

Notes:

1) Above loads are unfactored, service level design loads.
2) Weights of tank contents above consider tank as full to top of shell.

Exhibit B - Design Standards

Structural Calculations for T-18 Support Steel

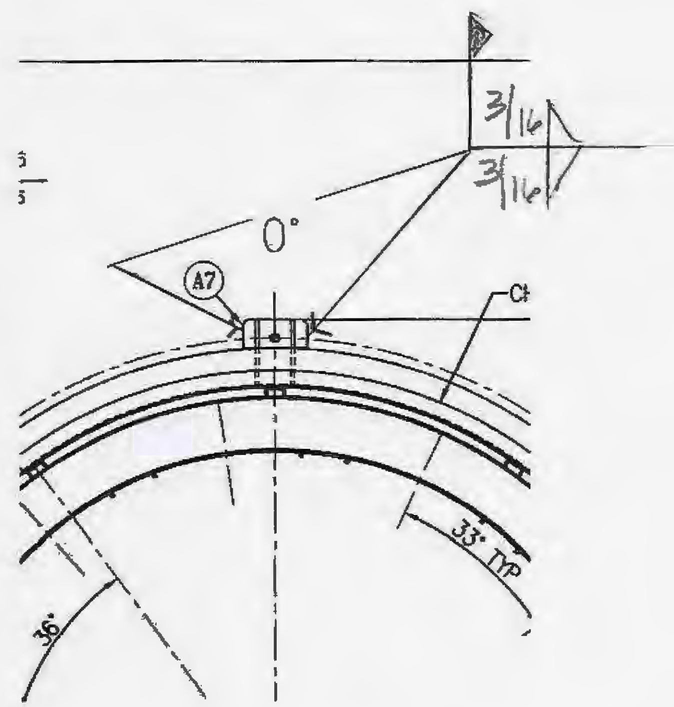
DESIGNED BY CD DATE 2/26/07
CHECKED BY______DATE______

CLIENT: SIEMENS WATER TECHNOLOGIES

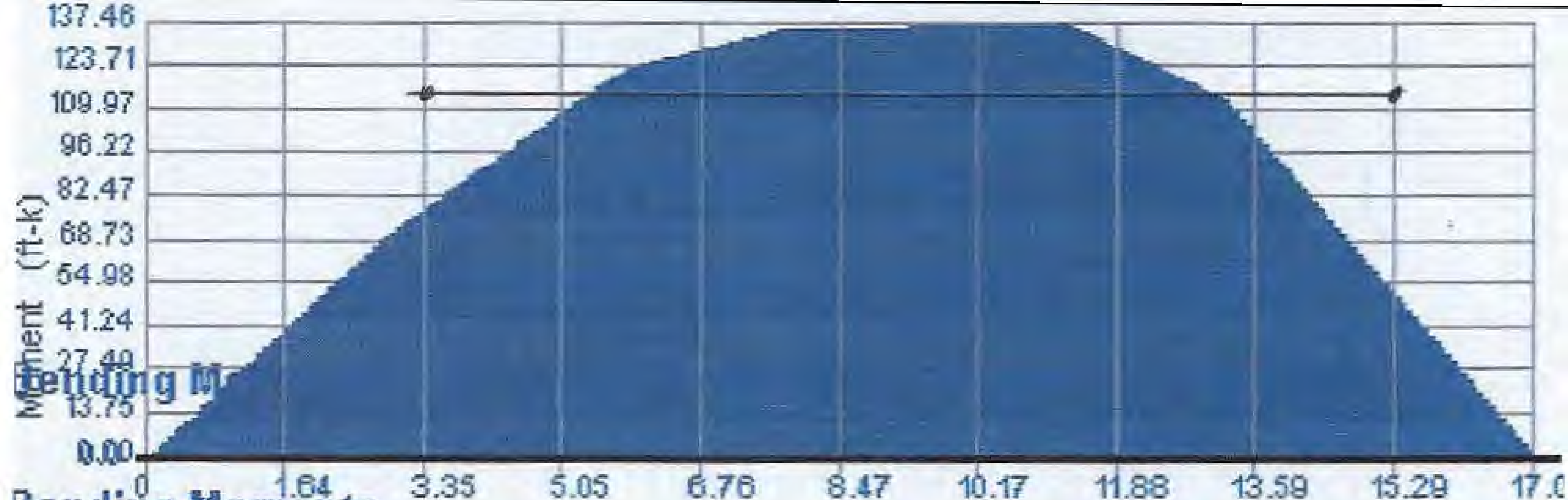
C.D.S.E.

CHARLES J. DOELL, P.E.
CONSULTING STRUCTURAL ENGINEER

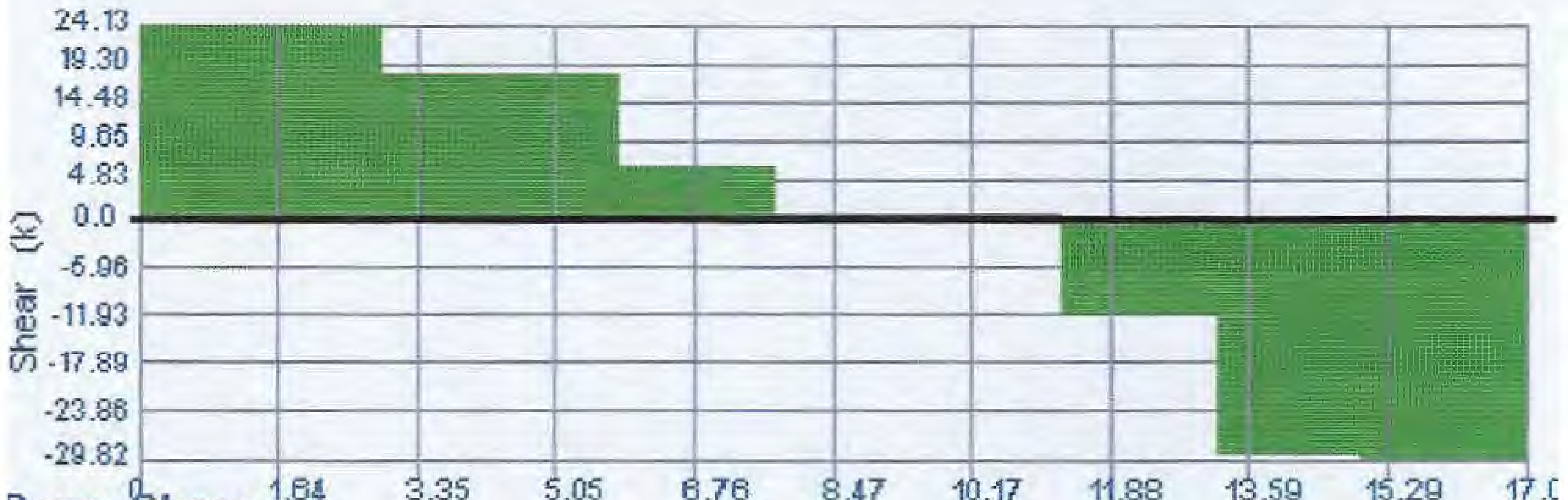
19775
CHARLES JOSEPH
DOELL
Date Signed 2/26/07



PLAN OF TANK LUG

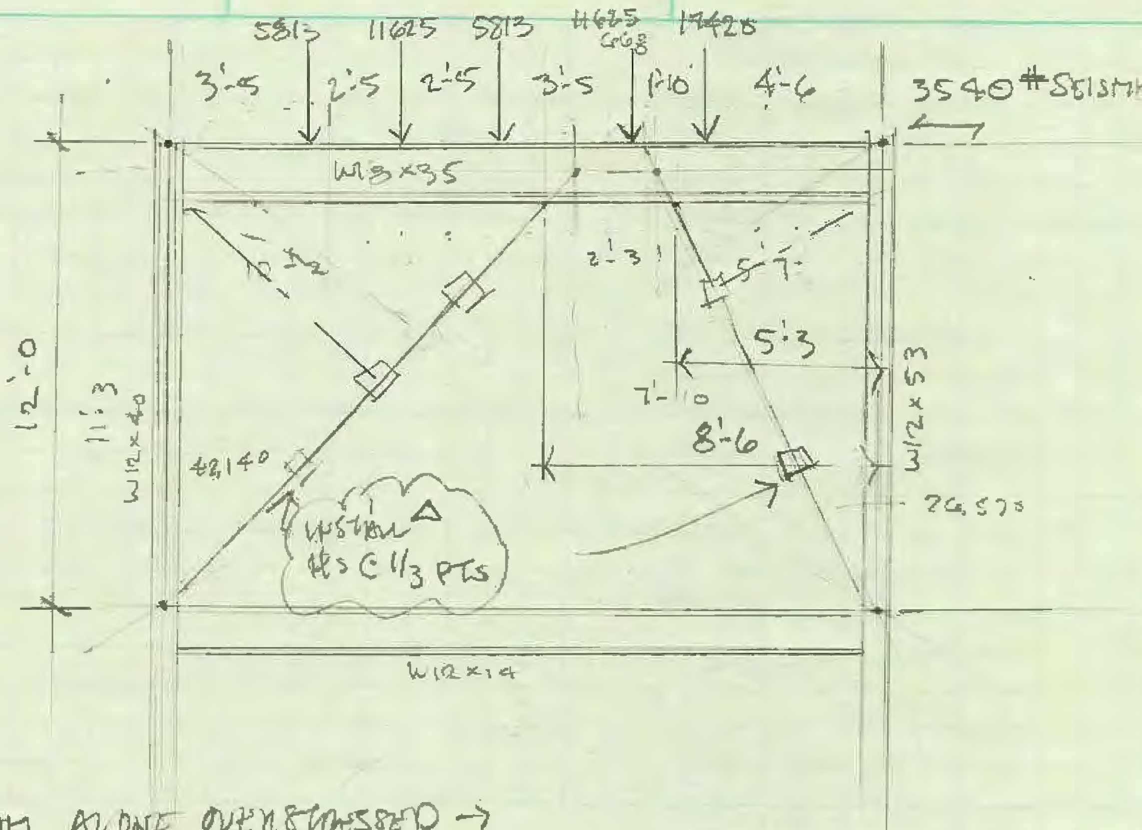


Bending Moments



Beam Shear

BCB
W18x35
L=18'



BEAM ALONE OVERSTRESSED →

$M = 141.7^{1\text{-}k}$ 137.5

$M_a = 57.6(2) = 115.2^{1\text{-}k}$

$\Delta M = 22.3^{1\text{-}k}$

$S = 11.2 = \frac{I}{8.85}$

$I = 98.7 \text{ in}^4 - 2A(4.5)^2 \quad A = 2.44 \text{ in}^2$

BAR $1\frac{1}{2}''\phi$ x 15' LG CENTER BETW COLUMNS

1) Reinforce Beam with BAR $1\frac{1}{2}\phi$

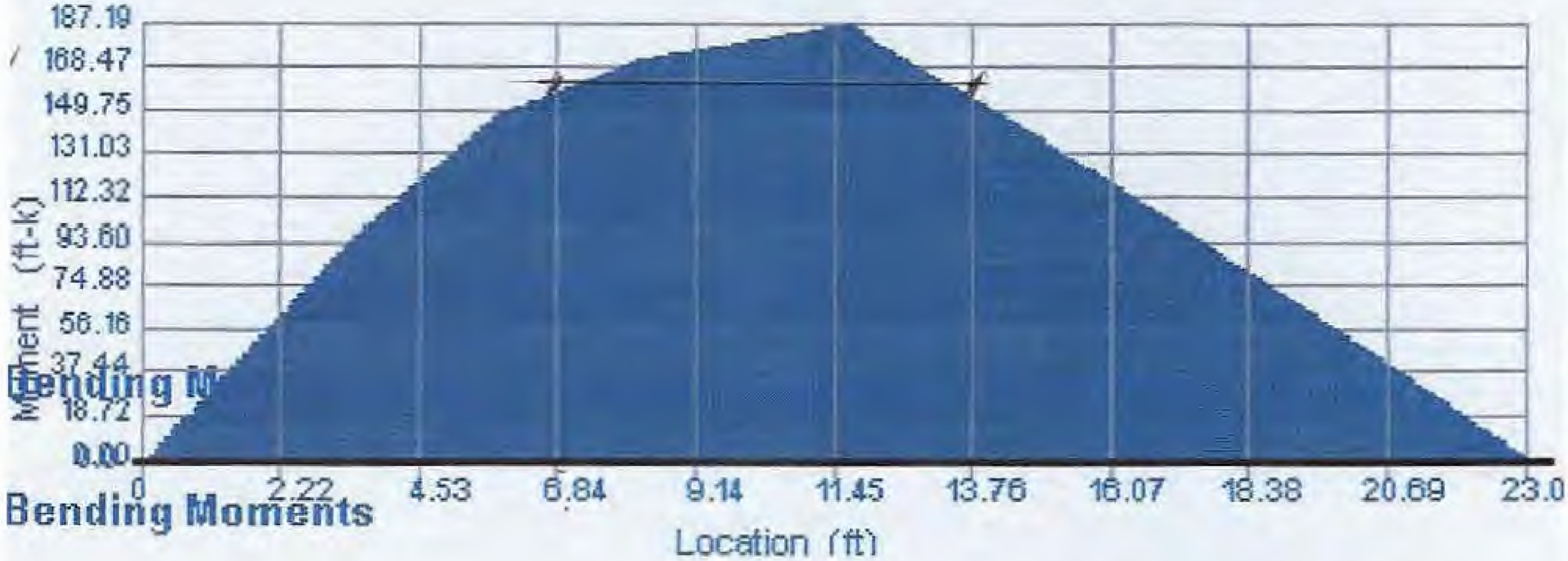
2) STRENGTHEN BRACES WITH SECONDARY

$I = 510 + 2(2.25)(4.5)^2 = 601 \text{ in}^4$

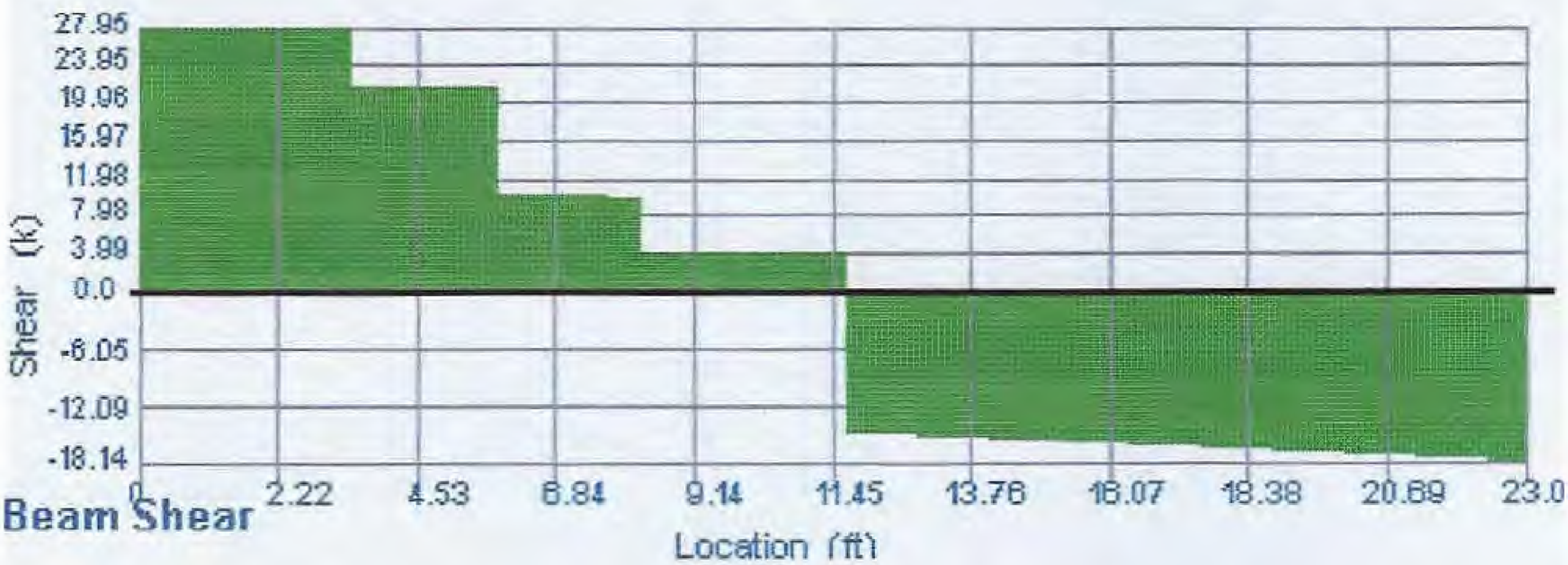
$f_b = \frac{137.5(12)\,8.85}{601} = 24.3 \text{ ksi}$ (OK)

$f_{b_{BAR}} = \frac{137.5(12)(5.25)}{601} = 14.4 \text{ ksi}$

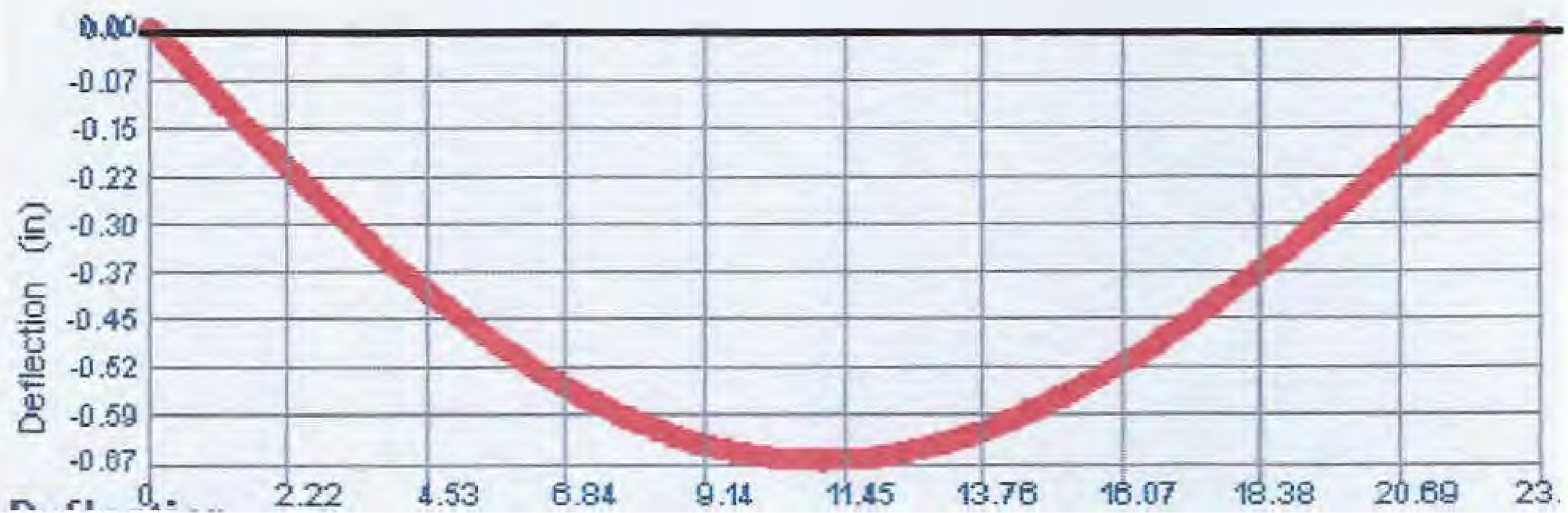
$F = 32.4^k / 2(.3)14.4 = 4''$
$2(.928)3 = 5.6 - 6''$



Bending Moments



Beam Shear

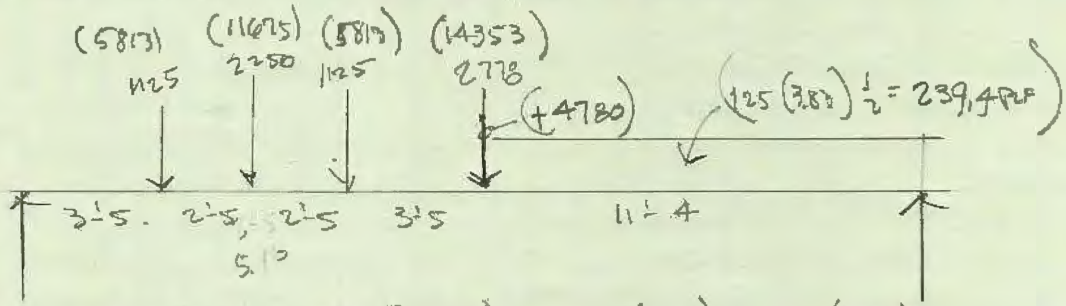


CHECK $M = 25283(11.17) - \frac{125(11.17)^2}{2} - 5813(8.25) - 11626(5.83)$
$- 5813(3.42) = 138996$ —

$f_b = \frac{138996(12)}{57.6} = 28957$ psi $>> 24000$
$< .66F_y \quad F_y \to 43875$ —

∴ Reinforce — use WT9×17.5

B13
W21X44
L = 23
S = 81.6



$\Sigma R = \frac{2778(11.33) + 1125(14.75) + 2250(17.17) + 1125(19.58)}{23}$

$= 4727$#

$\Sigma M = 4727(11.67) - 1125(3.42) - 2250(5.83) - 1125(8.25)$
$= 28918$ '-#

$f_b = \frac{28918(12)}{81.6} = 4253$ psi $(+17.7\%)$

$R_L = 4727\left(\frac{11625}{2250}\right) + \frac{4780(11.33) + 239.4(11.33)5.67}{23}$

$= 24423 + 3023 = 27446$#

$R_R = 17650$#

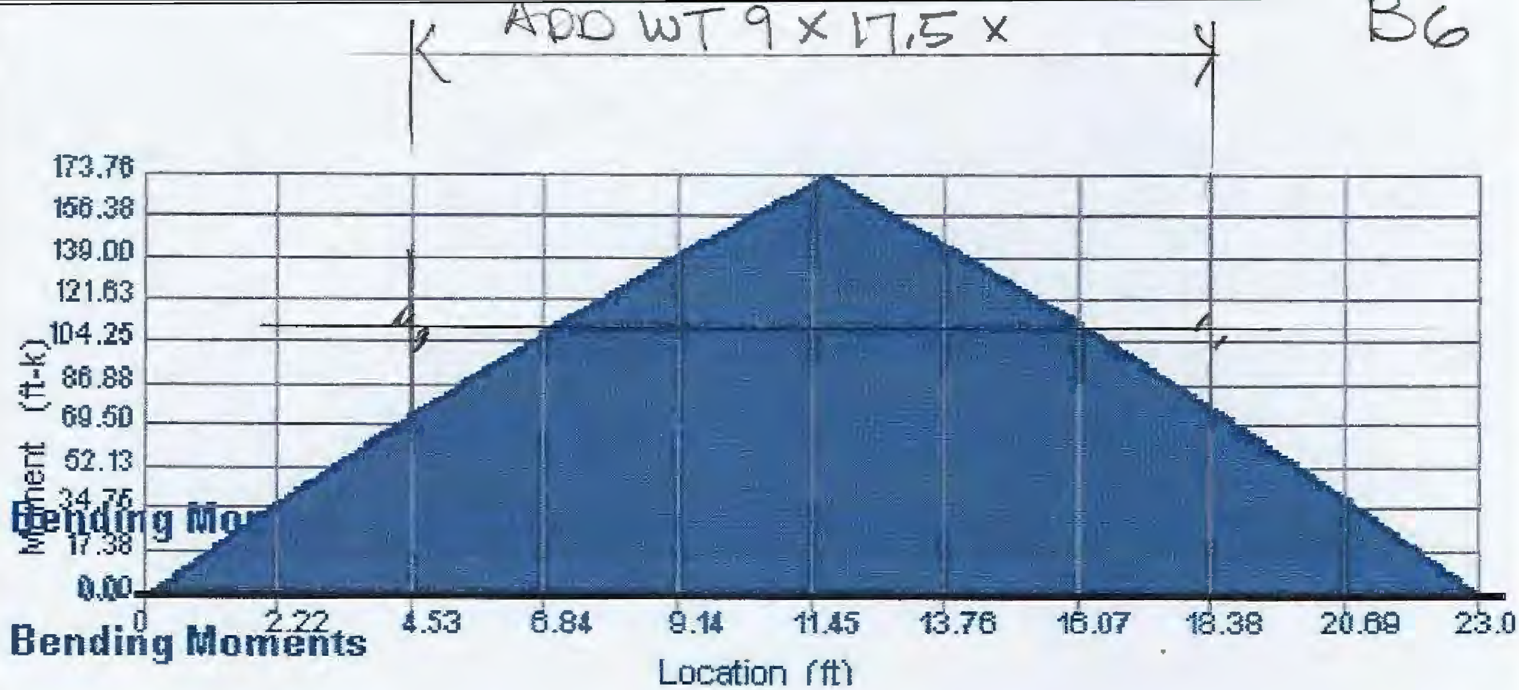
$M = 27446(11.67) - 5813(3.42) - 11625(5.83) - 5813(8.25)$
$= 184{,}683$ '-#

CHECK $M = 17650(11.33) - 239.4(11.33)^2/2 = 184608$

$f_b = \frac{184683(12)}{81.6} = 27148$ psi $(+13\%)$
$< .66F_y + F_y = 41133$ psi

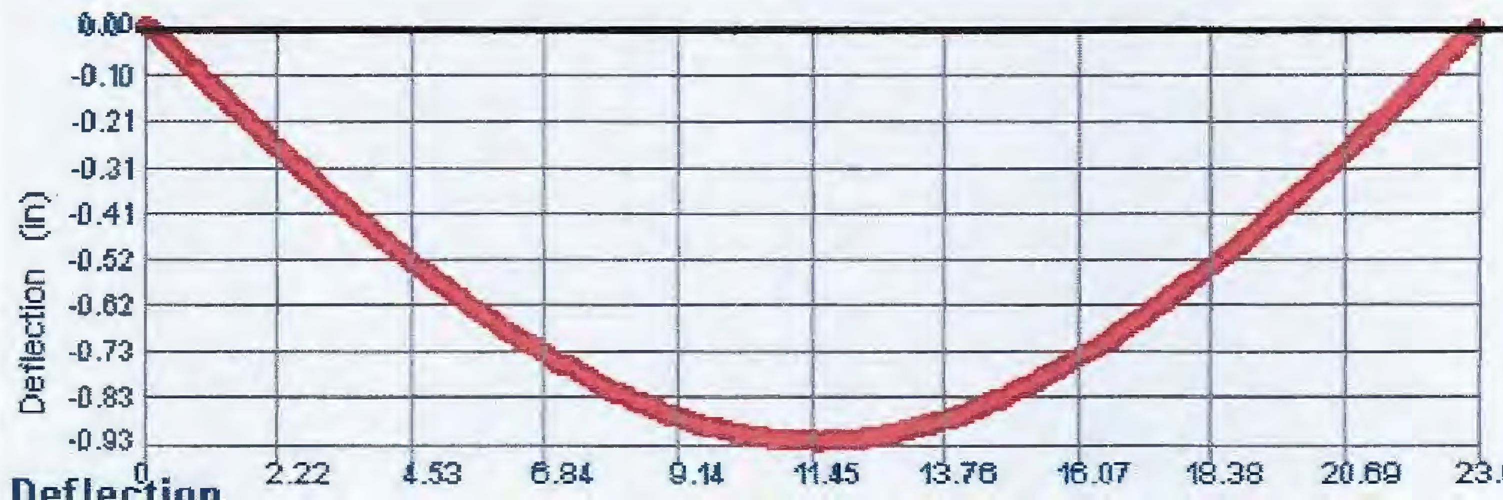
∴ REINFORCE PER ABOVE

B6



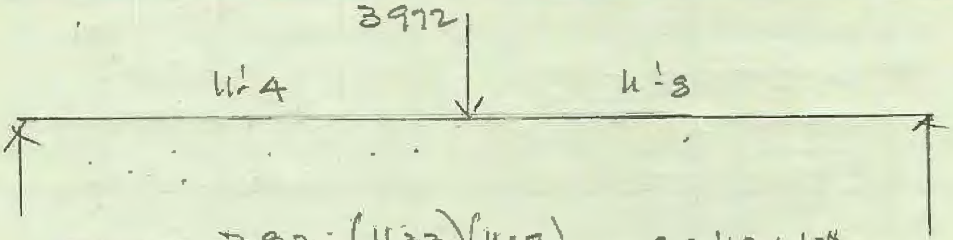
ADD WT 9 x 17.5 x
173.76
156.38
139.00
121.63
104.25
86.88
69.50
52.13
34.75
17.38
0.00
Moment (ft-k)
0
2.22
4.53
6.84
9.14
11.45
13.76
16.07
18.38
20.69
23.0
Location (ft)
Bending Moments

17.42
13.94
10.45
6.97
3.48
0.0
-3.55
-7.10
-10.65
-14.20
-17.75
Shear (k)
0
2.22
4.53
6.84
9.14
11.45
13.76
16.07
18.38
20.69
23.0
Location (ft)
Beam Shear



0.00
-0.10
-0.21
-0.31
-0.41
-0.52
-0.62
-0.73
-0.83
-0.93
Deflection (in)
0
2.22
4.53
6.84
9.14
11.45
13.76
16.07
18.38
20.69
23.0
Deflection

B6
W18x35
L = 23'
S = 57.6



$\Delta M = \frac{3972(11.33)(11.67)}{23} = 22834^{\,1\text{-}\#}$

$\Delta f_b = \frac{22834(12)}{57.6} = 4757\,psi \;\; (+198\%)$

$M = \frac{11625}{2250}(22834) + 125\left(\frac{4.5+1.83}{2}\right)\frac{23^2}{8}$

118 1-k + 26.2

TANK   LOCAL GRATE

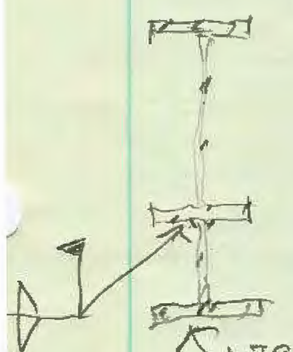
$+\ 125(11.33)\frac{1}{2}(13.5)\frac{1}{2}\frac{(11.33)(11.67)}{23} = 171{,}700\ \#\text{-}1$

B5 GRATE   4780   27.5

$f_b = 35770\,psi$ – NG >>> 24000 psi

∴ REINFORCE B-6 x 23' LG

(Add WT9x17.5 WELDED TO BOTTOM FLANG

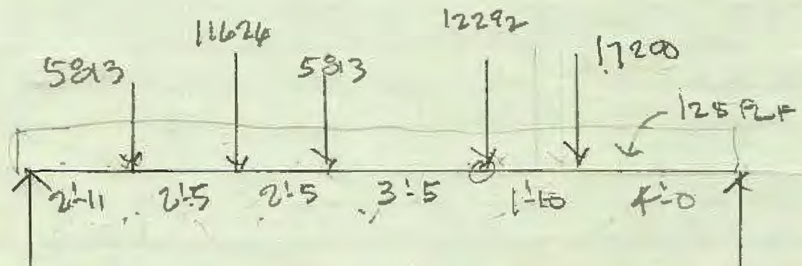


$I_{18+9} = \frac{13.5^2}{9^2} I_{W18} = 2.25\, I_{W18} = 1148$

$S = \frac{1148}{13.5} = 85$

$f_b = 24240\,psi \sim 24000$ — (OK)

B6
W18x35
L = 17'
S = 57.6



$R_L = 17200(4) + 12292(5.83) + 5813(9.25) + 11624(11.67) + 5813(14.08)$

$+\ 125(17)\frac{1}{2} = 25283\frac{17}{3}\ \#$

$R_R = 29586\#$

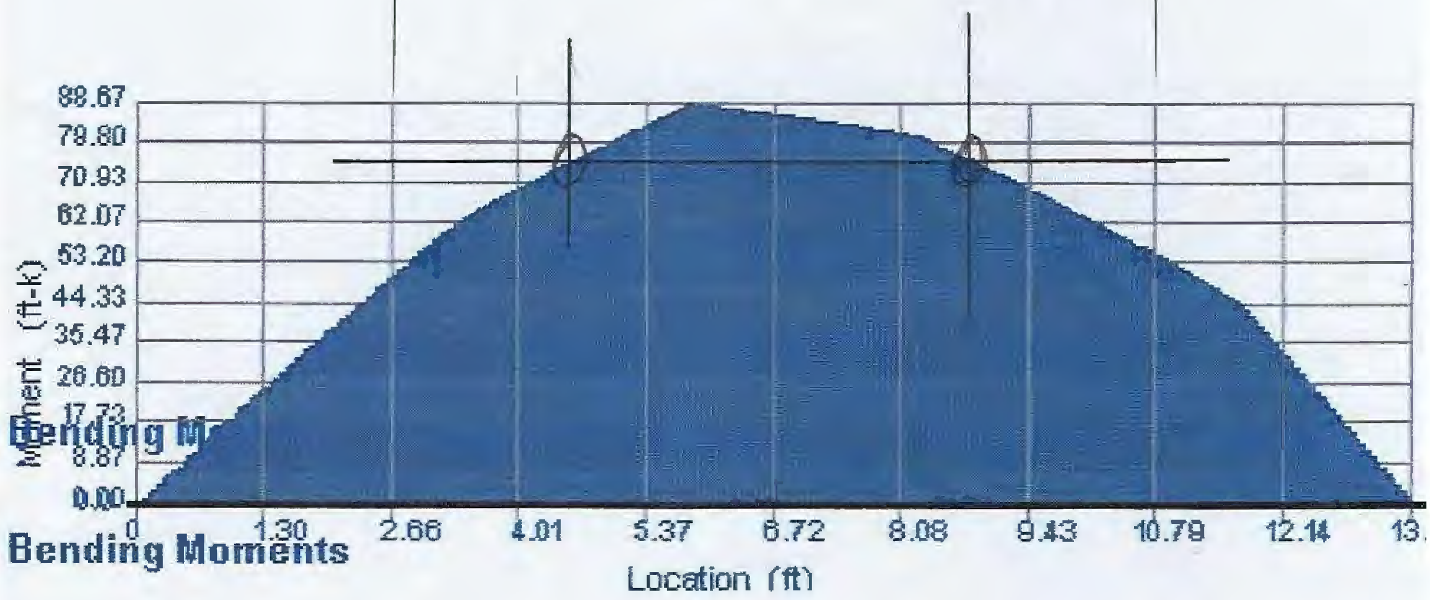
$M = 29586(5.83) - 17200(1.83) - 125(5.83)^2/2$

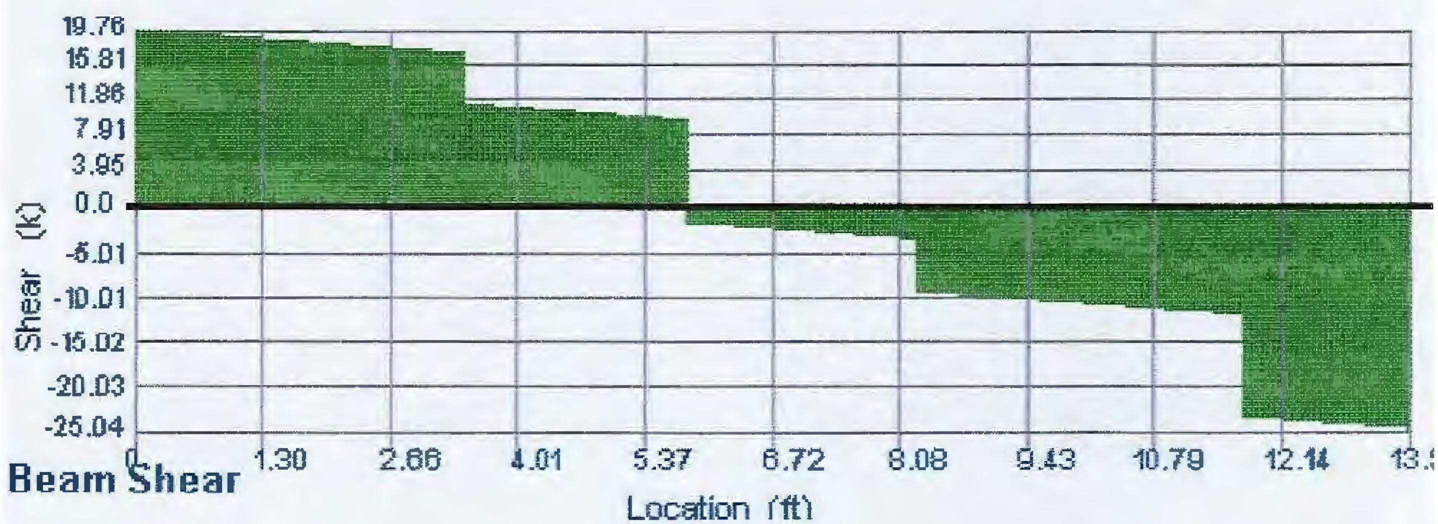
$= 138{,}886\ ^{1\text{-}\#}$

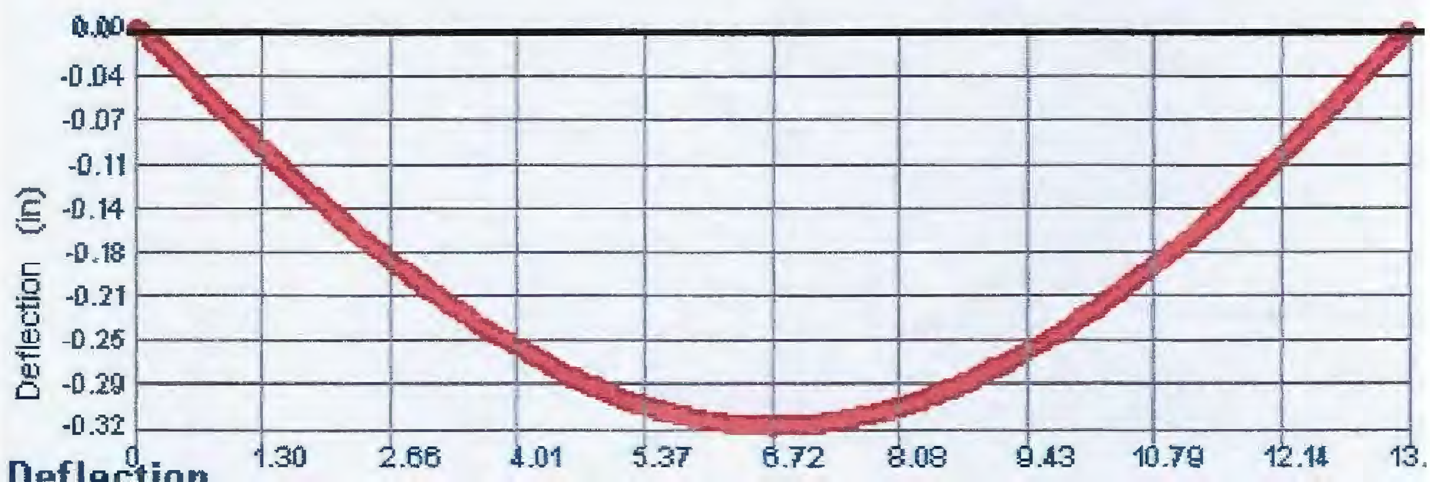
ADD WT 3X7.5

x 7'-2"

B5



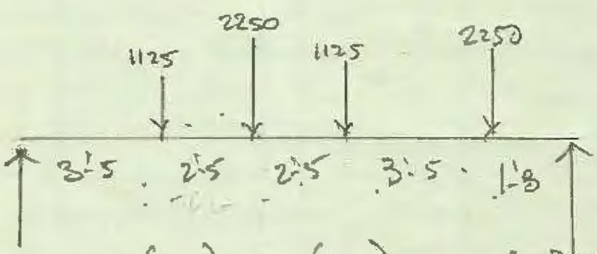




$$M = \frac{11625}{2250}(10395) + \frac{125(1.83)\frac{1}{2}(11.67)^2}{8} = 55655 \text{ 1\#}$$

$$f_b = 23029 \text{ psi} < 24000 \text{ — (OK)}$$

B5
W16x24
L = 13'-6
S = 38.4



$\Delta R_R = 3972\#$

$$\Delta R_L = \frac{2250(1.67) + 1125(5.08) + 2250(7.5) + 1125(9.92)}{13.5} = 2778\#$$

$$\Delta M = 2778(5.83) - 1125(2.42) = 13475 \text{ 1\#}$$

$$\Delta f_b = \frac{13475(12)}{38.4} = 4211 \text{ psi} \quad (+17.6\%)$$

$$M = \frac{11625}{2250}(13475) + \frac{125(11.33)\frac{1}{2}(13.5)^2}{8} = 85753 \text{ 1\#}$$

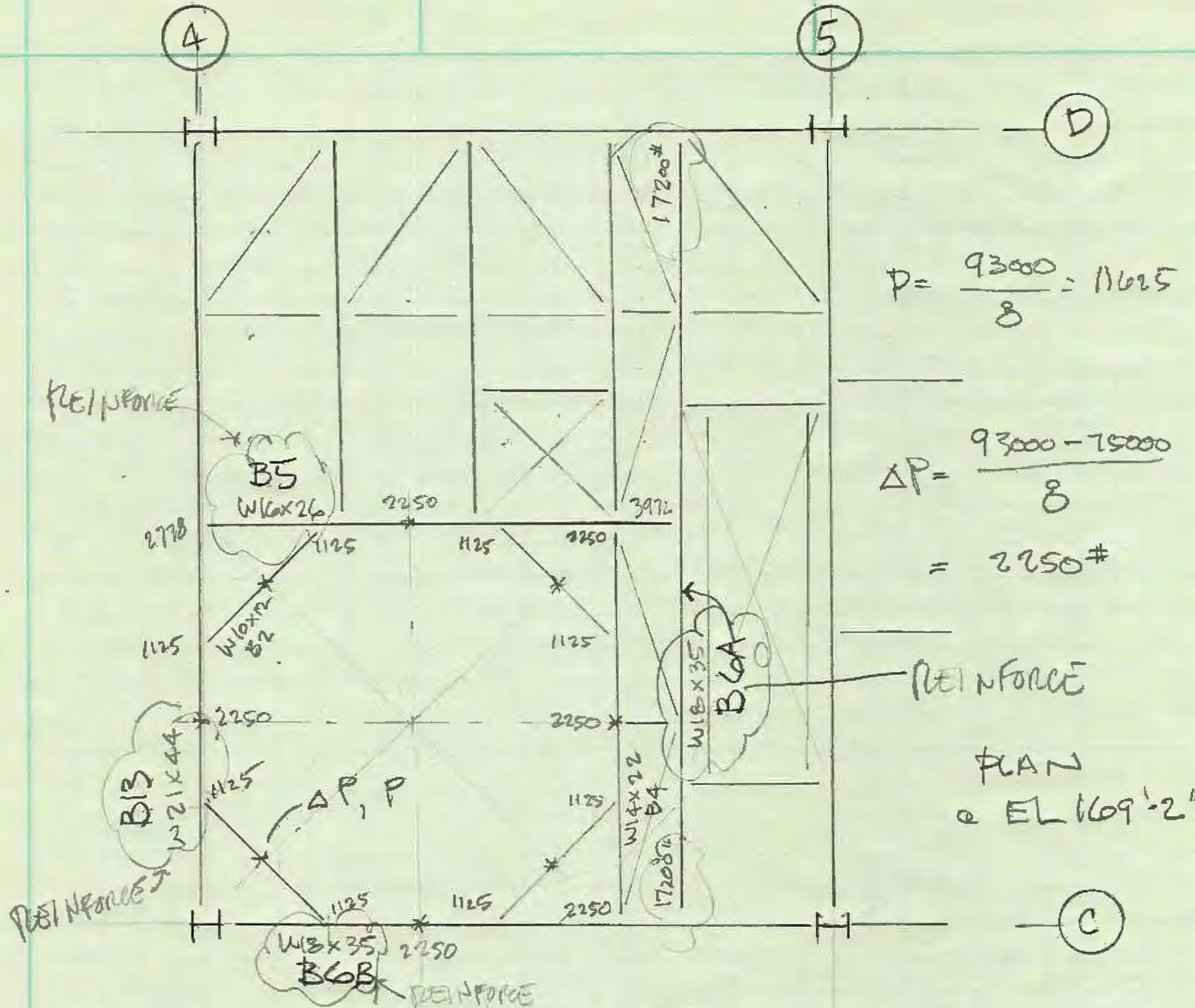
$$f_b = 26798 \text{ psi} > 24000 \quad + 11.7\% \quad \div .60 F_y \quad F_y = 40663$$

DL + LL allowed $M = 1.05(38.4)\left(\frac{24000}{12}\right) = 80640 \text{ 1\#}$
$- 69621$
$11019 \text{ 1\#}$

$$W = \frac{8(11019)}{13.5^2} = 483.7 \text{ PLF} = DL+LL\left(\frac{11.33}{2}\right)$$

$$DL+LL = \frac{2(483.7)}{11.33} = 85.4 \text{ PSF} - 25 = 60.4 \text{ psf}$$

NOTE! MILL CERTS FOR STEEL WILL SHOW $F_y > 36000$ USUALLY ∴ LL > 60.4 ALLOWED → 100PSF



$P = \frac{93000}{8} = 11625$

$\Delta P = \frac{93000-75000}{8}$

$= 2250\#$

PLAN
@ EL 169'-2"

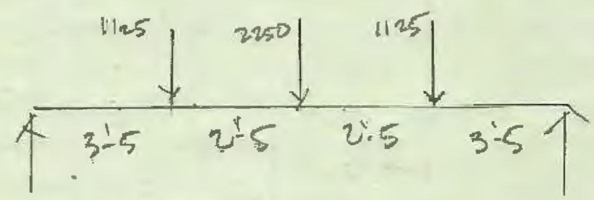
B2
W10x12
L= 4.83'
S= 10.9

$\Delta M = \frac{2250(4.83)}{4} = 2715 \text{ '\#}$

$\Delta f_b = \frac{2715(12)}{10.9} = 2989 \text{ psi} \quad (+12.5\%)$

$f_b = \frac{11625}{2250}(2989) = 15445 \text{ psi}$ (OK)

B4
W14x22
L= 11'-8
S= 29.0



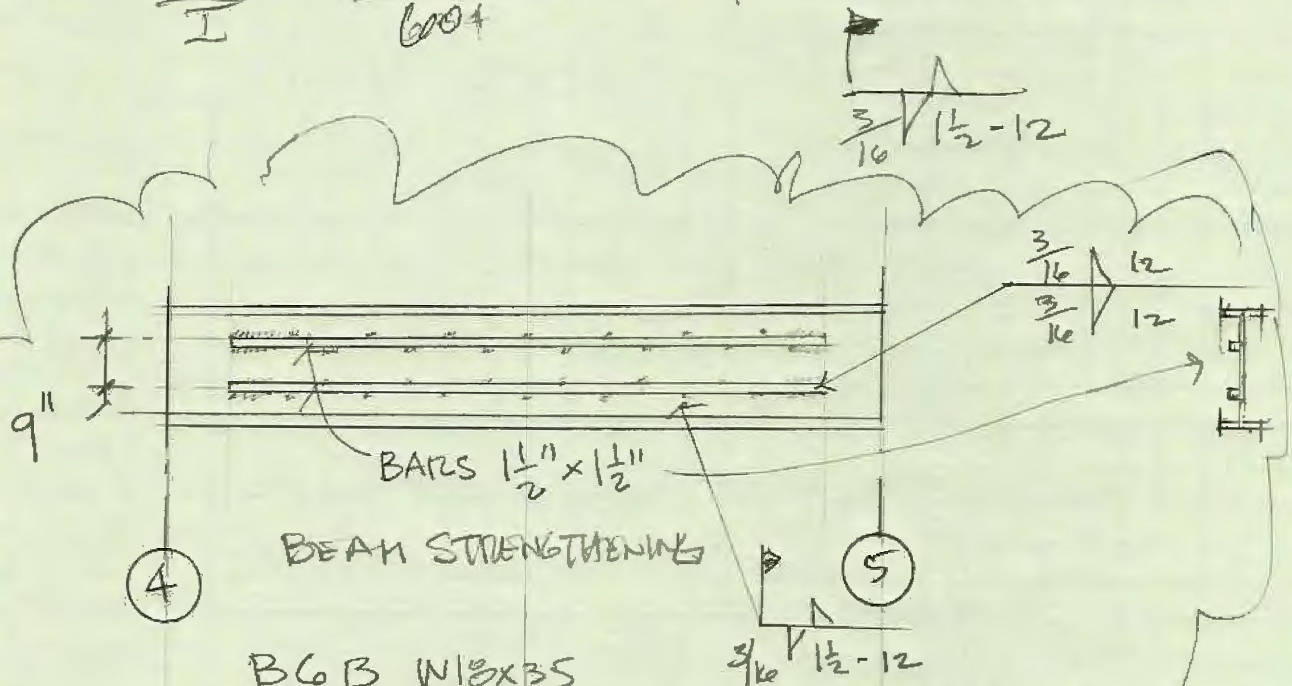
$\Delta R = 1125 + \frac{2250}{2} = 2250$

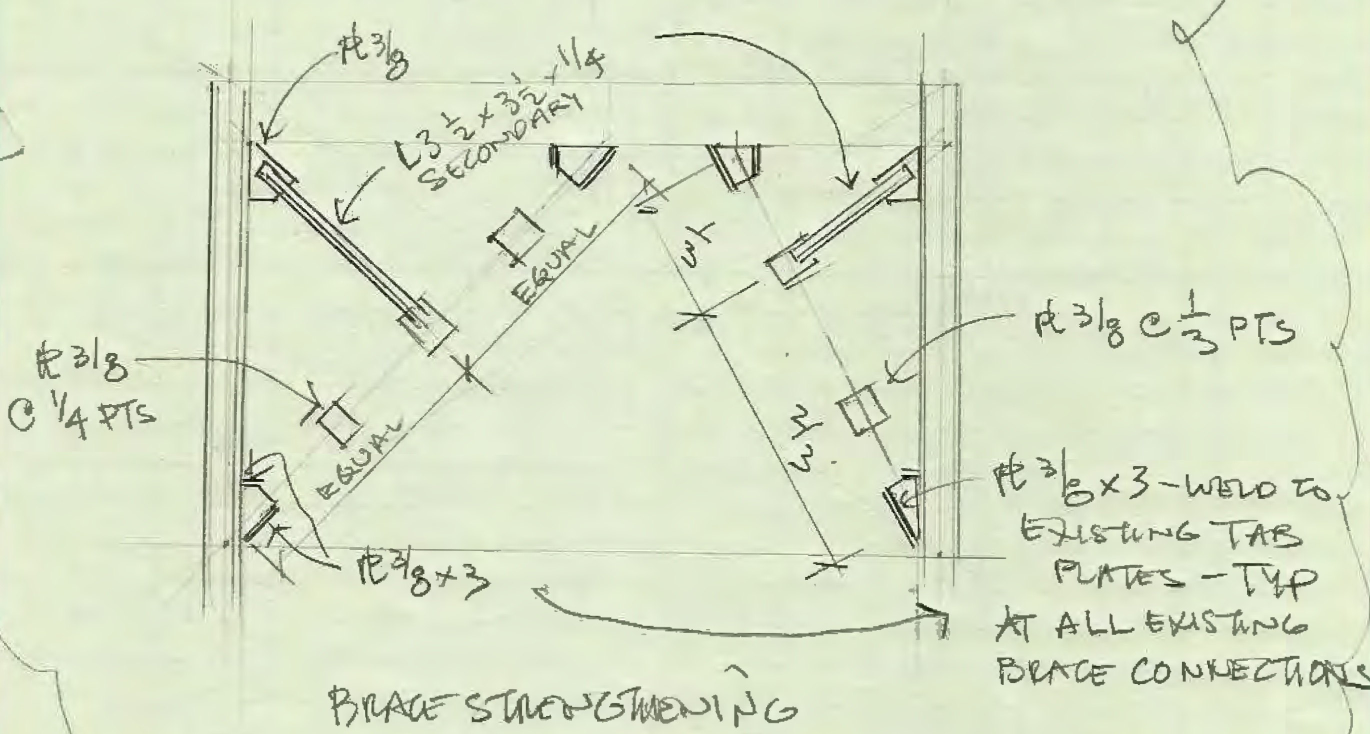
$\Delta M = 2250(5.83) - 1125(2.42) = 10395 \text{ '-\#}$

$\Delta f_b = \frac{10395(12)}{29.0} = 4301 \text{ psi} \quad (+17.9\%)$

$Q = 2.25(4.5) = 10.1$

$\frac{VQ}{I} = \frac{29(10.1)}{600.1} = 487 \text{ ppi}$ 3/16 @ 12"

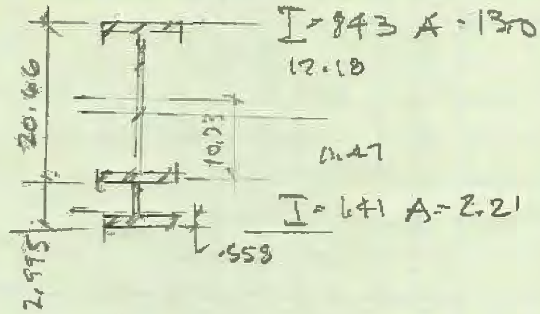




N.AXIS

$$2.21(.558) = 1.233$$
$$13(2.995+10.33) = 173.228$$
$$15.21 \times \bar{Y} = 174.458$$
$$\bar{Y} = 11.47''$$

$V = 28^k$



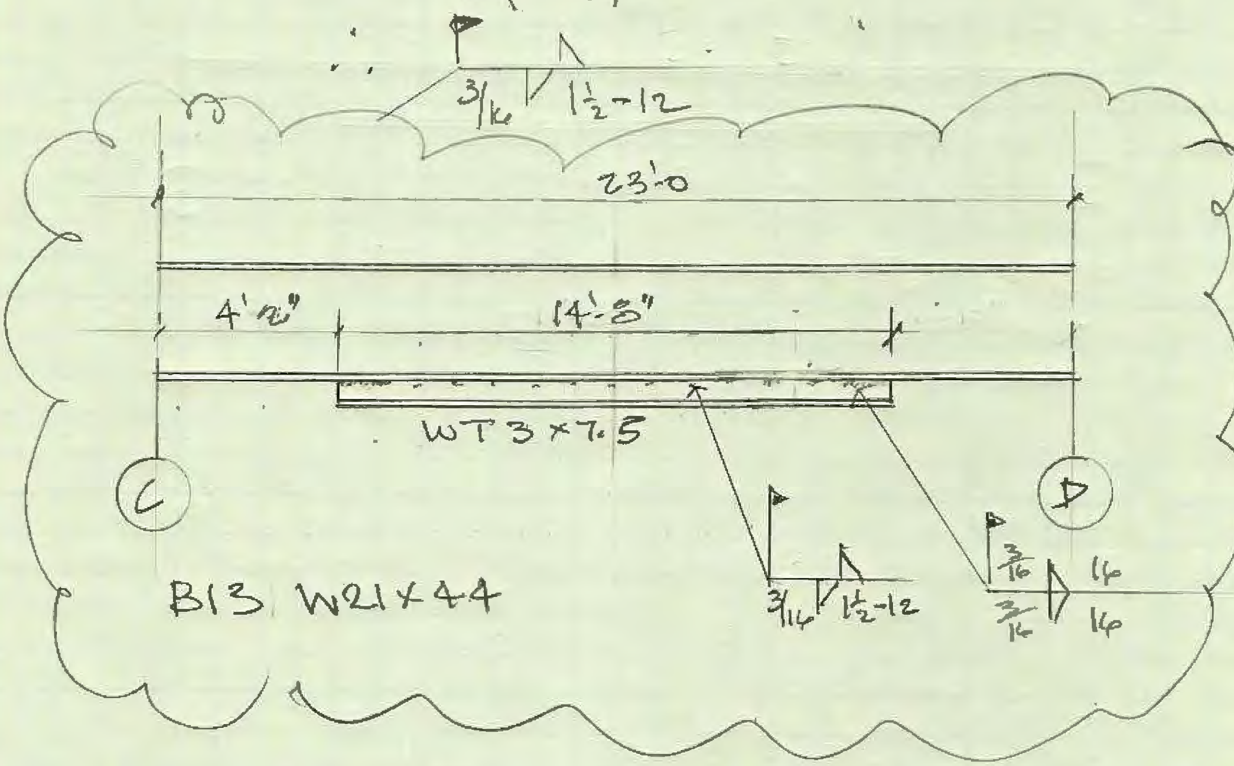
$$I = 843 + 1.41 + 13(11.47 - 2.995 - 10.33)^2 + 2.21(11.47 - .558)^2 = 1152 \text{ in}^4$$

$S_T = 94.6 \quad S_B = 100.5$

$$f_{b_b} = \frac{187.2(12)}{100.5} = 22.4 \text{ ksi} \qquad f_{b_T} = 23.8 \text{ ksi} \quad \text{ok}$$

$$f = \frac{VQ}{I} \qquad Q = 2.21(11.47 - .558) = 24.1 \text{ in}^3$$

$$= \frac{28(24.1)}{1152(.23)} = 2.55 \text{ ksi } (.23) = 586 \text{ ppi}$$



$S_T = 97.1 \quad S_B = 107.5$

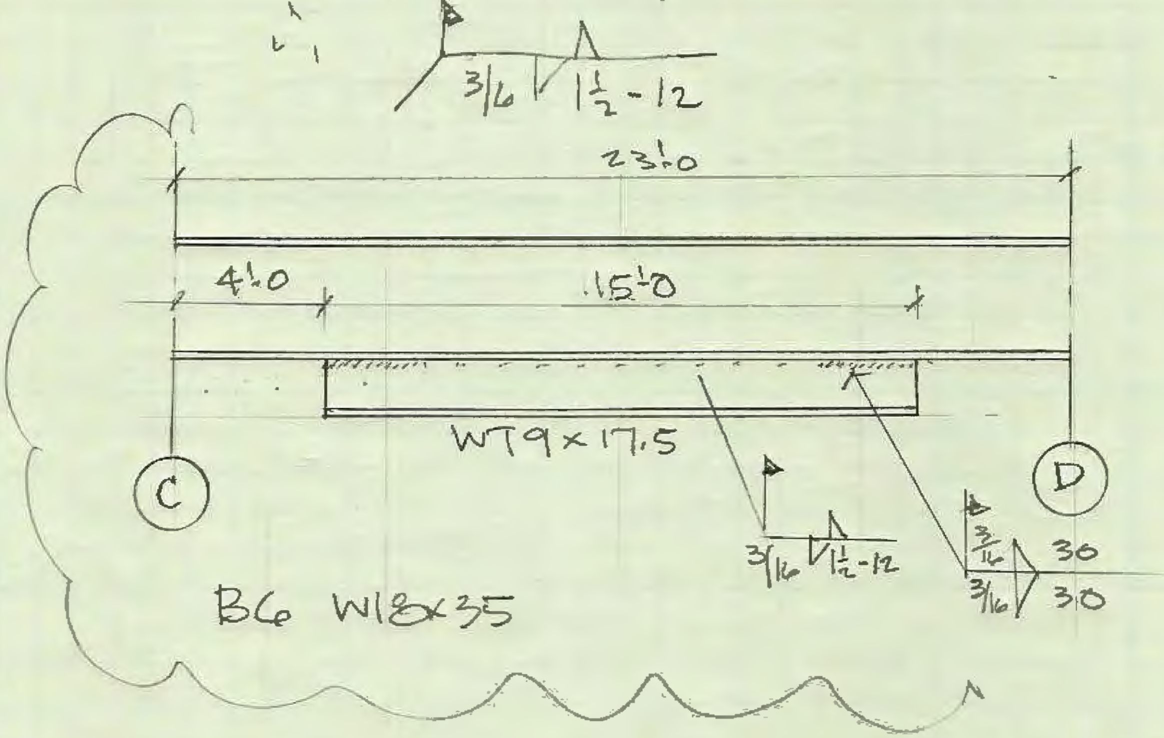
$f_b = \dfrac{173.74(12)}{97.1} = 21.5 \text{ ksi}$ — (OK)

$Q = 5.15(12.6 - 2.39) = 52.58$

$f = \dfrac{17{,}800\,(52.58)}{1355} = 691 \text{ ppi}$

For 3/16" WELD $928(3) = 2784 \text{ ppi} \times 1.5 = 4176$

$S = 4176 / 691 = 6"$



B13 W21x44 w/ WT3x7.5 $A_s = 2.21$ $t_w = .23"$

$f_b \cong 27.5\left(\dfrac{21}{21+3}\right) = 24.1 \text{ ksi}$

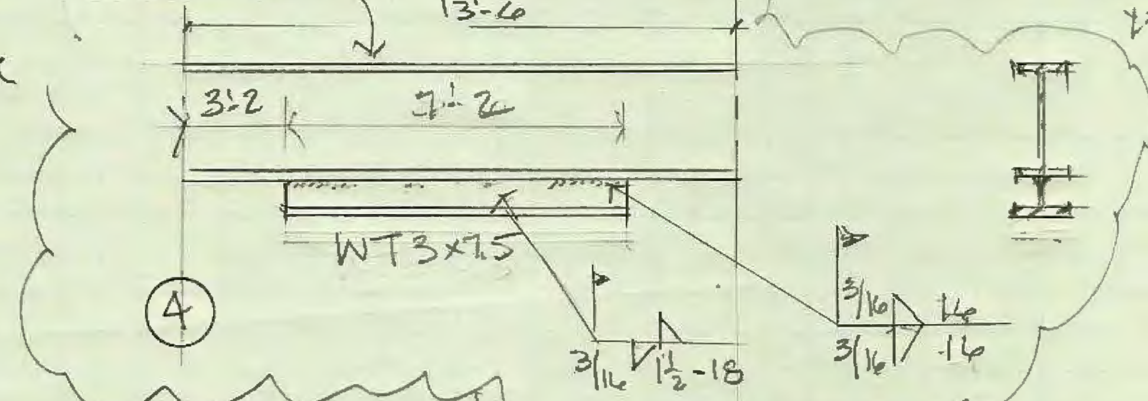
$F \cong 24.1(2.21) = 53.2^k$

$l_{weld} = \dfrac{53.2}{.3(14.4)} = 12.3" \rightarrow 16"$

BEAM STRENGTHENING

B5 - W16x26 - w/ WT3x7.5 $A_s = 2.21 in^2$ $t_w = .23$

$\bar{y} = .558$



$f_b \approx 27.71 \left(\frac{16}{16+3}\right) = 23.33 ksi$

$F \approx 23.33 (2.21) = 51.6^k$

$l_{weld} = \frac{51.6}{.23(14.4)} = 15.6" \rightarrow 16"$

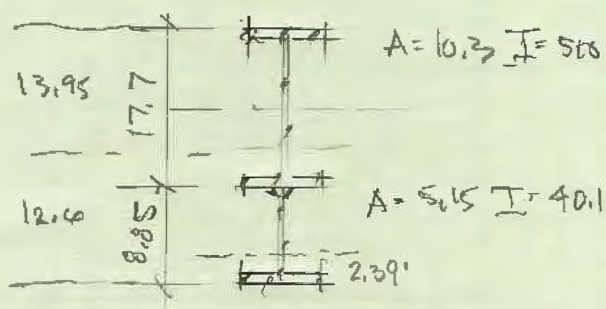
B6A W18x35 - w/ WT9x17.5 $A_s = 5.15$ $t_w = .3$

$f_b \approx 36.5 \left(\frac{18}{18+9}\right) = 24.3 ksi$

$F \approx 24.3 (5.15) = 125.3^k$

$l_{weld} = \frac{125.3}{.3(14.4)} = 29" \rightarrow 30"$

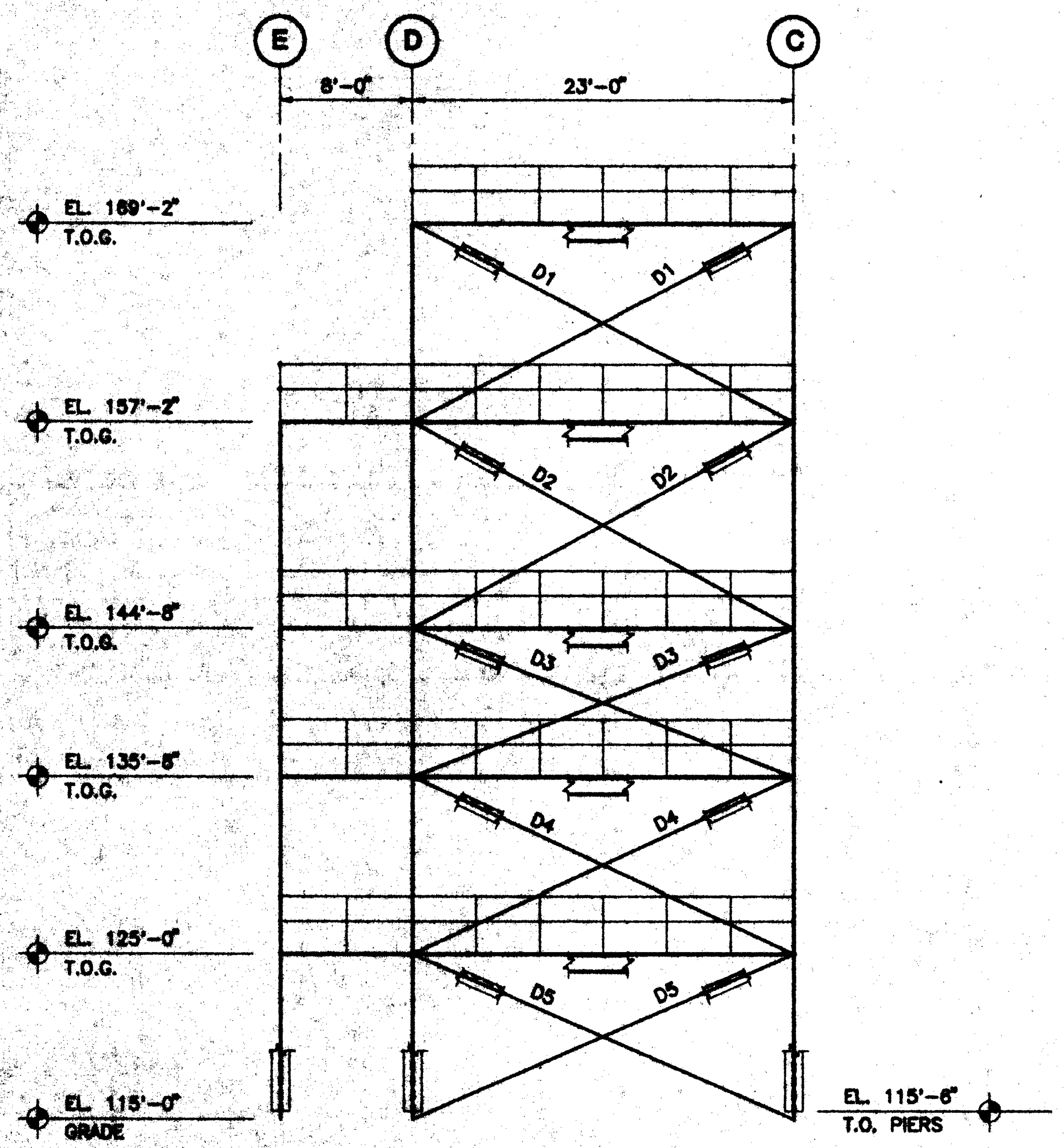
$f = \frac{VQ}{I}$



N. AXIS - 5.15 (2.39) = 12.31
10.3 (8.85+8.85) = 182.31
15.45 × $\bar{y}$ = 194.62

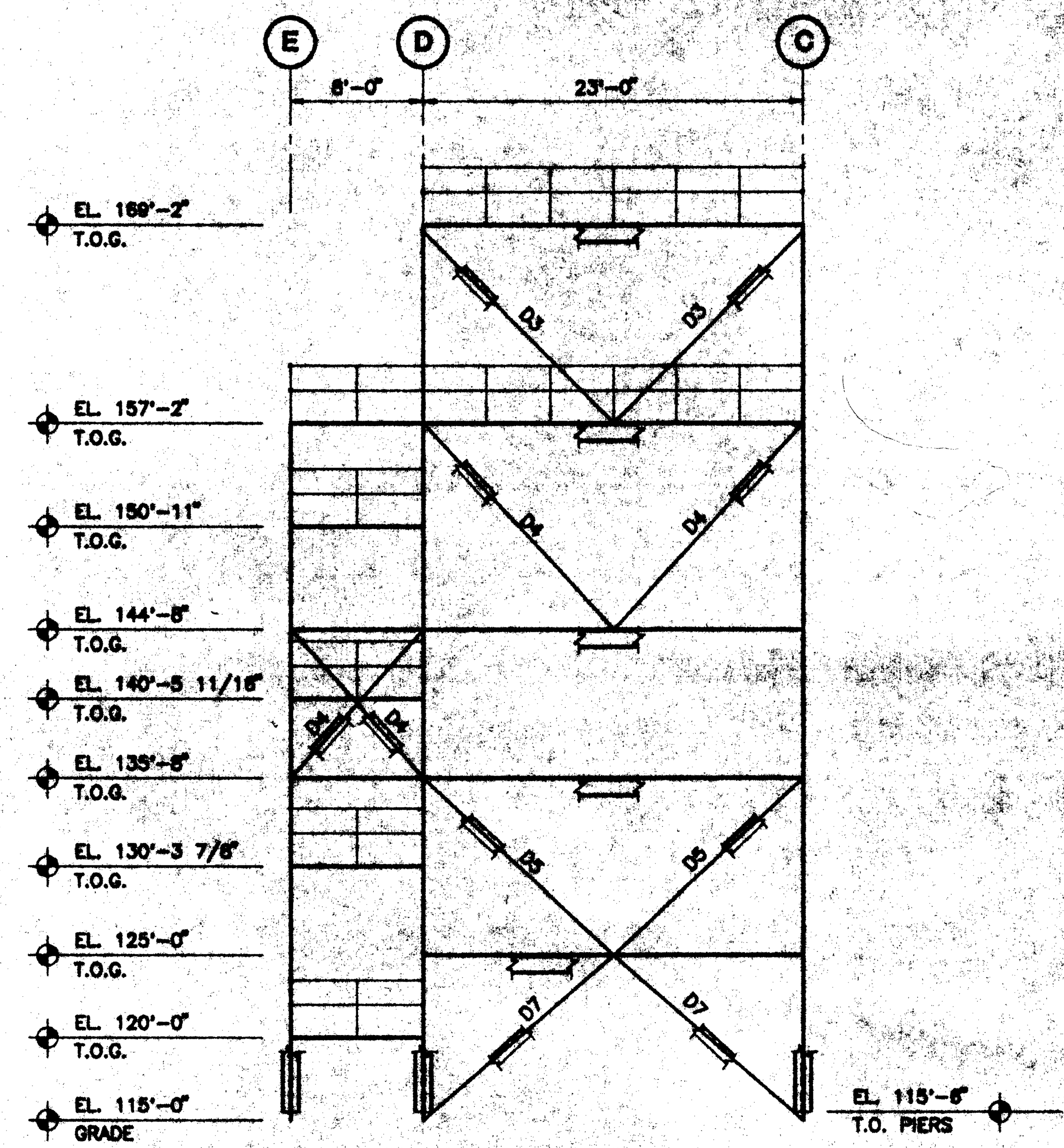
$\bar{y} = 12.6"$

$I = 510 + 40.1 + 5.15(12.6-2.39)^2 + 10.3(17.7-12.6)^2 = 1355 in^4$



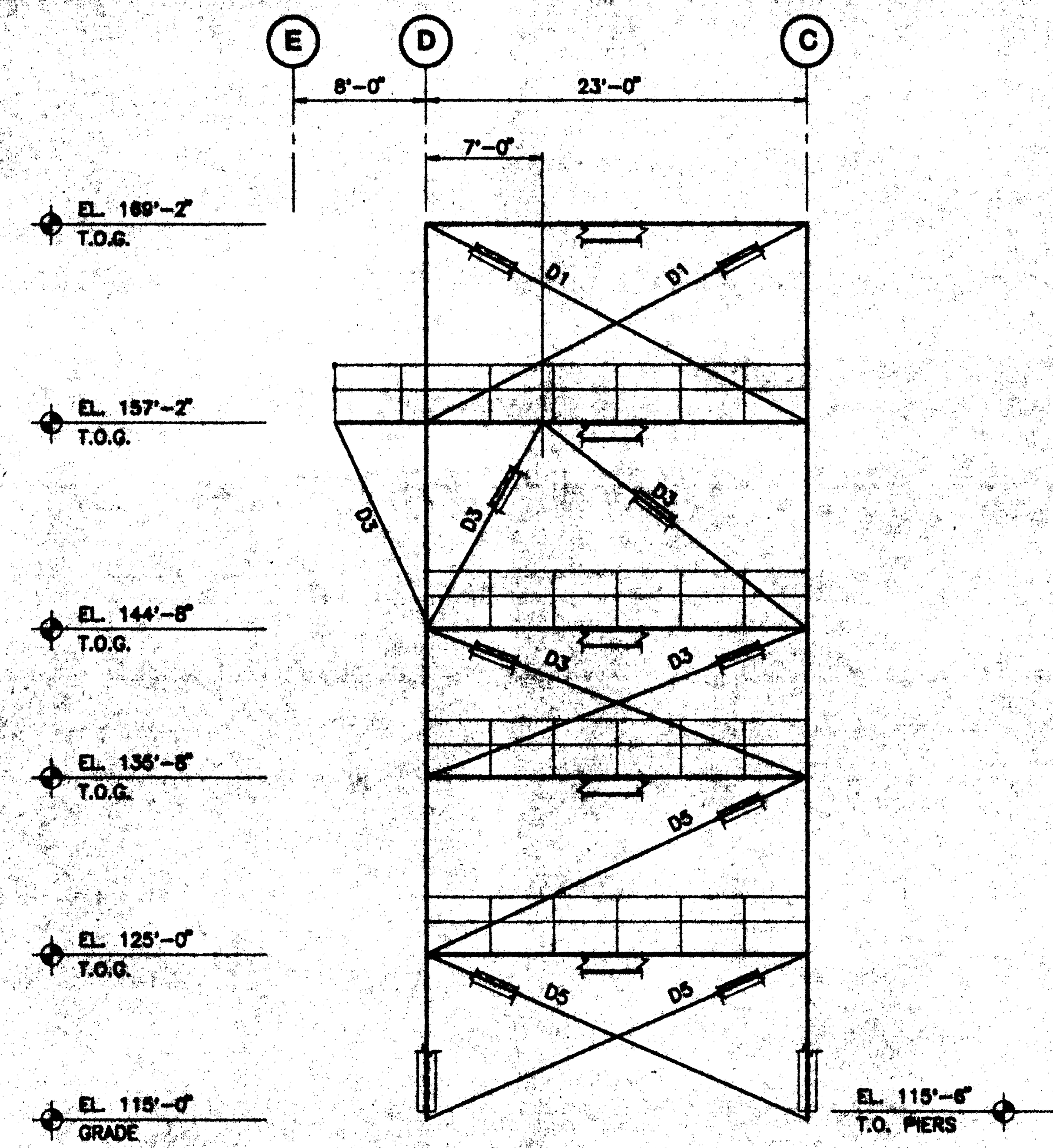
ELEV. ALONG GRID (4)

(LOOKING EAST) 1/8"=1'-0"



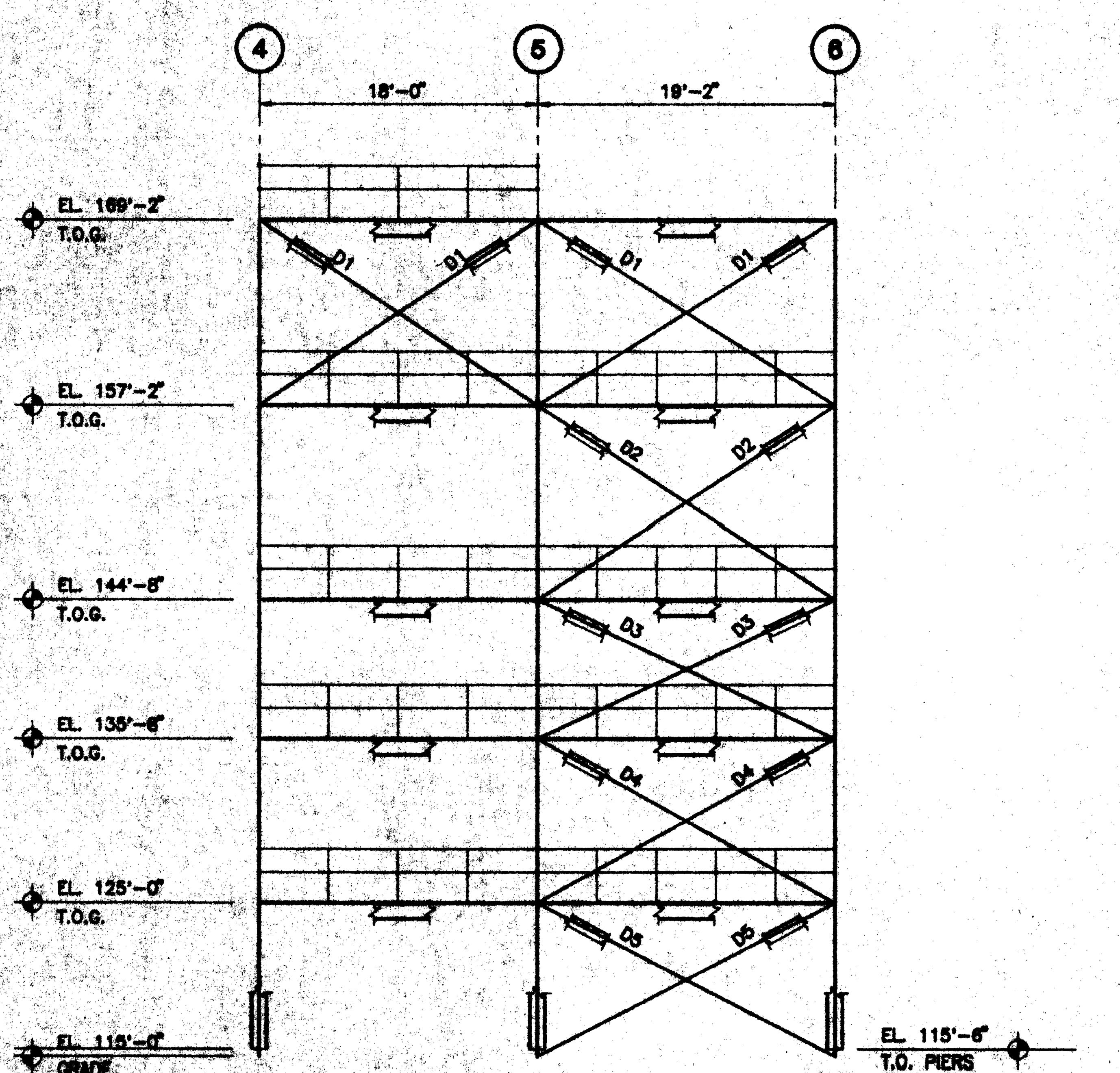
ELEV. ALONG GRID (5)

(LOOKING EAST) 1/8"=1'-0"



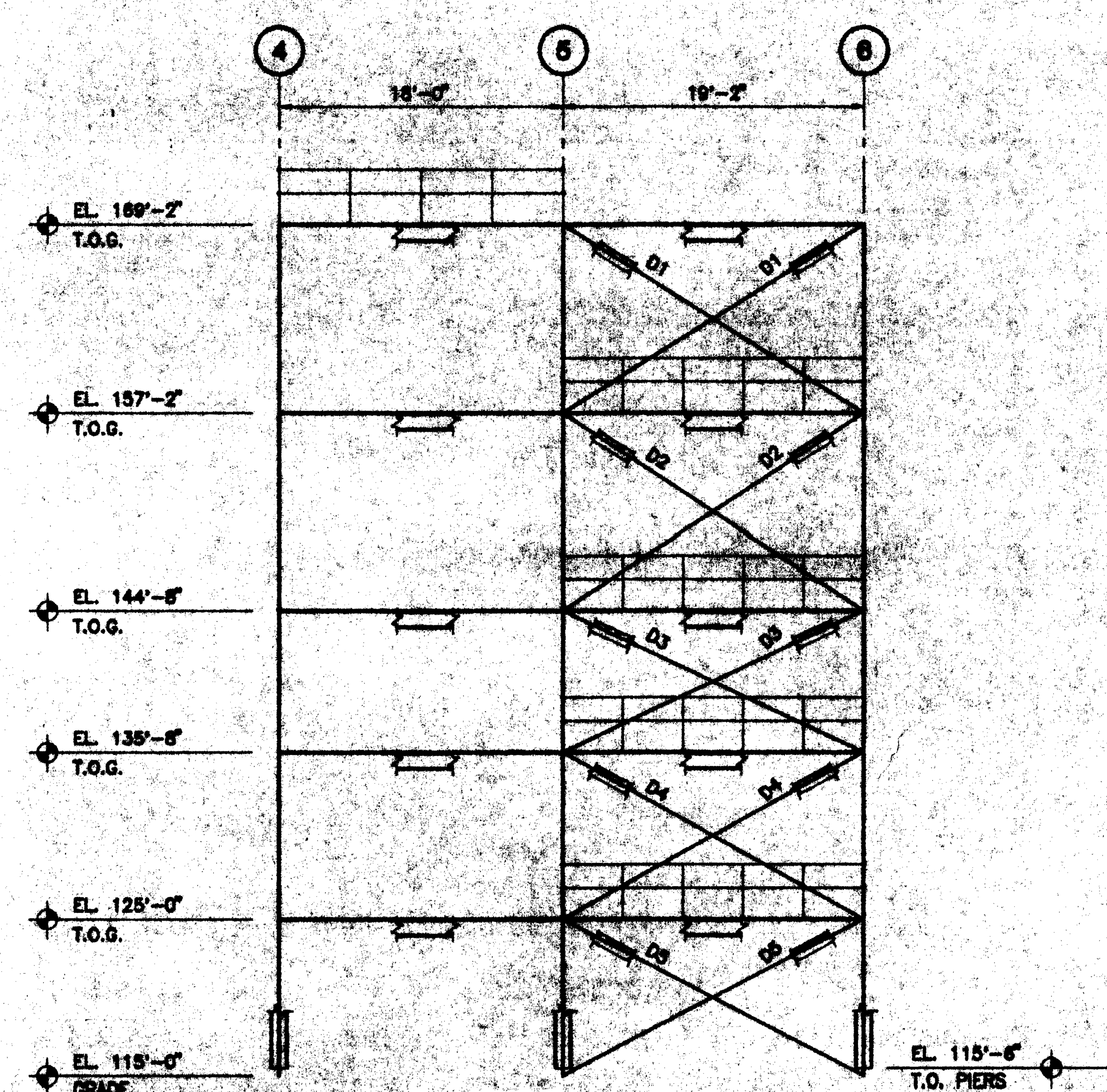
ELEV. ALONG GRID (6)

(LOOKING EAST) 1/8"=1'-0"



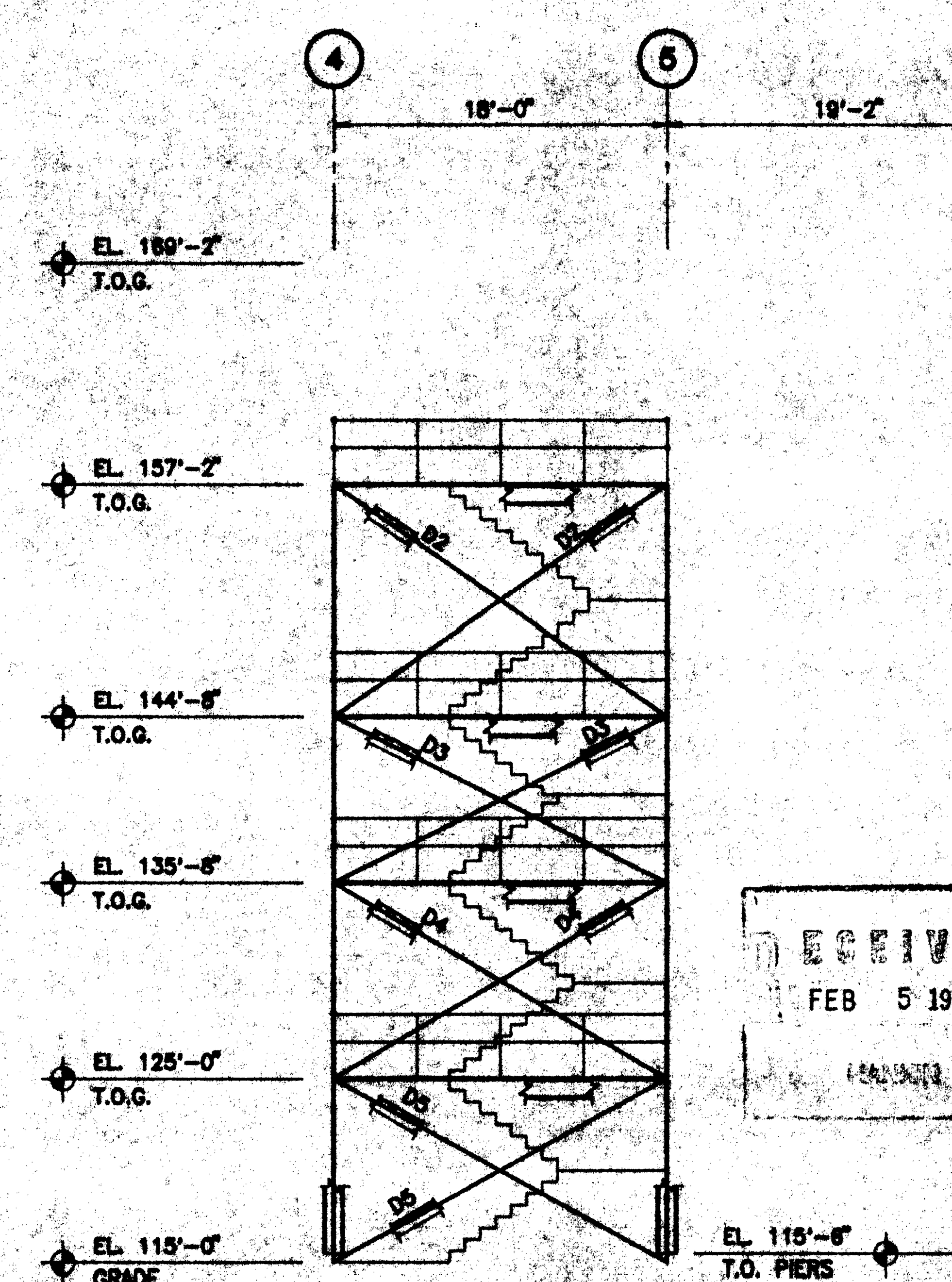
ELEV. ALONG GRID (C)

(LOOKING NORTH) 1/8"=1'-0"



ELEV. ALONG GRID (D)

(LOOKING NORTH) 1/8"=1'-0"



ELEV. ALONG GRID (E)

(LOOKING NORTH) 1/8"=1'-0"

ISSUED
ENGINEERING DEPT
FEB 5 1996
HANKIN ENVIRONMENTAL SYSTEMS INC

RECEIVED FEB 5 1996

BRACE SCHEDULE	
MARK	SIZE
D1	(2) L3 1/2 X 2 1/2 X 1/4
D2	(2) L3 1/2 X 3 X 1/4
D3	(2) L4 X 3 X 1/4
D4	(2) L4 X 3 1/2 X 1/4
D5	(2) L5 X 3 X 5/16
D6	NOT USED
D7	(2) L5 X 3 1/2 X 3/8

SCHEMATIC
NOT FOR CONSTRUCTION USE

A.V. SCHWAN & ASSOC. Inc.
CONSULTING ENGINEERS

S5

Exhibit C - Hazardous Waste Characteristics

Table 1 - EPA Listed Hazardous Wastes

Exhibit C -- HAZARDOUS WASTES RECEIVED AT SIEMENS WATER TECHNOLOGY CORP.	
EPA WASTE CODE	**WASTE DESCRIPTION**
D001	A SOLID WASTE THAT EXHIBITS THE CHARACTERISTIC OF IGNITABILITY
D004	ARSENIC
D005	BARIUM
D006	CADMIUM
D007	CHROMIUM
D008	LEAD
D009	MERCURY
D010	SELENIUM
D011	SILVER
D012	ENDRIN
D013	LINDANE
D014	METHOXYCHLOR
D015	TOXAPHENE
D016	2,4-D
D017	2,4,5-(SILVEX)
D018	BENZENE
D019	CARBON TETRACHLORIDE
D020	CHLORDANE
D021	CHLOROBENZENE
D022	CHLOROFORM
D023	O-CRESOL
D024	M-CRESOL
D025	P-CRESOL
D026	CRESOL
D027	1,4-DICHLOROBENZENE
D028	1,2-DICHLOROETHANE
D029	1,1-DICHLOROETHYLENE
D030	2,4-DITROTOLUENE
D031	HEPTACHLOR (AND ITS EPOXIDE)
D032	HEXACHLOROBENZENE
D033	HEXACHLOROBUTADIENE
D034	HEXACHLOROETHANE
D035	METHYL ETHYL KETONE
D036	NITROBENZENE
D037	PENTRACHLOROPHENOL

Exhibit C -- HAZARDOUS WASTES RECEIVED AT SIEMENS WATER TECHNOLOGY CORP.	
EPA WASTE CODE	**WASTE DESCRIPTION**
D038	PYRIDINE
D039	TETRACHLOROETHYLENE
D040	TRICHLOROETHYLENE
D041	2,4,5-TRICHLOROPHENOL
D042	2,4,6-TRICHLOROPHENOL
D043	VINYL CHLORIDE
F001	SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLOROETHYLENE, METHYLENE CHLORIDE, 1,1,1 TRICHLOROETHANE, CARBON TETRACHLORIDE, CHLORINATED FLUOROCARBONS; AND MIXTURES/BLENDS CONTAINING A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) BEFORE USE OF ONE OR MORE OF THE ABOVE SOLVENTS OR SOLVENTS LISTED IN F002, F004 AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF SPENT SOLVENTS AND MIXTURES
F002	TETRACHLOROETHYLENE, METHYLENE CHLORIDE, TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE, CHLOROBENZENE, 1,1,2-TRICHLOROETHANE; AND MIXTURES/BLENDS CONTAINING A TOTAL OF 10% OR MORE (BY VOLUME) BEFORE USE OF ONE OR MORE OF THE ABOVE SOLVENTS OR SOLVENTS LISTED IN F002, F004 AND F005 AND STILL BOTTOMS FROM RECOVERY OF SPENT SOLVENTS AND MIXTURES
F003	XYLENE, ACETONE ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANANE, METHANOL; MIXTURES/BLENDS OF ABOVE; AND 10% OR MORE (BY VOLUME) OF F001, F002, F004, F005; AND STILL BOTTOMS FROM RECOVERY OF SPENT SOLVENTS
F004	CRESOLS AND CRESYLIC ACID, NOTROBENZENE; SOLVENT MIXTURES/BLENDS OF 10% OR MORE BEFORE USE OF ONE OR MORE OF ABOVE OR F001, F002, F005; STILL BOTTOMS FROM RECOVERY OF SPENT SOLVENTS
F005	TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, 2-NITROPROPANE; MIXTURES/BLENDS OF 10% OR MORE (BY VOLUME) OF ABOVE OR SOLVENTS LISTED IN F001, F002, F004 AND STILL BOTTOMS FROM RECOVERY OF SOLVENTS
F006	WASTEWATER TREATMENT SLUDGES FROM ELECTROPLATING OPERATIONS EXCEPT FROM SULFURIC ACID ANODIZING OF ALUMINUM; TIN PLATING ON CARBON STEEL; ZINC PLATING ON CARBON STEEL; ALUMINUM, ZINC ALUMINUM PLATING ON CARBON STEEL; CLEANING/STRIPPING ASSOCIATED WITH TIN, ZINC AND ALUMINUM PLATING ON CARBON STEEL; AND CHEMICAL ETCHING AND MILLING OF ALUMINUM
F012	QUENCHING WASTEWATER TREATMENT SLUDGES FROM METAL HEAT TREATING OPERATIONS WHERE CYANIDES ARE USED
F019	WASTEWATER TREATMENT SLUDGES FROM CHEMICAL CONVERSION COATING OF ALUMINUM EXCEPT ZIRCONIUM PHOSPHATING IN ALUMINUM CAN WASHING
F025	CONDENSED LIGHT ENDS, SPENT FILTERS AND AIDS, SPENT DESICCANT WASTES FROM PRODUCTION OF CERTAIN CHLORINATED ALIPHATIC HYDROCARBONS (HAVING CARBON CHAIN LENGTHS RANGING FROM 1-5 WITH VARYING AMOUNTS

Exhibit C -- HAZARDOUS WASTES RECEIVED AT SIEMENS WATER TECHNOLOGY CORP.	
EPA WASTE CODE	**WASTE DESCRIPTION**
	AND POSITIONS OF CHLORINE SUBSTITUTION) BY FREE RADICAL CATALYZED PROCESSES.
F035	WASTEWATERS, PROCESS RESIDUALS, PRESERVATIVE DRIPPAGE, AND SPENT FORMULATIONS FORM WOOD PRESERVING PROCESS GENERATED AT PLANTS THAT USE INORGANIC PRESERVATIVES CONTAINING ARSENIC OR CHROMIUM. DOES NOT INCLUDE K001 BOTTOM SEDIMENT SLUDGE FROM TREATMENT OF WASTEWATER FROM WOOD PRESERVING PROCESSES USING CREOSOTE AND/OR PENTACHLOROPHENOL
F037	PETROLEUM REFINERY PRIMARY OIL/WATER/SOLIDS SEPARATION SLUDGE. SLUDGE FROM GRAVITATIONAL SEPARATION OF OIL/WATER/SOLIDS DURING STORAGE OR TREATMENT OF PROCESS WASTEWATERS AND OILY COOLING WASTEWATERS FROM PETROLEUM REFINERIES. (OIL/WATER/SOLIDS SEPARATORS; TANKS AND IMPOUNDMENTS; DITCHES/CONVEYANCES; SUMPS; STORMWATER UNITS. SLUDGES FROM NON-CONTACT ONCE-THROUGH COOLING WATERS, SLUDG3ES FROM AGRESSIVE BIOLOGICAL TREATMENT UNITS, K051 WASTES
F038	PETROLEUM REFINERY SECONDARY (EMULSIFIED) OIL/WATER/SOLIDS SEPARATION SLUDGE-ANY SLUDGE AND/OR FLOAT GENERATED FROM THE PHYSICAL AND/OR CHEMICAL SEPARATION OF OIL/WATER/SOLIDS IN PROCESS WASTEWATERS AND OILY COOLING WASTEWATERS FROM PETROLEUM REFINERIES. SUCH WASTES INCLUDE, BUT ARE NOT LLIMITED TO, ALL SLUDGES AND FLOATS GENERATED IN: INDUCED AIR FLOTATION (IAF) UNITS, TANKS AND IMPOUNDMENTS, AND ALL SLUDGES GENERATED IN DAF UNITS. SLUDGES GENERATED IN STORMWATER UNITS THAT DO NBOT RECEIVE DRY WEATHER FLOW, SLUDGES GENERATED FROM NON-CONTACT ONCE-THROUGH COOLING WATERS SEGREGATED FOR TREATMENT FROM OTHER PROCESS OR OILY COOLING WATERS, SLUDGES AND FLOATS GENERATED IN AGRESSIVE BIOLOGICAL TREATMENT UNITS (INCLUDING SLUDGES AND FLOATS GENERATED IN ONE OR MORE ADDITIONAL UNITS AFTER WASTEWATERS HAVE BEEN TREATED IN AGGRESSIVE GIOLOGICAL TREATMENT UNITS) AND F037,K048, AND K051 WASTES ARE NOT INCLUDED IN THIS LISTING.
F039	LEACHATE FROM DISPOSAL OF MORE THAN ONE RESTRICTED WASTE (HAZARDOUS UNDER SUBPART D; RESULTING FROM THE DISPOSAL OF ONE OR MORE OF EPA HAZARDOUS WASTES: F020, F021, F022, F026, F027, AND/OR F028)
K001	WASTEWATER TREATMENT SLUDGE BOTTOM SEDIMENT THAT USE CREOSOTE AND/OR PENTACHLOROPHENOL
K002	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF CHROME YELLOW AND ORANGE PIGMENTS
K003	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF MOLYBDATE ORANGE PIGMENTS
K004	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF ZINC YELLOW PIGMENTS
K005	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF CHROME GREEN PIGMENTS
K006	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF CHROME OXIDE GREEN PIGMENTS (ANHYDROUS AND HYDRATED)

Exhibit C -- HAZARDOUS WASTES RECEIVED AT SIEMENS WATER TECHNOLOGY CORP.	
EPA WASTE CODE	**WASTE DESCRIPTION**
K007	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF IRON BLUE PIGMENTS
K008	OVEN RESIDUE FROM PRODUCTION OF CHROME OXIDE GREEN PIGMENTS
K009	DISTILLATION BOTTOMS FROM THE PRODUCTION OF ACETALDEHYDE FROM ETHYLENE
K010	DISTILLATION SIDE CUTS FROM PRODUCTION OF ACETALDEHYDE FROM ETHYLENE
K014	VICINALS FROM THE PURIFICATION OF TOLUENEDIAMINE IN THE PRODUCTION OF TOLUENEDIAMINE VIA THE HYDROGENATION OF DINITROTOLUENE
K015	STILL BOTTOMS FROM DISTILLATION OF BENZYL CHLORIDE
K016	HEAVY ENDS OR DISTILLATION RESIDUES FROM PRODUCTION OF CARBON TETRACHLORIDE
K017	HEAVY ENDS (STILL BOTTOMS) FROM PURIFICATION COLUMN IN PRODUCTION OF EPICHLOROHYDRIN
K018	HEAVY ENDS FROM FRACTIONATION COLUMN IN ETHYL CHLORIDE PRODUCTION
K019	HEAVY ENDS FORM THE DISTILLATION OF ETHYLENE DICHLORIDE IN ETHYLENE DICHLORIDE PRODUCTION
K020	HEAVY ENDS FROM DISTILLATION OF VINYL CHLORIDE IN VINYL CHLORIDE MONOMER PRODUCTION
K022	DISTILLATION BOTTOM TARS FROM PRODUCTION OF PHENOL/ACETONE FROM CUMENE
K023	DISTILLATION LIGHT ENDS FROM PRODUCTION OF PHTHALIC ANHYDRIDE FROM NAPHTHALENE
K024	DISTILLATION BOTTOMS FROM PRODUCTION OF PHTHALIC ANHYDRIDE FROM NAPHTHALENE
K025	DISTILLATION BOTTOMS FROM THE PRODUCTION OF NITROBENZENEBY THE NITRATION OF BENZENE
K026	STRIPPING STILL TAILS FROM PRODUCTION OF METHY ETHYL PYRIDINES
K029	WASTE FROM PRODUCT STEAM STRIPPER IN PRODUCTION OF 1,1,1-TRICHLOROETHANE
K030	COLUMN BOTTOMS OR HEAVY ENDS FROM COMBINED PRODUCTION OF TRICHLOROETHYLENE AND PERCHLOROETHYLENE
K031	BY-PRODUCT SALTS GENERATED IN PRODUCTION OF MSMA AND CACODYLIC ACID
K032	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF CHLORDANE
K033	WASTEWATER TREATMENT AND SCRUB WATER FROM CHLORINATION OF CYCLOPENTADIENE IN PRODUCTION OF CHLORDANE
K034	FILTER SOLIDS FROM FILTRATION OF HEXACHLOROCYCLOPENTADIENE IN PRODUCTION OF CHLORDANE
K035	WASTEWATER TREATMENT SLUDGES GENERATED IN PRODUCTION OF CREOSOTE
K036	STILL BOTTOMS FROM TOLUENE RECLAMATION DISTILLATION IN PRODUCTION OF DISULFOTON

Exhibit C -- HAZARDOUS WASTES RECEIVED AT SIEMENS WATER TECHNOLOGY CORP.	
EPA WASTE CODE	**WASTE DESCRIPTION**
K037	WASTEWATER TREATMENT SLUDGES FROM PRODUCTION DISULFOTON
K038	WASTEWATER FROM WASHING AND STRIPPING OF PHORATE PRODUCTION
K039	FILTER CAKE FROM FILTRATIN OF DIETHYLPHOSPHORODITHIOIC ACID IN PRODUCTION OF PHORATE
K040	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF PHORATE
K041	WASTEWATER TREATMENT SLUDGE FORM PRODUCTION OF TOXAPHENE
K042	HEAVY ENDS OR DISTILLATION RESIDUES FROM DISTILLATION OF TETRACHLOROBENZENE IN PRODUCTION OF 2,4,5-T
K046	WASTEWATER TREATMENT SLUDGES FROM THE MANUFACTURING, FORMULATION AND LOADING OF LEAD-BASED INTIATING COMPOUNDS.
K048	DISSOLVED AIR FLOTATION FLOAT FROM PETROLEUM REFINING INDUSTRY
K049	SLOP OIL EMULSION SOLIDS FROM PETROLEUM REFINING INDUSTRY
K050	HEAT EXCHANGER BUNDLE CLEANING SLUDGE FROM PETROLEUM REFINING INDUSTRY
K051	API SEPARATOR SLUDGE FROM PETROLEUM REFINING INDUSTRY
K052	TANK BOTTOMS (LEADED) FROM PETROLEUM REFINING INDUSTRY
K061	EMISSION CONTROL DUST/SLUDGE FROM PRIMARY PRODUCTION OF STEEL IN ELECTRIC FURNACES
K064	ACID PLANT BLOWDOWN SLURRY/SLUDGE RESULTING FROM THE THICKENING OF BLOWDOWN SLURRY FROM PRIMARY COPPER PRODUCTION
K065	SURFACE IMPOUNDMENT SOLIDS CONTAINED IN AND DREDGED FROM SURFACE IMPOUNDMENTS AT PRIMARY LEAD SMELTING FACILITIES.
K066	SLUDGE FROM TREATMENT OF PROCESS WASTEWATER AND/OR ACID PLANT BLOWDOWN FROM PRIMARY ZINC PRODUCTION
K071	BRINE PURIFICATION MUDS FROM MERCURY CELL PROCESS IN CHLORINE PRODUCTION WHERE SEPARATELY PREPURIFIED BRINE IS NOT USED
K073	CHLORINATED HYDROCARBON WASTE FROM PURIFICAITON STEP OF THE DIAPHRAGM CELL PROCESS USING GRAPHITE ANODES IN CHLORINE PRODUCTION
K083	DISTILLATION BOTTOMS FROM ANILINE PRODUCTION
K084	WASTEWATER TREATMENT SLUDGES GENERATED DURING PRODUCTION OF VETERINARY PHARMACEUTICALS FROM ARSENIC OR ORGANO-ARSENIC COMPOUNDS
K085	DISTILLATION OR FRACTIONATION COLUMN BOTTOMS FROM PRODUCTION OF CHLOROBENZENES
K086	SOLVENT WASHES AND SLUDGES, CAUSTIC WASHES AND SLUDGES, OR WATER WASHES AND SLUDGES FROM CLEANING TUBS AND EQUIPMENT USED IN FORMULATION OF INK FROM PIGMENTS, DRIERS, SOAPS, STABILIZERS CONTAINING CHROMIUM AND LEAD
K087	DECANTER TANK TAR SLUGE FROM COKING
K088	SPENT POTLINERS FROM PRIMARY ALUMINUM REDUCTION

Exhibit C -- HAZARDOUS WASTES RECEIVED AT SIEMENS WATER TECHNOLOGY CORP.	
EPA WASTE CODE	WASTE DESCRIPTION
K090	EMISSION CONTROL DUST OR SLUDGE FROM FERROCHROMIUMSILICON PRODUCTION
K091	EMISSION CONTROL DUST OR SLUDGE FROM FERROCHROMIUM PRODUCTION
K093	DISTILLAION LIGHT ENDS FROM PRODUCTION OF PHTHALIC ANHYDRIDE FROM ORTHO-XYLENE
K094	DISTILLATION BOTTOMS FROM PRODUCTION OF PHTHALIC ANHYDRIDE FROM ORTHO-XYLENE
K095	DISTILLAION BOTTOMS FROM PRODUCTION OF 1,1,1-TRICHLOROETHANE
K096	HEAVY ENDS FROM HEAVY ENDS COLUMN FROM PRODUCTION OF 1,1,1-TRICHLOROETHANE
K097	VACUUM STRIPPER DISCHARGE FROM CHLORDANE CHLORINATOR IN PRODUCTION OF CHLORDANE
K098	UNTREATED PROCESS WASTEWATER FROM PRODUCTION OF TOXAPHENE
K100	WASTE LEACHING SOLUTION FROM ACID LEACHING OF EMISSION CONTROL DUST/SLUDGE FROM SECONDARY LEAD SMELTING
K101	DISTILLATION TAR RESIDUES FROM DISTILLATIONOF ANILINE-BASED COMPOUNDS IN PRODUCTION OF VETERINARY PHARMACEUTICALS FROM ARSENIC OR ORGANO-ARSENIC COMPOUNDS
K102	RESIDUE FROM USE OF ACTIVATED CARBON FOR DECOLORIZATION IN PRODUCTION OF VETERINARY PHARMACEUTICALS FRO ARSENIC OR ORGANO-ARSENIC COMPOUNDS
K103	PROCESS RESIDUES FROM ANILINE EXTRACTION FROM PRODUCTIONOF ANILINE
K104	COMBINED WASTEWATER STREAMS GENERATED FROM NITROBENZENE/ANILINE PRODUCTION
K105	SEPARATED AQUEOUS STREAM FROM THE REACTOR PRODUCT WASHING STEP IN PRODUCTION OF CHLOROBENZENES
K106	WASTEWATER TREATMENT SLUDGE FROM MERCURY CELL PROCESS IN CHLORINE PRODUCTION
K112	REACTION BY-PRODUCT WATER FROM THE DRYING COLUMN IN PRODUCTION OF TOLUENEDIAMINE VIA HYDROGENATION OF DINITROTOLUENE
K113	CONDENSED LIQUID LIGHT ENDS FROM THE PURIFICATIONOF TOLUENEDIAMINE IN PRODUCTION OF TOLUENEDIAMINE VIA HYDROGENATION OF DINITROTOLUENE
K114	VICINALS FROM PURIFICAITON OF TOLUENEDIAMINE IN PRODUCTION OF TOLUENEDIAMINE VIA HYDROGENATION OF DINITROTOLUENE
K115	HEAVY ENDS FROM THE PURIFICATION OF TOLUENEDIAMINE IN PRODUCTION OF TOLUENEDIAMINE VIA HYDROGENATION OF DINITROTOLUENE
K116	ORGANIC CONDENSATE FROM SOLVENT RECOVERY COLUMN IN PRODUCTION OF TOLUENE DIISOCYANATE VIA PHOSGENATION OF TOLUENEDIAMINE
K117	WASTEWATER FROM THE REACTOR VENT GAS SCRUBBER IN PRODUCTION OF ETHYLENE DIBROMIDE VIA BROMINATION OF ETHENE
K118	SPENT ADSORBENT SOLIDS FROM PURIFICATION OF ETHYLENE DIBROMIDE IN PRODUCTION OF ETHYLENE DIBROMIDE VIA BROMINATION OF ETHENE

Exhibit C -- HAZARDOUS WASTES RECEIVED AT SIEMENS WATER TECHNOLOGY CORP.	
EPA WASTE CODE	**WASTE DESCRIPTION**
K125	FILTRATION, EVAPORATION, AND CENTRIFUGATION SOLIDS FROM THE PRODUCTION OF ETHYLENEBISDITHIOCARBAMIC ACID AND ITS SALTS.
K126	BAGHOUSE DUST AND FLOOR SWEEPINGS IN MILLING AND PACKAGING OPERATIONS FROM PRODUCTION OR FORMULATION OF ETHYLENE BIS DITHIOCARBAMIC ACID AND ITS SALTS
P001	2H-1-BENZOPYRAN-2-ONE, 4-HYDROXY-3-(3-OXO-1-PHENYLBUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3% WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRAIONS GREATER THAN 0.3%
P002	ACETAMINE, N-(AMINOTHIOXOMETHYL); Also known as 1-ACETYL-2-THIOUREA
P003	ACROLEIN; Also known as 2-PROPENAL
P004	ALDRIN; Also known as 1,4,5,8-DIMETHANONAPHTHALENE, 1,2,3,4,10,10-HEXA-CHLORO-1,4,4A,5,8,8A,-HEXAHYDRO, (ALPHA, 4ALPHA, 4 ABETA, 5 ALPHA, 8ALPHA, 8ABETA)-
P005	ALLYL ALCOHOL; Also known as 2-PROPEN-1-OL
P007	5-(AMINOMETHYL)-3-ISOXAZOLOL; Also known as 3(2H)-ISOXAZOLONE, 5-(AMINOMETHYL)-
P008	4-AMINOPYRIDINE; Also known as 4-PYRIDINAMINE
P010	ARSENIC ACID H_3ASO_4
P011	ARSENIC OXIDE AS_2O_5; Also known as ARSENIC PENTOXIDE
P012	ARSENIC OXIDE AS_2O_3; Also known as ARSENIC TRIOXIDE
P013	BARIUM CYANIDE
P014	BENZENETHIOL; Also known as THIOPHENOL
P015	BERYLLIUM
P016	DICHLOROMETHYL ETHER; Also known as METHANE, OXYBIS[CHLORO-
P017	BROMOACETONE; Also known as 2-PROPANONE, 1-BROMO-
P018	BRUCINE
P020	DIOSEB; Also known as PHENOL, 2-(1-METHYLPROPYL)-4,6-DINITRO-
P021	CALCIUM CYANIDE; Also known as CALCIUM CYANIDE $CA(CN)_2$
P022	CARBON DISULFIDE
P023	ACETALDEHYDE, CHLORO-; Also known as CHLOROACETALDEHYDE
P024	BENZENAMINE, 4-CHLORO-; Also known as P-CHLORANILINE
P026	1-(O-CHLOROPHENYL)THIOUREA; Also known as THIOUREA, (2-CHLOROPHENYL)-
P027	PROPANENITRILE, 3-CHLORO-; Also known as 3-CHLOROPROPIONITRILE
P028	BENZENE, (CHLOROMETHYL)-; Also known as BENZYL CHLORIDE
P029	COPPER CYANIDE; Also known as COPPER CYANIDE CU(CN)
P030	CYANIDES (SOLUBLE CYANIDE SALTS), NOT OTHERWISE SPECIFIED
P031	CYANOGEN; Also known as ETHANEDINITRILE
P033	CYANOGEN CHLORIDE; Also known as CYANOGEN CHLORIDE (CN)CL

Exhibit C -- HAZARDOUS WASTES RECEIVED AT SIEMENS WATER TECHNOLOGY CORP.	
EPA WASTE CODE	**WASTE DESCRIPTION**
P034	2-CYCLOHEXYL-4,6-DINITROPHENOL; Also known as PHENOL, 2-CYCLOHEXYL-4,6-DINITRO-
P036	ARSONOUS DICHLORIDE, PHENYL-; Also known as DICHLOROPHENYLARSINE
P037	DIELDRIN; Also known as 2,7:3,6-DIMETHANONAPHTH[2,3-B]OXIRENE, 3,4,5,6,9,9-HEXACHLORO-1A,2,2A,3,6,6A,7,7A-OCTAHYDRO-, (1AALPHA, 2BETS, 2AALPHA, 3BETAK, 6BETA, 6AALPHA, 7BETA, 7AALPHA)-
P038	ARSINE, DIETHYL-; Also known as DIETHYLARSINE
P039	PHOSPHORODITHIOIC ACID, O,O-DIETHYL S-[2-(ETHYLTHIO)ETHYL]ESTER; Also known as DISULFOTON
P040	O,O-DIETHYL O-PYRAZINYL PHOSPHOROTHIOATE; Also known as PHOSPHOROTHIOIC ACID, O, O-DIMETHYL O-(4 NITROPHENYL) ESTER
P041	PHOSPHORIC ACID, DIETHYL 4-NITROPHENYL ESTER; Also known as DIETHYL-P-NITROPHENYL PHOSPHATE
P042	1,2-BENZENEDIOL, 4-[HYDROXY-2-(METHYLAMINO)ETHYL]-,(R)-; Also known as EPINEPHRINE
P043	DIISOPROPYLFLUOROPHOSPHATE (DFP); Also known as PHOSPHOROFLUORIDIC ACID, BIS (1-METHYLETHYL)ESTER
P044	DIMETHOATE; Also known as PHOSPHORODITHIOIC ACID,O, O-DIMETHYL S-[2-(METHYLAMINO)-2-OXOETHYL]ESTER
P045	2-BUTANONE, 3, 3-DIMETHYL-1-(METHYITHIO)-,O-[METHYLOAMINO)CARBONYL]OXIME; Also known as THIOFANOX
P046	BENZENEETHANAMINE, ALPHA,ALPHA-DIMETHYL-; Also known as ALPHA,ALPHA-DIMETHYLPHENETHYLAMINE
P047	4,6-DINITRO-O-CRESOL, & SALTS; Also known as PHENOL,2-METHYL-4,6-DINITRO-, & SALTS
P048	2,4-DINITROPHENOL; Also known as PHENOL, 2,4-DINITRO-
P049	DITHIOBIURET; Also known as THIOIMIDODICARBONIC DIAMIDE $[H_2N)C(S)]_2NH$
P050	ENDOSULFAN; Also known as 6M9-METHANO-2,4,3-BENZODIOXATHIEPIN, 6,7,8,9,10,1K0-HEXACHLORO-1,5,5A,6,9,91-HEXAHYDRO-,3-OXIDE
P051	2,7:3,6-DIMETHANONAPHTH [2,3-B]OXIRENE, 3,4,5,6,9,9-HEXACHLORO-1A,2,2A,3,6,6A,7,7A-OCTAHYDRO-, (1AALPHA, 2BETA, 2ABETA, 3ALPHA, 6ALPHA, 6ABETA, 7BETA, 7AALPHA)-, & METABOLITES; Also known as ENDRIN; Also known as ENDRIN, & METABOLITES
P054	AZIRIDINE; Also known as ETHYLENEIMINE
P056	FLUORINE
P057	ACETAMIDE, 2-FLUORO-; Also known as FLUOROACETAMIDE
P058	ACETIC ACID, FLUORO-,SODIUM SALT; Also known as FLUOROACETIC ACIDE, SODIUM SALT
P059	HEPTACHLOR; Also known as

Exhibit C -- HAZARDOUS WASTES RECEIVED AT SIEMENS WATER TECHNOLOGY CORP.	
EPA WASTE CODE	**WASTE DESCRIPTION**
	4,7-METHANO-1H-INDENE, 1,4,5,6,7,8,-HEPTACHLORO-3A,4,7,7A-TETRAHYDRO-
P060	1,4,5,8-DIMETHANONAPHTHALENE,1,2,3,4,10,10-HEXA- CHLORO-1,4,4A,5,7,8,8A-HEXAHYDRO-(1ALPHA, 4ALPHA, 4ABETA, 5BETA,8BETA,8ABETA)-; Also known as ISODRIN
P062	HEXAETHYL TETRAPHOSPHATE; Also known as TETRAPHOSPHORIC ACID, HEXAETHYL ESTER
P063	HYDROCYANIC ACID; Also known as HYDROGEN CYANIDE
P064	METHANE, ISOCYANATO-
P066	ETHANIMIDOTHIOIC ACID, N-[[(METHYLAMINO)CARBONYL]OXY]-, METHYL ESTER; Also known as METHOMYL
P067	AZINIDINE, 2-METHYL; Also known as 1,2-PROPYLENIMINE
P068	HYDRAZINE, METHYL-; Also known as METHYL HYDRAZINE
P069	2-METHYLLACTONITRILE; Also known as PROPANENITRILE, 2-HYDROXY-2-METHYL-
P070	ALDICARB; Also known as PROPANAL, 2-METHYL-2-(METHYLTHIO)-, O-[(METHYLAMINO)CARBONYL]OXIME
P071	METHYL PARATHION; Also known as PHOSPHOROTHIOIC ACID, O, O,-DIMETHYL O-(4-NITROPHENYL)ESTER
P072	ALPHA-NAPHTHYLTHIOUREA; Also known as THIOUREA, 1-NAPHTHALENYL-
P073	NICKEL CARBONYL; Also known as NICKEL CARBONYL $NI(CO)_4$, (T-4)-
P074	NICKEL CYANIDE; Also known as NICKEL CYNAIDE $NI(CN)_2$
P075	NICOTINE, & SALTS; Also known as PYRIDINE, 3-(1-METHYL-2-PYRROLIDINYL)-, (S)-, & SALTS
P077	BENZENAMINE, 4-NITRO-; Also known as P-NITROANILINE
P078	NITROGEN DIOXIDE; Also known as NITROGEN OXIDE NO_2
P082	METHANAMINE, N-METHYL-N-NITROSO-; Also known as N-NITROSODIMETHYLAMINE
P084	N-NITROSOMETHYLVINYLAMINE; Also known as VINYLAMINE, N-METHYL-N-NITROSO-
P085	DIPHOSPHORAMIDE, OCTAMETHYL-; Also known as OCTAMETHYLPYROPHOSPHORAMIDE
P087	OSMIUM OXIDE OSO_4, (T-4)-; Also known as OSMIUM TETROXIDE
P088	ENDOTHALL; Also known as 7-OXABICYCLO[2.2.1]HEPTANE-2,3-DICARBOXYLIC ACID
P089	PARATHION; Also known as PHOSPHORIC ACID, O,O-DIETHYL O-(4-NITROPHENYL)ESTER
P092	MERCURY, (ACETATO-O)PHENYL-; Also known as PHENYLMERCURY ACETATE
P093	PHENYLTHIOUREA; Also known as THIOUREA, PHENYL-
P094	PHORATE; Also known as PHOSPHORODITHIOIC ACID, O,O-DIETHYL; Also known as S-[ETHYLTHIO)METHYL] ESTER
P095	CARBONIC DICHLORIDE; Also known as PHOSGENE
P096	HYDROGEN PHOSPHIDE; Also known as PHOSPHINE
P097	FAMPHUR; Also known as

Exhibit C -- HAZARDOUS WASTES RECEIVED AT SIEMENS WATER TECHNOLOGY CORP.	
EPA WASTE CODE	**WASTE DESCRIPTION**
	PHOSPHOTHIOIC ACID, O-[4-[(DIMETHYLAMINO)SULFONYL]PHENYL] O,O-DIMETHYL ESTER
P098	POTASSIUM CYANIDE
P099	ARGENTATE(1-), BIS(CYANO-C)-, POTASSIUM; Also known as POTASSIUM SILVER CYANIDE
P101	ETHYL CYANIDE; Also known as PROPANENITRILE
P102	PROPARGYL ALCOHOL; Also known as 1-PROPYN-1-OL
P103	SELENOUREA
P104	SILVER CYANIDE
P105	SODIUM AZIDE
P108	STRYCHNIDIN-10-ONE, & SALTS; Also known as STRYCHNINE, & SALTS
P109	TETRAETHYLDITHIOPYROPHOSPHATE; Also known as THIODIPHOSPHIRIC ACID, TETRAETHYL ESTER
P110	TETRAETHYL LEAD
P113	THALLIUM OXIDE TL_2O_3
P114	THALLIUM(L) SELENITE
P115	THALLIUM(L) SULFATE
P116	THIOSEMICARBAZIDE
P118	TRICHLOROMETHANETHIOL
P119	VANADIC ACID, AMMONIUM SALT
P120	VANADIUM PENTOXIDE
P121	ZINC CYANIDE
P123	TOXAPHENE
U001	ACETALDEHYDE (I); Also known as ETHANAL (I)
U002	ACETONE (I); Also known as 2-PROPANONE (I)
U003	ACETONITRILE (I,T)
U004	ACETONITRILE (I,T)
U005	2, ACETYLAMINOFLUORENE; Also known as ACETAMIDE, N-9H-FLUOREN-2-YL-
U007	ACRYLAMIDE; Also known as 2-PROPENAMIDE
U008	ACRYLIC ACID (I); Also known as 2-PROPENOIC ACID (I)
U009	ACRYLONITRILE; Also known as 2-PROPENENITRILE
U010	AZIRINO[2',3':3,4]PYRROLO[1,2-a]INDOLE-4,7-DIONE,6-AMINO-8-[[(AMINOCARBONYL)OXY]METHYL]-1,1a,2,8,8a,8b-HEXAHYDRO-8a-METHOXY-5-METHYL-, [1aS-(1AALPHA, 8BETA, 8AALPHA, 8BALPHA)]-; Also known as MITOMYCIN C
U011	AMITROLE; Also known as 1H-1,2,-TRIAZOL-3-AMINE
U012	ANILINE (I,T); Also known as BENZENAMINE (I,T)
U014	AURAMINE; Also known as BENZENAMINE, 4,4'-CARBONIMIDOYLBIS[N,N-DIMETHYL-

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EPA WASTE CODE	**WASTE DESCRIPTION**
U015	AZASERINE; Also known as L-SERINE, DIAZOACETATE (ESTER)
U016	BENZ[C]ACRIDINE
U017	BENZAL CHLORIDE; Also known as BENZENE,(DICHLOROMETHYL)-
U018	BENZ[A]ANTHRACENE
U019	BENZENE (I,T)
U021	BENZIDINE; Also known as [1,1'-BIPHENYL]-4,4'-DIAMINE
U022	BENZO[A]PYRENE
U024	DICHLOROMETHOXY ETHANE; Also known as ETHANE, 1,1'-[METHYLENEBIS(OXY)]BIS[2-CHLORO-
U025	DICHLOROETHYL ETHER; Also known as ETHANE,1,1'-OXYBIS[2-CHLORO-
U026	CHLORNAPHAZIN; Also known as NAPHTHALENAMINE, N,N'-BIS(2-CHLOROETHYL)-
U027	DICHLOROISOPROPYL ETHER; Also known as PROPANE, 2,2'-OXYBIS[2-CHLORO-
U028	1,2-BENZENEDICARBOXYLIC ACID, BIS(2-ETHYLHEXYL) ESTER; Also known as DIETHYLHEXYL PHTHALATE
U029	METHANE, BROMO-; Also known as METHYL BROMIDE
U030	BENZENE, 1-BROMO-4-PHENOXY-; Also known as 4-BROMOPHENYL PHENYL ETHER
U031	1-BUTANOL (I); Also known as N-BUTYL ALCOHOL (I)
U032	CHROMIC ACID H_2CRO_4, CALCIUM SALT; Also known as CALCIUM CHROMATE
U034	CHLORAL; Also known as ACETALDEHYDE, TRICHLORO-
U035	CHLORAMBUCIL; Also known as BENZENEBUTANOIC ACID, 4-[BIS(2-CHLOROETHYL)AMINO]-
U036	CHLORDANE, ALPHA & GAMMA ISOMERS; Also known as 4,7-METHANO-1H-INDENE, 1,2,4,5,6,7,8,8-OCTACHLORO-2,3,3A,4,7,7A-HEXAHYDRO-
U037	CHLOROBENZENE; Also known as BENZENE, CHLORO-
U038	CHLOROBENZILATE; Also known as BENZENEACETIC ACID, 4-CHLORO-ALPHA-(4-CHLOROPHENYL)-ALPHA-HYDROXY-, ETHYL ESTER
U039	P-CHLORO-M-CRESOL; Also known as PHENOL, 4-CHLORO-3-METHYL-
U041	EPICHLOROHYDRIN; Also known as OXIRANE, (CHLOROMETHYL)-
U042	2-CHLOROETHYL VINYL ETHER; Also known as ETHENE, (2-CHLOROETHOXY)-
U043	VINYL CHLORIDE; Also known as ETHENE, CHLORO-
U044	CHLOROFORM; Also known as METHANE, TRICHLORO-
U045	METHANE, CHLORO- (I,T); Also known as METHYL CHLORIDE (I,T)
U046	CHLOROMETHYL METHYL ETHER; Also known as METHANE, CHLOROMETHOXY-
U047	BETA-CHLORONAPHTHALENE; Also known as NAPHTHALENE, 2-CHLORO-
U048	O-CHLOROPHENOL; Also known as PHENOL, 2-CHLORO-
U049	4-CHLORO-O-TOLUIDINE, HYDROCHLORIDE; Also known as BENZENAMINE, 4-CHLORO-2-METHYL, HYDROCHLORIDE

Exhibit C -- HAZARDOUS WASTES RECEIVED AT SIEMENS WATER TECHNOLOGY CORP.	
EPA WASTE CODE	**WASTE DESCRIPTION**
U050	CHRYSENE
U051	CREOSOTE
U052	CRESOL (CRESYLIC ACID); Also known as PHENOL, METHYL-
U053	CROTONALDEHYDE; Also known as 2-BUTENAL
U055	CUMENE (I); Also known as BENZENE, (1-METHYLETHYL)- (I)
U056	BENZENE, HEXAHYDRO- (I); Also known as CYCLOHEXANE (I)
U057	CYCLOHEXANONE (I)
U058	CYCLOPHOSPHAMIDE; Also known as 2H-1,3,2-OXAZAPHOSPHORIN-2-AMINE, N,N-BIS (2-CHLOROETHYL)TETRAHYDRO-, 2-OXIDE
U059	DAUNOMYCIN; Also known as 5,12-NAPHTHACENEDIONE, 8-ACETYL-10-[(3-AMINO-2,3,6-TRIDEOXY)-ALPHS-L-LYXO-HEXOPYRANOSY)OXY]-7,8,9,10-TETRAHYDRO-6,8,11-TRIHYDROXY-1-METHOXY-, (8S-CIS)-
U060	DDD; Also known as BENZENE, 1,1'-(2,2-DICHLOROETHYLIDENE)BIS[4-CHLORO-
U061	DDT; Also known as BENZENE, 1,1'-(2,2,2-TRICHLOROETHYLIDENT)BIS[4-CHLORO-
U062	DIALLATE; Also known as CARBAMOTHIOIC ACID, BIS(1-METHYLETHYL)-, S-(2,3-DICHLORO-2-PROPENYL) ESTER
U063	DIBENZ[A,H]ANTHRACENE
U064	DIBENZO[A,I]PYRENE; Also known as BENZO[RST]PENTAPHENE
U066	1,2-DIBROMO-3-CHLOROPROPANE; Also known as PROPANE, 1,2-DIBROMO-3-CHLORO-
U067	ETHANE, 1,2-DIBROMO-; Also known as ETHYLENE DIBROMIDE
U068	METHANE, DIBROMO-; Also known as METHYLENE BROMIDE
U069	DIBUTYL PHTHALATE; Also known as 1,2-BENZENEDICARBOXYLIC ACID, DIBUTYL ESTER
U070	o-DICHLOROBENZENE; Also known as BENZENE, 1,2-DICHLORO-
U071	m-DICHLOROBENZENE; Also known as BENZENE, 1,3-DICHLORO-
U072	p-DICHLOROBENZENE; Also known as BENZENE, 1,4-DICHLORO-
U073	3,3'-DICHLOROBENZIDINE; Also known as [1,1'-BIPHENYL]-4,4'-DIAMINE, 3,3'DICHLORO-
U074	1,4-DICHLORO-2-BUTENE (I,T); Also known as 2-BUTENE, 1,4-DICHLORO- (I,T)
U075	DICHLORODIFLUOROMETHANE; Also known as METHANE, DICHLORODIFLUORO-
U076	ETHANE, 1,1-DICHLORO-; Also known as ETHYLIDENE DICHLORIDE
U077	ETHANE, 1,2-DICHLORO-; Also known as ETHYLENE DIBROMIDE
U078	1,1-DICHLOROETHYLENE; Also known as ETHENE, 1,1-DICHLORO-
U079	1,2-DICHLOROETHYLENE; Also known as ETHENE, 1,2-DICHLORO-, (E)
U080	METHANE, DICHLORO-; Also known as METHYLENE CHLORIDE

Exhibit C -- HAZARDOUS WASTES RECEIVED AT SIEMENS WATER TECHNOLOGY CORP.	
EPA WASTE CODE	**WASTE DESCRIPTION**
U081	2,4-DICHLOROPHENOL; Also known as PHENOL, 2,4-DICHLORO-
U082	2,6-DICHLOROPHENOL; Also known as PHENOL,2,6-DICHLORO-
U083	PROPANE, 1,2-DICHLORO-; Also known as PROPYLENE DICHLORIDE
U084	1,3-DICHLOROPROPENE; Also known as 1-PROPENE, 1,3-DICHLORO-
U085	1,2:3,4--DIEPOXYBUTANE (I,T); Also known as 2,2'-BIOXIRANE
U086	N,N'-DIETHYLHYDRAZINE; Also known as HYDRAZINE, 1,2,-DIETHYL-
U087	O,O-DIETHYL S-METHYL DITHIOPHOSPHATE; Also known as PHOSPHORODITHIOIC ACID, 0,0-DIETHYL S-METHYL ESTER
U088	DIETHYL PHTHALATE; Also known 1,2-BENZENEDICARBOXYLIC ACID, DIETHYL ESTER
U089	DIETHYLSTILBESTEROL; Also known as PHENOL, 4,4'-(1,2-DIETHYL-1,2-ETHENEDIYL)BIS-, (E)
U090	DIHYDROSAFROLE; Also known as 1,3-BENZODIOXOLE, 5-PROPYL-
U091	3,3'-DIMETHOXYBENZIDINE; Also known as [1,1'-BIPHENYL]-4,4'-DIAMINE, 3,3'DIMETHOXY-
U092	DIMETHYLAMINE (I); Also known as METHANAMINE, N-METHYL- (I)
U093	BENZENAMINE, N,N-DIMETHYL-4-(PHENYLAZO)-; Also known as P-DIMETHYLAMINOAZOBENZENE
U094	BENZ[A]ANTHRACENE, 7,12-DIMETHYL-; Also known as 7,12-DIMETHYLBENZ[A]ANTHRACENE
U095	3,3'-DIMETHYLBENZIDINE; Also known as [1,1'-BIPHENYL]-4,4'-DIAMINE, 3,3'DIMETHYL-
U097	DIMETHYLCARBAMOYL CHLORIDE; Also known as CARBAMIC CHLORIDE, DIMETHYL-
U098	1,1-DIMETHYLHYDRAZINE; Also known as HYDRAZINE, 1,1-DIMETHYL-
U099	1,2-DIMETHYLHYDRAZINE; Also known as HYDRAZINE, 1,2,-DIMETHYL-
U101	2,4-DIMETHYLPHENOL; Also known as PHENOL, 2,4-DIMETHYL-
U102	DIMETHYL PHTHALATE; Also known as 1,2-BENZENEDICARBOXYLIC ACID, DIMETHYL ESTER
U103	DIMETHYL SULFATE; Also known as SULFURIC ACID, DIMETHYL ESTER
U105	2,4-DINITROTOLUENE; Also known as BENZENE, 1-METHYL-2,4-DINITRO-
U106	2,6-DINITROTOLUENE; Also known as BENZENE, 2-METHYL-1,3-DINITRO-
U107	DI-N-OCTYL PHTHALATE; Also known as 1,2-BENZENEDICARBOXYLIC ACID, DIOCTYL ESTER
U108	1,4-DIETHYLENEOXIDE; Also known as 1,4-DIOXANE
U109	1,2-DIPHENYLHYDRAZINE; Also known as HYDRAZINE, 1,2-DIPHENYL-
U110	DIPROPYLAMINE (I); Also known as 1-PROPANAMINE, N-PROPYL- (I)
U111	DI-N-PROPYLNITROSAMINE; Also known as 1-PROPANAMINE, N-NITROSO-N-PROPYL-
U112	ACETIC ACID ETHYL ESTER (I); Also known as ETHYL ACETATE (I)
U113	ETHYL ACRYLATE (I); Also known as 2-PROPENOIC ACID, ETHYL ESTER (I)

Exhibit C -- HAZARDOUS WASTES RECEIVED AT SIEMENS WATER TECHNOLOGY CORP.	
EPA WASTE CODE	**WASTE DESCRIPTION**
U114	ETHYLENEBISDITHIOCARBAMIC ACID, SALTS & ESTERS; Also known as CARBAMODITHIOIC ACID, 1,2- ETHANEDIYLBIS-, SALTS & ESTERS
U115	ETHYLENE OXIDE (I,T); Also known as OXIRANE (I,T)
U116	ETHYLENETHIOUREA; Also known as 2-IMIDAZOLIDINETHIONE
U117	ETHANE, 1,1'-OXYBIS-(I); Also known as ETHYL ETHER (I)
U118	ETHYL METHACRYLATE; Also known as 2-PROPENOIC ACID, 2-METHYL-, ETHYL ESTER
U119	ETHYL METHANESULFONATE; Also known as METHANESULFONIC ACID, ETHYL ESTER
U120	FLUORANTHENE
U121	TRICHLOROMONOFLUOROMETHANE; Also known as METHANE, TRICHLOROFLUORO-
U122	FORMALDEHYDE
U124	FURAN (I); Also known as FURFURAN (I)
U125	2-FURANCARBOXALDEHYDE (I); Also known as FURFURAL (I)
U126	GLYCIDYLALDEHYDE; Also known as OXIRANECARBOXYALDEHYDE
U127	HEXACHLOROBENZENE; Also known as BENZENE, HEXACHLORO-
U128	HEXACHLOROBUTADIENE; Also known as 1,3-BUTADIENE, 1,1,2,3,4,4-HEXACHLORO-
U129	LINDANE; Also known as CYCLOHEXANE, 1,2,3,4,5,6- HEXACHLORO-, (1ALPHA, 2ALPHA, 3BETA, 4ALPHA, 5ALPHA, 6BETA)-
U130	HEXACHLOROCYCLOPENTADIENE; Also known 1,3-CYCLOPENTADIENE, 1,2,3,4,5,5-HEXACHLORO-
U131	HEXACHLOROETHANE; Also known as ETHANE, HEXACHLORO-
U132	HEXACHLOROPHENE; Also known as PHENOL, 2,2'-METHYLENEBIS[3,4,6-TRICHLORO-
U135	HYDROGEN SULFIDE; Also known HYDROGEN SULFIDE H_2S
U136	ARSINIC ACID, DIMETHYL-; Also known as CACODYLIC ACID
U137	INDENO[1,2,3-CD]PYRENE
U138	METHANE, IODO-; Also known as METHYL IODIDE
U140	ISOBUTYL ALCOHOL, (I,T); Also known as 1-PROPANOL, 2-METHYL-, (I,T)
U141	ISOSAFROLE; Also known as 1,3-BENZODIOXOLE, 5-(1-PROPENYL)-
U142	KEPONE; Also known as 1,3,4-METHENO-2H-CYCLOBUTA[CD]PENTALEN-2-ONE, 1,1A,3,3A,4,5,5A,5B,6- DECACHLOROOCTAHYDRO-
U143	LASIOCARPINE; Also known as 2-BUTENOIC ACID, 2-METHYL-, 7-[2,3-DIHYDROXY-2-(1-METHOXYETHYL)-3-METHYL-1- OXOBUTOXY]METHYL]-2,3,5,6A-TETRAHYDRO-1H-PYRROLIZIN-1-YL ESTER,[1S-1ALPHA(Z),7(2S*,3R*),7AALPHA]]-
U144	ACETIC ACID, LEAD(2+) SALT; Also known as LEAD ACETATE
U145	LEAD PHOSPHATE; PHOSPHORIC ACID, LEAD(2+) SALT (2:3)
U146	LEAD, BIS(ACETATO-O) TETRAHYDROXYTRI-; Also known as LEAD SUBACETATE

Exhibit C -- HAZARDOUS WASTES RECEIVED AT SIEMENS WATER TECHNOLOGY CORP.	
EPA WASTE CODE	**WASTE DESCRIPTION**
U147	MALEIC ANHYDRIDE; Also known as 2,5-FURANDIONE
U148	MALEIC HYDRAZIDE; Also known as 3,6-PYRIDAZINEDIONE, 1,2-DIHYDRO-
U149	MALONONITRILE; Also known as PROPANEDINITRILE
U150	MELPHALAN; Also known as L-PHENYLALANINE, 4-[BIS(2-CHLOROETHYL)AMINO]-
U151	MERCYR
U152	METHACRYLONITRILE (I,T); Also known as 2-PROPENENITRILW, 2-METHYL- (I,T)
U153	METHANETHIOL (I,T); Also known as THIOMETHANOL (I,T)
U154	METHANOL (I); Also known as METHYL ALCOHOL (I)
U155	METHAPYRILENE; Also known 1,2-ETHANEDIAMINE, N,N- DIMETHYL-N'-W-PYRIDINYL-N'-(2- THIENYLMETHYL)-
U156	METHYL CHLOROCARBONATE (I,T); Also known CARBONOCHLORIDIC ACID, METHYL ESTER (I,T)
U157	BENZ[I]ACEANTHRYLENE, 1,2-DIHYDRO-3-METHYL-; Also known as 3-METHYLCHOLANTHRENE
U158	BENZENAMINE, 4,4'METHYLENEBIS[2-CHLORO-; Also known as 4,4'-METHYLENEBIS(2-CHLOROANILINE)
U159	METHYL ETHYL KETONE (MEK) (I,T); Also known as 2-BUTANONE (I,T)
U161	METHYL ISOBUTYL KETONE (I); Also known as 4-METHYL-2-PENTANONE (I) and PENTANOL, 4-METHYL-
U162	METHYL METHACRYLATE (I,T); Also known as 2-PROPENOIC ACID, 2-METHYL-, METHYL ESTER (I,T)
U163	MNNG; Also known as GUANIDINE, N-METHYL-N'-NITRO-N- NITROSO-
U164	METHYLTHIOURACIL; Also known as 4(1H)-PYRIMIDINONE, 2,3-DIHYDRO-6-METHYL-2-THIOXO-
U165	NAPHTHALENE
U166	1,4-NAPHTHALENEDIONE; Also known as 1,4-NAPHTHOQUINONE
U167	1-NAPHTHALENAMINE; Also known as ALPHA-NAPHTHYLAMINE
U168	2-NAPHTHALENAMINE; Also known as BETA-NAPHTHYLAMINE
U169	NITROBENZENE (I,T); Also known as BENZENE, NITRO-
U170	P-NITROPHENOL; Also known as PHENOL, 4-NITRO
U171	2-NITROPROPANE (I,T); Also known as PROPANE, 2-NITRO (I,T)
U172	N-NITROSODI-N-BUTYLAMINE; Also known as 1-BUTANAMINE, N-BUTYL-N-NITROSO-
U173	N-NITROSODIETHANOLAMINE; Also known as ETHANOL, 2,2'-(NITROSOIMINO)BIS-
U174	N-NITROSODIETHYLAMINE; Also known as ETHANAMINE, N-ETHYL-N-NITROSO-
U176	N-NITROSO-N-ETHYLUREA; Also known as UREA, N-ETHYL-N-NITROSO-
U177	N-NITROSO-N-METHYLUREA; Also known as UREA, N-METHYL-N-NITROSO-
U178	N-NITROSO-N-METHYLURETHANE; Also known as CARBAMIC ACID, METHYLNITROSO-,ETHYL ESTER

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EPA WASTE CODE	**WASTE DESCRIPTION**
U179	N-NITROSOPIPERIDINE; Also known as PIPERIDINE, 1-NITROSO-
U180	N-NITROSOPYRROLIDINE; Also known as PYRROLIDINE, 1-NITROSO-
U181	BENZENAMINE, 2-METHYL-5-NITRO-; Also known as 5-NITRO-O-TOLUIDINE
U182	PARALDEHYDE; Also known as 1,3,5-TRIOXANE, 2,4,6- TRIMETHYL-
U183	PENTACHLOROBENZENE; Also known as BENZENE, PENTACHLORO-
U184	PENTACHLOROETHANE; Also known as ETHANE, PENTACHLORO-
U185	PENTACHLORONITROBENZENE (PCNB); Also known as BENZENE, PENTACHLORONITRO-
U186	1,3-PENTADIENE (I); Also known as 1-METHYLBUTADIENE (I)
U187	ACETAMIDE, N-(4-ETHOXYPHENYL)-; Also known as PHENACETIN
U188	PHENOL
U190	PHTHALIC ANHYDRIDE; Also known as 1,3-ISOBENZOFURANDIONE
U191	2-PICOLINE; Also known as PYRIDINE, 2-METHYL-
U192	BENZAMIDE,3,5-DICHLORO-N-(1,1-DIMETHYL-2-PROPYNYL)-; Also known as PRONAMIDE
U193	1,3-PROPANE SULTONE; Also known as 1,2-OXATHIOLANE, 2,2-DIOXIDE
U194	1-PROPANAMINE (I,T); Also known as N-PROPYLAMINE (I,T)
U196	PYRIDINE
U197	P-BENZOQUINONE; Also known as 2,5-CYCLOHEXADIENE-1,4-DIONE
U200	RESERPINE; Also known as YOHIMBAN-16-CARBOXYLIC ACID, 11,17-DIMETHOXY-18-[(3,4,5-TRIMETHOXYBENZOYL)OXY]-, METHYL ESTER, (3BETA, 16BETA, 17ALPHA, 18BETA, 20ALPHA)-
U201	RESORCINOL; Also known as 1,3-BENZENEDIOL
U202	SACCHARIN, & SALTS; Also known as 1,2-BENZISOTHIAZOL-3(2H)-ONE, 1,1-DIOXIDE, & SALTS
U203	SAFROLE; Also known as 1,3-BENZODIOXOLE, 5-(2- PROPENYL)-
U204	SELENIOUS ACID; Also known as SELENIUM DIOXIDE
U206	STREPTOZOTOCIN; Also known as GLUCOPYRANOSE, 2-DEOXY-2-(3-METHYL-3-NITROSOUREIDO)-, D-D-GLUCOSE, 2-DEOXY-2-[[(METHYLNITROSOAMINO)-CARBONYL]AMINO]-
U207	1,2,4,5-TETRACHLOROBENZENE; Also known as BENZENE, 1,2,4,5-TETRACHLORO-
U208	1,1,1,2-TETRACHLOROETHANE; Also known as ETHANE, 1,1,1,2-TETRACHLORO-
U209	1,1,2,2-TETRACHLOROETHANE; Also known as ETHANE, 1,1,2,2-TETRACHLORO-
U210	TETRACHLOROETHYLENE; Also known as ETHENE, TETRACHLORO-
U211	CARBON TETRACHLORIDE; Also known as METHANE, TETRACHLORO-
U213	TETRAHYDROFURAN (I); Also known as FURAN, TETRAHYDRO-(I)
U214	ACETIC ACID, THALLIUM(1+) SALT; Also known as THALLIUM(I) ACETATE

Exhibit C -- HAZARDOUS WASTES RECEIVED AT SIEMENS WATER TECHNOLOGY CORP.	
EPA WASTE CODE	**WASTE DESCRIPTION**
U215	THALLIUM(I) CARBONATE; Also known as CARBONIC ACID, DITHALLIUM(1+) SALT
U216	THALLIUM(I) CHLORIDE; Also known as THALLIUM CHLORIDE TLCL
U217	THALLIUM(I) NITRATE; Also known as NITRIC ACID, THALLIUM(1+) SALT
U218	THIOACETAMIDE; Also known as ETHANETHIOAMIDE
U219	THIOUREA
U220	TOLUENE; Also known as BENZENE, METHYL-
U221	TOLUENEDIAMINE; Also known as BENZENEDIAMINE, AR-METHYL-
U222	BENZENAMINE, 2-METHYL-, Also known as HYDROCHLORIDE O-TOLUIDINE HYDROCHLORIDE
U225	BROMOFORM; Also known as METHANE, TRIBROMO-
U226	ETHANE, 1,1,1-TRICHLORO-; Also known as METHYL CHLOROFORM
U227	1,1,2-TRICHLOROETHANE; Also known as ETHANE, 1,1,2-TRICHLORO-
U228	TRICHLOROETHYLENE; Also known as ETHENE, TRICHLORO-
U235	TRIS(2,3-DIBROMOPROPYL) PHOSPHATE; Also known as 1-PROPANOL, 2,3-DIBROMO-, PHOSPHATE (3:1)
U236	TRYPAN BLUE; Also known as 2,7-NAPHTHALENEDISULFONIC ACID, 3,3'-[(3,3'-DIMETHYL[1,1'-BIPHENYL]-4,4'- DIYL)BIS(AZO)BIS[5-AMINO-4-HYDROXY]-, TETRASODIUM SALT
U237	URACIL MUSTARD; Also known as 2,4-(1H,3H)-PYRIMIDINEDIONE, 5-[BIS(2-CHLOROETHYL)AMINO]-
U238	CARBAMIC ACID, ETHYL ESTER; Also known as ETHYL CARBAMATE (URETHANE)
U239	XYLENE (I); Also known as BENZENE, DIMETHYL- (I,T)
U240	ACETIC ACID, 92,4-DICHLOROPHENOXY)-, SALTS & ESTERS; Also known as 2,4-D, SALTS & ESTERS
U243	HEXACHLOROPROPENE; Also known as 1-PROPENE, 1,1,2,3,3,3- HEXACHLORO-
U244	THIOPEROXYDICARBONIC DIAMIDE $[(H_2N)C(S)]_2S_2$, TETRAMETHYL-; Also known as THIRAM
U246	CYANOGEN BROMIDE (CN)Br
U247	BENZENE, 1,1'(2,2,2-TRICHLOROETHYLIDENE)BIS[4-METHOXY-; Also known as METHOXYCHLOR
U248	WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRATIONS OF 0.3% OR LESS; Also known as 2H-1-BENZOPYRAN-2-ONE, 4- HYDROXY-3-(3-OXO-1-PHENYL-BUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS OF 0.3% OR LESS
U249	ZINC PHOSPHIDE Zn_3P_2 WHEN PRESENT AT CONCENTRATIONS OF 10% OR LESS
U328	BENZENAMINE, 2-METHYL-; Also known as o-TOLUIDINE
U353	BENZENAMINE, 4-METHYL-; Also known as p-TOLUIDINE
U359	ETHANOL, 2-ETHOXY-; Also known as ETHYLENE GLYCOL MONOETHYL ETHER

Exhibit C - Hazardous Waste Characteristics

Table 2 – Spent Activated Carbon Organic Constituents

Exhibit C

Spent Activated Carbon Organic Constituent Data Summary				
		Organics (lb constituent per lb spent activated carbon)		
Constituent	**CAS NO.**	Minimum	Maximum	Average
1-Butanol	71-36-3	8.67E-04	8.67E-04	8.67E-04
1-Hexane	110-54-3	3.86E-04	8.45E-02	4.24E-02
1,1 Dichloroethane	75-34-3	9.00E-09	3.20E-02	9.71E-04
1,1 Dichloroethene	75-35-4	2.50E-10	2.94E-01	2.51E-03
1,1,1 Trichloroethane	71-55-6	2.50E-09	3.43E+00	1.31E-02
1,1,2 Trichloroethane	79-00-5	5.00E-07	1.41E-02	3.28E-03
1,1,2,2 Tetrachloroethane	79-34-5	1.45E-05	3.31E-04	2.29E-04
1,2 Dibromoethane	106-93-4	2.50E-08	1.98E-02	4.57E-03
1,2 Dichlorobenzene	95-50-1	2.05E-05	4.60E-03	9.99E-04
1,2 Dichloroethane	107-06-2	0.00E+00	1.39E-01	7.18E-03
1,2 Dichloroethene	540-59-0	2.50E-08	7.32E-03	2.13E-03
1,2 Dichloropropane	78-87-5	3.00E-09	5.30E-02	6.06E-03
1,2,3 Trichloropropane	96-18-4	3.72E-06	3.72E-06	3.72E-06
1,2,4 Trimethylbenzene	95-63-6	1.10E-07	4.80E-04	3.84E-04
1,2-Dichloroethene (cis)	156-59-2	1.00E-09	2.63E-03	1.39E-03
1,2-Dichloroethene (trans)	156-60-5	7.32E-05	5.44E-04	3.65E-04
1,3 Dichlorobenzene	541-73-1	7.40E-05	5.48E-04	1.70E-04
1,4 Dichlorobenzene	106-46-7	2.50E-08	3.44E-03	5.20E-04
2,3,4,6 Tetrachlorophenol	58-90-2	1.82E-05	1.82E-05	1.82E-05
2-Butanol	78-92-2	5.90E-04	5.90E-04	5.90E-04
2-Butoxyethanol	111-76-2	2.73E-03	2.73E-03	2.73E-03
2-ethyl-1-Methylbenzene	611-14-3	9.40E-05	9.40E-05	9.40E-05
2-methoxy-1-Propanol		6.24E-03	6.24E-03	6.24E-03
2-Methylnaphthalene	91-57-6	1.63E-05	1.34E-03	4.61E-04
2-Methylphenol (o-Cresol)	95-48-7	2.14E-05	2.14E-05	2.14E-05
3-/4-Methylphenol (m&p Cresol)	108-39-4 & 106-44-5	3.40E-05	3.40E-05	3.40E-05
4-ethyl-1-Methylbenzene		8.10E-05	8.10E-05	8.10E-05
Acenaphthalene	208-96-8	3.36E-05	6.26E-04	3.30E-04
Acenaphthene	83-32-9	2.81E-06	2.41E-05	1.09E-05
Acenaphthylene		1.18E-06	2.66E-06	1.92E-06
Acetone	67-64-1	4.51E-03	8.49E-03	6.50E-03
Acrylic Acid	79-10-7	2.50E-05	2.50E-05	2.50E-05
Acrylonitrile	107-13-1	9.30E-06	9.30E-06	9.30E-06
Aldrin	309-00-2	6.60E-07	6.60E-07	6.60E-07
Aniline	62-53-3	2.51E-05	4.26E-04	1.47E-04
Benzene	71-43-2	2.50E-10	9.25E-02	1.44E-03
Benzo(a)Anthracene	56-55-3	5.60E-07	2.10E-06	1.33E-06
Benzo(b)Fluoranthene	205-99-2	2.30E-07	4.00E-07	3.20E-07
Bromodichloromethane	75-27-46	3.00E-05	6.18E-04	4.06E-04
Butane	106-97-8	9.69E-06	9.69E-06	9.69E-06
Butyl Acetate	123-86-4	1.36E-02	1.36E-02	1.36E-02
Carbon Tetrachloride	56-23-5	3.00E-08	1.36E-02	5.39E-04
Chlorobenzene	108-90-7	2.50E-08	2.75E-03	4.76E-04
Chloroethane	75-00-3	3.89E-03	3.89E-03	3.89E-03
Chloroform	67-66-3	1.40E-08	2.08E-02	1.05E-02

Exhibit C

Spent Activated Carbon Organic Constituent Data Summary				
Constituent	CAS NO.	Organics (lb constituent per lb spent activated carbon)		
		Minimum	Maximum	Average
Chloromethane	74-87-3	2.06E-04	2.06E-04	2.06E-04
Chrysene	218-01-9	6.40E-07	6.40E-07	6.40E-07
Cresol	1319-77-3	5.10E-05	1.74E-04	1.13E-04
Cumene	98-82-8	5.78E-06	1.65E-03	4.37E-04
Dibenzofuran	132-64-9	7.66E-06	2.61E-05	1.69E-05
Dicyclopentadiene	77-73-6	6.06E-04	6.49E-02	1.68E-02
Dioxane	123-91-1	1.16E-04	9.20E-04	5.18E-04
Ethanol	64-17-5	3.56E-04	3.56E-04	3.56E-04
Ethyl Acetate	141-78-6	5.87E-03	5.87E-03	5.87E-03
Ethylbenzene	100-41-4	5.00E-10	2.30E-02	1.14E-03
Ethylene Glycol	107-21-1	2.94E-01	2.94E-01	2.94E-01
Fluoranthene	206-44-0	3.11E-06	2.90E-05	1.61E-05
Freon 113	76-13-1	1.10E-09	1.10E-09	1.10E-09
Isobutane	75-28-5	1.42E-02	1.42E-02	1.42E-02
Isopar C		1.27E-03	5.48E-02	2.80E-02
Isopropyl Alcohol	67-63-0	7.00E-03	7.00E-03	7.00E-03
Lindane	58-89-9	1.54E-09	6.70E-06	1.28E-06
m&p-Xylenes	108-38-3 &106-42-3	7.20E-08	2.89E-03	5.90E-04
Methanol	67-56-1	1.36E-01	1.36E-01	1.36E-01
Methoxychlor	72-43-5	2.80E-06	2.80E-06	2.80E-06
Methyl ethyl ketone	78-93-3	1.20E-08	4.10E-03	1.40E-03
Methyl Isobutyl ketone	108-10-1	5.00E-06	4.24E-02	2.94E-03
Methyl methacrylate	80-62-6	2.50E-08	2.50E-08	2.50E-08
methyl tert-butyl ether	1634-04-4	1.22E-07	4.66E-02	5.86E-03
Methylene chloride	75-09-2	1.90E-08	1.30E-01	1.63E-03
Methylnaphthalene	28804-88-8	3.54E-06	5.03E-06	4.29E-06
Naphthalene	91-20-3	6.00E-09	4.93E-03	4.31E-04
n-Hexane	110-54-3	5.51E-04	8.25E-03	4.40E-03
Nitrobenzene	98-95-3	6.99E-06	3.14E-02	4.50E-03
o-Xylene	95-47-6	2.50E-09	9.00E-05	1.22E-05
Pentachlorophenol	87-86-5	1.00E-06	3.97E-03	7.36E-04
Phenanthrene	85-01-8	3.20E-07	2.95E-05	1.08E-05
Phenol	108-95-2	2.00E-07	4.03E-03	1.27E-03
Polychlorinated Biphenyls	1336-36-3	8.00E-07	3.50E-06	2.15E-06
Propylbenzene	103-65-1	9.00E-05	9.00E-05	9.00E-05
Propylene glycol monomethyl ether acetate	107-98-2	1.45E-02	1.45E-02	1.45E-02
Propylene oxide	75-56-9	4.30E-09	4.00E-03	1.00E-03
Styrene	100-42-5	2.50E-08	3.97E-02	3.57E-03
Tetrachloroethane	630-20-6 & 79-34-5	2.96E-03	2.96E-03	2.96E-03
Tetrachloroethylene	127-18-4	0.00E+00	1.59E-01	1.84E-02
Tetrahydrofuran	109-99-9	4.16E-04	4.16E-04	4.16E-04
Toluene	108-88-3	1.60E-09	1.30E-01	8.68E-03
Trichloroethylene	79-01-6	2.50E-09	2.17E-01	2.24E-03

Exhibit C

Spent Activated Carbon Organic Constituent Data Summary				
Constituent	CAS NO.	Organics (lb constituent per lb spent activated carbon)		
		Minimum	Maximum	Average
Trichlorofluoromethane	75-69-4	1.00E-07	4.00E-02	1.42E-03
Triethylamine	121-44-8	9.54E-03	9.54E-03	9.54E-03
Tris(hydroxymethyl) Aminomethane		1.77E-02	1.77E-02	1.77E-02
Vinyl Chloride	75-01-4	2.30E-08	2.40E-05	2.58E-06
Xylene	1330-20-7	8.00E-10	1.59E-01	3.41E-03

All data reported on a dry carbon basis.

Exhibit C - Hazardous Waste Characteristics

Table 3 - Spent Activated Carbon Characterization

Exhibit C
Spent Activated Carbon Characterization Summary

Stream Type: Solid
Stream Name: Spent Activated Carbon
Feed Method: Dewatering screw, conveyor belt and rotary airlock

Constituent/Property	Units	Value	
		Typical	Range
Organic Constituents (a)			
Total organics	wt%	3.1	2 - 4
Inorganic Constituents			
Water	wt%	43.5	30 - 50
RCRA Metals (a)			
Antimony	mg/kg	<10	<10
Arsenic	mg/kg	2.8	1.2 - 19
Barium	mg/kg	38.3	1 - 110
Beryllium	mg/kg	0.5	<0.1 - 0.7
Cadmium	mg/kg	0.7	<0.5 - 6.9
Chromium	mg/kg	11	3.1 - 240
Chromium (VI)	mg/kg	<0.9	<1
Lead	mg/kg	2.7	<2 - 25
Mercury	mg/kg	0.1	0 - 0.5
Nickel	mg/kg	21.3	7.5 - 140
Selenium	mg/kg	<2	<1 - 3.9
Silver	mg/kg	1	<0.5 - 1.6
Thallium	mg/kg	10.7	<5 - 29
Other Metals (a)			
Cobalt	mg/kg	4.8	2.1 - 19
Copper	mg/kg	31.4	12 - 60
Manganese	mg/kg	223	54 - 590
Vanadium	mg/kg	6.2	3.7 - 7.9
Zinc	mg/kg	35.4	22 - 44
Elemental Composition (b)			
Carbon (from spent carbon)	wt%	94.5	70 - 99
Carbon (from organic adsorbed on carbon)	wt%	2.9	1.6 - 25
Hydrogen	wt%	0.4	0.2 - 8
Oxygen	wt%	0.5	0.3 - 5
Nitrogen	wt%	0.1	0.06 - 0.5
Sulfur	wt%	0	<0.1
Phosphorous	wt%	0	<0.1
Chlorine/chloride	wt%	1.5	0 - 5
Bromine/bromide	wt%	0	<0.1
Fluorine/fluoride	wt%	0	<0.1
Iodine/iodide	wt%	0	<0.1

(a) - As fed basis (wet)
(b) - Dry basis (as received)

Note: The information presented in this table is considered typical but should not be considered limiting.

Exhibit D – Information on Metal Components

Exhibit D - Information on Metal Components

Modern Custom Fabrication Drawing 1601794, Sheet 2 of 5:

bottom of base ring extension A7 (support lugs) to bottom of T-18 = 4' 3" + 9' 4-3/4" = 13' 7-3/4"

Schwan Drawing 5094, Sheet S2:

Top of T-18 structural steel support = EL 169' 2" - 1-1/4" = EL 169' 0-3/4"

Schwan Drawing 5094, Sheet S3:

Grade = EL 115' 0"

Distance from top of T-18 structural steel support to grade = 169' 0-3/4" - 115' 0" = 54' 0-3/4" above grade

Distance from bottom of T-18 to grade = 54' 0-3/4" - 13' 7-3/4" = 40' 5"

Bottom of T-18 is 40' 5" above grade; therefore no metal component of tank is in contact with the soil or with water.

APPENDIX IX

TAB 3

Certification of the T-Tank Containment Area

Revision 1
April 2012

CBE CHAVOND-BARRY ENGINEERING CORP.
400 County Route 518 • P.O. Box 205
Blawenburg, New Jersey 08504-0205
Tel: (609) 466-4900
Fax: (609) 466-1231

June 12, 2006

Mr. Monte McCue
Director of Plant Operations
Siemens Water Technologies Corp.
2523 Mutahar
PO Box 3308
Parker, AZ 85344

Ref: Certification Of The T-Tank Containment Area

Dear Mr. McCue:

I have reviewed the T-Tank Containment Pad Plan for the Westates Facility, dated 2/11/06, and I am satisfied, using my judgment as a professional engineer, of the following:

1. The proposed containment pad is designed to be constructed with materials that are compatible with the spent carbon wastes to be placed into the tank system that the pad will serve, and will have sufficient strength and thickness to prevent failure due to pressure gradients (including static head and external hydrological forces), physical contact with the spent carbon, climatic conditions, the stress of installation, and the stress of daily operation (including stresses from nearby vehicular traffic).

2. The proposed containment pad will be placed on a foundation or base capable of providing support to the secondary containment system and resistance to pressure gradients above and below the system and capable of preventing failure due to settlement, compression, or uplift.

Regards,
Chavond-Barry Engineering Corp.

Louis T. Barry, P. E. (NJ: 24GE03567600)
President

CC: Stephen M. Richmond SRichmond@BDLaw.com
Karl E. Monninger KEMonninger@Chavond-Barry.com
Darwin M. Owens Darwin.Owens@Patmedia.net

T-TANK CONTAINMENT VOLUME CALCULATIONS
US FILTER WESTATES CARBON
PARKER, AZ

CONTAINMENT VOLUME BELOW TOP OF PIERS

	ELEV (FT)	DIFF ELEV (FT)	SURFACE AREA (SF)	AVE AREA (SF)	GROSS VOLUME (CF)
TOP OF GRATE	10.60		8.00		
		0.07		20.49	1.43
	10.67		32.97		
		0.04		45.39	1.82
	10.71		57.81		
		0.13		246.37	32.03
	10.84		434.92		
		0.03		486.21	14.59
	10.87		537.50		
		0.21		769.04	161.50
	11.08		1,000.57		
		0.92		1,000.57	920.52
TOP OF PIER	12.00		1,000.57		
				GROSS VOLUME TOTAL =	1,131.89
				LESS PIER VOLUME =	45.10
				LESS STEP VOLUME =	8.56
				NET VOLUME TO TOP OF PIERS =	**1,078.23**

PIER VOLUME

	TOP ELEV	AVERAGE BOTTOM ELEV	AVERAGE HEIGHT (FT)	SIZE (FTxFT)	SURFACE AREA (SF)	VOLUME (CF)
PIER #1	12.00	10.69	1.31	2 X 2	4.00	5.24
PIER #2	12.00	10.78	1.22	2 X 2.5	5.00	6.10
PIER #3	12.00	10.78	1.22	2 X 2.5	5.00	6.10
PIER #4	12.00	10.87	1.13	2 X 2	4.00	4.52
PIER #5	12.00	10.87	1.13	2 X 2	4.00	4.52
PIER #6	12.00	10.87	1.13	2 X 2	4.00	4.52
PIER #7	12.00	10.97	1.03	2 X 2.5	5.00	5.15
PIER #8	12.00	10.97	1.03	2 X 2.5	5.00	5.15
PIER #9	12.00	11.05	0.95	2 X 2	4.00	3.80
				TOTAL FOR PIERS=	**40.00**	**45.10**

STEP VOLUME OCCURS BELOW TOP OF PIERS:
STEP VOLUME = 1.07 SF X 8 FT = 8.56 CF

TOTAL STEP VOLUME (ALL BELOW TOP OF PIERS) = 8.56 CF

NOTES:

1. FOR EASE OF CALCULATION AND BEING CONSERVATIVE, ASSUME PIER SURFACE AREA REMAINS CONSTANT TO ACCOUNT FOR THE SUPPORT STEEL
2. RESULTANT SURFACE AREA TAKING OUT PIER SURFACE AREA= 1,000.57 SF - 40 SF = 960.57 SF

CONTAINMENT VOLUME ABOVE TOP OF PIERS

	ELEV (FT)	DIFF ELEV (FT)	SURFACE AREA (SF)	AVE AREA (SF)	VOLUME (CF)	CUMULATIVE VOLUME (CF)	CUMULATIVE VOLUME (GAL)
TOP OF PIER	12.00		960.57			1,078	8,065
		0.60		960.57	576.34		
TOP OF WALL	12.60		960.57			1,655	12,376

TOTAL CONTAINMENT VOLUME TO TOP OF WALL = 12,376 GALLONS

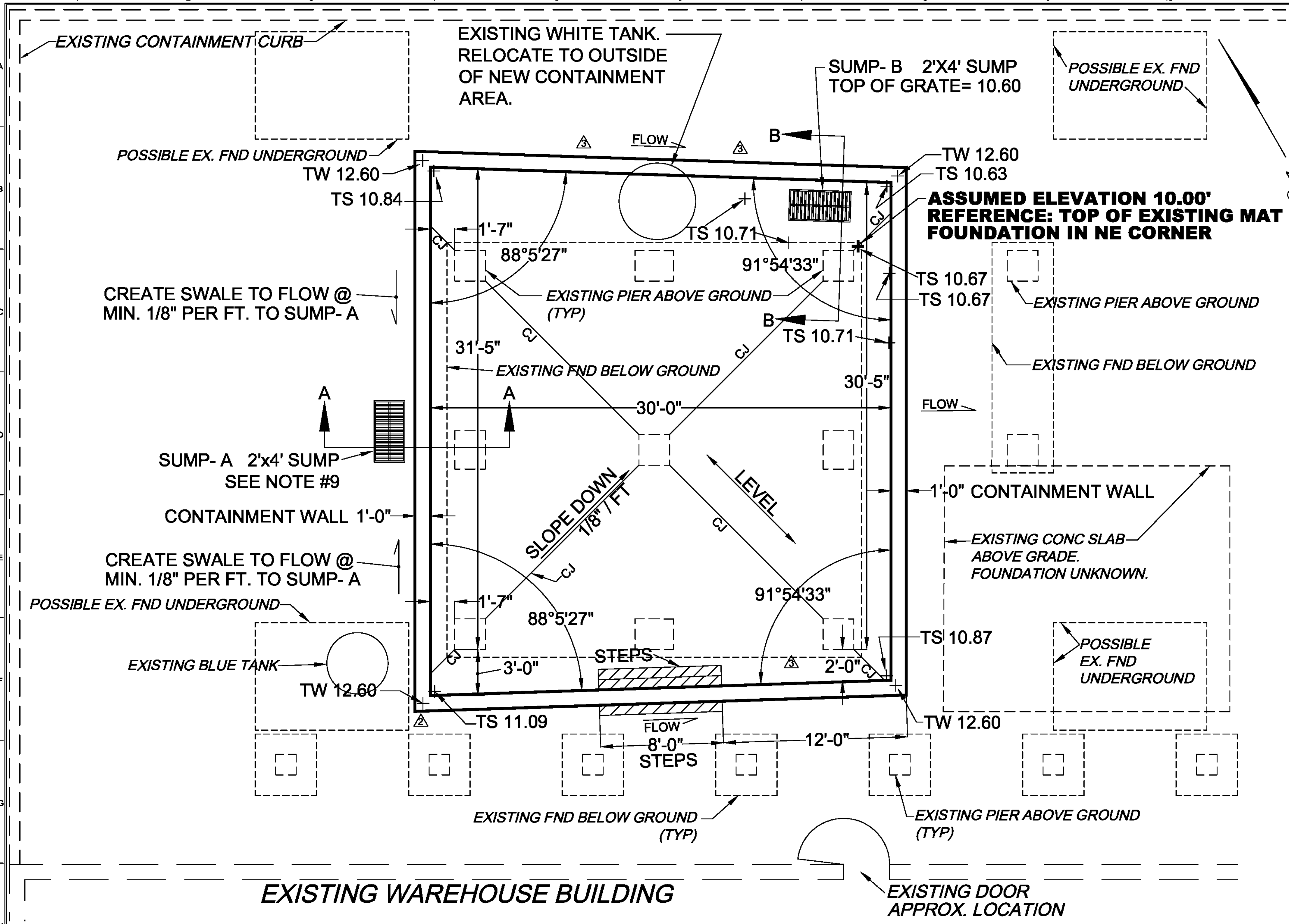
T-TANK CONTAINMENT VOLUME REQUIRED

LARGEST RCRA TANK VOLUME= 8,319 GALLONS

25-Year, 24 Hour Rain Event (PARKER, AZ) = 2.45 inches
(Per ASU Office of Climatology)

GROSS SURFACE AREA (SF)	RAIN DEPTH (INCHES)	VOL (CF)	VOL (GAL)
1,000.57	2.45	204	1,528

TANK VOLUME= 8,319 GALLONS
RAINFALL VOLUME= 1,528 GALLONS
TOTAL REQUIRED VOLUME= 9,847 GALLONS



CONTAINMENT PAD PLAN

SCALE: 1/4"= 1'

GRAPHIC SCALE 4' 2' 0 4' 8'

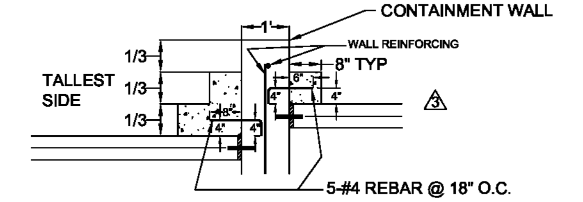
NOTES:

1. A FIELD SURVEY WAS NOT PERFORMED FOR THIS WORK. THE EXISTING CONDITIONS INFORMATION SHOWN HEREON WAS OBTAINED FROM 2 SETS OF PLANS AND SITE PHOTOS PROVIDED BY THE OWNER. THE 2 SETS OF PLANS ARE:
   1) THE FOUNDATION LAYOUT PLANS TITLED "WESTATES CARBON, LOS ANGELES, CA 90040" FOR PROJECT IN PARKER, AZ, PREPARED BY GMG ASSOCIATES, DATED 3-17-92 WITH LATEST REVISION "B" 3-23-92, DRAWING NO. D 9201-401 AND D 9201-402.
   2) PLANS TITLED "USFILTER WESTATES SURVEY OF CONTAINMENT VOLUME" PREPARED BY LEMME ENGINEERING INC., DATED 9-5-02 SHEETS 1&2 OF 5.
2. THE CONTRACTOR IS TO REVIEW THE SITE AND IT'S CONDITION BEFORE PROVIDING A PRICE AND AGAIN BEFORE BEGINNING CONSTRUCTION.
3. THE CONTRACTOR IS TO MOVE/RELOCATE ALL ITEMS AS NECESSARY TO DO THIS WORK. THE OWNER WILL INSTRUCT THE CONTRACTOR AS TO WHICH ITEMS HE WILL BE RESPONSIBLE FOR MOVING/RELOCATING DURING CONSTRUCTION AND WHICH ITEMS ARE TO BE MOVED BACK INTO THE CONTAINMENT AREA AFTER CONSTRUCTION.
4. THE CONTRACTOR IS TO REMOVE THE EXISTING CONCRETE CONTAINMENT PAD IN ITS ENTIRETY FROM THE AREA WHERE THE NEW PAD IS TO BE CONSTRUCTED. CONTRACTOR IS NOT TO DAMAGE THE EXISTING PIERS AND UNDERGROUND FOUNDATIONS.
5. THE CONTRACTOR IS TO UNCOVER THE EXISTING MAT FOUNDATION AND HAVE AN INDEPENDENT TESTING FIRM EXPERIENCED IN CONCRETE TESTING INSPECT THE EXISTING MAT FOUNDATION TO VERIFY ITS CONDITION. THE TESTING FIRM IS TO PROVIDE TO THE OWNER A REPORT SHOWING THAT THE PAD CONDITION IS NOT DAMAGED PRIOR TO THE CONTRACTOR PROCEEDING WITH CONSTRUCTION.
6. SUMP-A&B: USE NEENAH FOUNDRY FRAME & GRATE #R-1879-B8G 24"X48" LIGHT DUTY. GRATE COMES IN 2 PARTS
7. ALL CONSTRUCTION JOINTS ARE TO CONTAIN WATERSTOPS, EXPANSION JOINT MATERIAL AND CAULK.
8. ON BOTH SIDES OF THE CONTAINMENT WALL WHERE THE CONCRETE PAD MEETS THE WALL USE WATERSTOPS, EXPANSION JOINT MATERIAL AND CAULK.
9. SUMP-A TOP OF GRATE ELEVATION IS TO BE DETERMINED IN THE FIELD BY CREATING A SWALE ALONG THE CONTAINMENT WALL AT A MINIMUM SLOPE OF 1/8" PER FOOT FROM THE SW AND NW CORNER OF THE CONTAINMENT WALL SO THAT THE WATER DRAINS TO SUMP- A.

LEGEND

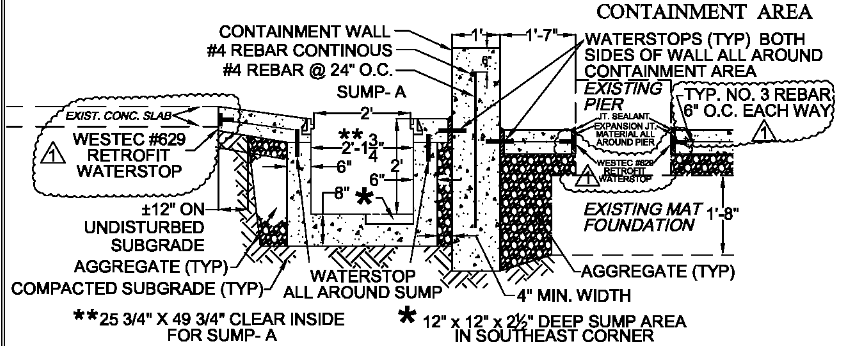
TW 12.60 = TOP OF WALL ELEVATION
TS 10.67 = TOP OF SLAB ELEVATION
CJ = CONSTRUCTION JOINT

TREADS ARE LEVEL, FLAT AND SAME ELEV. ON BOTH SIDES OF WALL



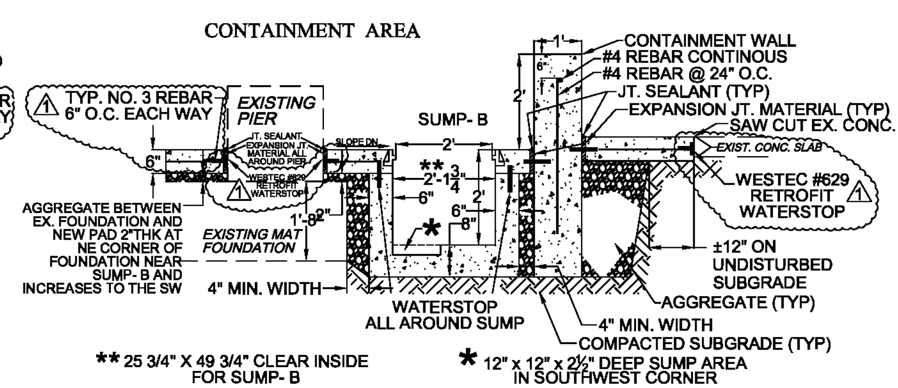
PAINT VERTICAL FACES OF THE STEPS WITH YELLOW PAINT INCLUDING THE WALL WITHIN THE LIMITS OF THE STEPS.

STEP DETAIL
NTS

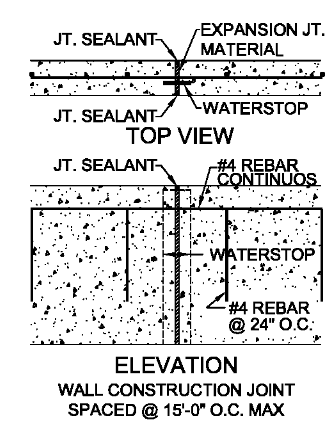


SUMP- A SECTION A-A

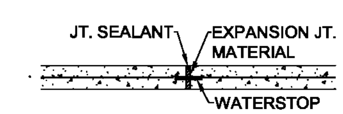
SCALE: HORZ & VERT 1/2"=1'-0"



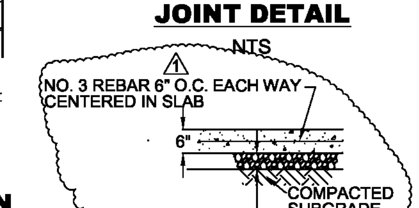
SUMP- B SECTION B-B



WALL CONSTRUCTION JOINT DETAIL
NTS



PAD CONSTRUCTION JOINT DETAIL
NTS



CONCRETE PAD DETAIL
NTS

NO	DWN	CK'D	APP	REVISIONS	DATE
3	JBE	KEM	KEM	Remove 4' steps and platform.	1/19/07
2	JBE	KEM	KEM	Existing foundation in way of west corner removed. Wall west corner revised.	12/27/06
1	DMO	JBE	KEM	Changed reinforcing in slab & waterstop adjacent existing slab and existing piers	5/23/06

CBE CHAVOND-BARRY ENGINEERING CORP.
NJ Certificate of Authorization Number: 24GA27984700
400 Route 518 • P.O. Box 205 • Blawenburg, New Jersey 08504

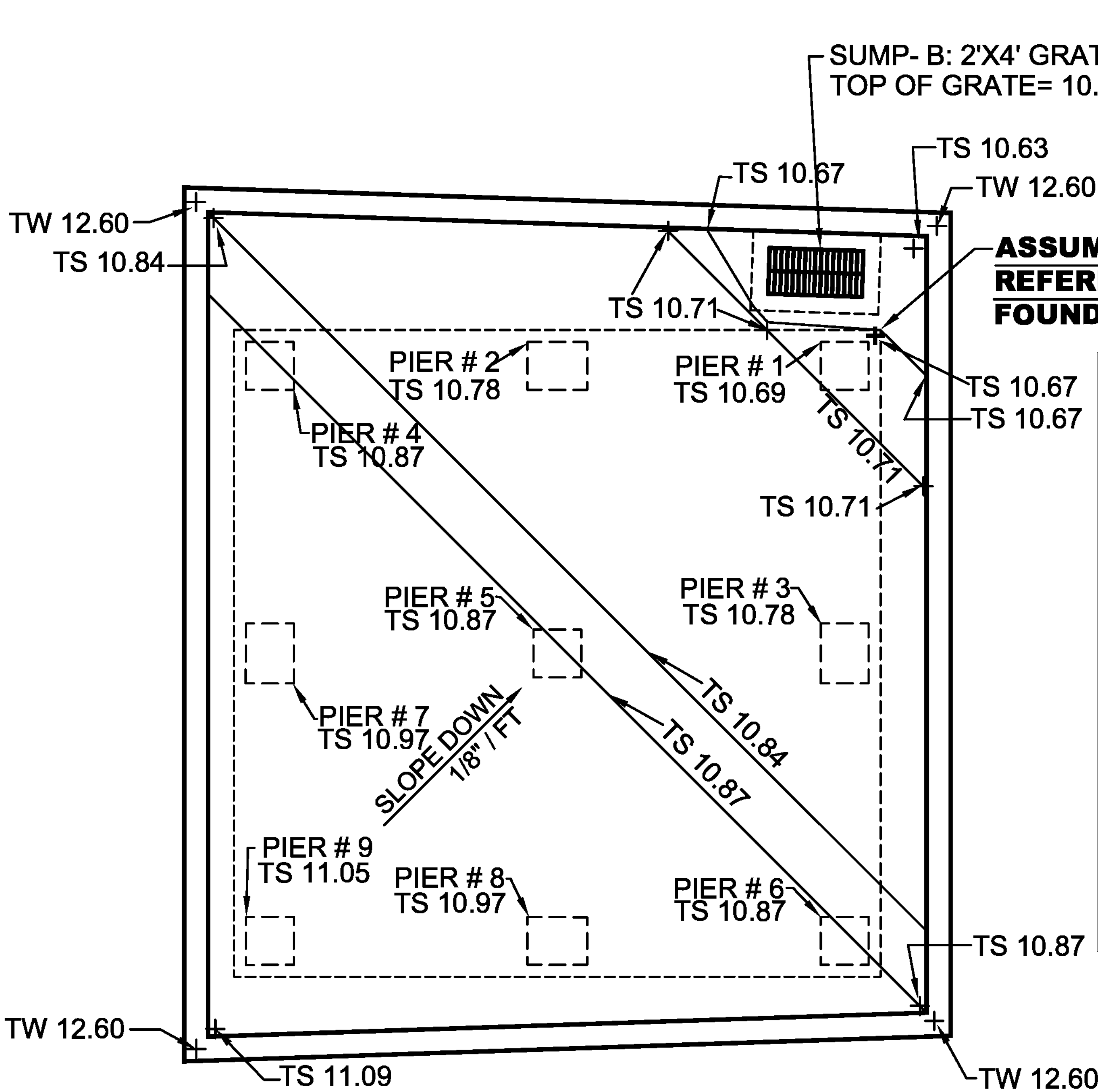
SIEMENS WATER TECHNOLOGIES PLANT
2523 MUTAHAR STREET, PARKER, AZ 85344
CONTAINMENT PAD REPLACEMENT

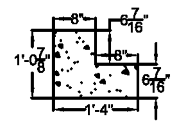
T-TANK CONTAINMENT PAD PLAN

DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
DMO	02/15/06	JBE	02/15/06	KEM	02/15/06

SCALE	DWG. NO.	REV.
1/4"=1'-0"	1541-C-001	3

PRINT DATE: 2-22-07





8' WIDE STEPS

CROSSECTION AREA= 1.07 SF

STEPS

NTS

CONTAINMENT VOLUME CALCULATION PLAN

GRAPHIC SCALE

8' 4' 0 8' 16'

SCALE: 1/8"=1'

APPENDIX X

RF-2 EQUIPMENT DRAWINGS AND SPECIFICATIONS

FOR

SIEMENS INDUSTRY, INC.

PARKER REACTIVATION FACILITY

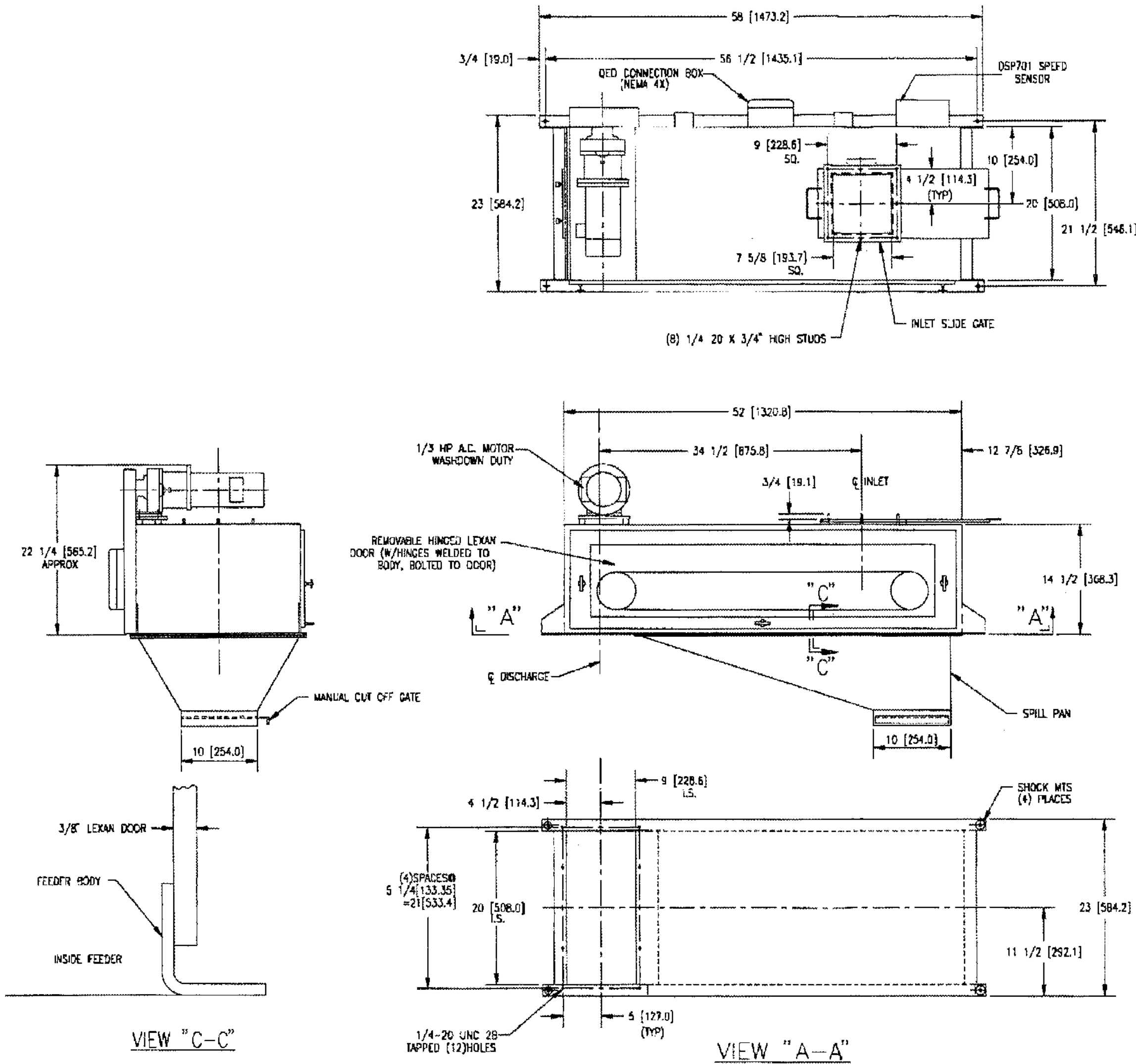
PARKER, ARIZONA

Revision 1
April 2012

TABLE OF CONTENTS

DRAWING A-30280
WEIGH BELT FEEDER

Revision 1
April 2012



NOTES:

1. ALLOW APPROX. 24" OF CLEARANCE ON "DOOR SIDE" OF UNIT, FOR REMOVAL OF CONVEYOR FROM CABINET.
2. DO NOT IMPOSE STRUCTURAL LOADS OR VIBRATION TO THE UNIT, AT THE INFEED AND DISCHARGE CONNECTIONS.
3. ELECTRONIC INSTRUMENT ENCLOSURE, TO BE MOUNTED REMOTELY.
4. QED TO BE FEEDER MOUNTED AND WIRED.
5. SCR UNIT MOUNTED REMOTELY IN SAME AREA AS FEEDER.

SPECIAL EQUIPMENT:

10. ENCLOSURE IS 316L SS, WITH A UNIFORM GLASS BEADED SURFACE FINISH EQUIVALENT TO 2B & BOLTED ON SPILL PAN (316L SS).
11. CONVEYOR FRAME AND ROD TYPE WEIGH DECK ARE 304 SS.
12. SIDE DOOR IS HINGED, 3/8" THICK LEXAN.
13. NO PAINT ON STAINLESS STEEL PARTS.
14. CONVEYOR DRIVE IS TOP MOUNTED.
15. CONVEYOR BELT IS F.D.A. APPROVED
16. LOAD CELL IS HERMETICALLY SEALED WITH QUICK DISCONNECT.
17. TAIL PULLEY IS 316L SS (OPTIONAL) WITH SS SCRAPER ASY. WITH DELRIN INSERT & AUTO-BELT TENSIONING.
18. HEAD PULLEY IS 316L SS (OPTIONAL).
19. SHOCK MOUNTS PROVIDED AS SHOWN.
20. ALL MATERIAL CONTACT PARTS ARE CONSTRUCTED FROM 316L SS.
21. SKIRT BOARDS HAVE BUNA-N SEAL STRIPS.

TAG NO: C-16
CONVEYOR WEIGH BELT

ORIGINAL

FILE I.D. = 111758
SHOP ORDER = M09338-000

REV NO.	DATE	DESCRIPTION
2A/B	3/28/96	A: SHOP ORDER WAS:M09300, IS:M09338 B: CHANGED SERIAL NUMBER
1A	2/26/96	REVISED PER CUSTOMER MARK UP

LEFT HAND ACCESS SHOWN

CONV. SPEED 10.07 FPM
CAPACITY 3000 LBS/HR
MATL CARBON
DENSITY 58 PCF

VENDOR WESTATES CARBON ARIZONA
CUSTOMER HANKIN ENVIRONMENTAL SOMERVILLE, NJ
CUSTOMER ORDER NO. 9503-022
MACHINE SERIAL NO. 950-MC-2-22734

OUTLINE DWG 12"-951
GRAVIMETRIC FEEDER
TOTALLY ENCLOSED (SPILL PAN)

SCALE 1/8" = 1"
DRAWN WCK
DATE 1/12/95

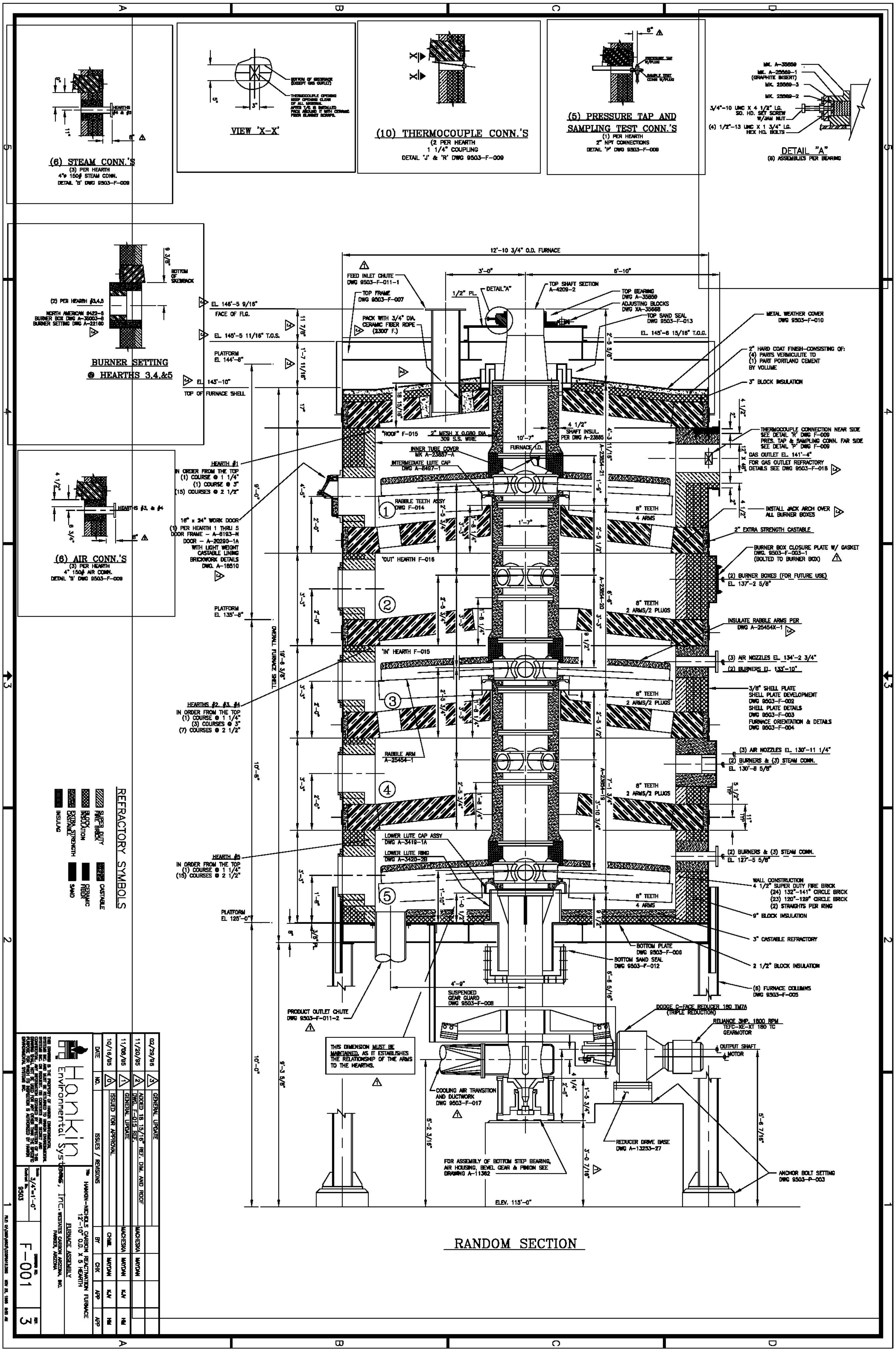
MERRICK
Merrick Industries, Inc.

REV. NO. 2 A-30280

SHT 1 OF 1

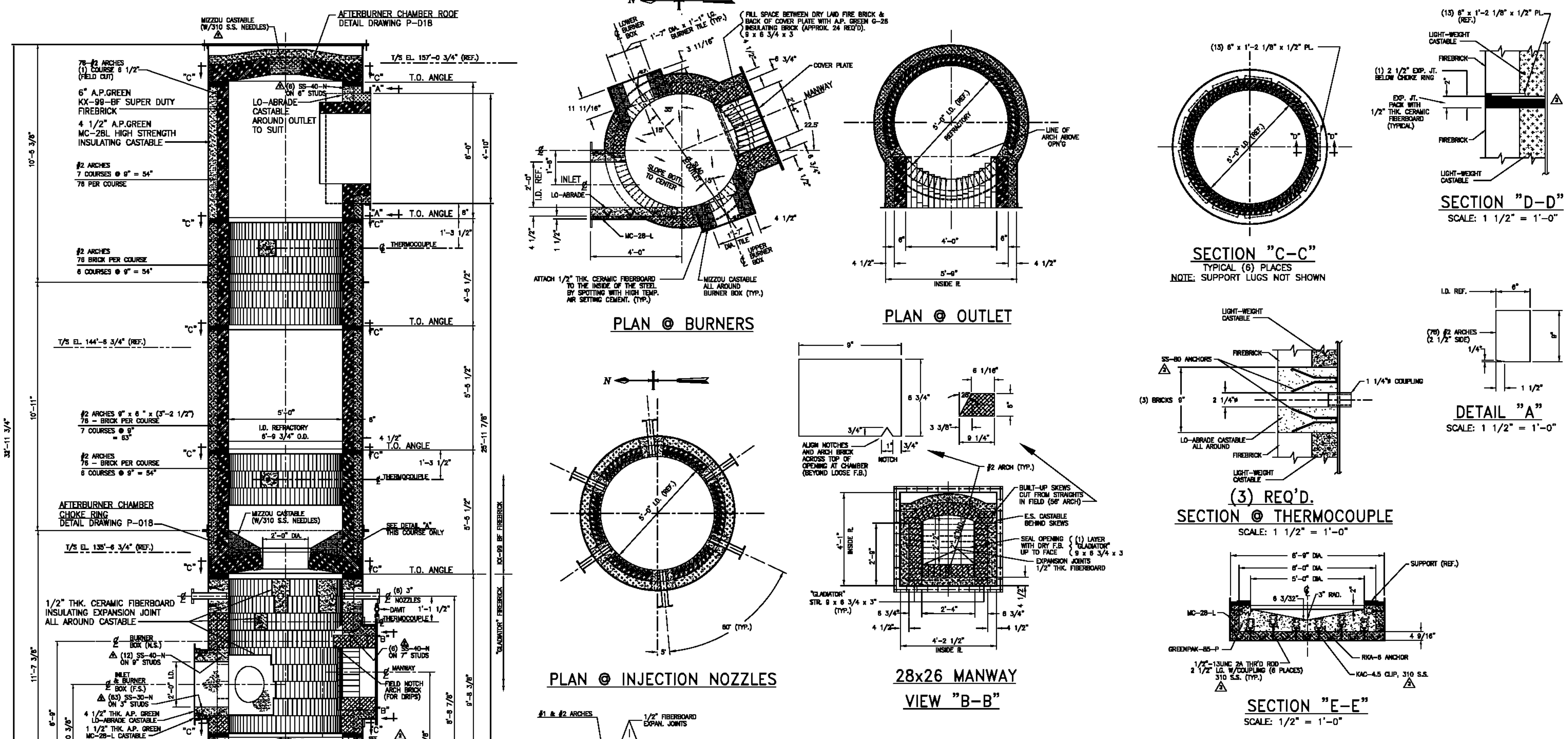
DRAWING F-001
RF-2 REACTIVATION FURNACE

Revision 1
April 2012


(6) STEAM CONN.'S
(3) PER HEARTH
4" 150# STEAM CONN.
DETAIL 'B' DWG 9503-F-009
VIEW 'X-X'
(10) THERMOCOUPLE CONN.'S
(2 PER HEARTH
1 1/4" COUPLING
DETAIL 'J' & 'R' DWG 9503-F-009
(5) PRESSURE TAP AND SAMPLING TEST CONN.'S
(1) PER HEARTH
2" NPT CONNECTIONS
DETAIL "P" DWG 9503-F-009
DETAIL "A"
(8) ASSEMBLIES PER BEARING
BURNER SETTING
@ HEARTHS 3,4,&5
(6) AIR CONN.'S
(3) PER HEARTH
4" 150# AIR CONN.
DETAIL 'S' DWG 9503-F-009
12'-10 3/4" O.D. FURNACE
REFRACTORY SYMBOLS
SUPER DUTY FIRE BRICK
BLOCK INSULATION
EXTRA STRENGTH CASTABLE
INSULAG
CASTABLE
CERAMIC FIBER
SAND
RANDOM SECTION
ELEV. 115'-0"
HANKIN Environmental Systems, Inc.
HANKIN-NICHOLS CARBON REACTIVATION FURNACE
12'-10" O.D. x 5 HEARTH
FURNACE ASSEMBLY
WESTATES CARBON ARIZONA, INC.
PARKER, ARIZONA
Scale 3/4"=1'-0"
Contract No. 9503
F-001
REV 3
02/28/96 3 GENERAL UPDATE MACHESKA MAYDAN
11/20/95 2 ADDED 18 15/16" REF. DIM. AND ROOF DWG. F-015 REF. MACHESKA MAYDAN
11/08/95 1 GENERAL UPDATE MACHESKA MAYDAN KJV HM
10/16/95 0 ISSUED FOR APPROVAL CHMIL MAYDAN KJV HM
DATE NO. ISSUES / REVISIONS BY CHK APP

DRAWING P-007
RF-2 AFTERBURNER

Revision 1
April 2012



NOTES:

1. ATTACH SS ANCHORS TO THE INSIDE OF AFTERBURNER BY FIELD BOLTING TO STUDS AS REQUIRED AND WHERE SHOWN ON DRAWINGS.
2. (Rev. 2) ALL SS- ANCHORS ARE 5/16" DIA. 310 S.S. ROD.
3. FOR TYPICAL ANCHOR DETAILS SEE DRAWING P-006.

DATE	NO.	ISSUES / REVISIONS	BY	CHK	APP	APP
1/23/96	2	ADD SLAG TAP OUTLET DET., REV. SUPPORTS REF. ANCHORS TO 310 SS (WERE 304 SS)				
12/14/95	1	DELETED HOPPER, REV. BOTT. SECT., RAISED OUTLET + 3'-9", LOCATED SLAG OUTLET, ADDED SECT. "E-E", DET. "A" & NOTE IN SECT. "D-D"	GRS	JMM	KJV	HM
11/8/95	0	ZERO ISSUE	GRS	JMM	KJV	HM

Hankin Environmental Systems, Inc.

Title: HANKIN-NICHOLS CARBON REACTIVATION SYSTEM
12'-10" O.D. x 5 HEARTH
AFTERBURNER REFRACTORY

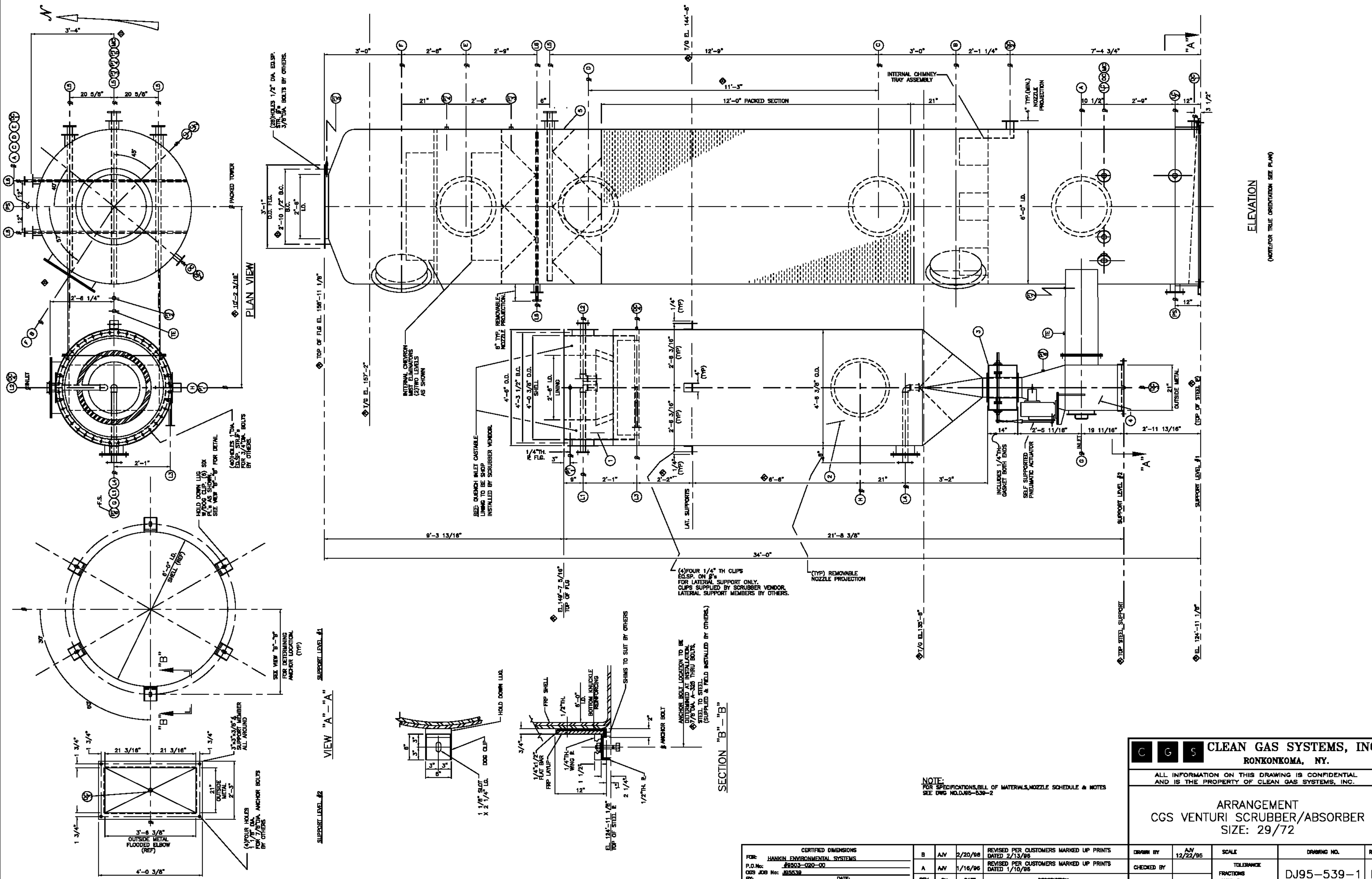
WESTATES CARBON ARIZONA, INC.
PARKER, ARIZONA

Scale: 1/2" = 1'-0"
Contract No. 9503
Drawing No. P-007
Rev. 2

FILE: C:\DWG\9503\C03P0072.DWG JAN 23, 1996 3:10 PM

DRAWING DJ95-539-1 & 2
CGS VENTURI SCRUBBER/ABSORBER

Revision 1
April 2012



NOTE:
FOR SPECIFICATIONS,BILL OF MATERIALS,NOZZLE SCHEDULE & NOTES SEE DWG NO.DJ95-539-2

CLEAN GAS SYSTEMS, INC.
RONKONKOMA, NY.

ALL INFORMATION ON THIS DRAWING IS CONFIDENTIAL AND IS THE PROPERTY OF CLEAN GAS SYSTEMS, INC.

ARRANGEMENT
CGS VENTURI SCRUBBER/ABSORBER
SIZE: 29/72

CERTIFIED DIMENSIONS
FOR: HANKIN ENVIRONMENTAL SYSTEMS
P.O.No: #9503-020-00
CGS JOB No: J95539
BY: DATE:

REV	BY	DATE	DESCRIPTION
B	AJV	2/20/96	REVISED PER CUSTOMERS MARKED UP PRINTS DATED 2/13/96
A	AJV	1/16/96	REVISED PER CUSTOMERS MARKED UP PRINTS DATED 1/10/96

DRAWN BY	AJV 12/22/95	SCALE	
CHECKED BY		TOLERANCE FRACTIONS ANGULAR	
APPROVED BY			

DRAWING NO. DJ95-539-1 REV B

SPECIFICATIONS

CONSTRUCTION MATERIAL

ITEM (1): PRE-QUENCH INLET TO BE FABRICATED FROM 3/16"TH. MIN HASTELLOY-C276.
INTERIOR OF PRE-QUENCH INLET TO BE REFACTORY LINED WITH 9"TH. INSULATING
CASTABLE, SHOP INSTALLED AND AIR CURED.
LINING ANCHORING SYSTEMS TO BE S.S.TYPE 310 (V-TYPE ANCHORS).
PRE-QUENCH LIQUID INLET (L1) & (L2) SPRAY HEADERS TO BE HASTELLOY -C 276. W/HASTELLOY C SPRAY NOZZLES.
NOTE: ITEM (1) PRE QUENCH INLET SECTION TO BE SUPPORTED BY OTHERS.
SEE NOTE 3.

ITEM (2): VENTURI INLET SECTION WITH LIQUID EXPANSION JOINT TO BE FABRICATED
FROM 3/16"TH. MIN. HASTELLOY-C 276.
LIQUID INLET (L3) & (L4) SPRAY HEADERS TO BE HASTELLOY-C 276.

ITEM (3) & (4): VENTURI THROAT AND FLOODED ELBOW SECTION TO BE FABRICATED
FROM 3/16"TH. HASTELLOY-C 276.

EXTERNAL REINFORCING, LIFTING LUGS, AND SUPPORT BRACKETS FOR THE ABOVE
ITEMS TO BE S.S TYP 18-8
EXTERNAL BOLTS & NUTS FOR THE ABOVE ITEMS TO BE S.S.TYPE 304.
GASKETS FOR THE ABOVE ITEMS TO BE 1/4" TH. NEOPRENE #40 DURO.

ITEM (5): PACKED TOWER SHELL TO BE FABRICATED FROM 3/4"TH. MIN FRP.

FABRICATION: HAND LAYUP PER NBS PS 15-69 AND /OR HAND LAYUP
PER ASTM D 4097-88. FILAMENT WOUND PER D 3299-88.
RESIN: DERAKANE 470
VEIL: NEXUS 10-15 MILS.
OUTSIDE COATING: UV INHIBITOR GELL COAT WHITE IN COLOR.
(B) EXTERNAL BOLTS & NUTS: GALVANIZED C.S. W/TEFLON ENVELOPE EXCEPT AT HOLO DOWN LUGS USE
A-325 C.S. BOLTS (SUPPLIED BY OTHERS) WITH CORROSION RESISTANT FINISH (NOT NECESSARILY GALVANIZED.)
GASKETS: GORTEX ROPE.
(B) EXTERNAL LIFTING AND HOLO DOWN LUGS: GALVANIZED C.S.

BILL OF MATERIAL

ITEM	QTY.	DESCRIPTION	REMARKS
1	1	SIZE: 29 PRE QUENCH INLET	SEE SPEC'S.
2	1	VENTURI INLET SECTION WITH LIQUID EXPANSION JOINT	SEE SPEC'S.
3	1	VENTURI THROAT(2-DOOR THROAT W/ PNEUMATIC ACTUATOR.)	SEE SPEC'S.
4	1	FLOODED ELBOW SECTION.	SEE SPEC'S.
5	1	PACKED TOWER (6'-0"DIA)	SEE SPEC'S.

NOZZLE SCHEDULE

A	1	24" BOLTED TYPE INSPECTION DOOR	
B	1	24" BOLTED TYPE INSPECTION DOOR	
C	1	24" BOLTED TYPE INSPECTION DOOR	
D	1	24" BOLTED TYPE INSPECTION DOOR	
E	1	24" BOLTED TYPE INSPECTION DOOR	
F	1	24" BOLTED TYPE INSPECTION DOOR	
G	1	12" BOLTED TYPE INSPECTION DOOR	
H	1	24" BOLTED TYPE INSPECTION DOOR	
L1	1	LIQUID INLET-2"SCH 40 PIPE	SEE NOTE: * AND **
L2	1	LIQUID INLET-3"SCH 40 PIPE	SEE NOTE: * AND **
L3	1	LIQUID INLET-3/4"SCH 40 PIPE	SEE NOTE: *
L4	1	LIQUID INLET-2"SCH 40 PIPE	SEE NOTE: * AND **
L5	3	LIQUID INLET-1 1/2" FRP PIPE W/POLYPR.SPRAY NOZZLES.	SEE NOTE: * AND **
L6	2	LIQUID INLET-1/2"FRP PIPE W/POLYPR. SPRAY NOZZLES.	SEE NOTE: * AND **
PS	1	4"DIA PUMP SUCTION	SEE NOTE: *
DC 1	1	2" DRAIN CONNECTION.	SEE NOTE: *
DC 2	1	3" DRAIN CONNECTION.	SEE NOTE: *
DC 3	1	1"DIA HALF CPL'G WITH PLUG.	NPT
DC 4	1	1/2"DIA HALF CPL'G. WITH PLUG.	NPT
(B) LC 1	1	3"DIA STILLING WELL CONNECTION.	SEE NOTE: *
(B) LC 2	1	3"DIA STILLING WELL CONNECTION.	SEE NOTE: *
OC	1	2"DIA OVERFLOW CONNECTION	SEE NOTE: *
MC	1	2"DIA MAKEUP CONNECTION.	SEE NOTE: *
PT 1	1	1" HALF CPL'G. W/PLUG - PRESS. TAP.	NPT
PT 2	1	1/2" HALF CPL'G. W/PLUG - PRESS. TAP.	NPT
PT 3	1	1/2" HALF CPL'G. W/PLUG - PRESS. TAP.	NPT
PT 4	1	1/2" HALF CPL'G. W/PLUG - PRESS. TAP.	NPT
PT 5	1	1/2" HALF CPL'G. W/PLUG - PRESS. TAP.	NPT
(A) PT 6	1	1/2" HALF CPL'G. W/PLUG - PRESS. TAP.	NPT
(A) TE	1	1" HALF CPL'G. W/PLUG - TEMP. TAP.	NPT

(A) NOTE *: NOZZLES SPECIFIED ARE PROVIDED WITH PLATE FLANGES
DRILLED TO MATCH ANSI 150# HOLES TO STRADDLE CL's.
NOTE **: LIQUID INLETS SPECIFIED ARE REMOVABLE TYPE.

REF. DWGS.:
GENERAL ARRANGEMENT DJ95-539-1

NOTES:

1. WELDING TO BE PER AWS. ALL SHELL BUTT WELDS TO BE MADE FROM (2)TWO SIDES (INSIDE & OUTSIDE).
   ALL CORNER JOINTS TO BE DOUBLE FILLETS.
2. UNIT DESIGN PRESSURE -70" W.G.
3. (A) DESIGN LOADS BASED ON 100 MPH WIND/SEISMIC ZONE 3.
   PACKED TOWER 6 LUGS W/ 6,800 LBS EACH
   * TOTAL PACKED TOWER EMERGENCY LOAD 16000#.
   VENTURI SCRUBBER 4 SUPPORTS W/ 1,650 LBS EACH
   ** TOTAL VENTURI SCRUBBER OPERATING LOAD 3200#
   PRE-QUENCH INLET ITEM (1) DEAD LOAD 2,500LBS (INDEPENDENTLY SUPPORTED BY OTHERS)
4. (1)ONE UNIT REQ'D. AS SHOWN.

*: TOTAL EMERGENCY LOAD INCLUDES STANDING DEAD LOAD
PLUS PACKED TOWER FILLED WITH WATER TO BOTTOM OF GAS INLET.

**: TOTAL OPERATING LOAD INCLUDES STANDING DEAD LOAD
PLUS 12" OF WATER IN BOTTOM OF FLOODED ELBOW.

FOR: HANKIN ENVIORNMENTAL SYSTEMS
P.O. No. 9503-020-00
CGS JOB No. J95539

REV.	BY	DATE	DESCRIPTION
C	AJV	3/4/96	ADDED LIQUID TEMP.(RECIRC) TO LIQUID DATA.
B	AJV	2/8/96	REVISED WHERE INDICATED BY (B)
A	AJV	1/16/96	REVISED PER CUSTOMERS MARKED UP PRINT DATED 1/10/96

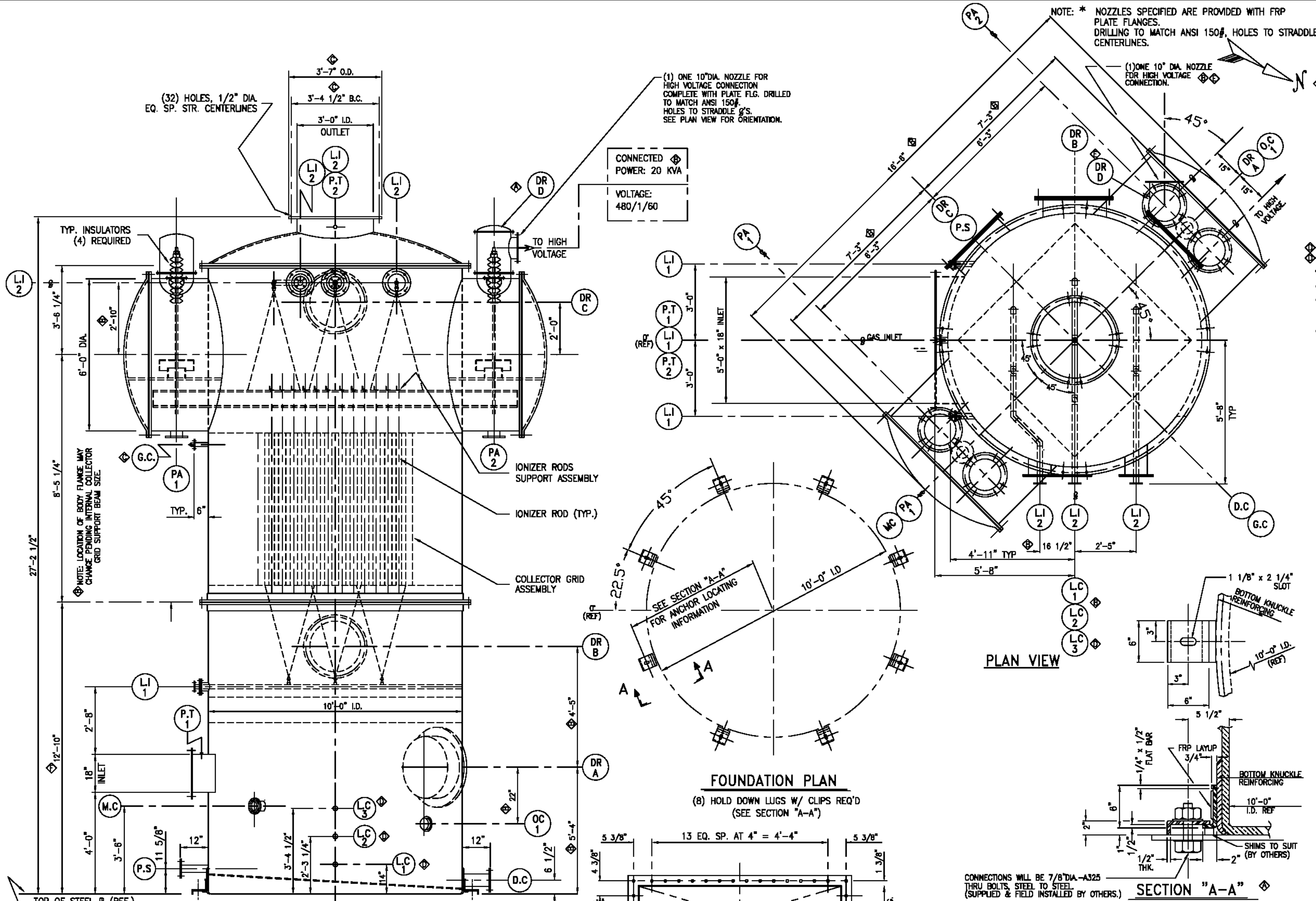
CGS
CLEAN GAS SYSTEMS, INC.

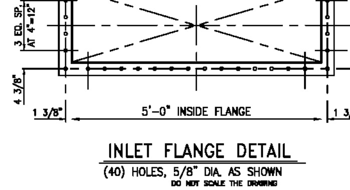
SPECIFICATIONS,NOZZLE SCHEDULE & NOTES
CGS VENTURI SCRUBBER/ABSORBER
SIZE: 29/72

DRN BY: AJV
DATE:
DWG. No.: DJ95-539-2
REV C

DRAWING DJ95-540-1
CGS WET ELECTROSTATIC PRECIPITATOR

Revision 1
April 2012





NOZZLES SCHEDULE

ITEM	QTY.	DESCRIPTION	REMARKS
D.C	1	4" DIA. DRAIN CONN. (FLANGED)	SEE NOTE: *
O.C 1	1	3" DIA. OVERFLOW CONN. (FLANGED)	SEE NOTE: *
G.C.	1	3" DIA. COLLECTOR GRID EXTERNAL GROUND CONN.(FLANGED)	SEE NOTE: *
P.S	1	4" DIA. PUMP SUCTION CONN. (FLANGED)	SEE NOTE: *
LI 1	3	LIQUID INLET 1" FLANGED CONN.(REMOVABLE)	SEE NOTE: *
LI 2	3	LIQUID INLET 2" FLANGED CONN.(REMOVABLE)	SEE NOTE: *
DR A	1	24" DIA. BOLTED TYPE ACCESS DOOR	
DR B	1	24" DIA. BOLTED TYPE ACCESS DOOR	
DR C	1	24" DIA. BOLTED TYPE ACCESS DOOR	
DR D	1	16" DIA. BOLTED TYPE DOOR	
PT 1	1	1/2" FULL COUPLING WITH PLUG	PRESSURE TAP
PT 2	1	1/2" FULL COUPLING WITH PLUG	PRESSURE TAP
LC 1	1	1 1/2" FULL COUPLING	LEVEL CONTROL CONNECTIONS FNPT
LC 2	1		
LC 3	1		
MC	1	2"DIA. MAKE-UP CONN.	SEE NOTE *
PA 1	1	2"DIA. PURGE AIR HEATER CONN.	
PA 2	1	2"DIA. PURGE AIR HEATER CONN.	SEE NOTE *

SPECIFICATIONS:

CONSTRUCTION MATERIAL:

HOUSING TO BE FABRICATED FROM 0.66" THK. MIN FRP, EXCEPT BOTTOM FLOOR TO BE 2 3/4" THK. (3/8" FRP, 2" BALSA, 3/8" FRP).

LIQUID SPRAY HEADERS TO BE FRP PIPE WITH HASTELLOY-C NOZZLES AT LI 1 AND POLYPROPYLENE AT LI 2

FABRICATIONS: HAND LAYUP PER NBS PS 15-69 AND/OR HAND LAYUP PER ASTM D 4097-88.
FILAMENT WOUND PER ASTM D 3299-88.

RESIN: DERAKANE 470
VEIL: NEXUS 10-15 MILS
OUTSIDE COATING: UV INHIBITOR GELL COAT WHITE IN COLOR
EXTERNAL BOLTS AND NUTS: GALVANIZED C.S. W/TEFLON ENVELOPES
GASKETS: GORTEX ROPE
EXTERNAL LIFTING LUGS AND HOLD DOWN LUGS: GALVANIZED C.S.

INTERNAL HIGH VOLTAGE COMPONENTS INCLUDING HEXAGONAL TUBE GRID ASSEMBLY TO BE # 10 GA. MIN. AL6XN OR "EQUAL".
INTERNAL BOLTS AND NUTS TO BE AL6XN OR HASTELOY-C.

NOTES:

1. UNIT DESIG PRESS -70" W.G.
2. DESIGN LOADS BASED ON 100 MPH WIND/SEISMIC ZONE 3. CG-WESP 8 LUGS WITH 2,820 LBS. EACH.
   *: TOTAL WESP EMERGENCY LOAD IS 41,000#
3. INTERNAL HIGH VOLTAGE COMPONENTS WILL BE SHIPPED LOOSE FOR FIELD INSTALLATION AND ASSEMBLY.
4. (1)ONE UNIT REQ'D AS SHOWN AND NOTED.

*: TOTAL EMERGENCY LOAD INCLUDES STANDING DEAD LOAD PLUS WESP FILLED WITH WATER TO BOTTOM OF GAS INLET.

FOR: HANKIN ENVIRONMENTAL SYSTEMS, INC.
WESTATES CARBON, INC.
PARKER, ARIZONA PROJECT.

REV	BY	DATE	DESCRIPTION
F	AJV	5/22/96	CORRECTED DIM. IN ELV. 1S 12'-10" WAS 12'-0". ADDED EL. REF. 127'-5" (TOP OF 1/2" TH. STEEL PLATE.)
E	AJV	5/1/96	RELOCATED DR-D AS SHOWN.
D	AJV	3/7/96	REVISED LEVEL CONTROL CONNECTIONS PER CUSTOMERS REQUEST DATED 3/7/96
C	AJV	2/20/96	ADDED GC TO NOZZLE SCHEDULE & WESP- DELETED O.C.2
B	AJV	1/24/96	REVISIONS PER CUSTOMERS MARKED-UP DWG'S DATED 1/22/96 & AS INDICATED BY
A	AJV	1/16/96	REVISIONS PER CUSTOMERS MARKED-UP DWG'S DATED 1/10/96

CERTIFIED DIMENSIONS
FOR: HANKIN ENVIRONMENTAL SYSTEMS, INC.
P.O.No: 9503-021-00
CGS JOB No: J95540
BY: ______ DATE: ______

CLEAN GAS SYSTEMS,INC.
RONKONKOMA, NY.

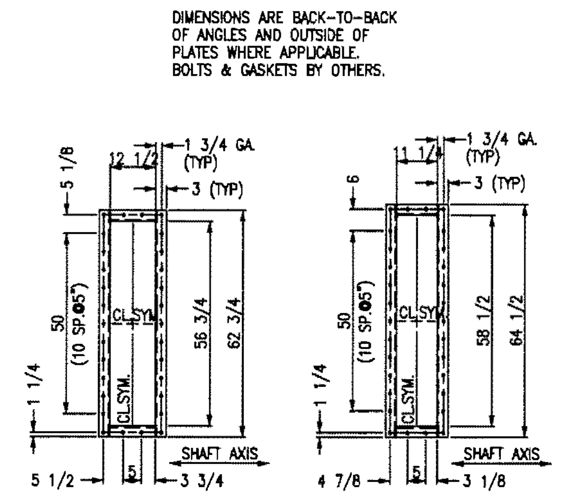
CGS WET ELECTROSTATIC PRECIPITATOR
SIZE: 36-120-C TYPE: CG-WESP HC

DRAWN BY	R.K. 12.19.95	SCALE: N.T.S.	DRAWING NO.	REV
CHECKED BY		TOLERANCE FRACTIONS	DJ95-540-1	F
APPROVED BY		ANGULAR		

DRAWING C25923F1
INDUCED DRAFT FAN

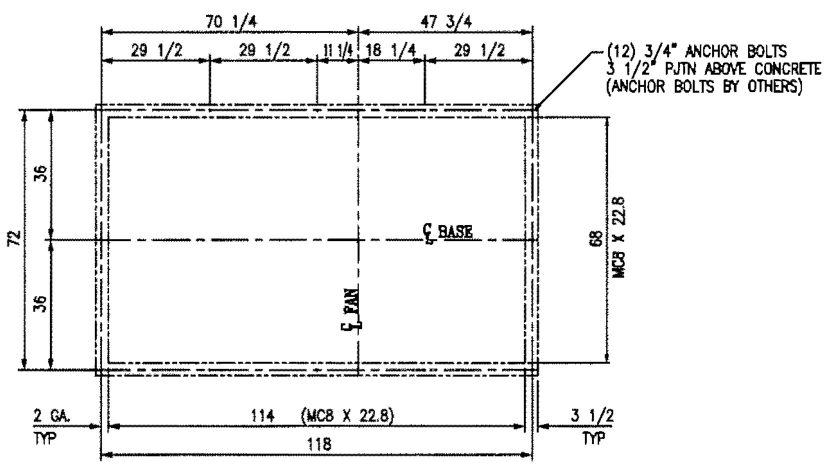
Revision 1
April 2012

DIMENSIONS ARE BACK-TO-BACK OF ANGLES AND OUTSIDE OF PLATES WHERE APPLICABLE. BOLTS & GASKETS BY OTHERS.



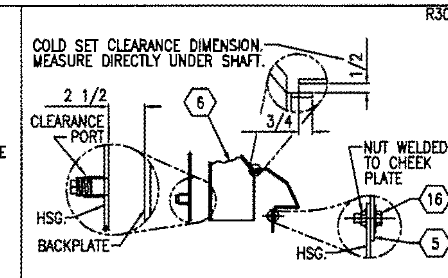
OUTLET FLANGE
FLANGE: L 3 x 3 x 3/8
(30) 3/4⌀ HOLES FOR 5/8⌀ BOLTS

INLET FLANGE
FLANGE: L 3 x 3 x 3/8
(30) 3/4⌀ HOLES FOR 5/8⌀ BOLTS



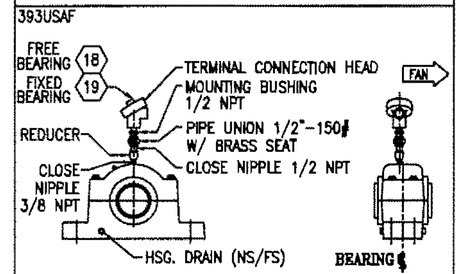
ANCHOR BOLT SETTING PLAN

R30A



TYPICAL SECTION THRU FAN HOUSING

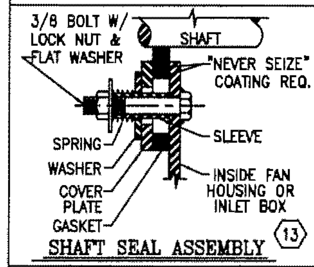
393USAF



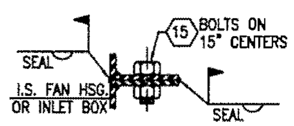
BEARING CONNECTION DETAIL

BEARING LUBRICATION REQUIREMENTS
TYPE: STATIC
GREASE: MOBILITH SHC 220

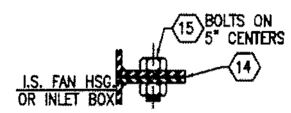
CUST FIND #	PCS TO SHIP	SHOP ASS'Y PCS	DESCRIPTION
	1		FAN ASSEMBLY
1		1	HOUSING BASE SECTION 3/8" THK 317L
2	1		IMPELLER REMOVAL SECTION
3	1		DISCHARGE SECTION
4			***** NOT USED *****
5		1	INLET CONE
6		1	IMPELLER: 662, R30A, 20%, SW, CCW 66 1/4" DIA. FERR 255 AVESTA 2205
7		1	PEDESTAL ASSEMBLY A36
8		1	FIXED BRG: SKF-SAF 225 3 15/16 DIA. SPHERICAL ROLLER
9		1	FREE BRG: SKF-SAF 1500 2 15/16 DIA. DOUBLE ROW BALL
10		1 LOT	BEARING MOUNTING HARDWARE A307 GRA
11		1	DRIVE COUPLING: HOLSET PM12 (SEE NOTE #5)
12		1	COUPLING GUARD A36
13		2	SHAFT SEAL ASSEMBLY
14		1	GASKET 1/8 x 3 FIBERGLASS
15		1 LOT	ASSEMBLY HARDWARE (HHBOLT 5/8"⌀ X 1 1/2 w/ NUT) 316
16		1 LOT	INLET CONE ASSY HARDWARE (HHBOLT 5/8"⌀ X 1 1/2 w/ NUT) (EXTRA HVY. FLAT WASHER) 316
17		7	SPLICE BAR 317L
18		1	THERMOCOUPLE: PYCO "J" SPRING-LOADED, SINGLE ELEMENT
			w/ ENCLOSURE & MTG HARDWARE (P/N 02-3046-13- 4.4)
19		1	THERMOCOUPLE: PYCO "J" SPRING-LOADED, SINGLE ELEMENT
			w/ ENCLOSURE & MTG HARDWARE (P/N 02-3046-13- 4.8)
20		1	MOTOR: SIEMENS FRAME: 445T TYPE: RGZESD
			BHP: 150 RPM: 1800 S.F.:1.0 INP: 460V/3PH/60HZ
21		1 LOT	MOTOR ASSEMBLY HARDWARE A307 GRA



SHAFT SEAL ASSEMBLY (13)



SHIPPING SPLIT



IMPELLER REMOVAL SPLIT

GENERAL NOTES:

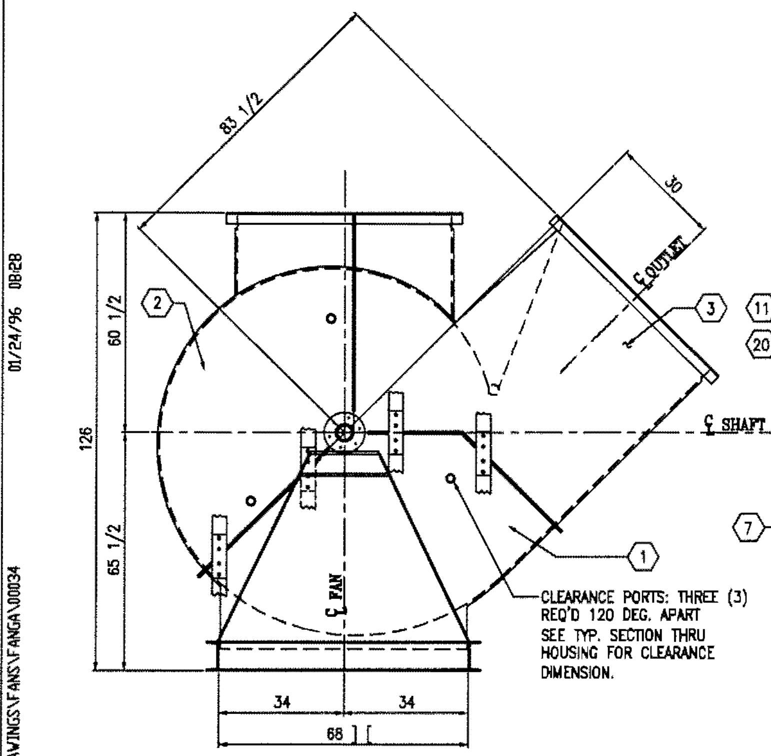
1. ONE FAN REQ'D – CCW ROTATION
2. FAN HOUSING IS NOT DESIGNED TO SUPPORT ANY EXTERNAL LOADS.
3. CUSTOMER IS TO PROVIDE EXPANSION JOINTS AT INLET AND OUTLET TO RELIEVE EXPANSION STRESSES AND VIBRATION.
4. DOWEL BEARINGS AND PEDESTALS TOGETHER AFTER THEY ARE ALIGNED AND BOLTED TOGETHER IN THE FIELD. (DOWELS PROVIDED BY OTHERS.)
5. COUPLING INFORMATION:
   CUST. NOTE
   IMPELLER HALF BORE: 3.8735/3.8725⌀ KEYWAY: 1 X 1/2
   BORED: BY BARRON
   MOUNTED: BY BARRON
   SHOP NOTE: MOUNT IMPELLER HALF COUPLING AFTER ASSEMBLING BEARINGS ON SHAFT.
   DRIVE HALF BORE: 3.3735/3.3725⌀ KEYWAY: 7/8 X 7/16
   BORED: BY BARRON
   MOUNTED: BY BARRON
6. ROTATING ASSEMBLY WEIGHT: 1130 LBS.
7. HOUSING STIFFENERS NOT SHOWN FOR CLARITY. (STIFF. MAT'L: 317L)
8. WELD ALL STIFFENERS CROSSING SHIPPING SPLITS TOG. AT FIELD INSTALLATION.
9. SEE BARRON OWNERS MANUAL FOR INSTALLATION & OPERATION INSTRUCTIONS.
10. SHOP TO CHOCK IMPELLER TO PREVENT MOVEMENT DURING SHIPMENT. CUSTOMER MUST REMOVE CHOCKS PRIOR TO START UP.
11. THIS FAN IS EQUIPPED WITH AN INLET DAMPER SEE DWG. C25923D1 FOR DETAILS.

(A) PAINTING REQUIREMENTS:

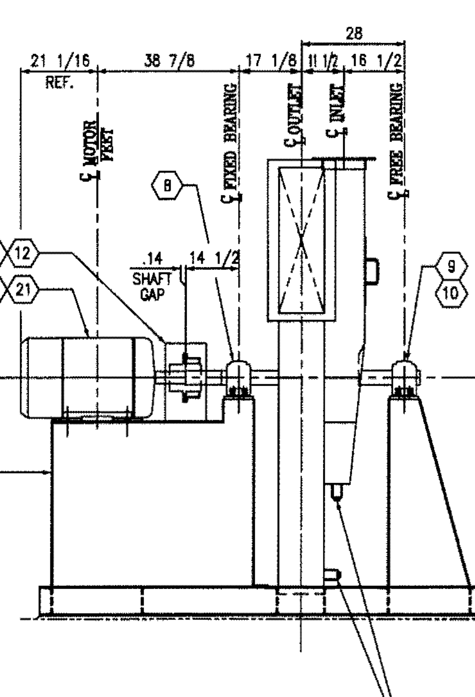
BASE / GUARDS
COATED SURFACES: FAN BASE – EXTERIOR ONLY
BALANCE – ALL SURFACES
SURFACE PREP: SSPC-SP7,
PRIMER: SOUTHERN COATINGS #1-4336(GRAY)
NO. COATS: 1 THICKNESS PER COAT: 1-2 MILS D.F.T.

PORTIONS OF SHAFT W/O STN. STL. COVERS
COATED SURFACES: ALL
SURFACE PREP: SSPC-SP7,
PRIMER: SOUTHERN COATINGS #1-1379(RED OXIDE)
NO. COATS: 1 THICKNESS PER COAT: 1-2 MILS D.F.T.

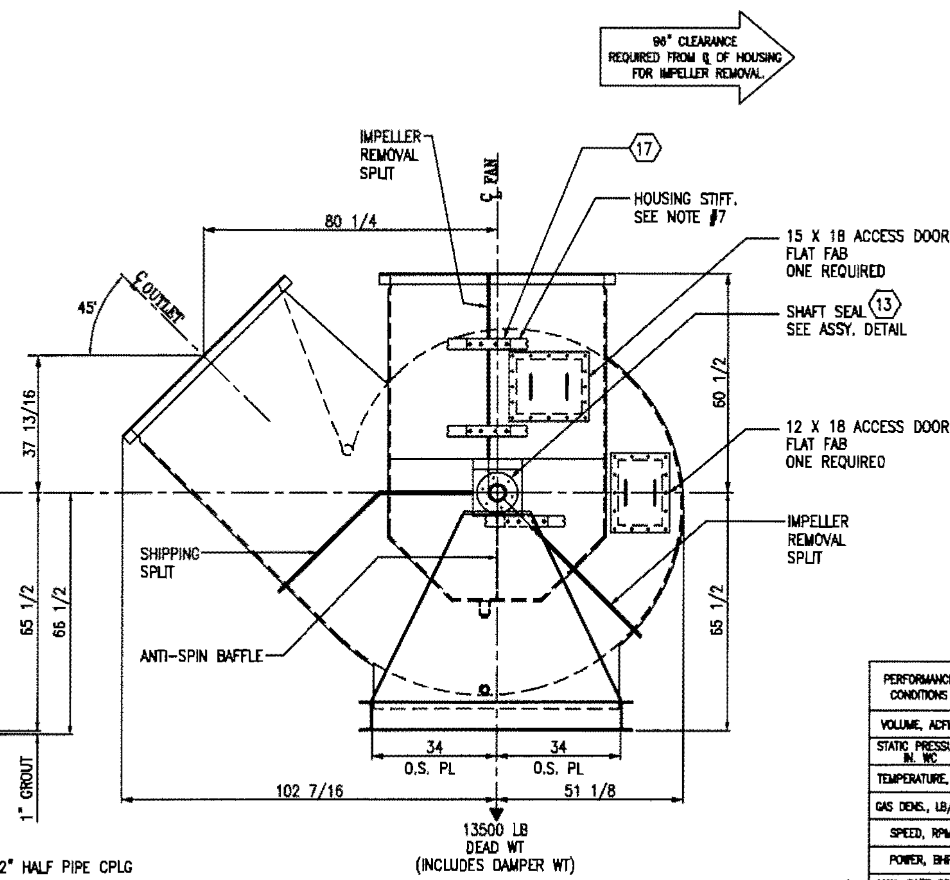
(A) VARIABLE SPEED FAN
VFD BY WESTATES CARBON



DRIVE SIDE ELEVATION – DRIVE ROTATION CCW
MOTOR, BEARING, COUPLING AND COUPLING GUARD OMITTED FOR CLARITY



END VIEW



NON-DRIVE SIDE ELEVATION
BEARING OMITTED FOR CLARITY

PERFORMANCE CONDITIONS	DES	HIGH	LOW	
VOLUME, ACFM	10104	8420	6315	
STATIC PRESSURE IN. WC	66.0	53.0	41.0	
TEMPERATURE, °F	174	174	174	
GAS DENS., LB/FT³	.0440	.0458	.0464	
SPEED, RPM	1980	1740	1510	
POWER, BHP	136	91	53	
(A) MAX. SAFE OPER. SPEED, RPM	1980	MAX. SAFE OPER. TEMP. °F	200	
SHAFT CRITICAL SPEED, RPM	3260	IMPELLER WR² LB FT²	3166	

BARRON INDUSTRIES INC.
LEEDS, AL PHONE (205) 699-2191

CUST.: HANKIN ENVIRONMENTAL, SOMERVILLE, NEW JERSEY
USER: WESTATES CARBON ARIZONA, PARKER, ARIZONA
APPLIC.: SCRUBBER INDUCED DRAFT FAN TAG NO. B-15
EQUIP.: 662/662 R30A SI(20.0%)SW ARRG'T #7 FAN GENERAL ARRANGEMENT

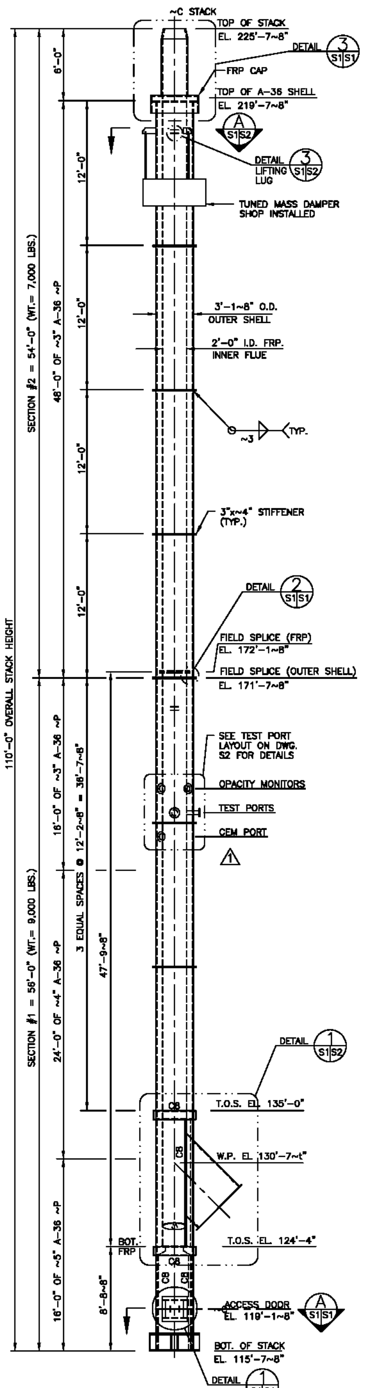
EO.#:	BY: MBB	DATE: 1/18/96	
P.O.: 9503-019-00	CHK.: DW	DATE: 1/19/96	
DWG. No. C25923F1	SHT. 1 OF 1		REV. A

REV.			
A	BY: MBB, DATE: 2/13/96	CHK: DSB, DATE: 2/13/96	GENERAL REVISION PER CUSTOMER APPROVAL

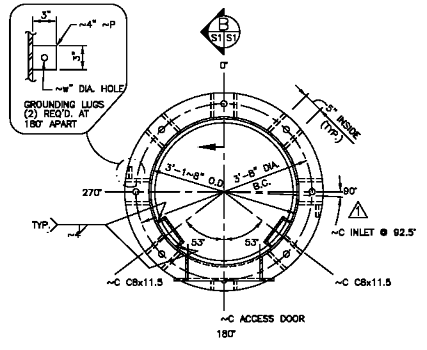
G:\DRAWINGS\FANS\FANGA\00034 01/24/96 08:28

DRAWING D95-75-S1-1
DUAL WALL STACK & DETAILS

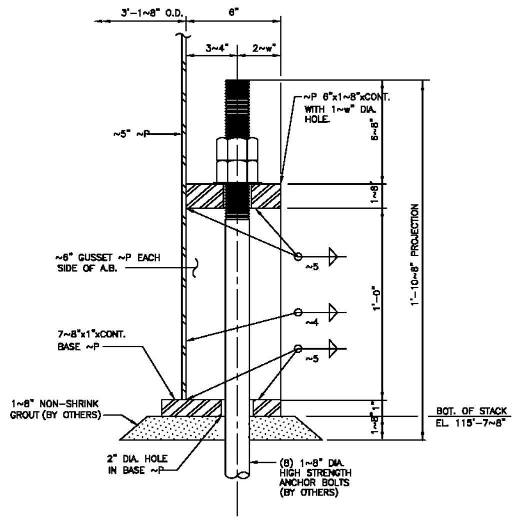
Revision 1
April 2012



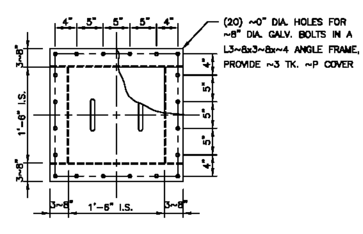
STACK ELEVATION
SCALE: ~3"=1'-0"



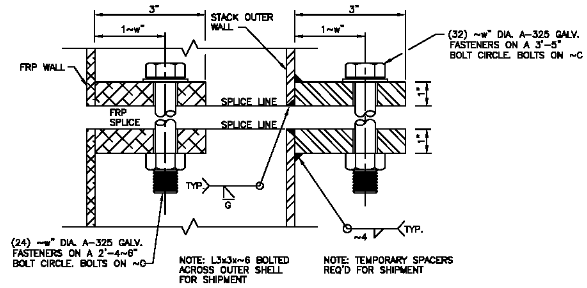
SECTION A S1|S1
SCALE: ~w"=1'-0"



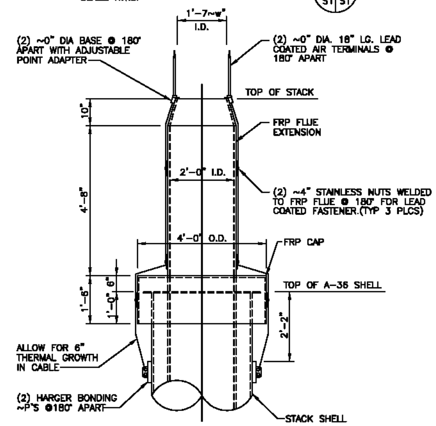
SECTION B S1|S1
SCALE: 3"=1'-0"



DETAIL 1 S1|S1
SCALE: 1" = 1'-0"



FIELD SPLICE DETAIL 2 S1|S1
SCALE: N.T.S.



DETAIL 3 S1|S1
SCALE: ~8"=1'-0"

GENERAL NOTES

1. MATERIALS
A. SHELL PLATES AND ALL EXTERNAL COMPONENT PARTS SUCH AS STIFFENERS, LIFTING LUGS AND BRACES SHALL CONFORM TO ASTM A-36 UNLESS NOTED OTHERWISE.
B. ALL FLUE MATERIAL INCLUDING TEST PORTS, CAP, INLET AND DRAIN SHALL BE FROM DERAKANE 510 FR. CAP, FALSE BOTTOM, INLET AND FLUE SHALL BE .475" TK.

2. FABRICATION – ALL WORK SHALL BE FABRICATED IN ACCORDANCE WITH AISC "SPECIFICATIONS FOR STRUCTURAL STEEL BUILDINGS", LATEST EDITION. WELDS SHALL BE MADE ONLY BY WELDING OPERATORS WHO HAVE BEEN PREVIOUSLY QUALIFIED BY TEST AS PRESCRIBED IN THE AWS "STRUCTURAL WELDING CODE", OR BY THE ASME CODE, TO PERFORM THE TYPE OF WORK REQUIRED. ALL BUTT WELDS SHALL BE PRE-QUALIFIED, FULL PENETRATION WELDS AND SHALL DEVELOP THE FULL STRENGTH OF THE SECTION. SHELL GIRTH AND VERTICAL SEAMS SHALL BE COMPLETE PENETRATION BUTT GROOVE WELD TYPE AND TOTALLY WELDED EITHER AUTOMATICALLY OR SEMI-AUTOMATICALLY BY THE SUBMERGED ARC WELDING PROCESS. ELECTRODES SHALL CONFORM TO THE AWS CODE AND SHALL BE EQUIVALENT TO THE BASE METAL IN STRENGTH, CORROSION RESISTANT AND WEATHERED APPEARANCE.

3. TOLERANCES – WALL PLATES SHALL BE FABRICATED IN ACCORDANCE WITH THE FOLLOWING TOLERANCES:
A. MAXIMUM DEVIATION OF BASE RING FROM CENTERLINE OF STACK – 3/16" FROM PLUMB AND OVERALL STRAIGHTNESS OF THE STACK SUCH THAT ERECTION OF THE STACK CAN BE PLUMBED TO WITHIN A MAXIMUM DEVIATION OF 1" PER 100' OF HEIGHT.
B. MAXIMUM OUT-OF-ROUNDNESS OF ANY SECTION – DIFFERENCE BETWEEN MINIMUM AND MAXIMUM DIAMETER – LESS THAN 1% OF NORMAL DIAMETER.
C. MAXIMUM MISALIGNMENT OF PLATES AT ANY JOINT SHALL NOT EXCEED 25% OF NORMAL THICKNESS OR 1/8", WHICHEVER IS LESS.
D. ADJOINING PLATE SECTIONS SHALL BE PAIRED FOR FULL 100% DEVELOPMENT.
E. PEAKING OF VERTICAL JOINTS SHALL NOT EXCEED 1/4" AS MEASURED FROM THE TRUE RADIUS OF THE STACK.
F. STRUCTURAL PLATES ARE TO BE PURCHASED OF SUFFICIENT LENGTH TO ALLOW FOR ONLY ONE VERTICAL SEAM PER GIRTH. VERTICAL SEAMS ON ADJACENT SECTIONS WILL BE OFFSET BY 90°. IN SPECIAL CASES, A MAXIMUM OF TWO VERTICAL SEAMS WILL BE OFFSET AT LEAST 90°
G. ALL APPURTENANCES, INCLUDING PLATFORMS AND LADDERS, WILL BE SHOP ATTACHED TO STACK TO ENSURE GOOD FIT.

4. INSPECTION AND TESTING – MATERIAL TEST REPORTS FOR ALL MATERIAL UTILIZED FOR MAJOR COMPONENTS SHALL BE SUBMITTED TO WARREN. MTR'S TO BE REQUESTED WHEN MATERIAL IS ORDERED AND FORWARDED TO WARREN IMMEDIATELY UPON RECEIPT.

5. SURFACE PREPARATION
A ALL SHARP PROJECTIONS SHALL BE GROUND SMOOTH.
B. ALL WELD FLUX AND SPLATTER SHALL BE REMOVED BY POWER TOOL CLEANING.

6. PAINTING SPECIFICATION – EXTERIOR & INTERIOR SURFACE TO BE SANDBLASTED PER SSPC-SP10 AND APPLY ONE PRIMER COAT OF CARBO ZINC 11 INORGANIC ZINC AT 3.5 MILS DFT. TOP COAT WITH TWO COATS OF CARBOLINE 1248 SILICONE ACRYLIC AT 1.0 TO 1.5 MILS DFT EACH. TOTAL FILM THICKNESS TO BE 6 TO 7 MILS DFT. COLOR TO BE SELECTED.

7. LOADING AND SHIPPING – STACKS WILL BE LOADED AND SECURED ON TRUCKS SUCH THAT PLATES ARE NOT DEFORMED AND PAINT SYSTEM IS NOT COMPROMISED. STACK LOADS ARE TO BE DISTRIBUTED OVER LARGE AREAS. POINT LOADS ON PLATES ARE TO BE AVOIDED. TIMBERS USED TO SECURE LOADS ARE TO BE PLACED LONGITUDINALLY, SPANNING AT LEAST TWO STIFFENERS. ERECTOR TO REMOVE ALL TEMPORARY SPACERS AND BRACES BEFORE COMPLETING ERECTION.

FOUNDATION DESIGN LOADS

DEAD LOAD OF STACK	15 KIPS
WIND SHEAR AT BASE OF STACK	8 KIPS
WIND MOMENT AT BASE OF STACK	350 KIP-FT.
WIND CODE:	ASCE 7-93
WIND SPEED	100 MPH EXP. B
IMPORTANCE FACTOR	1.0
SEISMIC LOADS DOES NOT CONTROL	

CERTIFIED FOR CONSTRUCTION

NO.	DATE	REVISION	BY	CHK.
1	2/8/96	AIR TERMINALS / PORTS	JWG	RSS

WESTATES CARBON
HANKIN ENVIRONMENTAL REF.# 9503-025
PARKER ARIZONA

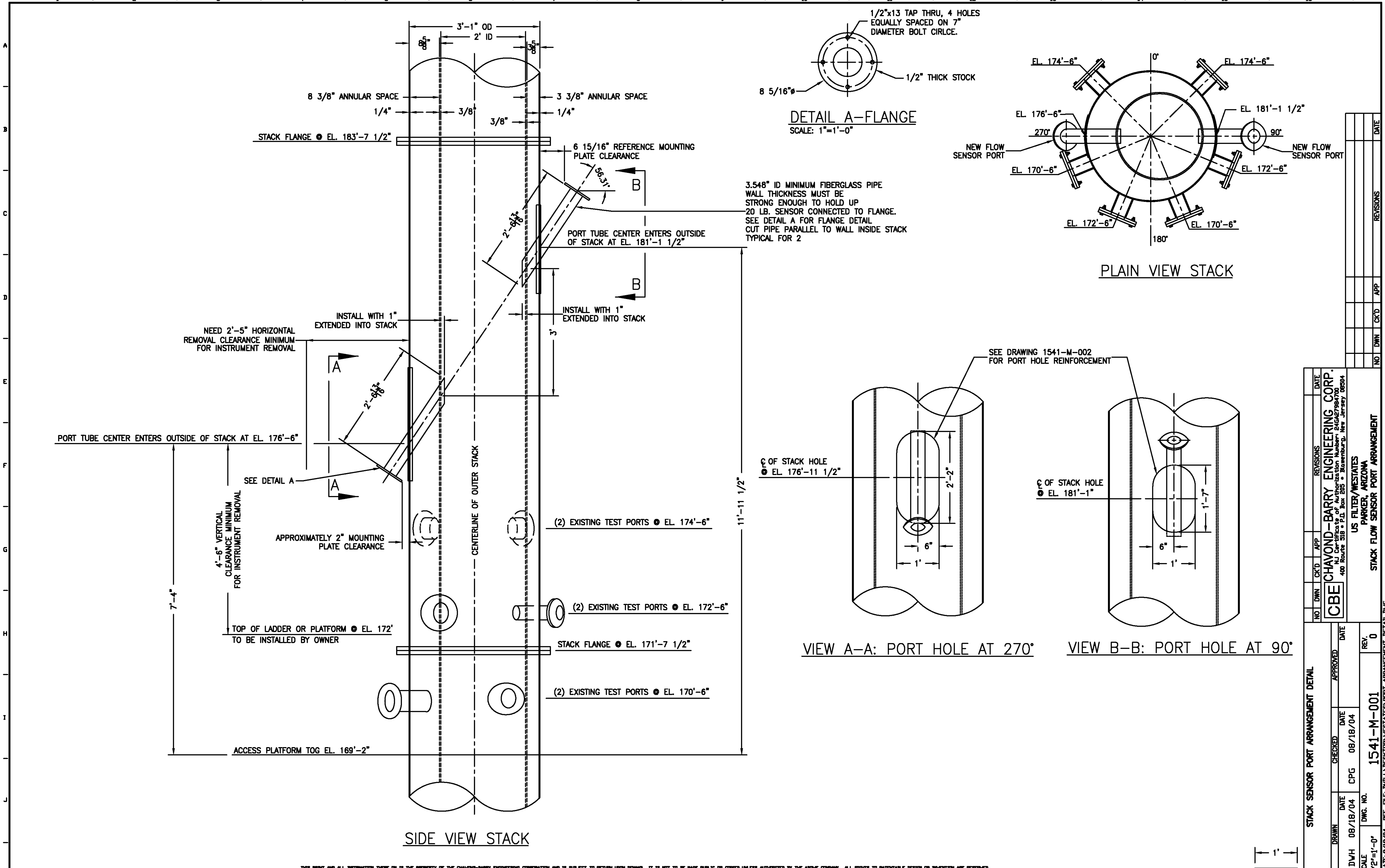
DUAL WALL STACK & DETAILS

WARREN ENVIRONMENT, INC.
ATLANTA GEORGIA

	MADE	CHKD.	RECOMMENDED	APPROVED
DESIGN	RSS	SLR		
DRAWN	JWG	RSS	SCALE AS SHOWN	DATE 1/19/96
TRACED			JOB NO.	DRAWING NO. D95-75-S1-1

DRAWING 1541-M-001
STACK PORT ARRANGEMENT

Revision 1
April 2012


3'-1" OD
2' ID
8 5/8"
3 5/8"
8 3/8" ANNULAR SPACE
3 3/8" ANNULAR SPACE
1/4"
3/8"
3/8"
1/4"
STACK FLANGE @ EL. 183'-7 1/2"
6 15/16" REFERENCE MOUNTING PLATE CLEARANCE
56.31°
B
2'-6 13/16"
PORT TUBE CENTER ENTERS OUTSIDE OF STACK AT EL. 181'-1 1/2"
3.548" ID MINIMUM FIBERGLASS PIPE WALL THICKNESS MUST BE STRONG ENOUGH TO HOLD UP 20 LB. SENSOR CONNECTED TO FLANGE. SEE DETAIL A FOR FLANGE DETAIL CUT PIPE PARALLEL TO WALL INSIDE STACK TYPICAL FOR 2
INSTALL WITH 1" EXTENDED INTO STACK
INSTALL WITH 1" EXTENDED INTO STACK
3'
NEED 2'-5" HORIZONTAL REMOVAL CLEARANCE MINIMUM FOR INSTRUMENT REMOVAL
A
PORT TUBE CENTER ENTERS OUTSIDE OF STACK AT EL. 176'-6"
SEE DETAIL A
CENTERLINE OF OUTER STACK
(2) EXISTING TEST PORTS @ EL. 174'-6"
APPROXIMATELY 2" MOUNTING PLATE CLEARANCE
4'-6" VERTICAL CLEARANCE MINIMUM FOR INSTRUMENT REMOVAL
7'-4"
11'-11 1/2"
(2) EXISTING TEST PORTS @ EL. 172'-6"
TOP OF LADDER OR PLATFORM @ EL. 172' TO BE INSTALLED BY OWNER
STACK FLANGE @ EL. 171'-7 1/2"
(2) EXISTING TEST PORTS @ EL. 170'-6"
ACCESS PLATFORM TOG EL. 169'-2"
SIDE VIEW STACK
1/2"x13 TAP THRU, 4 HOLES EQUALLY SPACED ON 7" DIAMETER BOLT CIRLCE.
1/2" THICK STOCK
8 5/16"ø
DETAIL A–FLANGE
SCALE: 1"=1'-0"
0°
EL. 174'-6"
EL. 174'-6"
EL. 176'-6"
EL. 181'-1 1/2"
270°
90°
NEW FLOW SENSOR PORT
NEW FLOW SENSOR PORT
EL. 170'-6"
EL. 172'-6"
EL. 172'-6"
EL. 170'-6"
180°
PLAIN VIEW STACK
SEE DRAWING 1541-M-002 FOR PORT HOLE REINFORCEMENT
℄ OF STACK HOLE @ EL. 176'-11 1/2"
2'-2"
6"
1'
℄ OF STACK HOLE @ EL. 181'-1"
1'-7"
6"
1'
VIEW A–A: PORT HOLE AT 270°
VIEW B–B: PORT HOLE AT 90°
1'
NO DWN CK'D APP REVISIONS DATE
CBE CHAVOND–BARRY ENGINEERING CORP.
NJ Certificate of Authorization Number: 24GA27984700
400 Route 518 • P.O. Box 205 • Blawenburg, New Jersey 08504
US FILTER/WESTATES
PARKER, ARIZONA
STACK FLOW SENSOR PORT ARRANGEMENT
STACK SENSOR PORT ARRANGEMENT DETAIL
DRAWN DWH DATE 08/18/04
CHECKED CPG DATE 08/18/04
APPROVED DATE
SCALE 1/2"=1'-0"
DWG. NO. 1541-M-001
REV. 0
DATE: 8/18/04 REF. FILE: DHILL\DESKTOP\WESTATES\PORT ARRANGEMENT DETAIL.DWG

NORTH AMERICAN MODEL 6422 BURNER INFORMATION

Revision 1
April 2012

North American
Manufacturing Company

FIRE•ALL™ DUAL-FUEL™ BURNERS

Bulletin 6422

April 2002

6422 Fire·All Dual-Fuel Burners are widely used on heat treat and non-ferrous melting furnaces, kilns, ovens, air heaters, dryers, chemical process equipment, and other applications where superior temperature uniformity is required. (For higher temperature service, specify 6425 Burners.)

These sealed-in, nozzle-mix burners for gas and/or distillate oil are stable on stoichiometric ratio, with large amounts of excess air, or with up to 50% excess fuel (provided additional air for combustion is in the furnace near the burner).

OPERATION

Burners can be lighted at rich, lean, or correct air/fuel ratio, then immediately turned to high fire.

Required gas pressures are low: 1 osi at the burner for coke oven gas, less for natural gas. Required oil pressure at the burner is nearly zero, but a pressure drop of about 10 psi should be taken across the Sensitrol™ Valve.

The most common ratio control system for 6422 Burners uses a cross-connected regulator and Ratiotrol™. When appropriate for the application, flow balancing systems or fuel only control (see "Excess Air" paragraph) is very satisfactory.

If furnace temperatures after shutdown rise above 1900 F, pass some air through burner to prevent overheating. During gas operation, use at least 4 osi atomizing air to cool atomizer (full atomizing air may be used); or for extended periods of operation on gas, atomizer can be withdrawn and stored: Use a backplate and gasket to seal rear of burner (see Dimensions & Parts List 4422-2).

LIGHTING/FLAME SUPERVISION

A 4011 Pilot Set normally is used to light 6422 Burners. On gas, direct spark ignition of the burner is available--see Sheet 4055. A manual torch can be used in some applications.

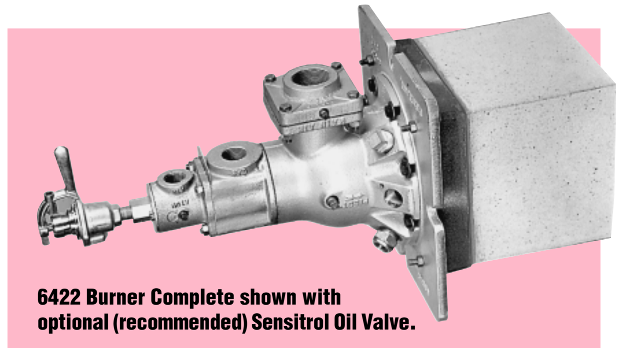
Burners accept ultraviolet (UV) scanners for monitoring pilot or main flame. A flame rod can be used to monitor pilot or main **gas** fire. Adapters are listed in Bulletin 8832.

When using flame supervision, an **interrupted** pilot is required--do **not** use constant or intermittent pilots. If using direct spark ignition, turn off spark after burner lights.

Table I. TOTAL AIR CAPACITIES*
scfh
(for Btu/hr, multiply by 100)

Burner designation	16 osi air at burner
6422-2	2 600
6422-3	4 100
6422-4	6 300
6422-5	10 300
6422-6	15 700
6422-7-A	27 000
6422-7-B	33 500
6422-8-A	44 800

* Includes combustion and atomizing air.



6422 Burner Complete shown with optional (recommended) Sensitrol Oil Valve.

An observation port is furnished with all burners. Positions of pilot, flame detector, and observation port are interchangeable, as long as pilot and flame detector are mounted in adjacent holes.

STANDARD CONSTRUCTION

Burner bodies are heat resistant cast iron with Inconel air tubes. Mounting plate and tile assembly can be separated from the burner body for installation convenience. Air and gas connection orientation can be rotated in 90° intervals, but air and gas pipes should be brought in from the top or side to prevent oil dripping into them. When reassembling the burner, the pilot and flame detector notches in the tile and mounting must be in proper alignment with the pilot and flame detector connections on the burner body (applies to 6422-2 through 6422-6 sizes). Burner is complete with cast iron mounting plate and 9" long 3200 F castable burner tile which must be supported and sealed in a hard refractory furnace wall. (See page 2 of Dimensions 6422 for optional construction suitable for fiber lined furnaces.) When the furnace wall is thicker than the tile length, the tunnel beyond the end of the burner tile should be flared at a 30° or greater included angle, starting at the OD of the tile. Extension tiles are not recommended. (See Supplement DF-M1 for detailed tile installation recommendations.

TILE SUPPORT JACKETS (6422- -LC, 6422- -L4, 6422- -L9)

6422 Burners with the standard 9" long square tiles are also available with support jackets for applications such as air heaters where frequently the tile is not supported by refractory. They also can be mounted in furnaces when desired. Jackets are available in three different metals and maximum temperature ratings. They must be protected with sufficient insulation so as not to exceed rated temperature. Maximum temperature rating for jacket metals depends upon frequency of heat-up/cool-down cycles. As an example, batch annealing furnaces that are heated and cooled every day should use the "intermittent exposure" ratings. Burners in a continuous annealing furnace that remain at the same temperature for months at a time, can use the higher "continuous" rating.

Designation	Jacket Metal	Continuous max.temp.	Intermittent exposure
6422- -LC	carbon steel	700 F	700 F
6422- -L4	304 SST	1600 F	1500 F
6422- -L9	309 SST	1900 F	1800 F

EXCESS AIR

Excess air can improve temperature uniformity by avoiding hot spots in front of burners, by churning furnace atmosphere to reduce stratification, and by creating positive furnace pressure to eliminate cold air infiltration.

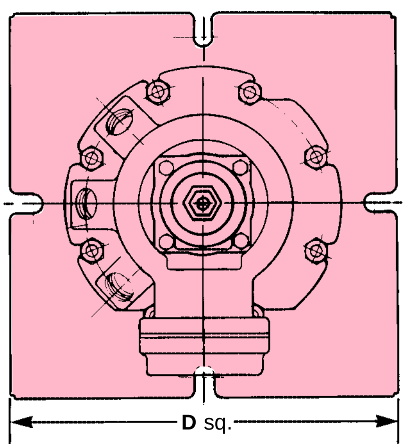
Excess air can give very high effective burner turndown. Thus a furnace used for high temperature work (such as heat treating at 1900 F) with burners firing on stoichiometric air/fuel ratio can also be used for low temperature jobs (such as drawing or drying at 600 F) with burners firing on lean ratio.

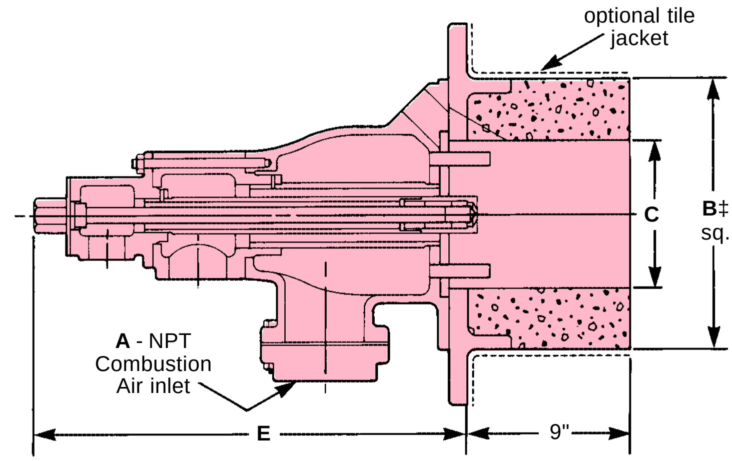
Table II. ATOMIZING AIR CAPACITIES in scfh

Burner designation	air pressure drop across burner in osi 14	16	18	20	22	24
6422-2, -3, -4	500	520	560	600	620	650
6422-5	640	690	720	760	800	840
6422-6	800	850	910	950	1000	1050
6422-7-A,-7-B	870	930	990	1040	1100	1150
6422-8-A	2650	2840	3000	3170	3320	3480

Table III. COMBUSTION AIR CAPACITIES in scfh
(not including atomizing air)

Burner designation	air pressure drop across burner in osi 0.1	1	5	6	8	12	16	approx. flame lengths with 16 osi Main Air (in open furnace) gas	oil
6422-2	160	520	1 160	1 270	1 470	1 800	2 100	1/2'	1 1/2'
6422-3	280	890	1 980	2 160	2 500	3 050	3 550	1 1/2'	2'
6422-4	460	1 450	3 240	3 540	4 100	5 000	5 800	2'	2 1/2'
6422-5	750	2 370	5 300	5 800	6 700	8 150	9 450	2 1/2'	2 1/2'
6422-6	1180	3 700	8 300	9 100	10 500	12 900	14 800	3'	4'
6422-7-A	2070	6 550	14 600	16 000	18 500	22 700	26 200	6'	6'
6422-7-B	2580	8 150	18 200	19 900	23 000	28 200	32 600	6'	5'
6422-8-A	3320	10 500	23 500	25 800	29 700	36 400	42 000	7'	6'





NOTE: For 6422-8-A, air and gas connections, cannot be piped in the same plane because the "flower pot" type air connection flange would interfere with the 2 1/2" gas line.

CLEARANCE DIMENSIONS
(for details, see Dimensions 6422)

Burner designation	dimensions in inches A	B‡	C	D	E
6422-2	1 1/4	8 1/2	5	12	13 5/8
6422-3	1 1/2	8 1/2	5	12	13 5/8
6422-4	2	8 1/2	5	12	13 5/8
6422-5	2 1/2	8 1/2	5	12	13 5/8
6422-6	3	8 1/2	5	12	13 5/8
6422-7-A	4	10	7	13 1/2	17 7/8
6422-7-B	4	10	7	13 1/2	17 7/8
6422-8-A	6	10	7	13 1/2	17 7/8

‡ 6422- -L_ metal jackets add about 1" to tile OD.

Table IV. MAXIMUM EXCESS AIR RATES in %
(without pilot)

Burner designation	GAS Combustion Air pressure 1 osi	8 osi	14 osi	OIL Combustion Air pressure 1 osi	8 osi	14 osi
6422-2	—	380	500	—	380	500
6422-3	330	1000	1300	210	480	670
6422-4	560	1560	1560	480	800	900
6422-5	1070	1440	1150	50	250	400
6422-6	380	1000	1400	140	560	610
6422-7-A	3200	4900	1000	160	330	450
6422-7-B	900	1450	1600	150	700	830
6422-8-A	460	660	400	200	280	350

DIMENSIONS SHOWN ARE SUBJECT TO CHANGE. PLEASE OBTAIN CERTIFIED PRINTS FROM NORTH AMERICAN MFG. CO. IF SPACE LIMITATIONS OR OTHER CONSIDERATIONS MAKE EXACT DIMENSION(S) CRITICAL.

WARNING: Situations dangerous to personnel and property can develop from incorrect operation of combustion equipment. North American urges compliance with National Safety Standards and Insurance Underwriters recommendations, and care in operation.

North American Mfg. Co., 4455 East 71st Street, Cleveland, OH 44105-5600 USA, Tel: +1.216.271.6000, Fax: +1.216.641.7852
email: sales@namfg.com • www.namfg.com

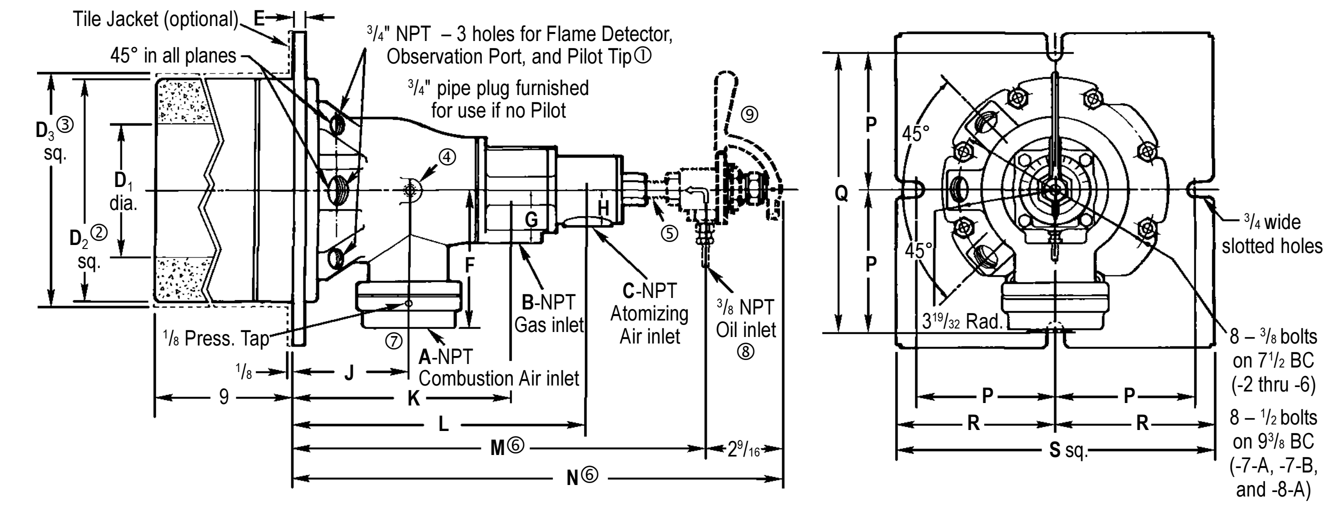
North American Manufacturing Company

FIRE•ALL™ DUAL-FUEL™ BURNERS

Dimensions 6422

April 2002

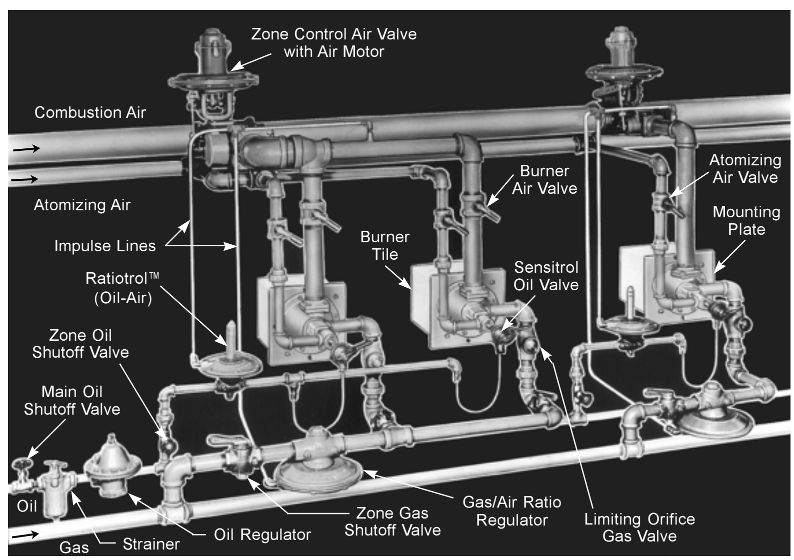
DIMENSIONS in inches



DIMENSIONS SHOWN ARE SUBJECT TO CHANGE. PLEASE OBTAIN CERTIFIED PRINTS FROM NORTH AMERICAN MFG. CO. IF SPACE LIMITATIONS OR OTHER CONSIDERATIONS MAKE EXACT DIMENSION(S) CRITICAL.

Burner designation	dimensions in inches A	B	C	D_1	$D_2$②	$D_3$③	E	F	G	H	J	K	L	M⑥	N⑥	P	Q	R	S
6422-2	1 1/4	1	3/4	5	8 1/2	9 1/2	1/2	5 1/4	2	1 3/8	4 3/8	8 3/8	11 5/16	15 13/16	18 3/8	5 1/4	10 1/2	6	12
6422-3	1 1/2	1	3/4	5	8 1/2	9 1/2	1/2	5 1/4	2	1 3/8	4 3/8	8 3/8	11 5/16	15 13/16	18 3/8	5 1/4	10 1/2	6	12
6422-4	2	1 1/4	3/4	5	8 1/2	9 1/2	1/2	5 1/4	2	1 3/8	4 3/8	8 3/8	11 5/16	15 13/16	18 3/8	5 1/4	10 1/2	6	12
6422-5	2 1/2	1 1/2	1	5	8 1/2	9 1/2	1/2	5 1/4	2	1 3/8	4 3/8	8 3/8	11 5/16	15 13/16	18 3/8	5 1/4	10 1/2	6	12
6422-6	3	1 1/2	1	5	8 1/2	9 1/2	1/2	5 9/16	2	1 3/8	4 3/8	8 3/8	11 5/16	15 13/16	18 3/8	5 1/4	10 1/2	6	12
6422-7-A	4	2 1/2	1 1/4	7	10	11	9/16	6 15/16	2 5/8	2 1/8	5 7/8	11	15 1/8	20 1/16	22 5/8	6 1/8	12 1/4	6 3/4	13 1/2
6422-7-B	4	2 1/2	1 1/4	7	10	11	9/16	6 15/16	2 5/8	2 1/8	5 7/8	11	15 1/8	20 1/16	22 5/8	6 1/8	12 1/4	6 3/4	13 1/2
6422-8-A	6	2 1/2	2	7	10	11	9/16	10 11/16	2 5/8	1 3/4	5 7/8	11	15 1/8	20 1/16	22 5/8	6 1/8	12 1/4	6 3/4	13 1/2

Burner designation	wt, lb	Recommended Sensitrol™ Oil Valve⑨	Recommended Pilot Size
6422-2	83	1813-02-A	
6422-3	83	1813-02-A	4011-11
6422-4	83	1813-02-A	(or)
6422-5	83	1813-02-A	4011-12
6422-6	83	1813-02-B	
6422-7-A	139	1813-02-C	4011-11
6422-7-B	139	1813-02-C	(or)
6422-8-A	145	1813-02-D	4011-12



Piping arrangement for single- and double-burner zones.

① Pilot, Flame Detector, and Observation Port positions are interchangeable, as long as pilot and flame detector are in adjacent holes.
② Opening in furnace shell should be about 1/2" larger than dimension D_2 to allow for fillets and draft on mounting plate.
③ For 6422- -LC, -L4 and -L9 Burners only. Opening in oven shell should be about 1/4" larger than dimension D_3.
④ 1/4" body air pressure tap on -2, -3, -4, -5, and -6. 1/8" body air pressure tap on -7-A, -7-B and -8-A.
⑤ Pipe nipple not furnished by North American.
⑥ Dimensions M and N assume the use of a 3/8" NPT close nipple between burner and Sensitrol Oil Valve.
⑦ For 6422-8-A, air and gas connections cannot be piped in the same plane because the "flower pot" type air connection flange would interfere with the 2 1/2" gas line.
⑧ Metal tubing is offered as an extra cost option (order as P.N. 3-0310-7).
⑨ Optional (recommended) Sensitrol Oil Valve is not included as part of the burner assembly, and must be ordered separately.

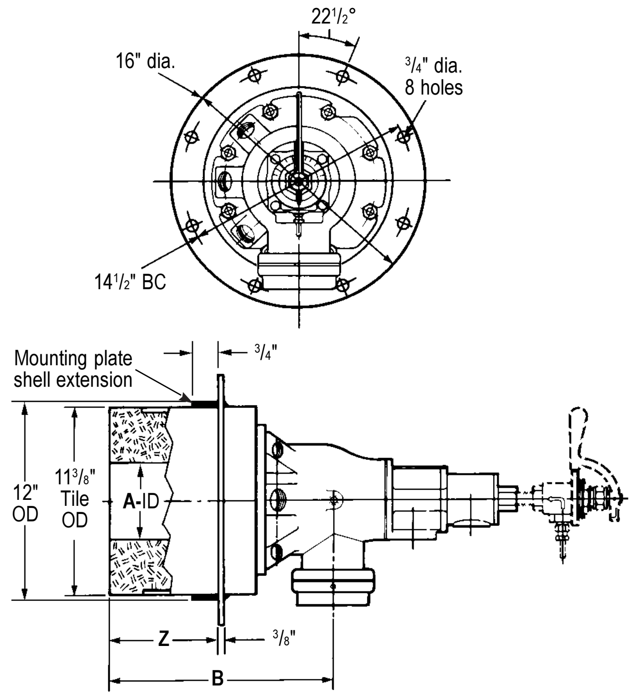
ALTERNATIVE MODELS

6422 Burners for Fiber Lined Furnaces. For furnaces with ceramic fiber walls, special mounting/tile construction is available: 11 3/8" diameter tile, jacketed in RA330 expanded metal for all but 2" of its length; a circular mounting flange factory-installed from 2" to 9" ("Z" dimension) from the hot face of the tile.

Customer must specify this dimension to nearest 1/2" so tile face is about flush with inside furnace wall.

This construction is suitable for 2000 F furnace temperature.

See Supplement DF-M2 for detailed tile installation recommendations for fiber-lined furnaces.



Dimensions in inches

Size designation	A	B	Z
-2 thru -6	5	13 3/8	†
-7-A thru -8-A	7	14 7/8	†

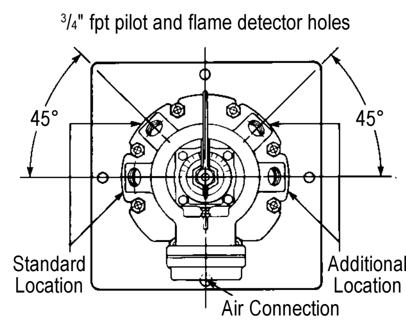
† "Z" dimension variable in 1/2" increments from 2" to 9".

To order, specify: 6422-(code)-(A or B if applicable) (Z) Burner complete. (Order 1813 Sensitrol™ Oil Valve separately--it is not included in complete burner assembly.) Include Z dimension in the burner description: between 2" and 9", written to the nearest 0.5" as a decimal.

Example: Line Item 10 = 6422-7-AZ Burner complete with Z dimension of 6.0"
Line Item 20 = 1813-02-C Sensitrol Oil Valve.

6422 Burners with Extra Pilot and Flame Detector Location. The fixed relationship between 6422 Burner air connections and pilot/flame detector holes occasionally presents problems in mounting pilots and flame detectors clear of furnace buckstays or other structural members.

6422-2 through -6 Burners can be furnished with a 4-hole OC3-2042 burner body that has a set of pilot and flame detector holes on each side. Either set can be used and one on the other side used for an observation port--plug any unused holes.



To order, specify: 6422D-(code) Burner complete. (Order 1813 Sensitrol Oil Valve separately--it is not included in complete burner assembly.)

Example: Line Item 10 = 6422D-2 Burner complete with Special Double-Boss Body
Line Item 20 = 1813-02-A Sensitrol Oil Valve

WARNING: Situations dangerous to personnel and property can develop from incorrect operation of combustion equipment.
North American urges compliance with National Safety Standards and Insurance Underwriters recommendations, and care in operation.

NORTH AMERICAN MODEL 6514 BURNER INFORMATION

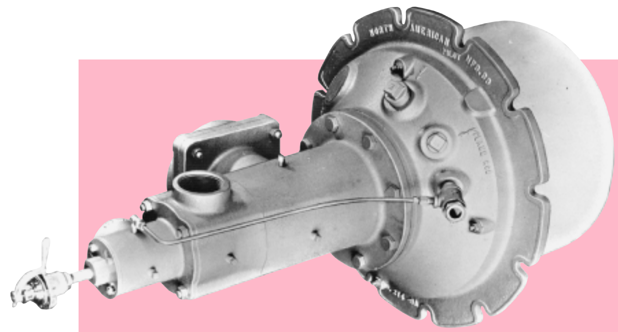
Revision 1
April 2012

6514 FIRE•ALL Dual-Fuel Burners are nozzle mix, sealed-in burners for gas, light oil, or heavy oil. Capable of efficient operation throughout a wide temperature range, these burners are equally at home on low temperature ovens and high temperature forge and melting furnaces.

Ruggedly built for sustained, maintenance-free operation, 6514 Burners also provide for quick change of fuels without disturbing process operations.

Sealed mountings help maintain furnace pressure, controlled atmosphere, and closer air/fuel ratio control--all contributing to better product quality.

Fire•All Burners have been used for years on all types of furnaces with great success.



6514 Burner Complete shown with optional (recommended) Sensitrol™ Oil Valve.

COMBUSTION CHARACTERISTICS

Oil. Oil viscosity at the burners must not exceed 100 SSU. Minimum atomizing air pressure at the burners is 14 osi for light oil, 22 osi for heavy oil.

Gas. Atomizing air (4 osi minimum) should be left on to protect the atomizer. Maximum required natural gas pressure at the burner for stoichiometric ratio is about 1/4 of the combustion air pressure.

Air/Fuel Ratio. 6514 Dual-Fuel Burners are stable with at least 100% excess air. They also can operate with excess fuel without forming carbon, but additional air for complete combustion must be available in the furnace near the burner.

For limits in a specific case, either rich or lean, consult North American.

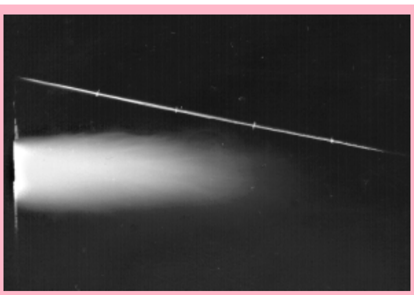
Turndown. Fire•All Burners can be turned down to atomizing air only (with fuel to match) except when burning residual oils in a cold, tight furnace. For prolonged operation on atomizing air only, specify an alloy burner nose if furnace temperature is above 1600 F.

Preheated Air. 6514 Burners are designed for use with ambient air. They are suitable for some preheated air applications (up to 700 F preheat). Consult North American.

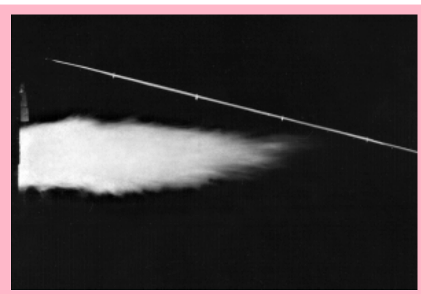
Total air capacities (including main and atomizing air)

Burner designation	16 osi air pressure drop across the burner: Air① scfh	Light oil② gph	Heavy oil③ gph	Gas④ scfh	24 osi air pressure drop across the burner: Air scfh	Light oil gph	Heavy oil gph	Gas scfh	Approx. flame lengths with 16 osi main air (in open furnace)
6514-6	17 900	13	12	1 790	21 900	16	15	2 190	4' - 5'
6514-7	28 400	21	19	2 840	34 800	26	23	3 480	5' - 6'
6514-8-A	48 900	36	33	4 890	60 000	44	40	6 000	8' - 9'
6514-8-B	81 500	60	54	8 150	100 000	74	67	10 000	9' - 12'
6514-9	165 000	122	110	16 500	202 000	150	135	20 200	15' - 18'
6514-10	247 000	183	165	24 700	303 000	224	202	30 300	20'

① For Btu/hr, multiply by 100 ② Light oil at 135 000 Btu/gal. ③ Heavy oil at 150 000 Btu/gal. ④Natural gas at 1000 Btu/cf.



Gas (left) and light oil flames for 6514-6 Dual-Fuel Burner with 16 osi main and atomizing air pressure drop across burner. White lines on pipe above flame indicate 1' intervals.



SPECIFICATIONS

Flame Supervision. An ultraviolet cell‡ will monitor pilot or main flame on gas or oil. For maximum safety, North American urges **interrupted** pilots when flame safeguards are used--pilots should be on only for a preset ignition period (usually 15 seconds), after which flame supervision detects main fire only. Adapters for mounting flame detection devices on 6514 Burners are tabulated on Bulletin 8832.

Tile/Installation. Burner tiles are cast refractory rated for 2800F furnace temperature. They should be supported securely in the furnace wall by castable refractory (not insulation) at least 9" thick all around the tile, extending back to the furnace shell and securely anchored to it. (See Supplement DF-M1.)

Tiles are replaceable in the field except for the 6514-10, whose mounting must be returned to the factory for tile replacement (or purchase a spare mounting plate with a tile cast onto it).

For furnace walls thicker than the length of the tile, the tunnel beyond the end of the tile should be flared at a 30° (included) angle, starting at the OD of the tile. If this is not practical, consult North American for specific recommendations.

Complete burners include tile, mounting plate, and an observation port into which a small quantity of atomizing air is introduced to keep the glass clear. Order pilot tips and Sensitrol™ Oil Valve separately.

SPECIAL OPTIONS

The following options are available for the 6514 burner but require consultation with your North American field engineer for application and ordering information.

1. **Increased capacities** - most sizes are available with up to 30% extra capacity.
2. **Hinged bodies** for easy access to internals.
3. **Short flame** versions are available in most sizes.
4. Special **high pressure oil atomizers** are available.

‡ Cleaning air must be introduced into the port downstream of the sensor to keep oil and poc's off the lens.

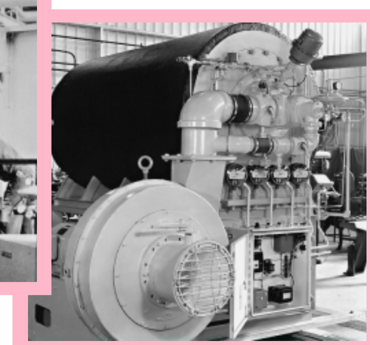
Jacketed Tiles. 6514 Burners are available with support jackets around the tile for applications where the tile is not supported by furnace refractory.

Jackets are available in three different metals and have maximum temperature ratings for each. They must be protected with sufficient insulation so as not to exceed rated temperature.

Maximum temperature rating for jacket metals depends upon frequency of heat-up/cool-down cycles. As an example, batch annealing furnaces that are heated and cooled every day should use the "intermittent exposure" ratings. Continuous annealing furnaces that remain at the same temperature for months at a time, can use the higher "continuous" rating.

Designation	Jacket Metal	Continuous max.temp.	Intermittent exposure
6514- -LC	carbon steel	700 F	700 F
6514- -L4	304 stainless	1600 F	1500 F
6514- -L9	309 stainless	1900 F	1800 F

6514's on a 2400 F slab heater.

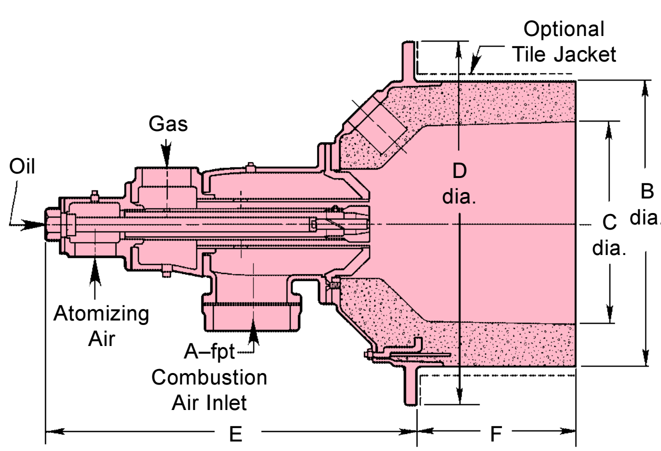


6514 on a 600 F air heater.

Burner designation	Main air capacities in scfh — Air pressure drop across the burner in osi: 1	5	6	8	12	16	Atomizing air capacities in scfh — Air pressure drop across the burner in osi: 14	16	18	20	22	24
6514-6	3 710	8 300	9 100	10 500	12 900	14 900	2 800	3 000	3 180	3 360	3 510	3 660
6514-7	6 100	13 600	15 000	17 200	21 000	24 400	3 770	4 030	4 270	4 500	4 720	4 900
6514-8-A	10 600	23 700	26 000	30 000	36 700	42 400	6 050	6 500	7 000	7 300	7 600	7 850
6514-8-B	17 600	39 200	43 000	49 600	60 500	70 000	10 600	11 300	12 000	12 700	13 200	13 800
6514-9	36 600	82 000	89 500	104 000	127 000	146 000	17 200	18 400	19 600	20 700	21 600	22 500
6514-10	54 500	122 000	135 000	154 000	189 000	218 000	27 200	29 100	30 900	32 600	34 100	35 500

CLEARANCE DIMENSIONS (for details, see Dimensions 6514)

Burner designation	dimensions in inches: A	B	C	D	E	F
6514 & 6514-6-L	3	15	10 3/8	19 1/2	23 5/16	9
6514 & 6514-7-L	4	16	11 3/8	20 1/2	25 1/2	9
6514 & 6514-8-AL	6	17 3/4	12 3/8	22 3/4	32 1/16	10
6514 & 6514-8-BL	6	19	13 1/2	24	35 15/16	13
6514 & 6514-9-L	8	23	16	28	44 3/16	13 1/2
6514 & 6514-10-L	10	27 1/2	20 1/2	32 1/2	50 9/16	13 7/16



DIMENSIONS SHOWN ARE SUBJECT TO CHANGE. PLEASE OBTAIN CERTIFIED PRINTS FROM NORTH AMERICAN MFG. CO. IF SPACE LIMITATIONS OR OTHER CONSIDERATIONS MAKE EXACT DIMENSION(S) CRITICAL.

WARNING: Situations dangerous to personnel and property can develop from incorrect operation of combustion equipment. North American urges compliance with National Safety Standards and Insurance Underwriters recommendations, and care in operation.

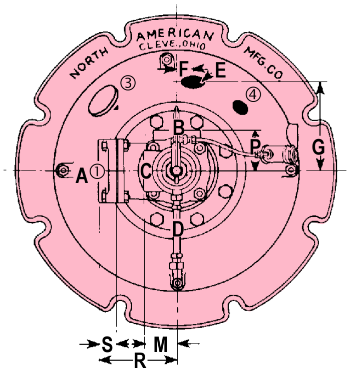
North American
Manufacturing Company

FIRE•ALL™ DUAL-FUEL™ BURNERS

Dimensions 6514

May 2002

DIMENSIONS – Main air, gas, atomizing air, and oil connections can be rotated relative to one another and to the mounting plate. Drawings show connections as assembled at the factory. These arrangements reduce maintenance by preventing oil dripping into air or gas manifolds (which should be above burners) and by minimizing dirt accumulation in pilots and flame supervisory devices. Pilot and main air connections cannot be aligned in the same direction.



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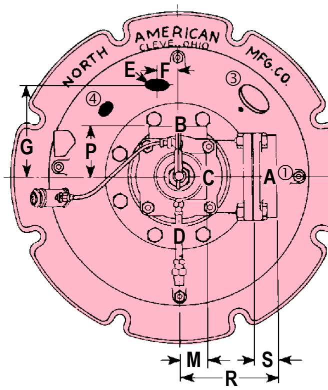

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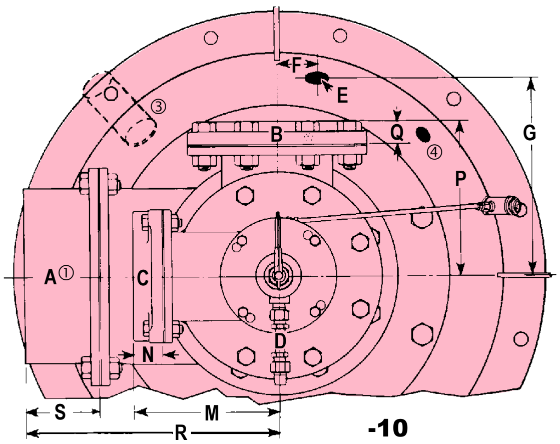

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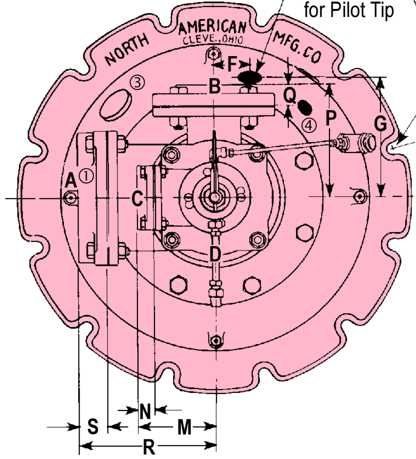
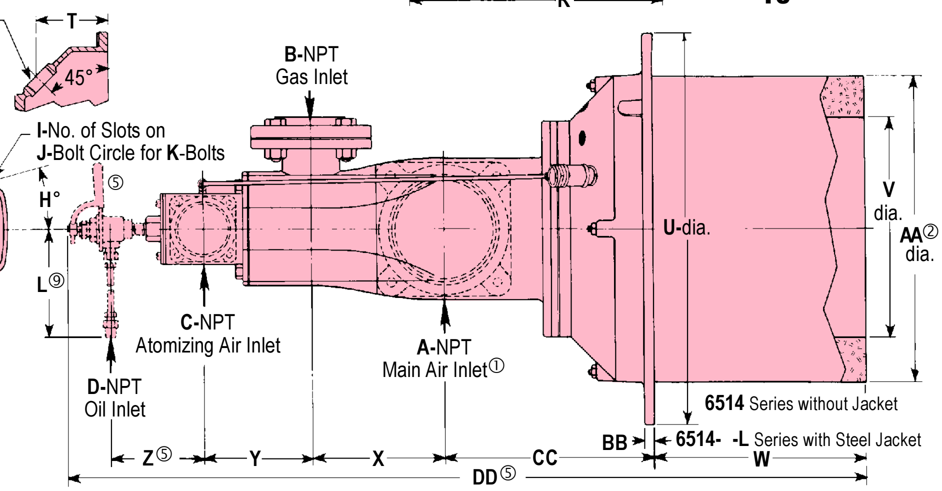


-8-A, -8-B, and -9



TYPICAL SIDE VIEW

DIMENSIONS SHOWN ARE SUBJECT TO CHANGE. PLEASE OBTAIN CERTIFIED PRINTS FROM NORTH AMERICAN MFG. CO. IF SPACE LIMITATIONS OR OTHER CONSIDERATIONS MAKE EXACT DIMENSION(S) CRITICAL.

Burner designation	Common dimensions in inches and degrees for 6514 and 6514- -L													
	A①	B	C	D	E	F	G	H°	I	J	K	L⑨	M	N	P
6514-6	3	2	1 1/2	3/8	3/4	1	5 17/32	22 1/2	8	18	5/8	19 3/4	2	—	2 1/2
6514-7	4	2 1/2	2	3/8	1 1/4	1 1/4	5 3/4	22 1/2	8	19	5/8	19 3/4	1 3/4	—	3 1/4
6514-8-A	6	2 1/2	2 1/2	3/8	1 1/4	1 1/2	6 7/8	15	12	21 1/4	5/8	19 3/4	2 3/8	—	3 7/8
6514-8-B	6	3⑧	3⑦	3/8	1 1/4	2 1/4	7 3/8	15	12	22 1/2	5/8	19 3/4	5 3/16①	1 1/2	6 13/16
6514-9	8	4⑧	4⑦	1/2	1 1/2	2 1/4	9 7/8	15	12	26 1/2	5/8	20 3/4	7 13/16①	1 1/2	8 3/4
6514-10	10	6⑧	6⑦	1/2	1 1/2	2 1/2	12 3/16	15	12	30 1/2	3/4	20 3/4	8 13/16①	1 3/4	9 5/8

Burner designation	Common dimensions in inches for 6514 and 6514- -L										for 6514 only				wt
	Q	R	$R_1$⑥	S	T	U	V	W	X	Y	Z⑤	AA②	BB	CC	DD⑤	lb
6514-6	—	5 3/16	10 3/8	1 1/2	3 5/16	19 1/2	10 3/8	9	3 7/8	4	4 1/16	15	5/8	8 5/16	31 11/16	165
6514-7	—	6 1/16	10 1/8	1 1/2	3 15/16	20 1/2	11 3/8	9	4 11/16	4 1/16	4 7/16	16	5/8	9 1/4	34	215
6514-8-A	—	7 5/16	11 1/4	1 3/4	4 5/16	22 3/4	12 3/8	10	6 1/4	4 15/16	4 15/16	17 3/4	5/8	12 7/8	41 9/16	300
6514-8-B	1 3/16	8 7/16	12 3/8	1 3/4	4 5/16	24	13 1/2	13	8 1/8	6 11/16	5 3/16	19	5/8	12 7/8	48 7/16	410
6514-9	1 5/16	13 3/8	—	3 13/16	6 3/16	28	16	13 1/2	11 5/16	8 7/16	6 3/16	23	5/8	14 11/16	57 3/16	705
6514-10	1 9/16	15 7/16	—	4 3/8	5 15/16	32 1/2	20 1/2	13 7/16†	13 1/16	11 3/16	6 11/16	27 1/2	1/2	16 1/8	63 5/8	990

See back for notes and additional information, including 6514- -L dimensions and weights.

† 6514-10 only is offered with a short (2") tile designated 6514-10-S.

Burner designation	for 6514- -L only AA	BB	CC	DD	wt lb	for 6514 and 6514- -L only Recommended Sensitrol™ oil valve	Recommended pilot tip
6514-6	16	3/4	8 7/16	32 5/16	190	1813-02-C	4021-12
6514-7	17	3/4	9 3/8	34 1/2	245	1813-02-D	4025-0-T
6514-8-A	18 3/4	3/4	13	42 1/16	335	1813-02-D	4025-0-T
6514-8-B	20	3/4	13	48 15/16	455	1813-02-D	4025-0-T
6514-9	24 1/4	13/16	14 7/8	57 11/16	755	1813-01	4025-2-T
6514-10	27 1/2	11/16	16 5/16	64	1020	1813-01	4025-2-T

① Flanged connection--a standard North American square threaded flange is used for sizes -6, -7, -8 main air connections, but SW style inlet may be specified with no change in price. An SW inlet (suitable for slip-on or welded connection) is standard for -9 and -10 burners.

② Opening in furnace shell or outer wall must be 1/2" larger than dimension "AA" to allow for mounting plate fillet and draft.

③ Blank boss--as a no cost special may be specified with a 2" pipe tap for photocell, or a 1 1/2" tap suitable for 5025-3-1T Oil Pilot, in which case North American will drill out 1/2" web of refractory left in tile before shipment, and the burner nose will be positioned so none of its holes are in front of that opening. Available upon request. For -10 size, which has no boss, one half of an appropriately sized coupling is added when specified.

④ 1" fpt for electrode or UV flame detector.

⑤ Pipe nipple and optional (recommended) Sensitrol Oil Valve are not included as part of the burner assembly, and must be ordered separately. Dimensions Z and DD assume a 3/8" close nipple between burner and Sensitrol Oil Valve (6514-6 through -8-B) and a 1/2" close nipple between burner and Sensitrol Valve (6514-9 and -10).

⑥ Applies when optional SW inlet is specified.

⑦ Flanged connection--a standard North American square threaded flange is used.

⑧ Flanged connection--a standard ANSI 125 psi threaded flange is used.

⑨ If Optional tubing purchased from North American.

ANSI or SW flanges: Flat face companion flanges and full face gaskets are supplied with this equipment. Do not use raised face flanges that may damage mating flange.

Ordering Information

To order, specify: 6514-(code)-(A or B if applicable) Burner complete and list 1813 Sensitrol Oil Valve separately.

Example: 6514-8-B Burner complete
1813-02-D Sensitrol Oil Valve

Options:
Add modifier to third term: BO = Burner only (less mounting and tile)
LC = carbon steel tile jacket
L4 = 304 SST tile jacket
L9 = 309 SST tile jacket

6514-8-AL4 Burner complete (with 304 SST tile jacket)
1813-02-D Sensitrol Oil Valve

6514-8-BBO Burner only

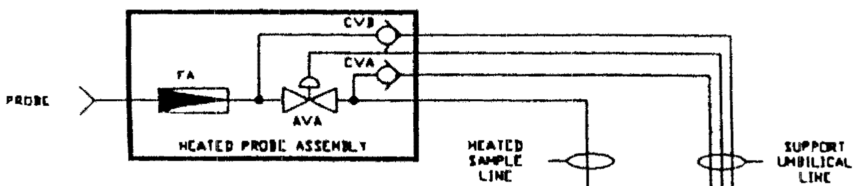
Optional short tile for 6514-10

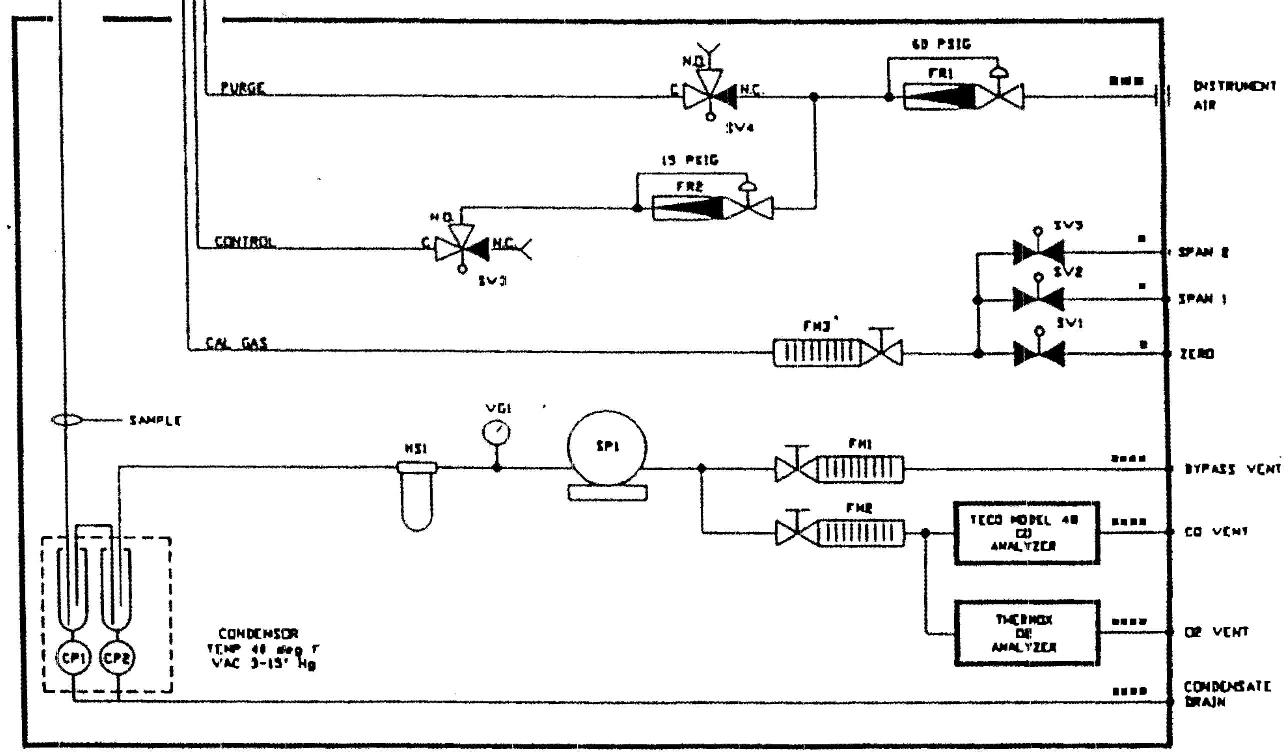
Example: 6514-10-S Burner complete with short tile

WARNING: Situations dangerous to personnel and property can develop from incorrect operation of combustion equipment.
North American urges compliance with National Safety Standards and Insurance Underwriters recommendations, and care in operation.

DRAWING ASC303-03
CEMS FLOW DIAGRAM

Revision 1
April 2012





■	1/4" BRASS BULKHEAD
■■	1/4" SS BULKHEAD
■■■	3/8" BRASS BULKHEAD
■■■■	3/8" SS BULKHEAD

INSTRUMENT AIR REQUIREMENTS

DRY, CLEAN, OIL-FREE AIR
DEWPOINT: -30 DEG. F
PRESSURE: 8 BAR
FLOWRATE: 25,000 l/hr.
PURGE FREQUENCY: 400 l/min FOR 15 SECS. 1 TIME PER HOUR.

CALIBRATION GAS REQUIREMENTS	
ZERO GAS	BALANCE N2
SPAN GAS 1	CO - 80 ppm O2 - 8% BALANCE N2
SPAN GAS 2	CO - 800 ppm BALANCE N2

RANGES	
CO HIGH	0 - 1000 ppm
CO LOW	0 - 100 ppm
O2	0 - 25 %

PARTS BLOCK

REF.	DESCRIPTION	QNTY.
FM2	0-250 L/H FLOWMETER	1
FM1,3	0-500 L/H FLOWMETER	2
FR2	FILTER REGULATOR (SET TO 15 PSI)	1
FR1	FILTER REGULATOR (SET TO 60 PSI)	1
SP1	TEFLON SAMPLE PUMP	1
VG1	VACUUM GUAGE	1
CP1,2	PERISTALIC CONDENSATE PUMP	2
MS1	MOISTURE SENSOR	1
SV4	3/8" BRASS 3-WAY SOLENOID VALVE	1
SV3	1/4" BRASS 3-WAY SOLENOID VALVE	1
SV1,2,3	1/4" BRASS 2-WAY SOLENOID VALVE	3

WESTATES CARBON
2323 MUTAHAR ST.
PARKER, ARIZONA 85344
P.O. NO. 930242
ALTECH SYSTEMS NO. ASC303

NO.	REVISION	APPR.	DATE:	NO.	REVISION	APPR.	DATE:
A	ADDED SV5 AND SPAN GAS 2	D.R.W.	9-19-93				

ALTECH SYSTEMS CORP
11009 CHALLENGER COURT, MOORPARK, CA 93021

SAMPLE FLOW DIAGRAM

PROJECT	WESTATES/ARIZONA		SCALE: NONE	SHEET: 1
DWN.	D.R.WHITE	DATE: 9/6/93	ASC303-03	
CKD.		DATE:		
APPRD.		DATE:		

AMETEK O_2 ANALYZER SPECIFICATIONS

Revision 1
April 2012

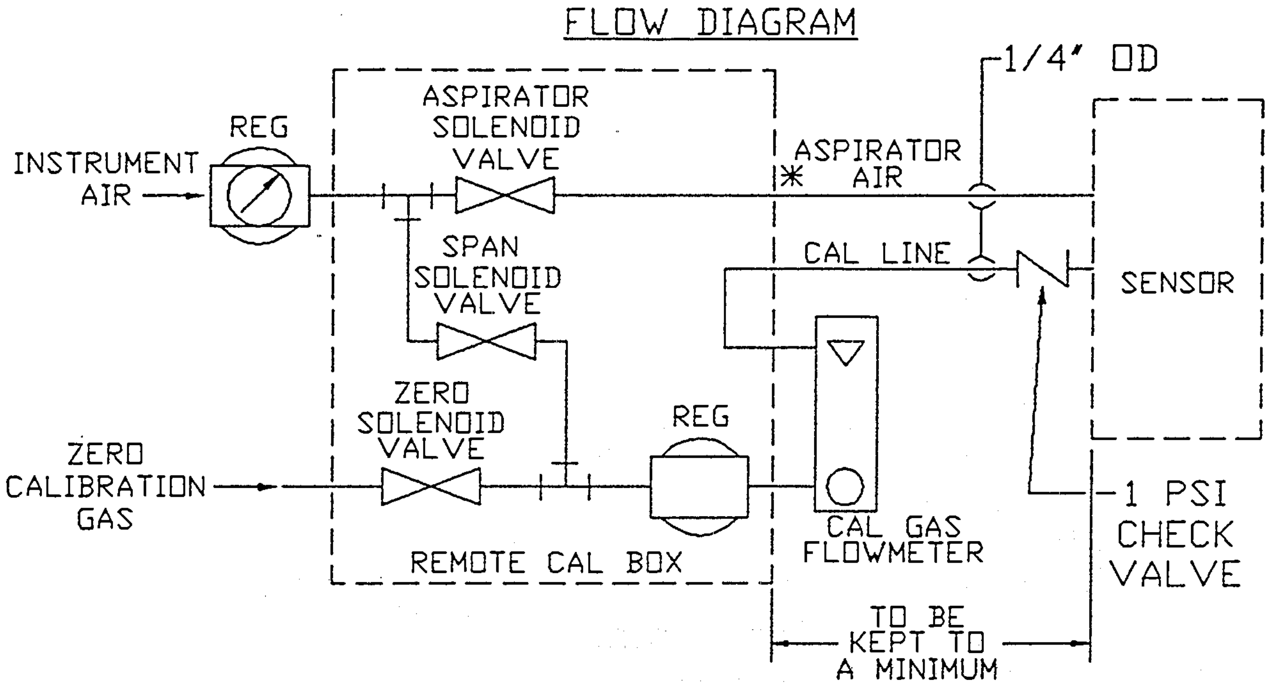
Stack Gas User's Manual

Rev. B

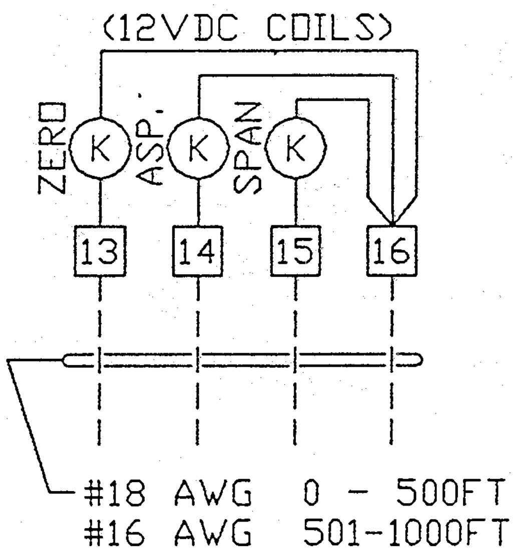
August, 1993

AMETEK

Process and Analytical Instruments Division
150 Freeport Road
Pittsburgh, PA 15238
Phone (412) 828-9040
Fax (412) 826-0399



* WDG IV - TO ASPIRATOR AIR REGULATOR ON SENSOR
WDG HP - NOT NEEDED, THIS OUTLET IS PLUGGED
STACK GAS - ASPIRATOR IS OPTIONAL



WIRING

FIGURE 2

VII. SPECIFICATIONS

OXYGEN ANALYZER

PRINCIPLE OF OPERATION	Zirconium oxide electrochemical cell.
ACCURACY	±2 percent of measured value
REPEATABILITY	±0.2 percent of measured value.
DRIFT	Less than 0.1% of cell output per month.
RESPONSE	90 percent of step change in less than five seconds.
ASPIRATOR AIR REQUIREMENTS (When supplied)	10 to 20 scfh (4.72 to 9.4 L/min.) to 100 PSI (.05 to 7.04 kg/cm2) aspirator air regulator.
MAX. SAMPLE TEMPERATURE	400°F (200°C).
SAMPLE PRESSURE	2 to 20 inches WC.
AMBIENT TEMPERATURE	5 to 160°F (-20 To 71°C).
POWER REQUIREMENTS	115 VAC, 50/60 Hz (230 VAC optional) 450 VA max.

THERMOX O_2 ANALYZER SPECIFICATIONS

Revision 1
April 2012

Thermox® CEM/O2 Oxygen Analyzer

User Manual

REGISTERED ISO 9001 MANAGEMENT SYSTEM

P/N 90275VE REV. P

AMETEK

Thermox
150 Freeport Road
Pittsburgh, PA 15238

SPECIFICATIONS

Control Unit

Display:

4-line x 20-character vacuum fluorescent. Displays combinations of oxygen, time and date, cell temperature, user programmable text, thermocouple mV or cell mV. Password protection, programmable pressure compensation and context-sensitive help are also provided.

Analog Output:

Two isolated linear current outputs. Select O2, cell temperature, thermocouple mV or cell mV. Each output can be 4-20 mA, 0-20 mA, 20-4 mA or 20-0 mA and is fully scalable. Hold or track during calibration and select degree of damping. Maximum load 1200 ohms.

Alarms:

Two independent oxygen alarms, each high or low selectable. One alarm can be assigned as oxygen, calibrate or verify. Set relays to energize or de-energize on alarm. Contact rating max 30VA, 30V max. non-inductive load.

Contact Rating:

1A, 30V max. noninductive load, AC or DC

Diagnostics:

Watchdog timer and service alarms. System test for A/D, RAM, EEPROM and keypad. Display line 4 reserved for full text error and diagnostic messages. Twenty entry event log for automatically detected system events.

Communications:

RS-485, 2-way addressable

Environment:

Ambient Temp: 14 – 122°F (-10 – 50°C)
Max. Altitude: 2000 meters
Relative Humidity: 0% to 80%, non-condensing
IEC Installation (Overvoltage) Category: II
IEC Pollution Degree 2

Enclosure:

Standard GP (General Purpose) 19" rack mount. Optional GP panel or wall mount, weatherproof NEMA 4 (IP56) and NEMA 4X (IP56) enclosures available. All are UL Listed for NEC Class I, Division 2 areas.

Calibration:

Store last calibration and verification data. Selectable calibration gas run time and process recovery time. Timed automatic calibration with optional remote calibration unit. Oxygen cell lifetime extender. Single gas verification that analyzer is within calibration limits.

Power Requirements:

Nominal 115-230 VAC, ± 10%, 47-63 Hz. max., 75 VA max.

Sensor

Operating Range:

0.1 to 100% O_2

Accuracy:

± 0.75% of reading or 0.05% O_2, whichever is greater.

Response Time:

Less than 4 seconds at 2 scfh from 2% O_2 to 20% O_2

Drift:

< 0.1% of cell output per month (< 0.005% O_2 per month with 2% O_2 applied)

Maximum Inlet Temperature:

400°F (204°C)

Sample Pressure:

± 2 psig max. (0.14 kg/cm^2)

Sample Flow:

2 to 20 scfh (0.94 to 9.4 L/min.)

Environment:

Ambient Temp: -0 to 122°F (-18 to 50°C)
Relative Humidity: 10% to 90%, non-condensing
Max. Altitude: 2000 meters
IEC Installation (Overvoltage) Category: II
IEC Pollution Degree 2

Power Requirements:

115 VAC, ±10%, 47-63 Hz.; 230 VAC, ±10%, 47-63 Hz; 1670 VA max.

Calibration Gas Requirements:

Use calibration gases @ 2 to 20 scfh (0.94 to 9.4 L/min.)
Zero Gas: From 0.1 to 10% O_2, balance N_2
Span Gas: Minimum one decade above zero gas (10 times greater)

System Compliance:

EMC Directive 89/336/EEC
Low Voltage Directive 73-23/EEC

Notes: 1. All static performance characteristics are with operating variables constant. 2. System accuracy reference to 0.1 to 10% calibrated range.

Remote Calibration Unit (RCU)

O_2 Only RCU

Enclosure:

UL Type 4X (NEMA 4X [IP56])

Environment:

AmbientTemp.: -18°C to 70°C (32°F to 150°F)
Humidity: 0 to 90%, non-condensing
Max Altitude: 2000 Meters

IEC Installation (Overvoltage) Category: II
IEC Pollution Degree 2

EMC Compliance: 89/336/EEC
Safety Compliance: 73/23/EEC

SIEMENS ULTRAMAT 23 CO ANALYZER SPECIFICATIONS

Revision 1
April 2012

SIEMENS

ULTRAMAT 23

Gas Analyzers for IR-absorbing Gases and Oxygen

7MB2335, 7MB2337, 7MB2338

Operating Instructions 02/01

ULTRAMAT 23 gas analyzer, benchtop unit

ULTRAMAT 23 gas analyzer, 19” rack

3.5.2 Internal Gas Paths, Gas Flow Diagrams, Basic Layout

Basic design

- Gas inlets/outlets:
  - Pipe with 6 mm outside diameter or
  - Pipe with ¼" outside diameter
- Internal gas paths:
  - Viton tube
- Flowmeter
- Pressure switch

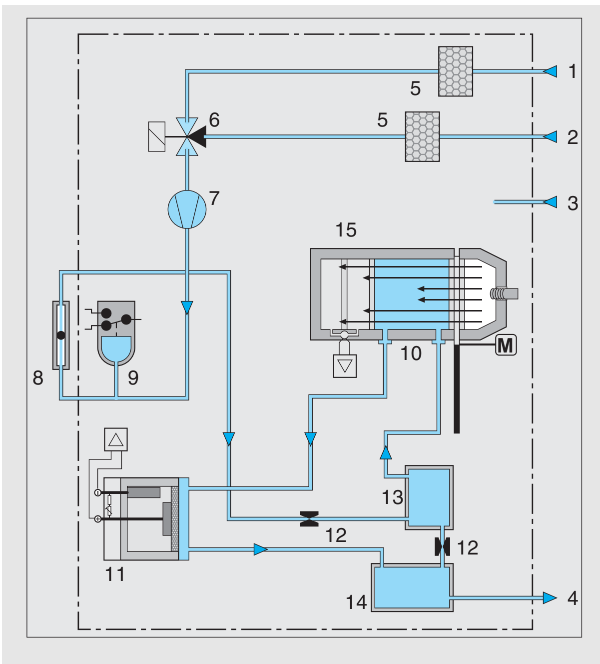


Fig. 3.7 ULTRAMAT 23, 19" unit,
e.g. one IR component with oxygen measurement,
with internal sample gas pump and safety filter

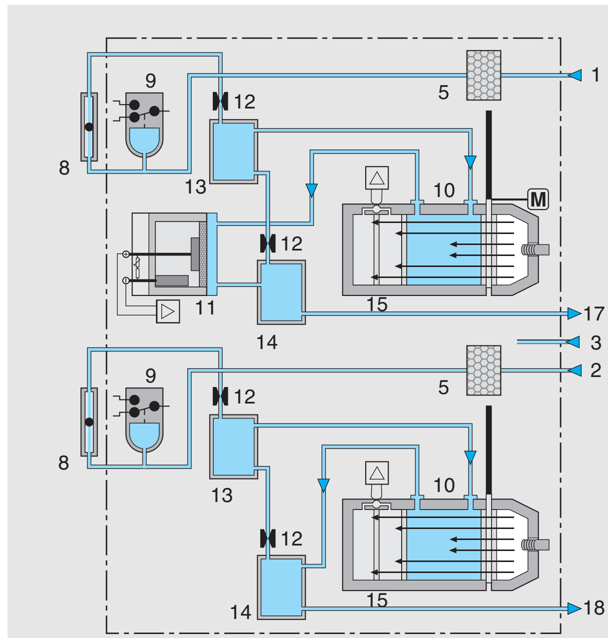


Fig. 3.8 ULTRAMAT 23, 19" unit, two channels with separate gas paths,
e.g. two IR components with oxygen measurement, without
sample gas pump, with internal safety filter

Key to Figures 7 to 11

1 Inlet for sample gas / calibration gas
2 Inlet for AUTOCAL / zero gas
or
inlet for sample gas / calibration gas (channel 2)
3 Enclosure purge inlet / chopper purge
4 Gas outlet
5 Membrane safety filter
6 Solenoid valve [1])
7 Sample gas pump [1])
8 Flowmeter
9 Pressure switch
10 Sample cell (see Fig. 3.3)
11 Oxygen measuring cell[1]) (see Fig. 3.4)
12 Restrictor
13 Condensation trap
14 Condensation trap
15 Infrared measuring cell
16 Condensation trap with filter
17 Gas outlet
18 Gas outlet (channel 2)

[1]) Depending on design, see Ordering data, pages 17 to 22

3.1 Application

The **ULTRAMAT 23** gas analyzer can measure up to 4 gas components at once: A maximum of three infrared sensitive gases such as CO, CO_2, NO, SO_2, CH_4, R22 (Freon $CHClF_2$) plus O_2 with an electrochemical oxygen measuring cell.

ULTRAMAT 23 basic versions for:
- 1 infrared gas component with/without oxygen measurement
- 2 infrared gas components with/without oxygen measurement
- 3 infrared gas components with/without oxygen measurement

Specific applications:
The **ULTRAMAT 23** with 2 IR components without pump and with or without oxygen measurement is also available with two separate gas paths. This allows the measurement of two measuring points as used e.g. for the NO_x measurement before and after the NO_x converter.

The **ULTRAMAT 23** gas analyzer can be used in emission measuring systems and for process and safety monitoring.

TÜV-approved versions of the **ULTRAMAT 23** are available for measurement of CO, NO, SO_2 and O_2 according to 13. BImSchV and TA Luft.

Smallest TÜV-approved and permitted measuring ranges:

- 1- and 2-component analyzer
  - CO: 0 to 150 mg/m^3
  - NO: 0 to 250 mg/m^3
  - SO_2: 0 to 400 mg/m^3
- 3-Komponenten-Analysator
  - CO: 0 to 250 mg/m^3
  - NO: 0 to 400 mg/m^3
  - SO_2: 0 to 400 mg/m^3

All larger measuring ranges are also permitted.

For use in non-potentially explosive atmospheres.

Application examples

- Optimization of small firing systems
- Monitoring of exhaust gas concentration from firing systems with all types of fuel (oil, gas and coal) as well as operational measurements with thermal incineration plants
- Room air monitoring
- Monitoring of air in fruit stores, greenhouses, fermenting cellars and warehouses
- Monitoring of process control functions
- Atmosphere monitoring during heat treatment of steel.

Special characteristics

- Stable 19" sheet-steel enclosure for mounting in hinged bay or on slide rails.
  Option: bench-top version with handles as well as condensation trap and coarse filter
- Operation based on NAMUR recommendation
- Simple, fast programming and commissioning of analyzer
- Practically maintenance-free as a result of AUTOCAL with ambient air (or with N_2 for analyzers without oxygen sensor); both the zero and the span are calibrated in the process
- Calibration with calibration gas is only necessary every six to 12 months, depending on application
- Large, backlit LCD for measured values; menu-based inputs for programming, test functions and calibration
- Two measuring ranges can be set per component within defined limits;
  all measuring ranges linearized;
  autoranging with range identification
- Automatic correction of variations in atmospheric pressure
- Gas flow monitoring;
  Low-flow alarm at < 1 l/min
- Maintenance request alert
- Two limits can be freely configured for each component, for upward or downward violation
- Three binary inputs for sample gas pump on/off, triggering of AUTOCAL and synchronization of several devices
- Eight relay outputs can be freely configured for fault, maintenance request, maintenance switch, limits, range identification, external solenoid valves
- Four electrically isolated analog outputs;
  RS 485 present in basic device;
  option: converter to RS 232
- Incorporation in networks via PROFIBUS-DP/-PA interface
- SIPROM GA software as service and maintenance tool
- Eight additional relay outputs as an option
- Eight additional binary outputs as an option.

TECO MODEL 48C CO ANALYZER SPECIFICATIONS

Revision 1
April 2012

MODEL 48C

GAS FILTER CORRELATION CO ANALYZER

INSTRUCTION MANUAL
P/N 42P255

CE

THERMO ELECTRON CORPORATION
ENVIRONMENTAL INSTRUMENTS
27 FORGE PARKWAY FRANKLIN MASSACHUSETTS 02038

(866) 282-0430 Toll Free
(508) 520-0430 International
(508) 520-1460 Fax

www.thermo.com/eid

3Mar2004

The 220V option complies with 89/336/EEC directive for electromagnetic compatibility.

The CO gas filter acts to produce a reference beam which cannot be further attenuated by CO in the sample cell. The N_2 side of the filter wheel is transparent to the infrared radiation and therefore produces a measure beam which can be absorbed by CO in the cell. The chopped detector signal is modulated by the alternation between the two gas filters with an amplitude related to the concentration of CO in the sample cell. Other gases do not cause modulation of the detector signal since they absorb the reference and measure beams equally. Thus the GFC system responds specifically to CO.

The Model 48C outputs the CO concentration to the front panel display and the analog outputs.

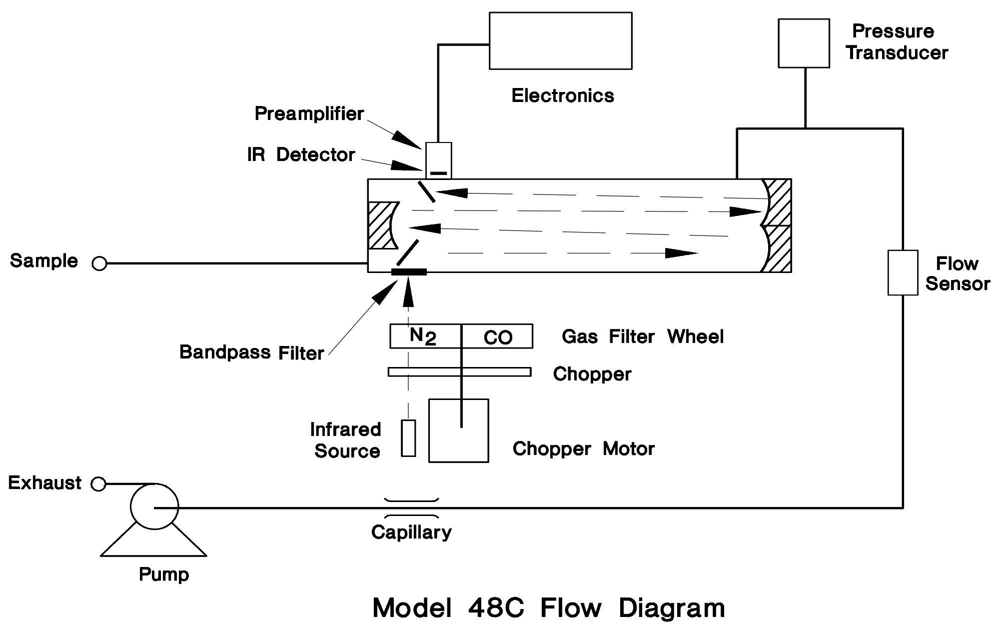


Figure 1-1. Model 48C Flow Schematic B42P809

SPECIFICATIONS

Preset ranges	0-1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000, 10000 ppm 0-1, 2, 5, 10, 20, 50, 100, 200, 500, 1000, 2000, 5000, 10000 mg/m^3
Custom ranges	0-1 to 10000 ppm 0-1 to 10000 mg/m^3
Zero noise	0.02 ppm RMS (30 second time setting)
Lower detectable limit	0.04 ppm
Zero drift (24 hour)	< 0.1 ppm
Span drift (24 hour)	±1% fullscale
Response time	60 seconds (30 second time setting)
Precision	± 0.1 ppm
Linearity	± 1% fullscale ≤ 1000 ppm ± 2.5% fullscale > 1000 ppm
Sample flow rate	0.5-2 liters/min
Operating temperature	20 - 30°C (may be safely operated over the range of 0 - 45°C)*
Power requirements	105-125 VAC, 60 Hz 220-240 VAC, 50 Hz 100 Watts
Physical dimensions	16.75" (W) X 8.62" (H) X 23" (D)
Weight	45 lbs.
Outputs	CO selectable voltage 4-20 mA, RS-232, RS-485

* In non-condensing environments

APPENDIX XI

RISK ASSESSMENT REPORT

FOR

SIEMENS INDUSTRY, INC.

PARKER REACTIVATION FACILITY

PARKER, ARIZONA

Revision 1
April 2012

Table of Contents

Summary of Documents

The risk assessment was performed according to a USEPA-approved Risk Assessment Workplan developed in 2003, updated by agreement with the USEPA to include elements of more recent 2005 USEPA guidance for risk assessments of waste combustion facilities. The USEPA approvals were received prior to the initiation of this study which included evaluations of potential human health and ecological risks associated with both furnace stack air emissions and fugitive air emissions from spent carbon unloading. At USEPA's request, the assessment also included evaluations of potential risks associated with exposure to the facility's effluent discharge to the Colorado River Sewage System Joint Venture (CRSSJV) publicly owned sewage treatment plant and with exposure to airborne chemicals in the workplace at the facility. The risk assessment for this project is presented in two documents. The first document is the *Draft Risk Assessment for the Siemens Water Technologies Corp. Carbon Reactivation Facility in Parker, Arizona* which was submitted to USEPA on July 30, 2007. The second document is the *Response To USEPA Region IX Comments on the Draft Siemens Water Technologies Corp. Carbon Regeneration Facility Risk Assessment* which was submitted to USEPA on March 13, 2008, to respond to comments on the draft risk assessment that were received from the Agency in late 2007.

In conclusion, the risk assessment demonstrates that, using conservative assumptions:

- the potential risks associated with air emissions from the Siemens Water Technologies Corp. carbon reactivation furnace and from spent carbon unloading are below regulatory and other target risk levels for both human health and ecological receptors;

- the incremental contribution of the facility effluent on the CRSSJV wastewater treatment plant discharge and the Main Drain does not pose unacceptable risks to either aquatic life or human health; and

- modeled on-site air concentrations due to fugitive emissions during spent carbon unloading at the facility, and measured worker breathing zone concentrations, do not exceed occupational exposure limits.

EXECUTIVE SUMMARY

SIEMENS WATER TECHNOLOGIES CORP.
CARBON REGENERATION FACILITY RISK ASSESSMENT
PARKER, ARIZONA

Prepared by:
CPF Associates, Inc.
7708 Takoma Avenue
Takoma Park, MD

Prepared for:
Siemens Water Technologies Corp.
2523 Mutahar Street
Parker, Arizona

March 13, 2008

EXECUTIVE SUMMARY
RISK ASSESSMENT FOR THE SIEMENS WATER TECHNOLOGIES CORP. CARBON REACTIVATION FACILITY IN PARKER, ARIZONA

The Siemens Water Technologies Corp. facility (SWT facility) is a carbon reactivation plant located within the 269,000 acre Colorado River Indian Tribes (CRIT) Reservation just outside of the Town of Parker in La Paz County, Arizona. The facility is located in an industrial park established by CRIT on Tribal land and is operated pursuant to a lease between the company and CRIT. The facility reactivates spent carbon which has been previously used to remove pollutants from water and air. The spent carbon is reactivated by heating it to very high temperatures under controlled conditions in a carbon reactivation furnace. The newly reactivated carbon is then reused as an activated carbon product.

A human health and ecological risk assessment of the facility was conducted as part of the facility's permitting activities for the carbon reactivation furnace under the Resource Conservation and Recovery Act permitting regulations at 40 CFR §270.10. A risk assessment is a scientific study that is used to help evaluate risks associated with exposure to chemicals in the environment. This risk assessment represents one of the final steps in a process that has extended over a seven year period beginning with the U.S. Environmental Protection Agency's (USEPA's) request to develop a Risk Assessment Workplan. The risk assessment was conducted by a team of scientists and engineers from independent consulting firms with expertise in risk assessment, toxicology, environmental engineering and air dispersion modeling.

This risk assessment was performed according to a USEPA-approved Risk Assessment Workplan ("Workplan") developed in 2003, updated by agreement with the USEPA to include elements of more recent 2005 USEPA guidance for risk assessments of waste combustion facilities. The USEPA approvals were received prior to the initiation of this study which included evaluations of potential human health and ecological risks associated with both furnace stack air emissions and fugitive air emissions from spent carbon unloading. At USEPA's request, the assessment also included evaluations of potential risks associated with exposure to the facility's effluent discharge to the Colorado River Sewage System Joint Venture (CRSSJV) publicly owned sewage treatment plant and with exposure to airborne chemicals in the workplace at the facility.

The risk assessment for this project is presented in two documents. The first document is the *Draft Risk Assessment for the Siemens Water Technologies Corp. Carbon Reactivation Facility in Parker, Arizona* which was submitted to USEPA on July 30, 2007. The second document is the *Response To USEPA Region IX Comments on the Draft Siemens Water Technologies Corp. Carbon Regeneration Facility Risk Assessment* which was submitted to USEPA on March 13, 2008, to respond to comments on the draft risk assessment that were received from the Agency in late 2007.

The risk assessment used a large amount of site-specific data, including but not limited to:

- comprehensive testing of emissions from the furnace stack, with analysis for site-specific chemicals of potential concern;
- data on spent carbon characteristics, the facility configuration, and facility operations;
- local land use and demographic information;
- water resources data available from the U.S. Geological Survey and the U.S. Bureau of Reclamation; and
- meteorological data from Parker, Arizona.

In the absence of site-specific information, health-protective default values recommended by the USEPA were used. Chemical-specific toxicological data and chemical properties for the compounds selected for evaluation were obtained from the USEPA or from other public health agencies, organizations or databases primarily recommended by the USEPA. In addition, many mathematical models developed by the USEPA and presented in the Agency's guidance documents were applied to perform the risk assessment calculations. Overall, the models and input data used in the risk assessment are expected to provide conservative (i.e., health protective) estimates of potential risks.

Potential risks from stack emissions into the air were evaluated for over 170 compounds selected for detailed assessment based on a comprehensive performance demonstration test (PDT) approved in advance by the USEPA and conducted at the facility by an independent testing firm. The PDT involved several days of stack gas sampling and sophisticated chemical analysis. The list of chemicals selected for evaluation included compounds that were detected in stack emissions and also over 80 compounds that were not detected but were included in the calculations as a conservative measure to ensure that risks would not be underestimated. Stack emission rates for the selected compounds were calculated based on either PDT results, proposed permit limits or, for a few chemicals, long-term average chemical feed rates and a conservative value for the furnace's destruction and removal efficiency. Potential risks from fugitive air emissions were evaluated for 23 compounds selected for evaluation based on their concentrations in spent carbon, the number of deliveries and amounts delivered to the facility, chemical toxicity, and volatility. Air dispersion and deposition modeling was conducted using a model developed and approved by the USEPA to allow calculation of chemical concentrations in air and deposition rates onto the earth's surface within a 154 square mile study area surrounding the facility. The mathematical equations used to calculate the fate and transport of each chemical in the environment, environmental concentrations for each chemical, and human exposures and risks, were based on current USEPA guidance and solved using the Industrial Risk Assessment Program software.

Human Health Risk Assessment

The stack emissions human health risk assessment calculated exposures for several different types of individuals who could hypothetically be exposed to emissions from the plant: adult and child residents, adult and child farmers, adults and children assumed to eat fish caught from the Colorado River or the Main Drain, and a nursing infant. In risk assessment terminology, these groups of individuals are known as "receptors". Each adult or child receptor was assumed to be exposed through a variety of pathways (e.g., the adult farmer receptor was assumed to be exposed via inhalation, soil ingestion, homegrown produce ingestion, and ingestion of home-raised or locally-raised beef, pork, poultry, and eggs). Each adult receptor was also conservatively assumed to be the mother of a breast-fed infant with the potential for transmission of chemicals from the mother through nursing. The fugitive emissions human health risk assessment evaluated inhalation exposures for adult and child residents, and adult and child farmers.

A variety of risk evaluations were performed in the human health risk assessment, as summarized below:

- Chronic long-term excess lifetime cancer risks from stack emissions were lower than USEPA's combustion risk assessment target level of $1x10^{-5}$ (one in 100,000) over a 70-year lifetime when all compounds were included. The excess lifetime cancer risks were reduced to 30 or more times lower than the target risk level when just one compound (that was not detected in the stack gases and has not been received at the facility in spent carbon) was removed from the analysis. Excess lifetime cancer risks due to inhalation of fugitive emissions were at least 200 times below the USEPA target risk level. When excess lifetime cancer risks from both stack and fugitive emissions are considered together, the cancer risk estimate remains below the USEPA target risk level.

- An analysis of chronic long-term non-cancer effects from exposure to stack and fugitive emissions showed that adverse chronic non-cancer effects would not occur. Calculated exposures were at least five times lower for stack emissions, and 250 times lower for fugitive emissions, than the conservative non-cancer target level of 0.25 used by USEPA for combustion sources.

- An analysis of short-term acute inhalation exposures showed that adverse acute effects would not occur at assessed residential locations and also at maximum impact points beyond the facility boundary as a result of both stack and fugitive emissions.

- The calculated air and soil concentrations for residential receptors were determined to be below conservatively-derived preliminary remediation goals that have been developed by USEPA Region 9.

Ecological Risk Assessment

An ecological risk assessment was also conducted to evaluate potential effects of stack emissions on selected representative ecological receptors within the facility area. The ecological analysis evaluated potential impacts to wildlife that was considered to be at greatest risk based on habitat use, exposure potential, ecological significance, and population status. The habitat types that were considered consisted of creosote bush scrub, agricultural areas, riparian corridors and backwaters, the Colorado River, and the Main Drain. The species selected for evaluation consisted of aquatic life, plants, the badger, Gambel's quail, the great horned owl, the burrowing owl, the southwestern willow flycatcher, the double-crested cormorant, the Yuma clapper rail and mule deer. Potential risks were evaluated by comparing calculated concentrations or exposures to toxicity reference values (TRVs) derived to be protective of these receptor groups. The TRVs were obtained from a variety of sources, including the USEPA, the State of Arizona, ecological databases and the published literature.

The calculated environmental concentrations and exposures to animals and birds were not only below the TRVs but also below the conservative ecological target risk level specified by USEPA Region 9 for this project (i.e., a hazard index value of 0.25). These site-specific results indicate that adverse ecological effects from exposure to stack emissions are not expected to occur for the evaluated receptors. Concentrations in surface water and sediment were found to be more than 800 times lower than the 0.25 target hazard index level. Concentrations in plants ranged from just below the 0.25 target level to more than 400 times lower than the 0.25 target level. Exposures to selected bird species were found to be at least five times lower than the 0.25 target level. Finally, exposures to the evaluated mammal species were determined to be at least 5,000 times below the 0.25 target level.

Wastewater Discharge from the Facility to the Wastewater Treatment Plant

The risk assessment also evaluated the potential incremental impact of the facility's wastewater effluent on chemical concentrations discharged from the publicly owned treatment plant into the Main Drain. The analysis also evaluated potential fish tissue concentrations and associated potential human health fish ingestion risks in the Main Drain downstream of the treatment plant's discharge point. This evaluation focused on 19 compounds selected based on measurements obtained from the facility's effluent discharge.

This evaluation showed that the incremental contribution of the facility's effluent on the treatment plant discharge and the Main Drain does not pose unacceptable risks to either aquatic life or human health. The modeled discharge concentrations were below or equivalent to the most stringent applicable state water quality standards and criteria and the treatment plant's discharge permit limits for all evaluated compounds. Semi-annual toxicity tests performed on the treatment plant's discharge since 2000 have consistently shown no toxicity to aquatic organisms. Additionally, potential risks due to ingestion of fish caught from the Main Drain associated with the incremental contribution of the SWT facility effluent were all below USEPA target risk levels for both cancer and non-cancer effects.

Evaluation of Fugitive Emissions in the Workplace

The risk assessment included an evaluation of workplace air concentrations associated with spent carbon unloading using methods consistent with those adopted by the U.S. Occupational Safety and Health Administration and the National Institute of Occupational Safety and Health. This analysis compared modeled on-site ambient air concentrations for the 23 selected compounds due to fugitive emissions, and measured industrial hygiene worker breathing zone concentrations, to workplace permissible exposure limits. The workplace evaluation indicated that modeled ambient air concentrations due to fugitive emissions during spent carbon unloading, and measured worker breathing zone concentrations, did not exceed occupational exposure limits within the property boundary.

Conclusion

In conclusion, the risk assessment demonstrates that, using conservative assumptions:

- the potential risks associated with air emissions from the Siemens Water Technologies Corp. carbon reactivation furnace and from spent carbon unloading are below regulatory and other target risk levels for both human health and ecological receptors;

- the incremental contribution of the facility effluent on the CRSSJV wastewater treatment plant discharge and the Main Drain does not pose unacceptable risks to either aquatic life or human health; and

- modeled on-site air concentrations due to fugitive emissions during spent carbon unloading at the facility, and measured worker breathing zone concentrations, do not exceed occupational exposure limits.

DRAFT
RISK ASSESSMENT FOR THE SIEMENS WATER TECHNOLOGIES CORP. CARBON REACTIVATION FACILITY PARKER, ARIZONA

Prepared by:
CPF Associates, Inc.
7708 Takoma Avenue
Takoma Park, MD

Prepared for:
Siemens Water Technologies Corp.
2523 Mutahar Street
Parker, Arizona

July 30, 2007

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APPENDICES

LIST OF ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
AEGL	Acute exposure guideline level
AIHA	American Industrial Hygiene Council
APC	Air pollution control equipment
AZMET	Arizona Meteorological Network
ATSDR	Agency for Toxic Substances and Disease Registry
CALEPA	California Environmental Protection Agency
CFM	Cubic feet per minute
CRIT	Colorado River Indian Tribes
CRSSJV	Colorado River Sewage System Joint Venture
DRE	Destruction and removal efficiency
E	Exponent in the presentation of numerical results (e.g., 3E-4 = $3x10^{-4}$)
HEAST	USEPA Health Effects Assessment Summary Tables
HHRAP	Human Health Risk Assessment Protocol published in 2005 by USEPA
IH	Industrial hygiene
IRAP	Industrial Risk Assessment Program
IRIS	USEPA Integrated Risk Information System
ISCST3	Industrial Source Complex Short-Term 3 air model
NAAQS	National Ambient Air Quality Standard
NESHAPs	National Emission Standards for Hazardous Air Pollutants
NIOSH	National Institute on Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
NWS	National Weather Service
OSHA	Occupational Safety and Health Administration
PCDDs/PCDFs	Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo furans
PDT	Performance Demonstration Test
PEL	Permissible exposure limit
PM	Particulate matter
PM10	Particulate matter less than 10 microns in diameter
PM2.5	Particulate matter less than 2.5 microns in diameter
POTW	Publicly owned treatment works
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
REL	Acute inhalation reference exposure level
RfC	Inhalation reference concentrations
RfD	Non-cancer reference dose
PRG	Preliminary remediation goals
QA	Quality assurance
SWT	Siemens Water Technologies Corp.
TEF	Toxic equivalency factors
TEQs	Toxic equivalents
2,3,7,8-TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin

LIST OF ABBREVIATIONS (Continued)

2,3,7,8-TCDF	2,3,7,8-Tetrachlorodibenzofuran
TIC	Tentatively identified compound
TOE	Total organic emissions
TWA	Time-weighted-average
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
VOC	Volatile organic compound
WHO	World Health Organization
WQS	Water quality standards

EXECUTIVE SUMMARY

The Siemens Water Technologies Corp. facility (SWT facility) is a carbon reactivation plant located within the 269,000 acre Colorado River Indian Tribes ("CRIT") Reservation just outside of the Town of Parker in La Paz County, Arizona.   The facility is located in an industrial park established by CRIT on Tribal land and is operated pursuant to a lease between the company and CRIT. The facility reactivates spent carbon which has been previously used to remove pollutants from water and air. The spent carbon is reactivated by heating it to very high temperatures under controlled conditions in a carbon reactivation furnace. The newly reactivated carbon product is then reused as an activated carbon product.

A human health and ecological risk assessment of the facility was conducted as part of the facility's permitting activities for the carbon reactivation furnace under the Resource Conservation and Recovery Act permitting regulations at 40 CFR §270.10. A risk assessment is a scientific study that can help evaluate risks associated with exposure to chemicals in the environment. This risk assessment represents one of the final steps in a process that has extended over a seven year period beginning with the U.S. Environmental Protection Agency's (USEPA's) request to develop a Risk Assessment Workplan. The risk assessment was conducted by a team of scientists and engineers from independent consulting firms with expertise in risk assessment, toxicology, environmental engineering and air dispersion modeling.

This risk assessment was performed according to a USEPA-approved Risk Assessment Workplan ("Workplan") developed in 2003, updated by agreement with the USEPA to include elements of more recent 2005 USEPA guidance for risk assessments of waste combustion facilities. The USEPA approvals were received prior to the initiation of this study which included evaluations of potential human health and ecological risks associated with both furnace stack air emissions and fugitive air emissions from spent carbon unloading. The assessment also included evaluations of potential risks associated with exposure to the facility's effluent discharge to the Colorado River Sewage System Joint Venture publicly owned sewage treatment plant and with exposure to airborne chemicals in the workplace at the facility.

The risk assessment used a large amount of site-specific data, including but not limited to:

- comprehensive testing of emissions from the furnace stack, with analysis for site-specific chemicals of potential concern;
- data on spent carbon characteristics, the facility configuration, and facility operations;
- local land use and demographic information;
- water resources data available from the U.S. Geological Survey and the U.S. Bureau of Reclamation; and
- meteorological data from Parker, Arizona.

In the absence of site-specific information, health-protective default values recommended by the USEPA were used. Chemical-specific toxicological data and chemical properties for the compounds selected for evaluation were obtained from the USEPA or from other public health agencies, organizations or databases primarily recommended by the USEPA. In addition, many mathematical models developed by the USEPA and presented in the Agency's guidance documents were applied to perform the risk assessment calculations. Overall, the models and input data used in the risk assessment are expected to provide conservative (i.e., health protective) estimates of potential risks.

Potential risks from stack emissions into the air were evaluated for over 170 compounds selected for detailed assessment based on a comprehensive performance demonstration test (PDT) approved in advance by the USEPA and conducted at the facility by an independent testing firm. The PDT involved several days of stack gas sampling and sophisticated chemical analysis. The list of chemicals selected for evaluation included compounds that were detected in stack emissions and also over 80 compounds that were not detected but were included in the calculations to ensure that risks would not be underestimated. Stack emission rates for the selected compounds were calculated based on either PDT results, proposed permit limits or, for a few chemicals, long-term average chemical feed rates and a conservative value for the furnace's destruction and removal efficiency. Potential risks from fugitive air emissions were evaluated for 21 compounds selected for evaluation based on their concentrations in spent carbon, the number of deliveries and amounts delivered to the facility, chemical toxicity, and volatility. Air dispersion and deposition modeling was conducted using a model developed and approved by the USEPA to allow calculation of chemical concentrations in air and deposition rates onto the earth's surface within a 154 square mile study area surrounding the facility. The mathematical equations used to calculate the fate and transport of each chemical in the environment, environmental concentrations for each chemical, and human exposures and risks, were based on current USEPA guidance and solved using the Industrial Risk Assessment Program software.

Human Health Risk Assessment

The stack emissions human health risk assessment calculated exposures for several different types of individuals who could hypothetically be exposed to emissions from the plant: adult and child residents, adult and child farmers, adults and children assumed to eat fish caught from the Colorado River or the Main Drain, and a nursing infant. In risk assessment terminology, these groups of individuals are known as "receptors". Each adult or child receptor was assumed to be exposed through a variety of pathways (e.g., the adult farmer receptor was assumed to be exposed via inhalation, soil ingestion, homegrown produce ingestion, and ingestion of home-raised or locally-raised beef, pork, poultry, and eggs). Each adult receptor was also conservatively assumed to be the mother of a breast-fed infant with the potential for transmission of chemicals from the mother through nursing. The fugitive emissions human health risk assessment evaluated inhalation exposures for adult and child residents, and adult and child farmers.

A variety of risk evaluations were performed in the human health risk assessment, as summarized below:

- Chronic long-term excess lifetime cancer risks from stack emissions were found to be at least five times lower than the USEPA's combustion risk assessment target level of $1x10^{-5}$ (one in 100,000) over a 70-year lifetime when all compounds were included. The excess lifetime cancer risks were reduced to 50 or more times lower than the target risk level when just one compound (that was not detected in the stack gases and has not been received at the facility in spent carbon) was removed from the analysis. Excess lifetime cancer risks due to inhalation of fugitive emissions were at least 200 times below the USEPA target risk level. The excess lifetime cancer risks would remain below the USEPA target risk level even if stack and fugitive emissions were considered together.

- Chronic long-term non-cancer effects from exposure to stack and fugitive emissions were predicted not to occur with a large margin of safety. Calculated exposures were at least 25 times lower and 250 times lower, respectively, than the conservative non-cancer target level used by USEPA for combustion sources, which is a hazard index value of 0.25.

- An analysis of short-term acute inhalation exposures showed that adverse acute effects would not occur with a large margin of safety at assessed residential locations and also at maximum impact points beyond the facility boundary.

- The calculated air and soil concentrations for residential receptors were determined to be below conservatively-derived preliminary remediation goals that have been developed by USEPA Region 9.

Ecological Risk Assessment

An ecological risk assessment was also conducted to evaluate potential effects of stack emissions on selected representative ecological receptors within the facility area. The ecological analysis evaluated potential impacts to wildlife that was considered to be at greatest risk based on habitat use, exposure potential, ecological significance, and population status. The habitat types that were considered consisted of creosote bush scrub, agricultural areas, riparian corridors and backwaters, the Colorado River, and the Main Drain. The species selected for evaluation consisted of aquatic life, plants, the badger, Gambel's quail, the great horned owl, the burrowing owl, the southwestern willow flycatcher, the double-crested cormorant, the Yuma clapper rail and mule deer. Potential risks were evaluated by comparing calculated concentrations or exposures to toxicity reference values (TRVs) derived to be protective of these receptor groups. The TRVs were obtained from a variety of sources, including the USEPA, the State of Arizona, ecological databases and the published literature.

The calculated environmental concentrations and exposures to animals and birds were not only below the TRVs but also below the conservative ecological target risk level specified by USEPA Region 9 for this project (i.e., a hazard index value of 0.25). These results indicate that adverse ecological effects from exposure to stack emissions are not expected to occur for the evaluated receptors. Concentrations in surface water and sediment were found to be more than 800 times lower than the 0.25 target hazard index level. Concentrations in plants ranged from just below the 0.25 target level to more than 400 times lower than the 0.25 target level. Exposures to selected bird species were found to be at least five times lower than the 0.25 target level. Finally, exposures to the evaluated mammal species were determined to be at least 5,000 times below the 0.25 target level.

Wastewater Discharge from the Facility to the Wastewater Treatment Plant

The risk assessment also evaluated the potential incremental impact of the facility's wastewater effluent on chemical concentrations discharged from the publicly owned treatment plant into the Main Drain. The analysis also evaluated potential fish tissue concentrations and associated potential human health fish ingestion risks in the Main Drain downstream of the treatment plant's discharge point. This evaluation focused on 19 compounds selected based on measurements obtained from the facility's effluent discharge.

This evaluation showed that the incremental contribution of the facility's effluent on the treatment plant discharge and the Main Drain does not pose unacceptable risks to either aquatic life or human health. The modeled discharge concentrations were below or equivalent to the most stringent applicable state water quality standards and criteria and the treatment plant's discharge permit limits for all evaluated compounds. Semi-annual toxicity tests performed on the treatment plant's discharge since 2000 have consistently shown no toxicity to aquatic organisms. Additionally, potential risks due to ingestion of fish caught from the Main Drain associated with the incremental contribution of the SWT facility effluent were all below USEPA target risk levels for both cancer and non-cancer effects.

Worker Evaluation of Fugitive Emissions

The risk assessment included an evaluation of workplace air concentrations associated with spent carbon unloading using methods consistent with those adopted by the U.S. Occupational Safety and Health Administration and the National Institute of Occupational Safety and Health. This analysis compared modeled on-site ambient air concentrations for the 21 selected compounds due to fugitive emissions, to workplace permissible exposure limits. The worker evaluation indicated that ambient air concentrations due to fugitive emissions during spent carbon unloading would not exceed occupational exposure limits within the property boundary. These results were supported by many years of industrial hygiene measurements, which have predominantly shown air concentrations of regulated chemicals to be either below quantitation limits or typically 100 or more times below the occupational standards and criteria.

Conclusion

In conclusion, the risk assessment presented in this document demonstrates that, using conservative assumptions, the potential risks associated with air emissions from the Siemens Water Technologies Corp. carbon reactivation furnace and from spent carbon unloading are below regulatory and other target risk levels for both human health and ecological receptors. Additionally, the incremental contribution of the facility effluent on the wastewater treatment plant discharge and the Main Drain does not pose unacceptable risks to either aquatic life or human health. Finally, fugitive emissions during spent carbon unloading do not exceed occupational exposure limits in ambient air at the facility.

RISK ASSESSMENT

1.0 INTRODUCTION

The Siemens Water Technologies Corp. facility (SWT facility) is a carbon reactivation plant located within the 269,000 acre Colorado River Indian Tribes (CRIT) Reservation in La Paz County, Arizona. The facility, formerly known as Westates Carbon-Arizona, Inc., is located just outside the Town of Parker in an industrial park owned by CRIT and is operated pursuant to a lease between the company and CRIT. The facility reactivates spent carbon, which has been previously used to remove pollutants from water and gases by heating it to very high temperatures under controlled conditions. The newly reactivated carbon product is then reused as an activated carbon product.

Activated carbon is used in treatment equipment to remove impurities from water, air and food. For example, activated carbon is widely used as a component of air pollution control systems (Cooper and Alley 2002). For carbon systems to remain effective, the carbon must be replaced regularly. Once carbon begins to approach its capacity to adsorb or filter impurities, it is recycled. Applications for activated carbon systems include improving the taste and quality of drinking water, treating industrial wastewater, purifying materials used in production processes (including foods and medicines), controlling air emissions, and decontaminating groundwater at environmental cleanup sites.

Spent carbon arrives at the facility in a variety of containers, including barrels, drums, bulk truck units and bulk bags. Spent carbon is accepted from a variety of sources, many of which are Fortune 500 companies as well as state and federal agencies, including the U.S. Environmental Protection Agency (USEPA). On average, as of the date of this study, about two-thirds of the spent carbon received at the facility is not classified as a hazardous waste under the U.S. Resource Conservation and Recovery Act (RCRA). The remaining one-third is classified as a hazardous waste because it has been used to treat materials that are classified as hazardous under RCRA (e.g., air and water at environmental cleanup sites that has been treated with spent carbon).

This document presents a human health and ecological risk assessment for the facility. A risk assessment is a scientific study that can help evaluate risks associated with exposure to chemicals in the environment. This risk assessment was conducted as one component in the facility's RCRA permitting process. It is one of the final steps in a process that has extended over a seven year period beginning with the USEPA's request to develop a Risk Assessment Workplan in 2001.

The risk assessment was conducted by a team of scientists and engineers with expertise in risk assessment, toxicology, environmental engineering and air dispersion modeling. CPF Associates, Inc. began working on this project in 2001, and prepared the Risk Assessment Workplan as well as this risk assessment. CPF is a Washington, D.C.-based scientific and health consulting firm with expertise in performing risk assessments for a variety of different types of waste treatment technologies, including combustion facilities. CPF also provided project management over all contractors and consultants who contributed to the risk assessment. Focus Environmental, Inc. provided the emission rates used in this risk assessment, and engineering expertise related to facility operations. Focus has provided engineering and environmental services to SWT over the duration of this project, including both managing the Performance Demonstration Test at the facility and preparing the recent RCRA Part B permit application. Focus provides environmental engineering and regulatory compliance services, and has extensive expertise in the engineering and testing of combustion facilities. ToxServices, Inc. assisted with the compilation of human health toxicological criteria and performed quality assurance of risk assessment calculations and inputs. ToxServices is a scientific consulting firm with expertise and experience in providing toxicology, regulatory, and risk assessment consulting services to certification and testing laboratories, private industry, and the federal government. Air dispersion and deposition modeling was performed by TRC. TRC provides environmental permitting, engineering, and compliance testing services for energy-related companies as well as a wide range of industrial clients in the U.S. and internationally, and possesses expertise in the development, application and evaluation of air modeling for a wide variety of emission sources. MACTEC assisted in the performance of the ecological risk assessment. MACTEC is a consulting firm that provides engineering, environmental and remedial construction services to public and private clients worldwide, and possesses in-depth expertise in ecological and habitat evaluations and the performance of ecological risk assessments.

Biographies of the study participants are provided in Appendix A. All of the above study participants are independent of Siemens Water Technologies Corp.

1.1 Project History

In 1990 and 1991, the SWT facility (then known as Westates Carbon-Arizona, Inc.) negotiated a lease agreement with CRIT and obtained the necessary permits to locate the facility in an industrial park on the CRIT Reservation. Before construction began, an environmental assessment was completed and a "Finding of No Significant Impact" was approved by the Bureau of Indian Affairs. The facility's RCRA Part A permit application was submitted in August 1991, in accordance with RCRA requirements. The facility has been operating since August 1992 under a variety of regulatory programs, including the Part A interim status regulations at 40 CFR Part 265 and USEPA regulations under the Clean Air Act's Benzene National Emission Standards for Hazardous Air Pollutants (NESHAPs) (Subpart FF of 40 CFR Part 61). The facility is also subject to regulations issued by the Occupational Safety and Health Administration (OSHA).

A RCRA Part B permit application was originally submitted to USEPA in November 1995 that discussed an existing carbon reactivation furnace (RF-1) and a future carbon reactivation furnace (RF-2). In February 2007, an amended Part B application was submitted to USEPA for RF-2, since the older furnace (RF-1) had been shut down (Focus 2007).

To provide a historical context for this project, a chronology of risk assessment actions and other related events leading up to this report is provided below:

- August 2001: USEPA Region 9 requested that SWT prepare a performance demonstration test (PDT) plan and a risk assessment workplan as part of the process for completing its review of the RCRA facility permit application (USEPA 2001a). The review of this permit application is being conducted in accordance with the requirements for a Miscellaneous Unit under Subpart X of 40 CFR Part 264. In its August letter, USEPA identified a variety of requirements for the risk assessment workplan and the human health and ecological risk assessments.[1]

- November 2001: A site visit to the facility and facility area was conducted by CPF.

- January 2002: Meetings were held with SWT, USEPA, CRIT, CPF and Focus.

- January and April 2002: Additional site visits were conducted.

- April 2002: An open house providing information about the SWT facility, the PDT, and the risk assessment process was held in Parker.

- June 2002: The first version of the Working Draft Risk Assessment Workplan ("Workplan") was submitted to USEPA (CPF 2002).

- March 2003: Comments on the Workplan were received from USEPA (USEPA 2003a).

- May 2003: A revised Workplan was submitted to USEPA incorporating USEPA's comments (CPF 2003a).

- September 2003: Additional comments on the Workplan were received from USEPA (USEPA 2003b).

- November 2003: The Workplan was finalized and submitted to USEPA (CPF 2003b).

- November 2003: The Performance Demonstration Test (PDT) Plan for the carbon reactivation furnace was submitted to USEPA (Focus 2003).

- March 2005: USEPA provided conditional approval of the Workplan and the PDT Plan (USEPA 2005a).

- March 2006: The PDT, which included measurement of stack emissions during facility operations, was conducted at the facility by Focus.

- June 2006: The PDT report was submitted to USEPA (Focus 2006).

[1] Risk assessments conducted for combustion sources to date have rarely included a full-scale ecological risk assessment such as that requested by USEPA for this project.

- February 2007: The facility's revised and updated RCRA Part B permit application was submitted to USEPA (Focus 2007).

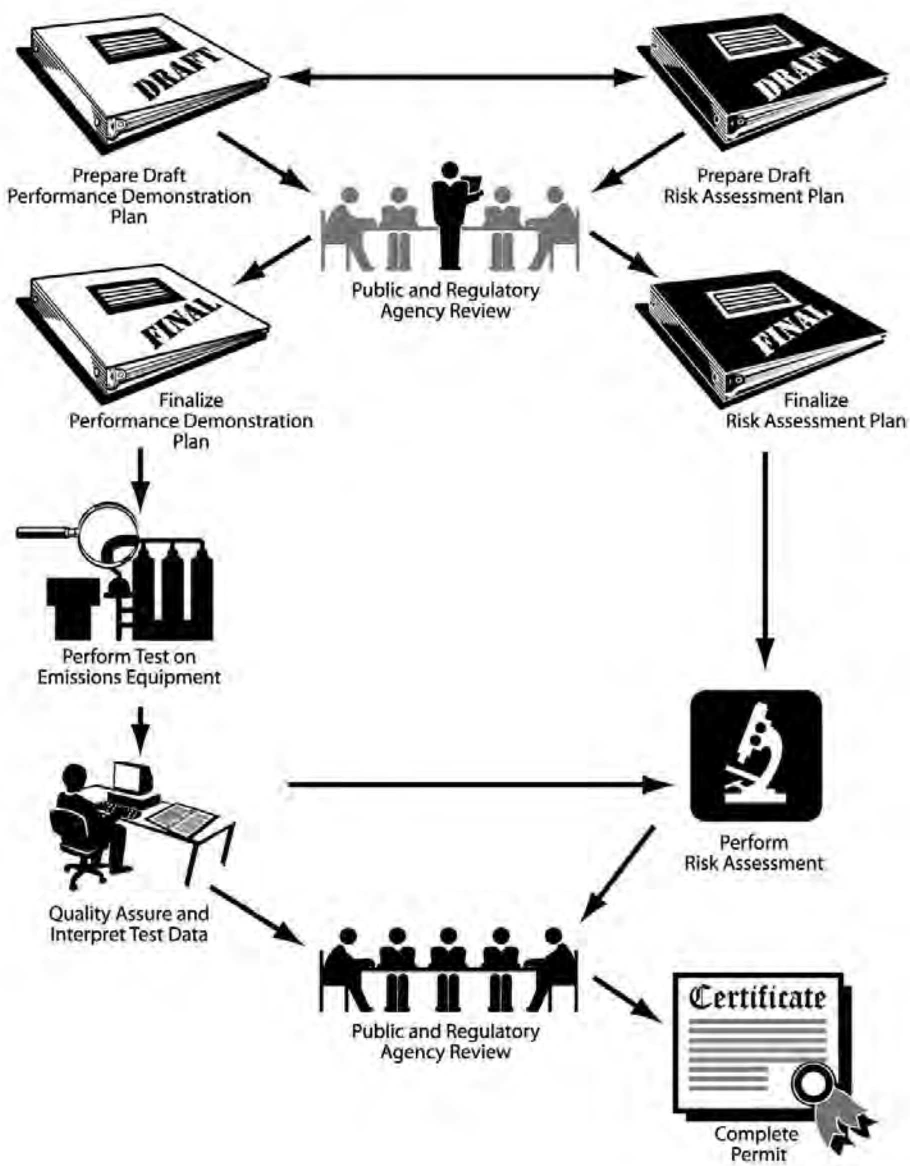
- April 2007: USEPA provided approval to use the PDT air emissions test data in the risk assessment and to perform the risk assessment calculations using the Industrial Risk Assessment Program (IRAP) software (USEPA 2007a).

As suggested in the chronology, the risk assessment and PDT are closely inter-related elements in the RCRA permit process. The relationship between these two activities is shown in Figure 1.

During the preparation of the Workplan, review and input was solicited not only from USEPA Region 9, but also from CRIT and other stakeholders. Many comments were received during this process and were incorporated into the final Workplan. In addition, USEPA conducted public outreach for this project and held consultations with CRIT (USEPA 2005c). For example, in January 2004, USEPA issued a public notice in the Parker Pioneer and mailed a notice to the facility's stakeholder mailing list inviting public comment on the Workplan. As part of this effort, copies of the Workplan were placed in the Parker Public Library and the CRIT Library in Parker (USEPA 2004d).

Figure 1-1

Flow Chart of the Facility RCRA Permit Process for the Performance Demonstration Test and the Risk Assessment



1.2 The Risk Assessment Process

The 2003 Risk Assessment Workplan provided a critical roadmap that was followed during the conduct of this risk assessment. The Workplan described the approaches that would be used to perform the facility risk assessment and it included detailed instructions on a wide variety of risk assessment elements (for example, methods for selecting chemicals for evaluation, performance of air dispersion and deposition modeling, and compilation of toxicological criteria). The Workplan was previously submitted to and approved by USEPA, and can be provided upon request.

In the several years since the Workplan was prepared, there have been some changes to USEPA risk assessment guidance and methods, most notably USEPA's publication in 2005 of a revised Human Health Risk Assessment Protocol (HHRAP) for Hazardous Waste Combustion Facilities. This guidance incorporates many important updates to USEPA's methods, particularly revisions to the fate and transport modeling equations and chemical-specific input parameters. To reflect this newer information, the risk assessment relied to a large extent on the more recent 2005 HHRAP. To facilitate consistency with the 2005 guidance, and as approved in advance by USEPA (2007a), a publicly available software program called IRAP, programmed by Lakes Environmental specifically to reflect USEPA's 2005 HHRAP, was used to perform most of the risk assessment calculations. This software has been widely used in the U.S. (e.g., most USEPA Regions and several states) and among its benefits are reliance on quality-assured programmed calculations, readily available USEPA-specified chemical-specific data, and the ability to address the large number of compounds required to be evaluated in this project. The IRAP program only includes the approaches specifically provided in HHRAP, however, and thus it is limited in its ability to address non-routine risk assessment elements. As a result, while the Workplan provided the primary roadmap for this project, in some cases modifications were made both to reflect HHRAP and to accommodate the capabilities of the IRAP program. This approach was approved for this project in advance by USEPA (2007a).

The Workplan also described a process for requesting site-specific information from CRIT for consideration in the risk assessment. SWT followed this procedure as required. Where information was not received or not available, this project relied on site-specific information available at the time the risk assessment was performed (e.g., information from published reports, publicly accessible information on the internet, contacts with local officials and site visits).

Overall, this risk assessment analyzed specific sets of assumptions that are, collectively, expected to overestimate potential risks. The risk assessment, therefore, calculates the potential for risks to occur under specific assumptions and does not calculate actual human health or ecological impacts.

1.3 Report Organization

The remainder of this document presents the risk assessment of the facility. The following topics are covered:

- A brief introduction to the facility area
- An overview of the risk assessment process
- Presentation of the human health risk assessment
- Presentation of the ecological risk assessment
- A brief summary of quality assurance procedures
- A listing of references cited in this document
- Appendices with supporting information

2.0 FACILITY AND AREA DESCRIPTION

The Workplan provided a detailed discussion of both the facility vicinity and facility operations. Additionally, the RCRA Part B permit application (Focus 2007) provides a comprehensive discussion of the facility including, for example, equipment and operations, and health and safety procedures. Rather than repeat this information here, the reader is referred to the Workplan and the RCRA Part B application which can be provided upon request. For general reference, a few of the figures from the Workplan are shown below, specifically Figure 2-1 which shows the facility location, Figure 2-2 which presents a map of the CRIT Reservation, Figure 2-3 which presents photographs of the facility area and surrounding landscape, Figure 2-4 which is an aerial photograph of the facility, and Figure 2-5 which illustrates a habitat map for the facility area.

Figure 2-1
Facility Location

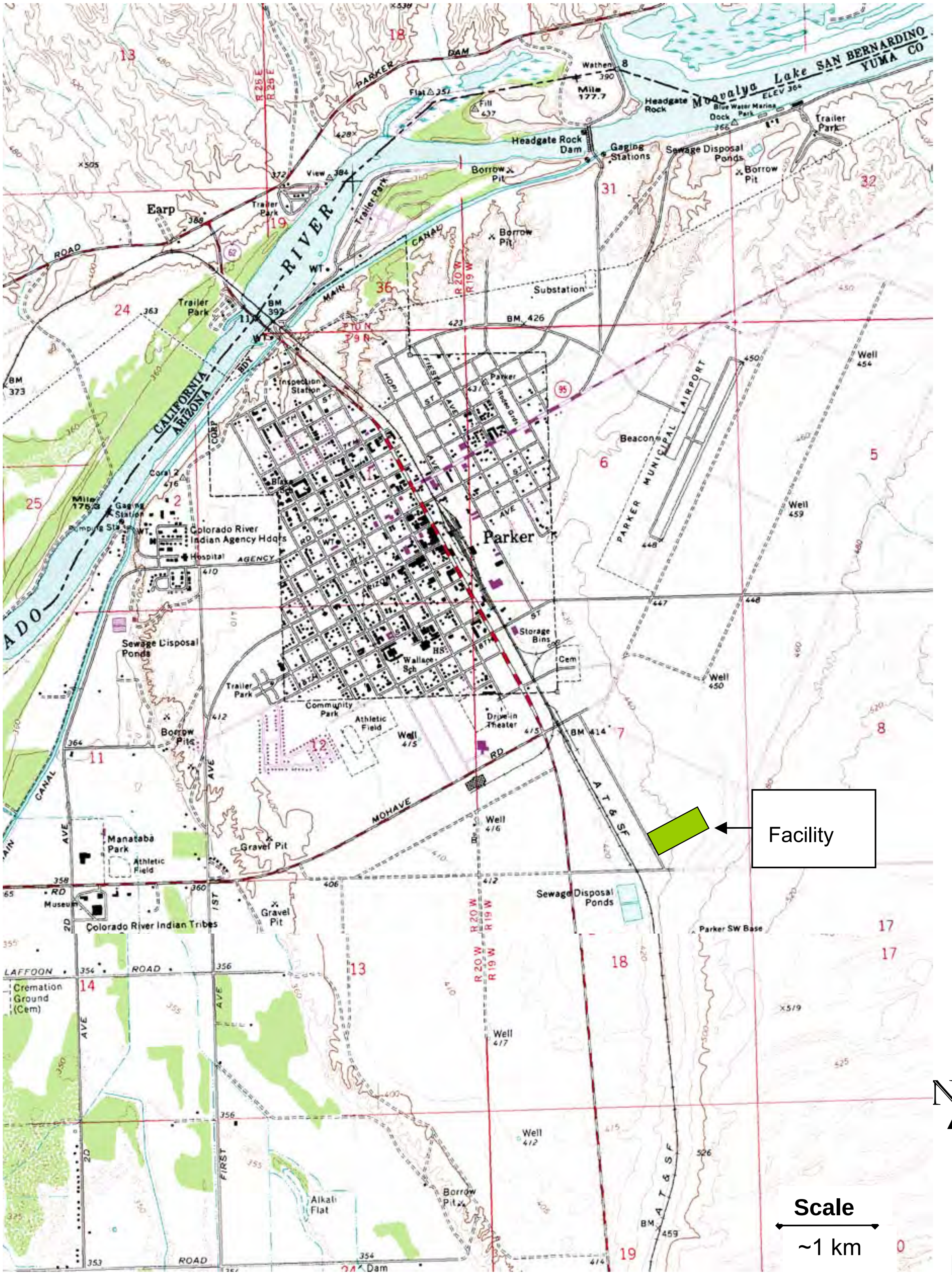


Figure 2-2

Colorado River Indian Tribes Reservation Map

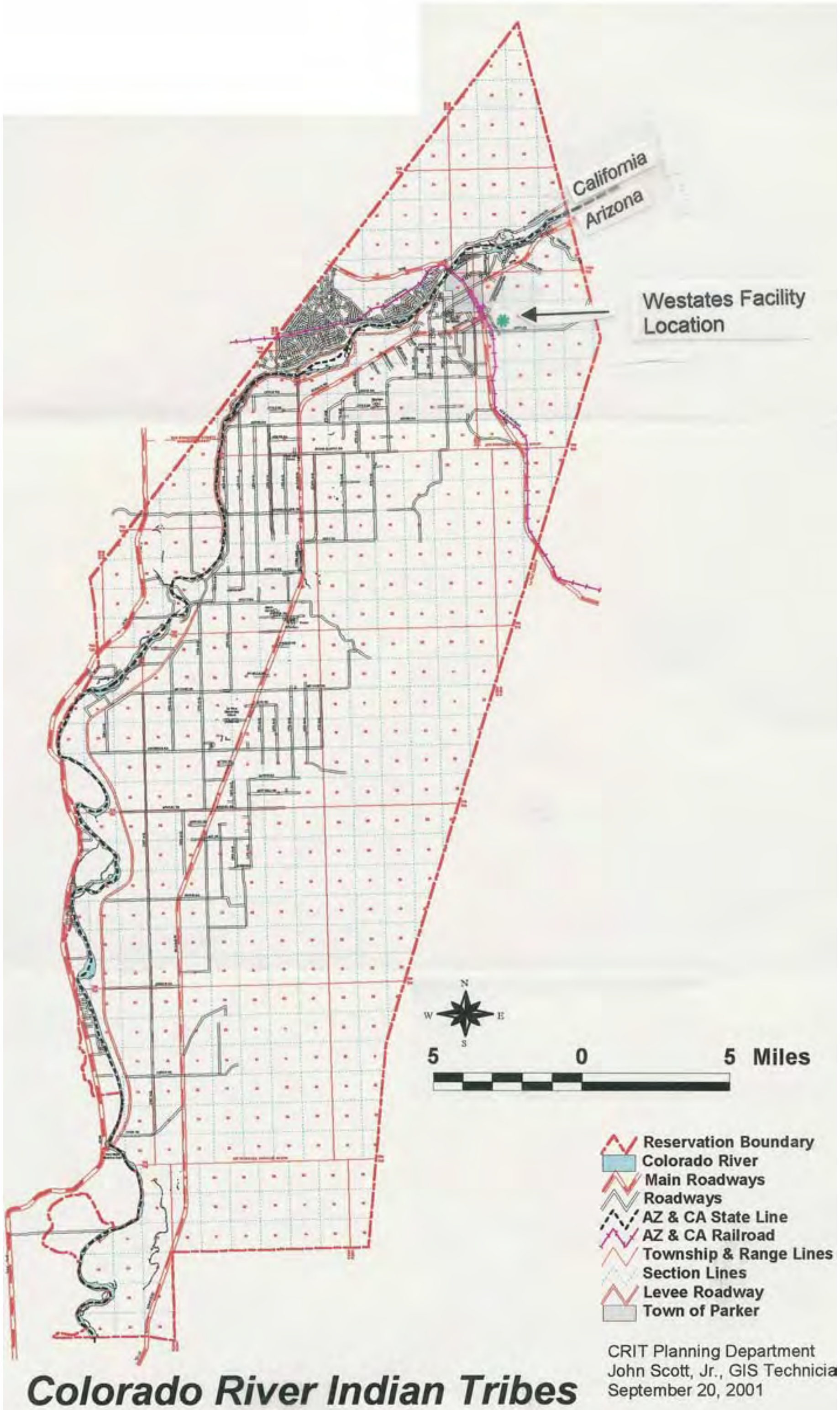
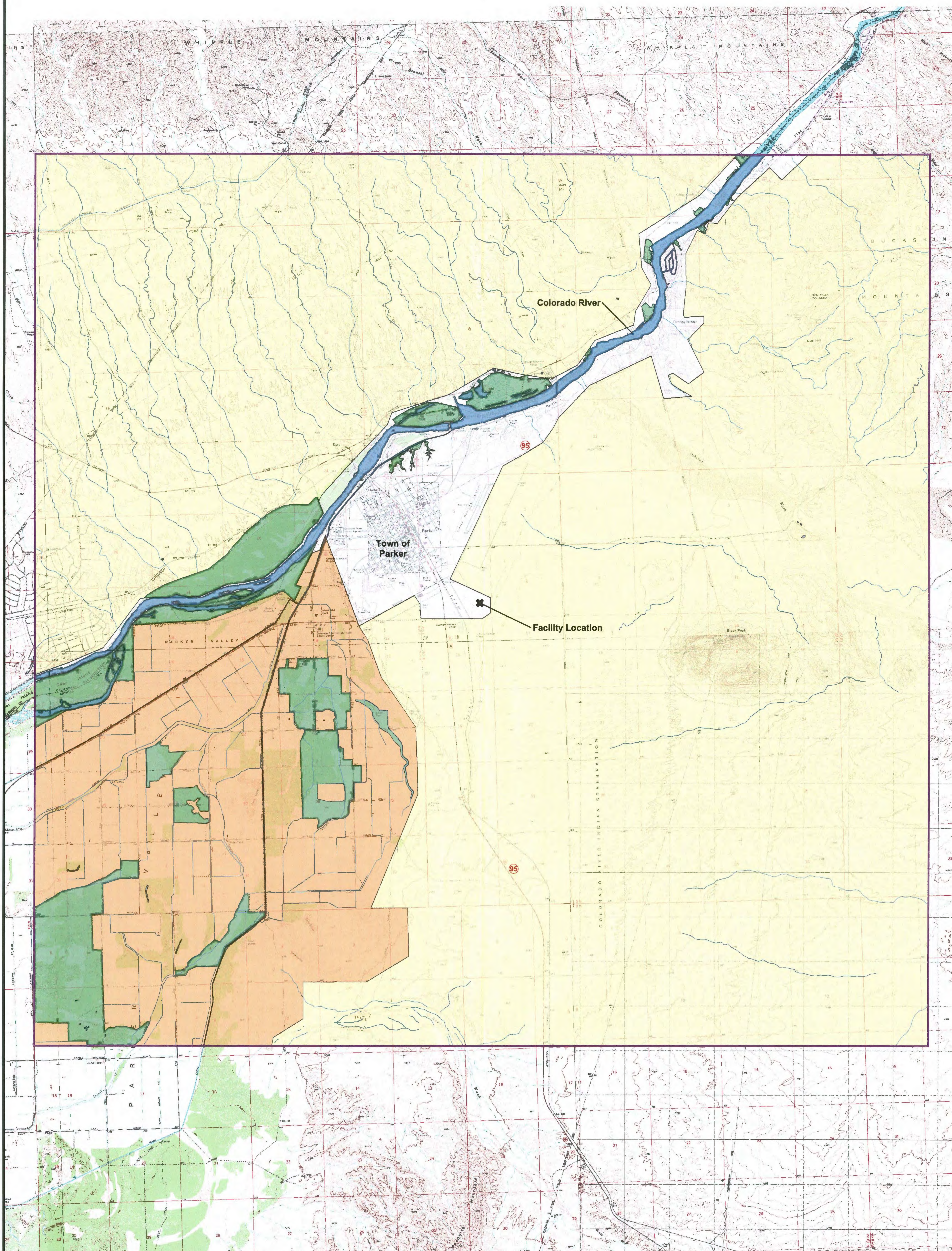


Figure 2-3
Landscape in the Facility Area

Figure 2-4
Aerial View of the Facility



Legend

✖ Facility Location

Study Area (20 km)

Habitat Types:

Agricultural | Creosote Bush Scrub

Riparian | Developed

Water | (Residential/Commercial/Industrial)

N

0 500 1,000 2,000 Meters

Prepared by BRP | Checked by ALF

Figure 6
Habitat Map - USGS Topography
Risk Assessment Work Plan

Westates Carbon Arizona, Inc.
Parker, Arizona
CPF Associates, Inc.

P:\Projects\Ecorisk\CPF\Westates\GIS\MapDocuments\HabitatMap.mxd P:\Projects\Ecorisk\CPF\Westates\GIS\Figures\HabitatMap_Figure6.pdf

3.0 RISK ASSESSMENT OVERVIEW

This remainder of this report summarizes the methods used to conduct the human health and ecological risk assessment, and presents the risk assessment results. As noted in the Workplan, the human health and ecological portions of the risk assessment share some common elements. These common elements are chemical emission rates, air dispersion and deposition modeling and fate and transport modeling used to calculate exposure concentrations in environmental media such as soil, plants and surface water. Elements that are unique to each analysis include the inputs and methods used to calculate exposures and chemical-specific toxicity criteria.

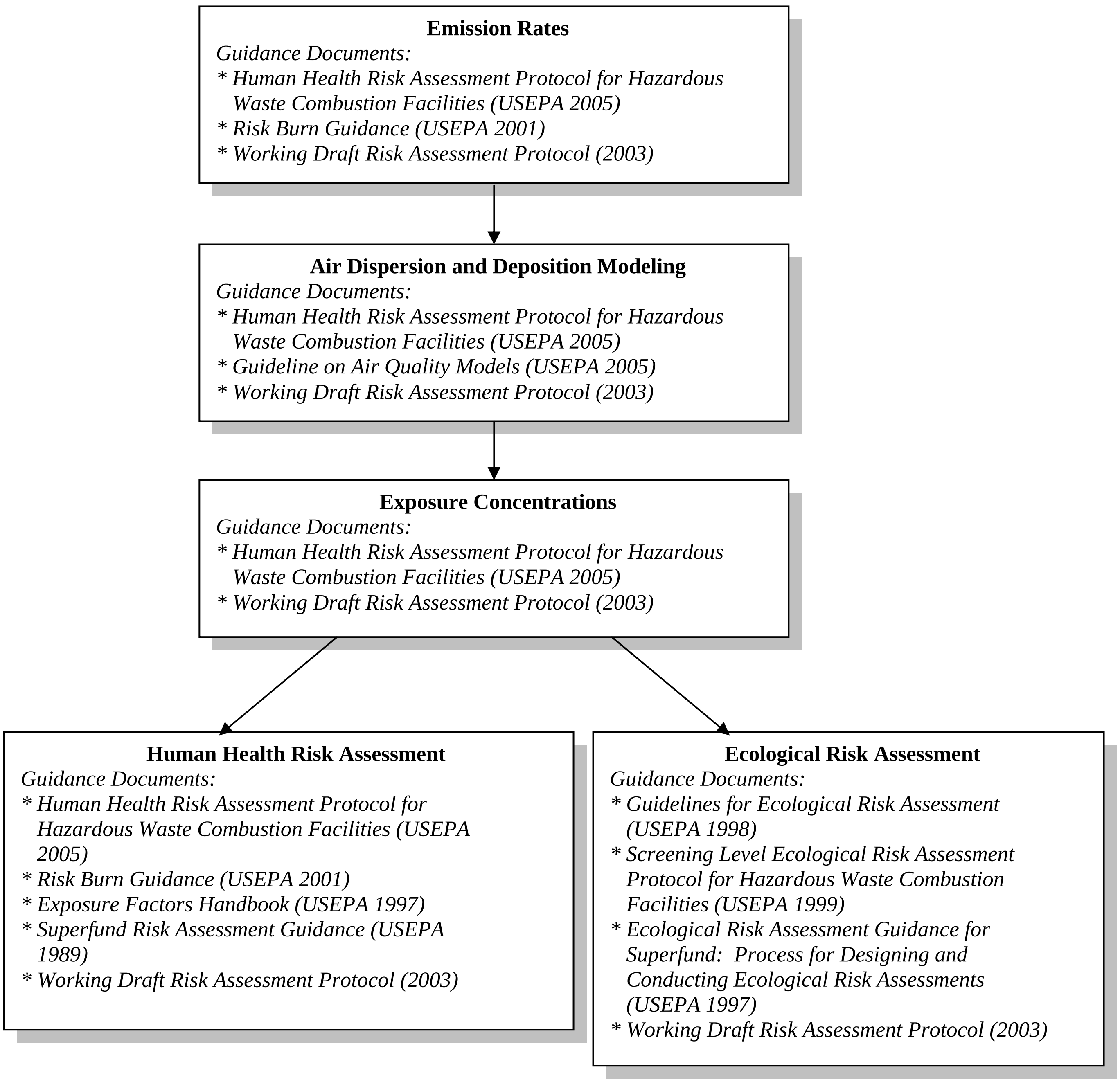
The human health and ecological portions of the risk assessment relied on a variety of regulatory guidance documents in addition to the methods described in the Workplan, as shown in Figure 3-1. In addition to relying on these guidance documents, the risk assessment used a large amount of site-specific data, including but not limited to:

- comprehensive testing of emissions from the furnace stack, with analysis for site-specific chemicals of potential concern
- data on spent carbon characteristics, the facility configuration, and facility operations
- local land use and demographic information
- water resources data available from the U.S. Geological Survey and the U.S. Bureau of Reclamation
- meteorological data from Parker, Arizona.

The basis for each site-specific value used in the analysis is provided in this report. In the absence of site-specific information, health-protective default values recommended by the USEPA were used.

Figure 3-1

Overview of Risk Assessment Process and Guidance Documents



4.0 HUMAN HEALTH RISK ASSESSMENT

This section presents the human health risk assessment for the carbon reactivation facility. The key steps in this assessment, consistent with USEPA guidance and the U.S. National Academy of Sciences, consist of:

- Hazard Identification
- Exposure Assessment
- Risk Characterization
- Discussion of Uncertainties

Figure 4-1 provides a flow chart of the human health risk assessment process for stack and fugitive emissions, each step of which is described below. It should be noted that all of the algorithms used to calculate environmental concentrations, exposures and potential risks associated with stack and fugitive air emissions beyond the property boundary were based entirely on HHRAP, and implemented using the IRAP software. In addition, separate discussions are provided below to address several issues identified for supplemental consideration by USEPA Region 9 or raised by the community during the Workplan development stage of this project, specifically evaluation of potential risks from exposure to airborne chemicals in the workplace from fugitive emissions and evaluation of the potential contribution of the facility's effluent on discharges from the Colorado River Sewage System Joint Venture (CRSSJV) sewage treatment plant.

4.1 Hazard Identification

The Hazard Identification presents the selection of chemicals for evaluation as well as the toxicity data for each selected chemical. This section focuses on the selection of compounds for the stack emissions risk assessment. Selection of compounds for the fugitive emissions analysis is presented later in this report (Section 4.3.2).

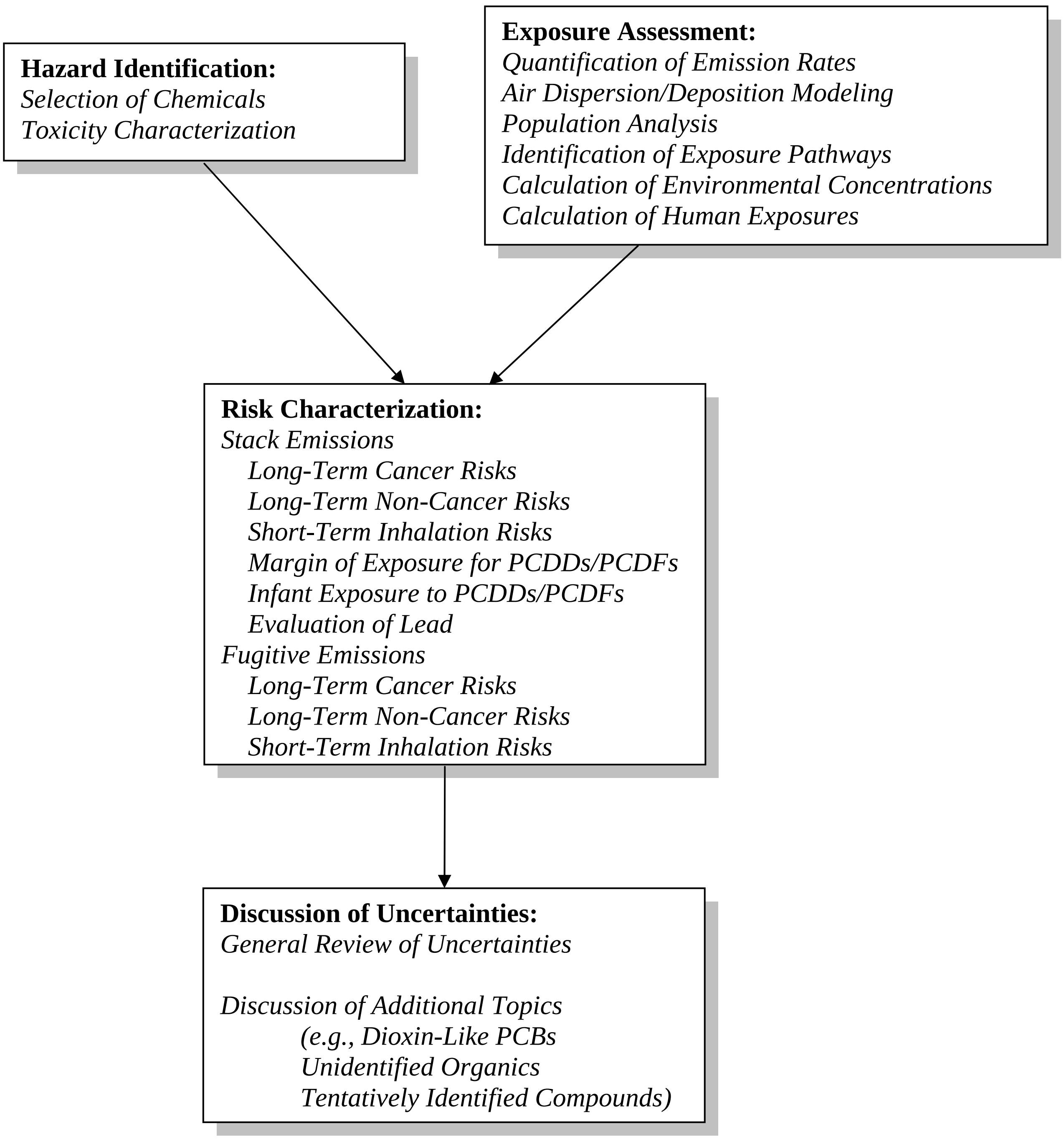
4.1.1 Selection of Chemicals of Potential Concern for Stack Emissions

The approach for selecting chemicals of potential concern (COPC) for quantitative evaluation in the human health risk assessment of stack air emissions was outlined in the Workplan. This approach specified that chemicals would be selected based on a variety of factors:

- Compounds would be selected from the list of constituents analyzed for during the PDT. As requested by USEPA, compounds analyzed for but not detected in the PDT were included in the evaluation, in addition to detected compounds. The PDT was approved in advance by the USEPA and conducted in March 2006 by an independent testing firm. It included comprehensive testing of the facility for site-specific chemicals of potential concern under operating conditions intended to overestimate emissions. The results of the PDT are presented in a comprehensive report prepared by Focus (2006).

Figure 4-1

Flow Chart of the Human Health Risk Assessment Process for the Carbon Reactivation Facility



- Tentatively identified compounds (TICs) in the PDT results would be considered for inclusion as chemicals for detailed evaluation.[2]

- Compounds that could potentially be present in spent carbon, even if they were not analyzed for during the PDT, would be considered for evaluation. A list of compounds that could be in spent carbon was compiled in the Workplan.

Application of this selection approach resulted in the identification of over 225 compounds for detailed evaluation in the human health risk assessment, including more than 100 compounds that were not detected in the PDT and also all detected TICs. Table 4.1-1 summarizes the list of selected compounds and indicates the basis for each compound's inclusion in the risk assessment.

4.1.2 Toxicity Characterization

The toxicity characterization followed the methods laid out in the Workplan, as described below.

4.1.2.1 Chronic Health Effects Criteria

The toxicity data used to evaluate chronic, long-term risks includes oral cancer slope factors and inhalation unit risk factors for predicting excess lifetime cancer risks and oral reference doses (RfDs) and inhalation reference concentrations (RfCs) for predicting the potential for long-term non-cancer effects. These toxicity data were compiled for each selected compound either directly from HHRAP's chemical-specific database (which is included in the IRAP software) or from the toxicity data sources recommended by HHRAP. Appendix B presents the chronic toxicity data compiled for compounds not already addressed in HHRAP that were used in the calculation of potential risks. Of the more than 200 compounds selected for evaluation, chronic toxicological criteria were not available from USEPA's recommended sources for 49 compounds. These compounds are discussed in the uncertainty section of this risk assessment.

As noted in the Workplan and HHRAP, mixtures of PCDDs/PCDFs were evaluated using toxic equivalency factors (TEFs) which relate the toxicity of each 2,3,7,8-congener to the toxicity of 2,3,7,8-TCDD, the most well-studied and most toxic congener among the PCDDs/PCDFs.[3] In this system, the TEF for 2,3,7,8-TCDD is 1.0 and the other congeners have TEF values ranging from 1.0 to 0.00001. For example, the TEF for 2,3,7,8-TCDF is 0.1, which means that the potential toxicity of 2,3,7,8-TCDF is considered to be 10 times

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[2] A TIC is a compound that is not specifically targeted for an analysis but which is detected. This means that while it can be seen in a laboratory analysis, its identity and concentration cannot be determined with certainty without further analytical investigation.

[3] Polychlorinated dioxins and furans are a class of chemicals known as polychlorinated dibenzodioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs), sometimes referred to as dioxins and furans. There are 75 PCDDs and 135 PCDFs, with each individual compound referred to as a congener. Only 7 of the 75 PCDD congeners and 10 of the 135 PCDFs are considered to be toxic; these are compounds with chlorine molecule substitutions at the 2, 3, 7, and 8 positions on the compound. In this document, the mixture of polychlorinated dioxins and furans are referred to as "PCDDs/PCDFs".

lower than that for 2,3,7,8-TCDD. To apply the TEF concept, the TEF of each congener present in a mixture is multiplied by its respective concentration or exposure and the products are summed to obtain the total TCDD toxic equivalents (TEQs) of the mixture. The TEFs are incorporated into the IRAP software consistent with USEPA (2005b) specifications.

4.1.2.2 Acute Health Effects Criteria

In addition to long-term toxicity data, the potential for short-term acute effects from stack emissions to air were evaluated using acute reference air concentrations. These concentrations, representing the short-term level in air above which adverse effects may occur, are provided in HHRAP and programmed into the IRAP software for many compounds. For compounds not addressed in HHRAP, acute reference air concentrations were derived from the published literature following HHRAP guidance. Appendix B presents the acute inhalation toxicity data compiled for compounds not already addressed in HHRAP. Among the more than 200 compounds selected for consideration in this study, 17 did not have acute inhalation toxicity criteria. Compounds without human health toxicity criteria are discussed in the uncertainty section of this study.

4.2 Stack Emissions Exposure Assessment

The next major step in the risk assessment is the stack emissions exposure assessment, which consists of the following elements:

- Quantification of stack air emissions
- Air dispersion and deposition modeling
- Population analysis
- Identification of exposure pathways
- Evaluation of environmental concentrations
- Calculation of human exposures

These elements of the exposure assessment were discussed in the Workplan and are described below.

4.2.1 Stack Emission Rates

4.2.1.1 Long-Term Emission Rates

One of the most important inputs to a combustion source exposure assessment is the chemical emission rate. Emission rates should reflect releases associated with actual facility operations, however, in this risk assessment assumptions were made that were designed to be more conservative than actual facility operating conditions. These assumptions included using PDT test results, which were measured under operating conditions intended to overestimate actual facility emissions, using proposed permit limits for compounds which had lower measured levels from the PDT, and including many compounds that were not detected in the PDT. As a result, the emission rates used in this assessment are expected to overestimate potential risks as compared to actual facility emissions.

The stack emission rates were calculated by Focus and are listed in Table 4.2-1 along with an indication of the basis for each value. In general, as noted above, emission rates were based on either the PDT results, proposed permit limits or, for a few chemicals that could be present in spent carbon but were not measured during the PDT, long-term average chemical feed rates and a conservative destruction and removal efficiency (DRE) of 99.99%.[4] Emission rates derived from the PDT measurements were calculated as described in the Workplan, based on the arithmetic average of results across the three test runs and using one-half the detection limit for non-detect results, consistent with standard risk assessment practice. Emission rates for the combustion gases sulfur dioxide and nitrogen dioxide were based on results from a miniburn test conducted in April 2005 since these were not measured during the PDT. Appendix C presents the detailed PDT test results used by Focus to calculate emission rates for this risk assessment.

Emission rates for mercury were identified in the PDT for three forms of mercury - particulate phase divalent mercury, vapor phase divalent mercury and vapor phase elemental mercury - as required for the USEPA (2005b) risk calculations. The speciation of mercury was determined by analyzing the separate components of the mercury sampling train. As recommended in USEPA (2001c), it was assumed that the particulate matter and front half rinse results represented divalent particulate mercury, the acidified impinger solution result represented divalent vapor phase mercury, and the potassium permanganate solution result represented elemental vapor mercury. The PDT results indicated a mercury breakdown for the stack emissions as 0.5% particulate phase divalent mercury, 19.8% vapor phase divalent mercury and 79.7% vapor phase elemental mercury.

4.2.1.2 Upset Scaling Factors

As discussed in the Workplan, consistent with USEPA (2005b) guidance, upset conditions were considered in this risk assessment. This was to be accomplished by adjusting the stack emission rates upwards by an upset scaling factor according to the equation below:

$$ER_{RA} = ER_{SE} * USF \qquad \text{(Equation 4-1)}$$

where

ER_{RA} = emission rate for input to risk assessment (g/sec),
ER_{SE} = emission rate based on stack emissions (g/sec), and
USF = upset scaling factor (unitless).

A scaling factor was developed using data provided by SWT for the carbon reactivation facility. SWT identified upset conditions that have the potential to affect stack emission rates, and compiled data on historical upsets at the facility that occurred for these conditions during 2001 and 2002. Based on the upset data, which are summarized in Table 4.2-2, the scaling factor was calculated according to HHRAP methods to be 1.02. The HHRAP method for deriving the scaling factor assumes that emissions increase by a factor of 10 for the

[4] The DREs measured in the PDT averaged more than 99.997% (Focus 2006).

percentage of operating time under upset conditions. The factor of 10 was based on a default approach for nonhazardous waste incinerators presented by the California Air Resources Board (1990) in which emissions were assumed to increase by a factor of 10 during upsets. The 1.02 scaling factor calculated for this project has a negligible numerical impact on the long-term stack emission rates, and thus the emission rates already shown in Table 4.2-1 were used, without adjustment according to Equation 4-1, to characterize long-term stack emissions.

As noted in the Workplan, the upset scaling factor does not reflect startup or shutdown conditions for the reactivation furnace stack because, under these conditions, emissions associated with spent carbon will not occur. During startup, there is no spent carbon in the reactivation furnace. Startup procedures involve increasing the temperature of the reactivation furnace and afterburner over a period of roughly 33 hours using natural gas only. Spent carbon is not introduced into the multiple hearth furnace until temperatures have reached their required levels. As a result, upset emissions associated with spent carbon do not occur during start up conditions. Shut down procedures involve shutting off spent carbon feed to the furnace and waiting until all spent carbon has been cleared from all hearths before starting to cool down the furnace. The amount of time needed to clear the furnace hearths of spent carbon is approximately 42 minutes. After all spent carbon is cleared from the furnace, temperatures in the furnace are slowly lowered to ambient temperature over a period of roughly 32 hours. Since the required high temperatures are maintained in the furnace, and the air pollution control equipment is continuously operated until all spent carbon is cleared, upset emissions associated with spent carbon do not occur during normal shut down conditions.

4.2.1.3 Short-Term Emission Rates

In addition to long-term emission rates, short-term emission rates were also considered in the acute inhalation risk analysis. The short-term emission rates were intended to reflect a one-hour period of time rather than a long-term, multi-year time period. Two sets of short-term emission rates were evaluated, one assuming no upset condition occurs during the one-hour period evaluated, and the other assuming an upset does occur during that one hour. The set of emission rates shown in Table 4.2-1 were used to calculate inhalation risks for the non-upset acute analysis. The risks associated with the upset condition were then calculated by increasing the acute results for the non-upset condition by a factor of 10, which assumes that an upset occurs for the entire 1-hour period evaluated.

4.2.2 Air Dispersion and Deposition Modeling

Air dispersion and deposition modeling is required in order to calculate chemical concentrations and ultimately human exposures from stack emissions. This modeling was performed according to a protocol included in the Workplan. The air dispersion model used was the most recent version of the Industrial Source Complex Short-Term model available from the USEPA (ISCST3, Version 02035). This model was developed and approved by USEPA. The remainder of this section summarizes the modeling performed using ISCST3 for this project. Appendix D describes the modeling work in greater detail.

The general application of modeling results in the risk assessment is outlined in Table 4.2-3 and, as described in the Workplan, was organized as follows:

- Long-term chronic risks were calculated using annual average modeling results. Annual average ambient air concentrations and annual average deposition rates were used to calculate concentrations in a variety of environmental media relevant to the risk assessment, with calculations performed using the IRAP software which incorporates USEPA (2005b) methods.

- Short-term acute inhalation risks were calculated using 1-hour average modeling results, also using the IRAP software.

Facility and meteorological input data used in the modeling are described in Appendix D. Facility-specific inputs were based on actual operating data (e.g., stack height, exhaust gas temperature, exhaust gas exit velocity) while meteorological inputs were based on surface air data collected by the Arizona Meteorological Network (AZMET) in Parker and upper air data (e.g., mixing heights) obtained from measurements collected at the National Weather Service (NWS) station at Flagstaff Pulliam Airport.

Both dry and wet deposition are important components in the facility's risk assessment. The risk assessment therefore considered four possible sources of deposition, consistent with USEPA (2005b) guidance:

- Dry deposition of particles,
- Wet deposition of particles,
- Dry deposition of gases, and
- Wet deposition of gases.

Wet and dry deposition modeling of particles requires information on the size distribution of emitted particles from the stack. The particle size distribution was based on test data collected from the facility stack during the PDT (see Appendix D). Consistent with USEPA (2005b) guidance, the particle size distribution was treated in two different ways in the ISCST3 model. A mass-weighted particle size distribution was used to represent emissions of metals (except mercury) that would form particles in the reactivation unit combustion area. A surface area-weighted size distribution was used to reflect organic compounds and mercury that most likely exit the combustion area as gases and then adsorb onto the surface of already-formed particles.

As outlined in USEPA (2005b) guidance, the ISCST3 model runs provided nine different types of outputs that were used in the risk calculations, as follows:

- Ambient air concentrations of mass-weighted particles
- Ambient air concentrations of surface area-weighted particles
- Ambient air concentrations of gases
- Dry deposition of mass-weighted particles

- Dry deposition of surface area-weighted particles
- Wet deposition of mass-weighted particles
- Wet deposition of surface area-weighted particles
- Dry deposition of gases
- Wet deposition of gases

These air and deposition modeling results were calculated across the modeling domain study area indicated in the Workplan, a 20 km-by-20 km square study area (154 square miles) with the facility stack at its center (see Figure 4-2). Modeling results were calculated at each of more than 4,000 receptor grid points beyond the facility property boundary within the modeling domain. A fine receptor grid was used with grid points evenly spaced at 100 m (328 foot) intervals out to 3 km from the facility. A coarse grid was used from 3 km to 10 km, with points evenly spaced at 500 m (1,600 foot) intervals. A description of the receptor grids is also provided in Appendix D.

The air dispersion and deposition modeling was performed using a unitized (1 g/sec) emission rate. The model outputs are thus referred to as "unitized" values, expressed in units of $\mu g/m^3$ per 1 g/sec for air concentrations and g/m^2-year per 1 g/sec for deposition rates. Chemical-specific concentrations and deposition rates may be obtained by multiplying the unitized results by the chemical-specific emission rates, a standard risk assessment step that occurs in the IRAP software.

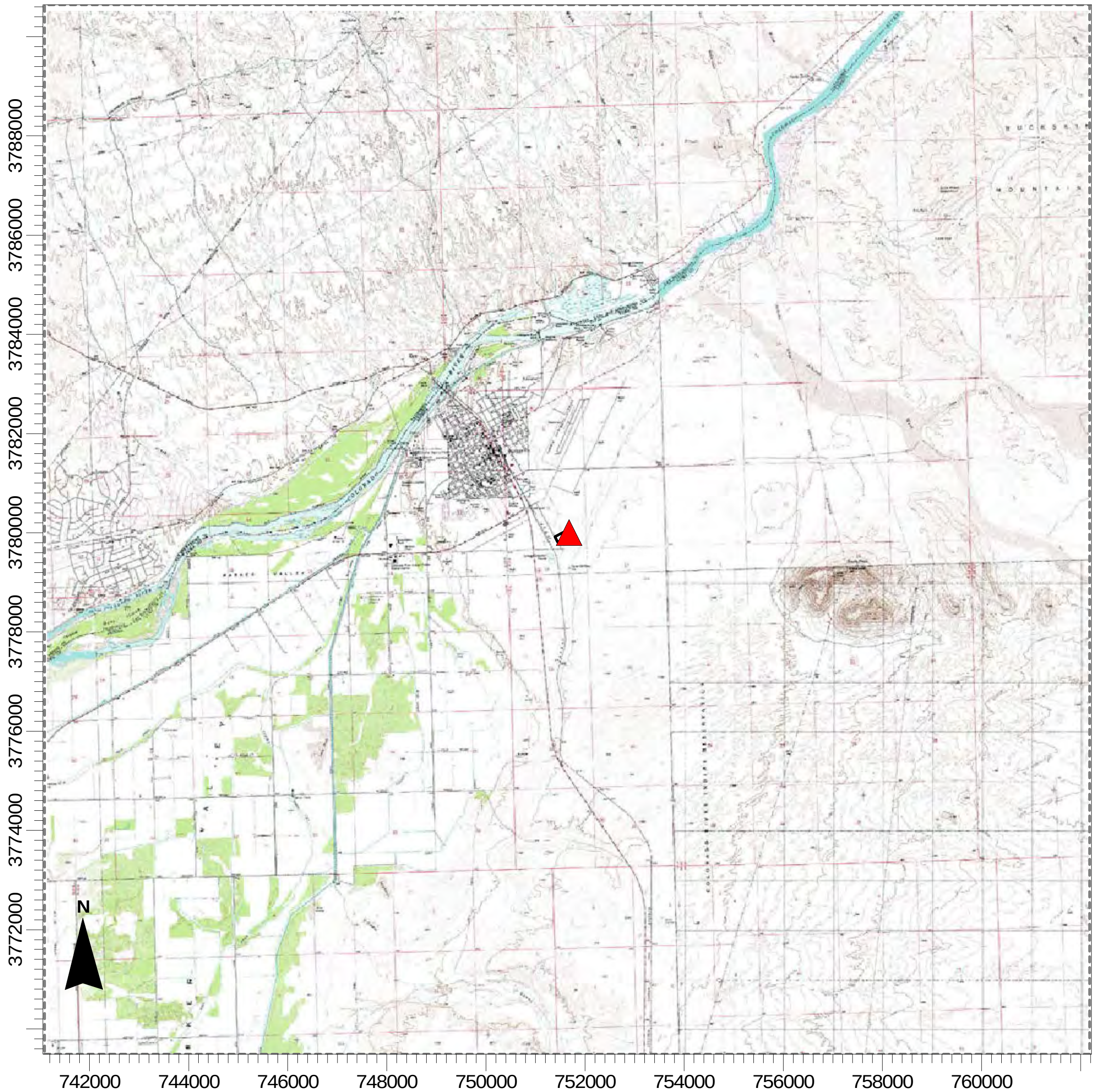
The annual average unitized modeling results for this project are illustrated in several isopleth[5] figures provided in Appendix E, with one figure for each of the different types of air concentrations and for each of the different dry deposition model outputs (i.e., vapor, particle mass weighted, and particle surface area weighted). An evaluation of the unitized modeling results showed that roughly 99% of the total wet plus dry deposition at any given receptor point was due to dry deposition, which is not surprising in an area that receives less than 6 inches of rain per year. Isopleths of unitized wet deposition rates were, therefore, not prepared, not only because of the negligible contribution of wet deposition to the total deposition rates, but also because the unitized wet deposition rates were too small to be plotted using the IRAP software.

Several specific receptor locations were identified for evaluation in the risk assessment by examining the unitized modeling results across specified types of land use areas. For example, annual average air concentrations and deposition rates were used to evaluate long-term chronic risks for residential assessment locations. Accordingly, the annual average unitized modeling results within areas currently used for residential assessment purposes within the Town of Parker and within the CRIT Reservation area with access to irrigation water were examined, and the maximum annual average impact locations in both areas were selected for detailed evaluation. One-hour average air concentrations were used to evaluate short-term acute inhalation risks in residential areas, at locations used for other purposes (e.g., commercial), and also undeveloped areas. Thus, the 1-hour average unitized modeling results were also examined to identify maximum impact locations within residential areas of

[5] An isopleth is a line that connects points of equal amounts of a quantity, such as an air concentration or a deposition rate.

Figure 4-2

Siemens Water Technologies Corp. Carbon Reactivation Facility, Parker, Arizona
Risk Assessment Study Area



Note: The x and y axes display UTM coordinates (universal tranverse mercatur grid system coordinates) in meters.

SCALE: 1:129,086

0 — 4 km

IRAP-h View - Lakes Environmental Software

the Town of Parker and the CRIT Reservation area with access to irrigation water, at locations used for non-residential purposes, and at the maximum impact point beyond the property boundary. Table 4.2-4 lists all of the receptor point locations selected for evaluation for both the chronic and acute stack emissions risk assessment. Figure 4-3 shows these locations overlain on a topographical map of the area.

4.2.3 Population Analysis

The next step in the exposure assessment involved identifying populations in the facility area through demographic and land use data, and information on population activity patterns. Local information was obtained for this project through site visits, contacts with local officials, published reports, and publicly available local descriptive information on the internet.[6]

4.2.4 Identification of Exposure Pathways

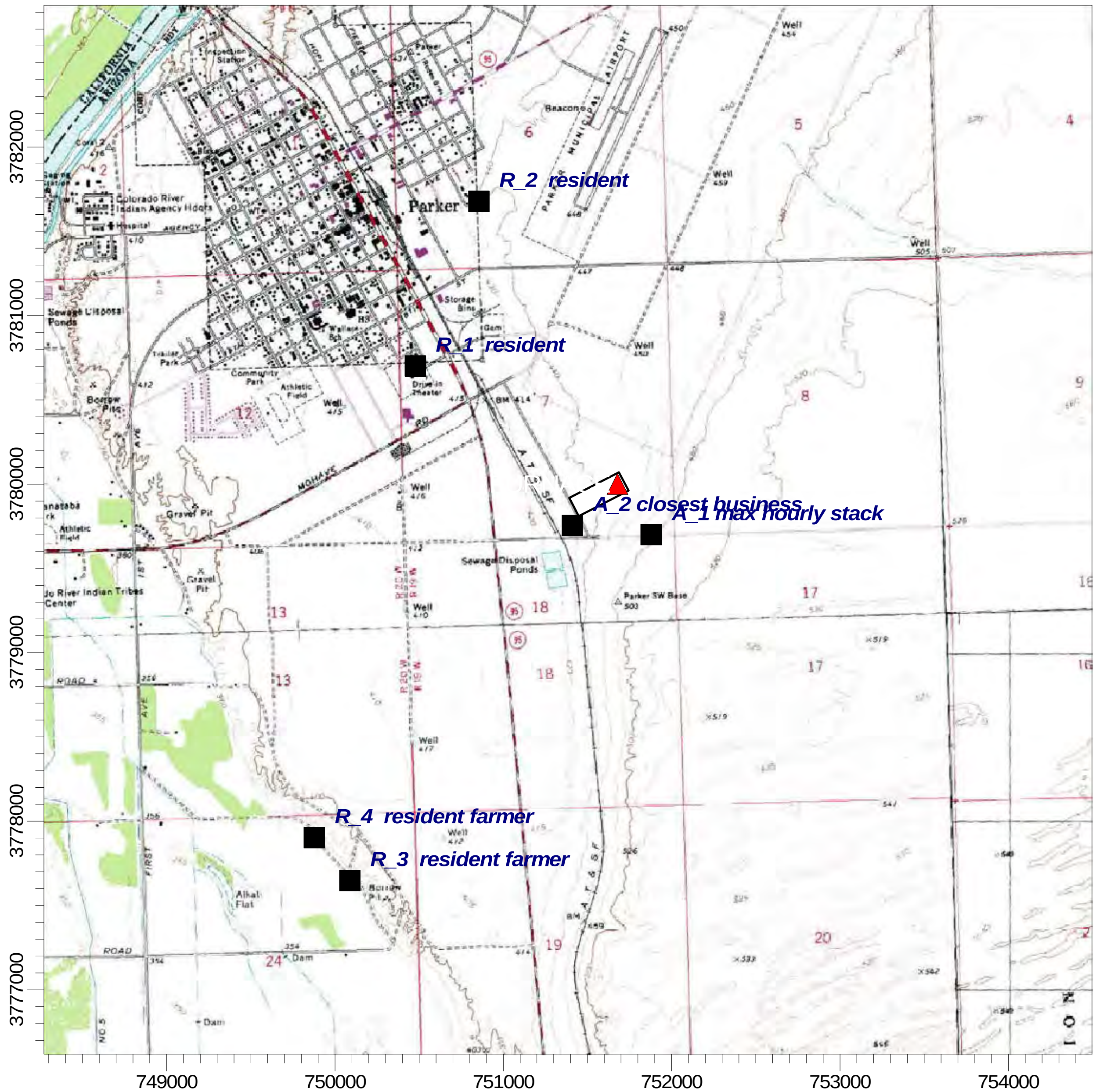
The next exposure assessment step was the selection of a set of exposure pathways for evaluation in the risk assessment. This list of pathways was selected based on site-specific information on land use, USEPA (2005b) default exposure pathways, USEPA's (2001a) request that the risk assessment consider exposure due to subsistence fishing, hunting and agriculture, and the available options programmed into the IRAP software.

A variety of local information regarding home produce gardens and locally raised animals was received from the La Paz County Agricultural Extension Office (Masters 2007). A few residents in the facility area may raise the following types of animals – beef cattle, pigs, chickens, lamb and goat. Some of these animals are raised by children as part of the local 4H program, and these animals are required to be sold rather than used as a household food source. There are no large beef farms within the modeling domain, dairy cows are not raised at all in the local area, and there are no commercial animal slaughter facilities in the Parker area. Based on communications with colleagues, Masters (2007) estimated that at most 10% of a resident’s diet of animal products would be obtained from locally raised animals. For residents who might butcher their own locally raised animals, it was estimated that no more than 20% of a person’s annual animal products diet would come from locally raised animals. Some residents in the study area cultivate home gardens, but because of the dry, hot climate, there is only a limited portion of the year during which produce may be grown. Based on communications with colleagues, Masters (2007) estimated that no more than 20% of a person’s annual produce ingestion was likely to be obtained from homegrown produce in the project study area.

[6] Local sources of information relied on for the project included, but were not limited to: USGS (2005, 2006a, 2006b, 2007), Williams (2007a, 2007b), Tunnel (2007), Jones (2007), Weiss (2007a, 2007b), Addiego (2007), SCS (1986), Milliken (2007), USBR (2007), USDOI (2000), AZDC (2005), and Masters (2007).

PROJECT TITLE:

Receptor Point Locations Evaluated in the Stack Emissions Risk Assessment



COMMENTS:

COMPANY NAME:

MODELER:

SCALE: 1:37,982

0 1 km

DATE:

PROJECT NO.:

Fishing occurs in the facility area, but details on where people routinely fish, how often people fish, and how much locally caught fish is ingested were not available at the time this project was performed.[7] Hunting also occurs in the facility area for a variety of animals, including mule deer.[8]

Another important factor affecting the selection of exposure pathways was the capabilities of the IRAP software, which directly reflects HHRAP methods. The IRAP software is programmed with all of USEPA's default exposure pathways which consist of inhalation of air, and ingestion of soil, produce, beef, chicken, eggs, fish, dairy milk, and pork.

Based on the available information at the time this assessment was performed in conjunction with the options available in the IRAP software, all of the USEPA (2005b) default exposure pathways except for dairy milk ingestion were retained for evaluation. Potential exposures associated with ingestion of venison, lamb and goat meat were evaluated in the uncertainties section of this report.

Table 4.2-5 identifies the exposure pathways and receptors that were selected for quantitative evaluation in this risk assessment using the IRAP software. As can be seen, this assessment addressed exposures to several different types of individuals (referred to as "receptors") who could hypothetically be exposed to stack air emissions from the facility: adult and child residents, adult and child farmers, adults and children assumed to eat fish caught from the Colorado River or the Main Drain, and a nursing infant conservatively assumed to be the child of each of the adult receptors, with the potential for transmission of chemicals from mother's breast milk.

4.2.5 Calculation of Environmental Concentrations

The next step in the exposure assessment was the calculation of chemical concentrations in each environmental medium of interest. These are referred to as exposure point concentrations. For example, concentrations were calculated in soil, homegrown produce, fish, animal products, and human breast milk. All the equations used to calculate environmental concentrations were based on HHRAP and are programmed into the IRAP software.

Many input parameters are required in order to calculate environmental concentrations using the USEPA (2005b) fate and transport modeling equations. These include numerous chemical-physical properties describing each compound and its behavior in the environment. Although USEPA (2005b) identified these properties for over 200 compounds in HHRAP (and all are included in IRAP), there were many additional compounds selected for evaluation in this risk assessment, based on the PDT results, for which these same types of chemical-physical properties needed to be compiled. Appendix F presents the properties that were compiled for these additional compounds and a listing of data sources for each value.

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[7] www.azgfd.gov/h_f/where_fish_southwest.shtml.
[8] www.azgfd.gov/h_f/hunting_units_43a.shtml and hunting_units_44a.shtml.

A variety of environmental parameters that are not chemical-specific are also needed to calculate environmental concentrations (e.g., rainfall, waterbody characteristics, animal feed ingestion rates). These parameters were, in most cases, based on USEPA-specified default values. A few of the inputs are required to be site-specific and these were obtained or derived from locally-available information. In addition, the default values for some of the inputs were refined with site-specific information where possible. Table 4.2-6 summarizes the site-specific input parameters used to calculate environmental concentrations in this risk assessment, along with the basis for each value. Other than these site-specific values, all other inputs were based on USEPA's (2005b) recommended default values.

The risk assessment calculated environmental concentrations for a variety of hypothetical receptors in the facility area. As noted above in Table 4.2-4, several receptor point locations identified from the unitized ISTST3 modeling results were evaluated. The default methods used to calculate environmental concentrations for these receptor points were extremely conservative, in that the calculations implausibly assume homegrown produce, home-raised animals and the animal's locally-obtained feed all come from a single receptor point, rather than averaged across the acreage necessary to grow large quantities of produce or crops, and to raise animals. These hypothetical receptor scenarios were complemented by the addition of four area-based residential receptors. Two of these area-based receptors were evaluated using as inputs unitized modeling results averaged across the Town of Parker and across the CRIT Reservation area with access to irrigation water and within the modeling domain (i.e., the receptors were not located at any single point). Similarly, the unitized modeling results averaged across waterbody and watershed areas for the Main Drain and the Colorado River within the modeling domain were used to evaluate two fish ingestion pathway receptors. These two waterbodies were selected based on input received from local officials and USEPA Region 9 during the Workplan preparation period of this project, although the extent of fishing in the Main Drain may be extremely limited (Masters 2007). Table 4.2-7 summarizes all the receptors evaluated in the stack emissions risk assessment, including both receptors located at specific points as well as receptors evaluated based on area-wide modeling results.

4.2.6 Calculation of Human Exposures

The last exposure assessment step is the calculation of human exposures in the facility area for each pathway. These calculations relied on the methods laid out in USEPA (2005b), which are programmed into the IRAP software. The types of information used to calculate exposures include rates of exposure for each pathway (e.g., food ingestion rates, soil ingestion rates), the fraction of ingestion of particular food types from locally-raised produce or animal products, and data on body weight, exposure frequency (i.e., days/year exposed) and exposure duration (i.e., total years exposed). As noted above, the exposure rates addressed both children and adults, consistent with current USEPA (2005b) guidance. A few of the exposure parameters were refined based on site-specific information received from Masters (2007), specifically the fraction of homegrown produce ingested by a resident was assumed to be 20% and the fraction of home-raised beef, pork, poultry and eggs ingested by a farmer was assumed to be 20%. All other exposure parameters were based on USEPA health-protective default values, including the default assumption of subsistence fishing.

4.3 Fugitive Emissions Exposure Assessment

This section of the report includes an exposure assessment of potential fugitive air emissions associated with the carbon reactivation facility. The Workplan described a variety of processes involving spent carbon at the facility that have the potential for fugitive particulate and volatile organic compound (VOC) emissions. The reader is referred to Section 4.3.1 of the Workplan for this discussion. In general, potential fugitive emissions from activities involving spent carbon are reduced through standard work practices, facility design, and air pollution control (APC) devices. At no time other than during unloading is spent carbon exposed directly to the ambient environment. In addition, the intrinsic highly adsorptive nature of spent carbon results in very low partitioning of contaminants from the carbon to the atmosphere.

4.3.1 Potential Fugitive Emission Source Selected for Evaluation

Based on the review of the potential for fugitive air emissions from activities involving spent carbon presented in the Workplan, the activity expected to have the highest potential impacts associated with fugitive air emissions from spent carbon was identified for evaluation in this study. This activity is spent carbon unloading at the outdoor hopper (H-1). The outdoor hopper is an enclosed three-walled building with a fixed roof located on a concrete containment area. It has heavy long plastic sheeting on the front where spent carbon is unloaded. The hopper has an air exhaust system which filters collected air from inside the structure through a fabric filter baghouse and carbon adsorption system. A hand-held water spray system is also used at H-1 during unloading if needed to minimize potential dust emissions from dry spent carbon and to facilitate transfer of the spent carbon from the hopper through the piping system to the spent carbon storage tanks.

Based on data collected at the facility from 2005 and 2006, between 82%-86% of the spent carbon received at the facility annually is unloaded into the outdoor hopper from a variety of different bulk container types (e.g., roll-off containers, slurry trucks). The remainder is unloaded indoors inside the spent carbon storage and warehouse building into hopper H-2 (e.g., drums, supersacks). Hopper H-2 is also equipped with an air exhaust system, which directs collected air to the same baghouse and carbon adsorber as the outdoor hopper.

There are two general types of spent carbon received at the facility: wet carbon (referred to as “aqua carbon”) which has been used for water treatment and is roughly 50% moisture content by weight, and dry carbon (referred to as “vapor carbon”) which has been used for air treatment and is roughly 10% moisture content by weight. Data from 2005 and 2006 show that approximately 42%-46% of the spent carbon unloaded at the outdoor hopper is wet while about 54%-58% of the unloaded spent carbon is dry.

4.3.2 Selection of Chemicals for Evaluation

The next step in the fugitive emissions analysis was the selection of chemicals of potential concern to be evaluated. This selection process considered data on each compound's concentration in spent carbon, the frequency and magnitude of spent carbon deliveries containing both volatile and inorganic compounds, each organic compound's tendency to volatilize into ambient air during unloading, and the potential toxicity of the compound. Table 4.3-1 presents a summary of this information for those compounds received in spent carbon at the facility from 2003-2006, based on the facility's Toxics Release Inventory reporting.[9]

The compounds listed in Table 4.3-1 were then ranked for a variety of factors that could be associated with potential risks in order to select chemicals of potential concern. Compounds were ranked in the following categories:

- Number of deliveries over the 4-year 2003-2006 period
- Total pounds delivered over the 4-year 2003-2006 period
- Potential volatility (based on concentration and Henry's law constant)
- Potential for acute inhalation health effects (based on chemical concentration and acute reference air concentration),
- Potential for chronic non-cancer health effects (based on chemical concentration and chronic inhalation reference air concentration),
- Potential for chronic cancer risks (based on chemical concentration and inhalation cancer unit risk factor)
- Identification of compounds that are known human carcinogens

Compounds were selected for evaluation for the fugitive emissions analysis if they ranked in the top five of any category or are classified as a known human carcinogen by the USEPA, the International Agency for Research on Cancer, or the U.S. National Toxicology Program. The top five ranking results, as well as the 21 selected compounds of potential concern for detailed evaluation, are shown in Table 4.3-2.

4.3.3 Calculation of Fugitive Emission Rates

Calculation of emission rates is the next step after the selection of chemicals for evaluation. In this study, fugitive air emission rates were calculated using mathematical modeling. The emission rates are combined with air dispersion modeling results to calculate potential ambient air concentrations, and associated inhalation risks. This section describes the emission modeling methods for both fugitive organic vapors as well as dusts and inorganic compounds that may be present in dust. The fugitive emission modeling did not take into account the air exhaust system employed at the outdoor hopper, an approach that is expected to overestimate potential emission rates.

4.3.3.1 Fugitive Organic Vapor Emissions

Organic compound emissions during spent carbon unloading at the outdoor hopper were calculated using two mathematical modeling methods developed for USEPA (USEPA 1997, 2004a). Conceptually the approach was based on a pore space gas model developed to

[9] The Toxics Release Inventory (TRI) Report for 2003-2006 was provided to CPF by M. McCue, Director of Plant Operations, Siemens Water Technologies Corp. May 2007.

calculate organic emissions from dumping of petroleum-contaminated soil onto piles (this model was developed by Radian for USEPA 1997). The Radian model calculates an emission rate by assuming that a portion of the chemical concentration within the air-filled pore space of the dumped material is released to the atmosphere during unloading.

Two sets of calculations were performed to address the two different types of spent carbon unloaded at the outdoor hopper (i.e., aqua carbon and vapor carbon). These types of spent carbon were evaluated separately because their characteristics vary (e.g., moisture content, types of containers unloaded).

Chemical concentrations within the air-filled pore space of spent carbon were calculated using a method outlined by USEPA (2004a), based on work by Johnson et al. (1990) and Johnson and Ettinger (1991), which mathematically partitions the total concentration of a compound into sorbed, aqueous, and vapor phases. The partitioning is modeled by taking into account chemical-specific properties as well as properties of the material, as follows:

$$C_s = \frac{(H'*C_{sp} * BD)}{(Ew + Koc * foc * BD + H'*Ea)} \qquad \text{(Equation 4-2)}$$

where

C_s	=	chemical concentration in air-filled pore spaces (g/cm^3),
H'	=	Henry's law constant (unitless),
C_{sp}	=	concentration in spent carbon (g/g),
BD	=	bulk density (g/cm^3),
Ew	=	water-filled porosity of spent carbon (unitless),
Koc	=	organic carbon:water partition coefficient (cm^3/g),
foc	=	fraction organic carbon in spent carbon (unitless), and
Ea	=	air-filled porosity of spent carbon (unitless).

Chemical emission rates associated with spent carbon unloading at the outdoor hopper during the workday were then calculated based on the Radian model methodology (USEPA 1997) as follows:

$$ER = \frac{(C_s * Vol * HR * Exc)}{AT} \qquad \text{(Equation 4-3)}$$

where

ER	=	chemical emission rate (g/sec),
Vol	=	volume of air pore space within spent carbon per hour during unloading (cm^3/hr),
HR	=	hours unloading per workday (4 hrs),
Exc	=	pore gas to atmosphere exchange constant (unitless), and
AT	=	averaging time (25,200 seconds per 7-hour period between

7 AM – 2 PM when unloading activities occur).[10]

The volume of air within spent carbon during an unloading event was calculated as follows:

$$Vol = \frac{(Ea * Q * 1{,}000)}{BD} \qquad \text{(Equation 4-4)}$$

where

Vol	=	volume of air pore space within spent carbon per hour during unloading (cm^3/hr),
Q	=	amount of spent carbon unloaded per unloading event per hour (kg/hr), and
1,000	=	conversion factor (1,000 g/kg).

The amount of spent carbon unloaded per hour (Q) was calculated based on data specific to this facility, including an analysis of spent carbon containers' capacities, approximate unloading times per container type, and the average amount of spent carbon, by container type and container capacity, unloaded during 2005 and 2006. The amount unloaded per unloading event per hour was calculated as follows:

$$Q = \frac{Mass_{sp}}{Hrs_{sp}} \qquad \text{(Equation 4-5)}$$

where

$Mass_{sp}$	=	average mass of spent carbon unloaded per event (2,975 kg aqua spent carbon or 1,783 kg vapor spent carbon), and
Hrs_{sp}	=	average unloading duration per container (0.77 hours for aqua spent carbon containers or 0.55 hours for vapor spent carbon containers).

The scenario-specific input parameters for these modeling equations are presented in Table 4.3-3. The values for these parameters were based on spent carbon data from the facility, where available, or from the published literature (e.g., Kleineidam et al. 2002). Note that several of the parameter values vary for the two different types of spent carbon unloaded at the outdoor hopper (vapor or aqua spent carbon). Table 4.3-4 presents the chemical-specific input parameters used in the modeling equations to calculate emission rates. Table 4.3-5 presents the calculated organic compound chemical emission rates for each selected chemical of potential concern.

[10] Personal communication with M. McCue, Director of Plant Operations, May 7, 2007.

4.3.3.2 Fugitive Dust and Inorganic Compound Emissions

Emission rates of dust and inorganic compounds during spent carbon unloading were calculated using a screening-level emission factor equation presented by USEPA (2006) that calculates dust emission rates from batch drop operations. This model was developed based on test results for a variety of materials used in a variety of industries, such as the coal and quarrying industries. The fraction of particles less than 75 microns in diameter (known as "silt content" in soil science) in the tested materials ranged from 0.44%-19%. Analyses of dry spent carbon from the facility show a silt content of roughly 0.5% (i.e., passing through a 200-mesh sieve screen).[11] This means that spent carbon has a silt content at the low end of the range of tested materials used to develop the USEPA emissions model, and thus it is likely to have a lower potential to generate dust emissions than the model predicts. As a result, the dust emission rates calculated using USEPA's emission factor are likely to be overestimated.

Dust emission rates were calculated only for vapor spent carbon unloaded at the outdoor hopper, since dust emissions will not occur during unloading of the water-saturated aqua carbon. In addition to total dust emissions, emission rates for different particle size categories were calculated using USEPA's default particle size multipliers. The particle sizes evaluated were selected for consistency with comparison benchmark particulate matter concentrations that are available. Accordingly, emission rates for inhalable particles less than or equal to 10 microns (i.e., PM10) were calculated for comparability to the National Ambient Air Quality Standards (NAAQS) set under the Clean Air Act and workplace exposure limits. Emission rates for PM2.5 were also calculated for comparability to the PM2.5 NAAQS.

The emission factor equation presented by USEPA (2006) is as follows:

$$E = (k * 0.0016)\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}} \qquad \text{(Equation 4-6)}$$

where

E	=	emission factor (kg particulate matter/megagram batch drop material),
K	=	USEPA default particle size multiplier (0.35 for PM10, 0.053 for PM2.5),
U	=	mean wind speed (2.38 m/sec, based on Parker, AZ data), and
M	=	material moisture content (10% for vapor spent carbon).

The particulate matter emission rate was then calculated as follows:

[11] Spent carbon analytical report provided by Siemens Water Technologies Corp., Activated Carbon Laboratory, Los Angeles, CA. July 17, 2007.

$$ER_{PM} = E * Q * conv \qquad \text{(Equation 4-7)}$$

ER_{PM}	=	emission rate of particulate matter (g/sec),
Q	=	amount of spent carbon unloaded per unloading event per hour (kg/hr), and
conv	=	conversion factor (megagram/1,000 kg * 1,000 g/kg * hr/3,600 sec).

Chemical-specific emission rates for inorganic compounds were then calculated by multiplying the particulate matter emission rate by the chemical concentration in the vapor spent carbon, as follows:

$$ER_{cpd} = ER_{PM10} * C_{sp} \qquad \text{(Equation 4-8)}$$

ER_{cpd}	=	inorganic compound emission rate (g/sec),
ER_{PM10}	=	emission rate of PM10 particles (g/sec), and
C_{sp}	=	concentration in spent carbon (g/g).[12]

Inorganic compound emission rates were calculated from the inhalable PM10 particle size category emission rate (i.e., ER_{PM10}) for comparability to occupational exposure limits and for the inhalation risk assessment.

The scenario-specific input parameters and calculated dust emission rates are presented in Table 4.3-6. Table 4.3-7 presents the calculated inorganic compound chemical emission rates for each selected chemical of potential concern.

4.3.4 Air Dispersion Modeling for Fugitive Emissions

Air dispersion modeling was conducted using the ISCST3 model to calculate ambient air concentrations associated with fugitive emissions during spent carbon unloading. Appendix D describes the details of the modeling performed for the fugitive emissions source. As described in the Workplan, fugitive emissions from the hopper were treated in ISCST3 as a volume source, with dimensions defined by the hopper building, and were modeled using a unitized (i.e., 1 g/sec) emission rate. The emission source was assumed to be "on" every day for the 7-hour period during 7 AM - 2 PM, based on the period of time during typical facility operations that spent carbon may be unloaded at the outdoor hopper.[13] The meteorological data used to model the fugitive emissions source were identical to the data used to model dispersion of stack emissions (e.g., 2001-2005 Arizona Meteorological Network data from Parker). The set of off-site receptor grid points used for stack emissions modeling was also applied for the fugitive emissions modeling.

The ISCST3 model calculated unitized annual average modeling results (to evaluate chronic long-term risks) and 1-hour average modeling results (to evaluate short-term acute inhalation

[12] For the inorganic compounds evaluated, total spent carbon concentrations were assumed to reasonably reflect the concentrations that would be solely associated with the solid phase.
[13] Personal communication with M. McCue, Director of Plant Operations, May 7, 2007.

risks) at all of the modeled off-site receptor locations beyond the property boundary. Since the modeling was performed using a unitized emission rate, the resulting ISCST3 air concentrations were expressed in units of $\mu g/m^3$ per 1 g/sec. Chemical-specific concentrations were then calculated using the IRAP software by multiplying the unitized results by the chemical-specific emission rates.

The specific locations addressed in the fugitive emissions risk assessment were identified by examining the unitized ISCST3 modeling results across specified types of land use areas. The annual average unitized modeling results within areas currently used for residential assessment purposes within the Town of Parker and within the CRIT Reservation with access to irrigation water were examined, and the maximum annual average impact locations in both areas were selected for detailed evaluation. The 1-hour average unitized modeling results were examined to identify maximum impact locations within residential assessment areas of the Town of Parker and the CRIT Reservation with access to irrigation water, at locations used for non-residential purposes, and at the maximum impact point beyond the property boundary. In addition to these locations, the receptor locations selected earlier for the stack emissions risk assessment were also evaluated. Table 4.3-8 lists all of the receptor point locations selected for evaluation for both the chronic and acute fugitive emissions inhalation risk assessment. Figure 4-4 shows these locations overlain on a topographical map of the area.

4.3.5 Identification of Exposure Pathways

The next step in the fugitive emissions analysis was the selection of exposure pathways for evaluation. As explained in the Workplan, the most important exposure pathway for this type of emissions source is direct inhalation and, accordingly, this risk assessment focused on the inhalation pathway of exposure.

4.3.6 Calculation of Environmental Concentrations

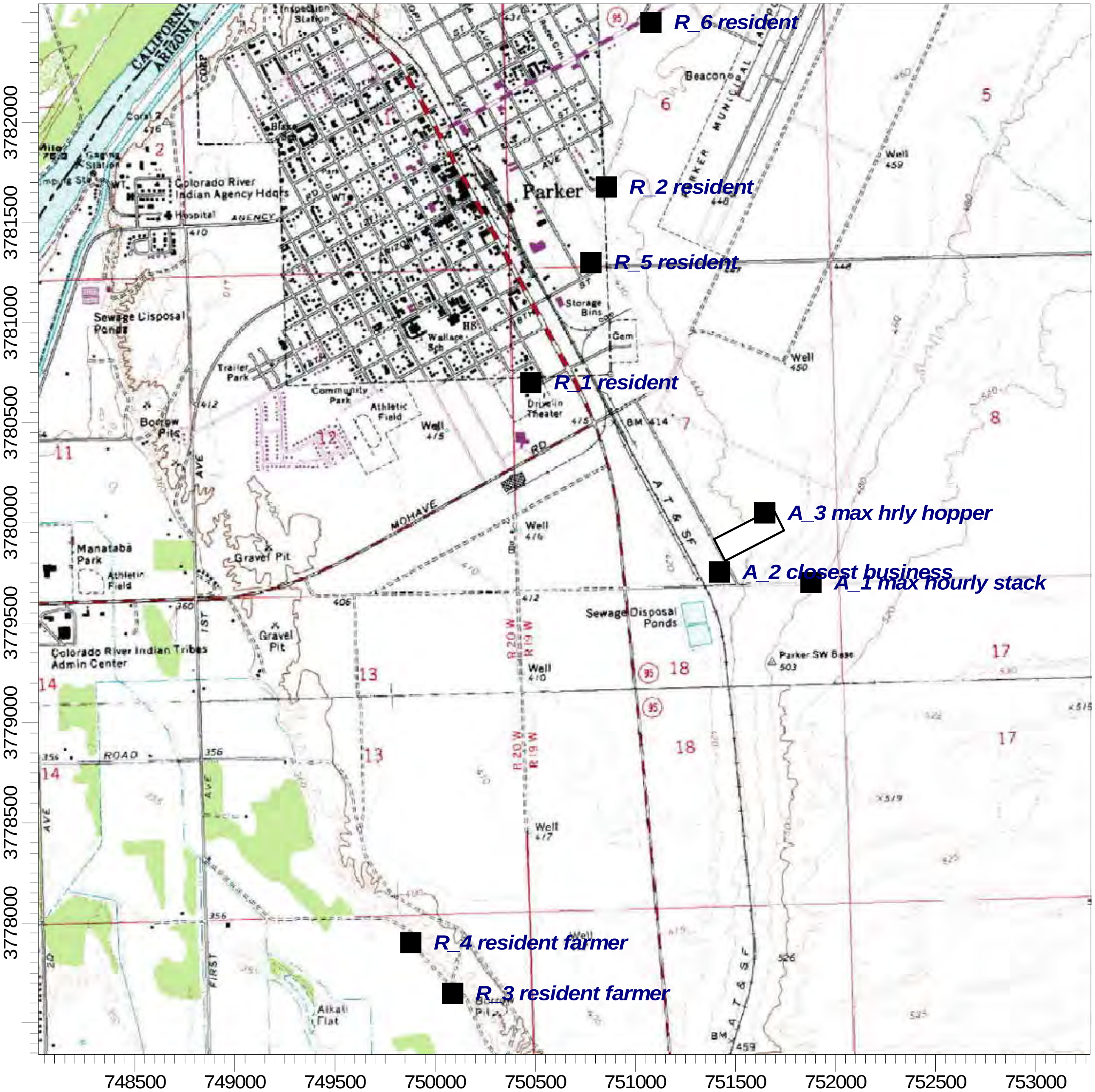
Chemical concentrations in ambient air were calculated, as described above, by multiplying the unitized results by the chemical-specific emission rates. This calculation was performed using the IRAP software for all the selected inorganic and organic compounds at the evaluated receptor locations. The organic compound emission rates used in this calculation were, however, based only on the vapor carbon values; since these emission rates were higher than for aqua spent carbon, this will tend to overestimate air concentrations and associated risks.

4.3.7 Calculation of Human Exposures

Inhalation exposures were calculated using the IRAP software. These calculations rely on the modeled ambient air concentrations, inhalation rates, and data on body weight, exposure frequency (i.e., days/year exposed) and exposure duration (i.e., total years exposed). Exposures due to inhalation were calculated using the HHRAP default assumptions for both an adult and a child.

PROJECT TITLE:

Receptor Locations Evaluated for the
Fugitive Organic Vapor Hopper Emissions Source



COMMENTS:	COMPANY NAME:	
	MODELER:	
	SCALE: 1:32,047 (0 — 1 km)	
	DATE:	PROJECT NO.:

4.4 Risk Characterization

This section of the report presents the risk characterization, in which potential risks associated with both stack and fugitive emissions are addressed. As described earlier, the stack emissions risk assessment was a multiple exposure pathway analysis, whereas the fugitive emissions risk assessment addressed only the inhalation pathway of exposure.

4.4.1 Stack Emissions

4.4.1.1 Chronic Long-Term Risks

Chronic long-term risks associated with stack emissions were calculated according to the HHRAP methods and using the IRAP software to perform the calculations. Both excess lifetime cancer risks and the potential for non-cancer effects were evaluated. This was accomplished by combining exposures with toxicity values for cancer and non-cancer effects.

Excess Lifetime Cancer Risks

Cancer risks reflect the upper bound probability that an individual may develop cancer over a 70-year lifetime under the assumed exposure conditions. The risks are referred to as "upper bound" because they are unlikely to be underestimated and, in fact, may range from as low as zero to the upper bound value. Cancer risks were calculated, by the IRAP program, separately for each chemical and summed across chemicals for each exposure pathway. Risks were also added across pathways for hypothetical population groups that were evaluated (e.g., adult and child resident, adult and child farmer). The cancer risks were evaluated relative to the USEPA (1998a) target risk level of 1E-5 (which is equivalent to $1x10^{-5}$). A cancer risk of $1x10^{-5}$ means that an individual could have, at most, a one in 100,000 chance of developing cancer over a 70-year lifetime under the evaluated exposure conditions. In comparison, each person in the U.S. has a background risk of developing cancer over a lifetime of about one in three.

The excess lifetime cancer risks are shown in Table 4.4-1. The detailed results for each exposure pathway and receptor are provided in Appendix G. As can be seen in this table, results are presented for the following three groups of evaluated chemicals:

- *Group 1 - All detected compounds.* This group includes 95 compounds that were detected in the PDT in addition to several compounds that were not measured during the PDT but which were evaluated based on emission rates derived from feed rates.
- *Group 2 - All evaluated compounds, both detects and compounds that were not detected, except for benzidine.* This group includes 177 compounds, 82 of which were not detected in the PDT. This group does not include benzidine which was not detected in the PDT in stack gases and for which there is no evidence from waste profile reports and analytical spent carbon data that it has ever been accepted

in spent carbon received at the facility. [14] Benzidine was singled out because it was found to be a significant risk driver, accounting for more than 95% of the total cancer risk when included in the risk calculations.

- *Group 3 - All evaluated compounds.* This group includes 178 compounds, of which 83 were not detected in the PDT, including benzidine.

The risks are also presented for three general categories of human receptors who could hypothetically be exposed to stack air emissions:

- *Resident receptors.* These receptors include residential assessment locations in the Town of Parker and assume exposure occurs via inhalation, soil ingestion and homegrown produce ingestion.
- *Farmer receptors.* These receptors include residential assessment locations assumed to have access to irrigation water and assume exposure occurs via inhalation, soil ingestion, homegrown produce ingestion, and ingestion of home- or locally-raised beef, poultry, eggs, and pork.
- *Fish ingestion.* These receptors are assumed to fish in either the Main Drain or the Colorado River with exposures occurring only as a result of fish ingestion. These risks may be added to any of the evaluated residential receptors.

The additional (i.e., excess) lifetime cancer risks for Group 1, all detected compounds, ranged from 4E-9 (four in one billion) for the fish ingestion pathway, to 8E-8 (eight in one hundred million) for resident receptor R_2. These results were more than 100 times lower than the 1E-5 target cancer risk level.

The risk results for Group 2, all detected and non-detected compounds except benzidine, were slightly increased above Group 1, while still well below the target level. Excess lifetime cancer risks calculated for Group 2 ranged from 4E-9 (four in one billion) for the fish ingestion pathway, to 2E-7 (two in ten million), again for resident receptor R_2. These results are 50 or more times lower than the 1E-5 target cancer risk level.

For Group 3, which added the non-detected compound benzidine to the risk calculations, excess lifetime cancer risks increased for all the residential receptors but did not change for the fish ingestion pathway. The highest cancer risk result was 2E-6 (two in one million) for the resident receptor R_2, five times below the 1E-5 target cancer risk level. As noted above, when benzidine was included in the risk calculations for the resident and farmer receptors, it accounted for more than 95% of the total cancer risks, even though this compound was not detected in the PDT, and there is no evidence from waste profile reports and analytical spent carbon data that it has ever been accepted in spent carbon received at the facility. If fish ingestion risks were added to the evaluated resident and farmer receptor results, all the excess lifetime cancer risks would still remained below the target risk of 1E-5.

[14] Benzidine was used in the past mostly to produce dyes, however, it has not been produced for sale in the U.S. since the mid-1970's. Major U.S. dye companies no longer make benzidine-based dyes, and benzidine is no longer used in medical laboratories or in the rubber or plastics industries (ATSDR 2001).

Although all the calculated excess lifetime cancer risks were below the target level, the results were examined to identify the dominant compounds accounting for the majority of the risks. This evaluation focused on Group 1 (all detected compounds) and Group 2 (all compounds except benzidine) because, as noted above, benzidine was not detected in the PDT but dominated the risk assessment results when included in the calculations. The dominant compounds affecting these risk assessment results are described below:

- For the resident receptors, the dominant compound in Group 1 was cadmium, accounting for over 75% of the total risk mostly due to direct inhalation. Cadmium was conservatively evaluated in this risk assessment using an emission rate based on a proposed permit limit that was more than 30 times higher than the emission rate measured during the PDT. This means that the risks calculated for cadmium in this analysis are expected to be overestimated due to the emission rate by at least a factor of 30.

- For the farmer receptors, the dominant Group 1 compounds were cadmium and PCDDs/PCDFs, accounting for roughly 40% and 57% of the total risks, respectively. The most important exposure pathway for PCDDs/PCDFs was beef ingestion. PCDDs/PCDFs also accounted for almost all of the calculated fish ingestion cancer risks. As with cadmium, PCDDs/PCDFs were evaluated in this risk assessment using emission rates based on a proposed permit limit. The measured PCDD/PCDF emission rates during the PDT, which was performed using spiked feed to maximize the production of combustion by-products such as PCDDs/PCDFs, were roughly four times lower than the values used in this risk assessment. Even with emission rates conservatively based on proposed permit limits, the cancer risks due to stack emissions for all detected compounds were well below the target risk level of 1E-5.

- The dominant compounds in Group 2 for the resident receptors included cadmium in addition to arsenic and beryllium, primarily due to inhalation exposure. Arsenic and beryllium were not detected in the PDT but were evaluated in the risk assessment using emission rates based on permit limits. The use of permit limits as a basis for emission rates for cadmium, arsenic and beryllium is expected to greatly overestimate potential risks, by more than an order of magnitude.

- For the farmer receptors, the dominant compounds in Group 2 still included cadmium and PCDDs/PCDFs, in addition to arsenic and beryllium. PCDDs/PCDFs continued to account for almost all of the calculated fish ingestion risks.

Potential Non-Cancer Effects

The potential for non-cancer health effects was evaluated by comparing calculated exposures with non-cancer oral reference doses (RfDs) and inhalation reference concentrations (RfCs), consistent with USEPA (2005b). A hazard quotient was calculated for each chemical, using the IRAP program, by dividing its exposure by its reference dose or reference air concentration. The hazard quotients for each pathway were added across all chemicals, as an initial evaluation step, regardless of the type of health effect endpoint, to produce what is called a hazard index. Hazard index results were evaluated against the USEPA (1998a) target level of 0.25. This target hazard index level is quite conservative; in many other environmental regulatory programs the target hazard index level is 1.0.

A hazard index summed across all compounds, not taking into account the type of health effects associated with each compound, is a conservative first step in evaluating the potential for non-cancer effects. If the hazard index for all compounds is above a value of one (1), this indicates that the hazard index values should be recalculated for groups of compounds having similar types of health effects or the hazard quotient values for those compounds producing a hazard index above one should be examined in more detail. If the hazard index for compounds with similar types of health effects is below one, then adverse health effects are not expected to occur. Even if the hazard index for compounds with similar types of health effects is above one, this does not automatically mean that adverse health effects will occur (for example, because of the safety factors that are incorporated in the non-cancer reference doses and reference air concentrations). Rather, this type of result means that there is an increased chance that health effects might occur. In this case, further research should be conducted to evaluate the potential for public health effects.

The non-cancer hazard index values for stack emissions (summed across all compounds regardless of type of health effect) are shown in Table 4.4-1. These values ranged from 0.003 to 0.01, were essentially the same for all three groups of compounds (Groups 1, 2 and 3), and were 25 or more times lower than the target level of 0.25. If the hazard index results were recalculated for groups of compounds having similar types of health effects, rather than all compounds, the resulting values would be even lower and still well below the target level.

The dominant compounds affecting the hazard index results were chlorine, for the resident and farmer receptors, mostly due to inhalation, and methyl mercury for the fish ingestion pathway. Chlorine was evaluated in this risk assessment using an emission rate based on a proposed permit limit that was much higher than the results measured during the PDT. The permit limit-based chlorine emission rate was roughly 20 times higher than the emission rate measured in the PDT, even though many chlorine-containing compounds were spiked into the feed during the PDT. Similarly, mercury was evaluated in this risk assessment using a permit limit-based emission rate that was about 15 times higher than the measured PDT emission rate. These results indicate that the non-cancer results due to stack emissions were not only below the target level using emission rates conservatively based on proposed permit limits, but would be even lower if measured PDT emission rates were used.

Summary

These results show that additional lifetime cancer risks from long-term exposure to stack emissions are well below regulatory target risk levels and that non-cancer health effects are not expected to occur from long-term exposures to stack emissions in residential areas near to the reactivation facility.

4.4.1.2 Margin of Exposure for PCDDs/PCDFs

The USEPA has not developed a non-cancer reference dose for PCDDs/PCDFs. As an alternative, a margin of exposure approach developed by USEPA was applied to compare the calculated doses in the risk assessment to typical background U.S. exposure levels (USEPA 2005b). This analysis is consistent with USEPA's (2001a) request that a margin of exposure analysis be conducted to assess PCDDs/PCDFs. Following the USEPA (2005b) protocol, in this analysis, the maximum PCDD/PCDF toxic equivalent (TEQ) average daily dose predicted for an adult receptor in the risk assessment associated with stack emissions was compared to a typical background level of 1 pg TEQs/kg-day. This analysis showed that the highest calculated average daily PCDD/PCDF TEQ dose to an adult (3E-4 pg/kg-day for farmer receptor R_3) was well below the typical background level.

4.4.1.3 Infant Exposure to PCDDs/PCDFs

The USEPA has not developed risk assessment methods to quantitatively evaluate the potential risks to a breast-fed infant from exposure to PCDDs/PCDFs. In this study, infant exposures to PCDDs/PCDFs were evaluated as an adjunct to the adult exposure scenarios evaluated for stack emissions. Hypothetical infant exposures were evaluated following the approach presented in USEPA (2005b), which is programmed into the IRAP software. In this method, the average daily dose to PCDDs/PCDFs, expressed as 2,3,7,8-TCDD toxic equivalents (TEQs), from breast milk ingestion is calculated and then compared to a comparison background level for a nursing infant. The comparison level used in this analysis was an average infant intake level of 60 pg/kg-day for 2,3,7,8-TCDD TEQs based on USEPA (2005b). It is very important to recognize, however, that the method specified for use in this risk assessment is a default regulatory approach; it does not reflect actual knowledge of the potential health effects, if any, of short-term exposure via breast-milk ingestion on an infant.

The calculated average daily doses from breast milk ingestion are shown in Table 4.4-2 for each adult receptor evaluated. These doses ranged from 0.0002 - 0.002 pg TEQs/kg-day, more than 10,000 times lower than the target intake level. These results indicate that potential exposure to PCDDs/PCDFs by a nursing infant would be far below background levels.

4.4.1.4 Acute Short-Term Risks

Facility Operating Conditions Under Non-Upset Conditions

The potential for short-term acute inhalation risks associated with stack emissions was also evaluated in the risk assessment, consistent with USEPA (2005b) methods. This was accomplished using the IRAP software, by comparing modeled short-term, 1-hour average air concentrations with the acute reference air concentrations in a manner similar to the evaluation of non-cancer risks. The evaluation addressed not only the maximum impact point for hourly concentrations beyond the facility boundary, but also receptors located in residential and non-residential land use areas.

The air concentrations used to evaluate acute risks were conservatively based on the highest 1-hour average air concentration calculated for each specified receptor location and compound out of a total of 43,800 hours evaluated by the ISCST3 model (i.e., 5 years of hourly meteorological data from 2001-2005 from Parker were used). The concentrations for the remaining 43,799 hours were lower than those used in this analysis.

An acute hazard quotient was calculated in the IRAP program by dividing each chemical's modeled 1-hour average air concentration by its acute reference concentration. Quotients below one are not expected to result in health effects. Quotients above one indicate an increased chance that mild transient adverse health effects might occur (e.g., eye irritation) or a clearly defined objectionable odor associated with the specific compound being evaluated might be noticed, although these may still be unlikely to occur because safety factors are incorporated in the acute reference air concentrations.

Table 4.4-3 summarizes the results of the acute inhalation analysis using the stack emission rates shown in Table 4.2-1. The detailed results are provided in Appendix H. As the summary table shows, the hazard quotients, which were calculated for each chemical individually, ranged from less than 1E-10 to 0.08. These values were all well below the target level of one, by factors of 12 or more times. If the hazard quotients for the individual compounds were added together for groups of compounds having similar types of health effects (e.g., respiratory), the combined results would still be well below a target level of one.

Upset Conditions

Acute inhalation risks were also evaluated assuming an upset condition occurred for 1 hour at the facility, during which emissions were assumed to increase by ten times as recommended in HHRAP. As noted earlier, the factor of 10 increase is based on a 15-year old conservative regulatory default assumption for nonhazardous waste combustors. The potential acute hazard quotients under this scenario would be ten times higher than those shown in Table 4.4-3, with values ranging from <1E-10 to a maximum of 0.8 occurring at the maximum 1-hour average impact point (i.e., location A_1 where there is no residential or commercial land use). If the hazard quotients for the individual compounds were added together for groups of compounds having similar types of health effects (e.g., respiratory), the combined results would still be below a target level of one.

The highest hazard quotients for all evaluated receptor locations under upset conditions were due to arsenic, nitrogen dioxide, chlorine, and sulfur dioxide, with values at the maximum impact point (A_1) of 0.8 for arsenic, 0.4 for nitrogen dioxide, 0.09 for chlorine, and 0.07 for sulfur dioxide, and at the closest business location (A_2) of 0.2 for arsenic, 0.4 for nitrogen dioxide, 0.09 for chlorine and 0.07 for sulfur dioxide. The results for arsenic and chlorine were calculated using emission rates based on proposed permit limits that were much higher than the results measured during the PDT. The measured arsenic emission rate from the PDT was over 30 times lower than the emission rate used in this risk assessment, while the measured chlorine emission rate was roughly 20 times lower than the emission rate used in this risk assessment (and chlorine was spiked into the feed during the PDT). These differences in evaluated versus measured emission rates indicate that the acute hazard quotients for arsenic and chlorine under both non-upset and upset conditions, are expected to be overestimated by more than a factor of 10.

The acute toxicity criteria for the compounds with the highest hazard quotients were all based on acute reference exposure levels from the California Environmental Protection Agency, which lists mild respiratory irritation as the health effects endpoint for chlorine, nitrogen dioxide and sulfur dioxide and lists reproductive/developmental effects (based on reduced fetal weight in mice) for arsenic. Hazard quotients may be added together to evaluate potential risks for multiple compounds, but only for groups of compounds having similar health effects endpoints. In this case, the sum of all hazard quotients grouped for compounds with similar health effects endpoints remains below the target level of 1.0.

Summary

These results indicate that short-term health effects are not expected to occur in areas near to the reactivation facility as a result of inhalation exposure to stack emissions, either under conservatively evaluated long-term conditions or under hypothetical upset conditions..

4.4.1.5 Evaluation of Lead

USEPA (2005b) recommends that lead be evaluated in a combustion source risk assessment initially by comparison with a soil benchmark level of 400 mg/kg in soil. If the calculated soil concentration exceeds the benchmark, USEPA recommends that additional evaluation of potential blood lead levels be performed using the Integrated Uptake Biokinetic Model (IEUBK). In this study, the lead soil concentrations at the evaluated receptor locations, due to stack emissions, were calculated to range from 6E-6 mg/kg to 3E-4 mg/kg, more than one million times lower than USEPA's target level, indicating that no further evaluation of lead was warranted.

4.4.1.6 Comparison to Risk-Based Standards and Criteria

Consistent with the Workplan, the risk assessment also compared the calculated environmental concentrations to available standards and criteria. Specifically, the highest annual average modeled air concentrations associated with stack emissions at a residential receptor were compared with the NAAQS and USEPA Region 9 risk-based preliminary remediation goals (PRGs). Similarly, the maximum annual soil concentrations modeled at a residential assessment receptor were compared with USEPA Region 9 risk-based PRGs for residential soil. Concentrations calculated in surface water were also compared to ambient water quality criteria in the ecological risk assessment section of this report.

The results of this comparison, presented in Appendix I, showed that all the modeled air concentrations were far below both the NAAQS and the very conservatively derived risk-based PRGs. The modeled soil concentrations were also found to be far below the risk-based residential soil PRGs.

4.4.2 Fugitive Emissions

4.4.2.1 Chronic Long-Term Risks

Chronic long-term risks associated with fugitive emissions during spent carbon unloading were calculated by combining the inhalation exposures with toxicity values for cancer and non-cancer effects according to the HHRAP methods described in USEPA (2005b), using the IRAP software to perform the calculations. This methodology is the same as that described above for evaluating chronic risks from stack emissions. The fugitive emissions analysis evaluated only the inhalation pathway of exposure, as described above in the selection of pathways section.

The results of the chronic inhalation risk assessment for both cancer risks and non-cancer health effects are shown in Table 4.4-4. The detailed results for each compound evaluated are provided in Appendix J. The additional (i.e., excess) lifetime cancer risks ranged from 2E-9 (two in one billion) to 5E-8 (five in one hundred million); these results were 200 or more times lower than the 1E-5 target cancer risk level. The non-cancer hazard index values (summed across all compounds regardless of type of health effect) ranged from 0.0004 to 0.001; these values were 250 or more times lower than the target level of 0.25. If the hazard index results were calculated for groups of compounds having similar types of health effects, rather than all compounds, the resulting values would be even lower and still well below the target level of 0.25. If the fugitive emissions risk results were added to those calculated for stack emissions, the combined results would still be below both the cancer and non-cancer target risk levels.

These results show that additional lifetime cancer risks in residential assessment areas near the reactivation facility, from long-term inhalation exposure to fugitive emissions from spent carbon unloading, individually or in combination with risks from stack emissions, are well below the regulatory target cancer risk level. Similarly, the results show that non-cancer health effects are not expected to occur from long-term inhalation exposure to fugitive emissions in residential assessment areas near the reactivation facility, individually or in combination with stack emissions.

4.4.2.2 Acute Short-Term Risks

The potential for short-term acute inhalation risks associated with fugitive emissions was also evaluated in the risk assessment. This was accomplished by comparing predicted short-term, 1-hour average air concentrations with acute reference air concentrations. The methodology described above for evaluating acute risks from stack emissions was also used to evaluate fugitive emissions.

Table 4.4-5 summarizes the results of the acute inhalation analysis for fugitive emissions. The detailed results for the selected chemicals are provided in Appendix K. As this table shows, the hazard quotients, which were calculated for each chemical individually, ranged from less than 1E-9 to 0.02 at the maximum off-site impact point (A_3). These values were all well below the target level of one, by factors of 50 or more times. If the hazard quotients for the individual compounds were added together for groups of compounds having similar types of health effects (e.g., respiratory), the combined results would be even lower, and still well below a target level of one. Moreover, if the acute results from fugitive and stack emissions for compounds emitted from both sources were added together at the evaluated receptor locations, the results would still be well below the target level.

These results indicate that short-term health effects are not expected to occur in areas near to the reactivation facility as a result of inhalation exposure to fugitive emissions during spent carbon unloading at the outdoor hopper, individually or in combination with risks from stack emissions.

4.4.2.3 Evaluation of Particulate Matter

The potential for health effects to occur as a result of fugitive particulate matter emissions was also evaluated. This analysis compared maximum off-site particulate matter (PM) concentrations to the NAAQS for PM10 and PM2.5. NAAQS are established by USEPA for criteria pollutants, including PM10 and PM2.5, and impose ambient air quality concentration standards which are determined by USEPA to be protective of public health with an adequate margin of safety. The current PM10 NAAQS is a 24-hour average of 150 $\mu g/m^3$, while the current PM2.5 NAAQS includes both a 24-hour average of 35 $\mu g/m^3$ and an annual average of 15 $\mu g/m^3$.

The maximum off-site annual average concentration of PM2.5 was calculated by multiplying the PM2.5 emission rate (see Section 4.3.3.2) by the maximum off-site unitized annual average concentration (which occurred at the property boundary where there is no residence). The resulting annual average concentration was 2.5E-3 $\mu g/m^3$, more than 6,000 times lower than the NAAQS. Maximum off-site 24-hour average PM10 and PM2.5 concentrations were calculated by multiplying the emission rates by the maximum off-site unitized 1-hour average air concentration (which also occurred at the property boundary), and also by a scaling factor of 0.4 to convert from a maximum 1-hour concentration to a maximum 24-hour concentration (USEPA 1992). The resulting PM10 and PM2.5 maximum 24-hour average concentrations were 0.6 $\mu g/m^3$ and 0.09 $\mu g/m^3$, respectively, 250 or more times lower than their respective NAAQS. This evaluation indicates that potential off-site impacts of particulate matter emissions associated with spent carbon unloading at the outdoor hopper will be protective of human health.

4.4.2.4 Comparison to Risk-Based Standards and Criteria

This part of the risk assessment compares the calculated ambient air concentrations associated with fugitive emissions to available standards and criteria. Specifically, the highest annual average modeled air concentrations at a residential assessment receptor were compared with NAAQS and USEPA Region 9 risk-based PRGs. The results of this comparison, presented in Appendix L, showed that all the modeled air concentrations were below both the applicable NAAQS and the very conservatively derived risk-based PRGs.

4.4.3 Wastewater Discharge from the Facility to the Joint Venture

4.4.3.1 Introduction

Wastewater discharged from the reactivation facility is transported via an underground pipe to the Colorado River Sewage System Joint Venture (CRSSJV) publicly owned treatment works (POTW). The reactivation facility effluent is regulated under an industrial wastewater discharge permit granted to SWT from the CRSSJV in accordance with the Clean Water Act.

The CRSSJV is a primary wastewater treatment plant that serves both the Town of Parker and the Colorado River Indian Tribes, a service population of approximately 5,000 people (USEPA 2001b). Roughly 18% of the water entering the POTW originates from the reactivation facility. Flow rate data from 2006 show a discharge rate from the POTW of about 709,000 gallons of water per day, with the reactivation facility contributing roughly 129,000 gallons per day to this amount. The remaining water entering the POTW comes from other businesses (e.g., Custom Metal Finishing, as indicated in USEPA 2001c) and households in the service area. The CRSSJV discharges the treated water to the Main Drain discharge canal, which begins slightly upstream of the CRSSJV discharge point and travels more than 10 miles in a south-southwesterly direction through the CRIT Reservation before discharging into the Colorado River. The amount of water flowing through the Main Drain substantially increases as it moves downstream due to the addition of water overflow from irrigation canals and seepage from adjacent agricultural land.

The CRSSJV performs semi-annual priority pollutant sampling of its discharge water, in addition to daily sampling for a variety of constituents, including metals, biological oxygen demand, pH and total suspended solids. Chronic aquatic toxicity tests are also conducted using raw CRSSJV effluent every 6 months on water fleas and fathead minnows.

4.4.3.2 Evaluation of Reactivation Facility Discharge

As requested by USEPA and described in the Workplan, a screening-level modeling analysis was conducted to evaluate the potential incremental contribution of the reactivation facility's effluent on chemical concentrations discharged from the CRSSJV into the Main Drain.

The incremental concentrations at the CRSSJV discharge were calculated using mathematical modeling. The calculated incremental concentrations were then compared to ambient water quality criteria in conjunction with a review of the CRSSJV semi-annual effluent toxicity testing results. In addition, potential fish tissue concentrations and associated potential human health fish ingestion risks were evaluated in the Main Drain at a location downstream of the CRSSJV discharge point where fishing was assumed to occur.

4.4.3.3 Evaluation of Reactivation Facility Incremental Impact to CRSSJV Discharge

Incremental chemical concentrations in the CRSSJV discharge due to effluent from the carbon reactivation facility were calculated in a series of six steps which are discussed below:

- Compile chemical concentrations in effluent and select compounds for evaluation
- Calculate total, dissolved and particulate concentrations in facility effluent
- Calculate incremental facility concentrations resulting from treatment at the CRSSJV
- Repartition concentrations at outfall between total, dissolved and particulate phases
- Compile ambient water quality standards and criteria for selected compounds
- Compare incremental facility concentrations to water quality standards

Compile Chemical Concentrations in Effluent and Select Compounds for Evaluation

Measurements of compounds in the reactivation facility effluent were compiled using data collected over the past two years (2005-2006) and provided to CPF by SWT.[15] Table 4.4-6 presents the data that were compiled.

All detected compounds, even if detected only once, were selected for evaluation. For these 19 detected compounds, the minimum and maximum detected levels were identified. Average concentrations were also calculated if there were at least three detected sample concentrations and the majority of reported results were detects. Table 4.4-6 indicates the compounds selected for analysis and the summary concentration data for each compound.

Calculate Total, Dissolved and Particulate Concentrations in Facility Effluent

The concentrations of each compound in the facility effluent in dissolved and particulate phases were calculated from the total measured concentrations according to a screening-level model provided by USEPA (1985):

$$C_{dissolved} = \frac{C_{total}}{[1+(K_{dsw} * TSS * 1E-6)]} \qquad \text{(Equation 4-9)}$$

and

$$C_{particulate} = C_{total} - C_{dissolved} \qquad \text{(Equation 4-10)}$$

where

$C_{dissolved}$	= dissolved concentration in water (μg/L),
C_{total}	= total concentration in water (μg/L),
$C_{particulate}$	= chemical concentration on suspended solids in water (μg/L),
Kdsw	= suspended solids:water partition coefficient (L/kg),
TSS	= total suspended solids concentration (7 mg/L; average in facility effluent), and
1E-6	= conversion factor.

[15] Data provided by M. McCue, Director of Plant Operations, Siemens Water Technologies Corp. May 2007.

The suspended solids:water partition coefficients were identified from recommended USEPA sources (USEPA 2005b, USEPA 2004b, USEPA 1996, and Baes et al. 1984). The partition coefficient was selected taking into account the average pH in the reactivation facility effluent (8.1) for those compounds for which the partition coefficient is pH-dependent (arsenic, barium, cadmium, chromium III and selenium), as described in USEPA's Soil Screening Guidance (USEPA 1996).

The results of these calculations are shown in Table 4.4-7. As indicated in this table, these calculations were performed using two sets of effluent concentrations in order to allow evaluation of both acute and chronic water quality impacts. The maximum single measured value (24-hour or less composite measurement) was conservatively used to model short-term concentrations for comparison to acute criteria or standards. The average concentration was used to model longer-term concentrations for comparison to chronic criteria or standards. Note that long-term concentrations could not be calculated for a number of compounds due to the large percentage of results that were non-detects.

Calculate Incremental Facility Concentrations Resulting From Water Treatment

The change in facility-related concentrations at the CRSSJV was calculated using a mass balance approach, taking into account both the effect of water treatment (particulate and organics removal) and the effect of water flow into the CRSSJV from other sources, as follows:

$$C_{CRSSJVoutfall} = C_{effluent} * (1 - RE) * Q_{facilityeffluent} / Q_{CRSSJVoutfall} \qquad \text{(Equation 4-11)}$$

where

$C_{CRSSJV\ outfall}$ = incremental concentration at CRSSJV outfall (μg/L),
$C_{effluent}$ = concentration in facility effluent (μg/L),
RE = removal efficiency (98%),
$Q_{facility\ effluent}$ = water flow rate into CRSSJV (129,465 gpd), and
$Q_{CRSSJV\ outfall}$ = water flow rate at CRSSJV outfall (708,541 gpd).

The removal efficiency at the CRSSJV was determined from the treatment plant's discharge records for 2005 which showed 98% removal of biological oxygen demand (BOD) and 98% removal of suspended solids. Annual average flow rates for the reactivation facility effluent and the CRSSJV were determined from measurements collected at both locations throughout 2006. As noted above, incremental concentrations at the CRSSJV outfall were calculated separately using short-term and long-term reactivation facility effluent concentrations. Table 4.4-8 presents the calculated concentrations at the CRSSJV outfall due to the incremental contribution from the reactivation facility's effluent.

Repartition Concentrations at Outfall Between Total, Dissolved and Particulate Phases

The concentrations of each compound in the CRSSJV outfall, due to the reactivation facility effluent, were repartitioned between dissolved and particulate phases using the same methodology shown above. The total concentrations in the CRSSJV outfall due to the reactivation facility effluent were calculated by summing the dissolved and particulate phase results shown in Table 4.4-8. These total concentrations were then repartitioned between dissolved and particulate phases taking into account the average pH and suspended solids levels measured at the CRSSJV outfall (7.0 and 3 mg/L, respectively). The resulting concentrations, presented separately for acute and chronic evaluation, are shown in Table 4.4-9.

Compile Ambient Water Quality Standards and Criteria For Selected Compounds

The next step in this evaluation involved compiling Arizona ambient water quality standards (WQS) and the CRSSJV discharge limits for the selected compounds. Arizona WQS for the Colorado River were assumed to be applicable to the CRSSJV outfall, based on similar treatment by USEPA in the CRSSJV's National Pollutant Discharge Elimination System (NPDES) permit. Table 4.4-10 presents the applicable standards and criteria for the selected compounds.

Compare Incremental Reactivation Facility Concentrations to Water Quality Standards

Table 4.4-11 presents the comparison of modeled incremental facility-related concentrations at the CRSSJV outfall to available water quality standards. The results of this screening-level effluent modeling analysis showed that the modeled concentrations in the CRSSJV discharge associated with the reactivation facility effluent were below the most stringent applicable State water quality standards and criteria and the CRSSJV discharge permit limits for all evaluated compounds except selenium. The modeled short-term selenium concentration was below the most stringent acute WQS, however, the modeled long-term average selenium concentration (2.4 μg/L) was marginally above the most stringent chronic criterion (Arizona's chronic WQS of 2 μg/L; the current USEPA ambient water quality criterion for selenium is 5 μg/L). This small difference is well within the bounds of uncertainty associated with the screening-level modeling evaluation and indicates that the modeled result is essentially equivalent to the WQS. Note that the calculated concentration at the outfall was based on the average concentration of selenium in the reactivation facility effluent over the past two years, whereas the effluent concentrations appear to be decreasing over time.

4.4.3.4 CRSSJV Effluent Toxicity Testing

The modeling results described above can be put into context by examining chronic toxicity testing results from the CRSSJV, which provide a more direct evaluation of potential aquatic toxicity of the treatment plant's discharge. Chronic toxicity testing is required to be performed semi-annually on effluent from the CRSSJV. These tests are conducted in January and July, each representing six (6) days of flow-weighted effluent composite samples. Test organisms are the water flea, *Ceriodaphnia dubia* and the fathead minnow, *Pimphales promelas*. Toxicity endpoints are survival and reproduction for *C. dubia* and survival and growth for *P. promelas*. The tests are conducted according to USEPA protocols (USEPA 2002a, 2002b) and include the full range of quality assurance required by the guidelines. Among the many tests conducted from 2001 through 2006, there has been no statistically significant difference between control samples and samples with 100% effluent. On the basis of these tests, it may be concluded that the whole effluent from the CRSSJV possesses no toxicity to aquatic organisms.

4.4.3.5 Potential Fish Ingestion Risks for the Main Drain

The uptake of chemicals from the Main Drain into fish and associated potential human health risks from fish ingestion were also addressed, as requested by USEPA. The compounds evaluated in the fish ingestion risk analysis were those for which average concentrations were calculated at the CRSSJV outfall, due to the incremental contribution from the reactivation facility's effluent. The fish ingestion pathway was evaluated at a downstream location on the Main Drain where fishing may occur and where water flow rate measurements are routinely collected by the U.S. Geological Survey (USGS). In December 2001, USEPA's Region 9 GIS Center prepared a map for a public meeting that displayed three fishing locations on the Main Drain (about 7, 12, and 15.5 miles downstream of the CRSSJV outfall) (USEPA 2001c). The evaluated location in this study was the middle location, which was the only one of the three with detailed water flow rate and drainage canal dimension data (USGS Station # 9428508).

The methods specified in HHRAP were used to calculate fish tissue concentrations, fish ingestion intakes by people assumed to regularly eat fish caught from the Main Drain, and potential excess lifetime cancer risks and the potential for non-cancer health effects. Potential exposures and risks were evaluated for both an adult and a child assumed to regularly ingest fish caught from the Main Drain. In the absence of site-specific data, it was conservatively assumed that 100% of the fish eaten by a person every year for many years would be caught only from the Main Drain (i.e., USEPA's HHRAP default assumption for a subsistence fisher receptor).

Two modifications to USEPA's default methods were incorporated into the calculations to reflect more refined information. USEPA's default selenium bioconcentration factor included in HHRAP was updated to reflect more recent information which shows that diet is an important route of selenium exposure to fish (USEPA 2004c). Older concepts of selenium bioaccumulation assumed that uptake occurred primarily from water. Accordingly, a bioaccumulation factor (BAF) based on field studies (409 L/kg) was developed to reflect the importance of diet to selenium uptake to fish.[16] In addition, the fish ingestion intake for arsenic was adjusted to reflect the fraction of arsenic present in the inorganic form in fish, since most arsenic in fish is present in the non-toxic organic form

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[16] The bioaccumulation factor (BAF) for selenium used in both the stack emissions risk assessment and in this calculation was based on the geometric mean of 12 values reported in dry tissue weight from field studies (USEPA 2004c), adjusted to wet tissue weight following USEPA's HHRAP methodology (assuming a fish moisture content of 0.8 per USEPA (1999) Ecological Risk Screening Protocol). The resulting BAF was 409 (L/kg wet weight). This compares with USEPA's HHRAP default value of 129 (L/kg wet weight), which was based on the geometric mean of 12 laboratory values.

(ATSDR 2005). Field measurements of arsenic in freshwater fish show the fraction inorganic as 0.01-0.125 (ATSDR 2003, USEPA 2003c). The State of Arizona uses a fraction of 0.1 for inorganic arsenic in calculating the State ambient water quality criterion for arsenic for fish consumption.[17] In this analysis, the Arizona value of 0.1 was thus used to adjust the fish ingestion arsenic intakes.

Table 4.4-12 presents the results of the Main Drain fish ingestion risk analysis, and shows all of the input parameters, and exposure and risk calculation equations that were used. Both the excess lifetime cancer risks and the non-cancer hazard quotient values were below USEPA's target health benchmarks. The excess lifetime cancer risks were calculated to be 3E-7 for an adult subsistence fisherman and 4E-8 for a child subsistence fisherman, both assumed to obtain 100% of the fish ingested solely from the Main Drain. These results are 30 or more times below USEPA's target cancer risk level of 1E-5. The compound accounting for essentially all of the cancer risk was arsenic, based on a calculated dissolved concentration in the Main Drain of 0.033 μg/L which is more than 50 times lower than background levels in the Colorado River in the Parker area.[18] The total hazard index values, based on the sum of all hazard quotients regardless of their potentially differing health effects endpoints, were 1E-2 for both an adult and a child, more than 20 times lower than USEPA's target level of 0.25 and 100 times lower than the more common regulatory target level of 1.0.

4.4.3.6 Summary

Based on the evaluation presented above, it can be concluded that the incremental contribution of the facility effluent on the CRSSJV outfall and the Main Drain does not pose unacceptable risks to either aquatic life or human health. The modeled concentrations in the CRSSJV discharge associated with the reactivation facility effluent are below the most stringent applicable State water quality standards and criteria and the CRSSJV discharge permit limits for all evaluated compounds except selenium. The modeled short-term selenium concentration was below the most stringent acute water quality standard (WQS), however, the modeled long-term average selenium concentration (2.4 μg/L) was marginally above the most stringent chronic criterion (Arizona's chronic WQS of 2 μg/L; the current USEPA ambient water quality criterion for selenium is 5 μg/L). This small difference is well within the bounds of uncertainty associated with the screening-level modeling evaluation and indicates that the modeled result is essentially equivalent to the WQS. More importantly, semi-annual toxicity tests performed on the CRSSJV effluent have consistently shown no toxicity to aquatic organisms. Additionally, potential risks due to ingestion of fish caught from the Main Drain associated with the incremental contribution of the facility effluent were all below USEPA target risk levels for both cancer and non-cancer effects.

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[17] Personal communication. Email from S. Pawlowski, Arizona Department of Environmental Quality, to S. Foster, CPF Associates, Inc. May 29, 2007.

[18] The average dissolved arsenic concentration measured in the Colorado River below Parker Dam is 2.1 ug/L, based on 2000-2005 data from USGS Station #09427520.

4.4.4 Worker Health and Safety Evaluation

As indicated in the Workplan, a risk analysis was conducted using methods consistent with those adopted by OSHA and NIOSH in which workplace air concentrations were compared to workplace permissible exposure limits. The worker analysis focused on spent carbon unloading at the outdoor hopper, the activity expected to have the highest potential impacts associated with fugitive air emissions from spent carbon (as described in the review of activities presented in the Workplan). This activity was evaluated using both modeled on-site air concentrations and available employee industrial hygiene air measurements.

It should be noted, however, that the facility has a well-developed worker health and safety program operating in compliance with OSHA. This program includes training, medical monitoring, industrial hygiene sampling and use of personal protective equipment.
For further information on worker health and safety at the facility, the reader is referred to the detailed discussion provided in Section 4.4.4 of the Workplan and the discussion of the personnel training program and procedures used to prevent hazards at the facility in the RCRA Part B permit application (Focus 2007).

4.4.4.1 Modeled On-Site Concentrations

Ambient air concentrations for the worker scenario were calculated using the emission rates already described above for the fugitive emissions source in conjunction with ISCST3 modeling results. The dispersion modeling of this emission source was identical to that described above for stack emissions with two modifications. First, the ISCST3 air dispersion model was run for a set of on-site receptor locations (rather than off-site receptors), evenly spaced at 50 foot increments, to evaluate the on-site occupational scenario. Second, 8-hour average unitized modeling results were calculated (instead of annual and 1-hour averages) in order to evaluate concentrations relative to 8-hour average occupational exposure limits. Appendix D describes the air dispersion modeling in more detail.

The maximum 8-hour average modeling result occurred at the location closest to the hopper (about 10 m or 33 feet north of the hopper) for all five years of modeled meteorological data (2001-2005 datasets). The 8-hour average unit concentrations at this location ranged from 8,586 ug/m^3 per 1 g/sec (2001 meteorological data) to 16,426 ug/m^3 per 1 g/sec (2003 meteorological data). All other 8-hour average concentrations were lower than these maximum values. Chemical-specific concentrations on site were then calculated by multiplying the unitized maximum result (16,426 ug/m^3 per 1 g/sec) by the chemical-specific emission rates. The fugitive emission rates, and the methods used to calculate them, were presented earlier in this report.

4.4.4.2 Evaluation of Modeled Air Concentrations

Table 4.4-13 lists the modeled maximum 8-hour average air concentrations on site for the fugitive emissions source and compares these concentrations to available occupational 8-hour average exposure limits. The occupational exposure limits included Occupational Safety and Health Administration (OSHA) permissible exposure limits (PELs), National

Institute on Occupational Safety and Health (NIOSH) reference exposure limits (RELs) and, if NIOSH RELs were not available, American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values (TLVs).

As can be seen from Table 4.4-13, the modeled on-site maximum 8-hour average air concentrations for the evaluated chemicals were all below the available occupational exposure limits. The modeled concentrations were from 5 to more than 1,000,000 times lower than the corresponding occupational exposure limits. If the results were evaluated collectively, by summing the ratios of concentration to exposure limit across all compounds, the combined results would still be below the exposure limits. The highest result, having modeled concentrations 5-50 times lower than its occupational exposure limit, was for 1,3-butadiene, a compound that was present in only one delivery over the 4-year 2003-2006 period.

Potential on-site concentrations of total and respirable dust were also calculated and compared to occupational exposure limits. The calculated maximum 8-hour average total dust concentration was 2.8E-3 mg/m^3, well below the available occupational exposure limits for total dust identified by OSHA and ACGIH (15 mg/m^3 and 10 mg/m^3, respectively). The calculated maximum 8-hour average respirable dust concentration (based on PM10) was 9.6E-4 mg/m^3, also well below the available occupational exposure limits for respirable dust identified by OSHA and ACGIH (5 mg/m^3 and 3 mg/m^3, respectively).

4.4.4.3 Industrial Hygiene Monitoring

Industrial hygiene (IH) monitoring is conducted each year for a wide variety of organic compounds and dust in air to ensure that adequate personal protective equipment is being used at the facility. The annual IH surveys monitor workplace breathing zone concentrations of organic compounds and particulate matter among workers employed in a variety of tasks at the facility, for example workers unloading and sampling spent carbon containers, lab technicians and facility assistant managers. The results of annual IH surveys for the past 14 years, from 1993 through 2006, found that the air concentrations of regulated chemicals were either below quantitation limits or typically 100 or more times below occupational permissible exposure limits (PELs). The only exception occurred during the December 1999 IH survey when a spent carbon load containing a high level of benzene (roughly 60,000 ppm in spent carbon) was being unloaded at the outdoor hopper H-2. Three of the five personal samples collected during this survey, all from inside the hopper building, had time-weighted-average (TWA) benzene levels equal to or just above the PEL, ranging from 1.0 to 2.2 parts per million in air (ppm) versus the PEL of 1 ppm. The samples were collected from individuals who were working inside the hopper during the spent carbon unloading and who were wearing personal protective equipment, including respirators, in accordance with the facility's worker protection program. Results for the other 15 organic compounds tested during the December 1999 IH survey were all either below the quantification limit or more than 100 times below their corresponding PELs. Benzene results from all other IH air samples collected during the 1993-2006 period were either below the detection limit or well below the PEL.

4.4.4.4 Conclusions

These results indicate that fugitive air emissions during spent carbon unloading at the outdoor hopper, the activity for which potential impacts associated with fugitive emissions from spent carbon are expected to be highest, would not exceed occupational exposure limits in ambient air within the property boundary. These results are supported by many years of industrial hygiene measurements which have consistently shown air concentrations of regulated chemicals, excluding a few samples collected inside the hopper structure, either below quantitation limits or typically 100 or more times below the occupational PELs.

4.5 Discussion of Uncertainties

All risk assessments involve the use of assumptions, judgment and incomplete data to varying degrees. This results in uncertainty in the final estimates of risk. In accordance with standard risk assessment practice, this section of the analysis presents discussions of key uncertainties affecting the risk assessment.

4.5.1 General Review of Uncertainties

The results of any risk assessment inherently reflect uncertainty because of the many complexities involved in the analysis. This risk assessment, for example, involved the integration of many steps, each of which is characterized by some uncertainty. These steps included the following:

- Calculation of chemical emission rates
- Modeling of potential air concentrations and deposition rates associated with chemical emissions
- Calculation of chemical concentrations in the environment (e.g., soil, beef, produce, and fish) using mathematical models in conjunction with many chemical/physical properties and assumed or site-specific information about the environment in the facility area
- Calculation of potential exposures to humans through multiple pathways using a combination of default and site-specific exposure parameters
- Calculation of potential risks using toxicity information derived in some instances from human data but predominantly derived by extrapolation from experimental data produced in animal studies

There are four types of uncertainty generally associated with a risk assessment, as described in HHRAP and based on Finkel (1990):

- Variable uncertainty
- Model uncertainty
- Decision-rule uncertainty
- Variability

Variable uncertainty results from uncertainties in the parameter values used in equations in the risk assessment. These uncertainties may stem from measurement, random or systematic errors associated with the numerical values assigned to input parameters. Variable uncertainty may be reducible through additional research or analysis (i.e., better data). Uncertain variables in a risk assessment include chemical-specific input parameters (e.g., biotransfer factors, cancer slope factors), and parameters describing the physical environment (e.g., characteristics of surface water bodies).

Model uncertainty is associated with models used in the risk assessment. The types of models incorporated into risk assessments include animal models used as surrogates for testing the human toxicity of chemicals, dose-response models used to develop chemical toxicity criteria, chemical property models used to calculate chemical-physical properties for the selected compounds, and fate and transport mathematical models used to calculate environmental concentrations of chemicals (e.g., HHRAP equations, ISCST3). Model uncertainty can stem from use of surrogate variables, excluded variables, abnormal conditions, and incorrect model structure.

Decision-rule uncertainty relates to uncertainties stemming from decisions applied in the risk assessment, including methods used to select chemicals for detailed evaluation, the decision to use USEPA default values in the analysis, the decision to use site-specific information to develop input parameters where information was available, and the decision to use USEPA-specified toxicity criteria to evaluate cancer and non-cancer risks.

Variability is related to variations in physical and biological processes, such as the natural differences in how much people weigh or how much they eat. Variability cannot be reduced by doing additional research but it can be addressed by incorporating information on the range of values that might be present in a population. In this risk assessment, many single point values were used for parameters that are known to vary across the population, and most of these were USEPA default values. Although this means that the risk results do not reflect variability in the population, when considered together the single point values, particularly USEPA's defaults, are expected to be more likely to overestimate risks than underestimate risks.

Table 4.5-1 summarizes some of the key elements of uncertainty associated with this analysis and also indicates whether each is expected to underestimate and/or overestimate potential risks. Discussions are also provided below for some additional topics and assumptions relevant to the risk assessment.

The risk assessment results presented earlier in this report reflect the combination of these potential sources of uncertainty. Collectively, however, the assumptions used in this assessment are considered more likely to overestimate risks than underestimate them.

4.5.2 Calculation of Emission Rates

Chemicals that have not been detected in emissions are sometimes included in combustion source risk assessments to ensure that risks are not underestimated. In this assessment, compounds that were not detected were included at the request of USEPA and, as described in the Workplan, they were evaluated using the common risk assessment practice of assuming they were present at a concentration equivalent to one-half of the reported detection limit. It is, however, uncommon, if not unprecedented, for a combustion source risk assessment to evaluate as many compounds, both detected and not detected, as were considered in this study. The calculation of risk results for over 80 compounds that were not detected adds uncertainty to this study, because these compounds may not actually be present in stack emissions. Overall, the inclusion of so many compounds, including many that were not detected, is considered likely to overestimate risks and unlikely to underestimate risks.

As described in the Workplan, chemical emission rates based on PDT measurements were based on average values across the three test runs. USEPA requested that risks also be considered using emission rates based on the maximum out of the three test runs. This change is only relevant for compounds that were detected in the PDT and for which emission rates were based on PDT results. As noted earlier in this report, the dominant compounds affecting the stack emissions risk assessment results were all evaluated at proposed permit limits, and not based on PDT results (i.e., PCDDs/PCDFs, cadmium, mercury, and chlorine). This alone suggests that the risks would not likely be affected even if maximum emission rates were used instead of averages. Additionally, the emission rates based on PDT results and used in the quantitative risk assessment were compared to the maximum single test run results to determine the potential effect on the calculated risks. This comparison, which was conducted for compounds with emission rates based on PDT measurements, showed that the differences between the average and maximum PDT emission rates ranged from a factor of 1.0 (i.e., no change) to no more than a factor of 3.0. These relatively small differences for compounds that were not risk drivers indicate that the overall risk assessment results would not change if maximum PDT-based emission rates were used rather than averages.

4.5.3 Chemical Concentrations in Spent Carbon

The Workplan indicated that the risk assessment would include a discussion of the representativeness of the spent carbon used during the PDT relative to long-term operating conditions. This issue was examined by developing a profile of the mass-weighted average composition of various organic constituents and metals in the spent carbon received at the facility, based on 2003 through 2006 Toxics Release Inventory (TRI) data. In addition, analytical results from the PDT feed carbon for metals, volatile organics, and semi-volatile organics were averaged across the three test runs and compared to the mass-weighted average carbon profile. The results showed that the concentration of many of the compounds on the PDT feed carbon corresponded well with the mass-weighted average composition based on the TRI data, while other compounds were present on the PDT carbon at concentrations either significantly above or below the mass-weighted average carbon values. For two of the compounds in spent carbon that accounted for the majority of the calculated risks, cadmium and methyl mercury (assessed using elemental mercury in carbon), the concentrations in the PDT feed were higher than the average composition concentrations calculated from the long-term TRI data.

The variation in results from the comparison of the mass-weighted average composition based on the TRI data with the PDT carbon is not unexpected, since the spent carbon fed during the PDT was comprised of the carbon available at the time of testing, and no attempt had been made prior to the test (due primarily to space limitations) to stockpile any particular carbon from specific sources. It was for this very reason that the PDT included the spiking of the feed carbon with principal organic hazardous constituents (POHCs), metals, and a suite of organic surrogate compounds which were believed to represent various classes of compounds and which would likely produce a broad range of combustion by-products and very conservative emissions (i.e., expected to be greater than under typical operating conditions with typical spent carbon).

4.5.4 Examination of Dioxin-Like PCBs

Measurements of specific PCB congeners, compounds believed to have "dioxin-like" properties, were collected during the PDT (Focus 2006).[19] The purpose of this section of the risk assessment is to present an evaluation of the potential impact of the measured dioxin-like PCB congener emissions on the risk assessment results.

The World Health Organization (WHO 1998) has developed toxic equivalency factors (TEFs) for certain dioxin-like PCBs that relate the potential toxicity of each dioxin-like PCB to that of 2,3,7,8-TCDD. For example, the PCB congener 3,4,3',4'-tetrachlorobiphenyl has been assigned a TEF of 0.0001 by WHO, which means that this PCB compound is believed to be 10,000 times less toxic than TCDD. These TEFs, which are also summarized in HHRAP, were used to calculate potential excess lifetime cancer risks for dioxin-like PCBs.

The approach used to perform this evaluation involved several steps. First, emission rates of dioxin-like PCBs based on the PDT were compiled. Second, the potential lifetime average daily dose for each dioxin-like PCB was calculated by multiplying the lifetime average daily dose already calculated for total PCBs by the ratio of the measured PDT emission rate for the dioxin-like PCB divided by the emission rate for total PCBs. The total PCB lifetime average daily dose was based on the receptor and exposure pathway that was found to dominate the risk results for PCDDs/PCDFs (ingestion of fish caught from the Main Drain by an adult). This provided the most conservative indication of the potential impact of dioxin-like PCBs on the risk assessment. The average daily dose for each dioxin-like PCB was then multiplied by its WHO TEF to calculate the TCDD toxic equivalent (TEQ) dose for each dioxin-like PCB. After this, the sum of all the dioxin-like PCB TEQ doses was calculated. Finally, the cancer slope factor for TCDD was multiplied by the total dioxin-like PCB TEQ dose to calculate the associated potential excess lifetime cancer risk. Table 4.5-2 presents the calculations performed for each of these steps.

The resulting excess lifetime cancer risk associated with dioxin-like PCBs was 4.3E-9. This potential risk is eight times lower than the cancer risk already calculated for the fish ingestion pathway for PCDDs/PCDFs (3.6E-8) and negligibly affects the overall results of this risk assessment.

[19] A PCB congener is a single unique chemical compound in the PCB category. There are 209 PCB congeners, of which 12 are considered by USEPA to be dioxin-like compounds.

There are a variety of uncertainties that are associated with this analysis. For example, the assumption that a dioxin-like PCB compound's potency is directly proportional to the potency of 2,3,7,8-TCDD and that this relationship can be quantified based on a TEF. This analysis is also uncertain because it does not account for the differing physicochemical properties of the PCBs that can affect their environmental fate and transport. In addition, many of the PDT test results for dioxin-like PCBs, and PCB homologue groups, were so low that method blank results were significant in relation to the actual sample results, however, no blank corrections were made. Further, a number of the analytical results for these compounds had to be estimated by the laboratory in a manner that is most likely to give an upper bound result (i.e., flagged as an estimated maximum possible concentration). This means that the PDT test results, and the associated dioxin-like PCB excess lifetime cancer risks, are likely to be overestimated.

4.5.5 Total Organic Emissions

This risk assessment evaluated a very large number of specific chemical compounds, and determined not only that the risk results were below target risk levels, but also that over 97% of the cancer risks were due to two compounds (cadmium and PCDDs/PCDFs evaluated as TEQs) and over 91% of the chronic noncancer hazard quotients were due to two other compounds (chlorine and methyl mercury) when all detected compounds were evaluated. When all compounds except for one that was not detected (benzidine) were evaluated, roughly 80% or more of the cancer risks were due to four compounds (cadmium, PCDDs/PCDFs, arsenic and beryllium) and over 85% of the chronic noncancer hazard quotients were due to two other compounds (chlorine and methyl mercury). All of these risk-driving compounds were evaluated at proposed permit limits and two were not detected in PDT stack emissions (arsenic and beryllium).

The dominance of a few compounds on the risk assessment results suggests that other compounds that may be present in stack emissions but which were not quantitatively evaluated in the risk assessment are unlikely to affect the calculated risk results and would not change the overall conclusions of this risk assessment. In order to evaluate this uncertainty further, this section discusses the potential impacts of total organic emissions on the risk assessment results.

During the PDT, total organic emissions were measured for total volatile organic compounds, total semi-volatile organic compounds and total non-volatile organic compounds (Focus 2006). These data were used to derive a total organic emissions (TOE) factor to determine the extent to which emissions of organic compounds not specifically evaluated in the risk assessment might affect the overall risk results. The TOE factor is defined as the ratio of the total organic compound emission rate divided by the sum of the emission rates for organic compounds quantitatively evaluated in the risk assessment. Current methods recommended by USEPA were used to derive this factor, though it should be noted that there are very important uncertainties associated with this practice (USEPA 2005b). In this particular case, a TOE factor of 10 was calculated.[20]

The potential increase in risks associated with the TOE factor was evaluated by examining the excess lifetime cancer risks for the two receptors with the highest cancer risk results (resident receptor R_2 and farmer receptor R_3). The TOE factor was taken into account by assuming that the toxicity of the unidentified organics was the same as the toxicity of all organics that were evaluated, except PCDDs/PCDFs which are in a class by themselves with respect to potential toxicity. The excess lifetime cancer risks for resident receptor R_2 increased by a factor of 1.2 when all detected compounds were considered and a factor of 1.4 when all compounds except benzidine were included (i.e., revised total cancer risks of 9E-8 and 3E-7, respectively). The excess lifetime cancer risks for the farmer receptor R_3 were not affected when all detected compounds were considered and increased by a factor of 1.2 when all compounds except benzidine were included (i.e., an unchanged total cancer risk of 5E-8 and a revised risk of 1E-7, respectively). These results show that total organic emissions that were not evaluated had a negligible effect on the risks already calculated in this report, resulted in risks still well below USEPA target risk levels, and would not change the overall conclusions of this analysis.

4.5.6 Tentatively Identified Compounds and Compounds Without Human Health Toxicity Criteria

Tentatively identified compounds (TICs) in stack emissions were evaluated as part of the PDT. A description of the methods used to identify TICs is provided in the PDT test report (Focus 2006). In general, these methods focused on identifying those TICs present in the largest amounts in the collected stack samples and for which a chemical-specific identification could be made with confidence. In the PDT, 12 compounds were identified as TICs and all of these were selected for consideration in the detailed quantitative risk analysis.

USEPA-approved human health toxicity criteria were, however, not available for the TIC compounds as well as a number of other organics. Of the more than 200 compounds that were selected for detailed evaluation in this risk assessment, a total of 49 did not have chronic toxicity criteria and 17 did not have acute toxicity criteria either in HHRAP or in sources recommended by HHRAP. These compounds are listed in Table 4.5-3, with an indication of whether chronic and/or acute toxicity criteria were lacking.

The potential impact of TICs and other compounds without toxicity criteria on the risk assessment results was addressed by the TOE evaluation presented above. The TOE factor incorporates not only all of the compounds shown in Table 4.5-3 but also other unidentified organics that may potentially be present in stack emissions. The TOE evaluation showed that the overall conclusions of this analysis would not change even if these compounds had been able to be quantitatively evaluated in the risk assessment.

[20] TOE factor = (TOE emission rate from PDT of 7.63E-3 g/sec) / (sum of emission rates of quantitatively evaluated compounds with chronic toxicity criteria of 7.87E-4 g/sec) = 9.7.

4.5.7 Evaluation of Irrigation Water Use

The IRAP software is not programmed to include inputs from irrigation water in calculating soil concentrations within an area. Soil concentrations were used in this assessment not only to calculate risks from soil ingestion, but also as inputs to the calculation of concentrations in other environmental media (e.g., produce, animals). The effect of this programming limitation was evaluated by comparing the chemical loading to agricultural area soil within the farmer receptor area that was included in IRAP (i.e., residential areas with access to irrigation water and within the modeling domain) to the chemical loading estimated to be due to irrigation water used over the same area. The chemical loading to soil addressed in HHRAP, and programmed into IRAP, reflects inputs due to direct deposition onto the ground surface. The loading was calculated based on a compound's emission rate, the unitized deposition modeling results, the fraction of the compound present in vapor and particulate phases, and the area across which deposition occurs. The loading due to irrigation was calculated based on the compound's concentration in irrigation water and the amount of water applied to the same area.

Irrigation water for the CRIT Reservation is withdrawn from the Colorado River above Headgate Rock Dam in Parker. For the purposes of this comparison, concentrations in irrigation water were assumed to be equivalent to those calculated by the IRAP software for the Colorado River within the modeling domain. The loadings to soil in the agricultural area within the modeling domain due to deposition (evaluated in IRAP) and due to irrigation water use were evaluated for three compounds with different characteristics to represent the range of possible differences in loadings. The three compounds were nickel, an inorganic with a fraction vapor of 0, methylene chloride, a volatile organic compound with a fraction vapor of 1.0, and PCBs (treated as Aroclor 1254), with a fraction vapor of 0.993. The results of the calculations for these three compounds showed that the loadings due to the use of irrigation water on soil were well below those already addressed in IRAP due to direct deposition, ranging from 65 times lower for PCBs to over 850 times lower for methylene chloride and nickel. These results indicate that the risks calculated for farmer receptors would not change if chemical loadings due to irrigation water use were included.

4.5.8 Selection of Meat Exposure Pathways

In this risk assessment, ingestion of several types of animal products was evaluated, consisting of beef, chicken, eggs, and pork. Some people in the facility area may, however, raise and eat goat and lamb (Masters 2007), and some may hunt for animals, including mule deer. Because the IRAP program does not include input parameters necessary to evaluate these pathways, they were not included in the quantitative calculations. As a result, an evaluation was conducted to estimate the extent to which risks might be underestimated by not including these exposure pathways.

This evaluation focused on the compound accounting for the majority of risks from the beef ingestion pathway, which was PCDDs/PCDFs with an excess lifetime cancer risk of roughly 2E-8 for the farmer receptor R_3. The total excess lifetime cancer risk for the farmer receptor R_3 across all evaluated pathways and all detected compounds was 5E-8.[21] PCDD/PCDF concentrations in beef were calculated using biotransfer coefficients that are proportional to the fat content of beef (HHRAP default for beef is 19%). The potential for PCDD/PCDF uptake into goat, lamb and venison was evaluated, relative to beef, by identifying the fat content of each of these animal meats (2.3%, 23% and 2.4%, respectively).[22] The differences in fat content indicate that PCDD/PCDF concentrations could be about eight times lower in venison and goat, and about the same in lamb, compared to beef. If fat on processed lamb is trimmed to a greater extent than beef, then concentrations in lamb could be lower than calculated in beef. Assuming that people eat the same amount of each of these meats as beef, the excess lifetime cancer risk for ingestion of all four meat types was calculated by adjusting the beef ingestion pathway risk. This adjustment conservatively assumed that a farmer would ingest not only locally-raised beef, but also locally-raised lamb and goat, and locally-caught deer. The resulting cancer risk was 4.5E-8,[23] approximately two times higher than the beef risk, which would produce a total cancer risk for farmer receptor R_3 of roughly 8E-8. These results are still well below the target cancer risk of 1E-5, indicating that the overall risk assessment results would not be affected by including these additional meat ingestion pathways.

4.5.9 Evaluation of Subsistence Exposure Pathways

In the Workplan development phase of this project, USEPA (2001a) requested that the risk assessment address exposure due to subsistence hunting, agriculture and gathering of plants for cultural practices. This section discusses the potential impact on risks associated with subsistence agriculture and subsistence hunting. Potential risks associated with use of plants for cultural practices was not addressed in this report because the information request process outlined by CRIT for this project specified that confidential tribal practices would be assessed separately by CRIT.

Potential risks associated with subsistence agriculture, which was assumed to apply to both ingestion of homegrown produce as well as home-raised or locally-raised animal meats, were evaluated by assuming that 100% of the produce and animal meats ingested by a resident would be homegrown or locally-raised. As noted earlier in this report, the local Agricultural Extension Agent, with input from colleagues, estimated that residents in the area may ingest, at most, 20% of their produce and animal products from home-raised or locally-raised sources (Masters 2007).

Potential risks under the hypothetical subsistence agriculture scenario were evaluated for all compounds, both detected and not detected, except for benzidine (i.e., Group 2 compounds, see Section 4.4.1.1). Risks were calculated, by re-running the IRAP software, for the resident receptor and the farmer receptor with the highest excess lifetime cancer risks presented earlier in this report (i.e., 2E-7 for resident receptor R_2 and 9E-8 for the farmer

[21] Of the total 5E-8 cancer risk, 58% was due to PCDDs/PCDFs of which 90% was due to beef ingestion. The other dominant compound was cadmium, accounting for 41% of the total, of which 83% was due to inhalation.
[22] U.S. Department of Agriculture Nutrient Database, Release 19. 2006. http://riley.nal.usda.gov/NDL.
[23] Approximated adjusted excess lifetime cancer risk = beef risk 2E-8 + lamb risk 2E-8 + goat risk 2E-8/8 + venison risk 2E-8/8 = 4.5E-8.

receptor R_3). The total excess lifetime cancer risks across all evaluated pathways combined for this subsistence scenario increased by a factor of 1.5, to 3E-7, for the resident receptor R_2, and by a factor of 2.2, to 2E-7, for farmer receptor R_3. These recalculated risks were more than 30 times below the USEPA target cancer risk level of 1E-5, indicating that consideration of a subsistence agriculture scenario would not change the overall results of this risk assessment.

Potential risks for a hypothethical subsistence hunting scenario were evaluated by analogy to the risk results for the beef ingestion pathway for farmer receptor R_3, assuming venison was the subsistence hunted food. As noted above, the risks for farmer receptor R_3, assuming 100% of all produce and animal meats ingested were from local or home sources, was calculated to be 2E-7. The dominant pathway contributing to this result was ingestion of beef (cancer risk of 1.3E-7) and the dominant compounds contributing to the beef risk were PCDDs/PCDFs (cancer risk of 1.2E-7). The analogous cancer risk from PCDDs/PCDFs for 100% ingestion of venison was then calculated to be roughly 1.5E-8, based on the fact that venison has roughly eight times less fat than beef (19% fat in beef / 2.4% fat in venison).[24] Conservatively assuming that all compounds other than PCDDs/PCDFs transfer to venison to the same extent as beef gives a total subsistence venison ingestion cancer risk across all compounds (except benzidine) of roughly 2.5E-8. This result is lower than the risk from 100% beef ingestion and well below USEPA's target risk level, indicating that potential risks from subsistence hunting would not alter the overall findings of this risk assessment.

4.5.10 Evaluation of Facility Effluent on the CRSSJV POTW

The incremental contribution of the facility effluent on chemical concentrations in the CRSSJV outfall and downstream in the Main Drain was evaluated using screening-level mathematical models which introduce uncertainty into this evaluation. Site-specific data were used in the calculations where possible to reduce uncertainty. The available site-specific data included: measurements of chemical concentrations in the facility effluent; measured water flow rates, pH levels and suspended solids levels in the facility effluent and the CRSSJV outfall; and measured water flow rates downstream in the Main Drain.

The analysis focused on a location on the Main Drain downstream of the CRSSJV where detailed water flow measurements and drainage ditch dimension data are collected and publicly available, and where fishing is believed to occur. Detailed local information on fishing behaviors was not available at the time this analysis was conducted and, as a result, it was conservatively assumed that 100% of the fish a person eats (i.e., every fish meal per year for many years) would be obtained solely from the one evaluated location on the Main Drain. This assumption is likely to over-estimate potential risks because people probably fish at a variety of locations, possibly along the Main Drain, possibly in other drains in irrigated areas, and/or in the Colorado River. The location that was evaluated in this analysis was considered likely to reasonably reflect potential risks for a person assumed to fish only from the Main Drain and at the fishing locations identified by USEPA (2001c). At

[24] Approximated risk = 100% PCDD/PCDF beef ingestion risk of 1.2E-7 * (2.4% fat in venison / 19% fat in beef) = 1.5E-8.

more distant locations than that evaluated, Main Drain water flow rates will be higher (and potential fish tissue concentrations lower) while at closer locations, water flow rates will be lower (and potential fish tissue concentrations higher). Chemical concentrations in fish tissue were calculated using a simplified fish uptake mathematical model and primarily using default fish biotransfer values provided in HHRAP, an approach which may over- or under-estimate fish tissue levels.

5.0 ECOLOGICAL RISK ASSESSMENT

An ecological risk assessment was conducted to determine the potential effects of modeled stack air emissions on ecological receptors within the study area. The overall approach was based on the approved Workplan which was developed from USEPA's Guidelines for Ecological Risk Assessment (USEPA 1998b) and USEPA's Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities ("Screening Level Protocol") (USEPA 1999).

As described in the Workplan, this ecological risk assessment was designed to present a screening-level assessment focused on the potential effects of stack emissions on selected representative ecological receptors within the facility area considered to be at greatest risk. It was not intended to be an exhaustive evaluation of wildlife species that may be present or to evaluate all possible ecological receptors or exposure pathways.

5.1 Problem Formulation

Problem formulation is the process by which the receptors, endpoints, and pathways which become the focus of the ecological risk assessment are identified. The foundation of problem formulation is an understanding of the predicted relationships between ecological entities and the chemicals to which they may be exposed. From this foundation, the particular receptors and endpoints to be the focus of the assessment are defined.

The problem formulation step of this project was described in the Workplan. In summary, the problem formulation process resulted in the identification of habitat types considered in the risk assessment, as well as the selection of representative ecological receptors for detailed analysis. The habitat types that were considered consisted of creosote bush scrub, agricultural areas, riparian corridors and backwaters, the Colorado River, and the Main Drain. The receptor species or groups selected for evaluation consisted of aquatic life, plants, the badger, Gambel's quail, the great horned owl, the burrowing owl, the southwestern willow flycatcher, the double-crested cormorant, the Yuma clapper rail and mule deer. Table 5.1-1 summarizes the receptor species and pathways for each habitat type that were selected for evaluation in this risk assessment.

For terrestrial receptors, the assessment endpoint was maintenance of long-term health and reproductive capacity of these populations. The measures of effect (measurement endpoints) for these receptors were alteration of reproduction and survival for wildlife and alteration of survival and growth for plants. For aquatic life, the assessment endpoint was maintenance of species abundance and diversity within the study area aquatic community. The measures of effect were alterations of growth, reproduction, or survival in individual species, or changes in community structure, abundance, or diversity in benthic communities. For endangered or threatened species which were selected as receptors (i.e. Yuma clapper rail), the assessment endpoint was reproduction and survival of individual organisms, rather than the population, as specified by USEPA (2003a).

5.2 Risk Analysis Method

Ecological risks were evaluated using a predictive hazard quotient (HQ) approach. In this approach, exposures were calculated for each receptor species or group and then compared to receptor group toxicity reference values (TRVs). This section describes the selection of compounds for the ecological risk assessment, then presents a toxicity assessment, an exposure assessment, an analysis of potential risks, and a discussion of uncertainties.

5.2.1 Selection of Chemicals for Evaluation

Chemicals of potential concern (COPCs) were selected for consideration in the risk assessment in Section 4.1.1 of this report. These compounds were selected based on the results of the PDT and based on their potential to be present in spent carbon.

Starting with the comprehensive COPC list from Section 4.1.1 of more than 225 compounds, available TRVs were identified both from USEPA's 1999 Screening Level Protocol and by referring to the toxicological data sources listed in the Workplan. Compounds for which TRVs were available were quantitatively evaluated in the ecological risk assessment. Compounds without TRVs from the referenced data sources were discussed qualitatively in the uncertainties section.

5.2.2 Toxicity Assessment

A variety of toxicological data sources were consulted to identify TRVs for each selected receptor. TRVs are the estimated dose or exposure level at which no adverse effects are expected to occur. In general, TRVs were obtained from USEPA's Screening Level Protocol or, in the absence of data from this report, from standards, criteria, guidance, or ecological benchmarks from the data sources listed in the Workplan.[25] Consistent with the selected receptor species and groups, available TRVs were compiled for birds, mammals, plants, and aquatic life (surface water and sediment). The TRVs for terrestrial wildlife were based on toxicity studies in which effects on reproduction or survival are measured, since these endpoints are relevant to an assessment of population level effects. For aquatic life, TRVs were based on toxicity studies that examine alterations in growth, reproduction, or survival in individual species, or changes in community structure, abundance, or diversity in benthic species.

As noted in the Workplan, PCDDs/PCDFs were evaluated using a TRV based on 2,3,7,8-TCDD and TEFs for fish and wildlife. These TEFs, which are listed in the Workplan, were applied to express PCDD/PCDF concentrations or doses as 2,3,7,8-TCDD toxic equivalents (TEQs). The TEQs were then summed to calculate the total concentration or dose of 2,3,7,8-TCDD equivalents for each receptor species or group. More information describing the evaluation of PCDD/PCDF mixtures is provided in Appendix M.

[25] CEPA (2002), AZDEQ (2003), USEPA (1996b, 1999, 2003d, 2005d, 2007b), Sample et al. (1996), Schafer et al. (1983), Schafer and Bowles (1985), EC (2000), Efroymson et al. 1997), Mayer and Ellersieck (1986), NOAA (2006), and MacDonald (2000).

5.2.3 Exposure Assessment

Exposures were calculated for each of the selected receptors in each of the selected habitats described above. Exposure point concentrations (EPCs) for environmental media (i.e., sediment, surface water, plants and soil) were calculated using the mathematical equations presented in HHRAP, and implemented using the IRAP software. The air dispersion, deposition, and fate and transport modeling conducted to support the human health risk assessment was also used in the ecological risk assessment to calculate the annual average EPC of each chemical in each habitat as a result of stack emissions. The EPCs were evaluated, either in direct comparisons with TRVs for terrestrial plant receptors and aquatic community receptors, or as inputs to food chain calculations for specific mammalian and avian receptors.

Exposures of selected mammalian and avian receptors were expressed as dosages (mg/kg bw) using food chain models conducted according to the methods recommended in the Screening Level Protocol. The food items and environmental media considered in the food chain analysis for each mammalian and avian receptor are shown in Table 5.2-1. Exposure factors for each receptor (e.g., amount and types of food ingested) were then compiled from the published literature for the specific receptors evaluated in this study, as shown in Table 5.2-2. A discussion of the food chain calculation methods is provided in Appendix M.

Chemical concentrations in food items evaluated in the food chain analyses were obtained either from the IRAP software output (i.e., plant and fish tissue concentrations) or calculated from environmental media concentrations using bioaccumulation factors to estimate tissue concentrations in prey items (i.e., invertebrates and small mammals). The bioaccumulation factors were obtained from values compiled by USEPA in the Screening Level Protocol where available. For compounds not addressed specifically in the Screening Level Protocol, the bioaccumulation factors were derived following the methods outlined in the Screening Level Protocol. One modification to the default bioaccumulation factors in the Screening Level Protocol was made for PCDDs/PCDFs for the Yuma clapper rail. The bioaccumulation factors for invertebrates, the food source for the Yuma clapper rail, that were used in the food chain evaluation for this receptor were developed by USEPA to be generically representative of benthic invertebrates. A detailed assessment of prey of the Yuma Clapper Rail in Arizona and California by the U.S. Fish and Wildlife Service (USFWS 2000) found, however, that the bird's primary prey is crayfish and small fish. Analyses of the stomach contents of 16 Yuma clapper rails collected in the Colorado River area above Laguna Dam[26] found that 94.7% (by volume) of the contents was comprised of crayfish (USFWS 2000). Rather than rely on USEPA's default sediment-to-benthic invertebrate bioconcentration factors (BCFs) for PCDDs/PCDFs, which are based on a 1978 non-specific regression equation (Southworth et al. 1978), recently published literature was reviewed to identify a sediment-to-benthic invertebrate BCF specific to crayfish based on experimental data for the Yuma Clapper Rail food chain analysis (Currie et al. 2000). Appendix M provides additional discussion of the bioaccumulation factors used in the food chain analyses.

[26] Laguna Dam is located about 13 miles northeast of Yuma, Arizona and about 100 miles south of Parker, Arizona.

5.2.4 Risk Estimation and Description

The potential for ecological risks was quantified using an HQ approach in which exposures were compared to receptor-specific TRVs. An HQ is the ratio of predicted exposure to predicted toxicity. In general, hazard quotients less than 1 indicate that adverse effects from chemical-specific exposures are unlikely, whereas hazard quotients greater than one indicate adverse effects are possible. As directed by USEPA Region 9 (USEPA 2003a) during the Workplan development, this screening-level assessment used an HQ threshold of 0.25, rather than 1.0, to initially characterize the potential for risks.

Potential cumulative toxicity was assessed by summing the HQs for all chemicals, regardless of differences in the mechanism of action of the various compounds, to calculate a hazard index (HI). To be consistent with USEPA Region 9 guidance, the very conservative 0.25 target level was also applied to the HI as an initial step. Most other USEPA regions and states use a target level of 1.0 for evaluating HQ and HI results in ecological risk assessments.

If an HI for all compounds is above 1.0, or above 0.25, this does not mean that adverse ecological effects will occur (for example, because of the safety factors that are incorporated in the TRVs). Rather it indicates that HI values should be recalculated for groups of compounds that act via a similar mechanism of action or the hazard quotient values for those compounds producing an HI above a target level should be examined in more detail. If the HI for compounds with similar mechanisms of action is below 1.0, then adverse health effects are not expected to occur. Even if the HI for compounds with similar mechanisms of action is above 1.0, this does not automatically mean that adverse health effects will occur; rather, this type of result means that there is an increased chance that adverse ecological effects might occur. In this case, further research should be conducted to evaluate the potential for ecological effects.

A summary of all the HI values calculated for receptor species or groups, for all the evaluated habitat areas, is presented in Table 5.2-3. The detailed chemical-specific results are provided in Appendix M. The cumulative HI values were not only below a target of 1.0, but also below the very conservative 0.25 ecological target risk level specified by USEPA Region 9 for this project. Concentrations in surface water and sediment were found to be more than 800 times lower than the 0.25 target hazard index level. Concentrations in plants ranged from just below the 0.25 target level to more than 400 times lower than the 0.25 target level. Exposures to selected bird species were found to be at least five times lower than the 0.25 target level. Finally, exposures to the evaluated mammal species were determined to be at least 5,000 times below the 0.25 target level. These results indicate that adverse ecological effects from exposure to stack emissions are not expected to occur for the evaluated receptors.

Although the results were all below the very conservative 0.25 USEPA Region 9 target level, the data were examined to identify those compounds with the highest HQ results. The highest HQ result was calculated for plants in the creosote bush scrub area, based entirely on one compound which was thallium (HQ=0.18). Thallium was not detected in the PDT and was not detected in any monthly composite spent carbon samples tested from 2003 through

June 2006. It was evaluated in the risk assessment using a stack emission rate derived from its reported detection limit in the PDT. In addition, the TRV for thallium identified in the Screening Level Protocol and used in this analysis incorporates an uncertainty factor of 100. These factors all indicate that the results for thallium are expected to be overestimated. The next highest HQ results were calculated for the double-crested cormorant in the Main Drain exposure area (HQ=0.05) and for the southwestern willow flycatcher in the riparian corridor area (HQ=0.03). These results, while at least five times below a 0.25 target level and 20 times below the more commonly used target level of 1.0, were due to one compound, methyl mercury. As described earlier in the human health risk assessment section of this report, mercury was evaluated in this risk assessment using a permit limit-based emission rate that was about 15 times higher than the measured PDT emission rate. This means that the ecological risk assessment results would be 15 times lower if measured emission rates were used in this analysis.

5.2.5 Discussion of Uncertainties

This section discusses uncertainties associated with the data, calculations, and assumptions specific to the ecological risk assessment. Awareness of important uncertainties involved in the risk assessment is critical to interpreting and understanding the potential risks calculated in this analysis.

5.2.5.1 Selection of Compounds for Detailed Evaluation

Many of the compounds identified for consideration in the ecological risk assessment did not have TRVs available from the data sources consulted (see above), and thus were not quantitatively evaluated. The number of TRVs that were available ranged from about 30 TRVs for birds to roughly 80 TRVs for surface water. This uncertainty could potentially under-estimate ecological risks. On the other hand, the chemicals with TRVs included those compounds generally considered to be of most concern to ecological receptors, such as PCDDs/PCDFs and other compounds with a high bioaccumulation potential, as well as selected inorganic compounds and methyl mercury.

5.2.5.2 Food Chain Models

The food chain model incorporated conservative assumptions in calculating potential exposures which is expected to overestimate potential risks. The screening level risk calculation incorporated the following conservative (i.e., protective) assumptions: a bioavailability from all ingested items of 100%, a body weight based on the low end of the receptor's weight range which results in higher calculated food ingestion rates, an exposure period assumed to occur during the most sensitive receptor life stage, the assumption that each individual species in a community or class-specific guild would be equally exposed, the assumption that 100% of ingested food items and environmental media were potentially contaminated, and the assumption that receptors spend their entire life cycles in the evaluated local habitat areas. The collective impact of these assumptions is expected to be an overestimation of potential exposures and associated risks.

Dietary parameters used in the food chain calculations (e.g., body weight, food intake rate, sediment ingestion rates) were based on literature values. For example, based on the scientific literature, it was assumed that the great horned owl's diet would consist entirely of small mammals, specifically the white-footed mouse. It was also assumed that chemical concentrations modeled in small mammals would be representative of concentrations found in any of the other prey items owls typically consume. It was further assumed that the environmental media concentrations were not high enough to affect viability of the prey populations or viability of vegetation, thus impacting the availability of food. In reality, there will be considerable variability in prey and foraging habits, which could add uncertainty to the ecological risk assessment, and may under- or over-estimate risk.

5.2.5.3 Exposure Point Concentrations

The ecological risk calculations relied on maximum annual concentrations associated with stack emissions, thereby conservatively assuming that the each receptor was exposed to the highest annual concentrations over their full life cycle. This assumption may overestimate potential exposures and associated risks.

Plant concentrations were used in the food chain analyses to represent potential concentrations in foods that may be eaten by the herbivores, Gambel's quail and mule deer. The plant concentrations output from the IRAP software based on the USEPA guidance and used in the calculations were for homegrown produce, rather than the specific plant types that may be ingested by these receptors. This may introduce some uncertainty into the exposure point concentrations. For example, differences in plant yields may affect chemical concentrations calculated in plants due to direct deposition, since these concentrations, as calculated by HHRAP methods, are inversely proportional to plant yields. Thus the lower plant yields characteristic of plants that may be ingested by the quail and mule deer, relative to produce, could possibly result in higher plant concentrations than were used in the food chain analyses. This approach could potentially underestimate food chain exposures and associated risks. The HQ results for Gambel's quail and mule deer, however, were more than 2,000 times below the target level, indicating that this uncertainty will not alter the overall risk assessment results.

Fish tissue concentrations used in the food chain analysis for the cormorant were calculated from the IRAP software for fish at the top of the aquatic food web (i.e., trophic level 4 fish). This approach may overestimate concentrations in fish species ingested by the cormorant since the cormorant will commonly feed on invertebrates and a wide variety of fish from varying trophic levels.

USEPA Region 9 requested that the ecological risk assessment discuss the influence of monsoons on chemical fate and transport. The monsoon season in southern Arizona usually occurs from roughly mid-June through mid-September and is associated with elevated humidity, a reversal of cyclonic wind patterns and severe thunderstorms that are often accompanied by strong winds and short periods of blowing dust.[27] Over the 15-year period

[27] www.wrh.noaa.gov/psr/general/monsoon/; http://www.public.asu.edu/~aunjs/asuclim_files/azclim.doc; www.ag.arizona.edu/maricopa/garden/html/weather/monsoon.htm;

from 1993-2007, seven thunderstorm and high wind events were recorded by the National Weather Service in Parker and all of these occurred between late June and late August.[28] The chemical fate and transport modeling methods provided by USEPA for combustion source risk assessments, and which were applied in this ecological risk assessment calculate long-term exposure point concentrations to be consistent with the TRVs, and cannot address the short-term impacts associated with brief climate events such as monsoons. This adds uncertainty to the risk assessment results. For example, during a monsoon, stack emissions will be dispersed in the air to a much greater extent than modeled in this study, short periods of intense rainfall could produce higher water flow rates than modeled in this study, and surface soil could become suspended and redistributed during periods of high winds. In general, environmental conditions that enhance mixing such as monsoons are considered more likely to reduce rather than increase potential long-term environmental concentrations due to stack emissions. This uncertainty could only be addressed through very refined site-specific modeling.

5.2.5.4 Toxicity Reference Values

Toxicity reference values for the selected species and communities were based on default values identified by USEPA in the Screening Level Protocol or obtained from standards, criteria, databases or literature noted in the Workplan or recommended by USEPA (1999). In general, TRVs are a major source of uncertainty in an ecological risk assessment. The results of different studies from which TRVs may be obtained often vary by several orders of magnitude, depending on various forms of the chemical, test species, and test endpoints. The sensitivity of receptors in the exposure areas may be different than the sensitivity of species used in tests reported in the literature. Assumptions about the similarity of the chemical speciation between laboratory tests and site conditions must also be made in the absence of speciation analyses. This is a source of uncertainty, since toxicity may vary with the form of the chemical in the environment. Thus, the actual toxicities of chemicals evaluated in this ecological risk assessment could be higher or lower than indicated by the TRVs. On the other hand, many of the TRVs used in this analysis incorporate uncertainty factors which provide an added margin of safety.

5.2.5.5 Dioxin-Like PCBs

The potential impact of emissions of dioxin-like dioxin-like PCBs on the ecological risk results was evaluated using PCB toxic equivalency factors (TEFs) for fish, birds and wildlife developed by the World Health Organization (WHO 1998). The emission rate of each dioxin-like PCB from the PDT was multiplied by the WHO TEFs to calculate the toxic equivalent (TEQ) emission rate for each dioxin-like PCB. These TEQ emission rates were then summed to provide a total TEQ emission rate for all dioxin-like PCBs combined. The resulting total dioxin-like PCB TEQ emission rates using the fish, bird and wildlife TEFs were all determined to be well below the total PCDD/PCDF TEQ emission rate evaluated in the risk assessment, by at least a factor of 35. Since the highest PCDD/PCDF hazard quotient based on the PCDD/PCDF emissions was calculated to be more than 80 times

[28] http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms

below the conservative 0.25 target level, these findings demonstrate that dioxin-like PCBs would not result in risks to fish, birds or wildlife.

5.2.5.6 Desert Tortoise

The desert tortoise receptor was selected for evaluation in the ecological risk assessment, as described in the Workplan, but no TRVs were identified from a search of available toxicity data sources for tortoises or turtles. As a result, potential risks to the desert tortoise are evaluated in this section, by qualitatively discussing factors relevant to the health status of the desert tortoise and the potential for these factors to be adversely affected by SWT facility stack emissions.

As described by the Nevada Fish and Wildlife Service, "Based on more than 40 years of data, we know that tortoises are directly and indirectly impacted by natural as well as human-caused activities. These threats include disease, predation, expanding development, off-highway vehicles, invasion of non-native grasses and weeds, fire, collection, poachers, sheep & cattle grazing, mining, and drought. At this point, there is not one threat that seems to impact tortoises more than another. It is, rather, an accumulation of threats that are taking a toll. Drought, disease, predation, mining, grazing, and off-highway vehicles all impact tortoises." [29]

TRVs are not available for the desert tortoise or any (even remotely related) reptilian species for the compounds considered in this study. Desert tortoises are herbivorous feeding on grasses, herbs, cacti, and some shrubs. Previous research performed by CPF (Chrostowski and Durda 1991) showed that the primary impact of environmental pollution on the desert tortoise was through phytotoxicity that diminished the availability of forage plants. To the extent that this risk assessment shows no impact of stack emissions on plants in general, there is not likely to be an impact on the desert tortoise.

[29] http://www.fws.gov/nevada/desert_tortoise/dt_threats.html

6.0 QUALITY ASSURANCE PROCEDURES

Risk assessments use data from many different sources in numerous mathematical equations. A multiple-chemical, multiple-pathway combustion source risk assessment, such as this one, generally includes thousands of individual calculations using dozens of input parameters. As a result, a quality assurance (QA) program is an important element in the risk assessment process.

For this project, the QA program included evaluation of input data for accuracy and traceability, documentation of the study process, retention of documents containing data and calculations, and independent QA of calculations by trained scientists who did not conduct the aspects of work they reviewed.

The fate and transport modeling, and exposure and risk assessment calculations for stack and fugitive air emissions, which accounted for the bulk of this study, were performed using the IRAP software. The IRAP software, which was created by Lakes Environmental based on USEPA's HHRAP methodology, relies on quality-assured programmed calculations which incorporate USEPA-specified chemical-specific data and USEPA default input parameters. The program was originally tested and verified in conjunction with USEPA, and the current 2005 version has also been independently verified by Lakes. This software has been widely used in the U.S. (e.g., most USEPA Regions and several states).

Additional QA was conducted for calculations that were independent of the IRAP program (e.g., chemical emission rates, evaluation of wastewater discharge from the facility to the Joint Venture, and QA of inputs entered into the IRAP program). The QA effort for the air dispersion and deposition modeling included an independent review of the input parameters (e.g., building dimensions, emission source input parameters), selected model options, conversions from English to Metric units, and model output files.

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TABLES

Table 4.1-1
List of Selected Chemicals for Detailed Evaluation in the Stack Emissions Risk Assessment

Constituent	CAS NO.	Potentially Present in Spent Carbon (a) (√ /N)	PDT Methods: Included in Stack Sampling Analysis (√ / X) (c)	PDT Results: Detected in Stack Samples (Y/ND/--)	Spiked During PDT (√) (% total feed from spiked material) (d)	Selected as Chemical for Evaluation (√ /N)
Inorganic Compounds						
Aluminum	7429-90-5	N	√	Y		√
Antimony	7440-36-0	√	√	ND		√
Arsenic	7440-38-2	√	√	ND		√
Barium	7440-39-3	√	√	Y		√
Beryllium	7440-41-7	√	√	ND		√
Cadmium	7440-43-9	√	√	Y		√
Chromium (III)	7440-47-3	√	√	Y	√ (96%)	√
Chromium VI (Cr6+)	18540-29-9	√	√	Y		√
Cobalt	7440-48-4	√	√	ND		√
Copper	7440-50-8	√	√	Y		√
Lead [b]	7439-92-1	√	√	Y	√ (97%)	√
Manganese	7439-96-5	√	√	Y		√
Mercury (divalent)	7487-94-7	√	√	Y		√
Mercury (elemental)	7439-97-6	√	√	Y		√
Mercury (methyl)	22967-92-6	N	X	-- compound created after emission)		√
Nickel	7440-02-0	√	√	Y		√
Selenium	7782-49-2	√	√	Y		√
Silver	7440-22-4	√	√	Y		√
Thallium	7440-28-0	√	√	ND		√
Vanadium	7440-62-2	√	√	ND		√
Zinc	7440-66-6	√	√	Y		√
Organic Compounds						
1,1,1-Trichloroethane	71-55-6	√	√	ND		√
1,1,2,2-Tetrachloroethane	79-34-5	√	√	ND		√
1,1,2-Trichloroethane	79-00-5	√	√	ND		√
1,1-Dichloroethane	75-34-3	√	√	ND		√
1,1-Dichloroethene	75-35-4	√	√	ND		√
1,1-Dichloropropene	563-58-6	NC	√+	ND		√
1,2,3-Trichlorobenzene	87-61-6	NC	√+	ND		√
1,2,3-Trichloropropane	96-18-4	√	√	ND		√
1,2,4-Trichlorobenzene	120-82-1	N	√	ND		√
1,2,4-Trimethylbenzene	95-63-6	√	√ (TIC)	ND		√
1,2-Dibromo-3-chloropropane	96-12-8	N	√	ND		√
1,2-Dibromoethane (ethylene dibromide)	106-93-4	√	√	ND		√
1,2-Dichlorobenzene	95-50-1	√	√	ND		√
1,2-Dichloroethane	107-06-2	√	√	Y		√
1,2-Dichloroethene	540-59-0	√	√	-- (data provided for cis- and trans-isomers)		N (evaluated separately as the individual isomers)
1,2-Dichloroethene (cis)	156-59-2	√	√	Y (*)		√
1,2-Dichloroethene (trans)	156-60-5	√	√	ND		√
1,2-Dichloropropane	78-87-5	√	√	ND		√
1,2-Diphenylhydrazine	122-66-7	NC	√+	ND		√
1,3,5-Trimethylbenzene	108-67-8	NC	√+	ND		√
1,3-Dichlorobenzene	541-73-1	√	√	ND		√
1,3-Dichloropropane	142-28-9	NC	√+	ND		√
1,3-Dichloropropene (cis)	10061-01-5	NC	√+	ND		√

Table 4.1-1
List of Selected Chemicals for Detailed Evaluation in the Stack Emissions Risk Assessment

Constituent	CAS NO.	Potentially Present in Spent Carbon (a) (√ /N)	PDT Methods: Included in Stack Sampling Analysis (√ / X) (c)	PDT Results: Detected in Stack Samples (Y/ND/--)	Spiked During PDT (√) (% total feed from spiked material) (d)	Selected as Chemical for Evaluation (√ /N)
1,3-Dichloropropene (trans)	10061-02-6	NC	√+	ND		√
1,3-Dinitrobenzene	99-65-0	N	√	ND		√
1,4-Dichlorobenzene	106-46-7	√	√	ND		√
1-Butanol	71-36-3	√	√ (TIC)	--		N (not reported in spent carbon during 1997-2007)
1-Hexane (n-hexane)	110-54-3	√	√ (TIC)	--		√
2,2'-oxybis (1-Chloropropane)	108-60-1	N	√	ND		√
2,2-Dichloropropane	594-20-7	NC	√+	ND		√
2,3,4,6-Tetrachlorophenol	58-90-2	√	√ (TIC)	--		N (not reported in spent carbon during 1997-2007)
2,4,5-Trichlorophenol	95-95-4	N	√	ND		√
2,4,6-Trichlorophenol	88-06-2	N	√	ND		√
2,4-Dichlorophenol	120-83-2	N	√	ND		√
2,4-Dimethylphenol	105-67-9	N	√	ND		√
2,4-Dinitrophenol	51-28-5	N	√	ND		√
2,4-Dinitrotoluene	121-14-2	N	√	ND		√
2,5-Dimethylfuran	625-86-5	NC	√+	Y (TIC)		√
2,5-Dimethylheptane	2216-30-0	NC	√+	Y (TIC)		√
2,5-Dione, 3-hexene	17559-81-8	NC	√+	Y (TIC)		√
2,6-Dinitrotoluene	606-20-2	N	√	ND		√
2-Butanol	78-92-2	√	X	--		N (not reported in spent carbon during 1997-2007)
2-Butanone (methyl ethyl ketone)	78-93-3	N	√	ND		√
2-Butoxyethanol	111-76-2	√	X	--		N (not reported in spent carbon during 1997-2007)
2-Chloronaphthalene	91-58-7	N	√	ND		√
2-Chlorophenol	95-57-8	N	√	ND		√
2-Chlorotoluene	95-49-8	NC	√+	ND		√
2-Ethyl-1-methylbenzene	611-14-3	√	√ (TIC)	--		N (not reported in spent carbon during 1997-2007)
2-Hexanone	591-78-6	N	√	ND		√
2-Methoxy-1-propanol	1589-47-5	√	X	--		N (not reported in spent carbon during 1997-2007)
2-Methyl octane	3221-61-2	NC	√+	Y (TIC)		√
2-Nitroaniline	88-74-4	N	√	ND		√
2-Nitrophenol	88-75-5	N	√	ND		√
3,3'-Dichlorobenzidine	91-94-1	N	√	ND		√
3-Ethyl benzaldehyde	34246-54-3	NC	√+	Y (TIC)		√
3-Hexen-2-one	763-93-9	NC	√+	Y (TIC)		√
3-Nitroaniline	99-09-2	N	√	ND		√

Table 4.1-1
List of Selected Chemicals for Detailed Evaluation in the Stack Emissions Risk Assessment

Constituent	CAS NO.	Potentially Present in Spent Carbon (a) (√ /N)	PDT Methods: Included in Stack Sampling Analysis (√ / X) (c)	PDT Results: Detected in Stack Samples (Y/ND/--)	Spiked During PDT (√) (% total feed from spiked material) (d)	Selected as Chemical for Evaluation (√ /N)
3-Penten-2-one (ethylidene acetone)	625-33-2	NC	√+	Y (TIC)		√
3-Penten-2-one, 4-methyl	141-79-7	NC	√+	Y (TIC)		√
4,4'-DDD	72-54-8	N	√	Y (*, COL)		√
4,4'-DDE	72-55-9	N	√	Y (*)		√
4,4'-DDT	50-29-3	N	√	Y (*, COL)		√
4,6-Dinitro-2-methylphenol	534-52-1	N	√	ND		√
4-Bromophenyl-phenyl ether	101-55-3	N	√	ND		√
4-Chloro-3-methylphenol	59-50-7	N	√	ND		√
4-Chloroaniline	106-47-8	N	√	ND		√
4-Chlorophenyl-phenyl ether	7005-72-3	N	√	ND		√
4-Chlorotoluene	106-43-4	NC	√+	ND		√
4-Ethyl benzaldehyde	4748-78-1	NC	√+	Y (TIC)		√
4-Ethyl-1-methylbenzene	622-96-8	√	√ (TIC)	--		N (not reported in spent carbon during 1997-2007)
4-Nitroaniline	100-01-6	N	√	ND		√
4-Nitrophenol	100-02-7	N	√	ND		√
9-Octadecenamide (oleamide)	301-02-0	NC	√+	Y (TIC)		√
Acenaphthene	83-32-9	√	√	Y (B)		√
Acenaphthylene	208-96-8	√	√	Y		√
Acetone	67-64-1	√	√	Y (B)		√
Acetophenone	98-86-2	NC	√+	Y		√
Acrylic Acid	79-10-7	√	X	--		√
Acrylonitrile	107-13-1	√	√	ND		√
Aldrin	309-00-2	√	√	ND		√
Aniline	62-53-3	√	√	ND		√
Anthracene	120-12-7	N	√	Y		√
Benzaldehyde	100-52-7	NC	√+	Y		√
Benzene	71-43-2	√	√	Y		√
Benzidine	92-87-5	NC	√+	ND		√
Benzo(a)Anthracene	56-55-3	√	√	Y		√
Benzo(a)pyrene	50-32-8	N	√	Y (B)		√
Benzo(b)fluoranthene	205-99-2	√	√	Y (B)		√
Benzo(e)pyrene	192-97-2	N	√	Y (B)		√
Benzo(g,h,i)perylene	191-24-2	N	√	Y		√
Benzo(k)fluoranthene	207-08-9	N	√	Y		√
Benzoic Acid	65-85-0	N	√	ND		√
Benzoic acid, methyl ester (methyl benzoate)	93-58-3	NC	√+	Y (TIC)		√
Benzonitrile	100-47-0	NC	√+	ND		√
Benzyl alcohol	100-51-6	N	√	ND		√
BHC, alpha (α-hexachlorocyclohexane)	319-84-6	N	√	Y (*)		√
BHC, beta (β-hexachlorocyclohexane)	319-85-7	N	√	Y (COL)		√
BHC, delta (δ-hexachlorocyclohexane)	319-86-8	√	√	Y (COL)		√
BHC, gamma (Lindane; γ-hexachlorocyclohexane)	58-89-9	N	√	ND		√

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List of Selected Chemicals for Detailed Evaluation in the Stack Emissions Risk Assessment

Constituent	CAS NO.	Potentially Present in Spent Carbon (a) (√ /N)	PDT Methods: Included in Stack Sampling Analysis (√ / X) (c)	PDT Results: Detected in Stack Samples (Y/ND/--)	Spiked During PDT (√) (% total feed from spiked material) (d)	Selected as Chemical for Evaluation (√ /N)
Bis(2-chloroethoxy) methane	111-91-1	N	√	ND		√
Bis-(2-chloroethyl) ether	111-44-4	N	√	ND		√
Bis(2-ethylhexyl) phthalate	117-81-7	N	√	Y		√
Bromobenzene	108-86-1	NC	√+	ND		√
Bromochloromethane	74-97-5	N	√	ND		√
Bromodichloromethane	75-27-46	√	√	Y		√
Bromoform (tribromomethane)	75-25-2	N	√	Y		√
Bromomethane	74-83-9	N	√	Y (B)		√
Butane	106-97-8	√	√	--		N (not reported in spent carbon during 1997-2007)
Butyl Acetate	123-86-4	√	X	--		N (not reported in spent carbon during 1997-2007)
Butylbenzene, n-	104-51-8	NC	√+	ND		√
Butylbenzene, sec	135-98-8	NC	√+	ND		√
Butylbenzene, tert	98-06-6	NC	√+	ND		√
Butylbenzylphthalate	85-68-7	N	√	ND		√
Carbazole	86-74-8	NC	√+	ND		√
Carbon Disulfide	75-15-0	N	√	Y		√
Carbon Tetrachloride	56-23-5	√	√	Y		√
Chlordane - mixed isomers	57-74-9	N	√	-- (data provided for individual isomers)		√ (evaluated based on the sum of results for individual isomers)
Chlordane, cis (α-chlordane)	5103-71-9	N	√	Y (*, COL)		N (evaluated as mixed chlordane)
Chlordane, trans (β-chlordane)	5103-74-2	N	√	ND		N (evaluated as mixed chlordane)
Chlorine	7782-50-5	N	√	Y	√ (from several compounds)	√
Chlorobenzene	108-90-7	√	√	Y (E)	√ (>99%)	√
Chlorobenzilate	510-15-6	N	√	Y (*, COL)		√
Chlorodibromomethane	124-48-1	N	√	Y		√
Chloroethane	75-00-3	√	√	ND		√
Chloroform	67-66-3	√	√	Y		√
Chloromethane	74-87-3	√	√	Y		√
Chrysene	218-01-9	√	√	Y (B)		√
Cresol	1319-77-3	√	√	-- (data provided for o- and m&p-cresols)		N (evaluated separately as the individual isomers)
Cresol, m&p (3-/4-Methylphenol)	108-39-4 & 106-44-5	√	√	ND		√
Cresol, o- (2-Methylphenol)	95-48-7	√	√	ND		√
Cumene (Isopropylbenzene)	98-82-8	√	√ (TIC)	Y (*)		√

Table 4.1-1
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Constituent	CAS NO.	Potentially Present in Spent Carbon (a) (√ /N)	PDT Methods: Included in Stack Sampling Analysis (√ / X) (c)	PDT Results: Detected in Stack Samples (Y/ND/--)	Spiked During PDT (√) (% total feed from spiked material) (d)	Selected as Chemical for Evaluation (√ /N)
Diallate	2303-16-4	N	√	ND		√
Dibenzo(a,h)anthracene	53-70-3	N	√	ND		√
Dibenzofuran	132-64-9	√	√	ND		√
Dibromomethane	74-95-3	N	√	ND		√
Dichlorodifluoromethane	75-71-8	N	√	Y		√
Dicyclopentadiene	77-73-6	√	√ (TIC)	--		N (not reported in spent carbon during 1997-2007)
Dieldrin	60-57-1	N	√	ND		√
Diethyl phthalate	84-66-2	N	√	ND		√
Dimethylphthalate	131-11-3	N	√	ND		√
Di-n-butylphthalate	84-74-2	N	√	ND		√
Di-n-octyl phthalate	117-84-0	N	√	ND		√
Dioxane (1,4)	123-91-1	√	√	--		√
Diphenylamine	122-39-4	N	√	ND		√
Endosulfan I	959-98-8	N	√	ND		√
Endosulfan II	33213-65-9	N	√	Y (*, COL)		√
Endosulfan sulfate	1031-07-8	N	√	ND		√
Endrin	72-20-8	N	√	ND		√
Endrin aldehyde	7421-93-4	N	√	Y (B, COL)		√
Endrin ketone	53494-70-5	N	√	ND		√
Ethanol	64-17-5	√	X	--		N (not reported in spent carbon during 1997-2007)
Ethyl Acetate	141-78-6	√	X	--		N (not reported in spent carbon during 1997-2007)
Ethylbenzene	100-41-4	√	√	Y		√
Ethylene Glycol	107-21-1	√	X	--		√
Fluoranthene	206-44-0	√	√	Y (B)		√
Fluorene	86-73-7	N	√	Y (B)		√
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	76-13-1	√	√	ND		√
Heptachlor	76-44-8	N	√	Y (COL)		√
Heptachlor epoxide	1024-57-3	N	√	Y (COL)		√
Hexachlorobenzene	118-74-1	N	√	ND		√
Hexachlorobutadiene	87-68-3	N	√	ND		√
Hexachlorocyclo-pentadiene	77-47-4	N	√	ND		√
Hexachloroethane	67-72-1	N	√	ND		√
Hydrogen chloride	7647-01-0	N	√	Y	√ (from several compounds)	√
Indeno(1,2,3-cd)pyrene	193-39-5	N	√	Y (B)		√
Iodomethane	74-88-4	N	√	Y (B)		√
Isobutane	75-28-5	√	X	--		N (not reported in spent carbon during 1997-2007)

Table 4.1-1
List of Selected Chemicals for Detailed Evaluation in the Stack Emissions Risk Assessment

Constituent	CAS NO.	Potentially Present in Spent Carbon (a) (√ /N)	PDT Methods: Included in Stack Sampling Analysis (√ / X) (c)	PDT Results: Detected in Stack Samples (Y/ND/--)	Spiked During PDT (√) (% total feed from spiked material) (d)	Selected as Chemical for Evaluation (√ /N)
Isodrin	465-73-6	N	√	--		N (not reported in spent carbon during 1997-2007; not in spent carbon)
Isopar C		√	X	--		N (not reported in spent carbon during 1997-2007)
Isophorone	78-59-1	N	√	ND		√
Isopropyl Alcohol	67-63-0	√	X	--		N (not reported in spent carbon during 1997-2007)
Isopropyl toluene, p-	99-87-6	NC	√+	ND		√
Methanol	67-56-1	√	X	--		N (not reported in spent carbon during 2003-2006)
Methoxychlor	72-43-5	√	√	ND		√
Methyl Isobutyl ketone (4-methyl-2-pentanone)	108-10-1	√	X	Y (*)		√
Methyl methacrylate	80-62-6	√	√ (TIC)	--		√
methyl tert-butyl ether	1634-04-4	√	X	--		√
Methylene chloride	75-09-2	√	√	Y	√ (>99%)	√
Methylnaphthalene	1321-94-4	√	√	-- (data provided for 2-methyl naphthalene)		N (2-methylnaphthalene was evaluated)
Methylnaphthalene, 2-	91-57-6	√	√	Y (B)		√
Naphthalene	91-20-3	√	√	Y (B)	√ (>99%)	√
Nitrobenzene	98-95-3	√	√	ND		√
N-nitrosodimethylamine	62-44-2	N	√	ND		√
N-Nitroso-di-n-propylamine	621-64-7	N	√	ND		√
N-Nitrosodiphenylamine	86-30-6	N	√	ND		√
Pentachlorobenzene	608-93-5	N	√	ND		√
Pentachloronitrobenzene	82-68-8	N	√	ND		√
Pentachlorophenol	87-86-5	√	√	ND		√
Perylene	198-55-0	N	√	Y (*, B)		√
Phenanthrene	85-01-8	√	√	Y (*, B)		√
Phenol	108-95-2	√	√	ND		√
Phosphine imide, P,P,P-triphenyl	2240-47-3	NC	√+	Y (TIC)		√
Polychlorinated biphenyls	1336-36-3	√	√	Y		√
Propylbenzene, n-	103-65-1	√	√ (TIC)	ND		√
Propylene glycol monomethyl ether acetate	107-98-2	√	X	--		N (not reported in spent carbon during 1997-2007)
Propylene oxide	75-56-9	√	X	--		√
Pyrene	129-00-0	N	√	Y (B)		√
Pyridine	110-86-1	NC	√+	ND		√
Styrene	100-42-5	√	√	ND		√

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Tetrachlorobenzene, 1,2,4,5-	95-94-3	NC	√+	ND		√
Tetrachloroethane, 1,1,1,2-	630-20-6	√	√	Y (*)		√
Tetrachloroethylene	127-18-4	√	√	Y (E)	√ (>99%)	√
Tetrahydrofuran	109-99-9	√	√ (TIC)	ND		√
Toluene	108-88-3	√	√	Y	√ (>99%)	√
Toxaphene	8001-35-2	N	√	--		N (not reported in spent carbon during 1997-2007; not in spent carbon)
Trichloroethylene	79-01-6	√	√	Y		√
Trichlorofluoromethane	75-69-4	√	√	Y (*)		√
Triethylamine	121-44-8	√	√ (TIC)	--		N (not reported in spent carbon during 1997-2007)
Tris(hydroxymethyl) aminomethane	77-86-1	√	N	--		N (not reported in spent carbon during 1997-2007)
Vinyl Acetate	108-05-4	N	√	ND		√
Vinyl Chloride	75-01-4	√	√	Y (*)		√
Xylene, o-	95-47-6	√	√	Y (*)		√
Xylenes (mixed isomers)	1330-20-7	√	√	Y		√
Xylenes, m&p-	108-38-3 & 106-42-3	√	√	Y		√
PCDDs/PCDFs (Dioxins and Furans)						
2,3,7,8-TCDD	1746-01-6	N	√	Y (EMPC)		√
Total TCDD	NA	N	√	Y (EMPC)		N (only 2,3,7,8 congeners are evaluated)
2,3,7,8-TCDF	51207-31-9	N	√	Y (EMPC)		√
Total TCDF	NA	N	√	Y (EMPC)		N (only 2,3,7,8 congeners are evaluated)
1,2,3,7,8-PeCDD	40321-76-4	N	√	Y		√
Total PeCDD	NA	N	√	Y (EMPC)		N (only 2,3,7,8 congeners are evaluated)
1,2,3,7,8-PeCDF	57117-41-6	N	√	Y (EMPC)		√
2,3,4,7,8-PeCDF	57117-31-4	N	√	Y (EMPC)		√
Total PeCDF	NA	N	√	Y (EMPC)		N (only 2,3,7,8 congeners are evaluated)
1,2,3,6,7,8-HxCDD	57653-85-7	N	√	Y (EMPC)		√
1,2,3,4,7,8-HxCDD	39227-28-6	N	√	Y (EMPC)		√
1,2,3,7,8,9-HxCDD	19408-74-3	N	√	Y		√
Total HxCDD	NA	N	√	Y (EMPC)		N (only 2,3,7,8 congeners are evaluated)

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List of Selected Chemicals for Detailed Evaluation in the Stack Emissions Risk Assessment

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1,2,3,6,7,8-HxCDF	57117-44-9	N	√	Y (EMPC)		√
1,2,3,4,7,8-HxCDF	70648-26-9	N	√	Y (EMPC)		√
1,2,3,7,8,9-HxCDF	72918-21-9	N	√	Y (B, EMPC)		√
2,3,4,6,7,8-HxCDF	60851-34-5	N	√	Y (B)		√
Total HxCDF	NA	N	√	Y (B, EMPC)		N (only 2,3,7,8 congeners are evaluated)
1,2,3,4,6,7,8-HpCDD	35822-46-9	N	√	Y (B)		√
Total HpCDD	NA	N	√	Y (B)		N (only 2,3,7,8 congeners are evaluated)
1,2,3,4,6,7,8-HpCDF	67562-39-4	N	√	Y (B, EMPC)		√
1,2,3,4,7,8,9-HpCDF	55673-89-7	N	√	Y (EMPC)		√
Total HpCDF	NA	N	√	Y (B, EMPC)		N (only 2,3,7,8 congeners are evaluated)
Total OCDD	3268-87-9	N	√	Y (B, EMPC)		√
Total OCDF	39001-02-0	N	√	Y (B, EMPC)		√
Polychlorinated Biphenyls						
3,4,3',4'-Tetrachlorobiphenyl (IUPAC 77)	32598-13-3	NoDa	√	Y (EMPC)		√ (b)
3,4,4',5-tetrachlorobiphenyl (IUPAC 81)	70362-50-4	NoDa	√	Y (*, EMPC)		√ (b)
2,3,4,3',4'-Pentachlorobiphenyl (IUPAC 105)	32598-14-4	NoDa	√	Y (B, EMPC)		√ (b)
2,3,4,5,4'-Pentachlorobiphenyl (IUPAC 114)	74472-37-0	NoDa	√	Y (*, EMPC)		√ (b)
2,4,5,3',4'-Pentachlorobiphenyl (IUPAC 118)	31508-00-6	NoDa	√	Y (B, EMPC)		√ (b)
3,4,5,2',4'-Pentachlorobiphenyl (IUPAC 123)	65510-44-3	NoDa	√	Y (B, *, EMPC)		√ (b)
3,4,5,3',4'-Pentachlorobiphenyl (IUPAC 126)	57465-28-8	NoDa	√	Y (EMPC)		√ (b)
2,3,4,5,3',4'-Hexachlorobiphenyl (IUPAC 156)	38380-98-4	NoDa	√	Y (C, EMPC)		√ (b)
2,3,4,3',4',5'-Hexachlorobiphenyl (IUPAC 157)	68782-90-7	NoDa	√	Y (C, EMPC)		√ (b)
2,4,5,3',4',5'-Hexachlorobiphenyl (IUPAC 167)	52663-72-6	NoDa	√	Y (EMPC)		√ (b)
3,4,5,3',4',5'-Hexachlorobiphenyl (IUPAC 169)	32774-16-6	NoDa	√	ND		√ (b)

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2,3,4,5,3',4',5'-Heptachlorobiphenyl (IUPAC 189)	39635-31-9	NoDa	√	ND		√ (b)
Criteria Pollutants, Carbon Monoxide, and Total Particulate Matter						
Carbon Monoxide gas	630-08-0	N	√	Y		N (Addressed in PDT)
Nitrogen oxides	10102-44-0 & 10024-97-2	N	√	--		√
Total particulate matter (TSP)	NA	N	√	Y		N (Addressed in PDT)
Sulfur dioxide	7446-09-5	N	√	--		√

Notes:

-- = the compound was not analyzed for or not identified in the PDT sample results
* = the compound was detected very infrequently, in only one or two of the sampled fractions, from the three replicate runs
√ = yes
√+ = new compound; included in PDT sampling and analysis but not originally identified in the 2003 Workplan
√ (TIC) = compound was evaluated in the PDT analysis as a tentatively identified compound
B = one or more sample fraction results from one or more of the three replicate runs were affected by method blank contamination
C = co-eluting PCB isomer
COL = there was a greater than 40% difference between primary and confirmatory columns in one or more sample fraction results from one or more of the three replicate runs; reported result should be considered estimated.
DRE = destruction and removal efficiency
E = one or more sample fraction results from one or more of the three replicate runs exceeded the calibration range
EMPC = one or more of the front or back half sample results from one or more of the three replicate runs were an
N = No
NC = new compound; not identified in the 2003 Workplan, but included in the PDT results
ND = not detected in any sample fraction from any of the three replicate runs
NoDa = No Data
PDT = Performance Demonstration Test (consisted of three replicate runs evaluating "worst-case" operating conditions)
TIC = tentatively identified compound
X = not included in PDT analysis
Y = yes; detected in one or more sample fractions from at least one of the three replicate runs

(a) Source: Risk Assessment Workplan - Identification of compounds based on: 1) "Spent Carbon Feed Metal Results Summary", monthly composites, July 1994 - July 2001. 2) TRI information 1998 through 2000. 3) RCRA Part B Permit Application, November 1995, Table C-2.

(b) These co-planar PCB congeners are addressed in the discussion of uncertainties section of the risk assessment.

(c) Compounds included in PDT sampling program based on analyte lists and PDT results provided by Focus Environmental.

(d) Determined by Focus from PDT report based on average concentration in spent activated carbon feed, an average spent carbon feed rate of 3,049 lb/hr during the test, and average spiked feed rates.

Table 4.2-1
Chemical Emission Rates for Reactivation Furnace Stack

Compound	CAS Number	Stack Emission Rate Used in Risk Assessment (g/sec)	Emission Rate Basis	PDT Results: Detected in Stack Samples (Y or ND)	Additional Emission Rate Information
Inorganic Compounds					
Aluminum	7429-90-5	1.15E-04	PDT	Y	
Antimony	7440-36-0	3.89E-06	PDT	ND	
Arsenic	7440-38-2	1.26E-04	permit limit (a)	ND	PDT emission rate = 3.73E-06 g/sec
Barium	7440-39-3	9.01E-06	PDT	Y	
Beryllium	7440-41-7	1.26E-04	permit limit (a)	ND	PDT emission rate = 2.01E-07 g/sec
Cadmium	7440-43-9	3.12E-04	permit limit (b)	Y	PDT emission rate = 9.11E-06 g/sec
Chromium	7440-47-3	1.26E-04	permit limit (a)	Y	PDT emission rate (chromium was spiked) = 3.54E-05 g/sec
Chromium, hexavalent	18540-29-9	5.80E-06	PDT	Y	
Cobalt	7440-48-4	5.82E-07	PDT	ND	
Copper	7440-50-8	1.19E-04	PDT	Y	
Lead	7439-92-1	3.12E-04	permit limit (b)	Y	PDT emission rate (lead was spiked) = 3.83E-04 g/sec
Manganese	7439-96-5	4.61E-05	PDT	Y	
Mercuric chloride	7487-94-7	3.43E-5 (2.3E-5) (c)	permit limit (c)	Y	PDT emission rate = 2.20E-06 g/sec
Mercury, elemental	7439-97-6	1.35E-4 (1.34E-6) (c)	permit limit (c)	Y	PDT emission rate = 8.60E-06 g/sec
Nickel	7440-02-0	9.91E-06	PDT	Y	
Selenium	7782-49-2	3.76E-06	PDT	Y	
Silver	7440-22-4	2.73E-06	PDT	Y	
Thallium	7440-28-0	9.24E-06	PDT	ND	
Vanadium	7440-62-2	2.43E-06	PDT	ND	
Zinc	7440-66-6	1.51E-04	PDT	Y	
Organic Compounds					
1,1,1-Trichloroethane	71-55-6	2.78E-07	PDT	ND	
1,1,2,2-Tetrachloroethane	79-34-5	1.32E-06	PDT	ND	
1,1,2-Trichloroethane	79-00-5	8.02E-07	PDT	ND	
1,1-Dichloroethane	75-34-3	3.09E-07	PDT	ND	
1,1-Dichloroethene	75-35-4	3.52E-07	PDT	ND	
1,1-Dichloropropene	563-58-6	2.15E-07	PDT	ND	
1,2,3-Trichlorobenzene	87-61-6	1.73E-06	PDT	ND	
1,2,3-Trichloropropane	96-18-4	1.25E-06	PDT	ND	
1,2,4-Trichlorobenzene	120-82-1	9.30E-07	PDT	ND	
1,2,4-Trimethylbenzene	95-63-6	6.26E-07	PDT	ND	
1,2-Dibromo-3-chloropropane	96-12-8	2.60E-06	PDT	ND	
Ethylene dibromide	106-93-4	1.32E-06	PDT	ND	
1,2-Dichlorobenzene	95-50-1	8.43E-07	PDT	ND	
1,2-Dichloroethane	107-06-2	5.05E-07	PDT	Y	
1,2-Dichloroethene (cis)	156-59-2	4.17E-07	PDT	Y (*)	
1,2-Dichloroethene (trans)	156-60-5	2.89E-07	PDT	ND	
1,2-Dichloropropane	78-87-5	3.98E-07	PDT	ND	
1,2-Diphenylhydrazine	122-66-7	7.00E-07	PDT	ND	
1,3,5-Trimethylbenzene	108-67-8	4.05E-07	PDT	ND	
1,3-Dichlorobenzene	541-73-1	8.86E-07	PDT	ND	
1,3-Dichloropropane	142-28-9	3.77E-07	PDT	ND	
1,3-Dichloropropene	542-75-6	7.58E-07	PDT	ND	Emission rate is based on the sum of reported PDT results for (cis) + (trans) dichloropropene (10061-01-5 & 10061-02-6).
1,3-Dinitrobenzene	99-65-0	1.08E-06	PDT	ND	
1,4-Dichlorobenzene	106-46-7	1.00E-06	PDT	ND	
1-Hexane (n-hexane)	110-54-3	7.98E-10	FR&DRE	--	
2,2'-oxybis (1-Chloropropane)	108-60-1	9.72E-07	PDT	ND	
2,2-Dichloropropane	594-20-7	2.79E-07	PDT	ND	
2,4,5-Trichlorophenol	95-95-4	1.61E-06	PDT	ND	
2,4,6-Trichlorophenol	88-06-2	1.27E-06	PDT	ND	
2,4-Dichlorophenol	120-83-2	1.30E-06	PDT	ND	
2,4-Dimethylphenol	105-67-9	3.09E-06	PDT	ND	
2,4-Dinitrophenol	51-28-5	9.15E-06	PDT	ND	
2,4-Dinitrotoluene	121-14-2	1.32E-06	PDT	ND	
2,5-Dimethylfuran	625-86-5	8.43E-07	PDT	Y (TIC)	
2,5-Dimethylheptane	2216-30-0	1.68E-05	PDT	Y (TIC)	
2,5-Dione, 3-hexene	17559-81-8	9.53E-07	PDT	Y (TIC)	
2,6-Dinitrotoluene	606-20-2	1.06E-06	PDT	ND	
Methyl ethyl ketone	78-93-3	4.51E-06	PDT	ND	
2-Chloronaphthalene	91-58-7	6.53E-07	PDT	ND	
2-Chlorophenol	95-57-8	8.60E-07	PDT	ND	
2-Chlorotoluene	95-49-8	5.10E-07	PDT	ND	
2-Hexanone	591-78-6	1.88E-06	PDT	ND	
2-Methyl octane	3221-61-2	3.98E-06	PDT	Y (TIC)	
2-Methylnaphthalene	91-57-6	5.79E-08	PDT	Y (B)	
Cresol, o-	95-48-7	2.09E-06	PDT	ND	
2-Nitroaniline	88-74-4	1.04E-06	PDT	ND	

Table 4.2-1
Chemical Emission Rates for Reactivation Furnace Stack

Compound	CAS Number	Stack Emission Rate Used in Risk Assessment (g/sec)	Emission Rate Basis	PDT Results: Detected in Stack Samples (Y or ND)	Additional Emission Rate Information
2-Nitrophenol	88-75-5	1.77E-06	PDT	ND	
3,3'-Dichlorobenzidine	91-94-1	4.96E-06	PDT	ND	
Cresol, m-	108-39-4	9.15E-07	PDT	ND	Value is one-half of the PDT emission rate for m&p cresol (1.83E-06 g/sec).
Cresol, p-	106-44-5	9.15E-07	PDT	ND	Value is one-half of the PDT emission rate for m&p cresol (1.83E-06 g/sec).
3-Ethyl benzaldehyde	34246-54-3	2.38E-06	PDT	Y (TIC)	
3-Hexen-2-one	763-93-9	1.14E-04	PDT	Y (TIC)	
3-Nitroaniline	99-09-2	2.91E-06	PDT	ND	
Ethylidene acetone (3-penten-2-one)	625-33-2	4.83E-06	PDT	Y (TIC)	
3-Penten-2-one, 4-methyl	141-79-7	9.30E-05	PDT	Y (TIC)	
4,4'-DDD	72-54-8	1.31E-07	PDT	Y (*, COL)	
4,4'-DDE	72-55-9	4.47E-08	PDT	Y (*)	
4,4'-DDT	50-29-3	3.34E-08	PDT	Y (*, COL)	
4,6-Dinitro-2-methylphenol	534-52-1	4.37E-06	PDT	ND	
4-Bromophenyl-phenyl ether	101-55-3	6.71E-07	PDT	ND	
4-Chloro-3-methylphenol	59-50-7	2.17E-06	PDT	ND	
4-Chloroaniline	106-47-8	4.17E-06	PDT	ND	
4-Chlorophenyl-phenyl ether	7005-72-3	1.11E-06	PDT	ND	
4-Chlorotoluene	106-43-4	4.42E-07	PDT	ND	
4-Ethyl benzaldehyde	4748-78-1	1.30E-06	PDT	Y (TIC)	
4-Nitroaniline	100-01-6	2.34E-06	PDT	ND	
4-Nitrophenol	100-02-7	2.92E-06	PDT	ND	
9-Octadecenamide	301-02-0	2.52E-06	PDT	Y (TIC)	
Acenaphthene	83-32-9	4.48E-09	PDT	Y (B)	
Acenaphthylene	208-96-8	8.11E-09	PDT	Y	
Acetone	67-64-1	6.14E-05	PDT	Y (B)	
Acetophenone	98-86-2	3.41E-06	PDT	Y	
Acrylic Acid	79-10-7	1.80E-11	FR&DRE	--	
Acrylonitrile	107-13-1	1.10E-05	PDT	ND	
Aldrin	309-00-2	2.45E-08	PDT	ND	
Aniline	62-53-3	7.19E-06	PDT	ND	
Anthracene	120-12-7	1.28E-08	PDT	Y	
Benzaldehyde	100-52-7	4.90E-06	PDT	Y	
Benzene	71-43-2	2.59E-06	PDT	Y	
Benzidine	92-87-5	4.68E-05	PDT	ND	
Benzo(a)Anthracene	56-55-3	2.84E-09	PDT	Y	
Benzo(a)pyrene	50-32-8	3.58E-09	PDT	Y (B)	
Benzo(b)fluoranthene	205-99-2	2.94E-08	PDT	Y (B)	
Benzo(e)pyrene	192-97-2	5.35E-09	PDT	Y (B)	
Benzo(g,h,i)perylene	191-24-2	1.13E-08	PDT	Y	
Benzo(k)fluoranthene	207-08-9	5.43E-09	PDT	Y	
Benzoic Acid	65-85-0	2.81E-05	PDT	ND	
Benzoic acid, methyl ester	93-58-3	8.07E-07	PDT	Y (TIC)	
Benzonitrile	100-47-0	1.87E-06	PDT	ND	
Benzyl alcohol	100-51-6	2.09E-05	PDT	ND	
Bis(2-chloroethoxy) methane	111-91-1	8.34E-07	PDT	ND	
Bis-(2-chloroethyl) ether	111-44-4	8.14E-07	PDT	ND	
Bis(2-ethylhexyl) phthalate	117-81-7	1.69E-05	PDT	Y	
Bromobenzene	108-86-1	5.00E-07	PDT	ND	
Bromochloromethane	74-97-5	1.52E-06	PDT	ND	
Bromodichloromethane	75-27-4	5.44E-06	PDT	Y	
Bromoform (tribromomethane)	75-25-2	1.38E-05	PDT	Y	
Bromomethane (methyl bromide)	74-83-9	4.72E-06	PDT	Y (B)	
Butylbenzene, n-	104-51-8	6.09E-07	PDT	ND	
Butylbenzene, sec-	135-98-8	4.89E-07	PDT	ND	
Butylbenzene, tert-	98-06-6	5.80E-07	PDT	ND	
Butylbenzylphthalate	85-68-7	1.08E-06	PDT	ND	
Carbazole	86-74-8	9.83E-07	PDT	ND	
Carbon Disulfide	75-15-0	1.24E-06	PDT	Y	
Carbon Tetrachloride	56-23-5	6.77E-07	PDT	Y	
Chlorine	7782-50-5	3.60E-02	permit limit (f)	Y	PDT emission rate (chlorine was spiked) = 1.88E-03 g/sec
Chlorobenzene	108-90-7	2.58E-04	PDT	Y (E)	
Chlorobenzilate	510-15-6	1.17E-07	PDT	Y (*, COL)	
Chlorodibromomethane	124-48-1	1.08E-05	PDT	Y	
Chloroethane	75-00-3	1.32E-06	PDT	ND	
Chloroform	67-66-3	8.24E-06	PDT	Y	
Chloromethane (methyl chloride)	74-87-3	2.41E-05	PDT	Y	

Table 4.2-1
Chemical Emission Rates for Reactivation Furnace Stack

Compound	CAS Number	Stack Emission Rate Used in Risk Assessment (g/sec)	Emission Rate Basis	PDT Results: Detected in Stack Samples (Y or ND)	Additional Emission Rate Information
Chrysene	218-01-9	1.10E-08	PDT	Y (B)	
Cumene (Isopropylbenzene)	98-82-8	3.64E-07	PDT	Y (*)	
Diallate	2303-16-4	6.27E-06	PDT	ND	
Dibenzo(a,h)anthracene	53-70-3	4.67E-10	PDT	ND	
Dibenzofuran	132-64-9	1.06E-06	PDT	ND	
Dibromomethane	74-95-3	1.28E-06	PDT	ND	
Dichlorodifluoromethane (methylene bromide)	75-71-8	3.83E-06	PDT	Y	
Dieldrin	60-57-1	1.17E-08	PDT	ND	
Diethyl phthalate	84-66-2	1.01E-06	PDT	ND	
Dimethylphthalate	131-11-3	6.71E-07	PDT	ND	
Di-n-butylphthalate	84-74-2	3.71E-06	PDT	ND	
Di-n-octyl phthalate	117-84-0	1.42E-06	PDT	ND	
Dioxane (1,4)	123-91-1	8.91E-11	FR&DRE	--	
Diphenylamine	122-39-4	1.05E-06	PDT	ND	
Endosulfan I	959-98-8	1.31E-08	PDT	ND	Evaluated in risk assessment as endosulfan which is included in HHRAP (CAS #115-29-7)
Endosulfan II	33213-65-9	2.67E-08	PDT	Y (*, COL)	
Endosulfan sulfate	1031-07-8	1.52E-08	PDT	ND	
Endrin	72-20-8	4.79E-08	PDT	ND	
Endrin aldehyde	7421-93-4	5.83E-08	PDT	Y (B, COL)	
Endrin ketone	53494-70-5	1.72E-08	PDT	ND	
Ethylbenzene	100-41-4	3.13E-07	PDT	Y	
Ethylene Glycol	107-21-1	1.25E-07	FR&DRE	--	
Fluoranthene	206-44-0	4.90E-08	PDT	Y (B)	
Fluorene	86-73-7	1.26E-08	PDT	Y (B)	
Freon 113	76-13-1	3.33E-07	PDT	ND	
Heptachlor	76-44-8	4.31E-08	PDT	Y (COL)	
Heptachlor epoxide	1024-57-3	2.46E-08	PDT	Y (COL)	
Hexachlorobenzene	118-74-1	1.00E-06	PDT	ND	
Hexachlorobutadiene	87-68-3	1.12E-06	PDT	ND	
Hexachlorocyclo-pentadiene	77-47-4	7.53E-06	PDT	ND	
Hexachloroethane	67-72-1	1.39E-06	PDT	ND	
Hydrogen chloride	7647-01-0	1.60E-01	permit limit (f)	Y	PDT emission rate (chlorine was spiked) = 4.30E-02 g/sec
Indeno(1,2,3-cd)pyrene	193-39-5	5.08E-09	PDT	Y (B)	
Iodomethane	74-88-4	1.97E-06	PDT	Y (B)	
Isophorone	78-59-1	7.96E-07	PDT	ND	
Isopropyl toluene, p-	99-87-6	5.10E-07	PDT	ND	
Methoxychlor	72-43-5	5.38E-08	PDT	ND	
Methyl Isobutyl ketone (4-methyl-2-pentanone)	108-10-1	2.25E-06	PDT	Y (*)	
Methyl methacrylate	80-62-6	5.50E-09	FR&DRE	--	
methyl tert-butyl ether	1634-04-4	8.16E-08	FR&DRE	--	
Methylene chloride	75-09-2	1.74E-05	PDT	Y	
Naphthalene	91-20-3	3.58E-06	PDT	Y (B)	
Nitrobenzene	98-95-3	7.87E-07	PDT	ND	
N-nitrosodimethylamine	62-75-9	9.21E-07	PDT	ND	
N-Nitroso-di-n-propylamine	621-64-7	9.63E-07	PDT	ND	
N-Nitrosodiphenylamine	86-30-6	7.90E-07	PDT	ND	
Pentachlorobenzene	608-93-5	8.83E-07	PDT	ND	
Pentachloronitrobenzene	82-68-8	1.04E-06	PDT	ND	
Pentachlorophenol	87-86-5	1.55E-05	PDT	ND	
Perylene	198-55-0	1.34E-08	PDT	Y (*, B)	
Phenanthrene	85-01-8	1.51E-07	PDT	Y (*, B)	
Phenol	108-95-2	1.14E-06	PDT	ND	
Phosphine imide, P,P,P-triphenyl	2240-47-3	1.06E-06	PDT	Y (TIC)	
PCBs as Aroclor 1254 (d)	11097-69-1	2.34E-08	PDT	Y	
Propylbenzene, n-	103-65-1	4.15E-07	PDT	ND	
Propylene oxide	75-56-9	1.00E-09	FR&DRE	--	
Pyrene	129-00-0	4.93E-08	PDT	Y (B)	
Pyridine	110-86-1	1.85E-06	PDT	ND	
Styrene	100-42-5	2.89E-07	PDT	ND	
Tetrachlorobenzene, 1,2,4,5-	95-94-3	9.55E-07	PDT	ND	
Tetrachloroethane, 1,1,1,2-	630-20-6	2.68E-07	PDT	Y (*)	
Tetrachloroethylene	127-18-4	1.12E-04	PDT	Y (E)	
Tetrahydrofuran	109-99-9	4.59E-06	PDT	ND	
Toluene	108-88-3	1.18E-05	PDT	Y	
Trichloroethylene	79-01-6	2.63E-06	PDT	Y	
Trichlorofluoromethane (Freon 11)	75-69-4	1.27E-06	PDT	Y (*)	

Table 4.2-1
Chemical Emission Rates for Reactivation Furnace Stack

Compound	CAS Number	Stack Emission Rate Used in Risk Assessment (g/sec)	Emission Rate Basis	PDT Results: Detected in Stack Samples (Y or ND)	Additional Emission Rate Information
Vinyl Acetate	108-05-4	1.52E-06	PDT	ND	
Vinyl Chloride	75-01-4	6.75E-07	PDT	Y (*)	
Xylene, o-	95-47-6	3.70E-07	PDT	Y (*)	
Xylene, m-	108-38-3	5.80E-07	PDT	Y	Value is one-half of the PDT emission rate for xylenes, m & p (1.16E-06 g/sec).
Xylene, p-	106-42-3	5.80E-07	PDT	Y	Value is one-half of the PDT emission rate for xylenes, m & p (1.16E-06 g/sec).
BHC, alpha-	319-84-6	2.14E-08	PDT	Y (*)	
Chlordane	57-74-9	5.97E-08	PDT	Y (*, COL) (alpha); ND (beta)	Emission rate is based on the sum of reported PDT results for (cis) + (trans) chlordane (CAS #5103-71-9 & 5103-74-2).
BHC, beta-	319-85-7	5.53E-08	PDT	Y (COL)	
BHC, gamma- (lindane)	58-89-9	1.17E-08	PDT	ND	
BHC, delta-	319-86-8	4.97E-08	PDT	Y (COL)	
PCDDs/PCDFs (Dioxins and Furans)					
2,3,7,8-TCDD	1746-01-6	4.37E-11	permit limit (e)	Y (EMPC)	PDT emission rate = 1.06E-11 g/sec
2,3,7,8-TCDF	51207-31-9	4.20E-10	permit limit (e)	Y (EMPC)	PDT emission rate = 1.02E-10 g/sec
1,2,3,7,8-PeCDD	40321-76-4	1.16E-10	permit limit (e)	Y	PDT emission rate = 2.82E-11 g/sec
1,2,3,7,8-PeCDF	57117-41-6	4.29E-10	permit limit (e)	Y (EMPC)	PDT emission rate = 1.04E-10 g/sec
2,3,4,7,8-PeCDF	57117-31-4	4.45E-10	permit limit (e)	Y (EMPC)	PDT emission rate = 1.08E-10 g/sec
1,2,3,6,7,8-HxCDD	57653-85-7	7.99E-11	permit limit (e)	Y (EMPC)	PDT emission rate = 1.94E-11 g/sec
1,2,3,4,7,8-HxCDD	39227-28-6	7.91E-11	permit limit (e)	Y (EMPC)	PDT emission rate = 1.92E-11 g/sec
1,2,3,7,8,9-HxCDD	19408-74-3	9.35E-11	permit limit (e)	Y	PDT emission rate = 2.27E-11 g/sec
1,2,3,6,7,8-HxCDF	57117-44-9	2.76E-10	permit limit (e)	Y (EMPC)	PDT emission rate = 6.7E-11 g/sec
1,2,3,4,7,8-HxCDF	70648-26-9	5.07E-10	permit limit (e)	Y (EMPC)	PDT emission rate = 1.23E-10 g/sec
1,2,3,7,8,9-HxCDF	72918-21-9	7.33E-11	permit limit (e)	Y (B, EMPC)	PDT emission rate = 1.78E-11 g/sec
2,3,4,6,7,8-HxCDF	60851-34-5	1.55E-10	permit limit (e)	Y (B)	PDT emission rate = 3.76E-11 g/sec
1,2,3,4,6,7,8-HpCDD	35822-46-9	8.20E-11	permit limit (e)	Y (B)	PDT emission rate = 1.99E-11 g/sec
1,2,3,4,6,7,8-HpCDF	67562-39-4	3.98E-10	permit limit (e)	Y (B, EMPC)	PDT emission rate = 9.65E-11 g/sec
1,2,3,4,7,8,9-HpCDF	55673-89-7	9.52E-11	permit limit (e)	Y (EMPC)	PDT emission rate = 2.31E-11 g/sec
Total OCDD	3268-87-9	1.05E-10	permit limit (e)	Y (B, EMPC)	PDT emission rate = 2.54E-11 g/sec
Total OCDF	39001-02-0	5.81E-11	permit limit (e)	Y (B, EMPC)	PDT emission rate = 1.41E-11 g/sec
Combustion Gases					
Sulfur dioxide	7446-09-5	8.69E-02	miniburn data	Y	
Nitrogen dioxide	10102-44-0	3.28E-01	miniburn data	Y	

Notes:

* = The compound was detected very infrequently, in only one or two of the sampled fractions, from the three replicate runs

B = One or more sample fraction results from one or more of the three replicate runs were affected by method blank contamination

COL = There was a greater than 40% difference between primary and confirmatory columns in one or more sample fraction results from one or more of the three replicate runs; reported result should be considered estimated.

EMPC = One or more of the front or back half sample results from one or more of the three replicate runs were an estimated maximum possible concentration.

FR&DRE = Feed rate and destruction and removal efficiency. Since emission rates for this compound were not measured during the PDT, the emission rate was calculated from the annual average feed rate of the compound in received spent carbon, based on 2003-2006 Toxics Release Inventory data from the facility, conservatively assuming a 99.99% destruction and removal efficiency (DRE). The DREs reported from the PDT were all >99.99%.

HHRAP = Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities (U.S. Environmental Protection Agency, 2005)

ND = Not detected in any sample fraction from any of the three replicate runs.

PDT = Performance Demonstration Test. The emission rate was calculated as the average across the three PDT test runs.

TIC = Tentatively identified compound.

Y = Yes; detected in one or more sample fractions from at least one of the three replicate runs.

(a) The proposed permit limit for arsenic, beryllium and chromium combined is 1.26E-4 g/sec (97 ug/dscm @7% O2). The emission rate for each compound was conservatively set at the total proposed permit limit.

(b) The proposed permit limit for lead and cadmium combined is 3.12E-4 g/sec (240 ug/dscm @7% O2). The emission rate for each compound was conservatively set at the total proposed permit limit.

(c) The proposed permit limit for total mercury is 1.69E-4 g/sec (130 ug/dscm @7% O2). This total was apportioned between elemental and divalent mercury based on the PDT results (79.7% and 20.3%, respectively). In the risk assessment, these emission rates wre further adjusted, per USEPA 2005 HHRAP guidance, to reflect the portion of mercury entering the global mercury cycle (85.6%) and the portion remaining available locally (14.4% overall, 1% for elemental, 36% for particulate divalent, and 68% for vapor phase divalent). The resulting emission rates available for local impacts, the input parameters used in HHRAP, were 1.34E-6 g/sec for elemental Hg, and 2.3E-5 g/sec for divalent Hg (mercuric chloride).

(d) PDT data for polychlorinated biphenyls (PCBs) (CAS #1336-36-3) was evaluated as Aroclor 1254 based on HHRAP guidance and an evaluation of the PCB homologue distribution, which showed that roughly 93% of the PCBs had 4 or less chlorines and 7% had more than 4 chlorines. Additionally, Aroclor 1254 was selected over Aroclor 1016 to represent total PCBs because it has more conservative human health toxicity criteria.

(e) Based on proposed permit limit of 0.4 ng/dscm @ 7% O2 for PCDD/F TEQs. The permit-limit based emission rate was apportioned between the congeners based on the distribution measured during the PDT.

Table 4.2-1
Chemical Emission Rates for Reactivation Furnace Stack

Compound	CAS Number	Stack Emission Rate Used in Risk Assessment (g/sec)	Emission Rate Basis	PDT Results: Detected in Stack Samples (Y or ND)	Additional Emission Rate Information

(f) Based on proposed permit limit for HCl and Cl2 combined of 77 ppmv @7% O2. The permit-limit based emission rate was apportioned between the compounds based on the results from the PDT (81.68% HCl and 18.32% Cl2).

Table 4.2-2
Upsets Analysis - Calendar Year 2000

Equipment Failure Emissions Affected	**Duration Basis**	**Event Data** **Time (min)**	 **Time (min)**	**Total Failure Time (min)**	**% of Total Failures**
Power Outage Organic, Metals/PM, HCL, CL	Outage + assumed maximum 15 min	56	15	**375**	**38.8%**
		95	23		
		101	20		
		65			
WESP Failure Metals/PM	Retention Time (maximum 42 min)	15		**57**	**5.9%**
		42			
Scrubber Pump Failure Metals/PM, HCL/CL	Retention Time (maximum 42 min)	42		**84**	**8.7%**
		42			
ID Fan Failure Organic, Metals/PM, HCl/Cl	Outage + assumed maximum 15 min	65	43	**305**	**31.6%**
		45	15		
		77	60		
Burner Failure Organic, Metals/PM, HCl/Cl	Outage + assumed maximum 15 min	63	30	**145**	**15.0%**
		25			
		27			
Caustic Failure HCl/Cl	Retention Time (maximum 42 min)			**0**	**0.0%**
Venturi Actuator Failure Metals/PM	Retention Time (maximum 42 min)			**0**	**0.0%**
Quench Spray Plugged Metals/PM	Retention Time (maximum 42 min)			**0**	**0.0%**
Secondary Combustion Fan Failure Organic	Retention Time (maximum 42 min)			**0**	**0.0%**

966 Minutes	**16.10 Hours**	**0.24% Percentage for year (a)**

(a) Total operating hours for the year = 7844 hours

Scaling factor = 1.02
Basis: 0.24% operation during upsets and 99.76% operation under normal conditions
Per USEPA 2005 guidance, scaling factor calculated as follows: (0.0024*10) + (.9976*1) = 1.02

Table 4.2-2 (continued)
Upsets Analysis - Calendar Year 2001

Equipment Failure Emissions Affected	**Duration Basis**	**Event Data** **Time (min)**	**Time (min)**	**Time (min)**	**Time (min)**	**Total Failure Time (min)**	**% of Total Failures**	
Power Outage Organic, Metals/PM, HCL, CL	Outage + assumed maximum 15 min	16	32	40	30	**666**	**60.5%**	Note: Power outages were mainly caused by power supplier - BIA
		20	26	45	25			
		44	60	35	155			
		95	43					
WESP Failure Metals/PM	Retention Time (maximum 42 min)	42				**42**	**3.8%**	
Scrubber Pump Failure Metals/PM, HCL/CL	Retention Time (maximum 42 min)	42				**45**	**4.1%**	
		3						
ID Fan Failure Organic, Metals/PM, HCl/Cl	Outage + assumed maximum 15 min	20	52			**297**	**27.0%**	events were caused by fault bearing vibration readings.
		75	66					
		42	42					
Burner Failure Organic, Metals/PM, HCl/Cl	Outage + assumed maximum 15 min	33				**51**	**4.6%**	
		18						
Caustic Failure HCl/Cl	Retention Time (maximum 42 min)					**0**	**0.0%**	
Venturi Actuator Failure Metals/PM	Retention Time (maximum 42 min)					**0**	**0.0%**	
Quench Spray Plugged Metals/PM	Retention Time (maximum 42 min)					**0**	**0.0%**	
Secondary Combustion Fan Failure Organic	Retention Time (maximum 48 min)					**0**	**0.0%**	
						1101 **Minutes**	**18.35** **Hours**	**0.23%** **Percentage for year (a)**

(a) Total operating hours for the year = 7844 hours

Scaling factor = 1.02
Basis: 0.23% operation during upsets and 99.77% operation under normal conditions
Per USEPA 2005 guidance, scaling factor calculated as follows: (0.0023*10) + (.9977*1) = 1.02

Table 4.2-3

Use of Dispersion and Deposition Modeling Results in the Carbon Reactivation Facility Risk Assessment

Exposure Pathway	Type of Environmental Concentration Calculated	Modeling Result Used
Air Dispersion Model		
Long-term chronic risks from inhalation of airborne compounds	Concentration in ambient air	Annual averages
Short-term inhalation risks from airborne compounds	Concentration in ambient air	1-hour averages
Air Dispersion and Deposition Model		
Long-term chronic risks from indirect pathways (e.g., ingestion of animal, products, ingestion of homegrown produce and soil ingestion)	Concentrations in ground-level and aquatic media (e.g., concentrations in plants, water, animal products, fish, soil) resulting from air concentrations and deposition of compounds	Annual averages

Table 4.2-4
Receptor Locations Evaluated for the Stack Emissions Risk Assessment

Receptor Name (a)	Description	Acute Inhalation Risk Evaluation	Chronic Multiple Pathway Risk Evaluation
Residential Receptors (developed area within and around Town of Parker)			
R_1 resident	Closest residential location to facility, residential area in town with highest hourly modeled impacts from stack emissions	√	√
R_2 resident	Residential area in town with highest annual modeled impacts from stack emissions	√	√
Farmer Receptors (residential areas with access to irrigation water and within modeling domain)			
R_3 resident farmer	Residential area with access to irrigation water with highest annual modeled impacts from stack emissions	√	√
R_4 resident farmer	Residential area with access to irrigation water with highest hourly modeled impacts from stack emissions	√	√
Maximum Impact Point (undeveloped land area)			
A_1 max hourly (stack)	Maximum stack emissions impact location for hourly concentrations. There is no residential or commercial land use in the vicinity of the maximum impact area (SW of facility).	√	--
Non-Residential Areas			
A_2 closest business (b)	Closest developed location beyond property boundary (non-residential) with highest hourly modeled impacts from stack emissions	√	--

-- = Not evaluated. These locations are not used for residential purposes.

(a) Receptor names are those used in the IRAP risk assessment software program.

(b) The County Agricultural Extension Office and CRIT Realty are located at receptor A_2. Maximum 1-hour average air concentrations due to stack emissions at all other non-residential developed land use locations were lower than at receptor A_2.

Table 4.2-5

Exposure Pathways and Receptors Quantitatively Evaluated in the Siemens Water Technology Corp. Facility Risk Assessment

Exposure Pathway	Receptors			
	Adult and Child Resident	Adult and Child Fisher	Adult and Child Livestock Farmer	Breast-Fed Infant (a)
Inhalation	✓		✓	
Incidental Soil Ingestion	✓		✓	
Ingestion of Homegrown Produce	✓		✓	
Ingestion of Fish Caught from the Main Drain		✓		
Ingestion of Fish Caught from the Colorado River		✓		
Ingestion of Locally-Raised Poultry			✓	
Ingestion of Locally-Raised Eggs			✓	
Ingestion of Locally-Raised Pork			✓	
Ingestion of Locally-Raised Beef			✓	
Ingestion of Breast-milk				✓

(a) A breast-fed infant exposure to PCDD/PCDFs was evaluated for each adult receptor.

Table 4.2-6
Site-Specific Fate and Transport Modeling Parameters for the Stack Emissions Risk Assessment

Input Parameter	Value	Units	Basis	Symbol
Global Input Parameters				
Average annual precipitation	13	cm/yr	National Climatic Data Center, Climate Summary for Parker, AZ. 1971-2000 Monthly Normals. Annual mean precipitation = 5.17 inches.year.	p
Ambient air temperature	294	K	Annual average temperature from Arizona Meteorological Network station in Parker for 2001-2005 period of record.	t
Average annual wind speed	2.38	m/sec	Annual average wind speed from Arizona Meteorological Network station in Parker for 2001-2005 period of record.	u
Fraction of mercury emissions not lost to the global cycle	.144	unitless	Fraction mercury not lost to global cycle based on PDT test results for mercury species in conjunction with USEPA default assumptions regarding percentages of mercury species lost to the global cycle (99% elemental Hg, 64% particulate Hg2+, 32% vapor Hg2+, per Figure 2-4 in USEPA's 2005 HHRAP).	merc_q_corr
Residential Receptor Area (developed area within and around Town of Parker)				
Average annual evapotranspiration	108	cm/yr	Annual evapotranspiration set at level necessary to meet IRAP program requirement P+I > E_v + RO. This reduces soil loss due to leaching to roughly 0, which will tend to overestimate soil concentrations.	E_v
Average annual irrigation	100	cm/yr	Irrigation based on water use information provided for several crop types by the University of Arizona Cooperative Extension (ag.arizona.edu/pubs/water) and the Arizona Master Gardener Manual (cals.arizona.edu/pubs/garden/mg/vegetable/index.html) in conjunction with growing season information for vegetable crops provided in U.S. Bureau of Reclamation. Lower Colorado River Accounting System Report. March 2007.	I
Average annual runoff	4.8	cm/yr	Calculated using curve number method described in Maidment (1992) and properties for soils present in non-irrigated areas within the modeling domain from SCS (1983). Sources: Maidment, D.R., Ed. 1992. Handbook of Hydrology. McGraw-Hill, Inc. and Soil Conservation Service. 1983. Soil Survey of Colorado River Indian Reservation. Arizona-California. U.S. Department of Agriculture.	RO
Farmer Receptor Area (residential areas with access to irrigation water and within modeling domain)				
Grain fraction grown on affected soil eaten by beef cattle	0	unitless	L. Masters, Director, La Paz County Agricultural Extension Office. Personal communcation with S. Foster, CPF Associates, June 26 and July 2, 2007.	beef_fi_grain
Grain fraction grown on affected soil eaten by chicken	0	unitless	L. Masters, Director, La Paz County Agricultural Extension Office. Personal communcation with S. Foster, CPF Associates, June 26 and July 2, 2007.	chick_fi_grain

Table 4.2-6
Site-Specific Fate and Transport Modeling Parameters for the Stack Emissions Risk Assessment

Input Parameter	Value	Units	Basis	Symbol
Average annual evapotranspiration	182	cm/yr	U.S. Bureau of Reclamation (USBR) calculated evapotranspiration rate for Parker, AZ area. (Source: U.S. Bureau of Reclamation. Lower Colorado River Accounting System Evapotranspiration and Evaporation Calculations. Calendar Year 2005. U.S. Dept. of Interior. March 2007.)	E_v
Average annual irrigation	230	cm/yr	Irrigation rate calculated by dividing water diverted at Headgate Rock Dam to the CRIT irrigation canal (544,600 acre-feet/yr for water year 2005) by number of acres irrigated for 2005 (73,159 acres). Source for water diverted: USGS Annual Water Report for Main Canal Near Parker, Station #09428500, Water Resources Data. Arizona. Water Year 2005. Report AZ-05-1. Source for acres irrigated: U.S. Bureau of Reclamation. Lower Colorado River Accounting System Report. March 2007. Sheet K - Colorado River Indian Reservation, Arizona.	I
Fraction of grain grown on affected soil eaten by pigs	0	unitless	L. Masters, Director, La Paz County Agricultural Extension Office. Personal communcation with S. Foster, CPF Associates, June 26 and July 2, 2007.	pork_fi_grain
Fraction of silage grown on affected soil and eaten by pigs	0	unitless	L. Masters, Director, La Paz County Agricultural Extension Office. Personal communcation with S. Foster, CPF Associates, June 26 and July 2, 2007.	pork_fi_silage
Average annual runoff	7.4	cm/yr	Calculated using curve number method described in Maidment (1992) and properties for soils present in the irrigated area within the modeling domain from SCS (1983). Sources: Maidment, D.R., Ed. 1992. Handbook of Hydrology. McGraw-Hill, Inc. and Soil Conservation Service. 1983. Soil Survey of Colorado River Indian Reservation. Arizona-California. U.S. Department of Agriculture.	RO
Parameters for the Main Drain Fate and Transport Modeling				
Universal Soil Loss Equation (USLE) cover management factor	0.08	unitless	Weighted average for major crop types grown (alfalfa, cotton, sudangrass, bermudagrass, wheat). Crop types and acreages were obtained from the CRIT Annual Irrigation Crop Report for 2000. Cover management factors (C values) were obtained from Mills et al. 1985, Table III-4 (USEPA. 1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water – Part I).	C
Universal Soil Loss Equation (USLE) erodibility factor	0.28	tons/acre	Average value based on soil types in irrigated areas, where soil types and erodibility (K) values were identified from the SCS Soil Survey of Colorado River Indian Reservation. Arizona-California. USDA 1986 (from maps and Table 13, respectively).	K
Universal Soil Loss Equation (USLE) erosivity factor	35	yr^{-1}	Obtained from Mills et al. (1985), Figure III-11 for the general Parker, Arizona region (USEPA. 1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water – Part I).	RF

Table 4.2-6
Site-Specific Fate and Transport Modeling Parameters for the Stack Emissions Risk Assessment

Input Parameter	Value	Units	Basis	Symbol
Impervious watershed area	0	m^2	Assumes the area of impervious surfaces, such as paved roads, is negligible in comparison to the entire watershed area.	AI
Watershed area	76,643,414	m^2	Surface area within modeling domain calculated by IRAP based on waterbody geometry drawn on base map within IRAP program.	AL
Water column depth	0.7	m	Average water depth of Main Drain at USGS Upper Main Drain Near Poston station (USGS #09428508), based on 2003-2007 data.	dwc
Current velocity	0.26	m/sec	Average water velocity of Main Drain at USGS Upper Main Drain Near Poston station (USGS #09428508), based on 2003-2007 data.	u
Total suspended solids concentration	2.6	mg/L	mg/L - Suspended solids concentration was estimated from turbidity measurements collected from 2002-2006 from the Colorado River at the USGS Parker Dam station #09427520. Suspended solids concentration was calculated using three regression equations that relate turbidity to suspended solids derived from studies of the Alamo River, CA, Verde River, AZ and Little Colorado River, AZ.	TSS
Flow rate	5.62E+07	m^3/yr	Average flow rate of Main Drain at USGS Upper Main Drain Near Poston station (USGS #09428508), based on 2003-2007 data (63 cfs). Flow rate measurement data were not available at any other location along the Main Drain.	Vfx
Water body surface area	86,322	m^2	Surface area within modeling domain calculated by IRAP based on waterbody geometry drawn on base map within IRAP program.	Aw
Average annual evapotranspiration	182	cm/yr	U.S. Bureau of Reclamation (USBR) calculated evapotranspiration rate for Parker, AZ area. (Source: U.S. Bureau of Reclamation. Lower Colorado River Accounting System Evapotranspiration and Evaporation Calculations. Calendar Year 2005. U.S. Dept. of Interior. March 2007.)	E_v
Average annual irrigation	230	cm/yr	Irrigation rate calculated by dividing water diverted at Headgate Rock Dam to the CRIT irrigation canal (544,600 acre-feet/yr for water year 2005) by number of acres irrigated for 2005 (73,159 acres). Source for water diverted: USGS Annual Water Report for Main Canal Near Parker, Station #09428500, Water Resources Data. Arizona. Water Year 2005. Report AZ-05-1. Source for acres irrigated: U.S. Bureau of Reclamation. Lower Colorado River Accounting System Report. March 2007. Sheet K - Colorado River Indian Reservation, Arizona.	I

Table 4.2-6
Site-Specific Fate and Transport Modeling Parameters for the Stack Emissions Risk Assessment

Input Parameter	Value	Units	Basis	Symbol
Average annual runoff	7.4	cm/yr	Calculated using curve number method described in Maidment (1992) and properties for soils present in the irrigated area within the modeling domain from SCS (1983). Sources: Maidment, D.R., Ed. 1992. Handbook of Hydrology. McGraw-Hill, Inc. and Soil Conservation Service. 1983. Soil Survey of Colorado River Indian Reservation. Arizona-California. U.S. Department of Agriculture.	RO
Parameters for the Colorado River Fate and Transport Modeling				
Universal Soil Loss Equation (USLE) cover management factor	0.2	unitless	Weighted average for major crop types grown (alfalfa, cotton, sudangrass, bermudagrass, wheat). Crop types and acreages were obtained from the CRIT Annual Irrigation Crop Report for 2000. Cover management factors (C values) were obtained from Mills et al. 1985, Table III-4 (USEPA. 1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water – Part I).	C
Universal Soil Loss Equation (USLE) erodibility factor	0.13	tons/acre	Average value based on soil types in irrigated areas, where soil types and erodibility (K) values were identified from the SCS Soil Survey of Colorado River Indian Reservation. Arizona-California. USDA 1986 (from maps and Table 13, respectively).	K
Universal Soil Loss Equation (USLE) erosivity factor	35	yr-1	Obtained from Mills et al. (1985), Figure III-11 for the general Parker, Arizona region (USEPA. 1985. Water Quality Assessment: A Screening Procedure for Toxic and Conventional Pollutants in Surface and Ground Water – Part I).	RF
Impervious watershed area	0	m^2	Assumes the area of impervious surfaces, such as paved roads, is negligible in comparison to the entire watershed area.	AI
Watershed area	359,614,253	m^2	Surface area within modeling domain calculated by IRAP based on waterbody geometry drawn on base map within IRAP program.	AL
Water column depth	1.7	m	Average water depth of Main Drain at USGS Upper Main Drain Near Poston station (USGS #09428508), based on 2003-2007 data.	dwc
Current velocity	0.99	m/sec	Average water velocity of Main Drain at USGS Upper Main Drain Near Poston station (USGS #09428508), based on 2003-2007 data.	u
Water body temperature	292	K	Average temperature measured at inlet to Main Colorado River Irrigation Canal, which draws water from the Colorado River at Headgate Rock Dam, from USGS Station #09428500 for period 1969-1983 (years for which data were available for electronic download).	T

Table 4.2-6
Site-Specific Fate and Transport Modeling Parameters for the Stack Emissions Risk Assessment

Input Parameter	Value	Units	Basis	Symbol
Total suspended solids concentration	2.6	mg/L	mg/L - Suspended solids concentration was estimated from turbidity measurements collected from 2002-2006 from the Colorado River at the USGS Parker Dam station #09427520. Suspended solids concentration was calculated using three regression equations that relate turbidity to suspended solids derived from studies of the Alamo River, CA, Verde River, AZ and Little Colorado River, AZ.	TSS
Flow rate	6.10E+06	m^3/yr	Average flow rate of Main Drain at USGS Upper Main Drain Near Poston station (USGS #09428508), based on 2003-2007 data (63 cfs). Flow rate measurement data were not available at any other location along the Main Drain.	Vfx
Water body surface area		m^2	Surface area within modeling domain calculated by IRAP based on waterbody geometry drawn on base map within IRAP program.	Aw
Average annual evapotranspiration	8.19	cm/yr	Annual evapotranspiration set at level necessary to meet IRAP program requirement P+I > E_v + RO, assuming that irrigation = 0 cm/year for this receptor area.	E_v
Average annual irrigation	0	cm/yr	Watershed assumed to be non-irrigated. For non-irrigated areas, irrigation was set to 0, and annual evapotranspiration was set at a level necessary to meet the modeling program condition of P+I > E_v + RO.	I
Average annual runoff	4.8	cm/yr	Calculated using curve number method described in Maidment (1992) and properties for soils present in non-irrigated areas within the modeling domain from SCS (1983). Sources: Maidment, D.R., Ed. 1992. Handbook of Hydrology. McGraw-Hill, Inc. and Soil Conservation Service. 1983. Soil Survey of Colorado River Indian Reservation. Arizona-California. U.S. Department of Agriculture.	RO

Table 4.2-7
Receptor Locations and Area-Wide Receptors Evaluated for the Stack Emissions Risk Assessment

Receptor Name (a)	Description	Acute Inhalation Risk Evaluation	Chronic Multiple Pathway Risk Evaluation
Residential Receptors (developed area within and around Town of Parker)			
R_1 resident	Closest residential location to facility, residential area in town with highest hourly modeled impacts from stack emissions	√	√
R_2 resident	Residential area in town with highest annual modeled impacts from stack emissions	√	√
Town area	Average of modeled impacts across town area	**	√
Farmer Receptors (residential areas with access to irrigation water and within modeling domain)			
R_3 resident farmer	Residential area with access to irrigation water with highest annual modeled impacts from stack emissions	√	√
R_4 resident farmer	Residential area with access to irrigation water with highest hourly modeled impacts from stack emissions	√	√
Farmer area	Average of modeled impacts across area with access to irrigation water within modeling domain	**	√
Fish Ingestion Pathway			
R_only_fish_drain	Average modeled impacts across Main Drain within modeling domain	**	√
R_only_fish_river	Average modeled impacts across Colorado River within modeling domain	**	√
Maximum Impact Point (undeveloped land area)			
A_1 max hourly (stack)	Maximum stack emissions impact location for hourly concentrations. There is no residential or commercial land use in the vicinity of the maximum impact area (SW of facility).	√	--
Non-Residential Areas			
A_2 closest business (b)	Closest developed location beyond property boundary (non-residential) with highest hourly modeled impacts from stack emissions	√	--

** = Not evaluated. Acute inhalation risks were evaluated at specific modeled receptor points. The "town area" and "farmer area" receptors were assessed based on the average of the annual average ISCST3 modeling results across each of these areas, respectively, within the modeling domain, and thus these areas were not associated with any single receptor point. Similarly, the fish ingestion pathway receptors were associated with waterbody and watershed areas within the modeling domain for either the Main Drain or the Colorado River, and thus they too were not associated with any single receptor point.

-- = Not evaluated. These locations are not used for residential purposes.

(a) Receptor names are those used in the IRAP risk assessment software program.

(b) The County Agricultural Extension Office and CRIT Realty are located at receptor A_2. Maximum 1-hour average air concentrations due to stack emissions at all other non-residential developed land use locations were lower than at receptor A_2.

Table 4.3-1
Data Used to Select Chemicals for the Fugitive Emissions Evaluation

2003-2006 TRI data from Siemens Parker Facility (January 1, 2003 - December 31, 2006)							Chemical-Specific Toxicity Information			Volatility Information
compound	CAS #	number of deliveries over 4 year period	average concentration in received carbon loads (ppm)	maximum concentration in received carbon loads (ppm)	total carbon received over 4 year period (lbs)	total chemical received over 4 year period (lbs)	acute inhalation reference concentration (mg/m^3) (a)	chronic inhalation reference concentration (mg/m^3) (a)	inhalation cancer unit risk ($(\mu g/m^3)^{-1}$) (a)	Henry's law constant ($atm\text{-}m^3/mol$) (b)
1,1,1-Trichloroethane	71-55-6	265	797	21,362	1,109,140	965.4	68			1.70E-02
1,1,2,2,-Tetrachloroethane	79-34-5	26	490	983	107,740	36.01	60	0.11	7.40E-06	3.40E-04
1,1,2-Trichloroethane	79-00-5	64	937	3,405	451,280	626.1	50		1.60E-05	9.10E-04
1,1-Dichlorethane	75-34-3	193	58	1,500	933,660	37.40	1250	0.5		5.60E-03
1,1-Dichloroethene	75-35-4	782	130	9,921	3,644,640	501.9	75	0.2		2.60E-02
1,2-Dichlorobenzene	95-50-1	52	6,550	78,000	274,720	684.1	300	0.2		1.90E-03
1,2,3-Trichloropropane	96-18-4	3	0.40	0.396	60,000	0.0238	60	0.021	0.002	4.10E-04
1,2,4-Trimethylbenzene	95-63-6	47	8.72	33	294,920	2.156	150			6.16E-03
1,2-Dibromoethane	106-93-4	11	152	402	18,100	3.147	200	0.009	6.00E-04	7.43E-04
1,2-Dichloroethane	107-06-2	437	166	16,000	2,476,100	528.1	202	2.4	2.60E-05	9.80E-04
1,2-Dichloroethene	540-59-0	32	196	1,700	104,700	15.41	555	0.07		9.40E-03
1,2-Dichloropropane	78-87-5	17	157	2,310	93,300	4.874	500	0.004	1.00E-05	2.80E-03
1,3-Butadiene	106-99-0	1	12,880	12,880	7,400	95.31	1481	2.00E-03	3.00E-05	7.36E-02
1,3-Dichlorobenzene	541-73-1	11	308	680	24,000	6.610	12.5	0.0032		3.10E-03
1,4-Dichlorobenzene	106-46-7	59	6,550	34,500	206,120	892.42	600	0.8	1.10E-05	2.40E-03
1,4-Dioxane	123-91-1	8	29	29	8,540	0.2477	3	3	3.10E-06	4.80E-06
2,4,Dinitrophenol	51-28-5	9	1.80	1.8	108,000	0.1944	7.5	0.007		4.43E-07
Acetone	67-64-1	63	222	720	340,140	30.74	475	0.35		3.90E-05
Acrylic Acid	79-10-7	1	25	25	2,000	0.0500	6	1.00E-03		1.17E-07
Acrylonitrile	107-13-1	9	11,500	11,500	57,000	655.5	22	0.002	6.80E-05	1.03E-04
Aldrin	309-00-2	2	2.60	2.6	3,000	0.0078	0.75	0.0001	0.0049	1.70E-04
Aniline	62-53-3	14	128	137	190,000	23.63	30.45	0.001	1.60E-06	1.90E-06
Antimony	7440-36-0	10	0.99	2.11	16,020	0.0203	1.5	0.0014		2.50E-02
Arsenic	7440-38-2	10	7.13	139	937,220	3.834	0.00019	3.00E-05	4.30E-03	
Barium	7440-39-3	302	40	920	2,361,760	78.82	1.5	5.00E-04		
Benzene	71-43-2	3443	2,057	70,000	19,245,740	67,042	1.3	0.03	7.80E-06	5.60E-03
Beryllium	7440-41-7	52	0.59	9.76	547,040	0.219	0.005	2.00E-05	2.40E-03	
Bromodichloromethane	75-27-4	3	0.82	1.2	7,280	0.00793	4	0.07	1.80E-05	1.60E-03
Cadmium	7440-43-9	63	3.31	79.3	818,120	3.576	0.03	2.00E-04	1.80E-03	
Carbon Tetrachloride	56-23-5	142	19	935	1,051,660	14.52	1.9	0.04	1.50E-05	3.00E-02
Chlorobenzene	108-90-7	109	444	5,762	764,100	1,376.04	125	0.06		3.70E-03
Chloroethane	75-00-3	3	11	11	3,000	0.0330	2500	10		8.80E-03
Chloroform	67-66-3	634	130	20,940	4,318,420	483.5	0.15	0.0003	2.30E-05	3.70E-03
Chloromethane	74-87-3	3	1,836	5,500	6,000	22.01	200	0.09	1.80E-06	8.82E-03
Chromium	7440-47-3	310	12	294	2,789,000	36.92	1.5	5.3		
cis 1,2-Dichloroethene	156-59-2	3	490	490	6,620	3.244	555	0.07		4.10E-03
Cobalt	7440-48-4	171	11	798	1,808,760	12.16	3	1.00E-04		
Copper	7440-50-8	256	119	6,820	2,075,180	56.81	0.1	3.50E-02		
Cyclohexane	110-82-7	16	8,634	46,000	48,800	231.4	1000	6		1.95E-01

Table 4.3-1
Data Used to Select Chemicals for the Fugitive Emissions Evaluation

2003-2006 TRI data from Siemens Parker Facility (January 1, 2003 - December 31, 2006)							Chemical-Specific Toxicity Information			Volatility Information
compound	CAS #	number of deliveries over 4 year period	average concentration in received carbon loads (ppm)	maximum concentration in received carbon loads (ppm)	total carbon received over 4 year period (lbs)	total chemical received over 4 year period (lbs)	acute inhalation reference concentration (mg/m^3) (a)	chronic inhalation reference concentration (mg/m^3) (a)	inhalation cancer unit risk ($(\mu g/m^3)^{-1}$) (a)	Henry's law constant ($atm\text{-}m^3/mol$) (b)
Ethylbenzene	100-41-4	888	1,408	25,932	5,225,120	5,168	500	1		7.90E-03
Ethylene Glycol	107-21-1	1	87,000	87,000	4,000	348.0	100	1.3		6.00E-08
Lead	7439-92-1	768	4.31	125	3,489,880	12.01	0.15	0.0015	1.20E-05	
Lindane	58-89-9	9	78	140	11,020	0.808	1.5			1.40E-05
Mercury	7439-97-6	69	1.34	11.6	266,000	0.118	0.0018	3.00E-04		7.10E-03
Methyl ethyl ketone	78-93-3	134	1,463	31,200	642,680	398.3	13	5		5.60E-05
methyl Isobutyl ketone	108-10-1	13	11,437	46,600	13,000	100.5	300	3		1.40E-04
Methyl methacrylate	80-62-6	3	4,002	12,000	5,060	15.13	70	0.7		3.37E-04
Methyl tert-butyl ether	1634-04-4	119	336	15,000	707,960	226.9	180	3		5.90E-04
Methylene chloride	75-09-2	134	2,047	7,913	943,120	1,385	14	3	4.70E-07	2.20E-03
Molybdenum	7439-98-7	29	14	130	375,700	6.227	30			
Naphthalene	91-20-3	57	663	3,600	248,520	110.44	75	0.003		4.80E-04
n-Hexane	110-54-3	1	2,220	2,220	1,000	2.220	1500	0.7		1.80E+00
Nickel	7440-02-0	226	39	1,610	2,035,460	24.49	0.006	2.00E-04	2.40E-04	
Nitrobenzene	98-95-3	10	1,936	2,150	128,000	232.4	15			2.40E-05
o-Xylene	95-47-6	11	205	530	31,220	2.448	22	0.1		5.20E-03
Pentachlorophenol	87-86-5	13	331	3,970	128,520	24.75	1.5		4.60E-06	2.40E-08
Phenol	108-95-2	75	864	27,000	233,040	93.32	5.8	0.2		4.00E-07
Propylene oxide	75-56-9	10	40	61	61,760	2.788	3.1	0.03	3.70E-06	1.23E-04
Selenium	7782-49-2	65	2.26	18.9	330,760	0.803	1.47	0.02		
Silver	7440-22-4	25	11	262	54,480	0.666	0.3	0.018		
Styrene	100-42-5	107	20,428	84,784	775,400	22,092	21	1		2.70E-03
Tetrachloroethylene	127-18-4	1562	1,608	91,000	5,908,780	5,343	20	0.4	5.90E-06	1.80E-02
Toluene	108-88-3	1145	1,855	35,837	7,178,420	13,322	37	0.4		6.60E-03
Trichloroethylene	79-01-6	2114	606	16,667	9,283,060	6,134	698	0.6	2.00E-06	1.00E-02
Trichlorofluoromethane	75-69-4	4	7.23	7.23	11,760	0.085	2500	0.7		9.70E-02
Vanadium	7440-62-2	156	4.09	124	1,632,640	5.050	0.15	2.00E-04		
Vinyl acetate	108-05-4	7	370	2,590	7,160	2.592	23.6	0.2		5.10E-04
Vinyl Chloride	75-01-4	375	61	6,100	1,116,660	64.63	180	0.1	8.80E-06	2.70E-02
Xylene	1330-20-7	565	1,240	90,657	3,234,140	2,578	22	0.1		7.70E-03
Zinc	7440-66-6	203	25	167	1,867,280	43.95	30	5.3		

(a) Toxicity data were obtained from values compiled by USEPA in its 2005 HHRAP, if available, or from the sources recommended in the USEPA guidance if they were not available. Reference concentrations for 1,2-dichloroethene and cis-1,2-dichloroethene were based on the lowest values reported in HHRAP for either the cis- or trans- compound for the selection of compounds for evaluation.
(b) Henry's law constants were obtained from values compiled by USEPA in its 2005 HHRAP, if available, or from the sources recommended in the USEPA guidance if they were not available.
Blank spaces indicate no data were available or the parameter was not applicable.

Table 4.3-2
Top Five (5) Compound Rankings by Category

Highlighted Rows Indicate Selected Compounds for Fugitive Emissions Evaluation

Basis for selection: ranked in top five (5) in any category or classified as a known human carcinogen by the U.S. Environmetnal Protection Agency, International Agency for Research on Cancer, or the National Toxicology Program

Blank cells indicate that a compound was ranked below the top five (5) compounds or that a ranking was not calculated, either because a toxicity criterion was not available or the ranking was not applicable (i.e., volatility rank was not calculated for metals except mercury).

Compound	CAS #	Number of deliveries rank	Total lbs received rank	Volatility rank (avg conc * Henry's law constant)	Acute effect rank (avg conc / acute reference air conc)	Acute effect rank (max conc / acute reference air conc)	Chronic effect rank (avg conc / chronic reference air conc)	Chronic effect rank (max conc / chronic reference air conc)	Cancer rank (avg conc * inhal unit risk)	Cancer rank (max conc * inhal unit risk)	Known human carcinogens (2005 11th NTP ROC and IARC Group 1)	EPA's IRIS carcinogen classification	Number of deliveries if <5
1,1,1-trichloroethane	71-55-6												
1,1,2,2,-tetrachloroethane	630-20-6											C	
1,1,2-Trichloroethane	79-00-5											C	
1,1dichlorethane	75-34-3												
1,1dichloroethene	75-35-4												
1,2, dichlorobenzene	95-50-1												
1,2,3,trichloropropane	96-18-4												3
1,2,4,trimethylbenzene	95-63-6												
1,2,dibromoethane	**106-93-4**								**3**			likely carc to humans	
1,2,dichloroethane	107-06-2											B2	
1,2,dichloroethene	540-59-0												
1,2,dichloropropane	78-87-5												
1,3-Butadiene	**106-99-0**			**3**			**1**	**4**	**2**		√	carc to humans	**1**
1,3-dichlorobenzene	541-73-1												
1,4, -dichlorobenzene	**106-46-7**								**4**				
1,4-Dioxane	123-91-1											B2	
2,4,Dinitrophenol	51-28-5												
acetone	67-64-1												
Acrylic Acid	79-10-7												1
acrylonitrile	**107-13-1**						**2**	**5**	**1**	**1**		**B1**	
Aldrin	309-00-2											B2	2
Aniline	62-53-3											B2	
Antimony	7440-36-0												
Arsenic	**7440-38-2**				**1**	**1**	**4**		**5**	**2**	√	**A**	
Barium	7440-39-3												
Benzene	**71-43-2**	**1** (3444)	**1** (67,042 lbs)		**3**	**5**				**3**	√	**A**	
Beryllium	**7440-41-7**										√	**B1**	
Bromodichloromethane	75-27-4											B2	3
Cadmium	**7440-43-9**										√	**B1**	
Carbon Tetrachloride	56-23-5											B2	
Chlorobenzene	108-90-7												
chloroethane	75-00-3												3
Chloroform	**67-66-3**					**3**	**3**	**1**	**5**			**B2**	
chloromethane	74-87-3											D	3
Chromium	7440-47-3												
cis 1,2-Dichloroethene	156-60-5												3
Cobalt	**7440-48-4**							**3**					

Table 4.3-2
Top Five (5) Compound Rankings by Category

Highlighted Rows Indicate Selected Compounds for Fugitive Emissions Evaluation

Basis for selection: ranked in top five (5) in any category or classified as a known human carcinogen by the U.S. Environmetnal Protection Agency, International Agency for Research on Cancer, or the National Toxicology Program

Blank cells indicate that a compound was ranked below the top five (5) compounds or that a ranking was not calculated, either because a toxicity criterion was not available or the ranking was not applicable (i.e., volatility rank was not calculated for metals except mercury).

Compound	CAS #	Number of deliveries rank	Total lbs received rank	Volatility rank (avg conc * Henry's law constant)	Acute effect rank (avg conc / acute reference air conc)	Acute effect rank (max conc / acute reference air conc)	Chronic effect rank (avg conc / chronic reference air conc)	Chronic effect rank (max conc / chronic reference air conc)	Cancer rank (avg conc * inhal unit risk)	Cancer rank (max conc * inhal unit risk)	Known human carcinogens (2005 11th NTP ROC and IARC Group 1)	EPA's IRIS carcinogen classification	Number of deliveries if <5
Copper	**7440-50-8**				**4**	**4**							
Cyclohexane	**110-82-7**			**2**									
Ethylbenzene	**100-41-4**	**5 (888)**											
Ethylene Glycol	107-21-1												1
Lead	7439-92-1											B2	
Lindane	58-89-9												
Mercury	7439-97-6												
Methyl ethyl ketone	78-93-3												
methyl Isobutyl ketone	108-10-1												
Methyl methacrylate	80-62-6												3
methyl tert-butyl ether	1634-04-4												
Methylene chloride	75-09-2											B2	
molybdenum	7439-98-7												
Naphthalene	**91-20-3**						**5**						
n-Hexane	**110-54-3**			**1**									**1**
Nickel	**7440-02-0**				**2**	**2**		**2**			√	**A (refinery dust)**	
Nitrobenzene	98-95-3												
o-Xylene	95-47-6												
Pentachlorophenol	87-86-5											B2	
Phenol	108-95-2												
Propylene oxide	75-56-9											B2	
Selenium	7782-49-2												
Silver	7440-22-4												
Styrene	**100-42-5**		**2**	**4**	**5**								
Tetrachloroethylene	**127-18-4**	**3**	**5 (5343 lbs)**	**5**						**4**			
Toluene	**108-88-3**	**4**	**3**										
Trichloroethylene	**79-01-6**	**2**	**4**										
Trichlorofluoromethane	75-69-4												4
Vanadium	7440-62-2												
vinyl acetate	108-05-4												
Vinyl Chloride	**75-01-4**										√	**A**	
Xylene	1330-20-7												
Zinc	7440-66-6												

Table 4.3-3

Input Parameters For Modeling Fugitive Organic Vapor Emissions During Unloading at the Outdoor Hopper

Parameter Name (Variable, units)	Aqua Spent Carbon (used to treat liquid)	Vapor Spent Carbon (used to treat gases)	Basis
Fraction organic carbon (foc, unitless)	0.89	0.89	Kleineidam, S., Schuth, C. and Grathwohl, P. 2002. Solubility-normalized combined adsorption-partitioning sorption isotherms for organic pollutants. Environ. Sci. & Technol. 36:4689-4697.
Bulk density of spent carbon (BD, g/cm^3)	0.50	0.50	Typical bulk density for activated carbon.
Total porosity of spent carbon (Et, unitless)	0.22	0.22	Calculated based on Kleineidam at al. (2002) pore volume for activated carbon of 441 cm^3/kg and assumed density for activated carbon of 0.5 g/cm^3.
Moisture content of spent carbon (M, unitless)	0.50	0.10	Personal communication with M. McCue, Director of Plant Operations, May 2007
Water-filled porosity of spent carbon (Ew, unitless)	0.11	0.02	Calculated based on total porosity and moisture content
Air-filled porosity of spent carbon (Ea, unitless)	0.11	0.20	Calculated: air-filled porosity = (total porosity - water-filled porosity)
Mass of spent carbon unloaded per unloading event per hour at hopper (Q, kg spent carbon/hr)	3,864	3,242	Based on analysis of spent carbon containers' capacities, approximate unloading times per container type, and the average amount of spent carbon, by container type and container capacity, unloaded during 2005 and 2006 (data provided by M. McCue, Director of Plant Operations, May 2007). Amount unloaded per unloading event per hour = average amount spent carbon unloaded per event (2,975 kg aqua spent carbon or 1,783 kg vapor spent carbon) / average unloading duration (0.77 hours for aqua spent carbon containers or 0.55 hours for vapor spent carbon containers).
Hours unloading per workday (HR, hrs)	4	4	Maximum duration of unloading activities at facility during a workday (personal communication with M. McCue, Director of Plant Operations, May 2007).
Pore gas to atmosphere exchange constant (Exc, unitless)	0.10	0.33	USEPA default values. Used value for wet soils to represent aqua and value for dry, sandy soils to represent vapor spent carbon (USEPA. 1997. Air Emissions from the Treatment of Soils Contaminated with Petroleum Fuels and Other Substances. EPA-600/R-97-116)
Volume of air-filled pore spaces in spent carbon affected per hour (Vol, cm^3/hr)	850,100	1,296,800	Calculated: cm^3/hr = (air-filled porosity of spent carbon in cm^3 air/cm^3 spent carbon * amount spent carbon unloaded per event in kg/hr * 1000 g/kg) /(bulk_density g/cm^3 spent carbon)

Table 4.3-4
Chemical-Specific Input Parameters Used to Calculate Fugitive Organic Vapor Emission Rates

compound	CAS #	Average concentration in received spent carbon loads (ppm)	Maximum concentration in received carbon loads (ppm)	Henry's law constant (atm-m^3/mol) (a)	Henry's law constant (unitless) (b)	Organic carbon:water partition coefficient (Koc)	H and Koc Sources
1,2-Dibromoethane	106-93-4	1.52E+02	4.02E+02	7.43E-04	3.10E-02	92.53	HHRAP
1,3-Butadiene	106-99-0	1.29E+04	1.29E+04	7.36E-02	3.07E+00	116	Chemfate
1,4-Dichlorobenzene	106-46-7	6.55E+03	3.45E+04	2.40E-03	1.00E-01	616	HHRAP
Acrylonitrile	107-13-1	1.15E+04	1.15E+04	1.03E-04	4.29E-03	1.76	HHRAP
Arsenic	7440-38-2	7.13E+00	1.39E+02	0.00E+00	0.00E+00	NA	HHRAP
Benzene	71-43-2	2.06E+03	7.00E+04	5.60E-03	2.33E-01	61.7	HHRAP
Beryllium	7440-41-7	5.95E-01	9.76E+00	0.00E+00	0.00E+00	NA	HHRAP
Cadmium	7440-43-9	3.31E+00	7.93E+01	0.00E+00	0.00E+00	NA	HHRAP
Chloroform	67-66-3	1.30E+02	2.09E+04	3.70E-03	1.54E-01	52.5	HHRAP
Cobalt	7440-48-4	1.15E+01	7.98E+02	0.00E+00	0.00E+00	NA	HHRAP
Copper	7440-50-8	1.19E+02	6.82E+03	0.00E+00	0.00E+00	NA	HHRAP
Cyclohexane	110-82-7	8.63E+03	4.60E+04	1.95E-01	8.13E+00	482	Chemfate
Ethylbenzene	100-41-4	1.41E+03	2.59E+04	7.90E-03	3.29E-01	204	HHRAP
Naphthalene	91-20-3	6.63E+02	3.60E+03	4.80E-04	2.00E-02	1190	HHRAP
n-Hexane	110-54-3	2.22E+03	2.22E+03	1.80E+00	7.50E+01	1468	Physprop (c)
Nickel	7440-02-0	3.89E+01	1.61E+03	0.00E+00	0.00E+00	NA	HHRAP
Styrene	100-42-5	2.04E+04	8.48E+04	2.70E-03	1.13E-01	912	HHRAP
Tetrachloroethylene	127-18-4	1.61E+03	9.10E+04	1.80E-02	7.50E-01	265	HHRAP
Toluene	108-88-3	1.86E+03	3.58E+04	6.60E-03	2.75E-01	140	HHRAP
Trichloroethylene	79-01-6	6.06E+02	1.67E+04	1.00E-02	4.17E-01	94.3	HHRAP
Vinyl Chloride	75-01-4	6.08E+01	6.10E+03	2.70E-02	1.13E+00	15.38	HHRAP

(a) Unless otherwise noted, Henry's law constants and Koc values were obtained from values compiled by USEPA in its 2005 HHRAP, if available, or from the sources recommended in the USEPA guidance if they were not available.
(b) The unitless H' = (H atm-m3/mol) / (RT of 2.4E-2 atm-m3/mol)
(c) The Koc was calculated from the log Kow using HHRAP methodology, and log Kow was obtained from Physprop.

NA = Not applicable.
Chemfate = Syracuse Research Service Chemical fate database (http://www.syrres.com/eSc/chemfate.htm)
HHRAP = USEPA's 2005 Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities (EPA-530/R-05-006).
Physprop = Syracuse Research Service physical chemical properties database (http://www.syrres.com/eSc/physdemo.htm)

Table 4.3-5
Fugitive Organic Compound Emission Rates During Spent Carbon Unloading at the Outdoor Hopper (a)

Compound	CAS #	Average Concentration in spent carbon (g/g)	Aqua Spent Carbon: Concentration in air-filled pore spaces of spent carbon (g/cm^3)	Vapor Spent Carbon: Concentration in air-filled pore spaces of spent carbon (g/cm^3)	Aqua Spent Carbon: Emission Rate (g/sec)	Vapor Spent Carbon: Emission Rate (g/sec)
1,2-Dibromoethane	106-93-4	1.52E-04	5.70E-08	5.71E-08	7.69E-07	3.88E-06
1,3-Butadiene	106-99-0	1.29E-02	3.79E-04	3.78E-04	5.12E-03	2.57E-02
1,4-Dichlorobenzene	106-46-7	6.55E-03	1.19E-06	1.19E-06	1.61E-05	8.11E-05
Acrylonitrile	107-13-1	1.15E-02	2.76E-05	3.06E-05	3.73E-04	2.08E-03
Arsenic	7440-38-2	7.13E-06	NA	NA	NA	NA
Benzene	71-43-2	2.06E-03	8.70E-06	8.72E-06	1.17E-04	5.92E-04
Beryllium	7440-41-7	5.95E-07	NA	NA	NA	NA
Cadmium	7440-43-9	3.31E-06	NA	NA	NA	NA
Chloroform	67-66-3	1.30E-04	4.26E-07	4.27E-07	5.74E-06	2.90E-05
Cobalt	7440-48-4	1.15E-05	NA	NA	NA	NA
Copper	7440-50-8	1.19E-04	NA	NA	NA	NA
Cyclohexane	110-82-7	8.63E-03	1.63E-04	1.62E-04	2.20E-03	1.10E-02
Ethylbenzene	100-41-4	1.41E-03	2.55E-06	2.55E-06	3.44E-05	1.73E-04
Naphthalene	91-20-3	6.63E-04	1.25E-08	1.25E-08	1.69E-07	8.50E-07
n-Hexane	110-54-3	2.22E-03	1.26E-04	1.25E-04	1.70E-03	8.46E-03
Nickel	7440-02-0	3.89E-05	NA	NA	NA	NA
Styrene	100-42-5	2.04E-02	2.83E-06	2.83E-06	3.82E-05	1.92E-04
Tetrachloroethylene	127-18-4	1.61E-03	5.10E-06	5.10E-06	6.89E-05	3.47E-04
Toluene	108-88-3	1.86E-03	4.08E-06	4.09E-06	5.51E-05	2.78E-04
Trichloroethylene	79-01-6	6.06E-04	3.00E-06	3.00E-06	4.05E-05	2.04E-04
Vinyl Chloride	75-01-4	6.08E-05	4.83E-06	4.82E-06	6.52E-05	3.27E-04

NA = Not applicable. Organic compound vapor emissions were not calculated for inorganic compounds.
(a) See text for description of modeling method.

Table 4.3-6
Evaluation of Potential Fugitive Dust Emissions During Spent Carbon Unloading

Parameter	Value	Units	Basis	Variable Name
Input Parameters				
PM10 particle size multiplier	0.35	unitless	USEPA default for PM10 (particles less than 10 microns in diameter). This multiplier was developed based on data for material with silt content between 0.44-19%. (USEPA 2006)	kPM10
PM2.5 particle size multiplier	0.053	unitless	USEPA default for PM2.5 (particles less than 2.510 microns in diameter). This multiplier was developed based on data for material with silt content between 0.44-19%. (USEPA 2006)	kPM2.5
Mean wind speed	2.38	m/sec	Long-term average value based on Parker AZ data	U
Material moisture content	10	%	Value for vapor carbon. M. McCue, Director of Plant Operations, May 2007.	M
Mass unloaded per unloading event per hour	3,242	kg spent carbon/hr	Based on analysis of spent carbon containers' capacities, approximate unloading times per container type, and the average amount of spent carbon, by container type and container capacity, unloaded during 2005 and 2006 (data provided by M. McCue, Director of Plant Operations, May 2007). Amount unloaded per unloading event per hour = average amount spent carbon unloaded per event (1,783 kg vapor spent carbon) / average unloading duration (0.55 hours for vapor spent carbon containers).	Q
Emission Rate Calculations				
Total Dust Emission Rate				
E in kg particulate / megagram material	1.86E-04	kg/megagram	E = k * (0.0016) * [((U/2.20)^1.3) / ((M/2)^1.4)]. This equation was developed based on data for material with silt content between 0.44-19%, and moisture content between 0.25-4.8%. (USEPA 2006)	
E in g particulate / kg material unloaded	1.86E-04	g/kg	g / kg = (kg / megagram) * megagram/1,000 kg * 1,000 g/kg	
Emission rate in g/sec	1.68E-04	g/sec	g/kg * kg spent carbon/hr * hr/3,600 sec	
PM10 Emission Rate				
E in kg particulate / megagram material	6.52E-05	kg/megagram	E = k * (0.0016) * [((U/2.20)^1.3) / ((M/2)^1.4)]. This equation was devleoped based on data for material with silt content between 0.44-19%, and moisture content between 0.25-4.8%. (USEPA 2006)	
E in g particulate / kg material unloaded	6.52E-05	g/kg	g / kg = (kg / megagram) * megagram/1,000 kg * 1,000 g/kg	
Emission rate in g/sec	5.87E-05	g/sec	g/kg * kg spent carbon/hr * hr/3,600 sec	
PM2.5 Emission Rate				
E in kg particulate / megagram material	9.87E-06	kg/megagram	E = k * (0.0016) * [((U/2.20)^1.3) / ((M/2)^1.4)]. This equation was devleoped based on data for material with silt content between 0.44-19%, and moisture content between 0.25-4.8%. (USEPA 2006)	
E in g particulate / kg material unloaded	9.87E-06	g/kg	g / kg = (kg / megagram) * megagram/1,000 kg * 1,000 g/kg	
Emission rate in g/sec	8.89E-06	g/sec	g/kg * kg spent carbon/hr * hr/3,600 sec	

USEPA 2006 = U.S. Environmental Protection Agency. 2006. AP-42 Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources. Aggregate Handling and Storage Piles, Section 13.2.4. November 2006.

Table 4.3-7
Inorganic Compound Emission Rates During Spent Carbon Unloading at the Outdoor Hopper (a)

Compound	CAS #	Average Concentration in spent carbon (g/g)	Inorganic Emission Rate (g/sec) (a)
1,2-Dibromoethane	106-93-4	1.52E-04	NA
1,3-Butadiene	106-99-0	1.29E-02	NA
1,4-Dichlorobenzene	106-46-7	6.55E-03	NA
Acrylonitrile	107-13-1	1.15E-02	NA
Arsenic	7440-38-2	7.13E-06	4.19E-10
Benzene	71-43-2	2.06E-03	NA
Beryllium	7440-41-7	5.95E-07	3.49E-11
Cadmium	7440-43-9	3.31E-06	1.94E-10
Chloroform	67-66-3	1.30E-04	NA
Cobalt	7440-48-4	1.15E-05	6.73E-10
Copper	7440-50-8	1.19E-04	6.99E-09
Cyclohexane	110-82-7	8.63E-03	NA
Ethylbenzene	100-41-4	1.41E-03	NA
Naphthalene	91-20-3	6.63E-04	NA
n-Hexane	110-54-3	2.22E-03	NA
Nickel	7440-02-0	3.89E-05	2.28E-09
Styrene	100-42-5	2.04E-02	NA
Tetrachloroethylene	127-18-4	1.61E-03	NA
Toluene	108-88-3	1.86E-03	NA
Trichloroethylene	79-01-6	6.06E-04	NA
Vinyl Chloride	75-01-4	6.08E-05	NA

NA = not applicable.

(a) Emission rate (g/sec) = PM10 dust emission rate (g/sec) * concentration in spent carbon (g/g), where the PM10 dust emission rate is 5.87E-5 g/sec (see text for description of PM10 emission rate calculation).

Table 4.3-8

Receptor Locations Evaluated for Fugitive Emissions During Spent Carbon Unloading at the Outdoor Hopper

Receptor Name (a)	Description	Acute Inhalation Risk Evaluation	Chronic Inhalation Risk Evaluation
Residential Receptors (developed area within and around Town of Parker)			
R_1 resident	Closest residential location to facility, residential area in town with highest hourly modeled impacts for stack emissions	√	√
R_2 resident	Residential area in town with highest annual modeled impacts for stack emissions	√	√
R_5 resident	Residential area in town with highest hourly modeled impacts for fugitive hopper emissions	√	√
R_6 resident	Residential area in town with highest annual modeled impacts for fugitive hopper emissions	√	√
Farmer Receptors (residential areas with access to irrigation water and within modeling domain)			
R_3 resident farmer	Residential area with access to irrigation water with highest annual modeled impacts (stack and fugitive hopper emissions)	√	√
R_4 resident farmer	Residential area with access to irrigation water with highest hourly modeled impacts (stack and fugitive hopper emissions)	√	√
Maximum Impact Point (undeveloped land area)			
A_1 max hourly (stack)	Maximum stack emissions impact location for hourly concentrations. There is no residential or commercial land use in the vicinity of the maximum impact area (SW of facility).	√	--
A_3 max hourly (fugitives)	Maximum fugitive hopper emissions impact location for hourly concentrations. There is no residential or commercial land use in the vicinity of the maximum impact area (immediately N of facility at property boundary).	√	--
Non-Residential Areas			
A_2 closest business (b)	Closest developed location beyond property boundary (non-residential) with highest hourly modeled impacts	√	--

-- = Not evaluated. These locations are not used for residential purposes.

(a) Receptor names are those used in the IRAP risk assessment software program.

(b) The County Agricultural Extension Office and CRIT Realty are located at receptor A_2. Maximum 1-hour average air concentrations at all other non-residential developed land use locations were lower than at receptor A_2.

Table 4.4-1
Chronic Risk Assessment Results - Reactivation Facility Stack

Receptor Name	Scenario	Description	EXCESS LIFETIME CANCER RISK (a)			TOTAL HAZARD INDEX (b)			Exposure Pathways
			Group 1: All Detected Compounds (n=95) (c)	Group 2: All Compounds (except benzidine) (n=177) (d)	Group 3: All Compounds (n=178) (e)	Group 1: All Detected Compounds (n=95) (c)	Group 2: All Compounds (except benzidine) (n=177) (d)	Group 3: All Compounds (n=178) (e)	
Residential Receptors (developed area within and around Town of Parker)									
R_1 resident	resident_adult	Closest residential location to facility	2.E-08	6.E-08	7.E-07	1.E-02	1.E-02	1.E-02	Inhalation Soil ingestion Homegrown produce ingestion (f)
	resident_child		7.E-09	2.E-08	3.E-07	1.E-02	1.E-02	1.E-02	
R_2 resident	resident_adult	Residential area in town with highest annual modeled impacts	8.E-08	2.E-07	2.E-06	5.E-02	5.E-02	5.E-02	
	resident_child		2.E-08	4.E-08	9.E-07	5.E-02	5.E-02	5.E-02	
Town area	resident_adult	Average across town area	1.E-08	3.E-08	4.E-07	1.E-02	1.E-02	1.E-02	
	resident_child		3.E-09	7.E-09	1.E-07	1.E-02	1.E-02	1.E-02	
Farmer Receptors (residential area with access to irrigation water and within modeling domain)									
R_3 resident farmer	farmer_adult	Residential area with access to irrigation water with highest annual modeled impacts	5.E-08	9.E-08	5.E-07	1.E-02	2.E-02	2.E-02	Inhalation Soil ingestion Homegrown produce ingestion Locally raised beef ingestion Locally raised poultry ingestion Locally raised egg ingestion Locally raised pork ingestion (f)
	farmer_child		7.E-09	1.E-08	1.E-07	2.E-02	2.E-02	2.E-02	
R_4 resident farmer	farmer_adult	Residential area with access to irrigation water with highest hourly modeled impacts	5.E-08	8.E-08	5.E-07	1.E-02	1.E-02	1.E-02	
	farmer_child		6.E-09	1.E-08	1.E-07	1.E-02	1.E-02	1.E-02	
Farmer area	farmer_adult	Average across residential area with access to irrigation water within modeling domain	2.E-08	3.E-08	2.E-07	6.E-03	6.E-03	6.E-03	
	farmer_child		3.E-09	5.E-09	6.E-08	6.E-03	6.E-03	6.E-03	
Fish Ingestion Pathway									
R_only fish_drain	fisher_adult	Fish ingestion evaluation for the Main Drain	4.E-08	4.E-08	4.E-08	1.E-02	1.E-02	1.E-02	Locally caught fish ingestion (f)
R_only fish_drain	fisher_child		5.E-09	6.E-09	6.E-09	1.E-02	1.E-02	1.E-02	
R_only fish_river	fisher_adult	Fish ingestion evaluation for the Colorado River	3.E-08	3.E-08	4.E-08	4.E-03	4.E-03	4.E-03	
R_only fish_river	fisher_child		4.E-09	4.E-09	5.E-09	3.E-03	3.E-03	3.E-03	

NOTES:
n = Number of compounds.
PDT = Performance Demonstration Test.

(a) The additional (excess) lifetime cancer risks reflect exposure to all potential carcinogens evaluated. The regulatory target cancer risk level used by USEPA for combustion sources is 1E-5 (1 in 100,000). A value of 1E-5 is 10 times higher than 1E-6 and 100 times higher than 1E-7.

(b) The listed hazard index values for non-cancer effects reflect exposure to all evaluated compounds, regardless of the type of health effects. If a hazard index, based on the sum of hazard quotients for all compounds, is above 1, then the hazard index values are recalculated for groups of compounds having the same type of health effect and/or a more detailed evaluation may be conducted. USEPA uses a target hazard index value, for compounds grouped according to specific types of health effects, of 0.25 for combustion sources. A common regulatory target hazard index value used by most states and many other USEPA programs, for compounds grouped according to specific types of health effects, is 1.

(c) Group 1 includes 95 compounds, with chronic toxicity data, that were detected in the PDT in addition to several compounds that were not measured during the PDT but which were evaluated based on emission rates derived from feed rates. This group does not include compounds not detected in the PDT.

(d) Group 2 includes 177 compounds with chronic toxicity data, 82 of which were not detected in the PDT. This group does not include benzidine which was not detected in the PDT. There is no evidence from waste profile reports or analytical spent carbon data that benzidine has been received at the facility. Benzidine was singled out because it was found to be a significant risk driver, accounting for more than 95% of the total cancer risk when included in the risk calculations.

(e) Group 3 includes 178 compounds with chronic toxicity data, of which 83 were not detected in the PDT, including benzidine.

(f) Masters (2007) estimated that at most 20% of the produce and animal foods ingested could be homegrown or raised locally, respectively (information obtained from La Paz County Agricultural Extension Office, personal communication, 6/26/07 and 7/2/07). Information was not available for the fish ingestion pathway and, therefore, it was assumed that 100% of fish ingested was caught exclusively in either the Main Drain or the Colorado River within 10 km of the facility.

Table 4.4-2
Infant Average Daily Doses of Dioxins and Furans From Breastmilk Ingestion

Receptor Name	Scenario	Infant Average Daily Dose (pg PCDD/PCDF TEQs/ kg BW-day) (a)	Adult (Mother's) Exposure Pathways
Residential Receptors (developed area within and around Town of Parker)			
R_1 resident	resident_adult	2.E-04	Inhalation, soil ingestion, and produce ingestion
R_2 resident	resident_adult	8.E-04	
Town area	resident_adult	2.E-04	
Farmer Receptors (residential area with access to irrigation water and within modeling domain)			
R_3 resident farmer	farmer_adult	2.E-03	Inhalation, soil ingestion, and produce ingestion plus ingestion of beef, poultry, eggs, and pork
R_4 resident farmer	farmer_adult	2.E-03	
Farmer area	farmer_adult	9.E-04	
Fish Ingestion Pathway			
R_only fish_drain	fisher_adult	7.E-03	Fish ingestion
R_only fish_river	fisher_adult	5.E-03	
Comparison Target Level		60	

(a) Doses are based on the sum of all dioxin and furan congeners (PCDDs/PCDFs) expressed as 2,3,7,8-TCDD toxic equivalents (TEQs).

Table 4.4-3
Acute Inhalation Results - Reactivation Facility Stack (a)

Receptor Name	Description	Minimum Hazard Quotient (b)	Maximum Hazard Quotient (b)
Residential Receptors (developed area within and around Town of Parker)			
R_1 resident	Closest residential location to facility and residential area in town with highest hourly modeled impacts	<1E-10	0.02
R_2 resident	Residential area in town with highest annual modeled impacts	<1E-10	0.01
Farmer Receptors (residential area with access to irrigation water and within modeling domain)			
R_3 resident farmer	Residential area with access to irrigation water with highest annual modeled impacts	<1E-10	0.009
R_4 resident farmer	Residential area with access to irrigation water with highest hourly modeled impacts	<1E-10	0.02
Maximum Impact Point (undeveloped land area)			
A_1 max hourly	Maximum impact location for hourly concentrations. There is no residential or commercial land use in the vicinity of the maximum impact area (SW of facility).	<1E-10	0.08
Non-Residential Areas			
A_2 closest business (c)	Closest developed location beyond property boundary (non-residential) with highest hourly modeled impacts	<1E-10	0.04

(a) These results are conservatively based on the highest 1-hour average air concentration calculated for each specified receptor location and compound out of a total of 43,800 hours evaluated by the ISCST3 model (i.e., 5 years of hourly meteorological data from Parker, from 2001-2005, were used). The concentrations for all other hours were lower than those used to calculate these hazard quotients.

(b) The minimum and maximum results are the lowest and highest hazard quotients, respectively, calculated among all of the evaluated compounds. The typical target hazard quotient value used by regulatory agencies is 1.

(c) The County Agricultural Extension Office and CRIT Realty are located at receptor A_2. Maximum 1-hour average air concentrations at all other non-residential developed land use locations were lower than at receptor A_2.

Table 4.4-4
Chronic Inhalation Risk Assessment Results - Fugitive Hopper Emissions (a)

Receptor Name	Scenario	Description	Excess Lifetime Cancer Risk (b)	Total Hazard Index (c)
Residential Receptors (developed area within and around Town of Parker)				
R_1 resident	resident_adult	Closest residential location to facility, residential area in town with highest hourly modeled impacts for stack emissions	1.E-08	4.E-04
	resident_child		2.E-09	4.E-04
R_2 resident	resident_adult	Residential area in town with highest annual modeled impacts for stack emissions	3.E-08	1.E-03
	resident_child		6.E-09	1.E-03
R_5 resident	resident_adult	Residential area in town with highest hourly modeled impacts for fugitive hopper emissions	2.E-08	9.E-04
	resident_child		5.E-09	9.E-04
R_6 resident	resident_adult	Residential area in town with highest annual modeled impacts for fugitive hopper emissions	3.E-08	1.E-03
	resident_child		6.E-09	1.E-03
Farmer Receptors (residential area with access to irrigation water and within modeling domain)				
R_3 resident farmer	farmer_adult	Residential area with access to irrigation water with highest annual modeled impacts (stack and fugitive hopper emissions)	5.E-08	1.E-03
	farmer_child		7.E-09	1.E-03
R_4 resident farmer	farmer_adult	Residential area with access to irrigation water with highest hourly modeled impacts (stack and fugitive hopper emissions)	4.E-08	1.E-03
	farmer_child		6.E-09	1.E-03

(a) Risks were calculated for 21 compounds selected for the fugitive emissions evaluation (see text).

(b) The additional (excess) lifetime cancer risks reflect exposure to all potential carcinogens evaluated. The regulatory target cancer risk level used by USEPA for combustion sources is 1E-5 (1 in 100,000). A value of 1E-5 is 10 times higher than 1E-6 and 100 times higher than 1E-7.

(c) The listed hazard index values for non-cancer effects reflect exposure to all evaluated compounds, regardless of the type of health effects. If a hazard index, based on the sum of hazard quotients for all compounds, is above 1, then the hazard index values are recalculated for groups of compounds having the same type of health effect and/or a more detailed evaluation may be conducted. USEPA uses a target hazard index value, for compounds grouped according to specific types of health effects, of 0.25 for combustion sources. A common regulatory target hazard index value used by most states and many other USEPA programs, for compounds grouped according to specific types of health effects, is 1.

Table 4.4-5
Acute Inhalation Results - Fugitive Hopper Emissions (a)

Receptor Name	Description	Minimum Hazard Quotient (b)	Maximum Hazard Quotient (b)
Residential Receptors (developed area within and around Town of Parker)			
R_1 resident	Closest residential location to facility, residential area in town with highest hourly modeled impacts for stack emissions	<1E-9	3E-05
R_2 resident	Residential area in town with highest annual modeled impacts for stack emissions	<1E-9	3E-05
R_5 resident	Residential area in town with highest hourly modeled impacts for fugitive hopper emissions	<1E-9	3E-05
R_6 resident	Residential area in town with highest annual modeled impacts for fugitive hopper emissions	<1E-9	2E-05
Farmer Receptors (residential area with access to irrigation water and within modeling domain)			
R_3 resident farmer	Residential area with access to irrigation water with highest annual modeled impacts (stack and fugitive hopper emissions)	<1E-9	2E-05
R_4 resident farmer	Residential area with access to irrigation water with highest hourly modeled impacts (stack and fugitive hopper emissions)	<1E-9	3E-05
Maximum Impact Point (undeveloped land area)			
A_1 max hourly (stack)	Maximum stack emissions impact location for hourly concentrations. There is no residential or commercial land use in the vicinity of the maximum impact area (SW of facility).	<1E-8	2E-04
A_3 max hourly (fugitives)	Maximum fugitive hopper emissions impact location for hourly concentrations. There is no residential or commercial land use in the vicinity of the maximum impact area (immediately N of facility at property boundary).	<1E-7	0.01
Non-Residential Areas			
A_2 closest business (c)	Closest developed location beyond property boundary (non-residential) with highest hourly modeled impacts	<1E-9	5E-04

(a) These results are conservatively based on the highest 1-hour average air concentration calculated for each specified receptor location and compound out of a total of 43,800 hours evaluated by the ISCST3 model (i.e., 5 years of hourly meteorological data from Parker, from 2001-2005, were used). The concentrations for all other hours were lower than those used to calculate these hazard quotients.

(b) The minimum and maximum results are the lowest and highest hazard quotients, respectively, calculated among all of the evaluated compounds. The typical target hazard quotient value used by regulatory agencies is 1.

(c) The County Agricultural Extension Office and CRIT Realty are located at receptor A_2. Maximum 1-hour average air concentrations at all other non-residential developed land use locations were lower than at receptor A_2.

Table 4.4-6
2005 - 2006 Effluent Discharge Data From the Facility

Date	Year	Compound: / Sample Type	Aluminum (ug/L)	Arsenic (ug/L)	Barium (ug/L)	Beryllium (ug/L)	Boron (ug/L)	Cadmium (ug/L)	Chromium III (ug/L)	Lead (ug/L)	Magnesium (ug/L)	Manganese (ug/L)	Mercury (ug/L)	Nickel (ug/L)	Selenium (ug/L)	Strontium (ug/L)	Vanadium (ug/L)	Acetone (ug/L)	Bromo-dichloro-methane (ug/L)	Bromo-form (ug/L)	Carbon disulfide (ug/L)	Chloro-dibromo-methane (ug/L)	Chloro-form (ug/L)
Metals Sampling																							
Jan	2005	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	< 1.0	--	--	< 0.2	--	9.1	--	--	--	--	--	--	--	--
Feb	2005	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	< 1.0	--	--	< 0.2	--	36	--	--	--	--	--	--	--	--
Mar	2005	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	1.0	--	--	< 0.2	--	37	--	--	--	--	--	--	--	--
Apr	2005	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	2.3	--	--	< 0.2	--	19	--	--	--	--	--	--	--	--
May	2005	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	< 1.0	--	--	< 0.2	--	18	--	--	--	--	--	--	--	--
Jun	2005	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	< 1.0	--	--	< 0.2	--	11	--	--	--	--	--	--	--	--
Jul	2005	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	< 1.0	--	--	< 0.2	--	11	--	--	--	--	--	--	--	--
Aug	2005	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	1.5	--	--	< 0.2	--	8.7	--	--	--	--	--	--	--	--
Sep	2005	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	< 1.0	--	--	< 0.2	--	11	--	--	--	--	--	--	--	--
Oct	2005	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	< 1.0	--	--	< 0.2	--	4.3	--	--	--	--	--	--	--	--
Nov	2005	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	< 1.0	--	--	< 0.2	--	19	--	--	--	--	--	--	--	--
Dec	2005	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	< 1.0	--	--	< 0.2	--	9.6	--	--	--	--	--	--	--	--
Jan	2006	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	< 1.0	--	--	< 0.2	--	7.6	--	--	--	--	--	--	--	--
Feb	2006	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	< 1.0	--	--	< 0.2	--	7.8	--	--	--	--	--	--	--	--
Mar	2006	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	< 1.0	--	--	< 0.2	--	12	--	--	--	--	--	--	--	--
Apr	2006	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	< 1.0	--	--	< 0.2	--	21	--	--	--	--	--	--	--	--
May	2006	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	< 1.0	--	--	< 0.2	--	16	--	--	--	--	--	--	--	--
Jun	2006	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	< 1.0	--	--	< 0.2	--	17	--	--	--	--	--	--	--	--
Jul	2006	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	1.2	--	--	< 0.2	--	11	--	--	--	--	--	--	--	--
Aug	2006	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	< 1.0	--	--	< 0.2	--	10	--	--	--	--	--	--	--	--
Sep	2006	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	< 1.0	--	--	< 0.2	--	17	--	--	--	--	--	--	--	--
Oct	2006	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	< 1.0	--	--	< 0.2	--	14	--	--	--	--	--	--	--	--
Nov	2006	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	< 1.0	--	--	< 0.2	--	2.2	--	--	--	--	--	--	--	--
Dec	2006	24-hr composite (a)	--	--	--	< 0.5	--	< 1.0	--	< 1.0	--	--	< 0.2	--	< 2.0	--	--	--	--	--	--	--	--
Performance Demonstration Test (detected compounds)																							
Mar	2006	4 hour composite (b)	114	13.7	247	<1.8	--	< 0.82	-- (c)	-- (c)	--	115	< 0.06	< 3.8	11	--	16.6	3.7	< 1.0	2	< 1.0	1.4	0.14
Mar	2006	6 hour composite (b)	<100	12.6	226	<1.8	--	< 0.82	-- (c)	-- (c)	--	61.2	< 0.06	< 3.8	10	--	21	4.8	0.89	2.1	< 1.0	1.3	0.15
Mar	2006	4 hour composite (b)	148	11.9	238	<1.8	--	2.4	-- (c)	-- (c)	--	85.9	< 0.06	4.8	9	--	21.1	4.07	1	2.03	0.16	1.4	0.14
Compliance Report for Categorical Pretreatment Standards (detected compounds)																							
Jun	2005	24-hour composite	--	13	--	--	--	< 5	5	< 5	--	--	< 0.2	< 10	--	--	<10	--	--	--	--	--	--
Dec	2005	24-hour composite	--	11	--	--	--	< 5	5.9	< 5	--	--	< 0.2	< 10	--	--	<10	--	--	--	--	--	--
Jun	2006	24-hour composite	--	12	--	--	--	< 5	< 5	< 5	--	--	< 0.2	< 10	--	--	31	--	--	--	--	--	--
Dec	2006	24-hour composite	--	<10	--	--	--	< 5	< 5	< 5	--	--	< 0.2	< 10	--	--	<10	--	--	--	--	--	--
Priority Pollutant Testing Report																							
Jul	2005	24-hour composite	82	5.2	75	--	640	--	--	--	29000	--	--	--	--	1700	--	--	--	--	--	--	--
Selection of Compounds for Evaluation																							
Compound Selected for Evaluation			√	√	√	NE	√	√	√	√	√	√	NE	√	√	√	√	√	√	√	√	√	√
Summary Data																							
Average (d)			99	11	197	NE	NC	NC	NC	NC	NC	87	NE	NC	13	NC	13	4.2	0.80	2.0	NC	1.4	0.14
Minimum detected level			82	5.2	75	NE	640	2.4	5	1	29000	61.2	NE	4.8	2.2	1700	16.6	3.7	0.89	2.0	0.16	1.3	0.14
Maximum			148	13.7	247	NE	640	2.4	5.9	2.3	29000	115	NE	4.8	37	1700	31	4.8	1	2.1	0.16	1.4	0.15

Source: Data obtained from M. McCue, Director of Plant Operations, May 2007.
-- = not available or not applicable
NC = not calculated due to the large percentage of samples that were non-detects
NE = not evaluated - compound was not detected
(a) One 24-hr composite sample collected per month
(b) Composite collected every 30 minutes during each test run (approximately 4 hours for runs 1 and 3, and approximately 6 hours for run 2)
(c) Lead and chromium were spiked in the Performance Demonstration Test
(d) Arithmetic average calculated using one-half the reported detection limit

Table 4.4-7
Analysis of Facility Incremental Contribution on CRSSJV POTW Concentrations

Concentrations in Facility Effluent (ug/L)				Concentrations in Facility Effluent and Entering POTW (ug/L)							
	Effluent Concentration (total ug/L)			Suspended solids:water partition coefficient for facility effluent (Kd_{sw})		Average Concentration - used to evaluate long-term (chronic) impacts			Maximum Concentration - used to evaluate acute (daily) impacts		
Compound	Average	Minimum detected level	Maximum	(L/kg)	Source (a)	Total	Dissolved (b)	Particulate (c)	Total	Dissolved (b)	Particulate (c)
Aluminum	99	82	148	9.9	2a	9.9E+01	9.8E+01	6.8E-03	1.5E+02	1.5E+02	1.0E-02
Arsenic	11	5.2	13.7	31	2b	1.1E+01	1.1E+01	2.3E-03	1.4E+01	1.4E+01	3.0E-03
Barium	197	75	247	52	2b	2.0E+02	2.0E+02	7.1E-02	2.5E+02	2.5E+02	9.0E-02
Boron	NC	640	640	3	2a	NC	NC	NC	6.4E+02	6.4E+02	1.3E-02
Cadmium	NC	2.4	2.4	4300	2b	NC	NC	NC	2.4E+00	2.3E+00	7.0E-02
Chromium III	NC	5	5.9	4.30E+06	2b	NC	NC	NC	5.9E+00	1.9E-01	5.7E+00
Lead	NC	1	2.3	900	1	NC	NC	NC	2.3E+00	2.3E+00	1.4E-02
Magnesium	NC	29000	29000	4.5	2c	NC	NC	NC	2.9E+04	2.9E+04	9.1E-01
Manganese	87	61.2	115	65	2a	8.7E+01	8.7E+01	4.0E-02	1.2E+02	1.1E+02	5.2E-02
Nickel	NC	4.8	4.8	1900	2b	NC	NC	NC	4.8E+00	4.7E+00	6.3E-02
Selenium	13	2.2	37	2.2	2b	1.3E+01	1.3E+01	2.1E-04	3.7E+01	3.7E+01	5.7E-04
Strontium	NC	1700	1700	35	2a	NC	NC	NC	1.7E+03	1.7E+03	4.2E-01
Vanadium	13	16.6	31	1000	2a	1.3E+01	1.3E+01	8.9E-02	3.1E+01	3.1E+01	2.2E-01
Acetone	4.2	3.7	4.8	0.04	1	4.2E+00	4.2E+00	1.2E-06	4.8E+00	4.8E+00	1.3E-06
Bromodichloromethane	0.80	0.89	1	0.11	2a	8.0E-01	8.0E-01	6.1E-07	1.0E+00	1.0E+00	7.7E-07
Bromoform	2.0	2	2.1	9.45	1	2.0E+00	2.0E+00	1.4E-04	2.1E+00	2.1E+00	1.4E-04
Carbon disulfide	NC	0.16	0.16	4.96	1	NC	NC	NC	1.6E-01	1.6E-01	5.6E-06
Chlorodibromomethane	1.4	1.3	1.4	5.24	1	1.4E+00	1.4E+00	5.0E-05	1.4E+00	1.4E+00	5.1E-05
Chloroform	0.14	0.14	0.15	3.94	1	1.4E-01	1.4E-01	4.0E-06	1.5E-01	1.5E-01	4.1E-06

CRSSJV POTW = Colorado River Sewage System Joint Venture Publicly Owned Treatment Works.

(a) Kdsw values were obtained from the following hierarchy of sources: (1) USEPA's HHRAP (2005) or (2) sources recommended in HHRAP (2005) consisting of (2a) USEPA's 2004 Superfund Chemical Data Matrix, (2b) USEPA's 1996 Soil Screening Guidance, and (2c) Baes et al. 1984. For pH-dependent Kd values, values provided in source (2b) were used basedon average pH levels in facility effluent (8.1) and in POTW outfall (7.0).

(b) Partitioning based on USEPA (1985): dissolved ug/L = total ug/L / [1 + (Kd L/kg * TSS mg/L * 1E-6)]

TSS in facility effluent (mg/L) = 7 Basis: Average from 2005 and 2006 sampling results at facility

TSS in POTW outfall (mg/L) = 3 Basis: Average from POTW discharge monitoring reports for 2005

(c) Particulate concentration = total concentration - dissolved concentration

Tables 4.4-8 and 4.4-9

Table 4.4-8

Incremental Facility Concentrations at POTW (ug/L)
(Concentrations reflect treatment to remove particulates and organics and effect of water flow into the POTW from other sources)

Compound	Average Concentration - used to evaluate long-term (chronic) impacts		Maximum Concentration - used to evaluate acute (daily) impacts	
	Dissolved (d)	Particulate (d)	Dissolved (d)	Particulate (d)
Aluminum	1.8E+01	2.5E-05	2.7E+01	3.7E-05
Arsenic	1.9E+00	8.4E-06	2.5E+00	1.1E-05
Barium	3.6E+01	2.6E-04	4.5E+01	3.3E-04
Boron	NC	NC	1.2E+02	4.9E-05
Cadmium	NC	NC	4.3E-01	2.6E-04
Chromium III	NC	NC	3.5E-02	2.1E-02
Lead	NC	NC	4.2E-01	5.3E-05
Magnesium	NC	NC	5.3E+03	3.3E-03
Manganese	1.6E+01	1.4E-04	2.1E+01	1.9E-04
Nickel	NC	NC	8.7E-01	2.3E-04
Selenium	2.4E+00	7.5E-07	6.8E+00	2.1E-06
Strontium	NC	NC	3.1E+02	1.5E-03
Vanadium	2.3E+00	3.2E-04	5.6E+00	7.9E-04
Acetone	1.5E-02	4.3E-09	1.8E-02	4.9E-09
Bromodichloromethane	2.9E-03	2.2E-09	3.7E-03	2.8E-09
Bromoform	7.5E-03	4.9E-07	7.7E-03	5.1E-07
Carbon disulfide	NC	NC	5.8E-04	2.0E-08
Chlorodibromomethane	5.0E-03	1.8E-07	5.1E-03	1.9E-07
Chloroform	5.2E-04	1.4E-08	5.5E-04	1.5E-08

Table 4.4-9

Incremental Concentrations Exiting in POTW Outfall (ug/L)
(Repartitioned Concentrations Between Total, Dissolved and Particulate)

Compound	Average Concentration - used to evaluate long-term (chronic) impacts	Maximum Concentration - used to evaluate acute (daily) impacts	Suspended solids:water partition coefficient for POTW outfall (Kd_{sw})		Average Concentration - used to evaluate long-term (chronic) impacts		Maximum Concentration - used to evaluate acute (daily) impacts	
	Total (e)	Total (e)	(L/kg)	Source (a)	Dissolved (b)	Particulate (c)	Dissolved (b)	Particulate (c)
Aluminum	1.8E+01	2.7E+01	9.9	2a	1.8E+01	5.3E-04	2.7E+01	8.0E-04
Arsenic	1.9E+00	2.5E+00	29	2b	1.9E+00	1.7E-04	2.5E+00	2.2E-04
Barium	3.6E+01	4.5E+01	42	2b	3.6E+01	4.5E-03	4.5E+01	5.7E-03
Boron	NC	1.2E+02	3	2a	NC	NC	1.2E+02	1.1E-03
Cadmium	NC	4.3E-01	110	2b	NC	NC	4.3E-01	1.4E-04
Chromium III	NC	5.6E-02	2.50E+06	2b	NC	NC	6.5E-03	4.9E-02
Lead	NC	4.2E-01	900	1	NC	NC	4.2E-01	1.1E-03
Magnesium	NC	5.3E+03	4.5	2c	NC	NC	5.3E+03	7.2E-02
Manganese	1.6E+01	2.1E+01	65	2a	1.6E+01	3.1E-03	2.1E+01	4.1E-03
Nickel	NC	8.7E-01	88	2b	NC	NC	8.7E-01	2.3E-04
Selenium	2.4E+00	6.8E+00	4.3	2b	2.4E+00	3.1E-05	6.8E+00	8.7E-05
Strontium	NC	3.1E+02	35	2a	NC	NC	3.1E+02	3.3E-02
Vanadium	2.3E+00	5.6E+00	1000	2a	2.3E+00	6.9E-03	5.6E+00	1.7E-02
Acetone	1.5E-02	1.8E-02	0.04	1	1.5E-02	1.8E-09	1.8E-02	2.1E-09
Bromodichloromethane	2.9E-03	3.7E-03	0.11	2a	2.9E-03	9.6E-10	3.7E-03	1.2E-09
Bromoform	7.5E-03	7.7E-03	9.45	1	7.5E-03	2.1E-07	7.7E-03	2.2E-07
Carbon disulfide	NC	5.8E-04	4.96	1	NC	NC	5.8E-04	8.7E-09
Chlorodibromomethane	5.0E-03	5.1E-03	5.24	1	5.0E-03	7.9E-08	5.1E-03	8.0E-08
Chloroform	5.2E-04	5.5E-04	3.94	1	5.2E-04	6.2E-09	5.5E-04	6.5E-09

(a) Kdsw values were obtained from the following hierarchy of sources: (1) USEPA's HHRAP (2005) or (2) sources recommended in HHRAP (2005) consisting of (2a) USEPA's 2004 Superfund Chemical Data Matrix, (2b) USEPA's 1996 Soil Screening Guidance, and (2c) Baes et al. 1984. For pH-dependent Kd values, values provided in source (2b) were used basedon average pH levels in facility effluent (8.1) and in POTW outfall (7.0).

(b) Partitioning based on USEPA (1985): dissolved ug/L = total ug/L / [1 + (Kd L/kg * TSS mg/L * 1E-6)]

TSS in facility effluent (mg/L) =	7	Basis: Average from 2005 and 2006 sampling results at facility
TSS in POTW outfall (mg/L) =	3	Basis: Average from POTW discharge monitoring reports for 2005

(c) Particulate concentration = total concentration - dissolved concentration

(d) Concentrations at POTW reflect treatment (particulate and organics removal) and effect of water flow into the POTW from other sources.
Concentration at POTW (ug/L) = influent concentration (ug/L) * (1-fractional removal efficiency) * facility effluent flow rate (gpd) / POTW outfall flow rate (gpd)
Removal efficiencies for constituents as follows:

Dissolved metal constituents:	0	%	Basis: POTW does not remove dissolved constituents
Particulate metal constituents:	98	%	Basis: Average suspended solids removal % in POTW discharge monitoring reports for 2005
Dissolved and particulate organic constituents:	98	%	Basis: Average BOD % removal in POTW discharge monitoring reports for 2005

Water flow rates as follows:

RF-2 facility effluent (gpd) =	129465	gpd	Basis: Average effluent flow rate to POTW for 2006 year
POTW outfall (gpd) =	708541	gpd	Basis: Average POTW outfall flow rate for 2006 year

(e) Total concentration in outfall due to facility increment = particulate + dissolved concentrations

Table 4.4-10
Ambient Water Quality Criteria and Standards
(Concentrations in ug/L)

Compound	Joint Venture NPDES Discharge Limit (1,2)						Arizona Water Quality Standards (WQS) for Colorado River Designated Uses (1,3) (Total concentration unless otherwise noted)								
	Average (monthly)	Basis		Maximum (daily)	Basis		DWS	FC	FBC	AgI	AgL	A&Ww -C		A&Ww-A	
Inorganic Compounds															
Aluminum												87 (4)		750 (4)	
Arsenic	--	--		--	--		50	1,450	50	2,000	200	190	d	360	d
Barium	--	--		--	--		2,000	--	98,000	--	--	--		--	
Boron							630	--	126,000	1,000	--	--		--	
Cadmium	3	A&Ww -C	d	70	FBC		5	84	700	50	50	5.3	d,h	15	d,h
Chromium (III)	--	--		--	--		10,500	1,010,000	2,100,000	--	--	191	d,h	1,470	d,h
Lead	15	A&Ww -C	d	386	A&Ww-A	d	15	--	15	10,000	100	8.7	d,h	222	d,h
Magnesium															
Manganese	--	--		--	--		980	--	196,000	10,000	--	--		--	
Nickel	--	--		--	--		140	4,600	28,000	--	--	138	d,h	1,246	d,h
Selenium	2	A&Ww -C		20	A&Ww-A		50	9,000	7,000	20	50	2		20	
Strontium															
Vanadium															
Organic Compounds															
Acetone															
Bromodichloromethane							TTHM	46	TTHM	--	--	--		--	
Bromoform							TTHM	360	180	--	--	--		--	
Carbon disulfide															
Chlorodibromomethane							TTHM	34	TTHM	--	--	--		--	
Chloroform							TTHM	470	230	--	--	--		--	

Notes

-- = value not available

NPDES = National Pollution Discharge Elimination System (USEPA program)

TTHM = compound is a trihalomethane. The drinking water standard for total trihalomethanes is 100 ug/L.

(1) Water Use Codes

FC = Fish Consumption

FBC = Full-body contact

DWS = Domestic Water Supply (domestic drinking water in the area is obtained from groundwater wells)

AgI = Agricultural Irrigation

AgL = Agricultural Livestock

A&Ww-C = Aquatic & wildlife, warmwater - chronic

A&Ww-A = Aquatic and wildlife, warmwater - acute

Water quality criteria descriptors

h = hardness-dependent criterion. Calculated using hardness data reported by the U.S. Geological Survey (USGS) for October 2005 - September 2006 in Colorado River below Parker Dam (318 mg $CaCO_3$/L)

d = dissolved concentration

(2) The basis of the NPDES limits are Arizona Water Quality Standards (WQS). The specific limits are the lowest criteria for all applicable water uses in the Colorado River near the POTW that were in effect prior to March 2002 (when the standards were updated).

(3) Arizona WQS, updated March 29, 2002 and April 8, 2003 (www.azsos.gov/public_services/Title_18/18-11.htm).

(4) USEPA National Recommended Water Quality Criteria (www.epa.gov/waterscience/criteria/wqcriteria/html).

Table 4.4-11
POTW Outfall Evaluation: Comparison to Most Stringent Applicable Criteria or Standard (ug/L)

Compound	Potential for Acute Effects			Potential for Chronic Effects		
	Acute Criterion	Basis of Criterion	Ratio of Modeled Result to Criterion	Chronic Criterion	Basis of Criterion	Ratio of Modeled Result to Criterion
Aluminum	750	total recoverable - aquatic life	0.04	87	total recoverable - aquatic life	0.2
Arsenic	360	total - aquatic life	0.007	50	dissolved - full body contact	0.04
Barium	--		NC	98000	total - full body contact	0.0004
Boron	--		NC	1000	total - agricultural irrigation	NC
Cadmium	15	dissolved - aquatic life	0.03	5.3	dissolved - aquatic life	NC
Chromium III	1470	dissolved - aquatic life	0.000004	191	dissolved - aquatic life	NC
Lead	222	dissolved - aquatic life	0.002	8.7	dissolved - aquatic life	NC
Magnesium	--		NC	--		NC
Manganese	--		NC	10000	total - agricultural irrigation	0.002
Nickel	1246	dissolved - aquatic life	0.0007	138	dissolved - aquatic life	NC
Selenium	20	total - aquatic life	0.3	2	total - aquatic life	1.2
Strontium	--		NC	--		NC
Vanadium	--		NC	--		NC
Acetone	--		NC	--		NC
Bromodichloromethane	--		NC	46	fish consumption	0.00006
Bromoform	--		NC	180	full body contact	0.00004
Carbon disulfide	--		NC	--		NC
Chlorodibromomethane	--		NC	34	fish consumption	0.0001
Chloroform	--		NC	230	full body contact	0.000002

-- = not available.

NC = not calculated either because a criterion or standard was not available or because of the large percentage of non-detected concentrations in the Seimens facility effluent.

Table 4.4-12

Fish Ingestion Pathway Risk Assessment
Concentrations in Main Drain and in Fish at Potential Fishing Location

Compound	Average Dissolved Concentration at POTW Outfall due to Facility Effluent (ug/L) (a)	Average Dissolved Concentration in Main Drain at USGS Station (ug/L) (b)	Fish Biotransfer Factor (L/kg FW)		Fish Tissue Concentration (mg/kg FW) (c)	Fish Ingestion Intake (mg/kg body weight-day) (d)		Oral Toxicity Criterion (e)			Excess Lifetime Cancer Risk (f)		Noncancer Hazard Quotient (g)	
			Value	Source		Adult	Child	CSF $(mg/kg\text{-}day)^{-1}$	RfD (mg/kg-day)	Source	Adult	Child	Adult	Child
Aluminum	18	3.1E-01	500	(7)	1.6E-01	2.0E-04	1.4E-04	NA	1	(4)	NC	NC	2E-04	1E-04
Arsenic	1.9	3.3E-02	114	(1)	3.8E-03	4.7E-07	3.3E-07	1.5	3.00E-04	(3)	3E-07	4E-08	2E-03	1E-03
Barium	36	6.3E-01	633	(1)	4.0E-01	5.0E-04	3.5E-04	NA	0.07	(3)	NC	NC	7E-03	5E-03
Boron	NC	NC	--	--	--	NC	NC	NA	2.00E-01	(5)	NC	NC	NC	NC
Cadmium	NC	NC	907	(1)	--	NC	NC	0.38	4.00E-04	(3)	NC	NC	NC	NC
Chromium III	NC	NC	19	(1)	--	NC	NC	NA	1.5	(3)	NC	NC	NC	NC
Lead	NC	NC	0.09	(1)	--	NC	NC	8.50E-03	4.30E-04	(3)	NC	NC	NC	NC
Magnesium	NC	NC	--	--	--	NC	NC	NA	NA		NC	NC	NC	NC
Manganese	16	2.8E-01	400	(7)	1.1E-01	1.4E-04	9.8E-05	NA	0.14	(5)	NC	NC	1E-03	7E-04
Nickel	NC	NC	78	(1)	--	NC	NC	NA	2.00E-02	(3)	NC	NC	NC	NC
Selenium	2.4	4.2E-02	409	(2)	1.7E-02	2.1E-05	1.5E-05	NA	5.00E-03	(3)	NC	NC	4E-03	3E-03
Strontium	NC	NC	60	(7)	--	NC	NC	NA	6.00E-01	(5)	NC	NC	NC	NC
Vanadium	2.3	4.0E-02	--	--	--	NC	NC	NA	3.00E-03	(6)	NC	NC	NC	NC
Acetone	0.015	2.6E-04	129	(1)	3.4E-05	4.2E-08	3.0E-08	NA	0.9	(3)	NC	NC	4E-08	3E-08
Bromodichloro-methane	2.90E-03	5.0E-05	8.26	(1)	4.2E-07	5.2E-10	3.7E-10	6.20E-02	2.00E-02	(3)	1E-11	2E-12	2E-08	2E-08
Bromoform	7.50E-03	1.3E-04	13.3	(1)	1.7E-06	2.2E-09	1.5E-09	7.90E-03	2.00E-02	(3)	7E-12	1E-12	1E-07	7E-08
Carbon disulfide	NC	NC	9.86	(1)	--	NC	NC	NA	1.00E-01	(3)	NC	NC	NC	NC
Chlorodibromo-methane	5.00E-03	8.7E-05	10.4	(1)	9.0E-07	1.1E-09	8.0E-10	8.40E-02	2.00E-02	(3)	4E-11	5E-12	5E-08	4E-08
Chloroform	5.20E-04	9.0E-06	6.92	(1)	6.3E-08	7.8E-11	5.5E-11	NA	1.00E-02	(3)	NC	NC	8E-09	5E-09
									Total		3E-07	4E-08	1E-02	1E-02

NA = not available.
NC = not calculated. An average concentration was not calculated for a compound if there was a large percentage of non-detected concentrations reported in the facility effluent.
-- = not identified (because an average concentration in the Main Drain was not calculated or because the biotransfer factor is not available or not applicable).
FW = fresh weight.

(a) Average dissolved concentration (from prior table).

(b) Concentrations were calculated at the only location on the Main Drain at which water flow rate data are measured (U.S. Geological Survey Station station #09428508). This USGS station is about 10 miles downstream of the outfall and about 5 miles upstream of the Colorado River.
Concentration downstream in Main Drain (ug/L) = incremental concentration at outfall (ug/L) * flow rate at outfall (gpd) / flow rate at USGS station (gpd)
Water flow rates as follows:

POTW outfall flow rate (gpd) =	708541	gpd	Basis: Average POTW outfall flow rate for 2006 year.
Flow rate at USGS Main Drain station (gpd) =	4.07E+07	gpd	Basis: Annual average flow rate from 2003-2007 measurements (63 ft3/sec) at USGS Station #09428508

(c) Fish tissue concentration (mg/kg) = BCF (L/kg) * dissolved H2O concentration (ug/L) * (1 mg/1,000 ug)

(d) Fish intake (mg/kg BW-day) = fish concentration (mg/kg FW) * fish ingestion rate (kg/kg body weight-day) * fraction ingested from evaluated location, where ingestion rates were 0.00125 and 0.00088 kg/kg body weight-day for an adult and child, respectively, and the fraction ingested was asusmed to be 1.0 (i.e., 100%), based on USEPA's 2005 HHRAP default assumptions.

The intake for arsenic was also adjusted to reflect the fraction of arsenic present in the inorganic form in fish, since most arsenic in fish is present in the nontoxic organic form (ATSDR 2005). Field measurements of arsenic in freshwater fish show the fraction inorganic as 0.01-0.125 (ATSDR 2003, USEPA 2003c). The State of Arizona uses a value of 0.1 fraction inorganic in calculating the State ambient water quality criterion for arsenic for fish consumption (S. Pawlowski, personal communication, May 29, 2007). In this analysis, the Arizona value of 0.1 was thus used to adjust the fish ingestion arsenic intakes.

(e) Hierarchy for chronic toxicity data as follows: USEPA's 2005 HHRAP, USEPA's IRIS, USEPA's Provisional Peer-Reviewed Toxicity Values (PPRTVs), ATSDR's chronic minimum risk level.

(f) Cancer risk = intake (mg/kg body weight-day) * exposure duration (yrs) * exposure frequency (days/yr) * CSF $(mg/kg\text{-}day)^{1}$ / (averaging time (yrs) * 365 days/yr), with the parameters defined based on USEPA 2005 HHRAP as follows: exposure duration (30 yrs adult, 6 yrs child), exposure frequency (350 days/yr), averaging time (70 yrs).

(g) Noncancer hazard quotient = intake (mg/kg body weight-day) * exposure duration (yrs) * exposure frequency (days/yr) / (reference dose (mg/kg-day) * exposure duration (yrs) * 365 days/yr), with the parameters defined based on USEPA 2005 HHRAP as follows: exposure duration (30 yrs adult, 6 yrs child), and exposure frequency (350 days/yr).

Sources:
(1) USEPA 2005 Human Health Risk Assessment Protocol (HHRAP), Appendix A, Biotransfer Factors
(2) Geometric mean of field-derived BAF values reported in USEPA's 2004 Draft Aquatic Life Water Quality Criteria for Selenium (EPA 822-D-04-001)
(3) USEPA 2005 Human Health Risk Assessment Protocol (HHRAP), Appendix A, health benchmarks
(4) USEPA's Provisional Peer-Reviewed Toxicity Values (PPRTVs), provided by D. Crawford, USEPA, March 2007.
(5) USEPA's Integrated Risk Information System (IRIS). 2007.
(6) Chronic minimum risk level (MRL) developed by Agency for Toxic Substances and Disease Registry (ATSDR). 2007
(7) Oak Ridge National Laboratory, Risk Assessment Information System (RAIS). Rais.ornl.gov/homepage/rap_tool.shtml. 2007

Table 4.4-13
Modeled Ambient Air Concentrations On Site Associated with Fugitive Emissions During Spent Carbon Unloading and Comparison to Occupational Exposure Limits

Compound	CAS #	8-Hour Average Air Concentration (mg/m3) (a)		Occupational Exposure Limits (mg/m3) (b)		Comparison of Maximum Modeled 8-Hour Average Concentrations to Occupational Exposure Limits			
						Aqua Spent Carbon (used to treat liquids)		Vapor Spent Carbon (used to treat vapors)	
		Aqua Spent Carbon (used to treat liquids)	Vapor Spent Carbon (used to treat vapors)	NIOSH Reference Exposure Limit (8-hr TWA REL)	OSHA Permissible Exposure Limit (8-hr TWA PEL)	Ratio - Air Concentration/ NIOSH REL	Ratio - Air Concentration/ OSHA PEL	Ratio - Air Concentration/ NIOSH REL	Ratio - Air Concentration/ OSHA PEL
1,2-Dibromoethane	106-93-4	1.26E-05	6.37E-05	0.35	150	4E-05	8E-08	2E-04	4E-07
1,3-Butadiene	106-99-0	8.41E-02	4.22E-01	4.4 (c)	2.2	2E-02	4E-02	1E-01	2E-01
1,4-Dichlorobenzene	106-46-7	2.65E-04	1.33E-03	60 (c)	450	4E-06	6E-07	2E-05	3E-06
Acrylonitrile	107-13-1	6.12E-03	3.42E-02	2.2	4.3	3E-03	1E-03	2E-02	8E-03
Arsenic	7440-38-2	NA	6.88E-09	0.002	0.01	--	--	3E-06	7E-07
Benzene	71-43-2	1.93E-03	9.73E-03	0.32	3.2	6E-03	6E-04	3E-02	3E-03
Beryllium	7440-41-7	NA	5.74E-10	0.0005	0.002	--	--	1E-06	3E-07
Cadmium	7440-43-9	NA	3.19E-09	--	0.005	--	--	--	6E-07
Chloroform	67-66-3	9.44E-05	4.76E-04	49 (c,e)	--	2E-06	--	1E-05	--
Cobalt	7440-48-4	NA	1.11E-08	0.05	0.1	--	--	2E-07	1E-07
Copper	7440-50-8	NA	1.15E-07	1	1	--	--	1E-07	1E-07
Cyclohexane	110-82-7	3.61E-02	1.81E-01	1050	1050	3E-05	3E-05	2E-04	2E-04
Ethylbenzene	100-41-4	5.65E-04	2.85E-03	435	435	1E-06	1E-06	7E-06	7E-06
Naphthalene	91-20-3	2.77E-06	1.40E-05	50	50	6E-08	6E-08	3E-07	3E-07
n-Hexane	110-54-3	2.79E-02	1.39E-01	180	1800	2E-04	2E-05	8E-04	8E-05
Nickel	7440-02-0	NA	3.75E-08	0.015	1	--	--	3E-06	4E-08
Styrene	100-42-5	6.27E-04	3.16E-03	215	430	3E-06	1E-06	1E-05	7E-06
Tetrachloroethylene	127-18-4	1.13E-03	5.70E-03	170 (c)	680	7E-06	2E-06	3E-05	8E-06
Toluene	108-88-3	9.05E-04	4.56E-03	375	750	2E-06	1E-06	1E-05	6E-06
Trichloroethylene	79-01-6	6.65E-04	3.35E-03	134 (d)	540	5E-06	1E-06	2E-05	6E-06
Vinyl Chloride	75-01-4	1.07E-03	5.38E-03	2.6 (c)	2.6	4E-04	4E-04	2E-03	2E-03

NA = not applicable.
-- = not available or not calculated.
TWA = time-weighted average.

(a) Air concentration (mg/m3) = emission rate (g/sec) * maximum 8-hour average unit air concentration (16,426 ug/m3 per 1 g/sec) * mg/1,000 ug. The maximum 8-hour average unit air concentration among the modeled on-site receptor locations for the fugitive emissions source occurred about 10 m north of the hopper for all five years of modeled meteorological data (2001-2005 datasets). The results at this receptor ranged from 8,586 ug/m^3 per 1 g/sec (2001 meteorological data) to 16,426 ug/m^3 per 1 g/sec (2003 meteorological data).
(b) Sources: OSHA PELS - www.osha.gov/pls/oshaweb. NIOSH RELs - www.cdc.gov/niosh/npg. ACGIH TLVs - www.osha.gov/dts/chemicalsampling/toc/toc_chemsamp.html.
(c) The ACGIH TWA-threshold limit value (TLV) was used, if available, if a NIOSH REL was not available.
(d) 10-hour TWA concentration.
(e) The NIOSH REL is 9.78 mg/m^3, for a 60-minute short-term exposure period.

Table 4.5-1
Uncertainties in the Facility Risk Assessment

Uncertainty	Effect of Uncertainty on Potential Risk
Selection of Chemicals	
Over 170 compounds were evaluated quantitatively in the risk assessment, including over 80 compounds that were not detected in stack emissions	Over- or under-estimation
Toxicity Characterization	
Conservatively derived cancer slope factors and reference doses were used to assess risks	Over-estimation
Excess lifetime cancer risks for PCDDs/PCDFs other than 2,3,7,8-TCDD were evaluated using toxicity equivalency factors	Over- or under-estimation
Acute inhalation toxicity criteria were derived from a variety of sources, and incorporated safety factors to account for even sensitive members of the population	Over- or under-estimation
Chronic and acute toxicity criteria were not available for all selected compounds	Under-estimation
Quantification of Stack Emission Rates	
Emission rates for several compounds were set at proposed permit levels that are higher than actually occur at the facility	Over-estimation
Calculation of Environmental Concentrations	
The ISCST3 model was used to calculate ambient air concentrations and deposition rates	Over- or under-estimation
USEPA fate and transport mathematical equations were used to calculate environmental concentrations	Over-estimation
Numerous USEPA default input parameters were used to calculate concentrations	Over-estimation
Mercury speciation in soil, sediment and water was based on USEPA default speciation fractions	Over- or under-estimation
Chemical concentrations in produce and in animal products were based on biotransfer coefficients, often derived using regression equations	Over- or under-estimation
Input parameters used to calculate chemical concentrations in water bodies were estimated from site-specific information as well as default assumptions	Over- or under-estimation
A number of scenarios calculated concentrations in produce and animal meat products at a single point rather than across the acreages necessary to support these practices	Over-estimation
Calculation of Human Exposures	
USEPA default assumptions for exposure duration, exposure frequency, and ingestion and inhalation rates were used to calculate exposures	Over-estimation
The fish ingestion exposure scenarios assume 100% of all fish ingested come from fish caught only from specific water bodies	Over-estimation
Risk Characterization	
Potential exposure to PCDDs/PCDFs were evaluated for infants and adults by comparison with estimates of current background exposure levels	Over- or under-estimation
Acute inhalation risks were evaluated for specific chemicals although the short-term effects of some chemicals may be additive, synergistic or antagonistic	Over- or under-estimation

Table 4.5-2
Analysis of Dioxin-Like Polychlorinated Biphenyls (PCBs)

Constituent	CAS NO.	PDT Results: Detected in Stack Samples (Y/ND)	Emission Rate Based on PDT (g/sec)	Ratio: Dioxin-like Emission Rate / Total PCB Emission Rate (a)	Extrapolated Lifetime Average Daily Dose (mg/kg-day) (b)	Dioxin-like PCB TEFs (c)	Extrapolated TEQ Lifetime Average Daily Dose (mg/kg-day) (d)
3,4,3',4'-Tetrachlorobiphenyl (IUPAC 77)	32598-13-3	Y (EMPC)	1.48E-10	6.32E-03	9.49E-13	0.0001	9.49E-17
3,4,4',5-tetrachlorobiphenyl (IUPAC 81)	70362-50-4	Y (*, EMPC)	2.62E-11	1.12E-03	1.68E-13	0.0001	1.68E-17
2,3,4,3',4'-Pentachlorobiphenyl (IUPAC 105)	32598-14-4	Y (B, EMPC)	6.29E-11	2.69E-03	4.03E-13	0.0001	4.03E-17
2,3,4,5,4'-Pentachlorobiphenyl (IUPAC 114)	74472-37-0	Y (*, EMPC)	8.41E-12	3.59E-04	5.39E-14	0.0005	2.70E-17
2,4,5,3',4'-Pentachlorobiphenyl (IUPAC 118)	31508-00-6	Y (B, EMPC)	1.36E-10	5.81E-03	8.72E-13	0.0001	8.72E-17
3,4,5,2',4'-Pentachlorobiphenyl (IUPAC 123)	65510-44-3	Y (B, *, EMPC)	1.28E-11	5.47E-04	8.21E-14	0.0001	8.21E-18
3,4,5,3',4'-Pentachlorobiphenyl (IUPAC 126)	57465-28-8	Y (EMPC)	4.3E-11	1.84E-03	2.76E-13	0.1	2.76E-14
2,3,4,5,3',4'-Hexachlorobiphenyl (IUPAC 156)	38380-98-4	Y (C, EMPC)	3.84E-11	1.64E-03	2.46E-13	0.0005	1.23E-16
2,3,4,3',4',5'-Hexachlorobiphenyl (IUPAC 157)	68782-90-7	Y (C, EMPC)	3.84E-11	1.64E-03	2.46E-13	0.0005	1.23E-16
2,4,5,3',4',5'-Hexachlorobiphenyl (IUPAC 167)	52663-72-6	Y (EMPC)	1.76E-11	7.52E-04	1.13E-13	0.00001	1.13E-18
3,4,5,3',4',5'-Hexachlorobiphenyl (IUPAC 169)	32774-16-6	ND	1E-11	4.27E-04	6.41E-14	0.01	6.41E-16
2,3,4,5,3',4',5'-Heptachlorobiphenyl (IUPAC 189)	39635-31-9	ND	6.7E-12	2.86E-04	4.29E-14	0.0001	4.29E-18
Total dioxin-like PCBs							2.87E-14
Total PCBs (as Aroclor 1254)	11097-69-1	Y	2.34E-08		1.50E-10		
Total dioxin-like PCBs excess lifetime cancer risk							4.3E-09

Notes:

* = the compound was detected very infrequently, in only one or two of the sampled fractions, from the three replicate runs
B = one or more sample fraction results from one or more of the three replicate runs were affected by method blank contamination
C = co-eluting PCB isomer
EMPC = one or more of the front or back half sample results from one or more of the three replicate runs were an estimated maximum possible concentration
ND = not detected in any sample fraction from any of the three replicate runs
Y = yes; detected in one or more sample fractions from at least one of the three replicate runs

(a) Ratio = dioxin-like PCB emission rate / total PCB emission rate used in the risk assessment.
(b) Extrapolated dose = lifetime average daily dose calculated for total PCBs for the Main Drain fish ingestion pathway (1.5E-10 mg/kg-day) * ratio of dioxin-like to total PCB emission rate.
(c) Toxic equivalency factors (TEFs) for dioxin-like PCBs are based on WHO values as summarized in USEPA's HHRAP.
(d) Toxic equivalents (TEQ) dose = dioxin-like extrapolated lifetime average daily dose * TEF.
(e) Cancer risk = TEQ dose * TCDD cancer slope factor (1.5E+5 (mg/kg-day)^-1).

Table 4.5-3
Compounds Selected for the Risk Assessment Without Human Health Toxicity Data

Compound	CAS Number	PDT Results: Detected in Stack Samples (Y or ND)	Compound Included in USEPA (2005) HHRAP	Compound Did Not Have Chronic Toxicity Data	Compound Did Not Have Acute Toxicity Data
1,1-Dichloropropene	563-58-6	ND		X	
1,2,3-Trichlorobenzene	87-61-6	ND	√	X	
1,2,4-Trimethylbenzene	95-63-6	ND		X	
1,2-Dichloroethene (cis)	156-59-2	Y (*)	√	X	
1,3,5-Trimethylbenzene	108-67-8	ND	√	X	
2,2-Dichloropropane	594-20-7	ND		X	
2,5-Dimethylfuran	625-86-5	Y (TIC)		X	X
2,5-Dimethylheptane	2216-30-0	Y (TIC)		X	
2,5-Dione, 3-hexene	17559-81-8	Y (TIC)		X	X
2-Hexanone	591-78-6	ND		X	
2-Methyl octane	3221-61-2	Y (TIC)		X	X
2-Nitroaniline	88-74-4	ND	√	X	
2-Nitrophenol	88-75-5	ND	√	X	
3-Ethyl benzaldehyde	34246-54-3	Y (TIC)		X	
3-Hexen-2-one	763-93-9	Y (TIC)		X	X
3-Nitroaniline	99-09-2	ND	√	X	
Ethylidene acetone (3-penten-2-one)	625-33-2	Y (TIC)		X	X
3-Penten-2-one, 4-methyl	141-79-7	Y (TIC)		X	
4-Bromophenyl-phenyl ether	101-55-3	ND	√	X	
4-Chloro-3-methylphenol	59-50-7	ND	√	X	
4-Chlorophenyl-phenyl ether	7005-72-3	ND	√	X	
4-Ethyl benzaldehyde	4748-78-1	Y (TIC)		X	
4-Nitroaniline	100-01-6	ND	√	X	
9-Octadecenamide	301-02-0	Y (TIC)		X	X
Acenaphthylene	208-96-8	Y		X	
Benzo(e)pyrene	192-97-2	Y (B)		X	X
Benzo(g,h,i)perylene	191-24-2	Y		X	
Benzoic acid, methyl ester	93-58-3	Y (TIC)		X	X
Benzonitrile	100-47-0	ND	√	X	
Benzyl alcohol	100-51-6	ND	√	X	
BHC, delta-	319-86-8	Y (COL)			X
Bromobenzene	108-86-1	ND		X	
Bromochloromethane	74-97-5	ND		X	
Butylbenzene, n-	104-51-8	ND		X	
Butylbenzene, sec-	135-98-8	ND		X	
Butylbenzene, tert-	98-06-6	ND		X	
Carbazole	86-74-8	ND		X	
Diallate	2303-16-4	ND		X	X
Dimethylphthalate	131-11-3	ND	√	X	
Di-n-octyl phthalate	117-84-0	ND	√	X	
Endosulfan II	33213-65-9	Y (*, COL)		X	X
Endosulfan sulfate	1031-07-8	ND		X	X
Endrin aldehyde	7421-93-4	Y (B, COL)		X	X
Endrin ketone	53494-70-5	ND		X	X
Iodomethane	74-88-4	Y (B)		X	
Isopropyl toluene, p-	99-87-6	ND		X	X
Perylene	198-55-0	Y (*, B)		X	X
Phenanthrene	85-01-8	Y (*, B)	√	X	
Phosphine imide, P,P,P-triphenyl	2240-47-3	Y (TIC)		X	X
Propylbenzene, n-	103-65-1	ND		X	

Notes:

* = The compound was detected very infrequently, in only 1-2 of the sampled fractions, from the three replicate runs.

B = One or more sample fraction results from one or more of the three replicate runs were affected by method blank contamination.

COL = There was a greater than 40% difference between primary and confirmatory columns in one or more sample fraction results from one or more of the three replicate runs; reported result should be considered estimated.

HHRAP = Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities (U.S. Environmental Protection Agency, 2005).

ND = Not detected in any sample fraction from any of the three replicate runs.

PDT = Performance Demonstration Test.

TIC = Tentatively identified compound.

X = Compound did not have chronic or acute human health toxicity data.

Y = Yes; detected in one or more sample fractions from at least one of the three replicate runs.

Table 5.1-1
Ecological Receptors and Exposure Pathways Evaluated in the Ecological Risk Assessment

a. Creosote Bush Scrub

Receptor	**Taxa**	**Reason for Selection**	**Exposure Medium & Exposure Route**	
			Soil	**Diet**
Badger	mammal	Common in study area. Carnivorous species. Member of mustelid family, which often demonstrates a greater sensitivity to toxicants than other mammals. Digs and forages in soil. Carnivorous habit will result in greater dietary exposures than other common mammals of this habitat (e.g., jackrabbit, pocket mice).	ingestion	ingestion
Gambel's quail	bird	Common to abundant study area resident. Most important game resource in the lower Colorado River Valley (Rosenberg et al. 1991). Toxicity data available for some chemicals. Exposures will be representative of that in other seed eaters of this habitat (e.g., dove, sparrow).	ingestion	ingestion
Great horned owl	bird	Fairly common resident throughout Parker Valley. Carnivorous.	ingestion	ingestion
Desert tortoise	reptile	Species of special concern in Arizona. Potentially distributed throughout desert scrub habitat of study area.	ingestion	ingestion
Creosote bush	plant	Dominant vegetative species in desert scrub habitat. Wide-spread throughout study area. Important plant to native people, and single most widely and frequently used medicinal herb in the Sonoran desert (Phillips and Comus 2000).	root uptake	na

na = not applicable to this receptor.

Table 5.1-1 (Continued)
Ecological Receptors and Exposure Pathways Evaluated in the Ecological Risk Assessment

b. Agricultural Areas

Receptor	Taxa	Reason for Selection	Exposure Medium & Exposure Route	
			Soil	Diet
Gambel's quail	bird	Common to abundant study area resident. Most important game resource in the lower Colorado River Valley (Rosenberg et al. 1991). Toxicity data available for some chemicals. Exposures will be representative of that in other seed eaters of this habitat (e.g., dove, sparrow).	ingestion	ingestion
Burrowing owl	bird	Common resident of agricultural areas in Parker Valley (Rosenberg et al. 1991). Special concern species in the State of California. Carnivorous.	ingestion	ingestion
Alfalfa	plant	Principal crop in agricultural lands of study area. Toxicity data available for some grass species. Other crops less important economically.	root uptake	na

na = not applicable to this receptor.

Table 5.1-1 (Continued)
Ecological Receptors and Exposure Pathways Evaluated in the Ecological Risk Assessment

c. Riparian Corridors

Receptor	Taxa	Reason for Selection	Exposure Medium & Exposure Route	
			Soil	Diet
Southwestern willow flycatcher	bird	Federally endangered. Carnivorous (Insectivorous) species. Presence historically documented in study area. Entire study area population limited to riparian areas. This species will be representative of potential exposures in other insectivorous birds of this habitat.	na	ingestion
Gambel's quail	bird	Common to abundant study area resident. Most important game resource in the lower Colorado River Valley (Rosenberg et al. 1991). Toxicity data available for some chemicals. Screwbeam mesquite of riparian habitats important seasonal food source for this species. Exposures will be representative of that in other seed eaters of this habitat (e.g., dove, sparrow). Other birds in this habitat are less important economically.	ingestion	ingestion
Screwbean mesquite	plant	Ecologically important plant of study area riparian areas, providing food for resident seed eaters. Part of re-vegetation efforts by CRIT to reestablish riparian vegetation in the area. Mesquite is an important and sacred tree in the Mohave religious tradition. Exposures will be representative of that in other woody vegetation of the corridor.	root uptake	na

na = not applicable to this receptor.

Table 5.1-1 (Continued)
Ecological Receptors and Exposure Pathways Evaluated in the Ecological Risk Assessment

d. Colorado River

Receptor	Taxa	Reason for Selection	Exposure Medium & Exposure Route		
			diet	surface water	sediment
Double-crested cormorant	bird	Year-round resident. Piscivorous. Some data suggest a potentially greater sensitivity to some toxicants.	ingestion	ingestion	ingestion
Aquatic community	fish, invertebrates, amphibians, plants	Year-round residents. Some fish and amphibian species important recreationally. Aquatic community is inclusive of all potential aquatic receptors.	ne (1)	all exposure routes	all exposure routes

ne = not evaluated

(1) aquatic life dietary exposures were considered as part of overall evaluation of surface water quality.

Table 5.1-1 (Continued)
Ecological Receptors and Exposure Pathways Evaluated in the Ecological Risk Assessment

e. Riparian Backwaters

Receptor	Taxa	Reason for Selection	Exposure Medium & Exposure Route		
			diet	surface water	sediment
Yuma clapper rail	bird	Federally endangered. Carnivorous (invertivorous) species. Presence historically documented in study area. Entire study area population limited to riparian areas.	ingestion	ingestion	ingestion
Aquatic community	fish, invertebrates, amphibians, plants, benthic invertebrates	Year-round residents. Some fish and amphibian species important recreationally. Aquatic community is inclusive of all potential aquatic receptors. Exposure in benthic invertebrates assessed separately from water column species to evaluate potential impacts of chemicals that partition preferentially to sediments.	ne (1)	all routes	all routes

na = not applicable to this receptor.
ne = not evaluated

(1) aquatic life dietary exposures were considered as part of overall evaluation of surface water quality.

Table 5.1-1 (Continued)
Ecological Receptors and Exposure Pathways Evaluated in the Ecological Risk Assessment

f. Canals, Aqueducts, Main Drain

Receptor	Taxa	Reason for Selection	Exposure Medium & Exposure Route		
			diet	surface water	soil/ sediment
Double-crested cormorant	bird	Year-round resident. Piscivorous. Some data suggest a potentially greater sensitivity to some toxicants.	ingestion	ingestion	ingestion
Mule deer	Mammal	Year-round resident. Could ingest surface water from these areas. Requested by USEPA.	Ingestion	Ingestion	Ingestion
Aquatic community	fish, invertebrates, amphibians, plants	Year-round residents. Some fish and amphibian species important recreationally.	ne (1)	all routes	all routes

na = not applicable to this receptor in this habitat.
ne = not evaluated

(1) aquatic life dietary exposures were considered as part of overall evaluation of surface water quality.

Table 5.2-1
Dietary Parameters for Selected Receptor Species

Receptor	Food Items					Media		
	Terrestrial Plants	Terrestrial Invertebrates	Benthic Invertebrates	Fish	Small Mammals	Soil	Sediment	Surface Water
Southwestern willow flycatcher		X				I		
Gambel's quail	X					I		
Burrowing owl					X	I		
Great horned owl					X	I		
Badger					X	I		
Double crested cormorant				X			I	I
Yuma clapper rail			X				I	I
Mule deer	X					I		I

X - Food chain model assumes 100 percent of a receptor's diet comes from the food source indicated.
I - Food chain model assumes incidental ingestion of medium indicated.

Table 5.2-2
Ingestion Rates for Selected Receptor Species

Receptor	Receptor Body Weight		Food Ingestion Rate		Water Ingestion Rate		Soil Ingestion Rate (d)		Sediment Ingestion Rate	
	(kg)	Reference	(kg WW/ kg BW-d)	Notes	(L/ kg BW-d)	Notes	(kg DW/ kg BW-d)	Notes	(kg DW/ kg BW-d)	Notes
Southwest willow flycatcher	0.011	Sedgewick 2000	1.680	(a, b)	--		0.00	(h)	--	
Gambel's quail	1.04	Brown et al. 1998	0.478	(a, c)	--		0.002	(i)	--	
Burrowing owl	0.15	Haug et al. 1993	0.352	(a, d)	--		0.064	(i)	--	
Great horned owl	0.91	Houston et al.1998	0.188	(a, d)	--		0.010	(i)	--	
Badger	6.4	Baker 1983	0.154	(a, d)	--		0.00004	(i)	--	
Double-crested cormorant	1.2	Hatch and Weseloh 1999	0.273	(a, e)	0.056	(g)	--		0.005	(j)
Yuma clapper rail	0.16	Eddleman and Conway 1998	0.660	(a, f)	0.108	(g)	--		0.021	(k)
Mule Deer	43.7	Relyea et al. 2000	0.292	(a, c)	0.068	(g)	0.0007	(l)	--	

-- = Not applicable; BW - body weight; d –day; DW- dry weight; g – grams; kg – kilograms; L- liters; WW- wet weight.

(a) Food Ingestion Rates (Food IR) were calculated using allometric equations presented in Table 5-1 of USEPA's Screening Level Ecological Risk Assessment Protocol (USEPA 1999):

Bird: IR (g DW/day) = $0.648 \times BW^{0.651}$ (g)

Mammal: IR (g DW/day)=$0.235 \times BW^{0.822}$ (g)

Then, the IR was divided by 1000 to convert the IR from g to kg, and divided by the receptor's body weight to get an ingestion rate in kg DW/kg BW-day.
Finally, to convert the IR from dry weight (DW) to wet weight (WW), the following equation was used:

Food IR (kg WW/kg BW-day) = (IR kg DW/kg BW-day)/(1- % moisture/100)

where % moisture of ingested material is

88% for plant matter (see Table 5-1 in USEPA 1999)
68% for small mammals (see Table 5-1 in USEPA 1999)
83.3% for terrestrial invertebrates (see page C-2 in USEPA 1999)
80% for fish (see page C-4 in USEPA 1999)
83.3% for aquatic invertebrates (see page C-3 in USEPA 1999)

(b) Assumes diet consists of aquatic invertebrates.
(c) Assumes diet consists of plants.
(d) Assumes diet consists of small mammals.
(e) Assumes diet consists of fish.
(f) Assumes diet consists of benthic macroinvertebrates.
(g) Water Ingestion Rates (Water IR) were calculated using allometric equations presented in Table 5-1 of USEPA, 1999:

Bird: IR (L/day) = $0.059 \times BW^{0.670}$ (kg)

Mammal: IR (L/day) = $0.099 \times BW^{0.900}$ (kg)

Then, the bird and mammal IR was divided by the receptor's body weight to get an ingestion rate in L/kg BW-day.

(h) No suitable surrogate species were found in either USEPA (1999) or Beyer et al. (1994). Soil ingestion is assumed to be zero because flycatchers forage by either aerially gleaning (capturing an insect from a substrate while hovering) or hawking (waiting on perches and capturing insects in flight) and thus have negligible contact with soil while foraging. (Craig and Williams, 1998).
(i) Soil ingestion rates for Gambel's quail, Burrowing owl, Great horned owl, and Badger were based on surrogate values for Northern bobwhite, Red-tailed hawk, Red-tailed hawk, and Long-tailed weasel, respectively (USEPA, 1999) were but corrected for the receptor species' body weight. Surrogates were chosen based on similarities in feeding strategy.
(j) No suitable surrogate species were found in USEPA (1999). The two highest sediment ingestion rates estimated by Beyer et al. (1994) for ducks and geese (i.e. wading and diving birds) were 11% of the food ingestion rate for the wood duck and 8.2% for Canada goose. The rounded average of these two rates (10%) was assumed to be a conservative estimate of the proportion of sediment ingestion for the double crested cormorant, which is a diving bird. The sediment ingestion rate was calculated by multiplying the cormorant's dry weight FIR by 10% (USEPA, 1999).
(k) The sediment ingestion rate for the Yuma clapper rail was based on a surrogate value for mallard but corrected for the Yuma clapper rail's body weight. The surrogate was chosen based on similarities in feeding strategy.
(l) Because a mule-deer specific soil ingestion rate (2%) was available from Beyer et al. (1994), a surrogate was not needed.

Table 5.2-3
Summary of Cumulative Hazard Index Values for Selected Ecological Receptors

Exposure Area	Receptor	Cumulative Hazard Index (a)
Creosote Bush Scrub Area	Badger	7.E-06
	Gambel's Quail	7.E-03
	Great Horned Owl	1.E-04
	Creosote Scrub Bush	2.E-01
Agricultural Area	Gambel's Quail	5.E-05
	Burrowing Owl	2.E-05
	Alfalfa	6.E-04
Riparian Corridor Area	Southwestern Willow Flycatcher	3.E-02
	Gambel's Quail	1.E-04
	Plant	8.E-03
Colorado River Area	Double-crested Cormorant	1.E-02
	Surface Water	1.E-04
	Sediment	8.E-05
Riparian Backwater Area	Yuma Clapper Rail	2.E-03
	Surface Water (b)	1.E-04
	Sediment (b)	8.E-05
Main Drain Area	Double-crested Cormorant	5.E-02
	Mule Deer	5.E-05
	Surface Water	8.E-05
	Sediment	3.E-04

(a) The cumulative hazard index (HI) conservatively reflects exposure to all evaluated compounds, regardless of the type or mechanism of effects. It is calculated by summing individual chemical-specific hazard quotient values. For this project, the target hazard index was specified by USEPA Region 9 at a value of 0.25. The target hazard index value used by most states and many other USEPA programs, for compounds grouped according to the mechanism of effects, is 1.0. If an HI, based on the sum of hazard quotients for all compounds, is above the target level, then the HI values are recalculated for groups of compounds having the same type of health effect and/or a more detailed evaluation may be conducted.

(b) Results for surface water and sediment for the riparian backwater were evaluated using the results for the Colorado River.

APPENDIX L

FUGITIVE EMISSIONS: COMPARISON TO USEPA REGION 9 PRELIMINARY REMEDIATION GOALS

Comparison of Modeled Ambient Air Concentrations at Residential Assessment Receptor Location R_6 with USEPA Region 9 Preliminary Remediation Goals

Fugitive Emissions Associated with Spent Carbon Unloading

Calculated Air Concentrations at Receptor R_6			USEPA Region 9 Preliminary Remediation Goals (PRGs) (a)				Comparison of Concentrations to PRGs
Compound (as listed in IRAP software)	CAS Number	Annual Average Air Concentration (ug/m^3)	Compound (as listed in PRG Table)	CAS Number	Ambient Air PRG (ug/m^3)		Air Concentration Ratio: modeled concentration/PRG
					Air Concentration	Basis	
1,3-Butadiene	106-99-0	2.08E-03	1,3-Butadiene	106-99-0	6.1E-02	ca*	3.E-02
1-Hexane (n-hexane)	110-54-3	6.84E-04	n-Hexane	110-54-3	2.1E+02	nc	3.E-06
Acrylonitrile	107-13-1	1.68E-04	Acrylonitrile	107-13-1	2.8E-02	ca*	6.E-03
Arsenic	7440-38-2	2.34E-11	Arsenic	7440-38-2	4.5E-04	ca	5.E-08
Benzene	71-43-2	4.79E-05	Benzene	71-43-2	2.5E-01	ca	2.E-04
Beryllium	7440-41-7	1.95E-12	Beryllium and compounds	7440-41-7	8.0E-04	ca*	2.E-09
Cadmium	7440-43-9	1.08E-11	Cadmium and compounds	7440-43-9	1.1E-03	ca	1.E-08
Chloroform (Trichloromethane)	67-66-3	2.34E-06	Chloroform	67-66-3	8.3E-02	ca	3.E-05
Cobalt	7440-48-4	3.74E-11	Cobalt	7440-48-4	6.9E-04	ca*	5.E-08
Copper	7440-50-8	3.89E-10	Copper and compounds	7440-50-8	NA		NC
Cyclohexane	110-82-7	8.89E-04	Cyclohexane	110-82-7	6.2E+03	nc	1.E-07
Dichlorobenzene,1,4-	106-46-7	6.56E-06	1,4-Dichlorobenzene	106-46-7	3.1E-01	ca	2.E-05
Ethylbenzene	100-41-4	1.40E-05	Ethylbenzene	100-41-4	1.1E+03	nc	1.E-08
Ethylene dibromide (1,2-dibromoethane)	106-93-4	3.14E-07	1,2-Dibromoethane (EDB)	106-93-4	3.4E-03	ca	9.E-05
Ethylene Glycol	107-21-1	3.31E-07	Ethylene glycol	107-21-1	7.3E+03	nc	5.E-11
Naphthalene	91-20-3	6.87E-08	Naphthalene	91-20-3	3.1E+00	nc	2.E-08
Nickel	7440-02-0	1.27E-10	Nickel (soluble salts)	7440-02-0	NA		NC
Styrene	100-42-5	1.55E-05	Styrene	100-42-5	1.1E+03	nc	1.E-08
Tetrachloroethylene (Perchloroethylene)	127-18-4	2.81E-05	Tetrachloroethylene (PCE)	127-18-4	3.2E-01	ca	9.E-05
Toluene	108-88-3	2.25E-05	Toluene	108-88-3	4.0E+02	nc	6.E-08
Trichloroethylene	79-01-6	1.65E-05	Trichloroethylene (TCE)	79-01-6	1.7E-02	ca	1.E-03
Vinyl Chloride	75-01-4	2.64E-05	Vinyl chloride	75-01-4	1.1E-01	ca	3.E-04

NA = PRG not available.
(a) Source: http://www.epa.gov/region09/waste/sfund/prg/files/prgtable2004.xls
Notes from USEPA Region IX PRG Table: ca=Cancer PRG; nc= Noncancer PRG; ca* (where: nc PRG < 100X ca PRG)

APPENDIX K

FUGITIVE EMISSIONS RISK ASSESSMENT: ACUTE INHALATION RISK RESULTS

ACUTE INHALATION RISK RESULTS
FUGITIVE AIR EMISSIONS DURING UNLOADING AT OUTDOOR HOPPER

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
A_1 maximum impact point (stack emissions)	
Benzene	2.1E-04
Chloroform (Trichloromethane)	8.8E-05
Acrylonitrile	4.3E-05
1,3-Butadiene	7.9E-06
Tetrachloroethylene (Perchloroethylene)	7.9E-06
Cyclohexane	5.0E-06
Styrene	4.1E-06
Toluene	3.4E-06
1-Hexane (n-hexane)	2.6E-06
Arsenic	1.0E-06
Vinyl Chloride	8.2E-07
Nickel	1.7E-07
Ethylbenzene	1.6E-07
Trichloroethylene	1.3E-07
Dichlorobenzene,1,4-	6.1E-08
Copper	3.2E-08
Ethylene Glycol	1.9E-08
Ethylene Dibromide	8.8E-09
Naphthalene	5.1E-09
Beryllium	3.2E-09
Cadmium	2.9E-09
Cobalt	1.0E-10
Total (b)	3.7E-04
A_2 closest business	
Benzene	4.6E-04
Chloroform (Trichloromethane)	1.9E-04
Acrylonitrile	9.5E-05
1,3-Butadiene	1.7E-05
Tetrachloroethylene (Perchloroethylene)	1.7E-05
Cyclohexane	1.1E-05
Styrene	9.2E-06
Toluene	7.5E-06
1-Hexane (n-hexane)	5.7E-06
Arsenic	2.2E-06
Vinyl Chloride	1.8E-06
Nickel	3.8E-07
Ethylbenzene	3.5E-07
Trichloroethylene	2.9E-07
Dichlorobenzene,1,4-	1.4E-07
Copper	7.0E-08
Ethylene Glycol	4.1E-08
Ethylene Dibromide	1.9E-08
Naphthalene	1.1E-08
Beryllium	7.0E-09
Cadmium	6.5E-09
Cobalt	2.3E-10
Total (b)	8.2E-04
A_3 maximum impact point (hopper fugitive emissions)	
Benzene	1.1E-02
Chloroform (Trichloromethane)	4.8E-03
Acrylonitrile	2.4E-03
1,3-Butadiene	4.3E-04
Tetrachloroethylene (Perchloroethylene)	4.3E-04
Cyclohexane	2.7E-04
Styrene	2.3E-04
Toluene	1.9E-04
1-Hexane (n-hexane)	1.4E-04
Arsenic	5.5E-05

ACUTE INHALATION RISK RESULTS
FUGITIVE AIR EMISSIONS DURING UNLOADING AT OUTDOOR HOPPER

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Vinyl Chloride	4.5E-05
Nickel	9.5E-06
Ethylbenzene	8.6E-06
Trichloroethylene	7.3E-06
Dichlorobenzene,1,4-	3.4E-06
Copper	1.7E-06
Ethylene Glycol	1.0E-06
Ethylene Dibromide	4.8E-07
Naphthalene	2.8E-07
Beryllium	1.7E-07
Cadmium	1.6E-07
Cobalt	5.6E-09
Total (b)	2.0E-02
R_1 resident	
Benzene	2.8E-05
Chloroform (Trichloromethane)	1.2E-05
Acrylonitrile	5.8E-06
1,3-Butadiene	1.1E-06
Tetrachloroethylene (Perchloroethylene)	1.1E-06
Cyclohexane	6.8E-07
Styrene	5.7E-07
Toluene	4.6E-07
1-Hexane (n-hexane)	3.5E-07
Arsenic	1.4E-07
Vinyl Chloride	1.1E-07
Nickel	2.4E-08
Ethylbenzene	2.1E-08
Trichloroethylene	1.8E-08
Dichlorobenzene,1,4-	8.4E-09
Copper	4.3E-09
Ethylene Glycol	2.5E-09
Ethylene Dibromide	1.2E-09
Naphthalene	7.0E-10
Beryllium	4.3E-10
Cadmium	4.0E-10
Cobalt	1.4E-11
Total (b)	5.1E-05
R_2 resident	
Benzene	2.6E-05
Chloroform (Trichloromethane)	1.1E-05
Acrylonitrile	5.4E-06
1,3-Butadiene	9.9E-07
Tetrachloroethylene (Perchloroethylene)	9.9E-07
Cyclohexane	6.3E-07
Styrene	5.2E-07
Toluene	4.3E-07
1-Hexane (n-hexane)	3.2E-07
Arsenic	1.3E-07
Vinyl Chloride	1.0E-07
Nickel	2.2E-08
Ethylbenzene	2.0E-08
Trichloroethylene	1.7E-08
Dichlorobenzene,1,4-	7.7E-09
Copper	4.0E-09
Ethylene Glycol	2.3E-09
Ethylene Dibromide	1.1E-09
Naphthalene	6.5E-10
Beryllium	4.0E-10
Cadmium	3.7E-10
Cobalt	1.3E-11

ACUTE INHALATION RISK RESULTS
FUGITIVE AIR EMISSIONS DURING UNLOADING AT OUTDOOR HOPPER

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Total (b)	4.7E-05
R_3 resident farmer	
Benzene	2.1E-05
Chloroform (Trichloromethane)	8.9E-06
Acrylonitrile	4.4E-06
1,3-Butadiene	8.0E-07
Tetrachloroethylene (Perchloroethylene)	8.0E-07
Cyclohexane	5.1E-07
Styrene	4.2E-07
Toluene	3.5E-07
1-Hexane (n-hexane)	2.6E-07
Arsenic	1.0E-07
Vinyl Chloride	8.4E-08
Nickel	1.8E-08
Ethylbenzene	1.6E-08
Trichloroethylene	1.4E-08
Dichlorobenzene,1,4-	6.3E-09
Copper	3.2E-09
Ethylene Glycol	1.9E-09
Ethylene Dibromide	9.0E-10
Naphthalene	5.2E-10
Beryllium	3.2E-10
Cadmium	3.0E-10
Cobalt	1.0E-11
Total (b)	3.8E-05
R_4 resident farmer	
Benzene	2.7E-05
Chloroform (Trichloromethane)	1.2E-05
Acrylonitrile	5.6E-06
1,3-Butadiene	1.0E-06
Tetrachloroethylene (Perchloroethylene)	1.0E-06
Cyclohexane	6.6E-07
Styrene	5.4E-07
Toluene	4.5E-07
1-Hexane (n-hexane)	3.4E-07
Arsenic	1.3E-07
Vinyl Chloride	1.1E-07
Nickel	2.3E-08
Ethylbenzene	2.1E-08
Trichloroethylene	1.7E-08
Dichlorobenzene,1,4-	8.1E-09
Copper	4.2E-09
Ethylene Glycol	2.4E-09
Ethylene Dibromide	1.2E-09
Naphthalene	6.7E-10
Beryllium	4.2E-10
Cadmium	3.9E-10
Cobalt	1.3E-11
Total (b)	4.9E-05
R_5 resident	
Benzene	3.4E-05
Chloroform (Trichloromethane)	1.4E-05
Acrylonitrile	7.0E-06
1,3-Butadiene	1.3E-06
Tetrachloroethylene (Perchloroethylene)	1.3E-06
Cyclohexane	8.2E-07
Styrene	6.8E-07
Toluene	5.6E-07
1-Hexane (n-hexane)	4.2E-07

ACUTE INHALATION RISK RESULTS
FUGITIVE AIR EMISSIONS DURING UNLOADING AT OUTDOOR HOPPER

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Arsenic	1.6E-07
Vinyl Chloride	1.4E-07
Nickel	2.8E-08
Ethylbenzene	2.6E-08
Trichloroethylene	2.2E-08
Dichlorobenzene,1,4-	1.0E-08
Copper	5.2E-09
Ethylene Glycol	3.1E-09
Ethylene Dibromide	1.4E-09
Naphthalene	8.4E-10
Beryllium	5.2E-10
Cadmium	4.8E-10
Cobalt	1.7E-11
Total (b)	6.1E-05
R_6 resident	
Benzene	1.5E-05
Chloroform (Trichloromethane)	6.5E-06
Acrylonitrile	3.2E-06
1,3-Butadiene	5.8E-07
Tetrachloroethylene (Perchloroethylene)	5.8E-07
Cyclohexane	3.7E-07
Styrene	3.1E-07
Toluene	2.5E-07
1-Hexane (n-hexane)	1.9E-07
Arsenic	7.4E-08
Vinyl Chloride	6.1E-08
Nickel	1.3E-08
Ethylbenzene	1.2E-08
Trichloroethylene	9.8E-09
Dichlorobenzene,1,4-	4.5E-09
Copper	2.3E-09
Ethylene Glycol	1.4E-09
Ethylene Dibromide	6.5E-10
Naphthalene	3.8E-10
Beryllium	2.3E-10
Cadmium	2.2E-10
Cobalt	7.5E-12
Total (b)	2.7E-05

(a) Acute hazard quotients were calculated for all compounds with fugitive air emission rates and acute inhalation toxicity criteria.

(b) The total is based on the sum of all chemical-specific hazard quotients regardless of the type of health effects of the summed compounds. A total value summed across all compounds is used as a screening tool only, to determine if additional evaluation for specific types of health effects is warranted (i.e., if the total value is greater than 1).

APPENDIX J

FUGITIVE EMISSIONS RISK ASSESSMENT: CHRONIC INHALATION RISK RESULTS BY COMPOUND

Fugitive Air Emissions Risk Assessment
Chronic Inhalation Risk Results by Compound
(IRAP Software Output Information)

Receptor	Scenario	Compound	Inhalation Excess Lifetime Cancer Risk	Inhalation Non-Cancer Hazard Quotient
R_1 resident	resident_adult	1,3-Butadiene	1.0E-08	3.9E-04
R_1 resident	resident_adult	1-Hexane (n-hexane)	0.0E+00	3.7E-07
R_1 resident	resident_adult	Acrylonitrile	1.8E-09	3.2E-05
R_1 resident	resident_adult	Arsenic	2.3E-14	4.2E-10
R_1 resident	resident_adult	Benzene	6.0E-11	6.0E-07
R_1 resident	resident_adult	Beryllium	1.1E-15	5.3E-11
R_1 resident	resident_adult	Cadmium	4.5E-15	2.9E-11
R_1 resident	resident_adult	Chloroform (Trichloromethane)	8.7E-12	2.9E-06
R_1 resident	resident_adult	Cobalt	0.0E+00	2.0E-10
R_1 resident	resident_adult	Copper	0.0E+00	6.1E-12
R_1 resident	resident_adult	Cyclohexane	0.0E+00	5.6E-08
R_1 resident	resident_adult	Dichlorobenzene,1,4-	1.2E-11	3.1E-09
R_1 resident	resident_adult	Ethylbenzene	0.0E+00	5.3E-09
R_1 resident	resident_adult	Ethylene Dibromide	3.0E-11	1.3E-08
R_1 resident	resident_adult	Ethylene Glycol	0.0E+00	9.6E-11
R_1 resident	resident_adult	Naphthalene	0.0E+00	8.6E-09
R_1 resident	resident_adult	Nickel	7.1E-15	3.5E-10
R_1 resident	resident_adult	Styrene	0.0E+00	5.8E-09
R_1 resident	resident_adult	Tetrachloroethylene (Perchloroethylene)	2.7E-11	2.6E-08
R_1 resident	resident_adult	Toluene	0.0E+00	2.1E-08
R_1 resident	resident_adult	Trichloroethylene	5.3E-12	1.0E-08
R_1 resident	resident_adult	Vinyl Chloride	3.7E-11	9.9E-08
		Total	1E-08	4E-04
R_1 resident	resident_child	1,3-Butadiene	2.0E-09	3.9E-04
R_1 resident	resident_child	1-Hexane (n-hexane)	0.0E+00	3.7E-07
R_1 resident	resident_child	Acrylonitrile	3.7E-10	3.2E-05
R_1 resident	resident_child	Arsenic	4.7E-15	4.2E-10
R_1 resident	resident_child	Benzene	1.2E-11	6.0E-07
R_1 resident	resident_child	Beryllium	2.2E-16	5.3E-11
R_1 resident	resident_child	Cadmium	9.1E-16	2.9E-11
R_1 resident	resident_child	Chloroform (Trichloromethane)	1.7E-12	2.9E-06
R_1 resident	resident_child	Cobalt	0.0E+00	2.0E-10
R_1 resident	resident_child	Copper	0.0E+00	6.1E-12
R_1 resident	resident_child	Cyclohexane	0.0E+00	5.6E-08
R_1 resident	resident_child	Dichlorobenzene,1,4-	2.3E-12	3.1E-09
R_1 resident	resident_child	Ethylbenzene	0.0E+00	5.3E-09
R_1 resident	resident_child	Ethylene Dibromide	6.1E-12	1.3E-08
R_1 resident	resident_child	Ethylene Glycol	0.0E+00	9.6E-11
R_1 resident	resident_child	Naphthalene	0.0E+00	8.6E-09
R_1 resident	resident_child	Nickel	1.4E-15	3.5E-10
R_1 resident	resident_child	Styrene	0.0E+00	5.8E-09
R_1 resident	resident_child	Tetrachloroethylene (Perchloroethylene)	5.3E-12	2.6E-08
R_1 resident	resident_child	Toluene	0.0E+00	2.1E-08
R_1 resident	resident_child	Trichloroethylene	1.1E-12	1.0E-08
R_1 resident	resident_child	Vinyl Chloride	7.5E-12	9.9E-08
		Total	2E-09	4E-04
R_2 resident	resident_adult	1,3-Butadiene	2.4E-08	9.2E-04
R_2 resident	resident_adult	1-Hexane (n-hexane)	0.0E+00	8.7E-07
R_2 resident	resident_adult	Acrylonitrile	4.4E-09	7.5E-05
R_2 resident	resident_adult	Arsenic	5.5E-14	1.0E-09
R_2 resident	resident_adult	Benzene	1.4E-10	1.4E-06
R_2 resident	resident_adult	Beryllium	2.6E-15	1.3E-10
R_2 resident	resident_adult	Cadmium	1.1E-14	7.0E-11
R_2 resident	resident_adult	Chloroform (Trichloromethane)	2.1E-11	6.9E-06
R_2 resident	resident_adult	Cobalt	0.0E+00	4.8E-10
R_2 resident	resident_adult	Copper	0.0E+00	1.4E-11
R_2 resident	resident_adult	Cyclohexane	0.0E+00	1.3E-07

Fugitive Air Emissions Risk Assessment
Chronic Inhalation Risk Results by Compound
(IRAP Software Output Information)

Receptor	Scenario	Compound	Inhalation Excess Lifetime Cancer Risk	Inhalation Non-Cancer Hazard Quotient
R_2 resident	resident_adult	Dichlorobenzene,1,4-	2.7E-11	7.3E-09
R_2 resident	resident_adult	Ethylbenzene	0.0E+00	1.2E-08
R_2 resident	resident_adult	Ethylene Dibromide	7.2E-11	3.1E-08
R_2 resident	resident_adult	Ethylene Glycol	0.0E+00	2.3E-10
R_2 resident	resident_adult	Naphthalene	0.0E+00	2.0E-08
R_2 resident	resident_adult	Nickel	1.7E-14	8.2E-10
R_2 resident	resident_adult	Styrene	0.0E+00	1.4E-08
R_2 resident	resident_adult	Tetrachloroethylene (Perchloroethylene)	6.3E-11	6.2E-08
R_2 resident	resident_adult	Toluene	0.0E+00	5.0E-08
R_2 resident	resident_adult	Trichloroethylene	1.3E-11	2.4E-08
R_2 resident	resident_adult	Vinyl Chloride	8.9E-11	2.3E-07
		Total	3E-08	1E-03
R_2 resident	resident_child	1,3-Butadiene	4.7E-09	9.2E-04
R_2 resident	resident_child	1-Hexane (n-hexane)	0.0E+00	8.7E-07
R_2 resident	resident_child	Acrylonitrile	8.7E-10	7.5E-05
R_2 resident	resident_child	Arsenic	1.1E-14	1.0E-09
R_2 resident	resident_child	Benzene	2.8E-11	1.4E-06
R_2 resident	resident_child	Beryllium	5.2E-16	1.3E-10
R_2 resident	resident_child	Cadmium	2.1E-15	7.0E-11
R_2 resident	resident_child	Chloroform (Trichloromethane)	4.1E-12	6.9E-06
R_2 resident	resident_child	Cobalt	0.0E+00	4.8E-10
R_2 resident	resident_child	Copper	0.0E+00	1.4E-11
R_2 resident	resident_child	Cyclohexane	0.0E+00	1.3E-07
R_2 resident	resident_child	Dichlorobenzene,1,4-	5.5E-12	7.3E-09
R_2 resident	resident_child	Ethylbenzene	0.0E+00	1.2E-08
R_2 resident	resident_child	Ethylene Dibromide	1.4E-11	3.1E-08
R_2 resident	resident_child	Ethylene Glycol	0.0E+00	2.3E-10
R_2 resident	resident_child	Naphthalene	0.0E+00	2.0E-08
R_2 resident	resident_child	Nickel	3.4E-15	8.2E-10
R_2 resident	resident_child	Styrene	0.0E+00	1.4E-08
R_2 resident	resident_child	Tetrachloroethylene (Perchloroethylene)	1.3E-11	6.2E-08
R_2 resident	resident_child	Toluene	0.0E+00	5.0E-08
R_2 resident	resident_child	Trichloroethylene	2.5E-12	2.4E-08
R_2 resident	resident_child	Vinyl Chloride	1.8E-11	2.3E-07
		Total	6E-09	1E-03
R_3 resident farmer	farmer_adult	1,3-Butadiene	3.9E-08	1.1E-03
R_3 resident farmer	farmer_adult	1-Hexane (n-hexane)	0.0E+00	1.1E-06
R_3 resident farmer	farmer_adult	Acrylonitrile	7.2E-09	9.3E-05
R_3 resident farmer	farmer_adult	Arsenic	9.2E-14	1.2E-09
R_3 resident farmer	farmer_adult	Benzene	2.4E-10	1.8E-06
R_3 resident farmer	farmer_adult	Beryllium	4.3E-15	1.6E-10
R_3 resident farmer	farmer_adult	Cadmium	1.8E-14	8.7E-11
R_3 resident farmer	farmer_adult	Chloroform (Trichloromethane)	3.4E-11	8.6E-06
R_3 resident farmer	farmer_adult	Cobalt	0.0E+00	6.0E-10
R_3 resident farmer	farmer_adult	Copper	0.0E+00	1.8E-11
R_3 resident farmer	farmer_adult	Cyclohexane	0.0E+00	1.6E-07
R_3 resident farmer	farmer_adult	Dichlorobenzene,1,4-	4.6E-11	9.1E-09
R_3 resident farmer	farmer_adult	Ethylbenzene	0.0E+00	1.5E-08
R_3 resident farmer	farmer_adult	Ethylene Dibromide	1.2E-10	3.9E-08
R_3 resident farmer	farmer_adult	Ethylene Glycol	0.0E+00	2.8E-10
R_3 resident farmer	farmer_adult	Naphthalene	0.0E+00	2.5E-08
R_3 resident farmer	farmer_adult	Nickel	2.8E-14	1.0E-09
R_3 resident farmer	farmer_adult	Styrene	0.0E+00	1.7E-08
R_3 resident farmer	farmer_adult	Tetrachloroethylene (Perchloroethylene)	1.0E-10	7.8E-08
R_3 resident farmer	farmer_adult	Toluene	0.0E+00	6.2E-08
R_3 resident farmer	farmer_adult	Trichloroethylene	2.1E-11	3.0E-08

Fugitive Air Emissions Risk Assessment
Chronic Inhalation Risk Results by Compound
(IRAP Software Output Information)

Receptor	Scenario	Compound	Inhalation Excess Lifetime Cancer Risk	Inhalation Non-Cancer Hazard Quotient
R_3 resident farmer	farmer_adult	Vinyl Chloride	1.5E-10	2.9E-07
		Total	5E-08	1E-03
R_3 resident farmer	farmer_child	1,3-Butadiene	5.9E-09	1.1E-03
R_3 resident farmer	farmer_child	1-Hexane (n-hexane)	0.0E+00	1.1E-06
R_3 resident farmer	farmer_child	Acrylonitrile	1.1E-09	9.3E-05
R_3 resident farmer	farmer_child	Arsenic	1.4E-14	1.2E-09
R_3 resident farmer	farmer_child	Benzene	3.5E-11	1.8E-06
R_3 resident farmer	farmer_child	Beryllium	6.4E-16	1.6E-10
R_3 resident farmer	farmer_child	Cadmium	2.7E-15	8.7E-11
R_3 resident farmer	farmer_child	Chloroform (Trichloromethane)	5.1E-12	8.6E-06
R_3 resident farmer	farmer_child	Cobalt	0.0E+00	6.0E-10
R_3 resident farmer	farmer_child	Copper	0.0E+00	1.8E-11
R_3 resident farmer	farmer_child	Cyclohexane	0.0E+00	1.6E-07
R_3 resident farmer	farmer_child	Dichlorobenzene,1,4-	6.8E-12	9.1E-09
R_3 resident farmer	farmer_child	Ethylbenzene	0.0E+00	1.5E-08
R_3 resident farmer	farmer_child	Ethylene Dibromide	1.8E-11	3.9E-08
R_3 resident farmer	farmer_child	Ethylene Glycol	0.0E+00	2.8E-10
R_3 resident farmer	farmer_child	Naphthalene	0.0E+00	2.5E-08
R_3 resident farmer	farmer_child	Nickel	4.2E-15	1.0E-09
R_3 resident farmer	farmer_child	Styrene	0.0E+00	1.7E-08
R_3 resident farmer	farmer_child	Tetrachloroethylene (Perchloroethylene)	1.6E-11	7.8E-08
R_3 resident farmer	farmer_child	Toluene	0.0E+00	6.2E-08
R_3 resident farmer	farmer_child	Trichloroethylene	3.1E-12	3.0E-08
R_3 resident farmer	farmer_child	Vinyl Chloride	2.2E-11	2.9E-07
		Total	7E-09	1E-03
R_4 resident farmer	farmer_adult	1,3-Butadiene	3.2E-08	9.4E-04
R_4 resident farmer	farmer_adult	1-Hexane (n-hexane)	0.0E+00	8.8E-07
R_4 resident farmer	farmer_adult	Acrylonitrile	5.9E-09	7.6E-05
R_4 resident farmer	farmer_adult	Arsenic	7.5E-14	1.0E-09
R_4 resident farmer	farmer_adult	Benzene	1.9E-10	1.4E-06
R_4 resident farmer	farmer_adult	Beryllium	3.5E-15	1.3E-10
R_4 resident farmer	farmer_adult	Cadmium	1.5E-14	7.1E-11
R_4 resident farmer	farmer_adult	Chloroform (Trichloromethane)	2.8E-11	7.0E-06
R_4 resident farmer	farmer_adult	Cobalt	0.0E+00	4.9E-10
R_4 resident farmer	farmer_adult	Copper	0.0E+00	1.5E-11
R_4 resident farmer	farmer_adult	Cyclohexane	0.0E+00	1.3E-07
R_4 resident farmer	farmer_adult	Dichlorobenzene,1,4-	3.7E-11	7.4E-09
R_4 resident farmer	farmer_adult	Ethylbenzene	0.0E+00	1.3E-08
R_4 resident farmer	farmer_adult	Ethylene Dibromide	9.7E-11	3.1E-08
R_4 resident farmer	farmer_adult	Ethylene Glycol	0.0E+00	2.3E-10
R_4 resident farmer	farmer_adult	Naphthalene	0.0E+00	2.1E-08
R_4 resident farmer	farmer_adult	Nickel	2.3E-14	8.3E-10
R_4 resident farmer	farmer_adult	Styrene	0.0E+00	1.4E-08
R_4 resident farmer	farmer_adult	Tetrachloroethylene (Perchloroethylene)	8.5E-11	6.3E-08
R_4 resident farmer	farmer_adult	Toluene	0.0E+00	5.1E-08
R_4 resident farmer	farmer_adult	Trichloroethylene	1.7E-11	2.5E-08
R_4 resident farmer	farmer_adult	Vinyl Chloride	1.2E-10	2.4E-07
		Total	4E-08	1E-03
R_4 resident farmer	farmer_child	1,3-Butadiene	4.8E-09	9.4E-04
R_4 resident farmer	farmer_child	1-Hexane (n-hexane)	0.0E+00	8.8E-07
R_4 resident farmer	farmer_child	Acrylonitrile	8.8E-10	7.6E-05
R_4 resident farmer	farmer_child	Arsenic	1.1E-14	1.0E-09
R_4 resident farmer	farmer_child	Benzene	2.9E-11	1.4E-06
R_4 resident farmer	farmer_child	Beryllium	5.2E-16	1.3E-10
R_4 resident farmer	farmer_child	Cadmium	2.2E-15	7.1E-11
R_4 resident farmer	farmer_child	Chloroform (Trichloromethane)	4.2E-12	7.0E-06

Fugitive Air Emissions Risk Assessment
Chronic Inhalation Risk Results by Compound
(IRAP Software Output Information)

Receptor	Scenario	Compound	Inhalation Excess Lifetime Cancer Risk	Inhalation Non-Cancer Hazard Quotient
R_4 resident farmer	farmer_child	Cobalt	0.0E+00	4.9E-10
R_4 resident farmer	farmer_child	Copper	0.0E+00	1.5E-11
R_4 resident farmer	farmer_child	Cyclohexane	0.0E+00	1.3E-07
R_4 resident farmer	farmer_child	Dichlorobenzene,1,4-	5.6E-12	7.4E-09
R_4 resident farmer	farmer_child	Ethylbenzene	0.0E+00	1.3E-08
R_4 resident farmer	farmer_child	Ethylene Dibromide	1.5E-11	3.1E-08
R_4 resident farmer	farmer_child	Ethylene Glycol	0.0E+00	2.3E-10
R_4 resident farmer	farmer_child	Naphthalene	0.0E+00	2.1E-08
R_4 resident farmer	farmer_child	Nickel	3.4E-15	8.3E-10
R_4 resident farmer	farmer_child	Styrene	0.0E+00	1.4E-08
R_4 resident farmer	farmer_child	Tetrachloroethylene (Perchloroethylene)	1.3E-11	6.3E-08
R_4 resident farmer	farmer_child	Toluene	0.0E+00	5.1E-08
R_4 resident farmer	farmer_child	Trichloroethylene	2.5E-12	2.5E-08
R_4 resident farmer	farmer_child	Vinyl Chloride	1.8E-11	2.4E-07
		Total	6E-09	1E-03
R_5 resident	resident_adult	1,3-Butadiene	2.1E-08	8.0E-04
R_5 resident	resident_adult	1-Hexane (n-hexane)	0.0E+00	7.5E-07
R_5 resident	resident_adult	Acrylonitrile	3.8E-09	6.5E-05
R_5 resident	resident_adult	Arsenic	4.8E-14	8.7E-10
R_5 resident	resident_adult	Benzene	1.2E-10	1.2E-06
R_5 resident	resident_adult	Beryllium	2.2E-15	1.1E-10
R_5 resident	resident_adult	Cadmium	9.3E-15	6.0E-11
R_5 resident	resident_adult	Chloroform (Trichloromethane)	1.8E-11	6.0E-06
R_5 resident	resident_adult	Cobalt	0.0E+00	4.2E-10
R_5 resident	resident_adult	Copper	0.0E+00	1.2E-11
R_5 resident	resident_adult	Cyclohexane	0.0E+00	1.1E-07
R_5 resident	resident_adult	Dichlorobenzene,1,4-	2.4E-11	6.3E-09
R_5 resident	resident_adult	Ethylbenzene	0.0E+00	1.1E-08
R_5 resident	resident_adult	Ethylene Dibromide	6.2E-11	2.7E-08
R_5 resident	resident_adult	Ethylene Glycol	0.0E+00	2.0E-10
R_5 resident	resident_adult	Naphthalene	0.0E+00	1.8E-08
R_5 resident	resident_adult	Nickel	1.5E-14	7.1E-10
R_5 resident	resident_adult	Styrene	0.0E+00	1.2E-08
R_5 resident	resident_adult	Tetrachloroethylene (Perchloroethylene)	5.5E-11	5.4E-08
R_5 resident	resident_adult	Toluene	0.0E+00	4.3E-08
R_5 resident	resident_adult	Trichloroethylene	1.1E-11	2.1E-08
R_5 resident	resident_adult	Vinyl Chloride	7.7E-11	2.0E-07
		Total	2E-08	9E-04
R_5 resident	resident_child	1,3-Butadiene	4.1E-09	8.0E-04
R_5 resident	resident_child	1-Hexane (n-hexane)	0.0E+00	7.5E-07
R_5 resident	resident_child	Acrylonitrile	7.5E-10	6.5E-05
R_5 resident	resident_child	Arsenic	9.6E-15	8.7E-10
R_5 resident	resident_child	Benzene	2.5E-11	1.2E-06
R_5 resident	resident_child	Beryllium	4.5E-16	1.1E-10
R_5 resident	resident_child	Cadmium	1.9E-15	6.0E-11
R_5 resident	resident_child	Chloroform (Trichloromethane)	3.6E-12	6.0E-06
R_5 resident	resident_child	Cobalt	0.0E+00	4.2E-10
R_5 resident	resident_child	Copper	0.0E+00	1.2E-11
R_5 resident	resident_child	Cyclohexane	0.0E+00	1.1E-07
R_5 resident	resident_child	Dichlorobenzene,1,4-	4.8E-12	6.3E-09
R_5 resident	resident_child	Ethylbenzene	0.0E+00	1.1E-08
R_5 resident	resident_child	Ethylene Dibromide	1.2E-11	2.7E-08
R_5 resident	resident_child	Ethylene Glycol	0.0E+00	2.0E-10
R_5 resident	resident_child	Naphthalene	0.0E+00	1.8E-08
R_5 resident	resident_child	Nickel	2.9E-15	7.1E-10
R_5 resident	resident_child	Styrene	0.0E+00	1.2E-08

Fugitive Air Emissions Risk Assessment
Chronic Inhalation Risk Results by Compound
(IRAP Software Output Information)

Receptor	Scenario	Compound	Inhalation Excess Lifetime Cancer Risk	Inhalation Non-Cancer Hazard Quotient
R_5 resident	resident_child	Tetrachloroethylene (Perchloroethylene)	1.1E-11	5.4E-08
R_5 resident	resident_child	Toluene	0.0E+00	4.3E-08
R_5 resident	resident_child	Trichloroethylene	2.2E-12	2.1E-08
R_5 resident	resident_child	Vinyl Chloride	1.5E-11	2.0E-07
		Total	5E-09	9E-04
R_6 resident	resident_adult	1,3-Butadiene	2.6E-08	1.0E-03
R_6 resident	resident_adult	1-Hexane (n-hexane)	0.0E+00	9.4E-07
R_6 resident	resident_adult	Acrylonitrile	4.7E-09	8.1E-05
R_6 resident	resident_adult	Arsenic	6.0E-14	1.1E-09
R_6 resident	resident_adult	Benzene	1.5E-10	1.5E-06
R_6 resident	resident_adult	Beryllium	2.8E-15	1.4E-10
R_6 resident	resident_adult	Cadmium	1.2E-14	7.5E-11
R_6 resident	resident_adult	Chloroform (Trichloromethane)	2.2E-11	7.5E-06
R_6 resident	resident_adult	Cobalt	0.0E+00	5.2E-10
R_6 resident	resident_adult	Copper	0.0E+00	1.5E-11
R_6 resident	resident_adult	Cyclohexane	0.0E+00	1.4E-07
R_6 resident	resident_adult	Dichlorobenzene,1,4-	3.0E-11	7.9E-09
R_6 resident	resident_adult	Ethylbenzene	0.0E+00	1.3E-08
R_6 resident	resident_adult	Ethylene Dibromide	7.7E-11	3.3E-08
R_6 resident	resident_adult	Ethylene Glycol	0.0E+00	2.4E-10
R_6 resident	resident_adult	Naphthalene	0.0E+00	2.2E-08
R_6 resident	resident_adult	Nickel	1.8E-14	8.8E-10
R_6 resident	resident_adult	Styrene	0.0E+00	1.5E-08
R_6 resident	resident_adult	Tetrachloroethylene (Perchloroethylene)	6.8E-11	6.7E-08
R_6 resident	resident_adult	Toluene	0.0E+00	5.4E-08
R_6 resident	resident_adult	Trichloroethylene	1.4E-11	2.6E-08
R_6 resident	resident_adult	Vinyl Chloride	9.6E-11	2.5E-07
		Total	3E-08	1E-03
R_6 resident	resident_child	1,3-Butadiene	5.1E-09	1.0E-03
R_6 resident	resident_child	1-Hexane (n-hexane)	0.0E+00	9.4E-07
R_6 resident	resident_child	Acrylonitrile	9.4E-10	8.1E-05
R_6 resident	resident_child	Arsenic	1.2E-14	1.1E-09
R_6 resident	resident_child	Benzene	3.1E-11	1.5E-06
R_6 resident	resident_child	Beryllium	5.6E-16	1.4E-10
R_6 resident	resident_child	Cadmium	2.3E-15	7.5E-11
R_6 resident	resident_child	Chloroform (Trichloromethane)	4.4E-12	7.5E-06
R_6 resident	resident_child	Cobalt	0.0E+00	5.2E-10
R_6 resident	resident_child	Copper	0.0E+00	1.5E-11
R_6 resident	resident_child	Cyclohexane	0.0E+00	1.4E-07
R_6 resident	resident_child	Dichlorobenzene,1,4-	5.9E-12	7.9E-09
R_6 resident	resident_child	Ethylbenzene	0.0E+00	1.3E-08
R_6 resident	resident_child	Ethylene Dibromide	1.5E-11	3.3E-08
R_6 resident	resident_child	Ethylene Glycol	0.0E+00	2.4E-10
R_6 resident	resident_child	Naphthalene	0.0E+00	2.2E-08
R_6 resident	resident_child	Nickel	3.6E-15	8.8E-10
R_6 resident	resident_child	Styrene	0.0E+00	1.5E-08
R_6 resident	resident_child	Tetrachloroethylene (Perchloroethylene)	1.4E-11	6.7E-08
R_6 resident	resident_child	Toluene	0.0E+00	5.4E-08
R_6 resident	resident_child	Trichloroethylene	2.7E-12	2.6E-08
R_6 resident	resident_child	Vinyl Chloride	1.9E-11	2.5E-07
		Total	6E-09	1E-03

APPENDIX I

STACK EMISSIONS:
COMPARISON TO USEPA REGION 9
PRELIMINARY REMEDIATION GOALS

Comparison of Modeled Air and Soil Concentrations at Residential Assessment Receptor Location R_2 with USEPA Region 9 Preliminary Remediation Goals

Stack Emissions

Calculated Air and Soil Concentrations at Receptor R_2				USEPA Region 9 Preliminary Remediation Goals (PRGs) (c)						Comparison of Concentrations to PRGs	
Compound (as listed in IRAP software)	CAS Number	Maximum (Annual) Soil Concentration (mg/kg)	Annual Average Air Concentration (ug/m^3)	Compound (as listed in PRG Table)	CAS Number	Residential Soil PRG (mg/kg)		Ambient Air PRG (ug/m^3)		Soil Concentration Ratio: modeled concentration/PRG	Air Concentration Ratio: modeled concentration/PRG
						Soil Concentration	Basis	Air Concentration	Basis		
11-Dichloropropene	563-58-6	1.13E-16	5.56E-08	NA						NC	NC
1,2,4-Trimethylbenzene	95-63-6	4.27E-09	1.62E-07	1,2,4-Trimethylbenzene	95-63-6	5.2E+01	nc	6.2E+00	nc	8.E-11	3.E-08
1,3-Dichloropropane	142-28-9	1.04E-09	9.75E-08	1,3-Dichloropropane	142-28-9	1.0E+02	nc	7.3E+01	nc	1.E-11	1.E-09
1-Hexane (n-hexane)	110-54-3	7.03E-15	2.06E-10	n-Hexane	110-54-3	1.1E+02	sat	2.1E+02	nc	6.E-17	1.E-12
2,2-oxybis (1-Chloropropane)	108-60-1	1.60E-08	2.51E-07	Bis(2-chloro-1-methylethyl)ether	108-60-1	2.9E+00	ca	1.9E-01	ca	6.E-09	1.E-06
2,2-Dichloropropane	594-20-7	1.28E-10	7.22E-08	NA						NC	NC
2,5-Dimethylfuran	625-86-5	2.18E-10	2.18E-07	NA						NC	NC
2,5-Dimethylheptane	2216-30-0	1.74E-16	4.34E-06	NA						NC	NC
2,5-Dione, 3-hexene	17559-81-8	2.21E-09	2.46E-07	NA						NC	NC
2-Chlorotoluene	95-49-8	6.28E-09	1.32E-07	o-Chlorotoluene	95-49-8	1.6E+02	nc	7.3E+01	nc	4.E-11	2.E-09
2-Hexanone	591-78-6	1.09E-08	4.86E-07	NA						NC	NC
2-Methyl octane	3221-61-2	2.51E-17	1.03E-06	NA						NC	NC
2-Methylnaphthalene	91-57-6	1.60E-07	1.50E-08	NA						NC	NC
3-Ethyl benzaldehyde	34246-54-3	1.28E-12	6.16E-07	NA						NC	NC
3-Hexen-2-one	763-93-9	5.06E-11	2.95E-05	NA						NC	NC
3-Penten-2-one (ethylidene acetone)	625-33-2	2.57E-12	1.25E-06	NA						NC	NC
3-Penten-2-one, 4-methyl	141-79-7	7.45E-11	2.41E-05	NA						NC	NC
4,6-Dinitro-2-methylphenol	534-52-1	6.69E-06	1.13E-06	4,6-Dinitro-o-cresol	534-52-1	6.1E+00	nc	3.7E-01	nc	1.E-06	3.E-06
4-Chlorotoluene	106-43-4	1.81E-09	1.14E-07	NA						NC	NC
4-Ethyl benzaldehyde	4748-78-1	6.96E-13	3.36E-07	NA						NC	NC
9-Octadecenamide (oleamide)	301-02-0	9.72E-11	6.52E-07	NA						NC	NC
Acenaphthene	83-32-9	2.08E-10	1.16E-09	Acenaphthene	83-32-9	3.7E+03	nc	2.2E+02	nc	6.E-14	5.E-12
Acenaphthylene	208-96-8	2.72E-08	2.10E-09	NA						NC	NC
Acetone	67-64-1	1.06E-07	1.59E-05	Acetone	67-64-1	1.4E+04	nc	3.3E+03	nc	8.E-12	5.E-09
Acetophenone	98-86-2	3.04E-07	8.82E-07	NA						NC	NC
Acrylic Acid	79-10-7	4.77E-14	4.66E-12	Acrylic acid	79-10-7	2.9E+04	nc	1.0E+00	nc	2.E-18	4.E-12
Acrylonitrile	107-13-1	3.65E-09	2.84E-06	Acrylonitrile	107-13-1	2.1E-01	ca*	2.8E-02	ca*	2.E-08	1.E-04
Aldrin	309-00-2	6.51E-09	6.34E-09	Aldrin	309-00-2	2.9E-02	ca*	3.9E-04	ca	2.E-07	2.E-05
Aluminum	7429-90-5	2.71E-03	2.53E-05	Aluminum	7429-90-5	7.6E+04	nc	5.1E+00	nc	4.E-08	5.E-06
Aniline	62-53-3	4.47E-06	1.86E-06	NA						NC	NC
Anthracene	120-12-7	2.67E-09	3.31E-09	Anthracene	120-12-7	2.2E+04	nc	1.1E+03	nc	1.E-13	3.E-12
Antimony	7440-36-0	1.96E-08	1.01E-06	Antimony and compounds	7440-36-0	3.1E+01	nc			6.E-10	NC
Aroclor 1254	11097-69-1	5.30E-08	6.06E-09	PCBs (unspeciated mixture, high risk, e.g. Aroclor 1254)	11097-69-1	2.2E-01	ca**	3.4E-03	ca*	2.E-07	2.E-06
Arsenic	7440-38-2	1.14E-07	2.77E-05	Arsenic	7440-38-2	3.9E-01	ca*	4.5E-04	ca	3.E-07	6.E-02
Barium	7440-39-3	2.51E-04	1.98E-06	Barium and compounds	7440-39-3	5.4E+03	nc	5.2E-01	nc	5.E-08	4.E-06
Benzaldehyde	100-52-7	1.27E-06	1.27E-06	Benzaldehyde	100-52-7	6.1E+03	nc	3.7E+02	nc	2.E-10	3.E-09
Benzene	71-43-2	1.35E-10	6.70E-07	Benzene	71-43-2	6.4E-01	ca*	2.5E-01	ca	2.E-10	3.E-06
Benzidine (d)	92-87-5	2.18E-05	1.30E-05	Benzidine	92-87-5	2.1E-03	ca	2.9E-05	ca	1.E-02	4.E-01
Benzo(a)Anthracene	56-55-3	6.91E-10	7.67E-10	Benz[a]anthracene	56-55-3	6.2E-01	ca	9.2E-03	ca	1.E-09	8.E-08
Benzo(a)pyrene	50-32-8	6.04E-10	9.82E-10	Benzo[a]pyrene	50-32-8	6.2E-02	ca	9.2E-04	ca	1.E-08	1.E-06
Benzo(b)fluoranthene	205-99-2	8.13E-09	7.63E-09	Benzo[b]fluoranthene	205-99-2	6.2E-01	ca	9.2E-03	ca	1.E-08	8.E-07
Benzo(e)pyrene	192-97-2	5.67E-13	1.47E-09	NA						NC	NC
Benzo(g,h,i)perylene	191-24-2	2.37E-08	3.15E-09	NA						NC	NC
Benzo(k)fluoranthene	207-08-9	3.52E-09	1.49E-09	Benzo[k]fluoranthene	207-08-9	6.2E+00	ca	9.2E-02	ca	6.E-10	2.E-08
Benzoic Acid	65-85-0	2.23E-06	7.27E-06	Benzoic acid	65-85-0	1.0E+05	max	1.5E+04	nc	2.E-11	5.E-10
Benzoic acid, methyl ester (methyl benzoate)	93-58-3	9.80E-08	2.09E-07	NA						NC	NC
Benzonitrile	100-47-0	4.96E-07	4.84E-07	NA						NC	NC
Benzyl alcohol	100-51-6	3.64E-06	5.41E-06	Benzyl alcohol	100-51-6	1.8E+04	nc	1.1E+03	nc	2.E-10	5.E-09
Beryllium	7440-41-7	1.59E-04	2.77E-05	Beryllium and compounds	7440-41-7	1.5E+02	nc	8.0E-04	ca*	1.E-06	3.E-02
BHC, alpha-	319-84-6	1.27E-09	5.53E-09	HCH (alpha)	319-84-6	9.0E-02	ca	1.1E-03	ca	1.E-08	5.E-06
BHC, beta-	319-85-7	3.02E-09	1.43E-08	HCH (beta)	319-85-7	3.2E-01	ca	3.7E-03	ca	1.E-08	4.E-06
Bis(2-chlorethyl)ether	111-44-4	4.42E-08	2.11E-07	Bis(2-chloroethyl)ether	111-44-4	2.2E-01	ca	6.1E-03	ca	2.E-07	3.E-05

Comparison of Modeled Air and Soil Concentrations at Residential Assessment Receptor Location R_2 with USEPA Region 9 Preliminary Remediation Goals

Stack Emissions

Calculated Air and Soil Concentrations at Receptor R_2				USEPA Region 9 Preliminary Remediation Goals (PRGs) (c)						Comparison of Concentrations to PRGs	
Compound (as listed in IRAP software)	CAS Number	Maximum (Annual) Soil Concentration (mg/kg)	Annual Average Air Concentration (ug/m^3)	Compound (as listed in PRG Table)	CAS Number	Residential Soil PRG (mg/kg)		Ambient Air PRG (ug/m^3)		Soil Concentration Ratio: modeled concentration/PRG	Air Concentration Ratio: modeled concentration/PRG
						Soil Concentration	Basis	Air Concentration	Basis		
Bis(2-chloroethoxy) methane	111-91-1	4.15E-07	2.16E-07	NA						NC	NC
Bromobenzene	108-86-1	1.23E-09	1.29E-07	Bromobenzene	108-86-1	2.8E+01	nc	1.0E+01	nc	4.E-11	1.E-08
Bromochloromethane	74-97-5	3.27E-14	3.93E-07	Chloroethane	75-00-3	3.0E+00	ca	2.3E+00	ca	1.E-14	2.E-07
Bromodichloromethane	75-27-4	7.42E-08	1.41E-06	Bromodichloromethane	75-27-4	8.2E-01	ca	1.1E-01	ca	9.E-08	1.E-05
Bromoform (tribromomethane)	75-25-2	3.88E-11	3.57E-06	Bromoform (tribromomethane)	75-25-2	6.2E+01	ca*	1.7E+00	ca*	6.E-13	2.E-06
Bromophenyl-phenylether, 4-	101-55-3	2.31E-06	1.74E-07	NA						NC	NC
Butylbenzene, n-	104-51-8	1.45E-15	1.58E-07	n-Butylbenzene	104-51-8	2.4E+02	sat	1.5E+02	nc	6.E-18	1.E-09
Butylbenzene, sec	135-98-8	1.05E-15	1.26E-07	sec-Butylbenzene	135-9-88	2.2E+02	sat	1.5E+02	nc	5.E-18	9.E-10
Butylbenzene, tert	98-06-6	3.61E-09	1.50E-07	tert-Butylbenzene	98-06-6	3.9E+02	sat	1.5E+02	nc	9.E-12	1.E-09
Butylbenzylphthalate	85-68-7	3.36E-09	2.81E-07	Butyl benzyl phthalate	85-68-7	1.2E+04	nc	7.3E+02	nc	3.E-13	4.E-10
Cadmium	7440-43-9	1.81E-05	6.87E-05	Cadmium and compounds	7440-43-9	3.7E+01	nc	1.1E-03	ca	5.E-07	6.E-02
Carbazole	86-74-8	3.37E-06	2.54E-07	Carbazole	86-74-8	2.4E+01	ca	3.4E-01	ca	1.E-07	8.E-07
Carbon Disulfide	75-15-0	7.81E-12	3.21E-07	Carbon disulfide	75-15-0	3.6E+02	nc	7.3E+02	nc	2.E-14	4.E-10
Carbon Tetrachloride	56-23-5	2.19E-11	1.75E-07	Carbon tetrachloride	56-23-5	2.5E-01	ca**	1.3E-01	ca*	9.E-11	1.E-06
Chlordane	57-74-9	3.77E-08	1.54E-08	Chlordane (technical) (a)	12789-03-6	1.6E+00	ca*	1.9E-02	ca*	2.E-08	8.E-07
Chlorine	7782-50-5	3.31E-03	9.31E-03	Chlorine	7782-50-5			2.1E-01	nc	NC	4.E-02
Chloro-3-methylphenol, 4-	59-50-7	6.04E-06	5.61E-07	NA						NC	NC
Chloroaniline, p-	106-47-8	2.18E-06	1.08E-06	4-Chloroaniline	106-47-8	2.4E+02	nc	1.5E+01	nc	9.E-09	7.E-08
Chlorobenzene	108-90-7	9.02E-08	6.67E-05	Chlorobenzene	108-90-7	1.5E+02	nc	6.2E+01	nc	6.E-10	1.E-06
Chlorobenzilate	510-15-6	1.75E-09	3.06E-08	Chlorobenzilate	510-15-6	1.8E+00	ca	2.5E-02	ca	1.E-09	1.E-06
Chloroethane	75-00-3	3.82E-12	3.41E-07	NA						NC	NC
Chloroform (Trichloromethane)	67-66-3	3.69E-10	2.13E-06	Chloroform	67-66-3	2.2E-01	ca	8.3E-02	ca	2.E-09	3.E-05
Chloronaphthalene,2-	91-58-7	1.79E-06	1.69E-07	beta-Chloronaphthalene	91-58-7	4.9E+03	nc	2.9E+02	nc	4.E-10	6.E-10
Chlorophenol, 2-	95-57-8	9.79E-07	2.22E-07	2-Chlorophenol	95-57-8	6.3E+01	nc	1.8E+01	nc	2.E-08	1.E-08
Chlorophenyl-phenylether, 4-	7005-72-3	1.42E-07	2.87E-07	NA						NC	NC
Chromium	7440-47-3	1.51E-04	1.28E-06	Chromium III	16065-83-1	1.0E+05	max			2.E-09	NC
Chromium, hexavalent	7440-47-3	1.51E-04	1.28E-06	Chromium VI	18540-29-9	3.0E+01	ca**	2.3E-05	ca	5.E-06	6.E-02
Chrysene	218-01-9	4.51E-09	2.91E-09	Chrysene	218-01-9	6.2E+01	ca	9.2E-01	ca	7.E-11	3.E-09
Cobalt	7440-48-4	1.65E-05	1.28E-07	Cobalt	7440-48-4	9.0E+02	ca**	6.9E-04	ca*	2.E-08	2.E-04
Copper	7440-50-8	4.96E-05	2.62E-05	Copper and compounds	7440-50-8	3.1E+03	nc			2.E-08	NC
Cresol, m-	108-39-4	1.18E-08	2.37E-07	3-Methylphenol	108-39-4	3.1E+03	nc	1.8E+02	nc	4.E-12	1.E-09
Cresol, o-	95-48-7	6.61E-09	5.41E-07	2-Methylphenol	95-48-7	3.1E+03	nc	1.8E+02	nc	2.E-12	3.E-09
Cresol, p-	106-44-5	2.77E-10	2.37E-07	4-Methylphenol	106-44-5	3.1E+02	nc	1.8E+01	nc	9.E-13	1.E-08
Cumene (Isopropylbenzene)	98-82-8	4.15E-10	9.41E-08	Cumene (isopropylbenzene)	98-82-8	5.7E+02	nc	4.0E+02	nc	7.E-13	2.E-10
DDD, 4,4'-	72-54-8	2.53E-07	3.41E-08	DDD	72-54-8	2.4E+00	ca	2.8E-02	ca	1.E-07	1.E-06
DDE, 4,4'-	72-55-9	8.91E-08	1.16E-08	DDE	72-55-9	1.7E+00	ca	2.0E-02	ca	5.E-08	6.E-07
DDT, 4-4'-	50-29-3	5.90E-08	8.85E-09	DDT	50-29-3	1.7E+00	ca*	2.0E-02	ca*	3.E-08	4.E-07
delta-BHC	319-86-8	1.61E-07	1.29E-08	NA						NC	NC
Diallate	2303-16-4	1.67E-10	1.62E-06	Diallate	2303-16-4	8.0E+00	ca	1.1E-01	ca	2.E-11	1.E-05
Dibenz(a,h)anthracene	53-70-3	1.64E-09	1.04E-10	Dibenz[ah]anthracene	53-70-3	6.2E-02	ca	9.2E-04	ca	3.E-08	1.E-07
Dibenzofuran	132-64-9	3.64E-06	2.74E-07	Dibenzofuran	132-64-9	1.5E+02	nc	7.3E+00	nc	3.E-08	4.E-08
Dibromo-3-chloropropane, 1,2-	96-12-8	1.23E-07	6.72E-07	1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	4.6E-01	ca**	2.1E-01	nc	3.E-07	3.E-06
Dibromochloromethane	124-48-1	5.63E-07	2.79E-06	Dibromochloromethane	124-48-1	1.1E+00	ca	8.0E-02	ca	5.E-07	3.E-05
Dichlorobenzene, 1,2-	95-50-1	4.88E-09	2.18E-07	1,2-Dichlorobenzene	95-50-1	6.0E+02	sat	2.1E+02	nc	8.E-12	1.E-09
Dichlorobenzene, 1,3-	541-73-1	6.85E-09	2.29E-07	1,3-Dichlorobenzene	541-73-1	5.3E+02	nc	1.1E+02	nc	1.E-11	2.E-09
Dichlorobenzene,1,4-	106-46-7	1.53E-09	2.59E-07	1,4-Dichlorobenzene	106-46-7	3.4E+00	ca	3.1E-01	ca	4.E-10	8.E-07
Dichlorobenzidine, 3,3'-	91-94-1	3.12E-07	1.34E-06	3,3-Dichlorobenzidine	91-94-1	1.1E+00	ca	1.5E-02	ca	3.E-07	9.E-05
Dichlorodifluoromethane	75-71-8	1.49E-09	9.91E-07	Dichlorodifluoromethane	75-71-8	9.4E+01	nc	2.1E+02	nc	2.E-11	5.E-09
Dichloroethane 1,1-	75-34-3	9.62E-12	7.99E-08	1,1-Dichloroethane	75-34-3	5.1E+02	nc	5.2E+02	nc	2.E-14	2.E-10
Dichloroethane, 1,2- (Ethylene Dichloride	107-06-2	3.74E-11	1.31E-07	1,2-Dichloroethane (EDC)	107-06-2	2.8E-01	ca*	7.4E-02	ca*	1.E-10	2.E-06
Dichloroethylene 1,1-	75-35-4	3.90E-12	9.10E-08	1,1-Dichloroethylene	75-35-4	1.2E+02	nc	2.1E+02	nc	3.E-14	4.E-10
Dichloroethylene, cis-1,2-	156-59-2	1.52E-09	1.08E-07	1,2-Dichloroethylene (cis)	156-59-2	4.3E+01	nc	3.7E+01	nc	4.E-11	3.E-09
Dichloroethylene-1,2 (trans)	156-60-5	9.44E-12	7.47E-08	1,2-Dichloroethylene (trans)	156-60-5	6.9E+01	nc	7.3E+01	nc	1.E-13	1.E-09
Dichlorophenol, 2,4-	120-83-2	3.73E-08	3.36E-07	2,4-Dichlorophenol	120-83-2	1.8E+02	nc	1.1E+01	nc	2.E-10	3.E-08
Dichloropropane, 1,2-	78-87-5	3.53E-11	1.03E-07	1,2-Dichloropropane	78-87-5	3.4E-01	ca*	9.9E-02	ca*	1.E-10	1.E-06

Comparison of Modeled Air and Soil Concentrations at Residential Assessment Receptor Location R_2 with USEPA Region 9 Preliminary Remediation Goals

Stack Emissions

Calculated Air and Soil Concentrations at Receptor R_2				USEPA Region 9 Preliminary Remediation Goals (PRGs) (c)						Comparison of Concentrations to PRGs	
Compound (as listed in IRAP software)	CAS Number	Maximum (Annual) Soil Concentration (mg/kg)	Annual Average Air Concentration (ug/m^3)	Compound (as listed in PRG Table)	CAS Number	Residential Soil PRG (mg/kg)		Ambient Air PRG (ug/m^3)		Soil Concentration Ratio: modeled concentration/PRG	Air Concentration Ratio: modeled concentration/PRG
						Soil Concentration	Basis	Air Concentration	Basis		
Dichloropropene, 1,3- (cis)	542-75-6	1.32E-11	1.96E-07	1,3-Dichloropropene	542-75-6	7.8E-01	ca	4.8E-01	ca	2.E-11	4.E-07
Dieldrin	60-57-1	5.74E-09	3.03E-09	Dieldrin	60-57-1	3.0E-02	ca	4.2E-04	ca	2.E-07	7.E-06
Diethyl phthalate	84-66-2	2.57E-08	2.61E-07	Diethyl phthalate	84-66-2	4.9E+04	nc	2.9E+03	nc	5.E-13	9.E-11
Dimethyl phthalate	131-11-3	2.11E-09	1.74E-07	Dimethyl phthalate	131-11-3	1.0E+05	max	3.7E+04	nc	2.E-14	5.E-12
Dimethylphenol, 2,4-	105-67-9	9.83E-09	7.99E-07	2,4-Dimethylphenol	105-67-9	1.2E+03	nc	7.3E+01	nc	8.E-12	1.E-08
Di-n-butyl phthalate	84-74-2	3.87E-08	9.60E-07	Dibutyl phthalate	84-74-2	6.1E+03	nc	3.7E+02	nc	6.E-12	3.E-09
Dinitrobenzene, 1,3-	99-65-0	8.58E-08	2.79E-07	1,3-Dinitrobenzene	99-65-0	6.1E+00	nc	3.7E-01	nc	1.E-08	8.E-07
Dinitrophenol, 2,4-	51-28-5	1.58E-08	2.37E-06	2,4-Dinitrophenol	51-28-5	1.2E+02	nc	7.3E+00	nc	1.E-10	3.E-07
Dinitrotoluene, 2,4-	121-14-2	9.57E-08	3.41E-07	2,4-Dinitrotoluene	121-14-2	1.2E+02	nc	7.3E+00	nc	8.E-10	5.E-08
Dinitrotoluene, 2,6-	606-20-2	7.26E-08	2.74E-07	2,6-Dinitrotoluene	606-20-2	6.1E+01	nc	3.7E+00	nc	1.E-09	8.E-08
Di-n-octylphthalate	117-84-0	1.70E-08	3.72E-07	di-n-Octyl phthalate	117-84-0	2.4E+03	nc	1.5E+02	nc	7.E-12	3.E-09
Dioxane, 1,4-	123-91-1	1.68E-13	2.30E-11	1,4-Dioxane	123-91-1	4.4E+01	ca	6.1E-01	ca	4.E-15	4.E-11
Diphenylamine	122-39-4	3.59E-06	2.72E-07	Diphenylamine	122-39-4	1.5E+03	nc	9.1E+01	nc	2.E-09	3.E-09
Diphenylhydrazine,1,2-	122-66-7	5.70E-08	1.81E-07	1,2-Diphenylhydrazine	122-66-7	6.1E-01	ca	8.4E-03	ca	9.E-08	2.E-05
Endosulfan I	115-29-7	5.39E-11	3.39E-09	Endosulfan	115-29-7	3.7E+02	nc	2.2E+01	nc	1.E-13	2.E-10
Endosulfan II	33213-65-9	3.08E-08	6.91E-09	NA						NC	NC
Endosulfan sulfate	1031-07-8	4.83E-08	3.95E-09	NA						NC	NC
Endrin	72-20-8	1.41E-07	1.25E-08	Endrin	72-20-8	1.8E+01	nc	1.1E+00	nc	8.E-09	1.E-08
Endrin aldehyde	7421-93-4	1.91E-07	1.52E-08	NA						NC	NC
Endrin ketone	53494-70-5	4.92E-11	4.45E-09	Endrin	72-20-8	1.8E+01	nc	1.1E+00	nc	3.E-12	4.E-09
Ethylbenzene	100-41-4	7.86E-11	8.09E-08	Ethylbenzene	100-41-4	4.0E+02	sat	1.1E+03	nc	2.E-13	8.E-11
Ethylene dibromide	106-93-4	2.23E-08	3.41E-07	1,2-Dibromoethane (EDB)	106-93-4	3.2E-02	ca	3.4E-03	ca	7.E-07	1.E-04
Ethylene Glycol	107-21-1	1.37E-08	3.23E-08	Ethylene glycol	107-21-1	1.0E+05	max	7.3E+03	nc	1.E-13	4.E-12
Ethylhexyl phthalate, bis-2-	117-81-7	1.12E-07	4.69E-06	Bis(2-ethylhexyl)phthalate (DEHP)	117-81-7	3.5E+01	ca*	4.8E-01	ca	3.E-09	1.E-05
Fluoranthene	206-44-0	9.85E-09	1.27E-08	Fluoranthene	206-44-0	2.3E+03	nc	1.5E+02	nc	4.E-12	9.E-11
Fluorene	86-73-7	3.43E-10	3.26E-09	Fluorene	86-73-7	2.7E+03	nc	1.5E+02	nc	1.E-13	2.E-11
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroet	76-13-1	7.13E-12	8.61E-08	Freon 113	76-13-1	5.6E+03	sat	3.1E+04	nc	1.E-15	3.E-12
gamma-BHC (Lindane)	58-89-9	1.05E-08	3.03E-09	HCH (gamma) Lindane	58-89-9	4.4E-01	ca*	5.2E-03	ca	2.E-08	6.E-07
HeptaCDD, 1,2,3,4,6,7,8-	35822-46-9	1.09E-10	2.30E-11	Dioxin (2,3,7,8-TCDD)+++	1746-01-6	3.9E-06	ca	4.5E-08	ca	3.E-05	5.E-04
HeptaCDF, 1,2,3,4,6,7,8-	67562-39-4	5.29E-10	1.12E-10	Dioxin (2,3,7,8-TCDD)+++	1746-01-6	3.9E-06	ca	4.5E-08	ca	1.E-04	2.E-03
HeptaCDF, 1,2,3,4,7,8,9-	55673-89-7	1.31E-10	2.66E-11	Dioxin (2,3,7,8-TCDD)+++	1746-01-6	3.9E-06	ca	4.5E-08	ca	3.E-05	6.E-04
Heptachlor	1024-57-3	1.06E-10	1.11E-08	Heptachlor epoxide	1024-57-3	5.3E-02	ca*	7.4E-04	ca*	2.E-09	2.E-05
Heptachlor epoxide	76-44-8	6.15E-09	6.36E-09	Heptachlor	76-44-8	1.1E-01	ca	1.5E-03	ca	6.E-08	4.E-06
HexaCDD, 1,2,3,4,7,8-	39227-28-6	1.06E-10	2.22E-11	Dioxin (2,3,7,8-TCDD)+++	1746-01-6	3.9E-06	ca	4.5E-08	ca	3.E-05	5.E-04
HexaCDD, 1,2,3,6,7,8-	57653-85-7	1.08E-10	2.24E-11	Dioxin (2,3,7,8-TCDD)+++	1746-01-6	3.9E-06	ca	4.5E-08	ca	3.E-05	5.E-04
HexaCDD, 1,2,3,7,8,9-	19408-74-3	1.25E-10	2.62E-11	Dioxin (2,3,7,8-TCDD)+++	1746-01-6	3.9E-06	ca	4.5E-08	ca	3.E-05	6.E-04
HexaCDF, 1,2,3,4,7,8-	70648-26-9	6.93E-10	1.42E-10	Dioxin (2,3,7,8-TCDD)+++	1746-01-6	3.9E-06	ca	4.5E-08	ca	2.E-04	3.E-03
HexaCDF, 1,2,3,6,7,8-	57117-44-9	3.78E-10	7.71E-11	Dioxin (2,3,7,8-TCDD)+++	1746-01-6	3.9E-06	ca	4.5E-08	ca	1.E-04	2.E-03
HexaCDF, 1,2,3,7,8,9-	72918-21-9	1.03E-10	2.04E-11	Dioxin (2,3,7,8-TCDD)+++	1746-01-6	3.9E-06	ca	4.5E-08	ca	3.E-05	5.E-04
HexaCDF, 2,3,4,6,7,8-	60851-34-5	2.13E-10	4.33E-11	Dioxin (2,3,7,8-TCDD)+++	1746-01-6	3.9E-06	ca	4.5E-08	ca	5.E-05	1.E-03
Hexachloro-1,3-butadiene (Perchlorobuta	87-68-3	8.93E-08	2.90E-07	Hexachlorobutadiene	87-68-3	6.2E+00	ca**	8.6E-02	ca*	1.E-08	3.E-06
Hexachlorobenzene	118-74-1	2.48E-07	2.59E-07	Hexachlorobenzene	118-74-1	3.0E-01	ca	4.2E-03	ca	8.E-07	6.E-05
Hexachlorocyclopentadiene	77-47-4	9.46E-08	1.95E-06	Hexachlorocyclopentadiene	77-47-4	3.7E+02	nc	2.1E-01	nc	3.E-10	9.E-06
Hexachloroethane (Perchloroethane)	67-72-1	9.11E-08	3.59E-07	Hexachloroethane	67-72-1	3.5E+01	ca**	4.8E-01	ca**	3.E-09	7.E-07
Hydrogen chloride	7647-01-0	1.47E-02	4.14E-02	Hydrogen chloride	7647-01-0			2.1E+01	nc	NC	2.E-03
Indeno(1,2,3-cd) pyrene	193-39-5	1.44E-08	1.12E-09	Indeno[1,2,3-cd]pyrene	193-39-5	6.2E-01	ca	9.2E-03	ca	2.E-08	1.E-07
Iodomethane	74-88-4	2.44E-09	5.09E-07	NA						NC	NC
Isophorone	78-59-1	9.32E-09	2.06E-07	Isophorone	78-59-1	5.1E+02	ca*	7.1E+00	ca	2.E-11	3.E-08
Isopropyl toluene, p-	99-87-6	3.77E-09	1.32E-07	NA						NC	NC
Lead	7439-92-1	2.70E-04	6.87E-05	Lead	7439-92-1	4.0E+02	nc	1.5E+00	NAAQS	7.E-07	5.E-05
Manganese	7439-96-5	2.96E-06	1.01E-05	Manganese and compounds	7439-96-5	1.8E+03	nc	5.1E-02	nc	2.E-09	2.E-04
Mercuric chloride	7487-94-7	7.28E-05	6.02E-06	Mercury and compounds	7487-94-7	2.3E+01	nc			3.E-06	NC
Mercury, elemental	7439-97-6	--	3.49E-07	NA						NC	NC
Methoxychlor	72-43-5	8.26E-09	1.41E-08	Methoxychlor	72-43-5	3.1E+02	nc	1.8E+01	nc	3.E-11	8.E-10
Methyl bromide (Bromomethane)	74-83-9	2.01E-10	1.22E-06	Bromomethane (Methyl bromide)	74-83-9	3.9E+00	nc	5.2E+00	nc	5.E-11	2.E-07

Comparison of Modeled Air and Soil Concentrations at Residential Assessment Receptor Location R_2 with USEPA Region 9 Preliminary Remediation Goals

Stack Emissions

Calculated Air and Soil Concentrations at Receptor R_2				USEPA Region 9 Preliminary Remediation Goals (PRGs) (c)						Comparison of Concentrations to PRGs	
Compound (as listed in IRAP software)	CAS Number	Maximum (Annual) Soil Concentration (mg/kg)	Annual Average Air Concentration (ug/m^3)	Compound (as listed in PRG Table)	CAS Number	Residential Soil PRG (mg/kg)		Ambient Air PRG (ug/m^3)		Soil Concentration Ratio: modeled concentration/PRG	Air Concentration Ratio: modeled concentration/PRG
						Soil Concentration	Basis	Air Concentration	Basis		
Methyl chloride (Chloromethane)	74-87-3	2.81E-10	6.23E-06	Chloromethane (methyl chloride)	74-87-3	4.7E+01	nc	9.5E+01	nc	6.E-12	7.E-08
Methyl ethyl ketone (2-Butanone)	78-93-3	5.96E-08	1.17E-06	Methyl ethyl ketone (2-Butanone)	78-93-3	2.2E+04	nc	5.1E+03	nc	3.E-12	2.E-10
Methyl isobutyl ketone	108-10-1	6.67E-09	5.82E-07	Methyl isobutyl ketone	108-10-1	5.3E+03	nc	3.1E+03	nc	1.E-12	2.E-10
Methyl mercury	22967-92-6	1.49E-06	--	Mercury (methyl)	22967-92-6	6.1E+00	nc			2.E-07	NC
Methyl methacrylate	80-62-6	9.99E-12	1.42E-09	Methyl methacrylate	80-62-6	2.2E+03	nc	7.3E+02	nc	5.E-15	2.E-12
methyl tert-butyl ether	1634-04-4	3.07E-09	2.11E-08	Methyl tertbutyl ether (MTBE)	1634-04-4	3.2E+01	ca	7.4E+00	ca	1.E-10	3.E-09
Methylene bromide	74-95-3	1.36E-08	3.31E-07	Methylene bromide	74-95-3	6.7E+01	nc	3.7E+01	nc	2.E-10	9.E-09
Methylene chloride	75-09-2	4.05E-10	4.50E-06	Methylene chloride	75-09-2	9.1E+00	ca	4.1E+00	ca	4.E-11	1.E-06
Naphthalene	91-20-3	7.74E-08	9.26E-07	Naphthalene	91-20-3	5.6E+01	nc	3.1E+00	nc	1.E-09	3.E-07
Nickel	7440-02-0	6.19E-07	2.18E-06	Nickel (soluble salts)	7440-02-0	1.6E+03	nc			4.E-10	NC
Nitroaniline, 2-	88-74-4	5.51E-07	2.69E-07	2-Nitroaniline	88-74-4	1.8E+02	nc	1.1E-01	nc	3.E-09	2.E-06
Nitroaniline, 3-	99-09-2	6.74E-07	7.53E-07	3-Nitroaniline	99-09-2	1.8E+01	nc	3.2E-01	ca**	4.E-08	2.E-06
Nitroaniline, 4-	100-01-6	5.86E-07	6.05E-07	4-Nitroaniline	100-01-6	2.3E+01	ca**	3.2E-01	ca*	3.E-08	2.E-06
Nitrobenzene	98-95-3	4.07E-08	2.04E-07	Nitrobenzene	98-95-3	2.0E+01	nc	2.1E+00	nc	2.E-09	1.E-07
Nitrogen dioxide	10102-44-0	1.08E-06	8.48E-02	Nitrogen dioxide				1.0E+02	NAAQS	NC	8.E-04
Nitrophenol, 2-	88-75-5	2.19E-08	4.58E-07	NA						NC	NC
Nitrophenol, 4-	100-02-7	1.60E-09	7.55E-07	NA						NC	NC
Nitrosodiphenylamine, N-	86-30-6	1.22E-08	2.04E-07	N-Nitrosodiphenylamine	86-30-6	9.9E+01	ca*	1.4E+00	ca*	1.E-10	1.E-07
Nitrosodipropylamine, n-	621-64-7	5.87E-08	2.49E-07	NA						NC	NC
N-nitrosodimethylamine	62-75-9	8.74E-08	2.38E-07	N-Nitrosodimethylamine	62-75-9	9.5E-03	ca*	1.4E-04	ca	9.E-06	2.E-03
OctaCDD, 1,2,3,4,6,7,8,9-	3268-87-9	1.39E-10	2.95E-11	Dioxin (2,3,7,8-TCDD)+++	1746-01-6	3.9E-06	ca	4.5E-08	ca	4.E-05	7.E-04
OctaCDF, 1,2,3,4,6,7,8,9-	39001-02-0	7.68E-11	1.63E-11	Dioxin (2,3,7,8-TCDD)+++	1746-01-6	3.9E-06	ca	4.5E-08	ca	2.E-05	4.E-04
PentaCDD, 1,2,3,7,8-	40321-76-4	1.66E-10	3.23E-11	Dioxin (2,3,7,8-TCDD)+++	1746-01-6	3.9E-06	ca	4.5E-08	ca	4.E-05	7.E-04
PentaCDF, 1,2,3,7,8-	57117-41-6	6.76E-10	1.18E-10	Dioxin (2,3,7,8-TCDD)+++	1746-01-6	3.9E-06	ca	4.5E-08	ca	2.E-04	3.E-03
PentaCDF, 2,3,4,7,8-	57117-31-4	6.81E-10	1.23E-10	Dioxin (2,3,7,8-TCDD)+++	1746-01-6	3.9E-06	ca	4.5E-08	ca	2.E-04	3.E-03
Pentachlorobenzene	608-93-5	1.36E-07	2.28E-07	Pentachlorobenzene	608-93-5	4.9E+01	nc	2.9E+00	nc	3.E-09	8.E-08
Pentachloronitrobenzene (PCNB)	82-68-8	3.31E-07	2.69E-07	Pentachloronitrobenzene	82-68-8	1.9E+00	ca*	2.6E-02	ca	2.E-07	1.E-05
Pentachlorophenol	87-86-5	1.15E-06	4.01E-06	Pentachlorophenol	87-86-5	3.0E+00	ca	5.6E-02	ca	4.E-07	7.E-05
Perylene	198-55-0	3.21E-13	3.53E-09	NA						NC	NC
Phenanthrene	85-01-8	1.38E-08	3.91E-08	NA						NC	NC
Phenol	108-95-2	5.17E-09	2.95E-07	Phenol	108-95-2	1.8E+04	nc	1.1E+03	nc	3.E-13	3.E-10
Phosphine imide, P,P,P-triphenyl	2240-47-3	3.56E-10	2.74E-07	NA						NC	NC
Propylbenzene, n-	103-65-1	1.42E-15	1.07E-07	n-Propylbenzene	103-65-1	2.4E+02	sat	1.5E+02	nc	6.E-18	7.E-10
Propylene oxide	75-56-9	4.15E-12	2.59E-10	Propylene oxide	75-56-9	1.9E+00	ca*	5.2E-01	ca*	2.E-12	5.E-10
Pyrene	129-00-0	4.26E-08	1.28E-08	Pyrene	129-00-0	2.3E+03	nc	1.1E+02	nc	2.E-11	1.E-10
Pyridine	110-86-1	4.54E-09	4.78E-07	Pyridine	110-86-1	6.1E+01	nc	3.7E+00	nc	7.E-11	1.E-07
Selenium	7782-49-2	4.69E-08	8.26E-07	Selenium	7782-49-2	3.9E+02	nc			1.E-10	NC
Silver	7440-22-4	6.10E-05	6.01E-07	Silver and compounds	7440-22-4	3.9E+02	nc			2.E-07	NC
Styrene	100-42-5	3.36E-09	7.47E-08	Styrene	100-42-5	1.7E+03	sat	1.1E+03	nc	2.E-12	7.E-11
Sulfur dioxide	9/5/7446	5.83E-06	2.25E-02	Sulfur dioxide				7.8E+01	NAAQS	NC	3.E-04
TetraCDD, 2,3,7,8-	1746-01-6	8.53E-11	1.16E-11	2,3,7,8-TCDD (dioxin)	1746-01-6	3.9E-06	ca	4.5E-08	ca	2.E-05	3.E-04
TetraCDF, 2,3,7,8-	51207-31-9	8.63E-10	1.11E-10	Dioxin (2,3,7,8-TCDD)+++	1746-01-6	3.9E-06	ca	4.5E-08	ca	2.E-04	2.E-03
Tetrachlorobenzene, 1,2,4,5-	95-94-3	7.08E-08	2.47E-07	1,2,4,5-Tetrachlorobenzene	95-94-3	1.8E+01	nc	1.1E+00	nc	4.E-09	2.E-07
Tetrachloroethane, 1,1,1,2-	630-20-6	8.97E-10	6.93E-08	1,1,1,2-Tetrachloroethane	630-20-6	3.2E+00	ca	2.6E-01	ca	3.E-10	3.E-07
Tetrachloroethane, 1,1,2,2-	79-34-5	2.05E-09	3.41E-07	1,1,2,2-Tetrachloroethane	79-34-5	4.1E-01	ca	3.3E-02	ca	5.E-09	1.E-05
Tetrachloroethylene (Perchloroethylene)	127-18-4	5.78E-09	2.90E-05	Tetrachloroethylene (PCE)	127-18-4	4.8E-01	ca*	3.2E-01	ca	1.E-08	9.E-05
Tetrahydrofuran	109-99-9	4.27E-09	1.19E-06	Tetrahydrofuran	109-99-9	9.4E+00	ca	9.9E-01	ca	5.E-10	1.E-06
Thallium (I)	7440-28-0	2.64E-04	2.03E-06	Thallium and compounds	7440-28-0	5.2E+00	nc			5.E-05	NC
Toluene	108-88-3	1.58E-09	3.05E-06	Toluene	108-88-3	5.2E+02	sat	4.0E+02	nc	3.E-12	8.E-09
Trichlorobenzene, 1,2,3-	87-61-6	3.35E-06	4.47E-07	NA						NC	NC
Trichlorobenzene, 1,2,4-	120-82-1	1.39E-08	2.41E-07	1,2,4-Trichlorobenzene	120-82-1	6.2E+01	nc	3.7E+00	nc	2.E-10	7.E-08
Trichloroethane, 1,1,1-	71-55-6	9.95E-12	7.19E-08	1,1,1-Trichloroethane	71-55-6	1.2E+03	sat	2.3E+03	nc	8.E-15	3.E-11
Trichloroethane, 1,1,2-	79-00-5	2.43E-10	2.07E-07	1,1,2-Trichloroethane	79-00-5	7.3E-01	ca*	1.2E-01	ca	3.E-10	2.E-06
Trichloroethylene	79-01-6	2.37E-10	6.80E-07	Trichloroethylene (TCE)	79-01-6	5.3E-02	ca	1.7E-02	ca	4.E-09	4.E-05
Trichlorofluoromethane (Freon 11)	75-69-4	7.80E-12	3.28E-07	Trichlorofluoromethane	75-69-4	3.9E+02	nc	7.3E+02	nc	2.E-14	4.E-10

Comparison of Modeled Air and Soil Concentrations at Residential Assessment Receptor Location R_2 with USEPA Region 9 Preliminary Remediation Goals

Stack Emissions

Calculated Air and Soil Concentrations at Receptor R_2				USEPA Region 9 Preliminary Remediation Goals (PRGs) (c)						Comparison of Concentrations to PRGs	
Compound (as listed in IRAP software)	CAS Number	Maximum (Annual) Soil Concentration (mg/kg)	Annual Average Air Concentration (ug/m^3)	Compound (as listed in PRG Table)	CAS Number	Residential Soil PRG (mg/kg)		Ambient Air PRG (ug/m^3)		Soil Concentration Ratio: modeled concentration/PRG	Air Concentration Ratio: modeled concentration/PRG
						Soil Concentration	Basis	Air Concentration	Basis		
Trichlorophenol, 2,4,5-	95-95-4	4.81E-07	4.16E-07	2,4,5-Trichlorophenol	95-95-4	6.1E+03	nc	3.7E+02	nc	8.E-11	1.E-09
Trichlorophenol, 2,4,6-	88-06-2	3.84E-08	3.28E-07	2,4,6-Trichlorophenol	88-06-2	6.1E+00	nc**	3.7E-01	nc**	6.E-09	9.E-07
Trichloropropane, 1,2,3-	96-18-4	1.28E-09	3.23E-07	1,2,3-Trichloropropane	96-18-4	3.4E-02	ca	3.4E-03	ca	4.E-08	1.E-04
Trimethylbenzene, 1,3,5-	108-67-8	1.01E-09	1.05E-07	1,3,5-Trimethylbenzene	108-67-8	2.1E+01	nc	6.2E+00	nc	5.E-11	2.E-08
Vanadium	7440-62-2	7.24E-05	5.34E-07	Vanadium and compounds	7440-62-2	7.8E+01	nc			9.E-07	NC
Vinyl Acetate	108-05-4	5.94E-09	3.93E-07	Vinyl acetate	108-05-4	4.3E+02	nc	2.1E+02	nc	1.E-11	2.E-09
Vinyl Chloride	75-01-4	1.88E-12	1.75E-07	Vinyl chloride	75-01-4	7.9E-02	ca	1.1E-01	ca	2.E-11	2.E-06
Xylene, m-	108-38-3	1.93E-10	1.50E-07	Xylenes (b)	1330-20-7	2.7E+02	nc	1.1E+02	nc	7.E-13	1.E-09
Xylene, o-	95-47-6	1.25E-10	9.57E-08	Xylenes (b)	1330-20-7	2.7E+02	nc	1.1E+02	nc	5.E-13	9.E-10
Xylene, p-	106-42-3	1.61E-10	1.50E-07	Xylenes (b)	1330-20-7	2.7E+02	nc	1.1E+02	nc	6.E-13	1.E-09
Zinc	7440-66-6	9.00E-06	3.32E-05	Zinc	7440-66-6	2.3E+04	nc			4.E-10	NC

NAAQS = National Ambient Air Quality Standard (annual average). Value for lead is a quarterly average.
+++ = Used PRG value for 2,3,7,8-TCDD toxic equivalents (TEQs) in comparison with other congeners, which are also expressed as 2,3,7,8-TCDD TEQs.
NA = PRG not available.
-- = Not calculated (per USEPA's HHRAP methodology).
(a) Used PRG value for technical chlordane
(b) Used PRG value for xylenes
(c) Source: http://www.epa.gov/region09/waste/sfund/prg/files/prgtable2004.xls
Notes from USEPA Region IX PRG Table: ca=Cancer PRG; nc= Noncancer PRG; ca* (where: nc PRG < 100X ca PRG); ca** (where nc PRG < 10X ca PRG); max=Ceiling limit; sat=Soil
(d) Benzidine was not detected in stack gases during the Performance Demonstration Test (PDT) and there is no evidence from waste profile reports and analytical spent carbon data that it has been accepted in spent carbon received at the facility.

APPENDIX H

STACK EMISSIONS RISK ASSESSMENT: ACUTE INHALATION RISK RESULTS

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
A_1 max hourly impact point (stack)	
Arsenic	8.2E-02
Nitrogen dioxide	3.6E-02
Chlorine	8.9E-03
Sulfur dioxide	6.8E-03
Hydrogen chloride	4.0E-03
Beryllium	3.1E-03
Cadmium	1.3E-03
Lead	2.6E-04
Nickel	2.1E-04
Copper	1.5E-04
Mercury	3.9E-05
Mercuric chloride	9.7E-06
Hexachlorobenzene	8.7E-06
Chlorophenyl-phenylether, 4-	7.7E-06
Benzidine	5.2E-06
Dibromo-3-chloropropane, 1,2-	4.5E-06
Thallium (l)	3.8E-06
Chloroform (Trichloromethane)	2.9E-06
Vanadium	2.0E-06
Hexachlorocyclopentadiene	2.0E-06
Manganese	1.9E-06
4,6-Dinitro-2-methylphenol	1.1E-06
Silver	1.1E-06
Barium	7.5E-07
Zinc	6.3E-07
Pentachlorophenol	5.4E-07
Chromium	4.8E-07
Chromium, hexavalent	4.8E-07
Aluminum	4.8E-07
PentaCDF, 2,3,4,7,8-	3.3E-07
Selenium	3.2E-07
Tetrachloroethylene (Perchloroethylene)	2.9E-07
Nitrosodipropylamine, n-	2.5E-07
Fluoranthene	1.7E-07
Bromoform (tribromomethane)	1.4E-07
Antimony	1.3E-07
Benzoic Acid	1.2E-07
Dinitrotoluene, 2,4-	1.1E-07
Chlorobenzene	1.1E-07
Benzene	1.0E-07
Ethylhexyl phthalate, bis-2-	9.4E-08
Dibromochloromethane	9.4E-08
Dinitrotoluene, 2,6-	9.2E-08
Bromodichloromethane	7.1E-08
Methylene chloride	6.5E-08
Dinitrophenol, 2,4-	6.3E-08
Methyl bromide (Bromomethane)	6.3E-08
Nitrophenol, 4-	6.1E-08
Nitroaniline, 3-	6.1E-08
Chloronaphthalene,2-	5.7E-08
3-Penten-2-one, 4-methyl	4.8E-08
Dichlorobenzidine, 3,3'-	4.5E-08
Methylene bromide	4.4E-08
Pentachloronitrobenzene (PCNB)	3.6E-08
Dimethylphenol, 2,4-	2.7E-08
Acrylonitrile	2.6E-08
Chlorobenzilate	2.5E-08
Cobalt	2.4E-08
Nitrophenol, 2-	2.3E-08
Carbazole	2.0E-08
Dinitrobenzene, 1,3-	1.9E-08
Carbon Tetrachloride	1.9E-08
Benzyl alcohol	1.8E-08
Methyl ethyl ketone (2-Butanone)	1.8E-08
Benzaldehyde	1.7E-08
Toluene	1.7E-08
Heptachlor	1.5E-08
Nitroaniline, 4-	1.4E-08

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Benzonitrile	1.3E-08
Di-n-butyl phthalate	1.3E-08
Aniline	1.2E-08
TetraCDF, 2,3,7,8-	1.1E-08
Carbon Disulfide	1.0E-08
Phenol	1.0E-08
Heptachlor epoxide	8.5E-09
Endrin	8.4E-09
Phenanthrene	7.9E-09
Chlorophenol, 2-	7.5E-09
Chloroaniline, p-	7.2E-09
Acetone	6.7E-09
Methyl chloride (Chloromethane)	6.3E-09
HexaCDF, 1,2,3,6,7,8-	6.2E-09
Trichlorobenzene, 1,2,3-	6.0E-09
Acetophenone	5.9E-09
Bromophenyl-phenylether, 4-	5.8E-09
HexaCDF, 2,3,4,6,7,8-	5.8E-09
Chloro-3-methylphenol, 4-	5.6E-09
Hexachloro-1,3-butadiene (Perchlorobutadiene)	5.4E-09
Cresol, o-	5.4E-09
N-nitrosodimethylamine	4.8E-09
HexaCDF, 1,2,3,4,7,8-	3.8E-09
Butylbenzylphthalate	3.8E-09
Dichlorobenzene, 1,3-	3.7E-09
HexaCDD, 1,2,3,4,7,8-	3.6E-09
Diethyl phthalate	3.5E-09
Tetrachloroethane, 1,1,2,2-	3.4E-09
Vinyl Acetate	3.3E-09
PentaCDF, 1,2,3,7,8-	3.2E-09
Dichloropropene, 1,3- (cis)	3.2E-09
Bis(2-chloroethoxy) methane	2.9E-09
Trichlorophenol, 2,4,5-	2.8E-09
Nitrobenzene	2.7E-09
Nitroaniline, 2-	2.7E-09
PentaCDD, 1,2,3,7,8-	2.6E-09
Benzo(b)fluoranthene	2.6E-09
2,5-Dimethylheptane	2.5E-09
Naphthalene	2.5E-09
2-Hexanone	2.4E-09
Hexachloroethane (Perchloroethane)	2.4E-09
Cresol, m-	2.4E-09
Cresol, p-	2.4E-09
Dimethyl phthalate	2.3E-09
Endosulfan I	2.3E-09
Dichlorophenol, 2,4-	2.3E-09
Trichlorophenol, 2,4,6-	2.2E-09
Acenaphthylene	2.1E-09
Chlordane	2.1E-09
Pyridine	1.9E-09
BHC, beta-	1.9E-09
Dibenzofuran	1.8E-09
Diphenylamine	1.8E-09
Bromobenzene	1.7E-09
Aldrin	1.7E-09
Isophorone	1.7E-09
Tetrachlorobenzene, 1,2,4,5-	1.7E-09
Nitrosodiphenylamine, N-	1.6E-09
TetraCDD, 2,3,7,8-	1.6E-09
Pentachlorobenzene	1.5E-09
Di-n-octylphthalate	1.5E-09
Trichlorobenzene, 1,2,4-	1.4E-09
Xylene, m-	1.4E-09
Xylene, p-	1.4E-09
Indeno(1,2,3-cd) pyrene	1.3E-09
Diphenylhydrazine,1,2-	1.2E-09
Trichloropropane, 1,2,3-	1.1E-09
Butylbenzene, sec	1.0E-09
Chrysene	9.7E-10
1,1-Dichloropropene	8.9E-10
Xylene, o-	8.7E-10

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Trichloroethane, 1,1,2-	8.3E-10
3-Ethyl benzaldehyde	8.2E-10
Aroclor 1254	8.1E-10
Dieldrin	8.1E-10
BHC, alpha-	7.4E-10
Styrene	7.2E-10
Iodomethane	7.1E-10
Bis(2-chlorethyl)ether	7.1E-10
2,2'-oxybis (1-Chloropropane)	6.7E-10
DDT, 4-4'-	5.9E-10
Benzo(a)Anthracene	5.1E-10
Benzo(k)fluoranthene	5.0E-10
4-Ethyl benzaldehyde	4.5E-10
OctaCDF, 1,2,3,4,6,7,8,9-	4.4E-10
gamma-BHC (Lindane)	4.1E-10
Methyl isobutyl ketone	3.9E-10
HexaCDD, 1,2,3,7,8,9-	3.5E-10
Ethylene dibromide	3.4E-10
Benzo(a)pyrene	3.3E-10
Tetrahydrofuran	3.2E-10
HexaCDD, 1,2,3,6,7,8-	3.0E-10
1,3-Dichloropropane	2.6E-10
Butylbenzene, n-	2.5E-10
Dichloroethylene 1,1-	2.4E-10
2,2-Dichloropropane	2.4E-10
Butylbenzene, tert	2.4E-10
Tetrachloroethane, 1,1,1,2-	2.3E-10
DDD, 4,4'-	2.3E-10
Trichloroethane, 1,1,1-	2.1E-10
Trichloroethylene	2.0E-10
Vinyl Chloride	1.9E-10
Acenaphthene	1.8E-10
Pyrene	1.7E-10
Trimethylbenzene, 1,3,5-	1.7E-10
2-Methylnaphthalene	1.5E-10
HeptaCDF, 1,2,3,4,6,7,8-	1.5E-10
Dichlorobenzene, 1,2-	1.5E-10
Dichloroethane, 1,2- (Ethylene Dichloride)	1.3E-10
Anthracene	1.1E-10
Methoxychlor	9.4E-11
Dichlorobenzene,1,4-	8.7E-11
OctaCDD, 1,2,3,4,6,7,8,9-	7.9E-11
DDE, 4,4'-	7.8E-11
Cumene (Isopropylbenzene)	7.7E-11
2-Chlorotoluene	6.6E-11
4-Chlorotoluene	6.6E-11
Ethylene Glycol	6.5E-11
Fluorene	5.7E-11
Propylbenzene, n-	5.4E-11
1,2,4-Trimethylbenzene	4.7E-11
Dichloropropane, 1,2-	4.1E-11
Dichloroethylene, cis-1,2-	3.9E-11
HexaCDF, 1,2,3,7,8,9-	3.3E-11
Ethylbenzene	3.3E-11
Chloroethane	2.7E-11
Trichlorofluoromethane (Freon 11)	2.6E-11
Bromochloromethane	2.6E-11
methyl tert-butyl ether	2.4E-11
HeptaCDF, 1,2,3,4,7,8,9-	2.1E-11
Benzo(g,h,i)perylene	2.1E-11
Propylene oxide	1.7E-11
Dichloroethylene-1,2 (trans)	1.4E-11
Dichlorodifluoromethane	1.3E-11
Dichloroethane 1,1-	1.3E-11
HeptaCDD, 1,2,3,4,6,7,8-	7.7E-12
Methyl methacrylate	4.1E-12
Dibenz(a,h)anthracene	1.9E-12
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	1.7E-12
Dioxane, 1,4-	1.5E-12
Acrylic Acid	1.6E-13
1-Hexane (n-hexane)	2.8E-14

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
2,5-Dimethylfuran	NC
2,5-Dione, 3-hexene	NC
2-Methyl octane	NC
3-Hexen-2-one	NC
3-Penten-2-one (ethylidene acetone)	NC
9-Octadecenamide (oleamide)	NC
Benzo(e)pyrene	NC
Benzoic acid, methyl ester (methyl benzoate)	NC
delta-BHC	NC
Diallate	NC
Endosulfan II	NC
Endosulfan sulfate	NC
Endrin aldehyde	NC
Endrin ketone	NC
Isopropyl toluene, p-	NC
Perylene	NC
Phosphine imide, P,P,P-triphenyl	NC
Total (b)	1.0E-01
A_2 closest business	
Nitrogen dioxide	3.6E-02
Arsenic	3.3E-02
Chlorine	9.0E-03
Sulfur dioxide	6.9E-03
Hydrogen chloride	4.0E-03
Beryllium	1.3E-03
Cadmium	5.2E-04
Lead	1.0E-04
Nickel	8.2E-05
Copper	5.9E-05
Mercury	3.9E-05
Mercuric chloride	9.7E-06
Hexachlorobenzene	8.7E-06
Chlorophenyl-phenylether, 4-	7.7E-06
Benzidine	5.1E-06
Dibromo-3-chloropropane, 1,2-	4.5E-06
Chloroform (Trichloromethane)	2.9E-06
Hexachlorocyclopentadiene	2.0E-06
Thallium (I)	1.5E-06
4,6-Dinitro-2-methylphenol	1.1E-06
Vanadium	8.1E-07
Manganese	7.7E-07
Pentachlorophenol	5.4E-07
Silver	4.5E-07
PentaCDF, 2,3,4,7,8-	3.2E-07
Barium	3.0E-07
Tetrachloroethylene (Perchloroethylene)	2.9E-07
Nitrosodipropylamine, n-	2.5E-07
Zinc	2.5E-07
Chromium	1.9E-07
Chromium, hexavalent	1.9E-07
Aluminum	1.9E-07
Fluoranthene	1.7E-07
Bromoform (tribromomethane)	1.4E-07
Antimony	1.4E-07
Selenium	1.3E-07
Benzoic Acid	1.2E-07
Dinitrotoluene, 2,4-	1.2E-07
Chlorobenzene	1.1E-07
Benzene	1.0E-07
Dibromochloromethane	9.4E-08
Dinitrotoluene, 2,6-	9.2E-08
Ethylhexyl phthalate, bis-2-	9.2E-08
Bromodichloromethane	7.1E-08
Methylene chloride	6.5E-08
Dinitrophenol, 2,4-	6.4E-08
Methyl bromide (Bromomethane)	6.3E-08
Nitrophenol, 4-	6.1E-08
Nitroaniline, 3-	6.1E-08
Chloronaphthalene,2-	5.7E-08

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
3-Penten-2-one, 4-methyl	4.9E-08
Methylene bromide	4.5E-08
Dichlorobenzidine, 3,3'-	4.4E-08
Pentachloronitrobenzene (PCNB)	3.6E-08
Dimethylphenol, 2,4-	2.7E-08
Acrylonitrile	2.6E-08
Chlorobenzilate	2.5E-08
Nitrophenol, 2-	2.3E-08
Carbazole	2.1E-08
Dinitrobenzene, 1,3-	1.9E-08
Carbon Tetrachloride	1.9E-08
Benzyl alcohol	1.8E-08
Methyl ethyl ketone (2-Butanone)	1.8E-08
Benzaldehyde	1.7E-08
Toluene	1.7E-08
Heptachlor	1.5E-08
Nitroaniline, 4-	1.4E-08
Benzonitrile	1.3E-08
Di-n-butyl phthalate	1.3E-08
Aniline	1.2E-08
TetraCDF, 2,3,7,8-	1.1E-08
Carbon Disulfide	1.0E-08
Phenol	1.0E-08
Cobalt	9.7E-09
Heptachlor epoxide	8.6E-09
Endrin	8.4E-09
Phenanthrene	7.9E-09
Chlorophenol, 2-	7.5E-09
Chloroaniline, p-	7.3E-09
Acetone	6.8E-09
Methyl chloride (Chloromethane)	6.3E-09
HexaCDF, 1,2,3,6,7,8-	6.0E-09
Trichlorobenzene, 1,2,3-	6.0E-09
Acetophenone	5.9E-09
Bromophenyl-phenylether, 4-	5.8E-09
Chloro-3-methylphenol, 4-	5.7E-09
HexaCDF, 2,3,4,6,7,8-	5.7E-09
Hexachloro-1,3-butadiene (Perchlorobutadiene)	5.5E-09
Cresol, o-	5.5E-09
N-nitrosodimethylamine	4.8E-09
Butylbenzylphthalate	3.8E-09
Dichlorobenzene, 1,3-	3.7E-09
HexaCDF, 1,2,3,4,7,8-	3.7E-09
Diethyl phthalate	3.5E-09
HexaCDD, 1,2,3,4,7,8-	3.5E-09
Tetrachloroethane, 1,1,2,2-	3.5E-09
Vinyl Acetate	3.4E-09
Dichloropropene, 1,3- (cis)	3.2E-09
PentaCDF, 1,2,3,7,8-	3.1E-09
Bis(2-chloroethoxy) methane	2.9E-09
Trichlorophenol, 2,4,5-	2.8E-09
Nitrobenzene	2.7E-09
Nitroaniline, 2-	2.7E-09
Benzo(b)fluoranthene	2.6E-09
PentaCDD, 1,2,3,7,8-	2.5E-09
2,5-Dimethylheptane	2.5E-09
Naphthalene	2.5E-09
2-Hexanone	2.5E-09
Hexachloroethane (Perchloroethane)	2.4E-09
Cresol, m-	2.4E-09
Cresol, p-	2.4E-09
Dimethyl phthalate	2.3E-09
Endosulfan I	2.3E-09
Dichlorophenol, 2,4-	2.3E-09
Trichlorophenol, 2,4,6-	2.2E-09
Acenaphthylene	2.1E-09
Chlordane	2.1E-09
Pyridine	1.9E-09
BHC, beta-	1.9E-09
Dibenzofuran	1.8E-09
Diphenylamine	1.8E-09

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Bromobenzene	1.7E-09
Aldrin	1.7E-09
Isophorone	1.7E-09
Tetrachlorobenzene, 1,2,4,5-	1.7E-09
Nitrosodiphenylamine, N-	1.7E-09
TetraCDD, 2,3,7,8-	1.5E-09
Pentachlorobenzene	1.5E-09
Di-n-octylphthalate	1.5E-09
Trichlorobenzene, 1,2,4-	1.4E-09
Xylene, m-	1.4E-09
Xylene, p-	1.4E-09
Diphenylhydrazine,1,2-	1.2E-09
Trichloropropane, 1,2,3-	1.1E-09
Butylbenzene, sec	1.0E-09
Chrysene	9.7E-10
1,1-Dichloropropene	9.0E-10
Xylene, o-	8.8E-10
Trichloroethane, 1,1,2-	8.4E-10
3-Ethyl benzaldehyde	8.3E-10
Aroclor 1254	8.2E-10
Dieldrin	8.2E-10
BHC, alpha-	7.5E-10
Styrene	7.2E-10
Iodomethane	7.1E-10
Bis(2-chlorethyl)ether	7.1E-10
2,2'-oxybis (1-Chloropropane)	6.8E-10
DDT, 4-4'-	5.9E-10
Benzo(a)Anthracene	5.1E-10
Indeno(1,2,3-cd) pyrene	5.1E-10
Benzo(k)fluoranthene	4.9E-10
4-Ethyl benzaldehyde	4.5E-10
OctaCDF, 1,2,3,4,6,7,8,9-	4.2E-10
gamma-BHC (Lindane)	4.1E-10
Methyl isobutyl ketone	3.9E-10
Ethylene dibromide	3.5E-10
HexaCDD, 1,2,3,7,8,9-	3.4E-10
Benzo(a)pyrene	3.2E-10
Tetrahydrofuran	3.2E-10
HexaCDD, 1,2,3,6,7,8-	2.9E-10
1,3-Dichloropropane	2.6E-10
Butylbenzene, n-	2.5E-10
Dichloroethylene 1,1-	2.5E-10
2,2-Dichloropropane	2.4E-10
Butylbenzene, tert	2.4E-10
Tetrachloroethane, 1,1,1,2-	2.3E-10
DDD, 4,4'-	2.3E-10
Trichloroethane, 1,1,1-	2.1E-10
Trichloroethylene	2.0E-10
Vinyl Chloride	2.0E-10
Acenaphthene	1.8E-10
Pyrene	1.7E-10
Trimethylbenzene, 1,3,5-	1.7E-10
2-Methylnaphthalene	1.5E-10
Dichlorobenzene, 1,2-	1.5E-10
HeptaCDF, 1,2,3,4,6,7,8-	1.5E-10
Dichloroethane, 1,2- (Ethylene Dichloride)	1.3E-10
Anthracene	1.1E-10
Methoxychlor	9.4E-11
Dichlorobenzene,1,4-	8.7E-11
DDE, 4,4'-	7.8E-11
Cumene (Isopropylbenzene)	7.7E-11
OctaCDD, 1,2,3,4,6,7,8,9-	7.7E-11
2-Chlorotoluene	6.7E-11
4-Chlorotoluene	6.6E-11
Ethylene Glycol	6.5E-11
Fluorene	5.7E-11
Propylbenzene, n-	5.4E-11
1,2,4-Trimethylbenzene	4.8E-11
Dichloropropane, 1,2-	4.2E-11
Dichloroethylene, cis-1,2-	3.9E-11
Ethylbenzene	3.3E-11

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
HexaCDF, 1,2,3,7,8,9-	3.2E-11
Chloroethane	2.8E-11
Trichlorofluoromethane (Freon 11)	2.7E-11
Bromochloromethane	2.6E-11
methyl tert-butyl ether	2.4E-11
HeptaCDF, 1,2,3,4,7,8,9-	2.1E-11
Benzo(g,h,i)perylene	2.1E-11
Propylene oxide	1.7E-11
Dichloroethylene-1,2 (trans)	1.4E-11
Dichlorodifluoromethane	1.3E-11
Dichloroethane 1,1-	1.3E-11
HeptaCDD, 1,2,3,4,6,7,8-	7.5E-12
Methyl methacrylate	4.1E-12
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	1.7E-12
Dioxane, 1,4-	1.6E-12
Dibenz(a,h)anthracene	7.8E-13
Acrylic Acid	1.6E-13
1-Hexane (n-hexane)	2.8E-14
2,5-Dimethylfuran	NC
2,5-Dione, 3-hexene	NC
2-Methyl octane	NC
3-Hexen-2-one	NC
3-Penten-2-one (ethylidene acetone)	NC
9-Octadecenamide (oleamide)	NC
Benzo(e)pyrene	NC
Benzoic acid, methyl ester (methyl benzoate)	NC
delta-BHC	NC
Diallate	NC
Endosulfan II	NC
Endosulfan sulfate	NC
Endrin aldehyde	NC
Endrin ketone	NC
Isopropyl toluene, p-	NC
Perylene	NC
Phosphine imide, P,P,P-triphenyl	NC
Total (b)	9.0E-02
R_1 resident	
Nitrogen dioxide	1.5E-02
Arsenic	1.2E-02
Chlorine	3.7E-03
Sulfur dioxide	2.8E-03
Hydrogen chloride	1.6E-03
Beryllium	4.5E-04
Cadmium	1.8E-04
Lead	3.7E-05
Nickel	2.9E-05
Copper	2.1E-05
Mercury	1.6E-05
Mercuric chloride	4.0E-06
Hexachlorobenzene	3.6E-06
Chlorophenyl-phenylether, 4-	3.2E-06
Benzidine	2.2E-06
Dibromo-3-chloropropane, 1,2-	1.8E-06
Chloroform (Trichloromethane)	1.2E-06
Hexachlorocyclopentadiene	8.0E-07
Thallium (I)	5.5E-07
4,6-Dinitro-2-methylphenol	4.7E-07
Vanadium	2.9E-07
Manganese	2.7E-07
Pentachlorophenol	2.2E-07
Silver	1.6E-07
PentaCDF, 2,3,4,7,8-	1.4E-07
Tetrachloroethylene (Perchloroethylene)	1.2E-07
Barium	1.1E-07
Nitrosodipropylamine, n-	1.0E-07
Zinc	8.9E-08
Fluoranthene	7.0E-08
Chromium	6.9E-08
Chromium, hexavalent	6.9E-08

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Aluminum	6.8E-08
Bromoform (tribromomethane)	5.9E-08
Antimony	5.5E-08
Benzoic Acid	4.8E-08
Dinitrotoluene, 2,4-	4.7E-08
Selenium	4.5E-08
Chlorobenzene	4.4E-08
Benzene	4.2E-08
Ethylhexyl phthalate, bis-2-	4.1E-08
Dibromochloromethane	3.8E-08
Dinitrotoluene, 2,6-	3.8E-08
Bromodichloromethane	2.9E-08
Methylene chloride	2.6E-08
Dinitrophenol, 2,4-	2.6E-08
Methyl bromide (Bromomethane)	2.6E-08
Nitrophenol, 4-	2.5E-08
Nitroaniline, 3-	2.5E-08
Chloronaphthalene,2-	2.3E-08
3-Penten-2-one, 4-methyl	2.0E-08
Dichlorobenzidine, 3,3'-	1.9E-08
Methylene bromide	1.8E-08
Pentachloronitrobenzene (PCNB)	1.5E-08
Dimethylphenol, 2,4-	1.1E-08
Acrylonitrile	1.1E-08
Chlorobenzilate	1.0E-08
Nitrophenol, 2-	9.4E-09
Carbazole	8.4E-09
Dinitrobenzene, 1,3-	7.7E-09
Carbon Tetrachloride	7.6E-09
Benzyl alcohol	7.4E-09
Methyl ethyl ketone (2-Butanone)	7.4E-09
Benzaldehyde	7.0E-09
Toluene	6.8E-09
Heptachlor	6.1E-09
Nitroaniline, 4-	5.5E-09
Benzonitrile	5.3E-09
Di-n-butyl phthalate	5.3E-09
Aniline	5.0E-09
TetraCDF, 2,3,7,8-	4.6E-09
Carbon Disulfide	4.3E-09
Phenol	4.2E-09
Heptachlor epoxide	3.5E-09
Endrin	3.5E-09
Cobalt	3.4E-09
Phenanthrene	3.2E-09
Chlorophenol, 2-	3.1E-09
Chloroaniline, p-	3.0E-09
Acetone	2.8E-09
HexaCDF, 1,2,3,6,7,8-	2.7E-09
Methyl chloride (Chloromethane)	2.6E-09
HexaCDF, 2,3,4,6,7,8-	2.5E-09
Trichlorobenzene, 1,2,3-	2.5E-09
Acetophenone	2.4E-09
Bromophenyl-phenylether, 4-	2.4E-09
Chloro-3-methylphenol, 4-	2.3E-09
Hexachloro-1,3-butadiene (Perchlorobutadiene)	2.2E-09
Cresol, o-	2.2E-09
N-nitrosodimethylamine	2.0E-09
HexaCDF, 1,2,3,4,7,8-	1.6E-09
Butylbenzylphthalate	1.5E-09
HexaCDD, 1,2,3,4,7,8-	1.5E-09
Dichlorobenzene, 1,3-	1.5E-09
Diethyl phthalate	1.4E-09
Tetrachloroethane, 1,1,2,2-	1.4E-09
Vinyl Acetate	1.4E-09
PentaCDF, 1,2,3,7,8-	1.3E-09
Dichloropropene, 1,3- (cis)	1.3E-09
Bis(2-chloroethoxy) methane	1.2E-09
Trichlorophenol, 2,4,5-	1.1E-09
Nitrobenzene	1.1E-09
PentaCDD, 1,2,3,7,8-	1.1E-09

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Nitroaniline, 2-	1.1E-09
Benzo(b)fluoranthene	1.0E-09
2,5-Dimethylheptane	1.0E-09
Naphthalene	1.0E-09
2-Hexanone	1.0E-09
Hexachloroethane (Perchloroethane)	9.9E-10
Cresol, m-	9.7E-10
Cresol, p-	9.7E-10
Dimethyl phthalate	9.5E-10
Endosulfan I	9.3E-10
Dichlorophenol, 2,4-	9.2E-10
Trichlorophenol, 2,4,6-	9.0E-10
Acenaphthylene	8.6E-10
Chlordane	8.5E-10
Pyridine	7.9E-10
BHC, beta-	7.9E-10
Dibenzofuran	7.5E-10
Diphenylamine	7.5E-10
Bromobenzene	7.1E-10
Aldrin	7.0E-10
Isophorone	6.8E-10
Tetrachlorobenzene, 1,2,4,5-	6.8E-10
Nitrosodiphenylamine, N-	6.7E-10
TetraCDD, 2,3,7,8-	6.5E-10
Pentachlorobenzene	6.3E-10
Di-n-octylphthalate	6.2E-10
Trichlorobenzene, 1,2,4-	5.7E-10
Xylene, m-	5.6E-10
Xylene, p-	5.6E-10
Diphenylhydrazine,1,2-	5.0E-10
Trichloropropane, 1,2,3-	4.4E-10
Butylbenzene, sec	4.2E-10
Chrysene	4.0E-10
1,1-Dichloropropene	3.7E-10
Xylene, o-	3.6E-10
Trichloroethane, 1,1,2-	3.4E-10
3-Ethyl benzaldehyde	3.4E-10
Aroclor 1254	3.3E-10
Dieldrin	3.3E-10
BHC, alpha-	3.0E-10
Styrene	2.9E-10
Iodomethane	2.9E-10
Bis(2-chlorethyl)ether	2.9E-10
2,2'-oxybis (1-Chloropropane)	2.8E-10
DDT, 4-4'-	2.5E-10
Benzo(a)Anthracene	2.2E-10
Benzo(k)fluoranthene	2.1E-10
OctaCDF, 1,2,3,4,6,7,8,9-	1.9E-10
4-Ethyl benzaldehyde	1.8E-10
Indeno(1,2,3-cd) pyrene	1.8E-10
gamma-BHC (Lindane)	1.7E-10
Methyl isobutyl ketone	1.6E-10
HexaCDD, 1,2,3,7,8,9-	1.5E-10
Ethylene dibromide	1.4E-10
Benzo(a)pyrene	1.4E-10
Tetrahydrofuran	1.3E-10
HexaCDD, 1,2,3,6,7,8-	1.3E-10
1,3-Dichloropropane	1.1E-10
Butylbenzene, n-	1.0E-10
Dichloroethylene 1,1-	1.0E-10
2,2-Dichloropropane	9.9E-11
Butylbenzene, tert	9.9E-11
Tetrachloroethane, 1,1,1,2-	9.5E-11
DDD, 4,4'-	9.4E-11
Trichloroethane, 1,1,1-	8.7E-11
Trichloroethylene	8.0E-11
Vinyl Chloride	8.0E-11
Acenaphthene	7.3E-11
Pyrene	7.0E-11
Trimethylbenzene, 1,3,5-	6.9E-11
HeptaCDF, 1,2,3,4,6,7,8-	6.5E-11

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
2-Methylnaphthalene	6.2E-11
Dichlorobenzene, 1,2-	6.0E-11
Dichloroethane, 1,2- (Ethylene Dichloride)	5.3E-11
Anthracene	4.5E-11
Methoxychlor	3.9E-11
Dichlorobenzene,1,4-	3.6E-11
OctaCDD, 1,2,3,4,6,7,8,9-	3.4E-11
DDE, 4,4'-	3.2E-11
Cumene (Isopropylbenzene)	3.2E-11
2-Chlorotoluene	2.7E-11
4-Chlorotoluene	2.7E-11
Ethylene Glycol	2.7E-11
Fluorene	2.3E-11
Propylbenzene, n-	2.2E-11
1,2,4-Trimethylbenzene	1.9E-11
Dichloropropane, 1,2-	1.7E-11
Dichloroethylene, cis-1,2-	1.6E-11
HexaCDF, 1,2,3,7,8,9-	1.4E-11
Ethylbenzene	1.3E-11
Chloroethane	1.1E-11
Trichlorofluoromethane (Freon 11)	1.1E-11
Bromochloromethane	1.1E-11
methyl tert-butyl ether	9.7E-12
HeptaCDF, 1,2,3,4,7,8,9-	9.2E-12
Benzo(g,h,i)perylene	9.1E-12
Propylene oxide	6.9E-12
Dichloroethylene-1,2 (trans)	5.5E-12
Dichlorodifluoromethane	5.4E-12
Dichloroethane 1,1-	5.3E-12
HeptaCDD, 1,2,3,4,6,7,8-	3.3E-12
Methyl methacrylate	1.7E-12
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	7.1E-13
Dioxane, 1,4-	6.3E-13
Dibenz(a,h)anthracene	2.8E-13
Acrylic Acid	6.4E-14
1-Hexane (n-hexane)	1.1E-14
2,5-Dimethylfuran	NC
2,5-Dione, 3-hexene	NC
2-Methyl octane	NC
3-Hexen-2-one	NC
3-Penten-2-one (ethylidene acetone)	NC
9-Octadecenamide (oleamide)	NC
Benzo(e)pyrene	NC
Benzoic acid, methyl ester (methyl benzoate)	NC
delta-BHC	NC
Diallate	NC
Endosulfan II	NC
Endosulfan sulfate	NC
Endrin aldehyde	NC
Endrin ketone	NC
Isopropyl toluene, p-	NC
Perylene	NC
Phosphine imide, P,P,P-triphenyl	NC
Total (b)	4.0E-02
R_2 resident	
Nitrogen dioxide	9.9E-03
Arsenic	7.0E-03
Chlorine	2.4E-03
Sulfur dioxide	1.9E-03
Hydrogen chloride	1.1E-03
Beryllium	2.6E-04
Cadmium	1.1E-04
Lead	2.2E-05
Nickel	1.7E-05
Copper	1.2E-05
Mercury	1.1E-05
Mercuric chloride	2.7E-06
Hexachlorobenzene	2.4E-06
Chlorophenyl-phenylether, 4-	2.1E-06

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Benzidine	1.5E-06
Dibromo-3-chloropropane, 1,2-	1.2E-06
Chloroform (Trichloromethane)	7.8E-07
Hexachlorocyclopentadiene	5.4E-07
Thallium (l)	3.2E-07
4,6-Dinitro-2-methylphenol	3.1E-07
Vanadium	1.7E-07
Manganese	1.6E-07
Pentachlorophenol	1.5E-07
Silver	9.6E-08
PentaCDF, 2,3,4,7,8-	9.5E-08
Tetrachloroethylene (Perchloroethylene)	8.0E-08
Nitrosodipropylamine, n-	6.9E-08
Barium	6.3E-08
Zinc	5.3E-08
Fluoranthene	4.7E-08
Chromium	4.1E-08
Chromium, hexavalent	4.1E-08
Aluminum	4.0E-08
Bromoform (tribromomethane)	3.9E-08
Antimony	3.7E-08
Benzoic Acid	3.2E-08
Dinitrotoluene, 2,4-	3.1E-08
Chlorobenzene	2.9E-08
Benzene	2.8E-08
Ethylhexyl phthalate, bis-2-	2.7E-08
Selenium	2.7E-08
Dibromochloromethane	2.6E-08
Dinitrotoluene, 2,6-	2.5E-08
Bromodichloromethane	1.9E-08
Methylene chloride	1.8E-08
Dinitrophenol, 2,4-	1.7E-08
Methyl bromide (Bromomethane)	1.7E-08
Nitrophenol, 4-	1.7E-08
Nitroaniline, 3-	1.7E-08
Chloronaphthalene,2-	1.6E-08
3-Penten-2-one, 4-methyl	1.3E-08
Dichlorobenzidine, 3,3'-	1.3E-08
Methylene bromide	1.2E-08
Pentachloronitrobenzene (PCNB)	9.9E-09
Dimethylphenol, 2,4-	7.3E-09
Acrylonitrile	7.1E-09
Chlorobenzilate	6.8E-09
Nitrophenol, 2-	6.3E-09
Carbazole	5.6E-09
Dinitrobenzene, 1,3-	5.1E-09
Carbon Tetrachloride	5.1E-09
Benzyl alcohol	5.0E-09
Methyl ethyl ketone (2-Butanone)	4.9E-09
Benzaldehyde	4.7E-09
Toluene	4.5E-09
Heptachlor	4.1E-09
Nitroaniline, 4-	3.7E-09
Benzonitrile	3.6E-09
Di-n-butyl phthalate	3.5E-09
Aniline	3.4E-09
TetraCDF, 2,3,7,8-	3.1E-09
Carbon Disulfide	2.9E-09
Phenol	2.8E-09
Heptachlor epoxide	2.3E-09
Endrin	2.3E-09
Phenanthrene	2.2E-09
Chlorophenol, 2-	2.0E-09
Cobalt	2.0E-09
Chloroaniline, p-	2.0E-09
Acetone	1.8E-09
HexaCDF, 1,2,3,6,7,8-	1.8E-09
Methyl chloride (Chloromethane)	1.7E-09
HexaCDF, 2,3,4,6,7,8-	1.7E-09
Trichlorobenzene, 1,2,3-	1.6E-09
Acetophenone	1.6E-09

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Bromophenyl-phenylether, 4-	1.6E-09
Chloro-3-methylphenol, 4-	1.5E-09
Hexachloro-1,3-butadiene (Perchlorobutadiene)	1.5E-09
Cresol, o-	1.5E-09
N-nitrosodimethylamine	1.3E-09
HexaCDF, 1,2,3,4,7,8-	1.1E-09
HexaCDD, 1,2,3,4,7,8-	1.0E-09
Butylbenzylphthalate	1.0E-09
Dichlorobenzene, 1,3-	1.0E-09
Diethyl phthalate	9.6E-10
Tetrachloroethane, 1,1,2,2-	9.4E-10
Vinyl Acetate	9.2E-10
PentaCDF, 1,2,3,7,8-	9.1E-10
Dichloropropene, 1,3- (cis)	8.6E-10
Bis(2-chloroethoxy) methane	7.9E-10
Trichlorophenol, 2,4,5-	7.7E-10
PentaCDD, 1,2,3,7,8-	7.5E-10
Nitrobenzene	7.5E-10
Nitroaniline, 2-	7.4E-10
Benzo(b)fluoranthene	7.0E-10
2,5-Dimethylheptane	6.8E-10
Naphthalene	6.8E-10
2-Hexanone	6.7E-10
Hexachloroethane (Perchloroethane)	6.6E-10
Cresol, m-	6.5E-10
Cresol, p-	6.5E-10
Dimethyl phthalate	6.4E-10
Endosulfan I	6.2E-10
Dichlorophenol, 2,4-	6.2E-10
Trichlorophenol, 2,4,6-	6.0E-10
Acenaphthylene	5.8E-10
Chlordane	5.7E-10
Pyridine	5.3E-10
BHC, beta-	5.3E-10
Dibenzofuran	5.0E-10
Diphenylamine	5.0E-10
Bromobenzene	4.8E-10
Aldrin	4.7E-10
Isophorone	4.5E-10
Tetrachlorobenzene, 1,2,4,5-	4.5E-10
Nitrosodiphenylamine, N-	4.5E-10
TetraCDD, 2,3,7,8-	4.4E-10
Pentachlorobenzene	4.2E-10
Di-n-octylphthalate	4.1E-10
Trichlorobenzene, 1,2,4-	3.8E-10
Xylene, m-	3.8E-10
Xylene, p-	3.8E-10
Diphenylhydrazine,1,2-	3.3E-10
Trichloropropane, 1,2,3-	3.0E-10
Butylbenzene, sec	2.8E-10
Chrysene	2.7E-10
1,1-Dichloropropene	2.5E-10
Xylene, o-	2.4E-10
Trichloroethane, 1,1,2-	2.3E-10
3-Ethyl benzaldehyde	2.3E-10
Aroclor 1254	2.2E-10
Dieldrin	2.2E-10
BHC, alpha-	2.0E-10
Styrene	2.0E-10
Iodomethane	1.9E-10
Bis(2-chlorethyl)ether	1.9E-10
2,2'-oxybis (1-Chloropropane)	1.8E-10
DDT, 4-4'-	1.7E-10
Benzo(a)Anthracene	1.5E-10
Benzo(k)fluoranthene	1.4E-10
OctaCDF, 1,2,3,4,6,7,8,9-	1.3E-10
4-Ethyl benzaldehyde	1.2E-10
gamma-BHC (Lindane)	1.1E-10
Methyl isobutyl ketone	1.1E-10
Indeno(1,2,3-cd) pyrene	1.1E-10
HexaCDD, 1,2,3,7,8,9-	1.0E-10

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Benzo(a)pyrene	9.5E-11
Ethylene dibromide	9.4E-11
HexaCDD, 1,2,3,6,7,8-	8.8E-11
Tetrahydrofuran	8.7E-11
1,3-Dichloropropane	7.2E-11
Butylbenzene, n-	6.9E-11
Dichloroethylene 1,1-	6.7E-11
2,2-Dichloropropane	6.6E-11
Butylbenzene, tert	6.6E-11
Tetrachloroethane, 1,1,1,2-	6.4E-11
DDD, 4,4'-	6.3E-11
Trichloroethane, 1,1,1-	5.8E-11
Trichloroethylene	5.4E-11
Vinyl Chloride	5.3E-11
Acenaphthene	4.9E-11
Pyrene	4.7E-11
Trimethylbenzene, 1,3,5-	4.6E-11
HeptaCDF, 1,2,3,4,6,7,8-	4.4E-11
2-Methylnaphthalene	4.1E-11
Dichlorobenzene, 1,2-	4.0E-11
Dichloroethane, 1,2- (Ethylene Dichloride)	3.6E-11
Anthracene	3.0E-11
Methoxychlor	2.6E-11
Dichlorobenzene,1,4-	2.4E-11
OctaCDD, 1,2,3,4,6,7,8,9-	2.3E-11
DDE, 4,4'-	2.1E-11
Cumene (Isopropylbenzene)	2.1E-11
2-Chlorotoluene	1.8E-11
4-Chlorotoluene	1.8E-11
Ethylene Glycol	1.8E-11
Fluorene	1.6E-11
Propylbenzene, n-	1.5E-11
1,2,4-Trimethylbenzene	1.3E-11
Dichloropropane, 1,2-	1.1E-11
Dichloroethylene, cis-1,2-	1.1E-11
HexaCDF, 1,2,3,7,8,9-	9.6E-12
Ethylbenzene	8.9E-12
Chloroethane	7.5E-12
Trichlorofluoromethane (Freon 11)	7.2E-12
Bromochloromethane	7.2E-12
methyl tert-butyl ether	6.5E-12
HeptaCDF, 1,2,3,4,7,8,9-	6.2E-12
Benzo(g,h,i)perylene	6.2E-12
Propylene oxide	4.6E-12
Dichloroethylene-1,2 (trans)	3.7E-12
Dichlorodifluoromethane	3.6E-12
Dichloroethane 1,1-	3.5E-12
HeptaCDD, 1,2,3,4,6,7,8-	2.3E-12
Methyl methacrylate	1.1E-12
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	4.7E-13
Dioxane, 1,4-	4.2E-13
Dibenz(a,h)anthracene	1.7E-13
Acrylic Acid	4.3E-14
1-Hexane (n-hexane)	7.6E-15
2,5-Dimethylfuran	NC
2,5-Dione, 3-hexene	NC
2-Methyl octane	NC
3-Hexen-2-one	NC
3-Penten-2-one (ethylidene acetone)	NC
9-Octadecenamide (oleamide)	NC
Benzo(e)pyrene	NC
Benzoic acid, methyl ester (methyl benzoate)	NC
delta-BHC	NC
Diallate	NC
Endosulfan II	NC
Endosulfan sulfate	NC
Endrin aldehyde	NC
Endrin ketone	NC
Isopropyl toluene, p-	NC
Perylene	NC
Phosphine imide, P,P,P-triphenyl	NC

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Total (b)	2.0E-02
R_3 resident farmer	
Nitrogen dioxide	9.4E-03
Arsenic	6.6E-03
Chlorine	2.3E-03
Sulfur dioxide	1.8E-03
Hydrogen chloride	1.0E-03
Beryllium	2.5E-04
Cadmium	1.0E-04
Lead	2.1E-05
Nickel	1.6E-05
Copper	1.2E-05
Mercury	1.0E-05
Mercuric chloride	2.5E-06
Hexachlorobenzene	2.2E-06
Chlorophenyl-phenylether, 4-	2.0E-06
Benzidine	1.5E-06
Dibromo-3-chloropropane, 1,2-	1.2E-06
Chloroform (Trichloromethane)	7.4E-07
Hexachlorocyclopentadiene	5.1E-07
Thallium (I)	3.1E-07
4,6-Dinitro-2-methylphenol	2.9E-07
Vanadium	1.6E-07
Manganese	1.5E-07
Pentachlorophenol	1.4E-07
PentaCDF, 2,3,4,7,8-	9.1E-08
Silver	9.1E-08
Tetrachloroethylene (Perchloroethylene)	7.5E-08
Nitrosodipropylamine, n-	6.5E-08
Barium	6.0E-08
Zinc	5.0E-08
Fluoranthene	4.4E-08
Chromium	3.9E-08
Chromium, hexavalent	3.9E-08
Aluminum	3.8E-08
Bromoform (tribromomethane)	3.7E-08
Antimony	3.5E-08
Benzoic Acid	3.0E-08
Dinitrotoluene, 2,4-	3.0E-08
Chlorobenzene	2.8E-08
Benzene	2.7E-08
Ethylhexyl phthalate, bis-2-	2.6E-08
Selenium	2.5E-08
Dibromochloromethane	2.4E-08
Dinitrotoluene, 2,6-	2.4E-08
Bromodichloromethane	1.8E-08
Methylene chloride	1.7E-08
Dinitrophenol, 2,4-	1.6E-08
Methyl bromide (Bromomethane)	1.6E-08
Nitrophenol, 4-	1.6E-08
Nitroaniline, 3-	1.6E-08
Chloronaphthalene,2-	1.5E-08
3-Penten-2-one, 4-methyl	1.2E-08
Dichlorobenzidine, 3,3'-	1.2E-08
Methylene bromide	1.1E-08
Pentachloronitrobenzene (PCNB)	9.3E-09
Dimethylphenol, 2,4-	6.9E-09
Acrylonitrile	6.7E-09
Chlorobenzilate	6.4E-09
Nitrophenol, 2-	5.9E-09
Carbazole	5.3E-09
Dinitrobenzene, 1,3-	4.8E-09
Carbon Tetrachloride	4.8E-09
Benzyl alcohol	4.7E-09
Methyl ethyl ketone (2-Butanone)	4.7E-09
Benzaldehyde	4.4E-09
Toluene	4.3E-09
Heptachlor	3.9E-09
Nitroaniline, 4-	3.5E-09

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Benzonitrile	3.3E-09
Di-n-butyl phthalate	3.3E-09
Aniline	3.2E-09
TetraCDF, 2,3,7,8-	2.9E-09
Carbon Disulfide	2.7E-09
Phenol	2.6E-09
Heptachlor epoxide	2.2E-09
Endrin	2.2E-09
Phenanthrene	2.0E-09
Cobalt	1.9E-09
Chlorophenol, 2-	1.9E-09
Chloroaniline, p-	1.9E-09
Acetone	1.7E-09
HexaCDF, 1,2,3,6,7,8-	1.7E-09
HexaCDF, 2,3,4,6,7,8-	1.6E-09
Methyl chloride (Chloromethane)	1.6E-09
Trichlorobenzene, 1,2,3-	1.5E-09
Acetophenone	1.5E-09
Bromophenyl-phenylether, 4-	1.5E-09
Chloro-3-methylphenol, 4-	1.5E-09
Hexachloro-1,3-butadiene (Perchlorobutadiene)	1.4E-09
Cresol, o-	1.4E-09
N-nitrosodimethylamine	1.2E-09
HexaCDF, 1,2,3,4,7,8-	1.1E-09
HexaCDD, 1,2,3,4,7,8-	1.0E-09
Butylbenzylphthalate	9.8E-10
Dichlorobenzene, 1,3-	9.5E-10
Diethyl phthalate	9.0E-10
Tetrachloroethane, 1,1,2,2-	8.9E-10
PentaCDF, 1,2,3,7,8-	8.7E-10
Vinyl Acetate	8.6E-10
Dichloropropene, 1,3- (cis)	8.1E-10
Bis(2-chloroethoxy) methane	7.5E-10
PentaCDD, 1,2,3,7,8-	7.2E-10
Trichlorophenol, 2,4,5-	7.2E-10
Nitrobenzene	7.0E-10
Nitroaniline, 2-	7.0E-10
Benzo(b)fluoranthene	6.6E-10
2,5-Dimethylheptane	6.4E-10
Naphthalene	6.4E-10
2-Hexanone	6.3E-10
Hexachloroethane (Perchloroethane)	6.2E-10
Cresol, m-	6.1E-10
Cresol, p-	6.1E-10
Dimethyl phthalate	6.0E-10
Endosulfan I	5.9E-10
Dichlorophenol, 2,4-	5.8E-10
Trichlorophenol, 2,4,6-	5.7E-10
Acenaphthylene	5.4E-10
Chlordane	5.4E-10
Pyridine	5.0E-10
BHC, beta-	5.0E-10
Dibenzofuran	4.7E-10
Diphenylamine	4.7E-10
Bromobenzene	4.5E-10
Aldrin	4.4E-10
Isophorone	4.3E-10
Tetrachlorobenzene, 1,2,4,5-	4.3E-10
Nitrosodiphenylamine, N-	4.2E-10
TetraCDD, 2,3,7,8-	4.1E-10
Pentachlorobenzene	4.0E-10
Di-n-octylphthalate	3.9E-10
Trichlorobenzene, 1,2,4-	3.6E-10
Xylene, m-	3.5E-10
Xylene, p-	3.5E-10
Diphenylhydrazine,1,2-	3.1E-10
Trichloropropane, 1,2,3-	2.8E-10
Butylbenzene, sec	2.6E-10
Chrysene	2.6E-10
1,1-Dichloropropene	2.3E-10
Xylene, o-	2.3E-10

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Trichloroethane, 1,1,2-	2.2E-10
3-Ethyl benzaldehyde	2.1E-10
Aroclor 1254	2.1E-10
Dieldrin	2.1E-10
BHC, alpha-	1.9E-10
Styrene	1.8E-10
Iodomethane	1.8E-10
Bis(2-chlorethyl)ether	1.8E-10
2,2'-oxybis (1-Chloropropane)	1.7E-10
DDT, 4-4'-	1.6E-10
Benzo(a)Anthracene	1.4E-10
Benzo(k)fluoranthene	1.4E-10
OctaCDF, 1,2,3,4,6,7,8,9-	1.2E-10
4-Ethyl benzaldehyde	1.2E-10
gamma-BHC (Lindane)	1.0E-10
Indeno(1,2,3-cd) pyrene	1.0E-10
Methyl isobutyl ketone	1.0E-10
HexaCDD, 1,2,3,7,8,9-	9.9E-11
Benzo(a)pyrene	9.0E-11
Ethylene dibromide	8.9E-11
HexaCDD, 1,2,3,6,7,8-	8.4E-11
Tetrahydrofuran	8.2E-11
1,3-Dichloropropane	6.7E-11
Butylbenzene, n-	6.5E-11
Dichloroethylene 1,1-	6.3E-11
2,2-Dichloropropane	6.2E-11
Butylbenzene, tert	6.2E-11
Tetrachloroethane, 1,1,1,2-	6.0E-11
DDD, 4,4'-	6.0E-11
Trichloroethane, 1,1,1-	5.5E-11
Trichloroethylene	5.1E-11
Vinyl Chloride	5.0E-11
Acenaphthene	4.6E-11
Pyrene	4.4E-11
Trimethylbenzene, 1,3,5-	4.4E-11
HeptaCDF, 1,2,3,4,6,7,8-	4.2E-11
2-Methylnaphthalene	3.9E-11
Dichlorobenzene, 1,2-	3.8E-11
Dichloroethane, 1,2- (Ethylene Dichloride)	3.4E-11
Anthracene	2.9E-11
Methoxychlor	2.5E-11
Dichlorobenzene,1,4-	2.2E-11
OctaCDD, 1,2,3,4,6,7,8,9-	2.2E-11
DDE, 4,4'-	2.0E-11
Cumene (Isopropylbenzene)	2.0E-11
2-Chlorotoluene	1.7E-11
4-Chlorotoluene	1.7E-11
Ethylene Glycol	1.7E-11
Fluorene	1.5E-11
Propylbenzene, n-	1.4E-11
1,2,4-Trimethylbenzene	1.2E-11
Dichloropropane, 1,2-	1.1E-11
Dichloroethylene, cis-1,2-	1.0E-11
HexaCDF, 1,2,3,7,8,9-	9.2E-12
Ethylbenzene	8.4E-12
Chloroethane	7.1E-12
Trichlorofluoromethane (Freon 11)	6.8E-12
Bromochloromethane	6.8E-12
methyl tert-butyl ether	6.1E-12
HeptaCDF, 1,2,3,4,7,8,9-	6.0E-12
Benzo(g,h,i)perylene	5.9E-12
Propylene oxide	4.3E-12
Dichloroethylene-1,2 (trans)	3.5E-12
Dichlorodifluoromethane	3.4E-12
Dichloroethane 1,1-	3.3E-12
HeptaCDD, 1,2,3,4,6,7,8-	2.2E-12
Methyl methacrylate	1.1E-12
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	4.5E-13
Dioxane, 1,4-	4.0E-13
Dibenz(a,h)anthracene	1.6E-13
Acrylic Acid	4.0E-14

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
1-Hexane (n-hexane)	7.1E-15
2,5-Dimethylfuran	NC
2,5-Dione, 3-hexene	NC
2-Methyl octane	NC
3-Hexen-2-one	NC
3-Penten-2-one (ethylidene acetone)	NC
9-Octadecenamide (oleamide)	NC
Benzo(e)pyrene	NC
Benzoic acid, methyl ester (methyl benzoate)	NC
delta-BHC	NC
Diallate	NC
Endosulfan II	NC
Endosulfan sulfate	NC
Endrin aldehyde	NC
Endrin ketone	NC
Isopropyl toluene, p-	NC
Perylene	NC
Phosphine imide, P,P,P-triphenyl	NC
Total (b)	2.0E-02
R_4 resident farmer	
Nitrogen dioxide	1.5E-02
Arsenic	1.1E-02
Chlorine	3.7E-03
Sulfur dioxide	2.9E-03
Hydrogen chloride	1.7E-03
Beryllium	4.2E-04
Cadmium	1.7E-04
Lead	3.5E-05
Nickel	2.8E-05
Copper	2.0E-05
Mercury	1.6E-05
Mercuric chloride	4.1E-06
Hexachlorobenzene	3.6E-06
Chlorophenyl-phenylether, 4-	3.2E-06
Benzidine	2.4E-06
Dibromo-3-chloropropane, 1,2-	1.9E-06
Chloroform (Trichloromethane)	1.2E-06
Hexachlorocyclopentadiene	8.2E-07
Thallium (I)	5.2E-07
4,6-Dinitro-2-methylphenol	4.8E-07
Vanadium	2.7E-07
Manganese	2.6E-07
Pentachlorophenol	2.3E-07
Silver	1.5E-07
PentaCDF, 2,3,4,7,8-	1.5E-07
Tetrachloroethylene (Perchloroethylene)	1.2E-07
Nitrosodipropylamine, n-	1.0E-07
Barium	1.0E-07
Zinc	8.4E-08
Fluoranthene	7.1E-08
Chromium	6.5E-08
Chromium, hexavalent	6.5E-08
Aluminum	6.4E-08
Bromoform (tribromomethane)	6.0E-08
Antimony	5.7E-08
Benzoic Acid	4.9E-08
Dinitrotoluene, 2,4-	4.8E-08
Chlorobenzene	4.5E-08
Ethylhexyl phthalate, bis-2-	4.4E-08
Benzene	4.3E-08
Selenium	4.3E-08
Dibromochloromethane	3.9E-08
Dinitrotoluene, 2,6-	3.9E-08
Bromodichloromethane	3.0E-08
Methylene chloride	2.7E-08
Dinitrophenol, 2,4-	2.7E-08
Methyl bromide (Bromomethane)	2.6E-08
Nitrophenol, 4-	2.5E-08
Nitroaniline, 3-	2.5E-08

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Chloronaphthalene,2-	2.4E-08
3-Penten-2-one, 4-methyl	2.0E-08
Dichlorobenzidine, 3,3'-	2.0E-08
Methylene bromide	1.9E-08
Pentachloronitrobenzene (PCNB)	1.5E-08
Dimethylphenol, 2,4-	1.1E-08
Acrylonitrile	1.1E-08
Chlorobenzilate	1.1E-08
Nitrophenol, 2-	9.6E-09
Carbazole	8.6E-09
Dinitrobenzene, 1,3-	7.8E-09
Carbon Tetrachloride	7.8E-09
Benzyl alcohol	7.6E-09
Methyl ethyl ketone (2-Butanone)	7.6E-09
Benzaldehyde	7.1E-09
Toluene	7.0E-09
Heptachlor	6.3E-09
Nitroaniline, 4-	5.7E-09
Benzonitrile	5.4E-09
Di-n-butyl phthalate	5.4E-09
Aniline	5.1E-09
TetraCDF, 2,3,7,8-	4.8E-09
Carbon Disulfide	4.4E-09
Phenol	4.3E-09
Endrin	3.6E-09
Heptachlor epoxide	3.6E-09
Phenanthrene	3.3E-09
Cobalt	3.2E-09
Chlorophenol, 2-	3.1E-09
Chloroaniline, p-	3.0E-09
HexaCDF, 1,2,3,6,7,8-	2.9E-09
Acetone	2.8E-09
HexaCDF, 2,3,4,6,7,8-	2.7E-09
Methyl chloride (Chloromethane)	2.6E-09
Trichlorobenzene, 1,2,3-	2.5E-09
Acetophenone	2.5E-09
Bromophenyl-phenylether, 4-	2.4E-09
Chloro-3-methylphenol, 4-	2.4E-09
Hexachloro-1,3-butadiene (Perchlorobutadiene)	2.3E-09
Cresol, o-	2.3E-09
N-nitrosodimethylamine	2.0E-09
HexaCDF, 1,2,3,4,7,8-	1.8E-09
HexaCDD, 1,2,3,4,7,8-	1.7E-09
Butylbenzylphthalate	1.6E-09
Dichlorobenzene, 1,3-	1.5E-09
Diethyl phthalate	1.5E-09
PentaCDF, 1,2,3,7,8-	1.5E-09
Tetrachloroethane, 1,1,2,2-	1.4E-09
Vinyl Acetate	1.4E-09
Dichloropropene, 1,3- (cis)	1.3E-09
PentaCDD, 1,2,3,7,8-	1.2E-09
Bis(2-chloroethoxy) methane	1.2E-09
Trichlorophenol, 2,4,5-	1.2E-09
Nitrobenzene	1.1E-09
Nitroaniline, 2-	1.1E-09
Benzo(b)fluoranthene	1.1E-09
2,5-Dimethylheptane	1.0E-09
Naphthalene	1.0E-09
2-Hexanone	1.0E-09
Hexachloroethane (Perchloroethane)	1.0E-09
Cresol, m-	1.0E-09
Cresol, p-	1.0E-09
Dimethyl phthalate	9.8E-10
Endosulfan I	9.5E-10
Dichlorophenol, 2,4-	9.4E-10
Trichlorophenol, 2,4,6-	9.2E-10
Acenaphthylene	8.8E-10
Chlordane	8.7E-10
Pyridine	8.1E-10
BHC, beta-	8.0E-10
Dibenzofuran	7.7E-10

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Diphenylamine	7.6E-10
Bromobenzene	7.3E-10
Aldrin	7.1E-10
Isophorone	6.9E-10
Tetrachlorobenzene, 1,2,4,5-	6.9E-10
Nitrosodiphenylamine, N-	6.9E-10
TetraCDD, 2,3,7,8-	6.8E-10
Pentachlorobenzene	6.4E-10
Di-n-octylphthalate	6.4E-10
Trichlorobenzene, 1,2,4-	5.8E-10
Xylene, m-	5.7E-10
Xylene, p-	5.7E-10
Diphenylhydrazine,1,2-	5.1E-10
Trichloropropane, 1,2,3-	4.5E-10
Butylbenzene, sec	4.3E-10
Chrysene	4.2E-10
1,1-Dichloropropene	3.7E-10
Xylene, o-	3.7E-10
Trichloroethane, 1,1,2-	3.5E-10
3-Ethyl benzaldehyde	3.5E-10
Aroclor 1254	3.4E-10
Dieldrin	3.4E-10
BHC, alpha-	3.1E-10
Styrene	3.0E-10
Iodomethane	3.0E-10
Bis(2-chlorethyl)ether	3.0E-10
2,2'-oxybis (1-Chloropropane)	2.8E-10
DDT, 4-4'-	2.6E-10
Benzo(a)Anthracene	2.3E-10
Benzo(k)fluoranthene	2.3E-10
OctaCDF, 1,2,3,4,6,7,8,9-	2.1E-10
4-Ethyl benzaldehyde	1.9E-10
Indeno(1,2,3-cd) pyrene	1.7E-10
gamma-BHC (Lindane)	1.7E-10
HexaCDD, 1,2,3,7,8,9-	1.7E-10
Methyl isobutyl ketone	1.6E-10
Benzo(a)pyrene	1.5E-10
Ethylene dibromide	1.4E-10
HexaCDD, 1,2,3,6,7,8-	1.4E-10
Tetrahydrofuran	1.3E-10
1,3-Dichloropropane	1.1E-10
Butylbenzene, n-	1.1E-10
Dichloroethylene 1,1-	1.0E-10
2,2-Dichloropropane	1.0E-10
Butylbenzene, tert	1.0E-10
Tetrachloroethane, 1,1,1,2-	9.7E-11
DDD, 4,4'-	9.7E-11
Trichloroethane, 1,1,1-	8.9E-11
Trichloroethylene	8.2E-11
Vinyl Chloride	8.2E-11
Acenaphthene	7.5E-11
Pyrene	7.2E-11
HeptaCDF, 1,2,3,4,6,7,8-	7.1E-11
Trimethylbenzene, 1,3,5-	7.1E-11
2-Methylnaphthalene	6.3E-11
Dichlorobenzene, 1,2-	6.1E-11
Dichloroethane, 1,2- (Ethylene Dichloride)	5.5E-11
Anthracene	4.7E-11
Methoxychlor	4.0E-11
OctaCDD, 1,2,3,4,6,7,8,9-	3.8E-11
Dichlorobenzene,1,4-	3.6E-11
DDE, 4,4'-	3.3E-11
Cumene (Isopropylbenzene)	3.2E-11
2-Chlorotoluene	2.8E-11
4-Chlorotoluene	2.8E-11
Ethylene Glycol	2.7E-11
Fluorene	2.4E-11
Propylbenzene, n-	2.3E-11
1,2,4-Trimethylbenzene	2.0E-11
Dichloropropane, 1,2-	1.7E-11
Dichloroethylene, cis-1,2-	1.6E-11

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
HexaCDF, 1,2,3,7,8,9-	1.5E-11
Ethylbenzene	1.4E-11
Chloroethane	1.2E-11
Trichlorofluoromethane (Freon 11)	1.1E-11
Bromochloromethane	1.1E-11
HeptaCDF, 1,2,3,4,7,8,9-	1.0E-11
Benzo(g,h,i)perylene	1.0E-11
methyl tert-butyl ether	9.9E-12
Propylene oxide	7.0E-12
Dichloroethylene-1,2 (trans)	5.7E-12
Dichlorodifluoromethane	5.6E-12
Dichloroethane 1,1-	5.4E-12
HeptaCDD, 1,2,3,4,6,7,8-	3.7E-12
Methyl methacrylate	1.7E-12
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	7.3E-13
Dioxane, 1,4-	6.5E-13
Dibenz(a,h)anthracene	2.6E-13
Acrylic Acid	6.5E-14
1-Hexane (n-hexane)	1.2E-14
2,5-Dimethylfuran	NC
2,5-Dione, 3-hexene	NC
2-Methyl octane	NC
3-Hexen-2-one	NC
3-Penten-2-one (ethylidene acetone)	NC
9-Octadecenamide (oleamide)	NC
Benzo(e)pyrene	NC
Benzoic acid, methyl ester (methyl benzoate)	NC
delta-BHC	NC
Diallate	NC
Endosulfan II	NC
Endosulfan sulfate	NC
Endrin aldehyde	NC
Endrin ketone	NC
Isopropyl toluene, p-	NC
Perylene	NC
Phosphine imide, P,P,P-triphenyl	NC
Total (b)	4.0E-02

NC = Not calculated.

(a) Acute hazard quotients were calculated for all compounds with stack air emission rates and acute inhalation toxicity criteria.

(b) The total is based on the sum of all chemical-specific hazard quotients regardless of the type of health effects of the summed compounds. A total value summed across all compounds is used as a screening tool only, to determine if additional evaluation for specific types of health effects is warranted (i.e., if the total value is greater than 1).

APPENDIX G

STACK EMISSIONS RISK ASSESSMENT: CHRONIC MULTIPLE PATHWAY RISK RESULTS BY PATHWAY AND RECEPTOR

Appendix G

Stack Emissions Risk Assessment:
Chronic Multipathway Risk Results by Pathway and Receptor

Group 1: All Detected Compounds

Stack Emissions Risk Assessment
Chronic Multipathway Risk Results by Pathway and Receptor
Group 1: All Detected Compounds (a)
(IRAP Software Output Information)

Receptor	Scenario	Pathway (b)	Total Excess Lifetime Cancer Risk	Total Non-Cancer Hazard Index
R_1 resident	resident_adult	air_crisk_inhale	1.9E-08	1.1E-02
R_1 resident	resident_adult	intake_crisk_ag	5.2E-09	1.4E-04
R_1 resident	resident_adult	intake_crisk_soil	9.4E-11	1.4E-06
		Total	2E-08	1E-02
R_1 resident	resident_child	air_crisk_inhale	3.8E-09	1.1E-02
R_1 resident	resident_child	intake_crisk_ag	2.5E-09	3.3E-04
R_1 resident	resident_child	intake_crisk_soil	1.8E-10	1.3E-05
		Total	7E-09	1E-02
R_2 resident	resident_adult	air_crisk_inhale	6.4E-08	4.8E-02
R_2 resident	resident_adult	intake_crisk_ag	1.1E-08	3.1E-04
R_2 resident	resident_adult	intake_crisk_soil	2.6E-10	4.9E-06
		Total	8E-08	5E-02
R_2 resident	resident_child	air_crisk_inhale	1.3E-08	4.8E-02
R_2 resident	resident_child	intake_crisk_ag	5.5E-09	7.4E-04
R_2 resident	resident_child	intake_crisk_soil	4.8E-10	4.6E-05
		Total	2E-08	5E-02
R_3 resident farmer	farmer_adult	air_crisk_inhale	2.5E-08	1.5E-02
R_3 resident farmer	farmer_adult	intake_crisk_ag	2.6E-09	4.2E-05
R_3 resident farmer	farmer_adult	intake_crisk_beef	2.4E-08	3.3E-06
R_3 resident farmer	farmer_adult	intake_crisk_chick	2.7E-12	6.2E-09
R_3 resident farmer	farmer_adult	intake_crisk_eggs	1.7E-12	5.4E-09
R_3 resident farmer	farmer_adult	intake_crisk_pork	6.0E-11	1.9E-09
R_3 resident farmer	farmer_adult	intake_crisk_soil	6.5E-11	2.9E-07
		Total	5E-08	1E-02
R_3 resident farmer	farmer_child	air_crisk_inhale	3.8E-09	1.5E-02
R_3 resident farmer	farmer_child	intake_crisk_ag	9.3E-10	1.0E-04
R_3 resident farmer	farmer_child	intake_crisk_beef	2.2E-09	2.1E-06
R_3 resident farmer	farmer_child	intake_crisk_chick	2.5E-13	4.2E-09
R_3 resident farmer	farmer_child	intake_crisk_eggs	1.6E-13	3.9E-09
R_3 resident farmer	farmer_child	intake_crisk_pork	6.1E-12	1.4E-09
R_3 resident farmer	farmer_child	intake_crisk_soil	8.1E-11	2.7E-06
		Total	7E-09	1E-02
R_4 resident farmer	farmer_adult	air_crisk_inhale	2.3E-08	1.2E-02
R_4 resident farmer	farmer_adult	intake_crisk_ag	2.9E-09	5.0E-05
R_4 resident farmer	farmer_adult	intake_crisk_beef	2.1E-08	3.9E-06
R_4 resident farmer	farmer_adult	intake_crisk_chick	2.5E-12	5.7E-09
R_4 resident farmer	farmer_adult	intake_crisk_eggs	1.6E-12	4.6E-09
R_4 resident farmer	farmer_adult	intake_crisk_pork	5.5E-11	1.6E-09
R_4 resident farmer	farmer_adult	intake_crisk_soil	6.1E-11	2.8E-07
		Total	5E-08	1E-02
R_4 resident farmer	farmer_child	air_crisk_inhale	3.4E-09	1.2E-02
R_4 resident farmer	farmer_child	intake_crisk_ag	1.0E-09	1.2E-04
R_4 resident farmer	farmer_child	intake_crisk_beef	1.9E-09	2.4E-06
R_4 resident farmer	farmer_child	intake_crisk_chick	2.3E-13	3.9E-09
R_4 resident farmer	farmer_child	intake_crisk_eggs	1.5E-13	3.3E-09
R_4 resident farmer	farmer_child	intake_crisk_pork	5.6E-12	1.2E-09
R_4 resident farmer	farmer_child	intake_crisk_soil	7.6E-11	2.6E-06
		Total	6E-09	1E-02
R_only fish_drain	fisher_adult	intake_crisk_fish	3.7E-08	1.4E-02
		Total	4E-08	1E-02

Stack Emissions Risk Assessment
Chronic Multipathway Risk Results by Pathway and Receptor
Group 1: All Detected Compounds (a)
(IRAP Software Output Information)

Receptor	Scenario	Pathway (b)	Total Excess Lifetime Cancer Risk	Total Non-Cancer Hazard Index
R_only fish_drain	fisher_child	intake_crisk_fish	5.2E-09	1.0E-02
		Total	5E-09	1E-02
R_only fish_river	fisher_adult	intake_crisk_fish	2.9E-08	3.8E-03
		Total	3E-08	4E-03
R_only fish_river	fisher_child	intake_crisk_fish	4.1E-09	2.7E-03
		Total	4E-09	3E-03
Farmer area	farmer_adult	air_crisk_inhale	1.0E-08	5.8E-03
Farmer area	farmer_adult	intake_crisk_ag	6.9E-10	1.0E-05
Farmer area	farmer_adult	intake_crisk_beef	9.4E-09	8.0E-07
Farmer area	farmer_adult	intake_crisk_chick	9.7E-13	2.2E-09
Farmer area	farmer_adult	intake_crisk_eggs	6.2E-13	2.1E-09
Farmer area	farmer_adult	intake_crisk_pork	2.2E-11	7.4E-10
Farmer area	farmer_adult	intake_crisk_soil	2.3E-11	9.9E-08
		Total	2E-08	6E-03
Farmer area	farmer_child	air_crisk_inhale	1.6E-09	5.8E-03
Farmer area	farmer_child	intake_crisk_ag	2.5E-10	2.4E-05
Farmer area	farmer_child	intake_crisk_beef	8.7E-10	4.9E-07
Farmer area	farmer_child	intake_crisk_chick	8.9E-14	1.5E-09
Farmer area	farmer_child	intake_crisk_eggs	5.9E-14	1.5E-09
Farmer area	farmer_child	intake_crisk_pork	2.2E-12	5.6E-10
Farmer area	farmer_child	intake_crisk_soil	2.9E-11	9.2E-07
		Total	3E-09	6E-03
Town area	resident_adult	air_crisk_inhale	1.3E-08	1.1E-02
Town area	resident_adult	intake_crisk_ag	8.9E-10	2.7E-05
Town area	resident_adult	intake_crisk_soil	3.8E-11	9.7E-07
		Total	1E-08	1E-02
Town area	resident_child	air_crisk_inhale	2.6E-09	1.1E-02
Town area	resident_child	intake_crisk_ag	4.3E-10	6.6E-05
Town area	resident_child	intake_crisk_soil	7.1E-11	9.1E-06
		Total	3E-09	1E-02

(a) Group 1 includes 95 compounds that were detected in the Performance Demonstration Test (PDT) in addition to several compounds that were not measured during the PDT but which were evaluated based on emission rates derived from feed rates.

(b) Exposure pathway definitions:

IRAP Term	Exposure pathway
air_crisk_inhale	= inhalation of air
intake_crisk_ag	= ingestion of produce
intake_crisk_beef	= ingestion of beef
intake_crisk_chick	= ingestion of chicken
intake_crisk_eggs	= ingestion of eggs
intake_crisk_pork	= ingestion of pork
intake_crisk_soil	= incidental ingestion of soil
intake_crisk_fish	= ingestion of fish

Appendix G

Stack Emissions Risk Assessment: Chronic Multipathway Risk Results by Pathway and Receptor

Group 2: All Compounds (except benzidine)

Stack Emissions Risk Assessment
Chronic Multipathway Risk Results by Pathway and Receptor
Group 2: All Compounds (except benzidine) (a)
(IRAP Software Output Information)

Receptor	Scenario	Pathway (b)	Total Excess Lifetime Cancer Risk	Total Non-Cancer Hazard Index
R_1 resident	resident_adult	air_crisk_inhale	4.4E-08	1.2E-02
R_1 resident	resident_adult	intake_crisk_ag	1.3E-08	1.8E-04
R_1 resident	resident_adult	intake_crisk_soil	9.5E-11	1.5E-06
		Total	6E-08	1E-02
R_1 resident	resident_child	air_crisk_inhale	8.8E-09	1.2E-02
R_1 resident	resident_child	intake_crisk_ag	6.4E-09	4.3E-04
R_1 resident	resident_child	intake_crisk_soil	1.8E-10	1.4E-05
		Total	2E-08	1E-02
R_2 resident	resident_adult	air_crisk_inhale	1.4E-07	5.1E-02
R_2 resident	resident_adult	intake_crisk_ag	3.2E-08	4.1E-04
R_2 resident	resident_adult	intake_crisk_soil	2.6E-10	5.0E-06
		Total	2E-07	5E-02
R_2 resident	resident_child	air_crisk_inhale	2.9E-08	5.1E-02
R_2 resident	resident_child	intake_crisk_ag	1.5E-08	9.8E-04
R_2 resident	resident_child	intake_crisk_soil	4.9E-10	4.7E-05
		Total	4E-08	5E-02
R_3 resident farmer	farmer_adult	air_crisk_inhale	5.6E-08	1.5E-02
R_3 resident farmer	farmer_adult	intake_crisk_ag	6.1E-09	6.1E-05
R_3 resident farmer	farmer_adult	intake_crisk_beef	2.6E-08	9.8E-06
R_3 resident farmer	farmer_adult	intake_crisk_chick	2.7E-12	6.3E-09
R_3 resident farmer	farmer_adult	intake_crisk_eggs	1.7E-12	5.5E-09
R_3 resident farmer	farmer_adult	intake_crisk_pork	6.1E-11	4.3E-09
R_3 resident farmer	farmer_adult	intake_crisk_soil	6.5E-11	3.1E-07
		Total	9E-08	2E-02
R_3 resident farmer	farmer_child	air_crisk_inhale	8.5E-09	1.5E-02
R_3 resident farmer	farmer_child	intake_crisk_ag	2.2E-09	1.4E-04
R_3 resident farmer	farmer_child	intake_crisk_beef	2.4E-09	6.0E-06
R_3 resident farmer	farmer_child	intake_crisk_chick	2.5E-13	4.3E-09
R_3 resident farmer	farmer_child	intake_crisk_eggs	1.6E-13	3.9E-09
R_3 resident farmer	farmer_child	intake_crisk_pork	6.2E-12	3.3E-09
R_3 resident farmer	farmer_child	intake_crisk_soil	8.2E-11	2.9E-06
		Total	1E-08	2E-02
R_4 resident farmer	farmer_adult	air_crisk_inhale	5.0E-08	1.3E-02
R_4 resident farmer	farmer_adult	intake_crisk_ag	6.9E-09	7.0E-05
R_4 resident farmer	farmer_adult	intake_crisk_beef	2.3E-08	1.2E-05
R_4 resident farmer	farmer_adult	intake_crisk_chick	2.5E-12	5.8E-09
R_4 resident farmer	farmer_adult	intake_crisk_eggs	1.6E-12	4.7E-09
R_4 resident farmer	farmer_adult	intake_crisk_pork	5.6E-11	3.7E-09
R_4 resident farmer	farmer_adult	intake_crisk_soil	6.1E-11	3.0E-07
		Total	8E-08	1E-02
R_4 resident farmer	farmer_child	air_crisk_inhale	7.6E-09	1.3E-02
R_4 resident farmer	farmer_child	intake_crisk_ag	2.5E-09	1.6E-04
R_4 resident farmer	farmer_child	intake_crisk_beef	2.1E-09	7.2E-06
R_4 resident farmer	farmer_child	intake_crisk_chick	2.4E-13	4.0E-09
R_4 resident farmer	farmer_child	intake_crisk_eggs	1.5E-13	3.4E-09
R_4 resident farmer	farmer_child	intake_crisk_pork	5.7E-12	2.8E-09
R_4 resident farmer	farmer_child	intake_crisk_soil	7.7E-11	2.8E-06
		Total	1E-08	1E-02
R_only fish_drain	fisher_adult	intake_crisk_fish	3.9E-08	1.4E-02
		Total	4E-08	1E-02

Stack Emissions Risk Assessment
Chronic Multipathway Risk Results by Pathway and Receptor
Group 2: All Compounds (except benzidine) (a)
(IRAP Software Output Information)

Receptor	Scenario	Pathway (b)	Total Excess Lifetime Cancer Risk	Total Non-Cancer Hazard Index
R_only fish_drain	fisher_child	intake_crisk_fish	5.6E-09	1.0E-02
		Total	6E-09	1E-02
R_only fish_river	fisher_adult	intake_crisk_fish	3.0E-08	3.8E-03
		Total	3E-08	4E-03
R_only fish_river	fisher_child	intake_crisk_fish	4.3E-09	2.7E-03
		Total	4E-09	3E-03
Farmer area	farmer_adult	air_crisk_inhale	2.3E-08	6.1E-03
Farmer area	farmer_adult	intake_crisk_ag	1.6E-09	1.6E-05
Farmer area	farmer_adult	intake_crisk_beef	9.8E-09	2.3E-06
Farmer area	farmer_adult	intake_crisk_chick	9.8E-13	2.2E-09
Farmer area	farmer_adult	intake_crisk_eggs	6.2E-13	2.2E-09
Farmer area	farmer_adult	intake_crisk_pork	2.2E-11	1.7E-09
Farmer area	farmer_adult	intake_crisk_soil	2.3E-11	1.0E-07
		Total	3E-08	6E-03
Farmer area	farmer_child	air_crisk_inhale	3.4E-09	6.1E-03
Farmer area	farmer_child	intake_crisk_ag	5.9E-10	3.6E-05
Farmer area	farmer_child	intake_crisk_beef	9.0E-10	1.4E-06
Farmer area	farmer_child	intake_crisk_chick	9.0E-14	1.5E-09
Farmer area	farmer_child	intake_crisk_eggs	6.0E-14	1.5E-09
Farmer area	farmer_child	intake_crisk_pork	2.2E-12	1.3E-09
Farmer area	farmer_child	intake_crisk_soil	2.9E-11	9.6E-07
		Total	5E-09	6E-03
Town area	resident_adult	air_crisk_inhale	2.9E-08	1.2E-02
Town area	resident_adult	intake_crisk_ag	3.4E-09	3.8E-05
Town area	resident_adult	intake_crisk_soil	3.9E-11	9.8E-07
		Total	3E-08	1E-02
Town area	resident_child	air_crisk_inhale	5.8E-09	1.2E-02
Town area	resident_child	intake_crisk_ag	1.5E-09	8.7E-05
Town area	resident_child	intake_crisk_soil	7.3E-11	9.2E-06
		Total	7E-09	1E-02

(a) Group 2 includes over 170 compounds, of which 82 were not detected in the Performance Demonstration Test (PDT). This group does not include benzidine which was not detected in the PDT.

(b) Exposure pathway definitions:

IRAP Term	Exposure pathway
air_crisk_inhale	= inhalation of air
intake_crisk_ag	= ingestion of produce
intake_crisk_beef	= ingestion of beef
intake_crisk_chick	= ingestion of chicken
intake_crisk_eggs	= ingestion of eggs
intake_crisk_pork	= ingestion of pork
intake_crisk_soil	= incidental ingestion of soil
intake_crisk_fish	= ingestion of fish

Appendix G

Stack Emissions Risk Assessment: Chronic Multipathway Risk Results by Pathway and Receptor

Group 3: All Compounds

Stack Emissions Risk Assessment
Chronic Multipathway Risk Results by Pathway and Receptor
Group 3: All Compounds (a)
(IRAP Software Output Information)

Receptor	Scenario	Pathway (b)	Total Excess Lifetime Cancer Risk	Total Non-Cancer Hazard Index
R_1 resident	resident_adult	air_crisk_inhale	1.3E-07	1.2E-02
R_1 resident	resident_adult	intake_crisk_ag	5.9E-07	1.8E-04
R_1 resident	resident_adult	intake_crisk_soil	9.9E-10	1.5E-06
		Total	7E-07	1E-02
R_1 resident	resident_child	air_crisk_inhale	2.5E-08	1.2E-02
R_1 resident	resident_child	intake_crisk_ag	2.8E-07	4.4E-04
R_1 resident	resident_child	intake_crisk_soil	1.8E-09	1.4E-05
		Total	3E-07	1E-02
R_2 resident	resident_adult	air_crisk_inhale	5.0E-07	5.1E-02
R_2 resident	resident_adult	intake_crisk_ag	1.6E-06	4.2E-04
R_2 resident	resident_adult	intake_crisk_soil	2.6E-09	5.1E-06
		Total	2E-06	5E-02
R_2 resident	resident_child	air_crisk_inhale	1.0E-07	5.1E-02
R_2 resident	resident_child	intake_crisk_ag	7.9E-07	1.0E-03
R_2 resident	resident_child	intake_crisk_soil	4.9E-09	4.7E-05
		Total	9E-07	5E-02
R_3 resident farmer	farmer_adult	air_crisk_inhale	2.1E-07	1.5E-02
R_3 resident farmer	farmer_adult	intake_crisk_ag	2.8E-07	6.2E-05
R_3 resident farmer	farmer_adult	intake_crisk_beef	4.0E-08	9.8E-06
R_3 resident farmer	farmer_adult	intake_crisk_chick	3.2E-12	6.3E-09
R_3 resident farmer	farmer_adult	intake_crisk_eggs	2.0E-12	5.5E-09
R_3 resident farmer	farmer_adult	intake_crisk_pork	7.1E-11	4.4E-09
R_3 resident farmer	farmer_adult	intake_crisk_soil	2.3E-10	3.1E-07
		Total	5E-07	2E-02
R_3 resident farmer	farmer_child	air_crisk_inhale	3.1E-08	1.5E-02
R_3 resident farmer	farmer_child	intake_crisk_ag	1.1E-07	1.4E-04
R_3 resident farmer	farmer_child	intake_crisk_beef	3.8E-09	6.0E-06
R_3 resident farmer	farmer_child	intake_crisk_chick	3.1E-13	4.3E-09
R_3 resident farmer	farmer_child	intake_crisk_eggs	2.0E-13	3.9E-09
R_3 resident farmer	farmer_child	intake_crisk_pork	7.6E-12	3.3E-09
R_3 resident farmer	farmer_child	intake_crisk_soil	3.6E-10	2.9E-06
		Total	1E-07	2E-02
R_4 resident farmer	farmer_adult	air_crisk_inhale	1.8E-07	1.3E-02
R_4 resident farmer	farmer_adult	intake_crisk_ag	2.5E-07	7.1E-05
R_4 resident farmer	farmer_adult	intake_crisk_beef	3.7E-08	1.2E-05
R_4 resident farmer	farmer_adult	intake_crisk_chick	2.9E-12	5.8E-09
R_4 resident farmer	farmer_adult	intake_crisk_eggs	1.8E-12	4.7E-09
R_4 resident farmer	farmer_adult	intake_crisk_pork	6.5E-11	3.7E-09
R_4 resident farmer	farmer_adult	intake_crisk_soil	2.2E-10	3.0E-07
		Total	5E-07	1E-02
R_4 resident farmer	farmer_child	air_crisk_inhale	2.7E-08	1.3E-02
R_4 resident farmer	farmer_child	intake_crisk_ag	9.9E-08	1.7E-04
R_4 resident farmer	farmer_child	intake_crisk_beef	3.4E-09	7.2E-06
R_4 resident farmer	farmer_child	intake_crisk_chick	2.9E-13	4.0E-09
R_4 resident farmer	farmer_child	intake_crisk_eggs	1.9E-13	3.4E-09
R_4 resident farmer	farmer_child	intake_crisk_pork	7.0E-12	2.9E-09
R_4 resident farmer	farmer_child	intake_crisk_soil	3.5E-10	2.8E-06
		Total	1E-07	1E-02
R_only fish_drain	fisher_adult	intake_crisk_fish	4.4E-08	1.4E-02
		Total	4E-08	1E-02

Stack Emissions Risk Assessment
Chronic Multipathway Risk Results by Pathway and Receptor
Group 3: All Compounds (a)
(IRAP Software Output Information)

Receptor	**Scenario**	**Pathway (b)**	**Total Excess Lifetime Cancer Risk**	**Total Non-Cancer Hazard Index**
R_only fish_drain	fisher_child	intake_crisk_fish	6.2E-09	1.0E-02
		Total	6E-09	1E-02
R_only fish_river	fisher_adult	intake_crisk_fish	3.9E-08	3.8E-03
		Total	4E-08	4E-03
R_only fish_river	fisher_child	intake_crisk_fish	5.4E-09	2.7E-03
		Total	5E-09	3E-03
Farmer area	farmer_adult	air_crisk_inhale	9.0E-08	6.1E-03
Farmer area	farmer_adult	intake_crisk_ag	1.0E-07	1.6E-05
Farmer area	farmer_adult	intake_crisk_beef	1.5E-08	2.3E-06
Farmer area	farmer_adult	intake_crisk_chick	1.1E-12	2.2E-09
Farmer area	farmer_adult	intake_crisk_eggs	7.2E-13	2.2E-09
Farmer area	farmer_adult	intake_crisk_pork	2.5E-11	1.7E-09
Farmer area	farmer_adult	intake_crisk_soil	7.9E-11	1.0E-07
		Total	2E-07	6E-03
Farmer area	farmer_child	air_crisk_inhale	1.3E-08	6.1E-03
Farmer area	farmer_child	intake_crisk_ag	4.0E-08	3.6E-05
Farmer area	farmer_child	intake_crisk_beef	1.4E-09	1.4E-06
Farmer area	farmer_child	intake_crisk_chick	1.1E-13	1.5E-09
Farmer area	farmer_child	intake_crisk_eggs	7.3E-14	1.5E-09
Farmer area	farmer_child	intake_crisk_pork	2.7E-12	1.3E-09
Farmer area	farmer_child	intake_crisk_soil	1.3E-10	9.6E-07
		Total	6E-08	6E-03
Town area	resident_adult	air_crisk_inhale	1.2E-07	1.2E-02
Town area	resident_adult	intake_crisk_ag	2.5E-07	3.9E-05
Town area	resident_adult	intake_crisk_soil	3.7E-10	9.9E-07
		Total	4E-07	1E-02
Town area	resident_child	air_crisk_inhale	2.3E-08	1.2E-02
Town area	resident_child	intake_crisk_ag	1.2E-07	9.0E-05
Town area	resident_child	intake_crisk_soil	6.9E-10	9.2E-06
		Total	1E-07	1E-02

(a) Group 3 includes over 170 compounds, of which 83 were not detected in the Performance Demonstration Test, including benzidine.

(b) Exposure pathway definitions:

IRAP Term	Exposure pathway
air_crisk_inhale	= inhalation of air
intake_crisk_ag	= ingestion of produce
intake_crisk_beef	= ingestion of beef
intake_crisk_chick	= ingestion of chicken
intake_crisk_eggs	= ingestion of eggs
intake_crisk_pork	= ingestion of pork
intake_crisk_soil	= incidental ingestion of soil
intake_crisk_fish	= ingestion of fish

APPENDIX F

CHEMICAL-PHYSICAL PARAMETERS FOR COMPOUNDS NOT INCLUDED IN USEPA'S HHRAP

APPENDIX F

CHEMICAL-PHYSICAL PARAMETERS FOR COMPOUNDS NOT INCLUDED IN USEPA'S HHRAP

A large number of chemical-physical properties are required to calculate environmental concentrations and potential risks for compounds in a combustion source risk assessment. In its 2005 Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities (HHRAP), the U.S. Environmental Protection Agency (USEPA) identified these properties for over 200 compounds. In this risk assessment, there were over 50 additional compounds selected for evaluation, based on the results of the Performance Demonstration Test, for which chemical-physical properties were not provided by HHRAP and which needed to be independently obtained

Table 1, which is included in this appendix, lists the properties compiled for these additional compounds. The methods used to identify these properties were those employed by USEPA for HHRAP, specifically as described in Appendix A-2 of the HHRAP report. In some cases, where data sources recommended in USEPA's Appendix A-2 did not provide information necessary to identify chemical-physical properties, alternative data sources were used. Notes are provided in Table 1 for every chemical-physical parameter indicating the source or basis for each listed value. Table 2 lists the basis for each note included in Table 1.

Either a full set of all chemical-physical properties, or a subset of the properties, was compiled for each compound, depending upon the availability of human health and ecological toxicity criteria. Compounds without chronic human health toxicity criteria and ecological toxicity reference values were not evaluated in the multiple pathway risk assessment and thus, for these compounds, a limited subset of the chemical physical properties was compiled. For these compounds, many of the chemical physical parameters used in USEPA's fate and transport modeling equations to calculate concentrations in plants and animals (e.g., plant, beef, poultry, pork and egg biotransfer coefficients) were not needed and thus were not compiled.

TABLE 1

CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA’S HHRAP

TABLE 1
CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA'S HHRAP

		Molecular weight (g/mole)		Melting point (K)	Melting point (oC)		Vapor pressure (atm) @25^{o}C (or 20-30^{o}C)	Vapor pressure (mmHg or Torr) @25^{o}C (or 20-30^{o}C)		Solubility in H2O (mg/L) @25^{o}C (or 20-30^{o}C)		Henry's law constant (atm-m^{3}/mol)		Diffusivity in air (cm2/sec)		Diffusivity in water (cm2/sec)		Octanol:water partition coefficient (unitless)	LOG Octanol:water partition coefficient
CAS #	Compound name	MW	Note	Tm		Note	Vp		Note	S	Note	H	Note	Da	Note	Dw	Note	Kow	Log Kow
563-58-6	1,1-Dichloropropene	111	3	183	-90	24	1.19E-01	90.8	3	749	3	0.05	3	0.0823	6a	9.53E-06	6a	3.39E+02	2.53
95-63-6	1,2,4-Trimethylbenzene	120	2	229	-44	2	2.76E-03	2.1	2	57	2	6.16E-03	2	0.0606	6	7.92E-06	6	6.03E+03	3.78
142-28-9	1,3-Dichloropropane	113	3	173.5	-99.5	3	2.39E-02	18.2	3	2750	3	9.76E-04	3	0.074	6	9.87E-06	6	1.00E+02	2
108-60-1	2,2'-oxybis (1-Chloropropane)	171	2	176	-97	2	1.16E-03	0.88	2	1700	2	1.17E-04	2	0.0617	6a	7.14E-06	6a	3.02E+02	2.48
594-20-7	2,2-Dichloropropane	113	2	239.2	-33.8	3	1.78E-01	135	3	391	3	1.61E-02	3	0.072	6	9.48E-06	6	8.32E+02	2.92
625-86-5	2,5-Dimethylfuran	96	3	210.2	-62.8	3	3.41E-02	25.9	3	1470	3	6.55E-03	3	0.0906	6a	1.05E-05	6a	1.74E+02	2.24
2216-30-0	2,5-Dimethylheptane	128	3	194	-79	24	1.25E-02	9.48	3	3.11	3	4	3	0.052	6	6.75E-06	6	4.07E+04	4.61
17559-81-8	2,5-Dione, 3-hexene	112	2	255	-18	24	2.86E-03	2.17	3	3.46E+04	3	1.11E-08	3	0.0818	6a	9.47E-06	6a	3.72E+00	0.57
78-93-3	2-Butanone	72	1	186	-87	1	1.25E-01	95	1	2.20E+05	1	5.60E-05	1	0.0808	6	9.80E-06	6	1.95E+00	0.29
95-49-8	2-Chlorotoluene	127	2	237.4	-35.6	2	4.51E-03	3.43	2	374	2	1.53E-03	2	0.0628	6	8.70E-06	6	2.63E+03	3.42
591-78-6	2-Hexanone	100	2	217.5	-55.5	3	1.53E-02	11.6	2	1.75E+04	2	9.32E-05	3	0.0882	6a	1.02E-05	6a	2.40E+01	1.38
3221-61-2	2-Methyl octane	128	2	192.7	-80.3	3	8.16E-03	6.2	2	2.87	3	5.73	3	0.0597	6	8.24E-06	6	4.90E+04	4.69
91-57-6	2-Methylnaphthalene	140	1	307	34	1	8.95E-05	0.068	1	25	1	5.20E-04	1	0.0522	6	7.75E-06	6	7.94E+03	3.9
34246-54-3	3-Ethyl benzaldehyde	134	24	280.1	7.1	24	1.64E-04	0.125	24	398	24	5.55E-05	24	0.0726	6a	8.40E-06	6a	5.62E+02	2.75

TABLE 1
CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA'S HHRAP

		Molecular weight (g/mole)		Melting point (K)	Melting point (oC)		Vapor pressure (atm) @25^{o}C (or 20-30^{o}C)	Vapor pressure (mmHg or Torr) @25^{o}C (or 20-30^{o}C)		Solubility in H2O (mg/L) @25^{o}C (or 20-30^{o}C)		Henry's law constant (atm-m^{3}/mol)		Diffusivity in air (cm2/sec)		Diffusivity in water (cm2/sec)		Octanol:water partition coefficient (unitless)	LOG Octanol:water partition coefficient
CAS #	Compound name	MW	Note	Tm		Note	Vp		Note	S	Note	H	Note	Da	Note	Dw	Note	Kow	Log Kow
763-93-9	3-Hexen-2-one	98	3	217.5	-55.5	24	1.05E-02	7.96	3	8970	3	5.44E-05	3	0.0894	6a	1.03E-05	6a	2.04E+01	1.31
625-33-2	3-Penten-2-one (ethylidene acetone)	84	2	205	-68	24	5.14E-02	39.1	3	4.62E+04	3	4.10E-05	3	0.0991	6a	1.15E-05	6a	3.31E+00	0.52
141-79-7	3-Penten-2-one, 4-methyl	98	2	214	-59	3	1.45E-02	11	2	2.89E+04	3	3.67E-05	3	0.0734	6	8.83E-06	6	2.34E+01	1.37
534-52-1	4,6-Dinitro-2-methylphenol	198	2	358	85	2	4.26E-07	3.24E-04	2	198	2	4.27E-07	2	0.0276	6	6.91E-06	6	1.32E+02	2.12
106-43-4	4-Chlorotoluene	127	2	280.5	7.5	3	3.54E-03	2.69	2	106	3	4.38E-03	3	0.0625	6	8.65E-06	6	2.14E+03	3.33
4748-78-1	4-Ethyl benzaldehyde	134	24	280.1	7.1	24	1.64E-04	0.125	24	398	24	5.55E-05	24	0.0726	6a	8.40E-06	6a	5.62E+02	2.75
301-02-0	9-Octadecenamide (oleamide)	281	2	432	159	24	4.82E-09	3.66E-06	24	0.046	24	1.26E-06	24	0.0443	6a	5.13E-06	6a	3.02E+06	6.48
208-96-8	Acenaphthylene	150	1	366	93	1	1.20E-06	9.10E-04	1	16	1	1.10E-04	1	0.0449	6	6.98E-06	6	1.26E+04	4.1
7429-90-5	Aluminum	27	1	933	660	1	0.00E+00	0	43	9.50E+04	1	0	3a	0.0772	6	9.57E-06	6	2.14E+00	0.33
92-87-5	Benzidine	180	1	393	120	1	1.05E-11	8.00E-09	1	500	1	3.90E-11	1	0.033	6	1.50E-05	6	5.01E+01	1.7
192-97-2	Benzo(e)pyrene	252	3	450.5	177.5	3	7.50E-12	5.70E-09	3	6.30E-03	3	3.00E-07	3	0.0476	6a	5.51E-06	6a	2.75E+06	6.44
191-24-2	Benzo(g,h,i)perylene	280	1	551	278	2	1.32E-13	1.00E-10	1	2.60E-04	1	3.31E-07	3	0.022	6	5.26E-06	6	3.98E+06	6.6
93-58-3	Benzoic acid, methyl ester (methyl benzoate)	136	2	258	-15	3	5.00E-04	0.38	3	2100	3	3.24E-05	3	0.0577	6	8.39E-06	6	1.32E+02	2.12
111-91-1	Bis(2-chloroethoxy) methane	173	2	241	-32	2	1.84E-07	1.40E-04	2	121000	2	1.70E-07	2	0.044	6	8.46E-06	6	5.62E+00	0.75

TABLE 1
CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA'S HHRAP

		Molecular weight (g/mole)		Melting point (K)	Melting point (oC)		Vapor pressure (atm) @25°C (or 20-30°C)	Vapor pressure (mmHg or Torr) @25°C (or 20-30°C)		Solubility in H2O (mg/L) @25°C (or 20-30°C)		Henry's law constant (atm-m³/mol)		Diffusivity in air (cm2/sec)		Diffusivity in water (cm2/sec)		Octanol:water partition coefficient (unitless)	LOG Octanol:water partition coefficient
CAS #	Compound name	MW	Note	Tm		Note	Vp		Note	S	Note	H	Note	Da	Note	Dw	Note	Kow	Log Kow
108-86-1	Bromobenzene	157	2	242.4	-30.6	3	5.50E-03	4.18	3	446	2	2.47E-03	3	0.0537	6	9.30E-06	6	9.77E+02	2.99
74-97-5	Bromochloromethane	129	2	185.1	-87.9	3	1.88E-01	142.5	2	1.67E+04	3	1.46E-03	3	0.0688	6	1.00E-05	6	2.57E+01	1.41
104-51-8	Butylbenzene, n-	134	2	185.1	-87.9	3	1.39E-03	1.06	3	11.8	3	1.59E-02	3	0.057	6	8.12E-06	6	2.40E+04	4.38
135-98-8	Butylbenzene, sec	134	3	190.3	-82.7	3	2.30E-03	1.75	3	17.6	3	1.76E-02	3	0.057	6	8.12E-06	6	3.72E+04	4.57
98-06-6	Butylbenzene, tert	134	2	215.2	-57.8	3	2.89E-03	2.2	3	29.5	3	1.32E-02	3	0.0565	6	8.02E-06	6	1.29E+04	4.11
86-74-8	Carbazole	170	1	523	250	1	9.21E-07	7.00E-04	1	1.2	1	8.70E-08	1	3.90E-02	5	7.03E-06	5	5.01E+03	3.7
7440-48-4	Cobalt	59	1	1773	1500	1	0.00E+00	0	43	8.70E+04	24	0	3a	0.0772	6	9.57E-06	6	1.70E+00	0.23
7440-50-8	Copper	64	1	1373	1100	1	5.58E-12	4.24E-09	3	4.21E+05	3	2.50E-02	1	0.0772	6	9.57E-06	6	2.69E-01	-0.57
2303-16-4	Diallate	270	2	300.5	27.5	2	1.97E-07	1.50E-04	2	14	2	3.80E-06	2	0.0213	6	5.27E-06	6	6.31E+04	4.8
132-64-9	Dibenzofuran	170	1	360	87	1	2.37E-07	1.80E-04	1	3.1	1	1.30E-05	1	0.0238	6	6.00E-06	6	1.26E+04	4.1
122-39-4	Diphenylamine	159	2	326.5	53.5	2	8.79E-07	6.68E-04	2	35.7	2	4.96E-07	2	0.058	6	6.31E-06	6	3.16E+03	3.5
1031-07-8	Endosulfan sulfate	423	3	454.5	181.5	3	3.68E-10	2.80E-07	3	0.48	3	3.25E-07	3	0.0182	6	4.45E-06	6	4.57E+03	3.66
7421-93-4	Endrin aldehyde	380	1	420	147	8	2.63E-10	2.00E-07	1	2.40E-02	1	4.20E-06	1	0.019	6	4.37E-06	6	6.31E+04	4.8
53494-70-5	Endrin ketone	381	3	419	146	24	1.21E-07	9.20E-05	24	0.222	3	2.02E-08	3	0.0362	6a	4.19E-06	6a	9.77E+04	4.99

TABLE 1
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		Molecular weight (g/mole)		Melting point (K)	Melting point (oC)		Vapor pressure (atm) @25^{o}C (or 20-30^{o}C)	Vapor pressure (mmHg or Torr) @25^{o}C (or 20-30^{o}C)		Solubility in H2O (mg/L) @25^{o}C (or 20-30^{o}C)		Henry's law constant (atm-m^3/mol)		Diffusivity in air (cm2/sec)		Diffusivity in water (cm2/sec)		Octanol:water partition coefficient (unitless)	LOG Octanol:water partition coefficient
CAS #	Compound name	MW	Note	Tm		Note	Vp		Note	S	Note	H	Note	Da	Note	Dw	Note	Kow	Log Kow
76-13-1	Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	187	2	236.6	-36.4	2	4.36E-01	331.6	2	170	2	4.81E-01	2	0.078	6	8.20E-06	6	1.45E+03	3.16
74-88-4	Iodomethane	142	2	206.6	-66.4	2	5.32E-01	404.46	2	13848	2	5.26E-03	2	0.0524	6	7.76E-06	6	3.24E+01	1.51
99-87-6	Isopropyl toluene, p-	134	2	204.1	-68.9	3	1.92E-03	1.46	2	23.4	2	1.10E-02	2	0.056	6	7.33E-06	6	1.26E+04	4.1
7439-96-5	Manganese	55	1	1473	1200	1	5.58E-12	4.24E-09	3	1100	1	0.0245	3	0.0772	6	9.57E-06	6	1.70E+00	0.23
62-75-9	N-nitrosodimethylamine	74	2	223	-50	2	3.55E-03	2.7	2	1.00E+06	8	1.20E-06	2	0.104	6	1.00E-05	6	2.69E-01	-0.57
198-55-0	Perylene	252	3	547	274	3	6.91E-12	5.25E-09	3	0.0004	3	3.65E-06	3	0.0223	6	5.56E-06	6	1.78E+06	6.25
2240-47-3	Phosphine imide, P,P,P-triphenyl	277	24	417	144	24	6.29E-09	4.78E-06	24	0.755	24	1.43E-07	24	0.0447	6a	5.18E-06	6a	1.20E+05	5.08
103-65-1	Propylbenzene, n-	120	2	173.5	-99.5	3	4.50E-03	3.42	2	52.2	2	1.05E-02	2	0.0601	6	7.83E-06	6	3.72E+03	3.57
7440-62-2	Vanadium	51	1	2173	1900	1	0.00E+00	0	43	700	1	0	3a	0.0772	6	9.57E-06	6	1.70E+00	0.23
58-89-9	γ-BHC (Lindane)	290	1	383	110	1	5.39E-07	4.10E-04	1	7.3	1	1.40E-05	2	1.42E-02	5	7.34E-06	5	3.98E+03	3.6
319-86-8	δ-BHC	291	2	415	142	2	4.63E-08	3.52E-05	2	31.4	2	4.29E-07	2	0.0221	6	5.57E-06	6	1.38E+04	4.14
110-54-3	1-Hexane (n-hexane)	86	2	177.7	-95.3	3	1.99E-01	151.3	2	124	2	1.8	3	0.2	6	7.77E-06	6	7.94E+03	3.9
79-10-7	Acrylic Acid	72	2	286.5	13.5	2	5.26E-03	4	2	1.00E+06	8	1.17E-07	2	0.098	6	1.06E-05	6	1.45E+00	0.161
107-21-1	Ethylene Glycol	62	2	260.4	-12.6	2	1.21E-04	0.092	2	1.00E+06	8	6.00E-08	2	0.108	6	1.22E-05	6	4.37E-02	-1.36
80-62-6	Methyl methacrylate	100	2	225	-48	3	5.05E-02	38.4	2	1.50E+04	2	3.37E-04	2	0.077	6	8.60E-06	6	2.40E+01	1.38

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		Molecular weight (g/mole)		Melting point (K)	Melting point (oC)		Vapor pressure (atm) @25°C (or 20-30°C)	Vapor pressure (mmHg or Torr) @25°C (or 20-30°C)		Solubility in H2O (mg/L) @25°C (or 20-30°C)		Henry's law constant (atm-m^3/mol)		Diffusivity in air (cm2/sec)		Diffusivity in water (cm2/sec)		Octanol:water partition coefficient (unitless)	LOG Octanol:water partition coefficient
CAS #	Compound name	MW	Note	Tm		Note	Vp		Note	S	Note	H	Note	Da	Note	Dw	Note	Kow	Log Kow
1634-04-4	methyl tert-butyl ether	88	1	163	-110	1	3.29E-01	250	1	5.10E+04	1	5.90E-04	1	0.086	6	1.01E-05	6	1.58E+01	1.2
75-56-9	Propylene oxide	58	2	161	-112	2	7.08E-01	538	2	590000	2	1.23E-04	2	0.104	6	1.00E-05	6	1.07E+00	0.03
33213-65-9	Endosulfan II	407	1	382	109	2	1.3158E-08	1.00E-05	1	0.45	2	1.30E-05	1	0.0346	6a	4.01E-06	6a	6.31E+03	3.8
7446-09-5	Sulfur dioxide	64	3	201	-72	3	3.94868421	3.00E+03	2	1.07E+05	3	8.10E-04	3	0.1188	6a	1.38E-05	6a	6.31E-03	-2.2
10102-44-0	Nitrogen dioxide	46	3	263.7	-9.3	3	1.19460526	9.08E+02	2	1.71E+05	3	2.45E-02	3	0.1480	6a	1.71E-05	6a	2.63E-01	-0.58
Compounds evaluated for fugitive vapor emissions only																			
106-99-0	1,3-Butadiene	54.09	3	164	-109	2	2.77236842	2.11E+03	2	7.35E+02	2	7.36E-02	2	0.1328	6a	1.54E-05	6a	9.77E+01	1.99
110-82-7	Cyclohexane	84.16	3	279.5	6.5	2	0.12736842	9.68E+01	2	5.50E+01	2	1.95E-01	2	0.0989	6a	1.15E-05	6a	2.75E+03	3.44

-- = Not applicable - compound did not have chronic human health toxicity data, or ecological risk assessment toxicity reference values (TRVs), and thus was not evaluated in the multiple pathway fate and transport modeling.

NA = Not applicable. Compound was only evaluated for the inhalation pathway in the human health risk assessment addressing potential fugitive emissions.

TABLE 1
CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA'S HHRAP

			Soil organic carbon:water partition coefficient (mL H2O/ g soil)	LOG Soil organic carbon:water partition coefficient (Koc) (mL H2O/ g soil)		Soil-water partition coefficient (mL H2O/g soil OR cm3 H2O/g soil)		Suspended sediment-surface water partition coefficient (L H2O/kg suspended sed OR cm3 H2O/g suspended sed)		Bed sediment-pore water partition coefficient (L H2O/kg bottom sed OR cm3 H2O/g bottom sed)		Soil loss constant due to biotic and abiotic degradation (yr-1)		Fraction of air concentration in vapor phase (unitless)	Liquid phase vapor pressure (atm) (used only for compounds that are solids at ambient T)		Root concentration factor (g COPC/g DW plant) / (g COPC/mL soil water)
CAS #	Compound name	Note	Koc	Log Koc	Note	Kd,s	Note	Kd,sw	Note	Kd,bs	Note	Ksg	Note	fv	Vp	Note	RCF DW
563-58-6	1,1-Dichloropropene	3			--		--		--		--	0	44	1.0		16	
95-63-6	1,2,4-Trimethylbenzene	2	1.18E+03	3.0718	10	1.18E+01	13	8.85E+01	14	4.72E+01	15	0	44	1.0		16	1.89E+02
142-28-9	1,3-Dichloropropane	3	9.25E+01	1.9663	9	9.25E-01	13	6.94E+00	14	3.70E+00	15	0	44	1.0		16	8.05E+00
108-60-1	2,2'-oxybis (1-Chloropropane)	2	57		2	5.70E-01	13	4.28E+00	14	2.28E+00	15	0	44	1.0		16	1.89E+01
594-20-7	2,2-Dichloropropane	3	2.46E+02	2.3907	10	2.46E+00	13	1.84E+01	14	9.84E+00	15	0	44	1.0		16	4.12E+01
625-86-5	2,5-Dimethylfuran	3	7.12E+01	1.8523	10	7.12E-01	13	5.34E+00	14	2.85E+00	15	0	44	1.0		16	1.23E+01
2216-30-0	2,5-Dimethylheptane	3	0		--		--		--		--	0	44	1.0		16	
17559-81-8	2,5-Dione, 3-hexene	3	0		--		--		--		--	0	44	1.0		16	
78-93-3	2-Butanone	1	1.93E+00	0.2854	9	0.29	1	1.45E-01	14	7.72E-02	15	0	44	1.0		16	6.70E+00
95-49-8	2-Chlorotoluene	2	550		2	5.50E+00	13	4.13E+01	14	2.20E+01	15	0	44	1.0		16	9.99E+01
591-78-6	2-Hexanone	2	2.27E+01	1.3568	9	2.27E-01	13	1.71E+00	14	9.10E-01	15	0	44	1.0		16	8.99E+00
3221-61-2	2-Methyl octane	3			--		--		--		--	0	44	1.0		16	
91-57-6	2-Methylnaphthalene	1	6.82E+03	3.8340	9	950	1	5.12E+02	14	2.73E+02	15	0	44	1.000E+00	1.10E-04	17,16	2.34E+02
34246-54-3	3-Ethyl benzaldehyde	24	102.2		24		--		--		--	0	44	1.0		16	

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CAS #	Compound name	Note	Koc	Log Koc	Note	Kd,s	Note	Kd,sw	Note	Kd,bs	Note	Ksg	Note	fv	Vp	Note	RCF DW
763-93-9	3-Hexen-2-one	3			--		--		--		--	0	44	1.0		16	
625-33-2	3-Penten-2-one (ethylidene acetone)	3			--		--		--		--	0	44	1.0		16	
141-79-7	3-Penten-2-one, 4-methyl	3			--		--		--		--	0	44	1.0		16	
534-52-1	4,6-Dinitro-2-methylphenol	2	257		2	2.57E+00	13	1.93E+01	14	1.03E+01	15	0	44	9.996E-01	1.67E-06	17,16	9.96E+00
106-43-4	4-Chlorotoluene	3	5.19E+02	2.7154	10	5.19E+00	13	3.89E+01	14	2.08E+01	15	0	44	1.0		16	8.51E+01
4748-78-1	4-Ethyl benzaldehyde	24	102.2		24		--		--		--	0	44	1.0		16	
301-02-0	9-Octadecenamide (oleamide)	24	1.02E+05		24		--		--		--	0	44	9.942E-01	1.02E-07	17,16	
208-96-8	Acenaphthylene	1	1.07E+04	4.0306	9	1.50E+03	1	8.05E+02	14	4.29E+02	15	0	44	9.999E-01	5.64E-06	17,16	3.33E+02
7429-90-5	Aluminum	24	0		43	9.9	1	9.9	14b	9.9	14b	0	44	0		16a	0
92-87-5	Benzidine	1	4.69E+01	1.6714	9	6.5	1	3.52E+00	14	1.88E+00	15	0.13	45	1.335E-01	9.17E-11	17,16	1.10E+01
192-97-2	Benzo(e)pyrene	3			--		--		--		--	0	44	2.893E-01	2.42E-10	17,16	
191-24-2	Benzo(g,h,i)perylene	1	3.08E+06	6.4881	9	4.50E+05	1	2.31E+05	14	1.23E+05	15	0	44	6.586E-02	4.20E-11	17,16	2.81E+04
93-58-3	Benzoic acid, methyl ester (methyl benzoate)	3	1.21E+02	2.0842	9	1.21E+00	13	9.11E+00	14	4.86E+00	15	0	44	1.0		16	9.96E+00
111-91-1	Bis(2-chloroethoxy) methane	2	61		2	6.10E-01	13	4.58E+00	14	2.44E+00	15	0	44	1.0		16	7.19E+00

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			Soil organic carbon:water partition coefficient (mL H2O/ g soil)	LOG Soil organic carbon:water partition coefficient (Koc) (mL H2O/ g soil)		Soil-water partition coefficient (mL H2O/g soil OR cm3 H2O/g soil)		Suspended sediment-surface water partition coefficient (L H2O/kg suspended sed OR cm3 H2O/g suspended sed)		Bed sediment-pore water partition coefficient (L H2O/kg bottom sed OR cm3 H2O/g bottom sed)		Soil loss constant due to biotic and abiotic degradation (yr-1)		Fraction of air concentration in vapor phase (unitless)	Liquid phase vapor pressure (atm) (used only for compounds that are solids at ambient T)		Root concentration factor (g COPC/g DW plant) / (g COPC/mL soil water)
CAS #	Compound name	Note	Koc	Log Koc	Note	Kd,s	Note	Kd,sw	Note	Kd,bs	Note	Ksg	Note	fv	Vp	Note	RCF DW
108-86-1	Bromobenzene	2	151		2	1.51E+00	13	1.13E+01	14	6.04E+00	15	0	44	1.0		16	4.66E+01
74-97-5	Bromochloromethane	3			--		--		--		--	0	44	1.0		16	
104-51-8	Butylbenzene, n-	3	2512		2		--		--		--	0	44	1.0		16	
135-98-8	Butylbenzene, sec	3	4.98E+03	3.6974	10		--		--		--	0	44	1.0		16	
98-06-6	Butylbenzene, tert	3	2.15E+03	3.3331	10	2.15E+01	13	1.61E+02	14	8.61E+01	15	0	44	1.0		16	3.39E+02
86-74-8	Carbazole	1	3390		5	520	1	2.54E+02	14	1.36E+02	15	0	44	1.000E+00	1.55E-04	17,16	1.64E+02
7440-48-4	Cobalt	1	0		43	45	1	45	14b	45	14b	0	44	0		16a	0
7440-50-8	Copper	1	0		43	430	1	430	14b	430	14b	0	44	0		16a	0
2303-16-4	Diallate	2	273		2		--		--		--	0	44	9.972E-01	2.09E-07	17,16	
132-64-9	Dibenzofuran	1	1.07E+04	4.0306	9	1700	1	8.05E+02	14	4.29E+02	15	0	44	9.994E-01	9.73E-07	17,16	3.33E+02
122-39-4	Diphenylamine	2	600		2	347	2	4.50E+01	14	2.40E+01	15	0	44	9.996E-01	1.68E-06	17,16	1.15E+02
1031-07-8	Endosulfan sulfate	3	3.96E+03	3.5981	9	3.96E+01	13	2.97E+02	14	1.59E+02	15	0	44	9.563E-01	1.30E-08	17,16	1.53E+02
7421-93-4	Endrin aldehyde	1	2.00E+04	4.3	8	8000	1	1.50E+03	14	7.98E+02	15	0	44	8.770E-01	4.24E-09	17,16	1.15E+03
53494-70-5	Endrin ketone	3			--		--		--		--	0	44	9.997E-01	1.91E-06	17,16	

TABLE 1
CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA'S HHRAP

			Soil organic carbon:water partition coefficient (mL H2O/ g soil)	LOG Soil organic carbon:water partition coefficient (Koc) (mL H2O/ g soil)		Soil-water partition coefficient (mL H2O/g soil OR cm3 H2O/g soil)		Suspended sediment-surface water partition coefficient (L H2O/kg suspended sed OR cm3 H2O/g suspended sed)		Bed sediment-pore water partition coefficient (L H2O/kg bottom sed OR cm3 H2O/g bottom sed)		Soil loss constant due to biotic and abiotic degradation (yr-1)		Fraction of air concentration in vapor phase (unitless)	Liquid phase vapor pressure (atm) (used only for compounds that are solids at ambient T)		Root concentration factor (g COPC/g DW plant) / (g COPC/mL soil water)
CAS #	Compound name	Note	Koc	Log Koc	Note	Kd,s	Note	Kd,sw	Note	Kd,bs	Note	Ksg	Note	fv	Vp	Note	RCF DW
76-13-1	Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	2	372		2	3.72E+00	13	2.79E+01	14	1.49E+01	15	0	44	1.0		16	6.30E+01
74-88-4	Iodomethane	2	158		2	1.58E+00	13	1.19E+01	14	6.32E+00	15	0	44	1.0		16	9.69E+00
99-87-6	Isopropyl toluene, p-	2	2.11E+03	3.3252	10	2.11E+01	13	1.59E+02	14	8.46E+01	15	0	44	1.0		16	3.33E+02
7439-96-5	Manganese	1	0		43	65	1	65	14b	65	14b	0	44	0		16a	0
62-75-9	N-nitrosodimethylamine	2	12		2	1.20E-01	13	9.00E-01	14	4.80E-01	15	0	44	1.0		16	6.39
198-55-0	Perylene	3	8.03E+05		24		--		--		--	0	44	7.716E-01	2.01E-09	17,16	
2240-47-3	Phosphine imide, P,P,P-triphenyl	24	6.96E+05		24		--		--		--	0	44	9.938E-01	9.47E-08	17,16	
103-65-1	Propylbenzene, n-	2	741		2		--		--		--	0	44	1.0		16	
7440-62-2	Vanadium	24	0		43	1000	1	1000	14b	1000	14b	0	44	0		16a	0
58-89-9	γ-BHC (Lindane)	1	1352		5	2.1	1	101.4	14	5.41E+01	15	0	44	9.998E-01	3.74E-06	17,16	1.37E+02
319-86-8	δ-BHC	2	4260		2	4.26E+01	13	3.20E+02	14	1.70E+02	15	0	44	9.991E-01	6.66E-07	17,16	3.58E+02
110-54-3	1-Hexane (n-hexane)	3	1.47E+03	3.1668	10	1.47E+01	13	1.10E+02	14	5.87E+01	15	0	44	1.0		16	2.34E+02
79-10-7	Acrylic Acid	2	1.45E-02	-1.84	12	1.45E-04	13	1.08E-03	14	5.78E-04	15	0	44	1.0		16	6.62E+00
107-21-1	Ethylene Glycol	2	4		2	4.00E-02	13	3.00E-01	14	1.60E-01	15	0	44	1.0		16	6.39
80-62-6	Methyl methacrylate	2	22		2	2.20E-01	13	1.65E+00	14	8.80E-01	15	0	44	1.0		16	8.99E+00

TABLE 1
CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA'S HHRAP

			Soil organic carbon:water partition coefficient (mL H2O/ g soil)	LOG Soil organic carbon:water partition coefficient (Koc) (mL H2O/ g soil)		Soil-water partition coefficient (mL H2O/g soil OR cm3 H2O/g soil)		Suspended sediment-surface water partition coefficient (L H2O/kg suspended sed OR cm3 H2O/g suspended sed)		Bed sediment-pore water partition coefficient (L H2O/kg bottom sed OR cm3 H2O/g bottom sed)		Soil loss constant due to biotic and abiotic degradation (yr-1)		Fraction of air concentration in vapor phase (unitless)	Liquid phase vapor pressure (atm) (used only for compounds that are solids at ambient T)		Root concentration factor (g COPC/g DW plant) / (g COPC/mL soil water)
CAS #	Compound name	Note	Koc	Log Koc	Note	Kd,s	Note	Kd,sw	Note	Kd,bs	Note	Ksg	Note	fv	Vp	Note	RCF DW
1634-04-4	methyl tert-butyl ether	1	1.51E+01	1.1799	9	8.9	1	1.13E+00	14	6.05E-01	15	0	44	1.0		16	8.26E+00
75-56-9	Propylene oxide	2	25		2	2.50E-01	13	1.88E+00	14	1.00E+00	15	0	44	1.0		16	6.55E+00
33213-65-9	Endosulfan II	1	6770		2	4.3	1	5.08E+02	14	2.71E+02	15	0	44	9.934E-01	8.92E-08	17,16	1.96E+02
7446-09-5	Sulfur dioxide	3	2.99		24	2.99E-02	13	2.24E-01	14	1.20E-01	15	0	44	1.0		16	6.31E+00
10102-44-0	Nitrogen dioxide	3	5.54		24	5.54E-02	13	4.16E-01	14	2.22E-01	15	0	44	1.0		16	6.39E+00
Compounds evaluated for fugitive vap																	
106-99-0	1,3-Butadiene	2	116		2	NA		NA		NA		NA		1.0		16	NA
110-82-7	Cyclohexane	2	482		2	NA		NA		NA		NA		1.0		16	NA

-- = Not applicable - compound did not have chronic human health toxicity data, or ecological risk assessment toxicity reference values (TRVs), and thus was not evaluated in the multiple pathway fate and transport modeling.

NA = Not applicable. Compound was only evaluated for the inhalation pathway in the human health risk assessment addressing potential fugitive emissions.

TABLE 1
CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA'S HHRAP

		RCF in fresh wt (FW) (g COPC/g FW plant) / (g COPC/mL soil water)		Plant-soil bioconcentration factor for below ground produce (g COPC/g DW plant) / (g COPC/g DW soil) (unitless)		Plant-soil bioconcentration factor for aboveground produce (HHRAP variable = Br_{ag}) (same value used for Br_{grain}) (g COPC/g DW plant) / (g COPC/g DW soil) (unitless)		Plant-soil bioconcentration factor for forage and silage (g COPC/g DW plant) / (g COPC/g DW soil) (unitless)		Air-to-plant biotransfer factor in aboveground produce (HHRAP variable = Bv_{ag}) (g COPC/g DW plant)/ (g COPC/g air) (unitless)	LOG Bvol		Air-to-plant biotransfer factor in forage and silage (g COPC/g DW plant)/ (g COPC/g air) (unitless)	
CAS #	Compound name	RCF FW	Note	Br, root-veg	Note	Br, leafy-veg	Note	Br, forage	Note	Bv, leafy veg	Log Bvol	Note	Bv, forage	Note
563-58-6	1,1-Dichloropropene		--		--	0	--		--			--		--
95-63-6	1,2,4-Trimethylbenzene	2.46E+01	18,20	1.60E+01	22	2.53E-01	25	2.53E-01	25	9.62E-02	2.97E+00	28	9.62E-02	28
142-28-9	1,3-Dichloropropane	1.05E+00	18,20	8.71E+00	22	2.70E+00	25	2.70E+00	25	7.72E-03	1.87E+00	28	7.72E-03	28
108-60-1	2,2'-oxybis (1-Chloropropane)	2.45E+00	18,20	3.31E+01	22	1.43E+00	25	1.43E+00	25	2.09E-01	3.31E+00	28	2.09E-01	28
594-20-7	2,2-Dichloropropane	5.35E+00	18,20	1.67E+01	22	7.95E-01	25	7.95E-01	25	4.47E-03	1.64E+00	28	4.47E-03	28
625-86-5	2,5-Dimethylfuran	1.60E+00	18,20	1.73E+01	22	1.96E+00	25	1.96E+00	25	2.07E-03	1.30E+00	28	2.07E-03	28
2216-30-0	2,5-Dimethylheptane		--		--		--		--	0		--		--
17559-81-8	2,5-Dione, 3-hexene		--		--		--		--	0		--		--
78-93-3	2-Butanone	8.71E-01	19,20	2.31E+01	22	8.38	25a	8.38	25a	2.03E-03	1.29E+00	28	2.03E-03	28
95-49-8	2-Chlorotoluene	1.30E+01	18,20	1.82E+01	22	4.09E-01	25	4.09E-01	25	1.60E-01	3.19E+00	28	1.60E-01	28
591-78-6	2-Hexanone	1.17E+00	19,20	3.95E+01	22	6.17E+00	25	6.17E+00	25	1.77E-02	2.23E+00	28	1.77E-02	28
3221-61-2	2-Methyl octane		--		--		--	0	--			--		--
91-57-6	2-Methylnaphthalene	3.04E+01	18,20	2.46E-01	22	2.16E-01	25	2.16E-01	25	1.53E+00	4.17E+00	28	1.53E+00	28
34246-54-3	3-Ethyl benzaldehyde		--		--		--	0	--			--		--

TABLE 1
CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA'S HHRAP

		RCF in fresh wt (FW) (g COPC/g FW plant) / (g COPC/mL soil water)		Plant-soil bioconcentration factor for below ground produce (g COPC/g DW plant) / (g COPC/g DW soil) (unitless)		Plant-soil bioconcentration factor for aboveground produce (HHRAP variable = Br_{ag}) (same value used for Br_{grain}) (g COPC/g DW plant) / (g COPC/g DW soil) (unitless)		Plant-soil bioconcentration factor for forage and silage (g COPC/g DW plant) / (g COPC/g DW soil) (unitless)		Air-to-plant biotransfer factor in aboveground produce (HHRAP variable = Bv_{ag}) (g COPC/g DW plant)/ (g COPC/g air) (unitless)	LOG Bvol		Air-to-plant biotransfer factor in forage and silage (g COPC/g DW plant)/ (g COPC/g air) (unitless)	
CAS #	Compound name	RCF FW	Note	Br, root-veg	Note	Br, leafy-veg	Note	Br, forage	Note	Bv, leafy veg	Log Bvol	Note	Bv, forage	Note
763-93-9	3-Hexen-2-one		--		--		--	0	--			--		--
625-33-2	3-Penten-2-one (ethylidene acetone)		--		--		--	0	--			--		--
141-79-7	3-Penten-2-one, 4-methyl		--		--		--		--			--		--
534-52-1	4,6-Dinitro-2-methylphenol	1.30E+00	18,20	3.88E+00	22	2.30E+00	25	2.30E+00	25	2.37E+01	5.36E+00	28	2.37E+01	28
106-43-4	4-Chlorotoluene	1.11E+01	18,20	1.64E+01	22	4.61E-01	25	4.61E-01	25	4.49E-02	2.64E+00	28	4.49E-02	28
4748-78-1	4-Ethyl benzaldehyde		--		--		--		--			--		--
301-02-0	9-Octadecenamide (oleamide)		--		--		--		--			--		--
208-96-8	Acenaphthylene	4.34E+01	18,20	2.22E-01	22	1.65E-01	25	1.65E-01	25	1.18E+01	5.06E+00	28	1.18E+01	28
7429-90-5	Aluminum		21a	6.50E-04	23	0.0011	27	1	26	0		29	0	29
92-87-5	Benzidine	1.44E+00	19,20	1.70E+00	22	4.03E+00	25	4.03E+00	25	9.26E+04	8.95E+00	28	9.26E+04	28
192-97-2	Benzo(e)pyrene		--		--		--	0	--			--		--
191-24-2	Benzo(g,h,i)perylene	3.65E+03	18,20	6.24E-02	22	5.93E-03	25	5.93E-03	25	1.80E+06	1.02E+01	28	1.80E+06	28
93-58-3	Benzoic acid, methyl ester (methyl benzoate)	1.30E+00	18,20	8.21E+00	22	2.30E+00	25	2.30E+00	25	3.12E-01	3.48E+00	28	3.12E-01	28
111-91-1	Bis(2-chloroethoxy) methane	9.34E-01	19,20	1.18E+01	22	8.38	25a	8.38	25a	2.07E+00	4.30E+00	28	2.07E+00	28

TABLE 1
CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA'S HHRAP

		RCF in fresh wt (FW) (g COPC/g FW plant) / (g COPC/mL soil water)		Plant-soil bioconcentration factor for below ground produce (g COPC/g DW plant) / (g COPC/g DW soil) (unitless)		Plant-soil bioconcentration factor for aboveground produce (HHRAP variable = Br_{ag}) (same value used for Br_{grain}) (g COPC/g DW plant) / (g COPC/g DW soil) (unitless)		Plant-soil bioconcentration factor for forage and silage (g COPC/g DW plant) / (g COPC/g DW soil) (unitless)		Air-to-plant biotransfer factor in aboveground produce (HHRAP variable = Bv_{ag}) (g COPC/g DW plant)/ (g COPC/g air) (unitless)	LOG Bvol		Air-to-plant biotransfer factor in forage and silage (g COPC/g DW plant)/ (g COPC/g air) (unitless)	
CAS #	Compound name	RCF FW	Note	Br, root-veg	Note	Br, leafy-veg	Note	Br, forage	Note	Bv, leafy veg	Log Bvol	Note	Bv, forage	Note
108-86-1	Bromobenzene	6.06E+00	18,20	3.09E+01	22	7.24E-01	25	7.24E-01	25	3.46E-02	2.53E+00	28	3.46E-02	28
74-97-5	Bromochloromethane		--		--		--	0	--	0		--		--
104-51-8	Butylbenzene, n-		--		--		--	0	--	0		--		--
135-98-8	Butylbenzene, sec		--		--		--		--			--		--
98-06-6	Butylbenzene, tert	4.41E+01	18,20	1.58E+01	22	1.63E-01	25	1.63E-01	25	1.01E-01	2.99E+00	28	1.01E-01	28
86-74-8	Carbazole	2.13E+01	18,20	3.16E-01	22	2.81E-01	25	2.81E-01	25	5.60E+03	7.74E+00	28	5.60E+03	28
7440-48-4	Cobalt		21a	7.00E-03	23	0.0086	27	0.02	26	0		29	0	29
7440-50-8	Copper		21a	0.25	23	0.27	27	0.4	26	0		29	0	29
2303-16-4	Diallate		--		--		--		--			--		--
132-64-9	Dibenzofuran	4.34E+01	18,20	1.96E-01	22	1.65E-01	25	1.65E-01	25	9.99E+01	5.99E+00	28	9.99E+01	28
122-39-4	Diphenylamine	1.50E+01	18,20	3.32E-01	22	3.67E-01	25	3.67E-01	25	6.01E+02	6.77E+00	28	6.01E+02	28
1031-07-8	Endosulfan sulfate	1.99E+01	18,20	3.86E+00	22	2.97E-01	25	2.97E-01	25	1.36E+03	7.12E+00	28	1.36E+03	28
7421-93-4	Endrin aldehyde	1.50E+02	18,20	1.44E-01	22	6.51E-02	25	6.51E-02	25	1.72E+03	7.22E+00	28	1.72E+03	28
53494-70-5	Endrin ketone		--		--		--		--			--		--

TABLE 1
CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA'S HHRAP

		RCF in fresh wt (FW) (g COPC/g FW plant) / (g COPC/mL soil water)		Plant-soil bioconcentration factor for below ground produce (g COPC/g DW plant) / (g COPC/g DW soil) (unitless)		Plant-soil bioconcentration factor for aboveground produce (HHRAP variable = Br_{ag}) (same value used for Br_{grain}) (g COPC/g DW plant) / (g COPC/g DW soil) (unitless)		Plant-soil bioconcentration factor for forage and silage (g COPC/g DW plant) / (g COPC/g DW soil) (unitless)		Air-to-plant biotransfer factor in aboveground produce (HHRAP variable = Bv_{ag}) (g COPC/g DW plant)/ (g COPC/g air) (unitless)	LOG Bvol		Air-to-plant biotransfer factor in forage and silage (g COPC/g DW plant)/ (g COPC/g air) (unitless)	
CAS #	Compound name	RCF FW	Note	Br, root-veg	Note	Br, leafy-veg	Note	Br, forage	Note	Bv, leafy veg	Log Bvol	Note	Bv, forage	Note
76-13-1	Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	8.19E+00	18,20	1.69E+01	22	5.77E-01	25	5.77E-01	25	2.69E-04	4.17E-01	28	2.69E-04	28
74-88-4	Iodomethane	1.26E+00	19,20	6.13E+00	22	5.19E+00	25	5.19E+00	25	4.31E-04	6.21E-01	28	4.31E-04	28
99-87-6	Isopropyl toluene, p-	4.34E+01	18,20	1.58E+01	22	1.65E-01	25	1.65E-01	25	1.18E-01	3.06E+00	28	1.18E-01	28
7439-96-5	Manganese		21a	0.05	23	0.075	27	0.25	26	0		29	0	29
62-75-9	N-nitrosodimethylamine		21	5.33E+01	22	8.38	25a	8.38	25a	1.15E-02	2.05E+00	28	1.15E-02	28
198-55-0	Perylene		--		--		--		--			--		--
2240-47-3	Phosphine imide, P,P,P-triphenyl		--		--		--		--	0		--		--
103-65-1	Propylbenzene, n-		--		--		--		--	0		--		--
7440-62-2	Vanadium		21a	3.00E-03	23	0.0033	27	5.50E-03	26	0		29	0	29
58-89-9	γ-BHC (Lindane)	1.79E+01	18,20	6.54E+01	22	3.22E-01	25	3.22E-01	25	2.72E+01	5.42E+00	28	2.72E+01	28
319-86-8	δ-BHC	4.65E+01	18,20	8.40E+00	22	1.57E-01	25	1.57E-01	25	3.34E+03	7.51E+00	28	3.34E+03	28
110-54-3	1-Hexane (n-hexane)	3.04E+01	18,20	1.59E+01	22	2.16E-01	25	2.16E-01	25	4.42E-04	6.32E-01	28	4.42E-04	28
79-10-7	Acrylic Acid	8.60E-01	19,20	4.58E+04	22	8.38	25a	8.38	25a	7.08E-01	3.84E+00	28	7.08E-01	28
107-21-1	Ethylene Glycol		21	1.60E+02	22	8.38	25a	8.38	25a	3.31E-02	2.51E+00	28	3.31E-02	28
80-62-6	Methyl methacrylate	1.17E+00	19,20	4.09E+01	22	6.17E+00	25	6.17E+00	25	4.89E-03	1.68E+00	28	4.89E-03	28

TABLE 1
CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA'S HHRAP

		RCF in fresh wt (FW) (g COPC/g FW plant) / (g COPC/mL soil water)		Plant-soil bioconcentration factor for below ground produce (g COPC/g DW plant) / (g COPC/g DW soil) (unitless)		Plant-soil bioconcentration factor for aboveground produce (HHRAP variable = Br_{ag}) (same value used for Br_{grain}) (g COPC/g DW plant) / (g COPC/g DW soil) (unitless)		Plant-soil bioconcentration factor for forage and silage (g COPC/g DW plant) / (g COPC/g DW soil) (unitless)		Air-to-plant biotransfer factor in aboveground produce (HHRAP variable = Bv_{ag}) (g COPC/g DW plant)/ (g COPC/g air) (unitless)	LOG Bvol		Air-to-plant biotransfer factor in forage and silage (g COPC/g DW plant)/ (g COPC/g air) (unitless)	
CAS #	Compound name	RCF FW	Note	Br, root-veg	Note	Br, leafy-veg	Note	Br, forage	Note	Bv, leafy veg	Log Bvol	Note	Bv, forage	Note
1634-04-4	methyl tert-butyl ether	1.07E+00	19,20	9.28E-01	22	7.84E+00	25	7.84E+00	25	1.80E-03	1.24E+00	28	1.80E-03	28
75-56-9	Propylene oxide	8.52E-01	19,20	2.62E+01	22	8.38	25a	8.38	25a	4.89E-04	6.76E-01	28	4.89E-04	28
33213-65-9	Endosulfan II	2.55E+01	18,20	4.56E+01	22	2.46E-01	25	2.46E-01	25	4.79E+01	5.67E+00	28	4.79E+01	28
7446-09-5	Sulfur dioxide	8.21E-01	19,20	2.11E+02	22	7.24E+02	25	7.24E+02	25	3.13E-07	-2.52E+00	28	3.13E-07	28
10102-44-0	Nitrogen dioxide	8.31E-01	19,20	1.15E+02	22	8.38E+01	25	8.38E+01	25	5.50E-07	-2.27E+00	28	5.50E-07	28
Compounds evaluated for fugitive vap														
106-99-0	1,3-Butadiene	NA		NA		NA		NA		NA			NA	
110-82-7	Cyclohexane	NA		NA		NA		NA		NA			NA	

-- = Not applicable - compound did not have chronic human health toxicity data, or ecological risk assessment toxicity reference values (TRVs), and thus was not evaluated in the multiple pathway fate and transport modeling.

NA = Not applicable. Compound was only evaluated for the inhalation pathway in the human health risk assessment addressing potential fugitive emissions.

TABLE 1
CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA'S HHRAP

		Biotransfer factor in milk (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)	LOG Ba,fat (Ba,fat in mg/kg fat / mg/day)		Biotransfer factor in beef (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)		Biotransfer factor in pork (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)		Bioconcentration factor in fish (L/kg FW OR unitless)	LOG BCF		Bioaccumulation factor in fish (mg COPC/kg FW tissue)/ (mg COPC/L total water column) OR (L water/kg FW tissue)	
CAS #	Compound name	Ba, milk	Log (Ba,fat)	Note	Ba, beef	Note	Ba, pork	Note	BCF, fish	log BCF	Note	BAF, fish	Note
563-58-6	1,1-Dichloropropene			--		--		--			--		--
95-63-6	1,2,4-Trimethylbenzene	4.70E-03	-9.30E-01	30a	2.23E-02	30b	2.70E-02	33	1.62E+02	2.21E+00	40b		
142-28-9	1,3-Dichloropropane	6.11E-04	-1.82E+00	30a	2.90E-03	30b	3.51E-03	33	6.92E+00	8.40E-01	40b		
108-60-1	2,2'-oxybis (1-Chloropropane)	1.22E-03	-1.52E+00	30a	5.80E-03	30b	7.02E-03	33	1.62E+01	1.21E+00	40b		
594-20-7	2,2-Dichloropropane	2.10E-03	-1.28E+00	30a	9.98E-03	30b	1.21E-02	33	3.54E+01	1.55E+00	40b		
625-86-5	2,5-Dimethylfuran	8.75E-04	-1.66E+00	30a	4.16E-03	30b	5.03E-03	33	1.06E+01	1.02E+00	40b		
2216-30-0	2,5-Dimethylheptane			--		--	0	--	0		--		--
17559-81-8	2,5-Dione, 3-hexene			--		--	0	--	0		--		--
78-93-3	2-Butanone	2.21E-05	-3.26E+00	30a	1.05E-04	30b	1.27E-04	33	3.16		40a	0	
95-49-8	2-Chlorotoluene	3.50E-03	-1.06E+00	30a	1.66E-02	30b	2.01E-02	33	8.58E+01	1.93E+00	40b	0	
591-78-6	2-Hexanone	2.14E-04	-2.27E+00	30a	1.02E-03	30b	1.23E-03	33	2.30E+00	3.63E-01	40b		
3221-61-2	2-Methyl octane			--	0	--		--			--		--
91-57-6	2-Methylnaphthalene	5.12E-03	-8.93E-01	30a	2.43E-02	30b	2.94E-02	33	2.01E+02	2.30E+00	40b		
34246-54-3	3-Ethyl benzaldehyde			--	0	--		--			--		--

TABLE 1
CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA'S HHRAP

		Biotransfer factor in milk (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)	LOG Ba,fat (Ba,fat in mg/kg fat / mg/day)		Biotransfer factor in beef (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)		Biotransfer factor in pork (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)		Bioconcentration factor in fish (L/kg FW OR unitless)	LOG BCF		Bioaccumulation factor in fish (mg COPC/kg FW tissue)/ (mg COPC/L total water column) OR (L water/kg FW tissue)	
CAS #	Compound name	Ba, milk	Log (Ba,fat)	Note	Ba, beef	Note	Ba, pork	Note	BCF, fish	log BCF	Note	BAF, fish	Note
763-93-9	3-Hexen-2-one			--	0	--		--			--		--
625-33-2	3-Penten-2-one (ethylidene acetone)			--	0	--		--			--		--
141-79-7	3-Penten-2-one, 4-methyl			--		--		--			--		--
534-52-1	4,6-Dinitro-2-methylphenol	7.34E-04	-1.74E+00	30a	3.49E-03	30b	4.22E-03	33	8.56E+00	9.32E-01	40b		
106-43-4	4-Chlorotoluene	3.22E-03	-1.09E+00	30a	1.53E-02	30b	1.85E-02	33	7.31E+01	1.86E+00	40b		
4748-78-1	4-Ethyl benzaldehyde			--		--		--			--		--
301-02-0	9-Octadecenamide (oleamide)			--		--		--			--		--
208-96-8	Acenaphthylene	5.82E-03	-8.37E-01	30a	2.76E-02	30b	3.35E-02	33	2.86E+02	2.46E+00	40b		
7429-90-5	Aluminum	0.0002		31	0.0015	31	0	34	500		42		
92-87-5	Benzidine	3.76E-04	-2.03E+00	30a	1.79E-03	30b	2.16E-03	33	4.06E+00	6.09E-01	40b		
192-97-2	Benzo(e)pyrene			--		--		--			--		--
191-24-2	Benzo(g,h,i)perylene	6.19E-03	-8.10E-01	30a	2.94E-02	30b	3.56E-02	33	7.28E+04	4.86E+00	40b +.48		
93-58-3	Benzoic acid, methyl ester (methyl benzoate)	7.34E-04	-1.74E+00	30a	3.49E-03	30b	4.22E-03	33	8.56E+00	9.32E-01	40b		
111-91-1	Bis(2-chloroethoxy) methane	6.15E-05	-2.81E+00	30a	2.92E-04	30b	3.54E-04	33	3.16		40a		

TABLE 1
CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA'S HHRAP

		Biotransfer factor in milk (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)	LOG Ba,fat (Ba,fat in mg/kg fat / mg/day)		Biotransfer factor in beef (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)		Biotransfer factor in pork (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)		Bioconcentration factor in fish (L/kg FW OR unitless)	LOG BCF		Bioaccumulation factor in fish (mg COPC/kg FW tissue)/ (mg COPC/L total water column) OR (L water/kg FW tissue)	
CAS #	Compound name	Ba, milk	Log (Ba,fat)	Note	Ba, beef	Note	Ba, pork	Note	BCF, fish	log BCF	Note	BAF, fish	Note
108-86-1	Bromobenzene	2.27E-03	-1.25E+00	30a	1.08E-02	30b	1.31E-02	33	4.00E+01	1.60E+00	40b		
74-97-5	Bromochloromethane			--	0	--		--			--		--
104-51-8	Butylbenzene, n-			--	0	--		--			--		--
135-98-8	Butylbenzene, sec			--		--		--			--		--
98-06-6	Butylbenzene, tert	5.85E-03	-8.35E-01	30a	2.78E-02	30b	3.37E-02	33	2.92E+02	2.46E+00	40b		
86-74-8	Carbazole	4.42E-03	-9.56E-01	30a	2.10E-02	30b	2.54E-02	33	1.41E+02	2.15E+00	40b		
7440-48-4	Cobalt	2.00E-03		31	0.02	31	0	34	300		42		
7440-50-8	Copper	1.50E-03		31	0.01	31	0	34	200		42		
2303-16-4	Diallate			--		--		--			--		--
132-64-9	Dibenzofuran	5.82E-03	-8.37E-01	30a	2.76E-02	30b	3.35E-02	33		2.46E+00		3.15E+02	41 (FCM =1.1)
122-39-4	Diphenylamine	3.75E-03	-1.03E+00	30a	1.78E-02	30b	2.16E-02	33	9.89E+01	2.00E+00	40b		
1031-07-8	Endosulfan sulfate	4.29E-03	-9.70E-01	30a	2.04E-02	30b	2.46E-02	33	1.31E+02	2.12E+00	40b		
7421-93-4	Endrin aldehyde	7.89E-03	-7.05E-01	30a	3.75E-02	30b	4.54E-02	33	9.91E+02	3.00E+00	40b		
53494-70-5	Endrin ketone			--		--		--			--		--

TABLE 1
CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA'S HHRAP

		Biotransfer factor in milk (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)	LOG Ba,fat (Ba,fat in mg/kg fat / mg/day)		Biotransfer factor in beef (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)		Biotransfer factor in pork (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)		Bioconcentration factor in fish (L/kg FW OR unitless)	LOG BCF		Bioaccumulation factor in fish (mg COPC/kg FW tissue)/ (mg COPC/L total water column) OR (L water/kg FW tissue)	
CAS #	Compound name	Ba, milk	Log (Ba,fat)	Note	Ba, beef	Note	Ba, pork	Note	BCF, fish	log BCF	Note	BAF, fish	Note
76-13-1	Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	2.72E-03	-1.17E+00	30a	1.29E-02	30b	1.56E-02	33	5.41E+01	1.73E+00	40b		
74-88-4	Iodomethane	2.70E-04	-2.17E+00	30a	1.28E-03	30b	1.55E-03	33	2.90E+00	4.63E-01	40b		
99-87-6	Isopropyl toluene, p-	5.82E-03	-8.37E-01	30a	2.76E-02	30b	3.35E-02	33	2.86E+02	2.46E+00	40b		
7439-96-5	Manganese	3.50E-04		31	4.00E-04	31	0	34	400		42		
62-75-9	N-nitrosodimethylamine	2.51E-06	-4.20E+00	30a	1.19E-05	30b	1.44E-05	33	3.16		40a		
198-55-0	Perylene			--		--		--			--		--
2240-47-3	Phosphine imide, P,P,P-triphenyl			--		--		--			--	0	--
103-65-1	Propylbenzene, n-			--		--		--			--	0	--
7440-62-2	Vanadium	2.00E-05		31	2.50E-03	31	0	34	0		42a		
58-89-9	γ-BHC (Lindane)	4.08E-03	-9.91E-01	30a	1.94E-02	30b	2.35E-02	33	1.18E+02	2.07E+00	40b		
319-86-8	δ-BHC	5.96E-03	-8.27E-01	30a	2.83E-02	30b	3.43E-02	33	0.00E+00	2.49E+00		3.38E+02	41 (FCM= 1.1)
110-54-3	1-Hexane (n-hexane)	5.12E-03	-8.93E-01	30a	2.43E-02	30b	2.94E-02	33	2.01E+02	2.30E+00	40b		
79-10-7	Acrylic Acid	1.63E-05	-3.39E+00	30a	7.73E-05	30b	9.36E-05	33	3.16		40c		
107-21-1	Ethylene Glycol	2.53E-07	-5.20E+00	30a	1.20E-06	30b	1.46E-06	33	3.16		40a		
80-62-6	Methyl methacrylate	2.14E-04	-2.27E+00	30a	1.02E-03	30b	1.23E-03	33	2.30E+00	3.63E-01	40b		

TABLE 1
CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA'S HHRAP

		Biotransfer factor in milk (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)	LOG Ba,fat (Ba,fat in mg/kg fat / mg/day)		Biotransfer factor in beef (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)		Biotransfer factor in pork (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)		Bioconcentration factor in fish (L/kg FW OR unitless)	LOG BCF		Bioaccumulation factor in fish (mg COPC/kg FW tissue)/ (mg COPC/L total water column) OR (L water/kg FW tissue)	
CAS #	Compound name	Ba, milk	Log (Ba,fat)	Note	Ba, beef	Note	Ba, pork	Note	BCF, fish	log BCF	Note	BAF, fish	Note
1634-04-4	methyl tert-butyl ether	1.53E-04	-2.42E+00	30a	7.25E-04	30b	8.77E-04	33	1.67E+00	2.24E-01	40b		
75-56-9	Propylene oxide	1.19E-05	-3.53E+00	30a	5.63E-05	30b	6.82E-05	33	3.16		40a		
33213-65-9	Endosulfan II	4.77E-03	-9.24E-01	30a	2.27E-02	30b	2.74E-02	33	1.68E+02	2.23E+00	40b		
7446-09-5	Sulfur dioxide	1.62E-08	-6.39E+00	30a	7.68E-08	30b	9.30E-08	33	3.16		40a		
10102-44-0	Nitrogen dioxide	2.44E-06	-4.21E+00	30a	1.16E-05	30b	1.41E-05	33	3.16		40a		
Compounds evaluated for fugitive vap													
106-99-0	1,3-Butadiene	NA	NA		NA		NA		NA			NA	
110-82-7	Cyclohexane	NA	NA		NA		NA		NA			NA	

-- = Not applicable - compound did not have chronic human health toxicity data, or ecological risk assessment toxicity reference values (TRVs), and thus was not evaluated in the multiple pathway fate and transport modeling.

NA = Not applicable. Compound was only evaluated for the inhalation pathway in the human health risk assessment addressing potential fugitive emissions.

TABLE 1
CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA'S HHRAP

		Biota-sediment accumulation factor in fish (mg COPC/kg lipid tissue)/(mg COPC/kg sediment) (unitless)		Plant-soil bioconcentration factor for grain (HHRAP variable = Br_{grain}) (same value used for Bra_g) (g COPC/g DW grain) / (g COPC/g DW soil) (unitless)		Biotransfer factor in eggs (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)		Biotransfer factor in chicken (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)	
CAS #	Compound name	BSAF, fish	Note	Br, grain	Note	Ba, egg	Note	Ba, chicken	Note
563-58-6	1,1-Dichloropropene		--		--		--		--
95-63-6	1,2,4-Trimethylbenzene			2.53E-01	37	9.40E-03	35b	1.65E-02	35a
142-28-9	1,3-Dichloropropane			2.70E+00	37	1.22E-03	35b	2.14E-03	35a
108-60-1	2,2'-oxybis (1-Chloropropane)			1.43E+00	37	2.44E-03	35b	4.27E-03	35a
594-20-7	2,2-Dichloropropane			7.95E-01	37	4.20E-03	35b	7.35E-03	35a
625-86-5	2,5-Dimethylfuran			1.96E+00	37	1.75E-03	35b	3.06E-03	35a
2216-30-0	2,5-Dimethylheptane		--		--		--		--
17559-81-8	2,5-Dione, 3-hexene		--		--		--		--
78-93-3	2-Butanone	0		8.38E+00	37	4.42E-05	35b	7.73E-05	35a
95-49-8	2-Chlorotoluene	0		4.09E-01	37	6.99E-03	35b	1.22E-02	35a
591-78-6	2-Hexanone			6.17E+00	37	4.28E-04	35b	7.49E-04	35a
3221-61-2	2-Methyl octane		--		--		--		--
91-57-6	2-Methylnaphthalene			2.16E-01	37	1.02E-02	35b	1.79E-02	35a
34246-54-3	3-Ethyl benzaldehyde		--		--		--		--

TABLE 1
CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA'S HHRAP

		Biota-sediment accumulation factor in fish (mg COPC/kg lipid tissue)/(mg COPC/kg sediment) (unitless)		Plant-soil bioconcentration factor for grain (HHRAP variable = Br_{grain}) (same value used for Bra_g) (g COPC/g DW grain) / (g COPC/g DW soil) (unitless)		Biotransfer factor in eggs (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)		Biotransfer factor in chicken (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)	
CAS #	Compound name	BSAF, fish	Note	Br, grain	Note	Ba, egg	Note	Ba, chicken	Note
763-93-9	3-Hexen-2-one		--		--		--		--
625-33-2	3-Penten-2-one (ethylidene acetone)		--		--		--		--
141-79-7	3-Penten-2-one, 4-methyl		--		--		--		--
534-52-1	4,6-Dinitro-2-methylphenol			2.30E+00	37	1.47E-03	35b	2.57E-03	35a
106-43-4	4-Chlorotoluene			4.61E-01	37	6.43E-03	35b	1.13E-02	35a
4748-78-1	4-Ethyl benzaldehyde		--		--		--		--
301-02-0	9-Octadecenamide (oleamide)		--		--		--		--
208-96-8	Acenaphthylene			1.65E-01	37	1.16E-02	35b	2.04E-02	35a
7429-90-5	Aluminum			6.50E-04	38	0	36	0	36
92-87-5	Benzidine			4.03E+00	37	7.52E-04	35b	1.32E-03	35a
192-97-2	Benzo(e)pyrene		--		--		--		--
191-24-2	Benzo(g,h,i)perylene			5.93E-03	37	1.24E-02	35b	2.17E-02	35a
93-58-3	Benzoic acid, methyl ester (methyl benzoate)			2.30E+00	37	1.47E-03	35b	2.57E-03	35a
111-91-1	Bis(2-chloroethoxy) methane			8.38E+00	37	1.23E-04	35b	2.15E-04	35a

TABLE 1
CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA'S HHRAP

		Biota-sediment accumulation factor in fish (mg COPC/kg lipid tissue)/(mg COPC/kg sediment) (unitless)		Plant-soil bioconcentration factor for grain (HHRAP variable = Br_{grain}) (same value used for Bra_g) (g COPC/g DW grain) / (g COPC/g DW soil) (unitless)		Biotransfer factor in eggs (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)		Biotransfer factor in chicken (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)	
CAS #	Compound name	BSAF, fish	Note	Br, grain	Note	Ba, egg	Note	Ba, chicken	Note
108-86-1	Bromobenzene			7.24E-01	37	4.54E-03	35b	7.95E-03	35a
74-97-5	Bromochloromethane		--		--		--		--
104-51-8	Butylbenzene, n-		--		--		--		--
135-98-8	Butylbenzene, sec		--		--		--		--
98-06-6	Butylbenzene, tert			1.63E-01	37	1.17E-02	35b	2.05E-02	35a
86-74-8	Carbazole			2.81E-01	37	8.85E-03	35b	1.55E-02	35a
7440-48-4	Cobalt			7.00E-03	38	0	36	0	36
7440-50-8	Copper			2.50E-01	38	0	36	0	36
2303-16-4	Diallate		--		--		--		--
132-64-9	Dibenzofuran			1.65E-01	37	1.16E-02	35b	2.04E-02	35a
122-39-4	Diphenylamine			3.67E-01	37	7.50E-03	35b	1.31E-02	35a
1031-07-8	Endosulfan sulfate			2.97E-01	37	8.57E-03	35b	1.50E-02	35a
7421-93-4	Endrin aldehyde			6.51E-02	37	1.58E-02	35b	2.76E-02	35a
53494-70-5	Endrin ketone		--		--		--		--

TABLE 1
CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA'S HHRAP

		Biota-sediment accumulation factor in fish (mg COPC/kg lipid tissue)/(mg COPC/kg sediment) (unitless)		Plant-soil bioconcentration factor for grain (HHRAP variable = Br_{grain}) (same value used for Bra_g) (g COPC/g DW grain) / (g COPC/g DW soil) (unitless)		Biotransfer factor in eggs (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)		Biotransfer factor in chicken (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)	
CAS #	Compound name	BSAF, fish	Note	Br, grain	Note	Ba, egg	Note	Ba, chicken	Note
76-13-1	Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)			5.77E-01	37	5.44E-03	35b	9.52E-03	35a
74-88-4	Iodomethane			5.19E+00	37	5.41E-04	35b	9.46E-04	35a
99-87-6	Isopropyl toluene, p-			1.65E-01	37	1.16E-02	35b	2.04E-02	35a
7439-96-5	Manganese			5.00E-02	38	0	36	0	36
62-75-9	N-nitrosodimethylamine			8.38E+00	37	5.02E-06	35b	8.79E-06	35a
198-55-0	Perylene		--		--		--		--
2240-47-3	Phosphine imide, P,P,P-triphenyl		--		--		--		--
103-65-1	Propylbenzene, n-		--		--		--		--
7440-62-2	Vanadium			3.00E-03	38	0	36	0	36
58-89-9	γ-BHC (Lindane)			3.22E-01	37	8.17E-03	35b	1.43E-02	35a
319-86-8	δ-BHC			1.57E-01	37	1.19E-02	35b	2.09E-02	35a
110-54-3	1-Hexane (n-hexane)			2.16E-01	37	1.02E-02	35b	1.79E-02	35a
79-10-7	Acrylic Acid			8.38E+00	37	3.26E-05	35b	5.70E-05	35a
107-21-1	Ethylene Glycol			8.38E+00	37	5.07E-07	35b	8.87E-07	35a
80-62-6	Methyl methacrylate			6.17E+00	37	4.28E-04	35b	7.49E-04	35a

TABLE 1
CHEMICAL-SPECIFIC PARAMETERS FOR COMPOUNDS NOT IN USEPA'S HHRAP

		Biota-sediment accumulation factor in fish (mg COPC/kg lipid tissue)/(mg COPC/kg sediment) (unitless)		Plant-soil bioconcentration factor for grain (HHRAP variable = Br_{grain}) (same value used for Bra_{g}) (g COPC/g DW grain) / (g COPC/g DW soil) (unitless)		Biotransfer factor in eggs (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)		Biotransfer factor in chicken (mg COPC/kg FW tissue)/ (mg COPC/day) OR (day/kg FW tissue)	
CAS #	Compound name	BSAF, fish	Note	Br, grain	Note	Ba, egg	Note	Ba, chicken	Note
1634-04-4	methyl tert-butyl ether			7.84E+00	37	3.05E-04	35b	5.34E-04	35a
75-56-9	Propylene oxide			8.38E+00	37	2.37E-05	35b	4.15E-05	35a
33213-65-9	Endosulfan II			2.46E-01	37	9.54E-03	35b	1.67E-02	35a
7446-09-5	Sulfur dioxide			7.24E+02	37	3.24E-08	35b	5.66E-08	35a
10102-44-0	Nitrogen dioxide			8.38E+01	37	4.89E-06	35b	8.56E-06	35a
Compounds evaluated for fugitive vap									
106-99-0	1,3-Butadiene	NA		NA		NA		NA	
110-82-7	Cyclohexane	NA		NA		NA		NA	

-- = Not applicable - compound did not have chronic human health toxicity data, or ecological risk assessment toxicity reference values (TRVs), and thus was not evaluated in the multiple pathway fate and transport modeling.

NA = Not applicable. Compound was only evaluated for the inhalation pathway in the human health risk assessment addressing potential fugitive emissions.

TABLE 2

REFERENCES FOR NOTES INCLUDED IN CHEMICAL-PHYSICAL PROPERTIES TABLE

TABLE 2
REFERENCES FOR NOTES INCLUDED IN CHEMICAL-PHYSICAL PROPERTIES TABLE

Note	Parameter	Description
1	Molecular weight (MW), melting point (Tm), vapor pressure (VP), water solubility (S), Henry's law constant (H), log octanol:water partition coefficient (log Kow), soil:water partition coefficient (Kd)	Superfund Chemical Data Matrix – USEPA (2005) Appendix A-2 recommended source
2	Molecular weight (MW), melting point (Tm), vapor pressure (VP), water solubility (S), Henry's law constant (H), log octanol:water partition coefficient (log Kow)	CHEMFATE (www/esc.syrres.com/eSc/chemfate.htm) – USEPA (2005) Appendix A-2 recommended source
3	Molecular weight (MW), melting point (Tm), vapor pressure (VP), water solubility (S), Henry's law constant (H), log octanol:water partition coefficient (log Kow)	Physprop (www.syrres.com/eSc/physdemo.htm) - USEPA (2005) Appendix A-2 recommended source
3a	Henry's law constant (H)	As directed in HHRAP, for metals, if no value is provided in sources 1, 2 or 3, assign a value of 0 (page A-2-8)
5	Organic carbon:water partition coefficient (Koc), soil:water partition coefficient (Kd)	USEPA's Soil Screening Guidance - USEPA (2005) Appendix A-2 recommended source
6	Air diffusivity (Da), water diffusivity (Dw)	USEPA's Water9 Model - USEPA (2005) Appendix A-2 recommended source
6a	Air diffusivity (Da), water diffusivity (Dw)	Per HHRAP, if no value is available in USEPA's WATER9 model, calculate based on molecular weight - HHRAP Equations A-2-4 and A-2-5
7	Soil:water partition coefficient (Kd)	Baes et al. (1984) - USEPA (2005) Appendix A-2 recommended source
8	Water solubility (S)	For compounds that are miscible, use USEPA default of 1E+6 mg/L
9	Organic carbon:water partition coefficient (Koc)	Calculate according to HHRAP Equation A-2-7

TABLE 2
REFERENCES FOR NOTES INCLUDED IN CHEMICAL-PHYSICAL PROPERTIES TABLE

Note	Parameter	Description
10	Organic carbon:water partition coefficient (Koc)	Calculate according to HHRAP Equation A-2-8
11	Organic carbon:water partition coefficient (Koc)	According to HHRAP, default value for Koc for metals is 0.
12	Organic carbon:water partition coefficient (Koc)	IWEM default chemical properties data. www.epa.gov/epaoswer/non-hw/industd/iwem_tbd.htm.
13	Soil:water partition coefficient (Kd_s)	Calculate according to HHRAP Equation A-2-10
14	Suspended sediment:water partition coefficient (Kd_{sw})	Calculate according to HHRAP Equation A-2-11
14b	Suspended sediment:water partition coefficient (Kd_{sw}), benthic sediment:water partition coefficient (Kd_{bs})	According to HHRAP, for metals, assume Kd_{sw} and $Kd_{bs} = Kd_s$
15	Benthic sediment:water partition coefficient (Kd_{bs})	Calculate according to HHRAP Equation A-2-12
16	Fraction vapor (fv)	Calculate according to HHRAP Equation A-2-1
16a	Fraction vapor (fv)	According to HHRAP, for metals, assume fv = 0
17	Fraction vapor (fv)	Calculate according to HHRAP Equations A-2-2 and A-2-1
18	Log root concentration factor (RCF)	Calculate according to HHRAP Equation A-2-14
19	Log root concentration factor (RCF)	Calculate according to HHRAP Equation A-2-15
20	Root concentration factor (RCF_{FW})	Calculate according to HHRAP Equation A-2-16
21	Root concentration factor (RCF_{FW})	According to HHRAP, set RCF = 6.39 if log Kow < -0.57
21a	Root concentration factor (RCF_{FW})	According to HHRAP, for metals, assume RCF = 0
22	Soil-to-plant bioconcentration factor for below ground produce ($Br_{rootveg}$)	Calculate according to HHRAP Equation A-2-16

TABLE 2
REFERENCES FOR NOTES INCLUDED IN CHEMICAL-PHYSICAL PROPERTIES TABLE

Note	Parameter	Description
23	Soil-to-plant bioconcentration factor for below ground produce ($Br_{rootveg}$)	According to HHRAP, values for metals obtained from Baes et al. 1984
24	Melting point (Tm), vapor pressure (VP), water solubility (S), Henry's law constant (H), log octanol:water partition coefficient (log Kow), organic carbon:water partition coefficient (Koc)	USEPA's EpiSuite™.v3 Program (Estimation Programs Interface) (http://www.epa.gov/oppt/exposure/pubs/episuite.htm)
25	Soil-to-plant bioconcentration factor for aboveground produce (Br_{ag}), soil-to-plant bioconcentration factor for forage and silage (Br_{forage})	Calculate according to HHRAP Equations A-2-17 and A-2-18 (equations are identical for the produce types)
25a	Soil-to-plant bioconcentration factor for aboveground produce (Br_{ag}), soil-to-plant bioconcentration factor for forage and silage (Br_{forage})	According to HHRAP, set Br_{ag} and Br_{forage} = 8.38 if log Kow < 1.15
26	Soil-to-plant bioconcentration factor for forage and silage (Br_{forage})	For metals, use values in Baes et al. 1984 for B_v (vegetative growth-leaves and stems, Figure 2.1 in Baes)
27	Soil-to-plant bioconcentration factor for aboveground produce (Br_{ag})	For metals, use weighted average of values in Baes et al. 1984 for B_v (vegetative growth-leaves and stems) and Br (reproductive growth – fruit, seeds, tubers, Figure 2.2 in Baes), weighting by consumption (pp. A-2-18 to A-2-19)
28	Air-to-plant biotransfer factor in aboveground produce (Bv_{ag}), air-to-plant biotransfer factor for forage and silage (Bv_{forage})	Calculate according to HHRAP Equations A-2-19 and A-2-20
29	Air-to-plant biotransfer factor in aboveground produce (Bv_{ag}), air-to-plant biotransfer factor for forage and silage (Bv_{forage})	According to HHRAP, for metals, assume air-to-leaf transfer = 0

TABLE 2
REFERENCES FOR NOTES INCLUDED IN CHEMICAL-PHYSICAL PROPERTIES TABLE

Note	Parameter	Description
30	Log fat biotransfer coefficient (Ba_{fat})	Calculate according to HHRAP Equation A-2-21
30a	Biotransfer factor in milk (Ba_{milk})	Calculate according to HHRAP Equation A-2-22 (not used because dairy milk pathway was not evaluated – see main text)
30b	Biotransfer factor in beef (Ba_{beef})	Calculate according to HHRAP Equation A-2-23
31	Biotransfer factor in milk (Ba_{milk}), biotransfer factor in beef (Ba_{beef})	According to HHRAP, values for metals obtained from Baes et al. 1984 (Figure 2.25 for beef and Figure 2.24 for milk)
33	Biotransfer factor in pork (Ba_{pork})	Calculate according to HHRAP Equation A-2-26
34	Biotransfer factor in pork (Ba_{pork})	According to HHRAP, values for metals assumed to be 0
35a	Biotransfer factor in chicken/poultry ($Ba_{chicken}$)	Calculate according to HHRAP Equation A-2-27
35b	Biotransfer factor in eggs (Ba_{egg})	Calculate according to HHRAP Equation A-2-28
36	Biotransfer factor in eggs (Ba_{egg}), biotransfer factor in chicken/poultry ($Ba_{chicken}$)	Following HHRAP guidance, for metals, $Ba_{chicken}$ and Ba_{egg} assumed to be 0
37	Soil-to-plant bioconcentration factor for grain (Br_{grain})	Use Br_{forage} values (p. A-2-17)
38	Soil-to-plant bioconcentration factor for grain (Br_{grain})	For metals, use values in Baes et al. for Br (reproductive growth – fruit, seeds, tubers, Figure 2.2 in Baes)
40a	Fish bioconcentration factor (BCF)	Calculate according to HHRAP Equation A-2-27
40b	Fish bioconcentration factor (BCF)	Calculate according to HHRAP Equation A-2-28
40c	Fish bioconcentration factor (BCF)	Calculate according to HHRAP Equation A-2-31
41	Fish bioconcentration factor (BCF)	Calculate according to HHRAP Equation A-2-28 multiplied by a Food Chain Multiplier (FCM) obtained from USEPA's 1999 Screening Level Ecological Risk Assessment Protocol (Table 5-2)
42	Fish bioconcentration factor (BCF)	Values for metals obtained from Oak Ridge National Laboratory, Risk Assessment Information System (RAIS). Rais.ornl.gov/homepage/rap_tool.shtml

TABLE 2
REFERENCES FOR NOTES INCLUDED IN CHEMICAL-PHYSICAL PROPERTIES TABLE

Note	Parameter	Description
42a	Fish bioconcentration factor (BCF)	A bioconcentration factor for vanadium was not provided in RAIS. Fish uptake is low for this compound (Miramand, Fowler and Guary. 2004. Experimental study on vanadium transfer in the benthic fish Gobius minutus. Marine Biol. 114:349-353)
43	Vapor pressure (VP), organic carbon:water partition coefficient (Koc)	Following HHRAP guidance for metals, a default value of 0 is used
44	Soil loss constant due to biotic and abiotic degradation (Ksg)	Assume a conservative default value of 0
45	Soil loss constant due to biotic and abiotic degradation (Ksg)	Calculate according to HHRAP Equation A-2-13, based on data in ATSDR. 2001. Toxicological Profile for Benzidine

APPENDIX E

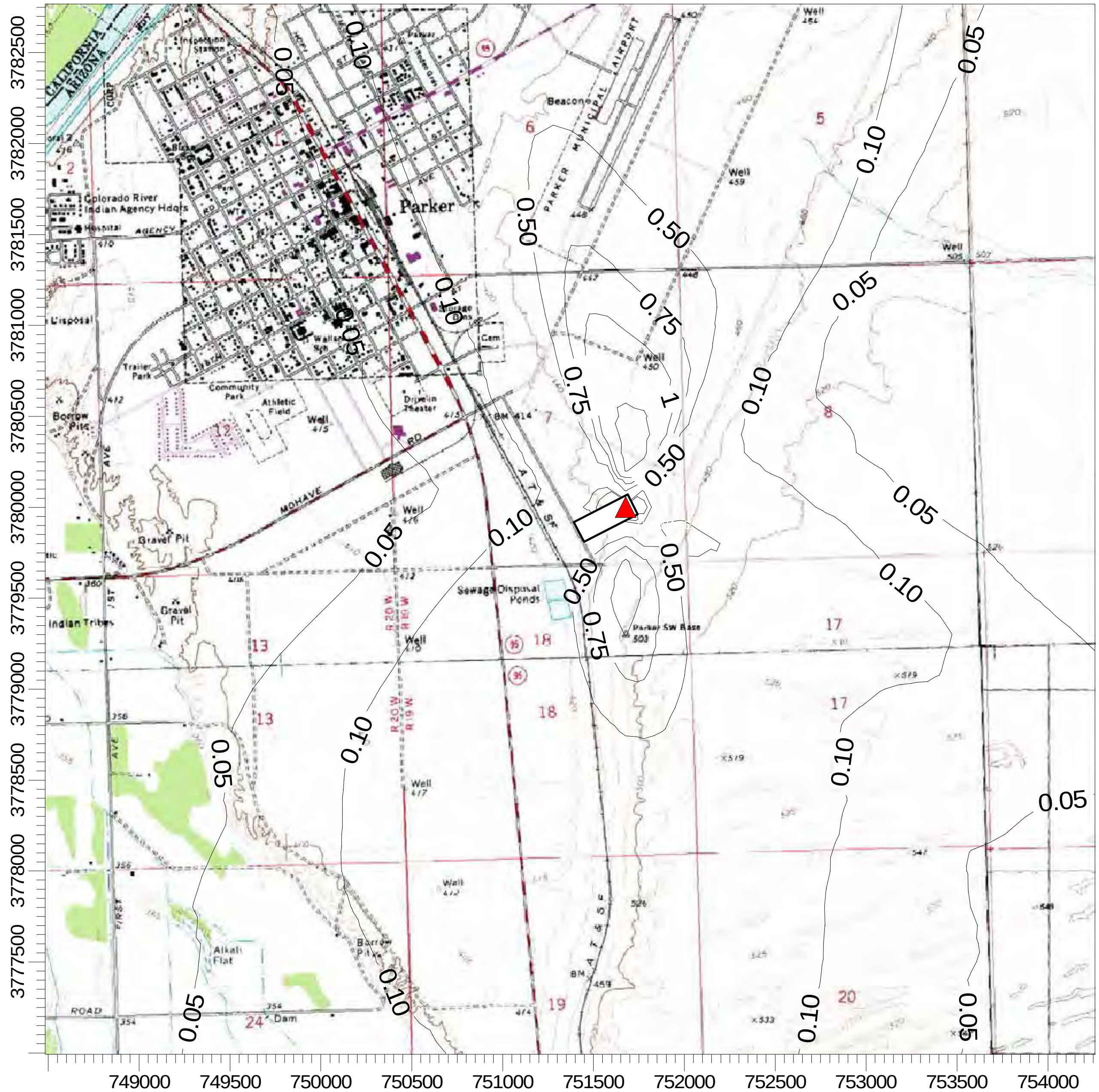
ISOPLETHS OF UNITIZED DISPERSION AND DEPOSITION MODELING RESULTS FOR STACK EMISSIONS

APPENDIX E

ISOPLETHS OF UNITIZED DISPERSION AND DEPOSITION MODELING RESULTS FOR STACK EMISSIONS

LIST OF FIGURES

Unitized Annual Average ISCST3 Modeling Results
Vapor Phase Air Concentrations (ug/m3 per 1 g/sec)



Note: The isopleth lines show results based on a unit, 1 gram per second (1 g/sec), stack emission rate. Chemical-specific results may be calculated by multiplying the unitized results by the gram per second chemical stack emission rate.

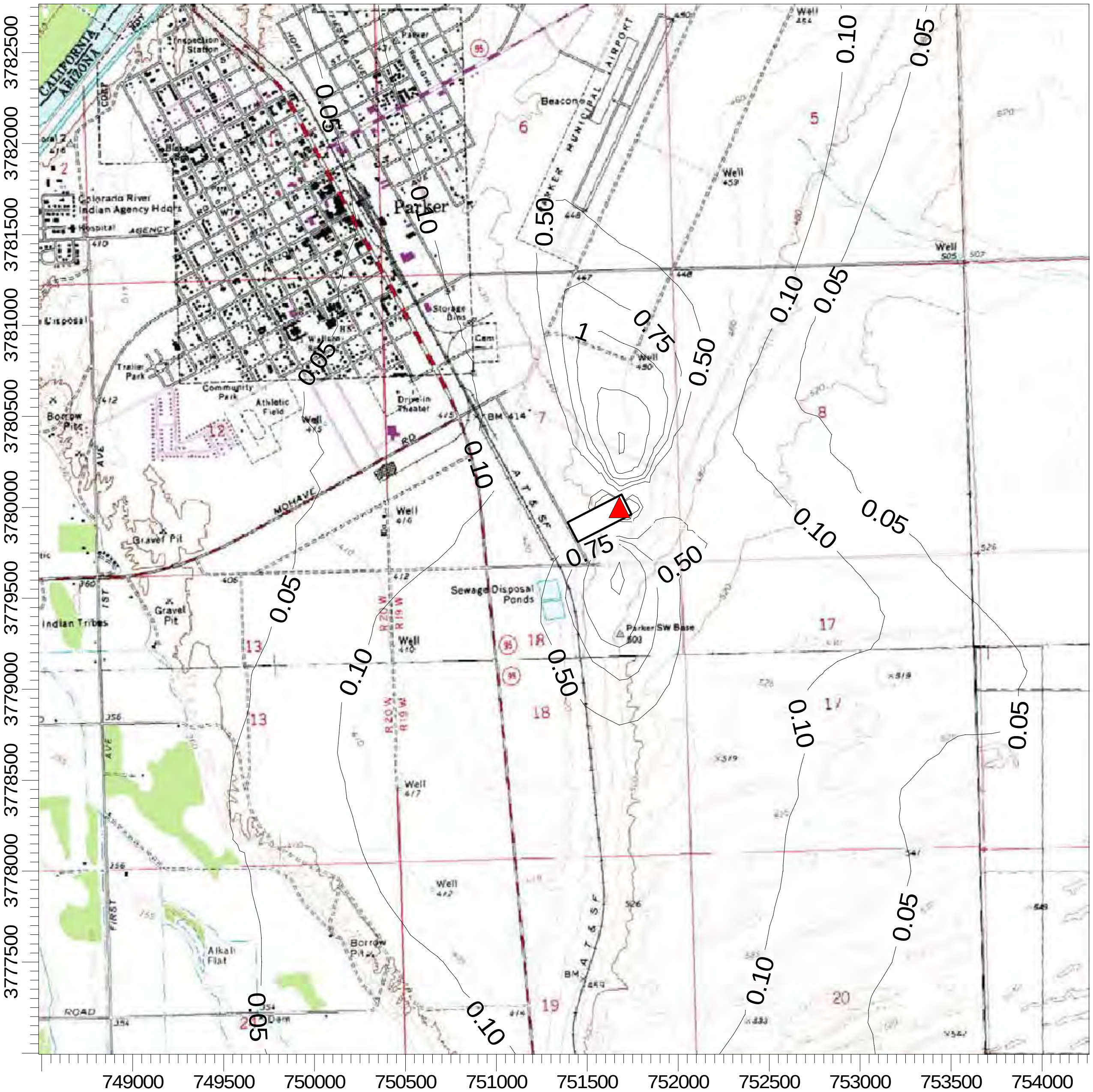
SCALE: 1:35,238

0 — 1 km

7/18/2007

IRAP-h View - Lakes Environmental Software

Unitized Annual Average ISCST3 Modeling Results
Particle Phase (Mass Weighted) Air Concentrations (ug/m3 per 1 g/sec)



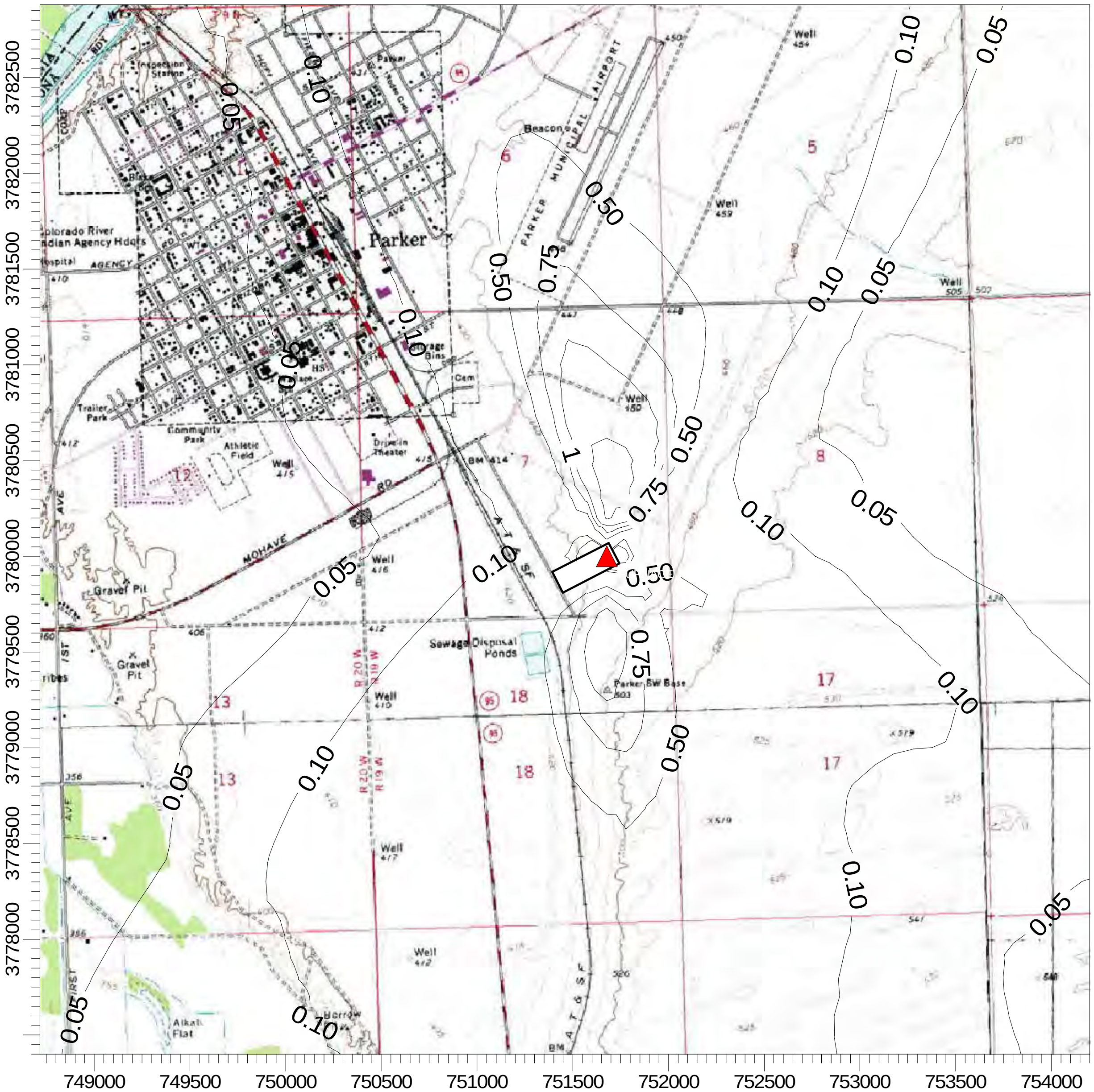
Note: The isopleth lines show results based on a unit, 1 gram per second (1 g/sec), stack emission rate. Chemical-specific results may be calculated by multiplying the unitized results by the gram per second chemical stack emission rate.

SCALE: 1:35,238

0 1 km

7/18/2007

Unitized Annual Average ISCST3 Modeling Results
Particle Bound (Surface Area Weighted) Air Concentrations (ug/m3 per 1 g/sec)



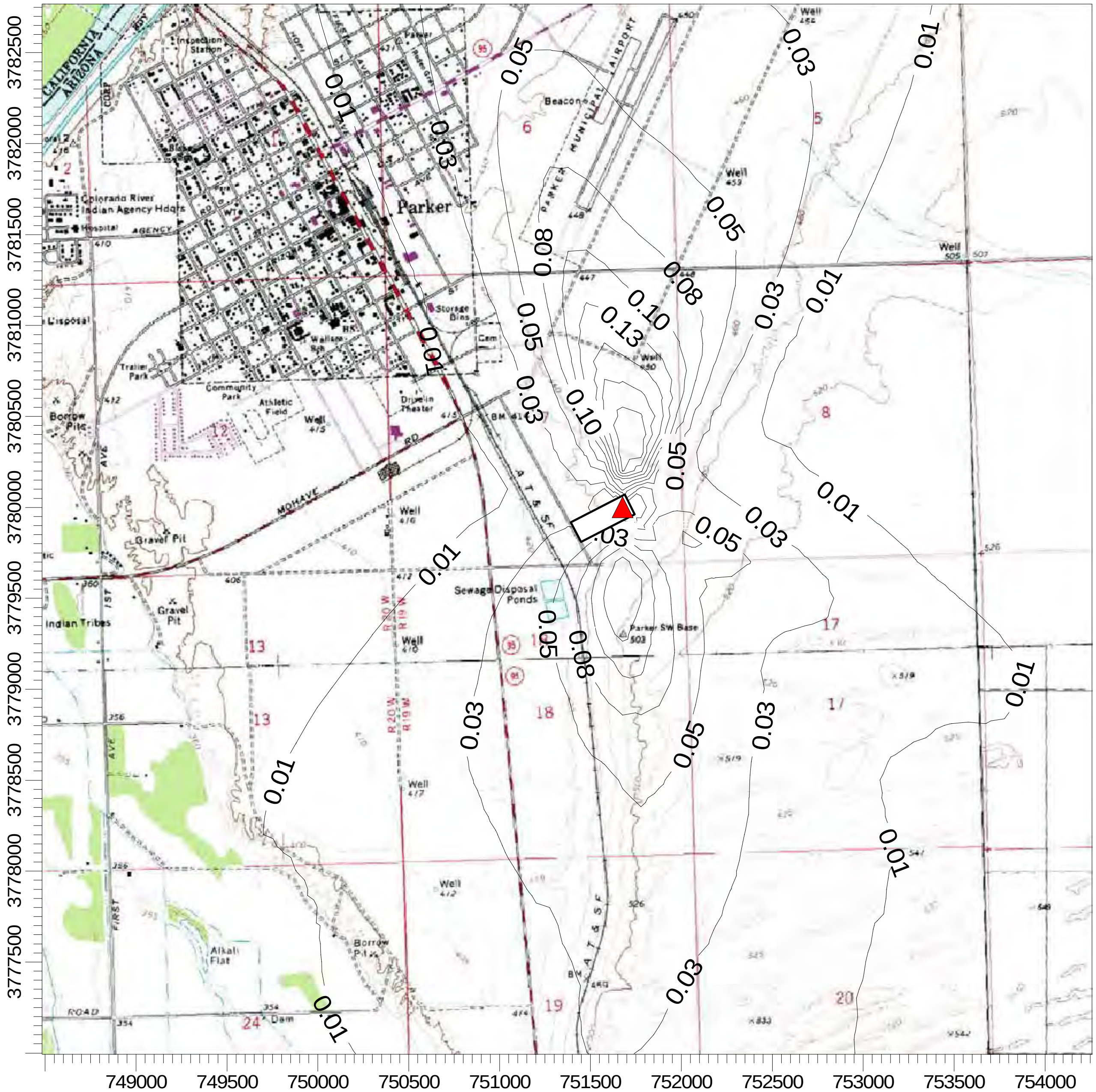
Note: The isopleth lines show results based on a unit, 1 gram per second (1 g/sec), stack emission rate. Chemical-specific results may be calculated by multiplying the unitized results by the gram per second chemical stack emission rate.

SCALE: 1:33,449

0 — 1 km

7/17/2007

Unitized Annual Average ISCST3 Modeling Results
Dry Deposition Rates for Vapor Phase Emissions (g/m2-yr per 1 g/sec)



Note: The isopleth lines show results based on a unit, 1 gram per second (1 g/sec), stack emission rate. Chemical-specific results may be calculated by multiplying the unitized results by the gram per second chemical stack emission rate.

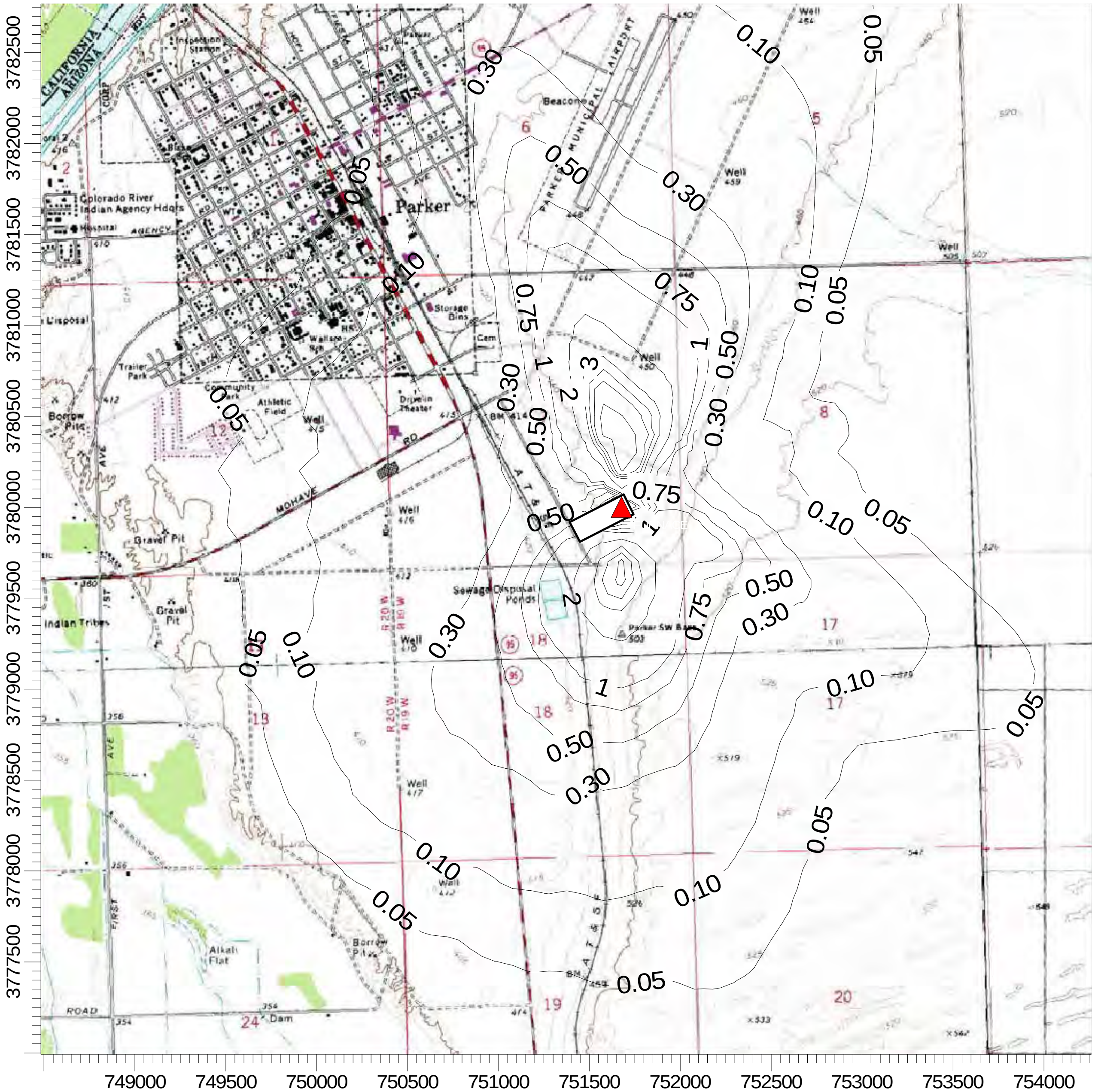
SCALE: 1:35,238

0 1 km

7/18/2007

IRAP-h View - Lakes Environmental Software

Unitized Annual Average ISCST3 Modeling Results
Dry Deposition Rates for Particle Emissions - Mass Weighted (g/m2-yr per 1 g/sec)



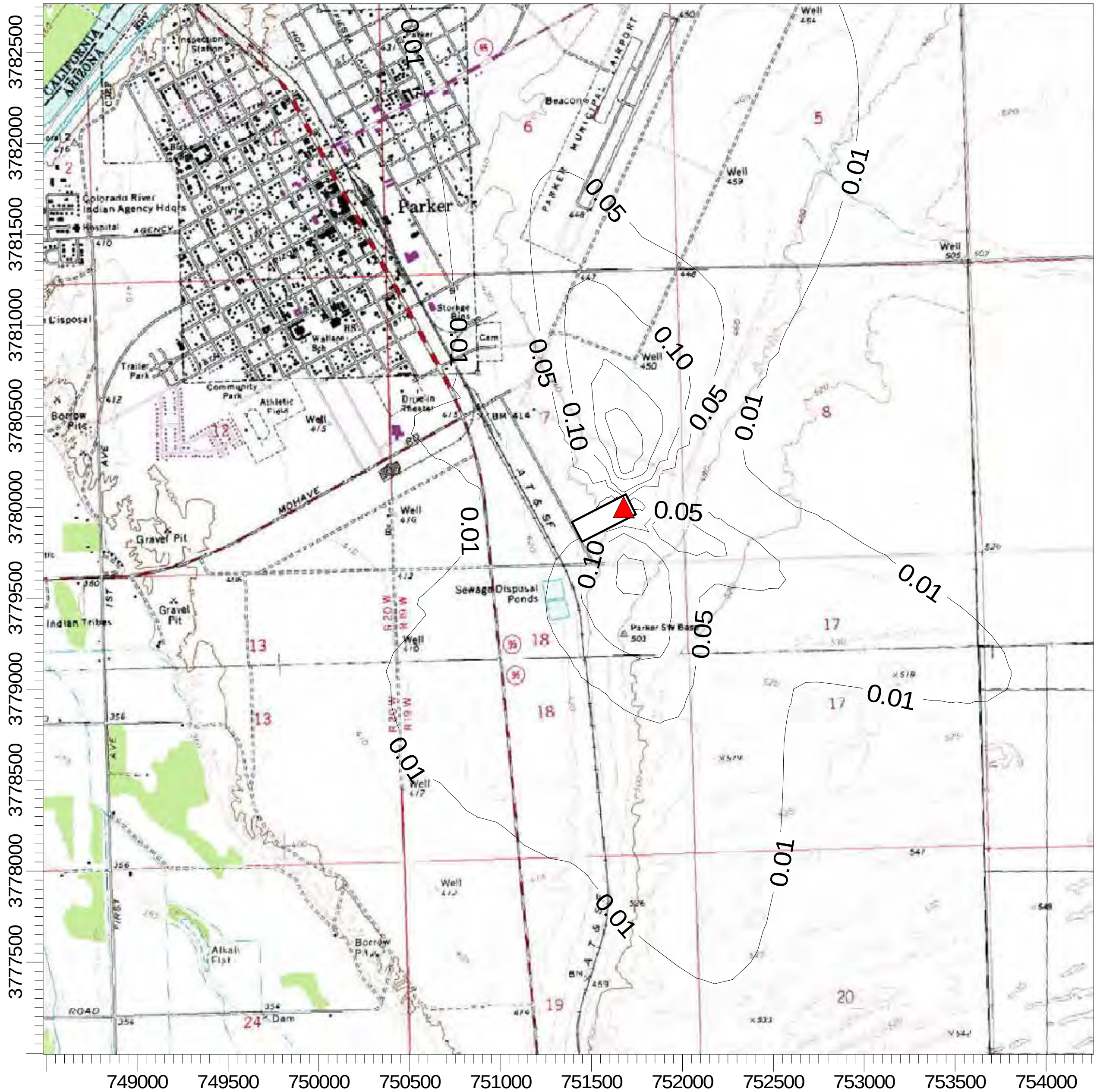
Note: The isopleth lines show results based on a unit, 1 gram per second (1 g/sec), stack emission rate. Chemical-specific results may be calculated by multiplying the unitized results by the gram per second chemical stack emission rate.

SCALE: 1:35,238

0 1 km

7/18/2007

Unitized Annual Average ISCST3 Modeling Results
Dry Deposition Rates for Particles - Surface Area Weighted (g/m2-yr per 1 g/sec)



Note: The isopleth lines show results based on a unit, 1 gram per second (1 g/sec), stack emission rate. Chemical-specific results may be calculated by multiplying the unitized results by the gram per second chemical stack emission rate.

SCALE: 1:35,238

0 — 1 km

7/18/2007

APPENDIX D

AIR DISPERSION AND DEPOSITION MODELING

APPENDIX D

Air Dispersion and Deposition Modeling for the Siemens Water Technologies Corp. Carbon Reactivation Facility in Parker, Arizona

Prepared For:
CPF Associates, Inc.
7708 Takoma Avenue
Takoma Park, MD

Prepared By:
TRC
1200 Wall Street West, 2nd Floor
Lyndhurst, New Jersey 07071

July 2007

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Appendix: ISCST3 Modeling Input and Output Files

LIST OF ABBREVIATIONS

AZMET	Arizona Meteorological Network
ft	Feet
HHRAP	Human Health Risk Assessment Protocol published in 2005 by USEPA
ISCST3	Industrial Source Complex Short-Term 3 air model
km	Kilometer
MPRM	Meteorological Processor for Regulatory Models
NLCD	National Land Cover Data
NWS	National Weather Service
PDT	Performance Demonstration Test
SWT	Siemens Water Technologies Corp.
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey

1.0 INTRODUCTION

This appendix documents the air dispersion and deposition modeling performed to support the human health and ecological risk assessment for the Siemens Water Technologies Corp. (SWT) Carbon Reactivation Facility ("Facility"). The risk assessment, and dispersion and deposition modeling, were performed according to a U.S. Environmental Protection Agency (USEPA) approved Risk Assessment Workplan ("Workplan") developed in 2003, updated by agreement with the USEPA to include elements of more recent 2005 USEPA guidance for risk assessments of waste combustion facilities.

The air modeling conducted for the Facility was prepared using methodologies outlined in an appendix to the 2003 Workplan entitled "Air Dispersion and Deposition Modeling Protocol Report." The modeling was also consistent with the procedures found in USEPA's 2005 guidance entitled "Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities" (HHRAP). The modeling approach was approved in advance by USEPA prior to initiation of this work.

The air modeling analysis for the Facility consisted of modeling stack emissions from the carbon reactivation furnace stack (RF-2) and fugitive air emissions from the outdoor hopper (H-1). The air model used was the most recent version of the Industrial Source Complex Short-Term model available from the USEPA (ISCST3, Version 02035). This model was developed and approved by USEPA. The ISCST3 model was run using unitized (i.e., 1.0 gram per second) emission rates. These unit emission rates were used to calculate hourly and annual average unitized concentrations and deposition rates. Chemical-specific concentrations and deposition rates can be calculated by multiplying the unitized results by chemical-specific emission rates. Consistent with USEPA guidance in HHRAP, modeling results for the stack were calculated to address three types of stack emission characteristics consisting of vapor phase emissions, particle phase emissions distributed by particle mass, and particle phase emissions distributed by particle surface area.

The remainder of this appendix provides additional details about the dispersion and deposition modeling performed for this project.

2.0 FACILITY LOCATION AND LAND USE

The SWT Facility is located at 2523 Mutahar Road, approximately 1 mile southeast of Parker in La Paz County, Arizona. Figure 2-1 presents a portion of the Parker, Arizona 7.5' United States Geological Survey (USGS) quadrangle showing the location of the site and the surrounding terrain. The site is approximately located at Latitude 34^{o} 07' 57" N and Longitude 114^{o} 16' 15" W, North American Datum of 1927.

The ISCST3 model includes dispersion coefficients which vary depending upon whether an area is characterized as primarily rural or urban. This classification was determined for the Facility area by conducting a land use analysis consistent with the procedures contained in the A.H. Auer paper "Correlation of Land Use and Cover with Meteorological Anomalies" (Auer, 1978). This procedure characterizes the uses of various industrial, commercial, residential, and agricultural/natural areas within a 3 km radius circle centered on the site being evaluated. Essentially, if more than 50 percent of the area within this circle is designated I1, I2, C1, R2, and R3 (industrial, light industrial, commercial, and compact residential), urban dispersion parameters should be used; otherwise, the modeling should use rural dispersion parameters.

According to standard USEPA modeling procedures, the land use classification was performed using the most recent available USGS National Land Cover Data (NLCD).[1] In the NLCD, USGS identifies land cover classes based on Landsat Thematic Mapper satellite imagery with a spatial resolution of 30 meters and supplemented by various ancillary data where available. The analysis and interpretation of the satellite imagery is conducted by USGS using very large image mosaics. For this project, the most recent NLCD, from 1992, was obtained for Arizona and its land cover data were used to determine surface characteristics within 3 km of the Facility. A TRC-developed land cover tabulation program was used to read the NLCD tag image file format (TIFF) image file and to extract and sum the land cover categories for each 30 m by 30 m grid cell within each of 12 adjacent 30 degree sectors around the Facility location. The results of this analysis are tabulated in Table 2-1 and are shown in Figure 2-2.

[1] The land cover datasets are provided on the USGS Internet website at http://edcsgs9.cr.usgs.gov/pub/data/landcover/states/.

Figure 2-1: Site Location Map

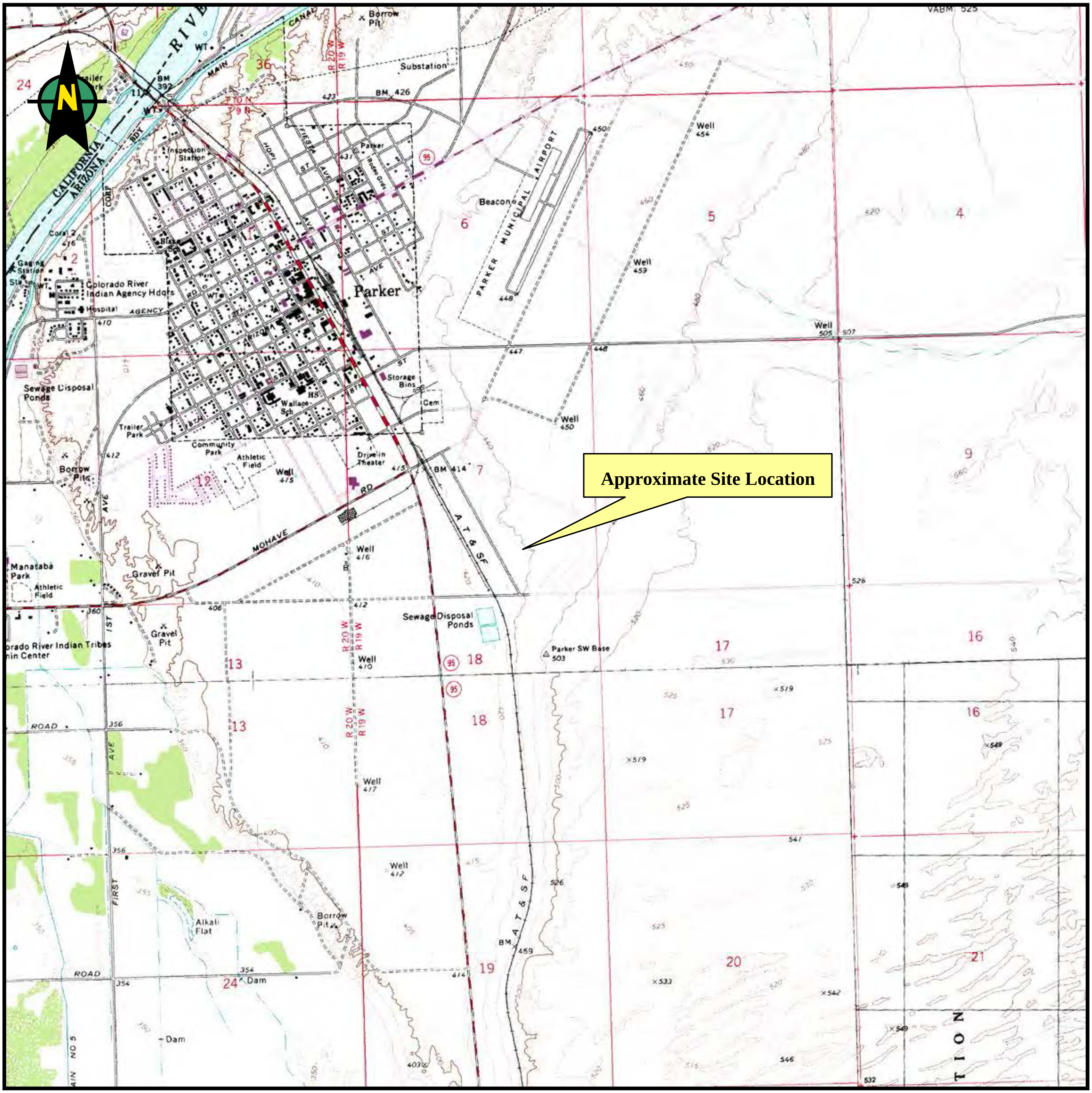
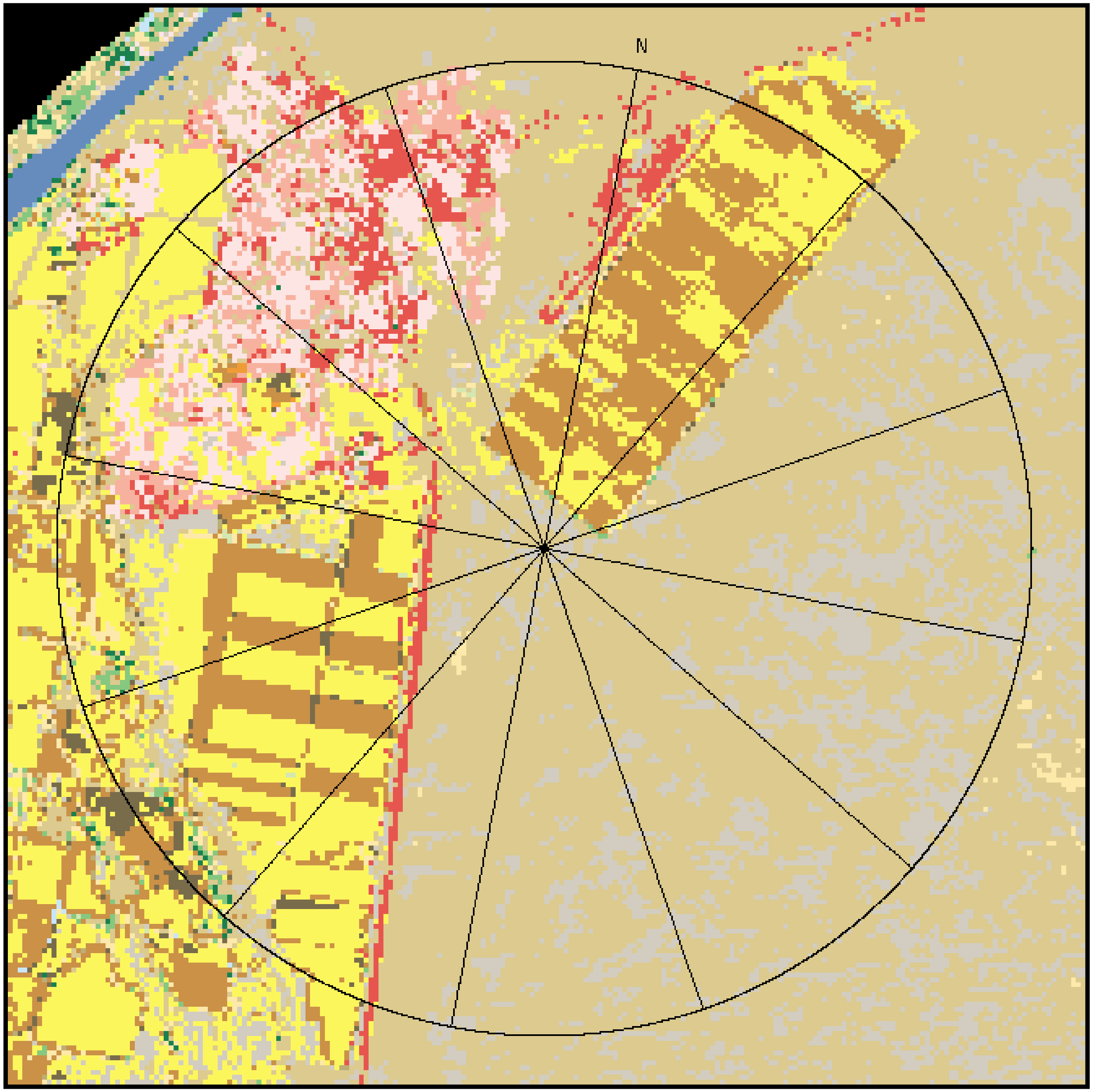


Figure 2-2: Land Use within 3-Kilometers of Facility Site



National Land Cover Dataset Classification System Legend

Color Key	RGB Value	Class Number and Name
	102, 140, 190	11 - Open Water
	255,255,255	12 - Perennial Ice/Snow
	253, 229, 228	21 - Low Intensity Residential
	247, 178, 159	22 - High Intensity Residential
	231, 86, 78	23 - Commerical/Industrial/Transportation
	210, 205, 192	31 - Bare Rock/Sand/Clay
	175, 175, 177	32 - Quarries/Strip Mines, Gravel Pits
	83, 62, 118	33 - Transitional
	134, 200, 127	41 - Deciduous Forest
	26, 129, 78	42 - Evergreen Forest
	212, 231, 177	43 - Mixed Forest
	220, 202, 143	51 - Shrubland
	187, 174, 118	61 - Orchards/Vineyards
	253, 233, 170	71 - Grasslands/Herbaceous
	252, 246, 93	81 - Pasture/Hay
	202, 145, 71	82 - Row Crops
	121, 108, 75	83 - Small Grains
	244, 238, 203	84 - Fallow
	240, 156, 054	85 - Urban/Recreational Grasses
	201, 230, 249	91 - Woody Wetlands
	144, 192, 217	92 - Emergent Herbaceous Wetlands

Approximately 88 percent of the land use surrounding the Facility is classified as agricultural rural, uncultivated, or undeveloped rural (A2, A3, or A4, respectively) according to the Auer classification technique. These classifications are considered rural and thus rural dispersion coefficients were used in the air modeling analysis. While there are some uncertainties in the USGS NLCD land classifications, the overall results are generally consistent with the land uses in the Facility area.

Table 2-1: Auer Land-Use Classifications within 3-Kilometers of the Facility

Description	Percentage within 3-km of Facility	Auer Classification
Open Water	0.0%	Rural
Perennial Ice/Snow	0.0%	Rural
Low Intensity Residential	5.0%	Urban
High Intensity Residential	2.9%	Urban
Commercial/Industrial/Transportation	3.7%	Urban
Bare Rock/Sand/Clay	12.1%	Rural
Quarries/Strip Mines, Gravel Pits	0.0%	Rural
Transitional	0.0%	Rural
Deciduous Forest	0.2%	Rural
Evergreen Forest	0.1%	Rural
Mixed Forest	0.1%	Rural
Shrubland	46.9%	Rural
Orchards/Vineyards	0.2%	Rural
Grasslands/Herbaceous	0.9%	Rural
Pasture/Hay	16.3%	Rural
Row Crops	10.8%	Rural
Small Grains	0.7%	Rural
Fallow	0.0%	Rural
Urban/Recreational Grasses	0.0%	Rural
Woody Wetlands	0.0%	Rural
Emergent Herbaceous Wetlands	0.0%	Rural

Source of land use data: USGS, National Land Cover Data, 1992.

The site is located at approximately 442 feet (ft) above mean sea level near the river plain of the Colorado River. There are terrain features in the vicinity of the plant that rise above stack top. The nearest location where terrain rises above stack top is approximately 2.6 kilometers to the east-southeast of the Facility. As such, terrain heights were included in the modeling analysis.

3.0 SOURCE DATA AND MODELING PARAMETERS

3.1 Source Parameters

The Facility emission sources included in the modeling analysis were stack air emissions from the carbon reactivation furnace stack and fugitive air emissions from the outdoor hopper. For the stack, which is considered a point source, the ISCST3 model requires the location coordinates, base elevation, and stack parameters including height, diameter, exit gas velocity, and exit gas temperature. The modeled stack parameters were based upon actual stack dimensions and measurements collected from the stack, as presented in Table 3-1.

The outdoor hopper is used for the unloading of bulk containers of spent carbon received at the facility. The hopper is a three-walled building with a fixed roof and heavy plastic sheeting on the front unloading face. During the unloading process, some fugitive air emissions may escape through the plastic sheeting. This source was treated as a volume source in ISCST3 to account for the negligible plume rise associated with fugitive air emissions consistent with USEPA modeling guidelines. The modeled source parameters for a volume source consist of location coordinates, a release height, and the initial lateral and vertical dimensions of the source. The initial lateral and vertical dimensions are based upon the length and height of the source and are calculated using formulas in the ISCST3 Users Guide. The initial lateral dimension is calculated by dividing the source length by 4.3 and the initial vertical dimension is calculated by dividing the source height by 2.15. The volume source parameters for fugitive air emissions from the outdoor hopper are shown in Table 3-1.

As stated earlier, the emission rates used as inputs to the ISCST3 model were set at a unitized value of 1.0 gram per second. For a given source, ISCST3 modeled concentrations and deposition rates are directly proportional to emission rate, and thus modeled unitized concentrations and deposition rates can be adjusted to chemical-specific concentrations and deposition rates by multiplying by the chemical-specific emission rate. For the stack source, the emission rate was assumed to be "on" 24 hours per day, 365 days per year. For the outdoor hopper volume source, the emission rate was assumed to be "on" 365 days per year, for the 7-hour period daily from 7 AM - 2 PM. The emission period was based on the time during typical facility operations that spent carbon may be unloaded at the outdoor hopper.[2] Accordingly, the ISCST3 modeling for the volume source included the HROFDAY card to account for the specific times of operation.

Table 3-1: Modeled Emission Source Parameters

Point Source	UTM Location Coordinates (NAD27)		Stack Height (above grade)	Stack Inner Diameter	Stack Gas Exit Velocity	Stack Gas Exhaust Temperature
	East	North				
Reactivation Furnace Stack (a)	751,678.4	3,780,000.4	110.0 ft 33.5 m	1.65 ft 0.502 m	57.0 ft/sec 17.37 m/sec	170.0 °F 349.82 K
Volume Source	**UTM Location Coordinates (NAD27)**		**Release Height (above grade)**	**Initial Lateral Dimension**	**Initial Vertical Dimension**	**Exhaust Temperature**
	East	**North**				
Fugitive Air Emissions from Outdoor Hopper (b)	751,663.2	3,780,031.4	7.59 ft 2.31 m	4.20 ft 1.28 m	7.05 ft 2.15 m	NA

(a) Stack height and diameter were based on facility engineering drawings. Stack exit velocity and exit temperature were based on the averages of measurements collected from the facility from February to April, 2007, and were provided by M. McCue, Director of Plant Operations.
(b) Parameters were based on facility engineering drawings.

3.2 Deposition Modeling Parameters

The modeling analysis for the furnace stack included modeling of both dry and wet deposition rates, consistent with HHRAP guidance and the project Workplan. Accordingly, the modeling calculated four possible types of deposition: dry deposition of particles, wet deposition of particles, dry deposition of gases, and wet deposition of gases. (Note that the modeling for the fugitive air emissions volume source included calculation of ambient air concentrations, but did not include deposition modeling as described in the risk assessment report and in the project Workplan.)

[2] Personal communication with M. McCue, Director of Plant Operations, May 7, 2007.

The source inputs needed to model deposition rates in ISCST3 include the particle size distribution of stack emissions and scavenging ratios for modeling wet deposition. The particle size distribution was based on test data collected from the facility stack during the comprehensive Performance Demonstration Test (PDT) conducted in March 2006. Scavenging ratios, which are multiplied by the vertically integrated air concentration in ISCST3 to predict wet deposition rates, were identified based on HHRAP guidance and using the facility-specific particle size distribution.

3.2.1 Vapor Phase Stack Emissions Modeling

ISCST3 modeling of wet and dry deposition of vapor phase emissions from the stack requires a dry deposition velocity and liquid and ice scavenging coefficients. The values recommended in HHRAP were utilized in this analysis, specifically a dry deposition velocity of 0.5 centimeters per second and wet vapor scavenging coefficients of 1.7 $x10^{-4}$ $s^{-1}/mm\text{-}h^{-1}$ for the liquid phase and 0.6 x 10^{-4} $s^{-1}/mm\text{-}h^{-1}$ for the ice phase. (Note that the ice phase was not relevant for this specific geographical location.)

3.2.2 Particle Phase Stack Emissions Modeling

Wet and dry deposition modeling of particles requires information on the size distribution of emitted particles from the stack, which was based on facility-specific measurements collected from the stack. Consistent with HHRAP guidance, the measured particle size distribution was treated in two different ways in the ISCST3 model. A mass-weighted particle size distribution was used to represent emissions of metals (except mercury) that would form particles in the reactivation unit combustion area. A surface area-weighted size distribution was used to reflect organic compounds and mercury that most likely exit the combustion area as gases and then adsorb onto the surface of already-formed particles.

The mass-weighted particle size distribution was calculated using Equation 3-1 from HHRAP and is shown in Table 3-2. Based on the mean particle diameters shown in Table 3-2, individual wet vapor scavenging coefficients for each particle diameter were then determined, following HHRAP guidance, using the curves developed by Jindal and Heinold (1991) which are located in the ISCST3 Users Guide.

Table 3-2: Particle Size Distribution by Mass for the Furnace Stack

Mean Particle Diameter (um)	Lower Bound of Category (um)	Upper Bound of Category (um)	Percent by Mass
0.34	0.1	0.5	6.9
0.78	0.5	1	2.4
3.39	1	5	34.8
7.77	5	10	17.9
65.25	10	100	38.0

The surface area weighted particle size distribution was also based upon the measured particle size distribution along with HHRAP guidance for apportioning the distribution by surface area. The results of weighting the particle size distribution by surface area according to the HHRAP methodology are shown in Table 3-3. Based on the mean particle diameters in this distribution, individual wet vapor scavenging coefficients for each particle diameter were determined, following HHRAP guidance, using the curves developed by Jindal and Heinold (1991) which are located in the ISCST3 Users Guide.

Table 3-3: Particle Size Distribution by Surface Area for the Furnace Stack

Mean Particle Diameter (um)	Fraction of Total Mass	Proportion of Available Surface Area	Relative Proportion of Surface Area	Fraction of Total Surface Area
0.34	0.069	17.693	1.221	0.556
0.78	0.024	7.724	0.185	0.084
3.39	0.348	1.769	0.616	0.280
7.77	0.179	0.772	0.138	0.063
65.25	0.38	0.092	0.035	0.016

3.3 Modeling Output Files

Taking into account the different types of stack emissions that were modeled, as prescribed in HHRAP and described above, the ISCST3 model runs provided nine different types of outputs that were used in the stack emissions risk assessment, as follows:

- Ambient air concentrations of mass-weighted particles
- Ambient air concentrations of surface area-weighted particles
- Ambient air concentrations of gases
- Dry deposition of mass-weighted particles
- Dry deposition of surface area-weighted particles
- Dry deposition of gases
- Wet deposition of mass-weighted particles
- Wet deposition of surface area-weighted particles
- Wet deposition of gases

For the fugitive air emissions source, the ISCST3 model runs provided ambient air concentrations which were used in the risk assessment. For this source, all emissions were modeled as vapors, which is conservative because no plume depletion due to the deposition of particles is assumed to occur and thus air concentrations will tend to be overestimated for compounds that may be present in a particle phase. Also, because of the nature of the spent carbon material, it is not feasible to measure a particle size distribution for inhalable particles from the fugitive emissions source that was modeled.

The ISCST3 model was run to calculate unitized annual average modeling results and 1-hour average modeling results at all of the modeled off-site receptor locations beyond the property boundary (see next section for discussion of receptor grids). These outputs were specified in the Workplan and were consistent with the needs of the risk assessment. In addition, for the worker evaluation in the risk assessment requested by USEPA Region 9, the ISCST3 model was also run to calculate unitized 8-hour average results at a series of on-site receptor locations.

4.0 MODELING OVERVIEW

4.1 Good Engineering Practice Stack Height Analysis

The USEPA provides specific guidance for determining good engineering practice (GEP) stack height and for determining whether building downwash will occur in the "Guidance for Determination of Good Engineering Practice Stack Height" (Technical Support Document for the Stack Height Regulations, EPA-450/4-80-023R, June, 1985). GEP is defined as "the height necessary to ensure that emissions from the stack do not result in excessive concentrations of any air pollutant in the immediate vicinity of the source as a result of atmospheric downwash, eddies, and wakes that may be created by the source itself, or nearby structures, or nearby terrain obstacles." The GEP definition is based on the observed phenomenon of atmospheric flow in the immediate vicinity of a structure. It identifies the minimum stack height at which significant adverse aerodynamics (downwash) are avoided.

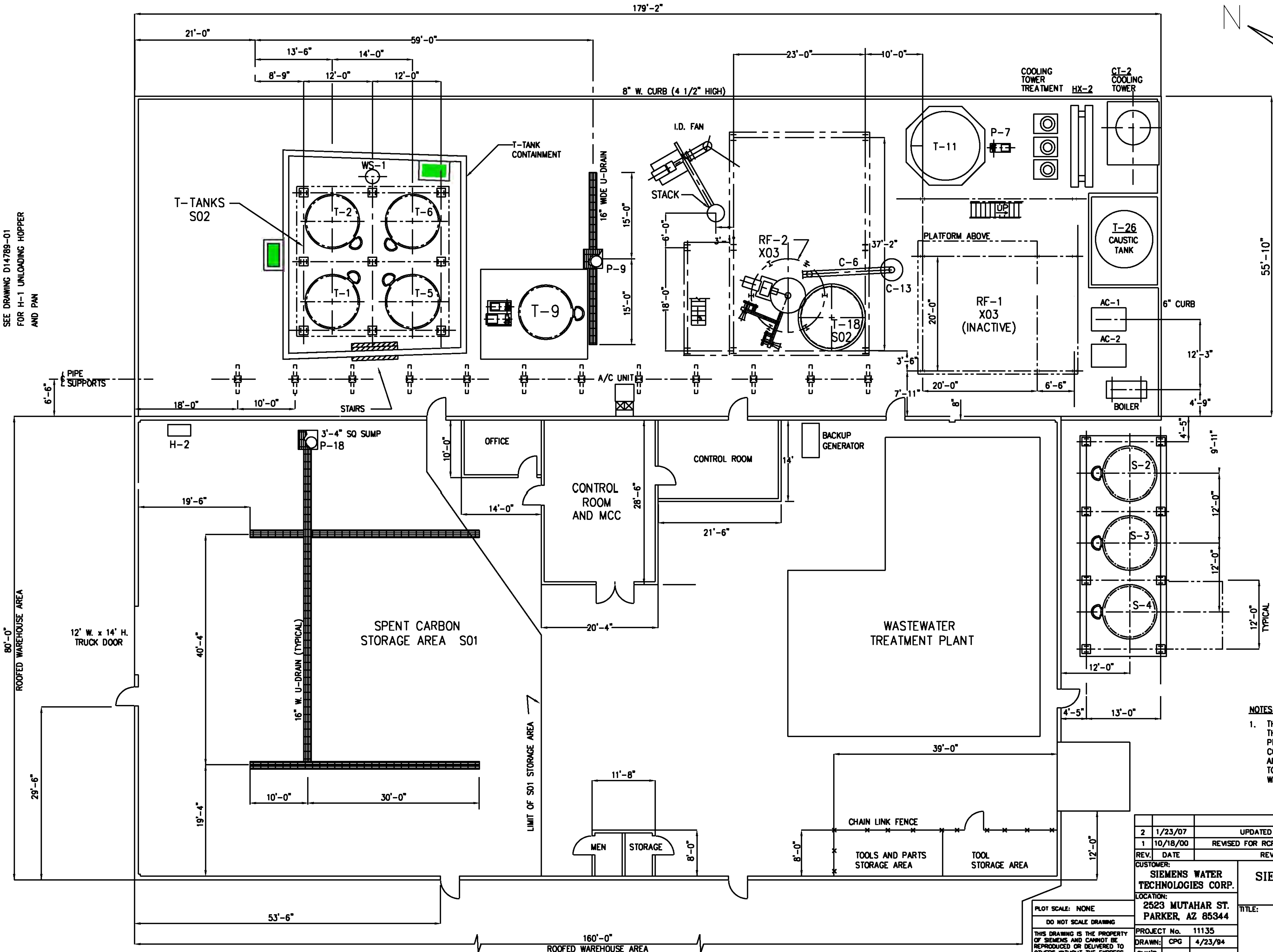
The USEPA GEP stack height regulations specify that the formula GEP stack height be calculated in the following manner:

$$H_{GEP} = H_B + 1.5L$$

where: H_B = the height of adjacent or nearby structures, and
L = the lesser dimension (height or projected width of the adjacent or nearby structures)

A GEP analysis was performed for the carbon reactivation furnace stack located at the Facility. Figure 4-1 includes a general plot plan of the facility while Figure 4-2 shows the locations and heights of buildings included in the GEP analysis as well as the locations of the modeled emission sources. The furnace stack, with a height of 110 ft above grade, is below the formula GEP stack height of 130 ft, which is based upon the height and projected width of the controlling structure, the carbon reactivation furnace building. Based on the configuration of the Facility, the ISCST3 model included directional dependent building dimensions. These dimensions were calculated using the USEPA approved Building Profile Input Program (BPIP, version 04112).

DWG: D14789-02



EQUIPMENT LIST:

C-4	TRANSPORTER
C-6	PRODUCT COOLING SCREW
C-13	TRANSPORTER
CT-2	COOLING TOWER
H-1	CARBON HOPPER
H-2	CARBON HOPPER
HX-2	HEAT EXCHANGER
P-4	RECYCLE WATER PUMP
P-5	RECYCLE WATER PUMP
P-7	PROCESS WW PUMP
P-9	SUMP PUMP
P-18	SUMP PUMP
S-2	CARBON STORAGE TANK
S-3	CARBON STORAGE TANK
S-4	CARBON STORAGE TANK
T-1	SPENT CARBON STORAGE TANK
T-2	SPENT CARBON STORAGE TANK
T-5	SPENT CARBON STORAGE TANK
T-6	SPENT CARBON STORAGE TANK
T-9	RECYCLE WATER STORAGE TANK
T-11	PROCESS WW STORAGE TANK
T-18	FURNACE FEED TANK
T-26	CAUSTIC TANK
WS-1	ACTIVATED CARBON ADSORBER

NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
2	1/23/07	UPDATED FOR PERMIT SUBMITTAL	JBE	KEM	
1	10/18/00	REVISED FOR RCRA PART B PERMIT APPLICATION	JBE	---	

PLOT SCALE: NONE

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS WATER TECHNOLOGIES CORP.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No. 11135

DRAWN: CPG 4/23/94

CHK'D:

ENG'R:

SIEMENS WATER TECHNOLOGIES CORP.
Parker, AZ

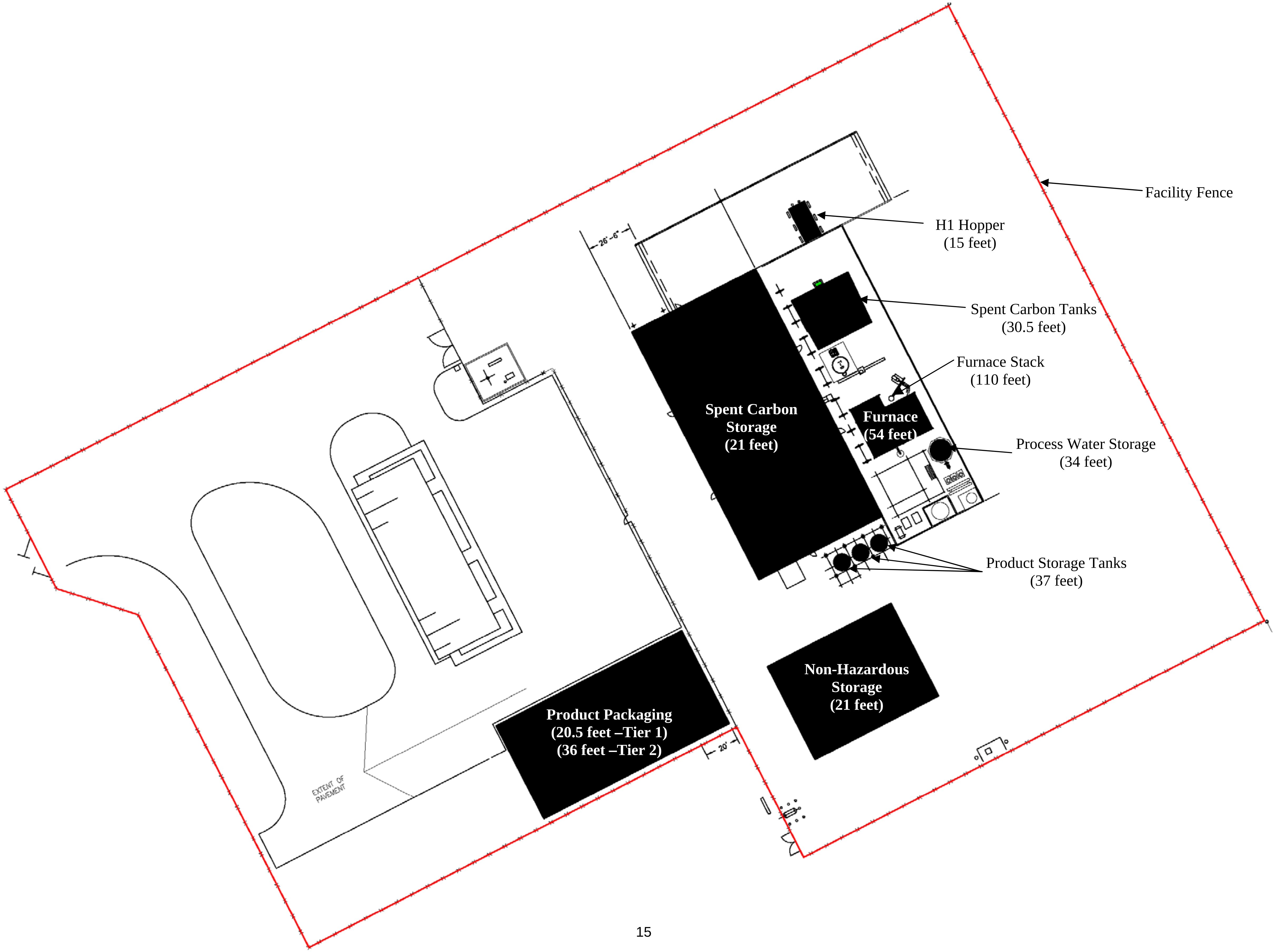
TITLE: REACTIVATION FACILITY EQUIPMENT ARRANGEMENT

PART No.

DWG No. D14789-02 REV. 2

PRINT DATE: 4/30/07

Figure 4-2: Facility Site Plan with Building Heights



4.2 Model Selection

The USEPA-developed and approved ISCST3 model (Version 02035) was used to calculate the air concentrations and deposition rates for use in the risk assessment. The ISCST3 model was specified in the USEPA-approved Workplan. As noted earlier, default model options for the stack and volume emission sources were used in the ISCST3 model along with rural dispersion coefficients. For the stack source, direction-specific downwash parameters were also used. The ISCST3 model was considered appropriate for this analysis as it is capable of modeling short-term and long-term average air concentrations, wet and dry deposition rates, and dispersion in rural areas, and it includes algorithms to address terrain and building wake effects.

4.3 Meteorological Data

For any modeling analysis conducted using the ISCST3 model, two meteorological datasets are required: 1) hourly surface data, and 2) upper air sounding data. According to the USEPA "Guideline on Air Quality Models (Revised)" (2005), the meteorological data used in a modeling analysis should be selected based on its spatial and climatological representativeness of a facility site and its ability to accurately characterize the transport and dispersion conditions in the area of concern. The spatial and climatological representativeness of the meteorological data are dependent on four factors:

1. The proximity of the meteorological monitoring site to the area under consideration;
2. The complexity of the terrain;
3. The locational characteristics of the meteorological monitoring site; and
4. The period of time during which data were collected.

Following the air modeling protocol in the Workplan, hourly surface measurments were obtained from the Parker, Arizona meteorological monitor operated by the Arizona Meteorological Network (AZMET). The Parker meteorological data station is approximately 32 km southwest of the Facility. Concurrent twice daily mixing heights were obtained from upper air data collected at the Flagstaff Pulliam Airport operated by the National Weather Service (NWS). A concurrent 5-year dataset from 2001 through 2005 was obtained for the two meteorological stations.

The two meteorological data sets from 2001-2005 were then processed with the USEPA Meteorological Processor for Regulatory Models (MPRM, Version 99349). The resulting meteorological file is then suitable for use in ISCST3 to model both air concentrations and wet and dry deposition rates. The basic meteorological parameters utilized by ISCST3 for predicting ambient air concentrations are wind direction and wind speed, ambient air temperature, atmospheric stability category, and rural and urban mixing heights. The additional parameters required to predict wet and dry deposition rates are the friction velocity, the Monin-Obukhov length (an indicator of atmospheric turbulence), the surface roughness length, the solar radiation, and the precipitation amount each hour. A wind rose for the 5-year meteorological record from 2001-2005 is presented in Figure 4-3. As the figure shows, the predominant wind directions for the facility site are northerly and southerly.

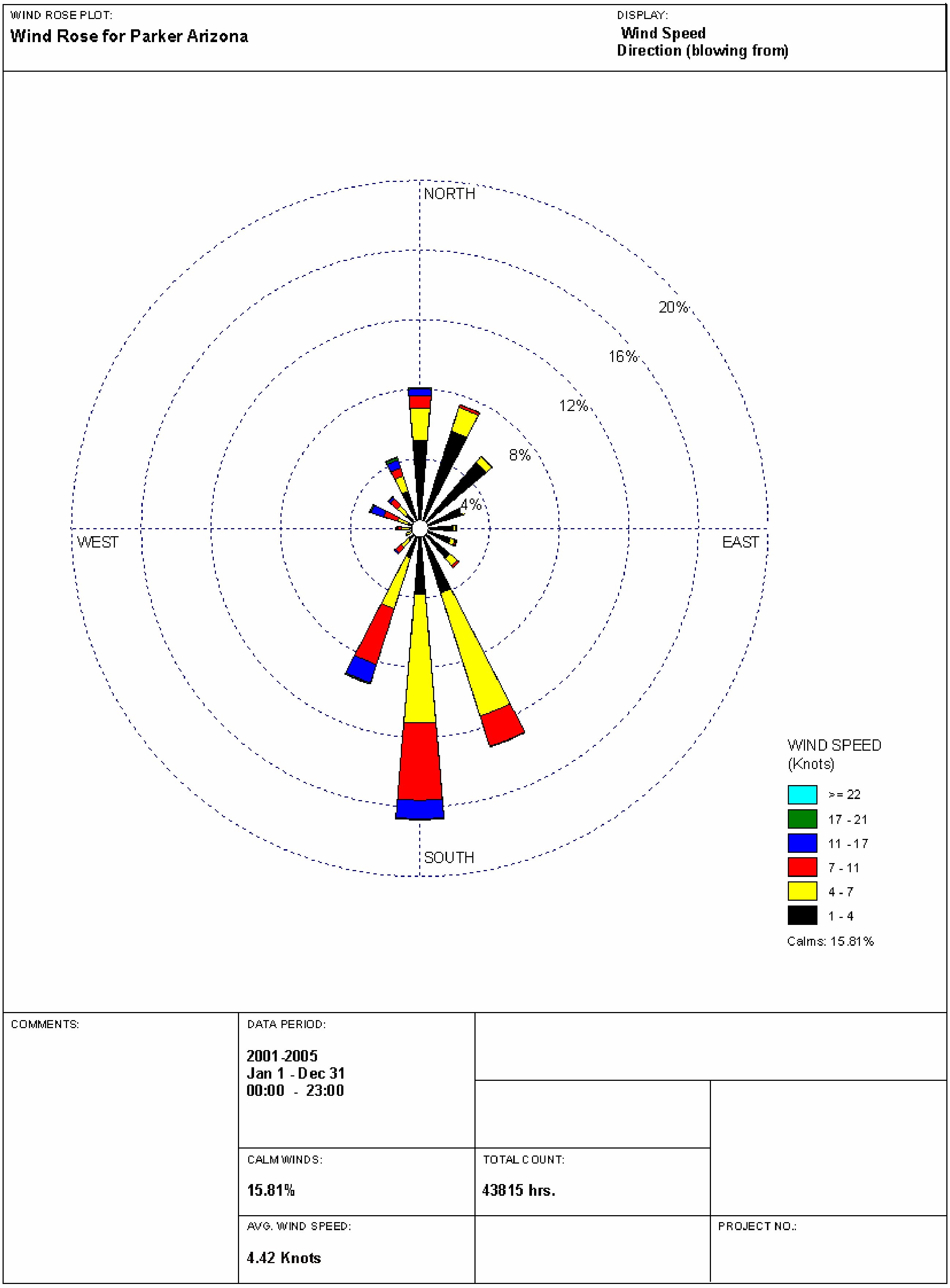
4.4 Land Cover Analyses

The MPRM meteorological processor, in addition to requiring both surface and upper-air meteorological data, requires surface parameters at the meteorological data measurement site to develop a complete ISCST3 meteorological dataset suitable for modeling deposition rates. These parameters are the minimum Monin-Obukhov length, the surface roughness length at the meteorological data measurement site and the Facility site, the noontime albedo, the Bowen ratio, the anthropogenic heat flux, and the fraction of net radiation absorbed at the surface.

For the minimum Monin-Obukhov length, the anthropogenic heat flux and the fraction of net radiation absorbed at the ground, the recommended values listed in HHRAP were used. Specifically, a minimum Monin-Obukhov length of 2 meters was assumed consistent within an open rural landuse, an anthropogenic heat flux of 0.0 watts per square meter was assumed consistent with a rural land use and a fraction of net radiation absorbed by the ground of 0.15 was assumed for a rural land use.

For the remainder of the required parameters (i.e., surface roughness length at the meteorological measurement site and the Facility site, the noontime albedo, and the Bowen ratio), land cover determinations were required. These determinations were made using the 1992 NLCD dataset created by USGS for Arizona.

Figure 4-3: Parker Arizona Wind Rose (2001-2005)



The TRC-developed land cover tabulation program was applied to the Parker Meteorological station to extract and sum land cover categories for each 30 m by 30 m grid cell within each of 12 adjacent 30 degree sectors within a 3-km radius of the station. Basic land cover statistics are illustrated for the Parker meteorological monitoring site in Figure 4-4. The data are presented in tabular form in Table 4-1, which indicates the number of cells by sector (12) and land cover type (8). It should be noted that, for the purposes of this analysis, quarries/strip mines/gravel pits were assumed to be desert shrubland; mixed forests were split 50/50 between coniferous and deciduous forests; and, urban/recreational grasses were assumed to be grassland. Tables 4-2 and 4-3, respectively, provide a breakdown of the 21 land use types in the 1992 NLCD data set and how they were related to the eight (8) MPRM land use categories.

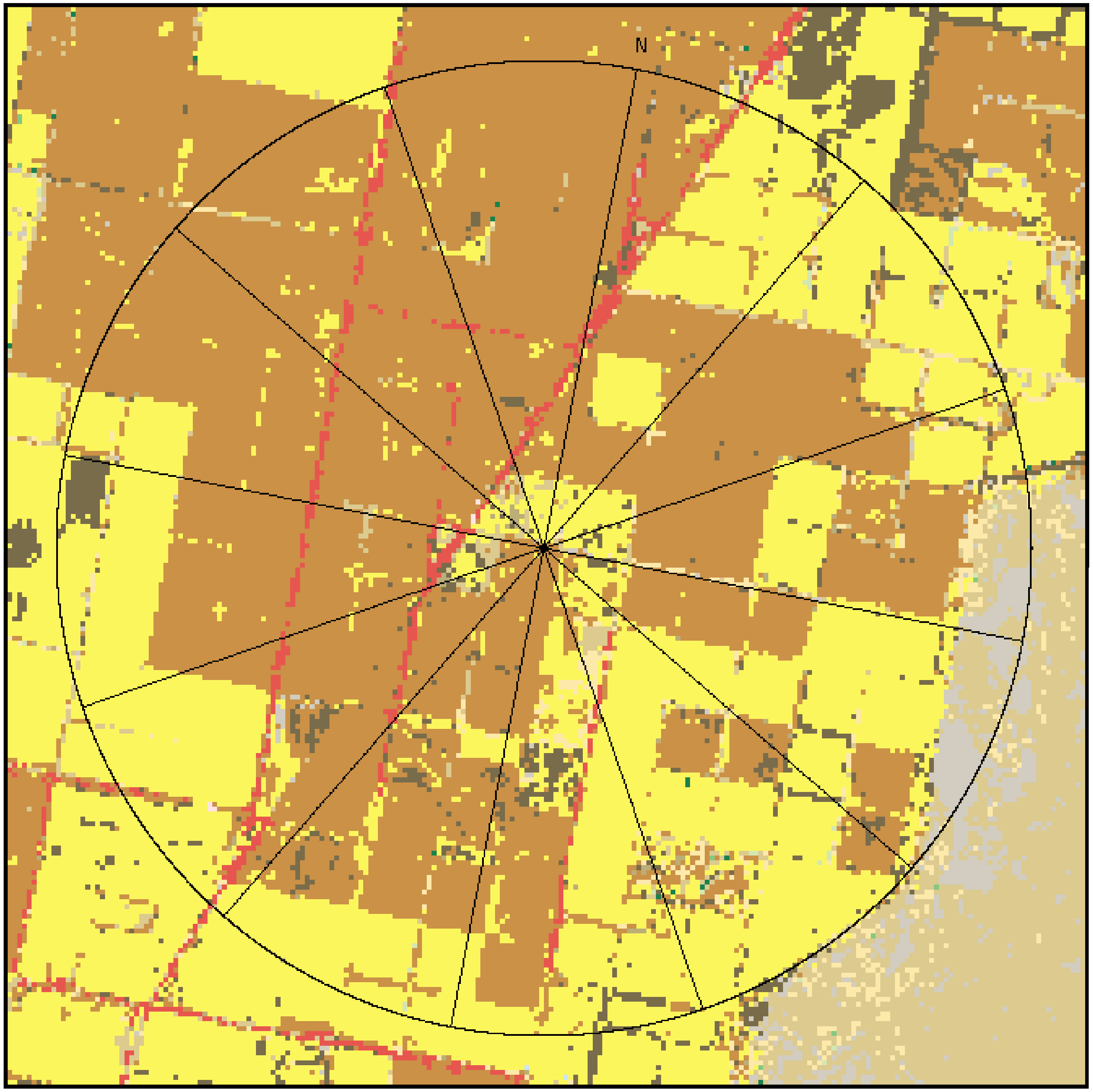
Table 4-1: Parker Arizona Meteorological Station Land Cover Statistics

MPRM Land Use Category	Sector											
	1	2	3	4	5	6	7	8	9	10	11	12
	Cells											
Water	0	0	0	0	0	0	0	0	0	0	0	0
Deciduous Forest	0	4	2	1	5	1	2	0	0	1	0	0
Coniferous Forest	0	4	1	1	10	2	3	0	0	1	0	2
Swamp	1	0	0	0	0	0	0	0	0	0	0	0
Cultivated Land	1,175	1,355	1,351	858	605	1,097	1,685	1,302	1,597	2,180	2,296	2,426
Grassland	1,288	1,201	883	1,318	1,901	1,473	906	1,130	898	369	165	119
Urban	116	0	0	0	11	48	10	134	67	48	109	57
Desert Shrubland	38	46	389	441	79	6	12	44	65	20	40	22

Source: USGS. Arizona National Land Cover Dataset. 1992 Data.

MPRM requires that three surface characteristics (albedo, Bowen ratio, and roughness length) be specified for the surface meteorological measurement site (i.e., the Parker AZMET monitor). USEPA default values for these three surface characteristics for the range of land cover classifications were obtained from HHRAP. Albedo, Bowen ratio, and roughness lengths were then weighted according to the eight MPRM land cover classifications (for each month and each sector). Generally, winter is classified as December, January, and February; spring is classified as March, April, and May; summer is classified as June, July, and August; and autumn is classified as September, October, and November. However, given the climate in the Parker area of Arizona, which doesn't experience northern U.S. winter conditions, autumn default values were substituted for winter values.

Figure 4-4: Land Use within 3-Kilometers of Parker Meteorological Monitoring Station



National Land Cover Dataset Classification System Legend

Color Key	RGB Value	Class Number and Name
	102, 140, 190	11 - Open Water
	255,255,255	12 - Perennial Ice/Snow
	253, 229, 228	21 - Low Intensity Residential
	247, 178, 159	22 - High Intensity Residential
	231, 86, 78	23 - Commerical/Industrial/Transportation
	210, 205, 192	31 - Bare Rock/Sand/Clay
	175, 175, 177	32 - Quarries/Strip Mines, Gravel Pits
	83, 62, 118	33 - Transitional
	134, 200, 127	41 - Deciduous Forest
	26, 129, 78	42 - Evergreen Forest
	212, 231, 177	43 - Mixed Forest
	220, 202, 143	51 - Shrubland
	187, 174, 118	61 - Orchards/Vineyards
	253, 233, 170	71 - Grasslands/Herbaceous
	252, 246, 93	81 - Pasture/Hay
	202, 145, 71	82 - Row Crops
	121, 108, 75	83 - Small Grains
	244, 238, 203	84 - Fallow
	240, 156, 054	85 - Urban/Recreational Grasses
	201, 230, 249	91 - Woody Wetlands
	144, 192, 217	92 - Emergent Herbaceous Wetlands

A summary table by season and sector for each of the required surface parameters is located in Table 4-4. These surface characteristics, in conjunction with the meteorological data, were processed using MPRM to create an ISCST3-ready meteorological data file for use in modeling wet and dry deposition rates.

Table 4-2: 1992 National Land Cover Dataset (NLCD) Land Cover Types

NLCD Type	Description
11	Open Water
12	Perennial Ice/Snow
21	Low Intensity Residential
22	High Intensity Residential
23	Commercial/Industrial/Transportation
31	Bare Rock/Sand/Clay
32	Quarries/Strip Mines, Gravel Pits
33	Transitional
41	Deciduous Forest
42	Evergreen Forest
43	Mixed Forest
51	Shrubland
61	Orchards/Vineyards
71	Grasslands/Herbaceous
81	Pasture/Hay
82	Row Crops
83	Small Grains
84	Fallow
85	Urban/Recreational Grasses
91	Woody Wetlands
92	Emergent Herbaceous Wetlands

Table 4-3: Comparison of USGS National Land Cover Dataset (NLCD) Land Cover Types to USEPA's Meteorological Processor for Regulatory Models (MPRM) Land Use Categories

NLCD Types	MPRM Land Use Category
11,12	Water
41 + ½(43)	Deciduous Forest
42 + ½(43)	Coniferous Forest
91,92	Swamp
61,82,83	Cultivated Land
71,81,84,85	Grassland
21,22,23	Urban
31,32,33,51	Desert Shrubland

Table 4-4: Summary of Meteorological Processor for Regulatory Models (MPRM) Surface Characteristics

Season	Sector	Albedo	Bowen Ratio	Surface Roughness Length (Parker Met. Site)	Surface Roughness Length (Facility Site)	Monin-Obukhov Length	Fraction of Net Radiation Absorbed by Ground	Anthropogenic Heat Flux	Leaf Area Index
1	1	0.19	0.98	0.08	0.11	2.00	0.15	0.00	2.00
1	2	0.19	0.93	0.04	0.26	2.00	0.15	0.00	2.00
1	3	0.20	1.59	0.07	0.30	2.00	0.15	0.00	2.00
1	4	0.21	1.74	0.07	0.30	2.00	0.15	0.00	2.00
1	5	0.20	1.09	0.04	0.30	2.00	0.15	0.00	2.00
1	6	0.19	0.90	0.05	0.30	2.00	0.15	0.00	2.00
1	7	0.19	0.83	0.04	0.24	2.00	0.15	0.00	2.00
1	8	0.19	0.99	0.09	0.12	2.00	0.15	0.00	2.00
1	9	0.19	0.97	0.07	0.18	2.00	0.15	0.00	2.00
1	10	0.18	0.81	0.06	0.47	2.00	0.15	0.00	2.00
1	11	0.18	0.85	0.09	0.66	2.00	0.15	0.00	2.00
1	12	0.18	0.79	0.07	0.43	2.00	0.15	0.00	2.00
2	1	0.16	0.42	0.09	0.12	2.00	0.15	0.00	2.00
2	2	0.16	0.39	0.05	0.26	2.00	0.15	0.00	2.00
2	3	0.18	0.73	0.08	0.30	2.00	0.15	0.00	2.00
2	4	0.19	0.81	0.09	0.30	2.00	0.15	0.00	2.00
2	5	0.17	0.46	0.06	0.30	2.00	0.15	0.00	2.00
2	6	0.16	0.38	0.06	0.30	2.00	0.15	0.00	2.00
2	7	0.15	0.35	0.04	0.24	2.00	0.15	0.00	2.00
2	8	0.16	0.42	0.09	0.13	2.00	0.15	0.00	2.00
2	9	0.16	0.42	0.07	0.20	2.00	0.15	0.00	2.00
2	10	0.15	0.35	0.05	0.48	2.00	0.15	0.00	2.00
2	11	0.14	0.38	0.08	0.66	2.00	0.15	0.00	2.00
2	12	0.14	0.34	0.06	0.43	2.00	0.15	0.00	2.00
3	1	0.19	0.76	0.19	0.22	2.00	0.15	0.00	2.00

Table 4-4: Summary of Meteorological Processor for Regulatory Models (MPRM) Surface Characteristics

Season	Sector	Albedo	Bowen Ratio	Surface Roughness Length (Parker Met. Site)	Surface Roughness Length (Facility Site)	Monin-Obukhov Length	Fraction of Net Radiation Absorbed by Ground	Anthropogenic Heat Flux	Leaf Area Index
3	2	0.19	0.70	0.16	0.28	2.00	0.15	0.00	2.00
3	3	0.21	1.12	0.18	0.30	2.00	0.15	0.00	2.00
3	4	0.20	1.24	0.17	0.30	2.00	0.15	0.00	2.00
3	5	0.19	0.83	0.14	0.30	2.00	0.15	0.00	2.00
3	6	0.19	0.70	0.16	0.30	2.00	0.15	0.00	2.00
3	7	0.19	0.63	0.17	0.27	2.00	0.15	0.00	2.00
3	8	0.19	0.77	0.20	0.21	2.00	0.15	0.00	2.00
3	9	0.19	0.73	0.19	0.27	2.00	0.15	0.00	2.00
3	10	0.20	0.60	0.20	0.51	2.00	0.15	0.00	2.00
3	11	0.20	0.64	0.23	0.67	2.00	0.15	0.00	2.00
3	12	0.20	0.58	0.21	0.45	2.00	0.15	0.00	2.00
4	1	0.19	0.98	0.08	0.11	2.00	0.15	0.00	2.00
4	2	0.19	0.93	0.04	0.26	2.00	0.15	0.00	2.00
4	3	0.20	1.59	0.07	0.30	2.00	0.15	0.00	2.00
4	4	0.21	1.74	0.07	0.30	2.00	0.15	0.00	2.00
4	5	0.20	1.09	0.04	0.30	2.00	0.15	0.00	2.00
4	6	0.19	0.90	0.05	0.30	2.00	0.15	0.00	2.00
4	7	0.19	0.83	0.04	0.24	2.00	0.15	0.00	2.00
4	8	0.19	0.99	0.09	0.12	2.00	0.15	0.00	2.00
4	9	0.19	0.97	0.07	0.18	2.00	0.15	0.00	2.00
4	10	0.18	0.81	0.06	0.47	2.00	0.15	0.00	2.00
4	11	0.18	0.85	0.09	0.66	2.00	0.15	0.00	2.00
4	12	0.18	0.79	0.07	0.43	2.00	0.15	0.00	2.00

Notes: 1. Season 1 is winter (treated as autumn for the Parker area), Season 2 is spring, Season 3 is summer, and Season 4 is autumn .

4.5 Modeled Receptor Grid

A 20 km-by-20 km Cartesian receptor grid with the following receptor spacing was used in the ISCST3 modeling analyses to calculate off-site concentrations and deposition rates:

1. Fine/near grid: Receptors every 100 m out to 3 km; and
2. Coarse/full grid: Receptors every 500 m from 3 km to 10 km.

Receptors were also placed along the Facility fence line every 25 m.

The ISCST3 model requires receptor data consisting of location coordinates and ground-level elevations. The receptor generating program, AERMAP (Version 06341), was used to develop a complete receptor grid to a distance of 10 kilometers from the Facility. AERMAP uses digital elevation model (DEM) data obtained from the United States Geological Survey (USGS). 7.5 minute DEM files were obtained for an area covering at least 10 kilometers in all directions from the proposed facility. AERMAP was then run with these DEM files to determine the representative elevations for each receptor.

Figure 4-5 shows the complete modeled receptor grid overlaid onto the DEM ground-level elevation contours, including both the coarse/full grid and the fine/near grid. Figure 4-6 shows the fine/near receptor grid overlain onto a topographic map of the Facility area.

A separate receptor grid was also developed to model on-site air concentrations from the fugitive emissions hopper volume source for the on-site worker evaluation performed in the risk assessment at the request of USEPA Region 9. This Cartesian receptor grid included on-site receptors every 50 ft excluding locations where buildings are present.

Figure 4-5: Modeled Receptor Grid (Full Grid)

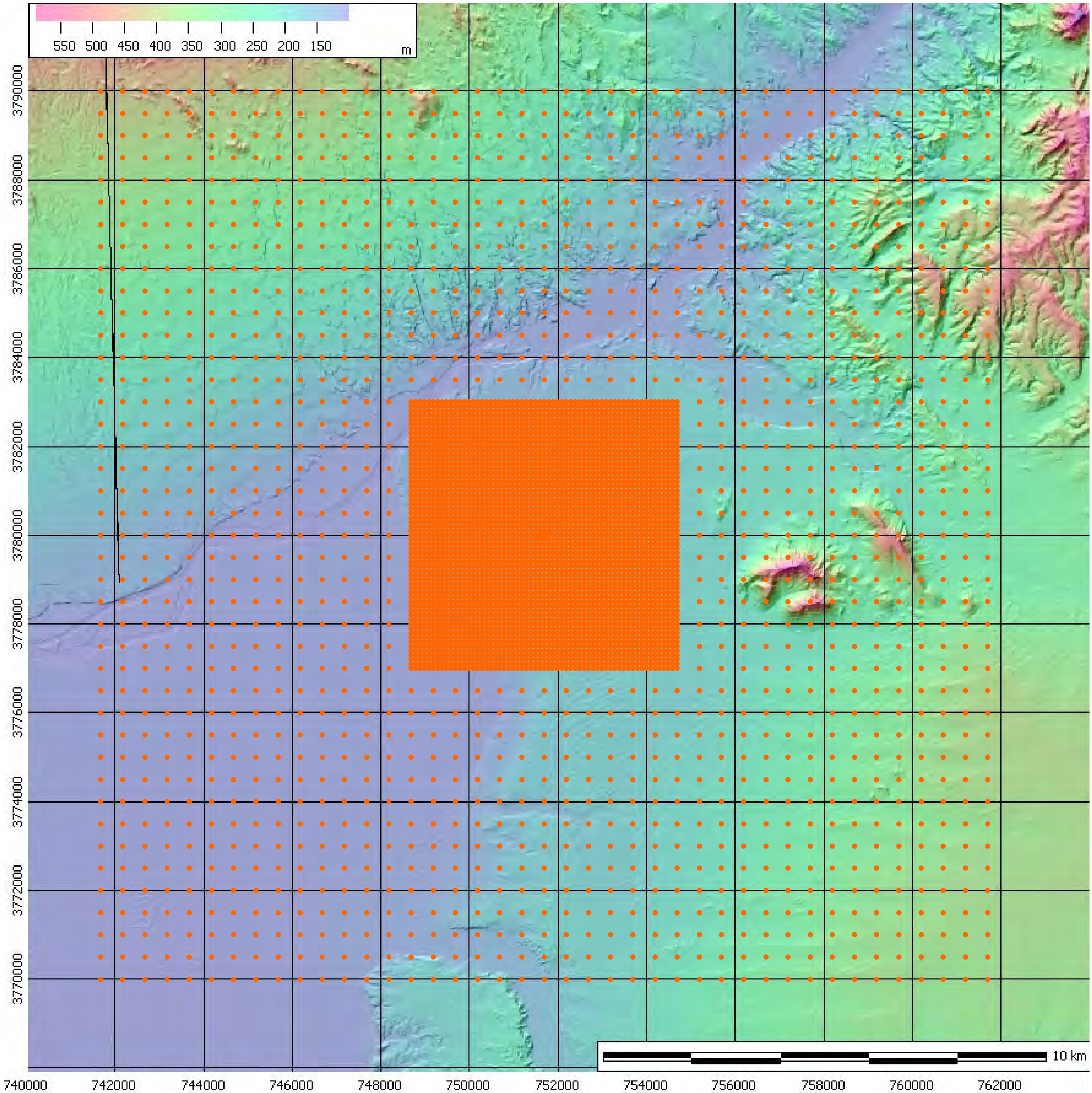
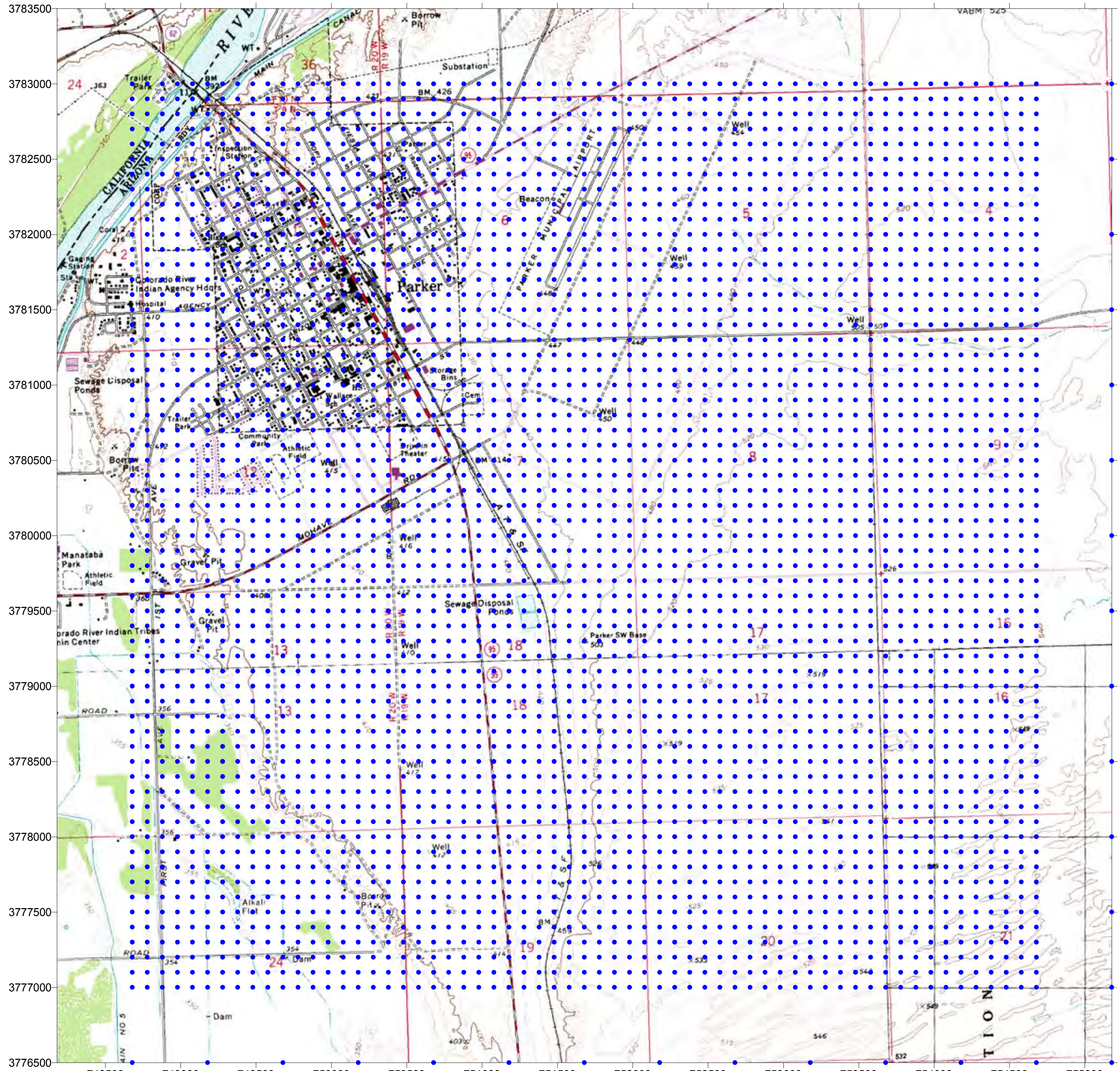


Figure 4-6: Modeled Receptor Grid (Near Grid)



Note: Coordinates in UTM Zone 11, NAD27

5.0 MODELING RESULTS

The ISCST3 modeling results used in the risk assessment included unitized annual average and 1-hour average ambient air concentrations at off-site receptor grid points beyond the property boundary for the stack and fugitive air emissions sources. Off-site unitized annual average deposition rates for the stack source were also used in the risk assessment. Finally, unitized 8-hour average ambient air concentrations associated with the fugitive emissions source at on-site receptor locations were used in the worker evaluation.

Appendix E, referenced in the main risk assessment report, provides figures illustrating the unitized annual average ISCST3 modeled ambient air concentrations and deposition rates associated with the stack source. These isopleth figures are overlain on a USGS topographical map of the Facility area. As the figures show, the maximum unitized annual average air concentrations and deposition rates occur near to, and to the north and south of, the stack, consistent with the predominantly northerly and southerly winds in the Parker area.

The detailed ISCST3 modeling input and output files associated with this project are included in a modeling appendix. These files include the ISCST3 input and output files, plotfiles, BPIP input and output files, and the meteorological data used in the analysis. These files are voluminous and thus are provided on a separate CD.

APPENDIX TO
AIR DISPERSION AND DEPOSITION
MODELING REPORT

ISCST3 MODELING INPUT AND OUTPUT FILES
(ON CDROM)

APPENDIX C

SUPPORTING DATA FOR STACK EMISSION RATES

APPENDIX C

SUPPORTING DATA FOR STACK EMISSION RATES

Chemical emission rates for the reactivation facility stack were calculated by Focus Environmental, Inc. The emission rates were based on either stack exhaust measurements collected during the Performance Demonstration Test (PDT), proposed permit limits or, for a few chemicals that could be present in spent carbon but were not measured during the PDT, long-term average chemical feed rates and a conservative destruction and removal efficiency (DRE) of 99.99%. (Note that the DREs measured during the PDT averaged more than 99.997%).

The individual chemical-specific emission rates used in the risk assessment are summarized Table 4.2-1 in the main body of this report, along with an indication of the basis for each value. This appendix provides the detailed PDT results that were used by Focus to calculate the emission rates for those compounds with emission rates based on the stack test measurements. For compounds that were not detected in the PDT, the listed values were calculated using one-half of the reported detection limit consistent with the risk assessment Workplan. (Note that these tables differ from those in the PDT Report in that one-half the detection limit was used for non-detect results.)

Total Semivolatile and Nonvolatile Organic Emission Results - Run 1

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	240
Stack gas flow rate	dscfm	5,080
	acfm	11,370
	dscm/min	143.87
Stack gas temperature	°F	175
Stack gas velocity	ft/min	3,618
Stack gas sample volume	dscf	134.440
	dscm	3.807
Isokinetic	%	97.7
Stack gas moisture content	vol %	45.5
Stack gas carbon dioxide content	vol %, dry	6.4
Stack gas oxygen content	vol %, dry	9.8
Total Semivolatile Organics by TCO		
Total semivolatiles collected	ug	5320
TCO concentration	ug/dscm	1.40E+03
	ug/dscm @7% O_2	1.75E+03
TCO emission rate	lb/h	2.66E-02
	kg/h	1.21E-02
	g/s	3.35E-03
Total Nonvolatile Organics by GRAV		
Total nonvolatiles collected	ug	3050
GRAV concentration	ug/dscm	8.01E+02
	ug/dscm @7% O_2	1.00E+03
GRAV emission rate	lb/h	1.52E-02
	kg/h	6.92E-03
	g/s	1.92E-03

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Total Semivolatile and Nonvolatile Organic Emission Results - Run 2

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	240
Stack gas flow rate	dscfm	3,860
	acfm	8,610
	dscm/min	109.32
Stack gas temperature	°F	174
Stack gas velocity	ft/min	2,742
Stack gas sample volume	dscf	120.300
	dscm	3.407
Isokinetic	%	98.9
Stack gas moisture content	vol %	45.1
Stack gas carbon dioxide content	vol %, dry	7.2
Stack gas oxygen content	vol %, dry	8.9
Total Semivolatile Organics by TCO		
Total semivolatiles collected	ug	2830
TCO concentration	ug/dscm	8.31E+02
	ug/dscm @7% O_2	9.61E+02
TCO emission rate	lb/h	1.20E-02
	kg/h	5.45E-03
	g/s	1.51E-03
Total Nonvolatile Organics by GRAV		
Total nonvolatiles collected	ug	2260
GRAV concentration	ug/dscm	6.63E+02
	ug/dscm @7% O_2	7.68E+02
GRAV emission rate	lb/h	9.59E-03
	kg/h	4.35E-03
	g/s	1.21E-03

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Total Semivolatile and Nonvolatile Organic Emission Results - Run 3

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	240
Stack gas flow rate	dscfm	4,060
	acfm	8,890
	dscm/min	114.98
Stack gas temperature	°F	175
Stack gas velocity	ft/min	2,832
Stack gas sample volume	dscf	125.030
	dscm	3.541
Isokinetic	%	97.7
Stack gas moisture content	vol %	44.5
Stack gas carbon dioxide content	vol %, dry	7.1
Stack gas oxygen content	vol %, dry	9.3
Total Semivolatile Organics by TCO		
Total semivolatiles collected	ug	1924
TCO concentration	ug/dscm	5.43E+02
	ug/dscm @7% O_2	6.50E+02
TCO emission rate	lb/h	8.26E-03
	kg/h	3.75E-03
	g/s	1.04E-03
Total Nonvolatile Organics by GRAV		
Total nonvolatiles collected	ug	2250
GRAV concentration	ug/dscm	6.35E+02
	ug/dscm @7% O_2	7.60E+02
GRAV emission rate	lb/h	9.66E-03
	kg/h	4.38E-03
	g/s	1.22E-03

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Volatile Organic Emission Results - Run 1

Parameter	Units	Tube Set A	Tube Set B	Tube Set C	Tube Set D
Net sampling time	min	40	40	40	40
Corrected sample volume	liters,dry std.	19.651	19.521	18.94	18.963
Corrected sample volume	dscf	0.694	0.689	0.669	0.670
Corrected sample volume	dscm	0.0197	0.0195	0.0189	0.0190
Analyzed (Y/N)	-	N	Y	Y	Y

Total volume sampled	dscf	2.722
Total volume sampled	dscm	0.0771
Number of tube pairs analyzed	-	3
Total condensate volume	ml	84
Stack gas flow rate	acfm	10,770
Stack gas flow rate	dscfm	4,870

VOST Compound	Mass VOC Compound (ug) Tube Set A	Tube Set B	Tube Set C	Tube Set D	Condensate (ug/L)	Mass VOC Compound (ug)	Stack Conc. (a,c) (ug/dscm)	Mass Emission Rate (a,b,c) (lb/hr)	Mass Emission Rate (a,b,c) (g/s)
Standard Target Analytes									
Acetone	0	< 0.183 J,B	0.55 B	0.554 J,B	4.8 J	< 1.69E+00	< 2.76E+01	< 5.04E-04	< 6.35E-05
Acrylonitrile	0	< 0.152 ND	< 0.152 ND	< 0.152 ND	< 2.7 ND	< 6.83E-01 ND	< 1.09E+01	< 1.99E-04	< 2.50E-05
Benzene	0	0.0139 J	0.0552 J	< 0.0064 ND	< 0.1 ND	< 8.39E-02	< 1.42E+00	< 2.60E-05	< 3.27E-06
Bromodichloromethane	0	0.05	< 0.0246	< 0.0032 ND	2.2	< 2.63E-01	< 3.75E+00	< 6.85E-05	< 8.63E-06
Bromoform	0	< 0.1366	0.115 J	< 0.0145 J	< 0.14 ND	< 2.78E-01	< 4.79E+00	< 8.73E-05	< 1.10E-05
Bromomethane	0	< 0.064 J,B	< 0.065 J,B	< 0.052 J,B	< 0.38 ND	< 2.13E-01	< 3.57E+00	< 6.51E-05	< 8.20E-06
2-Butanone	0	< 0.07 ND	< 0.07 ND	< 0.07 ND	< 0.75 ND	< 2.73E-01 ND	< 4.47E+00	< 8.16E-05	< 1.03E-05
Carbon Disulfide	0	0.0091 J	< 0.0087 J	< 0.0028 J	< 0.1 ND	< 2.90E-02	< 4.68E-01	< 8.53E-06	< 1.08E-06
Carbon Tetrachloride	0	0.0127 J	< 0.0045 J	< 0.0022 ND	< 0.12 ND	< 2.95E-02	< 4.69E-01	< 8.55E-06	< 1.08E-06
Chlorobenzene	0	5.818 E	3.556 E	0.0323 J	< 0.1 ND	< 9.41E+00	< 1.64E+02	< 2.99E-03	< 3.77E-04
Chlorodibromomethane	0	< 0.096	< 0.073	< 0.02 ND	1	< 2.73E-01	< 4.38E+00	< 7.99E-05	< 1.01E-05
Chloroethane	0	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.24 ND	< 8.02E-02 ND	< 1.31E+00	< 2.38E-05	< 3.00E-06
Chloroform	0	0.023 J	0.0183 J	0.0542 J	6.1	6.08E-01	8.31E+00	1.52E-04	1.91E-05
Chloromethane	0	0.4087 J	< 0.5132	< 0.3032	< 0.12 ND	< 1.24E+00	< 2.15E+01	< 3.92E-04	< 4.93E-05
Dibromomethane	0	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.21 ND	< 7.76E-02 ND	< 1.27E+00	< 2.32E-05	< 2.93E-06
Dichlorodifluoromethane	0	< 0.0131 J	< 0.015 J	< 0.195	< 0.15 ND	< 2.36E-01	< 4.05E+00	< 7.39E-05	< 9.31E-06
1,1-Dichloroethane	0	< 0.0038 ND	< 0.0038 ND	< 0.0038 ND	< 0.1 ND	< 1.98E-02 ND	< 3.08E-01	< 5.61E-06	< 7.07E-07
1,2-Dichloroethane	0	< 0.0044 ND	< 0.0044 ND	< 0.0044 ND	0.14 J	< 2.50E-02	< 3.82E-01	< 6.98E-06	< 8.79E-07
1,1-Dichloroethene	0	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.1 ND	< 2.22E-02 ND	< 3.49E-01	< 6.37E-06	< 8.03E-07
cis-1,2-Dichloroethene	0	< 0.005 ND	< 0.005 ND	< 0.0054 J	< 0.12 ND	< 2.55E-02	< 3.99E-01	< 7.28E-06	< 9.17E-07
trans-1,2-Dichloroethene	0	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.1 ND	< 1.86E-02 ND	< 2.87E-01	< 5.23E-06	< 6.59E-07
1,2-Dichloropropane	0	< 0.0054 ND	< 0.0054 ND	< 0.0054 ND	< 0.1 ND	< 2.46E-02 ND	< 3.91E-01	< 7.13E-06	< 8.99E-07
cis-1,3-Dichloropropene	0	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.1 ND	< 2.64E-02 ND	< 4.22E-01	< 7.71E-06	< 9.71E-07
trans-1,3-Dichloropropene	0	< 0.004 ND	< 0.004 ND	< 0.004 ND	< 0.11 ND	< 2.12E-02 ND	< 3.29E-01	< 6.00E-06	< 7.56E-07
Ethylbenzene	0	< 0.0026 ND	< 0.0026 ND	< 0.0062 J	< 0.1 ND	< 1.98E-02	< 3.08E-01	< 5.61E-06	< 7.07E-07
2-Hexanone	0	< 0.0198 ND	< 0.0198 ND	< 0.0198 ND	< 0.76 ND	< 1.23E-01 ND	< 1.86E+00	< 3.40E-05	< 4.28E-06
Iodomethane	0	< 0.0156 J,B	< 0.0166 J,B	< 0.0166 J,B	< 0.12 ND	< 5.89E-02	< 9.81E-01	< 1.79E-05	< 2.25E-06
Methylene Chloride	0	0.084 J	< 0.039	0.146	2.3	< 4.62E-01	< 7.19E+00	< 1.31E-04	< 1.65E-05
4-Methyl-2-pentanone (MIBK)	0	< 0.047	< 0.028 ND	< 0.028 ND	< 0.4 ND	< 1.37E-01	< 2.23E+00	< 4.07E-05	< 5.13E-06
Styrene	0	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.1 ND	< 1.86E-02 ND	< 2.87E-01	< 5.23E-06	< 6.59E-07
1,1,2,2-Tetrachloroethane	0	< 0.022 ND	< 0.022 ND	< 0.022 ND	< 0.15 ND	< 7.86E-02 ND	< 1.31E+00	< 2.40E-05	< 3.02E-06
Tetrachloroethene	0	4.733 E	0.696	< 0.008 J	< 0.1 ND	< 5.45E+00	< 9.48E+01	< 1.73E-03	< 2.18E-04
Toluene	0	0.0847 J	0.0936 J	< 0.0302	0.19 J	< 2.24E-01	< 3.84E+00	< 7.00E-05	< 8.82E-06
1,1,1-Trichloroethane	0	< 0.0032 ND	< 0.0032 ND	< 0.0032 ND	< 0.1 ND	< 1.80E-02 ND	< 2.76E-01	< 5.04E-06	< 6.35E-07
1,1,2-Trichloroethane	0	< 0.01 ND	< 0.01 ND	< 0.01 ND	< 0.25 ND	< 5.10E-02 ND	< 7.95E-01	< 1.45E-05	< 1.83E-06
Trichloroethene	0	0.0231 J	0.02 J	0.043	0.57 J	1.34E-01	2.12E+00	3.87E-05	4.87E-06
Trichlorofluoromethane	0	< 0.0098 ND	< 0.0098 ND	0.052 J	< 0.12 ND	< 8.17E-02	< 1.38E+00	< 2.51E-05	< 3.17E-06
1,2,3-Trichloropropane	0	< 0.0162 ND	< 0.0162 ND	< 0.0162 ND	< 0.36 ND	< 7.88E-02 ND	< 1.24E+00	< 2.26E-05	< 2.85E-06
Vinyl Acetate	0	< 0.024 ND	< 0.024 ND	< 0.024 ND	< 0.24 ND	< 9.22E-02 ND	< 1.52E+00	< 2.76E-05	< 3.48E-06
Vinyl Chloride	0	< 0.0064 ND	< 0.0064 ND	< 0.0097 J	< 0.24 ND	< 4.27E-02	< 6.53E-01	< 1.19E-05	< 1.50E-06
Xylenes (total)	0	< 0.0097 J	< 0.0096 ND	< 0.0238 J	< 0.3 ND	< 6.83E-02	< 1.08E+00	< 1.97E-05	< 2.48E-06
Special Target Analytes									
Bromobenzene	0	< 0.0072 ND	< 0.0072 ND	< 0.0072 ND	< 0.11 ND	< 3.08E-02 ND	< 4.96E-01	< 9.05E-06	< 1.14E-06
Bromochloromethane	0	< 0.024 ND	< 0.024 ND	< 0.024 ND	< 0.24 ND	< 9.22E-02 ND	< 1.52E+00	< 2.76E-05	< 3.48E-06
n-Butylbenzene	0	< 0.0094 ND	< 0.0094 ND	< 0.0094 ND	< 0.1 ND	< 3.66E-02 ND	< 6.00E-01	< 1.09E-05	< 1.38E-06
sec-Butylbenzene	0	< 0.0072 ND	< 0.0072 ND	< 0.0072 ND	< 0.1 ND	< 3.00E-02 ND	< 4.85E-01	< 8.85E-06	< 1.12E-06
tert-Butylbenzene	0	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.24 ND	< 3.82E-02 ND	< 5.75E-01	< 1.05E-05	< 1.32E-06
2-Chlorotoluene	0	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.24 ND	< 3.40E-02 ND	< 5.02E-01	< 9.16E-06	< 1.15E-06
4-Chlorotoluene	0	< 0.004 ND	< 0.004 ND	< 0.004 ND	< 0.21 ND	< 2.96E-02 ND	< 4.38E-01	< 7.99E-06	< 1.01E-06
1,2-Dibromo-3-chloropropane	0	< 0.04 ND	< 0.04 ND	< 0.04 ND	< 0.45 ND	< 1.58E-01 ND	< 2.58E+00	< 4.71E-05	< 5.93E-06
1,2-Dibromoethane	0	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.24 ND	< 8.02E-02 ND	< 1.31E+00	< 2.38E-05	< 3.00E-06
1,2-Dichlorobenzene	0	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.1 ND	< 2.64E-02 ND	< 4.22E-01	< 7.71E-06	< 9.71E-07
1,3-Dichlorobenzene	0	< 0.0062 ND	< 0.0062 ND	< 0.0062 ND	< 0.1 ND	< 2.70E-02 ND	< 4.33E-01	< 7.90E-06	< 9.95E-07
1,4-Dichlorobenzene	0	< 0.0086 ND	< 0.0086 ND	< 0.0086 ND	< 0.12 ND	< 3.59E-02 ND	< 5.80E-01	< 1.06E-05	< 1.33E-06
1,3-Dichloropropane	0	< 0.0036 ND	< 0.0036 ND	< 0.0036 ND	< 0.17 ND	< 2.51E-02 ND	< 3.73E-01	< 6.81E-06	< 8.58E-07
2,2-Dichloropropane	0	< 0.003 ND	< 0.003 ND	< 0.003 ND	< 0.11 ND	< 1.82E-02 ND	< 2.77E-01	< 5.05E-06	< 6.36E-07
1,1-Dichloropropene	0	< 0.002 ND	< 0.002 ND	< 0.002 ND	< 0.1 ND	< 1.44E-02 ND	< 2.13E-01	< 3.89E-06	< 4.91E-07
Hexachlorobutadiene	0	< 0.0096 ND	< 0.0096 ND	< 0.0096 ND	< 0.12 ND	< 3.89E-02 ND	< 6.32E-01	< 1.15E-05	< 1.45E-06
Isopropyl benzene	0	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.1 ND	< 2.22E-02 ND	< 3.49E-01	< 6.37E-06	< 8.03E-07
p-Isopropyltoluene	0	< 0.0076 ND	< 0.0076 ND	< 0.0076 ND	< 0.1 ND	< 3.12E-02 ND	< 5.06E-01	< 9.23E-06	< 1.16E-06
Naphthalene	0	< 0.02 ND	< 0.02 ND	< 0.021 J	< 0.17 ND	< 7.53E-02	< 1.25E+00	< 2.28E-05	< 2.87E-06
n-Propylbenzene	0	< 0.0058 ND	< 0.0058 ND	< 0.0058 ND	< 0.1 ND	< 2.58E-02 ND	< 4.12E-01	< 7.52E-06	< 9.47E-07
1,1,1,2-Tetrachloroethane	0	< 0.0038 J	< 0.002 ND	< 0.002 ND	< 0.12 ND	< 1.79E-02	< 2.67E-01	< 4.86E-06	< 6.13E-07
Tetrahydrofuran	0	< 0.062 ND	< 0.062 ND	< 0.062 ND	< 1.2 ND	< 2.87E-01 ND	< 4.55E+00	< 8.30E-05	< 1.05E-05
1,2,3-Trichlorobenzene	0	< 0.028 ND	< 0.028 ND	< 0.028 ND	< 0.23 ND	< 1.03E-01 ND	< 1.71E+00	< 3.13E-05	< 3.94E-06
1,2,4-Trichlorobenzene	0	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.15 ND	< 3.06E-02 ND	< 4.77E-01	< 8.70E-06	< 1.10E-06
1,1,2-Trichloro-1,2,2-trifluoroethane	0	< 0.0036 ND	< 0.0036 ND	< 0.0036 ND	< 0.13 ND	< 2.17E-02 ND	< 3.30E-01	< 6.02E-06	< 7.58E-07
1,2,4-Trimethylbenzene	0	< 0.0096 ND	< 0.0096 ND	< 0.0096 ND	< 0.11 ND	< 3.80E-02 ND	< 6.21E-01	< 1.13E-05	< 1.43E-06
1,3,5-Trimethylbenzene	0	< 0.0056 ND	< 0.0056 ND	< 0.0056 ND	< 0.1 ND	< 2.52E-02 ND	< 4.02E-01	< 7.33E-06	< 9.23E-07
m- & p-Xylene	0	< 0.0083 J	< 0.008 J	< 0.0184 J	< 0.2 ND	< 5.15E-02	< 8.22E-01	< 1.50E-05	< 1.89E-06
o-Xylene	0	< 0.0034 ND	< 0.0034 ND	< 0.0053 J	< 0.14 ND	< 2.39E-02	< 3.63E-01	< 6.63E-06	< 8.35E-07
	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tentatively Identified Compounds (TICs)									
Unknown	0	0.068 NJ	0.051 NJ	0	0	1.19E-01	2.07E+00	3.78E-05	4.76E-06
Benzaldehyde	0	0	0.087 NJ	0.078 NJ	0	1.65E-01	2.87E+00	5.24E-05	6.60E-06

(a) Stack gas sample volume (analyzed tubes only)
2.0277 dry std cubic feet
0.0574 dry std cubic meters

(b) Stack gas flow rate
10770 actual cubic feet per minute
5.0835 actual cubic meters per second
4870 dry std cubic feet per minute
2.2987 dry std cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using one half of the detection limit.

ND = Not Detected
NA = Not Analyzed

B=present in blank, J=estimated - below quantation limit
E=estimated - above calibration range, SAT=saturated

Volatile Organic Emission Results - Run 2

Parameter	Units	Tube Set A	Tube Set B	Tube Set C	Tube Set D
Net sampling time	min	40	40	40	40
Corrected sample volume	liters,dry std.	19.453	20.223	19.371	19.371
Corrected sample volume	dscf	0.687	0.714	0.684	0.684
Corrected sample volume	dscm	0.0195	0.0202	0.0194	0.0194
Analyzed (Y/N)	-	N	Y	Y	Y

Total volume sampled	dscf	2.769
Total volume sampled	dscm	0.0784
Number of tube pairs analyzed	-	3
Total condensate volume	ml	84
Stack gas flow rate	acfm	8,580
Stack gas flow rate	dscfm	3,880

VOST Compound	Mass VOC Compound (ug)					Mass VOC Compound (ug)	Stack Conc. (a,c) (ug/dscm)	Mass Emission Rate (a,b,c) (lb/hr)	Mass Emission Rate (a,b,c) (g/s)
	Tube Set A	Tube Set B	Tube Set C	Tube Set D	Condensate (ug/L)				
Standard Target Analytes									
Acetone	0	0.697 J,B	0.56 B	0.444 J,B	4.7 J	2.10E+00	3.39E+01	4.92E-04	6.21E-05
Acrylonitrile	0	< 0.152 ND	< 0.152 ND	< 0.152 ND	< 2.7 ND	< 6.83E-01 ND	< 1.06E+01	< 1.54E-04	< 1.95E-05
Benzene	0	< 0.0094 J	< 0.0126 J	< 0.0312	< 0.1 ND	< 6.16E-02	< 1.01E+00	< 1.47E-05	< 1.85E-06
Bromodichloromethane	0	< 0.0416	< 0.0346	< 0.0406	< 0.1 ND	< 1.25E-01	< 2.09E+00	< 3.03E-05	< 3.82E-06
Bromoform	0	< 0.1766	< 0.1466	0.194 J	< 0.14 ND	< 5.29E-01	< 8.92E+00	< 1.30E-04	< 1.63E-05
Bromomethane	0	< 0.05 J,B	< 0.052 J,B	< 0.046 J,B	< 0.38 ND	< 1.80E-01	< 2.92E+00	< 4.24E-05	< 5.34E-06
2-Butanone	0	< 0.07 ND	< 0.07 ND	< 0.07 ND	< 0.75 ND	< 2.73E-01 ND	< 4.36E+00	< 6.34E-05	< 7.99E-06
Carbon Disulfide	0	< 0.0106 J	< 0.009 J	0.0171 J	< 0.1 ND	< 4.51E-02	< 7.30E-01	< 1.06E-05	< 1.34E-06
Carbon Tetrachloride	0	< 0.006 J	< 0.0056 J	< 0.006 J	< 0.12 ND	< 2.77E-02	< 4.27E-01	< 6.21E-06	< 7.82E-07
Chlorobenzene	0	1.6028 J	< 0.6513	2.012	< 0.1 ND	< 4.27E+00	< 7.25E+01	< 1.05E-03	< 1.33E-04
Chlorodibromomethane	0	< 0.13	< 0.106	0.131 J	< 0.2 ND	< 3.84E-01	< 6.44E+00	< 9.36E-05	< 1.18E-05
Chloroethane	0	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.24 ND	< 8.02E-02 ND	< 1.27E+00	< 1.85E-05	< 2.33E-06
Chloroform	0	0.0349 J	< 0.0239	< 0.0289	< 0.1 ND	< 9.61E-02	< 1.59E+00	< 2.32E-05	< 2.92E-06
Chloromethane	0	< 0.0642	< 0.3232	< 0.0212 J	< 0.12 ND	< 4.19E-01	< 7.06E+00	< 1.03E-04	< 1.29E-05
Dibromomethane	0	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.21 ND	< 7.76E-02 ND	< 1.24E+00	< 1.81E-05	< 2.28E-06
Dichlorodifluoromethane	0	< 0.023 J	< 0.0113 J	< 0.015 J	< 0.15 ND	< 6.19E-02	< 9.97E-01	< 1.45E-05	< 1.83E-06
1,1-Dichloroethane	0	< 0.0038 ND	< 0.0038 ND	< 0.0038 ND	< 0.1 ND	< 1.98E-02 ND	< 3.00E-01	< 4.37E-06	< 5.50E-07
1,2-Dichloroethane	0	< 0.0044 ND	< 0.0044 ND	< 0.0044 ND	0.12 J	< 2.33E-02	< 3.52E-01	< 5.12E-06	< 6.45E-07
1,1-Dichloroethene	0	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.1 ND	< 2.22E-02 ND	< 3.41E-01	< 4.96E-06	< 6.25E-07
cis-1,2-Dichloroethene	0	< 0.005 ND	< 0.005 ND	< 0.005 ND	< 0.12 ND	< 2.51E-02 ND	< 3.83E-01	< 5.57E-06	< 7.01E-07
trans-1,2-Dichloroethene	0	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.1 ND	< 1.86E-02 ND	< 2.80E-01	< 4.07E-06	< 5.13E-07
1,2-Dichloropropane	0	< 0.0054 ND	< 0.0054 ND	< 0.0054 ND	< 0.1 ND	< 2.46E-02 ND	< 3.82E-01	< 5.55E-06	< 6.99E-07
cis-1,3-Dichloropropene	0	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.1 ND	< 2.64E-02 ND	< 4.12E-01	< 5.99E-06	< 7.55E-07
trans-1,3-Dichloropropene	0	< 0.004 ND	< 0.004 ND	< 0.004 ND	< 0.11 ND	< 2.12E-02 ND	< 3.21E-01	< 4.67E-06	< 5.88E-07
Ethylbenzene	0	< 0.0026 ND	< 0.0026 ND	< 0.0026 ND	< 0.1 ND	< 1.62E-02 ND	< 2.39E-01	< 3.48E-06	< 4.38E-07
2-Hexanone	0	< 0.0198 ND	< 0.0198 ND	< 0.0198 ND	< 0.76 ND	< 1.23E-01 ND	< 1.82E+00	< 2.65E-05	< 3.34E-06
Iodomethane	0	< 0.0156 J,B	< 0.0166 J,B	< 0.0156 J,B	< 0.12 ND	< 5.79E-02	< 9.39E-01	< 1.37E-05	< 1.72E-06
Methylene Chloride	0	0.059 J	< 0.026 ND	< 0.026 ND	1.1 J	< 2.03E-01	< 3.06E+00	< 4.45E-05	< 5.61E-06
4-Methyl-2-pentanone (MIBK)	0	< 0.028 ND	< 0.028 ND	< 0.028 ND	< 0.4 ND	< 1.18E-01 ND	< 1.85E+00	< 2.69E-05	< 3.39E-06
Styrene	0	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.1 ND	< 1.86E-02 ND	< 2.80E-01	< 4.07E-06	< 5.13E-07
1,1,2,2-Tetrachloroethane	0	< 0.022 ND	< 0.022 ND	< 0.022 ND	< 0.15 ND	< 7.86E-02 ND	< 1.28E+00	< 1.86E-05	< 2.34E-06
Tetrachloroethene	0	< 0.2321	< 0.0891	< 0.1421	< 0.1 ND	< 4.72E-01	< 7.96E+00	< 1.16E-04	< 1.46E-05
Toluene	0	0.1734 J	0.0158 J	< 0.0232	0.15 J	< 2.25E-01	< 3.76E+00	< 5.47E-05	< 6.89E-06
1,1,1-Trichloroethane	0	< 0.0032 ND	< 0.0032 ND	< 0.0032 ND	< 0.1 ND	< 1.80E-02 ND	< 2.70E-01	< 3.92E-06	< 4.94E-07
1,1,2-Trichloroethane	0	< 0.01 ND	< 0.01 ND	< 0.01 ND	< 0.25 ND	< 5.10E-02 ND	< 7.77E-01	< 1.13E-05	< 1.42E-06
Trichloroethene	0	0.0146 J	< 0.016	0.0135 J	< 0.1 ND	< 5.25E-02	< 8.55E-01	< 1.24E-05	< 1.57E-06
Trichlorofluoromethane	0	< 0.0098 ND	< 0.0098 ND	< 0.0098 ND	< 0.12 ND	< 3.95E-02 ND	< 6.27E-01	< 9.12E-06	< 1.15E-06
1,2,3-Trichloropropane	0	< 0.0162 ND	< 0.0162 ND	< 0.0162 ND	< 0.36 ND	< 7.88E-02 ND	< 1.21E+00	< 1.76E-05	< 2.22E-06
Vinyl Acetate	0	< 0.024 ND	< 0.024 ND	< 0.024 ND	< 0.24 ND	< 9.22E-02 ND	< 1.48E+00	< 2.15E-05	< 2.71E-06
Vinyl Chloride	0	< 0.0064 ND	< 0.0064 ND	< 0.0064 ND	< 0.24 ND	< 3.94E-02 ND	< 5.83E-01	< 8.47E-06	< 1.07E-06
Xylenes (total)	0	< 0.0121 J	< 0.0102 J	< 0.0116 J	< 0.3 ND	< 5.91E-02	< 8.96E-01	< 1.30E-05	< 1.64E-06
Special Target Analytes									
Bromobenzene	0	< 0.0072 ND	< 0.0072 ND	< 0.0072 ND	< 0.11 ND	< 3.08E-02 ND	< 4.84E-01	< 7.04E-06	< 8.87E-07
Bromochloromethane	0	< 0.024 ND	< 0.024 ND	< 0.024 ND	< 0.24 ND	< 9.22E-02 ND	< 1.48E+00	< 2.15E-05	< 2.71E-06
n-Butylbenzene	0	< 0.0094 ND	< 0.0094 ND	< 0.0094 ND	< 0.1 ND	< 3.66E-02 ND	< 5.85E-01	< 8.51E-06	< 1.07E-06
sec-Butylbenzene	0	< 0.0072 ND	< 0.0072 ND	< 0.0072 ND	< 0.1 ND	< 3.00E-02 ND	< 4.73E-01	< 6.88E-06	< 8.67E-07
tert-Butylbenzene	0	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.24 ND	< 3.82E-02 ND	< 5.62E-01	< 8.17E-06	< 1.03E-06
2-Chlorotoluene	0	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.24 ND	< 3.40E-02 ND	< 4.91E-01	< 7.14E-06	< 8.99E-07
4-Chlorotoluene	0	< 0.004 ND	< 0.004 ND	< 0.004 ND	< 0.21 ND	< 2.96E-02 ND	< 4.28E-01	< 6.23E-06	< 7.85E-07
1,2-Dibromo-3-chloropropane	0	< 0.04 ND	< 0.04 ND	< 0.04 ND	< 0.45 ND	< 1.58E-01 ND	< 2.52E+00	< 3.66E-05	< 4.61E-06
1,2-Dibromoethane	0	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.24 ND	< 8.02E-02 ND	< 1.27E+00	< 1.85E-05	< 2.33E-06
1,2-Dichlorobenzene	0	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.1 ND	< 2.64E-02 ND	< 4.12E-01	< 5.99E-06	< 7.55E-07
1,3-Dichlorobenzene	0	< 0.0062 ND	< 0.0062 ND	< 0.0062 ND	< 0.1 ND	< 2.70E-02 ND	< 4.23E-01	< 6.14E-06	< 7.74E-07
1,4-Dichlorobenzene	0	< 0.0086 ND	< 0.0086 ND	< 0.0086 ND	< 0.12 ND	< 3.59E-02 ND	< 5.66E-01	< 8.23E-06	< 1.04E-06
1,3-Dichloropropane	0	< 0.0036 ND	< 0.0036 ND	< 0.0036 ND	< 0.17 ND	< 2.51E-02 ND	< 3.65E-01	< 5.31E-06	< 6.69E-07
2,2-Dichloropropane	0	< 0.003 ND	< 0.003 ND	< 0.003 ND	< 0.11 ND	< 1.82E-02 ND	< 2.70E-01	< 3.93E-06	< 4.95E-07
1,1-Dichloropropene	0	< 0.002 ND	< 0.002 ND	< 0.002 ND	< 0.1 ND	< 1.44E-02 ND	< 2.09E-01	< 3.04E-06	< 3.83E-07
Hexachlorobutadiene	0	< 0.0096 ND	< 0.0096 ND	< 0.0096 ND	< 0.12 ND	< 3.89E-02 ND	< 6.17E-01	< 8.97E-06	< 1.13E-06
Isopropyl benzene	0	< 0.0046 ND	< 0.0046 ND	< 0.0046 J	< 0.1 ND	< 2.22E-02	< 3.41E-01	< 4.96E-06	< 6.25E-07
p-Isopropyltoluene	0	< 0.0076 ND	< 0.0076 ND	< 0.0076 ND	< 0.1 ND	< 3.12E-02 ND	< 4.94E-01	< 7.18E-06	< 9.04E-07
Naphthalene	0	< 0.02 ND	< 0.028 J	< 0.02 J	< 0.17 ND	< 8.23E-02	< 1.34E+00	< 1.94E-05	< 2.45E-06
n-Propylbenzene	0	< 0.0058 ND	< 0.0058 ND	< 0.0058 ND	< 0.1 ND	< 2.58E-02 ND	< 4.02E-01	< 5.85E-06	< 7.37E-07
1,1,1,2-Tetrachloroethane	0	< 0.002 ND	< 0.002 ND	< 0.002 ND	< 0.12 ND	< 1.61E-02 ND	< 2.30E-01	< 3.35E-06	< 4.22E-07
Tetrahydrofuran	0	< 0.062 ND	< 0.062 ND	< 0.062 ND	< 1.2 ND	< 2.87E-01 ND	< 4.44E+00	< 6.45E-05	< 8.13E-06
1,2,3-Trichlorobenzene	0	< 0.028 ND	< 0.028 ND	< 0.028 ND	< 0.23 ND	< 1.03E-01 ND	< 1.67E+00	< 2.43E-05	< 3.06E-06
1,2,4-Trichlorobenzene	0	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.15 ND	< 3.06E-02 ND	< 4.66E-01	< 6.77E-06	< 8.53E-07
1,1,2-Trichloro-1,2,2-trifluoroethane	0	< 0.0036 ND	< 0.0036 ND	< 0.0036 ND	< 0.13 ND	< 2.17E-02 ND	< 3.22E-01	< 4.69E-06	< 5.90E-07
1,2,4-Trimethylbenzene	0	< 0.0096 ND	< 0.0096 ND	< 0.0096 ND	< 0.11 ND	< 3.80E-02 ND	< 6.06E-01	< 8.81E-06	< 1.11E-06
1,3,5-Trimethylbenzene	0	< 0.0056 ND	< 0.0056 ND	< 0.0056 ND	< 0.1 ND	< 2.52E-02 ND	< 3.92E-01	< 5.70E-06	< 7.18E-07
m- & p-Xylene	0	< 0.0107 J	< 0.0088 J	< 0.0102 J	< 0.2 ND	< 4.65E-02	< 7.18E-01	< 1.04E-05	< 1.31E-06
o-Xylene	0	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.14 ND	< 2.20E-02 ND	< 3.23E-01	< 4.69E-06	< 5.91E-07
	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tentatively Identified Compounds (TICs)									
Benzaldehyde	0	0	0.04 NJ	0	0	4.00E-02	6.78E-01	9.86E-06	1.24E-06

(a) Stack gas sample volume 2.0821 dry std cubic feet
(analyzed tubes only) 0.059 dry std cubic meters

(b) Stack gas flow rate 8580 actual cubic feet per minute
4.0498 actual cubic meters per second
3880 dry std cubic feet per minute
1.8314 dry std cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using one half of the detection limit.

ND = Not Detected B=present in blank, J=estimated - below quantation limit
NA = Not Analyzed E=estimated - above calibration range, SAT=saturated

Volatile Organic Emission Results - Run 3

Parameter	Units	Tube Set A	Tube Set B	Tube Set C	Tube Set D
Net sampling time	min	40	40	40	40
Corrected sample volume	liters,dry std.	20.121	18.453	18.3	18.453
Corrected sample volume	dscf	0.711	0.652	0.646	0.652
Corrected sample volume	dscm	0.0201	0.0185	0.0183	0.0185
Analyzed (Y/N)	-	Y	Y	Y	Y

Total volume sampled	dscf	2.660
Total volume sampled	dscm	0.0753
Number of tube pairs analyzed	-	4
Total condensate volume	ml	84
Stack gas flow rate	acfm	8,850
Stack gas flow rate	dscfm	4,080

VOST Compound	Mass VOC Compound (ug)					Mass VOC Compound (ug)	Stack Conc. (a,c) (ug/dscm)	Mass Emission Rate (a,b,c) (lb/hr)	Mass Emission Rate (a,b,c) (g/s)
	Tube Set A	Tube Set B	Tube Set C	Tube Set D	Condensate (ug/L)				
Standard Target Analytes									
Acetone	< 0.245	0.56 B	0.64 B	0.458 J,B	5.9 J	< 2.40E+00	< 3.18E+01	< 4.87E-04	< 6.13E-05
Acrylonitrile	< 0.152 ND	< 0.152 ND	< 0.152 ND	< 0.152 ND	< 2.7 ND	< 8.35E-01 ND	< 1.11E+01	< 1.69E-04	< 2.13E-05
Benzene	0.0135 J	< 0.0115 J	< 0.0086 J	< 0.0101 J	< 0.1 ND	< 5.21E-02	< 6.92E-01	< 1.06E-05	< 1.33E-06
Bromodichloromethane	< 0.0396	< 0.0426	< 0.0376	< 0.0416	< 0.1 ND	< 1.70E-01	< 2.25E+00	< 3.45E-05	< 4.34E-06
Bromoform	< 0.1266	< 0.1666	< 0.1566	< 0.1366	< 0.14 ND	< 5.98E-01	< 7.94E+00	< 1.21E-04	< 1.53E-05
Bromomethane	< 0.044 ND	< 0.047 J,B	< 0.048 J,B	< 0.049 J,B	< 0.38 ND	< 2.20E-01	< 2.92E+00	< 4.46E-05	< 5.62E-06
2-Butanone	< 0.07 ND	< 0.07 ND	< 0.07 ND	< 0.07 ND	< 0.75 ND	< 3.43E-01 ND	< 4.55E+00	< 6.96E-05	< 8.77E-06
Carbon Disulfide	0.0124 J	0.0151 J	0.0128 J	0.0187 J	< 0.1 ND	< 6.74E-02	< 8.95E-01	< 1.37E-05	< 1.72E-06
Carbon Tetrachloride	< 0.0049 J	< 0.005 J	< 0.0042 J	< 0.0048 J	< 0.12 ND	< 2.90E-02	< 3.85E-01	< 5.88E-06	< 7.41E-07
Chlorobenzene	2.349 E	3.409 E,J	3.1048 E,J	1.4077 J	< 0.1 ND	< 1.03E+01	< 1.36E+02	< 2.09E-03	< 2.63E-04
Chlorodibromomethane	< 0.11	< 0.13	< 0.11	0.121 J	< 0.2 ND	< 4.88E-01	< 6.48E+00	< 9.90E-05	< 1.25E-05
Chloroethane	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.24 ND	< 1.00E-01 ND	< 1.33E+00	< 2.03E-05	< 2.56E-06
Chloroform	< 0.0289	< 0.0299	0.0244 J	< 0.0269	< 0.1 ND	< 1.19E-01	< 1.57E+00	< 2.40E-05	< 3.03E-06
Chloromethane	< 0.2532	< 0.0862	< 0.0242 J	< 0.0542	< 0.12 ND	< 4.28E-01	< 5.68E+00	< 8.68E-05	< 1.09E-05
Dibromomethane	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.21 ND	< 9.76E-02 ND	< 1.30E+00	< 1.98E-05	< 2.50E-06
Dichlorodifluoromethane	< 0.0127 J	< 0.0126 J	< 0.0114 J	< 0.0149 J	< 0.15 ND	< 6.42E-02	< 8.52E-01	< 1.30E-05	< 1.64E-06
1,1-Dichloroethane	< 0.0038 ND	< 0.0038 ND	< 0.0038 ND	< 0.0038 ND	< 0.1 ND	< 2.36E-02 ND	< 3.13E-01	< 4.79E-06	< 6.03E-07
1,2-Dichloroethane	< 0.0044 ND	< 0.0044 ND	< 0.0044 ND	< 0.0044 ND	0.11 J	< 2.68E-02	< 3.56E-01	< 5.45E-06	< 6.86E-07
1,1-Dichloroethene	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.1 ND	< 2.68E-02 ND	< 3.56E-01	< 5.44E-06	< 6.85E-07
cis-1,2-Dichloroethene	< 0.005 ND	< 0.005 ND	< 0.005 ND	< 0.005 ND	< 0.12 ND	< 3.01E-02 ND	< 3.99E-01	< 6.10E-06	< 7.69E-07
trans-1,2-Dichloroethene	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.1 ND	< 2.20E-02 ND	< 2.92E-01	< 4.46E-06	< 5.62E-07
1,2-Dichloropropane	< 0.0054 ND	< 0.0054 ND	< 0.0054 ND	< 0.0054 ND	< 0.1 ND	< 3.00E-02 ND	< 3.98E-01	< 6.09E-06	< 7.67E-07
cis-1,3-Dichloropropene	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.1 ND	< 3.24E-02 ND	< 4.30E-01	< 6.57E-06	< 8.28E-07
trans-1,3-Dichloropropene	< 0.004 ND	< 0.004 ND	< 0.004 ND	< 0.004 ND	< 0.11 ND	< 2.52E-02 ND	< 3.35E-01	< 5.12E-06	< 6.45E-07
Ethylbenzene	< 0.0031 J	< 0.0026 ND	< 0.0026 ND	< 0.0026 ND	< 0.1 ND	< 1.93E-02	< 2.56E-01	< 3.92E-06	< 4.93E-07
2-Hexanone	< 0.0198 ND	< 0.0198 ND	< 0.0198 ND	< 0.0198 ND	< 0.76 ND	< 1.43E-01 ND	< 1.90E+00	< 2.90E-05	< 3.66E-06
Iodomethane	< 0.0032 ND	< 0.0156 J,B	< 0.0156 J,B	< 0.0156 J,B	0.56 J,B	< 9.70E-02	< 1.29E+00	< 1.97E-05	< 2.48E-06
Methylene Chloride	0.183 J	0.48	0.161	0.295	1.2 J	1.22E+00	1.62E+01	2.47E-04	3.12E-05
4-Methyl-2-pentanone (MIBK)	< 0.028 ND	< 0.028 ND	< 0.028 ND	< 0.028 ND	< 0.4 ND	< 1.46E-01 ND	< 1.93E+00	< 2.95E-05	< 3.72E-06
Styrene	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.1 ND	< 2.20E-02 ND	< 2.92E-01	< 4.46E-06	< 5.62E-07
1,1,2,2-Tetrachloroethane	< 0.022 ND	< 0.022 ND	< 0.022 ND	< 0.022 ND	< 0.15 ND	< 1.01E-01 ND	< 1.34E+00	< 2.04E-05	< 2.57E-06
Tetrachloroethene	0.2332 J	< 2.4021 E	1.1097 J	0.3624 J	< 0.1 ND	< 4.12E+00	< 5.46E+01	< 8.35E-04	< 1.05E-04
Toluene	0.072 J	0.3743 J	0.1233 J	0.1925 J	0.12 J	7.72E-01	1.03E+01	1.57E-04	1.97E-05
1,1,1-Trichloroethane	< 0.0032 ND	< 0.0032 ND	< 0.0032 ND	< 0.0032 ND	< 0.1 ND	< 2.12E-02 ND	< 2.81E-01	< 4.30E-06	< 5.42E-07
1,1,2-Trichloroethane	< 0.01 ND	< 0.01 ND	< 0.01 ND	< 0.01 ND	< 0.25 ND	< 6.10E-02 ND	< 8.10E-01	< 1.24E-05	< 1.56E-06
Trichloroethene	0.0189 J	0.0217 J	< 0.0122 J	< 0.0117 J	< 0.1 ND	< 7.29E-02	< 9.68E-01	< 1.48E-05	< 1.86E-06
Trichlorofluoromethane	< 0.0098 ND	< 0.0098 ND	< 0.0098 ND	< 0.0098 ND	< 0.12 ND	< 4.93E-02 ND	< 6.54E-01	< 1.00E-05	< 1.26E-06
1,2,3-Trichloropropane	< 0.0162 ND	< 0.0162 ND	< 0.0162 ND	< 0.0162 ND	< 0.36 ND	< 9.50E-02 ND	< 1.26E+00	< 1.93E-05	< 2.43E-06
Vinyl Acetate	< 0.024 ND	< 0.024 ND	< 0.024 ND	< 0.024 ND	< 0.24 ND	< 1.16E-01 ND	< 1.54E+00	< 2.36E-05	< 2.97E-06
Vinyl Chloride	< 0.0064 ND	< 0.0064 ND	< 0.0064 ND	< 0.0064 ND	< 0.24 ND	< 4.58E-02 ND	< 6.07E-01	< 9.28E-06	< 1.17E-06
Xylenes (total)	< 0.0148 J	< 0.0113 J	< 0.0109 J	< 0.0097 J	< 0.3 ND	< 7.19E-02	< 9.54E-01	< 1.46E-05	< 1.84E-06
Special Target Analytes									
Bromobenzene	< 0.0072 ND	< 0.0072 ND	< 0.0072 ND	< 0.0072 ND	< 0.11 ND	< 3.80E-02 ND	< 5.05E-01	< 7.72E-06	< 9.72E-07
Bromochloromethane	< 0.024 ND	< 0.024 ND	< 0.024 ND	< 0.024 ND	< 0.24 ND	< 1.16E-01 ND	< 1.54E+00	< 2.36E-05	< 2.97E-06
n-Butylbenzene	< 0.0094 ND	< 0.0094 ND	< 0.0094 ND	< 0.0094 ND	< 0.1 ND	< 4.60E-02 ND	< 6.11E-01	< 9.33E-06	< 1.18E-06
sec-Butylbenzene	< 0.0072 ND	< 0.0072 ND	< 0.0072 ND	< 0.0072 ND	< 0.1 ND	< 3.72E-02 ND	< 4.94E-01	< 7.55E-06	< 9.51E-07
tert-Butylbenzene	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.24 ND	< 4.42E-02 ND	< 5.86E-01	< 8.96E-06	< 1.13E-06
2-Chlorotoluene	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.24 ND	< 3.86E-02 ND	< 5.12E-01	< 7.82E-06	< 9.86E-07
4-Chlorotoluene	< 0.004 ND	< 0.004 ND	< 0.004 ND	< 0.004 ND	< 0.21 ND	< 3.36E-02 ND	< 4.47E-01	< 6.83E-06	< 8.60E-07
1,2-Dibromo-3-chloropropane	< 0.04 ND	< 0.04 ND	< 0.04 ND	< 0.04 ND	< 0.45 ND	< 1.98E-01 ND	< 2.63E+00	< 4.01E-05	< 5.06E-06
1,2-Dibromoethane	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.02 ND	< 0.24 ND	< 1.00E-01 ND	< 1.33E+00	< 2.03E-05	< 2.56E-06
1,2-Dichlorobenzene	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.1 ND	< 3.24E-02 ND	< 4.30E-01	< 6.57E-06	< 8.28E-07
1,3-Dichlorobenzene	< 0.0062 ND	< 0.0062 ND	< 0.0062 ND	< 0.0062 ND	< 0.1 ND	< 3.32E-02 ND	< 4.41E-01	< 6.74E-06	< 8.49E-07
1,4-Dichlorobenzene	< 0.0086 ND	< 0.0086 ND	< 0.0086 ND	< 0.0086 ND	< 0.12 ND	< 4.45E-02 ND	< 5.90E-01	< 9.03E-06	< 1.14E-06
1,3-Dichloropropane	< 0.0036 ND	< 0.0036 ND	< 0.0036 ND	< 0.0036 ND	< 0.17 ND	< 2.87E-02 ND	< 3.81E-01	< 5.82E-06	< 7.33E-07
2,2-Dichloropropane	< 0.003 ND	< 0.003 ND	< 0.003 ND	< 0.003 ND	< 0.11 ND	< 2.12E-02 ND	< 2.82E-01	< 4.31E-06	< 5.43E-07
1,1-Dichloropropene	< 0.002 ND	< 0.002 ND	< 0.002 ND	< 0.002 ND	< 0.1 ND	< 1.64E-02 ND	< 2.18E-01	< 3.33E-06	< 4.19E-07
Hexachlorobutadiene	< 0.0096 ND	< 0.0096 ND	< 0.0096 ND	< 0.0096 ND	< 0.12 ND	< 4.85E-02 ND	< 6.44E-01	< 9.84E-06	< 1.24E-06
Isopropyl benzene	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.0046 ND	< 0.1 ND	< 2.68E-02 ND	< 3.56E-01	< 5.44E-06	< 6.85E-07
p-Isopropyltoluene	< 0.0076 ND	< 0.0076 ND	< 0.0076 ND	< 0.0076 ND	< 0.1 ND	< 3.88E-02 ND	< 5.15E-01	< 7.87E-06	< 9.92E-07
Naphthalene	< 0.02 ND	< 0.043	< 0.17	< 0.079	< 0.17 ND	< 3.26E-01	< 4.33E+00	< 6.62E-05	< 8.34E-06
n-Propylbenzene	< 0.0058 ND	< 0.0058 ND	< 0.0058 ND	< 0.0058 ND	< 0.1 ND	< 3.16E-02 ND	< 4.19E-01	< 6.41E-06	< 8.08E-07
1,1,1,2-Tetrachloroethane	< 0.002 ND	< 0.002 ND	< 0.002 ND	< 0.002 ND	< 0.12 ND	< 1.81E-02 ND	< 2.40E-01	< 3.67E-06	< 4.62E-07
Tetrahydrofuran	< 0.062 ND	< 0.062 ND	< 0.062 ND	< 0.062 ND	< 1.2 ND	< 3.49E-01 ND	< 4.63E+00	< 7.08E-05	< 8.92E-06
1,2,3-Trichlorobenzene	< 0.028 ND	< 0.028 ND	< 0.028 ND	< 0.028 ND	< 0.23 ND	< 1.31E-01 ND	< 1.74E+00	< 2.66E-05	< 3.36E-06
1,2,4-Trichlorobenzene	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.006 ND	< 0.15 ND	< 3.66E-02 ND	< 4.86E-01	< 7.43E-06	< 9.36E-07
1,1,2-Trichloro-1,2,2-trifluoroethane	< 0.0036 ND	< 0.0036 ND	< 0.0036 ND	< 0.0036 ND	< 0.13 ND	< 2.53E-02 ND	< 3.36E-01	< 5.14E-06	< 6.47E-07
1,2,4-Trimethylbenzene	< 0.0096 ND	< 0.0096 ND	< 0.0096 ND	< 0.0096 ND	< 0.11 ND	< 4.76E-02 ND	< 6.32E-01	< 9.67E-06	< 1.22E-06
1,3,5-Trimethylbenzene	< 0.0056 ND	< 0.0056 ND	< 0.0056 ND	< 0.0056 ND	< 0.1 ND	< 3.08E-02 ND	< 4.09E-01	< 6.25E-06	< 7.87E-07
m- & p-Xylene	< 0.0125 J	< 0.0099 J	< 0.0095 J	< 0.0083 J	< 0.2 ND	< 5.70E-02	< 7.57E-01	< 1.16E-05	< 1.46E-06
o-Xylene	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.0034 ND	< 0.14 ND	< 2.54E-02 ND	< 3.37E-01	< 5.15E-06	< 6.48E-07
	0	0	0	0	0	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Tentatively Identified Compounds (TICs)									
Nonane	0.06 NJ	0	0	0	0	6.00E-02	7.96E-01	1.22E-05	1.53E-06
Benzaldehyde	0	0.074 NJ	0.063 NJ	0.041 NJ	0	1.78E-01	2.36E+00	3.61E-05	4.55E-06

(a) Stack gas sample volume (analyzed tubes only) — 2.6599 dry std cubic feet; 0.0753 dry std cubic meters

(b) Stack gas flow rate — 8850 actual cubic feet per minute; 4.1773 actual cubic meters per second; 4080 dry std cubic feet per minute; 1.9258 dry std cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using one half of the detection limit.

ND = Not Detected
NA = Not Analyzed

B=present in blank, J=estimated - below quantation limit
E=estimated - above calibration range, SAT=saturated

PCDD/PCDF Congener and TEQ Results - CPT Run 1

Congener No.	PCDD/PCDF Compound	Analytical Result (pg/sample) Front Half	Back Half	Stack (a,b,c) Concentration (ng/dscm)	2,3,7,8-TCDD Toxicity Equivalence Factor	Stack Concentration Toxic Equivalents (ng/dscm)	Emission Rate as 2,3,7,8-TCDD (g/s)
PCDDs							
1	2,3,7,8-TCDD	10 ND	19 Q	< 4.82E-03	1	< 4.82E-03	< 1.20E-11
	Other TCDD	0	1681	4.26E-01			
	Total TCDD	4 Q,J	1700 Q	4.32E-01			
2	1,2,3,7,8-PeCDD	50 ND	33 J	< 8.37E-03	0.5	< 4.19E-03	< 1.05E-11
	Other PeCDD	0	547	1.39E-01			
	Total PeCDD	8.2 Q,J	580 Q	1.49E-01			
3	1,2,3,4,7,8-HxCDD	50 ND	11 J	< 2.79E-03	0.1	< 2.79E-04	< 6.97E-13
4	1,2,3,6,7,8-HxCDD	50 ND	9.6 J	< 2.43E-03	0.1	< 2.43E-04	< 6.08E-13
5	1,2,3,7,8,9-HxCDD	50 ND	16 J	< 4.06E-03	0.1	< 4.06E-04	< 1.01E-12
	Other HxCDD	0	123.4	3.13E-02			
	Total HxCDD	6.3 Q,J	160 Q	4.22E-02			
6	1,2,3,4,6,7,8-HpCDD	6.7 J	24 B,J	7.79E-03	0.01	7.79E-05	1.94E-13
	Other HpCDD	4.3	20	6.16E-03			
	Total HpCDD	11 J	44 J,B	1.40E-02			
7	OCDD	22 Q,B,J	27 B,J	1.24E-02	0.001	1.24E-05	3.10E-14
Total PCDDs(d)		< 51.5	2511	< 6.50E-01		< 1.00E-02	< 2.50E-11
PCDFs							
8	2,3,7,8-TCDF	2.4 Q,J	230 Q	5.89E-02	0.1	5.89E-03	1.47E-11
	Other TCDF	12.6	5770	1.47E+00			
	Total TCDF	15 Q,J	6000 Q	1.53E+00			
9	1,2,3,7,8-PeCDF	3.3 Q,J	170 Q	4.40E-02	0.05	2.20E-03	5.49E-12
10	2,3,4,7,8-PeCDF	2.9 Q,J	190	4.89E-02	0.5	2.45E-02	6.11E-11
	Other PeCDF	22.8	2240	5.74E-01			
	Total PeCDF	29 Q	2600 Q	6.67E-01			
11	1,2,3,4,7,8-HxCDF	5.7 Q,J	200 Q	5.22E-02	0.1	5.22E-03	1.30E-11
12	1,2,3,6,7,8-HxCDF	3.7 Q,J	100	2.63E-02	0.1	2.63E-03	6.57E-12
13	2,3,4,6,7,8-HxCDF	2.7 B,J	47 B,J	1.26E-02	0.1	1.26E-03	3.15E-12
14	1,2,3,7,8,9-HxCDF	50 ND	5.5 B,J	< 1.40E-03	0.1	< 1.40E-04	< 3.48E-13
	Other HxCDF	0	477.5	1.21E-01			
	Total HxCDF	21 Q,J,B	830 Q,B	2.16E-01			
15	1,2,3,4,6,7,8-HpCDF	8 Q,B,J	150 B	4.01E-02	0.01	4.01E-04	1.00E-12
16	1,2,3,4,7,8,9-HpCDF	50 ND	10 Q,J	< 2.54E-03	0.01	< 2.54E-05	< 6.33E-14
	Other HpCDF	0	40	1.01E-02			
	Total HpCDF	8 Q,B,J	200 B,Q	5.28E-02			
17	OCDF	8.5 Q,B,J	14 B,J	5.71E-03	0.001	5.71E-06	1.43E-14
Total PCDFs(e)		< 81.5	9644	< 2.47E+00		< 4.22E-02	< 1.05E-10
Total PCDD/PCDF		< 133	12155	< 3.12E+00		< 5.23E-02	< 1.30E-10

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume 139.210 dry standard cubic feet
3.94 dry standard cubic meters

(b) Stack gas flow rate 5,290 dry standard cubic feet per minute
2.50 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using one half of the detection limit. If the sum of the detection limits of the individual isomers for a given dioxin or furan exceeded the detection limit of the total it was assumed that these individual isomers, when added, constituted the entire total so that any contribution to the total by "other" isomers would be zero.

(d) Total PCDDs = Total TCDD + Total PeCDD + Total HxCDD + Total HpCDD + OCDD

(e) Total PCDFs = Total TCDF + Total PeCDF + Total HxCDF + Total HpCDF + OCDF

PCDD/PCDF Congener and TEQ Results - CPT Run 2

Congener No.	PCDD/PCDF Compound	Analytical Result (pg/sample) Front Half	Back Half	Stack (a,b,c) Concentration (ng/dscm)	2,3,7,8-TCDD Toxicity Equivalence Factor	Stack Concentration Toxic Equivalents (ng/dscm)	Emission Rate as 2,3,7,8-TCDD (g/s)
PCDDs							
1	2,3,7,8-TCDD	10 ND	9.2 Q,J	< 2.72E-03	1	< 2.72E-03	< 4.86E-12
	Other TCDD	0	490.8	1.45E-01			
	Total TCDD	10 ND	500 Q	< 1.48E-01			
2	1,2,3,7,8-PeCDD	50 ND	18 J	< 5.33E-03	0.5	< 2.67E-03	< 4.76E-12
	Other PeCDD	0	232	6.87E-02			
	Total PeCDD	1.3 Q,J	250 Q	7.44E-02			
3	1,2,3,4,7,8-HxCDD	50 ND	8.2 J	< 2.43E-03	0.1	< 2.43E-04	< 4.33E-13
4	1,2,3,6,7,8-HxCDD	50 ND	8.5 J	< 2.52E-03	0.1	< 2.52E-04	< 4.49E-13
5	1,2,3,7,8,9-HxCDD	50 ND	13 J	< 3.85E-03	0.1	< 3.85E-04	< 6.87E-13
	Other HxCDD	0	90.3	2.67E-02			
	Total HxCDD	50 ND	120 Q,J	< 3.55E-02			
6	1,2,3,4,6,7,8-HpCDD	50 ND	23 B,J	< 6.81E-03	0.01	< 6.81E-05	< 1.22E-13
	Other HpCDD	0	19	5.63E-03			
	Total HpCDD	2.2 Q,J	42 J,B	1.31E-02			
7	OCDD	17 B,J	24 B,J	1.21E-02	0.001	1.21E-05	2.17E-14
Total PCDDs(d)		< 80.5	936	< 2.83E-01		< 6.35E-03	< 1.13E-11
PCDFs							
8	2,3,7,8-TCDF	10 ND	130 Q	< 3.85E-02	0.1	< 3.85E-03	< 6.87E-12
	Other TCDF	0	2970	8.80E-01			
	Total TCDF	10 ND	3100 Q	< 9.18E-01			
9	1,2,3,7,8-PeCDF	50 ND	140	< 4.15E-02	0.05	< 2.07E-03	< 3.70E-12
10	2,3,4,7,8-PeCDF	50 ND	150	< 4.44E-02	0.5	< 2.22E-02	< 3.96E-11
	Other PeCDF	0	1710	5.06E-01			
	Total PeCDF	0.8 Q,J	2000 Q	5.93E-01			
11	1,2,3,4,7,8-HxCDF	2.1 Q,J	190	5.69E-02	0.1	5.69E-03	1.02E-11
12	1,2,3,6,7,8-HxCDF	1.6 Q,J	98	2.95E-02	0.1	2.95E-03	5.26E-12
13	2,3,4,6,7,8-HxCDF	50 ND	47 B,J	< 1.39E-02	0.1	< 1.39E-03	< 2.48E-12
14	1,2,3,7,8,9-HxCDF	50 ND	6 Q,B,J	< 1.78E-03	0.1	< 1.78E-04	< 3.17E-13
	Other HxCDF	0	489	1.45E-01			
	Total HxCDF	5.3 J,Q	830 B,Q	2.47E-01			
15	1,2,3,4,6,7,8-HpCDF	3.7 Q,B,J	160 B	4.85E-02	0.01	4.85E-04	8.65E-13
16	1,2,3,4,7,8,9-HpCDF	50 ND	18 J	< 5.33E-03	0.01	< 5.33E-05	< 9.51E-14
	Other HpCDF	0	52	1.54E-02			
	Total HpCDF	3.7 Q,B,J	230 B	6.92E-02			
17	OCDF	4.5 Q,B,J	23 B,J	8.14E-03	0.001	8.14E-06	1.45E-14
Total PCDFs(e)		< 24.3	6183	< 1.84E+00		< 3.89E-02	< 6.94E-11
Total PCDD/PCDF		< 104.8	7119	< 2.12E+00		< 4.52E-02	< 8.07E-11

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume 119.220 dry standard cubic feet
3.38 dry standard cubic meters

(b) Stack gas flow rate 3,780 dry standard cubic feet per minute
1.78 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using one half of the detection limit. If the sum of the detection limits of the individual isomers for a given dioxin or furan exceeded the detection limit of the total it was assumed that these individual isomers, when added, constituted the entire total so that any contribution to the total by "other" isomers would be zero.

(d) Total PCDDs = Total TCDD + Total PeCDD + Total HxCDD + Total HpCDD + OCDD

(e) Total PCDFs = Total TCDF + Total PeCDF + Total HxCDF + Total HpCDF + OCDF

PCDD/PCDF Congener and TEQ Results - CPT Run 3

Congener No.	PCDD/PCDF Compound	Analytical Result (pg/sample) Front Half	Back Half	Stack (a,b,c) Concentration (ng/dscm)	2,3,7,8-TCDD Toxicity Equivalence Factor	Stack Concentration Toxic Equivalents (ng/dscm)	Emission Rate as 2,3,7,8-TCDD (g/s)
	PCDDs						
1	2,3,7,8-TCDD	10 ND	12 Q	< 3.36E-03	1	< 3.36E-03	< 6.40E-12
	Other TCDD	0	398	1.11E-01			
	Total TCDD	10 ND	410 Q	< 1.15E-01			
2	1,2,3,7,8-PeCDD	50 ND	22 J	< 6.16E-03	0.5	< 3.08E-03	< 5.87E-12
	Other PeCDD	0	228	6.38E-02			
	Total PeCDD	50 ND	250 Q	< 7.00E-02			
3	1,2,3,4,7,8-HxCDD	50 ND	7.3 Q,J	< 2.04E-03	0.1	< 2.04E-04	< 3.90E-13
4	1,2,3,6,7,8-HxCDD	50 ND	9.7 Q,J	< 2.71E-03	0.1	< 2.71E-04	< 5.18E-13
5	1,2,3,7,8,9-HxCDD	50 ND	16 J	< 4.48E-03	0.1	< 4.48E-04	< 8.54E-13
	Other HxCDD	0	97	2.71E-02			
	Total HxCDD	50 ND	130 Q,J	< 3.64E-02			
6	1,2,3,4,6,7,8-HpCDD	2.2 J	26 B,J	7.89E-03	0.01	7.89E-05	1.50E-13
	Other HpCDD	0	24	6.72E-03			
	Total HpCDD	2.2 J	50 J,B	1.46E-02			
7	OCDD	18 B,J	26 B,J	1.23E-02	0.001	1.23E-05	2.35E-14
Total PCDDs(d)		< 130.2	866	< 2.48E-01		< 7.45E-03	< 1.42E-11
	PCDFs						
8	2,3,7,8-TCDF	10 ND	160 Q	< 4.48E-02	0.1	< 4.48E-03	< 8.54E-12
	Other TCDF	0	3840	1.07E+00			
	Total TCDF	10 ND	4000 Q	< 1.12E+00			
9	1,2,3,7,8-PeCDF	50 ND	190	< 5.32E-02	0.05	< 2.66E-03	< 5.07E-12
10	2,3,4,7,8-PeCDF	50 ND	180	< 5.04E-02	0.5	< 2.52E-02	< 4.80E-11
	Other PeCDF	0	2230	6.24E-01			
	Total PeCDF	2 Q,J	2600	7.28E-01			
11	1,2,3,4,7,8-HxCDF	50 ND	230	< 6.44E-02	0.1	< 6.44E-03	< 1.23E-11
12	1,2,3,6,7,8-HxCDF	50 ND	130	< 3.64E-02	0.1	< 3.64E-03	< 6.94E-12
13	2,3,4,6,7,8-HxCDF	50 ND	56 B	< 1.57E-02	0.1	< 1.57E-03	< 2.99E-12
14	1,2,3,7,8,9-HxCDF	50 ND	8.4 B,J	< 2.35E-03	0.1	< 2.35E-04	< 4.48E-13
	Other HxCDF	0	675.6	1.89E-01			
	Total HxCDF	50 ND	1100 B	< 3.08E-01			
15	1,2,3,4,6,7,8-HpCDF	3.5 Q,B,J	190 B	5.41E-02	0.01	5.41E-04	1.03E-12
16	1,2,3,4,7,8,9-HpCDF	50 ND	21 J	< 5.88E-03	0.01	< 5.88E-05	< 1.12E-13
	Other HpCDF	0	69	1.93E-02			
	Total HpCDF	3.5 Q,B,J	280 B	7.93E-02			
17	OCDF	3.4 Q,B,J	22 B,J	7.11E-03	0.001	7.11E-06	1.36E-14
Total PCDFs(e)		< 68.9	8002	< 2.24E+00		< 4.48E-02	< 8.54E-11
Total PCDD/PCDF		< 199.1	8868	< 2.49E+00		< 5.23E-02	< 9.96E-11

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume 126.180 dry standard cubic feet
3.57 dry standard cubic meters

(b) Stack gas flow rate 4,040 dry standard cubic feet per minute
1.91 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using one half of the detection limit. If the sum of the detection limits of the individual isomers for a given dioxin or furan exceeded the detection limit of the total it was assumed that these individual isomers, when added, constituted the entire total so that any contribution to the total by "other" isomers would be zero.

(d) Total PCDDs = Total TCDD + Total PeCDD + Total HxCDD + Total HpCDD + OCDD

(e) Total PCDFs = Total TCDF + Total PeCDF + Total HxCDF + Total HpCDF + OCDF

Multiple Metals Results - Run 1

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	4,970
	acfm	11,260
	dscm/min	140.75
Stack gas temperature	°F	176
Stack gas velocity	ft/min	3,582
Stack gas sample volume	dscf	76.790
	dscm	2.175
Isokinetic	%	98.2
Stack gas moisture content	vol %	46.2
Stack gas carbon dioxide content	vol %, dry	6.3
Stack gas oxygen content	vol %, dry	9.6
Aluminum		
Metal collected	ug	132.3
Metal concentration	ug/dscm	6.08E+01
	ug/dscm @ 7% O_2	7.47E+01
Metal emission rate	lb/h	1.13E-03
	g/s	1.43E-04
Antimony		
Metal collected	ug	< 5.3
Metal concentration	ug/dscm	< 2.44E+00
	ug/dscm @ 7% O_2	< 2.99E+00
Metal emission rate	lb/h	< 4.54E-05
	g/s	< 5.72E-06
Arsenic		
Metal collected	ug	< 5.9
Metal concentration	ug/dscm	< 2.73E+00
	ug/dscm @ 7% O_2	< 3.35E+00
Metal emission rate	lb/h	< 5.08E-05
	g/s	< 6.40E-06
Barium		
Metal collected	ug	10.2
Metal concentration	ug/dscm	4.69E+00
	ug/dscm @ 7% O_2	5.76E+00
Metal emission rate	lb/h	8.73E-05
	g/s	1.10E-05
Beryllium		
Metal collected	ug	< 0.4
Metal concentration	ug/dscm	< 1.75E-01
	ug/dscm @ 7% O_2	< 2.15E-01
Metal emission rate	lb/h	< 3.25E-06
	g/s	< 4.10E-07
Cadmium		
Metal collected	ug	12.1
Metal concentration	ug/dscm	5.56E+00
	ug/dscm @ 7% O_2	6.83E+00
Metal emission rate	lb/h	1.04E-04
	g/s	1.31E-05
Chromium		
Metal collected	ug	56.0
Metal concentration	ug/dscm	2.58E+01
	ug/dscm @ 7% O_2	3.16E+01
Metal emission rate	lb/h	4.79E-04
	g/s	6.04E-05
Cobalt		
Metal collected	ug	< 1.1
Metal concentration	ug/dscm	< 5.15E-01
	ug/dscm @ 7% O_2	< 6.32E-01
Metal emission rate	lb/h	< 9.59E-06
	g/s	< 1.21E-06
Copper		
Metal collected	ug	167.1
Metal concentration	ug/dscm	7.68E+01
	ug/dscm @ 7% O_2	9.44E+01
Metal emission rate	lb/h	1.43E-03
	g/s	1.80E-04

Iron		
Metal collected	ug	0.0
Metal concentration	ug/dscm	0.00E+00
	ug/dscm @ 7% O_2	0.00E+00
Metal emission rate	lb/h	0.00E+00
	g/s	0.00E+00
Lead		
Metal collected	ug	356.8
Metal concentration	ug/dscm	1.64E+02
	ug/dscm @ 7% O_2	2.01E+02
Metal emission rate	lb/h	3.05E-03
	g/s	3.85E-04
Manganese		
Metal collected	ug	65.8
Metal concentration	ug/dscm	3.03E+01
	ug/dscm @ 7% O_2	3.72E+01
Metal emission rate	lb/h	5.63E-04
	g/s	7.10E-05
Mercury		
Metal collected	ug	< 10.8
Metal concentration	ug/dscm	< 4.98E+00
	ug/dscm @ 7% O_2	< 6.11E+00
Metal emission rate	lb/h	< 9.26E-05
	g/s	< 1.17E-05
Molybdenum		
Metal collected	ug	0.0
Metal concentration	ug/dscm	0.00E+00
	ug/dscm @ 7% O_2	0.00E+00
Metal emission rate	lb/h	0.00E+00
	g/s	0.00E+00
Nickel		
Metal collected	ug	12.0
Metal concentration	ug/dscm	5.52E+00
	ug/dscm @ 7% O_2	6.78E+00
Metal emission rate	lb/h	1.03E-04
	g/s	1.29E-05
Selenium		
Metal collected	ug	4.5
Metal concentration	ug/dscm	2.07E+00
	ug/dscm @ 7% O_2	2.54E+00
Metal emission rate	lb/h	3.85E-05
	g/s	4.85E-06
Silver		
Metal collected	ug	2.6
Metal concentration	ug/dscm	1.20E+00
	ug/dscm @ 7% O_2	1.47E+00
Metal emission rate	lb/h	2.23E-05
	g/s	2.80E-06
Thallium		
Metal collected	ug	< 11.0
Metal concentration	ug/dscm	< 5.06E+00
	ug/dscm @ 7% O_2	< 6.21E+00
Metal emission rate	lb/h	< 9.42E-05
	g/s	< 1.19E-05
Vanadium		
Metal collected	ug	< 3.0
Metal concentration	ug/dscm	< 1.38E+00
	ug/dscm @ 7% O_2	< 1.69E+00
Metal emission rate	lb/h	< 2.57E-05
	g/s	< 3.24E-06
Zinc		
Metal collected	ug	218.4
Metal concentration	ug/dscm	1.00E+02
	ug/dscm @ 7% O_2	1.23E+02
Metal emission rate	lb/h	1.87E-03
	g/s	2.36E-04

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Multiple Metals Results - Run 2

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	3,860
	acfm	8,600
	dscm/min	109.32
Stack gas temperature	°F	175
Stack gas velocity	ft/min	2,736
Stack gas sample volume	dscf	79.370
	dscm	2.248
Isokinetic	%	102.9
Stack gas moisture content	vol %	45.1
Stack gas carbon dioxide content	vol %, dry	7.0
Stack gas oxygen content	vol %, dry	8.9
Aluminum		
Metal collected	ug	123.2
Metal concentration	ug/dscm	5.48E+01
	ug/dscm @ 7% O_2	6.34E+01
Metal emission rate	lb/h	7.93E-04
	g/s	9.99E-05
Antimony		
Metal collected	ug	< 4.8
Metal concentration	ug/dscm	< 2.14E+00
	ug/dscm @ 7% O_2	< 2.47E+00
Metal emission rate	lb/h	< 3.09E-05
	g/s	< 3.89E-06
Arsenic		
Metal collected	ug	< 2.7
Metal concentration	ug/dscm	< 1.21E+00
	ug/dscm @ 7% O_2	< 1.41E+00
Metal emission rate	lb/h	< 1.76E-05
	g/s	< 2.21E-06
Barium		
Metal collected	ug	9.0
Metal concentration	ug/dscm	4.00E+00
	ug/dscm @ 7% O_2	4.63E+00
Metal emission rate	lb/h	5.79E-05
	g/s	7.30E-06
Beryllium		
Metal collected	ug	< 0.4 ND
Metal concentration	ug/dscm	< 1.60E-01 ND
	ug/dscm @ 7% O_2	< 1.85E-01 ND
Metal emission rate	lb/h	< 2.32E-06 ND
	g/s	< 2.92E-07 ND
Cadmium		
Metal collected	ug	7.9
Metal concentration	ug/dscm	3.51E+00
	ug/dscm @ 7% O_2	4.07E+00
Metal emission rate	lb/h	5.08E-05
	g/s	6.40E-06
Chromium		
Metal collected	ug	20.2
Metal concentration	ug/dscm	8.99E+00
	ug/dscm @ 7% O_2	1.04E+01
Metal emission rate	lb/h	1.30E-04
	g/s	1.64E-05
Cobalt		
Metal collected	ug	< 1.0 ND
Metal concentration	ug/dscm	< 4.45E-01 ND
	ug/dscm @ 7% O_2	< 5.15E-01 ND
Metal emission rate	lb/h	< 6.43E-06 ND
	g/s	< 8.11E-07 ND
Copper		
Metal collected	ug	108.1
Metal concentration	ug/dscm	4.81E+01
	ug/dscm @ 7% O_2	5.56E+01
Metal emission rate	lb/h	6.95E-04
	g/s	8.76E-05

Iron		
Metal collected	ug	0.0
Metal concentration	ug/dscm	0.00E+00
	ug/dscm @ 7% O_2	0.00E+00
Metal emission rate	lb/h	0.00E+00
	g/s	0.00E+00
Lead		
Metal collected	ug	250.4
Metal concentration	ug/dscm	1.11E+02
	ug/dscm @ 7% O_2	1.29E+02
Metal emission rate	lb/h	1.61E-03
	g/s	2.03E-04
Manganese		
Metal collected	ug	42.0
Metal concentration	ug/dscm	1.87E+01
	ug/dscm @ 7% O_2	2.16E+01
Metal emission rate	lb/h	2.70E-04
	g/s	3.40E-05
Mercury		
Metal collected	ug	< 11.3
Metal concentration	ug/dscm	< 5.02E+00
	ug/dscm @ 7% O_2	< 5.81E+00
Metal emission rate	lb/h	< 7.26E-05
	g/s	< 9.15E-06
Molybdenum		
Metal collected	ug	0.0
Metal concentration	ug/dscm	0.00E+00
	ug/dscm @ 7% O_2	0.00E+00
Metal emission rate	lb/h	0.00E+00
	g/s	0.00E+00
Nickel		
Metal collected	ug	11.4
Metal concentration	ug/dscm	5.07E+00
	ug/dscm @ 7% O_2	5.87E+00
Metal emission rate	lb/h	7.33E-05
	g/s	9.24E-06
Selenium		
Metal collected	ug	4.0
Metal concentration	ug/dscm	1.78E+00
	ug/dscm @ 7% O_2	2.06E+00
Metal emission rate	lb/h	2.57E-05
	g/s	3.24E-06
Silver		
Metal collected	ug	5.7
Metal concentration	ug/dscm	2.54E+00
	ug/dscm @ 7% O_2	2.93E+00
Metal emission rate	lb/h	3.67E-05
	g/s	4.62E-06
Thallium		
Metal collected	ug	< 10.6
Metal concentration	ug/dscm	< 4.72E+00
	ug/dscm @ 7% O_2	< 5.46E+00
Metal emission rate	lb/h	< 6.82E-05
	g/s	< 8.59E-06
Vanadium		
Metal collected	ug	< 1.6
Metal concentration	ug/dscm	< 7.12E-01
	ug/dscm @ 7% O_2	< 8.24E-01
Metal emission rate	lb/h	< 1.03E-05
	g/s	< 1.30E-06
Zinc		
Metal collected	ug	136.2
Metal concentration	ug/dscm	6.06E+01
	ug/dscm @ 7% O_2	7.01E+01
Metal emission rate	lb/h	8.76E-04
	g/s	1.10E-04

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Multiple Metals Results - Run 3

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	4,000
	acfm	8,920
	dscm/min	113.28
Stack gas temperature	°F	175
Stack gas velocity	ft/min	2,838
Stack gas sample volume	dscf	82.610
	dscm	2.340
Isokinetic	%	103.2
Stack gas moisture content	vol %	45.5
Stack gas carbon dioxide content	vol %, dry	7.0
Stack gas oxygen content	vol %, dry	9.3
Aluminum		
Metal collected	ug	125.2
Metal concentration	ug/dscm	5.35E+01
	ug/dscm @ 7% O_2	6.40E+01
Metal emission rate	lb/h	8.02E-04
	g/s	1.01E-04
Antimony		
Metal collected	ug	< 4.9
Metal concentration	ug/dscm	< 2.09E+00
	ug/dscm @ 7% O_2	< 2.51E+00
Metal emission rate	lb/h	< 3.14E-05
	g/s	< 3.95E-06
Arsenic		
Metal collected	ug	< 3.7
Metal concentration	ug/dscm	< 1.59E+00
	ug/dscm @ 7% O_2	< 1.91E+00
Metal emission rate	lb/h	< 2.39E-05
	g/s	< 3.01E-06
Barium		
Metal collected	ug	10.8
Metal concentration	ug/dscm	4.62E+00
	ug/dscm @ 7% O_2	5.52E+00
Metal emission rate	lb/h	6.92E-05
	g/s	8.72E-06
Beryllium		
Metal collected	ug	< 0.4 ND
Metal concentration	ug/dscm	< 1.54E-01 ND
	ug/dscm @ 7% O_2	< 1.84E-01 ND
Metal emission rate	lb/h	< 2.31E-06 ND
	g/s	< 2.91E-07 ND
Cadmium		
Metal collected	ug	9.7
Metal concentration	ug/dscm	4.15E+00
	ug/dscm @ 7% O_2	4.97E+00
Metal emission rate	lb/h	6.22E-05
	g/s	7.84E-06
Chromium		
Metal collected	ug	36.5
Metal concentration	ug/dscm	1.56E+01
	ug/dscm @ 7% O_2	1.87E+01
Metal emission rate	lb/h	2.34E-04
	g/s	2.95E-05
Cobalt		
Metal collected	ug	< 1.0 ND
Metal concentration	ug/dscm	< 4.27E-01 ND
	ug/dscm @ 7% O_2	< 5.11E-01 ND
Metal emission rate	lb/h	< 6.40E-06 ND
	g/s	< 8.07E-07 ND
Copper		
Metal collected	ug	112.4
Metal concentration	ug/dscm	4.80E+01
	ug/dscm @ 7% O_2	5.75E+01
Metal emission rate	lb/h	7.20E-04
	g/s	9.07E-05

Iron		
Metal collected	ug	0.0
Metal concentration	ug/dscm	0.00E+00
	ug/dscm @ 7% O_2	0.00E+00
Metal emission rate	lb/h	0.00E+00
	g/s	0.00E+00
Lead		
Metal collected	ug	694.2
Metal concentration	ug/dscm	2.97E+02
	ug/dscm @ 7% O_2	3.55E+02
Metal emission rate	lb/h	4.45E-03
	g/s	5.60E-04
Manganese		
Metal collected	ug	41.4
Metal concentration	ug/dscm	1.77E+01
	ug/dscm @ 7% O_2	2.12E+01
Metal emission rate	lb/h	2.65E-04
	g/s	3.34E-05
Mercury		
Metal collected	ug	< 14.7
Metal concentration	ug/dscm	< 6.28E+00
	ug/dscm @ 7% O_2	< 7.52E+00
Metal emission rate	lb/h	< 9.42E-05
	g/s	< 1.19E-05
Molybdenum		
Metal collected	ug	0.0
Metal concentration	ug/dscm	0.00E+00
	ug/dscm @ 7% O_2	0.00E+00
Metal emission rate	lb/h	0.00E+00
	g/s	0.00E+00
Nickel		
Metal collected	ug	9.4
Metal concentration	ug/dscm	4.02E+00
	ug/dscm @ 7% O_2	4.81E+00
Metal emission rate	lb/h	6.02E-05
	g/s	7.59E-06
Selenium		
Metal collected	ug	3.9
Metal concentration	ug/dscm	1.68E+00
	ug/dscm @ 7% O_2	2.02E+00
Metal emission rate	lb/h	2.52E-05
	g/s	3.18E-06
Silver		
Metal collected	ug	< 1.9 ND
Metal concentration	ug/dscm	< 8.29E-01 ND
	ug/dscm @ 7% O_2	< 9.92E-01 ND
Metal emission rate	lb/h	< 1.24E-05 ND
	g/s	< 1.57E-06 ND
Thallium		
Metal collected	ug	< 10.7
Metal concentration	ug/dscm	< 4.57E+00
	ug/dscm @ 7% O_2	< 5.47E+00
Metal emission rate	lb/h	< 6.85E-05
	g/s	< 8.64E-06
Vanadium		
Metal collected	ug	< 2.0
Metal concentration	ug/dscm	< 8.55E-01
	ug/dscm @ 7% O_2	< 1.02E+00
Metal emission rate	lb/h	< 1.28E-05
	g/s	< 1.61E-06
Zinc		
Metal collected	ug	133.3
Metal concentration	ug/dscm	5.70E+01
	ug/dscm @ 7% O_2	6.82E+01
Metal emission rate	lb/h	8.54E-04
	g/s	1.08E-04

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Particulate, Hydrogen Chloride and Chlorine Results - Run 1

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	5,030
	acfm	11,320
	dscm/min	142.45
Stack gas temperature	°F	175
Stack gas velocity	ft/min	3,606
Stack gas sample volume	dscf	72.660
	dscm	2.058
Isokinetic	%	93.7
Stack gas moisture content	vol %	45.9
Stack gas carbon dioxide content	vol %, dry	6.3
Stack gas oxygen content	vol %, dry	9.6
Hydrogen chloride and chlorine		
HCl collected	mg	11.8
Cl_2 collected	mg	1.95
Stack gas HCl concentration	mg/dscm	5.73E+00
	mg/dscm @7% O_2	7.04E+00
Stack gas HCl emission rate	lb/h	1.08E-01
	kg/h	4.90E-02
	g/s	1.36E-02
Stack gas Cl_2 concentration	mg/dscm	9.48E-01
	mg/dscm @7% O_2	1.16E+00
Stack gas Cl_2 emission rate	lb/h	1.79E-02
	kg/h	8.10E-03
	g/s	2.25E-03
Stack gas HCl+Cl_2 concentration expressed as HCl equivalents	ppmv, dry	4.42E+00
	ppmv, dry @7% O_2	5.43E+00
Particulate		
Particulate matter collected	mg	34.3
Particulate concentration	gr/dscf	7.29E-03
	gr/dscf @ 7% O_2	8.95E-03
	mg/dscm	1.67E+01
	mg/dscm @ 7% O_2	2.05E+01
Particulate emission rate	lb/h	3.14E-01
	kg/h	1.42E-01
	g/s	3.96E-02

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Particulate, Hydrogen Chloride and Chlorine Results - Run 2

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	3,850
	acfm	8,580
	dscm/min	109.03
Stack gas temperature	°F	174
Stack gas velocity	ft/min	2,730
Stack gas sample volume	dscf	74.990
	dscm	2.124
Isokinetic	%	96.0
Stack gas moisture content	vol %	45.1
Stack gas carbon dioxide content	vol %, dry	7.0
Stack gas oxygen content	vol %, dry	8.9
Hydrogen chloride and chlorine		
HCl collected	mg	6.95
Cl_2 collected	mg	2.01
Stack gas HCl concentration	mg/dscm	3.27E+00
	mg/dscm @7% O_2	3.79E+00
Stack gas HCl emission rate	lb/h	4.72E-02
	kg/h	2.14E-02
	g/s	5.95E-03
Stack gas Cl_2 concentration	mg/dscm	9.46E-01
	mg/dscm @7% O_2	1.10E+00
Stack gas Cl_2 emission rate	lb/h	1.37E-02
	kg/h	6.19E-03
	g/s	1.72E-03
Stack gas HCl+Cl_2 concentration	ppmv, dry	2.80E+00
expressed as HCl equivalents	ppmv, dry @7% O_2	3.24E+00
Particulate		
Particulate matter collected	mg	19.4
Particulate concentration	gr/dscf	3.99E-03
	gr/dscf @ 7% O_2	4.62E-03
	mg/dscm	9.13E+00
	mg/dscm @ 7% O_2	1.06E+01
Particulate emission rate	lb/h	1.32E-01
	kg/h	5.98E-02
	g/s	1.66E-02

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Particulate, Hydrogen Chloride and Chlorine Results - Run 3

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	4,090
	acfm	8,970
	dscm/min	115.83
Stack gas temperature	°F	174
Stack gas velocity	ft/min	2,856
Stack gas sample volume	dscf	79.290
	dscm	2.246
Isokinetic	%	95.7
Stack gas moisture content	vol %	44.8
Stack gas carbon dioxide content	vol %, dry	7.0
Stack gas oxygen content	vol %, dry	9.3
Hydrogen chloride and chlorine		
HCl collected	mg	6.49
Cl_2 collected	mg	1.94
Stack gas HCl concentration	mg/dscm	2.89E+00
	mg/dscm @7% O_2	3.46E+00
Stack gas HCl emission rate	lb/h	4.43E-02
	kg/h	2.01E-02
	g/s	5.58E-03
Stack gas Cl_2 concentration	mg/dscm	8.64E-01
	mg/dscm @7% O_2	1.03E+00
Stack gas Cl_2 emission rate	lb/h	1.32E-02
	kg/h	6.00E-03
	g/s	1.67E-03
Stack gas HCl+Cl_2 concentration expressed as HCl equivalents	ppmv, dry	2.49E+00
	ppmv, dry @7% O_2	2.98E+00
Particulate		
Particulate matter collected	mg	33.6
Particulate concentration	gr/dscf	6.54E-03
	gr/dscf @ 7% O_2	7.83E-03
	mg/dscm	1.50E+01
	mg/dscm @ 7% O_2	1.79E+01
Particulate emission rate	lb/h	2.29E-01
	kg/h	1.04E-01
	g/s	2.89E-02

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Hexavalent Chromium Emissions Results - Run 1

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	5,120
	acfm	11,160
	dscm/min	145.00
Stack gas temperature	°F	176
Stack gas velocity	ft/min	3,552
Stack gas sample volume	dscf	76.040
	dscm	2.153
Isokinetic	%	93.6
Stack gas moisture content	vol %	44.0
Stack gas carbon dioxide content	vol %, dry	6.3
Stack gas oxygen content	vol %, dry	9.6
Hexavalent chromium		
Metal collected	ug	5.6
Metal concentration	ug/dscm	2.60E+00
	ug/dscm @ 7% O_2	3.19E+00
Metal emission rate	lb/h	4.99E-05
	g/s	6.28E-06

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Hexavalent Chromium Emissions Results - Run 2

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	3,780
	acfm	8,470
	dscm/min	107.05
Stack gas temperature	°F	175
Stack gas velocity	ft/min	2,694
Stack gas sample volume	dscf	75.030
	dscm	2.125
Isokinetic	%	101.1
Stack gas moisture content	vol %	45.3
Stack gas carbon dioxide content	vol %, dry	7.0
Stack gas oxygen content	vol %, dry	8.9
Hexavalent chromium		
Metal collected	ug	5.9
Metal concentration	ug/dscm	2.78E+00
	ug/dscm @ 7% O_2	3.21E+00
Metal emission rate	lb/h	3.93E-05
	g/s	4.95E-06

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

Hexavalent Chromium Emissions Results - Run 3

Parameter	Units	Measured Value
Stack Sampling Parameters		
Net sampling time	minutes	120
Stack gas flow rate	dscfm	3,890
	acfm	8,770
	dscm/min	110.17
Stack gas temperature	°F	176
Stack gas velocity	ft/min	2,796
Stack gas sample volume	dscf	78.620
	dscm	2.227
Isokinetic	%	103.1
Stack gas moisture content	vol %	46.1
Stack gas carbon dioxide content	vol %, dry	7.0
Stack gas oxygen content	vol %, dry	9.3
Hexavalent chromium		
Metal collected	ug	7.5
Metal concentration	ug/dscm	3.37E+00
	ug/dscm @ 7% O_2	4.03E+00
Metal emission rate	lb/h	4.91E-05
	g/s	6.18E-06

Note: dscf = Dry standard cubic feet
dscfm = Dry standard cubic feet per minute
acfm = Actual cubic feet per minute
dscm = Dry standard cubic meters

Standard conditions are 68°F, 29.92 in. Hg (20°C, 760 mm Hg)

OCP Compound Emission Results - Run 1

OCP Compound	Front Half Analytical Result (ug/sample)	Back Half Analytical Result (ug/sample)	Condensate Analytical Result (ug/sample)	Stack (a,b,c) Concentration (ug/dscm)	Emission Rate (g/s)
Standard Target Analytes					
Aldrin	0.036 ND	0.014 ND	0.034 ND	< 2.41E-02	< 5.54E-08
a-BHC	0.026 ND	0.022 ND	0.016 ND	< 1.84E-02	< 4.22E-08
b-BHC	0.033 ND	0.063 ND	0.034 ND	< 3.73E-02	< 8.58E-08
g-BHC (Lindane)	0.014 ND	0.014 ND	0.012 ND	< 1.15E-02	< 2.64E-08
d-BHC	0.015 ND	0.022 J,COL	0.025 ND	< 1.78E-02	< 4.09E-08
a-Chlordane	0.013 ND	0.021 J,COL	0.014 ND	< 1.38E-02	< 3.17E-08
g-Chlordane	0.078 ND	0.043 ND	0.018 ND	< 3.99E-02	< 9.17E-08
4,4'-DDD	0.083 ND	0.093 ND	0.14 ND	< 9.07E-02	< 2.09E-07
4,4'-DDE	0.039 ND	0.052 J	0.028 ND	< 3.42E-02	< 7.85E-08
4,4'-DDT	0.023 ND	0.063 J,COL	0.026 J	< 3.22E-02	< 7.39E-08
Dieldrin	0.013 ND	0.015 ND	0.012 ND	< 1.15E-02	< 2.64E-08
Endosulfan I	0.013 ND	0.018 ND	0.014 ND	< 1.29E-02	< 2.97E-08
Endosulfan II	0.014 ND	0.06 J,COL	0.018 ND	< 2.64E-02	< 6.07E-08
Endosulfan sulfate	0.023 ND	0.013 ND	0.016 ND	< 1.49E-02	< 3.43E-08
Endrin	0.05 ND	0.063 ND	0.051 ND	< 4.71E-02	< 1.08E-07
Heptachlor	0.016 ND	0.013 ND	0.02 J,COL	< 1.41E-02	< 3.23E-08
Methoxychlor	0.038 ND	0.11 ND	0.037 ND	< 5.31E-02	< 1.22E-07
Special Target Analytes					
Chlorobenzilate	0.083 ND	0.093 ND	0.15 J,COL	< 9.36E-02	< 2.15E-07
Endrin aldehyde	0.018 ND	0.04 ND	0.02 J,B,COL	< 2.24E-02	< 5.15E-08
Endrin ketone	0.017 ND	0.017 ND	0.025 ND	< 1.69E-02	< 3.89E-08
Heptachlor epoxide	0.015 ND	0.042 J,COL	0.012 ND	< 1.98E-02	< 4.55E-08
Diallate	11 ND	9.7 ND	0.78 ND	< 6.17E+00	< 1.42E-05
Total PAHs	< 11.66	10.591	1.502	< 6.82E+00	< 1.57E-05

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume	122.990	dry standard cubic feet
	3.48	dry standard cubic meters
(b) Stack gas flow rate	4,870	dry standard cubic feet per minute
	2.30	dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using one half of the detection limit.

OCP Compound Emission Results - Run 2

OCP Compound	Front Half Analytical Result (ug/sample)		Back Half Analytical Result (ug/sample)		Condensate Analytical Result (ug/sample)		Stack (a,b,c) Concentration (ug/dscm)		Emission Rate (g/s)	
Standard Target Analytes										
Aldrin	0.036	ND	0.014	ND	0.034	ND	<	2.52E-02	<	4.62E-08
a-BHC	0.026	ND	0.022	ND	0.023	J	<	2.13E-02	<	3.91E-08
b-BHC	0.033	ND	0.063	ND	0.052	J,COL	<	4.45E-02	<	8.14E-08
g-BHC (Lindane)	0.014	ND	0.014	ND	0.012	ND	<	1.20E-02	<	2.20E-08
d-BHC	0.015	ND	0.019	ND	0.11	COL	<	4.33E-02	<	7.92E-08
a-Chlordane	0.013	ND	0.028	J,COL	0.014	ND	<	1.65E-02	<	3.03E-08
g-Chlordane	0.078	ND	0.043	ND	0.018	ND	<	4.18E-02	<	7.65E-08
4,4'-DDD	0.083	ND	0.093	ND	0.14	ND	<	9.49E-02	<	1.74E-07
4,4'-DDE	0.039	ND	0.052	J	0.028	ND	<	3.57E-02	<	6.55E-08
4,4'-DDT	0.023	ND	0.012	ND	0.022	ND	<	1.71E-02	<	3.14E-08
Dieldrin	0.013	ND	0.015	ND	0.012	ND	<	1.20E-02	<	2.20E-08
Endosulfan I	0.013	ND	0.018	ND	0.014	ND	<	1.35E-02	<	2.48E-08
Endosulfan II	0.014	ND	0.023	ND	0.018	ND	<	1.65E-02	<	3.03E-08
Endosulfan sulfate	0.023	ND	0.013	ND	0.016	ND	<	1.56E-02	<	2.86E-08
Endrin	0.05	ND	0.063	ND	0.051	ND	<	4.93E-02	<	9.02E-08
Heptachlor	0.016	ND	0.013	ND	0.11	COL	<	4.18E-02	<	7.65E-08
Methoxychlor	0.038	ND	0.11	ND	0.035	ND	<	5.50E-02	<	1.01E-07
Special Target Analytes										
Chlorobenzilate	0.083	ND	0.093	ND	0.13	ND	<	9.19E-02	<	1.68E-07
Endrin aldehyde	0.018	ND	0.04	ND	0.18	B,COL	<	7.15E-02	<	1.31E-07
Endrin ketone	0.017	ND	0.017	ND	0.025	ND	<	1.77E-02	<	3.25E-08
Heptachlor epoxide	0.015	ND	0.015	ND	0.025	J,COL	<	1.65E-02	<	3.03E-08
Diallate	11	ND	9.7	ND	0.78	ND	<	6.45E+00	<	1.18E-05
Total PAHs	< 11.66		10.48		1.849		<	7.21E+00	<	1.32E-05

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume	117.540	dry standard cubic feet
	3.33	dry standard cubic meters
(b) Stack gas flow rate	3,880	dry standard cubic feet per minute
	1.83	dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using one half of the detection limit.

OCP Compound Emission Results - Run 3

OCP Compound	Front Half Analytical Result (ug/sample)		Back Half Analytical Result (ug/sample)		Condensate Analytical Result (ug/sample)		Stack (a,b,c) Concentration (ug/dscm)		Emission Rate (g/s)	
Standard Target Analytes										
Aldrin	0.036	ND	0.014	ND	0.034	ND	<	2.36E-02	<	4.54E-08
a-BHC	0.026	ND	0.022	ND	0.016	ND	<	1.80E-02	<	3.46E-08
b-BHC	0.033	ND	0.074	J,COL	0.035	J,COL	<	3.99E-02	<	7.68E-08
g-BHC (Lindane)	0.014	ND	0.014	ND	0.012	ND	<	1.12E-02	<	2.16E-08
d-BHC	0.015	ND	0.019	ND	0.078	J,COL	<	3.15E-02	<	6.06E-08
a-Chlordane	0.013	ND	0.016	ND	0.014	ND	<	1.21E-02	<	2.33E-08
g-Chlordane	0.078	ND	0.043	ND	0.018	ND	<	3.90E-02	<	7.52E-08
4,4'-DDD	0.083	ND	0.26	J,COL	0.14	ND	<	1.36E-01	<	2.61E-07
4,4'-DDE	0.039	ND	0.047	ND	0.028	ND	<	3.20E-02	<	6.17E-08
4,4'-DDT	0.023	ND	0.021	ND	0.023	ND	<	1.88E-02	<	3.62E-08
Dieldrin	0.013	ND	0.015	ND	0.012	ND	<	1.12E-02	<	2.16E-08
Endosulfan I	0.013	ND	0.018	ND	0.014	ND	<	1.26E-02	<	2.43E-08
Endosulfan II	0.014	ND	0.023	ND	0.018	ND	<	1.54E-02	<	2.98E-08
Endosulfan sulfate	0.023	ND	0.013	ND	0.016	ND	<	1.46E-02	<	2.81E-08
Endrin	0.05	ND	0.063	ND	0.051	ND	<	4.61E-02	<	8.87E-08
Heptachlor	0.016	ND	0.013	ND	0.056	J,COL	<	2.39E-02	<	4.60E-08
Methoxychlor	0.038	ND	0.11	ND	0.037	ND	<	5.20E-02	<	1.00E-07
Special Target Analytes										
Chlorobenzilate	0.083	ND	0.097	J,COL	0.14	ND	<	8.99E-02	<	1.73E-07
Endrin aldehyde	0.018	ND	0.04	ND	0.022	J,B,COL	<	2.25E-02	<	4.33E-08
Endrin ketone	0.017	ND	0.017	ND	0.025	ND	<	1.66E-02	<	3.19E-08
Heptachlor epoxide	0.015	ND	0.015	ND	0.013	J,COL	<	1.21E-02	<	2.33E-08
Diallate	11	ND	9.7	ND	0.78	ND	<	6.03E+00	<	1.16E-05
	0		0		0			0.00E+00		0.00E+00
	0		0		0			0.00E+00		0.00E+00
	0		0		0			0.00E+00		0.00E+00
	0		0		0			0.00E+00		0.00E+00
	0		0		0			0.00E+00		0.00E+00
	0		0		0			0.00E+00		0.00E+00
	0		0		0			0.00E+00		0.00E+00
	0		0		0			0.00E+00		0.00E+00
	0		0		0			0.00E+00		0.00E+00
	0		0		0			0.00E+00		0.00E+00

Total PAHs	<	11.66	10.654	1.582	<	6.71E+00	<	1.29E-05

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume — 125.710 dry standard cubic feet; 3.56 dry standard cubic meters

(b) Stack gas flow rate — 4,080 dry standard cubic feet per minute; 1.93 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using one half of the detection limit.

PAH Compound Emission Results - Run 1

PAH Compound	Front Half Analytical Result (ng/sample)	Back Half Analytical Result (ng/sample)	Condensate Analytical Result (ng/sample)	Stack (a,b,c) Concentration (ug/dscm)	Emission Rate (g/s)
Standard Target Analytes					
Acenaphthene	3.4 BJ	3.5 BJ	1.5 J	2.29E-03	5.51E-09
Acenaphthylene	9.1 J	14 J	0.29 ND	< 6.39E-03	< 1.53E-08
Anthracene	4 J	28	7.8 J	1.09E-02	2.61E-08
Benzo(a)anthracene	1.7 BJ	5.4 J	0.48 ND	< 2.07E-03	< 4.97E-09
Benzo(b)fluoranthene	4.2 BJ	40 B	5.8 J	1.37E-02	3.28E-08
Benzo(k)fluoranthene	3.1 BJ	4.3 J	5.5 J	3.52E-03	8.46E-09
Benzo(g,h,i)perylene	5.6 J	4 J	15 BJ	6.72E-03	1.61E-08
Benzo(a)pyrene	2.7 BJ	2.2 BJ	3.4 BJ	2.27E-03	5.45E-09
Benzo(e)pyrene	4.5 BJ	4.4 BJ	5.1 BJ	3.82E-03	9.18E-09
Chrysene	3.5 BJ	18 J	4.7 BJ	7.15E-03	1.72E-08
Dibenzo(a,h)anthracene	0.32 ND	0.5 ND	0.65 ND	< 4.01E-04	< 9.64E-10
Fluoranthene	27 B	100 B	26 B	4.18E-02	1.00E-07
Fluorene	15 BJ	11 BJ	3.3 J	8.00E-03	1.92E-08
Indeno(1,2,3-cd)pyrene	3.3 BJ	3.8 J	4.7 BJ	3.22E-03	7.74E-09
2-Methylnaphthalene	31 BJ	80 BJ	13 BJ	3.39E-02	8.13E-08
Naphthalene	40 BJ	880 B	30 BJ	2.59E-01	6.23E-07
Phenanthrene	140 B	300 B	39 BJ	1.31E-01	3.14E-07
Pyrene	25 BJ	110 B	20 BJ	4.23E-02	1.02E-07
Special Target Analytes					
Perylene	0.91 ND	3.5 BJ	1.7 ND	< 1.67E-03	< 4.01E-09
Total PAHs	< 324.33	1612.6	187.92	< 5.80E-01	< 1.39E-06

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume — 129.310 dry standard cubic feet; 3.66 dry standard cubic meters

(b) Stack gas flow rate — 5,090 dry standard cubic feet per minute; 2.40 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using one half of the detection limit.

PAH Compound Emission Results - Run 2

PAH Compound	Front Half Analytical Result (ng/sample)	Back Half Analytical Result (ng/sample)	Condensate Analytical Result (ng/sample)	Stack (a,b,c) Concentration (ug/dscm)	Emission Rate (g/s)
Standard Target Analytes					
Acenaphthene	1.1 BJ	3.3 BJ	1.5 J	1.67E-03	3.05E-09
Acenaphthylene	0.28 ND	7.8 J	0.23 ND	< 2.35E-03	< 4.29E-09
Anthracene	0.44 ND	8.1 J	3.5 J	< 3.41E-03	< 6.22E-09
Benzo(a)anthracene	0.36 ND	0.35 ND	0.45 ND	< 3.28E-04	< 5.99E-10
Benzo(b)fluoranthene	0.83 ND	55 B	3.9 J	< 1.69E-02	< 3.09E-08
Benzo(k)fluoranthene	1.1 ND	4.6 J	1.2 ND	< 1.95E-03	< 3.57E-09
Benzo(g,h,i)perylene	0.75 ND	4.4 J	18 BJ	< 6.55E-03	< 1.20E-08
Benzo(a)pyrene	1.4 ND	1.7 ND	2.7 BJ	< 1.64E-03	< 3.00E-09
Benzo(e)pyrene	1.1 ND	1.5 ND	5.3 BJ	< 2.23E-03	< 4.08E-09
Chrysene	0.39 ND	21	3.1 BJ	< 6.93E-03	< 1.27E-08
Dibenzo(a,h)anthracene	0.41 ND	0.92 ND	0.45 ND	< 5.04E-04	< 9.20E-10
Fluoranthene	4.4 BJ	32 B	18 BJ	1.54E-02	2.81E-08
Fluorene	3.3 BJ	10 BJ	2.8 J	4.55E-03	8.32E-09
Indeno(1,2,3-cd)pyrene	0.76 ND	1.4 ND	5.3 BJ	< 2.11E-03	< 3.86E-09
2-Methylnaphthalene	12 BJ	52 BJ	13 BJ	2.18E-02	3.98E-08
Naphthalene	23 BJ	1900 B	34 BJ	5.54E-01	1.01E-06
Phenanthrene	25 BJ	96 B	27 BJ	4.19E-02	7.65E-08
Pyrene	6.4 BJ	30 BJ	15 BJ	1.45E-02	2.66E-08
Special Target Analytes					
Perylene	1.4 ND	1.6 ND	1.3 ND	< 1.22E-03	< 2.22E-09
Total PAHs	< 84.42	2231.67	156.73	< 7.00E-01	< 1.28E-06

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume	124.810	dry standard cubic feet
	3.53	dry standard cubic meters
(b) Stack gas flow rate	3,870	dry standard cubic feet per minute
	1.83	dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using one half of the detection limit.

PAH Compound Emission Results - Run 3

PAH Compound	Front Half Analytical Result (ng/sample)	Back Half Analytical Result (ng/sample)	Condensate Analytical Result (ng/sample)	Stack (a,b,c) Concentration (ug/dscm)	Emission Rate (g/s)
Standard Target Analytes					
Acenaphthene	2 BJ	6.5 BJ	1.3 ND	< 2.87E-03	< 5.22E-09
Acenaphthylene	3.3 J	5.9 J	0.32 ND	< 2.79E-03	< 5.07E-09
Anthracene	0.37 ND	11 J	0.41 ND	< 3.45E-03	< 6.27E-09
Benzo(a)anthracene	0.21 ND	6.1 J	0.37 ND	< 1.96E-03	< 3.56E-09
Benzo(b)fluoranthene	4.1 BJ	40 B	2.3 J	1.36E-02	2.47E-08
Benzo(k)fluoranthene	1.1 ND	3.9 J	4.7 J	< 2.84E-03	< 5.16E-09
Benzo(g,h,i)perylene	7.5 J	3.7 J	0.67 ND	< 3.48E-03	< 6.32E-09
Benzo(a)pyrene	4.3 BJ	1.1 ND	1.9 ND	< 2.14E-03	< 3.89E-09
Benzo(e)pyrene	3.2 BJ	2.5 BJ	1.6 ND	< 2.14E-03	< 3.89E-09
Chrysene	0.23 ND	5.7 J	0.43 ND	< 1.86E-03	< 3.39E-09
Dibenzo(a,h)anthracene	0.35 ND	0.72 ND	0.65 ND	< 5.04E-04	< 9.16E-10
Fluoranthene	7.3 BJ	25 B	3.4 BJ	1.05E-02	1.90E-08
Fluorene	6.4 BJ	11 BJ	1.8 J	5.63E-03	1.02E-08
Indeno(1,2,3-cd)pyrene	4.1 BJ	3.1 J	0.68 J	2.31E-03	4.20E-09
2-Methylnaphthalene	17 BJ	67 BJ	15 BJ	2.90E-02	5.27E-08
Naphthalene	35 BJ	17000 B	72 BJ	5.01E+00	9.11E-06
Phenanthrene	49 B	65 B	5.8 BJ	3.51E-02	6.38E-08
Pyrene	5 BJ	28 BJ	3.1 BJ	1.06E-02	1.92E-08
Special Target Analytes					
Perylene	1.1 ND	66 B	1.8 ND	< 2.02E-02	< 3.67E-08
Total PAHs	< 151.56	17352.22	118.23	< 5.16E+00	< 9.38E-06

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume: 120.520 dry standard cubic feet; 3.41 dry standard cubic meters

(b) Stack gas flow rate: 3,850 dry standard cubic feet per minute; 1.82 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using one half of the detection limit.

PCB Compound Emission Results - Run 1

PCB Compound	Front Half Analytical Result (ng/sample)	Back Half Analytical Result (ng/sample)	Condensate Analytical Result (ng/sample)	Stack (a,b,c) Concentration (ng/dscm)	Emission Rate (g/s)
Co-Planar PCBs					
3,4,3',4'-Tetrachlorobiphenyl (IUPAC 77)	0.03 QB	0.36	0.021 QJ	1.12E-01	2.70E-10
3,4,4',5-Tetrachlorobiphenyl (IUPAC 81)	0.0083 ND	0.06 QJ	0.01 ND	< 2.14E-02	< 5.14E-11
2,3,4,3',4'-Pentachlorobiphenyl (IUPAC 105)	0.022 QJ	0.067 J	0.035 BJ	3.39E-02	8.13E-11
2,3,4,5,4'-Pentachlorobiphenyl (IUPAC 114)	0.0069 ND	0.011 ND	0.0065 ND	< 6.66E-03	< 1.60E-11
2,4,5,3',4'-Pentachlorobiphenyl (IUPAC 118)	0.087 J	0.13 J	0.078 QBJ	8.06E-02	1.94E-10
3,4,5,2',4'-Pentachlorobiphenyl (IUPAC 123)	0.0075 ND	0.022 J	0.0067 ND	< 9.88E-03	< 2.37E-11
3,4,5,3',4'-Pentachlorobiphenyl (IUPAC 126)	0.0073 ND	0.091 QJ	0.0072 ND	< 2.88E-02	< 6.92E-11
2,3,4,5,3',4'-Hexachlorobiphenyl (IUPAC 156)	0.01 ND	0.061 QCJ	0.013 ND	< 2.29E-02	< 5.51E-11
2,3,4,3',4',5'-Hexachlorobiphenyl (IUPAC 157)	0.01 ND	0.061 QCJ	0.013 ND	< 2.29E-02	< 5.51E-11
2,4,5,3',4',5'-Hexachlorobiphenyl (IUPAC 167)	0.0073 ND	0.027 J	0.0091 ND	< 1.19E-02	< 2.85E-11
3,4,5,3',4',5'-Hexachlorobiphenyl (IUPAC 169)	0.0073 ND	0.02 ND	0.0098 ND	< 1.01E-02	< 2.43E-11
2,3,4,5,3',4',5'-Heptachlorobiphenyl (IUPAC 189)	0.0066 ND	0.013 ND	0.0061 ND	< 7.02E-03	< 1.69E-11
Total PCB Homologs					
Total Monochlorobiphenyls	0.67 B	6 B	0.23 BJ	1.88E+00	4.53E-09
Total Dichlorobiphenyls	9.6 QB	9.8 QB	2 BQ	5.84E+00	1.40E-08
Total Trichlorobiphenyls	11 QB	8 QB	3.8 BQ	6.23E+00	1.50E-08
Total Tetrachlorobiphenyls	2.2 QB	4 BQ	2.5 BQ	2.38E+00	5.71E-09
Total Pentachlorobiphenyls	0.49 QJB	1 QB	0.75 JQB	6.12E-01	1.47E-09
Total Hexachlorobiphenyls	0.093 QJ	0.33 QBJ	0.23 QBJ	1.78E-01	4.28E-10
Total Heptachlorobiphenyls	0.21 ND	0.13 QJ	0.024 QBJ	< 9.94E-02	< 2.39E-10
Total Octachlorobiphenyls	0.1 ND	0.16 ND	0.14 ND	< 1.09E-01	< 2.62E-10
Total Nonachlorobiphenyls	0.029 ND	0.054 ND	0.05 ND	< 3.63E-02	< 8.73E-11
Total Decachlorobiphenyl	0.0096 ND	0.016 ND	0.025 ND	< 1.38E-02	< 3.32E-11
Total PCBs	< 24.4016	29.49	9.749	< 1.74E+01	< 4.18E-08

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume: 129.310 dry standard cubic feet; 3.66 dry standard cubic meters

(b) Stack gas flow rate: 5,090 dry standard cubic feet per minute; 2.40 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using one half of the detection limit.

PCB Compound Emission Results - Run 2

PCB Compound	Front Half Analytical Result (ng/sample)	Back Half Analytical Result (ng/sample)	Condensate Analytical Result (ng/sample)	Stack (a,b,c) Concentration (ng/dscm)	Emission Rate (g/s)
Co-Planar PCBs					
3,4,3',4'-Tetrachlorobiphenyl (IUPAC 77)	0.0073 ND	0.17 J	0.018 QJ	< 5.53E-02	< 1.01E-10
3,4,4',5-Tetrachlorobiphenyl (IUPAC 81)	0.0068 ND	0.019 QJ	0.0058 ND	< 8.94E-03	< 1.63E-11
2,3,4,3',4'-Pentachlorobiphenyl (IUPAC 105)	0.0061 ND	0.049 QJ	0.039 BJ	< 2.66E-02	< 4.86E-11
2,3,4,5,4'-Pentachlorobiphenyl (IUPAC 114)	0.0058 ND	0.01 ND	0.0075 QJ	< 6.59E-03	< 1.20E-11
2,4,5,3',4'-Pentachlorobiphenyl (IUPAC 118)	0.018 QJ	0.097 QJ	0.076 BJ	5.40E-02	9.87E-11
3,4,5,2',4'-Pentachlorobiphenyl (IUPAC 123)	0.0063 ND	0.01 ND	0.0036 ND	< 5.63E-03	< 1.03E-11
3,4,5,3',4'-Pentachlorobiphenyl (IUPAC 126)	0.0062 ND	0.069 J	0.0041 ND	< 2.24E-02	< 4.10E-11
2,3,4,5,3',4'-Hexachlorobiphenyl (IUPAC 156)	0.0091 ND	0.048 CJ	0.0069 ND	< 1.81E-02	< 3.31E-11
2,3,4,3',4',5'-Hexachlorobiphenyl (IUPAC 157)	0.0091 ND	0.048 CJ	0.0069 ND	< 1.81E-02	< 3.31E-11
2,4,5,3',4',5'-Hexachlorobiphenyl (IUPAC 167)	0.0063 ND	0.024 J	0.0049 ND	< 9.96E-03	< 1.82E-11
3,4,5,3',4',5'-Hexachlorobiphenyl (IUPAC 169)	0.0062 ND	0.019 ND	0.006 ND	< 8.83E-03	< 1.61E-11
2,3,4,5,3',4',5'-Heptachlorobiphenyl (IUPAC 189)	0.006 ND	0.011 ND	0.0034 ND	< 5.77E-03	< 1.05E-11
Total PCB Homologs					
Total Monochlorobiphenyls	0.061 QBJ	1.2 B	0.24 BJ	4.25E-01	7.76E-10
Total Dichlorobiphenyls	1.5 QB	6.4 QB	1.6 QB	2.69E+00	4.91E-09
Total Trichlorobiphenyls	1.6 BJQ	5.5 QB	2.9 BQ	2.83E+00	5.17E-09
Total Tetrachlorobiphenyls	0.38 QJB	2.8 BQ	2.1 BQ	1.49E+00	2.73E-09
Total Pentachlorobiphenyls	0.03 QJ	0.74 JQB	0.74 JQB	4.27E-01	7.80E-10
Total Hexachlorobiphenyls	0.028 QJ	0.43 BJQ	0.27 BJQ	2.06E-01	3.76E-10
Total Heptachlorobiphenyls	0.19 ND	0.16 QJ	0.03 JQB	< 1.08E-01	< 1.96E-10
Total Octachlorobiphenyls	0.089 ND	0.014 QJ	0.0099 QJ	< 3.19E-02	< 5.83E-11
Total Nonachlorobiphenyls	0.028 ND	0.039 ND	0.027 ND	< 2.66E-02	< 4.86E-11
Total Decachlorobiphenyl	0.0082 ND	0.02 QJ	0.011 ND	< 1.11E-02	< 2.03E-11
Total PCBs	< 3.9142	17.303	7.9279	< 8.25E+00	< 1.51E-08

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume — 124.810 dry standard cubic feet; 3.53 dry standard cubic meters

(b) Stack gas flow rate — 3,870 dry standard cubic feet per minute; 1.83 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using one half of the detection limit.

PCB Compound Emission Results - Run 3

PCB Compound	Front Half Analytical Result (ng/sample)	Back Half Analytical Result (ng/sample)	Condensate Analytical Result (ng/sample)	Stack (a,b,c) Concentration (ng/dscm)	Emission Rate (g/s)
Co-Planar PCBs					
3,4,3',4'-Tetrachlorobiphenyl (IUPAC 77)	0.017 QJ	0.12 QJ	0.0071 ND	< 4.22E-02	< 7.67E-11
3,4,4',5-Tetrachlorobiphenyl (IUPAC 81)	0.0079 ND	0.061 ND	0.0064 ND	< 2.21E-02	< 4.01E-11
2,3,4,3',4'-Pentachlorobiphenyl (IUPAC 105)	0.0069 ND	0.093 J	0.017 QBJ	< 3.42E-02	< 6.22E-11
2,3,4,5,4'-Pentachlorobiphenyl (IUPAC 114)	0.0066 ND	0.012 ND	0.0081 QJ	< 7.82E-03	< 1.42E-11
2,4,5,3',4'-Pentachlorobiphenyl (IUPAC 118)	0.031 J	0.16 J	0.023 QBJ	6.27E-02	1.14E-10
3,4,5,2',4'-Pentachlorobiphenyl (IUPAC 123)	0.0069 ND	0.012 ND	0.017 QBJ	< 1.05E-02	< 1.91E-11
3,4,5,3',4'-Pentachlorobiphenyl (IUPAC 126)	0.0074 ND	0.043 QJ	0.0053 ND	< 1.63E-02	< 2.97E-11
2,3,4,5,3',4'-Hexachlorobiphenyl (IUPAC 156)	0.0091 ND	0.056 CJ	0.012 QCJ	< 2.26E-02	< 4.10E-11
2,3,4,3',4',5'-Hexachlorobiphenyl (IUPAC 157)	0.0091 ND	0.056 CJ	0.012 QCJ	< 2.26E-02	< 4.10E-11
2,4,5,3',4',5'-Hexachlorobiphenyl (IUPAC 167)	0.0067 ND	0.021 QJ	0.0058 ND	< 9.81E-03	< 1.78E-11
3,4,5,3',4',5'-Hexachlorobiphenyl (IUPAC 169)	0.0078 ND	0.021 ND	0.0083 ND	< 1.09E-02	< 1.98E-11
2,3,4,5,3',4',5'-Heptachlorobiphenyl (IUPAC 189)	0.0065 ND	0.013 ND	0.0045 ND	< 7.03E-03	< 1.28E-11
Total PCB Homologs					
Total Monochlorobiphenyls	0.18 QBJ	0.91 B	0.19 BJ	3.75E-01	6.81E-10
Total Dichlorobiphenyls	2.6 BQ	4.9 QB	0.68 QBJ	2.40E+00	4.36E-09
Total Trichlorobiphenyls	2.6 BQ	6.1 BQ	0.88 QBJ	2.81E+00	5.10E-09
Total Tetrachlorobiphenyls	0.51 QBJ	2.9 BQ	0.73 JQB	1.21E+00	2.20E-09
Total Pentachlorobiphenyls	0.058 QJ	0.95 JQB	0.28 QJB	3.77E-01	6.86E-10
Total Hexachlorobiphenyls	0.047 JQ	0.47 QBJ	0.1 QBJ	1.81E-01	3.29E-10
Total Heptachlorobiphenyls	0.2 ND	0.15 QJ	0.21 ND	< 1.64E-01	< 2.98E-10
Total Octachlorobiphenyls	0.094 ND	0.15 ND	0.1 ND	< 1.01E-01	< 1.83E-10
Total Nonachlorobiphenyls	0.03 ND	0.052 ND	0.032 ND	< 3.34E-02	< 6.07E-11
Total Decachlorobiphenyl	0.0086 ND	0.015 ND	0.013 ND	< 1.07E-02	< 1.95E-11
Total PCBs	< 6.3276	16.597	3.215	< 7.66E+00	< 1.39E-08

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume — 120.520 dry standard cubic feet; 3.41 dry standard cubic meters

(b) Stack gas flow rate — 3,850 dry standard cubic feet per minute; 1.82 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using one half of the detection limit.

Semivolatile Organic Compound Emission Results - Run 1

Semivolatile Compound	Front Half Analytical Result (ug/sample)	Back Half Analytical Result (ug/sample)	Condensate Analytical Result (ug/sample)	Stack (a,b,c) Concentration (ug/dscm)	Emission Rate (g/s)
Standard Target Analytes					
Acenaphthene	0.5 ND	0.5 ND	1.8 ND	< 8.04E-01	< 1.85E-06
Acenaphthylene	0.5 ND	0.5 ND	1.5 ND	< 7.18E-01	< 1.65E-06
Benzyl alcohol	35 ND	35 ND	1.8 ND	< 2.06E+01	< 4.74E-05
Bis(2-chloroethoxy) methane	0.59 ND	0.5 ND	1.8 ND	< 8.30E-01	< 1.91E-06
Bis-(2-chloroethyl) ether	0.76 ND	0.56 ND	1.5 ND	< 8.10E-01	< 1.86E-06
Bis(2-ethylhexyl) phthalate	5.7 J	10 ND	18 J	< 9.68E+00	< 2.22E-05
4-Bromophenyl-phenyl ether	0.53 ND	0.5 ND	1.3 ND	< 6.69E-01	< 1.54E-06
Butylbenzylphthalate	1.1 ND	0.61 ND	2.1 ND	< 1.09E+00	< 2.51E-06
4-Chloroaniline	1.2 ND	6 ND	7.3 ND	< 4.16E+00	< 9.57E-06
4-Chloro-3-methylphenol	1 ND	0.62 ND	6 ND	< 2.19E+00	< 5.03E-06
2-Chloronaphthalene	0.5 ND	0.5 ND	1.3 ND	< 6.60E-01	< 1.52E-06
2-Chlorophenol	0.98 ND	0.5 ND	1.5 ND	< 8.56E-01	< 1.97E-06
4-Chlorophenyl-phenyl ether	0.51 ND	0.5 ND	2.9 ND	< 1.12E+00	< 2.58E-06
Dibenzofuran	0.53 ND	0.5 ND	2.7 ND	< 1.07E+00	< 2.46E-06
Di-n-butylphthalate	0.71 ND	10 ND	2.1 ND	< 3.68E+00	< 8.45E-06
1,2-Dichlorobenzene	0.84 ND	0.51 ND	1.6 ND	< 8.47E-01	< 1.95E-06
1,3-Dichlorobenzene	1.2 ND	0.57 ND	1.3 ND	< 8.81E-01	< 2.03E-06
1,4-Dichlorobenzene	1.1 ND	0.53 ND	1.9 ND	< 1.01E+00	< 2.33E-06
3,3'-Dichlorobenzidine	2.7 ND	7.4 ND	7.1 ND	< 4.94E+00	< 1.14E-05
2,4-Dichlorophenol	1.5 ND	0.5 ND	2.1 ND	< 1.18E+00	< 2.71E-06
Diethyl phthalate	1.5 ND	0.73 ND	1.3 ND	< 1.01E+00	< 2.33E-06
2,4-Dimethylphenol	2.9 ND	6.3 ND	1.4 ND	< 3.04E+00	< 7.00E-06
Dimethylphthalate	0.63 ND	0.5 ND	1.2 ND	< 6.69E-01	< 1.54E-06
4,6-Dinitro-2-methylphenol	5 ND	8.7 ND	1.3 ND	< 4.31E+00	< 9.90E-06
2,4-Dinitrophenol	5.9 ND	22 ND	3.7 ND	< 9.07E+00	< 2.09E-05
2,4-Dinitrotoluene	1.6 ND	0.5 ND	2.5 ND	< 1.32E+00	< 3.04E-06
2,6-Dinitrotoluene	1.3 ND	0.5 ND	1.9 ND	< 1.06E+00	< 2.44E-06
Di-n-octyl phthalate	2.1 ND	0.56 ND	2.3 ND	< 1.42E+00	< 3.27E-06
Hexachlorobenzene	0.56 ND	0.5 ND	2.4 ND	< 9.93E-01	< 2.28E-06
Hexachlorobutadiene	1.4 ND	0.74 ND	1.8 ND	< 1.13E+00	< 2.60E-06
Hexachlorocyclo-pentadiene	10 ND	10 ND	6 ND	< 7.46E+00	< 1.72E-05
Hexachloroethane	2.5 ND	0.54 ND	1.8 ND	< 1.39E+00	< 3.19E-06
Isophrone	0.66 ND	0.5 ND	1.6 ND	< 7.92E-01	< 1.82E-06
2-Methylphenol	2.3 ND	3 ND	1.9 ND	< 2.07E+00	< 4.75E-06
2-Nitroaniline	0.56 ND	0.5 ND	2.6 ND	< 1.05E+00	< 2.42E-06
3-Nitroaniline	3.8 ND	2 ND	4.3 ND	< 2.90E+00	< 6.67E-06
4-Nitroaniline	2.3 ND	2 ND	3.5 ND	< 2.24E+00	< 5.15E-06
Nitrobenzene	0.73 ND	0.5 ND	1.5 ND	< 7.84E-01	< 1.80E-06
2-Nitrophenol	3.2 ND	0.5 ND	2.4 ND	< 1.75E+00	< 4.03E-06
4-Nitrophenol	3.3 ND	3.3 ND	3.5 ND	< 2.90E+00	< 6.67E-06
N-Nitrosodiphenylamine	0.6 ND	0.87 ND	1.3 ND	< 7.95E-01	< 1.83E-06
N-Nitroso-di-n-propylamine	0.73 ND	0.5 ND	2.1 ND	< 9.56E-01	< 2.20E-06
2,2'-oxybis (1-Chloropropane)	1 ND	0.76 ND	1.6 ND	< 9.65E-01	< 2.22E-06
Pentachlorophenol	25 ND	25 ND	3.2 ND	< 1.53E+01	< 3.51E-05
Phenol	1.1 ND	0.9 ND	2 ND	< 1.15E+00	< 2.64E-06
1,2,4-Trichlorobenzene	0.73 ND	0.59 ND	2 ND	< 9.53E-01	< 2.19E-06
2,4,5-Trichlorophenol	2.3 ND	1.3 ND	2 ND	< 1.61E+00	< 3.70E-06
2,4,6-Trichlorophenol	1.4 ND	0.75 ND	2.3 ND	< 1.28E+00	< 2.94E-06
	0	0	0	0.00E+00	0.00E+00
Special Target Analytes					
Acetophenone	0.77 ND	3.9 J	2.4 ND	< 2.03E+00	< 4.67E-06
Aniline	0.95 ND	7.3 ND	17 ND	< 7.25E+00	< 1.67E-05
Anthracene	0.51 ND	0.5 ND	1.5 ND	< 7.21E-01	< 1.66E-06
Benzaldehyde	2.6 ND	6.4 J	2 ND	< 3.16E+00	< 7.26E-06
Benzidine	51 ND	51 ND	60 ND	< 4.65E+01	< 1.07E-04
Benzo(a)anthracene	0.82 ND	0.58 ND	1.6 ND	< 8.61E-01	< 1.98E-06
Benzo(b)fluoranthene	1.4 ND	1.1 ND	3.9 ND	< 1.84E+00	< 4.22E-06
Benzo(k)fluoranthene	2.1 ND	1.6 ND	2.7 ND	< 1.84E+00	< 4.22E-06
Benzoic acid	42 ND	46 ND	8.7 ND	< 2.78E+01	< 6.38E-05
Benzonitrile	2.4 ND	1.7 ND	2.4 ND	< 1.87E+00	< 4.29E-06
Benzo(ghi)perylene	2.8 ND	0.62 ND	2 ND	< 1.56E+00	< 3.58E-06
Benzo(a)pyrene	1 ND	0.5 ND	1.6 ND	< 8.90E-01	< 2.05E-06
Carbazole	0.76 ND	0.64 ND	2 ND	< 9.76E-01	< 2.24E-06
Chrysene	0.88 ND	0.64 ND	1.2 ND	< 7.81E-01	< 1.80E-06
Dibenz(ah)anthracene	2 ND	0.6 ND	2.6 ND	< 1.49E+00	< 3.43E-06
1,3-Dinitrobenzene	0.59 ND	0.52 ND	2.7 ND	< 1.09E+00	< 2.51E-06
Diphenylamine	0.5 ND	0.5 ND	2.7 ND	< 1.06E+00	< 2.44E-06
1,2-Diphenylhydrazine	0.63 ND	0.5 ND	1.3 ND	< 6.98E-01	< 1.60E-06
Fluoranthene	0.5 ND	0.5 ND	1.6 ND	< 7.46E-01	< 1.72E-06
Fluorene	0.51 ND	0.5 ND	2.5 ND	< 1.01E+00	< 2.32E-06
Indeno(1,2,3-cd)pyrene	2.1 ND	0.54 ND	2.1 ND	< 1.36E+00	< 3.13E-06
2-Methylnaphthalene	0.56 ND	0.5 ND	2.1 ND	< 9.07E-01	< 2.09E-06
3 & 4-Methylphenol	2.3 ND	2 ND	2 ND	< 1.81E+00	< 4.16E-06
Naphthalene	0.5 ND	0.6 ND	1.6 ND	< 7.75E-01	< 1.78E-06
N-Nitrosodimethylamine	0.72 ND	0.5 ND	2 ND	< 9.24E-01	< 2.13E-06
Pentachlorobenzene	0.52 ND	0.5 ND	2.1 ND	< 8.96E-01	< 2.06E-06
Pentachloronitrobenzene	0.76 ND	0.5 ND	2.4 ND	< 1.05E+00	< 2.42E-06
Phenanthrene	0.51 ND	0.5 ND	1.7 ND	< 7.78E-01	< 1.79E-06
Pyrene	0.74 ND	0.53 ND	1.3 ND	< 7.38E-01	< 1.70E-06
Pyridine	0.89 ND	0.74 ND	4.9 ND	< 1.87E+00	< 4.31E-06
1,2,4,5-Tetrachlorobenzene	0.87 ND	0.5 ND	2 ND	< 9.68E-01	< 2.22E-06
Tentatively Identified Compounds					
3-Penten-2-one, 4-methyl-	95 NJ	0	230 NJ	9.33E+01	2.14E-04
Unknown (2.5254)	4.5 NJ	0	40 NJ	1.28E+01	2.94E-05
Unknown (2.7017)	7.4 NJ	0	0	2.12E+00	4.88E-06
Unknown (2.7428)	52 NJ	0	0	1.49E+01	3.43E-05
Unknown (2.9132)	5.3 NJ	0	0	1.52E+00	3.50E-06
Unknown (2.1494)	0	70 NJ	0	2.01E+01	4.62E-05
Toluene	0	26 NJ	0	7.46E+00	1.72E-05
Methane, dibromochloro-	0	9.7 NJ	0	2.78E+00	6.40E-06
Tetrachloroethylene	0	75 NJ	0	2.15E+01	4.95E-05
Unknown (2.6018)	0	4.1 NJ	0	1.18E+00	2.71E-06
Unknown (2.6547)	0	9.3 NJ	0	2.67E+00	6.14E-06
Heptane, 2,5-dimethyl-	0	18 NJ	24 NJ	1.21E+01	2.77E-05
Unknown (2.7781)	0	590 NJ	1400 NJ	5.71E+02	1.31E-03
Benzene, chloro-	0	420 NJ	0	1.21E+02	2.77E-04
Methane, tribromo-	0	10 NJ	0	2.87E+00	6.60E-06
Benzaldehyde, 4-ethyl-	0	5.9 NJ	0	1.69E+00	3.89E-06
Phosphine imide, P,P,P-triphen	0	4.8 NJ	0	1.38E+00	3.17E-06
3-Penten-2-one, (E)-	0	0	22 NJ	6.32E+00	1.45E-05
Unknown (2.5724)	0	0	18 NJ	5.17E+00	1.19E-05
Octane, 2-methyl-	0	0	13 NJ	3.73E+00	8.58E-06
Unknown (4.5642)	0	0	47 NJ	1.35E+01	3.10E-05
Total Semivolatiles	< 431.94	1546.65	2073.6	< 1.16E+03	< 2.67E-03

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume 122.990 dry standard cubic feet
3.48 dry standard cubic meters

(b) Stack gas flow rate 4,870 dry standard cubic feet per minute
2.30 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using one half of the detection limit.

Semivolatile Organic Compound Emission Results - Run 2

Semivolatile Compound	Front Half Analytical Result (ug/sample)	Back Half Analytical Result (ug/sample)	Condensate Analytical Result (ug/sample)	Stack (a,b,c) Concentration (ug/dscm)	Emission Rate (g/s)
Standard Target Analytes					
Acenaphthene	0.5 ND	0.5 ND	1.7 ND	< 8.11E-01	< 1.49E-06
Acenaphthylene	0.5 ND	0.5 ND	1.4 ND	< 7.21E-01	< 1.32E-06
Benzyl alcohol	35 ND	35 ND	1.7 ND	< 2.15E+01	< 3.94E-05
Bis(2-chloroethoxy) methane	0.59 ND	0.5 ND	1.7 ND	< 8.38E-01	< 1.53E-06
Bis-(2-chloroethyl) ether	0.76 ND	0.56 ND	1.4 ND	< 8.17E-01	< 1.50E-06
Bis(2-ethylhexyl) phthalate	3.3 ND	10 ND	29	< 1.27E+01	< 2.33E-05
4-Bromophenyl-phenyl ether	0.53 ND	0.5 ND	1.2 ND	< 6.70E-01	< 1.23E-06
Butylbenzylphthalate	1.1 ND	0.61 ND	1.9 ND	< 1.08E+00	< 1.99E-06
4-Chloroaniline	1.2 ND	6 ND	6.8 ND	< 4.21E+00	< 7.70E-06
4-Chloro-3-methylphenol	1 ND	0.62 ND	5.6 ND	< 2.17E+00	< 3.97E-06
2-Chloronaphthalene	0.5 ND	0.5 ND	1.2 ND	< 6.61E-01	< 1.21E-06
2-Chlorophenol	0.98 ND	0.5 ND	1.4 ND	< 8.65E-01	< 1.58E-06
4-Chlorophenyl-phenyl ether	0.51 ND	0.5 ND	2.7 ND	< 1.11E+00	< 2.04E-06
Dibenzofuran	0.53 ND	0.5 ND	2.5 ND	< 1.06E+00	< 1.94E-06
Di-n-butylphthalate	0.71 ND	10 ND	1.9 ND	< 3.79E+00	< 6.94E-06
1,2-Dichlorobenzene	0.84 ND	0.51 ND	1.5 ND	< 8.56E-01	< 1.57E-06
1,3-Dichlorobenzene	1.2 ND	0.57 ND	1.2 ND	< 8.92E-01	< 1.63E-06
1,4-Dichlorobenzene	1.1 ND	0.53 ND	1.7 ND	< 1.00E+00	< 1.83E-06
3,3'-Dichlorobenzidine	2.7 ND	7.4 ND	6.6 ND	< 5.02E+00	< 9.19E-06
2,4-Dichlorophenol	1.5 ND	0.5 ND	2 ND	< 1.20E+00	< 2.20E-06
Diethyl phthalate	1.5 ND	0.73 ND	1.2 ND	< 1.03E+00	< 1.89E-06
2,4-Dimethylphenol	2.9 ND	6.3 ND	1.3 ND	< 3.15E+00	< 5.78E-06
Dimethylphthalate	0.63 ND	0.5 ND	1.1 ND	< 6.70E-01	< 1.23E-06
4,6-Dinitro-2-methylphenol	5 ND	8.7 ND	1.2 ND	< 4.48E+00	< 8.20E-06
2,4-Dinitrophenol	5.9 ND	22 ND	3.4 ND	< 9.40E+00	< 1.72E-05
2,4-Dinitrotoluene	1.6 ND	0.5 ND	2.3 ND	< 1.32E+00	< 2.42E-06
2,6-Dinitrotoluene	1.3 ND	0.5 ND	1.8 ND	< 1.08E+00	< 1.98E-06
Di-n-octyl phthalate	2.1 ND	0.56 ND	2.1 ND	< 1.43E+00	< 2.62E-06
Hexachlorobenzene	0.56 ND	0.5 ND	2.3 ND	< 1.01E+00	< 1.85E-06
Hexachlorobutadiene	1.4 ND	0.74 ND	1.6 ND	< 1.12E+00	< 2.06E-06
Hexachlorocyclo-pentadiene	10 ND	10 ND	5.6 ND	< 7.69E+00	< 1.41E-05
Hexachloroethane	2.5 ND	0.54 ND	1.7 ND	< 1.42E+00	< 2.61E-06
Isophrone	0.66 ND	0.5 ND	1.5 ND	< 7.99E-01	< 1.46E-06
2-Methylphenol	2.3 ND	3 ND	1.8 ND	< 2.13E+00	< 3.91E-06
2-Nitroaniline	0.56 ND	0.5 ND	2.4 ND	< 1.04E+00	< 1.90E-06
3-Nitroaniline	3.8 ND	2 ND	4 ND	< 2.94E+00	< 5.39E-06
4-Nitroaniline	2.3 ND	2 ND	3.3 ND	< 2.28E+00	< 4.18E-06
Nitrobenzene	0.73 ND	0.5 ND	1.4 ND	< 7.90E-01	< 1.45E-06
2-Nitrophenol	3.2 ND	0.5 ND	2.3 ND	< 1.80E+00	< 3.30E-06
4-Nitrophenol	3.3 ND	3.3 ND	3.3 ND	< 2.97E+00	< 5.45E-06
N-Nitrosodiphenylamine	0.6 ND	0.87 ND	1.2 ND	< 8.02E-01	< 1.47E-06
N-Nitroso-di-n-propylamine	0.73 ND	0.5 ND	2 ND	< 9.70E-01	< 1.78E-06
2,2'-oxybis (1-Chloropropane)	1 ND	0.76 ND	1.5 ND	< 9.79E-01	< 1.79E-06
Pentachlorophenol	25 ND	25 ND	2.9 ND	< 1.59E+01	< 2.91E-05
Phenol	1.1 ND	0.9 ND	1.8 ND	< 1.14E+00	< 2.09E-06
1,2,4-Trichlorobenzene	0.73 ND	0.59 ND	1.8 ND	< 9.37E-01	< 1.72E-06
2,4,5-Trichlorophenol	2.3 ND	1.3 ND	1.8 ND	< 1.62E+00	< 2.97E-06
2,4,6-Trichlorophenol	1.4 ND	0.75 ND	2.1 ND	< 1.28E+00	< 2.34E-06
	0	0	0	0.00E+00	0.00E+00
Special Target Analytes					
Acetophenone	0.77 ND	4 J	2.2 ND	< 2.09E+00	< 3.83E-06
Aniline	0.95 ND	7.3 ND	16 ND	< 7.28E+00	< 1.33E-05
Anthracene	0.51 ND	0.5 ND	1.4 ND	< 7.24E-01	< 1.33E-06
Benzaldehyde	2.6 ND	5.1 J	1.8 ND	< 2.85E+00	< 5.23E-06
Benzidine	51 ND	51 ND	56 ND	< 4.75E+01	< 8.69E-05
Benzo(a)anthracene	0.82 ND	0.58 ND	1.5 ND	< 8.71E-01	< 1.60E-06
Benzo(b)fluoranthene	1.4 ND	1.1 ND	3.6 ND	< 1.83E+00	< 3.36E-06
Benzo(k)fluoranthene	2.1 ND	1.6 ND	2.5 ND	< 1.86E+00	< 3.41E-06
Benzoic acid	42 ND	46 ND	8 ND	< 2.88E+01	< 5.28E-05
Benzonitrile	2.4 ND	1.7 ND	2.2 ND	< 1.89E+00	< 3.47E-06
Benzo(ghi)perylene	2.8 ND	0.62 ND	1.8 ND	< 1.57E+00	< 2.87E-06
Benzo(a)pyrene	1 ND	0.5 ND	1.5 ND	< 9.01E-01	< 1.65E-06
Carbazole	0.76 ND	0.64 ND	1.9 ND	< 9.91E-01	< 1.82E-06
Chrysene	0.88 ND	0.64 ND	1.1 ND	< 7.87E-01	< 1.44E-06
Dibenz(ah)anthracene	2 ND	0.6 ND	2.4 ND	< 1.50E+00	< 2.75E-06
1,3-Dinitrobenzene	0.59 ND	0.52 ND	2.5 ND	< 1.08E+00	< 1.99E-06
Diphenylamine	0.5 ND	0.5 ND	2.5 ND	< 1.05E+00	< 1.93E-06
1,2-Diphenylhydrazine	0.63 ND	0.5 ND	1.2 ND	< 7.00E-01	< 1.28E-06
Fluoranthene	0.5 ND	0.5 ND	1.5 ND	< 7.51E-01	< 1.38E-06
Fluorene	0.51 ND	0.5 ND	2.3 ND	< 9.94E-01	< 1.82E-06
Indeno(1,2,3-cd)pyrene	2.1 ND	0.54 ND	1.9 ND	< 1.36E+00	< 2.50E-06
2-Methylnaphthalene	0.56 ND	0.5 ND	1.9 ND	< 8.89E-01	< 1.63E-06
3 & 4-Methylphenol	2.3 ND	2 ND	1.9 ND	< 1.86E+00	< 3.41E-06
Naphthalene	0.5 ND	0.6 ND	1.5 ND	< 7.81E-01	< 1.43E-06
N-Nitrosodimethylamine	0.72 ND	0.5 ND	1.9 ND	< 9.37E-01	< 1.72E-06
Pentachlorobenzene	0.52 ND	0.5 ND	1.9 ND	< 8.77E-01	< 1.61E-06
Pentachloronitrobenzene	0.76 ND	0.5 ND	2.2 ND	< 1.04E+00	< 1.90E-06
Phenanthrene	0.51 ND	0.5 ND	1.6 ND	< 7.84E-01	< 1.44E-06
Pyrene	0.74 ND	0.53 ND	1.2 ND	< 7.42E-01	< 1.36E-06
Pyridine	0.89 ND	0.74 ND	4.5 ND	< 1.84E+00	< 3.37E-06
1,2,4,5-Tetrachlorobenzene	0.87 ND	0.5 ND	1.8 ND	< 9.52E-01	< 1.74E-06
Tentatively Identified Compounds					
Furan, 2,5-dimethyl-	4.6 NJ	0	0	1.38E+00	2.53E-06
Unknown (1.9671)	5.4 NJ	0	0	1.62E+00	2.97E-06
Unknown (2.5253)	4.8 NJ	0	38 NJ	1.29E+01	2.35E-05
Unknown (2.6545)	8.6 NJ	0	0	2.58E+00	4.73E-06
Heptane, 2,5-dimethyl-	18 NJ	12 NJ	11 NJ	1.23E+01	2.26E-05
Unknown (2.7485)	82 NJ	0	0	2.46E+01	4.51E-05
3-Hexene-2,5-dione	5.2 NJ	0	0	1.56E+00	2.86E-06
Unknown (2.1492)	0	54 NJ	0	1.62E+01	2.97E-05
Toluene	0	20 NJ	0	6.01E+00	1.10E-05
Methane, dibromochloro-	0	8 NJ	0	2.40E+00	4.40E-06
Octane, 2-methyl-	0	6.1 NJ	0	1.83E+00	3.36E-06
Unknown (2.7721)	0	550 NJ	0	1.65E+02	3.03E-04
Benzene, chloro-	0	82 NJ	0	2.46E+01	4.51E-05
Methane, tribromo-	0	10 NJ	0	3.00E+00	5.50E-06
Benzoic acid, methyl ester	0	4.4 NJ	0	1.32E+00	2.42E-06
Benzaldehyde, 3-ethyl-	0	5.9 NJ	0	1.77E+00	3.25E-06
Unknown (2.0259)	0	0	21 NJ	6.31E+00	1.16E-05
3-Hexen-2-one	0	0	620 NJ	1.86E+02	3.41E-04
Unknown (2.7486)	0	0	400 NJ	1.20E+02	2.20E-04
Unknown (2.9542)	0	0	17 NJ	5.11E+00	9.35E-06
Unknown (3.1657)	0	0	11 NJ	3.30E+00	6.05E-06
Unknown (4.8579)	0	0	16 NJ	4.81E+00	8.80E-06
Total Semivolatiles	< 393.94	1055.05	1406	< 8.58E+02	< 1.57E-03

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume — 117.540 dry standard cubic feet; 3.33 dry standard cubic meters

(b) Stack gas flow rate — 3,880 dry standard cubic feet per minute; 1.83 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using one half of the detection limit.

Semivolatile Organic Compound Emission Results - Run 3

Semivolatile Compound	Front Half Analytical Result (ug/sample)	Back Half Analytical Result (ug/sample)	Condensate Analytical Result (ug/sample)	Stack (a,b,c) Concentration (ug/dscm)	Emission Rate (g/s)
Standard Target Analytes					
Acenaphthene	0.5 ND	0.5 ND	1.7 ND	< 7.58E-01	< 1.46E-06
Acenaphthylene	0.5 ND	0.5 ND	1.5 ND	< 7.02E-01	< 1.35E-06
Benzyl alcohol	35 ND	35 ND	1.8 ND	< 2.02E+01	< 3.88E-05
Bis(2-chloroethoxy) methane	0.59 ND	0.5 ND	1.8 ND	< 8.12E-01	< 1.56E-06
Bis-(2-chloroethyl) ether	0.76 ND	0.56 ND	1.5 ND	< 7.92E-01	< 1.53E-06
Bis(2-ethylhexyl) phthalate	3.3 ND	10 ND	16 J	< 8.23E+00	< 1.58E-05
4-Bromophenyl-phenyl ether	0.53 ND	0.5 ND	1.3 ND	< 6.54E-01	< 1.26E-06
Butylbenzylphthalate	1.1 ND	0.61 ND	2 ND	< 1.04E+00	< 2.01E-06
4-Chloroaniline	1.2 ND	6 ND	7.1 ND	< 4.02E+00	< 7.74E-06
4-Chloro-3-methylphenol	1 ND	0.62 ND	5.8 ND	< 2.08E+00	< 4.01E-06
2-Chloronaphthalene	0.5 ND	0.5 ND	1.2 ND	< 6.18E-01	< 1.19E-06
2-Chlorophenol	0.98 ND	0.5 ND	1.5 ND	< 8.37E-01	< 1.61E-06
4-Chlorophenyl-phenyl ether	0.51 ND	0.5 ND	2.8 ND	< 1.07E+00	< 2.06E-06
Dibenzofuran	0.53 ND	0.5 ND	2.6 ND	< 1.02E+00	< 1.96E-06
Di-n-butylphthalate	0.71 ND	10 ND	2 ND	< 3.57E+00	< 6.88E-06
1,2-Dichlorobenzene	0.84 ND	0.51 ND	1.5 ND	< 8.01E-01	< 1.54E-06
1,3-Dichlorobenzene	1.2 ND	0.57 ND	1.3 ND	< 8.62E-01	< 1.66E-06
1,4-Dichlorobenzene	1.1 ND	0.53 ND	1.8 ND	< 9.63E-01	< 1.86E-06
3,3'-Dichlorobenzidine	2.7 ND	7.4 ND	6.9 ND	< 4.78E+00	< 9.20E-06
2,4-Dichlorophenol	1.5 ND	0.5 ND	2.1 ND	< 1.15E+00	< 2.22E-06
Diethyl phthalate	1.5 ND	0.73 ND	1.2 ND	< 9.63E-01	< 1.86E-06
2,4-Dimethylphenol	2.9 ND	6.3 ND	1.4 ND	< 2.98E+00	< 5.73E-06
Dimethylphthalate	0.63 ND	0.5 ND	1.2 ND	< 6.54E-01	< 1.26E-06
4,6-Dinitro-2-methylphenol	5 ND	8.7 ND	1.3 ND	< 4.21E+00	< 8.11E-06
2,4-Dinitrophenol	5.9 ND	22 ND	3.6 ND	< 8.85E+00	< 1.70E-05
2,4-Dinitrotoluene	1.6 ND	0.5 ND	2.4 ND	< 1.26E+00	< 2.43E-06
2,6-Dinitrotoluene	1.3 ND	0.5 ND	1.8 ND	< 1.01E+00	< 1.95E-06
Di-n-octyl phthalate	2.1 ND	0.56 ND	2.2 ND	< 1.37E+00	< 2.63E-06
Hexachlorobenzene	0.56 ND	0.5 ND	2.4 ND	< 9.72E-01	< 1.87E-06
Hexachlorobutadiene	1.4 ND	0.74 ND	1.7 ND	< 1.08E+00	< 2.08E-06
Hexachlorocyclo-pentadiene	10 ND	10 ND	5.8 ND	< 7.25E+00	< 1.40E-05
Hexachloroethane	2.5 ND	0.54 ND	1.7 ND	< 1.33E+00	< 2.56E-06
Isophrone	0.66 ND	0.5 ND	1.6 ND	< 7.75E-01	< 1.49E-06
2-Methylphenol	2.3 ND	3 ND	1.9 ND	< 2.02E+00	< 3.89E-06
2-Nitroaniline	0.56 ND	0.5 ND	2.5 ND	< 1.00E+00	< 1.93E-06
3-Nitroaniline	3.8 ND	2 ND	4.2 ND	< 2.81E+00	< 5.41E-06
4-Nitroaniline	2.3 ND	2 ND	3.4 ND	< 2.16E+00	< 4.17E-06
Nitrobenzene	0.73 ND	0.5 ND	1.5 ND	< 7.67E-01	< 1.48E-06
2-Nitrophenol	3.2 ND	0.5 ND	2.4 ND	< 1.71E+00	< 3.30E-06
4-Nitrophenol	3.3 ND	3.3 ND	3.4 ND	< 2.81E+00	< 5.41E-06
N-Nitrosodiphenylamine	0.6 ND	0.87 ND	1.2 ND	< 7.50E-01	< 1.44E-06
N-Nitroso-di-n-propylamine	0.73 ND	0.5 ND	2.1 ND	< 9.35E-01	< 1.80E-06
2,2'-oxybis (1-Chloropropane)	1 ND	0.76 ND	1.6 ND	< 9.44E-01	< 1.82E-06
Pentachlorophenol	25 ND	25 ND	3.1 ND	< 1.49E+01	< 2.87E-05
Phenol	1.1 ND	0.9 ND	1.9 ND	< 1.10E+00	< 2.11E-06
1,2,4-Trichlorobenzene	0.73 ND	0.59 ND	1.9 ND	< 9.04E-01	< 1.74E-06
2,4,5-Trichlorophenol	2.3 ND	1.3 ND	1.9 ND	< 1.54E+00	< 2.98E-06
2,4,6-Trichlorophenol	1.4 ND	0.75 ND	2.2 ND	< 1.22E+00	< 2.35E-06
	0	0	0	0.00E+00	0.00E+00
Special Target Analytes					
Acetophenone	0.77 ND	5.1 J	2.3 ND	< 2.29E+00	< 4.42E-06
Aniline	0.95 ND	7.3 ND	16 ND	< 6.81E+00	< 1.31E-05
Anthracene	0.51 ND	0.5 ND	1.5 ND	< 7.05E-01	< 1.36E-06
Benzaldehyde	2.6 ND	6.9 J	1.9 ND	< 3.20E+00	< 6.17E-06
Benzidine	51 ND	51 ND	58 ND	< 4.49E+01	< 8.65E-05
Benzo(a)anthracene	0.82 ND	0.58 ND	1.5 ND	< 8.15E-01	< 1.57E-06
Benzo(b)fluoranthene	1.4 ND	1.1 ND	3.8 ND	< 1.77E+00	< 3.41E-06
Benzo(k)fluoranthene	2.1 ND	1.6 ND	2.6 ND	< 1.77E+00	< 3.41E-06
Benzoic acid	42 ND	46 ND	8.4 ND	< 2.71E+01	< 5.21E-05
Benzonitrile	2.4 ND	1.7 ND	2.3 ND	< 1.80E+00	< 3.46E-06
Benzo(ghi)perylene	2.8 ND	0.62 ND	1.9 ND	< 1.49E+00	< 2.88E-06
Benzo(a)pyrene	1 ND	0.5 ND	1.6 ND	< 8.71E-01	< 1.68E-06
Carbazole	0.76 ND	0.64 ND	2 ND	< 9.55E-01	< 1.84E-06
Chrysene	0.88 ND	0.64 ND	1.2 ND	< 7.64E-01	< 1.47E-06
Dibenz(ah)anthracene	2 ND	0.6 ND	2.5 ND	< 1.43E+00	< 2.76E-06
1,3-Dinitrobenzene	0.59 ND	0.52 ND	2.6 ND	< 1.04E+00	< 2.01E-06
Diphenylamine	0.5 ND	0.5 ND	2.6 ND	< 1.01E+00	< 1.95E-06
1,2-Diphenylhydrazine	0.63 ND	0.5 ND	1.3 ND	< 6.83E-01	< 1.31E-06
Fluoranthene	0.5 ND	0.5 ND	1.6 ND	< 7.30E-01	< 1.41E-06
Fluorene	0.51 ND	0.5 ND	2.5 ND	< 9.86E-01	< 1.90E-06
Indeno(1,2,3-cd)pyrene	2.1 ND	0.54 ND	2 ND	< 1.30E+00	< 2.51E-06
2-Methylnaphthalene	0.56 ND	0.5 ND	2 ND	< 8.60E-01	< 1.66E-06
3 & 4-Methylphenol	2.3 ND	2 ND	2 ND	< 1.77E+00	< 3.41E-06
Naphthalene	0.5 ND	9.9 J	1.6 ND	< 3.37E+00	< 6.49E-06
N-Nitrosodimethylamine	0.72 ND	0.5 ND	1.9 ND	< 8.76E-01	< 1.69E-06
Pentachlorobenzene	0.52 ND	0.5 ND	2 ND	< 8.48E-01	< 1.63E-06
Pentachloronitrobenzene	0.76 ND	0.5 ND	2.3 ND	< 1.00E+00	< 1.93E-06
Phenanthrene	0.51 ND	0.5 ND	1.7 ND	< 7.61E-01	< 1.47E-06
Pyrene	0.74 ND	0.53 ND	1.3 ND	< 7.22E-01	< 1.39E-06
Pyridine	0.89 ND	0.74 ND	4.7 ND	< 1.78E+00	< 3.42E-06
1,2,4,5-Tetrachlorobenzene	0.87 ND	0.5 ND	1.9 ND	< 9.18E-01	< 1.77E-06
Tentatively Identified Compounds					
Unknown (2.7427)	23 NJ	0	0	6.46E+00	1.24E-05
9-Octadecenamide, (Z)-	14 NJ	0	0	3.93E+00	7.57E-06
Unknown (12.701)	5.7 NJ	0	0	1.60E+00	3.08E-06
Unknown (2.1492)	0	70 NJ	0	1.97E+01	3.79E-05
Toluene	0	55 NJ	0	1.54E+01	2.98E-05
Methane, dibromochloro-	0	9.9 NJ	0	2.78E+00	5.36E-06
Tetrachloroethylene	0	21 NJ	0	5.90E+00	1.14E-05
Unknown (2.7779)	0	630 NJ	0	1.77E+02	3.41E-04
Benzene, chloro-	0	260 NJ	0	7.30E+01	1.41E-04
Methane, tribromo-	0	14 NJ	0	3.93E+00	7.57E-06
Benzaldehyde, 3-ethyl-	0	7.2 NJ	0	2.02E+00	3.89E-06
3-Penten-2-one, 4-methyl-	0	0	120 NJ	3.37E+01	6.49E-05
Unknown (2.5254)	0	0	37 NJ	1.04E+01	2.00E-05
Unknown (2.7428)	0	0	34 NJ	9.55E+00	1.84E-05
Total Semivolatiles	< 308.04	1381.95	460.2	< 6.04E+02	< 1.16E-03

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume — 125.710 dry standard cubic feet; 3.56 dry standard cubic meters

(b) Stack gas flow rate — 4,080 dry standard cubic feet per minute; 1.93 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using one half of the detection limit.

Total Volatile (C1 - C7) Organic Compound Emission Results - Run :

Volatile Compound	Bag Analytical Result (ppmv, dry)	Condensate Analytical Result (ug/sample)	Stack (a,b,c) Concentration (ppmv, dry)	Stack (a,b,c) Concentration (ug/dscm)	Emission Rate (g/s)
Total C1	1.72	0	1.72E+00	1.15E+03	2.76E-03
Total C2	0.083 ND	0	< 8.30E-02	< 1.04E+02	< 2.49E-04
Total C3	0.11 ND	0	< 1.10E-01	< 2.02E+02	< 4.85E-04
Total C4	0.08 ND	0.042 ND	< 8.08E-02	< 1.96E+02	< 4.69E-04
Total C5	0.14 ND	0.02436 J,B	< 1.40E-01	< 4.22E+02	< 1.01E-03
Total C6	0.13 ND	0.03108 J	< 1.30E-01	< 4.68E+02	< 1.12E-03
Total C7	0.18 ND	0.0042 ND	< 1.80E-01	< 7.52E+02	< 1.80E-03
Total Volatile Organics	< 2.443	0.10164	< 2.44E+00	< 3.29E+03	< 7.90E-03

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume 0.759 dry standard cubic feet
0.02 dry standard cubic meters

(b) Stack gas flow rate 5,080 dry standard cubic feet per minute
2.40 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using one half of the detection limit.

Total Volatile (C1 - C7) Organic Compound Emission Results - Run 3

Volatile Compound	Bag Analytical Result (ppmv, dry)		Condensate Analytical Result (ug/sample)		Stack (a,b,c) Concentration (ppmv, dry)	Stack (a,b,c) Concentration (ug/dscm)	Emission Rate (g/s)
Total C1	1.76		0		1.76E+00	1.18E+03	2.14E-03
Total C2	0.083	ND	0		< 8.30E-02	< 1.04E+02	< 1.89E-04
Total C3	0.11	ND	0		< 1.10E-01	< 2.02E+02	< 3.68E-04
Total C4	0.08	ND	0.042	ND	< 8.07E-02	< 1.95E+02	< 3.56E-04
Total C5	0.14	ND	0.01386	J,B	< 1.40E-01	< 4.21E+02	< 7.68E-04
Total C6	0.13	ND	0.03654	J	< 1.30E-01	< 4.68E+02	< 8.53E-04
Total C7	0.18	ND	0.0042	ND	< 1.80E-01	< 7.52E+02	< 1.37E-03
Total Volatile Organics	< 2.483		0.0966		< 2.48E+00	< 3.32E+03	< 6.05E-03

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume	0.894	dry standard cubic feet
	0.03	dry standard cubic meters
(b) Stack gas flow rate	3,860	dry standard cubic feet per minute
	1.82	dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using one half of the detection limit.

Total Volatile (C1 - C7) Organic Compound Emission Results - Run 3

Volatile Compound	Bag Analytical Result (ppmv, dry)	Condensate Analytical Result (ug/sample)	Stack (a,b,c) Concentration (ppmv, dry)	Stack (a,b,c) Concentration (ug/dscm)	Emission Rate (g/s)
Total C1	1.68	0	1.68E+00	1.12E+03	2.15E-03
Total C2	0.083 ND	0	< 8.30E-02	< 1.04E+02	< 1.99E-04
Total C3	0.11 ND	0	< 1.10E-01	< 2.02E+02	< 3.87E-04
Total C4	0.08 ND	0.042 ND	< 8.06E-02	< 1.95E+02	< 3.74E-04
Total C5	0.14 ND	0.0126 J,B	< 1.40E-01	< 4.21E+02	< 8.07E-04
Total C6	0.13 ND	0.03906 J	< 1.30E-01	< 4.68E+02	< 8.97E-04
Total C7	0.18 ND	0.0042 ND	< 1.80E-01	< 7.52E+02	< 1.44E-03
Total Volatile Organics	< 2.403	0.09786	< 2.40E+00	< 3.26E+03	< 6.26E-03

NOTE: All concentrations in this table are uncorrected for oxygen concentration.

(a) Stack gas sample volume 1.065 dry standard cubic feet
0.03 dry standard cubic meters

(b) Stack gas flow rate 4,060 dry standard cubic feet per minute
1.92 dry standard cubic meters per second

(c) For non-detects, stack concentrations and emissions are calculated using one half of the detection limit.

APPENDIX B

CHRONIC AND ACUTE TOXICITY CRITERIA COMPILED FOR COMPOUNDS NOT INCLUDED IN USEPA'S HHRAP

APPENDIX B

CHRONIC AND ACUTE HUMAN HEALTH TOXICITY CRITERIA COMPILED FOR COMPOUNDS NOT INCLUDED IN USEPA'S HHRAP

Human health toxicity criteria were used in the risk assessment to evaluate the potential for both long-term, chronic and short-term, acute health risks. The chronic toxicity criteria used in the risk assessment included oral cancer slope factors and inhalation unit risk factors for predicting excess lifetime cancer risks, and oral reference doses (RfDs) and inhalation reference concentrations (RfCs) for predicting the potential for long-term non-cancer effects. The acute toxicity criteria consisted of acute reference air concentrations.

The toxicity criteria were compiled, where available, for each evaluated compound directly from the 2005 U.S. Environmental Protection Agency (USEPA) Human Health Risk Assessment Protocol (HHRAP) chemical-specific database. The information in this USEPA database is programmed into the IRAP software.[1] If toxicity criteria were not available from HHRAP, they were compiled using a hierarchy of toxicity data sources recommended by HHRAP.

This appendix presents the toxicity criteria that were compiled for compounds not already in USEPA's HHRAP database. Table 1 lists the chronic human health toxicity criteria compiled for this project, as well as the basis for each value. Table 2 lists the acute reference air concentrations compiled for this project, also including the basis for each value.

In addition, the oral cancer slope factors for two hexachlorodibenzodioxin congeners (1,2,3,6,7,8-HxCDD and 1,2,3,7,8,9-HxCDD) were corrected from the values listed in HHRAP (and which were entered in the IRAP software exactly as indicated in HHRAP). HHRAP and IRAP include an oral cancer slope factor of 0.0062 $(mg/kg\text{-}day)^{-1}$ for these two PCDD/PCDF congeners, however, USEPA's Integrated Risk Information System (IRIS) lists the slope factor as 6,200 $(mg/kg\text{-}day)^{-1}$. The IRIS value was thus entered into IRAP.

Finally, three additional toxicity values were entered into the IRAP software for compounds discussed in HHRAP, but for which the HHRAP chemical-specific database lists "no data". A "no data" entry in HHRAP results in a "0" entry in the IRAP software. First, the USEPA-specified 2,3,7,8-TCDD oral cancer slope factor of 1.5E+5 $(mg/kg\text{-}day)^{-1}$ was entered as the oral cancer slope factor for all PCDD/PCDF congeners (except the two HxCDDs noted above). This enabled the IRAP program to calculate oral cancer risks for the mixture of PCDDs/PCDFs using the 2,3,7,8-TCDD slope factor in conjunction with 2,3,7,8-TCDD toxic equivalency factors. Second, an inhalation unit risk factor for 2,3,7,8-TCDD of 33 $(\mu g/m^3)^{-1}$ from USEPA's 1997 Health Effects Assessment Summary Tables was entered for all PCDD/PCDF congeners (except the two

[1] The IRAP software, which was programmed by Lakes Environmental to implement the 2005 HHRAP methodology, was used to perform the risk assessment calculations for stack and fugitive air emissions.

HxCDDs noted above which have their own IRIS-identified inhalation values of 1.3 ($\mu g/m^3)^{-1}$). Third, the oral cancer slope factor of 2 $(mg/kg\text{-}day)^{-1}$ for Aroclor 1254 identified in the HHRAP report but not in its chemical-specific database was entered into IRAP. Polychlorinated biphenyls (PCBs) were evaluated in the risk assessment as Aroclor 1254 based on an evaluation of the PCB homologue distribution measured during the Performance Demonstration Test in accordance with HHRAP guidance. Additionally, Aroclor 1254 was selected over Aroclor 1016 because it has more conservative toxicity criteria.

Table 1
Compilation of Chronic Human Health Toxicity Criteria for Compounds Not Included in USEPA's 2005 HHRAP (a)

Toxicity Criteria							Sources for Toxicity Criteria				
CAS #	Compound name	Oral RfD (mg/kg/day)	Oral cancer slope factor $(mg/kg/day)^{-1}$	Inhalation RfC (mg/m^3)	Inhalation unit risk factor $(ug/m^3)^{-1}$	Health endpoint(s)	Oral RfD (mg/kg/day)	Oral cancer slope factor $(mg/kg/day)^{-1}$	Inhalation RfC (mg/m^3)	Inhalation Unit risk factor $(ug/m^3)^{-1}$	Health endpoint(s)
563-58-6	1,1-Dichloropropene	NA	NA	NA	NA	NA					
95-63-6	1,2,4-Trimethylbenzene	NA	NA	NA	NA	NA					
142-28-9	1,3-Dichloropropane	0.02	NA	0.07	NA	Liver/ Kidney	PPRTV		RTR (b)		PPRTV
108-60-1	2,2'-oxybis (1-Chloropropane)	0.04	NA	0.14	NA	Blood	IRIS		RTR (b)		IRIS
594-20-7	2,2-Dichloropropane	NA	NA	NA	NA	NA					
625-86-5	2,5-Dimethylfuran	NA	NA	NA	NA	NA					
2216-30-0	2,5-Dimethylheptane	NA	NA	NA	NA	NA					
17559-81-8	2,5-Dione, 3-hexene	NA	NA	NA	NA	NA					
78-93-3	2-Butanone	0.6	NA	5	NA	Developmental/ Reproductive System	IRIS		IRIS		IRIS
95-49-8	2-Chlorotoluene	0.02	NA	0.07	NA	Body Weight	IRIS		RTR (b)		IRIS
591-78-6	2-Hexanone	NA	NA	NA	NA	NA					
3221-61-2	2-Methyl octane	NA	NA	NA	NA	NA					
91-57-6	2-Methylnaphthalene	0.004	NA	0.014	NA	Respiratory tract	IRIS		RTR (b)		IRIS
34246-54-3	3-Ethyl benzaldehyde	NA	NA	NA	NA	NA					
763-93-9	3-Hexen-2-one	NA	NA	NA	NA	NA					
625-33-2	3-Penten-2-one (ethylidene acetone)	NA	NA	NA	NA	NA					
141-79-7	3-Penten-2-one, 4-methyl	NA	NA	NA	NA	NA					
534-52-1	4,6-Dinitro-2-methylphenol	0.004	NA	0.014	NA	Nervous System	ATSDR		RTR (b)		ASTDR
106-43-4	4-Chlorotoluene	0.07	NA	0.245	NA	Liver/ Kidney	PPRTV		RTR (b)		PPRTV
4748-78-1	4-Ethyl benzaldehyde	NA	NA	NA	NA	NA					
301-02-0	9-Octadecenamide (oleamide)	NA	NA	NA	NA	NA					
208-96-8	Acenaphthylene	NA	NA	NA	NA	NA					
7429-90-5	Aluminum	1	NA	0.005	NA	Developmental/ Nervous system	PPRTV		PPRTV		PPRTV
92-87-5	Benzidine	0.003	230	NA	0.067	Urinary/ Nervous System/ Liver	IRIS	IRIS		IRIS	IRIS
192-97-2	Benzo(e)pyrene	NA	NA	NA	NA	NA					
191-24-2	Benzo(g,h,i)perylene	NA	NA	NA	NA	NA					
93-58-3	Benzoic acid, methyl ester (methyl benzoate)	NA	NA	NA	NA	NA					
111-91-1	Bis(2-chloroethoxy) methane	0.003	NA	0.0105	NA	Liver	PPRTV		RTR (b)		PPRTV
108-86-1	Bromobenzene	NA	NA	NA	NA	NA					
74-97-5	Bromochloromethane	NA	NA	NA	NA	NA					
104-51-8	Butylbenzene, n-	NA	NA	NA	NA	NA					
135-98-8	Butylbenzene, sec	NA	NA	NA	NA	NA					
98-06-6	Butylbenzene, tert	NA	NA	NA	NA	NA					
86-74-8	Carbazole	NA	NA	NA	NA	NA					
7440-48-4	Cobalt	0.01	NA	0.0001	NA	Respiratory tract/ Blood	ATSDR		ASTDR		ATSDR
7440-50-8	Copper	0.01	NA	0.035	NA	Gastrointestinal	ATSDR		RTR (b)		ATSDR
2303-16-4	Diallate	NA	NA	NA	NA	NA					
132-64-9	Dibenzofuran	0.001	NA	0.0035	NA	Organ (weight)	PPRTV		RTR (b)		PPRTV
122-39-4	Diphenylamine	0.025	NA	0.0875	NA	Body Weight/ Kidney/ Liver	IRIS		RTR (b)		IRIS

Table 1

Compilation of Chronic Human Health Toxicity Criteria for Compounds Not Included in USEPA's 2005 HHRAP (a)

Toxicity Criteria							Sources for Toxicity Criteria				
CAS #	Compound name	Oral RfD (mg/kg/day)	Oral cancer slope factor $(mg/kg/day)^{-1}$	Inhalation RfC (mg/m^3)	Inhalation unit risk factor $(ug/m^3)^{-1}$	Health endpoint(s)	Oral RfD (mg/kg/day)	Oral cancer slope factor $(mg/kg/day)^{-1}$	Inhalation RfC (mg/m^3)	Inhalation Unit risk factor $(ug/m^3)^{-1}$	Health endpoint(s)
1031-07-8	Endosulfan sulfate	NA	NA	NA	NA	NA					
7421-93-4	Endrin aldehyde	NA	NA	NA	NA	NA					
53494-70-5	Endrin ketone	NA	NA	NA	NA	NA					
76-13-1	Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	3	NA	10.5	NA	Nervous System	IRIS		RTR (b)		IRIS
74-88-4	Iodomethane	NA	NA	NA	NA	NA					
99-87-6	Isopropyl toluene, p-	NA	NA	NA	NA	NA					
7439-96-5	Manganese	0.14	NA	0.00005	NA	Nervous System	IRIS		IRIS		IRIS
62-75-9	N-nitrosodimethylamine	NA	51	NA	0.014	Liver		IRIS		IRIS	IRIS
198-55-0	Perylene	NA	NA	NA	NA	NA					
2240-47-3	Phosphine imide, P,P,P-triphenyl	NA	NA	NA	NA	NA					
103-65-1	Propylbenzene, n-	NA	NA	NA	NA	NA					
7440-62-2	Vanadium	0.003	NA	0.0002	NA	Respiratory tract/ Kidney	ATSDR		ATSDR		ATSDR
58-89-9	γ-BHC (Lindane)	0.0047	NA	NA	NA	Liver/blood	OPPTS HED (c)	OPPTS HED (c)		OPPTS HED (c)	OPPTS HED (c)
319-86-8	δ-BHC	0.083	NA	NA	NA	Liver	CPF (d)				CPF (d)
110-54-3	1-Hexane (n-hexane)	0.06	NA	0.7	NA	Nervous System	HEAST		IRIS		IRIS/HEAST
79-10-7	Acrylic Acid	0.5	NA	0.001	NA	Developmental/ Respiratory Tract	IRIS		IRIS		IRIS
107-21-1	Ethylene Glycol	2	NA	1.3	NA	Kidney	IRIS		ATSDR		IRIS
80-62-6	Methyl methacrylate	1.4	NA	0.7	NA	Organ(weight)/ Respiratory Tract	IRIS		IRIS		IRIS
1634-04-4	methyl tert-butyl ether	0.3	NA	3	NA	Liver/Kidney	ATSDR		IRIS		IRIS
75-56-9	Propylene oxide	NA	0.24	0.03	0.0000037	Gastrointestinal/ Respiratory Tract		IRIS	IRIS	IRIS	IRIS
33213-65-9	Endosulfan II	NA	NA	NA	NA	NA					
7446-09-5	Sulfur dioxide	NA	NA	0.078	NA	Respiratory Tract			NAAQS (e)		
10102-44-0	Nitrogen oxides	NA	NA	0.1	NA	Respiratory Tract			NAAQS (e)		
Additional Compounds Addressed in Fugitive Air Emissions Inhalation Risk Assessment											
106-99-0	1,3-Butadiene	--	--	2.00E-03	3.00E-05				IRIS	IRIS	
110-82-7	Cyclohexane	--	--	6	NA				IRIS		

NA = not available

-- = not applicable. Only the inhalation pathway of exposure was evaluated.

(a) Heirarchy for chronic toxicity data, based on 2005 HHRAP: 1) EPA's Integrated Risk Information System (IRIS); 2) EPA's provisional peer-reviewed toxicity values (PPRTV); 3) Other - a) CALEPA (California Environmental Protection Agency) chronic reference exposure level (REL) and unit risk factor (URF); b) Agency for Toxic Substances and Disease Registry (ATSDR) chronic minimum risk level (MRL); c) USEPA's 1997 Health Effects Assessment Summary Tables (HEAST).

(b) RTR = route to route extrapolation, based on Appendix A-2 of USEPA's 2005 HHRAP. RTR was conducted if an oral toxicity value was available but no inhalation toxicity value was available. Inhal RfC (mg/m3) = Oral RfD (mg/kg-day) * 70 kg BW / 20 m3/day. This assumes that the toxicity of the compound is equivalent when inhaled or ingested; this is used as an initial screening tool.

(c) OPPTS HED = USEPA's Office of Prevention, Pesticides and Toxic Substances, Health Effects Division. 2002. Revised HED Risk Assessment for Lindane. DP Barcode D280622. Reregistration case #0315. January 30, 2002.

(d) CPF = CPF Associates, Inc. 2006. Comments on Assessment of Lindane and Other Hexachlorocyclohexane Isomers. EPA-HQ-OPP-2006-0034. www.cpfassociates.com/pdf/HCH_Assessment_Comments_2006.pdf.

(e) NAAQS = National Ambient Air Quality Standard set under the U.S. Clean Air Act

Table 2

Compilation of Acute Inhalation Toxicity Criteria for Compounds Not Included in USEPA'S 2005 HHRAP

CAS Number	Compound	Toxicity Criteria Data Sources (a)				Acute Inhalation Reference Air Concentration Used in Risk Assessment (mg/m^3)
		AEGL-1 (mg/m^3) (b)	ERPG-1 (mg/m^3)	TEEL-1 (mg/m^3)	CALEPA Acute REL (mg/m^3)	
563-58-6	1,1-Dichloropropene			12.5		12.5
95-63-6	1,2,4-Trimethylbenzene	687		150		687
142-28-9	1,3-Dichloropropane			75		75
108-60-1	2,2'-oxybis (1-Chloropropane)			75		75
594-20-7	2,2-Dichloropropane			60		60
625-86-5	2,5-Dimethylfuran					NA
2216-30-0	2,5-Dimethylheptane			350 (d)		350
17559-81-8	2,5-Dione, 3-hexene					NA
78-93-3	2-Butanone (MEK)	589			13	13
95-49-8	2-Chlorotoluene			400		400
591-78-6	2-Hexanone			40		40
3221-61-2	2-Methyl octane					NA
91-57-6	2-Methylnaphthalene			20		20
34246-54-3	3-Ethyl benzaldehyde			150 (c)		150
763-93-9	3-Hexen-2-one					NA
625-33-2	3-Penten-2-one (ethylidene acetone)					NA
141-79-7	3-Penten-2-one, 4-methyl (mesityl oxide)			100		100
534-52-1	4,6-Dinitro-2-methylphenol (4,6-dinitro-o-cresol)			0.2		0.2
106-43-4	4-Chlorotoluene			350		350
4748-78-1	4-Ethyl benzaldehyde			150 (c)		150
301-02-0	9-Octadecenamide (oleamide)					NA
208-96-8	Acenaphthylene			0.2		0.2
7429-90-5	Aluminum			30		30
92-87-5	Benzidine			0.5		0.5
192-97-2	Benzo(e)pyrene					NA
191-24-2	Benzo(g,h,i)perylene			30		30
93-58-3	Benzoic acid, methyl ester (methyl benzoate)					NA
111-91-1	Bis(2-chloroethoxy) methane			15		15
108-86-1	Bromobenzene			15		15
74-97-5	Bromochloromethane			3000		3000
104-51-8	Butylbenzene, n-			125		125
135-98-8	Butylbenzene, sec			25		25
98-06-6	Butylbenzene, tert			125		125
86-74-8	Carbazole			2.5		2.5
7440-48-4	Cobalt			3		3
7440-50-8	Copper				0.1	0.1
2303-16-4	Diallate					NA
132-64-9	Dibenzofuran			30		30
122-39-4	Diphenylamine			30		30
1031-07-8	Endosulfan sulfate					NA
7421-93-4	Endrin aldehyde					NA
53494-70-5	Endrin ketone					NA
76-13-1	Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)			10000		10000
74-88-4	Iodomethane (methyl iodide)		145			145
99-87-6	Isopropyl toluene, p-					NA
7439-96-5	Manganese			3		3
62-75-9	N-nitrosodimethylamine			10		10
198-55-0	Perylene					NA

Table 2

Compilation of Acute Inhalation Toxicity Criteria for Compounds Not Included in USEPA'S 2005 HHRAP

CAS Number	Compound	Toxicity Criteria Data Sources (a)				Acute Inhalation Reference Air Concentration Used in Risk Assessment (mg/m³)
		AEGL-1 (mg/m³) (b)	ERPG-1 (mg/m³)	TEEL-1 (mg/m³)	CALEPA Acute REL (mg/m³)	
2240-47-3	Phosphine imide, P,P,P-triphenyl					NA
103-65-1	Propylbenzene, n- (isocumene)			400		400
7440-62-2	Vanadium			0.15		0.15
58-89-9	γ-BHC (Lindane)			1.5		1.5
319-86-8	δ-BHC					NA
110-54-3	1-Hexane (n-hexane)			1,500		1,500
79-10-7	Acrylic Acid	4.4	5.9		6	6.0
107-21-1	Ethylene Glycol			100		100
80-62-6	Methyl methacrylate	70				70
1634-04-4	methyl tert-butyl ether	180				180
75-56-9	Propylene oxide	173			3.1	3.1
7446-09-5	Sulfur dioxide				0.66	0.66
10102-44-0	Nitrogen dioxide				0.47	0.47
33213-65-9	Endosulfan II					NA
Additional Compounds Addressed in Fugitive Air Emissions Inhalation Risk Assessment						
106-99-0	1,3-Butadiene	1,480				1,480
110-82-7	Cyclohexane			1,000		1,000

Abbreviations:

HHRAP = USEPA's 2005 Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities.

NA = Acute inhalation values were not available from the referenced data sources.

(a) Hierarchy for acute inhalation toxicity criteria, based on 2005 HHRAP: 1) CALEPA RELs, 2) USEPA AEGL-1, 3) ERPG-1, and 4) TEEL-1. Definitions are provided below:

CALEPA REL = California Environmental Protection Agency Acute Reference Exposure Level. The acute REL is the concentration level at or below which no adverse health effects are anticipated for a 1-hour exposure duration.

USEPA AEGL-1 = Acute exposure guideline level developed by USEPA. The AEGL-1 is the 1-hour average concentration in air below which mild transient effects (e.g., irritation) are not expected to occur in the general population, including susceptible individuals, but above which such transient effects might occur. AEGLs are developed to evaluate intermittent, short-term exposures.

ERPG-1: The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour without experiencing other than mild transient adverse health effects or perceiving a clearly defined, objectionable odor.

TEEL-1: The maximum airborne concentration below which it is believed that nearly all individuals could be exposed without experiencing other than mild transient adverse health effects or perceiving a clearly defined, objectionable odor.

(b) All listed AEGLs are interim values except for methyl tert butyl ether and 1,2,4-trimethylbenzene which are proposed AEGLs.

(c) TEEL-1 is for 2-ethyl benzaldehyde, no value was available for 3- or 4-ethyl benzaldehyde.

(d) TEEL-1 is for 2,2-dimethylheptane, no value was available for 2,5-dimethylheptane.

APPENDIX A

BIOGRAPHIES OF STUDY PARTICIPANTS

CPF ASSOCIATES, INC

Sarah A. Foster

EDUCATION

M.S., Environmental Health Sciences, Air Pollution Control Program Harvard University School of Public Health, Cambridge, MA (1985).

B.A., Political Science (Environmental Law/Energy Policy), Williams College, Williamstown, MA (1981).

EXPERIENCE

Ms. Foster is a founding member of CPF Associates, Inc. She has over 20 years of consulting experience in environmental health sciences, with expertise in developing strategies for and conducting exposure and risk analyses related to environmental issues and commercial and consumer products. Previously, Ms. Foster was a Senior Consultant with The Weinberg Group, a Project Manager at the Clement Division of ICF/Kaiser, an Environmental Analyst with the U.S. Environmental Protection Agency's Office of Policy Analysis, and a researcher for the Harvard Public Health School's Six City Study. Her areas of specialty include the application of quantitative methods for evaluating potential risks, including multiple chemical, multiple exposure pathway risk assessments for waste management technologies, air toxics sources and waste sites, Monte Carlo simulation, environmental epidemiology, and good risk assessment practice principles. She has managed and performed over 100 comprehensive risk assessment projects for combustion sources, waste sites and consumer and commercial products, with specialized knowledge in the conduct of risk assessments for municipal solid waste combustors, hazardous waste incinerators, landfills and emissions reported under SARA Title III. She has developed and applied a wide variety of environmental fate and transport models, and critically analyzed and compiled a broad array of human activity pattern data, in exposure assessment projects involving multiple inhalation, ingestion and dermal pathways as well as the use of household tap water. She has also developed and applied innovative risk assessment methods to assess risks from combustion sources, indoor water use, waste sites, pesticides and anti-microbial materials. Ms. Foster has analyzed issues regarding contaminated site remedy selection, cleanup goals, and the historical state-of-knowledge of toxicological and environmental health sciences. Ms. Foster has numerous publications focusing on risk assessment, air toxics and emissions from industrial sources and is a member of several professional societies. She also has considerable experience in developing and conducting risk assessment training courses.

CPF ASSOCIATES, INC.

Paul C. Chrostowski, Ph.D., QEP, FRSH

EDUCATION

Ph.D. Environmental Engineering and Science, Drexel University, Philadelphia, PA (1981).

M.S. Environmental Science, Drexel University, Philadelphia, PA (Environmental Chemistry and Health Specializations, USPHS Traineeship) (1979).

B.S. Chemistry, University of California, Berkeley, California (American Chemical Society Certified, Honors) (1976).

PROFESSIONAL CERTIFICATION

Dr. Chrostowski is a Qualified Environmental Professional (QEP) (#02970014) and a Fellow of the Royal Society of Health (FRSH).

EXPERIENCE

Dr. Chrostowski is a founding member of CPF Associates, Inc. He is an environmental health scientist with over 30 years experience in environmental science and engineering work on behalf of both government and private clients. Previously, he was Director of Environment, Health & Safety programs at The Weinberg Group, Vice President and Senior Science Advisor at ICF/Clement, Senior Scientist at EA Engineering, Science & Technology, Assistant Professor at Vassar College, a consultant in private practice and a pollution control/industrial hygiene technician in industry. He has specialized experience in the scientific and technical aspects of federal, state, and international regulatory programs including the CAA, CERCLA/SARA, RCRA, TSCA, FIFRA, OSHA, waste management technologies and ecological assessment. In addition to EPA and OSHA programs, Dr. Chrostowski has developed substantial expertise in indoor air quality, odor analysis, microbiological risk assessment, the risk analysis of hazardous material transportation, and the risk analysis of FDA-regulated products. Dr. Chrostowski has conducted research into environmentally-friendly new product development and has directed registration and approval petition processes for the environmental and occupational aspects of new products, pesticides, and pharmaceuticals. Dr. Chrostowski's research interests include the behavior of complex mixtures, pharmacokinetics, application of quantitative management tools to environmental strategy development and evaluation, biomonitoring, use of epidemiology in risk assessment, mass transfer phenomena, applied statistics, and mathematical modeling for risk management decision making. Dr. Chrostowski is active in numerous professional societies and expert panels and has authored or co-authored over 100 publications or presentations in the environmental field. In addition to his technical work, Dr. Chrostowski has taught university-level environmental sciences and has presented expert testimony in litigation cases, regulatory, and permitting hearings and public meetings and has conducted technical negotiations on behalf of private and governmental clients. Dr. Chrostowski was a member of the National Research Council's committee on Health Effects of Waste Incineration and assisted the presidential/Congressional Commission on Risk Assessment and Risk Management regarding risk assessment of municipal waste combustors.

FOCUS ENVIRONMENTAL, INC.
ANTHONY R. EICHER

Mr. Eicher is a chemical engineer and Principal of Focus Environmental, Inc., with over 26 years of project management and engineering experience in the design, evaluation, operation, and testing of hazardous materials treatment systems and air pollution control devices. Mr. Eicher's responsibilities include providing a full range of engineering services, from waste or emissions characterizations and feasibility studies through complete process design and detailed design reviews to permitting, startup assistance, troubleshooting, performance testing, and operator training. He has prepared and assisted clients in developing permit applications and supporting documents for RCRA, TSCA, NPDES, PSD, and state air and state solid waste permits and has represented clients in permitting negotiations with federal and state regulators, and in public hearings. He has participated in over 150 trial burn and compliance testing projects and has managed the implementation of numerous comprehensive testing programs. These projects have been conducted across 28 states (plus Puerto Rico), all 10 EPA regions, and 4 countries. Mr. Eicher has developed process designs and control strategies for a variety of processes and components including combustion systems; liquid, solid, and semi-solid material handling; energy recovery; wet and dry air pollution control systems; non-electrical utilities distribution (air, water, steam, etc.); vent controls; and several separation processes (air and steam stripping, liquid extraction, thin film evaporation). He has been involved in numerous new facility designs, upgrades of existing systems, and demonstration of emerging technologies. This experience has spanned a wide range of industries and applications including chemical and petrochemical processing, pharmaceuticals, metals and minerals, power generation, commercial waste treatment, mixed radioactive and hazardous waste management, as well as hazardous materials emergency response and waste site remediation. Mr. Eicher has authored or co-authored over 20 technical papers that have been presented in a variety of symposia or published in national and international journals. He served a two-year term as the Technical Chair for the International Conference on Incineration and Thermal Treatment Technologies, sponsored annually by the University of Maryland, College Park, and remains as an active member of the Conference Executive Committee and Program Advisory Committee. Mr. Eicher is recognized internationally for his expertise in the hazardous waste thermal treatment industry, especially in the areas of regulatory compliance and performance testing.

FOCUS ENVIRONMENTAL, INC.
TERESA BALES

Ms. Bales has over 24 years experience working in the environmental industry. She has experience with RCRA, NPDES, IATA, and DOT regulations. She has extensive experience reviewing analytical data for CLP, HAZWRAP, and project specific quality objectives. She has participated in CPT testing as the independent Quality Assurance Officer this is required by the regulatory agency. Ms. Bales has also developed field sampling and analysis plans (SAP) Feedstream Analysis Plans (FAP), and quality assurance project plans (QAPP) for a variety of projects. Her experience also includes project management and obtaining and managing grant moneys.

MACTEC

TONY RODOLAKIS

Mr. Rodolakis specializes in ecological risk assessment and other hazardous waste and environmental quality projects. He has over 14 years of experience in the environmental field. Mr. Rodolakis performs ecological risk assessments following state and federal guidelines, including Resource Conservation and Recovery Act (RCRA) and Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and advises clients on compliance issues and state and federal regulations. Mr. Rodolakis specializes in landfills, industrial, and commercial sites. Mr. Rodolakis earned a bachelors degree in Biology form Tufts University and a Masters of Environmental Science in Aquatic Science from the Yale School of Forestry and Environmental Studies. His specialized skill areas include RCRA, CERCLA, ecological risk assessment, remedial investigations, habitat assessments, permitting, and amphibian monitoring.

ToxServices, Inc.
Dr. Margaret H. Whittaker has over a decade of experience in both the performance and management of toxicology and human health risk assessment-related projects. She is currently the Chief Toxicologist and President of ToxServices LLC, a Washington, D.C.-based consulting firm that provides toxicology and risk assessment consulting services to private industry and the Federal government. Dr. Whittaker is Diplomate of the American Board of Toxicology who earned a Ph.D. in Toxicology from The University of Maryland, Baltimore and an M.P.H. in Environmental Health from The University of Michigan. Dr. Whittaker has extensive technical experience in hazard identification and noncancer and cancer dose-response assessment, including the preparation of quantitative risk assessments for carcinogens and noncarcinogens. She formed ToxServices in 2003 after working at two of the country's leading toxicology and risk assessment consulting firms (The ENVIRON Corporation and The Weinberg Group), and has successfully developed both a loyal client base and a growing staff of multidisciplinary toxicologists.

ToxServices, Inc.
Ms. Elizabeth Engimann is an Associate Toxicologist who earned her M.H.S. in Environmental Health Sciences from the Johns Hopkins University, Baltimore, Maryland, Bloomberg School of Public Health. Since joining ToxServices, Ms. Engimann has developed numerous human health risk assessments of direct and indirect additives extracting from drinking water distribution systems and drinking water treatment units. She has also performed initial and final toxicological reviews for products being evaluated under various NSF standards. Ms. Engimann has extensive laboratory experience in both *in vivo* and *in vitro* investigational techniques, and has over a decade of experience performing toxicity studies on mammalian and non-mammalian species. Ms. Engimann performs literature searches for EPA risk assessments and technical guidance documents, ATSDR Toxicological Profiles, and international toxicological evaluations, including NICNAS, BUA, WHO (INCHEM, JECFA, IPCS), BIBRA, and Japanese Ministry of Health and Welfare reports. She excels in searching online databases such as ChemIDplus, HSDB, MEDLINE, BIOSIS, TOXLINE, GENETOX, CCRIS, IARC, HPV, and TSCATS for epidemiological and toxicological data and reports. Ms. Engimann also is proficient at using NEMI to identify appropriate test methods for analyzing contaminants in water media.

ToxServices, Inc.
Lisa Marie Egner is a Research Associate who received her Bachelor's degree in Engineering Physics from the University of Illinois. Ms. Egner is an accomplished Research Associate who performs comprehensive literature searches in databases specializing in environmental quality or sustainability issues, such as Dialog's ENVIROLINE, INSIDE CONFERENCES, SCISEARCH, and WASTEINFO databases. Ms. Egner also assists ToxServices with her technical skills using Graphics in AutoCAD & AutoDesk Inventor, Numerical methods in MATLAB and EXCEL, and Programming in C and MATLAB.

TRC
THEODORE MAIN

EDUCATION
B.S., Meteorology, Pennsylvania State University, 1978

AREAS OF EXPERTISE
Mr. Theodore Main has program management and technical experience in the following general areas:

- Project Management
- Air Quality Dispersion Modeling
- Air Quality Permitting
- Air Quality/New Source Review Permitting
- Title V Permitting
- New York Article X Permitting
- Environmental Impact Studies
- Cooling tower and Visible Plume Studies
- EPA Program Management
- Air Quality/Environmental Due Diligence
- Air Quality Monitoring
- Expert Testimony
- Air Quality/Meteorology Computer Applications
- Computer Programming
- Technical Consultant for Software Applications

REPRESENTATIVE EXPERIENCE
Mr. Main has over 28 years of experience in preparing and supervising the preparation of air quality, meteorological and environmental impact studies performing air quality diffusion modeling, and additional environmental analyses. Mr. Main has also provided expert testimony regarding air quality issues in support of permit applications. His experience includes development, adaptation and operation of computer programs for environmental analyses; specification and installation of meteorological and air quality monitoring equipment; preparation and supervision of preparation of licensing documents and fugitive particulate studies performed for cogeneration facilities, fossil fuel steam electric generating facilities, steam heating plants, industrial process boilers, and municipal incinerators. Mr. Main is presently manager of the air quality modeling group within the TRC Lyndhurst, New Jersey office. In this capacity, he supervises the air quality modeling and analytical analysis support for air quality permits and environmental studies.

TRC
DARIN J. OMETZ

EDUCATION

Graduate Studies in Meteorology (The Pennsylvania State University)
B.S., Meteorology, The Pennsylvania State University, 2000

TECHNICAL SPECIALTIES

Mr. Ometz has over 5 years experience encompassing:

- New Source Review – Prevention of Significant Deterioration (PSD) Modeling
- Regional Haze (Visibility and Long-Range Transport) Modeling
- Toxic Air Pollutant Modeling
- Risk Management Plans/Modeling
- Health Risk Assessments
- Mobile Source Modeling (Roadway Assessments)
- Air Emissions Inventories and Regulatory Assessments
- Construction Permits and Operating Permit Applications

REPRESENTATIVE EXPERIENCE

Mr. Ometz has conducted air quality analyses for several electric power generating facilities. These facilities were located in EPA regions II and IV. He has worked with EPA guideline models such as the Industrial Source Complex Short-Term (ISCST3) model, AERMOD, CAL3QHC roadway screening model, CTSCREEN and SCREEN3, and ALOHA, as well as, non-EPA guideline models such as CALPUFF. Mr. Ometz provides modeling and engineering support for a variety of industrial clients including independent power/cogeneration development, manufacturing, and retail development.

APPENDIX M

SUPPORTING INFORMATION FOR THE ECOLOGICAL RISK ASSESSMENT

APPENDIX M

SUPPORTING INFORMATION FOR THE ECOLOGICAL RISK ASSESSMENT

This appendix includes supporting information related to the ecological risk assessment, as follows:

APPENDIX M
SECTION 1

COMPILATION OF TOXICITY REFERENCE VALUES (TRVs)
FOR THE ECOLOGICAL RISK ASSESSMENT

Toxicity reference values (TRVs) are the estimated dose or exposure level at which no adverse effects are expected to occur. For this project, TRVs were obtained from USEPA's 1999 *Screening Level Ecological Risk Protocol for Hazardous Waste Combustion Facilities* ("Screening Level Protocol") or, in the absence of data from this report, from standards, criteria, guidance, or ecological benchmarks from the data sources listed below (and in the project Working Draft Risk Assessment Workplan), in order of preference, as follows:

Birds & Mammals
- CalTox database (CEPA 2002)
- Sample et al. (1996)
- Schafer et al. (1983), Schafer and Bowles (1985)

Reptiles
- CalTox database (CEPA 2002)
- Reptile and Amphibian Toxicity Literature (RATL) database (EC 2000)

Plants
- Efromyson et al. (1997)
- USEPA Region V Ecological Screening Levels (USEPA 2003)

Aquatic Life – Surface Water
- AZDEQ water quality standards (AZDEQ 2003)
- USEPA (2005)
- USEPA (1996)
- Mayer and Ellersieck (1986)
- USEPA (2007)

Aquatic Life – Sediment
- NOAA (2006)
- MacDonald (2000)

If available and appropriate, TRVs which were associated with chronic exposures (i.e., long duration exposures) and which reported no-adverse-effects levels (NOAELs) relating to reproduction or mortality were selected. If only acute toxicity data were available, chronic values were estimated by dividing the acute value by 100, as recommended in USEPA (1999) guidance. In some cases, TRVs with endpoints relating to reproduction or mortality were not available in the literature. In such cases, TRVs associated with other sub-lethal effects were assumed to indirectly affect survival or reproductive capacity and were therefore appropriate. Studies were also selected based on similarity of test species to the receptors considered in the risk assessment. In some cases, a TRV could not be identified. Use of TRVs assumes that the bioavailability, uptake efficiency, uptake mechanism, and toxicity mechanism of the chemical used in the TRV study is similar to the chemical form which occurs at the project site.

The TRVs compiled for this project, for compounds not already included in USEPA's Screening Level Protocol, are presented in this appendix in a series of tables. Table 1 summarizes all the TRVs that were compiled for the various ecological receptor groups. Table 2 lists the data sources for the compiled TRVs for mammals, birds and plants. Tables 3 and 4 present detailed supporting data on the TRVs compiled from Sample et al. (1996) for mammalian and avian receptors, respectively. Table 5 lists the data sources for the surface water and sediment TRVs that were compiled. Table 6 presents detailed supporting data for the aquatic TRVs compiled from Mayer and Ellersieck (1986). Table 7 presents detailed supporting data for the aquatic TRVs compiled from USEPA's Ecotox Database. It should also be noted that Arizona Water Quality Criteria took precedence over surface water TRVs available in USEPA's Screening Level Protocol.

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U.S. Environmental Protection Agency (USEPA). 2007. EcoTox Database. http://www.epa.gov/ecotox.

Table 1
Toxicity Reference Values (TRVs) for Compounds Not Included in
USEPA's 1999 Screening Level Ecological Risk Assessment Protocol

Compound (a)	CAS NO.	Freshwater TRVs mg/L	Freshwater Sediment TRVs mg/kg (dry weight)	Terrestrial Plant TRVs mg/kg (dry weight soil)	Mammal TRVs mg/kg BW-day	Bird TRVs mg/kg BW-day
Inorganic Compounds						
Cobalt	7440-48-4	0.003	N/D	20	N/D	N/D
Manganese	7439-96-5	0.08	N/D	500	88	977
Vanadium	7440-62-2	0.019	N/D	2	0.21	11.4
Organic Compounds						
1,1-Dichloropropene	563-58-6	N/D	N/D	N/D	N/D	N/D
1,2,4-Trimethylbenzene	95-63-6	0.077	N/D	N/D	N/D	N/D
1,2-Dichloroethene	540-59-0	1.4	N/D	N/D	N/D	N/D
1,3-Dichloropropane	142-28-9	1.3	N/D	N/D	N/D	N/D
1,3-Dichloropropene (trans)	10061-02-6	N/D	N/D	N/D	N/D	N/D
1-Hexane (n-hexane)	110-54-3	0.025	N/D	N/D	N/D	N/D
2,2'-oxybis (1-Chloropropane)	108-60-1	N/D	N/D	20	N/D	N/D
2,2-Dichloropropane	594-20-7	0.39	N/D	N/D	N/D	N/D
2,5-Dimethylfuran	625-86-5	0.71	N/D	N/D	N/D	N/D
2,5-Dimethylheptane	2216-30-0	N/D	N/D	N/D	N/D	N/D
2,5-Dione, 3-hexene	17559-81-8	N/D	N/D	N/D	N/D	N/D
2-Chlorotoluene	95-49-8	0.14	N/D	N/D	N/D	N/D
2-Hexanone	591-78-6	4.28	N/D	13	N/D	N/D
2-Methyl octane	3221-61-2	N/D	N/D	N/D	N/D	N/D
3-Ethyl benzaldehyde	34246-54-3	N/D	N/D	N/D	N/D	N/D
3-Hexen-2-one	763-93-9	N/D	N/D	N/D	N/D	N/D
3-Penten-2-one (ethylidene acetone)	625-33-2	N/D	N/D	N/D	N/D	N/D
3-Penten-2-one, 4-methyl	141-79-7	N/D	N/D	N/D	N/D	N/D
4,6-Dinitro-2-methylphenol	534-52-1	0.024	N/D	0.14	N/D	N/D
4-Chlorotoluene	106-43-4	3.4	N/D	N/D	N/D	N/D
4-Ethyl benzaldehyde	4748-78-1	N/D	N/D	N/D	N/D	N/D
9-Octadecenamide (oleamide)	301-02-0	N/D	N/D	N/D	N/D	N/D
Acenaphthylene	208-96-8	N/D	N/D	680	N/D	N/D
Acrylic Acid	79-10-7	3.8	N/D	N/D	N/D	N/D
Benzidine	92-87-5	0.089	N/D	N/D	N/D	N/D
Benzo(e)pyrene	192-97-2	N/D	N/D	N/D	N/D	N/D
Benzo(g,h,i)perylene	191-24-2	N/D	N/D	120	N/D	N/D
Benzoic acid, methyl ester (methyl benzoate)	93-58-3	2.3	N/D	N/D	N/D	N/D
BHC, delta (δ-hexachlorocyclohexane	319-86-8	0.13	N/D	9.9	N/D	N/D
BHC, gamma (Lindane; γ-hexachlorocyclohexane	58-89-9	0.00028	0.00032	0.005	8	2
Bis(2-chloroethoxy) methane	111-91-1	1.8	N/D	0.3	N/D	N/D
Bromobenzene	108-86-1	0.056	N/D	N/D	N/D	N/D
Bromochloromethane	74-97-5	N/D	N/D	N/D	N/D	N/D
Butylbenzene, n-	104-51-8	N/D	N/D	N/D	N/D	N/D
Butylbenzene, sec	135-98-8	N/D	N/D	N/D	N/D	N/D
Butylbenzene, tert	98-06-6	0.65	N/D	N/D	N/D	N/D
Carbazole	86-74-8	0.015	N/D	N/D	N/D	N/D
Chlordane, cis (α-chlordane)	5103-71-9	0.000071	0.0032	N/D	4.58	2.14
Chlordane, trans (β-chlordane)	5103-74-2	0.0005	0.0032	N/D	N/D	N/D
Dibenzofuran	132-64-9	0.02	N/D	N/D	N/D	N/D
Diphenylamine	122-39-4	0.038	N/D	1	N/D	N/D
Endosulfan II	33213-65-9	0.000056	N/D	0.12	N/D	N/D
Endosulfan sulfate	1031-07-8	0.000060	N/D	N/D	N/D	N/D
Endrin aldehyde	7421-93-4	0.000080	N/D	0.011	N/D	N/D
Endrin ketone	53494-70-5	N/D	N/D	N/D	N/D	N/D
Ethylene Glycol	107-21-1	1000	N/D	N/D	N/D	N/D
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	76-13-1	N/D	N/D	N/D	N/D	N/D
Iodomethane	74-88-4	N/D	N/D	1.2	N/D	N/D
Isopropyl toluene, p-	99-87-6	0.046	N/D	N/D	N/D	N/D
Methyl methacrylate	80-62-6	3.37	N/D	980	N/D	N/D
methyl tert-butyl ether	1634-04-4	100	N/D	N/D	N/D	N/D
Methylnaphthalene, 2-	91-57-6	0.014	N/D	3.2	N/D	N/D
N-nitrosodimethylamine	62-44-2	1.41	N/D	12	N/D	N/D
Perylene	198-55-0	N/D	N/D	N/D	N/D	N/D
Phosphine imide, P,P,P-triphenyl	2240-47-3	N/D	N/D	N/D	N/D	N/D
Propylbenzene, n-	103-65-1	0.016	N/D	N/D	N/D	N/D
Propylene oxide	75-56-9	N/D	N/D	N/D	N/D	N/D
Xylenes (mixed isomers)	1330-20-7	8.60E-02	N/D	10	N/D	N/D

BW = body weight.
N/D = no data were available from the reviewed databases and TRV sources.

(a) Listed compounds consist of those selected for consideration in the ecological risk assessment that are not addressed by USEPA in its 1999 Screening Level Ecological Risk Assessment Protocol.

Table 2
Mammal, Bird and Plant Toxicity Reference Values for Compounds Not Included in USEPA's Screening Level Ecological Risk Assessment Protocol

Compound	CAS NO.	Mammals & Birds								Plants	
		CalTox [a]		Sample, 1996 [b]		Schafer		HSDB		Efroymson [e]	EPA Reg V [f]
		Mammal	Bird	Mammal (mg/kg-d)	Bird (mg/kg-d)	Mammal [c]	Bird [d]	Mammal	Bird	(mg/kg)	(mg/kg)
Cobalt	7440-48-4	-	-	-	-	-	-			20	0.14
Manganese	7439-96-5	-	-	88	977	-	-			500	-
Vanadium	7440-62-2	-	-	0.21	11.4	-	-			2	1.59
1,1-Dichloropropene	563-58-6	-	-	-	-	-	-			-	-
1,2,4-Trimethylbenzene	95-63-6	-	-	-	-	-	-			-	-
1,2-Dichloroethene	540-59-0	-	-	-	-	-	-			-	-
1,3-Dichloropropane	142-28-9	-	-	-	-	-	-			-	-
trans-1,3-Dichloropropene	10061-02-6	-	-	-	-	-	-			-	-
1-Hexane	110-54-3	-	-	-	-	-	-			-	-
2,2'-oxybis (1-Chloropropane)	108-60-1	-	-	-	-	-	-			-	19.9
2,2-Dichloropropane	594-20-7	-	-	-	-	-	-			-	-
2,5-Dimethylfuran	625-86-5	-	-	-	-	-	-			-	-
2,5-Dimethylheptane	2216-30-0	-	-	-	-	-	-			-	-
2,5-Dione, 3-hexene	17559-81-8	-	-	-	-	-	-			-	-
2-Chlorotoluene	95-49-8	-	-	-	-	-	-			-	-
2-Hexanone	591-78-6	-	-	-	-	-	-			-	12.6
2-Methyl octane	3221-61-2	-	-	-	-	-	-			-	-
3-Ethyl benzaldehyde	34246-54-3	-	-	-	-	-	-			-	-
3-Hexen-2-one	763-93-9	-	-	-	-	-	-			-	-
3-Penten-2-one (ethylidene acetone)	625-33-2	-	-	-	-	-	-			-	-
3-Penten-2-one, 4-methyl	141-79-7	-	-	-	-	-	-			-	-
4,6-Dinitro-2-methylphenol	534-52-1	-	-	-	-	-	-			-	0.144
4-Chlorotoluene	106-43-4	-	-	-	-	-	-			-	-
4-Ethyl benzaldehyde	4748-78-1	-	-	-	-	-	-			-	-
9-Octadecenamide (oleamide)	301-02-0	-	-	-	-	-	-			-	-
Acenaphthylene	208-96-8	-	-	-	-	-	-			-	682
Acrylic Acid	79-10-7	-	-	-	-	-	-			-	-
Benzidine	92-87-5	-	-	-	-	-	-			-	-
Benzo(e)pyrene	192-97-2	-	-	-	-	-	-			-	-
Benzo(g,h,i)perylene	191-24-2	-	-	-	-	-	-			-	119
Benzoic acid, methyl ester (methyl benzoate)	93-58-3	-	-	-	-	-	-			-	-
delta-BHC	319-86-8	-	-	-	-	-	-			-	9.94
BHC, gamma (Lindane; γ-hexachlorocyclohexane)	58-89-9	-	-	8	2	-	-			-	0.005
Bis(2-chloroethoxy)methane	111-91-1	-	-	-	-	-	-			-	0.302
Bromobenzene	108-86-1	-	-	-	-	-	-			-	-
Bromochloromethane	74-97-5	-	-	-	-	-	-			-	-
n-Butylbenzene	104-51-8	-	-	-	-	-	-			-	-
sec-Butylbenzene	135-98-8	-	-	-	-	-	-			-	-
tert-Butylbenzene	98-06-6	-	-	-	-	-	-			-	-
Carbazole	86-74-8	-	-	-	-	-	-			-	-
alpha-Chlordane	5103-71-9	-	-	4.58	2.14	-	-			-	-
beta-Chlordane	5103-74-2	-	-	-	-	-	-			-	-
Dibenzofuran	132-64-9	-	-	-	-	-	-			-	-
Diphenylamine	122-39-4	-	-	-	-	-	-			-	1.01
Endosulfan II	33213-65-9	-	-	-	-	-	-			-	0.119
Endosulfan sulfate	1031-07-8	-	-	-	-	-	-			-	-
Endrin aldehyde	7421-93-4	-	-	-	-	-	-			-	0.0105
Endrin ketone	53494-70-5	-	-	-	-	-	-			-	-
Ethylene Glycol	107-21-1	-	-	-	-	-	-			-	-
Freon 133 (1,1,2-Trichloro-1,2,2-trifluoroethane)	76-13-1	-	-	-	-	-	-			-	-
Iodomethane	74-88-4	-	-	-	-	-	-			-	1.23
p-Isopropyltoluene	99-87-6	-	-	-	-	-	-			-	-
Methyl methacrylate	80-62-6	-	-	-	-	-	-			-	984
Methyl tert-Butyl Ether	1634-04-4	-	-	-	-	-	-			-	-
2-Methylnaphthalene	91-57-6	-	-	-	-	-	-			-	3.24
N-nitrosodimethylamine	62-44-2	-	-	-	-	-	-			-	11.7
Perylene	198-55-0	-	-	-	-	-	-			-	-
Phosphine imide, P,P,P-triphenyl	2240-47-3	-	-	-	-	-	-			-	-
n-Propylbenzene	103-65-1	-	-	-	-	-	-			-	-
Propylene Oxide	75-56-9	-	-	-	-	-	-			-	-
Xylene (mixed isomers	1330-20-7	-	-	2.1	-	-	-			-	10

- = no benchmarks available

Notes:

[a] CalTox Database. California Environmental Protection Agency (CEPA). 2002. California Wildlife Exposure Factor and Toxicity Database (CalTox). Office of Environmental Health Hazard Assessment. http://www.oehha.org/cal_ecotox. Accessed May 23, 2007.

[b] Sample, B., Opresko, D., Suter, G. 1996. Toxicological Benchmarks for Wildlife. 1996 Revision. ES/ER/TM-86/R3.

[c] Schafer, E.W., and Bowles, W.A. 1985. Acute oral toxicity and repellency of 933 chemicals to house mice and deer mice. Arch. Environ. Contam. Toxicol. 14(1):111-129.

[d] Schafer, E.W., Bowles, W.A., and Hurlbut, J. 1983. The acute oral toxicity, repellency, and hazard potential of 998 chemicals to one or more species of wild and domestic birds. Arch. Envrion. Contam. Toxicol. 12:355-382.

[e] Efroymson, R.A, M. E. Will, G. W. Suter II, and A. C. Wooten. 1997. Toxicological Benchmarks for Screening Contaminants of Potential Concern for Effects on Terrestrial Plants: 1997 Revision. Prepared for the U.S. Department of Energy. ES/ER/TM-85/R3. November 1997.

[f] USEPA. 2003. USEPA, Region V, RCRA Ecological Screening Levels. August 22, 2003.

Table 3
Detailed Summary of Mammal Benchmarks from Sample *et al*. 1996

Compound	CAS NO.	Test Species	NOAEL (mg/kg-d)	Endpoint	Duration
Cobalt	7440-48-4	-	-	-	-
Manganese	7439-96-5	Rat	88	Reproduction	Chronic
Vanadium	7440-62-2	Rat	0.21	Reproduction	Chronic
1,1-Dichloropropene	563-58-6	-	-	-	-
1,2,4-Trimethylbenzene	95-63-6	-	-	-	-
1,2-Dichloroethene	540-59-0	-	-	-	-
1,3-Dichloropropane	142-28-9	-	-	-	-
trans-1,3-Dichloropropene	10061-02-6	-	-	-	-
1-Hexane	110-54-3	-	-	-	-
2,2'-oxybis (1-Chloropropane)	108-60-1	-	-	-	-
2,2-Dichloropropane	594-20-7	-	-	-	-
2,5-Dimethylfuran	625-86-5	-	-	-	-
2,5-Dimethylheptane	2216-30-0	-	-	-	-
2,5-Dione, 3-hexene	17559-81-8	-	-	-	-
2-Chlorotoluene	95-49-8	-	-	-	-
2-Hexanone	591-78-6	-	-	-	-
2-Methyl octane	3221-61-2	-	-	-	-
3-Ethyl benzaldehyde	34246-54-3	-	-	-	-
3-Hexen-2-one	763-93-9	-	-	-	-
3-Penten-2-one (ethylidene acetone)	625-33-2	-	-	-	-
3-Penten-2-one, 4-methyl	141-79-7	-	-	-	-
4,6-Dinitro-2-methylphenol	534-52-1	-	-	-	-
4-Chlorotoluene	106-43-4	-	-	-	-
4-Ethyl benzaldehyde	4748-78-1	-	-	-	-
9-Octadecenamide (oleamide)	301-02-0	-	-	-	-
Acenaphthylene	208-96-8	-	-	-	-
Acrylic Acid	79-10-7	-	-	-	-
Benzidine	92-87-5	-	-	-	-
Benzo(e)pyrene	192-97-2	-	-	-	-
Benzo(g,h,i)perylene	191-24-2	-	-	-	-
Benzoic acid, methyl ester (methyl benzoate)	93-58-3	-	-	-	-
delta-BHC	319-86-8	-	-	-	-
BHC, gamma (Lindane; γ-hexachlorocyclohexane)	58-89-9	Rat	8	Reproduction	Chronic
Bis(2-chloroethoxy)methane	111-91-1	-	-	-	-
Bromobenzene	108-86-1	-	-	-	-
Bromochloromethane	74-97-5	-	-	-	-
n-Butylbenzene	104-51-8	-	-	-	-
sec-Butylbenzene	135-98-8	-	-	-	-
tert-Butylbenzene	98-06-6	-	-	-	-
Carbazole	86-74-8	-	-	-	-
alpha-Chlordane	5103-71-9	Mouse	4.58	Reproduction	Chronic
beta-Chlordane	5103-74-2	-	-	-	-
Dibenzofuran	132-64-9	-	-	-	-
Diphenylamine	122-39-4	-	-	-	-
Endosulfan II	33213-65-9	-	-	-	-
Endosulfan sulfate	1031-07-8	-	-	-	-
Endrin aldehyde	7421-93-4	-	-	-	-
Endrin ketone	53494-70-5	-	-	-	-
Ethylene Glycol	107-21-1	-	-	-	-
Freon 133 (1,1,2-Trichloro-1,2,2-trifluoroethane)	76-13-1	-	-	-	-
Iodomethane	74-88-4	-	-	-	-
p-Isopropyltoluene	99-87-6	-	-	-	-
Methyl methacrylate	80-62-6	-	-	-	-
Methyl tert-Butyl Ether	1634-04-4	-	-	-	-
2-Methylnaphthalene	91-57-6	-	-	-	-
N-nitrosodimethylamine	62-44-2	-	-	-	-
Perylene	198-55-0	-	-	-	-
Phosphine imide, P,P,P-triphenyl	2240-47-3	-	-	-	-
n-Propylbenzene	103-65-1	-	-	-	-
Propylene Oxide	75-56-9	-	-	-	-
Xylene (mixed isomers)	1330-20-7	Mouse	2.1	Reproduction	Chronic

- = no data available.

Table 4
Detailed Summary of Avian Benchmarks from Sample *et al*. 1996

Compound	CAS NO.	Test Species	NOAEL (mg/kg-d)	Endpoint	Duration
Cobalt	7440-48-4	-	-	-	-
Manganese	7439-96-5	Japanese quail	977	Growth	Chronic
Vanadium	7440-62-2	Mallard	11.4	Mortality	Chronic
1,1-Dichloropropene	563-58-6	-	-	-	-
1,2,4-Trimethylbenzene	95-63-6	-	-	-	-
1,2-Dichloroethene	540-59-0	-	-	-	-
1,3-Dichloropropane	142-28-9	-	-	-	-
trans-1,3-Dichloropropene	10061-02-6	-	-	-	-
1-Hexane	110-54-3	-	-	-	-
2,2'-oxybis (1-Chloropropane)	108-60-1	-	-	-	-
2,2-Dichloropropane	594-20-7	-	-	-	-
2,5-Dimethylfuran	625-86-5	-	-	-	-
2,5-Dimethylheptane	2216-30-0	-	-	-	-
2,5-Dione, 3-hexene	17559-81-8	-	-	-	-
2-Chlorotoluene	95-49-8	-	-	-	-
2-Hexanone	591-78-6	-	-	-	-
2-Methyl octane	3221-61-2	-	-	-	-
3-Ethyl benzaldehyde	34246-54-3	-	-	-	-
3-Hexen-2-one	763-93-9	-	-	-	-
3-Penten-2-one (ethylidene acetone)	625-33-2	-	-	-	-
3-Penten-2-one, 4-methyl	141-79-7	-	-	-	-
4,6-Dinitro-2-methylphenol	534-52-1	-	-	-	-
4-Chlorotoluene	106-43-4	-	-	-	-
4-Ethyl benzaldehyde	4748-78-1	-	-	-	-
9-Octadecenamide (oleamide)	301-02-0	-	-	-	-
Acenaphthylene	208-96-8	-	-	-	-
Acrylic Acid	79-10-7	-	-	-	-
Benzidine	92-87-5	-	-	-	-
Benzo(e)pyrene	192-97-2	-	-	-	-
Benzo(g,h,i)perylene	191-24-2	-	-	-	-
Benzoic acid, methyl ester (methyl benzoate)	93-58-3	-	-	-	-
delta-BHC	319-86-8	-	-	-	-
BHC, gamma (Lindane; γ-hexachlorocyclohexane)	58-89-9	Mallard	2	Reproduction	Chronic
Bis(2-chloroethoxy)methane	111-91-1	-	-	-	-
Bromobenzene	108-86-1	-	-	-	-
Bromochloromethane	74-97-5	-	-	-	-
n-Butylbenzene	104-51-8	-	-	-	-
sec-Butylbenzene	135-98-8	-	-	-	-
tert-Butylbenzene	98-06-6	-	-	-	-
Carbazole	86-74-8	-	-	-	-
alpha-Chlordane	5103-71-9	Redwinged blackbird	2.14	Mortality	Chronic
beta-Chlordane	5103-74-2	-	-	-	-
Dibenzofuran	132-64-9	-	-	-	-
Diphenylamine	122-39-4	-	-	-	-
Endosulfan II	33213-65-9	-	-	-	-
Endosulfan sulfate	1031-07-8	-	-	-	-
Endrin aldehyde	7421-93-4	-	-	-	-
Endrin ketone	53494-70-5	-	-	-	-
Ethylene Glycol	107-21-1	-	-	-	-
Freon 133 (1,1,2-Trichloro-1,2,2-trifluoroethane)	76-13-1	-	-	-	-
Iodomethane	74-88-4	-	-	-	-
p-Isopropyltoluene	99-87-6	-	-	-	-
Methyl methacrylate	80-62-6	-	-	-	-
Methyl tert-Butyl Ether	1634-04-4	-	-	-	-
2-Methylnaphthalene	91-57-6	-	-	-	-
N-nitrosodimethylamine	62-44-2	-	-	-	-
Perylene	198-55-0	-	-	-	-
Phosphine imide, P,P,P-triphenyl	2240-47-3	-	-	-	-
n-Propylbenzene	103-65-1	-	-	-	-
Propylene Oxide	75-56-9	-	-	-	-
Xylene (mixed isomers)	1330-20-7	-	-	-	-

- = no data available.

Table 5
Summary of Surface Water and Sediment Toxicity Reference Values for Aquatic Life
for Compounds Not Included in USEPA's Screening Level Ecological Risk Assessment Protocol

Compound	CAS NO.	Surface Water (ug/L)						Sediment (mg/kg)		
		ADEQ WQS [a]	NRWQC [b]	ETs [c]	Mayer & Ellersieck [d]	Ecotox Database [e]	Final Benchmark [f]	NOAA [h]	MacDonald TECs [g]	Final Benchmark [f]
Cobalt	7440-48-4	-	-	3	-	-	3	-	-	-
Manganese	7439-96-5	-	-	80	-	-	80	-	-	-
Vanadium	7440-62-2	-	-	19	-	-	19	-	-	-
1,1-Dichloropropene	563-58-6	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	95-63-6	-	-	-	-	77.2	77.2	-	-	-
1,2-Dichloroethene	540-59-0	-	-	-	-	1,400	1,400	-	-	-
1,3-Dichloropropane	142-28-9	-	-	-	-	1,310	1,310	-	-	-
trans-1,3-Dichloropropene	10061-02-6	-	-	-	-	-	-	-	-	-
1-Hexane	110-54-3	-	-	-	-	25	25	-	-	-
2,2'-oxybis (1-Chloropropane)	108-60-1	-	-	-	-	-	-	-	-	-
2,2-Dichloropropane	594-20-7	-	-	-	-	390	390	-	-	-
2,5-Dimethylfuran	625-86-5	-	-	-	-	711	711	-	-	-
2,5-Dimethylheptane	2216-30-0	-	-	-	-	-	-	-	-	-
2,5-Dione, 3-hexene	17559-81-8	-	-	-	-	-	-	-	-	-
2-Chlorotoluene	95-49-8	-	-	-	-	140	140	-	-	-
2-Hexanone	591-78-6	-	-	-	-	4,280	4,280	-	-	-
2-Methyl octane	3221-61-2	-	-	-	-	-	-	-	-	-
3-Ethyl benzaldehyde	34246-54-3	-	-	-	-	-	-	-	-	-
3-Hexen-2-one	763-93-9	-	-	-	-	-	-	-	-	-
3-Penten-2-one (ethylidene acetone)	625-33-2	-	-	-	-	-	-	-	-	-
3-Penten-2-one, 4-methyl	141-79-7	-	-	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	534-52-1	24	-	-	-	-	24	-	-	-
4-Chlorotoluene	106-43-4	-	-	-	-	3,400	3,400	-	-	-
4-Ethyl benzaldehyde	4748-78-1	-	-	-	-	-	-	-	-	-
9-Octadecenamide (oleamide)	301-02-0	-	-	-	-	-	-	-	-	-
Acenaphthylene	208-96-8	-	-	-	-	-	-	-	-	-
Acrylic Acid	79-10-7	-	-	-	-	3,800	3,800	-	-	-
Benzidine	92-87-5	89	-	-	-	-	89	-	-	-
Benzo(e)pyrene	192-97-2	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	191-24-2	-	-	-	-	-	-	-	-	-
Benzoic acid, methyl ester (methyl benzoate)	93-58-3	-	-	-	-	2,331	2,331	-	-	-
delta-BHC	319-86-8	130	-	-	-	-	130	-	-	-
BHC, gamma (Lindane; γ-hexachlorocyclohexane)	58-89-9	0.28	-	0.08	-	-	0.28	0.00032	0.00237	0.00032
Bis(2-chloroethoxy)methane	111-91-1	-	-	-	-	1,840	1,840	-	-	-
Bromobenzene	108-86-1	-	-	-	-	56	56	-	-	-
Bromochloromethane	74-97-5	-	-	-	-	-	-	-	-	-
n-Butylbenzene	104-51-8	-	-	-	-	-	-	-	-	-
sec-Butylbenzene	135-98-8	-	-	-	-	-	-	-	-	-
tert-Butylbenzene	98-06-6	-	-	-	-	650	650	-	-	-
Carbazole	86-74-8	-	-	-	-	14.9	14.9	-	-	-
alpha-Chlordane	5103-71-9	-	-	-	0.0709	-	0.0709	-	0.00324	0.00324
beta-Chlordane	5103-74-2	-	-	-	0.505	-	0.505	-	0.00324	0.00324
Dibenzofuran	132-64-9	-	-	20	-	-	20	-	-	-
Diphenylamine	122-39-4	-	-	-	-	37.9	37.9	-	-	-
Endosulfan II	33213-65-9	-	0.056	0.051	-	-	0.056	-	-	-
Endosulfan sulfate	1031-07-8	0.06	-	-	-	-	0.06	-	-	-
Endrin aldehyde	7421-93-4	0.08	-	-	-	-	0.08	-	-	-

Table 5
Summary of Surface Water and Sediment Toxicity Reference Values for Aquatic Life
for Compounds Not Included in USEPA's Screening Level Ecological Risk Assessment Protocol

Compound	**CAS NO.**	**Surface Water (ug/L)**						**Sediment (mg/kg)**		
		ADEQ WQS [a]	NRWQC [b]	ETs [c]	Mayer & Ellersieck [d]	Ecotox Database [e]	Final Benchmark [f]	NOAA [h]	MacDonald TECs [g]	Final Benchmark [f]
Endrin ketone	53494-70-5	-	-	-	-	-	-	-	-	-
Ethylene Glycol	107-21-1	-	-	-	1,000,000	-	1,000,000	-	-	-
Freon 133 (1,1,2-Trichloro-1,2,2-trifluoro	76-13-1	-	-	-	-	-	-	-	-	-
Iodomethane	74-88-4	-	-	-	-	-	-	-	-	-
p-Isopropyltoluene	99-87-6	-	-	-	-	46	46	-	-	-
Methyl methacrylate	80-62-6	-	-	-	-	3,370	3370	-	-	-
Methyl tert-Butyl Ether	1634-04-4	-	-	-	-	100,000	100000	-	-	-
2-Methylnaphthalene	91-57-6	-	-	-	-	14.56	14.56	-	-	-
N-nitrosodimethylamine	62-44-2	-	-	-	-	1,410	1,410	-	-	-
Perylene	198-55-0	-	-	-	-	-	-	-	-	-
Phosphine imide, P,P,P-triphenyl	2240-47-3	-	-	-	-	-	-	-	-	-
n-Propylbenzene	103-65-1	-	-	-	-	15.5	15.5	-	-	-
Propylene Oxide	75-56-9	-	-	-	-	-	-	-	-	-
Xylene (mixed isomers)	1330-20-7	-	-	-	86	-	86	-	-	-

- = no benchmarks available.

[a] Arizona Department of Environmental Quality. 2003. Title 18, Chapter 11. ADEQ Water Quality Standards. http://www.azsos.gov/public_services/Title_18/18-11.htm

[b] U.S. Environmental Protection Agency (EPA). 2005. National Recommended Water Quality Criteria: 2005. www.epa.gov/waterscience/criteria/wqcriteria.html.

[c] U.S. Environmental Protection Agency (USEPA). 1996. Eco Update. Ecotox Thresholds. Office of Solid Waste and Emergency Response. EPA 540/F-95/038.

[d] Mayer, F.L. and Ellersieck, M.R. 1986. Manual of Acute Toxicity: Interpretation and Data Base for 410 Chemicals and 66 Species of Freshwater Animals. U.S. Fish and Wildlife Service, Washington, DC. Resource Publication 160.

[e] U.S. Environmental Protection Agency (USEPA). 2007. EcoTox Database. http://www.epa.gov/ecotox. Accessed May 22, 2007.

[f] Final benchmark selected according to project data source hierarchy.

[g] MacDonald, D.D., C.G. Ingersoll, and T.A. Berger. 2000. Development and Evaluation of Consensus-Based Sediment Quality Guidelines for Freshwater Ecosystem. Archives of Environmental Contamination and Toxicology 39:20-31.

[h] National Oceanic and Atomospheric Administration (NOAA). 2006. Screening Quick Reference Table (SQuiRTs). Hazmat Report 99-1.

Table 6
Summary of Aquatic Toxicity Values from Mayer & Ellersieck (1986)

Compound	CAS NO	Test Species	Effect	Duration	Concentration (ug/L)	Adjustment [a]	Final Benchmark	Page
Cobalt	7440-48-4	-	-	-	-	-	-	-
Manganese	7439-96-5	-	-	-	-	-	-	-
Vanadium	7440-62-2	-	-	-	-	-	-	-
1,1-Dichloropropene	563-58-6	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	95-63-6	-	-	-	-	-	-	-
1,2-Dichloroethene	540-59-0	-	-	-	-	-	-	-
1,3-Dichloropropane	142-28-9	-	-	-	-	-	-	-
trans-1,3-Dichloropropene	10061-02-6	-	-	-	-	-	-	-
1-Hexane	110-54-3	-	-	-	-	-	-	-
2,2'-oxybis (1-Chloropropane)	108-60-1	-	-	-	-	-	-	-
2,2-Dichloropropane	594-20-7	-	-	-	-	-	-	-
2,5-Dimethylfuran	625-86-5	-	-	-	-	-	-	-
2,5-Dimethylheptane	2216-30-0	-	-	-	-	-	-	-
2,5-Dione, 3-hexene	17559-81-8	-	-	-	-	-	-	-
2-Chlorotoluene	95-49-8	-	-	-	-	-	-	-
2-Hexanone	591-78-6	-	-	-	-	-	-	-
2-Methyl octane	3221-61-2	-	-	-	-	-	-	-
3-Ethyl benzaldehyde	34246-54-3	-	-	-	-	-	-	-
3-Hexen-2-one	763-93-9	-	-	-	-	-	-	-
3-Penten-2-one (ethylidene acetone)	625-33-2	-	-	-	-	-	-	-
3-Penten-2-one, 4-methyl	141-79-7	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	534-52-1	-	-	-	-	-	-	-
4-Chlorotoluene	106-43-4	-	-	-	-	-	-	-
4-Ethyl benzaldehyde	4748-78-1	-	-	-	-	-	-	-
9-Octadecenamide (oleamide)	301-02-0	-	-	-	-	-	-	-
Acenaphthylene	208-96-8	-	-	-	-	-	-	-
Acrylic Acid	79-10-7	-	-	-	-	-	-	-
Benzidine	92-87-5	-	-	-	-	-	-	-
Benzo(e)pyrene	192-97-2	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	191-24-2	-	-	-	-	-	-	-
Benzoic acid, methyl ester (methyl benzoate)	93-58-3	-	-	-	-	-	-	-
delta-BHC	319-86-8	-	-	-	-	-	-	-
BHC, gamma (Lindane; γ-hexachlorocyclohexane)	58-89-9	-	-	-	-	-	-	-
Bis(2-chloroethoxy)methane	111-91-1	-	-	-	-	-	-	-
Bromobenzene	108-86-1	-	-	-	-	-	-	-
Bromochloromethane	74-97-5	-	-	-	-	-	-	-

Table 6
Summary of Aquatic Toxicity Values from Mayer & Ellersieck (1986)

Compound	CAS NO	Test Species	Effect	Duration	Concentration (ug/L)	Adjustment [a]	Final Benchmark	Page
n-Butylbenzene	104-51-8	-	-	-	-	-	-	-
sec-Butylbenzene	135-98-8	-	-	-	-	-	-	-
tert-Butylbenzene	98-06-6	-	-	-	-	-	-	-
Carbazole	86-74-8	-	-	-	-	-	-	-
alpha-Chlordane	5103-71-9	Bluegill	LC50	96-hr	7.09	100	0.0709	80
beta-Chlordane	5103-74-2	Bluegill	LC50	96 hr	50.5	100	0.505	82
Dibenzofuran	132-64-9	-	-	-	-	-	-	-
Diphenylamine	122-39-4	-	-	-	-	-	-	-
Endosulfan II	33213-65-9	-	-	-	-	-	-	-
Endosulfan sulfate	1031-07-8	-	-	-	-	-	-	-
Endrin aldehyde	7421-93-4	-	-	-	-	-	-	-
Endrin ketone	53494-70-5	-	-	-	-	-	-	-
Ethylene Glycol	107-21-1	Bluegill	LC50	96	100,000,000	100	1,000,000	218
Freon 133 (1,1,2-Trichloro-1,2,2-trifluoroethane)	76-13-1	-	-	-	-	-	-	-
Iodomethane	74-88-4	-	-	-	-	-	-	-
p-Isopropyltoluene	99-87-6	-	-	-	-	-	-	-
Methyl methacrylate	80-62-6	-	-	-	-	-	-	-
Methyl tert-Butyl Ether	1634-04-4	-	-	-	-	-	-	-
2-Methylnaphthalene	91-57-6	-	-	-	-	-	-	-
N-nitrosodimethylamine	62-44-2	-	-	-	-	-	-	-
Perylene	198-55-0	-	-	-	-	-	-	-
Phosphine imide, P,P,P-triphenyl	2240-47-3	-	-	-	-	-	-	-
n-Propylbenzene	103-65-1	-	-	-	-	-	-	-
Propylene Oxide	75-56-9	-	-	-	-	-	-	-
Xylene (mixed isomers)	1330-20-7	Bluegill	LC50	96	8600	100	86	502

- = no benchmarks available.
[a] An adjustment factor of 100 was applied in converting acute concentrations to chronic concentrations.

Source:

Mayer, F.L. and Ellersieck, M.R. 1986. Manual of Acute Toxicity: Interpretation and Data Base for 410 Chemicals and 66 Species of Freshwater Animals. U.S. Fish and Wildlife Service, Washington, DC. Resource Publication 160.

Table 7
Summary of Aquatic Toxicity Values from the Ecotox Database

Constituent	CAS NO.	Species name	Common Name	Group	Endpoint	Effect	Exposure Duration (days)	Concentration (ug/L)	Adjustment [a]	Final Benchmark (ug/L)
Cobalt	7440-48-4	-	-	-	-	-	-	-	-	-
Manganese	7439-96-5	-	-	-	-	-	-	-	-	-
Vanadium	7440-62-2	-	-	-	-	-	-	-	-	-
1,1-Dichloropropene	563-58-6	-	-	-	-	-	-	-	-	-
1,2,4-Trimethylbenzene	95-63-6	*Pimephales promelas*	Fathead minnow	Fish	LC50	Mortality	4	7,720	100	77.2
1,2-Dichloroethene	540-59-0	*Lepomis macrochirus*	Bluegill	Fish	LC50	Mortality	4	140,000	100	1,400
1,3-Dichloropropane	142-28-9	*Pimephales promelas*	Fathead minnow	Fish	LC50	Mortality	4	131,000	100	1,310
trans-1,3-Dichloropropene	10061-02-6	-	-	-	-	-	-	-	-	-
1-Hexane	110-54-3	*Pimephales promelas*	Fathead minnow	Fish	LC50	Mortality	4	2,500	100	25
2,2'-oxybis (1-Chloropropane)	108-60-1	-	-	-	-	-	-	-	-	-
2,2-Dichloropropane	594-20-7	*Scenedesmus subpicatus*	Green algae	Algae	EC50	Mortality	4	39,000	100	390
2,5-Dimethylfuran	625-86-5	*Pimephales promelas*	Fathead minnow	Fish	LC50	Mortality	4	71,100	100	711
2,5-Dimethylheptane	2216-30-0	-	-	-	-	-	-	-	-	-
2,5-Dione, 3-hexene	17559-81-8	-	-	-	-	-	-	-	-	-
2-Chlorotoluene	95-49-8	*Daphnia magna*	Water flea	Crustaceans	NOEC	Reproduction	21	140	1	140
2-Hexanone	591-78-6	*Pimephales promelas*	Fathead minnow	Fish	LC50	Mortality	4	428,000	100	4,280
2-Methyl octane	3221-61-2	-	-	-	-	-	-	-	-	-
3-Ethyl benzaldehyde	34246-54-3	-	-	-	-	-	-	-	-	-
3-Hexen-2-one	763-93-9	-	-	-	-	-	-	-	-	-
3-Penten-2-one (ethylidene acetone)	625-33-2	-	-	-	-	-	-	-	-	-
3-Penten-2-one, 4-methyl	141-79-7	-	-	-	-	-	-	-	-	-
4,6-Dinitro-2-methylphenol	534-52-1	-	-	-	-	-	-	-	-	-
4-Chlorotoluene	106-43-4	*Danio rerio*	Zebra danio	Fish	NOEC	Reproduction	28	3,400	1	3,400
4-Ethyl benzaldehyde	4748-78-1	-	-	-	-	-	-	-	-	-
9-Octadecenamide (oleamide)	301-02-0	-	-	-	-	-	-	-	-	-
Acenaphthylene	208-96-8	-	-	-	-	-	-	-	-	-
Acrylic Acid	79-10-7	*Daphnia magna*	Water flea	Crustaceans	NOEC	Reproduction	21	3,800	1	3,800
Benzidine	92-87-5	-	-	-	-	-	-	-	-	-
Benzo(e)pyrene	192-97-2	-	-	-	-	-	-	-	-	-
Benzo(g,h,i)perylene	191-24-2	-	-	-	-	-	-	-	-	-
Benzoic acid, methyl ester (methyl benzoate)	93-58-3	*Ptychocheilus oregonensis*	Northern squawfish	Fish	IC50	Population	2	233,130	100	2331.3
delta-BHC	319-86-8	-	-	-	-	-	-	-	-	-
BHC, gamma (Lindane; γ-hexachlorocyclohexane)	58-89-9	-	-	-	-	-	-	-	-	-
Bis(2-chloroethoxy)methane	111-91-1	*Pimephales promelas*	Fathead minnow	Fish	LC50	Mortality	4	184,000	100	1,840
Bromobenzene	108-86-1	*Pimephales promelas*	Fathead minnow	Fish	LC50	Mortality	4	5,600	100	56
Bromochloromethane	74-97-5	-	-	-	-	-	-	-	-	-
n-Butylbenzene	104-51-8	-	-	-	-	-	-	-	-	-
sec-Butylbenzene	135-98-8	-	-	-	-	-	-	-	-	-
tert-Butylbenzene	98-06-6	*Leuciscus idus melanotus*	Carp	Fish	LC50	Mortality	2	65,000	100	650
Carbazole	86-74-8	*Pimephales promelas*	Fathead minnow	Fish	LC50	Mortality	4	1,490	100	14.9
alpha-Chlordane	5103-71-9	-	-	-	-	-	-	-	-	-
beta-Chlordane	5103-74-2	-	-	-	-	-	-	-	-	-
Dibenzofuran	132-64-9	-	-	-	-	-	-	-	-	-
Diphenylamine	122-39-4	*Pimephales promelas*	Fathead minnow	Fish	LC50	Mortality	4	3,790	100	37.9

Table 7
Summary of Aquatic Toxicity Values from the Ecotox Database

Constituent	CAS NO.	Species name	Common Name	Group	Endpoint	Effect	Exposure Duration (days)	Concentration (ug/L)	Adjustment [a]	Final Benchmark (ug/L)
Endosulfan II	33213-65-9	-	-	-	-	-	-	-	-	-
Endosulfan sulfate	1031-07-8	-	-	-	-	-	-	-	-	-
Endrin aldehyde	7421-93-4	-	-	-	-	-	-	-	-	-
Endrin ketone	53494-70-5	-	-	-	-	-	-	-	-	-
Ethylene Glycol	107-21-1	-	-	-	-	-	-	-	-	-
Freon 133 (1,1,2-Trichloro-1,2,2-trifluoroethane)	76-13-1	-	-	-	-	-	-	-	-	-
Iodomethane	74-88-4	-	-	-	-	-	-	-	-	-
p-Isopropyltoluene	99-87-6	*Daphnia magna*	Water flea	Crustaceans	LC50	Mortality	2	4,600	100	46
Methyl methacrylate	80-62-6	*[b]*	[b]	[b]	[b]	[b]	4	337,000	100	3,370
Methyl tert-Butyl Ether	1634-04-4	*Rana temporaria*	Frog	Amphibians	NOEC	Development	45	100,000	1	100,000
2-Methylnaphthalene	91-57-6	*Onocorynchus mykiss*	Rainbow trout	Fish	LC50	Mortality	4	1,456	100	14.56
N-nitrosodimethylamine	62-44-2	*Gambusia affinis*	Western mosquitofish	Fish	LC50	Mortality	4	141,000	100	1,410
Perylene	198-55-0	-	-	-	-	-	-	-	-	-
Phosphine imide, P,P,P-triphenyl	2240-47-3	-	-	-	-	-	-	-	-	-
n-Propylbenzene	103-65-1	*Onocorynchus mykiss*	Rainbow trout	Fish	LC50	Mortality	4	1,550	100	15.5
Propylene Oxide	75-56-9	-	-	-	-	-	-	-	-	-
Xylene (mixed isomers)	1330-20-7	-	-	-	-	-	-	-	-	-

- = no benchmarks available.
[a] Acute (i.e. LC50, IC50) values were divided by 100 to estimate chronic values.

[b] Effects concentration for CAS# 80-62-6 was derived by calculating the average (mean) effects concentrations of the numerous studies presented in the database with warm water fish, 4-day LC50 tests with mortality endpoints.

Source: U.S. Environmental Protection Agency (USEPA). 2007. EcoTox Database. http://www.epa.gov/ecotox. Accessed May 22, 2007.

APPENDIX M
SECTION 2

TECHNICAL APPROACH FOR CALCULATING DOSES TO WILDLIFE SPECIES

This appendix presents the technical approach used to model exposures to receptor species via food chain pathways for the Siemens Water Technologies Corp. Carbon Reactivation Facility ("Facility") ecological risk assessment. The food chain models follow the approach outlined in USEPA's 1999 "*Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combus*tion *Facilities*" ("Protocol"). This appendix first describes the wildlife receptor species which were evaluated using food chain models. It then presents the food chain modeling equations. Finally, this appendix discusses specific input parameters and summarizes important input assumptions incorporated in the food chain models.

1.0 SELECTION OF WILDLIFE SPECIES

Receptor species which were selected for the food chain modeling are representative of various taxonomic groups, trophic levels, and feeding strategies which may occur within the variety of habitats in the Facility vicinity. The main risk assessment report, and the Working Draft Risk Assessment Workplan prepared for this project, provide more information on the approach used to select wildlife species for detailed evaluation. The wildlife species that were selected for evaluation using food chain models, and the habitat areas for each, consisted of the following:

- Badger – creosote bush scrub area
- Gambel's quail – creosote bush scrub area, agricultural area, riparian corridor area
- Great horned owl – creosote bush scrub area
- Burrowing owl – agricultural area
- Southwestern willow flycatcher – riparian corridor area
- Double crested cormorant – Colorado River area, Main Drain area
- Yuma clapper rail – riparian backwater area
- Mule deer – Main Drain area

2.0 DAILY DOSE CALCULATIONS

Exposures to the selected receptors were assessed by quantifying the daily dose of each evaluated chemical of potential concern (COPC) ingested through consumption of potentially impacted food items (plants, terrestrial invertebrates, benthic invertebrates, fish, and animal prey) and environmental media (soil, sediment, and surface water). The following general equation was used to calculate the COPC daily dose for each receptor species (see Equation 5-1 in USEPA 1999):

$$DD = DD_{Tplant} + DD_{invert} + DD_{fish} + DD_{animal} + DD_{soil} + DD_{sed} + DD_{water} \qquad \text{(Equation 1)}$$

where

DD = total daily dose of COPC ingested per day (mg COPC/kg body weight-day)
DD_{Tplant} = amount of COPC ingested from terrestrial plants (mg COPC/kg body weight-day)
DD_{invert} = amount of COPC ingested from terrestrial or benthic invertebrate prey (mg COPC/kg body weight-day)
DD_{fish} = amount of COPC ingested from fish prey (mg COPC/kg body weight-day)
DD_{animal} = amount of COPC ingested from animal prey (mg COPC/kg body weight-day)
DD_{soil} = amount of COPC ingested from soil (mg COPC/kg body weight-day)
DD_{sed} = amount of COPC ingested from sediment (mg COPC/kg body weight-day)
DD_{water} = amount of COPC ingested from surface water (mg COPC/kg body weight-day)

Each of the terms in this equation are discussed in detail below.

2.1 Daily Doses from Incidental Ingestion of Environmental Media

This section presents equations for calculating daily doses from incidental ingestion of environmental media, specifically soil, sediment, and surface water.

Dose From Soil. Receptors may be exposed to COPCs through the incidental ingestion of soil while foraging. Doses of COPCs from soil were calculated using the following general equation (see Equation 5-1 in USEPA 1999):

$$DD_{soil} = IR_{soil} * C_{soil} * P_{soil} \qquad \text{(Equation 2)}$$

where

DD_{soil} = amount of COPC ingested from soil (mg COPC/kg body weight-day)
IR_{soil} = ingestion rate of soil (kg/kg body weight-day)
C_{soil} = concentration of COPC in soil (mg COPC/kg)
P_{soil} = proportion of ingested soil which is potentially contaminated (unitless)

Dose From Sediment. Receptors may be exposed to COPCs through the incidental ingestion of sediment while foraging. Doses of COPCs from sediment were calculated using the following general equation (see Equation 5-1 in USEPA 1999):

$$DD_{sed} = IR_{sed} * C_{sed} * P_{sed} \qquad \text{(Equation 3)}$$

where

DD_{sed} = amount of COPC ingested from sediment (mg COPC/kg body weight-day)
IR_{sed} = ingestion rate of sediment (kg/kg body weight-day)
C_{sed} = concentration of COPC in sediment (mg COPC/kg)
P_{sed} = proportion of ingested sediment which is potentially contaminated (unitless)

Dose from Surface Water. Receptors may also be exposed to COPCs through the ingestion of surface water. COPC doses from surface water were calculated using the following general equation:

$$DD_{water} = IR_{water} * C_{water} * P_{water} \qquad \text{(Equation 4)}$$

where

DD_{water} = amount of COPC ingested from water (mg COPC/kg body weight-day)
IR_{water} = surface water ingestion rate (L/kg body weight-day)
C_{water} = concentration (total) of COPC in surface water (mg COPC/L)
P_{water} = proportion of ingested surface water which is potentially contaminated (unitless)

2.2 Daily Doses from Consumption of Food

This section presents equations for estimating daily doses from ingestion of food items, including terrestrial plants, terrestrial and aquatic invertebrates, fish, and animal prey.

Dose From Terrestrial Plants. Receptors may be exposed to COPCs through ingestion of terrestrial plant material. COPC doses from terrestrial plants were calculated using the following general equation (see Equation 5-1 in USEPA 1999):

$$DD_{Tplant} = FIR * C_{Tplant} * P_{Tplant} * F_{Tplant} \qquad \text{(Equation 5)}$$

where

DD_{Tplant} = wet weight amount of COPC ingested from terrestrial plants (mg COPC/kg body weight-day)
FIR = food ingestion rate (kg wet weight/kg body weight-day)

C_{Tplant} = wet weight COPC concentration in terrestrial plant tissue (mg/kg WW)
P_{Tplant} = proportion of ingested plant material which is contaminated (unitless)
F_{Tplant} = fraction of diet from terrestrial plants

The concentrations of COPCs in plant tissue were modeled using the following general equation (see equation 5-6 in USEPA 1999):

$$C_{Tplant} = (P_d + P_v + P_r) * CF_{WW\text{-}Tplant} \qquad \text{(Equation 6)}$$

where

C_{Tplant} = wet weight COPC concentration in terrestrial plant tissue (mg COPC/kg)
P_d = COPC concentration in terrestrial plant tissue due to direct deposition (mg COPC/kg)
P_v = COPC concentration in terrestrial plant tissue due to air-to-plant transfer (mg COPC/kg)
P_r = COPC concentration in terrestrial plant tissue due to root-uptake (mg COPC/kg)
$CF_{WW\text{-}Tplant}$ = conversion factor from dry weight to wet weight (unitless)

The concentrations for P_d , P_v , and P_r were calculated according to equations presented in USEPA's 2005 Human Health Risk Assessment Protocol (HHRAP) and implemented using the IRAP software, as described in the human health risk assessment section of the main risk assessment report. Terrestrial plant concentrations used in the food chain model were calculated using the IRAP software. Terrestrial plant concentrations were converted from a dry weight to wet weight because the food ingestion rates used in the models require inputs in terms of wet weight.

Dose From Invertebrates. Receptors may be exposed to COPCs through ingestion of invertebrate prey. COPC doses from benthic and terrestrial invertebrates were calculated using the following general equation (see Equation 5-1 in USEPA 1999):

$$DD_{invert} = FIR * C_{invert} * P_{invert} * F_{invert} \qquad \text{(Equation 7)}$$

where

DD_{invert} = amount of COPC ingested from invertebrates (mg COPC/kg body weight-day)
FIR = food ingestion rate (kg wet weight/kg bodyweight-day)
C_{invert} = wet weight COPC concentration in invertebrate tissue (mg/kg)
P_{invert} = proportion of ingested invertebrate prey which is potentially contaminated (unitless)
F_{invert} = fraction of diet from invertebrates (unitless)

The concentrations of COPCs in terrestrial and benthic invertebrate tissue were modeled using the following general equation (see Equation 5-3 in USEPA 1999):

$$C_{invert} = C_{soil/sed} * BCF_{invert} * CF_{WW\text{-}invert} \quad \text{(Equation 8)}$$

where

C_{invert} = wet weight concentration in benthic or terrestrial invertebrate tissue (mg COPC/kg WW)
$C_{soil/sed}$ = measured concentration of COPC in soil or sediment (mg COPC/kg)
BCF_{invert} = bioconcentration factor in benthic or terrestrial invertebrates (unitless)
$CF_{WW\text{-}invert}$ = conversion factor from dry weight to wet weight (unitless)

Invertebrate concentrations were converted from a dry weight to wet weight because the food ingestion rates used in the models require inputs in terms of wet weight.

Invertebrate BCFs for organic COPCs were calculated using the following equation from Southworth *et al*. (1978) (see Equations C-1-1 and C-1-9 in USEPA 1999):

$$\log BCF_{invert} = 0.819 \times \log K_{ow} - 1.146 \quad \text{(Equation 9)}$$

where

BCF_{invert} = bioconcentration factor in invertebrates (unitless)
K_{ow} = octanol-water partition coefficient (unitless)

Inorganic BCFs for terrestrial invertebrates were obtained from USEPA's Protocol (see Table C-1 in USEPA 1999); if a value was not provided, then the arithmetic average of the available BCFs for other inorganic COPCs (0.22) was used, as directed by the Protocol (see Section C-1.1 in USEPA 1999).

Inorganic BCFs for benthic invertebrates were also obtained from the Protocol (see Table C-6 in USEPA 1999); similarly, if a value was not provided, then the arithmetic average of the available BCFs for other inorganic COPCs (0.90) was used, as directed by the Protocol (see Section C-1.6 in USEPA 1999).

Crayfish, which are the primary prey item for the Yuma clapper rail, were generally treated as benthic invertebrates. However, the BCFs for PCDDs/PCDFs listed in the Protocol were refined for this study. USEPA's default BCFs for PCDDs/PCDFs in benthic invertebreates are based on the over 15-year old non-specific regression equation published by Southworth et al. (1978)

which is based on the Kow. For this project, and as described in the main risk assessment report, a review of recently published literature was performed to identify a more appropriate (i.e., based on experimental data) sediment-to-benthic invertebrate BCF specific to crayfish. The most recent and directly applicable study identified in the published literature evaluated bioaccumulation of 2,3,7,8-TCDF in crayfish from sediment (Currie et al., 2000). This study identified mean biota-to-sediment accumulation factors (BSAFs) ranging from 0.06 - 5.23 g/kg lipid per g/kg sediment organic carbon. The highest value provided in the Currie study was used to derive a sediment-to-benthic invertebrate (i.e., crayfish) BCF of 0.4 g 2,3,7,8-TCDF/kg tissue fresh weight per g/kg dry sediment, using the study's reported crayfish lipid content of 0.17%, USEPA's HHRAP default sediment organic carbon fraction of 0.04 (USEPA 2005), and a crayfish moisture content of 82% from the U.S. Department of Agriculture's National Nutrient Database.[1] Congener specific sediment-to-benthic crayfish BCFs were then derived for the other PCDD/PCDF congeners, except 2,3,7,8-TCDF, using the methodology presented in USEPA's Protocol (USEPA 1999) which relies on USEPA (1995) bioaccumulation equivalency factors (BEFs). Table 1 presents the PCDD/PCDF benthic invertebrate BSAFs calculated for this assessment.

<u>Dose From Fish.</u> Receptors may be exposed to COPCs through ingestion of fish prey. COPC doses from fish were calculated using the following general equation (see Equation 5-1 in USEPA 1999):

$$DD_{fish} = FIR * C_{fish} * P_{fish} * F_{fish} \qquad \text{(Equation 10)}$$

where

DD_{fish} = amount of COPC ingested from fish (mg COPC/kg body weight-day)
FIR = food ingestion rate (kg wet weight/kg bodyweight-day)
C_{fish} = wet weight COPC concentration in fish tissue (mg/kg)
P_{fish} = proportion of ingested fish which is potentially contaminated (unitless)
F_{fish} = fraction of diet from fish (unitless)

Fish tissue concentrations were calculated according to equations presented in USEPA's 2005 Human Health Risk Assessment Protocol (HHRAP) and implemented using the IRAP software, as described in the human health risk assessment section of the main risk assessment report.

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[1] U.S. Department of Agriculture Nutrient Database, Release 19. 2006. http://riley.nal.usda.gov/NDL.

Table 1
Derivation of Sediment-to-Benthic Crayfish PCDD/PCDF Bioconcentration Factors

Congener	USEPA (1999) Default BEF	Currie et al. 2000 (a)		Calculated Congener Specific BCF (c)
		Reported BSAF (g/kg lipid / g/kg sed OC)	Calculated Sediment-to-Benthic Organism BCF (g/kg tissue WW/ g/kg dry sed) (b)	
2,3,7,8-TCDD	1		0.50	0.5
1,2,3,7,8-PeCDD	0.9			0.45
1,2,3,4,7,8-HxCDD	0.3			0.15
1,2,3,7,8,9-HxCDD	0.1			0.05
1,2,3,6,7,8-HxCDD	0.1			0.05
1,2,3,4,6,7,8-HpCDD	0.051			0.0255
OCDD	0.012			0.006
2,3,7,8-TCDF	0.8	5.23	0.40	0.4
1,2,3,7,8-PeCDF	0.2			0.1
2,3,4,7,8-PeCDF	1.6			0.8
1,2,3,4,7,8-HxCDF	0.08			0.04
1,2,3,7,8,9-HxCDF	0.6			0.3
1,2,3,6,7,8-HxCDF	0.2			0.1
2,3,4,6,7,8-HxCDF	0.7			0.35
1,2,3,4,6,7,8-HpCDF	0.01			0.005
1,2,3,4,7,8,9-HpCDF	0.4			0.2
OCDF	0.016			0.008
fraction lipid (d)			0.017	
sediment foc (USEPA HHRAP 2005 default)			0.04	
crayfish moisture content (USDA Nat'l Nutrient Database)			0.82	

BCF - Bioaccumulation factor; BEF - Bioaccumulation equivalency factor; BSAF = Biota-to-sediment accumulation factor
DW - dry weight; WW = wet weight
foc - fraction organic carbon
g/kg - grams per kilogram; mg/kg - milligrams per kilogram

USEPA HHRAP = U.S. Environmental Protection Agency Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities

(a) Value from Currie et al. (2000) was highest value reported during the study duration

(b) Sediment-to-benthic organism BCF (g/kg tissue WW / g/kg dry sed) = BSAF (g/kg lipid / g/kg sed OC) * kg lipid/kg tissue DW * (1-moisture fraction, kg DW tissue/kg WW tissue) / (foc, kg sed OC/kg sed DW)

(c) Congener specific BCFs were calculated using the crayfish-specific TCDD BCF (0.5) and the USEPA (1999) default BEF (BCF=0.5 x BEF), except for 2,3,7,8-TCDF for which a congener-specific BCF (0.4) was obtained from the literature.

(d) Listed value reported by Currie et al. (2000).

Dose from Animal Prey. Receptors may be exposed to COPCs through ingestion of animal prey. COPC doses from animal prey were calculated using the following general equation (see Equation 5-1 in USEAP, 1999):

$$DD_{animal} = FIR * C_{animal} * P_{animal} * F_{animal} \quad \text{(Equation 11)}$$

where

DD_{animal} = amount of COPC ingested from animal prey (mg COPC/kg-day)
FIR = food ingestion rate (kg wet weight/kg bodyweight-day)
C_{animal} = wet weight concentration of COPC in animal prey tissue (mg/kg)
P_{animal} = proportion of ingested animal prey which is contaminated (unitless)
F_{animal} = fraction of diet from animal prey (unitless)

Animal prey concentrations were calculated using the following general equation (see USEPA 1999, Equation 5-11):

$$C_{animal} = C_{Tplant} * BCF_{animal} * P_{Tplant} * F_{Tplant} \qquad \text{(Equation 12)}$$

where

C_{animal} = modeled wet weight concentration of COPC in animal prey tissue (mg/kg)
C_{Tplant} = wet weight concentration in terrestrial plant consumed by animal prey (mg/kg)
BCF_{animal} = bioconcentration factor in herbivorous animal prey (unitless)
P_{Tplant} =proportion of ingested terrestrial plant in animal prey diet which is potentially contaminated (unitless)
F_{Tplant} = fraction of diet from terrestrial vegetation in animal prey (unitless)

Plant concentrations were converted from a dry weight to wet weight because the food ingestion rates used in the models require inputs in terms of wet weight.

It was assumed that animal prey generally consist of rodents or other small mammals which themselves are primarily herbivores (USEPA 1993), thus F_{Tplant} was assumed to be 100 percent. It was assumed that prey obtain all water metabolically. It was also assumed that incidental ingestion of soil was negligible. Therefore, Equation 13 does not contain components for incidental ingestion of surface water or soil. The white footed mouse was used to represent rodents and small mammals in the food chain models. The white footed mouse was selected because they inhabit Arizona and dietary information and ingestion rates are provided in USEPA's Protocol for this mammal.

BCFs for herbivorous prey (white footed mouse) were obtained from USEPA's Protocol (see Table D-1 in USEPA 1999). If BCFs for animal prey were not provided, then BCFs were calculated using the following equation (see USEPA 1999, Equation D-1-1):

$$BCF_{animal} = Ba_{animal} * FIR \qquad \text{(Equation 13)}$$

where

BCF_{animal} = bioconcentration factor in animal prey (unitless)
Ba_{animal} = Ba_A = COPC-specific biotransfer factor applicable to animal prey (unitless)
FIR = food ingestion rate for the white footed mouse (0.614 kg WW/kg BW-day, see Table 5-1 in USEPA 1999)

Ba_{animal} values for herbivorous prey for evaluated organic COPCs not included in USEPA's Protocol were calculated using the following equation form Travis and Arms (1988) (see Equation D-1-4 in USEPA 1999)

$$\log Ba_{animal} = -7.6 + \text{Log } K_{ow} \qquad \text{(Equation 14)}$$

where

Ba_{animal} = COPC-specific biotransfer factor applicable to animal prey (unitless)
K_{ow} = octanol-water partition coefficient (unitless)

BCFs for inorganic COPCs not provided in the Protocol were derived from ingestion-to-beef transfer coefficients in Baes *et* al. (1984), as directed by the Protocol (see Section D-1.1 in USEPA 1999).

3.0 MODEL PARAMETERS AND ASSUMPTIONS

This section discusses sources and values of food chain model inputs and explains important assumptions adopted by the food chain model.

3.1 Exposure Point Concentrations

COPC exposure point concentrations (EPCs) in surface water, sediment, soil, plants and fish were modeled using fate and transport equations specified in USEPA's HHRAP, and implemented using the IRAP software (see main report text for additional information). The EPCs were based on the calculated maximum annual concentrations rather than long-term multiyear averages, both of which are outputs of the IRAP software.

3.2 Dietary Parameters

Dietary parameters were selected from a range of values available in the published scientific literature, including USEPA (1999), USEPA (1993), and Beyer (1994). For each selected receptor, the food chain models evaluated only the predominant food source (i.e. exclusive diets). For example, the model assumed that 100% of the diet of the badger consisted of small mammals but no other food type. The food chain models also included incidental ingestion of environmental media.

Ingestion rates for food, soil, sediment, and surface water were calculated following the methodology used by USEPA in its Protocol (see Table 5-2 in USEPA 1999). In some cases, soil and sediment ingestion rates were not specific to the receptor species but instead were based on literature values for surrogate species with similar feeding strategies. For all terrestrial species except mule deer, receptors were assumed to obtain water metabolically. Table 5.2-1 in the main risk assessment report presents the detailed calculations and sources used to derive the dietary and environmental media ingestion rates.

Log K_{ow} values were used in some cases to calculate bioconcentration and biotransfer factors. The Kow values were obtained from HHRAP or from the values compiled for this project for compounds not addressed in HHRAP (see Appendix F).

Conversion factors used to adjust dry weight concentrations to wet weight concentrations were based on default values provided in USEPA's Protocol as follows:

Tissue Type	Conversion Factor	Source
Terrestrial Plant	0.12	Table 5-1 (USEPA 1999)
Terrestrial Invertebrate	0.167	Appendix C-1.1 (USEPA 1999)
Aquatic Invertebrate	0.167	Appendix C-1.6 (USEPA 1999)
Fish Tissue	0.20	Appendix C-1.5 (USEPA 1999)
Animal Tissue	0.32	Table 5-1 (USEPA 1999)

3.3 Exposure Parameters

The models assumed that 100% of the chemical ingested in the diet is bioavailable. The models also assumed that receptor species spend their entire life cycle in potentially impacted areas, and do not migrate to, nest in, or forage from sources outside the project study area boundaries.

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APPENDIX M
SECTION 3

METHODS USED TO ADDRESS MIXTURES OF PCDDS/PCDFS IN THE ECOLOGICAL RISK ASSESSMENT

Introduction

This appendix provides information regarding methods used to evaluate mixtures of PCDDs/PCDFs in the ecological risk assessment. Two types of information are presented below. First, the method used to calculate PCDD/PCDF toxic equivalent (TEQ) concentrations is described, along with supporting tables. Second, the method used to calculate PCDD/PCDF concentrations in dietary prey species for input to the food chain modeling is presented, along with supporting tables.

Calculation of PCDD/PCDF Toxic Equivalent Concentrations

As noted in the main risk assessment report, PCDDs/PCDFs were evaluated using a toxicity reference value (TRV) based on 2,3,7,8-TCDD. Congener-specific toxic equivalency factors (TEFs) for fish, birds, and mammals were used to relate the toxicity of each congener to the toxicity of 2,3,7,8-TCDD. The USEPA-approved TEFs used in this assessment were presented in the project Workplan and were developed by the World Health Organization.

To apply the TEF concept in the ecological risk assessment, the congener-specific TEF was multiplied by its respective concentration in a given medium and the products were summed to obtain the total TCDD toxic equivalents (TEQs) of the mixture. This calculation was performed for each environmental medium and each food item addressed in the ecological risk assessment. The tables that follow present the results of these calculations. Table 1 presents the calculated TEF concentrations for the agricultural area, the creosote bush scrub area and the riparian corridor area. Table 2 presents the analogous concentrations for the Colorado River and Main Drain areas.

Calculation of Congener-Specific PCDD/PCDF Prey Concentrations

Exposures to PCDDs/PCDFs via the food chain were evaluated by calculating the concentration of each PCDD/PCDF congener in a number of prey items. The general approach for calculating concentrations in prey involved multiplying the environmental media concentration of each PCDD/PCDF congener (e.g., sediment, plant, or soil) by its congener-specific bioaccumulation factor (BCF). Once the prey concentrations were calculated for each PCDD/PCDF congener, then toxic equivalent concentrations reflecting the entire PCDD/PCDF mixture were calculated as described above.

The environmental media concentrations used to calculate prey concentrations were obtained from fate and transport modeling results which were determined according to USEPA's Human Health Risk Assessment Protocol (HHRAP) equations as implemented by the IRAP software program. More information on the calculation of environmental media concentrations is provided in the main risk assessment report.

The congener-specific bioaccumulation factors for PCDDs/PCDFs were obtained from USEPA's 1999 Screening Level Ecological Risk Assessment Protocol for mammalian prey and terrestrial invertebrates. As described in the food chain modeling discussion elsewhere in this appendix and in the main risk assessment report, congener specific BCFs for benthic invertebrates were derived following the USEPA 1999 methodology, but were based on a recent published scientific study from which BCFs for crayfish were derived rather than the USEPA default BCF values. Crayfish were selected as the basis of the BCF because crayfish are the primary diet item for the Yuma clapper rail. The crayfish-specific BCFs were calculated using a 2,3,7,8-TCDD BCF (0.5 g/kg tissue WW/ g/kg dry sediment) and the congener-specific bioequivalence factors (BEFs) from USEPA 1999, except for 2,3,7,8-TCDF for which a congener-specific BCF (0.4 g/kg tissue WW/ g/kg dry sediment) was obtained directly from the published scientific study.

The tables that follow show the resulting congener-specific PCDD/PCDF concentrations that were calculated in each prey item considered in the ecological risk assessment. Table 3 presents the mammalian BCFs and the calculated tissue concentrations in mammalian prey. Table 4 presents the terrestrial invertebrate BCFs and the calculated terrestrial invertebrate tissue concentrations. Table 5 present the benthic invertebrate BCFs and the calculated benthic invertebrate tissue concentrations.

Table 1
Calculation of PCDD/PCDF Toxic Equivalent Concentrations - Agricultural, Creosote Bush Scrub, Riparian Corridor Areas

				Agricultural Area (b)			Creosote Bush Scrub Area (b)			Riparian Corridor Area (b)		
Parameter	TEF Mammals (a)	TEF Birds (a)	TEF Fish (a)	Soil Concentration (mg/kg)	Plant Concentration (mg/kg)	Mammalian Prey Concentration (mg/kg)	Soil Concentration (mg/kg)	Plant Concentration (mg/kg)	Mammalian Prey Concentration (mg/kg)	Soil Concentration (mg/kg)	Plant Concentration (mg/kg)	Terrestrial Invertebrate Prey Concentration (mg/kg)
2,3,7,8-TCDD	1	1	1	8.7E-12	7.4E-14	1.1E-17	6.0E-10	8.4E-13	1.2E-16	9.0E-11	1.1E-13	1.4E-10
1,2,3,7,8-PeCDD	1	1	1	8.5E-12	1.8E-13	2.5E-17	1.5E-09	3.4E-12	4.5E-16	1.4E-10	3.2E-13	2.0E-10
1,2,3,4,7,8-HxCDD	0.1	0.05	0.5	4.1E-12	9.1E-14	4.1E-18	1.0E-09	1.9E-12	8.7E-17	8.2E-11	1.6E-13	4.0E-11
1,2,3,7,8,9-HxCDD	0.1	0.01	0.01	4.7E-12	9.6E-14	2.0E-18	1.2E-09	2.3E-12	4.7E-17	9.5E-11	1.9E-13	2.1E-11
1,2,3,6,7,8-HxCDD	0.1	0.1	0.01	4.3E-12	9.8E-14	1.7E-18	1.0E-09	2.0E-12	3.6E-17	8.3E-11	1.8E-13	1.6E-11
1,2,3,4,6,7,8-HpCDD	0.01	0.001	0.001	3.9E-12	7.0E-14	5.3E-19	1.1E-09	1.9E-12	1.4E-17	8.2E-11	1.5E-13	6.6E-12
OCDD	0.0001	--	--	4.9E-12	9.7E-14	1.7E-19	1.4E-09	2.4E-12	4.2E-18	1.0E-10	1.9E-13	2.0E-12
2,3,7,8-TCDF	0.1	1	0.05	9.3E-11	6.2E-13	7.2E-17	6.1E-09	9.5E-12	1.1E-15	9.6E-10	1.4E-12	1.2E-09
1,2,3,7,8-PeCDF	0.05	0.1	0.05	4.6E-11	6.1E-13	2.0E-17	5.8E-09	1.1E-11	3.4E-16	6.3E-10	1.1E-12	2.0E-10
2,3,4,7,8-PeCDF	0.5	1	0.5	4.3E-11	5.9E-13	1.4E-16	6.0E-09	1.2E-11	2.8E-15	6.1E-10	1.2E-12	1.6E-09
1,2,3,4,7,8-HxCDF	0.1	0.1	0.1	2.9E-11	5.1E-13	5.7E-18	6.6E-09	1.3E-11	1.4E-16	5.5E-10	1.0E-12	6.6E-11
1,2,3,7,8,9-HxCDF	0.1	0.1	0.1	4.9E-12	8.6E-14	8.0E-18	9.6E-10	1.8E-12	1.7E-16	8.4E-11	1.6E-13	8.4E-11
1,2,3,6,7,8-HxCDF	0.1	0.1	0.1	1.6E-11	2.8E-13	7.8E-18	3.6E-09	6.9E-12	1.9E-16	3.0E-10	5.7E-13	9.0E-11
2,3,4,6,7,8-HxCDF	0.1	0.1	0.1	9.2E-12	1.6E-13	1.6E-17	2.0E-09	3.9E-12	3.8E-16	1.7E-10	3.2E-13	1.8E-10
1,2,3,4,6,7,8-HpCDF	0.01	0.01	0.01	1.9E-11	4.1E-13	6.6E-19	5.1E-09	9.7E-12	1.6E-17	4.0E-10	8.1E-13	6.8E-12
1,2,3,4,7,8,9-HpCDF	0.01	0.01	0.01	5.7E-12	2.1E-13	1.2E-17	1.2E-09	2.9E-12	1.7E-16	1.0E-10	3.0E-13	6.5E-11
OCDF	0.0001	0.0001	0.0001	2.7E-12	5.3E-14	1.3E-19	7.5E-10	1.3E-12	3.1E-18	5.8E-11	1.1E-13	1.5E-12
Toxic Equivalents - Mammals (TEQM)				5.8E-11	7.8E-13	NA	7.74E-09	1.49E-11	2.21E-15	NA	NA	NA
Toxic Equivalents - Birds (TEQB)				1.65E-10	1.65E-12	2.53E-16	1.63E-08	2.97E-11	4.62E-15	1.99E-09	3.33E-12	3.19E-09
Toxic Equivalents - Fish (TEQF)				NA	NA	NA	NA	NA	NA	NA	NA	NA

-- - A TEF is not available.
NA - Not Applicable
TEF - Toxic Equivalency Factor
TEQ - Toxic Equivalents
mg/kg - milligrams per kilogram
mg/L - milligrams per liter
TEQM is calculated by multiplying each congener concentration by its corresponding mammal TEF then summing all of the results.
TEQB is calculated by multiplying each congener concentration by its corresponding bird TEF then summing all of the results.
TEQF is calculated by multiplying each congener concentration by its corresponding fish TEF then summing all of the results.
(a) World Health Organization (WHO). 1998. WHO toxic equivalency factors (TEFs) for dioxin-like compounds for humans and wildlife.
Prepared by Younes, M. Summary of WHO meeting in Stockholm, Sweden on June 15-18, 1998. International Programme on Chemical Safety.
(b) Soil and plant tissue concentrations were calculated using USEPA's HHRAP fate and transport equations, using the IRAP software program.

Table 2
Calculation of PCDD/PCDF Toxic Equivalent Concentrations - Colorado River and Main Drain Areas

				Colorado River Area (b) (c)					Main Drain Area (b)			
Parameter	TEF Mammals (a)	TEF Birds (a)	TEF Fish (a)	Sediment Concentration (mg/kg)	Dissolved Surface Water Concentration (mg/L)	Total Surface Water Concentration (mg/L)	Benthic Invertebrate (Crayfish) Concentrations (mg/L)	Fish Tissue Concentration (mg/kg)	Sediment Concentration (mg/kg)	Total Surface Water Concentration (mg/L)	Dissolved Surface Water Concentration (mg/L)	Fish Tissue Concentration (mg/kg)
2,3,7,8-TCDD	1	1	1	1.1E-10	7.3E-16	1.3E-15	5.7E-11	1.8E-11	2.1E-10	2.4E-15	1.3E-15	3.3E-11
1,2,3,7,8-PeCDD	1	1	1	2.0E-10	1.9E-15	2.8E-15	9.0E-11	3.1E-11	2.1E-10	3.0E-15	1.9E-15	3.3E-11
1,2,3,4,7,8-HxCDD	0.1	0.05	0.5	4.2E-10	2.7E-16	2.3E-15	6.3E-11	3.0E-11	1.2E-10	6.5E-16	7.5E-17	8.2E-12
1,2,3,7,8,9-HxCDD	0.1	0.01	0.01	3.6E-10	7.3E-16	2.5E-15	1.8E-11	2.5E-11	1.3E-10	9.0E-16	2.6E-16	9.1E-12
1,2,3,6,7,8-HxCDD	0.1	0.1	0.01	3.1E-10	6.3E-16	2.1E-15	1.6E-11	2.2E-11	1.2E-10	8.1E-16	2.4E-16	8.2E-12
1,2,3,4,6,7,8-HpCDD	0.01	0.001	0.001	4.6E-10	1.9E-16	2.4E-15	1.2E-11	4.1E-12	1.1E-10	5.9E-16	4.5E-17	9.7E-13
OCDD	0.0001	--	--	6.2E-10	1.6E-16	3.2E-15	3.7E-12	1.1E-13	1.4E-10	7.3E-16	3.6E-17	2.5E-14
2,3,7,8-TCDF	0.1	1	0.05	3.4E-10	1.1E-14	1.3E-14	1.4E-10	5.4E-11	1.6E-09	6.1E-14	5.3E-14	2.6E-10
1,2,3,7,8-PeCDF	0.05	0.1	0.05	1.0E-09	6.6E-15	1.2E-14	1.0E-10	1.6E-10	1.2E-09	1.4E-14	7.8E-15	1.9E-10
2,3,4,7,8-PeCDF	0.5	1	0.5	6.3E-10	8.1E-15	1.1E-14	5.1E-10	9.9E-11	1.0E-09	1.8E-14	1.3E-14	1.6E-10
1,2,3,4,7,8-HxCDF	0.1	0.1	0.1	1.4E-09	5.8E-15	1.3E-14	5.7E-11	1.0E-10	7.8E-10	7.0E-15	3.2E-15	5.5E-11
1,2,3,7,8,9-HxCDF	0.1	0.1	0.1	2.1E-10	8.6E-16	1.9E-15	6.3E-11	1.5E-11	1.3E-10	1.2E-15	5.3E-16	9.2E-12
1,2,3,6,7,8-HxCDF	0.1	0.1	0.1	7.8E-10	3.2E-15	7.0E-15	7.8E-11	5.5E-11	4.3E-10	3.9E-15	1.8E-15	3.0E-11
2,3,4,6,7,8-HxCDF	0.1	0.1	0.1	4.4E-10	1.8E-15	3.9E-15	1.5E-10	3.1E-11	2.5E-10	2.2E-15	1.0E-15	1.7E-11
1,2,3,4,6,7,8-HpCDF	0.01	0.01	0.01	1.7E-09	2.7E-15	1.1E-14	8.4E-12	1.5E-11	5.4E-10	3.5E-15	8.8E-16	4.8E-12
1,2,3,4,7,8,9-HpCDF	0.01	0.01	0.01	4.1E-10	6.6E-16	2.7E-15	8.2E-11	3.6E-12	1.6E-10	1.0E-15	2.6E-16	1.4E-12
OCDF	0.0001	0.0001	0.0001	3.3E-10	1.3E-16	1.7E-15	2.6E-12	5.8E-14	7.8E-11	4.1E-16	3.2E-17	1.4E-14
Toxic Equivalents - Mammals (TEQM)				NA	NA	NA	NA	NA	NA	2.27E-14	NA	NA
Toxic Equivalents - Birds (TEQB)				1.75E-09	NA	3.23E-14	8.41E-10	2.43E-10	3.37E-09	8.70E-14	NA	5.16E-10
Toxic Equivalents - Fish (TEQF)				1.22E-09	8.86E-15	NA	NA	NA	1.29E-09	NA	1.35E-14	NA

-- - A TEF is not available.
NA - Not Applicable
TEF - Toxic Equivalency Factor
TEQ - Toxic Equivalents
mg/kg - milligrams per kilogram
mg/L - milligrams per liter
TEQM is calculated by multiplying each congener concentration by its corresponding mammal TEF then summing all of the results.
TEQB is calculated by multiplying each congener concentration by its corresponding bird TEF then summing all of the results.
TEQF is calculated by multiplying each congener concentration by its corresponding fish TEF then summing all of the results.
(a) World Health Organization (WHO). 1998. WHO toxic equivalency factors (TEFs) for dioxin-like compounds for humans and wildlife. Prepared by Younes, M. Summary of WHO meeting in Stockholm, Sweden on June 15-18, 1998. International Programme on Chemical Safety.
(b) Sediment, surface water (total and dissolved), and fish tissue concentrations were calculated using USEPA's HHRAP fate and transport equations, using the IRAP software program.
(c) Colorado River sediment concentrations were used to estimate benthic invertebrate (crayfish) tissue concentrations in the Riparian Backwater Area.

Table 3
Mammalian Prey PCDD/PCFD Bioconcentration Factors and Tissue Concentrations

		Agricultural Area		Creosote Bush Scrub Area	
Congener	**USEPA (1999) default BCF (a)**	**Plant Tissue Concentration (mg/kg) (b)**	**Prey Tissue Concentration (mg/kg) (c)**	**Plant Tissue Concentration (mg/kg) (b)**	**Prey Tissue Concentration (mg/kg) (c)**
2,3,7,8-TCDD	1.47E-04	7.4E-14	1.1E-17	8.42E-13	1.24E-16
1,2,3,7,8-PeCDD	1.35E-04	1.8E-13	2.5E-17	3.35E-12	4.53E-16
1,2,3,4,7,8-HxCDD	4.55E-05	9.1E-14	4.1E-18	1.91E-12	8.69E-17
1,2,3,7,8,9-HxCDD	2.05E-05	9.6E-14	2.0E-18	2.30E-12	4.71E-17
1,2,3,6,7,8-HxCDD	1.76E-05	9.8E-14	1.7E-18	2.04E-12	3.59E-17
1,2,3,4,6,7,8-HpCDD	7.48E-06	7.0E-14	5.3E-19	1.85E-12	1.39E-17
OCDD	1.76E-06	9.7E-14	1.7E-19	2.39E-12	4.21E-18
2,3,7,8-TCDF	1.17E-04	6.2E-13	7.2E-17	9.54E-12	1.12E-15
1,2,3,7,8-PeCDF	3.23E-05	6.1E-13	2.0E-17	1.05E-11	3.41E-16
2,3,4,7,8-PeCDF	2.35E-04	5.9E-13	1.4E-16	1.19E-11	2.80E-15
1,2,3,4,7,8-HxCDF	1.12E-05	5.1E-13	5.7E-18	1.26E-11	1.41E-16
1,2,3,7,8,9-HxCDF	9.24E-05	8.6E-14	8.0E-18	1.85E-12	1.71E-16
1,2,3,6,7,8-HxCDF	2.79E-05	2.8E-13	7.8E-18	6.87E-12	1.92E-16
2,3,4,6,7,8-HxCDF	9.83E-05	1.6E-13	1.6E-17	3.86E-12	3.79E-16
1,2,3,4,6,7,8-HpCDF	1.61E-06	4.1E-13	6.6E-19	9.73E-12	1.57E-17
1,2,3,4,7,8,9-HpCDF	5.72E-05	2.1E-13	1.2E-17	2.89E-12	1.65E-16
OCDF	2.35E-06	5.3E-14	1.3E-19	1.33E-12	3.14E-18

BCF - Bioaccumulation Factor
mg/kg - milligrams per kilogram
(a) BCF values for mammalian prey (white-footed mouse) were obtained from Table D-1 in USEPA, 1999.
It was assumed that the prey diet consists 100% of plant material.
(b) Plant tissue concentrations were calculated using USEPA's HHRAP fate and transport equations,
using the IRAP software program.
(c) Prey tissue concentration = Plant concentration X BCF.

Table 4
Terrestrial Invertebrate PCDD/PCDF Bioconcentration Factors and Tissue Concentrations

Congener	USEPA (1999) default BCF (a)	Riparian Corridor	
		Soil Concentration (mg/kg)	Terrestrial Invertebrate Tissue Concentration (mg/kg) (b)
2,3,7,8-TCDD	1.59	8.95E-11	1.42E-10
1,2,3,7,8-PeCDD	1.46	1.39E-10	2.02E-10
1,2,3,4,7,8-HxCDD	0.49	8.20E-11	4.02E-11
1,2,3,7,8,9-HxCDD	0.22	9.52E-11	2.09E-11
1,2,3,6,7,8-HxCDD	0.19	8.32E-11	1.58E-11
1,2,3,4,6,7,8-HpCDD	0.081	8.20E-11	6.64E-12
OCDD	0.019	1.05E-10	1.99E-12
2,3,7,8-TCDF	1.27	9.60E-10	1.22E-09
1,2,3,7,8-PeCDF	0.32	6.29E-10	2.01E-10
2,3,4,7,8-PeCDF	2.54	6.14E-10	1.56E-09
1,2,3,4,7,8-HxCDF	0.121	5.47E-10	6.62E-11
1,2,3,7,8,9-HxCDF	1	8.44E-11	8.44E-11
1,2,3,6,7,8-HxCDF	0.3	3.00E-10	8.99E-11
2,3,4,6,7,8-HxCDF	1.07	1.69E-10	1.81E-10
1,2,3,4,6,7,8-HpCDF	0.017	4.03E-10	6.85E-12
1,2,3,4,7,8,9-HpCDF	0.62	1.04E-10	6.46E-11
OCDF	0.025	5.80E-11	1.45E-12

mg/kg - milligrams per kilogram
(a) Bioaccumulation Factor (BCF) values for terrestrial invertebrates were obtained from Table C-1 in USEPA, 1999
(b) Terrestrial invertebrate tissue concentration = BCF X soil concentration

Table 5
Benthic Invertebrate (Crayfish) PCDD/PCDF Bioconcentration Factors and Tissue Concentrations
Concentrations for Yuma Clapper Rail Analysis

Congener	Congener Specific BCF (a)	Colorado River Area Sediment Concentration (mg/kg) (b)	Benthic Invertebrate Tissue Concentration (mg/kg) (c)
2,3,7,8-TCDD	0.5	1.1E-10	5.7E-11
1,2,3,7,8-PeCDD	0.45	2.0E-10	9.0E-11
1,2,3,4,7,8-HxCDD	0.15	4.2E-10	6.3E-11
1,2,3,7,8,9-HxCDD	0.05	3.6E-10	1.8E-11
1,2,3,6,7,8-HxCDD	0.05	3.1E-10	1.6E-11
1,2,3,4,6,7,8-HpCDD	0.0255	4.6E-10	1.2E-11
OCDD	0.006	6.2E-10	3.7E-12
2,3,7,8-TCDF	0.4	3.4E-10	1.4E-10
1,2,3,7,8-PeCDF	0.1	1.0E-09	1.0E-10
2,3,4,7,8-PeCDF	0.8	6.3E-10	5.1E-10
1,2,3,4,7,8-HxCDF	0.04	1.4E-09	5.7E-11
1,2,3,7,8,9-HxCDF	0.3	2.1E-10	6.3E-11
1,2,3,6,7,8-HxCDF	0.1	7.8E-10	7.8E-11
2,3,4,6,7,8-HxCDF	0.35	4.4E-10	1.5E-10
1,2,3,4,6,7,8-HpCDF	0.005	1.7E-09	8.4E-12
1,2,3,4,7,8,9-HpCDF	0.2	4.1E-10	8.2E-11
OCDF	0.008	3.3E-10	2.6E-12

BEF - Bioaccumulation equivalency factor
BCF - Bioaccumulation factor
foc - fraction organic carbon
DW - dry weight
WW - wet weight
g/kg - grams per kilogram
mg/kg - milligrams per kilogram
(a) Congener specific BCFs were calculated using the crayfish-specific TCDD BCF (0.5) and the USEPA (1999) default BEF (BCF=0.5 x BEF), except for 2,3,7,8-TCDF for which a congener-specific BCF (0.4) was obtained from the literature.
(b) Sediment concentrations were calculated using USEPA's HHRAP fate and transport equations, using the IRAP software program.
(c) Benthic invertebrate tissue concentrations = BCF X sediment concentration

APPENDIX M
SECTION 4

DETAILED ECOLOGICAL RISK ASSESSMENT RESULTS

Table 1
Calculation of Hazard Quotients for Badger - Creosote Bush Scrub Area

Compound (a)	Maximum Annual Soil Concentration (mg/kg) (b)	Plant Tissue Concentration (mg/kg WW) (c)	Kow	Biotransfer Factor (BaA) (d)	BCF plant-herbivore (e)	Mammal Prey Tissue Concentration (mg/kg) (f)	Daily Dose from Prey (mg/kg-BW-d) (g)	Daily Dose from Soil (mg/kg-BW-d) (h)	Total Daily Dose (mg/kg-BW-d) (i)	TRV (mg/kg-BW-d) (j)	Hazard Quotient (k)
Acetone	1.63E-08	1.64E-08			9.3E-09	1.5E-16	2.3E-17	6.5E-13	6.5E-13	1.0E+01	6.5E-14
Acrylonitrile	2.62E-10	2.64E-10			2.8E-08	7.3E-18	1.1E-18	1.0E-14	1.0E-14	4.6E-01	2.3E-14
Aluminum	6.52E-03	3.49E-05		8.0E-04	4.9E-04	1.7E-08	2.6E-09	2.6E-07	2.6E-07	1.9E+00	1.4E-07
Antimony	1.36E-09	5.20E-12			6.1E-04	3.2E-15	4.9E-16	5.4E-14	5.4E-14	6.6E-02	8.2E-13
Aroclor 1254	3.61E-07	1.80E-10			2.5E-02	4.5E-12	6.9E-13	1.4E-11	1.5E-11	2.1E-04	7.3E-08
Arsenic	1.06E-08	3.73E-05			1.2E-03	4.6E-08	7.1E-09	4.2E-13	7.1E-09	1.3E+00	5.7E-09
Barium	1.44E-03	5.98E-06			9.2E-05	5.5E-10	8.5E-11	5.7E-08	5.7E-08	5.1E-01	1.1E-07
Benzo(a)Anthracene	5.51E-09	4.79E-11			7.4E-03	3.5E-13	5.4E-14	2.2E-13	2.7E-13	1.7E-01	1.6E-12
Benzo(a)pyrene	5.17E-09	8.48E-11			2.1E-02	1.8E-12	2.7E-13	2.0E-13	4.8E-13	1.0E-01	4.8E-12
Beryllium	1.48E-05	3.72E-05			6.1E-04	2.3E-08	3.5E-09	5.9E-10	4.1E-09	6.6E-01	6.2E-09
Cadmium	1.69E-06	9.20E-05			7.4E-05	6.8E-09	1.0E-09	6.7E-11	1.1E-09	2.5E-02	4.4E-08
Chloroform (Trichloromethane)	2.57E-11	8.61E-12			1.4E-06	1.2E-17	1.8E-18	1.0E-15	1.0E-15	6.0E+01	1.7E-17
Chromium, hexavalent	5.76E-04	1.94E-06			3.4E-03	6.6E-09	1.0E-09	2.3E-08	2.4E-08	3.5E+00	6.8E-09
Copper	4.61E-06	3.56E-05		8.0E-02	4.9E-02	1.7E-06	2.7E-07	1.8E-10	2.7E-07	1.2E+01	2.2E-08
DDE, 4,4'-	6.13E-07	9.06E-10			2.8E-02	2.5E-11	3.9E-12	2.4E-11	2.8E-11	1.0E+00	2.8E-11
Dibenz(a,h)anthracene	1.50E-08	2.84E-10			5.4E-02	1.5E-11	2.4E-12	5.9E-13	3.0E-12	2.0E-03	1.5E-09
Dinitrobenzene, 1,3-	4.81E-07	2.98E-07			4.8E-07	1.4E-13	2.2E-14	1.9E-11	1.9E-11	1.1E+00	1.8E-11
Dinitrotoluene, 2,4-	2.52E-07	8.53E-08			1.5E-06	1.3E-13	2.0E-14	1.0E-11	1.0E-11	7.0E-01	1.4E-11
Dinitrotoluene, 2,6-	2.05E-07	9.61E-08			1.2E-06	1.1E-13	1.8E-14	8.1E-12	8.1E-12	4.0E-01	2.0E-11
Di-n-octylphthalate	1.21E-07	7.97E-08			3.3E+01	2.6E-06	4.1E-07	4.8E-12	4.1E-07	7.5E+03	5.4E-11
Dioxane, 1,4-	1.21E-14	1.22E-14			8.4E-09	1.0E-22	1.6E-23	4.8E-19	4.8E-19	1.1E+02	4.5E-21
Ethylhexyl phthalate, bis-2-	1.03E-06	3.78E-07			2.5E-03	9.3E-10	1.4E-10	4.1E-11	1.8E-10	6.0E+01	3.1E-12
gamma-BHC (Lindane)	1.62E-09	6.78E-11	4.0E+03	1.0E-04	6.1E-05	4.2E-15	6.4E-16	6.4E-14	6.5E-14	8.0E+00	8.1E-15
Heptachlor	7.17E-10	1.09E-11			1.6E-03	1.7E-14	2.7E-15	2.8E-14	3.1E-14	2.5E-03	1.2E-11
Hexachlorobenzene	2.33E-08	9.68E-11			4.9E-03	4.8E-13	7.3E-14	9.2E-13	9.9E-13	1.6E+00	6.2E-13
Hexachlorocyclopentadiene	2.80E-07	1.59E-09			1.3E-03	2.0E-12	3.1E-13	1.1E-11	1.1E-11	3.8E+00	3.0E-12
Lead	2.51E-05	9.22E-05			1.8E-04	1.7E-08	2.6E-09	9.9E-10	3.6E-09	3.8E-02	9.6E-08
Manganese	2.75E-07	1.37E-05		5.0E-02	3.1E-02	4.2E-07	6.5E-08	1.1E-11	6.5E-08	8.8E+01	7.4E-10
Mercuric chloride	5.18E-04	9.92E-07			3.2E-03	3.2E-09	4.9E-10	2.1E-08	2.1E-08	1.0E+00	2.1E-08
Methyl mercury	1.05E-05	1.71E-07			4.8E-04	8.2E-11	1.3E-11	4.2E-10	4.3E-10	3.2E-02	1.3E-08
Nickel	5.75E-08	2.92E-06			3.7E-03	1.1E-08	1.7E-09	2.3E-12	1.7E-09	5.0E+01	3.3E-11
Pentachlorobenzene	2.79E-07	1.32E-09			1.9E-03	2.5E-12	3.8E-13	1.1E-11	1.1E-11	7.3E+00	1.6E-12
Pentachloronitrobenzene (PCNB)	1.95E-06	1.74E-08			6.8E-04	1.2E-11	1.8E-12	7.7E-11	7.9E-11	4.6E+02	1.7E-13
Pentachlorophenol	4.55E-06	1.74E-06			1.9E-03	3.2E-09	5.0E-10	1.8E-10	6.8E-10	3.0E-01	2.3E-09
Selenium	4.36E-09	1.12E-06			1.4E-03	1.6E-09	2.4E-10	1.7E-13	2.4E-10	7.6E-02	3.2E-09
Silver	1.30E-04	2.58E-06			1.8E-03	4.8E-09	7.3E-10	5.1E-09	5.9E-09	3.8E-01	1.6E-08
Dioxin - TEQM	7.74E-09	1.49E-11			(l)	2.2E-15	3.4E-16	3.1E-13	3.1E-13	1.0E-06	3.1E-07
Thallium (l)	1.82E-03	2.83E-06			2.5E-02	7.0E-08	1.1E-08	7.2E-08	8.3E-08	1.3E-02	6.3E-06
Vanadium	6.50E-04	8.53E-07		1.1E-03	6.8E-04	5.8E-10	8.9E-11	2.6E-08	2.6E-08	2.1E-01	1.2E-07
Vinyl Chloride	1.31E-13	9.50E-14			2.2E-07	2.1E-20	3.2E-21	5.2E-18	5.2E-18	1.7E-01	3.0E-17
Xylene, m-	1.38E-11	1.11E-12	1.6E+03	4.0E-05	2.4E-05	2.7E-17	4.2E-18	5.4E-16	5.5E-16	2.1E+00	2.6E-16
Xylene, o-	8.94E-12	8.10E-13	1.3E+03	3.2E-05	1.9E-05	1.6E-17	2.4E-18	3.5E-16	3.6E-16	2.1E+00	1.7E-16
Xylene, p-	1.14E-11	1.01E-12	1.3E+03	3.2E-05	1.9E-05	2.0E-17	3.0E-18	4.5E-16	4.6E-16	2.1E+00	2.2E-16
Zinc	8.37E-07	4.46E-05			5.5E-05	2.5E-09	3.8E-10	3.3E-11	4.1E-10	1.0E+01	4.0E-11
										Cumulative HI (m) :	**7E-06**

Table 1
Calculation of Hazard Quotients for Badger - Creosote Bush Scrub Area

Compound (a)	Maximum Annual Soil Concentration (mg/kg) (b)	Plant Tissue Concentration (mg/kg WW) (c)	Kow	Biotransfer Factor (BaA) (d)	BCF plant-herbivore (e)	Mammal Prey Tissue Concentration (mg/kg) (f)	Daily Dose from Prey (mg/kg-BW-d) (g)	Daily Dose from Soil (mg/kg-BW-d) (h)	Total Daily Dose (mg/kg-BW-d) (i)	TRV (mg/kg-BW-d) (j)	Hazard Quotient (k)

(a) Only those compounds with TRVs are listed in this table.
(b) Soil concentrations (Csoil) were calculated using USEPA's HHRAP fate and transport equations, using the IRAP software program.
(c) Plant concentrations (Cplant) were calculated using USEPA's HHRAP fate and transport equations, using the IRAP software program. Wet weight plant concentrations were calculated from the IRAP outputs dry weight concentrations using a moisture content of 88% as specified in USEPA's 1999 Screening Ecological Risk Assessment Protocol. (USEPA, 1999)
(d) For organic compounds not included in USEPA, 1999, the BaA was calculated using Travis & Arms equation: logBaA = -7.6 + logKow
For inorganic compounds not included in USEPA, 1999, the BaA was taken from Baes 1984.
(e) Bioconcentration Factors (BCFs) in prey items are based on the white footed mouse and were obtained from Appendix D of USEPA's 1999 Screening Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities. If a BCF was not available then it was calculated using the following equation:
BCFplant-herbivore = BaA X Food IR, Food Ingestion Rate for mouse = 0.614 (kg WW/kg BW-d)
(f) Prey tissue concentration = plant tissue concentration X BCFplant-herbivore; except for Dioxin - TEQM which is calculated on a congener-specific basis and is shown elsewhere in this appendix.
(g) DDdiet = Cprey x Food IR; assumes that 100% of ingested prey is potentially contaminated
(h) DDsoil = Csoil x Soil IR; assumes that 100% of ingested soil is potentially contaminated
(i) Total Daily Dose = DDdiet + DDsoil
(j) Toxicity Reference Values (TRVs) are discussed in the text.
(k) Hazard Quotients (HQ) are calculated by dividing the daily dose by the TRV.
(l) BCFs were calculated for individual congeners using bioaccumulation equivalency factors (BEFs) from Appendix D of USEPA (1999).
See elsewhere in this appendix for more information.
(m) The Cumulative Hazard Index (HI) is calculated by summing the chemical-specific HQs. The HI conservatively reflects exposure to all evaluated compounds, regardless of the type or mechanism of effects. For this project, the target hazard index value was 0.25, based on USEPA Region IX input. If an HI, based on the sum of hazard quotients for all compounds, is above the target level, then the HI values are recalculated for groups of compounds having the same type of health effect and/or a more detailed evaluation may be conducted. A common regulatory target hazard index value used by most states and many other USEPA programs, for compounds grouped according to specific types of health effects, is 1.

Dioxin-TEQM is the Toxic Equivalents (TEQ) for mammals calculated by multiplying each congener concentration by its corresponding TEF then summing all of the results.
This calculation is presented elsewhere in this appendix.
Food IR - Food ingestion rate as shown in Table 5.2-2
Soil IR - Soil ingestion rate as shown in Table 5.2-2

mg - milligrams
kg - kilograms
BW - body weight
WW- wet weight
d - day
DD - daily dose
Kow - octanol-water partition coefficient

Table 2
Calculation of Hazard Quotients for Gambel's Quail - Creosote Bush Scrub Area

Compound (a)	Maximum Annual Soil Concentration (mg/kg) (b)	Plant Tissue Concentration (mg/kg WW) (c)	Daily Dose from Diet (mg/kg BW-d) (d)	Daily Dose from Soil (mg/kg BW-d) (e)	Total Daily Dose (mg/kg bw-d) (f)	TRV (Bird) (mg/kg bw-d) (g)	Hazard Quotient (h)
Acetone	1.63E-08	1.64E-08	7.8E-09	2.8E-11	2.4E-08	5.2E+01	4.7E-10
Aluminum	6.52E-03	3.49E-05	1.7E-05	1.1E-05	6.3E-05	1.0E+02	6.3E-07
Aroclor 1254	3.61E-07	1.80E-10	8.6E-11	6.2E-10	8.9E-10	7.2E-02	1.2E-08
Arsenic	1.06E-08	3.73E-05	1.8E-05	1.8E-11	5.5E-05	2.5E+00	2.2E-05
Barium	1.44E-03	5.98E-06	2.9E-06	2.5E-06	1.1E-05	2.1E+01	5.4E-07
Benzo(a)Anthracene	5.51E-09	4.79E-11	2.3E-11	9.5E-12	8.0E-11	7.9E-04	1.0E-07
Benzo(a)pyrene	5.17E-09	8.48E-11	4.1E-11	8.9E-12	1.3E-10	1.0E-03	1.3E-07
Benzo(b)fluoranthene	5.60E-08	9.89E-11	4.7E-11	9.7E-11	2.4E-10	1.4E-04	1.7E-06
Benzo(k)fluoranthene	3.04E-08	1.71E-10	8.2E-11	5.3E-11	3.1E-10	1.4E-04	2.2E-06
Cadmium	1.69E-06	9.20E-05	4.4E-05	2.9E-09	1.4E-04	1.5E+00	9.4E-05
Chromium, hexavalent	5.76E-04	1.94E-06	9.3E-07	1.0E-06	3.9E-06	1.0E+00	3.9E-06
Chrysene	3.31E-08	1.29E-10	6.2E-11	5.7E-11	2.5E-10	1.0E-03	2.5E-07
Copper	4.61E-06	3.56E-05	1.7E-05	8.0E-09	5.3E-05	4.7E+01	1.1E-06
DDE, 4,4'-	6.13E-07	9.06E-10	4.3E-10	1.1E-09	2.4E-09	8.5E-01	2.8E-09
Dibenz(a,h)anthracene	1.50E-08	2.84E-10	1.4E-10	2.6E-11	4.5E-10	3.9E-04	1.1E-06
Dinitrobenzene, 1,3-	4.81E-07	2.98E-07	1.4E-07	8.3E-10	4.4E-07	4.2E-04	1.0E-03
Ethylhexyl phthalate, bis-2-	1.03E-06	3.78E-07	1.8E-07	1.8E-09	5.6E-07	1.1E+02	5.1E-09
gamma-BHC (Lindane)	1.62E-09	6.78E-11	3.2E-11	2.8E-12	1.0E-10	2.0E+00	5.1E-11
Heptachlor	7.17E-10	1.09E-11	5.2E-12	1.2E-12	1.7E-11	6.5E-02	2.7E-10
Hexachloro-1,3-butadiene (Perchlorobutadiene)	1.94E-07	1.50E-09	7.2E-10	3.4E-10	2.6E-09	3.2E+00	8.0E-10
Hexachlorobenzene	2.33E-08	9.68E-11	4.6E-11	4.0E-11	1.8E-10	2.3E-01	8.2E-10
Indeno(1,2,3-cd) pyrene	1.32E-07	1.60E-09	7.6E-10	2.3E-10	2.6E-09	1.0E-03	2.6E-06
Lead	2.51E-05	9.22E-05	4.4E-05	4.3E-08	1.4E-04	2.5E-02	5.5E-03
Manganese	2.75E-07	1.37E-05	6.6E-06	4.8E-10	2.0E-05	9.8E+02	2.1E-08
Mercuric chloride	5.18E-04	9.92E-07	4.7E-07	9.0E-07	2.4E-06	3.3E+00	7.3E-07
Methyl mercury	1.05E-05	1.71E-07	8.2E-08	1.8E-08	2.7E-07	6.4E-03	4.2E-05
Nickel	5.75E-08	2.92E-06	1.4E-06	1.0E-10	4.3E-06	6.5E+01	6.6E-08
Pentachloronitrobenzene (PCNB)	1.95E-06	1.74E-08	8.3E-09	3.4E-09	2.9E-08	6.9E+01	4.2E-10
Pentachlorophenol	4.55E-06	1.74E-06	8.3E-07	7.9E-09	2.6E-06	4.0E+00	6.4E-07
Selenium	4.36E-09	1.12E-06	5.3E-07	7.6E-12	1.7E-06	5.0E-01	3.3E-06
Silver	1.30E-04	2.58E-06	1.2E-06	2.2E-07	4.0E-06	1.8E+02	2.3E-08
Dioxin - TEQB	1.63E-08	2.97E-11	1.4E-11	2.8E-11	7.2E-11	1.0E-05	7.2E-06
Thallium (l)	1.82E-03	2.83E-06	1.4E-06	3.2E-06	7.3E-06	3.5E-01	2.1E-05
Vanadium	6.50E-04	8.53E-07	4.1E-07	1.1E-06	2.4E-06	1.1E+01	2.1E-07
Zinc	8.37E-07	4.46E-05	2.1E-05	1.4E-09	6.6E-05	1.3E+02	5.0E-07
						Cumulative HI (i):	**7E-03**

(a) Only those compounds with TRVs are listed in this table.
(b) Soil concentrations (Csoil) were calculated using USEPA's HHRAP fate and transport equations, using the IRAP software program.
(c) Plant concentrations (Cplant) were calculated using USEPA's HHRAP fate and transport equations, using the IRAP software program. Wet weight plant concentrations were calculated from the IRAP outputs dry weight concentrations using a moisture content of 88% as specified in USEPA's 1999 Screening Ecological Risk Assessment Protocol.
(d) DDdiet = Cplant x Food IR; assumes that 100% of ingested plant material is potentially contaminated
(e) DDsoil = Csoil x Soil IR; assumes that 100% of ingested soil is potentially contaminated
(f) Total Daily Dose = DDdiet + DDsoil

Table 2
Calculation of Hazard Quotients for Gambel's Quail - Creosote Bush Scrub Area

Compound (a)	Maximum Annual Soil Concentration (mg/kg) (b)	Plant Tissue Concentration (mg/kg WW) (c)	Daily Dose from Diet (mg/kg BW-d) (d)	Daily Dose from Soil (mg/kg BW-d) (e)	Total Daily Dose (mg/kg bw-d) (f)	TRV (Bird) (mg/kg bw-d) (g)	Hazard Quotient (h)

(g) Toxicity Reference Values (TRVs) are discussed in the text
(h) Hazard Quotients (HQ) are calculated by dividing the daily dose by the TRV.
(i) The Cumulative Hazard Index (HI) is calculated by summing the chemical-specific HQs. The HI conservatively reflects exposure to all evaluated compounds, regardless of the type or mechanism of effects. For this project, the target hazard index value was 0.25, based on USEPA Region IX input. If an HI, based on the sum of hazard quotients for all compounds, is above the target level, then the HI values are recalculated for groups of compounds having the same type of health effect and/or a more detailed evaluation may be conducted. A common regulatory target hazard index value used by most states and many other USEPA programs, for compounds grouped according to specific types of health effects, is 1.

Dioxin-TEQB is the Toxic Equivalents (TEQ) for birds calculated by multiplying each congener concentration by its corresponding TEF then summing all of the results. This calculation is presented elsewhere in this appendix.
Food IR - Food ingestion rate as shown in Table 5.2-2
Soil IR - Soil ingestion rate as shown in Table 5.2-2

mg - milligrams
kg - kilograms
BW - body weight
d - day
DD - daily dose

Table 3
Calculation of Hazard Quotients for Great Horned Owl - Creosote Bush Scrub Area

Compound (a)	Maximum Annual Soil Concentration (mg/kg) (b)	Plant Tissue Concentration (mg/kg) (c)	Biotrasfer Factor (BaA) (d)	BCF plant-herbivore (e)	Mammal Prey Tissue Concentration (mg/kg) (f)	Daily Dose from Prey (mg/kg-BW-d) (g)	Daily Dose from Soil (mg/kg-BW-d) (h)	Total Daily Dose (mg/kg-BW-d) (i)	TRV (mg/kg-BW-d) (j)	Hazard Quotient (k)
Acetone	1.63E-08	1.64E-08		9.3E-09	1.5E-16	2.9E-17	1.7E-10	1.7E-10	5.2E+01	3.3E-12
Aluminum	6.52E-03	3.49E-05	8.0E-04	4.9E-04	1.7E-08	3.2E-09	6.8E-05	6.8E-05	1.0E+02	6.8E-07
Aroclor 1254	3.61E-07	1.80E-10		2.5E-02	4.5E-12	8.4E-13	3.8E-09	3.8E-09	7.2E-02	5.3E-08
Arsenic	1.06E-08	3.73E-05		1.2E-03	4.6E-08	8.6E-09	1.1E-10	8.7E-09	2.5E+00	3.5E-09
Barium	1.44E-03	5.98E-06		9.2E-05	5.5E-10	1.0E-10	1.5E-05	1.5E-05	2.1E+01	7.3E-07
Benzo(a)Anthracene	5.51E-09	4.79E-11		7.4E-03	3.5E-13	6.6E-14	5.8E-11	5.8E-11	7.9E-04	7.3E-08
Benzo(a)pyrene	5.17E-09	8.48E-11		2.1E-02	1.8E-12	3.3E-13	5.4E-11	5.5E-11	1.0E-03	5.5E-08
Benzo(b)fluoranthene	5.60E-08	9.89E-11		2.5E-02	2.4E-12	4.6E-13	5.9E-10	5.9E-10	1.4E-04	4.2E-06
Benzo(k)fluoranthene	3.04E-08	1.71E-10		2.4E-02	4.2E-12	7.8E-13	3.2E-10	3.2E-10	1.4E-04	2.3E-06
Cadmium	1.69E-06	9.20E-05		7.4E-05	6.8E-09	1.3E-09	1.8E-08	1.9E-08	1.5E+00	1.3E-08
Chromium, hexavalent	5.76E-04	1.94E-06		3.4E-03	6.6E-09	1.2E-09	6.0E-06	6.0E-06	1.0E+00	6.0E-06
Chrysene	3.31E-08	1.29E-10		8.5E-03	1.1E-12	2.1E-13	3.5E-10	3.5E-10	1.0E-03	3.5E-07
Copper	4.61E-06	3.56E-05	8.0E-02	4.9E-02	1.7E-06	3.3E-07	4.8E-08	3.8E-07	4.7E+01	8.0E-09
DDE, 4,4'-	6.13E-07	9.06E-10		2.8E-02	2.5E-11	4.7E-12	6.4E-09	6.4E-09	8.5E-01	7.6E-09
Dibenz(a,h)anthracene	1.50E-08	2.84E-10		5.4E-02	1.5E-11	2.9E-12	1.6E-10	1.6E-10	3.9E-04	4.1E-07
Dinitrobenzene, 1,3-	4.81E-07	2.98E-07		4.8E-07	1.4E-13	2.7E-14	5.0E-09	5.0E-09	4.2E-04	1.2E-05
Ethylhexyl phthalate, bis-2-	1.03E-06	3.78E-07		2.5E-03	9.3E-10	1.8E-10	1.1E-08	1.1E-08	1.1E+02	9.9E-11
gamma-BHC (Lindane)	1.62E-09	6.78E-11	1.0E-04	6.1E-05	4.2E-15	7.8E-16	1.7E-11	1.7E-11	2.0E+00	8.5E-12
Heptachlor	7.17E-10	1.09E-11		1.6E-03	1.7E-14	3.3E-15	7.5E-12	7.5E-12	6.5E-02	1.2E-10
Hexachloro-1,3-butadiene (Perchlorobutadiene)	1.94E-07	1.50E-09		8.3E-04	1.2E-12	2.3E-13	2.0E-09	2.0E-09	3.2E+00	6.4E-10
Hexachlorobenzene	2.33E-08	9.68E-11		4.9E-03	4.8E-13	8.9E-14	2.4E-10	2.4E-10	2.3E-01	1.1E-09
Indeno(1,2,3-cd) pyrene	1.32E-07	1.60E-09		1.3E-01	2.0E-10	3.8E-11	1.4E-09	1.4E-09	1.0E-03	1.4E-06
Lead	2.51E-05	9.22E-05		1.8E-04	1.7E-08	3.2E-09	2.6E-07	2.7E-07	2.5E-02	1.1E-05
Manganese	2.75E-07	1.37E-05	5.0E-02	3.1E-02	4.2E-07	7.9E-08	2.9E-09	8.2E-08	9.8E+02	8.4E-11
Mercuric chloride	5.18E-04	9.92E-07		3.2E-03	3.2E-09	6.0E-10	5.4E-06	5.4E-06	3.3E+00	1.7E-06
Methyl mercury	1.05E-05	1.71E-07		4.8E-04	8.2E-11	1.5E-11	1.1E-07	1.1E-07	6.4E-03	1.7E-05
Nickel	5.75E-08	2.92E-06		3.7E-03	1.1E-08	2.0E-09	6.0E-10	2.6E-09	6.5E+01	4.0E-11
Pentachloronitrobenzene (PCNB)	1.95E-06	1.74E-08		6.8E-04	1.2E-11	2.2E-12	2.0E-08	2.0E-08	6.9E+01	3.0E-10
Pentachlorophenol	4.55E-06	1.74E-06		1.9E-03	3.2E-09	6.0E-10	4.8E-08	4.8E-08	4.0E+00	1.2E-08
Selenium	4.36E-09	1.12E-06		1.4E-03	1.6E-09	2.9E-10	4.6E-11	3.4E-10	5.0E-01	6.8E-10
Silver	1.30E-04	2.58E-06		1.8E-03	4.8E-09	8.9E-10	1.4E-06	1.4E-06	1.8E+02	7.6E-09
TEQB	1.63E-08	2.97E-11		(l)	4.6E-15	8.7E-16	1.7E-10	1.7E-10	1.0E-05	1.7E-05
Thallium (l)	1.82E-03	2.83E-06		2.5E-02	7.0E-08	1.3E-08	1.9E-05	1.9E-05	3.5E-01	5.5E-05
Vanadium	6.50E-04	8.53E-07	1.1E-03	6.8E-04	5.8E-10	1.1E-10	6.8E-06	6.8E-06	1.1E+01	6.0E-07
Zinc	8.37E-07	4.46E-05		5.5E-05	2.5E-09	4.6E-10	8.8E-09	9.2E-09	1.3E+02	7.1E-11
									Cumulative HI (m) :	1E-04

(a) Only those compounds with TRVs are listed in this table.

(b) Soil concentrations (Csoil) were calculated using USEPA's HHRAP fate and transport equations, using the IRAP software program.

(c) Plant concentrations (Cplant) were calculated using USEPA's HHRAP fate and transport equations, using the IRAP software program. Wet weight plant concentrations were calculated from the IRAP outputs dry weight concentrations using a moisture content of 88% as specified in USEPA's 1999 Screening Ecological Risk Assessment Protocol.

(d) For organic compounds not included in USEPA, 1999, the BaA was calculated using Travis & Arms equation: logBaA = -7.6 + logKow
For inorganic compounds not included in USEPA, 1999, the BaA was taken from Baes 1984.

(e) Bioconcentration Factors (BCFs) in prey items are based on the white footed mouse and were obtained from Appendix D of USEPA's 1999 Screening Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities. If a BCF was not available then it was calculated using the following equation:
BCFplant-herbivore = BaA X Food IR, Food Ingestion Rate for mouse = 0.614 (kg WW/kg BW-d)

(f) Prey tissue concentration = plant tissue concentration X BCFplant-herbivore; except for Dioxin - TEQB which is calculated on a congener-specific basis and is shown elsewhere in this appendix.

(g) DDdiet = Cprey x Food IR; assumes that 100% of ingested prey is potentially contaminated

(h) DDsoil = Csoil x Soil IR; assumes that 100% of ingested soil is potentially contaminated

(i) Total Daily Dose = DDdiet + DDsoil

(j) Toxicity Reference Values (TRVs) are discussed in the text.

Table 3
Calculation of Hazard Quotients for Great Horned Owl - Creosote Bush Scrub Area

Compound (a)	Maximum Annual Soil Concentration (mg/kg) (b)	Plant Tissue Concentration (mg/kg) (c)	Biotrasfer Factor (BaA) (d)	BCF plant-herbivore (e)	Mammal Prey Tissue Concentration (mg/kg) (f)	Daily Dose from Prey (mg/kg-BW-d) (g)	Daily Dose from Soil (mg/kg-BW-d) (h)	Total Daily Dose (mg/kg-BW-d) (i)	TRV (mg/kg-BW-d) (j)	Hazard Quotient (k)

(k) Hazard Quotients (HQ) are calculated by dividing the daily dose by the TRV.
(l) BCFs were calculated for individual congeners using bioaccumulation equivalency factors (BEFs) from Appendix D of USEPA (1999).
See elsewhere in this appendix for more information.
(m) The Cumulative Hazard Index (HI) is calculated by summing the chemical-specific HQs. The HI conservatively reflects exposure to all evaluated compounds, regardless of the type or mechanism of effects. For this project, the target hazard index value was 0.25, based on USEPA Region IX input. If an HI, based on the sum of hazard quotients for all compounds, is above the target level, then the HI values are recalculated for groups of compounds having the same type of health effect and/or a more detailed evaluation may be conducted. A common regulatory target hazard index value used by most states and many other USEPA programs, for compounds grouped according to specific types of health effects, is 1.

Dioxin-TEQB is the Toxic Equivalents (TEQ) for birds calculated by multiplying each congener concentration by its corresponding TEF then summing all of the results.
This calculation is presented elsewhere in this appendix.
Food IR - Food ingestion rate as shown in Table 5.2-2
Soil IR - Soil ingestion rate as shown in Table 5.2-2

mg - milligrams
kg - kilograms
BW - body weight
WW- wet weight
d - day
DD - daily dose
Kow - octanol-water partition coefficient

Table 4
Hazard Quotients for Plants (Creosote Bush) in the Creosote Bush Area

CAS No	Compound (a)	Maximum Annual Soil Concentration (mg/kg) (b)	Toxicity Reference Value (TRV) (mg/kg) (c)	Hazard Quotient (d)
108-60-1	2,2'-oxybis (1-Chloropropane)	1.15E-09	2.0E+01	5.8E-11
591-78-6	2-Hexanone	7.76E-10	1.3E+01	6.2E-11
91-57-6	2-Methylnaphthalene	3.03E-08	3.2E+00	9.4E-09
534-52-1	4,6-Dinitro-2-methylphenol	4.12E-06	1.4E-01	2.9E-05
208-96-8	Acenaphthylene	3.65E-08	6.8E+02	5.3E-11
7429-90-5	Aluminum	6.52E-03	5.0E+00	1.3E-03
7440-36-0	Antimony	1.36E-09	5.0E-01	2.7E-09
11097-69-1	Aroclor 1254	3.61E-07	1.0E+01	3.6E-08
7440-38-2	Arsenic	1.06E-08	1.0E+00	1.1E-08
7440-39-3	Barium	1.44E-03	5.0E+00	2.9E-04
56-55-3	Benzo(a)Anthracene	5.51E-09	1.2E+00	4.6E-09
50-32-8	Benzo(a)pyrene	5.17E-09	1.2E+00	4.3E-09
205-99-2	Benzo(b)fluoranthene	5.60E-08	1.2E+00	4.7E-08
191-24-2	Benzo(g,h,i)perylene	2.24E-07	1.2E+02	1.9E-09
207-08-9	Benzo(k)fluoranthene	3.04E-08	1.2E+00	2.5E-08
7440-41-7	Beryllium	1.48E-05	1.0E-01	1.5E-04
111-91-1	Bis(2-chloroethoxy) methane	2.34E-07	3.0E-01	7.8E-07
7440-43-9	Cadmium	1.69E-06	2.0E-01	8.4E-06
18540-29-9	Chromium, hexavalent	5.76E-04	1.8E-02	3.2E-02
218-01-9	Chrysene	3.31E-08	1.2E+00	2.8E-08
7440-48-4	Cobalt	9.81E-05	2.0E+01	4.9E-06
7440-50-8	Copper	4.61E-06	1.0E+00	4.6E-06
319-86-8	delta-BHC	6.13E-07	9.9E+00	6.2E-08
53-70-3	Dibenz(a,h)anthracene	1.50E-08	1.2E+00	1.2E-08
122-39-4	Diphenylamine	2.17E-05	1.0E+00	2.2E-05
33213-65-9	Endosulfan II	3.58E-09	1.2E-01	3.0E-08
7421-93-4	Endrin aldehyde	1.33E-06	1.1E-02	1.3E-04
58-89-9	gamma-BHC (Lindane)	1.62E-09	5.0E-03	3.2E-07
76-44-8	Heptachlor	7.17E-10	1.0E+00	7.2E-10
77-47-4	Hexachlorocyclopentadiene	2.80E-07	1.0E-01	2.8E-06
193-39-5	Indeno(1,2,3-cd) pyrene	1.32E-07	1.2E+00	1.1E-07
74-88-4	Iodomethane	1.69E-10	1.2E+00	1.4E-10
7439-92-1	Lead	2.51E-05	4.6E+00	5.5E-06
7439-96-5	Manganese	2.75E-07	5.0E+02	5.5E-10
7487-94-7	Mercuric chloride	5.18E-04	3.5E-01	1.5E-03
80-62-6	Methyl methacrylate	6.98E-13	9.8E+02	7.1E-16
7440-02-0	Nickel	5.75E-08	2.5E+01	2.3E-09
62-75-9	N-nitrosodimethylamine	1.19E-08	1.2E+01	1.0E-09
87-86-5	Pentachlorophenol	4.55E-06	1.7E+00	2.6E-06
7782-49-2	Selenium	4.36E-09	5.0E-02	8.7E-08
7440-22-4	Silver	1.30E-04	2.0E-02	6.5E-03
7440-28-0	Thallium (l)	1.82E-03	1.0E-02	1.8E-01
7440-62-2	Vanadium	6.50E-04	2.0E+00	3.3E-04
7440-66-6	Zinc	8.37E-07	9.0E-01	9.3E-07
			Cumulative HI (e) =	**2E-01**

(a) Only those compounds with TRVs are listed in this table.
(b) Soil concentrations were calculated using USEPA's 2005 HHRAP fate and transport equations, using the IRAP software program.
(c) Toxicity Reference Values (TRVs) are discussed in the text.
(d) Maximum Hazard Quotient (HQ) is calculated by dividing the maximum annual soil concentration by the TRV.
(e) The Cumulative Hazard Index (HI) is calculated by summing the chemical-specific HQs. The HI conservatively reflects exposure to all evaluated compounds, regardless of the type or mechanism of effects. For this project, the target hazard index value was 0.25, based on USEPA Region IX input. If an HI, based on the sum of hazard quotients for all compounds, is above the target level, then the HI values are recalculated for groups of compounds having the same type of health effect and/or a more detailed evaluation may be conducted.
A common regulatory target hazard index value used by most states and many other USEPA programs, for compounds grouped according to specific types of health effects, is 1.

mg/kg - milligrams per kilogram

Table 5
Calculation of Hazard Quotients for Gambel's Quail - Agricultural Area

Compound (a)	Maximum Annual Soil Concentration (mg/kg) (b)	Plant Tissue Concentration (mg/kg WW) (c)	Daily Dose from Diet (mg/kg BW-d) (d)	Daily Dose from Soil (mg/kg BW-d) (e)	Total Daily Dose (mg/kg BW-d) (f)	TRV (Bird) (mg/kg BW-d) (g)	Hazard Quotient (h)
Acetone	1.14E-08	8.59E-09	4.1E-09	2.0E-11	4.1E-09	5.2E+01	7.9E-11
Aluminum	1.36E-05	9.01E-07	4.3E-07	2.4E-08	4.5E-07	1.0E+02	4.5E-09
Aroclor 1254	6.38E-09	4.70E-12	2.2E-12	1.1E-11	1.3E-11	7.2E-02	1.8E-10
Arsenic	2.76E-09	9.80E-07	4.7E-07	4.8E-12	4.7E-07	2.5E+00	1.9E-07
Barium	3.37E-06	7.85E-08	3.8E-08	5.8E-09	4.3E-08	2.1E+01	2.1E-09
Benzo(a)Anthracene	6.09E-11	2.07E-12	9.9E-13	1.1E-13	1.1E-12	7.9E-04	1.4E-09
Benzo(a)pyrene	4.29E-11	6.10E-12	2.9E-12	7.4E-14	3.0E-12	1.0E-03	3.0E-09
Benzo(b)fluoranthene	9.68E-10	3.23E-12	1.5E-12	1.7E-12	3.2E-12	1.4E-04	2.3E-08
Benzo(k)fluoranthene	2.42E-10	1.31E-11	6.2E-12	4.2E-13	6.7E-12	1.4E-04	4.8E-08
Cadmium	4.38E-07	2.42E-06	1.2E-06	7.6E-10	1.2E-06	1.5E+00	8.0E-07
Chlordane	4.36E-09	1.17E-11	5.6E-12	7.5E-12	1.3E-11	2.1E+00	6.1E-12
Chromium, hexavalent	1.25E-06	4.55E-08	2.2E-08	2.2E-09	2.4E-08	1.0E+00	2.4E-08
Chrysene	4.81E-10	3.19E-12	1.5E-12	8.3E-13	2.4E-12	1.0E-03	2.4E-09
Copper	1.19E-06	9.60E-07	4.6E-07	2.1E-09	4.6E-07	4.7E+01	9.8E-09
DDE, 4,4'-	1.07E-08	2.14E-11	1.0E-11	1.9E-11	2.9E-11	8.5E-01	3.4E-11
Dibenz(a,h)anthracene	4.05E-11	2.85E-11	1.4E-11	7.0E-14	1.4E-11	3.9E-04	3.5E-08
Dinitrobenzene, 1,3-	8.08E-09	3.86E-09	1.8E-09	1.4E-11	1.9E-09	4.2E-04	4.4E-06
Ethylhexyl phthalate, bis-2-	5.92E-09	2.18E-08	1.0E-08	1.0E-11	1.0E-08	1.1E+02	9.4E-11
gamma-BHC (Lindane)	1.69E-10	5.90E-12	2.8E-12	2.9E-13	3.1E-12	2.0E+00	1.6E-12
Heptachlor	1.28E-11	1.46E-13	7.0E-14	2.2E-14	9.2E-14	6.5E-02	1.4E-12
Hexachloro-1,3-butadiene (Perchlorobutadiene)	1.08E-08	6.32E-11	3.0E-11	1.9E-11	4.9E-11	3.2E+00	1.5E-11
Hexachlorobenzene	2.90E-08	8.79E-11	4.2E-11	5.0E-11	9.2E-11	2.3E-01	4.1E-10
Indeno(1,2,3-cd) pyrene	3.48E-10	4.02E-11	1.9E-11	6.0E-13	2.0E-11	1.0E-03	2.0E-08
Lead	6.53E-06	2.43E-06	1.2E-06	1.1E-08	1.2E-06	2.5E-02	4.7E-05
Manganese	7.13E-08	3.61E-07	1.7E-07	1.2E-10	1.7E-07	9.8E+02	1.8E-10
Mercuric chloride	8.22E-06	9.67E-08	4.6E-08	1.4E-08	6.0E-08	3.3E+00	1.9E-08
Methyl mercury	1.67E-07	2.51E-08	1.2E-08	2.9E-10	1.2E-08	6.4E-03	1.9E-06
Nickel	1.50E-08	7.69E-08	3.7E-08	2.6E-11	3.7E-08	6.5E+01	5.7E-10
Pentachloronitrobenzene (PCNB)	3.95E-08	2.86E-10	1.4E-10	6.8E-11	2.1E-10	6.9E+01	3.0E-12
Pentachlorophenol	7.31E-08	3.04E-07	1.5E-07	1.3E-10	1.5E-07	4.0E+00	3.6E-08
Selenium	1.13E-09	2.94E-08	1.4E-08	1.9E-12	1.4E-08	5.0E-01	2.8E-08
Silver	2.71E-07	2.45E-08	1.2E-08	4.7E-10	1.2E-08	1.8E+02	6.8E-11
Dioxin - TEQB	1.65E-10	1.65E-12	7.9E-13	2.9E-13	1.1E-12	1.0E-05	1.1E-07
Thallium (I)	4.45E-06	7.20E-08	3.4E-08	7.7E-09	4.2E-08	3.5E-01	1.2E-07
Vanadium	1.70E-06	1.94E-08	9.3E-09	2.9E-09	1.2E-08	1.1E+01	1.1E-09
Zinc	2.17E-07	1.17E-06	5.6E-07	3.8E-10	5.6E-07	1.3E+02	4.3E-09
						Cumulative HI (i):	**5E-05**

(a) Only those compounds with TRVs are listed in this table.
(b) Soil concentrations (Csoil) were calculated using USEPA's HHRAP fate and transport equations, using the IRAP software program.
(c) Plant concentrations (Cplant) were calculated using USEPA's HHRAP fate and transport equations, using the IRAP software program. Wet weight plant concentrations were calculated from the IRAP outputs dry weight concentrations using a moisture content of 88% as specified in USEPA's 1999 Screening Ecological Risk Assessment Protocol.
(d) DDdiet = Cplant x Food IR; assumes that 100% of ingested plant material is potentially contaminated
(e) DDsoil = Csoil x Soil IR; assumes that 100% of ingested soil is potentially contaminated
(f) Total Daily Dose = DDdiet + DDsoil

Table 5
Calculation of Hazard Quotients for Gambel's Quail - Agricultural Area

Compound (a)	Maximum Annual Soil Concentration (mg/kg) (b)	Plant Tissue Concentration (mg/kg WW) (c)	Daily Dose from Diet (mg/kg BW-d) (d)	Daily Dose from Soil (mg/kg BW-d) (e)	Total Daily Dose (mg/kg BW-d) (f)	TRV (Bird) (mg/kg BW-d) (g)	Hazard Quotient (h)

(g) Toxicity Reference Values (TRVs) are discussed in the text.
(h) Hazard Quotients (HQ) are calculated by dividing the daily dose by the TRV.
(i) The Cumulative Hazard Index (HI) is calculated by summing the chemical-specific HQs. The HI conservatively reflects exposure to all evaluated compounds, regardless of the type or mechanism of effects. For this project, the target hazard index value was 0.25, based on USEPA Region IX input. If an HI, based on the sum of hazard quotients for all compounds, is above the target level, then the HI values are recalculated for groups of compounds having the same type of health effect and/or a more detailed evaluation may be conducted. A common regulatory target hazard index value used by most states and many other USEPA programs, for compounds grouped according to specific types of health effects, is 1.

Dioxin-TEQB is the Toxic Equivalents (TEQ) for birds calculated by multiplying each congener concentration by its corresponding TEF then summing all of the results. This calculation is presented elsewhere in this appendix.
Food IR - Food ingestion rate as shown in Table 5.2-2
Soil IR - Soil ingestion rate as shown in Table 5.2-2

mg - milligrams
kg - kilograms
BW - body weight
d - day
DD - daily dose

Table 6
Calculation of Hazard Quotients for Burrowing Owl - Agricultural Area

Compound (a)	Maximum Annual Soil Concentration (mg/kg) (b)	Plant Tissue Concentration (mg/kg) (c)	Kow	Biotransfer Factor (BaA) (d)	BCF plant-herbivore (e)	Mammal Prey Tissue Concentration (mg/kg) (f)	Daily Dose from Prey (mg/kg-BW-d) (g)	Daily Dose from Soil (mg/kg-BW-d) (h)	Total Daily Dose (mg/kg-BW-d) (i)	TRV (mg/kg-BW-d) (j)	Hazard Quotient (k)
Acetone	1.14E-08	8.59E-09			9.3E-09	8.0E-17	2.8E-17	7.2E-10	7.2E-10	5.2E+01	1.4E-11
Aluminum	1.36E-05	9.01E-07		8.0E-04	4.9E-04	4.4E-10	1.6E-10	8.7E-07	8.7E-07	1.0E+02	8.7E-09
Aroclor 1254	6.38E-09	4.70E-12			2.5E-02	1.2E-13	4.1E-14	4.1E-10	4.1E-10	7.2E-02	5.6E-09
Arsenic	2.76E-09	9.80E-07			1.2E-03	1.2E-09	4.2E-10	1.8E-10	6.0E-10	2.5E+00	2.4E-10
Barium	3.37E-06	7.85E-08			9.2E-05	7.2E-12	2.5E-12	2.1E-07	2.1E-07	2.1E+01	1.0E-08
Benzo(a)Anthracene	6.09E-11	2.07E-12			7.4E-03	1.5E-14	5.4E-15	3.9E-12	3.9E-12	7.9E-04	4.9E-09
Benzo(a)pyrene	4.29E-11	6.10E-12			2.1E-02	1.3E-13	4.5E-14	2.7E-12	2.8E-12	1.0E-03	2.8E-09
Benzo(b)fluoranthene	9.68E-10	3.23E-12			2.5E-02	7.9E-14	2.8E-14	6.2E-11	6.2E-11	1.4E-04	4.4E-07
Benzo(k)fluoranthene	2.42E-10	1.31E-11			2.4E-02	3.2E-13	1.1E-13	1.5E-11	1.6E-11	1.4E-04	1.1E-07
Cadmium	4.38E-07	2.42E-06			7.4E-05	1.8E-10	6.3E-11	2.8E-08	2.8E-08	1.5E+00	1.9E-08
Chlordane	4.36E-09	1.17E-11	3.2E+05	7.9E-03	4.9E-03	5.7E-14	2.0E-14	2.8E-10	2.8E-10	2.1E+00	1.3E-10
Chromium, hexavalent	1.25E-06	4.55E-08			3.4E-03	1.5E-10	5.4E-11	8.0E-08	8.0E-08	1.0E+00	8.0E-08
Chrysene	4.81E-10	3.19E-12			8.5E-03	2.7E-14	9.5E-15	3.1E-11	3.1E-11	1.0E-03	3.1E-08
Copper	1.19E-06	9.60E-07		8.0E-02	4.9E-02	4.7E-08	1.7E-08	7.6E-08	9.3E-08	4.7E+01	2.0E-09
DDE, 4,4'-	1.07E-08	2.14E-11			2.8E-02	6.0E-13	2.1E-13	6.8E-10	6.8E-10	8.5E-01	8.1E-10
Dibenz(a,h)anthracene	4.05E-11	2.85E-11			5.4E-02	1.5E-12	5.5E-13	2.6E-12	3.1E-12	3.9E-04	8.0E-09
Dinitrobenzene, 1,3-	8.08E-09	3.86E-09			4.8E-07	1.8E-15	6.5E-16	5.1E-10	5.1E-10	4.2E-04	1.2E-06
Ethylhexyl phthalate, bis-2-	5.92E-09	2.18E-08			2.5E-03	5.4E-11	1.9E-11	3.8E-10	4.0E-10	1.1E+02	3.6E-12
gamma-BHC (Lindane)	1.69E-10	5.90E-12	4.0E+03	1.0E-04	6.1E-05	3.6E-16	1.3E-16	1.1E-11	1.1E-11	2.0E+00	5.4E-12
Heptachlor	1.28E-11	1.46E-13			1.6E-03	2.3E-16	8.2E-17	8.1E-13	8.1E-13	6.5E-02	1.3E-11
Hexachloro-1,3-butadiene (Perchlorobutadiene)	1.08E-08	6.32E-11			8.3E-04	5.2E-14	1.8E-14	6.9E-10	6.9E-10	3.2E+00	2.2E-10
Hexachlorobenzene	2.90E-08	8.79E-11			4.9E-03	4.3E-13	1.5E-13	1.8E-09	1.8E-09	2.3E-01	8.2E-09
Indeno(1,2,3-cd) pyrene	3.48E-10	4.02E-11			1.3E-01	5.1E-12	1.8E-12	2.2E-11	2.4E-11	1.0E-03	2.4E-08
Lead	6.53E-06	2.43E-06			1.8E-04	4.5E-10	1.6E-10	4.2E-07	4.2E-07	2.5E-02	1.7E-05
Manganese	7.13E-08	3.61E-07		5.0E-02	3.1E-02	1.1E-08	3.9E-09	4.5E-09	8.4E-09	9.8E+02	8.6E-12
Mercuric chloride	8.22E-06	9.67E-08			3.2E-03	3.1E-10	1.1E-10	5.2E-07	5.2E-07	3.3E+00	1.6E-07
Methyl mercury	1.67E-07	2.51E-08			4.8E-04	1.2E-11	4.2E-12	1.1E-08	1.1E-08	6.4E-03	1.7E-06
Nickel	1.50E-08	7.69E-08			3.7E-03	2.8E-10	1.0E-10	9.5E-10	1.1E-09	6.5E+01	1.6E-11
Pentachloronitrobenzene (PCNB)	3.95E-08	2.86E-10			6.8E-04	1.9E-13	6.8E-14	2.5E-09	2.5E-09	6.9E+01	3.7E-11
Pentachlorophenol	7.31E-08	3.04E-07			1.9E-03	5.6E-10	2.0E-10	4.7E-09	4.9E-09	4.0E+00	1.2E-09
Selenium	1.13E-09	2.94E-08			1.4E-03	4.1E-11	1.4E-11	7.2E-11	8.6E-11	5.0E-01	1.7E-10
Silver	2.71E-07	2.45E-08			1.8E-03	4.5E-11	1.6E-11	1.7E-08	1.7E-08	1.8E+02	9.7E-11
Dioxin - TEQB	1.65E-10	1.65E-12			(l)	2.5E-16	8.9E-17	1.0E-11	1.0E-11	1.0E-05	1.0E-06
Thallium (l)	4.45E-06	7.20E-08			2.5E-02	1.8E-09	6.2E-10	2.8E-07	2.8E-07	3.5E-01	8.1E-07
Vanadium	1.70E-06	1.94E-08		1.1E-03	6.8E-04	1.3E-11	4.6E-12	1.1E-07	1.1E-07	1.1E+01	9.5E-09
Zinc	2.17E-07	1.17E-06			5.5E-05	6.5E-11	2.3E-11	1.4E-08	1.4E-08	1.3E+02	1.1E-10
										Cumulative HI (m) :	2E-05

(a) Only those compounds with TRVs are listed in this table.
(b) Soil concentrations (Csoil) were calculated using USEPA's HHRAP fate and transport equations, using the IRAP software program.
(c) Plant concentrations (Cplant) were calculated using USEPA's HHRAP fate and transport equations, using the IRAP software program. Wet weight plant concentrations were calculated from the IRAP outputs dry weight concentrations using a moisture content of 88% as specified in USEPA's 1999 Screening Ecological Risk Assessment Protocol.
(d) For organic compounds not included in USEPA, 1999, the BaA was calculated using Travis & Arms equation: logBaA = -7.6 + logKow
For inorganic compounds not included in USEPA, 1999, the BaA was taken from Baes 1984.
(e) Bioconcentration Factors (BCFs) in prey items are based on the white footed mouse and were obtained from Appendix D of USEPA's 1999 Screening Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities. If a BCF was not available then it was calculated using the following equation:
BCFplant-herbivore = BaA X Food IR, Food Ingestion Rate for mouse = 0.614 (kg WW/kg BW-d)
(f) Prey tissue concentration = plant tissue concentration X BCFplant-herbivore; except for Dioxin TEQB which is calculated on a congener-specific basis and is shown elsewhere in this appendix.
(g) DDdiet = Cprey x Food IR; assumes that 100% of ingested prey is potentially contaminated
(h) DDsoil = Csoil x Soil IR; assumes that 100% of ingested soil is potentially contaminated
(i) Total Daily Dose = DDdiet + DDsoil

Table 6
Calculation of Hazard Quotients for Burrowing Owl - Agricultural Area

Compound (a)	Maximum Annual Soil Concentration (mg/kg) (b)	Plant Tissue Concentration (mg/kg) (c)	Kow	Biotransfer Factor (BaA) (d)	BCF plant-herbivore (e)	Mammal Prey Tissue Concentration (mg/kg) (f)	Daily Dose from Prey (mg/kg-BW-d) (g)	Daily Dose from Soil (mg/kg-BW-d) (h)	Total Daily Dose (mg/kg-BW-d) (i)	TRV (mg/kg-BW-d) (j)	Hazard Quotient (k)

(j) Toxicity Reference Values (TRVs) are discussed in the text.
(k) Hazard Quotients (HQ) are calculated by dividing the daily dose by the TRV.
(l) BCFs were calculated for individual congeners using bioaccumulation equivalency factors (BEFs) from Appendix D of USEPA (1999). See elsewhere in this appendix for more information.
(m) The Cumulative Hazard Index (HI) is calculated by summing the chemical-specific HQs. The HI conservatively reflects exposure to all evaluated compounds, regardless of the type or mechanism of effects. For this project, the target hazard index value was 0.25, based on USEPA Region IX input. If an HI, based on the sum of hazard quotients for all compounds, is above the target level, then the HI values are recalculated for groups of compounds having the same type of health effect and/or a more detailed evaluation may be conducted. A common regulatory target hazard index value used by most states and many other USEPA programs, for compounds grouped according to specific types of health effects, is 1.

Dioxin-TEQB is the Toxic Equivalents (TEQ) for birds calculated by multiplying each congener concentration by its corresponding TEF then summing all of the results. This calculation is presented elsewhere in this appendix.
Food IR - Food ingestion rate as shown in Table 5.2-2
Soil IR - Soil ingestion rate as shown in Table 5.2-2

mg - milligrams
kg - kilograms
BW - body weight
WW- wet weight
d - day
DD - daily dose
Kow - octanol-water partition coefficient

Table 7
Hazard Quotients for Plants (Alfalfa) in the Agricultural Area

CAS No	Compound (a)	Maximum Annual Soil Concentration (mg/kg) (b)	Toxicity Reference Value (TRV) (mg/kg) (c)	Hazard Quotient (d)
108-60-1	2,2'-oxybis (1-Chloropropane)	1.40E-09	2.0E+01	7.0E-11
591-78-6	2-Hexanone	1.05E-09	1.3E+01	8.3E-11
91-57-6	2-Methylnaphthalene	1.88E-08	3.2E+00	5.8E-09
534-52-1	4,6-Dinitro-2-methylphenol	8.05E-08	1.4E-01	5.6E-07
208-96-8	Acenaphthylene	3.23E-09	6.8E+02	4.7E-12
7429-90-5	Aluminum	1.36E-05	5.0E+00	2.7E-06
7440-36-0	Antimony	2.36E-09	5.0E-01	4.7E-09
11097-69-1	Aroclor 1254	6.38E-09	1.0E+01	6.4E-10
7440-38-2	Arsenic	2.76E-09	1.0E+00	2.8E-09
7440-39-3	Barium	3.37E-06	5.0E+00	6.7E-07
56-55-3	Benzo(a)Anthracene	6.09E-11	1.2E+00	5.1E-11
50-32-8	Benzo(a)pyrene	4.29E-11	1.2E+00	3.6E-11
205-99-2	Benzo(b)fluoranthene	9.68E-10	1.2E+00	8.1E-10
191-24-2	Benzo(g,h,i)perylene	1.06E-09	1.2E+02	8.9E-12
207-08-9	Benzo(k)fluoranthene	2.42E-10	1.2E+00	2.0E-10
7440-41-7	Beryllium	3.85E-06	1.0E-01	3.8E-05
111-91-1	Bis(2-chloroethoxy) methane	4.23E-09	3.0E-01	1.4E-08
7440-43-9	Cadmium	4.38E-07	2.0E-01	2.2E-06
18540-29-9	Chromium, hexavalent	1.25E-06	1.8E-02	7.0E-05
218-01-9	Chrysene	4.81E-10	1.2E+00	4.0E-10
7440-48-4	Cobalt	2.30E-07	2.0E+01	1.1E-08
7440-50-8	Copper	1.19E-06	1.0E+00	1.2E-06
319-86-8	delta-BHC	1.10E-08	9.9E+00	1.1E-09
53-70-3	Dibenz(a,h)anthracene	4.05E-11	1.2E+00	3.4E-11
122-39-4	Diphenylamine	4.01E-07	1.0E+00	4.0E-07
33213-65-9	Endosulfan II	7.18E-10	1.2E-01	6.0E-09
7421-93-4	Endrin aldehyde	2.17E-08	1.1E-02	2.1E-06
58-89-9	gamma-BHC (Lindane)	1.69E-10	5.0E-03	3.4E-08
76-44-8	Heptachlor	1.28E-11	1.0E+00	1.3E-11
77-47-4	Hexachlorocyclopentadiene	1.14E-08	1.0E-01	1.1E-07
193-39-5	Indeno(1,2,3-cd) pyrene	3.48E-10	1.2E+00	2.9E-10
74-88-4	Iodomethane	2.91E-10	1.2E+00	2.4E-10
7439-92-1	Lead	6.53E-06	4.6E+00	1.4E-06
7439-96-5	Manganese	7.13E-08	5.0E+02	1.4E-10
7487-94-7	Mercuric chloride	8.22E-06	3.5E-01	2.4E-05
80-62-6	Methyl methacrylate	1.11E-12	9.8E+02	1.1E-15
7440-02-0	Nickel	1.50E-08	2.5E+01	6.0E-10
62-75-9	N-nitrosodimethylamine	1.49E-09	1.2E+01	1.3E-10
87-86-5	Pentachlorophenol	7.31E-08	1.7E+00	4.2E-08
7782-49-2	Selenium	1.13E-09	5.0E-02	2.3E-08
7440-22-4	Silver	2.71E-07	2.0E-02	1.4E-05
7440-28-0	Thallium (I)	4.45E-06	1.0E-02	4.5E-04
7440-62-2	Vanadium	1.70E-06	2.0E+00	8.5E-07
7440-66-6	Zinc	2.17E-07	9.0E-01	2.4E-07
			Cumulative HI (e) =	**6E-04**

(a) Only those compounds with TRVs are listed in this table.
(b) Soil concentrations were calculated using USEPA's 2005 HHRAP fate and transport equations, using the IRAP software program.
(c) Toxicity Reference Values (TRVs) are discussed in the text.
(d) Hazard Quotient (HQ) is calculated by dividing the maximum annual soil concentration by the TRV.
(e) The Cumulative Hazard Index (HI) is calculated by summing the chemical-specific HQs. The HI conservatively reflects exposure to all evaluated compounds, regardless of the type or mechanism of effects. For this project, the target hazard index value was 0.25, based on USEPA Region IX input. If an HI, based on the sum of hazard quotients for all compounds, is above the target level, then the HI values are recalculated for groups of compounds having the same type of health effect and/or a more detailed evaluation may be conducted.
A common regulatory target hazard index value used by most states and many other USEPA programs, for compounds grouped according to specific types of health effects, is 1.

mg/kg - milligrams per kilogram

Table 8
Calculation of Hazard Quotients for Southwest Willow Flycatcher - Riparian Corridor Area

Compound (a)	Maximum Annual Soil Concentration (mg/kg) (b)	Kow	BCF soil-soil invert (c)	Invertebrate Prey Tissue Concentration (mg/kg) (d)	Daily Dose from Prey (mg/kg-BW-d) (e)	Total Daily Dose (mg/kg-BW-d) (f)	TRV (mg/kg-BW-d) (g)	Hazard Quotient (h)
Acetone	2.90E-09		5.0E-02	8.7E-10	1.5E-09	1.5E-09	5.2E+01	2.8E-11
Aluminum	2.37E-04		2.2E-01	3.1E-04	5.2E-04	5.2E-04	1.0E+02	5.2E-06
Aroclor 1254	6.39E-08		1.1E+00	4.3E-07	7.3E-07	7.3E-07	7.2E-02	1.0E-05
Arsenic	3.87E-10		1.1E-01	2.5E-10	4.3E-10	4.3E-10	2.5E+00	1.7E-10
Barium	5.26E-05		2.2E-01	6.9E-05	1.2E-04	1.2E-04	2.1E+01	5.6E-06
Benzo(a)Anthracene	7.18E-10		3.0E-02	1.3E-10	2.2E-10	2.2E-10	7.9E-04	2.7E-07
Benzo(a)pyrene	5.72E-10		7.0E-02	2.4E-10	4.0E-10	4.0E-10	1.0E-03	4.0E-07
Benzo(b)fluoranthene	9.80E-09		7.0E-02	4.1E-09	6.9E-09	6.9E-09	1.4E-04	4.9E-05
Benzo(k)fluoranthene	3.29E-09		8.0E-02	1.6E-09	2.6E-09	2.6E-09	1.4E-04	1.9E-05
Cadmium	6.15E-08		9.6E-01	3.5E-07	5.9E-07	5.9E-07	1.5E+00	4.1E-07
Chromium, hexavalent	2.10E-05		2.2E-01	2.8E-05	4.7E-05	4.7E-05	1.0E+00	4.7E-05
Chrysene	5.14E-09		4.0E-02	1.2E-09	2.1E-09	2.1E-09	1.0E-03	2.1E-06
Copper	1.68E-07		4.0E-02	4.0E-08	6.7E-08	6.7E-08	4.7E+01	1.4E-09
DDE, 4,4'-	1.08E-07		1.3E+00	8.2E-07	1.4E-06	1.4E-06	8.5E-01	1.6E-06
Dibenz(a,h)anthracene	5.56E-10		7.0E-02	2.3E-10	3.9E-10	3.9E-10	3.9E-04	1.0E-06
Dinitrobenzene, 1,3-	8.56E-08		1.2E+00	6.1E-07	1.0E-06	1.0E-06	4.2E-04	2.4E-03
Ethylhexyl phthalate, bis-2-	9.50E-08		1.3E+03	7.4E-04	1.3E-03	1.3E-03	1.1E+02	1.1E-05
gamma-BHC (Lindane)	2.88E-10	4.0E+03	6.3E+01	1.1E-07	1.8E-07	1.8E-07	2.0E+00	9.2E-08
Heptachlor	1.28E-10		1.4E+00	1.1E-09	1.8E-09	1.8E-09	6.5E-02	2.8E-08
Hexachloro-1,3-butadiene (Perchlorobutadiene)	3.44E-08		5.4E+02	1.1E-04	1.9E-04	1.9E-04	3.2E+00	5.8E-05
Hexachlorobenzene	4.14E-09		2.3E+03	5.7E-05	9.6E-05	9.6E-05	2.3E-01	4.3E-04
Indeno(1,2,3-cd) pyrene	4.80E-09		8.0E-02	2.3E-09	3.9E-09	3.9E-09	1.0E-03	3.9E-06
Lead	9.16E-07		3.0E-02	1.6E-07	2.8E-07	2.8E-07	2.5E-02	1.1E-05
Manganese	1.00E-08		2.2E-01	1.3E-08	2.2E-08	2.2E-08	9.8E+02	2.3E-11
Mercuric chloride	8.55E-05		4.0E-02	2.0E-05	3.4E-05	3.4E-05	3.3E+00	1.1E-05
Methyl mercury	1.73E-06		8.5E+00	8.8E-05	1.5E-04	1.5E-04	6.4E-03	2.3E-02
Nickel	2.10E-09		2.0E-02	2.5E-10	4.2E-10	4.2E-10	6.5E+01	6.5E-12
Pentachloronitrobenzene (PCNB)	3.47E-07		4.5E+02	9.4E-04	1.6E-03	1.6E-03	6.9E+01	2.3E-05
Pentachlorophenol	8.08E-07		1.0E+03	5.0E-03	8.4E-03	8.4E-03	4.0E+00	2.1E-03
Selenium	1.59E-10		2.2E-01	2.1E-10	3.5E-10	3.5E-10	5.0E-01	7.0E-10
Silver	4.73E-06		2.2E-01	6.2E-06	1.0E-05	1.0E-05	1.8E+02	5.9E-08
Dioxin - TEQB	1.99E-09		(i)	3.2E-09	5.4E-09	5.4E-09	1.0E-05	5.4E-04
Thallium (l)	6.65E-05		2.2E-01	8.8E-05	1.5E-04	1.5E-04	3.5E-01	4.2E-04
Vanadium	2.36E-05		2.2E-01	3.1E-05	5.2E-05	5.2E-05	1.1E+01	4.6E-06
Zinc	3.05E-08		5.6E-01	1.0E-07	1.7E-07	1.7E-07	1.3E+02	1.3E-09
							Cumulative HI (j) :	**3E-02**

(a) Only those compounds with TRVs are listed in this table.
(b) Soil concentrations (Csoil) were calculated using USEPA's HHRAP fate and transport equations, using the IRAP software program.
(c) For organic compounds not included in USEPA, 1999, a BCF value was calculated using the following equation:
logBCF=0.819 x logKow 1.146. For inorganic compounds not included in USEPA, 1999, a BCF value of 0.22 was used.
(d) Prey Tissue Concentration = Csoil x $BCF/CF_{WWinvert}$; except for Dioxin - TEQB which is calculated on a congener-specific basis and is shown elsewhere in this appendix.
Assumes 100% of prey tissue is potentially contaminated

Table 8
Calculation of Hazard Quotients for Southwest Willow Flycatcher - Riparian Corridor Area

Compound (a)	Maximum Annual Soil Concentration (mg/kg) (b)	Kow	BCF soil-soil invert (c)	Invertebrate Prey Tissue Concentration (mg/kg) (d)	Daily Dose from Prey (mg/kg-BW-d) (e)	Total Daily Dose (mg/kg-BW-d) (f)	TRV (mg/kg-BW-d) (g)	Hazard Quotient (h)

(e) DDprey = Prey Tissue Concentration x Food IR; assumes 100% of prey tissue is potentially contaminated
(f) Total daily dose is the daily dose from prey with the assumption the flycatcher does not ingest soil.
(g) Toxicity Reference Values (TRVs) are discussed in the text.
(h) Hazard Quotients (HQ) are calculated by dividing the daily dose by the TRV.
(i) BCFs were calculated for individual congeners using bioaccumulation equivalency factors (BEFs) from Appendix D of USEPA (1999). See elsewhere in this appendix for more information.
(j) The Cumulative Hazard Index (HI) is calculated by summing the chemical-specific HQs. The HI conservatively reflects exposure to all evaluated compounds, regardless of the type or mechanism of effects. For this project, the target hazard index value was 0.25, based on USEPA Region IX input. If an HI, based on the sum of hazard quotients for all compounds, is above the target level, then the HI values are recalculated for groups of compounds having the same type of health effect and/or a more detailed evaluation may be conducted. A common regulatory target hazard index value used by most states and many other USEPA programs, for compounds grouped according to specific types of health effects, is 1.

Dioxin-TEQB is the Toxic Equivalents (TEQ) for birds calculated by multiplying each congener concentration by its corresponding TEF then summing all of the results. This calculation is presented elsewhere in this appendix.
Food IR - Food ingestion rate as shown in Table 5.2-2
Soil IR - Soil ingestion rate as shown in Table 5.2-2
$CF_{WW\text{-}invert}$ - Conversion factor from wet weight to dry weight (0.167)

mg - milligrams
kg - kilograms
BW - body weight
d - day
WW - wet weight
Kow - octanol-water partition coefficient

Table 9
Calculation of Hazard Quotients for Gambel's Quail - Riparian Corridor Area

Compound (a)	Maximum Annual Soil Concentration (mg/kg) (b)	Plant Tissue Concentration (mg/kg WW) (c)	Daily Dose from Diet (mg/kg BW-d) (d)	Daily Dose from Soil (mg/kg BW-d) (e)	Total Daily Dose (mg/kg BW-d) (f)	TRV (Bird) (mg/kg BW-d) (g)	Hazard Quotient (h)
Acetone	2.90E-09	2.91E-09	1.4E-09	5.0E-12	1.4E-09	5.2E+01	2.7E-11
Aluminum	2.37E-04	1.27E-06	6.1E-07	4.1E-07	1.0E-06	1.0E+02	1.0E-08
Aroclor 1254	6.39E-08	3.14E-11	1.5E-11	1.1E-10	1.3E-10	7.2E-02	1.7E-09
Arsenic	3.87E-10	1.36E-06	6.5E-07	6.7E-13	6.5E-07	2.5E+00	2.6E-07
Barium	5.26E-05	2.18E-07	1.0E-07	9.1E-08	2.0E-07	2.1E+01	9.4E-09
Benzo(a)Anthracene	7.18E-10	4.78E-12	2.3E-12	1.2E-12	3.5E-12	7.9E-04	4.5E-09
Benzo(a)pyrene	5.72E-10	9.07E-12	4.3E-12	9.9E-13	5.3E-12	1.0E-03	5.3E-09
Benzo(b)fluoranthene	9.80E-09	1.52E-11	7.3E-12	1.7E-11	2.4E-11	1.4E-04	1.7E-07
Benzo(k)fluoranthene	3.29E-09	1.96E-11	9.4E-12	5.7E-12	1.5E-11	1.4E-04	1.1E-07
Cadmium	6.15E-08	3.35E-06	1.6E-06	1.1E-10	1.6E-06	1.5E+00	1.1E-06
Chromium, hexavalent	2.10E-05	7.07E-08	3.4E-08	3.6E-08	7.0E-08	1.0E+00	7.0E-08
Chrysene	5.14E-09	1.54E-11	7.3E-12	8.9E-12	1.6E-11	1.0E-03	1.6E-08
Copper	1.68E-07	1.29E-06	6.2E-07	2.9E-10	6.2E-07	4.7E+01	1.3E-08
DDE, 4,4'-	1.08E-07	1.58E-10	7.6E-11	1.9E-10	2.6E-10	8.5E-01	3.1E-10
Dibenz(a,h)anthracene	5.56E-10	3.00E-11	1.4E-11	9.6E-13	1.5E-11	3.9E-04	3.9E-08
Dinitrobenzene, 1,3-	8.56E-08	5.30E-08	2.5E-08	1.5E-10	2.5E-08	4.2E-04	6.0E-05
Ethylhexyl phthalate, bis-2-	9.50E-08	3.50E-08	1.7E-08	1.6E-10	1.7E-08	1.1E+02	1.5E-10
gamma-BHC (Lindane)	2.88E-10	1.20E-11	5.8E-12	5.0E-13	6.3E-12	2.0E+00	3.1E-12
Heptachlor	1.28E-10	1.94E-12	9.3E-13	2.2E-13	1.1E-12	6.5E-02	1.8E-11
Hexachloro-1,3-butadiene (Perchlorobutadiene)	3.44E-08	2.67E-10	1.3E-10	6.0E-11	1.9E-10	3.2E+00	5.9E-11
Hexachlorobenzene	4.14E-09	1.72E-11	8.2E-12	7.2E-12	1.5E-11	2.3E-01	6.8E-11
Indeno(1,2,3-cd) pyrene	4.80E-09	5.83E-11	2.8E-11	8.3E-12	3.6E-11	1.0E-03	3.6E-08
Lead	9.16E-07	3.36E-06	1.6E-06	1.6E-09	1.6E-06	2.5E-02	6.4E-05
Manganese	1.00E-08	4.99E-07	2.4E-07	1.7E-11	2.4E-07	9.8E+02	2.4E-10
Mercuric chloride	8.55E-05	1.64E-07	7.8E-08	1.5E-07	2.3E-07	3.3E+00	7.0E-08
Methyl mercury	1.73E-06	2.83E-08	1.4E-08	3.0E-09	1.7E-08	6.4E-03	2.6E-06
Nickel	2.10E-09	1.06E-07	5.1E-08	3.6E-12	5.1E-08	6.5E+01	7.8E-10
Pentachloronitrobenzene (PCNB)	3.47E-07	3.09E-09	1.5E-09	6.0E-10	2.1E-09	6.9E+01	3.0E-11
Pentachlorophenol	8.08E-07	3.06E-07	1.5E-07	1.4E-09	1.5E-07	4.0E+00	3.7E-08
Selenium	1.59E-10	4.07E-08	1.9E-08	2.7E-13	1.9E-08	5.0E-01	3.9E-08
Silver	4.73E-06	9.41E-08	4.5E-08	8.2E-09	5.3E-08	1.8E+02	3.0E-10
Dioxin - TEQB	1.99E-09	3.33E-12	1.6E-12	3.5E-12	5.0E-12	1.0E-05	5.0E-07
Thallium (l)	6.65E-05	1.03E-07	4.9E-08	1.2E-07	1.6E-07	3.5E-01	4.7E-07
Vanadium	2.36E-05	3.10E-08	1.5E-08	4.1E-08	5.6E-08	1.1E+01	4.9E-09
Zinc	3.05E-08	1.62E-06	7.8E-07	5.3E-11	7.8E-07	1.3E+02	5.9E-09
						Cumulative HI (i):	**1E-04**

(a) Only those compounds with TRVs are listed in this table.
(b) Soil concentrations (Csoil) were calculated using USEPA's HHRAP fate and transport equations, using the IRAP software program.
(c) Plant concentrations (Cplant) were calculated using USEPA's HHRAP fate and transport equations, using the IRAP software program. Wet weight plant concentrations were calculated from the IRAP outputs dry weight concentrations using a moisture content of 88% as specified in USEPA's 1999 Screening Ecological Risk Assessment Protocol.
(d) DDdiet = Cplant x Food IR; assumes that 100% of ingested plant material is potentially contaminated
(e) DDsoil = Csoil x Soil IR; assumes that 100% of ingested soil is potentially contaminated
(f) Total Daily Dose = DDdiet + DDsoil
(g) Toxicity Reference Values (TRVs) are discussed in the text.

Table 9
Calculation of Hazard Quotients for Gambel's Quail - Riparian Corridor Area

Compound (a)	Maximum Annual Soil Concentration (mg/kg) (b)	Plant Tissue Concentration (mg/kg WW) (c)	Daily Dose from Diet (mg/kg BW-d) (d)	Daily Dose from Soil (mg/kg BW-d) (e)	Total Daily Dose (mg/kg BW-d) (f)	TRV (Bird) (mg/kg BW-d) (g)	Hazard Quotient (h)

(h) Hazard Quotients (HQ) are calculated by dividing the daily dose by the TRV.
(i) The Cumulative Hazard Index (HI) is calculated by summing the chemical-specific HQs. The HI conservatively reflects exposure to all evaluated compounds, regardless of the type or mechanism of effects. For this project, the target hazard index value was 0.25, based on USEPA Region IX input. If an HI, based on the sum of hazard quotients for all compounds, is above the target level, then the HI values are recalculated for groups of compounds having the same type of health effect and/or a more detailed evaluation may be conducted. A common regulatory target hazard index value used by most states and many other USEPA programs, for compounds grouped according to specific types of health effects, is 1.

Dioxin-TEQB is the Toxic Equivalents (TEQ) for birds calculated by multiplying each congener concentration by its corresponding TEF then summing all of the results. This calculation is presented elsewhere in this appendix.
Food IR - Food ingestion rate as shown in Table 5.2-2
Soil IR - Soil ingestion rate as shown in Table 5.2-2

mg - milligrams
kg - kilograms
BW - body weight
d - day
DD - daily dose

Table 10
Hazard Quotients for Plants (Screwbean mesquite) in the Riparian Corridor Area

CAS No	Compound (a)	Maximum Annual Soil Concentration (mg/kg) (b)	Toxicity Reference Value (TRV) (mg/kg) (c)	Hazard Quotient (d)
108-60-1	2,2'-oxybis (1-Chloropropane)	2.04E-10	2.0E+01	1.0E-11
591-78-6	2-Hexanone	1.38E-10	1.3E+01	1.1E-11
91-57-6	2-Methylnaphthalene	5.39E-09	3.2E+00	1.7E-09
534-52-1	4,6-Dinitro-2-methylphenol	7.33E-07	1.4E-01	5.1E-06
208-96-8	Acenaphthylene	6.48E-09	6.8E+02	9.5E-12
7429-90-5	Aluminum	2.37E-04	5.0E+00	4.7E-05
7440-36-0	Antimony	2.42E-10	5.0E-01	4.8E-10
11097-69-1	Aroclor 1254	6.39E-08	1.0E+01	6.4E-09
7440-38-2	Arsenic	3.87E-10	1.0E+00	3.9E-10
7440-39-3	Barium	5.26E-05	5.0E+00	1.1E-05
56-55-3	Benzo(a)Anthracene	7.18E-10	1.2E+00	6.0E-10
50-32-8	Benzo(a)pyrene	5.72E-10	1.2E+00	4.8E-10
205-99-2	Benzo(b)fluoranthene	9.80E-09	1.2E+00	8.2E-09
191-24-2	Benzo(g,h,i)perylene	1.91E-08	1.2E+02	1.6E-10
207-08-9	Benzo(k)fluoranthene	3.29E-09	1.2E+00	2.7E-09
7440-41-7	Beryllium	5.40E-07	1.0E-01	5.4E-06
111-91-1	Bis(2-chloroethoxy) methane	4.17E-08	3.0E-01	1.4E-07
7440-43-9	Cadmium	6.15E-08	2.0E-01	3.1E-07
18540-29-9	Chromium, hexavalent	2.10E-05	1.8E-02	1.2E-03
218-01-9	Chrysene	5.14E-09	1.2E+00	4.3E-09
7440-48-4	Cobalt	3.57E-06	2.0E+01	1.8E-07
7440-50-8	Copper	1.68E-07	1.0E+00	1.7E-07
319-86-8	delta-BHC	1.09E-07	9.9E+00	1.1E-08
53-70-3	Dibenz(a,h)anthracene	5.56E-10	1.2E+00	4.6E-10
122-39-4	Diphenylamine	3.86E-06	1.0E+00	3.8E-06
33213-65-9	Endosulfan II	6.35E-10	1.2E-01	5.3E-09
7421-93-4	Endrin aldehyde	2.23E-07	1.1E-02	2.1E-05
58-89-9	gamma-BHC (Lindane)	2.88E-10	5.0E-03	5.8E-08
76-44-8	Heptachlor	1.28E-10	1.0E+00	1.3E-10
77-47-4	Hexachlorocyclopentadiene	4.99E-08	1.0E-01	5.0E-07
193-39-5	Indeno(1,2,3-cd) pyrene	4.80E-09	1.2E+00	4.0E-09
74-88-4	Iodomethane	3.01E-11	1.2E+00	2.4E-11
7439-92-1	Lead	9.16E-07	4.6E+00	2.0E-07
7439-96-5	Manganese	1.00E-08	5.0E+02	2.0E-11
7487-94-7	Mercuric chloride	8.55E-05	3.5E-01	2.4E-04
80-62-6	Methyl methacrylate	1.24E-13	9.8E+02	1.3E-16
7440-02-0	Nickel	2.10E-09	2.5E+01	8.4E-11
62-75-9	N-nitrosodimethylamine	2.11E-09	1.2E+01	1.8E-10
87-86-5	Pentachlorophenol	8.08E-07	1.7E+00	4.7E-07
7782-49-2	Selenium	1.59E-10	5.0E-02	3.2E-09
7440-22-4	Silver	4.73E-06	2.0E-02	2.4E-04
7440-28-0	Thallium (I)	6.65E-05	1.0E-02	6.7E-03
7440-62-2	Vanadium	2.36E-05	2.0E+00	1.2E-05
7440-66-6	Zinc	3.05E-08	9.0E-01	3.4E-08
			Cumulative HI (e):	**8E-03**

(a) Only those compounds with TRVs are listed in this table.
(b) Soil concentrations were calculated using USEPA's 2005 HHRAP fate and transport equations, using the IRAP software program.
(c) Toxicity Reference Values (TRVs) are discussed in the text.
(d) Hazard Quotient (HQ) is calculated by dividing the maximum annual soil concentration by the TRV.
(e) The Cumulative Hazard Index (HI) is calculated by summing the chemical-specific HQs. The HI conservatively reflects exposure to all evaluated compounds, regardless of the type or mechanism of effects. For this project, the target hazard index value was 0.25, based on USEPA Region IX input. If an HI, based on the sum of hazard quotients for all compounds, is above the target level, then the HI values are recalculated for groups of compounds having the same type of health effect and/or a more detailed evaluation may be conducted.
A common regulatory target hazard index value used by most states and many other USEPA programs, for compounds grouped according to specific types of health effects, is 1.

mg/kg - milligrams per kilogram

Table 11
Calculation of Hazard Quotients for Double-crested Cormorant - Colorado River Area

Compound (a)	Maximum Annual Sediment Concentration (mg/kg) (b)	Maximum Annual Total Surface Water Concentration (mg/L) (c)	Maximum Annual Fish Concentration (mg COPC/kg WW tissue) (d)	Daily Dose from Sediment (mg/kg BW-d) (e)	Daily Dose from Surface Water (mg/kg BW-d) (f)	Daily Dose from Diet (mg/kg BW-d) (g)	Total Daily Dose (mg/kg BW-d) (h)	TRV (Bird) (mg/kg BW-d) (i)	Hazard Quotient (j)
Acetone	6.70E-12	3.35E-10	1.06E-09	3.7E-14	1.9E-11	2.9E-10	3.1E-10	5.2E+01	5.9E-12
Aluminum	5.48E-06	5.54E-07	2.77E-04	3.0E-08	3.1E-08	7.6E-05	7.6E-05	1.0E+02	7.6E-07
Aroclor 1254	4.48E-08	6.75E-13	1.57E-07	2.4E-10	3.7E-14	4.3E-08	4.3E-08	7.2E-02	6.0E-07
Arsenic	1.31E-08	4.52E-10	5.15E-08	7.2E-11	2.5E-11	1.4E-08	1.4E-08	2.5E+00	5.8E-09
Barium	1.24E-06	3.02E-08	1.91E-05	6.8E-09	1.7E-09	5.2E-06	5.2E-06	2.1E+01	2.5E-07
Benzo(a)Anthracene	2.09E-10	1.56E-14	7.27E-10	1.1E-12	8.7E-16	2.0E-10	2.0E-10	7.9E-04	2.5E-07
Benzo(a)pyrene	4.94E-10	1.52E-14	1.70E-09	2.7E-12	8.4E-16	4.6E-10	4.7E-10	1.0E-03	4.7E-07
Benzo(b)fluoranthene	6.89E-09	1.98E-13	3.39E-08	3.8E-11	1.1E-14	9.2E-09	9.3E-09	1.4E-04	6.6E-05
Benzo(k)fluoranthene	1.95E-09	5.88E-14	8.70E-09	1.1E-11	3.3E-15	2.4E-09	2.4E-09	1.4E-04	1.7E-05
Cadmium	8.57E-08	1.14E-09	1.04E-06	4.7E-10	6.3E-11	2.8E-07	2.8E-07	1.5E+00	2.0E-07
Chromium, hexavalent	4.52E-07	2.38E-08	4.52E-07	2.5E-09	1.3E-09	1.2E-07	1.3E-07	1.0E+00	1.3E-07
Chrysene	1.20E-09	8.08E-14	3.74E-09	6.6E-12	4.5E-15	1.0E-09	1.0E-09	1.0E-03	1.0E-06
Copper	1.90E-07	4.41E-10	8.82E-08	1.0E-09	2.5E-11	2.4E-08	2.5E-08	4.7E+01	5.3E-10
DDE, 4,4'-	3.92E-09	1.15E-12	5.65E-08	2.1E-11	6.4E-14	1.5E-08	1.5E-08	8.5E-01	1.8E-08
Dibenz(a,h)anthracene	1.35E-09	2.55E-14	9.38E-09	7.4E-12	1.4E-15	2.6E-09	2.6E-09	3.9E-04	6.6E-06
Dinitrobenzene, 1,3-	2.19E-10	1.84E-10	5.24E-10	1.2E-12	1.0E-11	1.4E-10	1.5E-10	4.2E-04	3.7E-07
Ethylhexyl phthalate, bis-2-	1.07E-07	2.46E-11	4.67E-09	5.8E-10	1.4E-12	1.3E-09	1.9E-09	1.1E+02	1.7E-11
gamma-BHC (Lindane)	6.66E-11	1.23E-12	1.45E-10	3.6E-13	6.8E-14	4.0E-11	4.0E-11	2.0E+00	2.0E-11
Heptachlor	3.00E-11	7.88E-14	4.79E-11	1.6E-13	4.4E-15	1.3E-11	1.3E-11	6.5E-02	2.0E-10
Hexachloro-1,3-butadiene (Perchlorobutadiene)	7.62E-10	2.52E-12	6.11E-09	4.2E-12	1.4E-13	1.7E-09	1.7E-09	3.2E+00	5.2E-10
Hexachlorobenzene	8.14E-09	2.58E-12	2.94E-08	4.4E-11	1.4E-13	8.0E-09	8.1E-09	2.3E-01	3.6E-08
Indeno(1,2,3-cd) pyrene	1.86E-08	2.42E-13	9.36E-08	1.0E-10	1.3E-14	2.6E-08	2.6E-08	1.0E-03	2.6E-05
Lead	1.04E-06	1.16E-09	1.04E-10	5.7E-09	6.4E-11	2.8E-11	5.8E-09	2.5E-02	2.3E-07
Manganese	1.11E-08	1.71E-10	6.82E-08	6.0E-11	9.5E-12	1.9E-08	1.9E-08	9.8E+02	1.9E-11
Mercuric chloride	1.54E-05	3.89E-10	0.00E+00	8.4E-08	2.2E-11	0.0E+00	8.4E-08	3.3E+00	2.6E-08
Methyl mercury	7.43E-08	4.63E-11	3.15E-04	4.1E-10	2.6E-12	8.6E-05	8.6E-05	6.4E-03	1.3E-02
Nickel	2.37E-09	3.65E-11	2.84E-09	1.3E-11	2.0E-12	7.8E-10	7.9E-10	6.5E+01	1.2E-11
Pentachloronitrobenzene (PCNB)	1.79E-08	1.24E-11	2.00E-08	9.8E-11	6.9E-13	5.4E-09	5.5E-09	6.9E+01	8.1E-11
Pentachlorophenol	1.38E-07	5.82E-09	1.42E-05	7.5E-10	3.2E-10	3.9E-06	3.9E-06	4.0E+00	9.6E-07
Selenium	7.24E-11	1.45E-11	5.93E-09	4.0E-13	8.0E-13	1.6E-09	1.6E-09	5.0E-01	3.2E-09
Silver	1.09E-07	1.31E-08	1.15E-06	5.9E-10	7.3E-10	3.1E-07	3.1E-07	1.8E+02	1.8E-09
Dioxin - TEQB	1.75E-09	3.23E-14	2.43E-10	9.6E-12	1.8E-15	6.6E-11	7.6E-11	1.0E-05	7.6E-06
Thallium (l)	1.59E-06	2.23E-08	2.23E-04	8.6E-09	1.2E-09	6.1E-05	6.1E-05	3.5E-01	1.7E-04
Vanadium	7.40E-07	7.42E-10	0.00E+00	4.0E-09	4.1E-11	0.0E+00	4.1E-09	1.1E+01	3.6E-10
Zinc	3.45E-08	5.56E-10	1.14E-06	1.9E-10	3.1E-11	3.1E-07	3.1E-07	1.3E+02	2.4E-09
								Cumulative HI (k):	**1E-02**

(a) Only those compounds with TRVs are listed in this table.
(b) Sediment concentrations (Csed) were calculated using USEPA's 2005 HHRAP fate and transport equations, using the IRAP software program.
(c) Surface water concentrations (Csw) were calculated using USEPA's 2005 HHRAP fate and transport equations, using the IRAP software program.
HHRAP calculates dissolved, but not total, water column concentrations for methyl mercury, and thus the dissolved concentration was used in this table for methyl mercury.
(d) Cfish were derived using IRAP software; assumes trophic level 4.
(e) DDsed = Csed x Sediment IR; assumes 100% of fish is potentially contaminated
(f) DDsw = Csw x Water IR; assumes 100% of surface water is potentially contaminated
(g) DDdiet = Cfish x Food IR; assumes 100% of fish is potentially contaminated
(h) Total Daily Dose = DDdiet + DDsed + DDsw

Table 11
Calculation of Hazard Quotients for Double-crested Cormorant - Colorado River Area

Compound (a)	Maximum Annual Sediment Concentration (mg/kg) (b)	Maximum Annual Total Surface Water Concentration (mg/L) (c)	Maximum Annual Fish Concentration (mg COPC/kg WW tissue) (d)	Daily Dose from Sediment (mg/kg BW-d) (e)	Daily Dose from Surface Water (mg/kg BW-d) (f)	Daily Dose from Diet (mg/kg BW-d) (g)	Total Daily Dose (mg/kg BW-d) (h)	TRV (Bird) (mg/kg BW-d) (i)	Hazard Quotient (j)

(i) Toxicity Reference Values (TRVs) are discussed in the text.
(j) Hazard Quotient is calculated by dividing the Daily Dose by the TRV.
(k) The Cumulative Hazard Index (HI) is calculated by summing the chemical-specific HQs. The HI conservatively reflects exposure to all evaluated compounds, regardless of the type or mechanism of effects. For this project, the target hazard index value was 0.25, based on USEPA Region IX input. If an HI, based on the sum of hazard quotients for all compounds, is above the target level, then the HI values are recalculated for groups of compounds having the same type of health effect and/or a more detailed evaluation may be conducted. A common regulatory target hazard index value used by most states and many other USEPA programs, for compounds grouped according to specific types of health effects, is 1.

Dioxin-TEQB is the Toxic Equivalents (TEQ) for birds calculated by multiplying each congener concentration by its corresponding TEF then summing all of the results. This calculation is presented elsewhere in this appendix.
Sediment IR - Sediment ingestion rate as shown in Table 5.2-2
Food IR - Food ingestion rate as shown in Table 5.2-2
Water IR - Surface water ingestion rate as shown in Table 5.2-2

mg - milligrams
kg - kilograms
L - liters
BW - body weight
d - day
WW - wet weight

Table 12
Calculation of Hazard Quotients for Surface Water - Colorado River Area*

CAS No	Compound (a)	Maximum Annual Dissolved Surface Water Concentration (mg/L) (b)	TRV (mg/L) (c)	Hazard Quotient (d)
95-63-6	1,2,4-Trimethylbenzene	1.26E-12	7.7E-02	1.6E-11
142-28-9	1,3-Dichloropropane	9.36E-13	1.3E+00	7.1E-13
110-54-3	1-Hexane (n-hexane)	1.51E-15	2.5E-02	6.1E-14
594-20-7	2,2-Dichloropropane	5.23E-13	3.9E-01	1.3E-12
625-86-5	2,5-Dimethylfuran	1.60E-12	7.1E-01	2.3E-12
95-49-8	2-Chlorotoluene	1.19E-12	1.4E-01	8.5E-12
591-78-6	2-Hexanone	9.45E-12	4.3E+00	2.2E-12
91-57-6	2-Methylnaphthalene	2.26E-13	1.5E-02	1.5E-11
534-52-1	4,6-Dinitro-2-methylphenol	2.58E-09	2.4E-02	1.1E-07
106-43-4	4-Chlorotoluene	9.00E-13	3.4E+00	2.6E-13
67-64-1	Acetone	3.35E-10	1.5E+00	2.2E-10
79-10-7	Acrylic Acid	1.10E-16	3.8E+00	2.9E-17
107-13-1	Acrylonitrile	3.85E-11	2.5E-01	1.5E-10
7429-90-5	Aluminum	5.54E-07	8.7E-02	6.4E-06
7440-36-0	Antimony	7.22E-12	3.0E-02	2.4E-10
11097-69-1	Aroclor 1254	4.56E-13	2.0E-05	2.3E-08
7440-38-2	Arsenic	4.52E-10	1.9E-01	2.4E-09
7440-39-3	Barium	3.02E-08	4.0E-03	7.6E-06
92-87-5	Benzidine	1.93E-08	8.9E-02	2.2E-07
56-55-3	Benzo(a)Anthracene	1.46E-14	2.7E-05	5.4E-10
50-32-8	Benzo(a)pyrene	1.28E-14	1.4E-05	9.1E-10
205-99-2	Benzo(b)fluoranthene	1.64E-13	2.7E-05	6.1E-09
207-08-9	Benzo(k)fluoranthene	4.93E-14	2.7E-05	1.8E-09
7440-41-7	Beryllium	4.76E-10	5.3E-03	9.0E-08
111-91-1	Bis(2-chloroethoxy) methane	5.33E-10	1.8E+00	2.9E-10
108-86-1	Bromobenzene	1.08E-12	5.6E-02	1.9E-11
98-06-6	Butylbenzene, tert	1.13E-12	6.5E-01	1.7E-12
7440-43-9	Cadmium	1.14E-09	5.3E-03	2.2E-07
86-74-8	Carbazole	1.12E-10	1.5E-02	7.5E-09
67-66-3	Chloroform (Trichloromethane)	1.62E-11	2.8E-02	5.8E-10
18540-29-9	Chromium, hexavalent	2.38E-08	1.1E-02	2.2E-06
218-01-9	Chrysene	7.50E-14	2.7E-05	2.8E-09
7440-50-8	Copper	4.41E-10	2.5E-02	1.8E-08
72-55-9	DDE, 4,4'-	1.13E-12	2.0E-05	5.7E-08
319-86-8	delta-BHC	2.53E-11	1.3E-01	1.9E-10
53-70-3	Dibenz(a,h)anthracene	1.89E-14	2.7E-05	7.0E-10
132-64-9	Dibenzofuran	5.95E-11	2.0E-02	3.0E-09
99-65-0	Dinitrobenzene, 1,3-	1.84E-10	2.6E-02	7.1E-09
121-14-2	Dinitrotoluene, 2,4-	4.24E-10	2.3E-02	1.8E-08
606-20-2	Dinitrotoluene, 2,6-	5.59E-10	6.0E-02	9.3E-09
117-84-0	Di-n-octylphthalate	3.94E-13	3.2E-01	1.2E-12
123-91-1	Dioxane, 1,4-	4.72E-16	6.2E+01	7.6E-18
122-39-4	Diphenylamine	1.45E-10	3.8E-02	3.8E-09
33213-65-9	Endosulfan II	1.43E-12	5.6E-05	2.5E-08
1031-07-8	Endosulfan sulfate	8.30E-12	6.0E-05	1.4E-07
7421-93-4	Endrin aldehyde	2.62E-12	8.0E-05	3.3E-08
107-21-1	Ethylene Glycol	5.40E-11	1.0E+03	5.4E-14
117-81-7	Ethylhexyl phthalate, bis-2-	2.41E-11	3.0E-03	8.0E-09
58-89-9	gamma-BHC (Lindane)	1.23E-12	2.8E-04	4.4E-09
76-44-8	Heptachlor	7.87E-14	4.0E-06	2.0E-08
87-68-3	Hexachloro-1,3-butadiene (Perchlorobutadiene)	2.52E-12	8.2E-03	3.1E-10
118-74-1	Hexachlorobenzene	2.54E-12	3.7E-03	6.9E-10
77-47-4	Hexachlorocyclopentadiene	1.65E-11	3.0E-04	5.5E-08
193-39-5	Indeno(1,2,3-cd) pyrene	1.51E-13	2.7E-05	5.6E-09
99-87-6	Isopropyl toluene, p-	1.01E-12	4.6E-02	2.2E-11
7439-92-1	Lead	1.16E-09	8.7E-03	1.3E-07
7439-96-5	Manganese	1.71E-10	8.0E-02	2.1E-09
7487-94-7	Mercuric chloride	2.62E-10	7.7E-04	3.4E-07
22967-92-6	Methyl mercury	4.63E-11	2.8E-06	1.7E-05
80-62-6	Methyl methacrylate	1.77E-14	3.4E+00	5.2E-15
1634-04-4	methyl tert-butyl ether	2.31E-13	1.0E+02	2.3E-15
7440-02-0	Nickel	3.65E-11	1.4E-01	2.6E-10
98-95-3	Nitrobenzene	1.20E-11	8.5E-01	1.4E-11

Table 12
Calculation of Hazard Quotients for Surface Water - Colorado River Area*

CAS No	Compound (a)	Maximum Annual Dissolved Surface Water Concentration (mg/L) (b)	TRV (mg/L) (c)	Hazard Quotient (d)
608-93-5	Pentachlorobenzene	2.76E-12	4.7E-04	5.9E-09
82-68-8	Pentachloronitrobenzene (PCNB)	1.23E-11	1.0E-02	1.2E-09
87-86-5	Pentachlorophenol	5.82E-09	1.6E-02	3.7E-07
103-65-1	Propylbenzene, n-	8.06E-13	1.6E-02	5.2E-11
7782-49-2	Selenium (e)	1.45E-11	2.0E-03	7.2E-09
7440-22-4	Silver	1.31E-08	1.2E-04	1.1E-04
TEQF	Dioxin - TEQF	8.86E-15	5.0E-06	1.8E-09
7440-28-0	Thallium (l)	2.23E-08	1.5E-01	1.5E-07
7440-62-2	Vanadium	7.40E-10	1.9E-02	3.9E-08
75-01-4	Vinyl Chloride	1.19E-12	3.9E+00	3.1E-13
7440-66-6	Zinc	5.56E-10	3.2E-01	1.8E-09
			Cumulative HI (f):	**1E-04**

(a) Only those compounds with TRVs are listed in this table.
(b) Surface water concentrations were calculated using USEPA's 2005 HHRAP fate and transport equations, using the IRAP software program.
(c) Toxicity Reference Values (TRVs) are discussed in the text.
(d) Maximum Hazard Quotient (HQ) is calculated by dividing the maximum annual surface water concentration by the TRV.
(e) The water concentration and the TRV for selenium is for total selenium.
(f) The Cumulative Hazard Index (HI) is calculated by summing the chemical-specific HQs. The HI conservatively reflects exposure to all evaluated compounds, regardless of the type or mechanism of effects. For this project, the target hazard index value was 0.25, based on USEPA Region IX input. If an HI, based on the sum of hazard quotients for all compounds, is above the target level, then the HI values are recalculated for groups of compounds having the same type of health effect and/or a more detailed evaluation may be conducted.
A common regulatory target hazard index value used by most states and many other USEPA programs, for compounds grouped according to specific types of health effects, is 1.

Dioxin-TEQF is the Toxic Equivalents (TEQ) for fish calculated by multiplying each congener concentration by its corresponding TEF then summing all of the results. This calculation is presented elsewhere in this appendix.
* Surface water concentrations for the Colorado River Area are used as a surrogate for the Riparian Backwater Area. Therefore, hazard quotients for Colorado River Area apply to the Riparian Backwater Area as well.

mg/L - milligrams per liter

Table 13
Calculation of Hazard Quotients for Sediment - Colorado River Area*

CAS No	Compound (a)	Maximum Annual Sediment Concentration (mg/kg) (b)	Toxicity Reference Value (TRV) (mg/kg) (c)	Hazard Quotient (d)
67-64-1	Acetone	6.70E-12	5.7E-02	1.2E-10
107-13-1	Acrylonitrile	2.70E-12	2.3E-02	1.2E-10
7429-90-5	Aluminum	5.48E-06	1.4E+04	3.9E-10
7440-36-0	Antimony	3.25E-10	6.4E+01	5.1E-12
11097-69-1	Aroclor 1254	4.48E-08	5.0E-02	9.0E-07
7440-38-2	Arsenic	1.31E-08	6.0E+00	2.2E-09
7440-39-3	Barium	1.24E-06	2.0E+01	6.2E-08
56-55-3	Benzo(a)Anthracene	2.09E-10	1.9E-02	1.1E-08
50-32-8	Benzo(a)pyrene	4.94E-10	8.4E-02	5.9E-09
205-99-2	Benzo(b)fluoranthene	6.89E-09	3.7E-02	1.9E-07
207-08-9	Benzo(k)fluoranthene	1.95E-09	3.7E-02	5.3E-08
7440-43-9	Cadmium	8.57E-08	6.0E-01	1.4E-07
67-66-3	Chloroform (Trichloromethane)	3.41E-11	5.9E-02	5.7E-10
7440-47-3	Chromium	4.52E-07	2.6E+01	1.7E-08
218-01-9	Chrysene	1.20E-09	3.0E-02	4.0E-08
7440-50-8	Copper	1.90E-07	1.6E+01	1.2E-08
72-55-9	DDE, 4,4'-	3.92E-09	5.0E-03	7.8E-07
53-70-3	Dibenz(a,h)anthracene	1.35E-09	1.0E-02	1.4E-07
99-65-0	Dinitrobenzene, 1,3-	2.19E-10	2.1E-02	1.0E-08
121-14-2	Dinitrotoluene, 2,4-	1.50E-09	4.7E-02	3.2E-08
606-20-2	Dinitrotoluene, 2,6-	1.10E-09	1.0E-01	1.1E-08
117-84-0	Di-n-octylphthalate	1.45E-06	1.2E+07	1.2E-13
123-91-1	Dioxane, 1,4-	9.44E-18	2.2E+00	4.3E-18
117-81-7	Ethylhexyl phthalate, bis-2-	1.07E-07	1.3E+01	8.0E-09
58-89-9	gamma-BHC (Lindane)	6.66E-11	3.2E-04	2.1E-07
76-44-8	Heptachlor	3.00E-11	3.0E-04	1.0E-07
87-68-3	Hexachloro-1,3-butadiene (Perchlorobutadiene)	7.62E-10	2.6E-01	3.0E-09
118-74-1	Hexachlorobenzene	8.14E-09	2.0E-02	4.1E-07
77-47-4	Hexachlorocyclopentadiene	7.75E-09	2.0E-01	3.9E-08
193-39-5	Indeno(1,2,3-cd) pyrene	1.86E-08	3.0E-02	6.2E-07
7439-92-1	Lead	1.04E-06	3.1E+01	3.4E-08
7487-94-7	Mercuric chloride	1.54E-05	2.0E-01	7.7E-05
22967-92-6	Methyl mercury	7.43E-08	2.0E-01	3.7E-07
7440-02-0	Nickel	2.37E-09	1.6E+01	1.5E-10
98-95-3	Nitrobenzene	5.70E-11	1.3E+00	4.4E-11
608-93-5	Pentachlorobenzene	1.34E-08	6.0E-01	2.2E-08
87-86-5	Pentachlorophenol	1.38E-07	7.0E+00	2.0E-08
7782-49-2	Selenium	7.24E-11	1.0E-01	7.2E-10
7440-22-4	Silver	1.09E-07	4.5E+00	2.4E-08
TEQF	Dioxin - TEQF	1.22E-09	4.1E-04	3.0E-06
75-01-4	Vinyl Chloride	7.37E-13	1.7E+00	4.3E-13
7440-66-6	Zinc	3.45E-08	1.1E+02	3.1E-10
			Cumulative HI (e):	**8E-05**

(a) Only those compounds with TRVs are listed in this table.
(b) Sediment concentrations were calculated using USEPA's 2005 HHRAP fate and transport equations, using the IRAP software program.
(c) Toxicity Reference Values (TRVs) are discussed in the text.
(d) Maximum Hazard Quotient (HQ) is calculated by dividing the maximum annual sediment concentration by the TRV.
(e) The Cumulative Hazard Index (HI) is calculated by summing the chemical-specific HQs. The HI conservatively reflects exposure to all evaluated compounds, regardless of the type or mechanism of effects. For this project, the target hazard index value was 0.25, based on USEPA Region IX input. If an HI, based on the sum of hazard quotients for all compounds, is above the target level, then the HI values are recalculated for groups of compounds having the same type of health effect and/or a more detailed evaluation may be conducted.
A common regulatory target hazard index value used by most states and many other USEPA programs, for compounds grouped according to specific types of health effects, is 1.
Dioxin-TEQF is the Toxic Equivalents (TEQ) for fish calculated by multiplying each congener concentration by its corresponding TEF then summing all of the results. This calculation is presented elsewhere in this appendix.
* Sediment concentrations for the Colorado River Area are used as a surrogate for the Riparian Backwater Area. Therefore, hazard quotients for Colorado River Area apply to the Riparian Backwater Area as well.

mg/kg - milligrams per kilogram

Table 14
Calculation of Hazard Quotients for Yuma Clapper Rail - Riparian Backwater Area

Compound (a)	Maximum Annual Sediment Concentration (mg/kg) (b)	Maximum Annual Total Surface Water Concentration (mg/L) (c)	Kow	BCF sediment-benthic invert (d)	Prey Tissue Concentration (mg/kg) (e)	Daily Dose from Sediment (mg/kg BW-d) (f)	Daily Dose from Surface Water (mg/kg BW-d) (g)	Daily Dose from Diet (mg/kg BW-d) (h)	Total Daily Dose (mg/kg BW-d) (i)	TRV (Bird) (mg/kg BW-d) (j)	Hazard Quotient (k)
Acetone	6.70E-12	3.35E-10		5.0E-02	2.8E-12	1.4E-13	3.6E-11	1.8E-12	3.8E-11	5.2E+01	7.3E-13
Aluminum	5.48E-06	5.54E-07		9.0E-01	4.1E-05	1.1E-07	6.0E-08	2.7E-05	2.7E-05	1.0E+02	2.7E-07
Aroclor 1254	4.48E-08	6.75E-13		5.3E-01	2.0E-07	9.3E-10	7.3E-14	1.3E-07	1.3E-07	7.2E-02	1.8E-06
Arsenic	1.31E-08	4.52E-10		9.0E-01	9.8E-08	2.7E-10	4.9E-11	6.5E-08	6.5E-08	2.5E+00	2.7E-08
Barium	1.24E-06	3.02E-08		9.0E-01	9.3E-06	2.6E-08	3.3E-09	6.1E-06	6.2E-06	2.1E+01	3.0E-07
Benzo(a)Anthracene	2.09E-10	1.56E-14		1.5E+00	2.5E-09	4.3E-12	1.7E-15	1.7E-09	1.7E-09	7.9E-04	2.1E-06
Benzo(a)pyrene	4.94E-10	1.52E-14		1.6E+00	6.6E-09	1.0E-11	1.6E-15	4.3E-09	4.3E-09	1.0E-03	4.3E-06
Benzo(b)fluoranthene	6.89E-09	1.98E-13		1.6E+00	9.2E-08	1.4E-10	2.1E-14	6.1E-08	6.1E-08	1.4E-04	4.4E-04
Benzo(k)fluoranthene	1.95E-09	5.88E-14		1.6E+00	2.6E-08	4.0E-11	6.3E-15	1.7E-08	1.7E-08	1.4E-04	1.2E-04
Cadmium	8.57E-08	1.14E-09		3.4E+00	2.4E-06	1.8E-09	1.2E-10	1.6E-06	1.6E-06	1.5E+00	1.1E-06
Chromium, hexavalent	4.52E-07	2.38E-08	1.0E+00	7.1E-02	2.7E-07	9.3E-09	2.6E-09	1.8E-07	1.9E-07	1.0E+00	1.9E-07
Chrysene	1.20E-09	8.08E-14		1.4E+00	1.4E-08	2.5E-11	8.7E-15	9.1E-09	9.2E-09	1.0E-03	9.2E-06
Copper	1.90E-07	4.41E-10		3.0E-01	4.7E-07	3.9E-09	4.8E-11	3.1E-07	3.2E-07	4.7E+01	6.7E-09
DDE, 4,4'-	3.92E-09	1.15E-12		9.5E-01	3.1E-08	8.1E-11	1.2E-13	2.0E-08	2.1E-08	8.5E-01	2.4E-08
Dibenz(a,h)anthracene	1.35E-09	2.55E-14		1.6E+00	1.8E-08	2.8E-11	2.8E-15	1.2E-08	1.2E-08	3.9E-04	3.1E-05
Dinitrobenzene, 1,3-	2.19E-10	1.84E-10		1.2E+00	2.2E-09	4.5E-12	2.0E-11	1.4E-09	1.5E-09	4.2E-04	3.4E-06
Ethylhexyl phthalate, bis-2-	1.07E-07	2.46E-11		1.3E+03	1.2E-03	2.2E-09	2.7E-12	7.7E-04	7.7E-04	1.1E+02	6.9E-06
gamma-BHC (Lindane)	6.66E-11	1.23E-12	4.0E+03	6.3E+01	3.5E-08	1.4E-12	1.3E-13	2.3E-08	2.3E-08	2.0E+00	1.2E-08
Heptachlor	3.00E-11	7.88E-14		1.7E+00	4.2E-10	6.2E-13	8.5E-15	2.8E-10	2.8E-10	6.5E-02	4.2E-09
Hexachloro-1,3-butadiene (Perchlorobutadiene)	7.62E-10	2.52E-12		4.4E-01	2.8E-09	1.6E-11	2.7E-13	1.8E-09	1.9E-09	3.2E+00	5.8E-10
Hexachlorobenzene	8.14E-09	2.58E-12		2.3E+03	1.6E-04	1.7E-10	2.8E-13	1.0E-04	1.0E-04	2.3E-01	4.6E-04
Indeno(1,2,3-cd) pyrene	1.86E-08	2.42E-13		1.6E+00	2.5E-07	3.9E-10	2.6E-14	1.6E-07	1.7E-07	1.0E-03	1.7E-04
Lead	1.04E-06	1.16E-09		6.3E-01	5.5E-06	2.1E-08	1.3E-10	3.6E-06	3.6E-06	2.5E-02	1.5E-04
Manganese	1.11E-08	1.71E-10		9.0E-01	8.3E-08	2.3E-10	1.8E-11	5.5E-08	5.5E-08	9.8E+02	5.6E-11
Mercuric chloride	1.54E-05	3.89E-10		6.8E-02	8.7E-06	3.2E-07	4.2E-11	5.8E-06	6.1E-06	3.3E+00	1.9E-06
Methyl mercury	7.43E-08	4.63E-11		4.8E-01	3.0E-07	1.5E-09	5.0E-12	2.0E-07	2.0E-07	6.4E-03	3.1E-05
Nickel	2.37E-09	3.65E-11		9.0E-01	1.8E-08	4.9E-11	3.9E-12	1.2E-08	1.2E-08	6.5E+01	1.8E-10
Pentachloronitrobenzene (PCNB)	1.79E-08	1.24E-11		4.5E+02	6.7E-05	3.7E-10	1.3E-12	4.4E-05	4.4E-05	6.9E+01	6.5E-07
Pentachlorophenol	1.38E-07	5.82E-09		1.0E+03	1.2E-03	2.8E-09	6.3E-10	7.8E-04	7.8E-04	4.0E+00	1.9E-04
Selenium	7.24E-11	1.45E-11		9.0E-01	5.4E-10	1.5E-12	1.6E-12	3.6E-10	3.6E-10	5.0E-01	7.2E-10
Silver	1.09E-07	1.31E-08		9.0E-01	8.2E-07	2.2E-09	1.4E-09	5.4E-07	5.4E-07	1.8E+02	3.0E-09
Dioxin - TEQB	1.75E-09	3.23E-14		(l)	8.4E-10	3.6E-11	3.5E-15	5.6E-10	5.9E-10	1.0E-05	5.9E-05
Thallium (l)	1.59E-06	2.23E-08		9.0E-01	1.2E-05	3.3E-08	2.4E-09	7.8E-06	7.9E-06	3.5E-01	2.3E-05
Vanadium	7.40E-07	7.42E-10		9.0E-01	5.6E-06	1.5E-08	8.0E-11	3.7E-06	3.7E-06	1.1E+01	3.2E-07
Zinc	3.45E-08	5.56E-10		5.7E-01	1.6E-07	7.1E-10	6.0E-11	1.1E-07	1.1E-07	1.3E+02	8.3E-10
										Cumulative HI (m) :	**2E-03**

(a) Only those compounds with TRVs are listed in this table.
(b) Sediment concentrations (Csed) were calculated using USEPA's HHRAP fate and transport equations, using the IRAP software program.
Riparian backwater area sediment concentrations were assumed to be the same as those calculated for the Colorado River.
(c) Surface water concentrations (Csw) were calculated using USEPA's HHRAP fate and transport equations, using the IRAP software program.
Riparian backwater area surface water concentrations were assumed to be the same as those calculated for the Colorado River.
(d) For organic compounds not included in USEPA, 1999, a BCF value was calculated using the following equation:
logBCF=0.819 x logKow 1.146. For inorganic compounds not included in USEPA, 1999, a BCF value of 0.9 was used.
(e) Prey Tissue Concentration (benthic invertebrates) = Csoil x BCF/$CF_{WWinvert}$; except for Dioxin - TEQB which is calculated on a congener-specific basis and is shown elsewhere in this appendix.
(f) $DD_{sed} = C_{sed}$ x Sediment IR; assumes 100% of sediment ingested is potentially contaminated
(g) $DD_{sw} = C_{sw}$ x Water IR; assumes 100% of surface water ingested is potentially contaminated
(h) $DD_{diet} = C_{prey}$ x Food IR; assumes 100% of prey tissue is potentially contaminated

Table 14
Calculation of Hazard Quotients for Yuma Clapper Rail - Riparian Backwater Area

Compound (a)	Maximum Annual Sediment Concentration (mg/kg) (b)	Maximum Annual Total Surface Water Concentration (mg/L) (c)	Kow	BCF sediment-benthic invert (d)	Prey Tissue Concentration (mg/kg) (e)	Daily Dose from Sediment (mg/kg BW-d) (f)	Daily Dose from Surface Water (mg/kg BW-d) (g)	Daily Dose from Diet (mg/kg BW-d) (h)	Total Daily Dose (mg/kg BW-d) (i)	TRV (Bird) (mg/kg BW-d) (j)	Hazard Quotient (k)

(i) Total Daily Dose = $DD_{diet} + DD_{soil} + DD_{sw}$
(j) Toxicity Reference Values (TRVs) are discussed in the text.
(k) Hazard Quotients (HQ) are calculated by dividing the daily dose by the TRV.
(l) BCFs were calculated for individual congeners following the methodology of USEPA (1999) but based on crayfish specific values. See elsewhere in this appendix for more information.
(m) The Cumulative Hazard Index (HI) is calculated by summing the chemical-specific HQs. The HI conservatively reflects exposure to all evaluated compounds, regardless of the type or mechanism of effects. For this project, the target hazard index value was 0.25, based on USEPA Region IX input. If an HI, based on the sum of hazard quotients for all compounds, is above the target level, then the HI values are recalculated for groups of compounds having the same type of health effect and/or a more detailed evaluation may be conducted. A common regulatory target hazard index value used by most states and many other USEPA programs, for compounds grouped according to specific types of health effects, is 1.

Dioxin-TEQB is the Toxic Equivalents (TEQ) for birds calculated by multiplying each congener concentration by its corresponding TEF then summing all of the results. This calculation is presented elsewhere in this appendix.
Food IR - Food ingestion rate as shown in Table 5.2-2
Sediment IR - Sediment ingestion rate as shown in Table 5.2-2
Water IR - Water ingestion rate as shown in Table 5.2-2
$CF_{WW\text{-}invert}$ - Conversion factor from wet weight to dry weight (0.12)

mg - milligrams
kg - kilograms
BW - body weight
d - day
WW - wet weight
L - liters

Table 15
Calculation of Hazard Quotients for Double-crested Cormorant - Main Drain Area

Compound (a)	Maximum Annual Sediment Concentration (mg/kg) (b)	Maximum Annual Total Surface Water Concentration (mg/L) (c)	Maximum Annual Fish Concentration (mg COPC/kg WW tissue) (d)	Daily Dose from Sediment (mg/kg BW-d) (e)	Daily Dose from Surface Water (mg/kg BW-d) (f)	Daily Dose from Diet (mg/kg BW-d) (g)	Total Daily Dose (mg/kg BW-d) (h)	TRV (Bird) (mg/kg BW-d) (i)	Hazard Quotient (j)
Acetone	2.83E-11	1.41E-09	4.47E-09	1.5E-13	7.9E-11	1.2E-09	1.3E-09	5.2E+01	2.5E-11
Aluminum	7.05E-07	7.12E-08	3.56E-05	3.8E-09	4.0E-09	9.7E-06	9.7E-06	1.0E+02	9.7E-08
Aroclor 1254	1.44E-07	2.17E-12	5.04E-07	7.9E-10	1.2E-13	1.4E-07	1.4E-07	7.2E-02	1.9E-06
Arsenic	3.36E-09	1.16E-10	1.32E-08	1.8E-11	6.4E-12	3.6E-09	3.6E-09	2.5E+00	1.5E-09
Barium	2.31E-07	5.63E-09	3.56E-06	1.3E-09	3.1E-10	9.7E-07	9.7E-07	2.1E+01	4.7E-08
Benzo(a)Anthracene	7.70E-10	5.75E-14	2.68E-09	4.2E-12	3.2E-15	7.3E-10	7.4E-10	7.9E-04	9.3E-07
Benzo(a)pyrene	8.74E-10	2.68E-14	3.00E-09	4.8E-12	1.5E-15	8.2E-10	8.2E-10	1.0E-03	8.2E-07
Benzo(b)fluoranthene	1.98E-08	5.68E-13	9.74E-08	1.1E-10	3.2E-14	2.7E-08	2.7E-08	1.4E-04	1.9E-04
Benzo(k)fluoranthene	4.69E-09	1.41E-13	2.09E-08	2.6E-11	7.8E-15	5.7E-09	5.7E-09	1.4E-04	4.1E-05
Cadmium	2.40E-08	3.19E-10	2.90E-07	1.3E-10	1.8E-11	7.9E-08	7.9E-08	1.5E+00	5.5E-08
Chlordane	2.96E-08	1.46E-11	3.50E-07	1.6E-10	8.1E-13	9.6E-08	9.6E-08	2.1E+00	4.5E-08
Chromium, hexavalent	6.16E-08	3.24E-09	6.16E-08	3.4E-10	1.8E-10	1.7E-08	1.7E-08	1.0E+00	1.7E-08
Chrysene	5.75E-09	3.86E-13	1.79E-08	3.1E-11	2.1E-14	4.9E-09	4.9E-09	1.0E-03	4.9E-06
Copper	5.40E-08	1.26E-10	2.51E-08	2.9E-10	7.0E-12	6.9E-09	7.2E-09	4.7E+01	1.5E-10
DDE, 4,4'-	4.28E-08	1.26E-11	6.18E-07	2.3E-10	7.0E-13	1.7E-07	1.7E-07	8.5E-01	2.0E-07
Dibenz(a,h)anthracene	9.18E-10	1.73E-14	6.37E-09	5.0E-12	9.6E-16	1.7E-09	1.7E-09	3.9E-04	4.5E-06
Dinitrobenzene, 1,3-	7.12E-10	5.98E-10	1.70E-09	3.9E-12	3.3E-11	4.7E-10	5.0E-10	4.2E-04	1.2E-06
Ethylhexyl phthalate, bis-2-	8.28E-08	1.91E-11	3.63E-09	4.5E-10	1.1E-12	9.9E-10	1.4E-09	1.1E+02	1.3E-11
gamma-BHC (Lindane)	2.85E-10	5.28E-12	6.23E-10	1.6E-12	2.9E-13	1.7E-10	1.7E-10	2.0E+00	8.6E-11
Heptachlor	2.62E-11	6.88E-14	4.18E-11	1.4E-13	3.8E-15	1.1E-11	1.2E-11	6.5E-02	1.8E-10
Hexachloro-1,3-butadiene (Perchlorobutadiene)	1.42E-09	4.70E-12	1.14E-08	7.8E-12	2.6E-13	3.1E-09	3.1E-09	3.2E+00	9.8E-10
Hexachlorobenzene	1.32E-08	4.20E-12	4.78E-08	7.2E-11	2.3E-13	1.3E-08	1.3E-08	2.3E-01	5.8E-08
Indeno(1,2,3-cd) pyrene	8.71E-09	1.13E-13	4.37E-08	4.8E-11	6.3E-15	1.2E-08	1.2E-08	1.0E-03	1.2E-05
Lead	3.01E-07	3.36E-10	3.01E-11	1.6E-09	1.9E-11	8.2E-12	1.7E-09	2.5E-02	6.7E-08
Manganese	3.14E-09	4.83E-11	1.93E-08	1.7E-11	2.7E-12	5.3E-09	5.3E-09	9.8E+02	5.4E-12
Mercuric chloride	5.83E-05	1.47E-09	0.00E+00	3.2E-07	8.2E-11	0.0E+00	3.2E-07	3.3E+00	9.8E-08
Methyl mercury	5.58E-07	1.75E-10	1.19E-03	3.0E-09	9.7E-12	3.2E-04	3.2E-04	6.4E-03	5.1E-02
Nickel	6.76E-10	1.04E-11	8.11E-10	3.7E-12	5.8E-13	2.2E-10	2.3E-10	6.5E+01	3.5E-12
Pentachloronitrobenzene (PCNB)	1.24E-07	8.60E-11	1.39E-07	6.8E-10	4.8E-12	3.8E-08	3.9E-08	6.9E+01	5.6E-10
Pentachlorophenol	2.42E-07	1.02E-08	2.50E-05	1.3E-09	5.7E-10	6.8E-06	6.8E-06	4.0E+00	1.7E-06
Selenium	2.34E-11	4.68E-12	1.91E-09	1.3E-13	2.6E-13	5.2E-10	5.2E-10	5.0E-01	1.0E-09
Silver	1.40E-08	1.68E-09	1.48E-07	7.6E-11	9.4E-11	4.0E-08	4.0E-08	1.8E+02	2.3E-10
Dioxin - TEQB	3.37E-09	8.70E-14	5.16E-10	1.8E-11	4.8E-15	1.4E-10	1.6E-10	1.0E-05	1.6E-05
Thallium (I)	4.15E-07	5.85E-09	5.85E-05	2.3E-09	3.2E-10	1.6E-05	1.6E-05	3.5E-01	4.6E-05
Vanadium	9.65E-07	9.68E-10	0.00E+00	5.3E-09	5.4E-11	0.0E+00	5.3E-09	1.1E+01	4.7E-10
Zinc	9.82E-09	1.58E-10	3.26E-07	5.4E-11	8.8E-12	8.9E-08	8.9E-08	1.3E+02	6.8E-10
								Cumulative HI (k):	**5E-02**

(a) Only those compounds with TRVs are listed in this table.
(b) Sediment concentrations (Csed) were calculated using USEPA's 2005 HHRAP fate and transport equations, using the IRAP software program.
(c) Surface water concentrations (Csw) were calculated using USEPA's 2005 HHRAP fate and transport equations, using the IRAP software program.
HHRAP calculates dissolved, but not total, water column concentrations for methyl mercury, and thus the dissolved concentration was used in this table for methyl mercury.
(d) Cfish were derived using IRAP software; assumes trophic level 4.

Table 15
Calculation of Hazard Quotients for Double-crested Cormorant - Main Drain Area

Compound (a)	Maximum Annual Sediment Concentration (mg/kg) (b)	Maximum Annual Total Surface Water Concentration (mg/L) (c)	Maximum Annual Fish Concentration (mg COPC/kg WW tissue) (d)	Daily Dose from Sediment (mg/kg BW-d) (e)	Daily Dose from Surface Water (mg/kg BW-d) (f)	Daily Dose from Diet (mg/kg BW-d) (g)	Total Daily Dose (mg/kg BW-d) (h)	TRV (Bird) (mg/kg BW-d) (i)	Hazard Quotient (j)

(e) DDsed = Csed x Sediment IR; assumes 100% of fish is potentially contaminated
(f) DDsw = Csw x Water IR; assumes 100% of surface water is potentially contaminated
(g) DDdiet = Cfish x Food IR; assumes 100% of fish is potentially contaminated
(h) Total Daily Dose = DDdiet + DDsed + DDsw
(i) Toxicity Reference Values (TRVs) are discussed in the text.
(j) Hazard Quotient is calculated by dividing the Daily Dose by the TRV.
(k) The Cumulative Hazard Index (HI) is calculated by summing the chemical-specific HQs. The HI conservatively reflects exposure to all evaluated compounds, regardless of the type or mechanism of effects. For this project, the target hazard index value was 0.25, based on USEPA Region IX input. If an HI, based on the sum of hazard quotients for all compounds, is above the target level, then the HI values are recalculated for groups of compounds having the same type of health effect and/or a more detailed evaluation may be conducted. A common regulatory target hazard index value used by most states and many other USEPA programs, for compounds grouped according to specific types of health effects, is 1.

Dioxin-TEQB is the Toxic Equivalents (TEQ) for birds calculated by multiplying each congener concentration by its corresponding TEF then summing all of the results. This calculation is presented elsewhere in this appendix.
Sediment IR - Sediment ingestion rate as shown in Table 5.2-2
Food IR - Food ingestion rate as shown in Table 5.2-2
Water IR - Surface water ingestion rate as shown in Table 5.2-2

mg - milligrams
kg - kilograms
L - liters
BW - body weight
d - day
WW - wet weight

Table 16
Calculation of Hazard Quotients for Mule Deer - Main Drain Area

Compound (a)	Maximum Annual Soil Concentration (mg/kg) (b)	Plant Tissue Concentration (mg/kg WW) (c)	Maximum Annual Total Surface Water Concentration (mg/L) (d)	Daily Dose from Soil (mg/kg BW-d) (e)	Daily Dose from Diet (mg/kg BW-d) (f)	Daily Dose from Surface Water (mg/kg BW-d) (g)	Total Daily Dose (mg/kg BW-d) (h)	TRV (Mammal) (mg/kg BW-d) (i)	Hazard Quotient (j)
Acetone	1.14E-08	8.59E-09	1.41E-09	8.0E-12	2.5E-09	9.6E-11	2.6E-09	1.0E+01	2.6E-10
Acrylonitrile	4.26E-10	3.21E-10	5.80E-11	3.0E-13	9.4E-11	3.9E-12	9.8E-11	4.6E-01	2.1E-10
Aluminum	1.36E-05	9.01E-07	7.12E-08	9.5E-09	2.6E-07	4.8E-09	2.8E-07	1.9E+00	1.4E-07
Antimony	2.36E-09	6.78E-12	5.88E-12	1.7E-12	2.0E-12	4.0E-13	4.0E-12	6.6E-02	6.1E-11
Aroclor 1254	6.38E-09	4.70E-12	2.17E-12	4.5E-12	1.4E-12	1.5E-13	6.0E-12	2.1E-04	2.9E-08
Arsenic	2.76E-09	9.80E-07	1.16E-10	1.9E-12	2.9E-07	7.9E-12	2.9E-07	1.3E+00	2.3E-07
Barium	3.37E-06	7.85E-08	5.63E-09	2.4E-09	2.3E-08	3.8E-10	2.6E-08	5.1E-01	5.0E-08
Benzo(a)Anthracene	6.09E-11	2.07E-12	5.75E-14	4.3E-14	6.0E-13	3.9E-15	6.5E-13	1.7E-01	3.9E-12
Benzo(a)pyrene	4.29E-11	6.10E-12	2.68E-14	3.0E-14	1.8E-12	1.8E-15	1.8E-12	1.0E-01	1.8E-11
Beryllium	3.85E-06	9.78E-07	1.50E-10	2.7E-09	2.9E-07	1.0E-11	2.9E-07	6.6E-01	4.4E-07
Cadmium	4.38E-07	2.42E-06	3.19E-10	3.1E-10	7.1E-07	2.2E-11	7.1E-07	2.5E-02	2.8E-05
Chlordane	4.36E-09	1.17E-11	1.46E-11	3.1E-12	3.4E-12	9.9E-13	7.5E-12	4.6E+00	1.6E-12
Chloroform (Trichloromethane)	4.45E-11	1.09E-11	1.37E-11	3.1E-14	3.2E-12	9.3E-13	4.1E-12	6.0E+01	6.9E-14
Chromium, hexavalent	1.25E-06	4.55E-08	3.24E-09	8.8E-10	1.3E-08	2.2E-10	1.4E-08	3.5E+00	4.1E-09
Copper	1.19E-06	9.60E-07	1.26E-10	8.4E-10	2.8E-07	8.5E-12	2.8E-07	1.2E+01	2.3E-08
DDE, 4,4'-	1.07E-08	2.14E-11	1.26E-11	7.5E-12	6.3E-12	8.5E-13	1.5E-11	1.0E+00	1.5E-11
Dibenz(a,h)anthracene	4.05E-11	2.85E-11	1.73E-14	2.8E-14	8.3E-12	1.2E-15	8.4E-12	2.0E-03	4.2E-09
Dinitrobenzene, 1,3-	8.08E-09	3.86E-09	5.98E-10	5.7E-12	1.1E-09	4.1E-11	1.2E-09	1.1E+00	1.1E-09
Dinitrotoluene, 2,4-	5.35E-09	1.66E-09	8.48E-10	3.8E-12	4.8E-10	5.8E-11	5.5E-10	7.0E-01	7.8E-10
Dinitrotoluene, 2,6-	3.15E-09	1.13E-09	7.32E-10	2.2E-12	3.3E-10	5.0E-11	3.8E-10	4.0E-01	9.6E-10
Di-n-octylphthalate	1.92E-09	1.35E-08	7.51E-13	1.3E-12	3.9E-09	5.1E-14	3.9E-09	7.5E+03	5.3E-13
Dioxane, 1,4-	1.67E-14	1.26E-14	1.83E-15	1.2E-17	3.7E-15	1.2E-16	3.8E-15	1.1E+02	3.6E-17
Ethylhexyl phthalate, bis-2-	5.92E-09	2.18E-08	1.91E-11	4.2E-12	6.4E-09	1.3E-12	6.4E-09	6.0E+01	1.1E-10
gamma-BHC (Lindane)	1.69E-10	5.90E-12	5.28E-12	1.2E-13	1.7E-12	3.6E-13	2.2E-12	8.0E+00	2.8E-13
Heptachlor	1.28E-11	1.46E-13	6.88E-14	9.0E-15	4.3E-14	4.7E-15	5.6E-14	2.5E-03	2.3E-11
Hexachlorobenzene	2.90E-08	8.79E-11	4.20E-12	2.0E-11	2.6E-11	2.9E-13	4.6E-11	1.6E+00	2.9E-11
Hexachlorocyclopentadiene	1.14E-08	4.87E-11	3.53E-11	8.0E-12	1.4E-11	2.4E-12	2.5E-11	3.8E+00	6.5E-12
Lead	6.53E-06	2.43E-06	3.36E-10	4.6E-09	7.1E-07	2.3E-11	7.2E-07	3.8E-02	1.9E-05
Manganese	7.13E-08	3.61E-07	4.83E-11	5.0E-11	1.1E-07	3.3E-12	1.1E-07	8.8E+01	1.2E-09
Mercuric chloride	8.22E-06	9.67E-08	1.47E-09	5.8E-09	2.8E-08	1.0E-10	3.4E-08	1.0E+00	3.4E-08
Methyl mercury	1.67E-07	2.51E-08	1.75E-10	1.2E-10	7.3E-09	1.2E-11	7.5E-09	3.2E-02	2.3E-07
Nickel	1.50E-08	7.69E-08	1.04E-11	1.0E-11	2.2E-08	7.1E-13	2.2E-08	5.0E+01	4.5E-10
Pentachlorobenzene	1.64E-08	5.94E-11	7.80E-12	1.1E-11	1.7E-11	5.3E-13	2.9E-11	7.3E+00	4.1E-12
Pentachloronitrobenzene (PCNB)	3.95E-08	2.86E-10	8.60E-11	2.8E-11	8.4E-11	5.8E-12	1.2E-10	4.6E+02	2.6E-13
Pentachlorophenol	7.31E-08	3.04E-07	1.02E-08	5.1E-11	8.9E-08	6.9E-10	9.0E-08	3.0E-01	3.0E-07
Selenium	1.13E-09	2.94E-08	4.68E-12	7.9E-13	8.6E-09	3.2E-13	8.6E-09	7.6E-02	1.1E-07
Silver	2.71E-07	2.45E-08	1.68E-09	1.9E-10	7.2E-09	1.1E-10	7.5E-09	3.8E-01	2.0E-08
Dioxin - TEQM	5.79E-11	7.83E-13	2.27E-14	4.1E-14	2.3E-13	1.5E-15	2.7E-13	1.0E-06	2.7E-07
Thallium (l)	4.45E-06	7.20E-08	5.85E-09	3.1E-09	2.1E-08	4.0E-10	2.5E-08	1.3E-02	1.9E-06
Vanadium	1.70E-06	1.94E-08	9.68E-10	1.2E-09	5.7E-09	6.6E-11	6.9E-09	2.1E-01	3.3E-08
Vinyl Chloride	2.28E-13	1.23E-13	9.18E-13	1.6E-16	3.6E-14	6.2E-14	9.8E-14	1.7E-01	5.8E-13
Xylene, m-	2.32E-11	1.18E-12	1.04E-12	1.6E-14	3.5E-13	7.1E-14	4.3E-13	2.1E+00	2.1E-13

Table 16
Calculation of Hazard Quotients for Mule Deer - Main Drain Area

Compound (a)	Maximum Annual Soil Concentration (mg/kg) (b)	Plant Tissue Concentration (mg/kg WW) (c)	Maximum Annual Total Surface Water Concentration (mg/L) (d)	Daily Dose from Soil (mg/kg BW-d) (e)	Daily Dose from Diet (mg/kg BW-d) (f)	Daily Dose from Surface Water (mg/kg BW-d) (g)	Total Daily Dose (mg/kg BW-d) (h)	TRV (Mammal) (mg/kg BW-d) (i)	Hazard Quotient (j)
Xylene, o-	1.51E-11	8.72E-13	6.48E-13	1.1E-14	2.5E-13	4.4E-14	3.1E-13	2.1E+00	1.5E-13
Xylene, p-	1.94E-11	1.12E-12	1.00E-12	1.4E-14	3.3E-13	6.8E-14	4.1E-13	2.1E+00	1.9E-13
Zinc	2.17E-07	1.17E-06	1.58E-10	1.5E-10	3.4E-07	1.1E-11	3.4E-07	1.0E+01	3.3E-08
								Cumulative HI (k) :	**5E-05**

(a) Only those compounds with TRVs are listed in this table.
(b) Soil concentrations (Csoil) were calculated using USEPA's HHRAP fate and transport equations, using the IRAP software program. Soil concentrations in the main drain area were based on those calculated for the agricultural area.
(c) Plant concentrations (Cplant) were calculated using USEPA's HHRAP fate and transport equations, using the IRAP software program. Wet weight plant concentrations were calculated from the IRAP outputs dry weight concentrations using a moisture content of 88% as specified in USEPA's 1999 Screening Ecological Risk Assessment Protocol. Plant concentrations in the main drain area were based on those calculated for the agricultural area.
(d) Surface water concentrations (Csw) were calculated using USEPA's 2005 HHRAP fate and transport equations, using the IRAP software program.
(e) DDsoil = Csoil x Soil IR; assumes 100% of soil is potentially contaminated
(f) DDdiet = Cplant x Food IR; assumes 100% of plant material is potentially contaminated
(g) DDsw = Csw x Water IR; assumes 100% of surface water is potentially contaminated
(h) Total Daily Dose = DDdiet + DDsoil + DDsw
(i) Toxicity Reference Values (TRVs) are discussed in the text.
(j) Hazard Quotients (HQ) are calculated by dividing the daily dose by the TRV.
(k) The Cumulative Hazard Index (HI) is calculated by summing the chemical-specific HQs. The HI conservatively reflects exposure to all evaluated compounds, regardless of the type or mechanism of effects. For this project, the target hazard index value was 0.25, based on USEPA Region IX input. If an HI, based on the sum of hazard quotients for all compounds, is above the target level, then the HI values are recalculated for groups of compounds having the same type of health effect and/or a more detailed evaluation may be conducted. A common regulatory target hazard index value used by most states and many other USEPA programs, for compounds grouped according to specific types of health effects, is 1.

Dioxin-TEQM is the Toxic Equivalents (TEQ) for mammals calculated by multiplying each congener concentration by its corresponding TEF then summing all of the results. This calculation is presented elsewhere in this appendix.
Food IR - Food ingestion rate as shown in Table 5.2-2
Soil IR - Soil ingestion rate as shown in Table 5.2-2
Water IR - Water ingestion rate as shown in Table 5.2-2

mg - milligrams
kg - kilograms
BW - body weight
d - day
WW - wet weight
L - liters

Table 17
Calculation of Hazard Quotients for Surface Water - Main Drain Area

CAS No	Compound (a)	Maximum Annual Dissolved Surface Water Concentration (mg/L) (b)	TRV (mg/L) (c)	Hazard Quotient (d)
95-63-6	1,2,4-Trimethylbenzene	1.22E-12	7.7E-02	1.6E-11
142-28-9	1,3-Dichloropropane	1.40E-12	1.3E+00	1.1E-12
110-54-3	1-Hexane (n-hexane)	1.19E-15	2.5E-02	4.8E-14
594-20-7	2,2-Dichloropropane	4.37E-13	3.9E-01	1.1E-12
625-86-5	2,5-Dimethylfuran	1.39E-12	7.1E-01	2.0E-12
95-49-8	2-Chlorotoluene	1.67E-12	1.4E-01	1.2E-11
591-78-6	2-Hexanone	3.78E-11	4.3E+00	8.8E-12
91-57-6	2-Methylnaphthalene	9.57E-13	1.5E-02	6.6E-11
534-52-1	4,6-Dinitro-2-methylphenol	3.07E-09	2.4E-02	1.3E-07
106-43-4	4-Chlorotoluene	9.16E-13	3.4E+00	2.7E-13
67-64-1	Acetone	1.41E-09	1.5E+00	9.4E-10
79-10-7	Acrylic Acid	5.19E-16	3.8E+00	1.4E-16
107-13-1	Acrylonitrile	5.80E-11	2.5E-01	2.3E-10
7429-90-5	Aluminum	7.12E-08	8.7E-02	8.2E-07
7440-36-0	Antimony	5.88E-12	3.0E-02	2.0E-10
11097-69-1	Aroclor 1254	1.47E-12	2.0E-05	7.3E-08
7440-38-2	Arsenic	1.16E-10	1.9E-01	6.1E-10
7440-39-3	Barium	5.63E-09	4.0E-03	1.4E-06
92-87-5	Benzidine	9.09E-09	8.9E-02	1.0E-07
56-55-3	Benzo(a)Anthracene	5.37E-14	2.7E-05	2.0E-09
50-32-8	Benzo(a)pyrene	2.25E-14	1.4E-05	1.6E-09
205-99-2	Benzo(b)fluoranthene	4.72E-13	2.7E-05	1.7E-08
207-08-9	Benzo(k)fluoranthene	1.18E-13	2.7E-05	4.4E-09
7440-41-7	Beryllium	1.49E-10	5.3E-03	2.8E-08
111-91-1	Bis(2-chloroethoxy) methane	5.89E-10	1.8E+00	3.2E-10
108-86-1	Bromobenzene	1.31E-12	5.6E-02	2.3E-11
98-06-6	Butylbenzene, tert	9.92E-13	6.5E-01	1.5E-12
7440-43-9	Cadmium	3.19E-10	5.3E-03	6.0E-08
86-74-8	Carbazole	8.20E-10	1.5E-02	5.5E-08
67-66-3	Chloroform (Trichloromethane)	1.37E-11	2.8E-02	4.9E-10
18540-29-9	Chromium, hexavalent	3.24E-09	1.1E-02	2.9E-07
218-01-9	Chrysene	3.58E-13	2.7E-05	1.3E-08
7440-48-4	Cobalt	3.66E-10	3.0E-03	1.2E-07
7440-50-8	Copper	1.26E-10	2.5E-02	5.0E-09
72-55-9	DDE, 4,4'-	1.24E-11	2.0E-05	6.2E-07
319-86-8	delta-BHC	3.67E-11	1.3E-01	2.8E-10
53-70-3	Dibenz(a,h)anthracene	1.28E-14	2.7E-05	4.8E-10
132-64-9	Dibenzofuran	6.25E-10	2.0E-02	3.1E-08
99-65-0	Dinitrobenzene, 1,3-	5.98E-10	2.6E-02	2.3E-08
121-14-2	Dinitrotoluene, 2,4-	8.48E-10	2.3E-02	3.7E-08
606-20-2	Dinitrotoluene, 2,6-	7.32E-10	6.0E-02	1.2E-08
117-84-0	Di-n-octylphthalate	3.98E-14	3.2E-01	1.2E-13
123-91-1	Dioxane, 1,4-	1.83E-15	6.2E+01	2.9E-17
122-39-4	Diphenylamine	8.72E-10	3.8E-02	2.3E-08
33213-65-9	Endosulfan II	8.39E-12	5.6E-05	1.5E-07
1031-07-8	Endosulfan sulfate	1.09E-11	6.0E-05	1.8E-07
7421-93-4	Endrin aldehyde	3.05E-11	8.0E-05	3.8E-07
107-21-1	Ethylene Glycol	8.42E-11	1.0E+03	8.4E-14
117-81-7	Ethylhexyl phthalate, bis-2-	1.87E-11	3.0E-03	6.2E-09
58-89-9	gamma-BHC (Lindane)	5.28E-12	2.8E-04	1.9E-08
76-44-8	Heptachlor	6.87E-14	4.0E-06	1.7E-08
87-68-3	Hexachloro-1,3-butadiene (Perchlorobutadiene)	4.69E-12	8.2E-03	5.7E-10
118-74-1	Hexachlorobenzene	4.14E-12	3.7E-03	1.1E-09
77-47-4	Hexachlorocyclopentadiene	3.53E-11	3.0E-04	1.2E-07
193-39-5	Indeno(1,2,3-cd) pyrene	7.08E-14	2.7E-05	2.6E-09
99-87-6	Isopropyl toluene, p-	9.15E-13	4.6E-02	2.0E-11
7439-92-1	Lead	3.35E-10	8.7E-03	3.8E-08
7439-96-5	Manganese	4.83E-11	8.0E-02	6.0E-10
7487-94-7	Mercuric chloride	9.90E-10	7.7E-04	1.3E-06
22967-92-6	Methyl mercury	1.75E-10	2.8E-06	6.2E-05
80-62-6	Methyl methacrylate	3.72E-14	3.4E+00	1.1E-14
1634-04-4	methyl tert-butyl ether	4.32E-13	1.0E+02	4.3E-15

Table 17
Calculation of Hazard Quotients for Surface Water - Main Drain Area

CAS No	Compound (a)	Maximum Annual Dissolved Surface Water Concentration (mg/L) (b)	TRV (mg/L) (c)	Hazard Quotient (d)
7440-02-0	Nickel	1.04E-11	1.4E-01	7.5E-11
98-95-3	Nitrobenzene	8.65E-11	8.5E-01	1.0E-10
608-93-5	Pentachlorobenzene	7.62E-12	4.7E-04	1.6E-08
82-68-8	Pentachloronitrobenzene (PCNB)	8.54E-11	1.0E-02	8.5E-09
87-86-5	Pentachlorophenol	1.02E-08	1.6E-02	6.6E-07
103-65-1	Propylbenzene, n-	6.36E-13	1.6E-02	4.1E-11
7782-49-2	Selenium (e)	4.68E-12	2.0E-03	2.3E-09
7440-22-4	Silver	1.68E-09	1.2E-04	1.4E-05
TEQF	Dioxin - TEQF	1.35E-14	5.0E-06	2.7E-09
7440-28-0	Thallium	5.85E-09	1.5E-01	3.9E-08
7440-62-2	Vanadium	9.65E-10	1.9E-02	5.1E-08
75-01-4	Vinyl Chloride	9.18E-13	3.9E+00	2.4E-13
7440-66-6	Zinc	1.58E-10	3.2E-01	5.0E-10
			Cumulative HI (f):	**8E-05**

(a) Only those compounds with TRVs are listed in this table.
(b) Surface water concentrations were calculated using USEPA's 2005 HHRAP fate and transport equations, using the IRAP software program.
(c) Toxicity Reference Values (TRVs) are discussed in the text.
(d) Maximum Hazard Quotient (HQ) is calculated by dividing the maximum annual surface water concentration by the TRV.
(e) The water concentration and the TRV for selenium is for total selenium.
(f) The Cumulative Hazard Index (HI) is calculated by summing the chemical-specific HQs. The HI conservatively reflects exposure to all evaluated compounds, regardless of the type or mechanism of effects. For this project, the target hazard index value was 0.25, based on USEPA Region IX input. If an HI, based on the sum of hazard quotients for all compounds, is above the target level, then the HI values are recalculated for groups of compounds having the same type of health effect and/or a more detailed evaluation may be conducted. A common regulatory target hazard index value used by most states and many other USEPA programs, for compounds grouped according to specific types of health effects, is 1.

Dioxin-TEQF is the Toxic Equivalents (TEQ) for fish calculated by multiplying each congener concentration by its corresponding TEF then summing all of the results. This calculation is presented elsewhere in this appendix.

mg/L - milligrams per liter

Table 18
Calculation of Hazard Quotients for Sediment - Main Drain Area

CAS No	Compound (a)	Maximum Annual Sediment Concentration (mg/kg) (b)	Toxicity Reference Value (TRV) (mg/kg) (c)	Hazard Quotient (d)
67-64-1	Acetone	2.83E-11	5.7E-02	5.0E-10
107-13-1	Acrylonitrile	4.06E-12	2.3E-02	1.8E-10
7429-90-5	Aluminum	7.05E-07	1.4E+04	5.0E-11
7440-36-0	Antimony	2.64E-10	6.4E+01	4.1E-12
11097-69-1	Aroclor 1254	1.44E-07	5.0E-02	2.9E-06
7440-38-2	Arsenic	3.36E-09	6.0E+00	5.6E-10
7440-39-3	Barium	2.31E-07	2.0E+01	1.2E-08
56-55-3	Benzo(a)Anthracene	7.70E-10	1.9E-02	4.1E-08
50-32-8	Benzo(a)pyrene	8.74E-10	8.4E-02	1.0E-08
205-99-2	Benzo(b)fluoranthene	1.98E-08	3.7E-02	5.3E-07
207-08-9	Benzo(k)fluoranthene	4.69E-09	3.7E-02	1.3E-07
7440-43-9	Cadmium	2.40E-08	6.0E-01	4.0E-08
67-66-3	Chloroform (Trichloromethane)	2.88E-11	5.9E-02	4.8E-10
7440-47-3	Chromium	6.16E-08	2.6E+01	2.4E-09
218-01-9	Chrysene	5.75E-09	3.0E-02	1.9E-07
7440-50-8	Copper	5.40E-08	1.6E+01	3.4E-09
72-55-9	DDE, 4,4'-	4.28E-08	5.0E-03	8.6E-06
53-70-3	Dibenz(a,h)anthracene	9.18E-10	1.0E-02	9.2E-08
99-65-0	Dinitrobenzene, 1,3-	7.12E-10	2.1E-02	3.3E-08
121-14-2	Dinitrotoluene, 2,4-	3.00E-09	4.7E-02	6.4E-08
606-20-2	Dinitrotoluene, 2,6-	1.44E-09	1.0E-01	1.4E-08
117-84-0	Di-n-octylphthalate	1.46E-07	1.2E+07	1.3E-14
123-91-1	Dioxane, 1,4-	3.65E-17	2.2E+00	1.7E-17
117-81-7	Ethylhexyl phthalate, bis-2-	8.28E-08	1.3E+01	6.2E-09
58-89-9	gamma-BHC (Lindane)	2.85E-10	3.2E-04	8.9E-07
76-44-8	Heptachlor	2.62E-11	3.0E-04	8.7E-08
87-68-3	Hexachloro-1,3-butadiene (Perchlorobutadiene)	1.42E-09	2.6E-01	5.5E-09
118-74-1	Hexachlorobenzene	1.32E-08	2.0E-02	6.6E-07
77-47-4	Hexachlorocyclopentadiene	1.66E-08	2.0E-01	8.4E-08
193-39-5	Indeno(1,2,3-cd) pyrene	8.71E-09	3.0E-02	2.9E-07
7439-92-1	Lead	3.01E-07	3.1E+01	9.7E-09
7487-94-7	Mercuric chloride	5.83E-05	2.0E-01	2.9E-04
22967-92-6	Methyl mercury	5.58E-07	2.0E-01	2.8E-06
7440-02-0	Nickel	6.76E-10	1.6E+01	4.2E-11
98-95-3	Nitrobenzene	4.12E-10	1.3E+00	3.2E-10
608-93-5	Pentachlorobenzene	3.69E-08	6.0E-01	6.1E-08
87-86-5	Pentachlorophenol	2.42E-07	7.0E+00	3.5E-08
7782-49-2	Selenium	2.34E-11	1.0E-01	2.3E-10
7440-22-4	Silver	1.40E-08	4.5E+00	3.1E-09
TEQF	Dioxin - TEQF	1.29E-09	4.1E-04	3.1E-06
75-01-4	Vinyl Chloride	5.69E-13	1.7E+00	3.3E-13
7440-66-6	Zinc	9.82E-09	1.1E+02	8.9E-11
			Cumulative HI (e) =	**3E-04**

(a) Only those compounds with TRVs are listed in this table.
(b) Sediment concentrations were calculated using USEPA's 2005 HHRAP fate and transport equations, using the IRAP software program.
(c) Toxicity Reference Values (TRVs) are discussed in the text.
(d) Maximum Hazard Quotient (HQ) is calculated by dividing the maximum annual sediment concentration by the TRV.
(e) The Cumulative Hazard Index (HI) is calculated by summing the chemical-specific HQs. The HI conservatively reflects exposure to all evaluated compounds, regardless of the type or mechanism of effects. For this project, the target hazard index value was 0.25, based on USEPA Region IX input. If an HI, based on the sum of hazard quotients for all compounds, is above the target level, then the HI values are recalculated for groups of compounds having the same type of health effect and/or a more detailed evaluation may be conducted. A common regulatory target hazard index value used by most states and many other USEPA programs, for compounds grouped according to specific types of health effects, is 1.

Dioxin-TEQF is the Toxic Equivalents (TEQ) for fish calculated by multiplying each congener concentration by its corresponding TEF then summing all of the results. This calculation is presented elsewhere in this appendix.

mg/kg - milligrams per kilogram

RESPONSE TO U.S. ENVIRONMENTAL PROTECTION AGENCY REGION IX COMMENTS ON THE SIEMENS WATER TECHNOLOGIES CORP. CARBON REGENERATION FACILITY RISK ASSESSMENT PARKER, ARIZONA

Prepared by:
CPF Associates, Inc.
7708 Takoma Avenue
Takoma Park, MD

Prepared for:
Siemens Water Technologies Corp.
2523 Mutahar Street
Parker, Arizona

March 13, 2008

RESPONSE TO U.S. ENVIRONMENTAL PROTECTION AGENCY REGION IX COMMENTS ON THE SIEMENS WATER TECHNOLOGIES CORP. CARBON REGENERATION FACILITY RISK ASSESSMENT, PARKER, ARIZONA

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ATTACHMENTS

LIST OF TABLES

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LIST OF ABBREVIATIONS

AZDEQ	Arizona Department of Environmental Quality
BOD	Biological oxygen demand
COD	Chemical oxygen demand
COPC	Chemical of potential concern
CPT	Comprehensive Performance Test
CRIT	Colorado River Indian Tribes
CRSSJV	Colorado River Sewage System Joint Venture
CrVI	Hexavalent Chromium
CWT	Centralized Waste Treatment
DRE	Destruction and removal efficiency
E	Exponent in the presentation of numerical results (e.g., 3E-4 = $3x10^{-4}$)
HCl	Hydrogen chloride
HHRAP	Human Health Risk Assessment Protocol published in 2005 by USEPA
HI	Hazard index
HQ	Hazard quotient
IEUBK	Integrated Exposure Uptake Biokinetic Model
IH	Industrial hygiene
IRAP	Industrial Risk Assessment Program
ISCST3	Industrial Source Complex Short-Term 3 air model
NIOSH	National Institute on Occupational Safety and Health
NOx	Nitrogen oxides
OSHA	Occupational Safety and Health Administration
PCBs	Polychlorinated biphenyls
PDT	Performance Demonstration Test
PCDDs/PCDFs	Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo-furans
POTW	Publicly Owned Treatment Works
ppm	parts per million
RA	Risk assessment
RCRA	Resource Conservation and Recovery Act
SWT	Siemens Water Technologies Corp.
TWA	Time-weighted-average
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey

RESPONSE TO U.S. ENVIRONMENTAL PROTECTION AGENCY REGION IX COMMENTS ON THE SIEMENS WATER TECHNOLOGIES CORP. CARBON REGENERATION FACILITY RISK ASSESSMENT, PARKER, ARIZONA

I. INTRODUCTION

This document provides responses to comments received from the U.S. Environmental Protection Agency (USEPA) Region IX on the *Draft Risk Assessment for the Siemens Water Technologies Corp. Carbon Reactivation Facility in Parker, Arizona*. The Risk Assessment (RA) was prepared on behalf of Siemens Water Technologies Corp. (SWT) by CPF Associates, Inc. and was submitted to USEPA on July 30, 2007. USEPA provided comments on the document to Siemens on December 7, 2007 (USEPA 2007a) and November 26, 2007 (USEPA 2007b).

The SWT facility is a carbon reactivation plant located within the 269,000 acre Colorado River Indian Tribes ("CRIT") Reservation just outside of the Town of Parker in La Paz County, Arizona. The facility is located in an industrial park established by CRIT on Tribal land and is operated pursuant to a lease between the company and CRIT. The facility reactivates spent carbon which has been previously used to remove pollutants from water and air. The spent carbon is reactivated by heating it to very high temperatures under controlled conditions in a carbon reactivation furnace. The newly reactivated carbon is then reused as an activated carbon product.

The RA, consisting of a human health and ecological risk assessment of the facility, was conducted as part of the facility's permitting activities under the Resource Conservation and Recovery Act (RCRA). A risk assessment is a scientific study that is used to help evaluate risks associated with exposure to chemicals in the environment. The risk assessment represents one of the final steps in an evaluation process that has extended over a seven year period. The study was performed in accordance with a USEPA-approved Risk Assessment Workplan and was conducted by a team of scientists and engineers from independent consulting firms with expertise in risk assessment, toxicology, environmental engineering and air dispersion modeling.

The RA demonstrated that the potential risks associated with air emissions from the SWT carbon reactivation furnace and from spent carbon unloading are below regulatory and other target risk levels for both human health and ecological receptors. Additionally, the study showed that the incremental contribution of the facility effluent on the wastewater treatment plant discharge and the Main Drain does not pose unacceptable risks to either aquatic life or human health. Finally, fugitive emissions in ambient air during spent carbon unloading activities were demonstrated not to exceed occupational exposure limits that are established to protect facility employees.

USEPA's review of the ecological risk assessment portion of the RA (USEPA 2007a) concluded that "*the methods and strategies used to quantify the likelihood and magnitude of environmental impacts from Siemens' releases are consistent with the recommended procedures and strategies articulated in EPA's guidance reference. The methods which were used are largely consistent with the 2003 Agency-approved risk assessment workplan. The* *results of the evaluation of putative ecological risk from facility operations to ecological receptors were below ecotoxicologically based levels and below a conservative target level of Hazard Quotient = 0.25*." USEPA's comments on the ecological risk assessment were generally favorable and do not require additional discussion or analysis.

USEPA's review of the human health risk assessment (USEPA 2007b) concluded that "*the methods and strategies used to quantify the likelihood and magnitude of environmental impacts from SWT releases are consistent with the recommended procedures and strategies articulated in EPA's guidance reference. In addition, the methods employed are largely consistent with the 2003 Agency-approved risk assessment workplan. All estimates of chronic human health impact fall well below the health-based regulatory thresholds with adequate margins of uncertainty*." USEPA also provided both general comments and page-specific comments on the human health risk assessment.

The remainder of this document provides responses to the USEPA comments on the human health risk assessment. Responses are provided in the same order as presented by USEPA (2007b), with General Comments addressed first and Specific Comments addressed second. In the following sections, USEPA's comments are presented in italics.

Responding to the wide range of comments provided by USEPA has resulted in a lengthy and complex response to comment document. It is recommended, therefore, that the entire risk assessment for this project be comprised of three documents: the original July 2007 draft risk assessment report, this response to comment document, and one inclusive executive summary that reflects and incorporates conclusions from both documents. The executive summary is provided as a stand-alone companion to this document.

II. RESPONSE TO GENERAL COMMENTS

Comment 1: Quality of Data Used to Support Analysis of Human and Ecological Impacts.

Comment:
This comment notes that the Comprehensive Performance Test (CPT) "was conducted and results tabulated in accordance with an Agency-approved CPT test plan." It also states that "All data subject to qualification review [from the CPT] was deemed sufficiently reliable to support quantitative estimations of the magnitude and likelihood of human or ecological impact."

Response: No response necessary.

Comment 2: Fugitive Impact Analysis and Occupational Dosimetry.

Comment:
"A predicted ambient air concentration was modeled from a high-end fugitive release scenario in support of the short-term or acute risk analysis. The location of maximum impact from fugitive releases was identified via the air dispersion and deposition model. This location was identified as about 10 meters north of hopper H-1.
The risk assessment has compared model-predicted airborne contaminant concentrations with constituent-specific occupational standards and recommendations from various government and non-governmental organizations. It would be useful to complement this level of analysis of on-site worker impact by conducting a retrospective comparison of model-predicted, on-site fugitive release air estimates with historical facility air monitoring results or occupational dosimetry data. Results from this level of comparison would provide additional data and further inform the overarching weight of evidence regarding the likelihood and magnitude of facility impacts on proximate, on-site receptors."

Response:

<u>Introduction</u>

Siemens conducts industrial hygiene (IH) surveys annually in which occupational dosimetry data are collected by measuring breathing zone air concentrations for organic compounds and dust. In response to this comment, historical IH survey data were compared to the risk assessment's model-predicted on-site air concentrations associated with fugitive releases. It is important to recognize, however, that these two data sets (measured IH breathing zone concentrations versus modeled outdoor ambient air concentrations) differ substantially in a number of important aspects and thus they should not be directly compared. Rather, as suggested in USEPA's comment, the two data sets together can help provide additional complementary information regarding the potential for impacts on proximate, on-site receptors.

Modeled chemical air concentrations on site were calculated in the risk assessment by combining chemical emission rates with air dispersion modeling results. Emission rates resulting from fugitive releases during spent carbon unloading at the outdoor hopper (H-1) were calculated using mathematical emission models developed for USEPA; these models are described in detail in Section 4.3 of the risk assessment (USEPA 1997, 2004, 2006). Concentrations of compounds in spent carbon, a key input to the emission models, were determined based on detailed spent carbon composition data measured over a four-year period from 2003 through 2006. The chemical emission rates were then combined with output from the USEPA-approved Industrial Source Complex Short-Term 3 (ISCST3) air dispersion model to calculate outdoor ambient air concentrations on site. The highest on-site concentrations identified for this emission source were determined to occur 10 meters (roughly 30 feet) from the outdoor hopper.

Occupational dosimetry data collected during IH surveys are very different from ambient air concentrations calculated in the risk assessment. The IH surveys measure concentrations in the breathing zone of workers by placing samplers on the workers themselves (e.g., on a lapel close to the worker's breathing zone). Collection of dosimetry data from the breathing zone is preferred over modeled concentrations for monitoring potential worker exposures (Chrostowski 1994, NAS 1991) and is an important element in the Siemens' facility worker health and safety program. IH surveys often intentionally focus on workers whose potential exposures may be high based on the activities they perform during the workday. Consistent with this approach, many of the workers sampled at the carbon regeneration facility are engaged in activities in the immediate vicinity of spent carbon (e.g., handling, unloading and/or sampling spent carbon containers received at the facility). This means that the locations at which breathing zone concentrations are measured during IH surveys differ from the on-site location modeled in the risk assessment. Moreover, the workers are likely to be much closer to potential emission sources than the modeled location addressed in the risk assessment. Further, air quality models like ISCST are based on the concept of Gaussian dispersion which assumes that time-averaged concentration profiles at any distance in the crosswind direction are well represented by a normal distribution. This may not be the case for very short distances between sources and receptors (Turner 1994)[1] which introduces an element of uncertainty not associated with dosimetry or personnel monitoring. Because of these types of differences, the measured and modeled concentrations are not directly comparable.

Keeping in mind these fundamental differences, the measured and modeled concentrations were compared as recommended by USEPA Region IX in its comment. The following discussion presents the measured IH data and describes how on-site air concentrations were modeled in response to this comment. Finally, this section examines these two datasets in comparison with occupational exposure limits.

Industrial Hygiene Data

This response to comment focused on historical IH data measured over the same four-year time period that was evaluated in the risk assessment (i.e., 2003-2006) and addressed those compounds that were both reported in the IH surveys and also modeled as fugitives in the risk assessment. The IH data were compiled from survey reports provided to CPF Associates by Siemens[2], and include worker measurements collected over time periods

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[1] Note also that the Pasquill-Gifford dispersion parameters have not been reliably measured for distances less than 0.1 km and the prediction of concentrations at receptors less than 0.1 km from a source is thus uncertain.
[2] Zurich Services Corporation. Industrial Hygiene Report – Parker, Arizona. Submitted to D. Eisner, US Filter Westates. February 26, 2004; Liberty Mutual Insurance Group. Industrial Hygiene Report. Submitted to D. Eisner, US Filter. January 5, 2005; Liberty Mutual Insurance Group. Industrial Hygiene Report. Submitted

ranging from roughly 140 minutes (2.3 hours) to 480 minutes (8 hours). Table 1 presents the reported IH results for the subset of compounds reported in the surveys and also modeled in the risk assessment. As can be seen, most of the organic compounds in Table 1 were not present at detectable concentrations. Those that were present at detectable concentrations were well below the associated Occupational Health and Safety Administration (OSHA) and National Institute of Occupational Safety and Health (NIOSH) occupational exposure limits.[3]

Modeled On-Site Chemical Air Concentrations

Modeled on-site chemical air concentrations associated with fugitive releases during spent carbon unloading were calculated by multiplying chemical emission rates with unitized ISCST3 air dispersion modeling results (i.e., air concentrations calculated for a unit 1 g/sec emission rate). This approach for calculating chemical air concentrations directly follows standard USEPA procedures and more specifically USEPA's Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities (HHRAP) guidance. Section 3.8.1 of HHRAP explains how air concentrations are calculated, stating "you can derive COPC-specific[4] air concentrations by multiplying as follows:"

$$\text{COPC-Specific air concentration } (\mu g/m^3) = \frac{\text{Modeled output air concentration } (\mu g/m^3) * \text{COPC-specific emission rate (g/sec)}}{\text{Unit emission rate (1 g/sec)}} \quad \text{(Equ 1)}$$

As illustrated by this equation, the two key inputs for calculating chemical air concentrations are the chemical-specific emission rates and the air dispersion modeling outputs. Section 4.3 of the risk assessment describes the mathematical models that were used to calculate these two key inputs. The following discussion provides additional details about the chemical emission rates and the air dispersion modeling in response to this comment.

Chemical Emission Rates

Two sets of chemical emission rates were considered in this response, in order to reflect different assumptions about chemical concentrations in spent carbon.

- One set of modeled emission rates was obtained directly from the risk assessment; these emission rates were derived using average concentrations in spent carbon received at the facility from 2003 through 2006.

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to D. Eisner, US Filter. January 2006; Liberty Mutual Insurance Group. Industrial Hygiene Report. Submitted to D. Eisner, US Filter. December 28, 2006.

[3] The IH surveys analyzed breathing zone samples for more than 30 organic compounds. Most compounds were below the limits of quantitation. Those compounds that were detected were present at levels well below occupational exposure limits.

[4] COPC = chemical of potential concern.

Table 1

Results from Carbon Regeneration Facility Industrial Hygiene (IH) Surveys Conducted from 2003 Through 2006

Year	Breathing Zone Air Concentrations (a) (concentrations for organic compounds in parts per million (ppm); concentrations for dust in mg/m3)										
	1,4-Dichloro-benzene	**Benzene**	**Chloroform**	**Cyclohexane**	**Ethylbenzene**	**n-Hexane**	**Styrene**	**Tetrachloro-ethylene**	**Toluene**	**Trichloro-ethylene**	**Total dust**	**Respirable dust**
2003	< 0.07	< 0.06	< 0.2	< 0.05	< 0.05	< 0.05	< 0.06	< 0.08	< 0.05	< 0.1	0.12	1.2
	< 0.07	< 0.06	< 0.2	< 0.06	< 0.06	< 0.05	< 0.06	< 0.09	< 0.05	< 0.1	0.42	0.24
	< 0.07	< 0.06	< 0.2	< 0.06	< 0.06	< 0.05	< 0.06	< 0.09	< 0.05	< 0.1	0.41	
	< 0.07	< 0.06	< 0.2	< 0.06	< 0.06	< 0.05	< 0.06	< 0.09	< 0.05	< 0.1	1.4	
	< 0.09	< 0.08	< 0.3	< 0.07	< 0.07	< 0.07	< 0.08	< 0.1	< 0.07	< 0.1		
2004	< 0.0009	< 0.002	< 0.0083		< 0.00066	< 0.0094	< 0.002	< 0.003	< 0.001	< 0.0024		
	< 0.0013	< 0.0029	< 0.012		< 0.00096	< 0.014	< 0.003	< 0.0044	< 0.0015	< 0.0035		
	< 0.00084	< 0.0018	< 0.0077		< 0.00061	< 0.0089	< 0.0019	< 0.0028	< 0.00094	< 0.0022		
	< 0.0017	< 0.0038	< 0.016		< 0.0013	< 0.018	< 0.004	< 0.0058	< 0.002	< 0.0046		
	< 0.00063	< 0.0014	< 0.0058		< 0.00046	< 0.0066	< 0.0014	< 0.0021	< 0.0007	< 0.0017		
	< 0.00086	< 0.0019	< 0.0079		< 0.00063	< 0.0091	< 0.002	< 0.0029	< 0.00097	< 0.0023		
	< 0.0013	< 0.0028	< 0.012		< 0.00094	< 0.014	< 0.0029	< 0.0043	< 0.0014	< 0.0034		
	< 0.00086	< 0.0019	< 0.008		< 0.00063	< 0.0091	< 0.002	< 0.0029	< 0.00097	< 0.0023	0.35	
	< 0.0014	< 0.003	< 0.013		< 0.001	< 0.014	< 0.0031	< 0.0046	< 0.0015	< 0.0036	0.26	
	< 0.00097	< 0.021	< 0.0089		< 0.00071	< 0.01	< 0.0022	< 0.0032	< 0.0011	< 0.0026	2.57	
	< 0.0013	< 0.0028	< 0.012		< 0.00092	< 0.013	< 0.0028	< 0.0042	< 0.0014	< 0.0033	1.49	
2005	< 0.012	< 0.022	< 0.046		< 0.012	< 0.046	< 0.014	< 0.027	< 0.015	< 0.045	0.2	
	< 0.011	< 0.021	< 0.045		< 0.012	< 0.045	< 0.014	< 0.026	< 0.014	< 0.044	0.39	
	< 0.011	< 0.021	< 0.045		< 0.012	< 0.045	< 0.014	< 0.026	< 0.014	< 0.044	0.93	
	< 0.013	< 0.025	< 0.052		< 0.014	< 0.052	< 0.016	< 0.03	0.025	< 0.051	< 0.15	
	< 0.011	< 0.021	< 0.045		< 0.012	< 0.044	< 0.014	< 0.026	< 0.014	< 0.044	0.079	
2006		< 0.0062	< 0.091		< 0.012	0.15	0.028	< 0.05	0.03	< 0.034	5.23	
		< 0.0097	< 0.14		< 0.018	< 0.016	< 0.016	0.78	0.034	< 0.054	2.9	
		< 0.016	< 0.24		< 0.031	0.029	< 0.027	2.7	< 0.027	< 0.09	0.25	
		< 0.0063	< 0.092		< 0.012	0.11	0.027	0.07	0.015	< 0.035	0.65	
		< 0.007	< 0.1		< 0.013	< 0.012	0.039	< 0.056	0.012	< 0.038		
Summary of IH Survey Data												
# samples	21	26	26	5	26	26	26	26	26	26	17	2
# non-detects	21	26	26	5	26	23	23	23	21	26	1	0
% detected	0%	0%	0%	0%	0%	12%	12%	12%	19%	0%	94%	100%
Occupational Exposure Limits (8-hour TWA)												
OSHA PEL	75	1	NA	305	100	511	101	100	199	100	15	5
NIOSH REL	10	0.1	10	305	100	51	50	25	100	25	10	3

Source: IH survey reports provided by Siemens.

< = Compound was not detected at the listed detection limit.

OSHA PEL = Occupational Safety and Health Administration 8-hour time-weighted average Permissible Exposure Limit

NIOSH REL = National Institute for Occupational Safety and Health 8-hour time-weighted average Reference Exposure Limit

(a) The listed compounds include those that were selected for detailed evaluation in the spent carbon fugitive emissions analysis in the risk assessment and also were analyzed for during industrial hygiene monitoring programs conducted at the facility. Compounds that were evaluated in the fugitive emissions risk assessment but were not analyzed for in the IH surveys consisted of inorganics, 1,3-butadiene, acrylonitrile, naphthalene and vinyl chloride.

- The second set of modeled emission rates was evaluated to respond to another USEPA comment (Region IX Specific Comment 10, see below) which recommended that maximum rather than average spent carbon concentrations be used to model fugitive releases for the acute risk analysis. Accordingly, the second set of modeled emission rates was derived using the maximum concentration reported in any spent carbon load that was unloaded at the outdoor hopper over the four-year 2003-2006 period, rather than the average concentration. Table 2 presents the maximum concentrations in spent carbon unloaded at the outdoor hopper, the number of deliveries with this maximum concentration relative to the total number of deliveries, and the mathematically modeled fugitive chemical emission rates.

Air Dispersion Modeling

Equation 1, presented above, shows the HHRAP method for calculating chemical-specific air concentrations. In this method, unitized ISCST3 dispersion model output air concentrations are multiplied by chemical-specific emission rates. The unitized ISCST3 air concentration used in the risk assessment and in this response was the maximum modeled 8-hour average air concentration based on a unit 1 g/sec emission rate (i.e., $\mu g/m^3$ per 1 g/sec). The chemical-specific emission rates were calculated as described above.

The ISCST3 model, using 5 years of input meteorological data, calculated more than 5,400 unitized 8-hour average concentrations at each of the more than 60 on-site receptor locations that were modeled.[5] The maximum impact receptor point was located about 10 meters from the outdoor hopper. At this location, the highest unitized ISCST3 8-hour average concentration, from among the more than 5,400 modeled output concentrations, was 16,426 $\mu g/m^3$ per 1 g/sec (see Section 4.4.4.1 and Appendix D in the risk assessment for more detail on the ISCST3 modeling). All the other 8-hour average air concentrations modeled 10 m from the outdoor hopper, and at all the other modeled on-site receptor locations, were lower than this highest value.

<u>Presentation of Measured Industrial Hygiene Data and Modeled On-Site Air Concentrations</u>

Figure 1 presents the IH survey data and the modeled on-site air concentrations along with available occupational exposure limits. This comparison indicates that both the modeled ambient air concentrations and the measured worker breathing zone concentrations for the four-year period from 2003 through 2006 did not exceed the OSHA permissible exposure limits and the NIOSH reference exposure limits.

The highest modeled air concentration relative to an occupational exposure limit in Figure 1 was the maximum modeled on-site concentration of benzene. The maximum modeled

[5] Three 8-hour averages are calculated by ISCST3 for each modeled day (i.e., midnight – 8 AM, 8 AM-4 PM, and 4 PM-midnight). With 5 years of input meteorological data, including one leap year, this produces more than 5,400 8-hour average ambient air concentrations at each modeled receptor location (e.g., 5 years * 365 days/year * 3 8-hour averages/day).

Table 2
Maximum Modeled Fugitive Compound Emission Rates During Spent Carbon Unloading at the Outdoor Hopper (a)

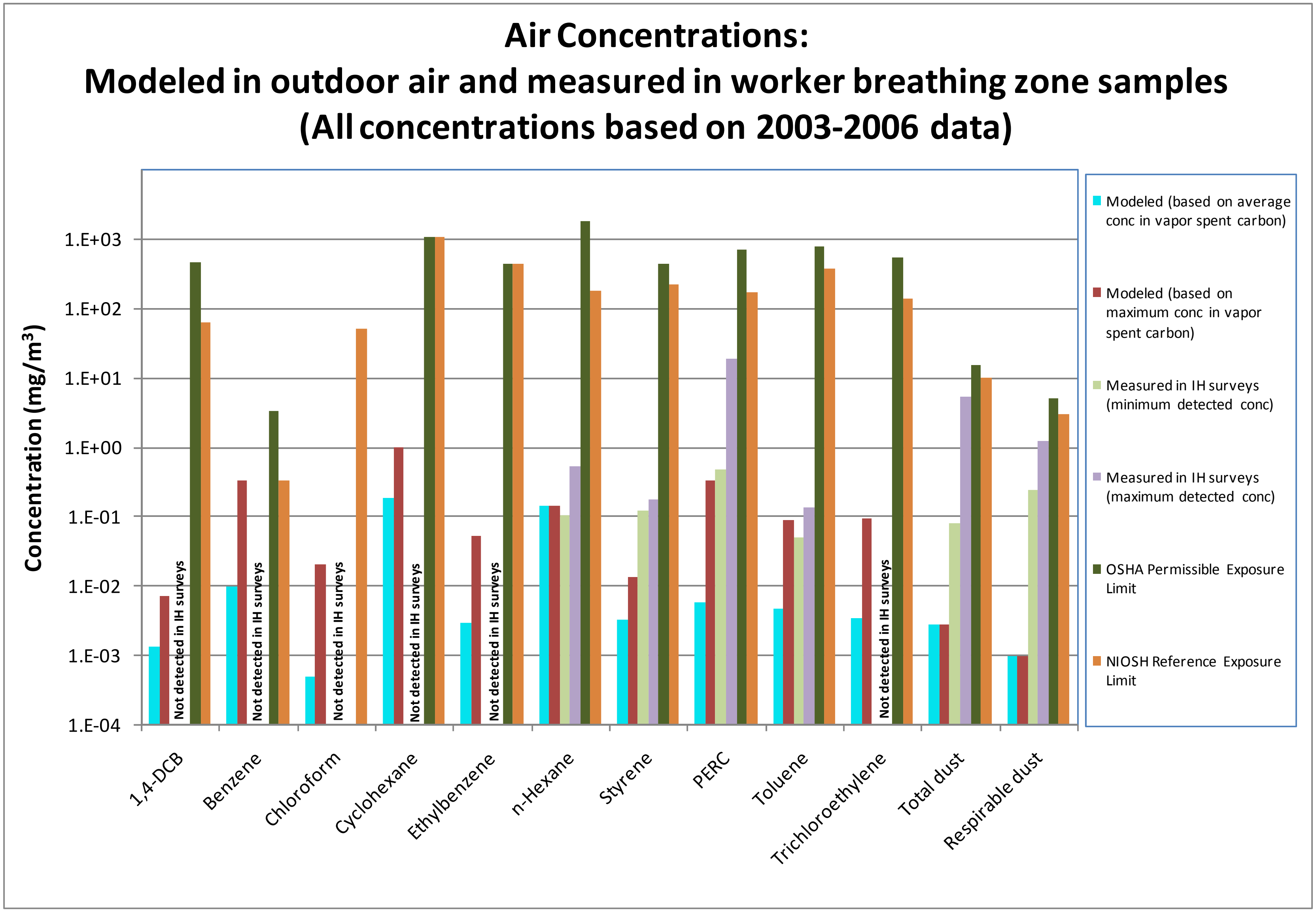
Compound	CAS #	Loads Unloaded at Outdoor Hopper H-1 (Based on 2003-2006 Spent Carbon Data)			Emission Rate Based on Maximum Concentration (loads unloaded at H-1) (g/sec) (b)
		Maximum Concentration (ppm)	Number of Deliveries with Maximum	Total Number of Deliveries over 4-Year Period	
1,2-Dibromoethane	106-93-4	0.025	1	11	6.38E-10
1,3-Butadiene	106-99-0	NA	0	1	NA
1,4-Dichlorobenzene	106-46-7	34,500	9	59	4.27E-04
Acrylonitrile	107-13-1	11,500	9	9	2.08E-03
Arsenic	7440-38-2	73.4	3	145 (c)	4.31E-09
Benzene	71-43-2	70,000	15	3,443	2.02E-02
Beryllium	7440-41-7	9.8	1	52	5.73E-10
Cadmium	7440-43-9	79.3	2	63	4.65E-09
Chloroform	67-66-3	5,579	2	634	1.25E-03
Chromium	7440-47-3	294	2	310	1.73E-08
Chromium VI	18540-29-9	170	--	--	9.98E-09
Cobalt	7440-48-4	798	2	171	4.68E-08
Copper	7440-50-8	91	1	256	5.37E-09
Cyclohexane	110-82-7	46,000	3	16	5.87E-02
Ethylbenzene	100-41-4	25,932	13	888	3.19E-03
Naphthalene	91-20-3	3,600	5	57	4.62E-06
n-Hexane	110-54-3	2,220	1	1	8.46E-03
Nickel	7440-02-0	279	2	226	1.64E-08
Styrene	100-42-5	84,784	8	107	7.98E-04
Tetrachloroethylene	127-18-4	91,000	3	1,562	1.96E-02
Toluene	108-88-3	35,837	35	1,145	5.37E-03
Trichloroethylene	79-01-6	16,667	1	2,114	5.61E-03
Vinyl Chloride	75-01-4	6,100	1	375	3.29E-02

-- = no data. Chromium VI concentrations were calculated from total chromium data (see text).

NA = not applicable. Only one spent carbon load containing this compound was received and it was unloaded at H-2.

(a) Emission rates were modeled using maximum spent carbon concentrations for loads unloaded at H-1.
(b) Methods for calculating emission rates:
- Emission rates for inorganic compounds (g/sec) = PM10 dust emission rate (g/sec) * concentration in spent carbon (g/g), where the PM10 dust emission rate is 5.87E-5 g/sec (see Section 4.3.3.2 in the risk assessment for a description of the PM10 emission rate calculation).
- See Section 4.3.3.1 in the risk assessment for information on the methods used to calculate emission rates for organic compounds. As described in Section 4.3.3.1 of the risk assessment, emission rates for organic compounds were calculated for two different types of spent carbon received at the facility, aqua spent carbon and vapor spent carbon. Emission rates for unloading vapor spent carbon are shown here and used to evaluate potential risks since these emission rates are higher than those for unloading aqua spent carbon.
(c) Table 4.3-1 of the risk assessment indicated there were 10 deliveries over the 4-year period. The correct number of deliveries is shown here.

Figure 1


Air Concentrations:
Modeled in outdoor air and measured in worker breathing zone samples
(All concentrations based on 2003-2006 data)
Concentration (mg/m³)
1.E+03
1.E+02
1.E+01
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
Not detected in IH surveys
1,4-DCB
Benzene
Chloroform
Cyclohexane
Ethylbenzene
n-Hexane
Styrene
PERC
Toluene
Trichloroethylene
Total dust
Respirable dust
Modeled (based on average conc in vapor spent carbon)
Modeled (based on maximum conc in vapor spent carbon)
Measured in IH surveys (minimum detected conc)
Measured in IH surveys (maximum detected conc)
OSHA Permissible Exposure Limit
NIOSH Reference Exposure Limit

8-hour average benzene air concentration, calculated using the maximum spent carbon benzene concentration and the maximum ISCST3 dispersion result, was equal to the NIOSH reference exposure limit and about 10 times lower than the OSHA permissible exposure limit. This scenario has a very low probability of occurrence, however, since it assumed that the maximum benzene concentration would be unloaded during a workday also characterized by meteorological conditions that produced the maximum 8-hour average air concentration. The likelihood of this situation occurring is less than 4 in 100,000,000 per year.[6]

As described in more detail in response to Specific Comment #10 below, the facility has a protective worker health and safety program which has been developed to meet the requirements of OSHA. In addition to the IH surveys, the program includes training, medical monitoring, provision and use of personal protective equipment, and hazard communication. Specifically with respect to this response to comment, it is important to recognize that all workers involved in spent carbon unloading operations wear respirators in addition to protective clothing. When handling any spent carbon (whether it is classified as non-hazardous or hazardous), a half-face respirator with organic and dust control cartridges is worn by workers. Workers also wear company-supplied shorts, pants, steel-toed boots, hard hat and safety glasses.

Thus, the results of the dosimetry corroborate the conclusions of the risk assessment model that unacceptable risks to workers associated with chemical exposures from spent carbon are not likely to occur.

Comment 3: Clean Air Act MACT.

Comment:
In this comment, USEPA discusses the Maximum Achievable Control Technology (MACT) standards under the U.S. Clean Air Act and concludes that "While the MACT standards are not risk-based per se, this level of analysis is consistent with the overall weight of evidence suggesting a de minimus level of human and ecological impact from stack emissions on proximate receptors."

Response: No response necessary.

Comment 4: Upset Conditions (Stack Emissions)

Comment:
"Non-cancer or systemically toxic chemicals evaluated in this analysis were assessed by the Agency's threshold strategy which produces a constituent-specific, yet cumulative hazard index. The potential for acute health impacts associated with facility stack release upsets

[6] The probability of the maximum benzene concentration occurring in spent carbon is 15 in 3,443 (i.e., 15 deliveries with the maximum concentration were received over the 4-year period out of a total of 3,443 spent carbon deliveries containing benzene). The probability of meteorological conditions producing the maximum 8-hour air concentration is less than 1 in 5,400 over 5 years (i.e., 1 maximum 8-hour concentration out of more than 5,400 calculated 8-hour average concentrations at the receptor location). The overall probability of the maximum modeled benzene concentration occurring is, thus, [(15/3443) / 4 years] * [(<1/5400) / 5 years] = <4E-8 or less than 4 in 100,000,000 per year.

were subject to this level of scrutiny. Discrete locations subject to the maximum levels of contaminant deposition were identified by the computerized air dispersion and deposition model. These discrete locations, irrespective of their relationship to known human receptors, were then used to determine media-specific exposure point concentrations - and the concomitant estimate of hazard incurred by a hypothetical receptor.

The acute or short-term hazard estimates associated with upset stack releases should be clearly detailed on pg 42. The cumulative acute hazard index associated with grid locations (A_1) and (A_2) should be clearly provided either in a table or a revised narrative. Further, the acute or short-term upset stack release concentration should be consistent with the 1-hr maximum upset emission rate rather than the 1-hr average upset emission rate.

Moreover, the relationship between the 10x increased emission rate associated with a hypothetical facility upset condition and the acute hazard index is not clear based upon the data provided. That is, the contention that acute hazard quotients are uniformly and linearly increased by a factor of 10 is not supported by any data, as the air dispersion and deposition model is based on a gaussian distribution, plume-depleted, mass balance algorithm."

Response:

<u>Introduction</u>

In response to this comment, a more detailed explanation and presentation of acute, short-term hazard estimates associated with upset stack releases is provided. This section first explains how the acute inhalation risk assessment for upset conditions was performed in response to this comment. Then the results of this assessment are presented. In the course of this discussion, USEPA's comments noted above are addressed.

An acute inhalation risk assessment for upset stack emissions is performed using three key pieces of information: 1) chemical stack emission rates under upset conditions, 2) unitized air dispersion model output concentrations calculated using a unit 1 g/sec emission rate, and 3) short-term acute inhalation reference exposure concentrations. The short-term reference exposure concentrations were identified and compiled according to USEPA's HHRAP guidance and are addressed in Section 4.1.2 of the risk assessment. In this section, an expanded discussion of the remaining two items, upset emission rates and air model outputs, is provided.

<u>Upset Stack Emission Rates</u>

Upset stack emission rates were calculated in two steps. First, maximum measured emission rates from the performance demonstration test (PDT) were compiled[7] and then, second, these maximum values were increased by USEPA's default upset multiplication factor.

The approach used in this response to comment is even more conservative than that provided for in the risk assessment, in that maximum measured emission rates from the PDT were used in this response whereas the risk assessment, in accordance with the project Workplan, used

[7] Stack measurements for nitrogen oxides and sulfur dioxide were obtained from miniburn data since these compounds were not measured in the PDT.

average emission rates derived across the three PDT test runs. This change was made to respond to USEPA's comment to use the "maximum upset emission rate." These maximum measured emission rates are presented in Table 3 along with the stack emission rates that were used in the risk assessment. As described in Section 4.5.2 of the risk assessment, and as shown in Table 3, the differences between the average and maximum measured stack emission rates for those compounds with emission rates based on stack test data were not substantial, and ranged from a factor of 1.0 (i.e., no change) to a factor of 3.0.

Upset emission rates were calculated from the maximum measured values according to the USEPA guidance presented in Section 2.2.5 of HHRAP which, as a default and in the absence of site-specific data, assumes that "emissions during process upsets are 10 times greater than emissions measured during the trial burn." USEPA indicates in HHRAP that the multiplicative default factor of 10 is based on a method presented in 1990 by the California Air Resources Board for non-hazardous municipal waste combustors; HHRAP has extrapolated this to hazardous waste incinerators. An activated carbon regeneration facility is not a hazardous waste incinerator and is intrinsically easier to control than an incinerator due to homogeneity in the feedstock (consisting of only spent carbon), thereby ensuring that the default assumption is likely to be overly conservative when applied to carbon regeneration facilities. In addition, peer review comments received by USEPA on the hazardous waste incinerator methodology pointed out that "available technical information indicates that upset emissions are not close to 10 times normal emissions" (USEPA 2005). Nonetheless, in keeping with USEPA's HHRAP default approach, and because site-specific emissions data during upsets were not available, the upset stack emission rates were calculated by multiplying the maximum measured stack emission rates by a factor of 10. These upset emission rates are also listed in Table 3.

Upset conditions occur at the facility very infrequently. Facility data describing the frequency and duration of upset conditions from 2000 and 2001, which were presented in the risk assessment, indicate that upset conditions occur for about 0.24% of the time the facility is operating. The facility operated under upset conditions for 16.1 hours out of a total of 6,745 operating hours in 2000 and for 18.4 hours out of a total of 7,844 operating hours in 2001 (see Table 4.2-2 in the risk assessment for more details).

Proportionality of Chemical Emission Rates to Air Concentrations and Hazard Quotients

USEPA's comment questions whether the relationship between acute hazard quotients (HQs) and emission rates is linear and the contention that a factor of 10 increase in emission rates will increase HQs by a factor of 10. This section responds to USEPA's comment, drawing directly from USEPA guidance.

Short-term chemical-specific air concentrations for the upset acute risk assessment, and in fact chemical-specific air concentrations throughout the risk assessment, were calculated in accordance with standard USEPA procedures and HHRAP guidance. USEPA's guidance in Section 3.8 of HHRAP (Using Model Output) states: "ISCST3 output (air concentrations and deposition rates) are usually provided on a unit emission rate (1.0 g/sec) basis from the combustor or emission source, and aren't COPC-specific. This is to preclude having to run the

Table 3

Maximum Measured Stack Emission Rates, Emission Rates Used in the Risk Assessment, and Upset Condition Stack Emission Rates

Compound	CAS Number	Stack Emission Rates Used in Risk Assessment (Non-Upset Conditions)		Maximum Measured Stack Emission Rate from PDT (g/sec)	Ratio: Maximum Measured Emission Rate / Average Measured Emission Rate Used in Risk Assessment	Upset Condition Stack Emission Rates Used in Response to Comments (maximum measured emission rate * 10) (g/sec) (d)
		Emission Rate (g/sec) (a)	Basis for Emission Rate			
Inorganic Compounds						
Aluminum	7429-90-5	1.15E-04	PDT	1.43E-04	1.2	1.43E-03
Antimony	7440-36-0	3.89E-06	PDT	4.96E-06	1.3	4.96E-05
Arsenic	7440-38-2	1.26E-04	permit limit	6.22E-06	not applicable (b)	6.22E-05
Barium	7440-39-3	9.01E-06	PDT	1.10E-05	1.2	1.10E-04
Beryllium	7440-41-7	1.26E-04	permit limit	3.13E-07	not applicable (b)	3.13E-06
Cadmium	7440-43-9	3.12E-04	permit limit	1.31E-05	not applicable (b)	1.31E-04
Chromium	7440-47-3	1.26E-04	permit limit	6.04E-05 (c)	not applicable (b)	6.04E-04
Chromium, hexavalent	7440-47-3	5.80E-06	PDT	6.28E-06	1.1	6.28E-05
Cobalt	7440-48-4	5.82E-07	PDT	9.38E-07	1.6	9.38E-06
Copper	7440-50-8	1.19E-04	PDT	1.80E-04	1.5	1.80E-03
Lead	7439-92-1	3.12E-04	permit limit	5.60E-04 (c)	not applicable (b)	5.60E-03
Manganese	7439-96-5	4.61E-05	PDT	7.10E-05	1.5	7.10E-04
Mercuric chloride	7487-94-7	2.30E-05	permit limit	1.62E-06	not applicable (b)	1.62E-05
Mercury, elemental	7439-97-6	1.34E-06	permit limit	9.48E-08	not applicable (b)	9.48E-07
Nickel	7440-02-0	9.91E-06	PDT	1.29E-05	1.3	1.29E-04
Selenium	7782-49-2	3.76E-06	PDT	4.85E-06	1.3	4.85E-05
Silver	7440-22-4	2.73E-06	PDT	4.62E-06	1.7	4.62E-05
Thallium	7440-28-0	9.24E-06	PDT	1.13E-05	1.2	1.13E-04
Vanadium	7440-62-2	2.43E-06	PDT	3.23E-06	1.3	3.23E-05
Zinc	7440-66-6	1.51E-04	PDT	2.36E-04	1.6	2.36E-03
Organic Compounds						
1,1,1-Trichloroethane	71-55-6	2.78E-07	PDT	3.17E-07	1.1	3.17E-06
1,1,2,2-Tetrachloroethane	79-34-5	1.32E-06	PDT	1.51E-06	1.1	1.51E-05
1,1,2-Trichloroethane	79-00-5	8.02E-07	PDT	9.14E-07	1.1	9.14E-06
1,1-Dichloroethane	75-34-3	3.09E-07	PDT	3.53E-07	1.1	3.53E-06

Table 3
Maximum Measured Stack Emission Rates, Emission Rates Used in the Risk Assessment, and Upset Condition Stack Emission Rates

Compound	CAS Number	Stack Emission Rates Used in Risk Assessment (Non-Upset Conditions)		Maximum Measured Stack Emission Rate from PDT (g/sec)	Ratio: Maximum Measured Emission Rate / Average Measured Emission Rate Used in Risk Assessment	Upset Condition Stack Emission Rates Used in Response to Comments (maximum measured emission rate * 10) (g/sec) (d)
		Emission Rate (g/sec) (a)	Basis for Emission Rate			
1,1-Dichloroethene	75-35-4	3.52E-07	PDT	4.01E-07	1.1	4.01E-06
1,1-Dichloropropene	563-58-6	2.15E-07	PDT	2.45E-07	1.1	2.45E-06
1,2,3-Trichlorobenzene	87-61-6	1.73E-06	PDT	1.97E-06	1.1	1.97E-05
1,2,3-Trichloropropane	96-18-4	1.25E-06	PDT	1.42E-06	1.1	1.42E-05
1,2,4-Trichlorobenzene	120-82-1	9.30E-07	PDT	1.06E-06	1.1	1.06E-05
1,2,4-Trimethylbenzene	95-63-6	6.26E-07	PDT	7.14E-07	1.1	7.14E-06
1,2-Dibromo-3-chloropropane	96-12-8	2.60E-06	PDT	2.97E-06	1.1	2.97E-05
Ethylene dibromide	106-93-4	1.32E-06	PDT	1.50E-06	1.1	1.50E-05
1,2-Dichlorobenzene	95-50-1	8.43E-07	PDT	9.73E-07	1.2	9.73E-06
1,2-Dichloroethane	107-06-2	5.05E-07	PDT	6.15E-07	1.2	6.15E-06
1,2-Dichloroethene (cis)	156-59-2	4.17E-07	PDT	5.17E-07	1.2	5.17E-06
1,2-Dichloroethene (trans)	156-60-5	2.89E-07	PDT	3.29E-07	1.1	3.29E-06
1,2-Dichloropropane	78-87-5	3.98E-07	PDT	4.49E-07	1.1	4.49E-06
1,2-Diphenylhydrazine	122-66-7	7.00E-07	PDT	8.02E-07	1.1	8.02E-06
1,3,5-Trimethylbenzene	108-67-8	4.05E-07	PDT	4.62E-07	1.1	4.62E-06
1,3-Dichlorobenzene	541-73-1	8.86E-07	PDT	1.01E-06	1.1	1.01E-05
1,3-Dichloropropane	142-28-9	3.77E-07	PDT	4.29E-07	1.1	4.29E-06
1,3-Dichloropropene	542-75-6	7.58E-07	PDT	8.46E-07	1.1	8.46E-06
1,3-Dinitrobenzene	99-65-0	1.08E-06	PDT	1.26E-06	1.2	1.26E-05
1,4-Dichlorobenzene	106-46-7	1.00E-06	PDT	1.16E-06	1.2	1.16E-05
1-Hexane (n-hexane)	110-54-3	7.98E-10	FR&DRE	--	not applicable (b)	8.0E-09
2,2'-oxybis (1-Chloropropane)	108-60-1	9.72E-07	PDT	1.11E-06	1.1	1.11E-05
2,2-Dichloropropane	594-20-7	2.79E-07	PDT	3.18E-07	1.1	3.18E-06
2,4,5-Trichlorophenol	95-95-4	1.61E-06	PDT	1.85E-06	1.1	1.85E-05
2,4,6-Trichlorophenol	88-06-2	1.27E-06	PDT	1.47E-06	1.2	1.47E-05
2,4-Dichlorophenol	120-83-2	1.30E-06	PDT	1.68E-06	1.3	1.68E-05

Table 3

Maximum Measured Stack Emission Rates, Emission Rates Used in the Risk Assessment, and Upset Condition Stack Emission Rates

Compound	CAS Number	Stack Emission Rates Used in Risk Assessment (Non-Upset Conditions)		Maximum Measured Stack Emission Rate from PDT (g/sec)	Ratio: Maximum Measured Emission Rate / Average Measured Emission Rate Used in Risk Assessment	Upset Condition Stack Emission Rates Used in Response to Comments (maximum measured emission rate * 10) (g/sec) (d)
		Emission Rate (g/sec) (a)	Basis for Emission Rate			
2,4-Dimethylphenol	105-67-9	3.09E-06	PDT	3.50E-06	1.1	3.50E-05
2,4-Dinitrophenol	51-28-5	9.15E-06	PDT	1.04E-05	1.1	1.04E-04
2,4-Dinitrotoluene	121-14-2	1.32E-06	PDT	1.52E-06	1.1	1.52E-05
2,5-Dimethylfuran	625-86-5	8.43E-07	PDT	2.53E-06	3.0	2.53E-05
2,5-Dimethylheptane	2216-30-0	1.68E-05	PDT	2.77E-05	1.6	2.77E-04
2,5-Dione, 3-hexene	17559-81-8	9.53E-07	PDT	2.86E-06	3.0	2.86E-05
2,6-Dinitrotoluene	606-20-2	1.06E-06	PDT	1.22E-06	1.2	1.22E-05
Methyl ethyl ketone	78-93-3	4.51E-06	PDT	5.14E-06	1.1	5.14E-05
2-Chloronaphthalene	91-58-7	6.53E-07	PDT	7.59E-07	1.2	7.59E-06
2-Chlorophenol	95-57-8	8.60E-07	PDT	9.83E-07	1.1	9.83E-06
2-Chlorotoluene	95-49-8	5.10E-07	PDT	5.77E-07	1.1	5.77E-06
2-Hexanone	591-78-6	1.88E-06	PDT	2.14E-06	1.1	2.14E-05
2-Methyl octane	3221-61-2	3.98E-06	PDT	8.58E-06	2.2	8.58E-05
2-Methylnaphthalene	91-57-6	5.79E-08	PDT	8.13E-08	1.4	8.13E-07
Cresol, o-	95-48-7	2.09E-06	PDT	2.38E-06	1.1	2.38E-05
2-Nitroaniline	88-74-4	1.04E-06	PDT	1.21E-06	1.2	1.21E-05
2-Nitrophenol	88-75-5	1.77E-06	PDT	2.01E-06	1.1	2.01E-05
3,3'-Dichlorobenzidine	91-94-1	4.96E-06	PDT	5.68E-06	1.1	5.68E-05
Cresol, m-	108-39-4	9.15E-07	PDT	1.04E-06	1.1	1.04E-05
Cresol, p-	106-44-5	9.15E-07	PDT	1.04E-06	1.1	1.04E-05
3-Ethyl benzaldehyde	34246-54-3	2.38E-06	PDT	3.89E-06	1.6	3.89E-05
3-Hexen-2-one	763-93-9	1.14E-04	PDT	3.41E-04	3.0	3.41E-03
3-Nitroaniline	99-09-2	2.91E-06	PDT	3.33E-06	1.1	3.33E-05
Ethylidene acetone (3-penten-2-one)	625-33-2	4.83E-06	PDT	1.45E-05	3.0	1.45E-04
3-Penten-2-one, 4-methyl	141-79-7	9.30E-05	PDT	2.14E-04	2.3	2.14E-03

Table 3
Maximum Measured Stack Emission Rates, Emission Rates Used in the Risk Assessment, and Upset Condition Stack Emission Rates

Compound	CAS Number	Stack Emission Rates Used in Risk Assessment (Non-Upset Conditions)		Maximum Measured Stack Emission Rate from PDT (g/sec)	Ratio: Maximum Measured Emission Rate / Average Measured Emission Rate Used in Risk Assessment	Upset Condition Stack Emission Rates Used in Response to Comments (maximum measured emission rate * 10) (g/sec) (d)
		Emission Rate (g/sec) (a)	Basis for Emission Rate			
4,4'-DDD	72-54-8	1.31E-07	PDT	2.01E-07	1.5	2.01E-06
4,4'-DDE	72-55-9	4.47E-08	PDT	5.64E-08	1.3	5.64E-07
4,4'-DDT	50-29-3	3.34E-08	PDT	6.63E-08	2.0	6.63E-07
4,6-Dinitro-2-methylphenol	534-52-1	4.37E-06	PDT	4.95E-06	1.1	4.95E-05
4-Bromophenyl-phenyl ether	101-55-3	6.71E-07	PDT	7.69E-07	1.1	7.69E-06
4-Chloro-3-methylphenol	59-50-7	2.17E-06	PDT	2.51E-06	1.2	2.51E-05
4-Chloroaniline	106-47-8	4.17E-06	PDT	4.78E-06	1.1	4.78E-05
4-Chlorophenyl-phenyl ether	7005-72-3	1.11E-06	PDT	1.29E-06	1.2	1.29E-05
4-Chlorotoluene	106-43-4	4.42E-07	PDT	5.03E-07	1.1	5.03E-06
4-Ethyl benzaldehyde	4748-78-1	1.30E-06	PDT	3.89E-06	3.0	3.89E-05
4-Nitroaniline	100-01-6	2.34E-06	PDT	2.57E-06	1.1	2.57E-05
4-Nitrophenol	100-02-7	2.92E-06	PDT	3.33E-06	1.1	3.33E-05
9-Octadecenamide	301-02-0	2.52E-06	PDT	7.57E-06	3.0	7.57E-05
Acenaphthene	83-32-9	4.48E-09	PDT	5.51E-09	1.2	5.51E-08
Acenaphthylene	208-96-8	8.11E-09	PDT	1.52E-08	1.9	1.52E-07
Acetone	67-64-1	6.14E-05	PDT	6.21E-05	1.0	6.21E-04
Acetophenone	98-86-2	3.41E-06	PDT	3.62E-06	1.1	3.62E-05
Acrylic Acid	79-10-7	1.80E-11	FR&DRE	--	not applicable (b)	1.8E-10
Acrylonitrile	107-13-1	1.10E-05	PDT	1.25E-05	1.1	1.25E-04
Aldrin	309-00-2	2.45E-08	PDT	2.77E-08	1.1	2.77E-07
Aniline	62-53-3	7.19E-06	PDT	8.33E-06	1.2	8.33E-05
Anthracene	120-12-7	1.28E-08	PDT	2.61E-08	2.0	2.61E-07
Benzaldehyde	100-52-7	4.90E-06	PDT	6.60E-06	1.3	6.60E-05
Benzene	71-43-2	2.59E-06	PDT	3.02E-06	1.2	3.02E-05
Benzidine	92-87-5	4.68E-05	PDT	5.35E-05	1.1	5.35E-04
Benzo(a)Anthracene	56-55-3	2.84E-09	PDT	4.82E-09	1.7	4.82E-08

Table 3

Maximum Measured Stack Emission Rates, Emission Rates Used in the Risk Assessment, and Upset Condition Stack Emission Rates

Compound	CAS Number	Stack Emission Rates Used in Risk Assessment (Non-Upset Conditions)		Maximum Measured Stack Emission Rate from PDT (g/sec)	Ratio: Maximum Measured Emission Rate / Average Measured Emission Rate Used in Risk Assessment	Upset Condition Stack Emission Rates Used in Response to Comments (maximum measured emission rate * 10) (g/sec) (d)
		Emission Rate (g/sec) (a)	Basis for Emission Rate			
Benzo(a)pyrene	50-32-8	3.58E-09	PDT	5.45E-09	1.5	5.45E-08
Benzo(b)fluoranthene	205-99-2	2.94E-08	PDT	3.28E-08	1.1	3.28E-07
Benzo(e)pyrene	192-97-2	5.35E-09	PDT	9.18E-09	1.7	9.18E-08
Benzo(g,h,i)perylene	191-24-2	1.13E-08	PDT	1.61E-08	1.4	1.61E-07
Benzo(k)fluoranthene	207-08-9	5.43E-09	PDT	8.46E-09	1.6	8.46E-08
Benzoic Acid	65-85-0	2.81E-05	PDT	3.19E-05	1.1	3.19E-04
Benzoic acid, methyl ester	93-58-3	8.07E-07	PDT	2.42E-06	3.0	2.42E-05
Benzonitrile	100-47-0	1.87E-06	PDT	2.14E-06	1.1	2.14E-05
Benzyl alcohol	100-51-6	2.09E-05	PDT	2.37E-05	1.1	2.37E-04
Bis(2-chloroethoxy) methane	111-91-1	8.34E-07	PDT	9.54E-07	1.1	9.54E-06
Bis-(2-chloroethyl) ether	111-44-4	8.14E-07	PDT	9.31E-07	1.1	9.31E-06
Bis(2-ethylhexyl) phthalate	117-81-7	1.69E-05	PDT	1.96E-05	1.2	1.96E-04
Bromobenzene	108-86-1	5.00E-07	PDT	5.70E-07	1.1	5.70E-06
Bromochloromethane	74-97-5	1.52E-06	PDT	1.74E-06	1.1	1.74E-05
Bromodichloromethane	75-27-4	5.44E-06	PDT	8.53E-06	1.6	8.53E-05
Bromoform (tribromomethane)	75-25-2	1.38E-05	PDT	1.60E-05	1.2	1.60E-04
Bromomethane (methyl bromide)	74-83-9	4.72E-06	PDT	6.40E-06	1.4	6.40E-05
Butylbenzene, n-	104-51-8	6.09E-07	PDT	6.90E-07	1.1	6.90E-06
Butylbenzene, sec-	135-98-8	4.89E-07	PDT	5.58E-07	1.1	5.58E-06
Butylbenzene, tert-	98-06-6	5.80E-07	PDT	6.61E-07	1.1	6.61E-06
Butylbenzylphthalate	85-68-7	1.08E-06	PDT	1.26E-06	1.2	1.26E-05
Carbazole	86-74-8	9.83E-07	PDT	1.12E-06	1.1	1.12E-05
Carbon Disulfide	75-15-0	1.24E-06	PDT	1.62E-06	1.3	1.62E-05
Carbon Tetrachloride	56-23-5	6.77E-07	PDT	8.61E-07	1.3	8.61E-06
Chlorine	7782-50-5	3.60E-02	permit limit	2.25E-03 (c)	not applicable (b)	2.25E-02
Chlorobenzene	108-90-7	2.58E-04	PDT	3.77E-04 (c)	1.5	3.77E-03

Table 3
Maximum Measured Stack Emission Rates, Emission Rates Used in the Risk Assessment, and Upset Condition Stack Emission Rates

Compound	CAS Number	Stack Emission Rates Used in Risk Assessment (Non-Upset Conditions)		Maximum Measured Stack Emission Rate from PDT (g/sec)	Ratio: Maximum Measured Emission Rate / Average Measured Emission Rate Used in Risk Assessment	Upset Condition Stack Emission Rates Used in Response to Comments (maximum measured emission rate * 10) (g/sec) (d)
		Emission Rate (g/sec) (a)	Basis for Emission Rate			
Chlorobenzilate	510-15-6	1.17E-07	PDT	1.54E-07	1.3	1.54E-06
Chlorodibromomethane	124-48-1	1.08E-05	PDT	1.19E-05	1.1	1.19E-04
Chloroethane	75-00-3	1.32E-06	PDT	1.50E-06	1.1	1.50E-05
Chloroform	67-66-3	8.24E-06	PDT	1.91E-05	2.3	1.91E-04
Chloromethane (methyl chloride)	74-87-3	2.41E-05	PDT	4.91E-05	2.0	4.91E-04
Chrysene	218-01-9	1.10E-08	PDT	1.72E-08	1.6	1.72E-07
Cumene (Isopropylbenzene)	98-82-8	3.64E-07	PDT	4.01E-07	1.1	4.01E-06
Diallate	2303-16-4	6.27E-06	PDT	7.09E-06	1.1	7.09E-05
Dibenzo(a,h)anthracene	53-70-3	4.67E-10	PDT	4.82E-10	1.0	4.82E-09
Dibenzofuran	132-64-9	1.06E-06	PDT	1.23E-06	1.2	1.23E-05
Dibromomethane	74-95-3	1.28E-06	PDT	1.46E-06	1.1	1.46E-05
Dichlorodifluoromethane	75-71-8	3.83E-06	PDT	8.82E-06	2.3	8.82E-05
Dieldrin	60-57-1	1.17E-08	PDT	1.32E-08	1.1	1.32E-07
Diethyl phthalate	84-66-2	1.01E-06	PDT	1.16E-06	1.2	1.16E-05
Dimethylphthalate	131-11-3	6.71E-07	PDT	7.69E-07	1.1	7.69E-06
Di-n-butylphthalate	84-74-2	3.71E-06	PDT	4.23E-06	1.1	4.23E-05
Di-n-octyl phthalate	117-84-0	1.42E-06	PDT	1.64E-06	1.2	1.64E-05
Dioxane (1,4)	123-91-1	8.91E-11	FR&DRE	--	not applicable (b)	8.9E-10
Diphenylamine	122-39-4	1.05E-06	PDT	1.22E-06	1.2	1.22E-05
Endosulfan I	959-98-8	1.31E-08	PDT	1.48E-08	1.1	1.48E-07
Endosulfan II	33213-65-9	2.67E-08	PDT	5.02E-08	1.9	5.02E-07
Endosulfan sulfate	1031-07-8	1.52E-08	PDT	1.72E-08	1.1	1.72E-07
Endrin	72-20-8	4.79E-08	PDT	5.41E-08	1.1	5.41E-07
Endrin aldehyde	7421-93-4	5.83E-08	PDT	1.15E-07	2.0	1.15E-06
Endrin ketone	53494-70-5	1.72E-08	PDT	1.95E-08	1.1	1.95E-07

Table 3

Maximum Measured Stack Emission Rates, Emission Rates Used in the Risk Assessment, and Upset Condition Stack Emission Rates

Compound	CAS Number	Stack Emission Rates Used in Risk Assessment (Non-Upset Conditions)		Maximum Measured Stack Emission Rate from PDT (g/sec)	Ratio: Maximum Measured Emission Rate / Average Measured Emission Rate Used in Risk Assessment	Upset Condition Stack Emission Rates Used in Response to Comments (maximum measured emission rate * 10) (g/sec) (d)
		Emission Rate (g/sec) (a)	Basis for Emission Rate			
Ethylbenzene	100-41-4	3.13E-07	PDT	4.51E-07	1.4	4.51E-06
Ethylene Glycol	107-21-1	1.25E-07	FR&DRE	--	not applicable (b)	1.3E-06
Fluoranthene	206-44-0	4.90E-08	PDT	1.00E-07	2.0	1.00E-06
Fluorene	86-73-7	1.26E-08	PDT	1.92E-08	1.5	1.92E-07
Freon 113	76-13-1	3.33E-07	PDT	3.79E-07	1.1	3.79E-06
Heptachlor	76-44-8	4.31E-08	PDT	6.85E-08	1.6	6.85E-07
Heptachlor epoxide	1024-57-3	2.46E-08	PDT	3.66E-08	1.5	3.66E-07
Hexachlorobenzene	118-74-1	1.00E-06	PDT	1.14E-06	1.1	1.14E-05
Hexachlorobutadiene	87-68-3	1.12E-06	PDT	1.30E-06	1.2	1.30E-05
Hexachlorocyclo-pentadiene	77-47-4	7.53E-06	PDT	8.58E-06	1.1	8.58E-05
Hexachloroethane	67-72-1	1.39E-06	PDT	1.60E-06	1.1	1.60E-05
Hydrogen chloride	7647-01-0	1.60E-01	permit limit	1.36E-02 (c)	not applicable (b)	1.36E-01
Indeno(1,2,3-cd)pyrene	193-39-5	5.08E-09	PDT	7.74E-09	1.5	7.74E-08
Iodomethane	74-88-4	1.97E-06	PDT	2.01E-06	1.0	2.01E-05
Isophorone	78-59-1	7.96E-07	PDT	9.11E-07	1.1	9.11E-06
Isopropyl toluene, p-	99-87-6	5.10E-07	PDT	5.82E-07	1.1	5.82E-06
Methoxychlor	72-43-5	5.38E-08	PDT	6.10E-08	1.1	6.10E-07
Methyl Isobutyl ketone (4-methyl-2-pentanone)	108-10-1	2.25E-06	PDT	3.22E-06	1.4	3.22E-05
Methyl methacrylate	80-62-6	5.50E-09	FR&DRE	--	not applicable (b)	5.5E-08
methyl tert-butyl ether	1634-04-4	8.16E-08	FR&DRE	--	not applicable (b)	8.2E-07
Methylene chloride	75-09-2	1.74E-05	PDT	3.12E-05 (c)	1.8	3.12E-04
Naphthalene	91-20-3	3.58E-06	PDT	9.11E-06 (c)	2.5	9.11E-05
Nitrobenzene	98-95-3	7.87E-07	PDT	9.01E-07	1.1	9.01E-06
N-nitrosodimethylamine	62-75-9	9.21E-07	PDT	1.06E-06	1.2	1.06E-05
N-Nitroso-di-n-propylamine	621-64-7	9.63E-07	PDT	1.10E-06	1.1	1.10E-05

Table 3

Maximum Measured Stack Emission Rates, Emission Rates Used in the Risk Assessment, and Upset Condition Stack Emission Rates

Compound	CAS Number	Stack Emission Rates Used in Risk Assessment (Non-Upset Conditions)		Maximum Measured Stack Emission Rate from PDT (g/sec)	Ratio: Maximum Measured Emission Rate / Average Measured Emission Rate Used in Risk Assessment	Upset Condition Stack Emission Rates Used in Response to Comments (maximum measured emission rate * 10) (g/sec) (d)
		Emission Rate (g/sec) (a)	Basis for Emission Rate			
N-Nitrosodiphenylamine	86-30-6	7.90E-07	PDT	9.14E-07	1.2	9.14E-06
Pentachlorobenzene	608-93-5	8.83E-07	PDT	1.03E-06	1.2	1.03E-05
Pentachloronitrobenzene	82-68-8	1.04E-06	PDT	1.21E-06	1.2	1.21E-05
Pentachlorophenol	87-86-5	1.55E-05	PDT	1.76E-05	1.1	1.76E-04
Perylene	198-55-0	1.34E-08	PDT	3.59E-08	2.7	3.59E-07
Phenanthrene	85-01-8	1.51E-07	PDT	3.14E-07	2.1	3.14E-06
Phenol	108-95-2	1.14E-06	PDT	1.32E-06	1.2	1.32E-05
Phosphine imide, P,P,P-triphenyl	2240-47-3	1.06E-06	PDT	3.17E-06	3.0	3.17E-05
PCBs as Aroclor 1254 (d)	11097-69-1	2.34E-08	PDT	4.18E-08	1.8	4.18E-07
Propylbenzene, n-	103-65-1	4.15E-07	PDT	4.74E-07	1.1	4.74E-06
Propylene oxide	75-56-9	1.00E-09	FR&DRE	--	not applicable (b)	1.0E-08
Pyrene	129-00-0	4.93E-08	PDT	1.02E-07	2.1	1.02E-06
Pyridine	110-86-1	1.85E-06	PDT	2.15E-06	1.2	2.15E-05
Styrene	100-42-5	2.89E-07	PDT	3.29E-07	1.1	3.29E-06
Tetrachlorobenzene, 1,2,4,5-	95-94-3	9.55E-07	PDT	1.11E-06	1.2	1.11E-05
Tetrachloroethane, 1,1,1,2-	630-20-6	2.68E-07	PDT	3.62E-07	1.4	3.62E-06
Tetrachloroethylene	127-18-4	1.12E-04	PDT	2.18E-04 (c)	1.9	2.18E-03
Tetrahydrofuran	109-99-9	4.59E-06	PDT	5.23E-06	1.1	5.23E-05
Toluene	108-88-3	1.18E-05	PDT	2.98E-05 (c)	2.5	2.98E-04
Trichloroethylene	79-01-6	2.63E-06	PDT	4.87E-06	1.9	4.87E-05
Trichlorofluoromethane (Freon 11)	75-69-4	1.27E-06	PDT	2.62E-06	2.1	2.62E-05
Vinyl Acetate	108-05-4	1.52E-06	PDT	1.74E-06	1.1	1.74E-05
Vinyl Chloride	75-01-4	6.75E-07	PDT	8.81E-07	1.3	8.81E-06
Xylene, o-	95-47-6	3.70E-07	PDT	4.90E-07	1.3	4.90E-06
Xylene, m-	108-38-3	5.80E-07	PDT	1.44E-06	2.5	1.44E-05

Table 3
Maximum Measured Stack Emission Rates, Emission Rates Used in the Risk Assessment, and Upset Condition Stack Emission Rates

Compound	CAS Number	Stack Emission Rates Used in Risk Assessment (Non-Upset Conditions)		Maximum Measured Stack Emission Rate from PDT (g/sec)	Ratio: Maximum Measured Emission Rate / Average Measured Emission Rate Used in Risk Assessment	Upset Condition Stack Emission Rates Used in Response to Comments (maximum measured emission rate * 10) (g/sec) (d)
		Emission Rate (g/sec) (a)	Basis for Emission Rate			
Xylene, p-	106-42-3	5.80E-07	PDT	1.44E-06	2.5	1.44E-05
BHC, alpha-	319-84-6	2.14E-08	PDT	2.59E-08	1.2	2.59E-07
Chlordane	57-74-9	5.97E-08	PDT	1.23E-07	2.1	1.23E-06
BHC, beta-	319-85-7	5.53E-08	PDT	6.79E-08	1.2	6.79E-07
BHC, gamma- (lindane)	58-89-9	1.17E-08	PDT	1.32E-08	1.1	1.32E-07
BHC, delta-	319-86-8	4.97E-08	PDT	6.99E-08	1.4	6.99E-07
PCDDs/PCDFs (Dioxins and Furans)						
2,3,7,8-TCDD	1746-01-6	4.37E-11	permit limit	1.20E-11	not applicable (b)	1.20E-10
2,3,7,8-TCDF	51207-31-9	4.20E-10	permit limit	1.47E-11	not applicable (b)	1.47E-10
1,2,3,7,8-PeCDD	40321-76-4	1.16E-10	permit limit	1.05E-11	not applicable (b)	1.05E-10
1,2,3,7,8-PeCDF	57117-41-6	4.29E-10	permit limit	5.49E-12	not applicable (b)	5.49E-11
2,3,4,7,8-PeCDF	57117-31-4	4.45E-10	permit limit	6.11E-11	not applicable (b)	6.11E-10
1,2,3,6,7,8-HxCDD	57653-85-7	7.99E-11	permit limit	6.08E-13	not applicable (b)	6.08E-12
1,2,3,4,7,8-HxCDD	39227-28-6	7.91E-11	permit limit	6.97E-13	not applicable (b)	6.97E-12
1,2,3,7,8,9-HxCDD	19408-74-3	9.35E-11	permit limit	1.01E-12	not applicable (b)	1.01E-11
1,2,3,6,7,8-HxCDF	57117-44-9	2.76E-10	permit limit	6.57E-12	not applicable (b)	6.57E-11
1,2,3,4,7,8-HxCDF	70648-26-9	5.07E-10	permit limit	1.30E-11	not applicable (b)	1.30E-10
1,2,3,7,8,9-HxCDF	72918-21-9	7.33E-11	permit limit	4.48E-13	not applicable (b)	4.48E-12
2,3,4,6,7,8-HxCDF	60851-34-5	1.55E-10	permit limit	3.15E-12	not applicable (b)	3.15E-11
1,2,3,4,6,7,8-HpCDD	35822-46-9	8.20E-11	permit limit	1.94E-13	not applicable (b)	1.94E-12
1,2,3,4,6,7,8-HpCDF	67562-39-4	3.98E-10	permit limit	1.00E-12	not applicable (b)	1.00E-11
1,2,3,4,7,8,9-HpCDF	55673-89-7	9.52E-11	permit limit	1.12E-13	not applicable (b)	1.12E-12
Total OCDD	3268-87-9	1.05E-10	permit limit	3.10E-14	not applicable (b)	3.10E-13
Total OCDF	39001-02-0	5.81E-11	permit limit	1.45E-14	not applicable (b)	1.45E-13

Table 3

Maximum Measured Stack Emission Rates, Emission Rates Used in the Risk Assessment, and Upset Condition Stack Emission Rates

Compound	CAS Number	Stack Emission Rates Used in Risk Assessment (Non-Upset Conditions)		Maximum Measured Stack Emission Rate from PDT (g/sec)	Ratio: Maximum Measured Emission Rate / Average Measured Emission Rate Used in Risk Assessment	Upset Condition Stack Emission Rates Used in Response to Comments (maximum measured emission rate * 10) (g/sec) (d)
		Emission Rate (g/sec) (a)	Basis for Emission Rate			
Combustion Gases						
Sulfur dioxide	7446-09-5	8.69E-02	miniburn data	1.79E-01	2.1	1.79E+00
Nitrogen dioxide	10102-44-0	3.28E-01	miniburn data	3.53E-01	1.1	3.53E+00

-- = This compound was not measured in the Performance Demonstration Test.

FR&DRE = Emission rate based on annual average feed rate and 99.99% destruction and removal efficiency (DRE), because emission rates for this compound were not measured during the PDT. See Section 4.2.1 of the Risk Assessment for additional discussion.

PDT = Performance Demonstration Test.

(a) For compounds measured in the PDT, without proposed permit limits, the emission rate was calculated as the average across the three PDT test runs.

(b) Not applicable is listed because the emission rate used in the risk assessment was either based on a proposed permit limit or was calculated based on feed rate and DRE.

(c) This compound was spiked into the feed materials used during the PDT.

(d) If a compound was not measured in the PDT, and its emission rate was based on feed rate and DRE, its upset emission rate was calculated by increasing the feed rate & DRE based emission rate by a factor of 10.

model for each individual COPC." USEPA further explains that chemical-specific emission rates are used to adjust the ISCST3 unitized output to calculate chemical-specific air concentrations and deposition rates, noting that "concentration and deposition are directly proportional to the unit emission rate used in the ISCST3 modeling."

USEPA also states in Section 3.8.1 of HHRAP, "We advocate using a unit emission rate in the air modeling because you can develop a common ratio relationship between the unit emission rate and the COPC-specific emission rate. The ratio is based on the fact that both individual relationships are linear in the air model. This ratio relationship is expressed by the following equation:"

$$\frac{\text{COPC-specific air concentration } (\mu g/m^3)}{\text{COPC-specific emission rate (g/sec)}} = \frac{\text{Modeled output air concentration } (\mu g/m^3)}{\text{Unit emission rate (1 g/sec)}} \qquad \text{(Equ 2)}$$

In addition, the relationship between chemical air concentration and the acute hazard quotient is also linear. Section 7.4.3 of HHRAP presents the equation used to calculate the hazard quotient as follows:

$$\text{Acute hazard quotient} = \frac{\text{COPC-specific air concentration (acute 1-hour average) } (\mu g/m^3)}{\text{Acute inhalation reference exposure concentration } (\mu g/m^3)} \qquad \text{(Equ 3)}$$

If Equation 2 is solved for COPC-specific air concentration, and this result is substituted into Equation 3, the resulting solution demonstrates that the acute hazard quotient is linearly proportional to emission rate:

$$\text{Acute hazard quotient} = \frac{\text{Modeled output air concentration } (\mu g/m^3) * \text{COPC-specific emission rate (g/sec)}}{\text{Unit emission rate (1 g/sec)} * \text{Acute inhalation exposure concentration } (\mu g/m^3)} \qquad \text{(Equ 4)}$$

In essence, when following HHRAP guidance, air concentrations are linearly proportional to emission rates and hazard quotients are linearly proportional to air concentrations, therefore, hazard quotients are also proportional to emission rates at any given receptor location. As a result, a factor of 10 increase in chemical emission rates will produce a factor of 10 increase in HQs for a given modeled emission source and receptor location when HHRAP acute risk assessment guidance is followed.

ISCST3 Modeling of Air Concentrations for Acute Risk Assessment Under Upset Conditions

USEPA's comment mentions the terms "1-hour average" and "1-hour maximum" as they relate to the "upset stack release concentration." This section clarifies the basis and meaning of the term "1-hour average" air concentration and how it relates to the air concentrations used in the risk assessment.

The HHRAP guidance recommends evaluating risks due to acute exposure based on maximum 1-hour average air concentrations calculated using a dispersion model. The shortest time step that the ISCST3 dispersion model can predict is a 1-hour average period. The term "1-hour average" thus commonly refers to the averaging time associated with this ISCST3 output.

When the ISCST3 model is run to produce results for an acute inhalation risk assessment, it calculates a 1-hour average air concentration for every hour of input meteorological data at each modeled receptor location. The five years of hourly meteorological data input to ISCST3 for the risk assessment, therefore, produced more than 40,000 1-hour average air concentrations at each of the more than 5,200 individual modeled receptor locations beyond the property boundary. The highest of these more than 40,000 1-hour average concentrations at each location was then selected and used to evaluate potential acute inhalation risks in the risk assessment. This means that, for any given receptor location, the 1-hour average air concentrations for all other hours modeled by ISCST3 were lower than the one result used in the risk assessment. This very conservative approach is recommended in HHRAP and was used in the risk assessment and in this response to USEPA's comment.

As indicated in Equation 1 above, chemical air concentrations are calculated by combining unitized ISCST3 model output air concentrations with chemical emission rates. The modeled output air concentrations used to evaluate potential acute risks (both in the risk assessment and in this section) were, as described above, the maximum modeled 1-hour average air concentrations based on a unit 1 g/sec emission rate calculated at each assessed receptor location. The chemical emission rates used to evaluate upset conditions were based on maximum measured values multiplied by USEPA's default factor of 10.

Potential Acute Inhalation Risks Under Upset Conditions

The potential for acute inhalation risks under stack upset conditions, using the inputs described above, was evaluated by re-running the Industrial Risk Assessment Program (IRAP) software in the same manner as applied in the risk assessment, except that in this case the upset emission rates were based on maximum measured values rather than average measured values multiplied by USEPA's upset default factor of 10.

The resulting hazard quotients are presented in Table 4 for the same set of receptor locations already evaluated in the risk assessment. The detailed chemical-specific acute hazard quotient results for this upset stack emissions scenario are included in Attachment A. The cumulative acute hazard index (HI) values, based on exposure to all compounds evaluated regardless of the type of potential health effects, were 0.59 at grid location A_1 and 0.56 at grid location A_2. Summing all hazard quotients regardless of type of health effect is not recommended in HHRAP, but was performed here in response to USEPA Region IX's comment. HHRAP recommends instead that acute hazard quotients from individual compounds be summed if they have similar effects. Given that the cumulative HI across all compounds is less than 1, the sum for subsets with similar types of health effects will also be less than 1.

The likelihood of this upset acute inhalation risk scenario occurring at any given receptor location is expected to be less than 1 in 100,000,000 (one in one hundred million) per year, because it presumes that a stack upset occurs simultaneously with meteorological conditions that produce the maximum 1-hour average air concentration. As noted earlier, detailed facility data from 2000 and 2001 indicate that upset conditions have occurred very infrequently, for only about 0.24% of the time the facility is operating. Also, as described above, the maximum air concentration evaluated in the acute inhalation risk analysis for each location was based on the

Table 4
Acute Inhalation Results - Upset Stack Emissions (a)

Receptor Name	Description	Minimum Hazard Quotient (b)	Maximum Hazard Quotient (b)
Residential Receptors (developed area within and around Town of Parker)			
R_1 resident	Closest residential location to facility and residential area in town with highest hourly modeled impacts	<1E-10	0.2
R_2 resident	Residential area in town with highest annual modeled impacts	<1E-10	0.1
Farmer Receptors (residential area with access to irrigation water and within modeling domain)			
R_3 resident farmer	Residential area with access to irrigation water with highest annual modeled impacts	<1E-10	0.1
R_4 resident farmer	Residential area with access to irrigation water with highest hourly modeled impacts	<1E-10	0.2
Maximum Impact Point (undeveloped land area)			
A_1 max hourly	Maximum impact location for hourly concentrations. There is no residential or commercial land use in the vicinity of the maximum impact location (SW of facility).	<1E-10	0.4
Non-Residential Areas			
A_2 closest business (c)	Closest developed location beyond property boundary (non-residential) with highest hourly modeled impacts	<1E-10	0.4

(a) These results are conservatively based on both maximum upset emission rates and maximum modeled ISCST3 air concentrations. For each specific receptor location, the maximum modeled ISCST3 concentration was the highest 1-hour average result out of the more than 40,000 1-hour averages calculated at that location (i.e., based on input to ISCST3 of 5 years of hourly meteorological data from Parker, Arizona). This means that at each location the concentrations for all other hours were lower than those used to calculate these hazard quotients.

(b) The minimum and maximum results are the lowest and highest hazard quotients, respectively, calculated among all of the evaluated compounds. The typical target hazard quotient value used by regulatory agencies is 1.

(c) The County Agricultural Extension Office and CRIT Realty are located at receptor A_2. Maximum 1-hour average air concentrations at all other non-residential developed land use locations were lower than at receptor A_2.

highest ISCST3 model output calculated out of more than 40,000 hours modeled over a 5-year period. As a result, the probability per year of the maximum 1-hour average modeled concentration occurring during an upset condition is less than 1 in 100,000,000 per year.[8]

<u>Conclusion</u>

These results indicate that short-term acute health effects are not expected to occur in areas near the reactivation facility as a result of inhalation of stack emissions under hypothetical upset conditions.

Comment 4. Upset Conditions (continued)

Comment:
"Finally, the mitigating contention that the constituent-specific emission rates associated with the acute upset scenario are overestimations of the emission rates optimized in the performance demonstration test (PDT) is germane only to the extent that the facility subscribes to a series of permitable conditions which limits constituent-specific emission rates to those exclusively used in the PDT. Other results, and lines of reasoning in this risk assessment suggest that the differences between "evaluated versus measured emission rates" remain a basis for supporting the proposed de minimus level of public health and ecological impact from facility operations."

Response: No response required.

Comment 5. Fate & Transport Air Dispersion Modeling

Comment:
In this comment, USEPA Region IX discusses the "application of Agency-approved air dispersion and deposition computerized fate and transport models" in the risk assessment, explains that the "Data inputs and air dispersion and deposition results were reviewed by air modeling experts in U.S. EPA Region IX's Air Division" and concludes "that the air dispersion and deposition analysis was conducted consistent with the Agency's recommended procedures, and that the results from the modeling exercise are useful to support risk-based analysis."

Response: No response required.

[8] [(<1/40,000) / 5 years] * (0.24/100) = <1E-8

III. RESPONSE TO SPECIFIC COMMENTS

1. Executive Summary, pg. xii.

Comment:
"The final sentence of the first paragraph should be revised to: 'When excess lifetime cancer risks from both stack and fugitive emissions are considered together, the cancer risk estimate remains below the U.S. EPA target risk level.' "

Response: The executive summary has been revised to incorporate this comment and to reflect the other responses to USEPA's comments. As noted in the Introduction to this document, it is recommended that the entire risk assessment for this project be comprised of three documents: the original July 2007 draft risk assessment report, this response to comment document, and one inclusive executive summary that reflects and incorporates conclusions from both documents. The executive summary is included as a stand-alone companion to this document.

2. Upset Scaling Factors – Section 4.2.1.2, pg. 20 (Stack Emissions)
This comment includes two related items, each of which are addressed below.

2a. Start-up and Shut-down Procedures

Comment:
"The risk assessment concludes that contaminant releases do not occur from the facility's stack during start-up and shut-down procedures. This conclusion is supported by the fact that spent or contaminated carbon is not processed during this operation. Please detail or document all efforts made, or any monitoring data or modeled studies pursued, to characterize the emission profile during start-up or shut-down procedures. The de minimus impact contention from emissions resulting from natural gas initiated start-up, should be well characterized prior to concluding that unit start-up and shut-down procedures do not substantively contribute to either acute or chronic-level human or ecological impact."

Response:

With respect to start-up and shut-down procedures, the risk assessment states that "under these conditions, emissions associated with spent carbon [emphasis added] will not occur." The focus of the RCRA permitting activity for this facility, and accordingly the risk assessment, is on potential environmental releases associated with the management and treatment of spent carbon, not emissions from natural gas.

The carbon regeneration facility, like waste combustion facilities, requires fuel for combustion to create heat and ensure stable operating conditions when spent carbon is being heated in the furnace. Among the fuel options available, natural gas is the only fuel used for the furnace and is the preferred fuel choice from an emissions perspective because it emits lower quantities of greenhouse gases, nitrogen oxides, sulfur dioxide, particulates and mercury when compared to other options such as oil and coal. During typical start-up and shut-down procedures, spent carbon is not present in the furnace and, therefore, there are no emissions associated with spent carbon. Start-up and shut-down conditions account for less than 3% of the total facility operating time.[9]

In response to this comment, potential emission rates associated with natural gas combustion when no spent carbon is in the furnace were calculated and compared to those when spent carbon is being heated in the furnace. Table 5 shows that the natural gas emission rates are consistently lower than those used in the risk assessment and measured during the stack test, generally by several orders of magnitude. Emission rates associated with combustion of natural gas were calculated from typical constituent concentrations reported by the Gas Research Institute (GRI 2000), the natural gas fuel use rate at the facility (approximately 250,000 cubic feet per day), and the reactivation facility system removal efficiencies determined from the PDT (Focus 2006). The calculated emission rates are shown in Table 5 for those compounds with reported natural gas concentrations in GRI (2000) that were also evaluated in the risk assessment. The facility's destruction and removal efficiency (DRE) for organic compounds present in natural gas was conservatively assumed to be 99.99%. The removal efficiencies demonstrated in the PDT for low-volatile and semi-volatile metals were 99.92% and 97.05% for chromium and lead, respectively (Focus 2006).[10] These REs were applied to the other metals in natural gas using USEPA (2001) metal volatility groupings. Emission rates of chlorine and hydrogen chloride (HCl) associated with chlorine present in natural gas were determined based on the PDT test results, which showed that for every pound of chlorine fed into the combustion system, 1.08×10^{-3} pounds of HCl and 1.93×10^{-4} pounds of chlorine would be emitted.[11]

The measured nitrogen oxides (NOx) emission rate that was used in the risk assessment is considered to be a reasonable reflection of potential NOx emissions during periods when the facility is burning natural gas and there is no spent carbon in the furnace. Nitrogen oxides (NOx) generated by combustion include thermal NOx and fuel NOx. Fuel NOx comes from direct oxidation of nitrogen in the fuel or nitrogen present in spent carbon that is being heated. Thermal NOx is generated through high temperature bonding of nitrogen and oxygen in the combustion air and predominantly occurs at the auxiliary fuel burner, which is where natural gas is fired. Considering that the spent carbon contains very little nitrogen, the primary source of NOx in emissions would be natural gas.

In conclusion, potential emissions from the combustion of natural gas at the facility during start-up and shut-down conditions have a negligible impact compared to emissions when spent carbon is being treated and would not substantively contribute to the acute or chronic-level risks calculated in the risk assessment.

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[9] Each start-up and shut-down condition requires about 30 hours and typically there are three start-up and shut-down conditions each year. This amounts to roughly 180 hours per year under start-up and shut-down conditions or about 3% of the total facility operating time.

[10] Metal system removal efficiencies were calculated from data provided in Tables 3-5, 4-9, 4-10, 4-11, and 6-2 in the PDT report (Focus 2006).

[11] See Tables 3-5, 4-6, 4-7, and 4-8 in the PDT report (Focus 2006).

Table 5
Evaluation of Natural Gas Emissions During Start-Up and Shut-Down Procedures

Compound	Typical Concentrations in Natural Gas (a)		Facility Removal Efficiency (b)	Emission Rate for Natural Gas Only (g/sec) (d)	Stack Emission Rates (spent carbon plus natural gas) (g/sec) (e)	
					Emission Rates Used in Risk Assessment	Maximum Measured Stack Emission Rate from PDT
Arsenic (LV)	< 0.2	µg/m3	0.9992	< 1.31E-11	1.26E-04	6.22E-06
Barium (SV)	< 0.05	µg/m3	0.9705	< 1.21E-10	9.01E-06	1.10E-05
Cadmium (SV)	< 0.01	µg/m3	0.9705	< 2.42E-11	3.12E-04	1.31E-05
Chromium (LV)	< 0.01	µg/m3	0.9992	< 6.55E-13	1.26E-04	6.04E-05
Cobalt (LV)	< 0.1	µg/m3	0.9992	< 6.55E-12	5.82E-07	9.38E-07
Copper (LV)	< 0.3	µg/m3	0.9992	< 1.97E-11	1.19E-04	1.80E-04
Lead (SV)	< 0.05	µg/m3	0.9705	< 1.21E-10	3.12E-04	5.60E-04
Manganese (LV)	< 0.2	µg/m3	0.9992	< 1.31E-11	4.61E-05	7.10E-05
Mercury	< 0.01	µg/m3	0	< 8.19E-10	1.34E-06	9.48E-08
Nickel (LV)	< 0.5	µg/m3	0.9992	< 3.28E-11	9.91E-06	1.29E-05
Vanadium (LV)	< 0.2	µg/m3	0.9992	< 1.31E-11	2.43E-06	3.23E-06
Benzene	57,500	µg/m3	0.9999	4.71E-07	2.59E-06	3.02E-06
Chlorine	< 1.6	µg/m3 (c)	NA (c)	< 2.53E-11	3.60E-02	2.25E-03
Ethylbenzene	3,040	µg/m3	0.9999	2.49E-08	3.13E-07	4.51E-07
Hydrogen chloride	< 1.6	µg/m3 (c)	NA (c)	< 1.42E-10	1.60E-01	1.36E-02
PCBs as Aroclor 1254	< 0.13	µg/m3	0.9999	< 1.09E-12	2.34E-08	4.18E-08
Toluene	37,700	µg/m3	0.9999	3.09E-07	1.18E-05	2.98E-05
Xylene, o-	3,500	µg/m3	0.9999	2.87E-08	3.70E-07	4.90E-07
Xylene, m-	10,400	µg/m3	0.9999	8.52E-08	5.80E-07	1.44E-06
Xylene, p-	2,600	µg/m3	0.9999	2.13E-08	5.80E-07	1.44E-06

LV = low volatile metals (USEPA 2001).

SV = semi-volatile metals (USEPA 2001).

(a) Source: Gas Research Institute (GRI). 2000. Analysis of Trace Level Compounds in Natural Gas. GRI-99/0111. February 2000.

(b) Facility removal efficiencies were based on Performance Demonstration Test results (Focus 2006).

(c) The listed concentration is for total chlorine/chloride in natural gas (GRI 2000). Emission rates of chlorine and hydrogen chloride associated with chlorine present in natural gas were determined based on the PDT test results (Focus 2006), which showed that for every pound of chlorine fed into the combustion system, 1.08×10^{-3} pounds of hydrogen chloride (HCl) and 1.93×10^{-4} pounds of chlorine would be emitted.

(d) Emission rate (g/sec) = concentration ug/m3 * g/10^6 ug * flow rate m3/day * day/86,400 sec * (1 - removal efficiency). The typical natural gas flow rate at facility is 250,000 cubic feet/day (7,079 cubic meters/day).

(e) See Table 3 in Response to Comment Document for stack emission rates.

2b. Upset Scaling Factors

Comment:
"The narrative supporting the analysis of upset scaling factors is not clear. An upset scaling factor of 1.02 was developed from historical analysis of the frequency of facility upsets having the potential to increase stack emissions from study years 2001-2002. In essence then, approximately 2% of operational time during the period of interest was interrupted by some level of facility upset. These upsets potentially increase stack emissions by up to 10%. It is not clear from this review why the upset scaling factor has a negligible numerical impact on the chronic stack emission rates as determined by equation 4-1. The basis and data for this conclusion has not been made clear in the narrative. The narrative should be revised to reflect that the increased stack emissions would only occur approximately 220 days out of a total of 10,950 operational days. A similar illustration detailing the magnitude of emission rate differences would also be useful and offer consistency in support of this line of reasoning."

Response:

In response to this comment, the following discussion clarifies the method used to derive the upset scaling factor for the risk assessment, the frequency of time the facility operates under upset conditions, and the impacts of the upset scaling factor on the risk assessment results.

USEPA's Default Scaling Factors

Upset scaling factors were developed for the risk assessment by directly applying HHRAP guidance. Section 2.2.5 of HHRAP recommends "that the stack emission rates estimated from trial burn data be multiplied by an upset factor" and that "when available, site-specific emissions or process data can be useful to estimate the upset factor."

HHRAP provides a default upset scaling factor for metals "by assuming that emissions during process upsets are 10 times greater than emissions measured during the trial burn" and that the facility operates under upset conditions 5% of the year. This produces a default upset scaling factor for metals of 1.45, as follows:

$$\text{Scaling factor}_{(metals)} * ER = (95/100)*ER + (5/100)*10*ER = 1.45_{(metals)} * ER$$

where ER = emission rate under on non-upset stack conditions.

Similarly, HHRAP provides a default upset scaling factor for organics "by assuming that emissions during process upsets are 10 times greater than emissions measured during the trial burn" and that the facility operates under upset conditions 20% of the year. This produces a default upset scaling factor for organics of 2.8, as follows:

$$\text{Scaling factor}_{(organics)} * ER = (80/100)*ER + (20/100)*10*ER = 2.8_{(organics)} * ER$$

As discussed earlier in response to General Comment 4, USEPA indicates that these default assumptions are based on a method presented in 1990 by the California Air Resources Board for non-hazardous municipal waste combustors that HHRAP has extrapolated to hazardous waste incinerators. Due to heterogeneity of the feedstock, MSW combustors typically have a more variable range of emissions than hazardous waste incinerators, thus it is anticipated that MSW incinerators will experience upsets resulting in an increase of emissions at a greater frequency than hazardous waste incinerators. An activated carbon regeneration facility is not a hazardous waste incinerator and is intrinsically easier to control than an incinerator due to homogeneity in the feedstock (consisting of only spent carbon). As a result, a carbon regeneration facility should experience a much lower frequency of upsets resulting in an increase in emissions than at an incinerator, thereby ensuring that the default assumptions are likely to be overly conservative when applied to carbon regeneration facilities. In addition, peer review comments received by USEPA on the hazardous waste incinerator methodology pointed out that the default upset factors are "excessively conservative" for those facilities, noting not only that no facility would be allowed to operate under upset conditions for the durations assumed by USEPA but also that upset emissions are not close to 10 times non-upset emissions (USEPA 2005).

In the absence of site-specific information, USEPA's approach assumes that emissions increase by a factor of 10 during upset conditions. A factor of 10 increase in emission rates equates to a 900% increase in emissions, as follows: ((ER*10) – ER) / ER) * 100 = 900%.

Scaling Factors Used in the Risk Assessment: Chronic Risks

In HHRAP, USEPA recommends generating a site-specific upset factor where possible. For example, USEPA explains that site-specific information on the percentage of time, on an annual basis, that the facility operates under upset conditions can be used to estimate the upset scaling factor. In the carbon regeneration facility risk assessment, site-specific information on the percentage of time, on an annual basis, that the facility operates under upset conditions was presented in Table 4.2-2. This information, which was discussed earlier in response to General Comment 4, indicates that the facility operates under upset conditions very infrequently, representing about 0.24% of the total operating time. Based on the annual 2000 and 2001 data where were used in the risk assessment, the facility operated under upset conditions for 16.1 hours out of a total of 6,745 operating hours in 2000[12] and for 18.4 hours out of a total of 7,844 operating hours in 2001.

This site-specific information was used in place of USEPA's defaults in the scaling factor equations shown above to calculate a site-specific scaling factor for both metals and organics of 1.02, as follows:

$$\text{Scaling factor}_{(\text{site-specific})} * ER = (99.76/100)*ER + (0.24/100)*10*ER = 1.02_{(\text{site-specific})} * ER$$

[12] In 2000, the total operating hours were 6,745 hours, not 7,844 hours as noted in footnote (a) on Table 4.2-2. The hours listed in footnote (a) on Table 4.2-2 for 2000 was a typographical error. The scaling factor for 2000 was, however, calculated using the correct number of operating hours (i.e., 6,745 hours). The total operating hours for 2001 was 7,844 hours.

Note that this calculation incorporates USEPA's conservative default assumption that emission rates increase by a factor of 10 during an upset. This default was used because emissions data during actual facility upsets was not available.

As directed in HHRAP, emission rates for a chronic risk assessment are then calculated by multiplying the non-upset emission rates by the upset scaling factor, as follows:

$$ER_{RA} = ER * USF \qquad \text{(Equ 5)}$$

where ER_{RA} = emission rate for input to risk assessment (g/sec), ER = emission rate based on non-upset stack conditions (g/sec), and USF = upset scaling factor (unitless).

This equation was also shown in the risk assessment (see Equation 4-1 in Section 4.2.1.2).

The upset scaling factor had a negligible numerical impact on the chronic stack emission rates because its value was 1.02, that is, essentially equal to a value of 1. As a result, in the chronic facility risk assessment, the emission rates under non-upset conditions were used without adjustment for the scaling factor.

Scaling Factors Used in the Risk Assessment: Acute Risks

The approach used to identify emission rates for the acute risk assessment differed from that described above for the chronic risk assessment, and was consistent with HHRAP guidance. Potential acute inhalation risks associated with upset conditions were evaluated using upset stack emission rates, combined with maximum unitized air modeling results from ISCST3, as described earlier in response to General Comment 4. The upset stack emission rates were calculated, in according with HHRAP guidance, by assuming that stack emissions would increase by a factor of 10 during upsets. This approach also assumes that the duration of an upset condition would be at least one hour. As noted in response to General Comment 4 above, the likelihood of the acute inhalation scenario occurring is expected to be less than 1 in 100,000,000 (less than one in one hundred million), because it presumes that a stack upset occurs simultaneously with meteorological conditions that produce maximum 1-hour average air concentrations.

2c. Upset Scaling Factors - Dates of data

Comment:
"The narrative supporting this section is not clear and appears inconsistent with graphical representations of the data. Historical upset data is provided for calendar years 2000 & 2001 in table 4.2-2 rather than years 2001 & 2002 as claimed in section 4.2.1.2. Please reconcile this discrepancy."

Response:

The upset data used in the risk assessment were from 2000 and 2001, not 2001 and 2002. The revised narrative therefore reads as follows (edits shown in italics): "SWT identified upset conditions that have the potential to affect stack emission rates, and compiled data on historical upsets at the facility that occurred for these conditions during *2000* and *2001*."

3. Calculation of environmental concentrations – Section 4.2.5, pg. 27

Comment:
"This section of the analysis details the environmental media for which exposure point concentrations will be developed. Please supplement this section by adding "air" to the list of media that will be subject to development of media-specific exposure point concentrations."

Response:

Air is one of the media for which exposure point concentrations were developed. The revised narrative reads as follows (edits shown in italics): "The next step in the exposure assessment was the calculation of chemical concentrations in each environmental medium of interest. These are referred to as exposure point concentrations. For example, concentrations were calculated in *air,* soil, homegrown produce, fish, animal products, and human breast milk."

4. Calculation of human exposures – Section 4.2.6, pg.28
This comment includes two items, each of which are addressed below.

<u>4a. Calculation of human exposures – subsistence scenarios</u>

Comment:
"EPA's guidance reference for conducting risk assessments of combustion facilities recommends impact analysis of several differing human receptor exposure scenarios. Subsistence fishers and subsistence farmers are considered potentially high-end receptors from a contaminant exposure and impact standpoint because, in addition to directly inhaling contaminants released to air, their sources of food and water may also be secondarily impacted by facility releases. To the extent these impacts result from indirect pathways of exposure (ingestion of an impacted food source), potential combined exposures impacting these human receptors is considered high-end, and unlikely to be exceeded by those receptors incurring exposure exclusively from the direct pathways of contaminant exposure."

Response:

<u>Introduction</u>

The following discussion expands on the subsistence exposure scenarios that were addressed in the risk assessment in order to more fully explore potential risks to hypothetical subsistence fisher and subsistence farmer receptors in the facility vicinity. Specifically, this discussion summarizes the hypothetical, high-end subsistence exposure scenarios that were evaluated in the risk assessment and presents additional evaluations in response to Region IX's comment.

Subsistence Exposure Scenarios Addressed in the Risk Assessment

In the risk assessment, fish ingestion risks were calculated for a subsistence scenario and were determined to be below USEPA's target risk levels. Potential risks for the adult and child fisher exposure scenarios incorporated USEPA's default subsistence assumption that 100% of fish ingested were obtained from either the Main Drain or the Colorado River. As shown in Table 4.4-1 of the risk assessment, these receptors were designated as "R_only_fish_drain" and "R_only_fish_river", respectively. The highest excess lifetime cancer risk for the subsistence fisher scenarios was 2E-08 (2 in 100 million), 500 times below USEPA's target cancer risk level of 1E-05 (1 in 100 thousand). The highest non-cancer hazard index for the subsistence fisher scenarios was 0.01, 25 times lower than USEPA's target level of 0.25.

Subsistence farmer exposure scenarios were also addressed in the Discussion of Uncertainties section of the risk assessment (Section 4.5.9) and were determined to be below USEPA's target risk levels. As noted in the risk assessment, site-specific information received from Ms. Linda Masters of the La Paz County Agricultural Extension Office (see response to Specific Comment 4b below) indicated that subsistence (i.e., 100%) reliance on locally-grown produce and locally raised animal products is not applicable to the facility area. The Discussion of Uncertainties Section of the risk assessment, however, nonetheless evaluated potential risks incorporating subsistence assumptions. The subsistence scenarios assumed that 100% of all produce, beef, poultry, eggs and pork ingested by a receptor was locally-grown or locally-raised, compared to the 20% assumption used in the risk assessment (see Table 4.4-1 in the risk assessment). The subsistence evaluation in the Discussion of Uncertainties (Section 4.5.9) addressed the resident and farmer receptors with the highest risks (i.e., receptors R_2 and R_3, respectively, as noted in Table 4.2-7) and focused on all compounds evaluated in the risk assessment, both detected and not detected, except for benzidine (these were referred to as "Group 2" compounds in the risk assessment). As presented in Section 4.5.9, the excess lifetime cancer risks for these subsistence scenarios were 3E-07 for receptor R_2 and 1E-07 for receptor R_3, more than 30 times below USEPA's target cancer risk level of 1E-05.

Additional Subsistence Exposure Scenarios

In response to Region IX's comment, the risk assessment results associated with hypothetical subsistence assumptions were further evaluated in this document. This additional evaluation addressed the three different groups of chemical compounds that were evaluated in the risk assessment:[13]

- *Group 1 - All detected compounds.* This group includes 95 compounds that were detected in the PDT in addition to several compounds that were not measured during the PDT but which were evaluated based on emission rates derived from feed rates.

[13] The list of chemicals selected for evaluation included compounds that were detected in stack emissions and also over 80 compounds that were not detected. Compounds that were not detectable in stack emissions were included in the risk assessment at the request of USEPA, according to the chemical-selection method in the USEPA-approved 2003 Workplan. This method ensures that risks are likely to be overestimated, and would not be underestimated.

- *Group 2 - All evaluated compounds, both detects and compounds that were not detected, except for benzidine.* This group includes 177 compounds, 82 of which were not detected in the PDT. This group does not include benzidine which was not detected in the PDT in stack gases and for which there is no evidence from waste profile reports and analytical spent carbon data that it has ever been accepted in spent carbon received at the facility. In addition, benzidine is a chemically unstable hetero-nitrogen compound that is not a product of incomplete combustion.[14] Benzidine was singled out because it was found to be a significant risk driver, accounting for most of the total cancer risk when included in the risk calculations.

- *Group 3 - All evaluated compounds.* This group includes 178 compounds, of which 83 were not detected in the PDT, including benzidine.

A summary of the hypothetical subsistence results, in comparison with those presented in Table 4.4-1 of the risk assessment (i.e., the results calculated in the risk assessment using site-specific assumptions), is shown below in Table 6. As can be seen from this table, the risks using subsistence assumptions, even when all selected compounds are evaluated (i.e., Group 3 compounds), remain below USEPA's target levels for both cancer risks (1E-05 target) and non-cancer health effects (0.25 target). When only detected compounds are included, the risks are reduced significantly below USEPA's target risk levels.

Table 7 expands on the subsistence results by presenting cumulative risks for the hypothetical subsistence scenarios. This table shows the combined risks for a subsistence town resident who is also assumed to be a subsistence fisher, and a subsistence farmer who is also assumed to be a subsistence fisher, as compared to the results from Table 4.4-1 in the risk assessment. The potential risks even when added across all subsistence exposure pathways remain below USEPA's target risk levels for both cancer and non-cancer health effects. These potential combined risks for subsistence receptors reflect high-end scenarios that are highly unlikely to be exceeded.

4b. Calculation of human exposures – site-specific exposure information

Comment:
"The current analysis makes use of site-specific exposure assumptions which essentially serve to diminish the concentration of impacted local food sources ingested in support of the subsistence farmer exposure scenario. These community or site-specific intake values were derived from a personal communication reference provided by the La Paz County Agricultural Extension Office (Masters 2007). Please provide reference to any and all data or surveys conducted by the extension office in support of this site-specific value."

Response:

The site-specific information from the La Paz County Agricultural Extension Office was

[14] Benzidine was used in the past mostly to produce dyes, however, it has not been produced for sale in the U.S. since the mid-1970's. Major U.S. dye companies no longer make benzidine-based dyes, and benzidine is no longer used in medical laboratories or in the rubber or plastics industries (ATSDR 2001).

Table 6
Evaluation of Hypothetical Subsistence Scenarios
for Receptors with the Highest Risk Results

Receptor and Group of Evaluated Compounds	**Excess Lifetime Cancer Risk**		**Total Hazard Index**	
	Risk assessment results in Table 4.4-1	**Subsistence scenario (a)**	**Risk assessment results in Table 4.4-1**	**Subsistence scenario (a)**
Town resident receptor (R_2 Adult): Receptor in town residential area with highest potential risks and highest annual modeled impacts				
Group 1 – all detected compounds (95 compounds)	6E-08	1E-07	5E-02	5E-02
Group 2 – all compounds except benzidine (177 compounds)	2E-07	3E-07	5E-02	5E-02
Group 3 – all compounds (178 compounds) (c)	2E-06	9E-06	5E-02	5E-02
Farmer receptor (R_3 Adult): Farmer in residential area with access to irrigation water with highest potential risks and highest annual modeled impacts				
Group 1 – all detected compounds (95 compounds)	3E-08	6E-08	1E-02	1E-02
Group 2 – all compounds except benzidine (177 compounds)	6E-08	1E-07	2E-02	2E-02
Group 3 – all compounds (178 compounds) (c)	5E-07	2E-06	2E-02	2E-02
Subsistence fish ingestion pathway receptor (R_only_fish_drain): Fish ingestion evaluation for the Main Drain (b)				
Group 1 – all detected compounds (95 compounds)	1E-08		1E-02	
Group 2 – all compounds except benzidine (177 compounds)	1E-08		1E-02	
Group 3 – all compounds (178 compounds) (c)	2E-08		1E-02	
USEPA Target Risk Levels				
Target risk levels for combustion source risk assessment	1E-05		0.25	

(a) The subsistence scenarios assume that 100% of all produce, beef, eggs, chicken, and pork ingested by a receptor would be locally-grown or locally-raised. The risk assessment results in Table 4.4-1 assumed, based on site-specific input, that 20% of all produce, beef, eggs, chicken and pork ingested by a receptor would be locally-grown or locally-raised.

(b) The risk assessment evaluated a subsistence fish ingestion scenario, assuming that 100% of all fish ingested would be caught locally. Thus, the results in Table 4.4-1 already reflect a subsistence scenario.

(c) The stack emissions risk results for Group 3 compounds (which includes 83 compounds that were not detected in stack emissions) were dominated by one compound, benzidine, which was not detected stack gases and for which there is no evidence that it has ever been accepted in spent carbon received at the facility.

Table 7
Combined Potential Risks for Hypothetical Subsistence Receptors

Receptor and Group of Evaluated Compounds	Excess Lifetime Cancer Risk		Total Hazard Index	
	Risk assessment results in Table 4.4-1	Subsistence scenario	Risk assessment results in Table 4.4-1	Subsistence scenario
Town Resident + Subsistence Fisher (a) ***Exposure pathways: inhalation + soil ingestion + produce ingestion + fish ingestion (c)***				
Group 1 – all detected compounds (95 compounds)	7E-08	1E-07	6E-02	
Group 2 – all compounds except benzidine (177 compounds)	2E-07	3E-07	6E-02	
Group 3 – all compounds (178 compounds) (d)	2E-06	9E-06	6E-02	
Farmer + Subsistence Fisher (b) ***Exposure pathways: inhalation + soil ingestion + produce ingestion + fish ingestion + beef ingestion + poultry ingestion + egg ingestion + pork ingestion (c)***				
Group 1 – all detected compounds (95 compounds)	4E-08	9E-08	2E-02	
Group 2 – all compounds except benzidine (177 compounds)	7E-08	1E-07	3E-02	
Group 3 – all compounds (178 compounds) (d)	5E-07	2E-06	3E-02	
USEPA Target Risk Levels				
Target risk levels for combustion source risk assessment	1E-05		0.25	

(a) Adult receptors “R_2” + “R_only_fish_drain”.

(b) Adult receptors “R_3” + “R_only_fish_drain”.

(c) The results in Table 4.4-1 of the risk assessment assumed that 20% of a person's diet from the following food items was locally grown or raised and ingested - produce, beef, poultry, eggs and pork. It was also assumed that 100% of a person's fish diet was provided by locally caught fish. The subsistence results assume 100% of a person's diet from all evaluated food items are locally grown or raised, and ingested.

(d) The stack emissions risk results for Group 3 compounds (which includes 83 compounds that were not detected in stack emissions) were dominated by one compound, benzidine, which was not detected stack gases and for which there is no evidence that it has ever been accepted in spent carbon received at the facility.

obtained via telephone interviews with Ms. Masters conducted by S. Foster of CPF Associates on June 26, 2007 and July 2, 2007. A summary of the information obtained during these interviews is provided below.

June 26, 2007 interview

Homegrown produce: Not many vegetables are raised in the northern part of the CRIT reservation; there are some backyard gardens in Parker but these won't get much produce; water bill may triple for a town residence with a home garden because of watering needs of crops grown in town; produce can only be grown seasonally, a few months in spring and fall; most produce (e.g., tomatoes, onions, melons) is grown in the southern part of the CRIT reservation near Poston, not near Parker; most crops grown on CRIT reservation are commercial and are shipped out and are not marketed locally. A reasonable estimate for someone living on the CRIT reservation is that 10% of the annual diet could be obtained from home grown produce, and 5% or less for someone living in town. Ms. Masters indicated she would follow up with colleagues on this topic and respond back.

Animal products: CRIT reservation residents buy their meat at the store; animals are raised through 4-H program, perhaps 70 pigs per year, and these animals have to be sold to someone else; people do not butcher their own animals for meat; 1 farmer has 50 head of cattle located beyond 10 km from the facility which are sold; there are no dairy cows and no locally-produced dairy milk on the CRIT reservation; there are no slaughter facilities in the vicinity that she is aware of; people may raise chicken and eggs, and might have pigs or beef cattle; not many chickens raised in the area, though kids might raise chickens sometimes; alfalfa feed for animals is available locally; grain is not grown locally; chickens probably don't have locally grown feed because grain is not grown locally; there is a feed store in the area where animal feed can be purchased.

July 2, 2007 interview

Ms. Masters indicated that she had spoken with many colleagues since the 6/26/07 phone interview and was providing additional information based on this broader input.

Homegrown produce: The types of produce grown in Parker and the irrigated valley are similar but it is very difficult due to climate and soil. Based on the input she received, she estimates that 10% of produce diet may be from home grown produce and cannot see this number being higher than 20%, especially considering there are not extended growing seasons.

Animal products: All feed used for pigs is not local; people may raise lamb and goat, feed for these animals is not obtained locally; no feed for chickens is locally-grown; hay for cattle is obtained locally, but grain not local; among people who might raise animals, they might butcher 1 animal/year and only 20% of their meat diet would be from locally-raised animals; a small number of people raise animals, expects no more than 10% to raise animals for home consumption.

5. Selection of Chemicals for Evaluation – Section 4.3.2, pg. 29 & Tables 4.3.1, 4.3.2 (Fugitive Emissions)

Comment:
"It is not clear from this review the basis for exclusion of chrome as a constituent in the assessment of potential fugitive releases and impacts. Chrome (valence-specific) is considered carcinogenic via the inhalation exposure pathway by several government regulatory agencies and international scientific bodies, and while an inorganic constituent, the metal does enjoy limited volatility under terrestrial conditions. Please reconsider the criteria used for selection of constituents subject to this level of analysis and modify the list of constituents with the stated criteria."

Response:

Introduction

In response to this comment, both total and hexavalent chromium were selected for evaluation in the assessment of potential fugitive emissions from spent carbon unloading. The remainder of this response describes the approaches used to evaluate the two chromium compounds and the risk assessment results. Chromium is generally not considered to be volatile in the environment. The vapor pressure of chromium at 298K calculated from Antoine coefficients is approximately 10E-50 mm Hg. Some specific chromium compounds such as chromium carbonyl and chromium oxychloride are somewhat volatile at ambient temperatures (Yaws 1999), however these compounds are unstable under environmental conditions. Due to these properties, this analysis focuses on the particulate phase rather than the vapor phase.

Chromium Emission Rates

Fugitive emission rates for the two chromium compounds were calculated using the methodology presented in Section 4.3.3.2 and Equation 4-8 in the risk assessment. In this method, inorganic compound emission rates were calculated by multiplying the emission rate of PM10 particles (particles < 10 microns in diameter) in g/sec by the inorganic compound concentration in spent carbon in g/g.

Based on 2003-2006 spent carbon data from the facility, the average concentration of total chromium in spent carbon was 12 parts per million (ppm) or $1.2x10^{-5}$ g/g (see Table 4.3.1 in the risk assessment). The PM10 emission rate was calculated to be $5.87x10^{-5}$ g/sec in Table 4.3-6 in the risk assessment. Using these inputs, a total chromium emission rate of $7.0x10^{-10}$ g/sec was calculated (i.e., PM10 emission rate * total chromium spent carbon concentration).[15]

From a thermodynamic standpoint, activated carbon will reduce chromium and maintain it in a stable chromium III form which will predominate over the unstable hexavalent form. The hexavalent chromium (CrVI) concentration in spent carbon was, however, calculated by

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[15] For example, total chromium emission rate (g/sec) based on average spent carbon concentration = PM10 emission rate of $5.87x10^{-5}$ g/sec from Table 4.3-6 in the risk assessment * total chromium average concentration in spent carbon of $1.2x10^{-5}$ g/g = $7.0x10^{-10}$ g/sec.

assuming that 13% of the total chromium was present as CrVI[16] based on an evaluation of 137 concurrent CrVI and total chromium measurements in monthly composite spent carbon samples from 1994-2006 that were provided to CPF by Siemens. Although CrVI was not detected in 134 of the 137 samples, these data showed that, on average, 13% of the total chromium could potentially be CrVI if all non-detected CrVI results were conservatively assumed to be present at their reported detection limits. If the more commonly employed assumption of one-half the detection limit were used for samples in which CrVI was not detected, roughly 7% of the total chromium could be CrVI; this would produce lower spent carbon concentrations, lower air concentrations, and lower risks than calculated in response to this Region IX comment. Based on a conservatively assumed CrVI concentration in spent carbon of $1.6x10^{-6}$ g/g (13% of the total chromium), the CrVI emission rate was calculated to be $9.4x10^{-11}$ g/sec.[17]

Ambient Air Concentrations

Ambient air concentrations of total chromium and CrVI were calculated using the standard USEPA method described in HHRAP guidance and used in the risk assessment. In this method, as discussed previously in response to General Comment 2 and indicated in Equation 1 shown earlier in this document, air concentrations are calculated by multiplying unitized ISCST3 air dispersion modeling results (i.e., unitized concentrations in $\mu g/m^3$ based on a 1 g/sec emission rate) by the chemical emission rates in g/sec.

Potential ambient air concentrations associated with fugitive emissions in the risk assessment were modeled both on site, at the maximum on-site impact location, and off site, at a variety of receptor locations, using the same approaches applied in the risk assessment. The off-site locations are described in Table 4.3-8 in the risk assessment and include four residential receptor locations, two farmer receptor locations, two maximum off-site impact points on undeveloped land, and the closest maximally impacted non-residential business receptor location.

Risk Characterization

Potential risks associated with the chromium ambient air concentrations were evaluated using the same methods applied in the risk assessment. For off-site receptors, off-site ambient air concentrations and associated risks were calculated using the IRAP software program. For the on-site worker analysis, on-site ambient air concentrations and their comparison to occupational exposure limits were calculated using an excel spreadsheet.

Inclusion of the chromium compounds in the off-site fugitives risk assessment did not change the risk assessment conclusions. The numerical risk results for the fugitive evaluation were presented in the risk assessment in Table 4.4-4 (chronic inhalation risks) and Table 4.4-5 (acute inhalation risks); these results are all well below USEPA target risk levels and are unchanged by the addition of chromium. The detailed chemical-specific results from the revised off-site fugitives risk assessment, now including total chromium and CrVI, are presented in Attachment B. This attachment provides the same data that were included in the risk assessment in Appendix J (chronic inhalation risks) and Appendix K (acute inhalation risks), with the addition

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[16] CrVI concentration (g/g) = $1.2x10^{-5}$ g/g total Cr * 0.13 = $1.6x10^{-6}$ g/g CrVI.
[17] CrVI emission rate (g/sec) = PM10 emission rate of $5.87x10^{-5}$ g/sec * CrVI concentration in spent carbon of $1.6x10^{-6}$ g/g = $9.4x10^{-11}$ g/sec.

of the two chromium compounds. The total chromium and CrVI results in Attachment B are many orders of magnitude below the chronic and acute USEPA target risk levels.

The conclusions of the on-site workplace evaluation also did not change after total chromium and CrVI were added to the fugitives risk assessment in that the on-site concentrations were well below occupational exposure limits. The calculated on-site maximum 8-hour average chromium air concentrations and associated occupational exposure limits are presented in Table 8. As can be seen, the on-site air concentrations were significantly lower than the 8-hour average OSHA and NIOSH exposure limits.

6. Fugitive Organic Vapor Emissions & Hazard – Section 4.3.3.1, pg.30

Comment:
"The human health and ecological impacts assessed from fugitive releases were determined from facility activities (spent carbon unloading) or sources with the potential for maximum or high-end contaminant releases. Non-cancer or systemically toxic compounds are assessed in this analysis by a cumulative approach which considers the total concentration of those compounds in an exposure scenario germane to the impacted receptor. It is not clear from this review why the non-cancer or systemically-toxic hazard potentially incurred from fugitive releases was not considerate of the combined exposures from both the outdoor spent-carbon unloading hopper (H-1) operations, in addition to the source and activity generating fugitive emissions from other facility operations (hopper H-2)? This estimate of cumulative hazard would more closely capture the entire range of potential exposures incurred by human receptors."

Response:

A detailed review of facility operations was conducted during the Workplan stage of this risk assessment process, in 2003, in order to select a potential fugitive emissions source most likely to impact ambient air. This review, which is presented in Section 4.3 of the 2003 Workplan and reprinted here as Attachment C, provided an overview of potential sources of fugitive emissions related to spent carbon at the facility in addition to a discussion of regulatory requirements, and engineering and institutional controls that are in place to minimize potential fugitive emissions. Based on this review, the Workplan (which was approved by USEPA prior to performing the risk assessment) indicated that the potential fugitive emission source related to spent carbon considered most likely to impact ambient air is the unloading of spent carbon at the outdoor hopper (H-1) and that this emission source would be addressed in the risk assessment.

In addition to the reasons outlined in Attachment C for selecting the outdoor hopper (H-1) for detailed evaluation in the risk assessment, potential fugitive emissions from H-1 were considered more likely to impact outdoor ambient air for a number of reasons. First, most of the spent carbon received at the facility is unloaded at H-1. For example, between 82%-86% of the spent carbon received at the facility annually during 2005 and 2006 was unloaded into the outdoor hopper from a variety of different bulk container types (e.g., roll-off containers, slurry trucks). The remainder of spent carbon received at the facility was unloaded indoors inside the spent carbon storage and warehouse building into hopper H-2 (e.g., drums, supersacks). Second, while

Table 8
On-Site Air Concentrations Associated with Fugitive Chromium Emissions and Comparison to Occupational Exposure Limits

Compound	Maximum On-Site 8-Hour Average Air Concentration (mg/m^3) (a)	Occupational Exposure Limits (mg/m^3) (b)		Comparison of Maximum Modeled 8-Hour Average Concentrations to Occupational Exposure Limits	
		NIOSH Reference Exposure Limit (8-hr TWA REL)	OSHA Permissible Exposure Limit (8-hr TWA PEL)	Ratio - Air Concentration/ NIOSH REL	Ratio - Air Concentration/ OSHA PEL
Total Chromium (c)	1.2E-08	0.5	0.5	2E-08	2E-08
Chromium VI (d)	1.5E-09	0.001	0.005	2E-06	3E-07

TWA = time-weighted average.

(a) Air concentration (mg/m3) = emission rate (g/sec) * maximum 8-hour average unit air concentration (16,426 ug/m3 per 1 g/sec) * mg/1,000 ug.

(b) Sources: OSHA PELS - www.osha.gov/pls/oshaweb. NIOSH RELs - www.cdc.gov/niosh/npg.

(c) The listed OSHA PEL for chromium is based on CrIII and CrII. The value for chromium metals and insoluble salts is slightly higher, at 1 mg/m3.

(d) The listed NIOSH REL for CrVI is a 10-hr TWA.

both hoppers are equipped with an air exhaust system, which directs collected air to a fabric filter baghouse and carbon adsorber, potential fugitive emissions to outdoor air are considered more likely to occur from H-1 due to its outdoor location and its configuration. The outdoor hopper is an enclosed three-walled free standing building with a fixed roof and heavy long plastic sheeting on the fourth side where spent carbon is unloaded. At the face of hopper H-1 where unloading occurs, fugitive emissions have the potential to occur during unloading operations.

Additionally, the method used to calculate fugitive emissions from hopper H-1 in the risk assessment did not take into account the beneficial effect of the air exhaust system. The calculated emission rates assumed, instead, that all fugitive emissions during unloading were directly released to outdoor ambient air. This approach assumed that no fugitive emissions were captured by the exhaust system and thus none were directed through the particulate and organic vapor pollution control systems. This unrealistic, albeit conservative, assumption is expected to overestimate potential ambient air concentrations, and thus potential risks, associated with fugitive emissions.

Finally, as discussed above in response to General Comment 2, it is important to recognize that all workers involved in spent carbon unloading operations wear respirators in addition to protective clothing. When handling any spent carbon (whether it is classified as non-hazardous or hazardous), a half-face respirator with organic and dust control cartridges is worn by workers. Workers also wear company-supplied shorts, pants, steel-toed boots, hard hat and safety glasses. The facility's worker health and safety program additionally includes training, medical monitoring, and hazard communication.

7. Risk Characterization – Section 4.4.1.1, pg.39 (Stack Emissions)

Comment:
"It would be useful to provide a table supporting this narrative which detailed those constituents which significantly influenced the receptor-specific risk estimates, but whose rate of emission was not consistent with the emission rate optimized in the performance demonstration test (PDT). Cadmium and benzidine are illustrative of this phenomenon."

Response:

Table 9 was prepared to detail those constituents which significantly influenced the receptor-specific excess lifetime cancer risk estimates. This table focuses on the receptors with the highest risk results, indicating the dominant compounds affecting the results and providing background on the basis of each compound's emission rate used in the risk assessment. The risks are presented for the three groups of compounds addressed in the risk assessment, as described earlier in response to Specific Comment 4. The results, which are discussed in Section 4.4.1.1 of the risk assessment, are all below USEPA's target cancer risk level of 1E-5 (one in 100,000) over a 70-year lifetime.

A similar table was not prepared for the non-cancer risk results because the non-cancer hazard index values, and the dominant compounds, were essentially the same across the three groups of

Table 9
Dominant Compounds Contributing to Excess Lifetime Cancer Risks Associated with Stack Emissions

Receptor and Group of Evaluated Compounds	**Excess Lifetime Cancer Risks (a)**	**Dominant Compounds (% Contribution to Risk Result)**
Town Resident receptor (R_2 Adult): Receptor in town residential area with highest potential risks and highest annual modeled impacts		
Group 1 – all detected compounds (95 compounds)	6E-08	- Cadmium (94%) (b)
Group 2 – all compounds except benzidine (177 compounds)	2E-07	- Cadmium (36%) (b) - Arsenic (38%) (c) - Beryllium (17%) (d)
Group 3 – all compounds (178 compounds)	2E-06	- Benzidine (92%) (e)
Farmer receptor (R_3 Adult): Farmer in residential area with access to irrigation water with highest potential risks and highest annual modeled impacts		
Group 1 – all detected compounds (95 compounds)	3E-08	- Cadmium (75%) (b) - PCDDs/PCDFs (23%) (f)
Group 2 – all compounds except benzidine (177 compounds)	6E-08	- Cadmium (33%) (b) - PCDDs/PCDFs (10%) (f) - Arsenic (36%) (c) - Beryllium (16%) (d)
Group 3 – all compounds (178 compounds)	5E-07	- Benzidine (87%) (e)
Subsistence fish ingestion pathway receptor (R_only_fish_drain): Fish ingestion evaluation for the Main Drain		
Group 1 – all detected compounds (95 compounds)	1E-08	- PCDDs/PCDFs (88%) (f)
Group 2 – all compounds except benzidine (177 compounds)	1E-08	- PCDDs/PCDFs (71%) (f)
Group 3 – all compounds (178 compounds)	2E-08	- PCDDs/PCDFs (53%) (f) - Benzidine (36%) (e)

PDT = Performance Demonstration Test.

PCDDs/PCDFs = polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo furans.

(a) The cancer risks were obtained from Table 4.4-1 in the risk assessment. They reflect the additional excess lifetime cancer risks from exposure to all potential carcinogens evaluated. These risk results are all lower than the regulatory target cancer risk level used by USEPA for combustion sources of 1E-05 (1 in 100,000).

(b) Cadmium was evalauted using an emission rate based on a proposed permit limit that was >30 times higher than measured during the PDT.

(c) Arsenic was not detected in the PDT but was evaluated in the risk assessment using an emission rate based on a proposed permit limit.

(d) Beryllium was not detected in the PDT but was evaluated in the risk assessment using an emission rate based on a proposed permit limit.

(e) Benzidine was not detected in the PDT and there is no evidence from waste profile reports and analytical spent carbon data that it has ever been accepted in spent carbon received at the facility. It was evaluated using an emission rate based on its PDT-reported detection limit.

(f) PCDDs/PCDFs were evaluted using an emission rate based on a proposed permit limit that was about 4 times higher than measured during the PDT. The feed used during the PDT was spiked to maximize production of combustion by-products such as PCDDs/PCDFs.

compounds evaluated (i.e., Groups 1, 2 and 3). The hazard index values for stack emissions were lower than the conservative non-cancer target level of 0.25 used by USEPA for evaluating combustion sources. As described in Section 4.4.1.1 of the risk assessment, the dominant compounds affecting the hazard index results were chlorine, for the resident and farmer receptors, and methyl mercury for the fish ingestion pathway. Chlorine was evaluated in the risk assessment using an emission rate based on a proposed permit limit that was much higher than measured in the PDT, even though many chlorine-containing compounds were spiked into the feed during the PDT. Similarly, mercury was evaluated using a permit limit-based emission rate that was higher than measured in the PDT. These results indicate that chronic non-cancer adverse health effects would not occur due to stack emissions from the carbon reactivation facility.

8. Acute Short-term Risks – Section 4.4.1.4, pg.41 (Stack Emissions)
This comment includes two items, each of which are addressed below.

8a. Acute Short-term Risks – Calculation of Maximum Concentrations

Comment:
"The current assessment evaluated the impact from acute or short-term inhalation exposures from stack emissions by comparing the 1-hr average air concentrations (model derived) with acute reference thresholds. Results from this comparison demonstrated that the non-cancer or systemically toxic hazard thresholds were not exceeded. Determination of acute inhalation impacts should be derived from comparison of the 1-hr maximum stack concentrations with acute thresholds rather than 1-hr average maximum stack concentrations. Results from this level of analysis would better inform and therefore reduce the level of uncertainty inherent in the acute level impact characterization."

Response:

The acute risk assessment evaluation for stack emissions was modified, in response to this comment, by using maximum measured stack emission rates. This approach differs from the risk assessment which, as described in the Workplan, used average emission rates derived across the three PDT test runs. As noted earlier in response to General Comment 4, and as described in Section 4.5.2 of the risk assessment, the differences between the average and maximum measured stack emission rates for those compounds with emission rates based on stack test data were not substantial, and ranged from a factor of 1.0 (i.e., no change) to a factor of 3.0. The maximum measured emission rates are listed in Table 2 in response to General Comment 4.

In this analysis, the maximum measured emission rates were used for those compounds with emission rates based on stack test data. For the remaining compounds (i.e., those with emission rates based on proposed permit limits or calculated based on feed rate and destruction and removal efficiency), the emission rates for this acute analysis were the same as those used in the chronic risk assessment (see Table 2).

The potential acute inhalation risks were evaluated by re-running the IRAP software program in the same manner as applied in the risk assessment. The resulting hazard quotients are presented in Table 10 for the same set of receptor locations evaluated in the risk assessment. The detailed chemical-specific acute hazard quotients for this stack emissions scenario are included in Attachment D.

All of the hazard quotients (HQs) at all receptor locations were well below the target level of 1.0, indicating that adverse acute health effects would not occur due to stack emissions at locations beyond the property boundary. The highest HQ values were calculated at grid location A_1 (0.08) and A_2 (0.04). These results were unchanged from the original risk assessment (see Table 4.4-3 in the risk assessment report).

The cumulative acute hazard index (HI) values, based on the sum of all hazard quotients and assuming exposure to all compounds evaluated regardless of the type of potential health effects, were 0.2 at grid location A_1 and 0.1 at grid location A_2, still well below a target of 1.0. The corresponding cumulative hazard index results from the risk assessment using average measured stack emission rates (see Appendix H of the risk assessment) were 0.1 at A_1 and 0.09 at A_2, only slightly lower than calculated here using maximum measured emission rates. These results confirm that the acute risk assessment results are negligibly different whether using average or maximum stack emission rates.

It should be noted that summing all hazard quotients together regardless of type of health effect is not recommended in HHRAP, but was performed here in response to General Comment 4. HHRAP recommends that acute hazard quotients from individual compounds be summed if they have similar effects. Given that the cumulative HI values across all compounds were less than 1, the sum for any subsets with similar types of health effects will also be less than 1.

<u>8b. Acute Short-term Risks – Acute Hazard Quotients</u>

Comment:
"An acute hazard quotient above one may indicate and increased chance of developing health endpoints more profound than the mild transient adverse health effects described in the report. The specific health endpoint is constituent-specific and has been detailed in the reference documents used to support acute reference levels."

Response: No response necessary.

9. Evaluation of Lead – Section 4.4.1.5, pg. 43

Comment:
"EPA's Integrated Exposure Uptake Biokinetic Model (IEUBK) for lead in children is designed to predict a child's blood-lead concentration from multimedia exposure pathways. While EPA's combustion guidance reference for risk analysis recommends application of the model in the context of combustion-unit risk assessments when the lead in soil concentrations exceed health-based levels (400 mg/kg), it is not clear from this review the manner in which potential lead exposure and the resultant blood-lead level impact from the direct pathway of human exposure (inhalation) can be assessed without model application. The IEUBK model should be considered to reduce uncertainties associated with potential lead impacts on proximate receptors."

Table 10

Acute Inhalation Results - Maximum Measured Stack Emissions (a)

Receptor Name	Description	Minimum Hazard Quotient (b)	Maximum Hazard Quotient (b)
Residential Receptors (developed area within and around Town of Parker)			
R_1 resident	Closest residential location to facility and residential area in town with highest hourly modeled impacts	<1E-10	0.02
R_2 resident	Residential area in town with highest annual modeled impacts	<1E-10	0.01
Farmer Receptors (residential area with access to irrigation water and within modeling domain)			
R_3 resident farmer	Residential area with access to irrigation water with highest annual modeled impacts	<1E-10	0.01
R_4 resident farmer	Residential area with access to irrigation water with highest hourly modeled impacts	<1E-10	0.02
Maximum Impact Point (undeveloped land area)			
A_1 max hourly	Maximum impact location for hourly concentrations. There is no residential or commercial land use in the vicinity of the maximum impact location (SW of facility).	<1E-10	0.08
Non-Residential Areas			
A_2 closest business (c)	Closest developed location beyond property boundary (non-residential) with highest hourly modeled impacts	<1E-10	0.04

(a) These results are conservatively based on both maximum measured stack emission rates and also maximum modeled unitized ISCST3 air concentrations. For each specific receptor location, the maximum modeled ISCST3 unitized concentration was the highest 1-hour average result out of the more than 40,000 1-hour averages calculated at that location (i.e., based on input to ISCST3 of 5 years of hourly meteorological data from Parker, Arizona). At each location the concentrations for all other hours were lower than those used to calculate these hazard quotients.

(b) The minimum and maximum results are the lowest and highest hazard quotients, respectively, calculated among all of the evaluated compounds. The typical target hazard quotient value used by regulatory agencies is 1.

(c) The County Agricultural Extension Office and CRIT Realty are located at receptor A_2. Maximum 1-hour average air concentrations at all other non-residential developed land use locations were lower than at receptor A_2.

Response:

In response to this comment, potential lead exposures were evaluated using the IEUBK model (USEPA 2002, Version 1.0.264). Inputs to the IEUBK model include background exposures to lead in addition to lead exposures associated with facility stack emissions.

Background lead exposures were based on the USEPA defaults incorporated in the IEUBK model with the exception of background air and soil lead concentrations, for which data specific to Arizona were compiled. Background levels in air were based on ambient air measurements from Maricopa, Pima and Yavapai Counties reported in AZDEQ (1999) (no data were available for La Paz, Mohave or Yuma Counties). Note that lead is no longer routinely measured in ambient air by AZDEQ because concentrations have declined to very low levels in response to regulatory controls (AZDEQ 2007). Background soil levels were based on surface soil measurements from Yuma and Mohave Counties reported in USGS (1981) (data were not available for La Paz County in the USGS report).

Potential lead exposures associated with facility stack emissions were compiled for the resident child and farmer child receptors that were calculated to have the highest lead intakes in the risk assessment (referred to as receptors R_2 and R_3). The facility-specific IEUBK inputs for these receptors included air and soil lead concentrations at each receptor location, in addition to dietary lead intakes. These inputs were compiled from the risk assessment results calculated using the IRAP software program which, as described in the risk assessment, calculates lead exposures and risks using USEPA's HHRAP methods and inputs. Table 11 presents the lead concentrations and dietary intakes associated with stack emissions that were calculated using IRAP and used in the IEUBK model.

The IEUBK inputs and outputs are summarized in Table 12. The model outputs were compared to the USEPA target blood lead level of 10 µg/dL (USEPA 2002). As shown in Table 12, the model predicted no blood lead elevation compared to that predicted by exposure to background. The predicted blood lead levels were all lower than those measured among children in Yuma County, Arizona as part of the Arizona/Sonora blood lead study (mean blood lead level = 3.1 µg/dL; 95% confidence interval = 2.9-3.3 µg/dL) (Cowan et al. 2006). The blood lead levels associated with background, and background plus potential facility impacts, were all below USEPA's target level. The probability of the target level being exceeded, which is an output of the IEUBK model, was 0.01% for all model runs. These results indicate that adverse health effects due to lead exposure would not occur as a result of facility stack emissions.

10. Acute Short-term Risks – Section 4.4.2.2, pg. 44 (Fugitive Emissions)
This comment includes a number of items, each of which is addressed below.

<u>10a. Acute Short-term Risks – Maximum Modeled Fugitive Emission Rates</u>

Comment:
"An acute or short-term analysis of fugitive releases from the facility's spent-carbon hopper loading activities was conducted to assess the magnitude of acute impacts. Rather than applying the 1-hr average air concentration from modeled releases in support of this analysis, the 1-hr

Table 11
Potential Lead Concentrations and Dietary Intakes
Associated with Stack Emissions

Risk Assessment Results (a)	Resident child receptor (R_2) (b)	Farmer child receptor (R_3) (b)	Units
Air Concentration	6.9E-05	2.0E-05	ug/m3
Soil Concentration	2.7E-04	2.8E-05	ug/g
Dietary intake (1-7 year old child)			
Produce	1.95E-03	3.00E-04	ug Pb/day
Beef	NA	6.30E-06	ug Pb/day
Fish (Main Drain)	3.90E-10	3.90E-10	ug Pb/day
Fish (Colorado River)	1.38E-09	1.38E-09	ug Pb/day
Total	2.0E-03	3.1E-04	ug Pb/day

NA = not applicable for this receptor.

(a) The reported results were calculated in the risk assessment using the IRAP software program (see Section 4.2 in the risk assessment report).

(b) Results are presented for the resident child and farmer child receptors with the highest intakes calculated in the risk assessment : R_2 resident and R_3 farmer.

Table 12
Lead Exposure Evaluation Using USEPA's IEUBK Model

Information	AZ background (a,b) + USEPA diet defaults	Potential facility contribution + background (c)	
		Resident child receptor (R_2)	Farmer child receptor (R_3)
Model Inputs			
Air concentration (µg/m3)	0.01	0.010069	0.01002
Soil concentration (µg/g)	27	27.00027	27.000028
Dietary intake (µg/day)			
.5-1 years	5.53	5.532	5.5303
1-2 years	5.78	5.782	5.7803
2-3 years	6.49	6.492	6.4903
3-4 years	6.24	6.242	6.2403
4-5 years	6.01	6.012	6.0103
5-6 years	6.34	6.342	6.3403
6-7 years	7.00	7.002	7.0003
Model Outputs			
Blood Pb Concentration (ug/dL)			
.5-1 years	2.0	2.0	2.0
1-2 years	2.0	2.0	2.0
2-3 years	1.9	1.9	1.9
3-4 years	1.8	1.8	1.8
4-5 years	1.6	1.6	1.6
5-6 years	1.5	1.5	1.5
6-7 years	1.4	1.4	1.4
Probability of Pb blood concentration greater than USEPA's 10 µg/dL target			
Probability	0.01%	0.01%	0.01%

(a) Background levels in air were based on data in AZDEQ (1999).
(b) Background soil levels were based on Arizona surface soil measurements reported in USGS (1981).

(c) The facility contribution was evaluated for the resident child and farmer child receptors with the highest intakes calculated in the risk assessment : R_2 resident and R_3 farmer.
Facility contribution for R_2 included air, soil and diet (produce + fish).
Facility contribution for R_3 included air, soil and diet (produce + beef + fish).

maximum concentration should be applied to determine the magnitude of acute impacts associated with fugitive releases. Further, the cumulative hazard index for all compounds should be clearly detailed in the supporting narrative, and only when this value exceeds the target threshold, should a target-organ segregation approach be applied in the context of risk characterization."

Response:

In response to this comment, emission rates for the acute fugitives risk evaluation were re-calculated using maximum rather than average spent carbon concentrations. These revised maximum emission rates were then input into the IRAP software program to recalculate potential acute risks associated with fugitive releases during unloading activities.

Maximum Modeled Fugitive Emission Rates

Table 2, shown earlier in this document, presents the mathematically modeled maximum fugitive chemical emission rates, as well as the maximum concentrations in spent carbon unloaded at the outdoor hopper, and the number of deliveries with this maximum concentration relative to the total number of deliveries.

ISCST3 Modeling of Short-Term Unitized Air Concentrations

Equation 1, presented earlier in this document, shows the HHRAP method for calculating chemical-specific air concentrations. In this method, unitized ISCST3 model output air concentrations are multiplied by chemical-specific emission rates. The unitized ISCST3 air concentration at each receptor location was the maximum modeled 1-hour average air concentration based on a unit 1 g/sec emission rate. The chemical-specific emission rates were calculated as described above.

HHRAP recommends evaluating risks due to acute exposure based on maximum 1-hour average air concentrations calculated using a dispersion model. The shortest time step that the ISCST3 dispersion model can predict is a 1-hour average period. The term "1-hour average" thus commonly refers to the averaging time associated with this ISCST3 output.

The ISCST3 model calculates a 1-hour average unitized air concentration (i.e., $\mu g/m^3$ per 1 g/sec) for every hour of input meteorological data at each modeled receptor location. The five years of hourly meteorological data input to ISCST3 for the risk assessment, therefore, produced more than 40,000 1-hour average air concentrations at each of the more than 5,200 individual modeled receptor locations beyond the property boundary. The highest of these more than 40,000 1-hour average concentrations at each location was then selected for use in evaluating potential acute inhalation risks in the risk assessment. This very conservative approach is recommended in HHRAP and was used in the risk assessment and in response to this Region IX comment.

The maximum 1-hour average unitized concentration modeled by ISCST3 at each location reflects a specific set of meteorological conditions that produce less dispersion and higher air concentrations than for any of the other more than 40,000 modeled hours. This means that the maximum short-term air concentrations, and thus the acute risks derived from them, have a very low probability of occurrence. It also means that the short-term air concentrations for every other hour modeled at each receptor location were lower than the maximum used in the risk assessment.

Potential Acute Inhalation Risks

The potential acute inhalation risks associated with the maximum modeled fugitive emission rates and the maximum unitized ISCST3 modeled short-term air concentrations were evaluated by re-running the IRAP software program in the same manner as applied in the risk assessment.

The resulting hazard quotients are presented in Table 13 for the same set of receptor locations evaluated in the risk assessment (see Table 4.4-5 in the risk assessment). The detailed chemical-specific acute hazard quotients for this fugitive emissions scenario are included in Attachment E.

All of the hazard quotients (HQs) at all receptor locations were below the target level of 1.0, indicating that adverse acute health effects are not expected to occur due to fugitive hopper emissions, even when spent carbon containing maximum concentrations are unloaded at the outdoor hopper. The highest HQ values were calculated at grid location A_3 (0.4) and A_2 (0.02). Note that grid location A_3 is on the facility property boundary; beyond this location there is undeveloped land that is not used for residential or commercial purposes. The cumulative acute hazard index (HI) values, based on the sum of all hazard quotients and assuming exposure to all compounds evaluated regardless of the type of potential health effects, were 0.6 at grid location A_3 and 0.03 at grid location A_2, still below the target of 1.0.

These results corroborate the conclusions of the risk assessment. They indicate that short-term health effects are not expected to occur in areas near the facility as a result of inhalation exposure to fugitive emissions during spent carbon unloading at the outdoor hopper, individually or in combination with risks from stack emissions.

10b. Acute Short-term Risks – On-Site Evaluation of Short-term Exposure Limits

Comment:
"The fugitive release acute analysis suggests that on-site receptors incur maximal impacts from fugitive releases (hopper activities). While the narrative in this section identifies the location of maximal off-site impacts and the resultant hazard estimates, the magnitude of on-site impact associated with this exposure scenario should also be identified (10 m north of hopper) and discussed. A fugitive release, on-site acute analysis comparing short-term occupational standards (STELs) to maximum predicted air concentrations should also be considered."

Table 13
Acute Inhalation Results - Maximum Fugitive Emissions During Spent Carbon Unloading at the Outdoor Hopper (a)

Receptor Name	Description	Minimum Hazard Quotient (b)	Maximum Hazard Quotient (b)
Residential Receptors (developed area within and around Town of Parker)			
R_1 resident	Closest residential location to facility, residential area in town with highest hourly modeled impacts for stack emissions	<1E-9	0.001
R_2 resident	Residential area in town with highest annual modeled impacts for stack emissions	<1E-9	0.0009
R_5 resident	Residential area in town with highest hourly modeled impacts for fugitive hopper emissions	<1E-9	0.001
R_6 resident	Residential area in town with highest annual modeled impacts for fugitive hopper emissions	<1E-9	0.0005
Farmer Receptors (residential area with access to irrigation water and within modeling domain)			
R_3 resident farmer	Residential area with access to irrigation water with highest annual modeled impacts (stack and fugitive hopper emissions)	<1E-9	0.0007
R_4 resident farmer	Residential area with access to irrigation water with highest hourly modeled impacts (stack and fugitive hopper emissions)	<1E-9	0.0009
Maximum Impact Point (undeveloped land area)			
A_1 max hourly (stack)	Maximum stack emissions impact location for hourly concentrations. There is no residential or commercial land use in the vicinity of the maximum impact location (SW of facility).	<1E-8	0.007
A_3 max hourly (fugitives)	Maximum fugitive hopper emissions impact location for hourly concentrations. Occurs on northern facility property boundary. There is no residential or commercial land use in the vicinity of the maximum impact location.	<1E-7	0.4
Non-Residential Areas			
A_2 closest business (c)	Closest developed location beyond property boundary (non-residential) with highest hourly modeled impacts	<1E-9	0.02

(a) These results are based on both maximum fugitive chemical-specific emission rates and maximum modeled ISCST3 unitized 1-hour average air concentrations calculated for each specified receptor location. The ISCST3 air concentrations for all other hours were lower than those used to calculate these hazard quotients.

(b) The minimum and maximum results are the lowest and highest hazard quotients, respectively, calculated among all of the evaluated compounds. The typical target hazard quotient value used by regulatory agencies is 1.

(c) The County Agricultural Extension Office and CRIT Realty are located at receptor A_2. Maximum 1-hour average air concentrations at all other non-residential developed land use locations were lower than at receptor A_2.

Response:

Section 4.4.2.2 of the risk assessment addresses potential off-site impacts to public health. On-site impacts are addressed in Section 4.4.4 of the risk assessment and also in response to General Comment 2.

In response to this comment, an on-site acute analysis was conducted to compare short-term occupational exposure limits to maximum modeled on-site air concentrations. Short-term exposure limits (STELs) have been developed by NIOSH and OSHA for varying short-term durations. For example, STELs are defined as 15-minute time-weighted average concentrations that should not be exceeded at any time during a workday. Ceiling limits are maximum peak values not to be exceeded at any time.

Table 14 presents the available short-term exposure limits provided by OSHA and NIOSH, the approximate duration associated with each short-term limit, and the 8-hour time weighted average permissible exposure limits (PELs).

Table 14 also presents modeled maximum on-site air concentrations associated with maximum fugitive emissions. The maximum 8-hour average and 1-hour average air concentrations were calculated by combining ISCST3 unitized modeling results with maximum modeled chemical-specific emission rates. The air concentrations for averaging times less than 1 hour were calculated by scaling from the modeled maximum on-site 1-hour average concentrations using USEPA screening-level scaling factors that convert concentrations to different averaging times (USEPA 1992). The estimated short-term air concentrations were calculated for durations that corresponded to the short-term exposure limit durations indicated in Table 14. The screening-level scaling factors can only provide very rough approximations of air concentrations because of their inherent uncertainties (e.g., application at close distances from a source).

Table 14 shows that the modeled short-term on-site air concentrations are lower than the corresponding short-term exposure limits, in most cases by several orders of magnitude. This conclusion provides additional support that unacceptable risks to workers associated with chemical exposures from spent carbon unloading activities are not likely to occur.

<u>10c. Acute Short-term Risks – Risk Management Procedures</u>

Comment:
"To the extent that on-site risk management procedures remain in place to mitigate these potential exposures and concomitant risks, and to the extent that these potential exposures are regulated by facility compliance with the Occupational Safety & Health Administration (OSHA) worker protection standards, the risk implications associated with this scenario can be deemed de minimus. This level of analysis should be clearly articulated in this section, and section 4.4.4 of the risk assessment report."

Response:

The facility has in place a protective worker health and safety program which has been developed to meet the requirements of OSHA and a set of comprehensive on-site risk

Table 14
Evaluation of Short-Term Occupational Exposure Limits And Modeled Maximum Ambient Air Concentrations On Site
Associated with Fugitive Emissions During Spent Carbon Unloading

		Maximum Modeled On-Site Air Concentrations (mg/m3) (a)		Calculated Maximum On-Site Air Concentrations for Short-Term Averaging Times (mg/m3) (scaled from maximum modeled 1-hour average concentration) (f)				8-Hour Average Occupational Exposure Limits (mg/m3) (b)		Short-Term Occupational Exposure Limits (mg/m3) (b) — OSHA Exposure Limits		Short-Term Occupational Exposure Limits (mg/m3) (b) — NIOSH Exposure Limits	
Compound	**CAS #**	**Maximum Modeled 8-Hour Average**	**Maximum Modeled 1-Hour Average**	**30-minute (1-hr)*1.1**	**15-minute (1-hr)*1.3**	**10-minute (1-hr)*1.4**	**5-minute (1-hr)*1.6**	**NIOSH Reference Exposure Limit (8-hr TWA REL)**	**OSHA Permissible Exposure Limit (8-hr TWA PEL)**	**Exposure Limit**	**Duration**	**Exposure Limit**	**Duration**
1,2-Dibromoethane	106-93-4	1.0E-08	2.4E-08		3E-08		4E-08	0.35	150	230	5-minute	1.0	15-minute
1,3-Butadiene	106-99-0	--	--					4.4 (c)	2.2	10	15-minute		
1,4-Dichlorobenzene	106-46-7	7.0E-03	1.6E-02					60 (c)	450				
Acrylonitrile	107-13-1	3.4E-02	8.0E-02		1E-01			2.2	4.3	20	15-minute	20	15-minute
Arsenic	7440-38-2	7.1E-08	1.7E-07		2E-07			--	0.01			0.002	15-minute
Benzene	71-43-2	3.3E-01	7.7E-01		1E+00			0.32	3.2	20	15-minute	3	15-minute
Beryllium	7440-41-7	9.4E-09	2.2E-08	2E-08			4E-08	--	0.002	0.005	30-minute	0.0005	ceiling
Cadmium	7440-43-9	7.6E-08	1.8E-07		2E-07		3E-07	--	0.005	0.6	ceiling		
Chloroform	67-66-3	2.0E-02	4.8E-02		6E-02		8E-02	49 (c)	--	240	ceiling	9.78	60-minute
Chromium (e)	7440-47-3	2.8E-07	6.6E-07					0.5	0.5				
Chromium VI	18540-29-9	1.6E-07	3.8E-07					0.001 (e)	0.005				
Cobalt	7440-48-4	7.7E-07	1.8E-06					0.05	0.1				
Copper	7440-50-8	8.8E-08	2.1E-07					1	1				
Cyclohexane	110-82-7	9.6E-01	2.2E+00					1050	1050				
Ethylbenzene	100-41-4	5.2E-02	1.2E-01		2E-01			435	435			545	15-minute
Naphthalene	91-20-3	7.6E-05	1.8E-04		2E-04			50	50			75	15-minute
n-Hexane	110-54-3	1.4E-01	3.2E-01					180	1800				
Nickel	7440-02-0	2.7E-07	6.3E-07					0.015	1				
Styrene	100-42-5	1.3E-02	3.1E-02		4E-02		5E-02	215	430	850	5-minute	425	15-minute
Tetrachloroethylene	127-18-4	3.2E-01	7.5E-01				1E+00	170 (c)	680	1360	5-minute		
Toluene	108-88-3	8.8E-02	2.1E-01		3E-01	3E-01		375	750	1130	10-minute	560	15-minute
Trichloroethylene	79-01-6	9.2E-02	2.1E-01				3E-01	134 (d)	540	1070	5-minute		
Vinyl Chloride	75-01-4	5.4E-01	1.3E+00		2E+00			2.6 (c)	2.6	13	15-minute		

TWA = time weighted average.
-- = not available or not calculated.

(a) The maximum modeled on-site 8-hour and 1-hour average air concentrations were based on: 1) the maximum modeled receptor location on site (about 10 meter from H-1); 2) the highest ISCST3-modeled unitized 8-hour average and 1-hour average concentration among all modeled concentrations at the maximum receptor location; and 3) maximum fugitive chemical-specific emission rates calculated based on the maximum spent carbon concentrations unloaded at H-1 for vapor spent carbon. The highest ISCST3-modeled unitized 8-hour and 1-hour average concentrations at the maximum modeled receptor location were 16,426 ug/m3 per 1 g/sec, and 38,302 ug/m3 per 1 g/sec, respectively.
(b) Sources: OSHA PELS - www.osha.gov/pls/oshaweb. NIOSH RELs - www.cdc.gov/niosh/npg. ACGIH TLVs - www.osha.gov/dts/chemicalsampling/toc/toc_chemsamp.html.
(c) The ACGIH TWA-threshold limit value (TLV) was used, if available, if a NIOSH REL was not available.
(d) 10-hour TWA concentration.
(e) NIOSH REL for CrVI is a 10-hr TWA. The listed OSHA PEL for chromium is based on CrIII and CrII. The value for chromium metals and insoluble salts is slightly higher, at 1 mg/m3.
(f) Short-term concentrations were calculated using screening-level scaling factors for durations that corresponded to available short-term occupational exposure limits. Source for screening-level scaling factors: USEPA. 1992. Workbook of Screening Techniques for Assessing Impacts of Toxic Air Pollutants (Revised). EPA-454/R-92-024.

management procedures. A detailed description of on-site risk management procedures and OSHA compliance programs is provided in the RCRA Part B permit application submitted to USEPA in February 2007 (Focus 2007). In addition, the risk assessment Workplan prepared in 2003 presented a summary of workplace practices implemented under OSHA.

In response to this comment, a summary of information related to these topics is provided below, with reference to pertinent sections of the RCRA Part B permit.

The facility's worker health and safety program includes training, medical monitoring, industrial hygiene sampling, hazard communication and use of personal protective equipment, as outlined in Table 15. This program includes an extensive training program to ensure worker safety in areas ranging from use of personal protective equipment to minimize potential chemical exposures, to fall and back protection to minimize the chance of accidental injury or muscle strain. All employees must undergo 40 hours of training related to hazardous waste operations when initially hired, plus an 8-hour refresher course each year. All employees are required to attend regularly scheduled safety meetings and are also required to pass an additional safety test each month. Section H and Appendix XIV of the RCRA Part B permit application provide more details on the facility's personnel training program, including an overall description of the personnel training program and requirements established for handling of hazardous wastes at the facility.

The facility's worker health and safety program includes provision and use of personal protective equipment. All workers involved in spent carbon unloading operations wear respirators in addition to protective clothing. Workers wear company-supplied shirts, pants and steel-toe boots, hard hat, and safety glasses. When handling any spent carbon (whether it is classified as non-hazardous or hazardous), a half-face respirator with organic and dust control cartridges is worn by workers. This practice has been followed since 1992. All employees also receive physicals prior to the start of work and annually thereafter, including the performance of blood testing, EKGs, hearing tests, and pulmonary function tests.

Industrial hygiene (IH) monitoring is conducted each year for a wide variety of organic compounds and dust in air to ensure that adequate personal protective equipment is being used at the facility. The IH monitoring also evaluates noise conditions at the plant. The annual IH surveys monitor workplace breathing zone concentrations of organic compounds and particulate matter among workers employed in a variety of tasks at the facility, for example workers unloading and sampling spent carbon containers, lab technicians and facility assistant managers. As described previously in response to General Comment 2, the IH monitoring includes workers whose potential exposures may be high based on the activities they perform during the workday.

The facility has a variety of safety, emergency and security devices and procedures in place to minimize the possibility of an explosion, fire, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water which could threaten human health or the environment. These devices and procedures are described in Section F of the RCRA Part B permit application. Section F also describes the security measures and devices that are used to prevent unauthorized site entry and minimize

Table 15
Siemens Water Technologies Corp. Facility Worker Protection Program

1. **Corporate EH&S Manual**

2. **Local Training Programs**
   - 40-Hour Hazwoper Training (new employees)
   - Hazard Communication (Computer)
   - Confined Space (Computer)
   - Lock Out/Tag Out (Computer)
   - Bloodborne Pathogens (Computer)
   - Fire Extinguisher
   - Contingency Plan
   - Personal Protection Equipment (Computer)
   - Back Safety (Computer)
   - Respiratory Protection (Computer)
   - Forklift Training (Computer)
   - Hot Work
   - First Aid (Every Other Year)
   - HM-181 (Computer)
   - Hearing Protection (Computer)
   - Electrical Safety (Computer)
   - Laboratory Safety (Computer)
   - Fall Protection
   - 8-Hour Hazwoper Refresher
   - Hazardous Debris Management
   - Burn Prevention
   - Acid and Caustic Handling

3. **Annual Employee Physicals**
   - General Physical
   - Blood Workup
   - EKG
   - Hearing Test
   - Pulmonary Function Test

4. **Annual Employee IH Monitoring** (organics, dust, noise)

5. **Annual Respirator Fit Test**

6. **Monthly Employee Safety Meetings**

7. **Monthly Safety Committee Meetings**

8. **Company Furnished Items:** Split Lockeroom, Showers, Soap, Towels, Work clothes, Steel-Toed Safety Shoes, Safety Glasses, Gloves, etc.

the possibility of livestock or persons contacting hazardous waste or hazardous waste management units. Additionally, the facility has a comprehensive inspection schedule and inspection procedures to ensure that all facility equipment is in proper operating condition and is being operated properly, as described in Appendix XII in the permit application.

The facility also has a Contingency Plan, presented in Section G and Appendix XIII of the permit application, which is designed to minimize hazards to human health or the environment in the event of a fire, explosion or any unplanned sudden or nonsudden release of hazardous waste or hazardous waste constituents to air, soil or surface water.

11. Evaluation of Reactivation Facility Incremental Impact to CRSSJV Discharge – Section 4.4.3.3, pg. 47

Comment:
"The subsection regarding the "Compil(ation) of chemical concentrations in effluent and select compounds for evaluation" should be expanded to include additional levels of detail. Similar to the manner in which the waste stream was well characterized in preparation of the facility-specific PDT, this section should include general descriptions of the type and magnitude of waste treated while facility effluent data was being compiled. These waste characterization efforts should coincide with the window of time (2005-2006) which serves as the basis for effluent analysis. The subsection should also be expanded to include details regarding effluent monitoring or sampling frequency throughout the period used for analysis."

Response:

The facility performs routine effluent monitoring for a variety of constituents. The facility is required to monitor twice per month for total suspended solids, once per month for chemical oxygen demand (COD) and once per year for a comprehensive priority pollutant test in accordance with its discharge permit issued by the Colorado River Sewage System Joint Venture (CRSSJV) publicly owned treatment works (POTW). The annual comprehensive priority pollutant test samples effluent for more than 20 inorganic compounds, and more than 70 organic compounds, including volatile organics, semi-volatile organics, organochlorine pesticides, and polychlorinated biphenyls (PCBs). The facility's effluent that is discharged to the POTW is also continuously monitored for pH, total dissolved solids, flow, and temperature. The facility also conducts biannual sampling in compliance with USEPA's Centralized Waste Treatment (CWT) categorical pretreatment standards and its analytical results are submitted to both USEPA and CRIT every 6 months. The CWT analysis includes several organic compounds, metals, and oil and grease, in accordance with 40 CFR 437.46(b).

Effluent discharge data from 2005-2006 are provided in Table 4.4-6 in the risk assessment. These data encompass roughly 30 separate sampling events, and include results from several days of sampling conducted during the PDT, biannual sampling conducted in compliance with the CWT categorical pretreatment standards, one sampling event conducted for the facility's annual priority pollutants testing report, and monthly composite metals sampling that was conducted for a limited time for internal Siemens reference. The submitted regulatory monitoring reports for these tests are provided in Attachment F.

In general, since the facility accepts spent carbon that has been used for a variety of different purposes (e.g., treating industrial and municipal wastewater, groundwater, surface water, process materials, or for removing pollutants from vent gases) and at a variety of different locations, the type and magnitude of the spent carbon treated at the facility varies. A detailed description of spent carbon treated during the PDT, and the spiked materials that were added to the feed during the test, is provided in the comprehensive PDT report (Focus 2006). The composition of the spent carbon was considered in establishing the feed for the PDT in order to develop test conditions that were illustrative of the variability of the carbon received by the facility, although to be conservative the feed during the PDT was more heavily loaded with compounds than is typical due to the addition of several spiked materials, and the feed rate was higher than is typical. Sections 3.2 and 3.3 of the PDT report contain information on the spent carbon and spiked material characteristics and constituent feed rates during the PDT. The spent carbon feed rate to the furnace during the PDT averaged 3,049 lbs/hour. During the 2005 priority pollutant testing, the average spent carbon feed rate to the furnace was 2,716 lbs/hour. The average spent carbon feed rate during the biannual CWT tests in 2005 and 2006 ranged from 2,473 lbs/hour to 2,707 lbs/hour. The amount of spent carbon fed to the furnace in 2005 and 2006 averaged 2,680 lbs/hour and 2,686 lbs/hour, respectively. In 2005 and 2006, the annual average total concentration in spent carbon received, calculated based on the sum of all organic and inorganic compound concentrations reported in spent carbon profiles, was approximately 2,100 ppm and 2,800 ppm, respectively. Overall, the 2005-2006 sampling data in Table 4.4-6 (other than the PDT data) are likely to represent a good cross-section of the wide range of spent carbon that is routinely received at the facility.

12. Calculation of incremental facility concentrations resulting from water treatment

Comment:
"The subsection regarding the "Calculat(ion of) incremental facility concentrations resulting from water treatment" should provide additional detail on the relationship between the CRSSJV's removal efficiencies for BOD and suspended solids in treated waters with the removal efficiencies estimated for the range of constituents identified in the SWT effluent."

Response:

In response to USEPA's comment, the following discussion provides additional detail on the relationship between the CRSSJV's removal efficiencies for biological oxygen demand (BOD) and suspended solids in treated waters with the removal efficiencies estimated for the constituents identified in the SWT effluent.

Section 4.4.3.3 in the risk assessment describes the mathematical modeling used to calculate facility-related incremental concentrations in the CRSSJV discharge due to effluent from the carbon reactivation facility that enters the CRSSJV. This methodology took into account the effectiveness of water treatment at the CRSSJV in removing particulates and organics from water prior to discharge. The CRSSJV treatment plant's discharge records for 2005 documented 98% removal of suspended solids and 98% removal of BOD. For purposes of this analysis, suspended solids removal is assumed to correlate directly with particulate removal, and BOD removal is assumed to correlate directly with organics removal. Accordingly, the removal efficiencies for effluent from the facility treated at the CRSSJV were assumed to be 98% for particulates, based on the reported suspended solids removal efficiency, and 98% for organics, based on the facility's reported BOD removal efficiency.

Analysis for chemical material in water and wastewater is classified into two general types of measurements: those that quantify an aggregate amount of chemical matter comprising constituents with a common characteristic and those that quantify individual compounds (APHA/AWWA/WEF 1998). Two aggregate parameters, BOD and total suspended solids (TSS) have traditionally been used to assess the performance and efficacy of waste water treatment plants (Metcalf & Eddy 1991). The common characteristic measured by BOD is the ability of aggressive microorganisms to degrade organic constituents. The common characteristic measured by TSS is the amount of insoluble inorganic constituents.

Operationally, BOD measures the amount of oxygen consumed by heterotrophic microorganisms during the biochemical oxidation of organic matter over a period of 5 days under controlled conditions. Since most organic chemicals (including the priority pollutants) are biodegradable to some extent, BOD can be used as a surrogate for the overall destruction and removal efficiency of individual organics. As an example, we can look at the common priority pollutant toluene. Toluene is 98.6% biotransformed during secondary wastewater treatment (Verschueren 2001). The BOD reduction (as a percentage of the amount that can be rigorously chemically oxidized) corresponding to this treatment is about 86%. Thus the use of BOD is a plausible (albeit conservative) estimate for the destruction and removal of toluene.

Inorganics, particularly metals, in water are partitioned into two broad categories – dissolved and sorbed or chemical incorporated into particulate. Taken together, these categories constitute the aggregate parameter of total solids. Dissolved solids is determined by the residue remaining following evaporation while undissolved particulate is determined by the fraction of materials that is retained on a filter (APHA/AWWA/WEF 1998). The filters normally used to effect this separation have pore sizes between 1.0 and 1.2 µm, thus, only extremely small particulate or colloidal matter can pass (Metcalf & Eddy 1991). The removal of TSS in a wastewater treatment plant is thus a surrogate for the removal of undissolved particulate which is primarily composed of insoluble inorganic matter.

13. Potential fish ingestion risks for the Main Drain – Section 4.4.3.5, pg. 50
This comment includes two items, each of which is addressed below.

<u>13a. Potential fish ingestion risks for the Main Drain – Subsistence Scenario</u>

Comment:
"The risk characterization of this subsistence receptor scenario (fisher), and all subsistence receptor scenarios evaluated, should include the likelihood and magnitude of the entire range of direct and indirect exposures that these receptors incur. EPA's HHRAP guidance is clear, the subsistence fisher exposure scenario assumes that the receptor is exposed to

contaminants emitted from the facility via direct inhalation of vapors and particles, via incidental ingestion of soil, via ingestion of drinking water from surface water sources, via ingestion of homegrown produce, via ingestion of fish, and via ingestion of breast milk. Therefore, please revise and supplement the subsistence receptor risk and hazard estimates with a comprehensive estimate of impact inclusive of the recommended pathways of contaminant exposure."

Response:

In response to this comment, the potential risks due to stack emissions for hypothetical subsistence receptors were expanded to explicitly add in the potential subsistence fish ingestion risks associated with the incremental impact of facility effluent discharged from the CRSSJV.

Table 16 presents the potential fish ingestion risks associated with the incremental impact of facility-effluent on the CRSSJV discharge. These results, which conservatively assume that an adult receptor obtains 100% of the fish they ingest from only the Main Drain over a 30-year period, are well below USEPA's target risk level. The evaluation of the potential incremental impact of facility effluent on the CRSSJV discharge is presented in the risk assessment in Section 4.4.3.5 and Table 4.4-12.

Table 16 also shows the potential risks associated with stack emissions for the receptor with the highest results calculated in the risk assessment (i.e., adult town resident "receptor R_2" who is also assumed to be a subsistence fisher) (see Table 7 in response to Specific Comment 4).

The resulting combined risks shown in Table 16, inclusive of all pathways and reflecting potential impacts from both stack emissions and incremental effluent-related discharge from the CRSSJV, are below USEPA's target risk levels for both cancer and non-cancer health effects. As shown in Table 9, the stack emissions risk assessment results are dominated by one compound, benzidine, which was not detected in the PDT stack gases and which has never been accepted in spent carbon at the facility. When this one compound is removed from the calculations, the risks drop substantially below USEPA's target risk levels. When only detected compounds are included, the risks are reduced even further below target levels.

The likelihood of the subsistence scenario actually occurring is considered to be extremely small, because it incorporates a number of high-end assumptions that each are expected to have a low likelihood of occurrence (e.g., (i) assuming that 100% of a town resident's produce diet for a 30-year period is obtained from homegrown produce, even though the climate limits growing seasons to only selected months of the year, and (ii) assuming that 100% of a person's fish diet over a 30-year period is obtained solely from fish caught in the Main Drain). The potential combined risks for subsistence receptors are considered to reflect high-end scenarios that are highly unlikely to be exceeded.

HHRAP guidance (Chapter 4, Chapter 7 and Appendix C) recommends that infant exposure via breast-milk ingestion be evaluated separately from other exposure scenarios. The

Table 16

Combined Potential Risks for Hypothetical Subsistence Receptors: Stack Emissions and Effluent-Related Discharge from the Joint Venture

Receptor and Group of Evaluated Compounds	Excess Lifetime Cancer Risk		Total Hazard Index	
	Risk assessment results	**Subsistence scenario**	**Risk assessment results**	**Subsistence scenario**
Incremental Effluent-Related Discharge from POTW: Adult Subsistence Fisher (Main Drain) (a)				
All detected compounds in facility effluent	3E-07		1E-02	
Stack Emissions: Adult Town Resident + Subsistence Fisher (Main Drain) (a, b)				
Group 1 – all detected compounds in stack emissions (95 compounds)	7E-08	1E-07	6E-02	
Group 2 – all compounds in stack emissions except benzidine (177 compounds)	2E-07	3E-07	6E-02	
Group 3 – all compounds in stack emissions (178 compounds) (c)	2E-06	9E-06	6E-02	
Incremental Effluent-Related Discharge from POTW + Stack Emissions: Adult Town Resident + Subsistence Fisher (Main Drain) (a)				
Group 1 – all detected compounds in stack emissions (95 compounds)	4E-07	4E-07	7E-02	
Group 2 – all compounds in stack emissions except benzidine (177 compounds)	5E-07	3E-07	7E-02	
Group 3 – all compounds in stack emissions (178 compounds) (c)	2E-06	9E-06	7E-02	
USEPA Target Risk Levels				
Target risk levels for combustion source risk assessment	1E-05		0.25	

(a) The subsistence fish ingestion pathway assumes 100% of a person's fish diet is provided by fish caught from the Main Drain.

(b) Results are shown for the receptor with the highest calculated potential risks associated with stack emissions (the adult town resident receptor "R_2", who is also assumed to be a subsistence fisher receptor "R_only_fish_drain"). Potential risks for all other evaluated receptors were lower than these values. The town resident receptor is assumed to be exposed via inhalation, soil ingestion, produce ingestion and fish ingestion. The risk assessment assumes that 20% of a person's produce diet is home grown. The subsistence scenario assumes 100% of a persons' produce diet is home grown.

(c) The stack emissions risk results for Group 3 compounds (which includes 83 compounds that were not detected in stack emissions) were dominated by one compound, benzidine, which was not detected stack gases and for which there is no evidence that it has ever been accepted in spent carbon received at the facility.

guidance does not recommend adding infant risks from ingestion of breast-milk to risks calculated for other receptors (adult or child) via other exposure pathways. Rather the guidance recommends calculating cumulative risks for each given receptor. Accordingly, potential risks from breast-milk ingestion by an infant receptor were not added into the combined risks shown in Table 16, which were based on an adult receptor. Rather, as described in Section 4.4.1.3 in the risk assessment, potential risks for a breast-fed infant were calculated using the recommended HHRAP method in which average daily doses of PCDDs/PCDFs from breast-milk ingestion are compared to a background level for a nursing infant. The risk assessment results demonstrated that potential exposure to PCDDs/PCDFs by a nursing infant would be far below background levels.

Potential exposures via drinking water were not evaluated in the risk assessment because drinking water is obtained from groundwater wells for both the CRIT area and for the Town of Parker. Drinking water for CRIT is provided by the CRIT Regional Water System. Drinking water for the Town of Parker is provided by the town water department.

13b. Potential fish ingestion risks for the Main Drain – Exposure Duration

Comment:
"In addition, the details regarding the number of years of contaminant exposure incurred by each subsistence receptor is not clear as presented in table 4.4-12. Please revise the table and narrative in this section by replacing the term "many years", with the precise number of years assumed for determination of both subsistence and chronic-level health impact."

Response:

Footnote (f) in Table 4.4-12 in the risk assessment indicates that the exposure durations used in the fish ingestion exposure calculation were 30 years for an adult and 6 years for a child. These are the recommended default values from HHRAP. The revised narrative in the risk assessment reads as follows (edits in italics): "In the absence of site-specific data, it was conservatively assumed that 100% of the fish eaten by a person every year, *for 30 years by an adult receptor and 6 years by a child receptor,* would be caught only from the Main Drain."

14. Evaluation of subsistence exposure pathways – Section 4.5.9, pg. 61

Comment:
"This assessment of facility-associated health and ecological impact has attempted to comprehensively characterize the range and magnitude of constituents released, and the settings or conditions under which potential exposure may occur. To the extent practicable, site-specific exposure conditions and assumptions were applied to the analysis in an attempt to reduce assessment uncertainty. Many tribal subgroups enjoy unique and culturally significant practices which may effectively serve to increase their exposure to toxic constituents released to the terrestrial environment. The use of sweat lodges and the use of plants and other agricultural products for cultural and/or traditional healing practices illustrate this concept.

This risk assessment report should be expanded to detail all efforts made to evaluate and assess potential impacts resulting from idiosyncratic and culturally-specific tribal practices with the potential to increase contaminant exposure. To the extent these efforts have been made, and the lack of exposure information from culturally-specific tribal practices results in significant datagaps, the influence of those exposure-related datagaps on the overall risk and hazard estimates should be described and characterized as an element of uncertainty."

Response:

The risk assessment aimed to incorporate as much site-specific information as available, including information from CRIT. In 2002, CRIT developed a protocol for obtaining all site-specific information relating to CRIT and tribal members for use in performing the risk assessment. This protocol is presented in Appendix A of the November 2003 Working Draft Risk Assessment Workplan and reprinted here in Attachment G. The protocol was approved as part of the Risk Assessment Workplan and was followed for the risk assessment project, as discussed recently in a phone call with USEPA.[18] Adherence to this protocol is essential for both the integrity of the risk assessment process and for recognition of the unique status and role of CRIT in the permitting process.

The protocol ensures that the RCRA permitting process will provide appropriate respect and deference to Native religious and cultural practices. This has precluded the inclusion of a detailed assessment of these practices in the risk assessment. As with many variables in risk assessment methodology, this adds some uncertainty to the assessment. The potential exposures that were characterized, particularly for subsistence receptors, may provide insight into potential risks from other exposure pathways.

15. Table 4.4-6, 2005-2006 Effluent Discharge Data from Facility

Comment:
"The subject table details the constituents discharged from the facility via the main drain. The primary compounds released via this pathway remain inorganic and metallic constituents. Please develop a supporting narrative for the table which better explains, from a facility-specific constituent fate and transport perspective, why so few organic constituents are subject to release in this aqueous discharge."

Response:

Every organic compound that was detected, even once, in the sampling programs noted in Table 4.4-6 in the risk assessment was evaluated in the risk assessment.[19] As noted above, the facility monitors its effluent for a variety of organic parameters in accordance with its discharge permit and USEPA regulations. The annual comprehensive priority pollutant sampling analyzes the facility effluent for more than 70 organic compounds, including

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[18] Telephone conference call with Patrick Wilson, USEPA Region IX, Monte McCue, Siemens Water Technologies Corp. Plant Manager, and Sarah Foster, CPF Associates, Inc. January 14, 2008.

[19] Organic compounds that were detected only in the PDT effluent testing and were also spiked into the feed materials during the PDT were not selected for evaluation (see Table 4.1-1 in the risk assessment for spiking information).

volatile organics, semi-volatile organics, organochlorine pesticides, and polychlorinated biphenyls (PCBs), in addition to more than 20 inorganic compounds. The biannual CWT sampling analyzes effluent for nine organic compounds, in addition to metals and oil and grease, in accordance with 40 CFR 437.46(b). Sampling conducted as part of the PDT analyzed effluent for over 100 volatile and semi-volatile organic compounds.

The small number of detected organic compounds in facility effluent is a reflection of the facility's carbon regeneration process. Effluent from the facility is discharged from Tank 11 which contains scrubber water blow down, cooling water blow down, boiler blow down, and excess recycle water. Two of these effluent water sources come into contact with compounds associated with spent carbon, the scrubber water that is used to scrub exhaust gases in the facility's air pollution control system, and the recycle water that is used to facilitate transport of spent carbon from the hoppers to the furnace. The presence of organic compounds in scrubber water blow down is limited because these compounds are largely destroyed in the combustion process. The destruction rate of the afterburner is designed to achieve a stringent destruction and removal efficiency (DRE) of 99.99%. The DREs actually achieved in the PDT, which was conducted under challenged operating conditions, were even higher, ranging on average from 99.9941% to 99.997% (see Table 4-1 in the PDT report) (Focus 2006). The transfer of organic compounds that are not destroyed in the afterburner to scrubber water may also be limited by their chemical-physical characteristics (e.g., highly volatile or poorly water soluble compounds will not tend to partition into the aqueous phase). Recycle water accounts for only about 0.1% of the water in Tank 11 and thus the recycle water has a negligible effect on organics in the effluent. The effectiveness of these procedures in limiting organic compounds in the facility effluent is evident in the results compiled for the risk assessment. Out of the more than 100 organic compounds tested for across the multiple sampling programs considered, less than 10 were detected and these were evaluated in the risk assessment.

16. Table 1, Compilation of Chronic Human Health Toxicity Criteria for Compounds not Included in USEPA's 2005 HHRAP

Comment:
"The source of toxicity information (rfd) for the element cobalt appears to be U.S. EPA's Provisional Peer-Reviewed Toxicity Value (PPRTV) database rather than from ATSDR datasource. Please review and confirm the source of all toxicity values to ensure the accuracy of table #1."

Response:

The sources of all toxicity values in Table 1 of Appendix B have been reviewed and confirmed. A check of USEPA's PPRTV database provided by the National Center for Environmental Assessment (NCEA), specifically the "PPRTV Status Table for Registered Users" for the 4^{th} Quarter FY07, showed that cobalt is not on the list of compounds addressed. In the absence of values from USEPA's Integrated Risk Information System (IRIS) or the PPRTV database, toxicity values for cobalt were obtained from one of the other preferred sources recommended in HHRAP. The toxicity values for cobalt were based on minimum risk levels (MRLs) developed by the Agency for Toxic Substances and Disease Registry (ATSDR).

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ATTACHMENTS

ATTACHMENT A

STACK EMISSIONS RISK ASSESSMENT:

ACUTE INHALATION RISK RESULTS

UNDER HYPOTHETICAL UPSET CONDITIONS

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS - UPSET CONDITIONS (MAXIMUM MEASURED EMISSION RATE *10)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
A_1 max hourly impact point (stack)	
Nitrogen dioxide	3.9E-01
Sulfur dioxide	1.4E-01
Arsenic	4.1E-02
Chlorine	5.6E-03
Lead	4.6E-03
Hydrogen chloride	3.4E-03
Nickel	2.7E-03
Copper	2.2E-03
Cadmium	5.4E-04
Hexachlorobenzene	9.9E-05
Chlorophenyl-phenylether, 4-	8.9E-05
Beryllium	7.8E-05
Chloroform (Trichloromethane)	6.6E-05
Benzidine	6.0E-05
Dibromo-3-chloropropane, 1,2-	5.1E-05
Thallium (I)	4.7E-05
Manganese	3.0E-05
Mercury	2.7E-05
Vanadium	2.7E-05
Hexachlorocyclopentadiene	2.2E-05
Silver	1.9E-05
4,6-Dinitro-2-methylphenol	1.3E-05
Zinc	9.8E-06
Barium	9.1E-06
Mercuric chloride	6.8E-06
Pentachlorophenol	6.1E-06
Aluminum	5.9E-06
Tetrachloroethylene (Perchloroethylene)	5.7E-06
Chromium	5.2E-06
Chromium, hexavalent	5.2E-06
Selenium	4.1E-06
Fluoranthene	3.5E-06
Nitrosodipropylamine, n-	2.9E-06
Antimony	1.7E-06
Bromoform (tribromomethane)	1.7E-06
Chlorobenzene	1.6E-06
Benzoic Acid	1.3E-06
Dinitrotoluene, 2,4-	1.3E-06
Benzene	1.2E-06
Methylene chloride	1.2E-06
3-Penten-2-one, 4-methyl	1.1E-06
Bromodichloromethane	1.1E-06
Ethylhexyl phthalate, bis-2-	1.1E-06
Dinitrotoluene, 2,6-	1.1E-06
Dibromochloromethane	1.0E-06
Methyl bromide (Bromomethane)	8.5E-07
Dinitrophenol, 2,4-	7.2E-07
Nitrophenol, 4-	6.9E-07
Nitroaniline, 3-	6.9E-07
Chloronaphthalene,2-	6.6E-07
Dichlorobenzidine, 3,3'-	5.1E-07
Methylene bromide	5.1E-07
PentaCDF, 2,3,4,7,8-	4.5E-07
Pentachloronitrobenzene (PCNB)	4.2E-07
Toluene	4.2E-07
Cobalt	3.9E-07
Chlorobenzilate	3.2E-07
Dimethylphenol, 2,4-	3.0E-07
Acrylonitrile	3.0E-07
Nitrophenol, 2-	2.6E-07
Heptachlor	2.4E-07
Carbon Tetrachloride	2.4E-07
Carbazole	2.3E-07
Benzaldehyde	2.3E-07
Dinitrobenzene, 1,3-	2.2E-07
Methyl ethyl ketone (2-Butanone)	2.1E-07
Benzyl alcohol	2.1E-07
Phenanthrene	1.6E-07

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS -
UPSET CONDITIONS (MAXIMUM MEASURED EMISSION RATE *10)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Nitroaniline, 4-	1.5E-07
Benzonitrile	1.5E-07
Di-n-butyl phthalate	1.5E-07
Aniline	1.4E-07
Carbon Disulfide	1.4E-07
Methyl chloride (Chloromethane)	1.3E-07
Heptachlor epoxide	1.3E-07
Phenol	1.2E-07
Endrin	9.5E-08
Chlorophenol, 2-	8.5E-08
Chloroaniline, p-	8.3E-08
Trichlorobenzene, 1,2,3-	6.8E-08
Acetone	6.8E-08
Bromophenyl-phenylether, 4-	6.7E-08
Chloro-3-methylphenol, 4-	6.5E-08
Hexachloro-1,3-butadiene (Perchlorobutadiene)	6.3E-08
Naphthalene	6.3E-08
Acetophenone	6.3E-08
Cresol, o-	6.2E-08
N-nitrosodimethylamine	5.5E-08
Butylbenzylphthalate	4.4E-08
Chlordane	4.3E-08
Dichlorobenzene, 1,3-	4.2E-08
2,5-Dimethylheptane	4.1E-08
Diethyl phthalate	4.0E-08
Acenaphthylene	4.0E-08
Tetrachloroethane, 1,1,2,2-	3.9E-08
Vinyl Acetate	3.8E-08
Dichloropropene, 1,3- (cis)	3.5E-08
Xylene, p-	3.4E-08
Xylene, m-	3.4E-08
Bis(2-chloroethoxy) methane	3.3E-08
Trichlorophenol, 2,4,5-	3.2E-08
Nitroaniline, 2-	3.1E-08
Nitrobenzene	3.1E-08
Dichlorophenol, 2,4-	2.9E-08
Benzo(b)fluoranthene	2.9E-08
2-Hexanone	2.8E-08
Hexachloroethane (Perchloroethane)	2.8E-08
Cresol, p-	2.7E-08
Cresol, m-	2.7E-08
Dimethyl phthalate	2.7E-08
Endosulfan I	2.6E-08
Trichlorophenol, 2,4,6-	2.5E-08
BHC, beta-	2.4E-08
Pyridine	2.2E-08
Dibenzofuran	2.1E-08
Diphenylamine	2.1E-08
Bromobenzene	2.0E-08
Indeno(1,2,3-cd) pyrene	1.9E-08
Tetrachlorobenzene, 1,2,4,5-	1.9E-08
Aldrin	1.9E-08
Nitrosodiphenylamine, N-	1.9E-08
Isophorone	1.9E-08
Pentachlorobenzene	1.8E-08
Di-n-octylphthalate	1.7E-08
Trichlorobenzene, 1,2,4-	1.6E-08
Chrysene	1.5E-08
Aroclor 1254	1.4E-08
Diphenylhydrazine,1,2-	1.4E-08
3-Ethyl benzaldehyde	1.3E-08
4-Ethyl benzaldehyde	1.3E-08
Trichloropropane, 1,2,3-	1.2E-08
DDT, 4-4'-	1.2E-08
Butylbenzene, sec	1.2E-08
Xylene, o-	1.2E-08
1,1-Dichloropropene	1.0E-08
Trichloroethane, 1,1,2-	9.5E-09
Dieldrin	9.2E-09
BHC, alpha-	9.0E-09
Benzo(a)Anthracene	8.7E-09

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS - UPSET CONDITIONS (MAXIMUM MEASURED EMISSION RATE *10)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Styrene	8.1E-09
Bis(2-chlorethyl)ether	8.1E-09
Benzo(k)fluoranthene	7.8E-09
2,2'-oxybis (1-Chloropropane)	7.7E-09
Iodomethane	7.2E-09
Methyl isobutyl ketone	5.6E-09
Benzo(a)pyrene	5.0E-09
gamma-BHC (Lindane)	4.6E-09
TetraCDD, 2,3,7,8-	4.3E-09
Ethylene dibromide	3.9E-09
TetraCDF, 2,3,7,8-	3.9E-09
Trichloroethylene	3.6E-09
Tetrahydrofuran	3.6E-09
Pyrene	3.5E-09
DDD, 4,4'-	3.5E-09
Tetrachloroethane, 1,1,1,2-	3.1E-09
1,3-Dichloropropane	3.0E-09
Butylbenzene, n-	2.9E-09
Dichloroethylene 1,1-	2.8E-09
2,2-Dichloropropane	2.8E-09
Butylbenzene, tert	2.7E-09
Vinyl Chloride	2.5E-09
Trichloroethane, 1,1,1-	2.4E-09
PentaCDD, 1,2,3,7,8-	2.3E-09
Anthracene	2.3E-09
Acenaphthene	2.2E-09
2-Methylnaphthalene	2.1E-09
Trimethylbenzene, 1,3,5-	1.9E-09
Dichlorobenzene, 1,2-	1.7E-09
Dichloroethane, 1,2- (Ethylene Dichloride)	1.6E-09
HexaCDF, 1,2,3,6,7,8-	1.5E-09
HexaCDF, 2,3,4,6,7,8-	1.2E-09
Methoxychlor	1.1E-09
Dichlorobenzene,1,4-	1.0E-09
DDE, 4,4'-	9.8E-10
HexaCDF, 1,2,3,4,7,8-	9.8E-10
Fluorene	8.6E-10
Cumene (Isopropylbenzene)	8.5E-10
2-Chlorotoluene	7.5E-10
4-Chlorotoluene	7.5E-10
Ethylene Glycol	6.5E-10
Propylbenzene, n-	6.2E-10
Trichlorofluoromethane (Freon 11)	5.4E-10
1,2,4-Trimethylbenzene	5.4E-10
Dichloroethylene, cis-1,2-	4.8E-10
Ethylbenzene	4.7E-10
Dichloropropane, 1,2-	4.7E-10
PentaCDF, 1,2,3,7,8-	4.0E-10
HexaCDD, 1,2,3,4,7,8-	3.1E-10
Chloroethane	3.1E-10
Dichlorodifluoromethane	3.1E-10
Bromochloromethane	3.0E-10
Benzo(g,h,i)perylene	3.0E-10
methyl tert-butyl ether	2.4E-10
Propylene oxide	1.7E-10
Dichloroethylene-1,2 (trans)	1.5E-10
Dichloroethane 1,1-	1.5E-10
Methyl methacrylate	4.1E-11
HexaCDD, 1,2,3,7,8,9-	3.8E-11
HexaCDD, 1,2,3,6,7,8-	2.3E-11
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	2.0E-11
Dibenz(a,h)anthracene	1.9E-11
Dioxane, 1,4-	1.5E-11
HeptaCDF, 1,2,3,4,6,7,8-	3.8E-12
HexaCDF, 1,2,3,7,8,9-	2.0E-12
Acrylic Acid	1.6E-12
OctaCDF, 1,2,3,4,6,7,8,9-	1.1E-12
1-Hexane (n-hexane)	2.8E-13
HeptaCDF, 1,2,3,4,7,8,9-	2.5E-13
OctaCDD, 1,2,3,4,6,7,8,9-	2.3E-13
HeptaCDD, 1,2,3,4,6,7,8-	1.8E-13

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS -
UPSET CONDITIONS (MAXIMUM MEASURED EMISSION RATE *10)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Endosulfan sulfate	NC
2,5-Dione, 3-hexene	NC
Benzo(e)pyrene	NC
Perylene	NC
Phosphine imide, P,P,P-triphenyl	NC
Diallate	NC
9-Octadecenamide (oleamide)	NC
delta-BHC	NC
2-Methyl octane	NC
Endosulfan II	NC
Endrin ketone	NC
3-Penten-2-one (ethylidene acetone)	NC
2,5-Dimethylfuran	NC
Endrin aldehyde	NC
3-Hexen-2-one	NC
Benzoic acid, methyl ester (methyl benzoate)	NC
Isopropyl toluene, p-	NC
Total (b)	5.9E-01
A_2 closest business	
Nitrogen dioxide	3.9E-01
Sulfur dioxide	1.4E-01
Arsenic	1.6E-02
Chlorine	5.6E-03
Hydrogen chloride	3.4E-03
Lead	1.9E-03
Nickel	1.1E-03
Copper	9.0E-04
Cadmium	2.2E-04
Hexachlorobenzene	9.9E-05
Chlorophenyl-phenylether, 4-	9.0E-05
Chloroform (Trichloromethane)	6.7E-05
Benzidine	5.8E-05
Dibromo-3-chloropropane, 1,2-	5.2E-05
Beryllium	3.1E-05
Mercury	2.8E-05
Hexachlorocyclopentadiene	2.2E-05
Thallium (I)	1.9E-05
4,6-Dinitro-2-methylphenol	1.3E-05
Manganese	1.2E-05
Vanadium	1.1E-05
Silver	7.7E-06
Mercuric chloride	6.8E-06
Pentachlorophenol	6.1E-06
Tetrachloroethylene (Perchloroethylene)	5.7E-06
Zinc	3.9E-06
Barium	3.7E-06
Fluoranthene	3.5E-06
Nitrosodipropylamine, n-	2.9E-06
Aluminum	2.4E-06
Chromium	2.1E-06
Chromium, hexavalent	2.1E-06
Antimony	1.7E-06
Bromoform (tribromomethane)	1.7E-06
Selenium	1.6E-06
Chlorobenzene	1.6E-06
Benzoic Acid	1.3E-06
Dinitrotoluene, 2,4-	1.3E-06
Benzene	1.2E-06
Methylene chloride	1.2E-06
3-Penten-2-one, 4-methyl	1.1E-06
Bromodichloromethane	1.1E-06
Ethylhexyl phthalate, bis-2-	1.1E-06
Dinitrotoluene, 2,6-	1.1E-06
Dibromochloromethane	1.0E-06
Methyl bromide (Bromomethane)	8.6E-07
Dinitrophenol, 2,4-	7.3E-07
Nitrophenol, 4-	7.0E-07
Nitroaniline, 3-	7.0E-07
Chloronaphthalene,2-	6.6E-07

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS -
UPSET CONDITIONS (MAXIMUM MEASURED EMISSION RATE *10)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Methylene bromide	5.1E-07
Dichlorobenzidine, 3,3'-	5.1E-07
PentaCDF, 2,3,4,7,8-	4.4E-07
Pentachloronitrobenzene (PCNB)	4.2E-07
Toluene	4.2E-07
Chlorobenzilate	3.2E-07
Dimethylphenol, 2,4-	3.1E-07
Acrylonitrile	3.0E-07
Nitrophenol, 2-	2.6E-07
Heptachlor	2.4E-07
Carbon Tetrachloride	2.4E-07
Carbazole	2.3E-07
Benzaldehyde	2.3E-07
Dinitrobenzene, 1,3-	2.2E-07
Methyl ethyl ketone (2-Butanone)	2.1E-07
Benzyl alcohol	2.1E-07
Phenanthrene	1.6E-07
Cobalt	1.6E-07
Nitroaniline, 4-	1.5E-07
Benzonitrile	1.5E-07
Di-n-butyl phthalate	1.5E-07
Aniline	1.4E-07
Carbon Disulfide	1.4E-07
Methyl chloride (Chloromethane)	1.3E-07
Heptachlor epoxide	1.3E-07
Phenol	1.2E-07
Endrin	9.5E-08
Chlorophenol, 2-	8.6E-08
Chloroaniline, p-	8.3E-08
Trichlorobenzene, 1,2,3-	6.9E-08
Acetone	6.8E-08
Bromophenyl-phenylether, 4-	6.7E-08
Chloro-3-methylphenol, 4-	6.6E-08
Hexachloro-1,3-butadiene (Perchlorobutadiene)	6.4E-08
Naphthalene	6.4E-08
Acetophenone	6.3E-08
Cresol, o-	6.2E-08
N-nitrosodimethylamine	5.5E-08
Butylbenzylphthalate	4.4E-08
Chlordane	4.3E-08
Dichlorobenzene, 1,3-	4.2E-08
2,5-Dimethylheptane	4.1E-08
Diethyl phthalate	4.0E-08
Acenaphthylene	4.0E-08
Tetrachloroethane, 1,1,2,2-	3.9E-08
Vinyl Acetate	3.9E-08
Dichloropropene, 1,3- (cis)	3.5E-08
Xylene, p-	3.4E-08
Xylene, m-	3.4E-08
Bis(2-chloroethoxy) methane	3.3E-08
Trichlorophenol, 2,4,5-	3.2E-08
Nitroaniline, 2-	3.2E-08
Nitrobenzene	3.1E-08
Dichlorophenol, 2,4-	2.9E-08
Benzo(b)fluoranthene	2.9E-08
2-Hexanone	2.8E-08
Hexachloroethane (Perchloroethane)	2.8E-08
Cresol, p-	2.7E-08
Cresol, m-	2.7E-08
Dimethyl phthalate	2.7E-08
Endosulfan I	2.6E-08
Trichlorophenol, 2,4,6-	2.6E-08
BHC, beta-	2.4E-08
Pyridine	2.2E-08
Dibenzofuran	2.1E-08
Diphenylamine	2.1E-08
Bromobenzene	2.0E-08
Tetrachlorobenzene, 1,2,4,5-	1.9E-08
Aldrin	1.9E-08
Nitrosodiphenylamine, N-	1.9E-08
Isophorone	1.9E-08

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS -
UPSET CONDITIONS (MAXIMUM MEASURED EMISSION RATE *10)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Pentachlorobenzene	1.8E-08
Di-n-octylphthalate	1.7E-08
Trichlorobenzene, 1,2,4-	1.6E-08
Chrysene	1.5E-08
Aroclor 1254	1.5E-08
Diphenylhydrazine,1,2-	1.4E-08
3-Ethyl benzaldehyde	1.4E-08
4-Ethyl benzaldehyde	1.4E-08
Trichloropropane, 1,2,3-	1.2E-08
DDT, 4-4'-	1.2E-08
Butylbenzene, sec	1.2E-08
Xylene, o-	1.2E-08
1,1-Dichloropropene	1.0E-08
Trichloroethane, 1,1,2-	9.6E-09
Dieldrin	9.2E-09
BHC, alpha-	9.0E-09
Benzo(a)Anthracene	8.6E-09
Styrene	8.2E-09
Bis(2-chlorethyl)ether	8.1E-09
2,2'-oxybis (1-Chloropropane)	7.7E-09
Indeno(1,2,3-cd) pyrene	7.7E-09
Benzo(k)fluoranthene	7.6E-09
Iodomethane	7.2E-09
Methyl isobutyl ketone	5.6E-09
Benzo(a)pyrene	4.9E-09
gamma-BHC (Lindane)	4.6E-09
TetraCDD, 2,3,7,8-	4.3E-09
Ethylene dibromide	3.9E-09
TetraCDF, 2,3,7,8-	3.9E-09
Trichloroethylene	3.6E-09
Tetrahydrofuran	3.6E-09
Pyrene	3.6E-09
DDD, 4,4'-	3.5E-09
Tetrachloroethane, 1,1,1,2-	3.2E-09
1,3-Dichloropropane	3.0E-09
Butylbenzene, n-	2.9E-09
Dichloroethylene 1,1-	2.8E-09
2,2-Dichloropropane	2.8E-09
Butylbenzene, tert	2.8E-09
Vinyl Chloride	2.6E-09
Trichloroethane, 1,1,1-	2.4E-09
PentaCDD, 1,2,3,7,8-	2.3E-09
Anthracene	2.3E-09
Acenaphthene	2.2E-09
2-Methylnaphthalene	2.1E-09
Trimethylbenzene, 1,3,5-	1.9E-09
Dichlorobenzene, 1,2-	1.7E-09
Dichloroethane, 1,2- (Ethylene Dichloride)	1.6E-09
HexaCDF, 1,2,3,6,7,8-	1.4E-09
HexaCDF, 2,3,4,6,7,8-	1.1E-09
Methoxychlor	1.1E-09
Dichlorobenzene,1,4-	1.0E-09
DDE, 4,4'-	9.8E-10
HexaCDF, 1,2,3,4,7,8-	9.5E-10
Fluorene	8.7E-10
Cumene (Isopropylbenzene)	8.5E-10
2-Chlorotoluene	7.5E-10
4-Chlorotoluene	7.5E-10
Ethylene Glycol	6.5E-10
Propylbenzene, n-	6.2E-10
Trichlorofluoromethane (Freon 11)	5.5E-10
1,2,4-Trimethylbenzene	5.4E-10
Dichloroethylene, cis-1,2-	4.9E-10
Ethylbenzene	4.7E-10
Dichloropropane, 1,2-	4.7E-10
PentaCDF, 1,2,3,7,8-	4.0E-10
Chloroethane	3.1E-10
Dichlorodifluoromethane	3.1E-10
HexaCDD, 1,2,3,4,7,8-	3.1E-10
Bromochloromethane	3.0E-10
Benzo(g,h,i)perylene	2.9E-10

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS - UPSET CONDITIONS (MAXIMUM MEASURED EMISSION RATE *10)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
methyl tert-butyl ether	2.4E-10
Propylene oxide	1.7E-10
Dichloroethylene-1,2 (trans)	1.5E-10
Dichloroethane 1,1-	1.5E-10
Methyl methacrylate	4.1E-11
HexaCDD, 1,2,3,7,8,9-	3.7E-11
HexaCDD, 1,2,3,6,7,8-	2.2E-11
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	2.0E-11
Dioxane, 1,4-	1.6E-11
Dibenz(a,h)anthracene	8.0E-12
HeptaCDF, 1,2,3,4,6,7,8-	3.7E-12
HexaCDF, 1,2,3,7,8,9-	2.0E-12
Acrylic Acid	1.6E-12
OctaCDF, 1,2,3,4,6,7,8,9-	1.1E-12
1-Hexane (n-hexane)	2.8E-13
HeptaCDF, 1,2,3,4,7,8,9-	2.5E-13
OctaCDD, 1,2,3,4,6,7,8,9-	2.3E-13
HeptaCDD, 1,2,3,4,6,7,8-	1.8E-13
Endosulfan sulfate	NC
2,5-Dione, 3-hexene	NC
Benzo(e)pyrene	NC
Perylene	NC
Phosphine imide, P,P,P-triphenyl	NC
Diallate	NC
9-Octadecenamide (oleamide)	NC
delta-BHC	NC
2-Methyl octane	NC
Endosulfan II	NC
Endrin ketone	NC
3-Penten-2-one (ethylidene acetone)	NC
2,5-Dimethylfuran	NC
Endrin aldehyde	NC
3-Hexen-2-one	NC
Benzoic acid, methyl ester (methyl benzoate)	NC
Isopropyl toluene, p-	NC
Total (b)	5.6E-01
R_1 resident	
Nitrogen dioxide	1.6E-01
Sulfur dioxide	5.8E-02
Arsenic	5.8E-03
Chlorine	2.3E-03
Hydrogen chloride	1.4E-03
Lead	6.6E-04
Nickel	3.8E-04
Copper	3.2E-04
Cadmium	7.8E-05
Hexachlorobenzene	4.0E-05
Chlorophenyl-phenylether, 4-	3.7E-05
Chloroform (Trichloromethane)	2.7E-05
Benzidine	2.6E-05
Dibromo-3-chloropropane, 1,2-	2.1E-05
Mercury	1.1E-05
Beryllium	1.1E-05
Hexachlorocyclopentadiene	9.1E-06
Thallium (I)	6.7E-06
4,6-Dinitro-2-methylphenol	5.3E-06
Manganese	4.2E-06
Vanadium	3.8E-06
Mercuric chloride	2.8E-06
Silver	2.7E-06
Pentachlorophenol	2.5E-06
Tetrachloroethylene (Perchloroethylene)	2.3E-06
Fluoranthene	1.4E-06
Zinc	1.4E-06
Barium	1.3E-06
Nitrosodipropylamine, n-	1.2E-06
Aluminum	8.4E-07
Chromium	7.4E-07
Chromium, hexavalent	7.4E-07

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS -
UPSET CONDITIONS (MAXIMUM MEASURED EMISSION RATE *10)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Antimony	7.0E-07
Bromoform (tribromomethane)	6.8E-07
Chlorobenzene	6.4E-07
Selenium	5.8E-07
Benzoic Acid	5.4E-07
Dinitrotoluene, 2,4-	5.4E-07
Benzene	4.9E-07
Methylene chloride	4.7E-07
Ethylhexyl phthalate, bis-2-	4.7E-07
3-Penten-2-one, 4-methyl	4.6E-07
Bromodichloromethane	4.5E-07
Dinitrotoluene, 2,6-	4.3E-07
Dibromochloromethane	4.2E-07
Methyl bromide (Bromomethane)	3.5E-07
Dinitrophenol, 2,4-	3.0E-07
Nitrophenol, 4-	2.8E-07
Nitroaniline, 3-	2.8E-07
Chloronaphthalene,2-	2.7E-07
Dichlorobenzidine, 3,3'-	2.2E-07
Methylene bromide	2.1E-07
PentaCDF, 2,3,4,7,8-	1.9E-07
Pentachloronitrobenzene (PCNB)	1.7E-07
Toluene	1.7E-07
Chlorobenzilate	1.3E-07
Dimethylphenol, 2,4-	1.2E-07
Acrylonitrile	1.2E-07
Nitrophenol, 2-	1.1E-07
Heptachlor	9.7E-08
Carbon Tetrachloride	9.7E-08
Carbazole	9.5E-08
Benzaldehyde	9.4E-08
Dinitrobenzene, 1,3-	8.9E-08
Methyl ethyl ketone (2-Butanone)	8.4E-08
Benzyl alcohol	8.4E-08
Phenanthrene	6.7E-08
Nitroaniline, 4-	6.1E-08
Benzonitrile	6.1E-08
Di-n-butyl phthalate	6.0E-08
Aniline	5.8E-08
Carbon Disulfide	5.6E-08
Cobalt	5.5E-08
Methyl chloride (Chloromethane)	5.2E-08
Heptachlor epoxide	5.2E-08
Phenol	4.8E-08
Endrin	3.9E-08
Chlorophenol, 2-	3.5E-08
Chloroaniline, p-	3.4E-08
Trichlorobenzene, 1,2,3-	2.8E-08
Acetone	2.8E-08
Bromophenyl-phenylether, 4-	2.7E-08
Chloro-3-methylphenol, 4-	2.7E-08
Hexachloro-1,3-butadiene (Perchlorobutadiene)	2.6E-08
Naphthalene	2.6E-08
Acetophenone	2.6E-08
Cresol, o-	2.5E-08
N-nitrosodimethylamine	2.3E-08
Butylbenzylphthalate	1.8E-08
Chlordane	1.7E-08
Dichlorobenzene, 1,3-	1.7E-08
2,5-Dimethylheptane	1.7E-08
Diethyl phthalate	1.6E-08
Acenaphthylene	1.6E-08
Tetrachloroethane, 1,1,2,2-	1.6E-08
Vinyl Acetate	1.6E-08
Dichloropropene, 1,3- (cis)	1.4E-08
Xylene, p-	1.4E-08
Xylene, m-	1.4E-08
Bis(2-chloroethoxy) methane	1.4E-08
Trichlorophenol, 2,4,5-	1.3E-08
Nitroaniline, 2-	1.3E-08
Nitrobenzene	1.3E-08

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS -
UPSET CONDITIONS (MAXIMUM MEASURED EMISSION RATE *10)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Dichlorophenol, 2,4-	1.2E-08
Benzo(b)fluoranthene	1.2E-08
2-Hexanone	1.1E-08
Hexachloroethane (Perchloroethane`	1.1E-08
Cresol, p-	1.1E-08
Cresol, m-	1.1E-08
Dimethyl phthalate	1.1E-08
Endosulfan I	1.1E-08
Trichlorophenol, 2,4,6-	1.0E-08
BHC, beta-	9.6E-09
Pyridine	9.2E-09
Dibenzofuran	8.7E-09
Diphenylamine	8.7E-09
Bromobenzene	8.1E-09
Aldrin	7.9E-09
Tetrachlorobenzene, 1,2,4,5-	7.9E-09
Nitrosodiphenylamine, N-	7.8E-09
Isophorone	7.8E-09
Pentachlorobenzene	7.3E-09
Di-n-octylphthalate	7.1E-09
Trichlorobenzene, 1,2,4-	6.5E-09
Chrysene	6.3E-09
Aroclor 1254	5.9E-09
Diphenylhydrazine,1,2-	5.7E-09
3-Ethyl benzaldehyde	5.5E-09
4-Ethyl benzaldehyde	5.5E-09
Trichloropropane, 1,2,3-	5.0E-09
DDT, 4-4'-	4.9E-09
Butylbenzene, sec	4.8E-09
Xylene, o-	4.7E-09
1,1-Dichloropropene	4.2E-09
Trichloroethane, 1,1,2-	3.9E-09
Dieldrin	3.8E-09
BHC, alpha-	3.7E-09
Benzo(a)Anthracene	3.7E-09
Styrene	3.3E-09
Benzo(k)fluoranthene	3.3E-09
Bis(2-chlorethyl)ether	3.3E-09
2,2'-oxybis (1-Chloropropane)	3.2E-09
Iodomethane	3.0E-09
Indeno(1,2,3-cd) pyrene	2.7E-09
Methyl isobutyl ketone	2.3E-09
Benzo(a)pyrene	2.1E-09
gamma-BHC (Lindane)	1.9E-09
TetraCDD, 2,3,7,8-	1.8E-09
TetraCDF, 2,3,7,8-	1.6E-09
Ethylene dibromide	1.6E-09
Trichloroethylene	1.5E-09
Tetrahydrofuran	1.5E-09
Pyrene	1.5E-09
DDD, 4,4'-	1.4E-09
Tetrachloroethane, 1,1,1,2-	1.3E-09
1,3-Dichloropropane	1.2E-09
Butylbenzene, n-	1.2E-09
Dichloroethylene 1,1-	1.1E-09
2,2-Dichloropropane	1.1E-09
Butylbenzene, tert	1.1E-09
Vinyl Chloride	1.0E-09
PentaCDD, 1,2,3,7,8-	1.0E-09
Trichloroethane, 1,1,1-	9.9E-10
Anthracene	9.3E-10
Acenaphthene	9.0E-10
2-Methylnaphthalene	8.7E-10
Trimethylbenzene, 1,3,5-	7.9E-10
Dichlorobenzene, 1,2-	6.9E-10
Dichloroethane, 1,2- (Ethylene Dichloride)	6.5E-10
HexaCDF, 1,2,3,6,7,8-	6.4E-10
HexaCDF, 2,3,4,6,7,8-	5.1E-10
Methoxychlor	4.4E-10
HexaCDF, 1,2,3,4,7,8-	4.2E-10
Dichlorobenzene,1,4-	4.1E-10

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS -
UPSET CONDITIONS (MAXIMUM MEASURED EMISSION RATE *10)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
DDE, 4,4'-	4.0E-10
Fluorene	3.5E-10
Cumene (Isopropylbenzene)	3.5E-10
2-Chlorotoluene	3.1E-10
4-Chlorotoluene	3.1E-10
Ethylene Glycol	2.7E-10
Propylbenzene, n-	2.5E-10
Trichlorofluoromethane (Freon 11)	2.2E-10
1,2,4-Trimethylbenzene	2.2E-10
Dichloroethylene, cis-1,2-	2.0E-10
Ethylbenzene	1.9E-10
Dichloropropane, 1,2-	1.9E-10
PentaCDF, 1,2,3,7,8-	1.7E-10
HexaCDD, 1,2,3,4,7,8-	1.4E-10
Benzo(g,h,i)perylene	1.3E-10
Chloroethane	1.3E-10
Dichlorodifluoromethane	1.3E-10
Bromochloromethane	1.2E-10
methyl tert-butyl ether	9.7E-11
Propylene oxide	6.9E-11
Dichloroethylene-1,2 (trans)	6.3E-11
Dichloroethane 1,1-	6.0E-11
Methyl methacrylate	1.7E-11
HexaCDD, 1,2,3,7,8,9-	1.6E-11
HexaCDD, 1,2,3,6,7,8-	9.8E-12
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	8.1E-12
Dioxane, 1,4-	6.3E-12
Dibenz(a,h)anthracene	2.9E-12
HeptaCDF, 1,2,3,4,6,7,8-	1.6E-12
HexaCDF, 1,2,3,7,8,9-	8.6E-13
Acrylic Acid	6.4E-13
OctaCDF, 1,2,3,4,6,7,8,9-	4.7E-13
1-Hexane (n-hexane)	1.1E-13
HeptaCDF, 1,2,3,4,7,8,9-	1.1E-13
OctaCDD, 1,2,3,4,6,7,8,9-	1.0E-13
HeptaCDD, 1,2,3,4,6,7,8-	7.9E-14
Endosulfan sulfate	NC
2,5-Dione, 3-hexene	NC
Benzo(e)pyrene	NC
Perylene	NC
Phosphine imide, P,P,P-triphenyl	NC
Diallate	NC
9-Octadecenamide (oleamide)	NC
delta-BHC	NC
2-Methyl octane	NC
Endosulfan II	NC
Endrin ketone	NC
3-Penten-2-one (ethylidene acetone)	NC
2,5-Dimethylfuran	NC
Endrin aldehyde	NC
3-Hexen-2-one	NC
Benzoic acid, methyl ester (methyl benzoate)	NC
Isopropyl toluene, p-	NC
Total (b)	2.3E-01
R_2 resident	
Nitrogen dioxide	1.1E-01
Sulfur dioxide	3.9E-02
Arsenic	3.4E-03
Chlorine	1.5E-03
Hydrogen chloride	9.2E-04
Lead	3.9E-04
Nickel	2.3E-04
Copper	1.9E-04
Cadmium	4.6E-05
Hexachlorobenzene	2.7E-05
Chlorophenyl-phenylether, 4-	2.5E-05
Chloroform (Trichloromethane)	1.8E-05
Benzidine	1.7E-05
Dibromo-3-chloropropane, 1,2-	1.4E-05

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS - UPSET CONDITIONS (MAXIMUM MEASURED EMISSION RATE *10)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Mercury	7.5E-06
Beryllium	6.6E-06
Hexachlorocyclopentadiene	6.1E-06
Thallium (I)	4.0E-06
4,6-Dinitro-2-methylphenol	3.5E-06
Manganese	2.5E-06
Vanadium	2.3E-06
Mercuric chloride	1.9E-06
Pentachlorophenol	1.7E-06
Silver	1.6E-06
Tetrachloroethylene (Perchloroethylene)	1.6E-06
Fluoranthene	9.5E-07
Zinc	8.3E-07
Nitrosodipropylamine, n-	7.8E-07
Barium	7.7E-07
Aluminum	5.0E-07
Antimony	4.7E-07
Bromoform (tribromomethane)	4.6E-07
Chromium	4.4E-07
Chromium, hexavalent	4.4E-07
Chlorobenzene	4.3E-07
Benzoic Acid	3.6E-07
Dinitrotoluene, 2,4-	3.6E-07
Selenium	3.5E-07
Benzene	3.3E-07
Ethylhexyl phthalate, bis-2-	3.2E-07
Methylene chloride	3.2E-07
3-Penten-2-one, 4-methyl	3.1E-07
Bromodichloromethane	3.0E-07
Dinitrotoluene, 2,6-	2.9E-07
Dibromochloromethane	2.8E-07
Methyl bromide (Bromomethane)	2.3E-07
Dinitrophenol, 2,4-	2.0E-07
Nitrophenol, 4-	1.9E-07
Nitroaniline, 3-	1.9E-07
Chloronaphthalene,2-	1.8E-07
Dichlorobenzidine, 3,3'-	1.5E-07
Methylene bromide	1.4E-07
PentaCDF, 2,3,4,7,8-	1.3E-07
Pentachloronitrobenzene (PCNB)	1.1E-07
Toluene	1.1E-07
Chlorobenzilate	9.0E-08
Dimethylphenol, 2,4-	8.3E-08
Acrylonitrile	8.1E-08
Nitrophenol, 2-	7.2E-08
Heptachlor	6.5E-08
Carbon Tetrachloride	6.5E-08
Carbazole	6.4E-08
Benzaldehyde	6.3E-08
Dinitrobenzene, 1,3-	6.0E-08
Methyl ethyl ketone (2-Butanone)	5.6E-08
Benzyl alcohol	5.6E-08
Phenanthrene	4.5E-08
Nitroaniline, 4-	4.1E-08
Benzonitrile	4.1E-08
Di-n-butyl phthalate	4.0E-08
Aniline	3.9E-08
Carbon Disulfide	3.7E-08
Methyl chloride (Chloromethane)	3.5E-08
Heptachlor epoxide	3.5E-08
Cobalt	3.3E-08
Phenol	3.2E-08
Endrin	2.6E-08
Chlorophenol, 2-	2.3E-08
Chloroaniline, p-	2.3E-08
Trichlorobenzene, 1,2,3-	1.9E-08
Acetone	1.9E-08
Bromophenyl-phenylether, 4-	1.8E-08
Chloro-3-methylphenol, 4-	1.8E-08
Hexachloro-1,3-butadiene (Perchlorobutadiene)	1.7E-08
Naphthalene	1.7E-08

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS -
UPSET CONDITIONS (MAXIMUM MEASURED EMISSION RATE *10)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Acetophenone	1.7E-08
Cresol, o-	1.7E-08
N-nitrosodimethylamine	1.5E-08
Butylbenzylphthalate	1.2E-08
Chlordane	1.2E-08
Dichlorobenzene, 1,3-	1.2E-08
2,5-Dimethylheptane	1.1E-08
Diethyl phthalate	1.1E-08
Acenaphthylene	1.1E-08
Tetrachloroethane, 1,1,2,2-	1.1E-08
Vinyl Acetate	1.1E-08
Dichloropropene, 1,3- (cis)	9.6E-09
Xylene, p-	9.3E-09
Xylene, m-	9.3E-09
Bis(2-chloroethoxy) methane	9.1E-09
Trichlorophenol, 2,4,5-	8.8E-09
Nitroaniline, 2-	8.6E-09
Nitrobenzene	8.6E-09
Dichlorophenol, 2,4-	8.0E-09
Benzo(b)fluoranthene	7.8E-09
2-Hexanone	7.6E-09
Hexachloroethane (Perchloroethane)	7.6E-09
Cresol, p-	7.4E-09
Cresol, m-	7.4E-09
Dimethyl phthalate	7.3E-09
Endosulfan I	7.0E-09
Trichlorophenol, 2,4,6-	7.0E-09
BHC, beta-	6.5E-09
Pyridine	6.1E-09
Dibenzofuran	5.8E-09
Diphenylamine	5.8E-09
Bromobenzene	5.4E-09
Aldrin	5.3E-09
Tetrachlorobenzene, 1,2,4,5-	5.3E-09
Nitrosodiphenylamine, N-	5.2E-09
Isophorone	5.2E-09
Pentachlorobenzene	4.9E-09
Di-n-octylphthalate	4.8E-09
Trichlorobenzene, 1,2,4-	4.3E-09
Chrysene	4.3E-09
Aroclor 1254	4.0E-09
Diphenylhydrazine,1,2-	3.8E-09
3-Ethyl benzaldehyde	3.7E-09
4-Ethyl benzaldehyde	3.7E-09
Trichloropropane, 1,2,3-	3.4E-09
DDT, 4-4'-	3.3E-09
Butylbenzene, sec	3.2E-09
Xylene, o-	3.2E-09
1,1-Dichloropropene	2.8E-09
Trichloroethane, 1,1,2-	2.6E-09
Dieldrin	2.5E-09
Benzo(a)Anthracene	2.5E-09
BHC, alpha-	2.5E-09
Benzo(k)fluoranthene	2.2E-09
Styrene	2.2E-09
Bis(2-chlorethyl)ether	2.2E-09
2,2'-oxybis (1-Chloropropane)	2.1E-09
Iodomethane	2.0E-09
Indeno(1,2,3-cd) pyrene	1.6E-09
Methyl isobutyl ketone	1.5E-09
Benzo(a)pyrene	1.4E-09
gamma-BHC (Lindane)	1.3E-09
TetraCDD, 2,3,7,8-	1.2E-09
TetraCDF, 2,3,7,8-	1.1E-09
Ethylene dibromide	1.1E-09
Trichloroethylene	9.9E-10
Tetrahydrofuran	9.9E-10
Pyrene	9.7E-10
DDD, 4,4'-	9.7E-10
Tetrachloroethane, 1,1,1,2-	8.6E-10
1,3-Dichloropropane	8.2E-10

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS - UPSET CONDITIONS (MAXIMUM MEASURED EMISSION RATE *10)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Butylbenzene, n-	7.9E-10
Dichloroethylene 1,1-	7.6E-10
2,2-Dichloropropane	7.6E-10
Butylbenzene, tert	7.5E-10
Vinyl Chloride	7.0E-10
PentaCDD, 1,2,3,7,8-	6.8E-10
Trichloroethane, 1,1,1-	6.6E-10
Anthracene	6.2E-10
Acenaphthene	6.0E-10
2-Methylnaphthalene	5.8E-10
Trimethylbenzene, 1,3,5-	5.3E-10
Dichlorobenzene, 1,2-	4.6E-10
Dichloroethane, 1,2- (Ethylene Dichloride)	4.3E-10
HexaCDF, 1,2,3,6,7,8-	4.3E-10
HexaCDF, 2,3,4,6,7,8-	3.4E-10
Methoxychlor	3.0E-10
HexaCDF, 1,2,3,4,7,8-	2.8E-10
Dichlorobenzene,1,4-	2.8E-10
DDE, 4,4'-	2.7E-10
Fluorene	2.4E-10
Cumene (Isopropylbenzene)	2.3E-10
2-Chlorotoluene	2.1E-10
4-Chlorotoluene	2.0E-10
Ethylene Glycol	1.8E-10
Propylbenzene, n-	1.7E-10
Trichlorofluoromethane (Freon 11)	1.5E-10
1,2,4-Trimethylbenzene	1.5E-10
Dichloroethylene, cis-1,2-	1.3E-10
Ethylbenzene	1.3E-10
Dichloropropane, 1,2-	1.3E-10
PentaCDF, 1,2,3,7,8-	1.2E-10
HexaCDD, 1,2,3,4,7,8-	9.2E-11
Benzo(g,h,i)perylene	8.8E-11
Chloroethane	8.6E-11
Dichlorodifluoromethane	8.4E-11
Bromochloromethane	8.3E-11
methyl tert-butyl ether	6.5E-11
Propylene oxide	4.6E-11
Dichloroethylene-1,2 (trans)	4.2E-11
Dichloroethane 1,1-	4.0E-11
Methyl methacrylate	1.1E-11
HexaCDD, 1,2,3,7,8,9-	1.1E-11
HexaCDD, 1,2,3,6,7,8-	6.7E-12
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	5.4E-12
Dioxane, 1,4-	4.2E-12
Dibenz(a,h)anthracene	1.7E-12
HeptaCDF, 1,2,3,4,6,7,8-	1.1E-12
HexaCDF, 1,2,3,7,8,9-	5.8E-13
Acrylic Acid	4.3E-13
OctaCDF, 1,2,3,4,6,7,8,9-	3.2E-13
1-Hexane (n-hexane)	7.6E-14
HeptaCDF, 1,2,3,4,7,8,9-	7.3E-14
OctaCDD, 1,2,3,4,6,7,8,9-	6.8E-14
HeptaCDD, 1,2,3,4,6,7,8-	5.3E-14
Endosulfan sulfate	NC
2,5-Dione, 3-hexene	NC
Benzo(e)pyrene	NC
Perylene	NC
Phosphine imide, P,P,P-triphenyl	NC
Diallate	NC
9-Octadecenamide (oleamide)	NC
delta-BHC	NC
2-Methyl octane	NC
Endosulfan II	NC
Endrin ketone	NC
3-Penten-2-one (ethylidene acetone)	NC
2,5-Dimethylfuran	NC
Endrin aldehyde	NC
3-Hexen-2-one	NC
Benzoic acid, methyl ester (methyl benzoate)	NC
Isopropyl toluene, p-	NC

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS - UPSET CONDITIONS (MAXIMUM MEASURED EMISSION RATE *10)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Total (b)	1.5E-01
R_3 resident farmer	
Nitrogen dioxide	1.0E-01
Sulfur dioxide	3.6E-02
Arsenic	3.3E-03
Chlorine	1.4E-03
Hydrogen chloride	8.7E-04
Lead	3.7E-04
Nickel	2.1E-04
Copper	1.8E-04
Cadmium	4.4E-05
Hexachlorobenzene	2.6E-05
Chlorophenyl-phenylether, 4-	2.3E-05
Chloroform (Trichloromethane)	1.7E-05
Benzidine	1.7E-05
Dibromo-3-chloropropane, 1,2-	1.3E-05
Mercury	7.1E-06
Beryllium	6.2E-06
Hexachlorocyclopentadiene	5.8E-06
Thallium (I)	3.8E-06
4,6-Dinitro-2-methylphenol	3.3E-06
Manganese	2.4E-06
Vanadium	2.1E-06
Mercuric chloride	1.8E-06
Pentachlorophenol	1.6E-06
Silver	1.5E-06
Tetrachloroethylene (Perchloroethylene)	1.5E-06
Fluoranthene	9.0E-07
Zinc	7.8E-07
Nitrosodipropylamine, n-	7.4E-07
Barium	7.3E-07
Aluminum	4.7E-07
Antimony	4.4E-07
Bromoform (tribromomethane)	4.3E-07
Chromium	4.2E-07
Chromium, hexavalent	4.2E-07
Chlorobenzene	4.0E-07
Benzoic Acid	3.4E-07
Dinitrotoluene, 2,4-	3.4E-07
Selenium	3.3E-07
Benzene	3.1E-07
Ethylhexyl phthalate, bis-2-	3.0E-07
Methylene chloride	3.0E-07
3-Penten-2-one, 4-methyl	2.9E-07
Bromodichloromethane	2.9E-07
Dinitrotoluene, 2,6-	2.7E-07
Dibromochloromethane	2.7E-07
Methyl bromide (Bromomethane)	2.2E-07
Dinitrophenol, 2,4-	1.9E-07
Nitrophenol, 4-	1.8E-07
Nitroaniline, 3-	1.8E-07
Chloronaphthalene,2-	1.7E-07
Dichlorobenzidine, 3,3'-	1.4E-07
Methylene bromide	1.3E-07
PentaCDF, 2,3,4,7,8-	1.2E-07
Pentachloronitrobenzene (PCNB)	1.1E-07
Toluene	1.1E-07
Chlorobenzilate	8.5E-08
Dimethylphenol, 2,4-	7.8E-08
Acrylonitrile	7.6E-08
Nitrophenol, 2-	6.7E-08
Heptachlor	6.1E-08
Carbon Tetrachloride	6.1E-08
Carbazole	6.0E-08
Benzaldehyde	5.9E-08
Dinitrobenzene, 1,3-	5.6E-08
Methyl ethyl ketone (2-Butanone)	5.3E-08
Benzyl alcohol	5.3E-08
Phenanthrene	4.2E-08

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS -
UPSET CONDITIONS (MAXIMUM MEASURED EMISSION RATE *10)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Nitroaniline, 4-	3.8E-08
Benzonitrile	3.8E-08
Di-n-butyl phthalate	3.8E-08
Aniline	3.7E-08
Carbon Disulfide	3.5E-08
Methyl chloride (Chloromethane)	3.3E-08
Heptachlor epoxide	3.3E-08
Cobalt	3.1E-08
Phenol	3.1E-08
Endrin	2.5E-08
Chlorophenol, 2-	2.2E-08
Chloroaniline, p-	2.1E-08
Trichlorobenzene, 1,2,3-	1.8E-08
Acetone	1.8E-08
Bromophenyl-phenylether, 4-	1.7E-08
Chloro-3-methylphenol, 4-	1.7E-08
Hexachloro-1,3-butadiene (Perchlorobutadiene)	1.6E-08
Naphthalene	1.6E-08
Acetophenone	1.6E-08
Cresol, o-	1.6E-08
N-nitrosodimethylamine	1.4E-08
Butylbenzylphthalate	1.1E-08
Chlordane	1.1E-08
Dichlorobenzene, 1,3-	1.1E-08
2,5-Dimethylheptane	1.1E-08
Diethyl phthalate	1.0E-08
Acenaphthylene	1.0E-08
Tetrachloroethane, 1,1,2,2-	1.0E-08
Vinyl Acetate	9.9E-09
Dichloropropene, 1,3- (cis)	9.1E-09
Xylene, p-	8.8E-09
Xylene, m-	8.8E-09
Bis(2-chloroethoxy) methane	8.5E-09
Trichlorophenol, 2,4,5-	8.3E-09
Nitroaniline, 2-	8.1E-09
Nitrobenzene	8.1E-09
Dichlorophenol, 2,4-	7.5E-09
Benzo(b)fluoranthene	7.4E-09
2-Hexanone	7.2E-09
Hexachloroethane (Perchloroethane)	7.2E-09
Cresol, p-	7.0E-09
Cresol, m-	7.0E-09
Dimethyl phthalate	6.9E-09
Endosulfan I	6.6E-09
Trichlorophenol, 2,4,6-	6.6E-09
BHC, beta-	6.1E-09
Pyridine	5.8E-09
Dibenzofuran	5.5E-09
Diphenylamine	5.5E-09
Bromobenzene	5.1E-09
Aldrin	5.0E-09
Tetrachlorobenzene, 1,2,4,5-	5.0E-09
Nitrosodiphenylamine, N-	4.9E-09
Isophorone	4.9E-09
Pentachlorobenzene	4.6E-09
Di-n-octylphthalate	4.5E-09
Trichlorobenzene, 1,2,4-	4.1E-09
Chrysene	4.0E-09
Aroclor 1254	3.7E-09
Diphenylhydrazine,1,2-	3.6E-09
3-Ethyl benzaldehyde	3.5E-09
4-Ethyl benzaldehyde	3.5E-09
Trichloropropane, 1,2,3-	3.2E-09
DDT, 4-4'-	3.1E-09
Butylbenzene, sec	3.0E-09
Xylene, o-	3.0E-09
1,1-Dichloropropene	2.6E-09
Trichloroethane, 1,1,2-	2.5E-09
Dieldrin	2.4E-09
Benzo(a)Anthracene	2.4E-09
BHC, alpha-	2.3E-09

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS -
UPSET CONDITIONS (MAXIMUM MEASURED EMISSION RATE *10)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Benzo(k)fluoranthene	2.1E-09
Styrene	2.1E-09
Bis(2-chlorethyl)ether	2.1E-09
2,2'-oxybis (1-Chloropropane)	2.0E-09
Iodomethane	1.9E-09
Indeno(1,2,3-cd) pyrene	1.5E-09
Methyl isobutyl ketone	1.4E-09
Benzo(a)pyrene	1.4E-09
gamma-BHC (Lindane)	1.2E-09
TetraCDD, 2,3,7,8-	1.1E-09
TetraCDF, 2,3,7,8-	1.0E-09
Ethylene dibromide	1.0E-09
Trichloroethylene	9.4E-10
Tetrahydrofuran	9.4E-10
Pyrene	9.1E-10
DDD, 4,4'-	9.1E-10
Tetrachloroethane, 1,1,1,2-	8.1E-10
1,3-Dichloropropane	7.7E-10
Butylbenzene, n-	7.4E-10
Dichloroethylene 1,1-	7.2E-10
2,2-Dichloropropane	7.1E-10
Butylbenzene, tert	7.1E-10
Vinyl Chloride	6.6E-10
PentaCDD, 1,2,3,7,8-	6.5E-10
Trichloroethane, 1,1,1-	6.3E-10
Anthracene	5.8E-10
Acenaphthene	5.7E-10
2-Methylnaphthalene	5.5E-10
Trimethylbenzene, 1,3,5-	5.0E-10
Dichlorobenzene, 1,2-	4.4E-10
HexaCDF, 1,2,3,6,7,8-	4.1E-10
Dichloroethane, 1,2- (Ethylene Dichloride)	4.1E-10
HexaCDF, 2,3,4,6,7,8-	3.3E-10
Methoxychlor	2.8E-10
HexaCDF, 1,2,3,4,7,8-	2.7E-10
Dichlorobenzene,1,4-	2.6E-10
DDE, 4,4'-	2.5E-10
Fluorene	2.2E-10
Cumene (Isopropylbenzene)	2.2E-10
2-Chlorotoluene	1.9E-10
4-Chlorotoluene	1.9E-10
Ethylene Glycol	1.7E-10
Propylbenzene, n-	1.6E-10
Trichlorofluoromethane (Freon 11)	1.4E-10
1,2,4-Trimethylbenzene	1.4E-10
Dichloroethylene, cis-1,2-	1.3E-10
Ethylbenzene	1.2E-10
Dichloropropane, 1,2-	1.2E-10
PentaCDF, 1,2,3,7,8-	1.1E-10
HexaCDD, 1,2,3,4,7,8-	8.8E-11
Benzo(g,h,i)perylene	8.4E-11
Chloroethane	8.1E-11
Dichlorodifluoromethane	7.9E-11
Bromochloromethane	7.8E-11
methyl tert-butyl ether	6.1E-11
Propylene oxide	4.3E-11
Dichloroethylene-1,2 (trans)	4.0E-11
Dichloroethane 1,1-	3.8E-11
HexaCDD, 1,2,3,7,8,9-	1.1E-11
Methyl methacrylate	1.1E-11
HexaCDD, 1,2,3,6,7,8-	6.4E-12
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	5.1E-12
Dioxane, 1,4-	4.0E-12
Dibenz(a,h)anthracene	1.6E-12
HeptaCDF, 1,2,3,4,6,7,8-	1.1E-12
HexaCDF, 1,2,3,7,8,9-	5.6E-13
Acrylic Acid	4.0E-13
OctaCDF, 1,2,3,4,6,7,8,9-	3.1E-13
1-Hexane (n-hexane)	7.1E-14
HeptaCDF, 1,2,3,4,7,8,9-	7.0E-14
OctaCDD, 1,2,3,4,6,7,8,9-	6.5E-14

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS -
UPSET CONDITIONS (MAXIMUM MEASURED EMISSION RATE *10)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
HeptaCDD, 1,2,3,4,6,7,8-	5.1E-14
Endosulfan sulfate	NC
2,5-Dione, 3-hexene	NC
Benzo(e)pyrene	NC
Perylene	NC
Phosphine imide, P,P,P-triphenyl	NC
Diallate	NC
9-Octadecenamide (oleamide)	NC
delta-BHC	NC
2-Methyl octane	NC
Endosulfan II	NC
Endrin ketone	NC
3-Penten-2-one (ethylidene acetone)	NC
2,5-Dimethylfuran	NC
Endrin aldehyde	NC
3-Hexen-2-one	NC
Benzoic acid, methyl ester (methyl benzoate)	NC
Isopropyl toluene, p-	NC
Total (b)	1.4E-01
R_4 resident farmer	
Nitrogen dioxide	1.6E-01
Sulfur dioxide	5.9E-02
Arsenic	5.5E-03
Chlorine	2.3E-03
Hydrogen chloride	1.4E-03
Lead	6.3E-04
Nickel	3.6E-04
Copper	3.0E-04
Cadmium	7.3E-05
Hexachlorobenzene	4.1E-05
Chlorophenyl-phenylether, 4-	3.7E-05
Benzidine	2.8E-05
Chloroform (Trichloromethane)	2.8E-05
Dibromo-3-chloropropane, 1,2-	2.2E-05
Mercury	1.1E-05
Beryllium	1.0E-05
Hexachlorocyclopentadiene	9.4E-06
Thallium (I)	6.3E-06
4,6-Dinitro-2-methylphenol	5.4E-06
Manganese	4.0E-06
Vanadium	3.6E-06
Mercuric chloride	2.9E-06
Silver	2.6E-06
Pentachlorophenol	2.6E-06
Tetrachloroethylene (Perchloroethylene)	2.4E-06
Fluoranthene	1.5E-06
Zinc	1.3E-06
Barium	1.2E-06
Nitrosodipropylamine, n-	1.2E-06
Aluminum	8.0E-07
Antimony	7.2E-07
Chromium	7.0E-07
Chromium, hexavalent	7.0E-07
Bromoform (tribromomethane)	7.0E-07
Chlorobenzene	6.6E-07
Benzoic Acid	5.6E-07
Dinitrotoluene, 2,4-	5.5E-07
Selenium	5.5E-07
Ethylhexyl phthalate, bis-2-	5.1E-07
Benzene	5.1E-07
Methylene chloride	4.9E-07
3-Penten-2-one, 4-methyl	4.7E-07
Bromodichloromethane	4.6E-07
Dinitrotoluene, 2,6-	4.4E-07
Dibromochloromethane	4.3E-07
Methyl bromide (Bromomethane)	3.6E-07
Dinitrophenol, 2,4-	3.0E-07
Nitrophenol, 4-	2.9E-07
Nitroaniline, 3-	2.9E-07

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS -
UPSET CONDITIONS (MAXIMUM MEASURED EMISSION RATE *10)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Chloronaphthalene,2-	2.8E-07
Dichlorobenzidine, 3,3'-	2.3E-07
Methylene bromide	2.1E-07
PentaCDF, 2,3,4,7,8-	2.1E-07
Pentachloronitrobenzene (PCNB)	1.8E-07
Toluene	1.8E-07
Chlorobenzilate	1.4E-07
Dimethylphenol, 2,4-	1.3E-07
Acrylonitrile	1.2E-07
Nitrophenol, 2-	1.1E-07
Heptachlor	1.0E-07
Carbon Tetrachloride	9.9E-08
Carbazole	9.8E-08
Benzaldehyde	9.6E-08
Dinitrobenzene, 1,3-	9.2E-08
Methyl ethyl ketone (2-Butanone)	8.6E-08
Benzyl alcohol	8.6E-08
Phenanthrene	6.8E-08
Nitroaniline, 4-	6.2E-08
Benzonitrile	6.2E-08
Di-n-butyl phthalate	6.2E-08
Aniline	6.0E-08
Carbon Disulfide	5.7E-08
Methyl chloride (Chloromethane)	5.4E-08
Heptachlor epoxide	5.3E-08
Cobalt	5.2E-08
Phenol	5.0E-08
Endrin	4.0E-08
Chlorophenol, 2-	3.6E-08
Chloroaniline, p-	3.5E-08
Trichlorobenzene, 1,2,3-	2.9E-08
Acetone	2.9E-08
Bromophenyl-phenylether, 4-	2.8E-08
Chloro-3-methylphenol, 4-	2.7E-08
Hexachloro-1,3-butadiene (Perchlorobutadiene)	2.6E-08
Naphthalene	2.6E-08
Acetophenone	2.6E-08
Cresol, o-	2.6E-08
N-nitrosodimethylamine	2.3E-08
Butylbenzylphthalate	1.9E-08
Chlordane	1.8E-08
Dichlorobenzene, 1,3-	1.8E-08
2,5-Dimethylheptane	1.7E-08
Diethyl phthalate	1.7E-08
Acenaphthylene	1.7E-08
Tetrachloroethane, 1,1,2,2-	1.6E-08
Vinyl Acetate	1.6E-08
Dichloropropene, 1,3- (cis)	1.5E-08
Xylene, p-	1.4E-08
Xylene, m-	1.4E-08
Bis(2-chloroethoxy) methane	1.4E-08
Trichlorophenol, 2,4,5-	1.3E-08
Nitroaniline, 2-	1.3E-08
Nitrobenzene	1.3E-08
Dichlorophenol, 2,4-	1.2E-08
Benzo(b)fluoranthene	1.2E-08
2-Hexanone	1.2E-08
Hexachloroethane (Perchloroethane)	1.2E-08
Cresol, p-	1.1E-08
Cresol, m-	1.1E-08
Dimethyl phthalate	1.1E-08
Endosulfan I	1.1E-08
Trichlorophenol, 2,4,6-	1.1E-08
BHC, beta-	9.9E-09
Pyridine	9.4E-09
Dibenzofuran	8.9E-09
Diphenylamine	8.9E-09
Bromobenzene	8.3E-09
Aldrin	8.1E-09
Tetrachlorobenzene, 1,2,4,5-	8.1E-09
Nitrosodiphenylamine, N-	8.0E-09

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS - UPSET CONDITIONS (MAXIMUM MEASURED EMISSION RATE *10)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Isophorone	7.9E-09
Pentachlorobenzene	7.5E-09
Di-n-octylphthalate	7.4E-09
Chrysene	6.6E-09
Trichlorobenzene, 1,2,4-	6.6E-09
Aroclor 1254	6.1E-09
Diphenylhydrazine,1,2-	5.8E-09
3-Ethyl benzaldehyde	5.7E-09
4-Ethyl benzaldehyde	5.7E-09
Trichloropropane, 1,2,3-	5.2E-09
DDT, 4-4'-	5.1E-09
Butylbenzene, sec	4.9E-09
Xylene, o-	4.9E-09
1,1-Dichloropropene	4.3E-09
Trichloroethane, 1,1,2-	4.0E-09
Benzo(a)Anthracene	3.9E-09
Dieldrin	3.8E-09
BHC, alpha-	3.8E-09
Benzo(k)fluoranthene	3.6E-09
Styrene	3.4E-09
Bis(2-chlorethyl)ether	3.4E-09
2,2'-oxybis (1-Chloropropane)	3.2E-09
Iodomethane	3.0E-09
Indeno(1,2,3-cd) pyrene	2.6E-09
Methyl isobutyl ketone	2.3E-09
Benzo(a)pyrene	2.3E-09
gamma-BHC (Lindane)	1.9E-09
TetraCDD, 2,3,7,8-	1.9E-09
TetraCDF, 2,3,7,8-	1.7E-09
Ethylene dibromide	1.6E-09
Trichloroethylene	1.5E-09
Tetrahydrofuran	1.5E-09
DDD, 4,4'-	1.5E-09
Pyrene	1.5E-09
Tetrachloroethane, 1,1,1,2-	1.3E-09
1,3-Dichloropropane	1.2E-09
Butylbenzene, n-	1.2E-09
Dichloroethylene 1,1-	1.2E-09
2,2-Dichloropropane	1.2E-09
Butylbenzene, tert	1.2E-09
PentaCDD, 1,2,3,7,8-	1.1E-09
Vinyl Chloride	1.1E-09
Trichloroethane, 1,1,1-	1.0E-09
Anthracene	9.5E-10
Acenaphthene	9.2E-10
2-Methylnaphthalene	8.9E-10
Trimethylbenzene, 1,3,5-	8.1E-10
Dichlorobenzene, 1,2-	7.1E-10
HexaCDF, 1,2,3,6,7,8-	7.0E-10
Dichloroethane, 1,2- (Ethylene Dichloride)	6.6E-10
HexaCDF, 2,3,4,6,7,8-	5.6E-10
HexaCDF, 1,2,3,4,7,8-	4.6E-10
Methoxychlor	4.6E-10
Dichlorobenzene,1,4-	4.2E-10
DDE, 4,4'-	4.1E-10
Fluorene	3.6E-10
Cumene (Isopropylbenzene)	3.6E-10
2-Chlorotoluene	3.1E-10
4-Chlorotoluene	3.1E-10
Ethylene Glycol	2.7E-10
Propylbenzene, n-	2.6E-10
Trichlorofluoromethane (Freon 11)	2.3E-10
1,2,4-Trimethylbenzene	2.3E-10
Dichloroethylene, cis-1,2-	2.0E-10
Ethylbenzene	2.0E-10
Dichloropropane, 1,2-	2.0E-10
PentaCDF, 1,2,3,7,8-	1.9E-10
HexaCDD, 1,2,3,4,7,8-	1.5E-10
Benzo(g,h,i)perylene	1.4E-10
Chloroethane	1.3E-10
Dichlorodifluoromethane	1.3E-10

ACUTE INHALATION RISK RESULTS

**REACTIVATION FACILITY STACK EMISSIONS -
UPSET CONDITIONS (MAXIMUM MEASURED EMISSION RATE *10)**

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Bromochloromethane	1.3E-10
methyl tert-butyl ether	9.9E-11
Propylene oxide	7.0E-11
Dichloroethylene-1,2 (trans)	6.5E-11
Dichloroethane 1,1-	6.2E-11
HexaCDD, 1,2,3,7,8,9-	1.8E-11
Methyl methacrylate	1.7E-11
HexaCDD, 1,2,3,6,7,8-	1.1E-11
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	8.3E-12
Dioxane, 1,4-	6.5E-12
Dibenz(a,h)anthracene	2.7E-12
HeptaCDF, 1,2,3,4,6,7,8-	1.8E-12
HexaCDF, 1,2,3,7,8,9-	9.4E-13
Acrylic Acid	6.5E-13
OctaCDF, 1,2,3,4,6,7,8,9-	5.2E-13
HeptaCDF, 1,2,3,4,7,8,9-	1.2E-13
1-Hexane (n-hexane)	1.2E-13
OctaCDD, 1,2,3,4,6,7,8,9-	1.1E-13
HeptaCDD, 1,2,3,4,6,7,8-	8.7E-14
Endosulfan sulfate	NC
2,5-Dione, 3-hexene	NC
Benzo(e)pyrene	NC
Perylene	NC
Phosphine imide, P,P,P-triphenyl	NC
Diallate	NC
9-Octadecenamide (oleamide)	NC
delta-BHC	NC
2-Methyl octane	NC
Endosulfan II	NC
Endrin ketone	NC
3-Penten-2-one (ethylidene acetone)	NC
2,5-Dimethylfuran	NC
Endrin aldehyde	NC
3-Hexen-2-one	NC
Benzoic acid, methyl ester (methyl benzoate)	NC
Isopropyl toluene, p-	NC
Total (b)	2.3E-01

NC = Not calculated.

(a) Acute hazard quotients were calculated for all compounds with stack air emission rates and acute inhalation toxicity criteria.

(b) The total is based on the sum of all chemical-specific hazard quotients regardless of the type of health effects of the summed compounds. A total value summed across all compounds is used as a screening tool only, to determine if additional evaluation for specific types of health effects is warranted (i.e., if the total value is greater than 1).

ATTACHMENT B

FUGITIVE EMISSIONS RISK ASSESSMENT:

DETAILED CHRONIC AND ACUTE RISK RESULTS INCLUDING

TOTAL CHROMIUM AND HEXAVALENT CHROMIUM

Fugitive Air Emissions Risk Assessment
Chronic Inhalation Risk Results by Compound
(IRAP Software Output Information)

Receptor	Scenario	Compound	Inhalation Excess Lifetime Cancer Risk	Inhalation Non-Cancer Hazard Quotient
R_1 resident	resident_adult	1,3-Butadiene	1.0E-08	3.9E-04
R_1 resident	resident_adult	1-Hexane (n-hexane)	0.0E+00	3.7E-07
R_1 resident	resident_adult	Acrylonitrile	1.8E-09	3.2E-05
R_1 resident	resident_adult	Arsenic	2.3E-14	4.2E-10
R_1 resident	resident_adult	Benzene	6.0E-11	6.0E-07
R_1 resident	resident_adult	Beryllium	1.1E-15	5.3E-11
R_1 resident	resident_adult	Cadmium	4.5E-15	2.9E-11
R_1 resident	resident_adult	Chloroform (Trichloromethane)	8.7E-12	2.9E-06
R_1 resident	resident_adult	Chromium	0.0E+00	4.0E-15
R_1 resident	resident_adult	Chromium, hexavalent	1.5E-14	3.6E-10
R_1 resident	resident_adult	Cobalt	0.0E+00	2.0E-10
R_1 resident	resident_adult	Copper	0.0E+00	6.1E-12
R_1 resident	resident_adult	Cyclohexane	0.0E+00	5.6E-08
R_1 resident	resident_adult	Dichlorobenzene,1,4-	1.2E-11	3.1E-09
R_1 resident	resident_adult	Ethylbenzene	0.0E+00	5.3E-09
R_1 resident	resident_adult	Ethylene Dibromide	3.0E-11	1.3E-08
R_1 resident	resident_adult	Ethylene Glycol	0.0E+00	9.6E-11
R_1 resident	resident_adult	Naphthalene	0.0E+00	8.6E-09
R_1 resident	resident_adult	Nickel	7.1E-15	3.5E-10
R_1 resident	resident_adult	Styrene	0.0E+00	5.8E-09
R_1 resident	resident_adult	Tetrachloroethylene (Perchloroethylene)	2.7E-11	2.6E-08
R_1 resident	resident_adult	Toluene	0.0E+00	2.1E-08
R_1 resident	resident_adult	Trichloroethylene	5.3E-12	1.0E-08
R_1 resident	resident_adult	Vinyl Chloride	3.7E-11	9.9E-08
		Total	1E-08	4E-04
R_1 resident	resident_child	1,3-Butadiene	2.0E-09	3.9E-04
R_1 resident	resident_child	1-Hexane (n-hexane)	0.0E+00	3.7E-07
R_1 resident	resident_child	Acrylonitrile	3.7E-10	3.2E-05
R_1 resident	resident_child	Arsenic	4.7E-15	4.2E-10
R_1 resident	resident_child	Benzene	1.2E-11	6.0E-07
R_1 resident	resident_child	Beryllium	2.2E-16	5.3E-11
R_1 resident	resident_child	Cadmium	9.1E-16	2.9E-11
R_1 resident	resident_child	Chloroform (Trichloromethane)	1.7E-12	2.9E-06
R_1 resident	resident_child	Chromium	0.0E+00	4.0E-15
R_1 resident	resident_child	Chromium, hexavalent	2.9E-15	3.6E-10
R_1 resident	resident_child	Cobalt	0.0E+00	2.0E-10
R_1 resident	resident_child	Copper	0.0E+00	6.1E-12
R_1 resident	resident_child	Cyclohexane	0.0E+00	5.6E-08
R_1 resident	resident_child	Dichlorobenzene,1,4-	2.3E-12	3.1E-09
R_1 resident	resident_child	Ethylbenzene	0.0E+00	5.3E-09
R_1 resident	resident_child	Ethylene Dibromide	6.1E-12	1.3E-08
R_1 resident	resident_child	Ethylene Glycol	0.0E+00	9.6E-11
R_1 resident	resident_child	Naphthalene	0.0E+00	8.6E-09
R_1 resident	resident_child	Nickel	1.4E-15	3.5E-10
R_1 resident	resident_child	Styrene	0.0E+00	5.8E-09
R_1 resident	resident_child	Tetrachloroethylene (Perchloroethylene)	5.3E-12	2.6E-08
R_1 resident	resident_child	Toluene	0.0E+00	2.1E-08
R_1 resident	resident_child	Trichloroethylene	1.1E-12	1.0E-08
R_1 resident	resident_child	Vinyl Chloride	7.5E-12	9.9E-08
		Total	2E-09	4E-04
R_2 resident	resident_adult	1,3-Butadiene	2.4E-08	9.2E-04
R_2 resident	resident_adult	1-Hexane (n-hexane)	0.0E+00	8.7E-07
R_2 resident	resident_adult	Acrylonitrile	4.4E-09	7.5E-05
R_2 resident	resident_adult	Arsenic	5.5E-14	1.0E-09
R_2 resident	resident_adult	Benzene	1.4E-10	1.4E-06
R_2 resident	resident_adult	Beryllium	2.6E-15	1.3E-10
R_2 resident	resident_adult	Cadmium	1.1E-14	7.0E-11
R_2 resident	resident_adult	Chloroform (Trichloromethane)	2.1E-11	6.9E-06
R_2 resident	resident_adult	Chromium	0.0E+00	9.5E-15
R_2 resident	resident_adult	Chromium, hexavalent	3.5E-14	8.4E-10
R_2 resident	resident_adult	Cobalt	0.0E+00	4.8E-10
R_2 resident	resident_adult	Copper	0.0E+00	1.4E-11

Fugitive Air Emissions Risk Assessment
Chronic Inhalation Risk Results by Compound
(IRAP Software Output Information)

Receptor	Scenario	Compound	Inhalation Excess Lifetime Cancer Risk	Inhalation Non-Cancer Hazard Quotient
R_2 resident	resident_adult	Cyclohexane	0.0E+00	1.3E-07
R_2 resident	resident_adult	Dichlorobenzene,1,4-	2.7E-11	7.3E-09
R_2 resident	resident_adult	Ethylbenzene	0.0E+00	1.2E-08
R_2 resident	resident_adult	Ethylene Dibromide	7.2E-11	3.1E-08
R_2 resident	resident_adult	Ethylene Glycol	0.0E+00	2.3E-10
R_2 resident	resident_adult	Naphthalene	0.0E+00	2.0E-08
R_2 resident	resident_adult	Nickel	1.7E-14	8.2E-10
R_2 resident	resident_adult	Styrene	0.0E+00	1.4E-08
R_2 resident	resident_adult	Tetrachloroethylene (Perchloroethylene)	6.3E-11	6.2E-08
R_2 resident	resident_adult	Toluene	0.0E+00	5.0E-08
R_2 resident	resident_adult	Trichloroethylene	1.3E-11	2.4E-08
R_2 resident	resident_adult	Vinyl Chloride	8.9E-11	2.3E-07
		Total	3E-08	1E-03
R_2 resident	resident_child	1,3-Butadiene	4.7E-09	9.2E-04
R_2 resident	resident_child	1-Hexane (n-hexane)	0.0E+00	8.7E-07
R_2 resident	resident_child	Acrylonitrile	8.7E-10	7.5E-05
R_2 resident	resident_child	Arsenic	1.1E-14	1.0E-09
R_2 resident	resident_child	Benzene	2.8E-11	1.4E-06
R_2 resident	resident_child	Beryllium	5.2E-16	1.3E-10
R_2 resident	resident_child	Cadmium	2.1E-15	7.0E-11
R_2 resident	resident_child	Chloroform (Trichloromethane)	4.1E-12	6.9E-06
R_2 resident	resident_child	Chromium	0.0E+00	9.5E-15
R_2 resident	resident_child	Chromium, hexavalent	6.9E-15	8.4E-10
R_2 resident	resident_child	Cobalt	0.0E+00	4.8E-10
R_2 resident	resident_child	Copper	0.0E+00	1.4E-11
R_2 resident	resident_child	Cyclohexane	0.0E+00	1.3E-07
R_2 resident	resident_child	Dichlorobenzene,1,4-	5.5E-12	7.3E-09
R_2 resident	resident_child	Ethylbenzene	0.0E+00	1.2E-08
R_2 resident	resident_child	Ethylene Dibromide	1.4E-11	3.1E-08
R_2 resident	resident_child	Ethylene Glycol	0.0E+00	2.3E-10
R_2 resident	resident_child	Naphthalene	0.0E+00	2.0E-08
R_2 resident	resident_child	Nickel	3.4E-15	8.2E-10
R_2 resident	resident_child	Styrene	0.0E+00	1.4E-08
R_2 resident	resident_child	Tetrachloroethylene (Perchloroethylene)	1.3E-11	6.2E-08
R_2 resident	resident_child	Toluene	0.0E+00	5.0E-08
R_2 resident	resident_child	Trichloroethylene	2.5E-12	2.4E-08
R_2 resident	resident_child	Vinyl Chloride	1.8E-11	2.3E-07
		Total	6E-09	1E-03
R_3 resident farmer	farmer_adult	1,3-Butadiene	3.9E-08	1.1E-03
R_3 resident farmer	farmer_adult	1-Hexane (n-hexane)	0.0E+00	1.1E-06
R_3 resident farmer	farmer_adult	Acrylonitrile	7.2E-09	9.3E-05
R_3 resident farmer	farmer_adult	Arsenic	9.2E-14	1.2E-09
R_3 resident farmer	farmer_adult	Benzene	2.4E-10	1.8E-06
R_3 resident farmer	farmer_adult	Beryllium	4.3E-15	1.6E-10
R_3 resident farmer	farmer_adult	Cadmium	1.8E-14	8.7E-11
R_3 resident farmer	farmer_adult	Chloroform (Trichloromethane)	3.4E-11	8.6E-06
R_3 resident farmer	farmer_adult	Chromium	0.0E+00	1.2E-14
R_3 resident farmer	farmer_adult	Chromium, hexavalent	5.8E-14	1.1E-09
R_3 resident farmer	farmer_adult	Cobalt	0.0E+00	6.0E-10
R_3 resident farmer	farmer_adult	Copper	0.0E+00	1.8E-11
R_3 resident farmer	farmer_adult	Cyclohexane	0.0E+00	1.6E-07
R_3 resident farmer	farmer_adult	Dichlorobenzene,1,4-	4.6E-11	9.1E-09
R_3 resident farmer	farmer_adult	Ethylbenzene	0.0E+00	1.5E-08
R_3 resident farmer	farmer_adult	Ethylene Dibromide	1.2E-10	3.9E-08
R_3 resident farmer	farmer_adult	Ethylene Glycol	0.0E+00	2.8E-10
R_3 resident farmer	farmer_adult	Naphthalene	0.0E+00	2.5E-08
R_3 resident farmer	farmer_adult	Nickel	2.8E-14	1.0E-09
R_3 resident farmer	farmer_adult	Styrene	0.0E+00	1.7E-08
R_3 resident farmer	farmer_adult	Tetrachloroethylene (Perchloroethylene)	1.0E-10	7.8E-08
R_3 resident farmer	farmer_adult	Toluene	0.0E+00	6.2E-08
R_3 resident farmer	farmer_adult	Trichloroethylene	2.1E-11	3.0E-08

Fugitive Air Emissions Risk Assessment
Chronic Inhalation Risk Results by Compound
(IRAP Software Output Information)

Receptor	Scenario	Compound	Inhalation Excess Lifetime Cancer Risk	Inhalation Non-Cancer Hazard Quotient
R_3 resident farmer	farmer_adult	Vinyl Chloride	1.5E-10	2.9E-07
		Total	5E-08	1E-03
R_3 resident farmer	farmer_child	1,3-Butadiene	5.9E-09	1.1E-03
R_3 resident farmer	farmer_child	1-Hexane (n-hexane)	0.0E+00	1.1E-06
R_3 resident farmer	farmer_child	Acrylonitrile	1.1E-09	9.3E-05
R_3 resident farmer	farmer_child	Arsenic	1.4E-14	1.2E-09
R_3 resident farmer	farmer_child	Benzene	3.5E-11	1.8E-06
R_3 resident farmer	farmer_child	Beryllium	6.4E-16	1.6E-10
R_3 resident farmer	farmer_child	Cadmium	2.7E-15	8.7E-11
R_3 resident farmer	farmer_child	Chloroform (Trichloromethane)	5.1E-12	8.6E-06
R_3 resident farmer	farmer_child	Chromium	0.0E+00	1.2E-14
R_3 resident farmer	farmer_child	Chromium, hexavalent	8.7E-15	1.1E-09
R_3 resident farmer	farmer_child	Cobalt	0.0E+00	6.0E-10
R_3 resident farmer	farmer_child	Copper	0.0E+00	1.8E-11
R_3 resident farmer	farmer_child	Cyclohexane	0.0E+00	1.6E-07
R_3 resident farmer	farmer_child	Dichlorobenzene,1,4-	6.8E-12	9.1E-09
R_3 resident farmer	farmer_child	Ethylbenzene	0.0E+00	1.5E-08
R_3 resident farmer	farmer_child	Ethylene Dibromide	1.8E-11	3.9E-08
R_3 resident farmer	farmer_child	Ethylene Glycol	0.0E+00	2.8E-10
R_3 resident farmer	farmer_child	Naphthalene	0.0E+00	2.5E-08
R_3 resident farmer	farmer_child	Nickel	4.2E-15	1.0E-09
R_3 resident farmer	farmer_child	Styrene	0.0E+00	1.7E-08
R_3 resident farmer	farmer_child	Tetrachloroethylene (Perchloroethylene)	1.6E-11	7.8E-08
R_3 resident farmer	farmer_child	Toluene	0.0E+00	6.2E-08
R_3 resident farmer	farmer_child	Trichloroethylene	3.1E-12	3.0E-08
R_3 resident farmer	farmer_child	Vinyl Chloride	2.2E-11	2.9E-07
		Total	7E-09	1E-03
R_4 resident farmer	farmer_adult	1,3-Butadiene	3.2E-08	9.4E-04
R_4 resident farmer	farmer_adult	1-Hexane (n-hexane)	0.0E+00	8.8E-07
R_4 resident farmer	farmer_adult	Acrylonitrile	5.9E-09	7.6E-05
R_4 resident farmer	farmer_adult	Arsenic	7.5E-14	1.0E-09
R_4 resident farmer	farmer_adult	Benzene	1.9E-10	1.4E-06
R_4 resident farmer	farmer_adult	Beryllium	3.5E-15	1.3E-10
R_4 resident farmer	farmer_adult	Cadmium	1.5E-14	7.1E-11
R_4 resident farmer	farmer_adult	Chloroform (Trichloromethane)	2.8E-11	7.0E-06
R_4 resident farmer	farmer_adult	Chromium	0.0E+00	9.7E-15
R_4 resident farmer	farmer_adult	Chromium, hexavalent	4.7E-14	8.6E-10
R_4 resident farmer	farmer_adult	Cobalt	0.0E+00	4.9E-10
R_4 resident farmer	farmer_adult	Copper	0.0E+00	1.5E-11
R_4 resident farmer	farmer_adult	Cyclohexane	0.0E+00	1.3E-07
R_4 resident farmer	farmer_adult	Dichlorobenzene,1,4-	3.7E-11	7.4E-09
R_4 resident farmer	farmer_adult	Ethylbenzene	0.0E+00	1.3E-08
R_4 resident farmer	farmer_adult	Ethylene Dibromide	9.7E-11	3.1E-08
R_4 resident farmer	farmer_adult	Ethylene Glycol	0.0E+00	2.3E-10
R_4 resident farmer	farmer_adult	Naphthalene	0.0E+00	2.1E-08
R_4 resident farmer	farmer_adult	Nickel	2.3E-14	8.3E-10
R_4 resident farmer	farmer_adult	Styrene	0.0E+00	1.4E-08
R_4 resident farmer	farmer_adult	Tetrachloroethylene (Perchloroethylene)	8.5E-11	6.3E-08
R_4 resident farmer	farmer_adult	Toluene	0.0E+00	5.1E-08
R_4 resident farmer	farmer_adult	Trichloroethylene	1.7E-11	2.5E-08
R_4 resident farmer	farmer_adult	Vinyl Chloride	1.2E-10	2.4E-07
		Total	4E-08	1E-03
R_4 resident farmer	farmer_child	1,3-Butadiene	4.8E-09	9.4E-04
R_4 resident farmer	farmer_child	1-Hexane (n-hexane)	0.0E+00	8.8E-07
R_4 resident farmer	farmer_child	Acrylonitrile	8.8E-10	7.6E-05
R_4 resident farmer	farmer_child	Arsenic	1.1E-14	1.0E-09
R_4 resident farmer	farmer_child	Benzene	2.9E-11	1.4E-06
R_4 resident farmer	farmer_child	Beryllium	5.2E-16	1.3E-10
R_4 resident farmer	farmer_child	Cadmium	2.2E-15	7.1E-11
R_4 resident farmer	farmer_child	Chloroform (Trichloromethane)	4.2E-12	7.0E-06
R_4 resident farmer	farmer_child	Chromium	0.0E+00	9.7E-15

Fugitive Air Emissions Risk Assessment
Chronic Inhalation Risk Results by Compound
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Receptor	Scenario	Compound	Inhalation Excess Lifetime Cancer Risk	Inhalation Non-Cancer Hazard Quotient
R_4 resident farmer	farmer_child	Chromium, hexavalent	7.0E-15	8.6E-10
R_4 resident farmer	farmer_child	Cobalt	0.0E+00	4.9E-10
R_4 resident farmer	farmer_child	Copper	0.0E+00	1.5E-11
R_4 resident farmer	farmer_child	Cyclohexane	0.0E+00	1.3E-07
R_4 resident farmer	farmer_child	Dichlorobenzene,1,4-	5.6E-12	7.4E-09
R_4 resident farmer	farmer_child	Ethylbenzene	0.0E+00	1.3E-08
R_4 resident farmer	farmer_child	Ethylene Dibromide	1.5E-11	3.1E-08
R_4 resident farmer	farmer_child	Ethylene Glycol	0.0E+00	2.3E-10
R_4 resident farmer	farmer_child	Naphthalene	0.0E+00	2.1E-08
R_4 resident farmer	farmer_child	Nickel	3.4E-15	8.3E-10
R_4 resident farmer	farmer_child	Styrene	0.0E+00	1.4E-08
R_4 resident farmer	farmer_child	Tetrachloroethylene (Perchloroethylene)	1.3E-11	6.3E-08
R_4 resident farmer	farmer_child	Toluene	0.0E+00	5.1E-08
R_4 resident farmer	farmer_child	Trichloroethylene	2.5E-12	2.5E-08
R_4 resident farmer	farmer_child	Vinyl Chloride	1.8E-11	2.4E-07
		Total	6E-09	1E-03
R_5 resident	resident_adult	1,3-Butadiene	2.1E-08	8.0E-04
R_5 resident	resident_adult	1-Hexane (n-hexane)	0.0E+00	7.5E-07
R_5 resident	resident_adult	Acrylonitrile	3.8E-09	6.5E-05
R_5 resident	resident_adult	Arsenic	4.8E-14	8.7E-10
R_5 resident	resident_adult	Benzene	1.2E-10	1.2E-06
R_5 resident	resident_adult	Beryllium	2.2E-15	1.1E-10
R_5 resident	resident_adult	Cadmium	9.3E-15	6.0E-11
R_5 resident	resident_adult	Chloroform (Trichloromethane)	1.8E-11	6.0E-06
R_5 resident	resident_adult	Chromium	0.0E+00	8.3E-15
R_5 resident	resident_adult	Chromium, hexavalent	3.0E-14	7.3E-10
R_5 resident	resident_adult	Cobalt	0.0E+00	4.2E-10
R_5 resident	resident_adult	Copper	0.0E+00	1.2E-11
R_5 resident	resident_adult	Cyclohexane	0.0E+00	1.1E-07
R_5 resident	resident_adult	Dichlorobenzene,1,4-	2.4E-11	6.3E-09
R_5 resident	resident_adult	Ethylbenzene	0.0E+00	1.1E-08
R_5 resident	resident_adult	Ethylene Dibromide	6.2E-11	2.7E-08
R_5 resident	resident_adult	Ethylene Glycol	0.0E+00	2.0E-10
R_5 resident	resident_adult	Naphthalene	0.0E+00	1.8E-08
R_5 resident	resident_adult	Nickel	1.5E-14	7.1E-10
R_5 resident	resident_adult	Styrene	0.0E+00	1.2E-08
R_5 resident	resident_adult	Tetrachloroethylene (Perchloroethylene)	5.5E-11	5.4E-08
R_5 resident	resident_adult	Toluene	0.0E+00	4.3E-08
R_5 resident	resident_adult	Trichloroethylene	1.1E-11	2.1E-08
R_5 resident	resident_adult	Vinyl Chloride	7.7E-11	2.0E-07
		Total	2E-08	9E-04
R_5 resident	resident_child	1,3-Butadiene	4.1E-09	8.0E-04
R_5 resident	resident_child	1-Hexane (n-hexane)	0.0E+00	7.5E-07
R_5 resident	resident_child	Acrylonitrile	7.5E-10	6.5E-05
R_5 resident	resident_child	Arsenic	9.6E-15	8.7E-10
R_5 resident	resident_child	Benzene	2.5E-11	1.2E-06
R_5 resident	resident_child	Beryllium	4.5E-16	1.1E-10
R_5 resident	resident_child	Cadmium	1.9E-15	6.0E-11
R_5 resident	resident_child	Chloroform (Trichloromethane)	3.6E-12	6.0E-06
R_5 resident	resident_child	Chromium	0.0E+00	8.3E-15
R_5 resident	resident_child	Chromium, hexavalent	6.0E-15	7.3E-10
R_5 resident	resident_child	Cobalt	0.0E+00	4.2E-10
R_5 resident	resident_child	Copper	0.0E+00	1.2E-11
R_5 resident	resident_child	Cyclohexane	0.0E+00	1.1E-07
R_5 resident	resident_child	Dichlorobenzene,1,4-	4.8E-12	6.3E-09
R_5 resident	resident_child	Ethylbenzene	0.0E+00	1.1E-08
R_5 resident	resident_child	Ethylene Dibromide	1.2E-11	2.7E-08
R_5 resident	resident_child	Ethylene Glycol	0.0E+00	2.0E-10
R_5 resident	resident_child	Naphthalene	0.0E+00	1.8E-08
R_5 resident	resident_child	Nickel	2.9E-15	7.1E-10
R_5 resident	resident_child	Styrene	0.0E+00	1.2E-08

Fugitive Air Emissions Risk Assessment
Chronic Inhalation Risk Results by Compound
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Receptor	Scenario	Compound	Inhalation Excess Lifetime Cancer Risk	Inhalation Non-Cancer Hazard Quotient
R_5 resident	resident_child	Tetrachloroethylene (Perchloroethylene)	1.1E-11	5.4E-08
R_5 resident	resident_child	Toluene	0.0E+00	4.3E-08
R_5 resident	resident_child	Trichloroethylene	2.2E-12	2.1E-08
R_5 resident	resident_child	Vinyl Chloride	1.5E-11	2.0E-07
		Total	5E-09	9E-04
R_6 resident	resident_adult	1,3-Butadiene	2.6E-08	1.0E-03
R_6 resident	resident_adult	1-Hexane (n-hexane)	0.0E+00	9.4E-07
R_6 resident	resident_adult	Acrylonitrile	4.7E-09	8.1E-05
R_6 resident	resident_adult	Arsenic	6.0E-14	1.1E-09
R_6 resident	resident_adult	Benzene	1.5E-10	1.5E-06
R_6 resident	resident_adult	Beryllium	2.8E-15	1.4E-10
R_6 resident	resident_adult	Cadmium	1.2E-14	7.5E-11
R_6 resident	resident_adult	Chloroform (Trichloromethane)	2.2E-11	7.5E-06
R_6 resident	resident_adult	Chromium	0.0E+00	1.0E-14
R_6 resident	resident_adult	Chromium, hexavalent	3.7E-14	9.1E-10
R_6 resident	resident_adult	Cobalt	0.0E+00	5.2E-10
R_6 resident	resident_adult	Copper	0.0E+00	1.5E-11
R_6 resident	resident_adult	Cyclohexane	0.0E+00	1.4E-07
R_6 resident	resident_adult	Dichlorobenzene,1,4-	3.0E-11	7.9E-09
R_6 resident	resident_adult	Ethylbenzene	0.0E+00	1.3E-08
R_6 resident	resident_adult	Ethylene Dibromide	7.7E-11	3.3E-08
R_6 resident	resident_adult	Ethylene Glycol	0.0E+00	2.4E-10
R_6 resident	resident_adult	Naphthalene	0.0E+00	2.2E-08
R_6 resident	resident_adult	Nickel	1.8E-14	8.8E-10
R_6 resident	resident_adult	Styrene	0.0E+00	1.5E-08
R_6 resident	resident_adult	Tetrachloroethylene (Perchloroethylene)	6.8E-11	6.7E-08
R_6 resident	resident_adult	Toluene	0.0E+00	5.4E-08
R_6 resident	resident_adult	Trichloroethylene	1.4E-11	2.6E-08
R_6 resident	resident_adult	Vinyl Chloride	9.6E-11	2.5E-07
		Total	3E-08	1E-03
R_6 resident	resident_child	1,3-Butadiene	5.1E-09	1.0E-03
R_6 resident	resident_child	1-Hexane (n-hexane)	0.0E+00	9.4E-07
R_6 resident	resident_child	Acrylonitrile	9.4E-10	8.1E-05
R_6 resident	resident_child	Arsenic	1.2E-14	1.1E-09
R_6 resident	resident_child	Benzene	3.1E-11	1.5E-06
R_6 resident	resident_child	Beryllium	5.6E-16	1.4E-10
R_6 resident	resident_child	Cadmium	2.3E-15	7.5E-11
R_6 resident	resident_child	Chloroform (Trichloromethane)	4.4E-12	7.5E-06
R_6 resident	resident_child	Chromium	0.0E+00	1.0E-14
R_6 resident	resident_child	Chromium, hexavalent	7.5E-15	9.1E-10
R_6 resident	resident_child	Cobalt	0.0E+00	5.2E-10
R_6 resident	resident_child	Copper	0.0E+00	1.5E-11
R_6 resident	resident_child	Cyclohexane	0.0E+00	1.4E-07
R_6 resident	resident_child	Dichlorobenzene,1,4-	5.9E-12	7.9E-09
R_6 resident	resident_child	Ethylbenzene	0.0E+00	1.3E-08
R_6 resident	resident_child	Ethylene Dibromide	1.5E-11	3.3E-08
R_6 resident	resident_child	Ethylene Glycol	0.0E+00	2.4E-10
R_6 resident	resident_child	Naphthalene	0.0E+00	2.2E-08
R_6 resident	resident_child	Nickel	3.6E-15	8.8E-10
R_6 resident	resident_child	Styrene	0.0E+00	1.5E-08
R_6 resident	resident_child	Tetrachloroethylene	1.4E-11	6.7E-08
R_6 resident	resident_child	Toluene	0.0E+00	5.4E-08
R_6 resident	resident_child	Trichloroethylene	2.7E-12	2.6E-08
R_6 resident	resident_child	Vinyl Chloride	1.9E-11	2.5E-07
		Total	6E-09	1E-03

IRAP-h View

ACUTE INHALATION RISK RESULTS
FUGITIVE AIR EMISSIONS DURING UNLOADING AT OUTDOOR HOPPER

Emission Rates Based On Average Concentration in All Delivered Spent Carbon Loads Over 4-Year Period (2003-2006 Data)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
A_1 maximum impact point (stack emissions)	
Benzene	2.1E-04
Chloroform (Trichloromethane)	8.8E-05
Acrylonitrile	4.3E-05
1,3-Butadiene	7.9E-06
Tetrachloroethylene (Perchloroethylene)	7.9E-06
Cyclohexane	5.0E-06
Styrene	4.1E-06
Toluene	3.4E-06
1-Hexane (n-hexane)	2.6E-06
Arsenic	1.0E-06
Vinyl Chloride	8.2E-07
Nickel	1.7E-07
Ethylbenzene	1.6E-07
Trichloroethylene	1.3E-07
Dichlorobenzene,1,4-	6.1E-08
Copper	3.2E-08
Ethylene Dibromide	8.8E-09
Naphthalene	5.1E-09
Beryllium	3.2E-09
Cadmium	2.9E-09
Chromium	2.1E-10
Cobalt	1.0E-10
Chromium, hexavalent (c)	0.0E+00
Total	3.7E-04
A_2 closest business	
Benzene	4.6E-04
Chloroform (Trichloromethane)	1.9E-04
Acrylonitrile	9.5E-05
1,3-Butadiene	1.7E-05
Tetrachloroethylene (Perchloroethylene)	1.7E-05
Cyclohexane	1.1E-05
Styrene	9.2E-06
Toluene	7.5E-06
1-Hexane (n-hexane)	5.7E-06
Arsenic	2.2E-06
Vinyl Chloride	1.8E-06
Nickel	3.8E-07
Ethylbenzene	3.5E-07
Trichloroethylene	2.9E-07
Dichlorobenzene,1,4-	1.4E-07
Copper	7.0E-08
Ethylene Dibromide	1.9E-08
Naphthalene	1.1E-08
Beryllium	7.0E-09
Cadmium	6.5E-09
Chromium	4.7E-10
Cobalt	2.3E-10
Chromium, hexavalent (c)	0.0E+00
Total	8.2E-04
A_3 maximum impact point (hopper fugitive emissions)	
Benzene	1.1E-02
Chloroform (Trichloromethane)	4.8E-03
Acrylonitrile	2.4E-03
1,3-Butadiene	4.3E-04
Tetrachloroethylene (Perchloroethylene)	4.3E-04
Cyclohexane	2.7E-04
Styrene	2.3E-04
Toluene	1.9E-04
1-Hexane (n-hexane)	1.4E-04
Arsenic	5.5E-05
Vinyl Chloride	4.5E-05
Nickel	9.5E-06

ACUTE INHALATION RISK RESULTS
FUGITIVE AIR EMISSIONS DURING UNLOADING AT OUTDOOR HOPPER

Emission Rates Based On Average Concentration in All Delivered Spent Carbon Loads Over 4-Year Period (2003-2006 Data)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Ethylbenzene	8.6E-06
Trichloroethylene	7.3E-06
Dichlorobenzene,1,4-	3.4E-06
Copper	1.7E-06
Ethylene Dibromide	4.8E-07
Naphthalene	2.8E-07
Beryllium	1.7E-07
Cadmium	1.6E-07
Chromium	1.2E-08
Cobalt	5.6E-09
Chromium, hexavalent (c)	0.0E+00
Total	2.0E-02
R_1 resident	
Benzene	2.8E-05
Chloroform (Trichloromethane)	1.2E-05
Acrylonitrile	5.8E-06
1,3-Butadiene	1.1E-06
Tetrachloroethylene (Perchloroethylene)	1.1E-06
Cyclohexane	6.8E-07
Styrene	5.7E-07
Toluene	4.6E-07
1-Hexane (n-hexane)	3.5E-07
Arsenic	1.4E-07
Vinyl Chloride	1.1E-07
Nickel	2.4E-08
Ethylbenzene	2.1E-08
Trichloroethylene	1.8E-08
Dichlorobenzene,1,4-	8.4E-09
Copper	4.3E-09
Ethylene Dibromide	1.2E-09
Naphthalene	7.0E-10
Beryllium	4.3E-10
Cadmium	4.0E-10
Chromium	2.9E-11
Cobalt	1.4E-11
Chromium, hexavalent (c)	0.0E+00
Total	5.1E-05
R_2 resident	
Benzene	2.6E-05
Chloroform (Trichloromethane)	1.1E-05
Acrylonitrile	5.4E-06
1,3-Butadiene	9.9E-07
Tetrachloroethylene (Perchloroethylene)	9.9E-07
Cyclohexane	6.3E-07
Styrene	5.2E-07
Toluene	4.3E-07
1-Hexane (n-hexane)	3.2E-07
Arsenic	1.3E-07
Vinyl Chloride	1.0E-07
Nickel	2.2E-08
Ethylbenzene	2.0E-08
Trichloroethylene	1.7E-08
Dichlorobenzene,1,4-	7.7E-09
Copper	4.0E-09
Ethylene Dibromide	1.1E-09
Naphthalene	6.5E-10
Beryllium	4.0E-10
Cadmium	3.7E-10
Chromium	2.7E-11
Cobalt	1.3E-11
Chromium, hexavalent (c)	0.0E+00
Total	4.7E-05
R_3 resident farmer	

ACUTE INHALATION RISK RESULTS
FUGITIVE AIR EMISSIONS DURING UNLOADING AT OUTDOOR HOPPER

Emission Rates Based On Average Concentration in All Delivered Spent Carbon Loads Over 4-Year Period (2003-2006 Data)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Benzene	2.1E-05
Chloroform (Trichloromethane)	8.9E-06
Acrylonitrile	4.4E-06
1,3-Butadiene	8.0E-07
Tetrachloroethylene (Perchloroethylene)	8.0E-07
Cyclohexane	5.1E-07
Styrene	4.2E-07
Toluene	3.5E-07
1-Hexane (n-hexane)	2.6E-07
Arsenic	1.0E-07
Vinyl Chloride	8.4E-08
Nickel	1.8E-08
Ethylbenzene	1.6E-08
Trichloroethylene	1.4E-08
Dichlorobenzene,1,4-	6.3E-09
Copper	3.2E-09
Ethylene Dibromide	9.0E-10
Naphthalene	5.2E-10
Beryllium	3.2E-10
Cadmium	3.0E-10
Chromium	2.2E-11
Cobalt	1.0E-11
Chromium, hexavalent (c)	0.0E+00
Total	3.8E-05
R_4 resident farmer	
Benzene	2.7E-05
Chloroform (Trichloromethane)	1.2E-05
Acrylonitrile	5.6E-06
1,3-Butadiene	1.0E-06
Tetrachloroethylene (Perchloroethylene)	1.0E-06
Cyclohexane	6.6E-07
Styrene	5.4E-07
Toluene	4.5E-07
1-Hexane (n-hexane)	3.4E-07
Arsenic	1.3E-07
Vinyl Chloride	1.1E-07
Nickel	2.3E-08
Ethylbenzene	2.1E-08
Trichloroethylene	1.7E-08
Dichlorobenzene,1,4-	8.1E-09
Copper	4.2E-09
Ethylene Dibromide	1.2E-09
Naphthalene	6.7E-10
Beryllium	4.2E-10
Cadmium	3.9E-10
Chromium	2.8E-11
Cobalt	1.3E-11
Chromium, hexavalent (c)	0.0E+00
Total	4.9E-05
R_5 resident	
Benzene	3.4E-05
Chloroform (Trichloromethane)	1.4E-05
Acrylonitrile	7.0E-06
1,3-Butadiene	1.3E-06
Tetrachloroethylene (Perchloroethylene)	1.3E-06
Cyclohexane	8.2E-07
Styrene	6.8E-07
Toluene	5.6E-07
1-Hexane (n-hexane)	4.2E-07
Arsenic	1.6E-07
Vinyl Chloride	1.4E-07
Nickel	2.8E-08
Ethylbenzene	2.6E-08
Trichloroethylene	2.2E-08

ACUTE INHALATION RISK RESULTS
FUGITIVE AIR EMISSIONS DURING UNLOADING AT OUTDOOR HOPPER

Emission Rates Based On Average Concentration in All Delivered Spent Carbon Loads Over 4-Year Period (2003-2006 Data)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
Dichlorobenzene,1,4-	1.0E-08
Copper	5.2E-09
Ethylene Dibromide	1.4E-09
Naphthalene	8.4E-10
Beryllium	5.2E-10
Cadmium	4.8E-10
Chromium	3.5E-11
Cobalt	1.7E-11
Chromium, hexavalent (c)	0.0E+00
Total	6.1E-05
R_6 resident	
Benzene	1.5E-05
Chloroform (Trichloromethane)	6.5E-06
Acrylonitrile	3.2E-06
1,3-Butadiene	5.8E-07
Tetrachloroethylene (Perchloroethylene)	5.8E-07
Cyclohexane	3.7E-07
Styrene	3.1E-07
Toluene	2.5E-07
1-Hexane (n-hexane)	1.9E-07
Arsenic	7.4E-08
Vinyl Chloride	6.1E-08
Nickel	1.3E-08
Ethylbenzene	1.2E-08
Trichloroethylene	9.8E-09
Dichlorobenzene,1,4-	4.5E-09
Copper	2.3E-09
Ethylene Dibromide	6.5E-10
Naphthalene	3.8E-10
Beryllium	2.3E-10
Cadmium	2.2E-10
Chromium	1.6E-11
Cobalt	7.5E-12
Chromium, hexavalent (c)	0.0E+00
Total	2.7E-05

(a) Acute hazard quotients were calculated for all compounds with fugitive air emission rates and acute inhalation toxicity criteria.

(b) The total is based on the sum of all chemical-specific hazard quotients regardless of the type of health effects of the summed compounds. A total value summed across all compounds is used as a screening tool only, to determine if additional evaluation for specific types of health effects is warranted (i.e., if the total value is greater than 1).

(c) USEPA does not provide an acute inhalation reference concentration for hexavalent chromium.

ATTACHMENT C

EXCERPT FROM 2003 WORKING DRAFT
RISK ASSESSMENT WORKPLAN
FOR THE SIEMENS WATER TECHNOLOGIES CORP.
CARBON REACTIVATION FACILITY:

4.3 FUGITIVE EMISSIONS EXPOSURE ASSESSMENT

ATTACHMENT C

EXCERPT FROM 2003 WORKING DRAFT RISK ASSESSMENT WORKPLAN FOR THE SIEMENS WATER TECHNOLOGIES CORP. CARBON REACTIVATION FACILITY

INTRODUCTION

The following text is an excerpt from the November 2003 Risk Assessment Workplan prepared for the Siemens Water Technologies Corp. (SWT) carbon reactivation facility. This excerpt is provided in response to USEPA Region IX comments on the July 2007 risk assessment that was performed for the facility. The information provided in this excerpt was based on facility data available in 2003.

The Workplan described the approaches proposed for the SWT facility risk assessment. The Workplan, updated by agreement with the USEPA to include elements of more recent 2005 Agency guidance for risk assessments of waste combustion facilities, was approved by USEPA prior to the initiation of the risk assessment.

EXCERPT FROM 2003 WORKPLAN

4.3 Fugitive Emissions Exposure Assessment

USEPA (2001a) requested that Westates' risk analysis address fugitive emissions potentially associated with the carbon reactivation facility including waste unloading, handling and processing. This section provides an overview of potential sources of fugitive emissions related to spent carbon at the facility in addition to a discussion of regulatory requirements, and engineering and institutional controls that are in place to minimize potential fugitive emissions. This discussion is used to identify the potential fugitive emission source related to spent carbon considered most likely to impact ambient air and thus proposed for detailed evaluation. This section also describes the exposure assessment approach that will be used to quantitatively evaluate the selected fugitive emissions source.

4.3.1 Potential for Fugitive Emissions from the Westates Facility

Processes involving spent carbon at the Westates facility that have the potential for fugitive particulate and volatile organic compound (VOC) emissions include:

- Handling of spent carbon containers received at the facility,
- Spent carbon unloading operations,
- Storage of spent carbon at the facility,
- Reactivation of spent carbon, and
- Production and bagging of reactivated carbon.

Potential fugitive emissions from each of these activities are reduced through standard work practices, facility design, and air pollution control (APC) devices. In addition, the intrinsic highly adsorptive nature of spent carbon results in very low partitioning of contaminants from the carbon to the atmosphere.

Potential fugitive emission sources at the facility are addressed by the USEPA under:

- the National Emission Standard for Benzene Waste Operations, Subpart FF of 40 CFR Part 61 (part of USEPA's program addressing National Emission Standards for Hazardous Air Pollutants or NESHAPs),
- the Resource Conservation and Recovery Act (RCRA) Subpart CC,[1] and
- the Potential to Emit Transition Policy for Part 71 Implementation (part of USEPA's Clean Air Act program).

4.3.1.1 Spent Carbon Containers

All containers received at the facility that contain spent carbon classified as hazardous waste under RCRA and all containers of spent carbon received from a facility that is regulated under the benzene NESHAP rule must be managed in accordance with strict USEPA requirements. These requirements include assuring that the spent carbon containers are completely sealed; this is initially accomplished by the spent carbon generators through both visual inspections of containers and VOC monitoring around the seals of containers. Then upon arrival at the Westates facility, containers are again visually inspected for proper seals.

The Westates facility currently stores sealed containers of spent carbon for up to one year, although most such containers are typically unloaded into the unloading hopper H-2 within about one month. These containers are also visually inspected during routine quarterly plant inspections. Rolloff containers and slurry trucks unload spent carbon at the time of delivery into hopper H-1. Supersacks and other smaller containers unloaded at H-1 may be stored for up to one year but are usually unloaded within about one to three months. Although not required, similar practices are typically followed for non-RCRA classified spent carbon as well.

4.3.1.2 Spent Carbon Unloading

Engineering and work practices during unloading operations at the facility's two hoppers are designed to limit the potential for fugitive dust emissions. Moreover, at no time other than when spent carbon is being unloaded into one of the hoppers is spent carbon exposed directly to the ambient environment. The two spent carbon hoppers are considered in the Part 71 Implementation program, but are not specifically regulated under the benzene Subpart FF standard or RCRA Subpart CC.

[1] USEPA's air emission control standards under RCRA for certain hazardous waste management units (tanks and containers) are generally known as the Subpart CC standards, found at 40 CFR Parts 264 and 265. USEPA has also developed national emissions standards for hazardous air pollutants (NESHAPS) under the Clean Air Act specifically for benzene, known as the National Emission Standard for Benzene Waste Operations, Subpart FF of 40 CFR Part 61. RCRA waste management units that are operated in compliance with the Subpart FF standards are generally exempt from the RCRA Subpart CC standards (because the practices used to control potential benzene emissions will also control other volatile organic compound emissions, meeting the Subpart CC requirements as well. See 40 CFR 264.1080(b)(7) and 40 CFR 265.1080(b)(7)). (See 40 CFR 264.1080 and 40 CFR 265.1080 for Subpart CC standards and 40 CFR 61.340 for Subpart FF standards.)

Roughly 52% of the spent carbon unloaded at hopper H-1 and 47% of the spent carbon unloaded at hopper H-2 is wet (saturated at roughly 50% moisture content by weight) and, therefore, do not generate fugitive dusts. Moreover, only a very small percentage of the dry spent carbon may be fine particulates. Powdered activated carbon is not accepted at the facility.

A hand-held water spray hose is used at H-1 as the material exits the containers to minimize potential dust emissions during unloading of dry spent carbon as well as to facilitate transfer of the spent carbon from the hopper through the piping system to the storage tanks. A hand-held water spray is also occasionally used to minimize dust emissions while unloading at hopper H-2 inside the spent carbon storage building.

An exhaust ventilation system is used for both hoppers, drawing roughly 2,500 cubic feet per minute of air from several ducts inside the hoppers through a fabric filter baghouse (BH-2) and then a carbon adsorber (WS-2). Particulate matter collected in the baghouse is periodically emptied into a container and placed in the RCRA-regulated debris bin maintained on site. Waste in the debris bin is sent to the RCRA-regulated Aptus, Utah incinerator facility every 60-90 days.

4.3.1.3 Spent Carbon Storage and Furnace Feed Hopper

All spent carbon storage tanks and the furnace feed hopper used at the facility are regulated under the benzene NESHAP Subpart FF air emission regulation which effectively minimizes potential VOC emissions. Although this regulation focuses on controlling benzene emissions, it ultimately achieves control of all VOC emissions. The tanks used to store spent carbon, as well as the furnace feed hopper and the water recycle tanks, have been constructed and are managed to comply with these regulations. The spent carbon storage tanks (tanks T-1, T-2, T-5, T-6), the furnace feed hopper (T-18) and the primary and secondary water recycle tanks (T-9 and T-12) are all fixed-roof, closed-vent storage vessels from which all vapors are passively routed through activated carbon adsorbers. The control efficiency of the carbon adsorbers is at least 95% for organic compounds and at least 98% for benzene. The carbon in these systems is changed over every 40 days for the adsorber that vents tanks T-1, T-2, T-5, T-6, T-9 and T-12. The adsorber that serves the furnace feed hopper T-18 is changed every 38 days. The changeout time for each of these adsorbers has been set based on engineering calculations to assure that the carbon does not approach its maximum collection efficiency.

The holding and discharge water tank, tank T-11, which is used for water and not spent carbon, is subject to recordkeeping and monitoring requirements, but is exempt from the RCRA Subpart CC and benzene Subpart FF air emission control requirements. Under Subpart CC, a tank in which the entering material has an average VOC concentration less than 500 mg/L (i.e., < 500 parts per million by weight or ppmw) is exempt from the RCRA Subpart CC air emission control requirements (40 CFR 265.1082(c)). In accordance with this program, annual monitoring of the material in tank T-11 is conducted and has indicated that the average VOC concentration in the water is less than 500 mg/L. Tank T-11 water is also monitored for benzene annually and has to date been found to contain less than 10 mg/L benzene, the trigger level at which USEPA's Subpart FF benzene NESHAP air emission requirements would be needed.

Process equipment (e.g., piping, valves, flanges, hatches, etc.) is also regularly monitored and inspected to minimize potential fugitive emissions in accordance with the facility's RCRA compliance program and the benzene NESHAP Subpart FF requirements. Annual air monitoring, in accordance with Subpart FF, is conducted to measure any VOC emissions from tanks, the furnace feed hopper, carbon adsorbers, piping, and other equipment involved in the handling of spent carbon. The Westates monitoring program examines more than 80 potential emission locations at the facility (e.g., flanges, equipment doors, valves, carbon adsorber outlets, etc.). An instrument reading, using USEPA's Method 21, of more than 500 parts per million by volume (ppmv) in air above background is used as a trigger under Subpart FF indicating unacceptable VOC emissions. Measurements made on process equipment (e.g., piping, valves, flanges, hatches, etc.) have exceeded the 500 ppmw trigger only once from 1995 through 2001 (the hatch of recycle water tank T-9 had been left ajar).[2] In this instance, the hatch was immediately closed. Other than this instance, the measured VOC concentrations at process equipment potential emission locations using Method 21 have typically been no more than 1-10 ppmv above background levels.

Visual inspections of facility equipment and processes also occur on a daily, weekly, quarterly and bi-annual basis. The inspection forms used by Westates to conduct these inspections are included in Appendix D. On a daily basis, for example, all drums, vessels and bags are checked for leaks, corrosion, and complete closure and the storage tank systems are checked to ensure that there are no valve leaks, no cracks in piping, no corrosion, that overfill protection systems are functioning and that all monitoring equipment is functioning. Dust collection systems are checked weekly for leaks and to assure adequate pressure drop. A detailed inspection of all seals, inlets and outlets of pumps and valves is performed on a monthly basis. Visual inspections are also conducted to search for cracks, holes, loose connections or gaps in all fixed-roofs, seals, access doors, ductwork, piping, connections and all other openings of equipment used to manage spent carbon. These openings are required to be maintained in a closed, sealed position at all times when spent carbon is present except when it is necessary to use the opening for sampling or removal, or for equipment inspection, maintenance or repair.

4.3.1.4 Spent Carbon Reactivation

Potential emissions associated with spent carbon reactivation are routed through the facility's air pollution control (APC) equipment and then discharged through the facility stack. The high temperature reactivation process and APC employed at the facility are extremely effective in minimizing and removing potential pollutants from the exhaust stack gases. As noted in Section 4.2, potential risks associated with stack emissions will be considered in the risk assessment. Fugitive emissions from the reactivation furnace are, however, prevented by the design of the process which utilizes a totally sealed system. Facility inspection procedures also ensure the integrity of the equipment.

4.3.1.5 Production and Bagging of Reactivated Carbon

Potential fugitive dusts associated with production and bagging of reactivated carbon are controlled through the use of an exhaust system which draws air from the product piping and bagging equipment to the product-side baghouse (BH-1). Not only are product bags connected

[2] VOC concentrations greater than 500 ppmw have been observed using the Method 21 sampling not for process equipment but rather in the immediate vicinity of spent carbon barrels at the moment they are opened for unloading and during unloading.

with tight seals to the bagging equipment while filling, but the piping inserted into bags being filled exhausts air to baghouse BH-1. Almost the entire reactivated carbon product consists of small pellets or granules. Based on data from January 2000 to October 2001, only 3.7% of the reactivated product was screened into the smallest "fines" category (i.e., close to powdered activated carbon). Of this percentage, approximately 88% is fed directly to bagging equipment with the remainder (powdered activated carbon) collected in the product-side baghouse fabric filters. The baghouse is shaken periodically, and then a rotary valve scrapes the product directly from the filters into supersacks that are tightly sealed onto the base of the baghouse. When full, the supersacks are manually closed and sealed. This process produces roughly one bag of fine powdered activated carbon per week. The reactivated carbon product is no longer subject to RCRA regulations.

4.3.1.6 Potential Fugitive Emissions from Other Sources

All spent carbon received at the facility is maintained inside sealed containers which are regularly inspected until they are unloaded. Spent carbon is never stored in storage piles anywhere at the facility. The only time spent carbon is ever exposed to the ambient air is during unloading. Once unloaded into the hoppers, all spent carbon is maintained in a slurry form (roughly 44% water) and is enclosed in process equipment (e.g., storage tanks) until it is sent to the combustion system.

All roads used by vehicles transporting spent carbon and reactivated carbon at the facility are paved, thereby minimizing potential fugitive dust emissions. Since spent carbon remains containerized until unloading, fugitive dust emissions that could potentially occur from vehicle movement would only contain native soils, not spent carbon. In addition, the length of paved road segments used by vehicles at the facility is very limited (no more than about 1/4 mile) and vehicle speeds are kept very slow at all times on facility roads (typically less than 5 miles per hour). These factors all limit the likelihood of fugitive dust emissions of soil due to vehicular traffic at the facility. Vehicles carrying spent carbon occasionally wait on the shoulder of the paved facility driveway for their turn to unload their spent carbon; in this case, the vehicle will be at a standstill except when pulling off or on the pavement. The potential for fugitive dust emissions of soil from non-paved surfaces is, therefore, negligible due to the infrequent need for vehicles to pull over while waiting their turn coupled with the fact that the vehicles on the driveway shoulder are not moving except when pulling off or on the paved surface.

4.3.2 Exposure Assessment for Fugitive Emissions

4.3.2.1 Potential Fugitive Emission Sources Selected for Evaluation

The requirements of the benzene Subpart FF regulations minimize potential fugitive volatile organic emissions associated with spent carbon containers and spent carbon storage and process equipment. The combustion process effectively destroys VOCs on spent carbon, thus fugitive VOC emissions will not occur during production and bagging of reactivated carbon. Spent carbon is only exposed to the ambient air during unloading, and there is thus some potential for fugitive VOC emissions during this activity. The potential impact of fugitive VOC emissions in outdoor ambient air will be lower for unloading activities at the indoor hopper compared to the outdoor hopper because the indoor environment will hinder release and dispersion of potential VOC emissions into the outdoor environment.

Fugitive dust emissions associated with spent carbon may occur during unloading of dry spent carbon at the hoppers. Fugitive dust emissions associated with reactivated carbon could potentially occur during production and bagging activities. At all other points in the facility's process, spent carbon and reactivated carbon are maintained in enclosed systems with no contact with the ambient air. Also, after unloading until combustion, all spent carbon is maintained in a slurry form and will not generate fugitive dusts. There is, however, a potential for spent carbon fugitive dust emissions to occur during unloading of dry spent carbon at the two hoppers even though these emissions are reduced through the use of an exhaust system at the hoppers as well as through the use of a water spray during unloading. Fugitive dust emissions during production and bagging of reactivated carbon are minimized by routing all product through a well-controlled piping and bagging system equipped with highly localized air emission controls at the point of potential dust generation. Thus, fugitive dust emissions associated with reactivated carbon are likely to be negligible.

Based on the discussion provided above, the potential fugitive emission source related to spent carbon considered most likely to impact ambient air is the unloading of spent carbon at the outdoor hopper. Thus, this fugitive emission source will be addressed in the risk assessment, focusing on both fugitive dust emissions as well as fugitive VOC emissions.

ATTACHMENT D

STACK EMISSIONS RISK ASSESSMENT:

ACUTE INHALATION RISK RESULTS

USING MAXIMUM MEASURED STACK EMISSION RATES

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS - MAXIMUM MEASURED STACK EMISSION RATES (a)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (b)
A_1 max hourly impact point (stack)	
Arsenic	8.2E-02
Nitrogen dioxide	3.9E-02
Sulfur dioxide	1.4E-02
Chlorine	8.9E-03
Hydrogen chloride	4.0E-03
Beryllium	3.1E-03
Cadmium	1.3E-03
Nickel	2.7E-04
Lead	2.6E-04
Copper	2.2E-04
Mercury	3.9E-05
Hexachlorobenzene	9.9E-06
Mercuric chloride	9.7E-06
Chlorophenyl-phenylether, 4-	8.9E-06
Chloroform (Trichloromethane)	6.6E-06
Benzidine	6.0E-06
Dibromo-3-chloropropane, 1,2-	5.1E-06
Thallium (I)	4.7E-06
Manganese	3.0E-06
Vanadium	2.7E-06
Hexachlorocyclopentadiene	2.2E-06
Silver	1.9E-06
4,6-Dinitro-2-methylphenol	1.3E-06
Zinc	9.8E-07
Barium	9.1E-07
Pentachlorophenol	6.1E-07
Aluminum	5.9E-07
Tetrachloroethylene (Perchloroethylene)	5.7E-07
Chromium	5.2E-07
Chromium, hexavalent	5.2E-07
Selenium	4.1E-07
Fluoranthene	3.5E-07
PentaCDF, 2,3,4,7,8-	3.3E-07
Nitrosodipropylamine, n-	2.9E-07
Antimony	1.7E-07
Bromoform (tribromomethane)	1.7E-07
Chlorobenzene	1.6E-07
Benzoic Acid	1.3E-07
Dinitrotoluene, 2,4-	1.3E-07
Benzene	1.2E-07
Methylene chloride	1.2E-07
3-Penten-2-one, 4-methyl	1.1E-07
Bromodichloromethane	1.1E-07
Ethylhexyl phthalate, bis-2-	1.1E-07
Dinitrotoluene, 2,6-	1.1E-07
Dibromochloromethane	1.0E-07
Methyl bromide (Bromomethane)	8.5E-08
Dinitrophenol, 2,4-	7.2E-08
Nitrophenol, 4-	6.9E-08
Nitroaniline, 3-	6.9E-08
Chloronaphthalene,2-	6.6E-08
Dichlorobenzidine, 3,3'-	5.1E-08
Methylene bromide	5.1E-08
Pentachloronitrobenzene (PCNB)	4.2E-08
Toluene	4.2E-08
Cobalt	3.9E-08
Chlorobenzilate	3.2E-08
Dimethylphenol, 2,4-	3.0E-08
Acrylonitrile	3.0E-08
Nitrophenol, 2-	2.6E-08
Heptachlor	2.4E-08
Carbon Tetrachloride	2.4E-08
Carbazole	2.3E-08
Benzaldehyde	2.3E-08
Dinitrobenzene, 1,3-	2.2E-08
Methyl ethyl ketone (2-Butanone)	2.1E-08
Benzyl alcohol	2.1E-08
Phenanthrene	1.6E-08
Nitroaniline, 4-	1.5E-08
Benzonitrile	1.5E-08
Di-n-butyl phthalate	1.5E-08

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS - MAXIMUM MEASURED STACK EMISSION RATES (a)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (b)
Aniline	1.4E-08
Carbon Disulfide	1.4E-08
Methyl chloride (Chloromethane)	1.3E-08
Heptachlor epoxide	1.3E-08
Phenol	1.2E-08
TetraCDF, 2,3,7,8-	1.1E-08
Endrin	9.5E-09
Chlorophenol, 2-	8.5E-09
Chloroaniline, p-	8.3E-09
Trichlorobenzene, 1,2,3-	6.8E-09
Acetone	6.8E-09
Bromophenyl-phenylether, 4-	6.7E-09
Chloro-3-methylphenol, 4-	6.5E-09
Hexachloro-1,3-butadiene (Perchlorobutadiene)	6.3E-09
Naphthalene	6.3E-09
Acetophenone	6.3E-09
HexaCDF, 1,2,3,6,7,8-	6.2E-09
Cresol, o-	6.2E-09
HexaCDF, 2,3,4,6,7,8-	5.8E-09
N-nitrosodimethylamine	5.5E-09
Butylbenzylphthalate	4.4E-09
Chlordane	4.3E-09
Dichlorobenzene, 1,3-	4.2E-09
2,5-Dimethylheptane	4.1E-09
Diethyl phthalate	4.0E-09
Acenaphthylene	4.0E-09
Tetrachloroethane, 1,1,2,2-	3.9E-09
Vinyl Acetate	3.8E-09
HexaCDF, 1,2,3,4,7,8-	3.8E-09
HexaCDD, 1,2,3,4,7,8-	3.6E-09
Dichloropropene, 1,3- (cis)	3.5E-09
Xylene, p-	3.4E-09
Xylene, m-	3.4E-09
Bis(2-chloroethoxy) methane	3.3E-09
Trichlorophenol, 2,4,5-	3.2E-09
PentaCDF, 1,2,3,7,8-	3.2E-09
Nitroaniline, 2-	3.1E-09
Nitrobenzene	3.1E-09
Dichlorophenol, 2,4-	2.9E-09
Benzo(b)fluoranthene	2.9E-09
2-Hexanone	2.8E-09
Hexachloroethane (Perchloroethane)	2.8E-09
Cresol, p-	2.7E-09
Cresol, m-	2.7E-09
Dimethyl phthalate	2.7E-09
PentaCDD, 1,2,3,7,8-	2.6E-09
Endosulfan I	2.6E-09
Trichlorophenol, 2,4,6-	2.5E-09
BHC, beta-	2.4E-09
Pyridine	2.2E-09
Dibenzofuran	2.1E-09
Diphenylamine	2.1E-09
Bromobenzene	2.0E-09
Indeno(1,2,3-cd) pyrene	1.9E-09
Tetrachlorobenzene, 1,2,4,5-	1.9E-09
Aldrin	1.9E-09
Nitrosodiphenylamine, N-	1.9E-09
Isophorone	1.9E-09
Pentachlorobenzene	1.8E-09
Di-n-octylphthalate	1.7E-09
Trichlorobenzene, 1,2,4-	1.6E-09
TetraCDD, 2,3,7,8-	1.6E-09
Chrysene	1.5E-09
Aroclor 1254	1.4E-09
Diphenylhydrazine,1,2-	1.4E-09
3-Ethyl benzaldehyde	1.3E-09
4-Ethyl benzaldehyde	1.3E-09
Trichloropropane, 1,2,3-	1.2E-09
DDT, 4-4'-	1.2E-09
Butylbenzene, sec	1.2E-09
Xylene, o-	1.2E-09
1,1-Dichloropropene	1.0E-09
Trichloroethane, 1,1,2-	9.5E-10
Dieldrin	9.2E-10

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS - MAXIMUM MEASURED STACK EMISSION RATES (a)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (b)
BHC, alpha-	9.0E-10
Benzo(a)Anthracene	8.7E-10
Styrene	8.1E-10
Bis(2-chlorethyl)ether	8.1E-10
Benzo(k)fluoranthene	7.8E-10
2,2'-oxybis (1-Chloropropane)	7.7E-10
Iodomethane	7.2E-10
Methyl isobutyl ketone	5.6E-10
Benzo(a)pyrene	5.0E-10
gamma-BHC (Lindane)	4.6E-10
OctaCDF, 1,2,3,4,6,7,8,9-	4.4E-10
Ethylene dibromide	3.9E-10
Trichloroethylene	3.6E-10
Tetrahydrofuran	3.6E-10
Pyrene	3.5E-10
HexaCDD, 1,2,3,7,8,9-	3.5E-10
DDD, 4,4'-	3.5E-10
Tetrachloroethane, 1,1,1,2-	3.1E-10
HexaCDD, 1,2,3,6,7,8-	3.0E-10
1,3-Dichloropropane	3.0E-10
Butylbenzene, n-	2.9E-10
Dichloroethylene 1,1-	2.8E-10
2,2-Dichloropropane	2.8E-10
Butylbenzene, tert	2.7E-10
Vinyl Chloride	2.5E-10
Trichloroethane, 1,1,1-	2.4E-10
Anthracene	2.3E-10
Acenaphthene	2.2E-10
2-Methylnaphthalene	2.1E-10
Trimethylbenzene, 1,3,5-	1.9E-10
Dichlorobenzene, 1,2-	1.7E-10
Dichloroethane, 1,2- (Ethylene Dichloride)	1.6E-10
HeptaCDF, 1,2,3,4,6,7,8-	1.5E-10
Methoxychlor	1.1E-10
Dichlorobenzene,1,4-	1.0E-10
DDE, 4,4'-	9.8E-11
Fluorene	8.6E-11
Cumene (Isopropylbenzene)	8.5E-11
OctaCDD, 1,2,3,4,6,7,8,9-	7.9E-11
2-Chlorotoluene	7.5E-11
4-Chlorotoluene	7.5E-11
Ethylene Glycol	6.5E-11
Propylbenzene, n-	6.2E-11
Trichlorofluoromethane (Freon 11)	5.4E-11
1,2,4-Trimethylbenzene	5.4E-11
Dichloroethylene, cis-1,2-	4.8E-11
Ethylbenzene	4.7E-11
Dichloropropane, 1,2-	4.7E-11
HexaCDF, 1,2,3,7,8,9-	3.3E-11
Chloroethane	3.1E-11
Dichlorodifluoromethane	3.1E-11
Bromochloromethane	3.0E-11
Benzo(g,h,i)perylene	3.0E-11
methyl tert-butyl ether	2.4E-11
HeptaCDF, 1,2,3,4,7,8,9-	2.1E-11
Propylene oxide	1.7E-11
Dichloroethylene-1,2 (trans)	1.5E-11
Dichloroethane 1,1-	1.5E-11
HeptaCDD, 1,2,3,4,6,7,8-	7.7E-12
Methyl methacrylate	4.1E-12
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	2.0E-12
Dibenz(a,h)anthracene	1.9E-12
Dioxane, 1,4-	1.5E-12
Acrylic Acid	1.6E-13
1-Hexane (n-hexane)	2.8E-14
Endosulfan sulfate	0.0E+00
2,5-Dione, 3-hexene	0.0E+00
Benzo(e)pyrene	0.0E+00
Perylene	0.0E+00
Phosphine imide, P,P,P-triphenyl	0.0E+00
Diallate	0.0E+00
9-Octadecenamide (oleamide)	0.0E+00
delta-BHC	0.0E+00
2-Methyl octane	0.0E+00

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS -
MAXIMUM MEASURED STACK EMISSION RATES (a)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (b)
Endosulfan II	0.0E+00
Endrin ketone	0.0E+00
3-Penten-2-one (ethylidene acetone)	0.0E+00
2,5-Dimethylfuran	0.0E+00
Endrin aldehyde	0.0E+00
3-Hexen-2-one	0.0E+00
Benzoic acid, methyl ester (methyl benzoate)	0.0E+00
Isopropyl toluene, p-	0.0E+00
Total (c)	1.5E-01
A_2 closest business	
Nitrogen dioxide	3.9E-02
Arsenic	3.3E-02
Sulfur dioxide	1.4E-02
Chlorine	9.0E-03
Hydrogen chloride	4.0E-03
Beryllium	1.3E-03
Cadmium	5.2E-04
Nickel	1.1E-04
Lead	1.0E-04
Copper	9.0E-05
Mercury	3.9E-05
Hexachlorobenzene	9.9E-06
Mercuric chloride	9.7E-06
Chlorophenyl-phenylether, 4-	9.0E-06
Chloroform (Trichloromethane)	6.7E-06
Benzidine	5.8E-06
Dibromo-3-chloropropane, 1,2-	5.2E-06
Hexachlorocyclopentadiene	2.2E-06
Thallium (I)	1.9E-06
4,6-Dinitro-2-methylphenol	1.3E-06
Manganese	1.2E-06
Vanadium	1.1E-06
Silver	7.7E-07
Pentachlorophenol	6.1E-07
Tetrachloroethylene (Perchloroethylene)	5.7E-07
Zinc	3.9E-07
Barium	3.7E-07
Fluoranthene	3.5E-07
PentaCDF, 2,3,4,7,8-	3.2E-07
Nitrosodipropylamine, n-	2.9E-07
Aluminum	2.4E-07
Chromium	2.1E-07
Chromium, hexavalent	2.1E-07
Antimony	1.7E-07
Bromoform (tribromomethane)	1.7E-07
Selenium	1.6E-07
Chlorobenzene	1.6E-07
Benzoic Acid	1.3E-07
Dinitrotoluene, 2,4-	1.3E-07
Benzene	1.2E-07
Methylene chloride	1.2E-07
3-Penten-2-one, 4-methyl	1.1E-07
Bromodichloromethane	1.1E-07
Ethylhexyl phthalate, bis-2-	1.1E-07
Dinitrotoluene, 2,6-	1.1E-07
Dibromochloromethane	1.0E-07
Methyl bromide (Bromomethane)	8.6E-08
Dinitrophenol, 2,4-	7.3E-08
Nitrophenol, 4-	7.0E-08
Nitroaniline, 3-	7.0E-08
Chloronaphthalene,2-	6.6E-08
Methylene bromide	5.1E-08
Dichlorobenzidine, 3,3'-	5.1E-08
Pentachloronitrobenzene (PCNB)	4.2E-08
Toluene	4.2E-08
Chlorobenzilate	3.2E-08
Dimethylphenol, 2,4-	3.1E-08
Acrylonitrile	3.0E-08
Nitrophenol, 2-	2.6E-08
Heptachlor	2.4E-08
Carbon Tetrachloride	2.4E-08
Carbazole	2.3E-08

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS - MAXIMUM MEASURED STACK EMISSION RATES (a)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (b)
Benzaldehyde	2.3E-08
Dinitrobenzene, 1,3-	2.2E-08
Methyl ethyl ketone (2-Butanone)	2.1E-08
Benzyl alcohol	2.1E-08
Phenanthrene	1.6E-08
Cobalt	1.6E-08
Nitroaniline, 4-	1.5E-08
Benzonitrile	1.5E-08
Di-n-butyl phthalate	1.5E-08
Aniline	1.4E-08
Carbon Disulfide	1.4E-08
Methyl chloride (Chloromethane)	1.3E-08
Heptachlor epoxide	1.3E-08
Phenol	1.2E-08
TetraCDF, 2,3,7,8-	1.1E-08
Endrin	9.5E-09
Chlorophenol, 2-	8.6E-09
Chloroaniline, p-	8.3E-09
Trichlorobenzene, 1,2,3-	6.9E-09
Acetone	6.8E-09
Bromophenyl-phenylether, 4-	6.7E-09
Chloro-3-methylphenol, 4-	6.6E-09
Hexachloro-1,3-butadiene (Perchlorobutadiene)	6.4E-09
Naphthalene	6.4E-09
Acetophenone	6.3E-09
Cresol, o-	6.2E-09
HexaCDF, 1,2,3,6,7,8-	6.0E-09
HexaCDF, 2,3,4,6,7,8-	5.7E-09
N-nitrosodimethylamine	5.5E-09
Butylbenzylphthalate	4.4E-09
Chlordane	4.3E-09
Dichlorobenzene, 1,3-	4.2E-09
2,5-Dimethylheptane	4.1E-09
Diethyl phthalate	4.0E-09
Acenaphthylene	4.0E-09
Tetrachloroethane, 1,1,2,2-	3.9E-09
Vinyl Acetate	3.9E-09
HexaCDF, 1,2,3,4,7,8-	3.7E-09
Dichloropropene, 1,3- (cis)	3.5E-09
HexaCDD, 1,2,3,4,7,8-	3.5E-09
Xylene, p-	3.4E-09
Xylene, m-	3.4E-09
Bis(2-chloroethoxy) methane	3.3E-09
Trichlorophenol, 2,4,5-	3.2E-09
Nitroaniline, 2-	3.2E-09
Nitrobenzene	3.1E-09
PentaCDF, 1,2,3,7,8-	3.1E-09
Dichlorophenol, 2,4-	2.9E-09
Benzo(b)fluoranthene	2.9E-09
2-Hexanone	2.8E-09
Hexachloroethane (Perchloroethane)	2.8E-09
Cresol, p-	2.7E-09
Cresol, m-	2.7E-09
Dimethyl phthalate	2.7E-09
Endosulfan I	2.6E-09
Trichlorophenol, 2,4,6-	2.6E-09
PentaCDD, 1,2,3,7,8-	2.5E-09
BHC, beta-	2.4E-09
Pyridine	2.2E-09
Dibenzofuran	2.1E-09
Diphenylamine	2.1E-09
Bromobenzene	2.0E-09
Tetrachlorobenzene, 1,2,4,5-	1.9E-09
Aldrin	1.9E-09
Nitrosodiphenylamine, N-	1.9E-09
Isophorone	1.9E-09
Pentachlorobenzene	1.8E-09
Di-n-octylphthalate	1.7E-09
Trichlorobenzene, 1,2,4-	1.6E-09
TetraCDD, 2,3,7,8-	1.5E-09
Chrysene	1.5E-09
Aroclor 1254	1.5E-09
Diphenylhydrazine,1,2-	1.4E-09
3-Ethyl benzaldehyde	1.4E-09

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS -
MAXIMUM MEASURED STACK EMISSION RATES (a)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (b)
4-Ethyl benzaldehyde	1.4E-09
Trichloropropane, 1,2,3-	1.2E-09
DDT, 4-4'-	1.2E-09
Butylbenzene, sec	1.2E-09
Xylene, o-	1.2E-09
1,1-Dichloropropene	1.0E-09
Trichloroethane, 1,1,2-	9.6E-10
Dieldrin	9.2E-10
BHC, alpha-	9.0E-10
Benzo(a)Anthracene	8.6E-10
Styrene	8.2E-10
Bis(2-chlorethyl)ether	8.1E-10
2,2'-oxybis (1-Chloropropane)	7.7E-10
Indeno(1,2,3-cd) pyrene	7.7E-10
Benzo(k)fluoranthene	7.6E-10
Iodomethane	7.2E-10
Methyl isobutyl ketone	5.6E-10
Benzo(a)pyrene	4.9E-10
gamma-BHC (Lindane)	4.6E-10
OctaCDF, 1,2,3,4,6,7,8,9-	4.2E-10
Ethylene dibromide	3.9E-10
Trichloroethylene	3.6E-10
Tetrahydrofuran	3.6E-10
Pyrene	3.6E-10
DDD, 4,4'-	3.5E-10
HexaCDD, 1,2,3,7,8,9-	3.4E-10
Tetrachloroethane, 1,1,1,2-	3.2E-10
1,3-Dichloropropane	3.0E-10
HexaCDD, 1,2,3,6,7,8-	2.9E-10
Butylbenzene, n-	2.9E-10
Dichloroethylene 1,1-	2.8E-10
2,2-Dichloropropane	2.8E-10
Butylbenzene, tert	2.8E-10
Vinyl Chloride	2.6E-10
Trichloroethane, 1,1,1-	2.4E-10
Anthracene	2.3E-10
Acenaphthene	2.2E-10
2-Methylnaphthalene	2.1E-10
Trimethylbenzene, 1,3,5-	1.9E-10
Dichlorobenzene, 1,2-	1.7E-10
Dichloroethane, 1,2- (Ethylene Dichloride)	1.6E-10
HeptaCDF, 1,2,3,4,6,7,8-	1.5E-10
Methoxychlor	1.1E-10
Dichlorobenzene,1,4-	1.0E-10
DDE, 4,4'-	9.8E-11
Fluorene	8.7E-11
Cumene (Isopropylbenzene)	8.5E-11
OctaCDD, 1,2,3,4,6,7,8,9-	7.7E-11
2-Chlorotoluene	7.5E-11
4-Chlorotoluene	7.5E-11
Ethylene Glycol	6.5E-11
Propylbenzene, n-	6.2E-11
Trichlorofluoromethane (Freon 11)	5.5E-11
1,2,4-Trimethylbenzene	5.4E-11
Dichloroethylene, cis-1,2-	4.9E-11
Ethylbenzene	4.7E-11
Dichloropropane, 1,2-	4.7E-11
HexaCDF, 1,2,3,7,8,9-	3.2E-11
Chloroethane	3.1E-11
Dichlorodifluoromethane	3.1E-11
Bromochloromethane	3.0E-11
Benzo(g,h,i)perylene	2.9E-11
methyl tert-butyl ether	2.4E-11
HeptaCDF, 1,2,3,4,7,8,9-	2.1E-11
Propylene oxide	1.7E-11
Dichloroethylene-1,2 (trans)	1.5E-11
Dichloroethane 1,1-	1.5E-11
HeptaCDD, 1,2,3,4,6,7,8-	7.5E-12
Methyl methacrylate	4.1E-12
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	2.0E-12
Dioxane, 1,4-	1.6E-12
Dibenz(a,h)anthracene	8.0E-13
Acrylic Acid	1.6E-13
1-Hexane (n-hexane)	2.8E-14

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS - MAXIMUM MEASURED STACK EMISSION RATES (a)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (b)
Endosulfan sulfate	0.0E+00
2,5-Dione, 3-hexene	0.0E+00
Benzo(e)pyrene	0.0E+00
Perylene	0.0E+00
Phosphine imide, P,P,P-triphenyl	0.0E+00
Diallate	0.0E+00
9-Octadecenamide (oleamide)	0.0E+00
delta-BHC	0.0E+00
2-Methyl octane	0.0E+00
Endosulfan II	0.0E+00
Endrin ketone	0.0E+00
3-Penten-2-one (ethylidene acetone)	0.0E+00
2,5-Dimethylfuran	0.0E+00
Endrin aldehyde	0.0E+00
3-Hexen-2-one	0.0E+00
Benzoic acid, methyl ester (methyl benzoate)	0.0E+00
Isopropyl toluene, p-	0.0E+00
Total (c)	1.0E-01
R_1 resident	
Nitrogen dioxide	1.6E-02
Arsenic	1.2E-02
Sulfur dioxide	5.8E-03
Chlorine	3.7E-03
Hydrogen chloride	1.6E-03
Beryllium	4.5E-04
Cadmium	1.8E-04
Nickel	3.8E-05
Lead	3.7E-05
Copper	3.2E-05
Mercury	1.6E-05
Hexachlorobenzene	4.0E-06
Mercuric chloride	4.0E-06
Chlorophenyl-phenylether, 4-	3.7E-06
Chloroform (Trichloromethane)	2.7E-06
Benzidine	2.6E-06
Dibromo-3-chloropropane, 1,2-	2.1E-06
Hexachlorocyclopentadiene	9.1E-07
Thallium (I)	6.7E-07
4,6-Dinitro-2-methylphenol	5.3E-07
Manganese	4.2E-07
Vanadium	3.8E-07
Silver	2.7E-07
Pentachlorophenol	2.5E-07
Tetrachloroethylene (Perchloroethylene)	2.3E-07
Fluoranthene	1.4E-07
PentaCDF, 2,3,4,7,8-	1.4E-07
Zinc	1.4E-07
Barium	1.3E-07
Nitrosodipropylamine, n-	1.2E-07
Aluminum	8.4E-08
Chromium	7.4E-08
Chromium, hexavalent	7.4E-08
Antimony	7.0E-08
Bromoform (tribromomethane)	6.8E-08
Chlorobenzene	6.4E-08
Selenium	5.8E-08
Benzoic Acid	5.4E-08
Dinitrotoluene, 2,4-	5.4E-08
Benzene	4.9E-08
Methylene chloride	4.7E-08
Ethylhexyl phthalate, bis-2-	4.7E-08
3-Penten-2-one, 4-methyl	4.6E-08
Bromodichloromethane	4.5E-08
Dinitrotoluene, 2,6-	4.3E-08
Dibromochloromethane	4.2E-08
Methyl bromide (Bromomethane)	3.5E-08
Dinitrophenol, 2,4-	3.0E-08
Nitrophenol, 4-	2.8E-08
Nitroaniline, 3-	2.8E-08
Chloronaphthalene,2-	2.7E-08
Dichlorobenzidine, 3,3'-	2.2E-08
Methylene bromide	2.1E-08

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS - MAXIMUM MEASURED STACK EMISSION RATES (a)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (b)
Pentachloronitrobenzene (PCNB)	1.7E-08
Toluene	1.7E-08
Chlorobenzilate	1.3E-08
Dimethylphenol, 2,4-	1.2E-08
Acrylonitrile	1.2E-08
Nitrophenol, 2-	1.1E-08
Heptachlor	9.7E-09
Carbon Tetrachloride	9.7E-09
Carbazole	9.5E-09
Benzaldehyde	9.4E-09
Dinitrobenzene, 1,3-	8.9E-09
Methyl ethyl ketone (2-Butanone)	8.4E-09
Benzyl alcohol	8.4E-09
Phenanthrene	6.7E-09
Nitroaniline, 4-	6.1E-09
Benzonitrile	6.1E-09
Di-n-butyl phthalate	6.0E-09
Aniline	5.8E-09
Carbon Disulfide	5.6E-09
Cobalt	5.5E-09
Methyl chloride (Chloromethane)	5.2E-09
Heptachlor epoxide	5.2E-09
Phenol	4.8E-09
TetraCDF, 2,3,7,8-	4.6E-09
Endrin	3.9E-09
Chlorophenol, 2-	3.5E-09
Chloroaniline, p-	3.4E-09
Trichlorobenzene, 1,2,3-	2.8E-09
Acetone	2.8E-09
Bromophenyl-phenylether, 4-	2.7E-09
Chloro-3-methylphenol, 4-	2.7E-09
HexaCDF, 1,2,3,6,7,8-	2.7E-09
Hexachloro-1,3-butadiene (Perchlorobutadiene)	2.6E-09
Naphthalene	2.6E-09
Acetophenone	2.6E-09
Cresol, o-	2.5E-09
HexaCDF, 2,3,4,6,7,8-	2.5E-09
N-nitrosodimethylamine	2.3E-09
Butylbenzylphthalate	1.8E-09
Chlordane	1.7E-09
Dichlorobenzene, 1,3-	1.7E-09
2,5-Dimethylheptane	1.7E-09
Diethyl phthalate	1.6E-09
HexaCDF, 1,2,3,4,7,8-	1.6E-09
Acenaphthylene	1.6E-09
Tetrachloroethane, 1,1,2,2-	1.6E-09
Vinyl Acetate	1.6E-09
HexaCDD, 1,2,3,4,7,8-	1.5E-09
Dichloropropene, 1,3- (cis)	1.4E-09
Xylene, p-	1.4E-09
Xylene, m-	1.4E-09
Bis(2-chloroethoxy) methane	1.4E-09
PentaCDF, 1,2,3,7,8-	1.3E-09
Trichlorophenol, 2,4,5-	1.3E-09
Nitroaniline, 2-	1.3E-09
Nitrobenzene	1.3E-09
Dichlorophenol, 2,4-	1.2E-09
Benzo(b)fluoranthene	1.2E-09
2-Hexanone	1.1E-09
Hexachloroethane (Perchloroethane)	1.1E-09
PentaCDD, 1,2,3,7,8-	1.1E-09
Cresol, p-	1.1E-09
Cresol, m-	1.1E-09
Dimethyl phthalate	1.1E-09
Endosulfan I	1.1E-09
Trichlorophenol, 2,4,6-	1.0E-09
BHC, beta-	9.6E-10
Pyridine	9.2E-10
Dibenzofuran	8.7E-10
Diphenylamine	8.7E-10
Bromobenzene	8.1E-10
Aldrin	7.9E-10
Tetrachlorobenzene, 1,2,4,5-	7.9E-10
Nitrosodiphenylamine, N-	7.8E-10

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS - MAXIMUM MEASURED STACK EMISSION RATES (a)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (b)
Isophorone	7.8E-10
Pentachlorobenzene	7.3E-10
Di-n-octylphthalate	7.1E-10
TetraCDD, 2,3,7,8-	6.5E-10
Trichlorobenzene, 1,2,4-	6.5E-10
Chrysene	6.3E-10
Aroclor 1254	5.9E-10
Diphenylhydrazine,1,2-	5.7E-10
3-Ethyl benzaldehyde	5.5E-10
4-Ethyl benzaldehyde	5.5E-10
Trichloropropane, 1,2,3-	5.0E-10
DDT, 4-4'-	4.9E-10
Butylbenzene, sec	4.8E-10
Xylene, o-	4.7E-10
1,1-Dichloropropene	4.2E-10
Trichloroethane, 1,1,2-	3.9E-10
Dieldrin	3.8E-10
BHC, alpha-	3.7E-10
Benzo(a)Anthracene	3.7E-10
Styrene	3.3E-10
Benzo(k)fluoranthene	3.3E-10
Bis(2-chlorethyl)ether	3.3E-10
2,2'-oxybis (1-Chloropropane)	3.2E-10
Iodomethane	3.0E-10
Indeno(1,2,3-cd) pyrene	2.7E-10
Methyl isobutyl ketone	2.3E-10
Benzo(a)pyrene	2.1E-10
OctaCDF, 1,2,3,4,6,7,8,9-	1.9E-10
gamma-BHC (Lindane)	1.9E-10
Ethylene dibromide	1.6E-10
HexaCDD, 1,2,3,7,8,9-	1.5E-10
Trichloroethylene	1.5E-10
Tetrahydrofuran	1.5E-10
Pyrene	1.5E-10
DDD, 4,4'-	1.4E-10
HexaCDD, 1,2,3,6,7,8-	1.3E-10
Tetrachloroethane, 1,1,1,2-	1.3E-10
1,3-Dichloropropane	1.2E-10
Butylbenzene, n-	1.2E-10
Dichloroethylene 1,1-	1.1E-10
2,2-Dichloropropane	1.1E-10
Butylbenzene, tert	1.1E-10
Vinyl Chloride	1.0E-10
Trichloroethane, 1,1,1-	9.9E-11
Anthracene	9.3E-11
Acenaphthene	9.0E-11
2-Methylnaphthalene	8.7E-11
Trimethylbenzene, 1,3,5-	7.9E-11
Dichlorobenzene, 1,2-	6.9E-11
Dichloroethane, 1,2- (Ethylene Dichloride)	6.5E-11
HeptaCDF, 1,2,3,4,6,7,8-	6.5E-11
Methoxychlor	4.4E-11
Dichlorobenzene,1,4-	4.1E-11
DDE, 4,4'-	4.0E-11
Fluorene	3.5E-11
Cumene (Isopropylbenzene)	3.5E-11
OctaCDD, 1,2,3,4,6,7,8,9-	3.4E-11
2-Chlorotoluene	3.1E-11
4-Chlorotoluene	3.1E-11
Ethylene Glycol	2.7E-11
Propylbenzene, n-	2.5E-11
Trichlorofluoromethane (Freon 11)	2.2E-11
1,2,4-Trimethylbenzene	2.2E-11
Dichloroethylene, cis-1,2-	2.0E-11
Ethylbenzene	1.9E-11
Dichloropropane, 1,2-	1.9E-11
HexaCDF, 1,2,3,7,8,9-	1.4E-11
Benzo(g,h,i)perylene	1.3E-11
Chloroethane	1.3E-11
Dichlorodifluoromethane	1.3E-11
Bromochloromethane	1.2E-11
methyl tert-butyl ether	9.7E-12
HeptaCDF, 1,2,3,4,7,8,9-	9.2E-12
Propylene oxide	6.9E-12

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS - MAXIMUM MEASURED STACK EMISSION RATES (a)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (b)
Dichloroethylene-1,2 (trans)	6.3E-12
Dichloroethane 1,1-	6.0E-12
HeptaCDD, 1,2,3,4,6,7,8-	3.3E-12
Methyl methacrylate	1.7E-12
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	8.1E-13
Dioxane, 1,4-	6.3E-13
Dibenz(a,h)anthracene	2.9E-13
Acrylic Acid	6.4E-14
1-Hexane (n-hexane)	1.1E-14
Endosulfan sulfate	0.0E+00
2,5-Dione, 3-hexene	0.0E+00
Benzo(e)pyrene	0.0E+00
Perylene	0.0E+00
Phosphine imide, P,P,P-triphenyl	0.0E+00
Diallate	0.0E+00
9-Octadecenamide (oleamide)	0.0E+00
delta-BHC	0.0E+00
2-Methyl octane	0.0E+00
Endosulfan II	0.0E+00
Endrin ketone	0.0E+00
3-Penten-2-one (ethylidene acetone)	0.0E+00
2,5-Dimethylfuran	0.0E+00
Endrin aldehyde	0.0E+00
3-Hexen-2-one	0.0E+00
Benzoic acid, methyl ester (methyl benzoate)	0.0E+00
Isopropyl toluene, p-	0.0E+00
Total (c)	4.0E-02
R_2 resident	
Nitrogen dioxide	1.1E-02
Arsenic	7.0E-03
Sulfur dioxide	3.9E-03
Chlorine	2.4E-03
Hydrogen chloride	1.1E-03
Beryllium	2.6E-04
Cadmium	1.1E-04
Nickel	2.3E-05
Lead	2.2E-05
Copper	1.9E-05
Mercury	1.1E-05
Hexachlorobenzene	2.7E-06
Mercuric chloride	2.7E-06
Chlorophenyl-phenylether, 4-	2.5E-06
Chloroform (Trichloromethane)	1.8E-06
Benzidine	1.7E-06
Dibromo-3-chloropropane, 1,2-	1.4E-06
Hexachlorocyclopentadiene	6.1E-07
Thallium (I)	4.0E-07
4,6-Dinitro-2-methylphenol	3.5E-07
Manganese	2.5E-07
Vanadium	2.3E-07
Pentachlorophenol	1.7E-07
Silver	1.6E-07
Tetrachloroethylene (Perchloroethylene)	1.6E-07
Fluoranthene	9.5E-08
PentaCDF, 2,3,4,7,8-	9.5E-08
Zinc	8.3E-08
Nitrosodipropylamine, n-	7.8E-08
Barium	7.7E-08
Aluminum	5.0E-08
Antimony	4.7E-08
Bromoform (tribromomethane)	4.6E-08
Chromium	4.4E-08
Chromium, hexavalent	4.4E-08
Chlorobenzene	4.3E-08
Benzoic Acid	3.6E-08
Dinitrotoluene, 2,4-	3.6E-08
Selenium	3.5E-08
Benzene	3.3E-08
Ethylhexyl phthalate, bis-2-	3.2E-08
Methylene chloride	3.2E-08
3-Penten-2-one, 4-methyl	3.1E-08
Bromodichloromethane	3.0E-08

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS - MAXIMUM MEASURED STACK EMISSION RATES (a)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (b)
Dinitrotoluene, 2,6-	2.9E-08
Dibromochloromethane	2.8E-08
Methyl bromide (Bromomethane)	2.3E-08
Dinitrophenol, 2,4-	2.0E-08
Nitrophenol, 4-	1.9E-08
Nitroaniline, 3-	1.9E-08
Chloronaphthalene,2-	1.8E-08
Dichlorobenzidine, 3,3'-	1.5E-08
Methylene bromide	1.4E-08
Pentachloronitrobenzene (PCNB)	1.1E-08
Toluene	1.1E-08
Chlorobenzilate	9.0E-09
Dimethylphenol, 2,4-	8.3E-09
Acrylonitrile	8.1E-09
Nitrophenol, 2-	7.2E-09
Heptachlor	6.5E-09
Carbon Tetrachloride	6.5E-09
Carbazole	6.4E-09
Benzaldehyde	6.3E-09
Dinitrobenzene, 1,3-	6.0E-09
Methyl ethyl ketone (2-Butanone)	5.6E-09
Benzyl alcohol	5.6E-09
Phenanthrene	4.5E-09
Nitroaniline, 4-	4.1E-09
Benzonitrile	4.1E-09
Di-n-butyl phthalate	4.0E-09
Aniline	3.9E-09
Carbon Disulfide	3.7E-09
Methyl chloride (Chloromethane)	3.5E-09
Heptachlor epoxide	3.5E-09
Cobalt	3.3E-09
Phenol	3.2E-09
TetraCDF, 2,3,7,8-	3.1E-09
Endrin	2.6E-09
Chlorophenol, 2-	2.3E-09
Chloroaniline, p-	2.3E-09
Trichlorobenzene, 1,2,3-	1.9E-09
Acetone	1.9E-09
Bromophenyl-phenylether, 4-	1.8E-09
HexaCDF, 1,2,3,6,7,8-	1.8E-09
Chloro-3-methylphenol, 4-	1.8E-09
Hexachloro-1,3-butadiene (Perchlorobutadiene)	1.7E-09
Naphthalene	1.7E-09
Acetophenone	1.7E-09
Cresol, o-	1.7E-09
HexaCDF, 2,3,4,6,7,8-	1.7E-09
N-nitrosodimethylamine	1.5E-09
Butylbenzylphthalate	1.2E-09
Chlordane	1.2E-09
Dichlorobenzene, 1,3-	1.2E-09
2,5-Dimethylheptane	1.1E-09
HexaCDF, 1,2,3,4,7,8-	1.1E-09
Diethyl phthalate	1.1E-09
Acenaphthylene	1.1E-09
Tetrachloroethane, 1,1,2,2-	1.1E-09
Vinyl Acetate	1.1E-09
HexaCDD, 1,2,3,4,7,8-	1.0E-09
Dichloropropene, 1,3- (cis)	9.6E-10
Xylene, p-	9.3E-10
Xylene, m-	9.3E-10
PentaCDF, 1,2,3,7,8-	9.1E-10
Bis(2-chloroethoxy) methane	9.1E-10
Trichlorophenol, 2,4,5-	8.8E-10
Nitroaniline, 2-	8.6E-10
Nitrobenzene	8.6E-10
Dichlorophenol, 2,4-	8.0E-10
Benzo(b)fluoranthene	7.8E-10
2-Hexanone	7.6E-10
Hexachloroethane (Perchloroethane)	7.6E-10
PentaCDD, 1,2,3,7,8-	7.5E-10
Cresol, p-	7.4E-10
Cresol, m-	7.4E-10
Dimethyl phthalate	7.3E-10
Endosulfan I	7.0E-10

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS - MAXIMUM MEASURED STACK EMISSION RATES (a)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (b)
Trichlorophenol, 2,4,6-	7.0E-10
BHC, beta-	6.5E-10
Pyridine	6.1E-10
Dibenzofuran	5.8E-10
Diphenylamine	5.8E-10
Bromobenzene	5.4E-10
Aldrin	5.3E-10
Tetrachlorobenzene, 1,2,4,5-	5.3E-10
Nitrosodiphenylamine, N-	5.2E-10
Isophorone	5.2E-10
Pentachlorobenzene	4.9E-10
Di-n-octylphthalate	4.8E-10
TetraCDD, 2,3,7,8-	4.4E-10
Trichlorobenzene, 1,2,4-	4.3E-10
Chrysene	4.3E-10
Aroclor 1254	4.0E-10
Diphenylhydrazine,1,2-	3.8E-10
3-Ethyl benzaldehyde	3.7E-10
4-Ethyl benzaldehyde	3.7E-10
Trichloropropane, 1,2,3-	3.4E-10
DDT, 4-4'-	3.3E-10
Butylbenzene, sec	3.2E-10
Xylene, o-	3.2E-10
1,1-Dichloropropene	2.8E-10
Trichloroethane, 1,1,2-	2.6E-10
Dieldrin	2.5E-10
Benzo(a)Anthracene	2.5E-10
BHC, alpha-	2.5E-10
Benzo(k)fluoranthene	2.2E-10
Styrene	2.2E-10
Bis(2-chlorethyl)ether	2.2E-10
2,2'-oxybis (1-Chloropropane)	2.1E-10
Iodomethane	2.0E-10
Indeno(1,2,3-cd) pyrene	1.6E-10
Methyl isobutyl ketone	1.5E-10
Benzo(a)pyrene	1.4E-10
OctaCDF, 1,2,3,4,6,7,8,9-	1.3E-10
gamma-BHC (Lindane)	1.3E-10
Ethylene dibromide	1.1E-10
HexaCDD, 1,2,3,7,8,9-	1.0E-10
Trichloroethylene	9.9E-11
Tetrahydrofuran	9.9E-11
Pyrene	9.7E-11
DDD, 4,4'-	9.7E-11
HexaCDD, 1,2,3,6,7,8-	8.8E-11
Tetrachloroethane, 1,1,1,2-	8.6E-11
1,3-Dichloropropane	8.2E-11
Butylbenzene, n-	7.9E-11
Dichloroethylene 1,1-	7.6E-11
2,2-Dichloropropane	7.6E-11
Butylbenzene, tert	7.5E-11
Vinyl Chloride	7.0E-11
Trichloroethane, 1,1,1-	6.6E-11
Anthracene	6.2E-11
Acenaphthene	6.0E-11
2-Methylnaphthalene	5.8E-11
Trimethylbenzene, 1,3,5-	5.3E-11
Dichlorobenzene, 1,2-	4.6E-11
HeptaCDF, 1,2,3,4,6,7,8-	4.4E-11
Dichloroethane, 1,2- (Ethylene Dichloride)	4.3E-11
Methoxychlor	3.0E-11
Dichlorobenzene,1,4-	2.8E-11
DDE, 4,4'-	2.7E-11
Fluorene	2.4E-11
Cumene (Isopropylbenzene)	2.3E-11
OctaCDD, 1,2,3,4,6,7,8,9-	2.3E-11
2-Chlorotoluene	2.1E-11
4-Chlorotoluene	2.0E-11
Ethylene Glycol	1.8E-11
Propylbenzene, n-	1.7E-11
Trichlorofluoromethane (Freon 11)	1.5E-11
1,2,4-Trimethylbenzene	1.5E-11
Dichloroethylene, cis-1,2-	1.3E-11
Ethylbenzene	1.3E-11

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS - MAXIMUM MEASURED STACK EMISSION RATES (a)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (b)
Dichloropropane, 1,2-	1.3E-11
HexaCDF, 1,2,3,7,8,9-	9.6E-12
Benzo(g,h,i)perylene	8.8E-12
Chloroethane	8.6E-12
Dichlorodifluoromethane	8.4E-12
Bromochloromethane	8.3E-12
methyl tert-butyl ether	6.5E-12
HeptaCDF, 1,2,3,4,7,8,9-	6.2E-12
Propylene oxide	4.6E-12
Dichloroethylene-1,2 (trans)	4.2E-12
Dichloroethane 1,1-	4.0E-12
HeptaCDD, 1,2,3,4,6,7,8-	2.3E-12
Methyl methacrylate	1.1E-12
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	5.4E-13
Dioxane, 1,4-	4.2E-13
Dibenz(a,h)anthracene	1.7E-13
Acrylic Acid	4.3E-14
1-Hexane (n-hexane)	7.6E-15
Endosulfan sulfate	0.0E+00
2,5-Dione, 3-hexene	0.0E+00
Benzo(e)pyrene	0.0E+00
Perylene	0.0E+00
Phosphine imide, P,P,P-triphenyl	0.0E+00
Diallate	0.0E+00
9-Octadecenamide (oleamide)	0.0E+00
delta-BHC	0.0E+00
2-Methyl octane	0.0E+00
Endosulfan II	0.0E+00
Endrin ketone	0.0E+00
3-Penten-2-one (ethylidene acetone)	0.0E+00
2,5-Dimethylfuran	0.0E+00
Endrin aldehyde	0.0E+00
3-Hexen-2-one	0.0E+00
Benzoic acid, methyl ester (methyl benzoate)	0.0E+00
Isopropyl toluene, p-	0.0E+00
Total (c)	2.6E-02
R_3 resident farmer	
Nitrogen dioxide	1.0E-02
Arsenic	6.6E-03
Sulfur dioxide	3.6E-03
Chlorine	2.3E-03
Hydrogen chloride	1.0E-03
Beryllium	2.5E-04
Cadmium	1.0E-04
Nickel	2.1E-05
Lead	2.1E-05
Copper	1.8E-05
Mercury	1.0E-05
Hexachlorobenzene	2.6E-06
Mercuric chloride	2.5E-06
Chlorophenyl-phenylether, 4-	2.3E-06
Chloroform (Trichloromethane)	1.7E-06
Benzidine	1.7E-06
Dibromo-3-chloropropane, 1,2-	1.3E-06
Hexachlorocyclopentadiene	5.8E-07
Thallium (I)	3.8E-07
4,6-Dinitro-2-methylphenol	3.3E-07
Manganese	2.4E-07
Vanadium	2.1E-07
Pentachlorophenol	1.6E-07
Silver	1.5E-07
Tetrachloroethylene (Perchloroethylene)	1.5E-07
PentaCDF, 2,3,4,7,8-	9.1E-08
Fluoranthene	9.0E-08
Zinc	7.8E-08
Nitrosodipropylamine, n-	7.4E-08
Barium	7.3E-08
Aluminum	4.7E-08
Antimony	4.4E-08
Bromoform (tribromomethane)	4.3E-08
Chromium	4.2E-08
Chromium, hexavalent	4.2E-08

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS -
MAXIMUM MEASURED STACK EMISSION RATES (a)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (b)
Chlorobenzene	4.0E-08
Benzoic Acid	3.4E-08
Dinitrotoluene, 2,4-	3.4E-08
Selenium	3.3E-08
Benzene	3.1E-08
Ethylhexyl phthalate, bis-2-	3.0E-08
Methylene chloride	3.0E-08
3-Penten-2-one, 4-methyl	2.9E-08
Bromodichloromethane	2.9E-08
Dinitrotoluene, 2,6-	2.7E-08
Dibromochloromethane	2.7E-08
Methyl bromide (Bromomethane)	2.2E-08
Dinitrophenol, 2,4-	1.9E-08
Nitrophenol, 4-	1.8E-08
Nitroaniline, 3-	1.8E-08
Chloronaphthalene,2-	1.7E-08
Dichlorobenzidine, 3,3'-	1.4E-08
Methylene bromide	1.3E-08
Pentachloronitrobenzene (PCNB)	1.1E-08
Toluene	1.1E-08
Chlorobenzilate	8.5E-09
Dimethylphenol, 2,4-	7.8E-09
Acrylonitrile	7.6E-09
Nitrophenol, 2-	6.7E-09
Heptachlor	6.1E-09
Carbon Tetrachloride	6.1E-09
Carbazole	6.0E-09
Benzaldehyde	5.9E-09
Dinitrobenzene, 1,3-	5.6E-09
Methyl ethyl ketone (2-Butanone)	5.3E-09
Benzyl alcohol	5.3E-09
Phenanthrene	4.2E-09
Nitroaniline, 4-	3.8E-09
Benzonitrile	3.8E-09
Di-n-butyl phthalate	3.8E-09
Aniline	3.7E-09
Carbon Disulfide	3.5E-09
Methyl chloride (Chloromethane)	3.3E-09
Heptachlor epoxide	3.3E-09
Cobalt	3.1E-09
Phenol	3.1E-09
TetraCDF, 2,3,7,8-	2.9E-09
Endrin	2.5E-09
Chlorophenol, 2-	2.2E-09
Chloroaniline, p-	2.1E-09
Trichlorobenzene, 1,2,3-	1.8E-09
Acetone	1.8E-09
HexaCDF, 1,2,3,6,7,8-	1.7E-09
Bromophenyl-phenylether, 4-	1.7E-09
Chloro-3-methylphenol, 4-	1.7E-09
Hexachloro-1,3-butadiene (Perchlorobutadiene)	1.6E-09
Naphthalene	1.6E-09
HexaCDF, 2,3,4,6,7,8-	1.6E-09
Acetophenone	1.6E-09
Cresol, o-	1.6E-09
N-nitrosodimethylamine	1.4E-09
Butylbenzylphthalate	1.1E-09
Chlordane	1.1E-09
Dichlorobenzene, 1,3-	1.1E-09
HexaCDF, 1,2,3,4,7,8-	1.1E-09
2,5-Dimethylheptane	1.1E-09
Diethyl phthalate	1.0E-09
Acenaphthylene	1.0E-09
Tetrachloroethane, 1,1,2,2-	1.0E-09
HexaCDD, 1,2,3,4,7,8-	1.0E-09
Vinyl Acetate	9.9E-10
Dichloropropene, 1,3- (cis)	9.1E-10
Xylene, p-	8.8E-10
Xylene, m-	8.8E-10
PentaCDF, 1,2,3,7,8-	8.7E-10
Bis(2-chloroethoxy) methane	8.5E-10
Trichlorophenol, 2,4,5-	8.3E-10
Nitroaniline, 2-	8.1E-10
Nitrobenzene	8.1E-10

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS -
MAXIMUM MEASURED STACK EMISSION RATES (a)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (b)
Dichlorophenol, 2,4-	7.5E-10
Benzo(b)fluoranthene	7.4E-10
PentaCDD, 1,2,3,7,8-	7.2E-10
2-Hexanone	7.2E-10
Hexachloroethane (Perchloroethane)	7.2E-10
Cresol, p-	7.0E-10
Cresol, m-	7.0E-10
Dimethyl phthalate	6.9E-10
Endosulfan I	6.6E-10
Trichlorophenol, 2,4,6-	6.6E-10
BHC, beta-	6.1E-10
Pyridine	5.8E-10
Dibenzofuran	5.5E-10
Diphenylamine	5.5E-10
Bromobenzene	5.1E-10
Aldrin	5.0E-10
Tetrachlorobenzene, 1,2,4,5-	5.0E-10
Nitrosodiphenylamine, N-	4.9E-10
Isophorone	4.9E-10
Pentachlorobenzene	4.6E-10
Di-n-octylphthalate	4.5E-10
TetraCDD, 2,3,7,8-	4.1E-10
Trichlorobenzene, 1,2,4-	4.1E-10
Chrysene	4.0E-10
Aroclor 1254	3.7E-10
Diphenylhydrazine,1,2-	3.6E-10
3-Ethyl benzaldehyde	3.5E-10
4-Ethyl benzaldehyde	3.5E-10
Trichloropropane, 1,2,3-	3.2E-10
DDT, 4-4'-	3.1E-10
Butylbenzene, sec	3.0E-10
Xylene, o-	3.0E-10
1,1-Dichloropropene	2.6E-10
Trichloroethane, 1,1,2-	2.5E-10
Dieldrin	2.4E-10
Benzo(a)Anthracene	2.4E-10
BHC, alpha-	2.3E-10
Benzo(k)fluoranthene	2.1E-10
Styrene	2.1E-10
Bis(2-chlorethyl)ether	2.1E-10
2,2'-oxybis (1-Chloropropane)	2.0E-10
Iodomethane	1.9E-10
Indeno(1,2,3-cd) pyrene	1.5E-10
Methyl isobutyl ketone	1.4E-10
Benzo(a)pyrene	1.4E-10
OctaCDF, 1,2,3,4,6,7,8,9-	1.2E-10
gamma-BHC (Lindane)	1.2E-10
Ethylene dibromide	1.0E-10
HexaCDD, 1,2,3,7,8,9-	9.9E-11
Trichloroethylene	9.4E-11
Tetrahydrofuran	9.4E-11
Pyrene	9.1E-11
DDD, 4,4'-	9.1E-11
HexaCDD, 1,2,3,6,7,8-	8.4E-11
Tetrachloroethane, 1,1,1,2-	8.1E-11
1,3-Dichloropropane	7.7E-11
Butylbenzene, n-	7.4E-11
Dichloroethylene 1,1-	7.2E-11
2,2-Dichloropropane	7.1E-11
Butylbenzene, tert	7.1E-11
Vinyl Chloride	6.6E-11
Trichloroethane, 1,1,1-	6.3E-11
Anthracene	5.8E-11
Acenaphthene	5.7E-11
2-Methylnaphthalene	5.5E-11
Trimethylbenzene, 1,3,5-	5.0E-11
Dichlorobenzene, 1,2-	4.4E-11
HeptaCDF, 1,2,3,4,6,7,8-	4.2E-11
Dichloroethane, 1,2- (Ethylene Dichloride)	4.1E-11
Methoxychlor	2.8E-11
Dichlorobenzene,1,4-	2.6E-11
DDE, 4,4'-	2.5E-11
Fluorene	2.2E-11
OctaCDD, 1,2,3,4,6,7,8,9-	2.2E-11

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS -
MAXIMUM MEASURED STACK EMISSION RATES (a)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (b)
Cumene (Isopropylbenzene)	2.2E-11
2-Chlorotoluene	1.9E-11
4-Chlorotoluene	1.9E-11
Ethylene Glycol	1.7E-11
Propylbenzene, n-	1.6E-11
Trichlorofluoromethane (Freon 11)	1.4E-11
1,2,4-Trimethylbenzene	1.4E-11
Dichloroethylene, cis-1,2-	1.3E-11
Ethylbenzene	1.2E-11
Dichloropropane, 1,2-	1.2E-11
HexaCDF, 1,2,3,7,8,9-	9.2E-12
Benzo(g,h,i)perylene	8.4E-12
Chloroethane	8.1E-12
Dichlorodifluoromethane	7.9E-12
Bromochloromethane	7.8E-12
methyl tert-butyl ether	6.1E-12
HeptaCDF, 1,2,3,4,7,8,9-	6.0E-12
Propylene oxide	4.3E-12
Dichloroethylene-1,2 (trans)	4.0E-12
Dichloroethane 1,1-	3.8E-12
HeptaCDD, 1,2,3,4,6,7,8-	2.2E-12
Methyl methacrylate	1.1E-12
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	5.1E-13
Dioxane, 1,4-	4.0E-13
Dibenz(a,h)anthracene	1.6E-13
Acrylic Acid	4.0E-14
1-Hexane (n-hexane)	7.1E-15
Endosulfan sulfate	0.0E+00
2,5-Dione, 3-hexene	0.0E+00
Benzo(e)pyrene	0.0E+00
Perylene	0.0E+00
Phosphine imide, P,P,P-triphenyl	0.0E+00
Diallate	0.0E+00
9-Octadecenamide (oleamide)	0.0E+00
delta-BHC	0.0E+00
2-Methyl octane	0.0E+00
Endosulfan II	0.0E+00
Endrin ketone	0.0E+00
3-Penten-2-one (ethylidene acetone)	0.0E+00
2,5-Dimethylfuran	0.0E+00
Endrin aldehyde	0.0E+00
3-Hexen-2-one	0.0E+00
Benzoic acid, methyl ester (methyl benzoate)	0.0E+00
Isopropyl toluene, p-	0.0E+00
Total (c)	2.4E-02
R_4 resident farmer	
Nitrogen dioxide	1.6E-02
Arsenic	1.1E-02
Sulfur dioxide	5.9E-03
Chlorine	3.7E-03
Hydrogen chloride	1.7E-03
Beryllium	4.2E-04
Cadmium	1.7E-04
Nickel	3.6E-05
Lead	3.5E-05
Copper	3.0E-05
Mercury	1.6E-05
Mercuric chloride	4.1E-06
Hexachlorobenzene	4.1E-06
Chlorophenyl-phenylether, 4-	3.7E-06
Benzidine	2.8E-06
Chloroform (Trichloromethane)	2.8E-06
Dibromo-3-chloropropane, 1,2-	2.2E-06
Hexachlorocyclopentadiene	9.4E-07
Thallium (I)	6.3E-07
4,6-Dinitro-2-methylphenol	5.4E-07
Manganese	4.0E-07
Vanadium	3.6E-07
Silver	2.6E-07
Pentachlorophenol	2.6E-07
Tetrachloroethylene (Perchloroethylene)	2.4E-07
PentaCDF, 2,3,4,7,8-	1.5E-07

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS - MAXIMUM MEASURED STACK EMISSION RATES (a)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (b)
Fluoranthene	1.5E-07
Zinc	1.3E-07
Barium	1.2E-07
Nitrosodipropylamine, n-	1.2E-07
Aluminum	8.0E-08
Antimony	7.2E-08
Chromium	7.0E-08
Chromium, hexavalent	7.0E-08
Bromoform (tribromomethane)	7.0E-08
Chlorobenzene	6.6E-08
Benzoic Acid	5.6E-08
Dinitrotoluene, 2,4-	5.5E-08
Selenium	5.5E-08
Ethylhexyl phthalate, bis-2-	5.1E-08
Benzene	5.1E-08
Methylene chloride	4.9E-08
3-Penten-2-one, 4-methyl	4.7E-08
Bromodichloromethane	4.6E-08
Dinitrotoluene, 2,6-	4.4E-08
Dibromochloromethane	4.3E-08
Methyl bromide (Bromomethane)	3.6E-08
Dinitrophenol, 2,4-	3.0E-08
Nitrophenol, 4-	2.9E-08
Nitroaniline, 3-	2.9E-08
Chloronaphthalene,2-	2.8E-08
Dichlorobenzidine, 3,3'-	2.3E-08
Methylene bromide	2.1E-08
Pentachloronitrobenzene (PCNB)	1.8E-08
Toluene	1.8E-08
Chlorobenzilate	1.4E-08
Dimethylphenol, 2,4-	1.3E-08
Acrylonitrile	1.2E-08
Nitrophenol, 2-	1.1E-08
Heptachlor	1.0E-08
Carbon Tetrachloride	9.9E-09
Carbazole	9.8E-09
Benzaldehyde	9.6E-09
Dinitrobenzene, 1,3-	9.2E-09
Methyl ethyl ketone (2-Butanone)	8.6E-09
Benzyl alcohol	8.6E-09
Phenanthrene	6.8E-09
Nitroaniline, 4-	6.2E-09
Benzonitrile	6.2E-09
Di-n-butyl phthalate	6.2E-09
Aniline	6.0E-09
Carbon Disulfide	5.7E-09
Methyl chloride (Chloromethane)	5.4E-09
Heptachlor epoxide	5.3E-09
Cobalt	5.2E-09
Phenol	5.0E-09
TetraCDF, 2,3,7,8-	4.8E-09
Endrin	4.0E-09
Chlorophenol, 2-	3.6E-09
Chloroaniline, p-	3.5E-09
HexaCDF, 1,2,3,6,7,8-	2.9E-09
Trichlorobenzene, 1,2,3-	2.9E-09
Acetone	2.9E-09
Bromophenyl-phenylether, 4-	2.8E-09
HexaCDF, 2,3,4,6,7,8-	2.7E-09
Chloro-3-methylphenol, 4-	2.7E-09
Hexachloro-1,3-butadiene (Perchlorobutadiene)	2.6E-09
Naphthalene	2.6E-09
Acetophenone	2.6E-09
Cresol, o-	2.6E-09
N-nitrosodimethylamine	2.3E-09
Butylbenzylphthalate	1.9E-09
HexaCDF, 1,2,3,4,7,8-	1.8E-09
Chlordane	1.8E-09
Dichlorobenzene, 1,3-	1.8E-09
2,5-Dimethylheptane	1.7E-09
HexaCDD, 1,2,3,4,7,8-	1.7E-09
Diethyl phthalate	1.7E-09
Acenaphthylene	1.7E-09
Tetrachloroethane, 1,1,2,2-	1.6E-09

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS - MAXIMUM MEASURED STACK EMISSION RATES (a)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (b)
Vinyl Acetate	1.6E-09
Dichloropropene, 1,3- (cis)	1.5E-09
PentaCDF, 1,2,3,7,8-	1.5E-09
Xylene, p-	1.4E-09
Xylene, m-	1.4E-09
Bis(2-chloroethoxy) methane	1.4E-09
Trichlorophenol, 2,4,5-	1.3E-09
Nitroaniline, 2-	1.3E-09
Nitrobenzene	1.3E-09
Dichlorophenol, 2,4-	1.2E-09
PentaCDD, 1,2,3,7,8-	1.2E-09
Benzo(b)fluoranthene	1.2E-09
2-Hexanone	1.2E-09
Hexachloroethane (Perchloroethane)	1.2E-09
Cresol, p-	1.1E-09
Cresol, m-	1.1E-09
Dimethyl phthalate	1.1E-09
Endosulfan I	1.1E-09
Trichlorophenol, 2,4,6-	1.1E-09
BHC, beta-	9.9E-10
Pyridine	9.4E-10
Dibenzofuran	8.9E-10
Diphenylamine	8.9E-10
Bromobenzene	8.3E-10
Aldrin	8.1E-10
Tetrachlorobenzene, 1,2,4,5-	8.1E-10
Nitrosodiphenylamine, N-	8.0E-10
Isophorone	7.9E-10
Pentachlorobenzene	7.5E-10
Di-n-octylphthalate	7.4E-10
TetraCDD, 2,3,7,8-	6.8E-10
Chrysene	6.6E-10
Trichlorobenzene, 1,2,4-	6.6E-10
Aroclor 1254	6.1E-10
Diphenylhydrazine,1,2-	5.8E-10
3-Ethyl benzaldehyde	5.7E-10
4-Ethyl benzaldehyde	5.7E-10
Trichloropropane, 1,2,3-	5.2E-10
DDT, 4-4'-	5.1E-10
Butylbenzene, sec	4.9E-10
Xylene, o-	4.9E-10
1,1-Dichloropropene	4.3E-10
Trichloroethane, 1,1,2-	4.0E-10
Benzo(a)Anthracene	3.9E-10
Dieldrin	3.8E-10
BHC, alpha-	3.8E-10
Benzo(k)fluoranthene	3.6E-10
Styrene	3.4E-10
Bis(2-chlorethyl)ether	3.4E-10
2,2'-oxybis (1-Chloropropane)	3.2E-10
Iodomethane	3.0E-10
Indeno(1,2,3-cd) pyrene	2.6E-10
Methyl isobutyl ketone	2.3E-10
Benzo(a)pyrene	2.3E-10
OctaCDF, 1,2,3,4,6,7,8,9-	2.1E-10
gamma-BHC (Lindane)	1.9E-10
HexaCDD, 1,2,3,7,8,9-	1.7E-10
Ethylene dibromide	1.6E-10
Trichloroethylene	1.5E-10
Tetrahydrofuran	1.5E-10
DDD, 4,4'-	1.5E-10
Pyrene	1.5E-10
HexaCDD, 1,2,3,6,7,8-	1.4E-10
Tetrachloroethane, 1,1,1,2-	1.3E-10
1,3-Dichloropropane	1.2E-10
Butylbenzene, n-	1.2E-10
Dichloroethylene 1,1-	1.2E-10
2,2-Dichloropropane	1.2E-10
Butylbenzene, tert	1.2E-10
Vinyl Chloride	1.1E-10
Trichloroethane, 1,1,1-	1.0E-10
Anthracene	9.5E-11
Acenaphthene	9.2E-11
2-Methylnaphthalene	8.9E-11

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS - MAXIMUM MEASURED STACK EMISSION RATES (a)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (b)
Trimethylbenzene, 1,3,5-	8.1E-11
HeptaCDF, 1,2,3,4,6,7,8-	7.1E-11
Dichlorobenzene, 1,2-	7.1E-11
Dichloroethane, 1,2- (Ethylene Dichloride)	6.6E-11
Methoxychlor	4.6E-11
Dichlorobenzene,1,4-	4.2E-11
DDE, 4,4'-	4.1E-11
OctaCDD, 1,2,3,4,6,7,8,9-	3.8E-11
Fluorene	3.6E-11
Cumene (Isopropylbenzene)	3.6E-11
2-Chlorotoluene	3.1E-11
4-Chlorotoluene	3.1E-11
Ethylene Glycol	2.7E-11
Propylbenzene, n-	2.6E-11
Trichlorofluoromethane (Freon 11)	2.3E-11
1,2,4-Trimethylbenzene	2.3E-11
Dichloroethylene, cis-1,2-	2.0E-11
Ethylbenzene	2.0E-11
Dichloropropane, 1,2-	2.0E-11
HexaCDF, 1,2,3,7,8,9-	1.5E-11
Benzo(g,h,i)perylene	1.4E-11
Chloroethane	1.3E-11
Dichlorodifluoromethane	1.3E-11
Bromochloromethane	1.3E-11
HeptaCDF, 1,2,3,4,7,8,9-	1.0E-11
methyl tert-butyl ether	9.9E-12
Propylene oxide	7.0E-12
Dichloroethylene-1,2 (trans)	6.5E-12
Dichloroethane 1,1-	6.2E-12
HeptaCDD, 1,2,3,4,6,7,8-	3.7E-12
Methyl methacrylate	1.7E-12
Freon 113 (1,1,2-trichloro-1,2,2-trifluoroethane)	8.3E-13
Dioxane, 1,4-	6.5E-13
Dibenz(a,h)anthracene	2.7E-13
Acrylic Acid	6.5E-14
1-Hexane (n-hexane)	1.2E-14
Endosulfan sulfate	0.0E+00
2,5-Dione, 3-hexene	0.0E+00
Benzo(e)pyrene	0.0E+00
Perylene	0.0E+00
Phosphine imide, P,P,P-triphenyl	0.0E+00
Diallate	0.0E+00
9-Octadecenamide (oleamide)	0.0E+00
delta-BHC	0.0E+00
2-Methyl octane	0.0E+00
Endosulfan II	0.0E+00
Endrin ketone	0.0E+00
3-Penten-2-one (ethylidene acetone)	0.0E+00
2,5-Dimethylfuran	0.0E+00
Endrin aldehyde	0.0E+00
3-Hexen-2-one	0.0E+00
Benzoic acid, methyl ester (methyl benzoate)	0.0E+00
Isopropyl toluene, p-	0.0E+00
Total (c)	4.0E-02

NC = Not calculated.

(a) For those compounds with emission rates based on stack test data, emission rates for this acute analysis were based on maximum measured stack test measurements. For the remaining compounds (i.e., with emission rates based on proposed permit limits or calculated based on feed rate and destruction and removal efficiency), the emission rates for this acute analysis were the same as those used in the chronic risk assessment. The emission rates are listed in Table 3 in the Response to USEPA Comment Document.

(b) Acute hazard quotients were calculated for all compounds with stack air emission rates and acute inhalation toxicity criteria.

ACUTE INHALATION RISK RESULTS

REACTIVATION FACILITY STACK EMISSIONS -
MAXIMUM MEASURED STACK EMISSION RATES (a)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (b)

(c) The total is based on the sum of all chemical-specific hazard quotients regardless of the type of health effects of the summed compounds. A total value summed across all compounds is used as a screening tool only, to determine if additional evaluation for specific types of health effects is warranted (i.e., if the total value is greater than 1).

ATTACHMENT E

FUGITIVE EMISSIONS RISK ASSESSMENT:

ACUTE INHALATION RISK RESULTS

USING MAXIMUM MODELED FUGITIVE EMISSION RATES

ACUTE INHALATION RISK RESULTS
FUGITIVE AIR EMISSIONS DURING UNLOADING AT OUTDOOR HOPPER

Emission Rates Based On Maximum Concentration in Spent Carbon Unloaded at Outdoor Hopper H-1 Over 4-Year Period (2003-2006 Data)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
A_1 maximum impact point (stack emissions)	
Benzene	7.0E-03
Chloroform (Trichloromethane)	3.8E-03
Tetrachloroethylene (Perchloroethylene)	4.4E-04
Vinyl Chloride	8.3E-05
Toluene	6.6E-05
Acrylonitrile	4.3E-05
Cyclohexane	2.7E-05
Styrene	1.7E-05
Arsenic	1.0E-05
Trichloroethylene	3.6E-06
Ethylbenzene	2.9E-06
1-Hexane (n-hexane)	2.6E-06
Nickel	1.2E-06
Dichlorobenzene,1,4-	3.2E-07
Cadmium	7.0E-08
Beryllium	5.2E-08
Naphthalene	2.8E-08
Copper	2.4E-08
Cobalt	7.1E-09
Chromium	5.2E-09
Ethylene Dibromide	1.4E-12
1,3-Butadiene	0.0E+00
Chromium, hexavalent	0.0E+00
Total (b)	1.2E-02
A_2 closest business	
Benzene	1.6E-02
Chloroform (Trichloromethane)	8.4E-03
Tetrachloroethylene (Perchloroethylene)	9.8E-04
Vinyl Chloride	1.8E-04
Toluene	1.5E-04
Acrylonitrile	9.5E-05
Cyclohexane	5.9E-05
Styrene	3.8E-05
Arsenic	2.3E-05
Trichloroethylene	8.1E-06
Ethylbenzene	6.4E-06
1-Hexane (n-hexane)	5.7E-06
Nickel	2.7E-06
Dichlorobenzene,1,4-	7.1E-07
Cadmium	1.6E-07
Beryllium	1.2E-07
Naphthalene	6.2E-08
Copper	5.4E-08
Cobalt	1.6E-08
Chromium	1.2E-08
Ethylene Dibromide	3.2E-12
1,3-Butadiene	0.0E+00
Chromium, hexavalent	0.0E+00
Total (b)	2.6E-02
A_3 maximum impact point (hopper fugitive emissions)	
Benzene	3.9E-01
Chloroform (Trichloromethane)	2.1E-01
Tetrachloroethylene (Perchloroethylene)	2.4E-02
Vinyl Chloride	4.6E-03
Toluene	3.6E-03
Acrylonitrile	2.4E-03
Cyclohexane	1.5E-03
Styrene	9.5E-04
Arsenic	5.6E-04
Trichloroethylene	2.0E-04
Ethylbenzene	1.6E-04

ACUTE INHALATION RISK RESULTS
FUGITIVE AIR EMISSIONS DURING UNLOADING AT OUTDOOR HOPPER

Emission Rates Based On Maximum Concentration in Spent Carbon Unloaded at Outdoor Hopper H-1 Over 4-Year Period (2003-2006 Data)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
1-Hexane (n-hexane)	1.4E-04
Nickel	6.8E-05
Dichlorobenzene,1,4-	1.8E-05
Cadmium	3.9E-06
Beryllium	2.9E-06
Naphthalene	1.5E-06
Copper	1.3E-06
Cobalt	3.9E-07
Chromium	2.9E-07
Ethylene Dibromide	7.9E-11
1,3-Butadiene	0.0E+00
Chromium, hexavalent	0.0E+00
Total (b)	6.3E-01
R_1 resident	
Benzene	9.6E-04
Chloroform (Trichloromethane)	5.2E-04
Tetrachloroethylene (Perchloroethylene)	6.1E-05
Vinyl Chloride	1.1E-05
Toluene	9.0E-06
Acrylonitrile	5.8E-06
Cyclohexane	3.6E-06
Styrene	2.4E-06
Arsenic	1.4E-06
Trichloroethylene	5.0E-07
Ethylbenzene	3.9E-07
1-Hexane (n-hexane)	3.5E-07
Nickel	1.7E-07
Dichlorobenzene,1,4-	4.4E-08
Cadmium	9.6E-09
Beryllium	7.1E-09
Naphthalene	3.8E-09
Copper	3.3E-09
Cobalt	9.7E-10
Chromium	7.1E-10
Ethylene Dibromide	2.0E-13
1,3-Butadiene	0.0E+00
Chromium, hexavalent	0.0E+00
Total (b)	1.6E-03
R_2 resident	
Benzene	8.9E-04
Chloroform (Trichloromethane)	4.8E-04
Tetrachloroethylene (Perchloroethylene)	5.6E-05
Vinyl Chloride	1.0E-05
Toluene	8.3E-06
Acrylonitrile	5.4E-06
Cyclohexane	3.3E-06
Styrene	2.2E-06
Arsenic	1.3E-06
Trichloroethylene	4.6E-07
Ethylbenzene	3.6E-07
1-Hexane (n-hexane)	3.2E-07
Nickel	1.6E-07
Dichlorobenzene,1,4-	4.1E-08
Cadmium	8.8E-09
Beryllium	6.5E-09
Naphthalene	3.5E-09
Copper	3.1E-09
Cobalt	8.9E-10
Chromium	6.6E-10
Ethylene Dibromide	1.8E-13
1,3-Butadiene	0.0E+00
Chromium, hexavalent	0.0E+00
Total (b)	1.4E-03

ACUTE INHALATION RISK RESULTS
FUGITIVE AIR EMISSIONS DURING UNLOADING AT OUTDOOR HOPPER

Emission Rates Based On Maximum Concentration in Spent Carbon Unloaded at Outdoor Hopper H-1 Over 4-Year Period (2003-2006 Data)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
R_3 resident farmer	
Benzene	7.2E-04
Chloroform (Trichloromethane)	3.9E-04
Tetrachloroethylene (Perchloroethylene)	4.5E-05
Vinyl Chloride	8.5E-06
Toluene	6.7E-06
Acrylonitrile	4.4E-06
Cyclohexane	2.7E-06
Styrene	1.8E-06
Arsenic	1.0E-06
Trichloroethylene	3.7E-07
Ethylbenzene	3.0E-07
1-Hexane (n-hexane)	2.6E-07
Nickel	1.3E-07
Dichlorobenzene,1,4-	3.3E-08
Cadmium	7.2E-09
Beryllium	5.3E-09
Naphthalene	2.9E-09
Copper	2.5E-09
Cobalt	7.2E-10
Chromium	5.3E-10
Ethylene Dibromide	1.5E-13
1,3-Butadiene	0.0E+00
Chromium, hexavalent	0.0E+00
Total (b)	1.2E-03
R_4 resident farmer	
Benzene	9.3E-04
Chloroform (Trichloromethane)	5.0E-04
Tetrachloroethylene (Perchloroethylene)	5.8E-05
Vinyl Chloride	1.1E-05
Toluene	8.6E-06
Acrylonitrile	5.6E-06
Cyclohexane	3.5E-06
Styrene	2.3E-06
Arsenic	1.4E-06
Trichloroethylene	4.8E-07
Ethylbenzene	3.8E-07
1-Hexane (n-hexane)	3.4E-07
Nickel	1.6E-07
Dichlorobenzene,1,4-	4.2E-08
Cadmium	9.2E-09
Beryllium	6.8E-09
Naphthalene	3.7E-09
Copper	3.2E-09
Cobalt	9.3E-10
Chromium	6.9E-10
Ethylene Dibromide	1.9E-13
1,3-Butadiene	0.0E+00
Chromium, hexavalent	0.0E+00
Total (b)	1.5E-03
R_5 resident	
Benzene	1.2E-03
Chloroform (Trichloromethane)	6.2E-04
Tetrachloroethylene (Perchloroethylene)	7.3E-05
Vinyl Chloride	1.4E-05
Toluene	1.1E-05
Acrylonitrile	7.0E-06
Cyclohexane	4.4E-06
Styrene	2.8E-06
Arsenic	1.7E-06
Trichloroethylene	6.0E-07
Ethylbenzene	4.8E-07

ACUTE INHALATION RISK RESULTS
FUGITIVE AIR EMISSIONS DURING UNLOADING AT OUTDOOR HOPPER

Emission Rates Based On Maximum Concentration in Spent Carbon Unloaded at Outdoor Hopper H-1 Over 4-Year Period (2003-2006 Data)

COMPOUND	ACUTE INHALATION HAZARD QUOTIENT (a)
1-Hexane (n-hexane)	4.2E-07
Nickel	2.0E-07
Dichlorobenzene,1,4-	5.3E-08
Cadmium	1.2E-08
Beryllium	8.5E-09
Naphthalene	4.6E-09
Copper	4.0E-09
Cobalt	1.2E-09
Chromium	8.6E-10
Ethylene Dibromide	2.4E-13
1,3-Butadiene	0.0E+00
Chromium, hexavalent	0.0E+00
Total (b)	1.9E-03
R_6 resident	
Benzene	5.2E-04
Chloroform (Trichloromethane)	2.8E-04
Tetrachloroethylene (Perchloroethylene)	3.3E-05
Vinyl Chloride	6.1E-06
Toluene	4.9E-06
Acrylonitrile	3.2E-06
Cyclohexane	2.0E-06
Styrene	1.3E-06
Arsenic	7.6E-07
Trichloroethylene	2.7E-07
Ethylbenzene	2.1E-07
1-Hexane (n-hexane)	1.9E-07
Nickel	9.2E-08
Dichlorobenzene,1,4-	2.4E-08
Cadmium	5.2E-09
Beryllium	3.8E-09
Naphthalene	2.1E-09
Copper	1.8E-09
Cobalt	5.2E-10
Chromium	3.9E-10
Ethylene Dibromide	1.1E-13
1,3-Butadiene	0.0E+00
Chromium, hexavalent	0.0E+00
Total (b)	8.5E-04

(a) Acute hazard quotients were calculated for all compounds with fugitive air emission rates and acute inhalation toxicity criteria.

(b) The total is based on the sum of all chemical-specific hazard quotients regardless of the type of health effects of the summed compounds. A total value summed across all compounds is used as a screening tool only, to determine if additional evaluation for specific types of health effects is warranted (i.e., if the total value is greater than 1).

ATTACHMENT F

FACILITY EFFLUENT MONITORING REPORTS FOR 2005-2006

(PROVIDED IN SEPARATE PDF FILE)

Siemens Water Technologies Corp

Report on Compliance with Categorical Pretreatment Standards

Summary of Sample Results - June 2005

Analyte	CWT Limits 40 CFR 437.46(b)		Method 200.7 / 7470	Sample Result[1]			
Metals - 200.7 / 7470	**Maximum Daily[1]**	**Monthly Average[1]**	**Reporting Limit[1]**	**IOF0712-01**	**NA**	**NA**	**NA**
Antimony (200.7)	0.249	0.206	0.010	ND			
Arsenic (200.7)	0.162	0.104	0.0050	0.013			
Cadmium (200.7)	0.474	0.0962	0.0050	ND			
Chromium (200.7)	0.947	0.487	0.0050	0.005			
Cobalt (200.7)	0.192	0.124	0.010	ND			
Copper (200.7)	0.405	0.301	0.010	ND			
Lead (200.7)	0.222	0.172	0.0050	ND			
Mercury (7470)	0.00234	0.000739	0.00020	ND			
Nickel (200.7)	3.95	1.45	0.010	ND			
Silver (200.7)	0.120	0.0351	0.010	ND			
Tin (200.7)	0.409	0.120	0.10	ND			
Titanium (200.7)	0.0947	0.0618	0.0050	ND			
Vanadium (200.7)	0.218	0.0662	0.010	ND			
Zinc (200.7)	2.87	0.641	0.020	ND			

Analyte	CWT Limits 40 CFR 437.46(b)		Method 625	Sample Result[1]			
Organics - 625	**Maximum Daily[1]**	**Monthly Average[1]**	**Reporting Limit[1]**	**IOF0712-02**	**IOF0712-03**	**IOF0712-04**	**IOF0712-05**
2,3-Dichloroaniline	0.0731	0.0361	0.005	ND	ND	ND	ND
Bis(2-ethylhexyl) phthalate	0.267	0.158	0.01	ND	ND	ND	ND
Carbazole	0.392	0.233	0.005	ND	ND	ND	ND
o-Cresol	1.92	0.561	0.005	ND	ND	ND	ND
p-Cresol	0.698	0.205	0.005	ND	ND	ND	ND
n-Decane	5.79	3.31	0.005	ND	ND	ND	ND
Fluoranthene	0.787	0.393	0.01	ND	ND	ND	ND
n-Octadecane	1.22	0.925	0.005	ND	ND	ND	ND
2,4,6-Trichlorophenol	0.155	0.106	0.01	ND	ND	ND	ND

Analyte	CWT Limits		Method 413.1	Sample Result[1]			
Oil & Grease - 413.1	**Maximum Daily[1]**	**Monthly Average[1]**	**Reporting Limit[1]**	**IOF0712-02**	**IOF0712-03**	**IOF0712-04**	**IOF0712-05**
Oil and Grease	127	38	5	ND	ND	ND	ND

[1] mg/l (ppm)

ND - Analyte Not Detected at or above reporting limit

Siemens Water Technologies Corp

Report on Compliance with Categorical Pretreatment Standards

Summary of Sample Results - December 2005

Analyte	CWT Limits 40 CFR 437.46(b)		Method 200.7 / 7470	Sample Result[1]			
Metals - 200.7 / 7470	Maximum Daily[1]	Monthly Average[1]	Reporting Limit[1]	IOL1934-01	NA	NA	NA
Antimony (200.7)	0.249	0.206	0.010	ND			
Arsenic (200.7)	0.162	0.104	0.0050	0.011			
Cadmium (200.7)	0.474	0.0962	0.0050	ND			
Chromium (200.7)	0.947	0.487	0.0050	0.0059			
Cobalt (200.7)	0.192	0.124	0.010	ND			
Copper (200.7)	0.405	0.301	0.010	ND			
Lead (200.7)	0.222	0.172	0.0050	ND			
Mercury (7470)	0.00234	0.000739	0.00020	ND			
Nickel (200.7)	3.95	1.45	0.010	ND			
Silver (200.7)	0.120	0.0351	0.010	ND			
Tin (200.7)	0.409	0.120	0.10	ND			
Titanium (200.7)	0.0947	0.0618	0.0050	ND			
Vanadium (200.7)	0.218	0.0662	0.010	ND			
Zinc (200.7)	2.87	0.641	0.020	ND			

Analyte	CWT Limits 40 CFR 437.46(b)		Method 625	Sample Result[2]			
Organics - 625	Maximum Daily[1]	Monthly Average[1]	Reporting Limit[2]	IOL1934-02	IOL1934-03	IOL1934-04	IOL1934-05
Bis(2-ethylhexyl) phthalate	0.267	0.158	9.6	ND	ND	ND	ND
Carbazole	0.392	0.233	4.8	ND	ND	ND	ND
o-Cresol	1.92	0.561	4.8	ND	ND	ND	ND
p-Cresol	0.698	0.205	4.8	ND	ND	ND	ND
n-Decane	5.79	3.31	4.8	ND	ND	ND	ND
Fluoranthene	0.787	0.393	9.6	ND	ND	ND	ND
n-Octadecane	1.22	0.925	4.8	ND	ND	ND	ND
2,4,6-Trichlorophenol	0.155	0.106	9.6	ND	ND	ND	ND

Analyte	CWT Limits		Method 413.1	Sample Result[1]			
Oil & Grease - 413.1	Maximum Daily[1]	Monthly Average[1]	Reporting Limit[1]	IOL1934-02	IOL1934-03	IOL1934-04	IOL1934-05
Oil and Grease	127	38	4.8	ND	ND	ND	ND

[1] mg/l (ppm) [2] ug/l (ppb)

ND - Analyte Not Detected at or above reporting limit

Siemens Water Technologies Corp

Report on Compliance with Categorical Pretreatment Standards

Summary of Sample Results - June 2006

Analyte	CWT Limits 40 CFR 437.46(b)		Method 200.7 / 7470	Sample Result[1]			
Metals - 200.7 / 7470	Maximum Daily[1]	Monthly Average[1]	Reporting Limit[1]	IPE2573-01	NA	NA	NA
Antimony (200.7)	0.249	0.206	0.010	ND			
Arsenic (200.7)	0.162	0.104	0.0050	0.012			
Cadmium (200.7)	0.474	0.0962	0.0050	ND			
Chromium (200.7)	0.947	0.487	0.0050	ND			
Cobalt (200.7)	0.192	0.124	0.010	ND			
Copper (200.7)	0.405	0.301	0.010	ND			
Lead (200.7)	0.222	0.172	0.0050	ND			
Mercury (7470)	0.00234	0.000739	0.00020	ND			
Nickel (200.7)	3.95	1.45	0.010	ND			
Silver (200.7)	0.120	0.0351	0.010	ND			
Tin (200.7)	0.409	0.120	0.10	ND			
Titanium (200.7)	0.0947	0.0618	0.0050	ND			
Vanadium (200.7)	0.218	0.0662	0.010	0.031			
Zinc (200.7)	2.87	0.641	0.020	ND			

Analyte	CWT Limits 40 CFR 437.46(b)		Method 625	Sample Result[2]			
Organics - 625	Maximum Daily[1]	Monthly Average[1]	Reporting Limit[2]	IPE2573-02	IPE2573-03	IPE2573-04	IPE2573-05
Bis(2-ethylhexyl) phthalate	0.267	0.158	9.5	ND	ND	ND	ND
Carbazole	0.392	0.233	4.8	ND	ND	ND	ND
o-Cresol	1.92	0.561	4.8	ND	ND	ND	ND
p-Cresol	0.698	0.205	4.8	ND	ND	ND	ND
n-Decane	5.79	3.31	4.8	ND	ND	ND	ND
Fluoranthene	0.787	0.393	9.5	ND	ND	ND	ND
n-Octadecane	1.22	0.925	4.8	ND	ND	ND	ND
2,4,6-Trichlorophenol	0.155	0.106	9.5	ND	ND	ND	ND

Analyte	CWT Limits		Method 413.1	Sample Result[1]			
Oil & Grease - 413.1	Maximum Daily[1]	Monthly Average[1]	Reporting Limit[1]	IPE2573-02	IPE2573-03	IPE2573-04	IPE2573-05
Oil and Grease	127	38	4.8	ND	ND	ND	ND

[1] mg/l (ppm) [2] ug/l (ppb)

ND - Analyte Not Detected at or above reporting limit

Siemens Water Technologies Corp
Report on Compliance with Categorical Pretreatment Standards
Summary of Sample Results - December 2006

Analyte	CWT Limits 40 CFR 437.46(b)		Method 200.7 / 7470	Sample Result[1]			
Metals - 200.7 / 7470	**Maximum Daily[1]**	**Monthly Average[1]**	**Reporting Limit[1]**	**IPL1042-01**	**NA**	**NA**	**NA**
Antimony (200.7)	0.249	0.206	0.010	ND			
Arsenic (200.7)	0.162	0.104	0.010	ND			
Cadmium (200.7)	0.474	0.0962	0.0050	ND			
Chromium (200.7)	0.947	0.487	0.0050	ND			
Cobalt (200.7)	0.192	0.124	0.010	ND			
Copper (200.7)	0.405	0.301	0.010	ND			
Lead (200.7)	0.222	0.172	0.0050	ND			
Mercury (7470)	0.00234	0.000739	0.00020	ND			
Nickel (200.7)	3.95	1.45	0.010	ND			
Silver (200.7)	0.120	0.0351	0.010	ND			
Tin (200.7)	0.409	0.120	0.10	ND			
Titanium (200.7)	0.0947	0.0618	0.0050	ND			
Vanadium (200.7)	0.218	0.0662	0.010	ND			
Zinc (200.7)	2.87	0.641	0.020	ND			

Analyte	CWT Limits 40 CFR 437.46(b)		Method 625	Sample Result[2]			
Organics - 625	**Maximum Daily[1]**	**Monthly Average[1]**	**Reporting Limit[2]**	**IPL1042-02**	**IPL1042-03**	**IPL1042-04**	**IPL1042-05**
Bis(2-ethylhexyl) phthalate	0.267	0.158	9.5	ND	ND	ND	ND
Carbazole	0.392	0.233	4.8	ND	ND	ND	ND
o-Cresol	1.92	0.561	4.8	ND	ND	ND	ND
p-Cresol	0.698	0.205	4.8	ND	ND	ND	ND
n-Decane	5.79	3.31	4.8	ND	ND	ND	ND
Fluoranthene	0.787	0.393	9.5	ND	ND	ND	ND
n-Octadecane	1.22	0.925	4.8	ND	ND	ND	ND
2,4,6-Trichlorophenol	0.155	0.106	9.5	ND	ND	ND	ND

Analyte	CWT Limits		Method 413.1	Sample Result[1]			
Oil & Grease - 413.1	**Maximum Daily[1]**	**Monthly Average[1]**	**Reporting Limit[1]**	**IPL1042-02**	**IPL1042-03**	**IPL1042-04**	**IPL1042-05**
Oil and Grease	127	38	4.8	ND	ND	ND	ND

[1] mg/l (ppm) [2] ug/l (ppb)

ND - Analyte Not Detected at or above reporting limit

Table 3-9. Makeup Water, Caustic, and Scrubber Purge POHC Concentration

Constituent	Makeup Water (ug/L)				Caustic (ug/L)				Scrubber Blowdown (ug/L)				POTW Discharge (ug/L)			
	Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average	Run 1	Run 2	Run 3	Average
Metals																
Aluminum	< 1.10E+02	< 1.10E+02	< 1.10E+02	< 1.10E+02	< 4.40E+02	NA	NA	< 4.40E+02	1.37E+04	1.17E+04	1.76E+04	1.43E+04	1.14E+02	< 1.10E+02	1.48E+02	< 1.24E+02
Antimony	< 1.40E+01	< 1.40E+01	< 1.40E+01	< 1.40E+01	< 5.60E+01	NA	NA	< 5.60E+01	< 1.40E+01	< 1.40E+01	1.77E+01	< 1.52E+01	< 1.40E+01	< 1.40E+01	< 1.40E+01	< 1.40E+01
Arsenic	< 5.10E+00	5.90E+00	< 5.10E+00	< 5.37E+00	< 2.04E+01	NA	NA	< 2.04E+01	3.67E+01	2.61E+01	3.93E+01	3.40E+01	1.37E+01	1.26E+01	1.19E+01	1.27E+01
Barium	5.12E+01	5.19E+01	4.92E+01	5.08E+01	3.63E+02	NA	NA	3.63E+02	8.74E+02	7.65E+02	1.13E+03	9.23E+02	2.47E+02	2.26E+02	2.38E+02	2.37E+02
Beryllium	< 1.80E+00	< 1.80E+00	< 1.80E+00	< 1.80E+00	< 7.20E+00	NA	NA	< 7.20E+00	3.80E+00	3.70E+00	5.40E+00	4.30E+00	< 1.80E+00	< 1.80E+00	< 1.80E+00	< 1.80E+00
Cadmium	< 8.20E-01	< 8.20E-01	< 8.20E-01	< 8.20E-01	< 3.30E+00	NA	NA	< 3.30E+00	1.13E+01	1.17E+01	1.37E+01	1.22E+01	< 8.20E-01	< 8.20E-01	2.40E+00	< 1.35E+00
Chromium *	< 3.90E+00	< 3.90E+00	< 3.90E+00	< 3.90E+00	3.64E+02	NA	NA	3.64E+02	1.72E+03	1.75E+03	2.90E+03	2.12E+03	2.46E+01	1.30E+01	2.51E+01	2.09E+01
Cobalt	< 2.20E+00	< 2.20E+00	< 2.20E+00	< 2.20E+00	< 8.80E+00	NA	NA	< 8.80E+00	3.15E+01	2.64E+01	4.05E+01	3.28E+01	< 2.20E+00	< 2.20E+00	< 2.20E+00	< 2.20E+00
Copper	< 7.00E+00	< 7.00E+00	< 7.00E+00	< 7.00E+00	< 2.80E+01	NA	NA	< 2.80E+01	1.78E+03	9.65E+02	6.69E+02	1.14E+03	< 7.00E+00	< 7.00E+00	< 7.00E+00	< 7.00E+00
Lead *	< 3.70E+00	< 3.70E+00	< 3.70E+00	< 3.70E+00	9.75E+01	NA	NA	9.75E+01	7.21E+02	5.92E+02	1.51E+03	9.41E+02	< 3.70E+00	< 3.70E+00	< 3.70E+00	< 3.70E+00
Manganese	1.54E+01	1.85E+01	1.40E+01	1.60E+01	7.48E+01	NA	NA	7.48E+01	3.38E+03	3.10E+03	4.32E+03	3.60E+03	1.15E+02	6.12E+01	8.59E+01	8.74E+01
Mercury	< 6.00E-02	< 6.00E-02	< 6.00E-02	< 6.00E-02	3.50E+00	NA	NA	3.50E+00	3.50E-01	4.20E-01	4.50E-01	4.07E-01	< 6.00E-02	< 6.00E-02	< 6.00E-02	< 6.00E-02
Nickel	< 3.80E+00	< 3.80E+00	< 3.80E+00	< 3.80E+00	1.50E+02	NA	NA	1.50E+02	4.33E+02	3.97E+02	4.05E+02	4.12E+02	< 3.80E+00	< 3.80E+00	4.80E+00	< 4.13E+00
Selenium	< 4.30E+00	< 4.30E+00	< 4.30E+00	< 4.30E+00	< 1.72E+01	NA	NA	< 1.72E+01	1.19E+01	8.80E+00	1.21E+01	1.09E+01	1.10E+01	1.00E+01	9.00E+00	1.00E+01
Silver	< 9.70E+00	< 9.70E+00	< 9.70E+00	< 9.70E+00	5.30E+01	NA	NA	5.30E+01	< 9.70E+00	< 9.70E+00	< 9.70E+00	< 9.70E+00	< 9.70E+00	< 9.70E+00	< 9.70E+00	< 9.70E+00
Thallium	< 1.00E+01	< 1.00E+01	< 1.00E+01	< 1.00E+01	< 4.00E+01	NA	NA	< 4.00E+01	< 1.00E+01	< 1.00E+01	< 1.00E+01	< 1.00E+01	< 1.00E+01	< 1.00E+01	< 1.00E+01	< 1.00E+01
Vanadium	< 5.00E+00	< 5.00E+00	< 5.00E+00	< 5.00E+00	< 2.00E+01	NA	NA	< 2.00E+01	8.43E+01	5.81E+01	1.09E+02	8.38E+01	2.56E+01	1.66E+01	2.10E+01	2.11E+01
Zinc	< 3.80E+00	< 3.80E+00	< 3.80E+00	< 3.80E+00	2.04E+02	NA	NA	2.04E+02	7.65E+02	5.64E+02	6.45E+02	6.58E+02	< 3.80E+00	< 3.80E+00	< 3.80E+00	< 3.80E+00
Volatile Organics																
Acetone	4.40E+00	3.80E+00	4.50E+00	4.23E+00	4.50E+00	NA	NA	4.50E+00	ND	4.10E+00	3.60E+00	3.85E+00	3.70E+00	3.70E+00	4.80E+00	4.07E+00
Bromobenzene	ND	ND	ND	ND	1.80E-01	NA	NA	1.80E-01	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	3.20E+00	4.10E+00	2.50E+00	3.27E+00	8.60E-01	NA	NA	8.60E-01	ND	ND	ND	ND	ND	8.90E-01	1.00E+00	9.45E-01
Bromoform	4.00E+01	3.20E+01	2.80E+01	3.33E+01	2.80E+00	NA	NA	ND	9.90E-01	9.20E-01	1.00E+00	9.70E-01	2.00E+00	2.00E+00	2.10E+00	2.03E+00
Carbon disulfide	ND	ND	ND	ND	ND	NA	NA	ND	ND	ND	ND	ND	ND	ND	1.60E-01	1.60E-01
Chlorodibromomethane	1.30E+01	1.30E+01	8.90E+00	1.16E+01	1.00E+00	NA	NA	1.00E+00	9.20E-01	8.70E-01	8.90E-01	8.93E-01	1.40E+00	1.30E+00	1.40E+00	1.37E+00
Chloroform	5.60E-01	6.40E-01	6.20E-01	6.07E-01	1.70E-01	NA	NA	1.70E-01	ND	ND	ND	ND	1.40E-01	1.50E-01	1.40E-01	1.43E-01
1,2-Dichloroethane	ND	1.30E-01	1.20E-01	1.25E-01	1.30E-01	NA	NA	1.30E-01	ND	ND	ND	ND	ND	ND	ND	ND
Iodomethane	ND	ND	ND	ND	ND	NA	NA	ND	5.50E-01	ND	ND	5.50E-01	ND	ND	ND	ND
Methylene chloride *	5.50E-01	2.40E+00	2.00E+00	1.65E+00	5.30E-01	NA	NA	ND	ND	2.30E+00	8.40E-01	1.57E+00	3.50E-01	2.00E+00	6.50E-01	1.00E+00
Tetrachloroethene *	3.30E-01	3.10E-01	4.50E-01	3.63E-01	2.40E-01	NA	NA	2.40E-01	ND	ND	ND	ND	1.30E-01	ND	ND	1.30E-01
Toluene *	ND	4.10E-01	3.10E-01	3.60E-01	ND	NA	NA	ND	ND	4.10E-01	ND	4.10E-01	ND	4.30E-01	1.20E-01	2.75E-01
Semivolatile Organics																
bis(2-ethylhexyl)phthalate	ND	ND	ND	ND	4.10E+01	NA	NA		ND	ND	ND	ND	ND	ND	ND	ND

Note: Only detected organics shown on this table.

* These compounds were spiked into the feed materials during the PDT.

USFILTER W[illegible]ATES
P.O. Box 3308
2523 Mutahar Street
Parker, AZ 85344

Telephone 928-669-5758
Facsimile 928-669-5775

VIA Certified Mail

August 1, 2005

Mr. Andy Jones
Plant Manager
Colorado River Sewage System Joint Venture
P.O. Box 628
Parker, Arizona 85344

Re: Westates Carbon-Arizona, Inc.
Priority Pollutants Testing Report 2005

Dear Mr. Jones:

In accordance with our Industrial Wastewater Discharge Permit Number 1002-96, I am submitting the 2005 Priority Pollutants Testing Report, per our agreement, for analytes from 40 CFR Part 122, Table 2 and Table 5. As per your verbal request we have also tested analytes contained in Table III and IV.

Please call if you have any questions or require any further information.

Sincerely,

Deborah Foster
EHS Specialist

Del Mar Analytical

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

LABORATORY REPORT

Prepared For: U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project: TTO

Sampled: 07/13/05
Received: 07/14/05
Issued: 07/27/05 17:35

NELAP #01108CA California ELAP#1197 CSDLAC #10117

The results listed within this Laboratory Report pertain only to the samples tested in the laboratory. The analyses contained in this report were performed in accordance with the applicable certifications as noted. All soil samples are reported on a wet weight basis unless otherwise noted in the report. This Laboratory Report is confidential and is intended for the sole use of Del Mar Analytical and its client. This report shall not be reproduced, except in full, without written permission from Del Mar Analytical. The Chain(s) of Custody, 4 pages, are included and are an integral part of this report.
This entire report was reviewed and approved for release.

SAMPLE CROSS REFERENCE

SUBCONTRACTED: Refer to the last page for specific subcontract laboratory information included in this report.

LABORATORY ID	CLIENT ID	MATRIX
IOG0857-01	TTO	Water

Reviewed By:

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
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Del Mar Analytical

U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water)								
Reporting Units: ug/l								
Acrolein	EPA 8260B	5G16003	50	ND	1	7/16/2005	7/16/2005	
Acrylonitrile	EPA 8260B	5G16003	50	ND	1	7/16/2005	7/16/2005	
2-Chloroethyl vinyl ether	EPA 8260B	5G16003	5.0	ND	1	7/16/2005	7/16/2005	
Surrogate: Dibromofluoromethane (80-120%)				*99 %*				
Surrogate: Toluene-d8 (80-120%)				*102 %*				
Surrogate: 4-Bromofluorobenzene (80-120%)				*96 %*				

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

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2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

Del Mar Analytical

U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

VOLATILE ORGANICS by GC/MS (EPA 5035/8260B)

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water) - cont.								
Reporting Units: ug/l								
Benzene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Bromobenzene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
Bromochloromethane	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
Bromodichloromethane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Bromoform	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
Bromomethane	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
n-Butylbenzene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
sec-Butylbenzene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
tert-Butylbenzene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
Carbon Disulfide	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
Carbon tetrachloride	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
Chlorobenzene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Chloroethane	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
Chloroform	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Chloromethane	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
2-Chlorotoluene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
4-Chlorotoluene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
Dibromochloromethane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,2-Dibromo-3-chloropropane	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
1,2-Dibromoethane (EDB)	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Dibromomethane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,2-Dichlorobenzene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,3-Dichlorobenzene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,4-Dichlorobenzene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Dichlorodifluoromethane	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
1,1-Dichloroethane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,2-Dichloroethane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,1-Dichloroethene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
cis-1,2-Dichloroethene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
trans-1,2-Dichloroethene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,2-Dichloropropane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,3-Dichloropropane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
2,2-Dichloropropane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,1-Dichloropropene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
cis-1,3-Dichloropropene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
trans-1,3-Dichloropropene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Ethylbenzene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Hexachlorobutadiene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
Isopropylbenzene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
p-Isopropyltoluene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Methylene chloride	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave. Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

VOLATILE ORGANICS by GC/MS (EPA 5035/8260B)

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water) - cont.								
Reporting Units: ug/l								
Naphthalene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
n-Propylbenzene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Styrene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,1,1,2-Tetrachloroethane	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
1,1,2,2-Tetrachloroethane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Tetrachloroethene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Toluene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,2,3-Trichlorobenzene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
1,2,4-Trichlorobenzene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
1,1,1-Trichloroethane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,1,2-Trichloroethane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Trichloroethene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Trichlorofluoromethane	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
1,2,3-Trichloropropane	EPA 8260B	5G21019	10	ND	1	7/21/2005	7/21/2005	
1,2,4-Trimethylbenzene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,3,5-Trimethylbenzene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Vinyl acetate	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
Vinyl chloride	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
o-Xylene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
m,p-Xylenes	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Surrogate: Dibromofluoromethane (80-120%)				*99 %*				
Surrogate: Toluene-d8 (80-120%)				*104 %*				
Surrogate: 4-Bromofluorobenzene (80-120%)				*95 %*				

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

SEMI-VOLATILE ORGANICS BY GC/MS (EPA 3520C/8270C)

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water)								
Reporting Units: ug/l								
Acenaphthene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Acenaphthylene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Aniline	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Anthracene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Benzidine	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	L
Benzoic acid	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
Benzo(a)anthracene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Benzo(b)fluoranthene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Benzo(k)fluoranthene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Benzo(g,h,i)perylene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Benzo(a)pyrene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Benzyl alcohol	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
Bis(2-chloroethoxy)methane	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Bis(2-chloroethyl)ether	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Bis(2-chloroisopropyl)ether	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Bis(2-ethylhexyl)phthalate	EPA 8270C	5G17017	50	ND	1	7/17/2005	7/20/2005	
4-Bromophenyl phenyl ether	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Butyl benzyl phthalate	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
4-Chloroaniline	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
2-Chloronaphthalene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
4-Chloro-3-methylphenol	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
2-Chlorophenol	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
4-Chlorophenyl phenyl ether	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Chrysene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Dibenz(a,h)anthracene	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
Dibenzofuran	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Di-n-butyl phthalate	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
1,3-Dichlorobenzene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
1,4-Dichlorobenzene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
1,2-Dichlorobenzene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
3,3-Dichlorobenzidine	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
2,4-Dichlorophenol	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Diethyl phthalate	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
2,4-Dimethylphenol	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
Dimethyl phthalate	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
4,6-Dinitro-2-methylphenol	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
2,4-Dinitrophenol	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
2,4-Dinitrotoluene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
2,6-Dinitrotoluene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Di-n-octyl phthalate	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
Fluoranthene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

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Report Number: IOG0857

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SEMI-VOLATILE ORGANICS BY GC/MS (EPA 3520C/8270C)

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water) - cont.								
Reporting Units: ug/l								
Fluorene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Hexachlorobenzene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Hexachlorobutadiene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Hexachlorocyclopentadiene	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
Hexachloroethane	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Indeno(1,2,3-cd)pyrene	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
Isophorone	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
2-Methylnaphthalene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
2-Methylphenol	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
4-Methylphenol	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Naphthalene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
2-Nitroaniline	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
3-Nitroaniline	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
4-Nitroaniline	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
Nitrobenzene	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
2-Nitrophenol	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
4-Nitrophenol	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
N-Nitrosodiphenylamine	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
N-Nitroso-di-n-propylamine	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Pentachlorophenol	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
Phenanthrene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Phenol	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Pyrene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
1,2,4-Trichlorobenzene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
2,4,5-Trichlorophenol	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
2,4,6-Trichlorophenol	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
N-Nitrosodimethylamine	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	C
1,2-Diphenylhydrazine/Azobenzene	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
Surrogate: 2-Fluorophenol (30-120%)				*60 %*				
Surrogate: Phenol-d6 (35-120%)				*70 %*				
Surrogate: 2,4,6-Tribromophenol (45-120%)				*84 %*				
Surrogate: Nitrobenzene-d5 (45-120%)				*71 %*				
Surrogate: 2-Fluorobiphenyl (45-120%)				*75 %*				
Surrogate: Terphenyl-d14 (45-120%)				*80 %*				

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805 San Diego CA 92123 (858) 505-8596 FAX (858) 505-9689
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

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ORGANOCHLORINE PESTICIDES (EPA 3510C/8081A)

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water)								
Reporting Units: ug/l								
Aldrin	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
alpha-BHC	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
beta-BHC	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
delta-BHC	EPA 3510C/8081A	5G20057	0.20	ND	0.971	7/20/2005	7/20/2005	
gamma-BHC (Lindane)	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Chlordane	EPA 3510C/8081A	5G20057	1.0	ND	0.971	7/20/2005	7/20/2005	
4,4'-DDD	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
4,4'-DDE	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
4,4'-DDT	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Dieldrin	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Endosulfan I	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Endosulfan II	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Endosulfan sulfate	EPA 3510C/8081A	5G20057	0.20	ND	0.971	7/20/2005	7/20/2005	
Endrin	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Endrin aldehyde	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Endrin ketone	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Heptachlor	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Heptachlor epoxide	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Methoxychlor	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Toxaphene	EPA 3510C/8081A	5G20057	5.0	ND	0.971	7/20/2005	7/20/2005	
Surrogate: Tetrachloro-m-xylene (35-115%)				*56 %*				
Surrogate: Decachlorobiphenyl (45-120%)				*73 %*				

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

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1014 E. Cooley Dr., Suite A, Colton CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

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POLYCHLORINATED BIPHENYLS (EPA 3510C/8082)

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water)								
Reporting Units: ug/l								
Aroclor 1016	EPA 3510/8082	5G20057	1.0	ND	0.971	7/20/2005	7/22/2005	
Aroclor 1221	EPA 3510/8082	5G20057	1.0	ND	0.971	7/20/2005	7/22/2005	
Aroclor 1232	EPA 3510/8082	5G20057	1.0	ND	0.971	7/20/2005	7/22/2005	
Aroclor 1242	EPA 3510/8082	5G20057	1.0	ND	0.971	7/20/2005	7/22/2005	
Aroclor 1248	EPA 3510/8082	5G20057	1.0	ND	0.971	7/20/2005	7/22/2005	
Aroclor 1254	EPA 3510/8082	5G20057	1.0	ND	0.971	7/20/2005	7/22/2005	
Aroclor 1260	EPA 3510/8082	5G20057	1.0	ND	0.971	7/20/2005	7/22/2005	
Surrogate: Decachlorobiphenyl (45-120%)				*88 %*				

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Kathleen A. Robb
Project Manager

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
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9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

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METALS

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water)								
Reporting Units: mg/l								
Aluminum	EPA 6010B	5G19086	0.050	**0.082**	1	7/19/2005	7/20/2005	
Antimony	EPA 6010B	5G18097	0.010	ND	1	7/18/2005	7/20/2005	
Arsenic	EPA 6010B	5G18097	0.0050	**0.0052**	1	7/18/2005	7/20/2005	
Barium	EPA 6010B	5G18097	0.010	**0.075**	1	7/18/2005	7/20/2005	
Boron	EPA 6010B	5G19086	0.050	**0.64**	1	7/19/2005	7/20/2005	
Chromium	EPA 6010B	5G18097	0.0050	ND	1	7/18/2005	7/20/2005	
Cobalt	EPA 6010B	5G18097	0.010	ND	1	7/18/2005	7/20/2005	
Copper	EPA 6010B	5G18097	0.010	ND	1	7/18/2005	7/20/2005	
Iron	EPA 6010B	5G19086	0.040	ND	1	7/19/2005	7/20/2005	
Magnesium	EPA 6010B	5G19086	0.020	**29**	1	7/19/2005	7/20/2005	
Manganese	EPA 6010B	5G19086	0.020	ND	1	7/19/2005	7/20/2005	
Mercury	EPA 7470A	5G19037	0.00020	ND	1	7/19/2005	7/19/2005	
Molybdenum	EPA 6010B	5G18097	0.020	ND	1	7/18/2005	7/20/2005	
Silver	EPA 6010B	5G18097	0.0070	ND	1	7/18/2005	7/20/2005	
Strontium	EPA 6010B	5G19086	0.020	**1.7**	1	7/19/2005	7/20/2005	
Thallium	EPA 6010B	5G18097	0.010	ND	1	7/18/2005	7/20/2005	
Tin	EPA 6010B	5G19086	0.10	ND	1	7/19/2005	7/20/2005	
Titanium	EPA 6010B	5G19086	0.0050	ND	1	7/19/2005	7/20/2005	
Vanadium	EPA 6010B	5G18097	0.010	ND	1	7/18/2005	7/20/2005	
Zinc	EPA 6010B	5G18097	0.020	ND	1	7/18/2005	7/20/2005	
Zirconium	EPA 6010B	5G25067	0.20	ND	1	7/25/2005	7/25/2005	

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Kathleen A. Robb
Project Manager

Del Mar Analytical

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1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
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2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

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INORGANICS

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water)								
Reporting Units: Color Units								
Color	SM2120B	5G14089	1.0	ND	1	7/14/2005	7/14/2005	pH
Sample ID: IOG0857-01 (TTO - Water)								
Reporting Units: mg/l								
Total Kjeldahl Nitrogen	SM4500-NORG,C	5G19066	0.50	**0.84**	1	7/19/2005	7/19/2005	
Ammonia-N	EPA 350.3	5G22113	0.50	ND	1	7/22/2005	7/22/2005	
Bromide	EPA 300.0	5G14039	0.50	**1.1**	1	7/14/2005	7/14/2005	
Total Cyanide	SM4500-CN-C,E	5G15075	0.025	ND	1	7/15/2005	7/18/2005	
Fluoride	EPA 300.0	5G14039	0.50	**1.8**	1	7/14/2005	7/14/2005	
Nitrate-N	EPA 300.0	5G14039	0.15	**2.7**	1	7/14/2005	7/14/2005	
Nitrite-N	EPA 300.0	5G14039	1.5	ND	10	7/14/2005	7/14/2005	RL-3
Oil & Grease	EPA 413.1	5G20078	5.0	ND	1	7/20/2005	7/20/2005	
Phenols	EPA 420.1	5G22080	0.10	ND	1	7/22/2005	7/22/2005	
Phosphorus	EPA 365.3	5G14075	0.050	**0.15**	1	7/14/2005	7/14/2005	
Residual Chlorine	EPA 330.5	5G14094	0.10	ND	1	7/14/2005	7/14/2005	
Sulfate	EPA 300.0	5G14039	5.0	**480**	10	7/14/2005	7/14/2005	
Sulfide	EPA 376.2	5G15045	0.10	ND	1	7/15/2005	7/15/2005	
Surfactants (MBAS)	SM5540-C	5G14118	0.10	ND	1	7/14/2005	7/14/2005	

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Kathleen A. Robb
Project Manager

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
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2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

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NITROGEN, ORGANIC (Calculation)

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water)								
Reporting Units: mg/l								
Organic Nitrogen - N	Calculation	5G25044	0.50	0.84	1	7/25/2005	7/25/2005	

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Project Manager

Del Mar Analytical

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DIQUAT/PARAQUAT (EPA 549.2)

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water)								
Reporting Units: ug/l								
Diquat	EPA 549.2	C5G1809	4.0	ND	1	7/18/2005	7/18/2005	
Paraquat	EPA 549.2	C5G1809	20	ND	1	7/18/2005	7/18/2005	

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Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

SHORT HOLD TIME DETAIL REPORT

	Hold Time (in days)	Date/Time Sampled	Date/Time Received	Date/Time Extracted	Date/Time Analyzed
Sample ID: TTO (IOG0857-01) - Water					
EPA 300.0	2	07/13/2005 14:00	07/14/2005 10:10	07/14/2005 16:00	07/14/2005 16:09
Nitrite-N				07/14/2005 16:00	07/14/2005 17:10
EPA 330.5	1	07/13/2005 14:00	07/14/2005 10:10	07/14/2005 16:08	07/14/2005 16:08
SM2120B	2	07/13/2005 14:00	07/14/2005 10:10	07/14/2005 14:00	07/14/2005 15:00
SM5540-C	2	07/13/2005 14:00	07/14/2005 10:10	07/14/2005 23:00	07/14/2005 23:35

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

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METHOD BLANK/QC DATA

VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G16003 Extracted: 07/16/05										
Blank Analyzed: 07/16/2005 (5G16003-BLK1)										
Acrolein	ND	50	ug/l							
Acrylonitrile	ND	50	ug/l							
2-Chloroethyl vinyl ether	ND	5.0	ug/l							
Surrogate: Dibromofluoromethane	*23.9*		*ug/l*	*25.0*		*96*	*80-120*			
Surrogate: Toluene-d8	*25.4*		*ug/l*	*25.0*		*102*	*80-120*			
Surrogate: 4-Bromofluorobenzene	*24.2*		*ug/l*	*25.0*		*97*	*80-120*			
LCS Analyzed: 07/16/2005 (5G16003-BS1)										
2-Chloroethyl vinyl ether	29.4	5.0	ug/l	25.0		118	25-170			
Surrogate: Dibromofluoromethane	*24.5*		*ug/l*	*25.0*		*98*	*80-120*			
Surrogate: Toluene-d8	*25.4*		*ug/l*	*25.0*		*102*	*80-120*			
Surrogate: 4-Bromofluorobenzene	*24.8*		*ug/l*	*25.0*		*99*	*80-120*			
Matrix Spike Analyzed: 07/16/2005 (5G16003-MS1)					**Source: IOG0808-01**					
2-Chloroethyl vinyl ether	27.1	5.0	ug/l	25.0	ND	108	25-170			
Surrogate: Dibromofluoromethane	*24.7*		*ug/l*	*25.0*		*99*	*80-120*			
Surrogate: Toluene-d8	*25.4*		*ug/l*	*25.0*		*102*	*80-120*			
Surrogate: 4-Bromofluorobenzene	*24.7*		*ug/l*	*25.0*		*99*	*80-120*			
Matrix Spike Dup Analyzed: 07/16/2005 (5G16003-MSD1)					**Source: IOG0808-01**					
2-Chloroethyl vinyl ether	28.2	5.0	ug/l	25.0	ND	113	25-170	4	25	
Surrogate: Dibromofluoromethane	*25.3*		*ug/l*	*25.0*		*101*	*80-120*			
Surrogate: Toluene-d8	*25.8*		*ug/l*	*25.0*		*103*	*80-120*			
Surrogate: 4-Bromofluorobenzene	*24.4*		*ug/l*	*25.0*		*98*	*80-120*			

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Kathleen A. Robb
Project Manager

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METHOD BLANK/QC DATA

VOLATILE ORGANICS by GC/MS (EPA 5035/8260B)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G21019 Extracted: 07/21/05										
Blank Analyzed: 07/21/2005 (5G21019-BLK1)										
Benzene	ND	2.0	ug/l							
Bromobenzene	ND	5.0	ug/l							
Bromochloromethane	ND	5.0	ug/l							
Bromodichloromethane	ND	2.0	ug/l							
Bromoform	ND	5.0	ug/l							
Bromomethane	ND	5.0	ug/l							
n-Butylbenzene	ND	5.0	ug/l							
sec-Butylbenzene	ND	5.0	ug/l							
tert-Butylbenzene	ND	5.0	ug/l							
Carbon Disulfide	ND	5.0	ug/l							
Carbon tetrachloride	ND	5.0	ug/l							
Chlorobenzene	ND	2.0	ug/l							
Chloroethane	ND	5.0	ug/l							
Chloroform	ND	2.0	ug/l							
Chloromethane	ND	5.0	ug/l							
2-Chlorotoluene	ND	5.0	ug/l							
4-Chlorotoluene	ND	5.0	ug/l							
Dibromochloromethane	ND	2.0	ug/l							
1,2-Dibromo-3-chloropropane	ND	5.0	ug/l							
1,2-Dibromoethane (EDB)	ND	2.0	ug/l							
Dibromomethane	ND	2.0	ug/l							
1,2-Dichlorobenzene	ND	2.0	ug/l							
1,3-Dichlorobenzene	ND	2.0	ug/l							
1,4-Dichlorobenzene	ND	2.0	ug/l							
Dichlorodifluoromethane	ND	5.0	ug/l							
1,1-Dichloroethane	ND	2.0	ug/l							
1,2-Dichloroethane	ND	2.0	ug/l							
1,1-Dichloroethene	ND	5.0	ug/l							
cis-1,2-Dichloroethene	ND	2.0	ug/l							
trans-1,2-Dichloroethene	ND	2.0	ug/l							
1,2-Dichloropropane	ND	2.0	ug/l							
1,3-Dichloropropane	ND	2.0	ug/l							
2,2-Dichloropropane	ND	2.0	ug/l							
1,1-Dichloropropene	ND	2.0	ug/l							
cis-1,3-Dichloropropene	ND	2.0	ug/l							

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Project Manager

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METHOD BLANK/QC DATA

VOLATILE ORGANICS by GC/MS (EPA 5035/8260B)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G21019 Extracted: 07/21/05										
Blank Analyzed: 07/21/2005 (5G21019-BLK1)										
trans-1,3-Dichloropropene	ND	2.0	ug/l							
Ethylbenzene	ND	2.0	ug/l							
Hexachlorobutadiene	ND	5.0	ug/l							
Isopropylbenzene	ND	2.0	ug/l							
p-Isopropyltoluene	ND	2.0	ug/l							
Methylene chloride	ND	5.0	ug/l							
Naphthalene	ND	5.0	ug/l							
n-Propylbenzene	ND	2.0	ug/l							
Styrene	ND	2.0	ug/l							
1,1,1,2-Tetrachloroethane	ND	5.0	ug/l							
1,1,2,2-Tetrachloroethane	ND	2.0	ug/l							
Tetrachloroethene	ND	2.0	ug/l							
Toluene	ND	2.0	ug/l							
1,2,3-Trichlorobenzene	ND	5.0	ug/l							
1,2,4-Trichlorobenzene	ND	5.0	ug/l							
1,1,1-Trichloroethane	ND	2.0	ug/l							
1,1,2-Trichloroethane	ND	2.0	ug/l							
Trichloroethene	ND	2.0	ug/l							
Trichlorofluoromethane	ND	5.0	ug/l							
1,2,3-Trichloropropane	ND	10	ug/l							
1,2,4-Trimethylbenzene	ND	2.0	ug/l							
1,3,5-Trimethylbenzene	ND	2.0	ug/l							
Vinyl acetate	ND	5.0	ug/l							
Vinyl chloride	ND	5.0	ug/l							
o-Xylene	ND	2.0	ug/l							
m,p-Xylenes	ND	2.0	ug/l							
Surrogate: Dibromofluoromethane	*24.8*		*ug/l*	*25.0*		*99*	*80-120*			
Surrogate: Toluene-d8	*25.4*		*ug/l*	*25.0*		*102*	*80-120*			
Surrogate: 4-Bromofluorobenzene	*23.7*		*ug/l*	*25.0*		*95*	*80-120*			

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Kathleen A. Robb
Project Manager

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METHOD BLANK/QC DATA

VOLATILE ORGANICS by GC/MS (EPA 5035/8260B)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G21019 Extracted: 07/21/05										
LCS Analyzed: 07/21/2005 (5G21019-BS1)										
Benzene	20.3	2.0	ug/l	25.0		81	65-120			
Bromobenzene	21.5	5.0	ug/l	25.0		86	70-120			
Bromochloromethane	22.5	5.0	ug/l	25.0		90	65-130			
Bromodichloromethane	20.0	2.0	ug/l	25.0		80	65-135			
Bromoform	19.3	5.0	ug/l	25.0		77	50-130			
Bromomethane	19.4	5.0	ug/l	25.0		78	60-140			
n-Butylbenzene	20.9	5.0	ug/l	25.0		84	70-125			
sec-Butylbenzene	20.0	5.0	ug/l	25.0		80	70-125			
tert-Butylbenzene	20.8	5.0	ug/l	25.0		83	70-125			
Carbon Disulfide	20.9	5.0	ug/l	25.0		84	50-130			
Carbon tetrachloride	19.9	5.0	ug/l	25.0		80	65-140			
Chlorobenzene	20.5	2.0	ug/l	25.0		82	70-125			
Chloroethane	19.5	5.0	ug/l	25.0		78	55-140			
Chloroform	20.9	2.0	ug/l	25.0		84	65-130			
Chloromethane	16.6	5.0	ug/l	25.0		66	40-140			
2-Chlorotoluene	20.9	5.0	ug/l	25.0		84	70-125			
4-Chlorotoluene	20.8	5.0	ug/l	25.0		83	70-125			
Dibromochloromethane	21.4	2.0	ug/l	25.0		86	65-140			
1,2-Dibromo-3-chloropropane	20.2	5.0	ug/l	25.0		81	45-135			
1,2-Dibromoethane (EDB)	22.2	2.0	ug/l	25.0		89	70-125			
Dibromomethane	22.2	2.0	ug/l	25.0		89	65-130			
1,2-Dichlorobenzene	20.3	2.0	ug/l	25.0		81	70-120			
1,3-Dichlorobenzene	19.8	2.0	ug/l	25.0		79	70-125			
1,4-Dichlorobenzene	20.1	2.0	ug/l	25.0		80	70-125			
Dichlorodifluoromethane	13.5	5.0	ug/l	25.0		54	25-155			
1,1-Dichloroethane	21.4	2.0	ug/l	25.0		86	65-130			
1,2-Dichloroethane	20.6	2.0	ug/l	25.0		82	60-140			
1,1-Dichloroethene	20.8	5.0	ug/l	25.0		83	70-130			
cis-1,2-Dichloroethene	20.5	2.0	ug/l	25.0		82	65-125			
trans-1,2-Dichloroethene	20.8	2.0	ug/l	25.0		83	65-130			
1,2-Dichloropropane	21.6	2.0	ug/l	25.0		86	65-125			
1,3-Dichloropropane	22.0	2.0	ug/l	25.0		88	65-125			
2,2-Dichloropropane	21.8	2.0	ug/l	25.0		87	60-145			
1,1-Dichloropropene	20.1	2.0	ug/l	25.0		80	70-130			
cis-1,3-Dichloropropene	21.6	2.0	ug/l	25.0		86	70-130			

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Kathleen A. Robb
Project Manager

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Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

METHOD BLANK/QC DATA

VOLATILE ORGANICS by GC/MS (EPA 5035/8260B)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G21019 Extracted: 07/21/05										
LCS Analyzed: 07/21/2005 (5G21019-BS1)										
trans-1,3-Dichloropropene	21.9	2.0	ug/l	25.0		88	65-130			
Ethylbenzene	20.6	2.0	ug/l	25.0		82	70-125			
Hexachlorobutadiene	17.0	5.0	ug/l	25.0		68	60-135			
Isopropylbenzene	22.5	2.0	ug/l	25.0		90	70-125			
p-Isopropyltoluene	19.2	2.0	ug/l	25.0		77	70-125			
Methylene chloride	22.6	5.0	ug/l	25.0		90	60-130			
Naphthalene	20.3	5.0	ug/l	25.0		81	50-140			
n-Propylbenzene	21.9	2.0	ug/l	25.0		88	70-125			
Styrene	22.4	2.0	ug/l	25.0		90	70-130			
1,1,1,2-Tetrachloroethane	21.0	5.0	ug/l	25.0		84	70-135			
1,1,2,2-Tetrachloroethane	25.8	2.0	ug/l	25.0		103	55-130			
Tetrachloroethene	19.4	2.0	ug/l	25.0		78	65-125			
Toluene	21.2	2.0	ug/l	25.0		85	70-125			
1,2,3-Trichlorobenzene	19.5	5.0	ug/l	25.0		78	60-130			
1,2,4-Trichlorobenzene	19.5	5.0	ug/l	25.0		78	65-135			
1,1,1-Trichloroethane	20.0	2.0	ug/l	25.0		80	65-135			
1,1,2-Trichloroethane	22.5	2.0	ug/l	25.0		90	65-125			
Trichloroethene	19.8	2.0	ug/l	25.0		79	70-125			
Trichlorofluoromethane	18.3	5.0	ug/l	25.0		73	60-140			
1,2,3-Trichloropropane	24.5	10	ug/l	25.0		98	55-130			
1,2,4-Trimethylbenzene	19.6	2.0	ug/l	25.0		78	70-125			
1,3,5-Trimethylbenzene	21.0	2.0	ug/l	25.0		84	70-125			
Vinyl acetate	15.6	5.0	ug/l	25.0		62	45-145			
Vinyl chloride	17.6	5.0	ug/l	25.0		70	50-130			
o-Xylene	20.4	2.0	ug/l	25.0		82	70-125			
m,p-Xylenes	40.0	2.0	ug/l	50.0		80	70-125			
Surrogate: Dibromofluoromethane	*25.0*		*ug/l*	*25.0*		*100*	*80-120*			
Surrogate: Toluene-d8	*25.7*		*ug/l*	*25.0*		*103*	*80-120*			
Surrogate: 4-Bromofluorobenzene	*24.7*		*ug/l*	*25.0*		*99*	*80-120*			

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VOLATILE ORGANICS by GC/MS (EPA 5035/8260B)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G21019 Extracted: 07/21/05										
Matrix Spike Analyzed: 07/21/2005 (5G21019-MS1)					**Source: IOG0857-01**					
Benzene	25.1	2.0	ug/l	25.0	ND	100	60-125			
Bromobenzene	25.4	5.0	ug/l	25.0	ND	102	65-125			
Bromochloromethane	27.3	5.0	ug/l	25.0	ND	109	60-135			
Bromodichloromethane	24.6	2.0	ug/l	25.0	ND	98	65-135			
Bromoform	23.0	5.0	ug/l	25.0	2.6	82	50-135			
Bromomethane	25.2	5.0	ug/l	25.0	ND	101	50-145			
n-Butylbenzene	25.7	5.0	ug/l	25.0	ND	103	65-135			
sec-Butylbenzene	24.3	5.0	ug/l	25.0	ND	97	65-125			
tert-Butylbenzene	25.0	5.0	ug/l	25.0	ND	100	65-130			
Carbon Disulfide	23.4	5.0	ug/l	25.0	ND	94	40-140			
Carbon tetrachloride	25.1	5.0	ug/l	25.0	ND	100	65-140			
Chlorobenzene	25.0	2.0	ug/l	25.0	ND	100	70-125			
Chloroethane	24.9	5.0	ug/l	25.0	ND	100	50-140			
Chloroform	25.6	2.0	ug/l	25.0	ND	102	65-135			
Chloromethane	20.5	5.0	ug/l	25.0	ND	82	35-140			
2-Chlorotoluene	24.9	5.0	ug/l	25.0	ND	100	65-135			
4-Chlorotoluene	25.0	5.0	ug/l	25.0	ND	100	65-135			
Dibromochloromethane	26.2	2.0	ug/l	25.0	ND	105	60-140			
1,2-Dibromo-3-chloropropane	23.1	5.0	ug/l	25.0	ND	92	40-150			
1,2-Dibromoethane (EDB)	26.5	2.0	ug/l	25.0	ND	106	65-130			
Dibromomethane	26.1	2.0	ug/l	25.0	ND	104	60-135			
1,2-Dichlorobenzene	24.6	2.0	ug/l	25.0	ND	98	70-125			
1,3-Dichlorobenzene	24.2	2.0	ug/l	25.0	ND	97	70-125			
1,4-Dichlorobenzene	24.4	2.0	ug/l	25.0	ND	98	70-125			
Dichlorodifluoromethane	18.4	5.0	ug/l	25.0	ND	74	15-155			
1,1-Dichloroethane	26.3	2.0	ug/l	25.0	ND	105	60-130			
1,2-Dichloroethane	24.9	2.0	ug/l	25.0	ND	100	60-140			
1,1-Dichloroethene	25.3	5.0	ug/l	25.0	ND	101	60-135			
cis-1,2-Dichloroethene	25.2	2.0	ug/l	25.0	ND	101	60-130			
trans-1,2-Dichloroethene	25.8	2.0	ug/l	25.0	ND	103	60-135			
1,2-Dichloropropane	26.1	2.0	ug/l	25.0	ND	104	60-125			
1,3-Dichloropropane	26.1	2.0	ug/l	25.0	ND	104	60-135			
2,2-Dichloropropane	27.8	2.0	ug/l	25.0	ND	111	60-145			
1,1-Dichloropropene	24.9	2.0	ug/l	25.0	ND	100	65-135			
cis-1,3-Dichloropropene	26.0	2.0	ug/l	25.0	ND	104	65-135			

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
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9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

METHOD BLANK/QC DATA

VOLATILE ORGANICS by GC/MS (EPA 5035/8260B)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G21019 Extracted: 07/21/05										
Matrix Spike Analyzed: 07/21/2005 (5G21019-MS1)					**Source: IOG0857-01**					
trans-1,3-Dichloropropene	25.9	2.0	ug/l	25.0	ND	104	65-140			
Ethylbenzene	25.0	2.0	ug/l	25.0	ND	100	65-130			
Hexachlorobutadiene	20.6	5.0	ug/l	25.0	ND	82	60-135			
Isopropylbenzene	26.2	2.0	ug/l	25.0	ND	105	65-130			
p-Isopropyltoluene	23.2	2.0	ug/l	25.0	ND	93	65-125			
Methylene chloride	28.0	5.0	ug/l	25.0	ND	112	55-130			
Naphthalene	22.9	5.0	ug/l	25.0	ND	92	45-145			
n-Propylbenzene	25.9	2.0	ug/l	25.0	ND	104	65-130			
Styrene	16.4	2.0	ug/l	25.0	ND	66	45-145			
1,1,1,2-Tetrachloroethane	25.6	5.0	ug/l	25.0	ND	102	65-140			
1,1,2,2-Tetrachloroethane	28.9	2.0	ug/l	25.0	ND	116	55-140			
Tetrachloroethene	24.5	2.0	ug/l	25.0	ND	98	60-130			
Toluene	25.5	2.0	ug/l	25.0	ND	102	65-125			
1,2,3-Trichlorobenzene	22.8	5.0	ug/l	25.0	ND	91	55-135			
1,2,4-Trichlorobenzene	23.6	5.0	ug/l	25.0	ND	94	60-135			
1,1,1-Trichloroethane	24.9	2.0	ug/l	25.0	ND	100	65-140			
1,1,2-Trichloroethane	26.2	2.0	ug/l	25.0	ND	105	60-130			
Trichloroethene	24.3	2.0	ug/l	25.0	ND	97	60-125			
Trichlorofluoromethane	23.2	5.0	ug/l	25.0	ND	93	55-145			
1,2,3-Trichloropropane	27.8	10	ug/l	25.0	ND	111	50-135			
1,2,4-Trimethylbenzene	23.5	2.0	ug/l	25.0	ND	94	55-130			
1,3,5-Trimethylbenzene	25.0	2.0	ug/l	25.0	ND	100	65-130			
Vinyl acetate	19.8	5.0	ug/l	25.0	ND	79	40-150			
Vinyl chloride	19.2	5.0	ug/l	25.0	ND	77	40-135			
o-Xylene	24.5	2.0	ug/l	25.0	ND	98	60-125			
m,p-Xylenes	48.8	2.0	ug/l	50.0	ND	98	60-130			
Surrogate: Dibromofluoromethane	*25.0*		*ug/l*	*25.0*		*100*	*80-120*			
Surrogate: Toluene-d8	*25.7*		*ug/l*	*25.0*		*103*	*80-120*			
Surrogate: 4-Bromofluorobenzene	*24.6*		*ug/l*	*25.0*		*98*	*80-120*			

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Kathleen A. Robb
Project Manager

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1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
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2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

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Parker, AZ 85344
Attention: Deborah Foster

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METHOD BLANK/QC DATA

VOLATILE ORGANICS by GC/MS (EPA 5035/8260B)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G21019 Extracted: 07/21/05										
Matrix Spike Dup Analyzed: 07/21/2005 (5G21019-MSD1)					**Source: IOG0857-01**					
Benzene	23.8	2.0	ug/l	25.0	ND	95	60-125	5	20	
Bromobenzene	23.3	5.0	ug/l	25.0	ND	93	65-125	9	20	
Bromochloromethane	26.0	5.0	ug/l	25.0	ND	104	60-135	5	25	
Bromodichloromethane	22.7	2.0	ug/l	25.0	ND	91	65-135	8	20	
Bromoform	22.5	5.0	ug/l	25.0	2.6	80	50-135	2	25	
Bromomethane	23.4	5.0	ug/l	25.0	ND	94	50-145	7	25	
n-Butylbenzene	25.0	5.0	ug/l	25.0	ND	100	65-135	3	20	
sec-Butylbenzene	23.6	5.0	ug/l	25.0	ND	94	65-125	3	20	
tert-Butylbenzene	24.0	5.0	ug/l	25.0	ND	96	65-130	4	20	
Carbon Disulfide	23.8	5.0	ug/l	25.0	ND	95	40-140	2	20	
Carbon tetrachloride	23.6	5.0	ug/l	25.0	ND	94	65-140	6	25	
Chlorobenzene	23.7	2.0	ug/l	25.0	ND	95	70-125	5	20	
Chloroethane	23.5	5.0	ug/l	25.0	ND	94	50-140	6	25	
Chloroform	24.5	2.0	ug/l	25.0	ND	98	65-135	4	20	
Chloromethane	19.4	5.0	ug/l	25.0	ND	78	35-140	6	25	
2-Chlorotoluene	23.2	5.0	ug/l	25.0	ND	93	65-135	7	20	
4-Chlorotoluene	23.3	5.0	ug/l	25.0	ND	93	65-135	7	20	
Dibromochloromethane	24.8	2.0	ug/l	25.0	ND	99	60-140	5	25	
1,2-Dibromo-3-chloropropane	23.8	5.0	ug/l	25.0	ND	95	40-150	3	30	
1,2-Dibromoethane (EDB)	25.2	2.0	ug/l	25.0	ND	101	65-130	5	25	
Dibromomethane	25.0	2.0	ug/l	25.0	ND	100	60-135	4	25	
1,2-Dichlorobenzene	23.6	2.0	ug/l	25.0	ND	94	70-125	4	20	
1,3-Dichlorobenzene	22.9	2.0	ug/l	25.0	ND	92	70-125	6	20	
1,4-Dichlorobenzene	23.0	2.0	ug/l	25.0	ND	92	70-125	6	20	
Dichlorodifluoromethane	17.4	5.0	ug/l	25.0	ND	70	15-155	6	30	
1,1-Dichloroethane	25.2	2.0	ug/l	25.0	ND	101	60-130	4	20	
1,2-Dichloroethane	23.3	2.0	ug/l	25.0	ND	93	60-140	7	20	
1,1-Dichloroethene	23.7	5.0	ug/l	25.0	ND	95	60-135	7	20	
cis-1,2-Dichloroethene	24.1	2.0	ug/l	25.0	ND	96	60-130	4	20	
trans-1,2-Dichloroethene	24.8	2.0	ug/l	25.0	ND	99	60-135	4	20	
1,2-Dichloropropane	24.6	2.0	ug/l	25.0	ND	98	60-125	6	20	
1,3-Dichloropropane	25.2	2.0	ug/l	25.0	ND	101	60-135	4	25	
2,2-Dichloropropane	28.5	2.0	ug/l	25.0	ND	114	60-145	2	25	
1,1-Dichloropropene	23.4	2.0	ug/l	25.0	ND	94	65-135	6	20	
cis-1,3-Dichloropropene	24.1	2.0	ug/l	25.0	ND	96	65-135	8	20	

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

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U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

METHOD BLANK/QC DATA

VOLATILE ORGANICS by GC/MS (EPA 5035/8260B)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G21019 Extracted: 07/21/05										
Matrix Spike Dup Analyzed: 07/21/2005 (5G21019-MSD1)					**Source: IOG0857-01**					
trans-1,3-Dichloropropene	24.1	2.0	ug/l	25.0	ND	96	65-140	7	25	
Ethylbenzene	23.8	2.0	ug/l	25.0	ND	95	65-130	5	20	
Hexachlorobutadiene	20.9	5.0	ug/l	25.0	ND	84	60-135	1	20	
Isopropylbenzene	24.8	2.0	ug/l	25.0	ND	99	65-130	5	20	
p-Isopropyltoluene	22.6	2.0	ug/l	25.0	ND	90	65-125	3	20	
Methylene chloride	26.4	5.0	ug/l	25.0	ND	106	55-130	6	20	
Naphthalene	24.6	5.0	ug/l	25.0	ND	98	45-145	7	30	
n-Propylbenzene	24.4	2.0	ug/l	25.0	ND	98	65-130	6	20	
Styrene	14.0	2.0	ug/l	25.0	ND	56	45-145	16	30	
1,1,1,2-Tetrachloroethane	24.2	5.0	ug/l	25.0	ND	97	65-140	6	20	
1,1,2,2-Tetrachloroethane	28.7	2.0	ug/l	25.0	ND	115	55-140	1	30	
Tetrachloroethene	23.3	2.0	ug/l	25.0	ND	93	60-130	5	20	
Toluene	23.9	2.0	ug/l	25.0	ND	96	65-125	6	20	
1,2,3-Trichlorobenzene	23.5	5.0	ug/l	25.0	ND	94	55-135	3	20	
1,2,4-Trichlorobenzene	23.6	5.0	ug/l	25.0	ND	94	60-135	0	20	
1,1,1-Trichloroethane	24.3	2.0	ug/l	25.0	ND	97	65-140	2	20	
1,1,2-Trichloroethane	25.0	2.0	ug/l	25.0	ND	100	60-130	5	25	
Trichloroethene	22.5	2.0	ug/l	25.0	ND	90	60-125	8	20	
Trichlorofluoromethane	21.8	5.0	ug/l	25.0	ND	87	55-145	6	25	
1,2,3-Trichloropropane	27.0	10	ug/l	25.0	ND	108	50-135	3	30	
1,2,4-Trimethylbenzene	22.3	2.0	ug/l	25.0	ND	89	55-130	5	25	
1,3,5-Trimethylbenzene	23.6	2.0	ug/l	25.0	ND	94	65-130	6	20	
Vinyl acetate	19.9	5.0	ug/l	25.0	ND	80	40-150	1	30	
Vinyl chloride	18.2	5.0	ug/l	25.0	ND	73	40-135	5	30	
o-Xylene	23.1	2.0	ug/l	25.0	ND	92	60-125	6	20	
m,p-Xylenes	46.6	2.0	ug/l	50.0	ND	93	60-130	5	25	
Surrogate: Dibromofluoromethane	*24.9*		*ug/l*	*25.0*		*100*	*80-120*			
Surrogate: Toluene-d8	*25.2*		*ug/l*	*25.0*		*101*	*80-120*			
Surrogate: 4-Bromofluorobenzene	*24.5*		*ug/l*	*25.0*		*98*	*80-120*			

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

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1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
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U.S. Filter/Westates Carbon
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Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

METHOD BLANK/QC DATA

SEMI-VOLATILE ORGANICS BY GC/MS (EPA 3520C/8270C)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G17017 Extracted: 07/17/05										
Blank Analyzed: 07/20/2005 (5G17017-BLK1)										
Acenaphthene	ND	10	ug/l							
Acenaphthylene	ND	10	ug/l							
Aniline	ND	10	ug/l							
Anthracene	ND	10	ug/l							
Benzidine	ND	20	ug/l							
Benzoic acid	ND	20	ug/l							
Benzo(a)anthracene	ND	10	ug/l							
Benzo(b)fluoranthene	ND	10	ug/l							
Benzo(k)fluoranthene	ND	10	ug/l							
Benzo(g,h,i)perylene	ND	10	ug/l							
Benzo(a)pyrene	ND	10	ug/l							
Benzyl alcohol	ND	20	ug/l							
Bis(2-chloroethoxy)methane	ND	10	ug/l							
Bis(2-chloroethyl)ether	ND	10	ug/l							
Bis(2-chloroisopropyl)ether	ND	10	ug/l							
Bis(2-ethylhexyl)phthalate	ND	50	ug/l							
4-Bromophenyl phenyl ether	ND	10	ug/l							
Butyl benzyl phthalate	ND	20	ug/l							
4-Chloroaniline	ND	10	ug/l							
2-Chloronaphthalene	ND	10	ug/l							
4-Chloro-3-methylphenol	ND	20	ug/l							
2-Chlorophenol	ND	10	ug/l							
4-Chlorophenyl phenyl ether	ND	10	ug/l							
Chrysene	ND	10	ug/l							
Dibenz(a,h)anthracene	ND	20	ug/l							
Dibenzofuran	ND	10	ug/l							
Di-n-butyl phthalate	ND	20	ug/l							
1,3-Dichlorobenzene	ND	10	ug/l							
1,4-Dichlorobenzene	ND	10	ug/l							
1,2-Dichlorobenzene	ND	10	ug/l							
3,3-Dichlorobenzidine	ND	20	ug/l							
2,4-Dichlorophenol	ND	10	ug/l							
Diethyl phthalate	ND	10	ug/l							
2,4-Dimethylphenol	ND	20	ug/l							
Dimethyl phthalate	ND	10	ug/l							

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Project Manager

Del Mar Analytical

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METHOD BLANK/QC DATA

SEMI-VOLATILE ORGANICS BY GC/MS (EPA 3520C/8270C)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G17017 Extracted: 07/17/05										
Blank Analyzed: 07/20/2005 (5G17017-BLK1)										
4,6-Dinitro-2-methylphenol	ND	20	ug/l							
2,4-Dinitrophenol	ND	20	ug/l							
2,4-Dinitrotoluene	ND	10	ug/l							
2,6-Dinitrotoluene	ND	10	ug/l							
Di-n-octyl phthalate	ND	20	ug/l							
Fluoranthene	ND	10	ug/l							
Fluorene	ND	10	ug/l							
Hexachlorobenzene	ND	10	ug/l							
Hexachlorobutadiene	ND	10	ug/l							
Hexachlorocyclopentadiene	ND	20	ug/l							
Hexachloroethane	ND	10	ug/l							
Indeno(1,2,3-cd)pyrene	ND	20	ug/l							
Isophorone	ND	10	ug/l							
2-Methylnaphthalene	ND	10	ug/l							
2-Methylphenol	ND	10	ug/l							
4-Methylphenol	ND	10	ug/l							
Naphthalene	ND	10	ug/l							
2-Nitroaniline	ND	20	ug/l							
3-Nitroaniline	ND	20	ug/l							
4-Nitroaniline	ND	20	ug/l							
Nitrobenzene	ND	20	ug/l							
2-Nitrophenol	ND	10	ug/l							
4-Nitrophenol	ND	20	ug/l							
N-Nitrosodiphenylamine	ND	10	ug/l							
N-Nitroso-di-n-propylamine	ND	10	ug/l							
Pentachlorophenol	ND	20	ug/l							
Phenanthrene	ND	10	ug/l							
Phenol	ND	10	ug/l							
Pyrene	ND	10	ug/l							
1,2,4-Trichlorobenzene	ND	10	ug/l							
2,4,5-Trichlorophenol	ND	20	ug/l							
2,4,6-Trichlorophenol	ND	20	ug/l							
N-Nitrosodimethylamine	ND	20	ug/l							
1,2-Diphenylhydrazine/Azobenzene	ND	20	ug/l							
Surrogate: 2-Fluorophenol	*121*		*ug/l*	*200*		*60*	*30-120*			

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METHOD BLANK/QC DATA

SEMI-VOLATILE ORGANICS BY GC/MS (EPA 3520C/8270C)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G17017 Extracted: 07/17/05										
Blank Analyzed: 07/20/2005 (5G17017-BLK1)										
Surrogate: Phenol-d6	*137*		*ug/l*	*200*		*68*	*35-120*			
Surrogate: 2,4,6-Tribromophenol	*164*		*ug/l*	*200*		*82*	*45-120*			
Surrogate: Nitrobenzene-d5	*71.7*		*ug/l*	*100*		*72*	*45-120*			
Surrogate: 2-Fluorobiphenyl	*77.0*		*ug/l*	*100*		*77*	*45-120*			
Surrogate: Terphenyl-d14	*78.7*		*ug/l*	*100*		*79*	*45-120*			
LCS Analyzed: 07/20/2005 (5G17017-BS1)										M-NR1
Acenaphthene	86.7	10	ug/l	100		87	55-120			
Acenaphthylene	89.0	10	ug/l	100		89	55-120			
Aniline	81.3	10	ug/l	100		81	35-120			
Anthracene	79.9	10	ug/l	100		80	55-120			
Benzidine	173	20	ug/l	100		173	20-160			L
Benzoic acid	69.7	20	ug/l	100		70	35-120			
Benzo(a)anthracene	81.7	10	ug/l	100		82	60-120			
Benzo(b)fluoranthene	89.1	10	ug/l	100		89	50-120			
Benzo(k)fluoranthene	89.2	10	ug/l	100		89	50-120			
Benzo(g,h,i)perylene	93.7	10	ug/l	100		94	40-125			
Benzo(a)pyrene	77.0	10	ug/l	100		77	55-120			
Benzyl alcohol	58.4	20	ug/l	100		58	45-120			
Bis(2-chloroethoxy)methane	84.1	10	ug/l	100		84	55-120			
Bis(2-chloroethyl)ether	83.6	10	ug/l	100		84	50-120			
Bis(2-chloroisopropyl)ether	84.8	10	ug/l	100		85	45-120			
Bis(2-ethylhexyl)phthalate	83.4	50	ug/l	100		83	60-130			
4-Bromophenyl phenyl ether	85.3	10	ug/l	100		85	50-120			
Butyl benzyl phthalate	85.2	20	ug/l	100		85	55-125			
4-Chloroaniline	78.4	10	ug/l	100		78	50-120			
2-Chloronaphthalene	79.5	10	ug/l	100		80	55-120			
4-Chloro-3-methylphenol	84.0	20	ug/l	100		84	60-120			
2-Chlorophenol	77.6	10	ug/l	100		78	45-120			
4-Chlorophenyl phenyl ether	89.9	10	ug/l	100		90	55-120			
Chrysene	87.0	10	ug/l	100		87	60-120			
Dibenz(a,h)anthracene	96.1	20	ug/l	100		96	45-130			
Dibenzofuran	85.1	10	ug/l	100		85	60-120			
Di-n-butyl phthalate	76.3	20	ug/l	100		76	55-125			
1,3-Dichlorobenzene	74.2	10	ug/l	100		74	35-120			
1,4-Dichlorobenzene	72.9	10	ug/l	100		73	35-120			

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Kathleen A. Robb
Project Manager

Del Mar Analytical

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U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

METHOD BLANK/QC DATA

SEMI-VOLATILE ORGANICS BY GC/MS (EPA 3520C/8270C)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G17017 Extracted: 07/17/05										
LCS Analyzed: 07/20/2005 (5G17017-BS1)										M-NR1
1,2-Dichlorobenzene	74.8	10	ug/l	100		75	35-120			
3,3-Dichlorobenzidine	90.4	20	ug/l	100		90	45-130			
2,4-Dichlorophenol	77.7	10	ug/l	100		78	55-120			
Diethyl phthalate	86.1	10	ug/l	100		86	55-120			
2,4-Dimethylphenol	63.8	20	ug/l	100		64	30-120			
Dimethyl phthalate	84.3	10	ug/l	100		84	60-120			
4,6-Dinitro-2-methylphenol	85.2	20	ug/l	100		85	50-120			
2,4-Dinitrophenol	89.2	20	ug/l	100		89	40-120			
2,4-Dinitrotoluene	93.9	10	ug/l	100		94	60-120			
2,6-Dinitrotoluene	81.3	10	ug/l	100		81	60-120			
Di-n-octyl phthalate	84.2	20	ug/l	100		84	60-130			
Fluoranthene	82.0	10	ug/l	100		82	55-120			
Fluorene	89.0	10	ug/l	100		89	60-120			
Hexachlorobenzene	85.7	10	ug/l	100		86	50-120			
Hexachlorobutadiene	76.7	10	ug/l	100		77	40-120			
Hexachlorocyclopentadiene	90.5	20	ug/l	100		90	15-120			
Hexachloroethane	76.3	10	ug/l	100		76	35-120			
Indeno(1,2,3-cd)pyrene	90.3	20	ug/l	100		90	40-130			
Isophorone	82.6	10	ug/l	100		83	50-120			
2-Methylnaphthalene	81.0	10	ug/l	100		81	50-120			
2-Methylphenol	79.4	10	ug/l	100		79	45-120			
4-Methylphenol	80.8	10	ug/l	100		81	45-120			
Naphthalene	78.8	10	ug/l	100		79	50-120			
2-Nitroaniline	84.6	20	ug/l	100		85	60-120			
3-Nitroaniline	94.0	20	ug/l	100		94	55-120			
4-Nitroaniline	93.5	20	ug/l	100		94	50-125			
Nitrobenzene	79.1	20	ug/l	100		79	50-120			
2-Nitrophenol	82.1	10	ug/l	100		82	55-120			
4-Nitrophenol	78.4	20	ug/l	100		78	45-120			
N-Nitrosodiphenylamine	86.3	10	ug/l	100		86	55-120			
N-Nitroso-di-n-propylamine	88.8	10	ug/l	100		89	45-120			
Pentachlorophenol	91.4	20	ug/l	100		91	50-120			
Phenanthrene	80.2	10	ug/l	100		80	55-120			
Phenol	77.5	10	ug/l	100		78	45-120			
Pyrene	87.4	10	ug/l	100		87	50-120			

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Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
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METHOD BLANK/QC DATA

SEMI-VOLATILE ORGANICS BY GC/MS (EPA 3520C/8270C)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G17017 Extracted: 07/17/05										
LCS Analyzed: 07/20/2005 (5G17017-BS1)										M-NR1
1,2,4-Trichlorobenzene	75.1	10	ug/l	100		75	45-120			
2,4,5-Trichlorophenol	89.1	20	ug/l	100		89	60-120			
2,4,6-Trichlorophenol	80.8	20	ug/l	100		81	60-120			
N-Nitrosodimethylamine	84.9	20	ug/l	100		85	40-120			
1,2-Diphenylhydrazine/Azobenzene	86.6	20	ug/l	100		87	60-120			
Surrogate: 2-Fluorophenol	*148*		*ug/l*	*200*		*74*	*30-120*			
Surrogate: Phenol-d6	*161*		*ug/l*	*200*		*80*	*35-120*			
Surrogate: 2,4,6-Tribromophenol	*181*		*ug/l*	*200*		*90*	*45-120*			
Surrogate: Nitrobenzene-d5	*80.3*		*ug/l*	*100*		*80*	*45-120*			
Surrogate: 2-Fluorobiphenyl	*81.7*		*ug/l*	*100*		*82*	*45-120*			
Surrogate: Terphenyl-d14	*86.2*		*ug/l*	*100*		*86*	*45-120*			
LCS Dup Analyzed: 07/20/2005 (5G17017-BSD1)										
Acenaphthene	84.0	10	ug/l	100		84	55-120	3	20	
Acenaphthylene	87.2	10	ug/l	100		87	55-120	2	20	
Aniline	76.7	10	ug/l	100		77	35-120	6	25	
Anthracene	80.8	10	ug/l	100		81	55-120	1	20	
Benzidine	99.1	20	ug/l	100		99	20-160	54	35	*R-2*
Benzoic acid	87.7	20	ug/l	100		88	35-120	23	30	
Benzo(a)anthracene	86.0	10	ug/l	100		86	60-120	5	20	
Benzo(b)fluoranthene	88.7	10	ug/l	100		89	50-120	0	25	
Benzo(k)fluoranthene	86.9	10	ug/l	100		87	50-120	3	20	
Benzo(g,h,i)perylene	94.7	10	ug/l	100		95	40-125	1	25	
Benzo(a)pyrene	79.8	10	ug/l	100		80	55-120	4	25	
Benzyl alcohol	60.6	20	ug/l	100		61	45-120	4	20	
Bis(2-chloroethoxy)methane	83.2	10	ug/l	100		83	55-120	1	20	
Bis(2-chloroethyl)ether	81.7	10	ug/l	100		82	50-120	2	20	
Bis(2-chloroisopropyl)ether	81.1	10	ug/l	100		81	45-120	4	20	
Bis(2-ethylhexyl)phthalate	85.2	50	ug/l	100		85	60-130	2	20	
4-Bromophenyl phenyl ether	87.8	10	ug/l	100		88	50-120	3	25	
Butyl benzyl phthalate	83.2	20	ug/l	100		83	55-125	2	20	
4-Chloroaniline	77.3	10	ug/l	100		77	50-120	1	25	
2-Chloronaphthalene	81.4	10	ug/l	100		81	55-120	2	20	
4-Chloro-3-methylphenol	79.2	20	ug/l	100		79	60-120	6	25	
2-Chlorophenol	74.5	10	ug/l	100		74	45-120	4	25	
4-Chlorophenyl phenyl ether	87.0	10	ug/l	100		87	55-120	3	20	

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

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SEMI-VOLATILE ORGANICS BY GC/MS (EPA 3520C/8270C)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G17017 Extracted: 07/17/05										
LCS Dup Analyzed: 07/20/2005 (5G17017-BSD1)										
Chrysene	87.1	10	ug/l	100		87	60-120	0	20	
Dibenz(a,h)anthracene	97.1	20	ug/l	100		97	45-130	1	25	
Dibenzofuran	83.3	10	ug/l	100		83	60-120	2	20	
Di-n-butyl phthalate	77.2	20	ug/l	100		77	55-125	1	20	
1,3-Dichlorobenzene	72.2	10	ug/l	100		72	35-120	3	25	
1,4-Dichlorobenzene	70.2	10	ug/l	100		70	35-120	4	25	
1,2-Dichlorobenzene	72.6	10	ug/l	100		73	35-120	3	25	
3,3-Dichlorobenzidine	89.1	20	ug/l	100		89	45-130	1	25	
2,4-Dichlorophenol	76.5	10	ug/l	100		76	55-120	2	20	
Diethyl phthalate	83.2	10	ug/l	100		83	55-120	3	20	
2,4-Dimethylphenol	63.7	20	ug/l	100		64	30-120	0	25	
Dimethyl phthalate	84.4	10	ug/l	100		84	60-120	0	20	
4,6-Dinitro-2-methylphenol	82.9	20	ug/l	100		83	50-120	3	25	
2,4-Dinitrophenol	86.7	20	ug/l	100		87	40-120	3	25	
2,4-Dinitrotoluene	90.1	10	ug/l	100		90	60-120	4	20	
2,6-Dinitrotoluene	83.0	10	ug/l	100		83	60-120	2	20	
Di-n-octyl phthalate	87.3	20	ug/l	100		87	60-130	4	20	
Fluoranthene	79.8	10	ug/l	100		80	55-120	3	20	
Fluorene	85.8	10	ug/l	100		86	60-120	4	20	
Hexachlorobenzene	89.2	10	ug/l	100		89	50-120	4	20	
Hexachlorobutadiene	74.9	10	ug/l	100		75	40-120	2	25	
Hexachlorocyclopentadiene	88.4	20	ug/l	100		88	15-120	2	30	
Hexachloroethane	73.3	10	ug/l	100		73	35-120	4	25	
Indeno(1,2,3-cd)pyrene	90.1	20	ug/l	100		90	40-130	0	25	
Isophorone	83.7	10	ug/l	100		84	50-120	1	20	
2-Methylnaphthalene	78.7	10	ug/l	100		79	50-120	3	20	
2-Methylphenol	76.8	10	ug/l	100		77	45-120	3	20	
4-Methylphenol	79.3	10	ug/l	100		79	45-120	2	20	
Naphthalene	78.3	10	ug/l	100		78	50-120	1	20	
2-Nitroaniline	83.5	20	ug/l	100		84	60-120	1	20	
3-Nitroaniline	90.4	20	ug/l	100		90	55-120	4	25	
4-Nitroaniline	87.8	20	ug/l	100		88	50-125	6	20	
Nitrobenzene	79.1	20	ug/l	100		79	50-120	0	25	
2-Nitrophenol	79.7	10	ug/l	100		80	55-120	3	25	
4-Nitrophenol	74.7	20	ug/l	100		75	45-120	5	25	

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

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1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
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SEMI-VOLATILE ORGANICS BY GC/MS (EPA 3520C/8270C)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G17017 Extracted: 07/17/05										
LCS Dup Analyzed: 07/20/2005 (5G17017-BSD1)										
N-Nitrosodiphenylamine	88.2	10	ug/l	100		88	55-120	2	20	
N-Nitroso-di-n-propylamine	86.8	10	ug/l	100		87	45-120	2	20	
Pentachlorophenol	94.4	20	ug/l	100		94	50-120	3	25	
Phenanthrene	79.7	10	ug/l	100		80	55-120	1	20	
Phenol	74.4	10	ug/l	100		74	45-120	4	25	
Pyrene	83.4	10	ug/l	100		83	50-120	5	25	
1,2,4-Trichlorobenzene	75.3	10	ug/l	100		75	45-120	0	20	
2,4,5-Trichlorophenol	88.5	20	ug/l	100		88	60-120	1	20	
2,4,6-Trichlorophenol	82.1	20	ug/l	100		82	60-120	2	20	
N-Nitrosodimethylamine	72.3	20	ug/l	100		72	40-120	16	20	
1,2-Diphenylhydrazine/Azobenzene	82.7	20	ug/l	100		83	60-120	5	25	
Surrogate: 2-Fluorophenol	*133*		*ug/l*	*200*		*66*	*30-120*			
Surrogate: Phenol-d6	*147*		*ug/l*	*200*		*74*	*35-120*			
Surrogate: 2,4,6-Tribromophenol	*181*		*ug/l*	*200*		*90*	*45-120*			
Surrogate: Nitrobenzene-d5	*79.2*		*ug/l*	*100*		*79*	*45-120*			
Surrogate: 2-Fluorobiphenyl	*83.5*		*ug/l*	*100*		*84*	*45-120*			
Surrogate: Terphenyl-d14	*83.1*		*ug/l*	*100*		*83*	*45-120*			

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Kathleen A. Robb
Project Manager

Del Mar Analytical

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METHOD BLANK/QC DATA

ORGANOCHLORINE PESTICIDES (EPA 3510C/8081A)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G20057 Extracted: 07/20/05										
Blank Analyzed: 07/20/2005-07/22/2005 (5G20057-BLK1)										
Aldrin	ND	0.10	ug/l							
alpha-BHC	ND	0.10	ug/l							
beta-BHC	ND	0.10	ug/l							
delta-BHC	ND	0.20	ug/l							
gamma-BHC (Lindane)	ND	0.10	ug/l							
Chlordane	ND	1.0	ug/l							
4,4'-DDD	ND	0.10	ug/l							
4,4'-DDE	ND	0.10	ug/l							
4,4'-DDT	ND	0.10	ug/l							
Dieldrin	ND	0.10	ug/l							
Endosulfan I	ND	0.10	ug/l							
Endosulfan II	ND	0.10	ug/l							
Endosulfan sulfate	ND	0.20	ug/l							
Endrin	ND	0.10	ug/l							
Endrin aldehyde	ND	0.10	ug/l							
Endrin ketone	ND	0.10	ug/l							
Heptachlor	ND	0.10	ug/l							
Heptachlor epoxide	ND	0.10	ug/l							
Methoxychlor	ND	0.10	ug/l							
Toxaphene	ND	5.0	ug/l							
Surrogate: Tetrachloro-m-xylene	*0.352*		*ug/l*	*0.500*		*70*	*35-115*			
Surrogate: Decachlorobiphenyl	*0.446*		*ug/l*	*0.500*		*89*	*45-120*			
LCS Analyzed: 07/20/2005 (5G20057-BS1)										**M-NR1**
Aldrin	0.356	0.10	ug/l	0.500		71	40-115			
alpha-BHC	0.435	0.10	ug/l	0.500		87	45-115			
beta-BHC	0.397	0.10	ug/l	0.500		79	50-115			
delta-BHC	0.447	0.20	ug/l	0.500		89	55-120			
gamma-BHC (Lindane)	0.431	0.10	ug/l	0.500		86	45-115			
4,4'-DDD	0.462	0.10	ug/l	0.500		92	60-120			
4,4'-DDE	0.446	0.10	ug/l	0.500		89	55-120			
4,4'-DDT	0.443	0.10	ug/l	0.500		89	60-120			
Dieldrin	0.437	0.10	ug/l	0.500		87	55-120			
Endosulfan I	0.417	0.10	ug/l	0.500		83	50-115			
Endosulfan II	0.433	0.10	ug/l	0.500		87	60-125			
Endosulfan sulfate	0.471	0.20	ug/l	0.500		94	60-120			

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Project Manager

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ORGANOCHLORINE PESTICIDES (EPA 3510C/8081A)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G20057 Extracted: 07/20/05										
LCS Analyzed: 07/20/2005 (5G20057-BS1)										M-NR1
Endrin	0.441	0.10	ug/l	0.500		88	55-125			
Endrin aldehyde	0.443	0.10	ug/l	0.500		89	55-115			
Endrin ketone	0.441	0.10	ug/l	0.500		88	60-115			
Heptachlor	0.370	0.10	ug/l	0.500		74	45-115			
Heptachlor epoxide	0.416	0.10	ug/l	0.500		83	50-115			
Methoxychlor	0.454	0.10	ug/l	0.500		91	60-120			
Surrogate: Tetrachloro-m-xylene	*0.338*		*ug/l*	*0.500*		*68*	*35-115*			
Surrogate: Decachlorobiphenyl	*0.439*		*ug/l*	*0.500*		*88*	*45-120*			
LCS Dup Analyzed: 07/20/2005 (5G20057-BSD1)										
Aldrin	0.341	0.10	ug/l	0.500		68	40-115	4	30	
alpha-BHC	0.422	0.10	ug/l	0.500		84	45-115	3	30	
beta-BHC	0.386	0.10	ug/l	0.500		77	50-115	3	30	
delta-BHC	0.433	0.20	ug/l	0.500		87	55-120	3	30	
gamma-BHC (Lindane)	0.419	0.10	ug/l	0.500		84	45-115	3	30	
4,4'-DDD	0.439	0.10	ug/l	0.500		88	60-120	5	30	
4,4'-DDE	0.425	0.10	ug/l	0.500		85	55-120	5	30	
4,4'-DDT	0.420	0.10	ug/l	0.500		84	60-120	5	30	
Dieldrin	0.417	0.10	ug/l	0.500		83	55-120	5	30	
Endosulfan I	0.398	0.10	ug/l	0.500		80	50-115	5	30	
Endosulfan II	0.411	0.10	ug/l	0.500		82	60-125	5	30	
Endosulfan sulfate	0.445	0.20	ug/l	0.500		89	60-120	6	30	
Endrin	0.421	0.10	ug/l	0.500		84	55-125	5	30	
Endrin aldehyde	0.379	0.10	ug/l	0.500		76	55-115	16	30	
Endrin ketone	0.415	0.10	ug/l	0.500		83	60-115	6	30	
Heptachlor	0.356	0.10	ug/l	0.500		71	45-115	4	30	
Heptachlor epoxide	0.400	0.10	ug/l	0.500		80	50-115	4	30	
Methoxychlor	0.430	0.10	ug/l	0.500		86	60-120	5	30	
Surrogate: Tetrachloro-m-xylene	*0.337*		*ug/l*	*0.500*		*67*	*35-115*			
Surrogate: Decachlorobiphenyl	*0.410*		*ug/l*	*0.500*		*82*	*45-120*			

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Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
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2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

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METHOD BLANK/QC DATA

POLYCHLORINATED BIPHENYLS (EPA 3510C/8082)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G20057 Extracted: 07/20/05										
Blank Analyzed: 07/20/2005-07/22/2005 (5G20057-BLK1)										
Aroclor 1016	ND	1.0	ug/l							
Aroclor 1221	ND	1.0	ug/l							
Aroclor 1232	ND	1.0	ug/l							
Aroclor 1242	ND	1.0	ug/l							
Aroclor 1248	ND	1.0	ug/l							
Aroclor 1254	ND	1.0	ug/l							
Aroclor 1260	ND	1.0	ug/l							
Surrogate: Decachlorobiphenyl	*0.513*		*ug/l*	*0.500*		*103*	*45-120*			
LCS Analyzed: 07/22/2005 (5G20057-BS2)										**M-NR1**
Aroclor 1016	3.51	1.0	ug/l	4.00		88	50-115			
Aroclor 1260	3.67	1.0	ug/l	4.00		92	55-115			
Surrogate: Decachlorobiphenyl	*0.521*		*ug/l*	*0.500*		*104*	*45-120*			
LCS Dup Analyzed: 07/22/2005 (5G20057-BSD2)										
Aroclor 1016	3.23	1.0	ug/l	4.00		81	50-115	8	30	
Aroclor 1260	3.37	1.0	ug/l	4.00		84	55-115	9	25	
Surrogate: Decachlorobiphenyl	*0.479*		*ug/l*	*0.500*		*96*	*45-120*			

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Kathleen A. Robb
Project Manager

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METALS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G18097 Extracted: 07/18/05										
Blank Analyzed: 07/19/2005 (5G18097-BLK1)										
Antimony	ND	0.010	mg/l							
Arsenic	ND	0.0050	mg/l							
Barium	ND	0.010	mg/l							
Chromium	ND	0.0050	mg/l							
Cobalt	ND	0.010	mg/l							
Copper	ND	0.010	mg/l							
Molybdenum	ND	0.020	mg/l							
Silver	ND	0.0070	mg/l							
Thallium	ND	0.010	mg/l							
Vanadium	ND	0.010	mg/l							
Zinc	ND	0.020	mg/l							
LCS Analyzed: 07/19/2005 (5G18097-BS1)										
Antimony	1.07	0.010	mg/l	1.00		107	80-120			
Arsenic	1.00	0.0050	mg/l	1.00		100	80-120			
Barium	0.954	0.010	mg/l	1.00		95	80-120			
Chromium	0.986	0.0050	mg/l	1.00		99	80-120			
Cobalt	1.02	0.010	mg/l	1.00		102	80-120			
Copper	1.01	0.010	mg/l	1.00		101	80-120			
Molybdenum	0.956	0.020	mg/l	1.00		96	80-120			
Silver	0.507	0.0070	mg/l	0.500		101	80-120			
Thallium	0.962	0.010	mg/l	1.00		96	80-120			
Vanadium	0.988	0.010	mg/l	1.00		99	80-120			
Zinc	0.959	0.020	mg/l	1.00		96	80-120			
Matrix Spike Analyzed: 07/19/2005 (5G18097-MS1)					**Source: IOG0791-01**					
Antimony	0.998	0.010	mg/l	1.00	ND	100	75-125			
Arsenic	0.946	0.0050	mg/l	1.00	0.0099	94	75-125			
Barium	0.888	0.010	mg/l	1.00	0.024	86	75-125			
Chromium	0.897	0.0050	mg/l	1.00	ND	90	75-125			
Cobalt	0.946	0.010	mg/l	1.00	ND	95	75-125			
Copper	1.02	0.010	mg/l	1.00	ND	102	75-125			
Molybdenum	1.09	0.020	mg/l	1.00	0.21	88	75-125			
Silver	0.476	0.0070	mg/l	0.500	ND	95	75-125			
Thallium	0.837	0.010	mg/l	1.00	ND	84	75-125			
Vanadium	0.925	0.010	mg/l	1.00	0.0044	92	75-125			

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Kathleen A. Robb
Project Manager

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G18097 Extracted: 07/18/05										
Matrix Spike Analyzed: 07/19/2005 (5G18097-MS1)					**Source: IOG0791-01**					
Zinc	0.910	0.020	mg/l	1.00	ND	91	75-125			
Matrix Spike Dup Analyzed: 07/19/2005 (5G18097-MSD1)					**Source: IOG0791-01**					
Antimony	0.994	0.010	mg/l	1.00	ND	99	75-125	0	20	
Arsenic	0.945	0.0050	mg/l	1.00	0.0099	94	75-125	0	20	
Barium	0.879	0.010	mg/l	1.00	0.024	86	75-125	1	20	
Chromium	0.886	0.0050	mg/l	1.00	ND	89	75-125	1	20	
Cobalt	0.937	0.010	mg/l	1.00	ND	94	75-125	1	20	
Copper	1.01	0.010	mg/l	1.00	ND	101	75-125	1	20	
Molybdenum	1.08	0.020	mg/l	1.00	0.21	87	75-125	1	20	
Silver	0.471	0.0070	mg/l	0.500	ND	94	75-125	1	20	
Thallium	0.837	0.010	mg/l	1.00	ND	84	75-125	0	20	
Vanadium	0.916	0.010	mg/l	1.00	0.0044	91	75-125	1	20	
Zinc	0.900	0.020	mg/l	1.00	ND	90	75-125	1	20	
Batch: 5G19037 Extracted: 07/19/05										
Blank Analyzed: 07/19/2005 (5G19037-BLK1)										
Mercury	ND	0.00020	mg/l							
LCS Analyzed: 07/19/2005 (5G19037-BS1)										
Mercury	0.00823	0.00020	mg/l	0.00800		103	90-115			
Matrix Spike Analyzed: 07/19/2005 (5G19037-MS1)					**Source: IOG0937-01**					
Mercury	0.00796	0.00020	mg/l	0.00800	ND	100	75-120			
Matrix Spike Dup Analyzed: 07/19/2005 (5G19037-MSD1)					**Source: IOG0937-01**					
Mercury	0.00788	0.00020	mg/l	0.00800	ND	98	75-120	1	20	

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Kathleen A. Robb
Project Manager

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Batch: 5G19086 Extracted: 07/19/05										
Blank Analyzed: 07/20/2005 (5G19086-BLK1)										
Aluminum	ND	0.050	mg/l							
Boron	ND	0.050	mg/l							
Iron	ND	0.040	mg/l							
Magnesium	ND	0.020	mg/l							
Manganese	ND	0.020	mg/l							
Strontium	ND	0.020	mg/l							
Tin	ND	0.10	mg/l							
Titanium	ND	0.0050	mg/l							
LCS Analyzed: 07/20/2005 (5G19086-BS1)										
Aluminum	0.972	0.050	mg/l	1.00		97	80-120			
Boron	1.01	0.050	mg/l	1.00		101	80-120			
Iron	1.04	0.040	mg/l	1.00		104	80-120			
Magnesium	4.92	0.020	mg/l	5.00		98	80-120			
Manganese	1.02	0.020	mg/l	1.00		102	80-120			
Strontium	0.985	0.020	mg/l	1.00		98	80-120			
Tin	0.973	0.10	mg/l	1.00		97	80-120			
Titanium	1.03	0.0050	mg/l	1.00		103	80-120			
Matrix Spike Analyzed: 07/20/2005 (5G19086-MS1)					**Source: IOG0857-01**					
Aluminum	1.06	0.050	mg/l	1.00	0.082	98	75-125			
Boron	1.66	0.050	mg/l	1.00	0.64	102	75-125			
Iron	0.991	0.040	mg/l	1.00	0.034	96	75-125			
Magnesium	33.0	0.020	mg/l	5.00	29	80	75-125			
Manganese	0.938	0.020	mg/l	1.00	0.010	93	75-125			
Strontium	2.68	0.020	mg/l	1.00	1.7	98	75-125			
Tin	0.933	0.10	mg/l	1.00	0.0053	93	75-125			
Titanium	0.987	0.0050	mg/l	1.00	0.0034	98	75-125			

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Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
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2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

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METALS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G19086 Extracted: 07/19/05										
Matrix Spike Dup Analyzed: 07/20/2005 (5G19086-MSD1)					**Source: IOG0857-01**					
Aluminum	1.11	0.050	mg/l	1.00	0.082	103	75-125	5	20	
Boron	1.74	0.050	mg/l	1.00	0.64	110	75-125	5	20	
Iron	1.02	0.040	mg/l	1.00	0.034	99	75-125	3	20	
Magnesium	34.4	0.020	mg/l	5.00	29	108	75-125	4	20	
Manganese	0.977	0.020	mg/l	1.00	0.010	97	75-125	4	20	
Strontium	2.76	0.020	mg/l	1.00	1.7	106	75-125	3	20	
Tin	0.950	0.10	mg/l	1.00	0.0053	94	75-125	2	20	
Titanium	1.02	0.0050	mg/l	1.00	0.0034	102	75-125	3	20	
Batch: 5G25067 Extracted: 07/25/05										
Blank Analyzed: 07/25/2005 (5G25067-BLK1)										
Zirconium	ND	0.20	mg/l							
LCS Analyzed: 07/25/2005 (5G25067-BS1)										
Zirconium	1.01	0.20	mg/l	1.00		101	80-120			
Matrix Spike Analyzed: 07/25/2005 (5G25067-MS1)					**Source: IOG1423-01**					
Zirconium	1.02	0.20	mg/l	1.00	ND	102	75-125			
Matrix Spike Dup Analyzed: 07/25/2005 (5G25067-MSD1)					**Source: IOG1423-01**					
Zirconium	1.03	0.20	mg/l	1.00	ND	103	75-125	1	20	

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Project Manager

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G14039 Extracted: 07/14/05										
Blank Analyzed: 07/14/2005 (5G14039-BLK1)										
Bromide	ND	0.50	mg/l							
Fluoride	ND	0.50	mg/l							
Nitrate-N	ND	0.15	mg/l							
Nitrite-N	ND	0.15	mg/l							
Sulfate	ND	0.50	mg/l							
LCS Analyzed: 07/14/2005 (5G14039-BS1)										
Bromide	4.88	0.50	mg/l	5.00		98	90-110			
Fluoride	4.68	0.50	mg/l	5.00		94	90-110			
Nitrate-N	1.08	0.15	mg/l	1.13		96	90-110			
Nitrite-N	1.47	0.15	mg/l	1.52		97	90-110			
Sulfate	9.53	0.50	mg/l	10.0		95	90-110			*M-3*
Matrix Spike Analyzed: 07/14/2005 (5G14039-MS1)					**Source: IOG0829-01**					
Bromide	4.97	0.50	mg/l	5.00	ND	99	80-120			
Fluoride	4.98	0.50	mg/l	5.00	0.18	96	80-120			
Nitrate-N	6.59	0.15	mg/l	1.13	5.2	123	80-120			*M-HA*
Nitrite-N	1.54	0.15	mg/l	1.52	ND	101	80-120			
Matrix Spike Dup Analyzed: 07/14/2005 (5G14039-MSD1)					**Source: IOG0829-01**					
Bromide	4.71	0.50	mg/l	5.00	ND	94	80-120	5	20	
Fluoride	4.91	0.50	mg/l	5.00	0.18	95	80-120	1	20	
Nitrate-N	6.54	0.15	mg/l	1.13	5.2	119	80-120	1	20	
Nitrite-N	1.50	0.15	mg/l	1.52	ND	99	80-120	3	20	
Batch: 5G14075 Extracted: 07/14/05										
Blank Analyzed: 07/14/2005 (5G14075-BLK1)										
Phosphorus	ND	0.050	mg/l							

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Project Manager

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G14075 Extracted: 07/14/05										
LCS Analyzed: 07/14/2005 (5G14075-BS1)										
Phosphorus	0.915	0.050	mg/l	1.00		92	80-120			
Matrix Spike Analyzed: 07/14/2005 (5G14075-MS1)					**Source: IOG0784-01**					
Phosphorus	1.25	0.050	mg/l	1.00	0.37	88	65-130			
Matrix Spike Dup Analyzed: 07/14/2005 (5G14075-MSD1)					**Source: IOG0784-01**					
Phosphorus	1.31	0.050	mg/l	1.00	0.37	94	65-130	5	15	
Batch: 5G14089 Extracted: 07/14/05										
Duplicate Analyzed: 07/14/2005 (5G14089-DUP1)					**Source: IOG0808-01**					
Color	10.0	1.0	Color Units		10			0	20	*pH*
Batch: 5G14094 Extracted: 07/14/05										
Duplicate Analyzed: 07/14/2005 (5G14094-DUP1)					**Source: IOG0812-01**					
Residual Chlorine	ND	0.10	mg/l		ND				20	
Batch: 5G14118 Extracted: 07/14/05										
Blank Analyzed: 07/14/2005 (5G14118-BLK1)										
Surfactants (MBAS)	ND	0.10	mg/l							
LCS Analyzed: 07/14/2005 (5G14118-BS1)										
Surfactants (MBAS)	0.255	0.10	mg/l	0.250		102	90-110			

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G14118 Extracted: 07/14/05										
Matrix Spike Analyzed: 07/14/2005 (5G14118-MS1)					**Source: IOG0833-01**					
Surfactants (MBAS)	0.271	0.10	mg/l	0.250	ND	108	50-125			
Matrix Spike Dup Analyzed: 07/14/2005 (5G14118-MSD1)					**Source: IOG0833-01**					
Surfactants (MBAS)	0.299	0.10	mg/l	0.250	ND	120	50-125	10	20	
Batch: 5G15045 Extracted: 07/15/05										
Blank Analyzed: 07/15/2005 (5G15045-BLK1)										
Sulfide	ND	0.10	mg/l							
LCS Analyzed: 07/15/2005 (5G15045-BS1)										
Sulfide	0.567	0.10	mg/l	0.560		101	80-120			
Matrix Spike Analyzed: 07/15/2005 (5G15045-MS1)					**Source: IOG0959-02**					
Sulfide	0.547	0.10	mg/l	0.560	0.010	96	70-130			
Matrix Spike Dup Analyzed: 07/15/2005 (5G15045-MSD1)					**Source: IOG0959-02**					
Sulfide	0.527	0.10	mg/l	0.560	0.010	92	70-130	4	30	
Batch: 5G15075 Extracted: 07/15/05										
Blank Analyzed: 07/18/2005 (5G15075-BLK1)										
Total Cyanide	ND	0.025	mg/l							
LCS Analyzed: 07/18/2005 (5G15075-BS1)										
Total Cyanide	0.191	0.025	mg/l	0.200		96	90-110			

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Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851
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U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

METHOD BLANK/QC DATA

INORGANICS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G15075 Extracted: 07/15/05										
Matrix Spike Analyzed: 07/18/2005 (5G15075-MS1)					**Source: IOG0684-02**					
Total Cyanide	0.214	0.025	mg/l	0.200	ND	107	70-115			
Matrix Spike Dup Analyzed: 07/18/2005 (5G15075-MSD1)					**Source: IOG0684-02**					
Total Cyanide	0.188	0.025	mg/l	0.200	ND	94	70-115	13	15	
Batch: 5G19066 Extracted: 07/19/05										
Blank Analyzed: 07/19/2005 (5G19066-BLK1)										
Total Kjeldahl Nitrogen	ND	0.50	mg/l							
LCS Analyzed: 07/19/2005 (5G19066-BS1)										
Total Kjeldahl Nitrogen	11.5	0.50	mg/l	10.0		115	85-120			
LCS Dup Analyzed: 07/19/2005 (5G19066-BSD1)										
Total Kjeldahl Nitrogen	11.2	0.50	mg/l	10.0		112	85-120	3	15	
Matrix Spike Analyzed: 07/19/2005 (5G19066-MS1)					**Source: IOG0863-02**					
Total Kjeldahl Nitrogen	11.8	0.50	mg/l	10.0	0.84	110	85-120			
Matrix Spike Dup Analyzed: 07/19/2005 (5G19066-MSD1)					**Source: IOG0863-02**					
Total Kjeldahl Nitrogen	12.3	0.50	mg/l	10.0	0.84	115	85-120	4	15	
Batch: 5G20078 Extracted: 07/20/05										
Blank Analyzed: 07/20/2005 (5G20078-BLK1)										
Oil & Grease	ND	5.0	mg/l							

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Kathleen A. Robb
Project Manager

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1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
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U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

METHOD BLANK/QC DATA

INORGANICS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G20078 Extracted: 07/20/05										
LCS Analyzed: 07/20/2005 (5G20078-BS1)										**M-NR1**
Oil & Grease	16.0	5.0	mg/l	20.0		80	65-120			
LCS Dup Analyzed: 07/20/2005 (5G20078-BSD1)										
Oil & Grease	15.5	5.0	mg/l	20.0		78	65-120	3	20	
Batch: 5G22080 Extracted: 07/22/05										
Blank Analyzed: 07/22/2005 (5G22080-BLK1)										
Phenols	ND	0.10	mg/l							
LCS Analyzed: 07/22/2005 (5G22080-BS1)										
Phenols	0.508	0.10	mg/l	0.500		102	90-110			
Matrix Spike Analyzed: 07/22/2005 (5G22080-MS1)					**Source: IOG0903-08**					
Phenols	0.508	0.10	mg/l	0.500	ND	102	65-155			
Matrix Spike Dup Analyzed: 07/22/2005 (5G22080-MSD1)					**Source: IOG0903-08**					
Phenols	0.526	0.10	mg/l	0.500	ND	105	65-155	3	20	
Batch: 5G22113 Extracted: 07/22/05										
Blank Analyzed: 07/22/2005 (5G22113-BLK1)										
Ammonia-N	ND	0.50	mg/l							
LCS Analyzed: 07/22/2005 (5G22113-BS1)										
Ammonia-N	0.993	0.50	mg/l	1.00		99	85-115			

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Kathleen A. Robb
Project Manager

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P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

METHOD BLANK/QC DATA

INORGANICS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G22113 Extracted: 07/22/05										
Matrix Spike Analyzed: 07/22/2005 (5G22113-MS1)					**Source: IOG0857-01**					
Ammonia-N	1.74	0.50	mg/l	2.00	ND	87	75-125			
Matrix Spike Dup Analyzed: 07/22/2005 (5G22113-MSD1)					**Source: IOG0857-01**					
Ammonia-N	1.83	0.50	mg/l	2.00	ND	92	75-125	5	15	

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Kathleen A. Robb
Project Manager

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
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Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

METHOD BLANK/QC DATA

DIQUAT/PARAQUAT (EPA 549.2)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: C5G1809 Extracted: 07/18/05										
Blank Analyzed: 07/18/2005 (C5G1809-BLK1)										
Diquat	ND	4.0	ug/l							
Paraquat	ND	20	ug/l							
LCS Analyzed: 07/18/2005 (C5G1809-BS1)										
Diquat	32.5	4.0	ug/l	40.0		81	70-120			
Paraquat	32.7	20	ug/l	40.0		82	65-120			
LCS Dup Analyzed: 07/18/2005 (C5G1809-BSD1)										
Diquat	32.7	4.0	ug/l	40.0		82	70-120	1	20	
Paraquat	33.1	20	ug/l	40.0		83	65-120	1	20	
Matrix Spike Analyzed: 07/18/2005 (C5G1809-MS1)					**Source: COG0352-01**					
Diquat	34.8	4.0	ug/l	40.0	ND	87	70-120			
Paraquat	35.5	20	ug/l	40.0	ND	89	65-120			

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Kathleen A. Robb
Project Manager

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17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
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U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

DATA QUALIFIERS AND DEFINITIONS

C	Calibration Verification recovery was above the method control limit for this analyte. Analyte not detected, data not impacted.
L	Laboratory Control Sample recovery was above the method control limits. Analyte not detected, data not impacted.
M-3	Results exceeded the linear range in the MS/MSD and therefore are not available for reporting. The batch was accepted based on acceptable recovery in the Blank Spike (LCS).
M-HA	Due to high levels of analyte in the sample, the MS/MSD calculation does not provide useful spike recovery information. See Blank Spike (LCS).
M-NR1	There was no MS/MSD analyzed with this batch due to insufficient sample volume. See Blank Spike/Blank Spike Duplicate.
pH	pH = 7
R-2	The RPD exceeded the method control limit.
RL-3	Reporting limit raised due to high concentrations of non-target analytes.
ND	Analyte NOT DETECTED at or above the reporting limit or MDL, if MDL is specified.
RPD	Relative Percent Difference

ADDITIONAL COMMENTS

For 1,2-Diphenylhydrazine:

The result for 1,2-Diphenylhydrazine is based upon the reading of its breakdown product, Azobenzene.

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
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2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

U.S. Filter/Westates Carbon
P.O. Box 3308
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Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

Certification Summary

Del Mar Analytical, Irvine

Method	Matrix	Nelac	California
Calculation	Water	X	X
EPA 300.0	Water	X	X
EPA 330.5	Water	X	X
EPA 350.3	Water	X	X
EPA 3510/8082	Water	X	X
EPA 3510C/8081A	Water	X	X
EPA 365.3	Water	X	X
EPA 376.2	Water	X	X
EPA 413.1	Water	X	X
EPA 420.1	Water	X	X
EPA 6010B	Water	X	X
EPA 7470A	Water	X	X
EPA 8260B	Water	X	X
EPA 8270C	Water	X	X
SM2120B	Water	N/A	N/A
SM4500-CN-C,E	Water	X	X
SM4500-NORG,C	Water		X
SM5540-C	Water	X	X

Nevada and NELAP provide analyte specific accreditations. Analyte specific information for Del Mar Analytical may be obtained by contacting the laboratory or visiting our website at www.dmalabs.com.

Subcontracted Laboratories

Del Mar Analytical - Colton *California Cert #1169, Arizona Cert #AZ0062, Nevada Cert #CA-242*
1014 E. Cooley Drive, Suite AB - Colton, CA 92324
Method Performed: EPA 549.2
Samples: IOG0857-01

Test America, Inc.
2960 Foster Creighton Drive - Nashville, TN 37204
Analysis Performed: 8151A (Herbicides)
Samples: IOG0857-01

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave. [illegible], Irvine, CA 92614 Ph (949) 261-1022 Fax (949) 261-1228
1014 E. Cooley Dr., Suite A, Colton, CA 92324 Ph (909) 370-4667 Fax (909) 370-1046
9484 Chesapeake Drive, Suite 805, San Diego, CA 92123 Ph (619) 505-9596 Fax (619) 505-9689
9830 South 51st Street, Suite B-120, Phoenix, AZ 85044 Ph (480) 785-0043 Fax (480) 785-0851
2520 E. Sunset Rd., Suite #3, Las Vegas, NV 89120 Ph (702) 798-3620 Fax (702) 798-3621

SUBCONTRACT ORDER - PROJECT # IOG0857

SENDING LABORATORY:	RECEIVING LABORATORY:
Del Mar Analytical, Irvine	Del Mar Analytical - Colton
17461 Derian Avenue. Suite 100	1014 E. Cooley Drive, Suite AB
Irvine, CA 92614	Colton, CA 92324
Phone: (949) 261-1022	Phone :(909) 370-4667
Fax: (949) 261-1228	Fax: (909) 370-1046
Project Manager: Kathleen A. Robb	COG0448

Analysis	Expiration	Due	Comments
Sample ID: IOG0857-01 Water	**Sampled: 07/13/05 14:00**		
549.1-Diquat	07/20/05 14:00	07/25/05 12:00	std TAT- sub to DMAC-see comments

Containers Supplied:
1 L Brown Poly (IOG0857-01V)

SAMPLE INTEGRITY:

All containers intact: ☑ Yes ☐ No	Sample labels/COC agree: ☑ Yes ☐ No	Samples Received On Ice:: ☑ Yes ☐ No	
Custody Seals Present: ☐ Yes ☐ No	Samples Preserved Properly: ☑ Yes ☐ No	Samples Received at (temp): 6°	

Released By	Date	Time	Received By	Date	Time
[signature]			A. Greco	7-14-05	[illegible]
Anthony Greco	7-14-05	1500	Ashley Banks	7/14/05	1500

Del Mar Analytical

17461 Derian, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3299
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
9830 South 51st St., Suite B-120, Phoenix AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

CHAIN OF CUSTODY FORM

Client Name/Address: USF Westates PO Box 3308 Parker AZ

P.O. #:

Project: TTO

Project Manager/Phone Number: Foster 928 669 5758

Phone Number:

Sampler:

Fax Number:

ANALYSIS REQUIRED: IOG0857 — 1/3 — 041

Analyses: Metals (NPDES); Hg 1631/245.1; Total cyanide; Total phenols; D+G 413.1; Sulfide 376.2; Residual Chlorine; Total phosphorus; NH3; TKN

Sample Description	Sample Matrix	Container Type	# of Containers	Sampling Date/Time	Preservation	Metals (NPDES)	Hg	Total cyanide	Total phenols	D+G 413.1	Sulfide 376.2	Residual Chlorine	Total phosphorus	NH3	TKN	Special Instructions
TTO	H2O	500ml	1	7/12-13	HNO3	X	X									
↓	↓	↓	1	↓	NAOH			X								
↓	↓	1 amb	2	↓	H2SO4				X							
↓	↓	↓	2	↓	HCL					X						
↓	↓	500ml	1	↓	NAOH/ZN						X					
↓	↓	50ml	1	↓	—							X				
↓	↓	500ml	2	↓	H2SO4								X	X	X	

VB

Relinquished By	Date/Time	Received By	Date/Time
N Foster	7/13/05 2PM		
Relinquished By	Date/Time	Received By	Date/Time
Relinquished By	Date/Time	Received By [signature]	7-14-05 10:10

Turnaround Time: (check)
Same Day ______ 72 Hours ______
24 Hours ______ 5 days ______
48 hours ______ normal ✱
Sample Integrity: (Check)
Intact ✓ On Ice: ✓ 10°C

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CHAIN OF CUSTODY FORM

Client Name/Address: USF Westates

P.O. #:

Project:

Project Manager/Phone Number:

Phone Number:

Sampler:

Fax Number:

ANALYSIS REQUIRED: Color, Br, F, NO3 | NO2, SO4, MBA | 8260B + CS2 | Vin Acet | 2CVE, Acrolein | Acrylonitrile VIA 8260B | 8270D+ NDMA | 8081/8082 | 8151A

2/3

041

Sample Description	Sample Matrix	Container Type	# of Containers	Sampling Date/Time	Preservation	Color, Br, F, NO3	NO2, SO4, MBA	8260B + CS2	Vin Acet	2CVE, Acrolein	Acrylonitrile VIA 8260B	8270D+ NDMA	8081/8082	8151A	Special Instructions
FTO	H2O	500ml	2	7/12-13	—	X	X								
↓	↓	VOA	4	↓	HCL			X	X						
↓	↓	VOA	3	↓	—					X	X				
↓	↓	LAMB	1	↓	—							X			
↓	↓	LAMB	1	↓	—								X		
↓	↓	LAMB	1	↓	—									X	

Relinquished By	Date/Time	Received By	Date/Time
[signature]	7/13/05 2pm		
		[signature]	7-14-05 10:10

Turnaround Time: (check)
Same Day ____ 72 Hours ____
24 Hours ____ 5 days ____
48 hours ____ normal ✓

Sample Integrity: (Check)
Intact ✓ On Ice: ✓ 18°C

73

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CHAIN OF CUSTODY FORM

Client Name/Address: USF Westates

P.O. #:

Project:

Project Manager/Phone Number:

Phone Number:

Sampler:

Fax Number:

ANALYSIS REQUIRED: 549.2, Extras

(041)

Sample Description	Sample Matrix	Container Type	# of Containers	Sampling Date/Time	Preservation	549.2	Extras	Special Instructions
TTO	H2O	LBrN	1	7/12-13	H2SO4	X		
↓	↓	LAMB	4	↓	—		X	

Relinquished By	Date/Time:	Received By	Date/Time:
[signature]	7/13/05 2pm		
Relinquished By	Date/Time:	Received By	Date/Time:
Relinquished By	Date/Time:	Received By	Date/Time:
		[signature]	7-14-05 10:10

Turnaround Time: (check)
Same Day ____ 72 Hours ____
24 Hours ____ 5 days ____
48 hours ____ normal X

Sample Integrity: (Check)
Intact ✓ On Ice: ✓ 10°C

Melting Ice

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2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

CHAIN OF CUSTODY FORM

Client Name/Address: USF Westates, PO Box 3308, Parker AZ

P.O. #:

Project: TTO

Project Manager/Phone Number: Foster 928 669 5758

Sampler:

Phone Number:

Fax Number:

ANALYSIS REQUIRED: IOG0857

1/3

C041

Analyses: Metals 6010B; Hg M7470/7471; total cyanide; total phenols; O+G 413.1; Sulfide 376.2; Residual Chlorine; total phos (365.3); NH3, TKN

Sample Description	Sample Matrix	Container Type	# of Containers	Sampling Date/Time	Preservation	Metals 6010B	Hg M7470/7471	total cyanide	total phenols	O+G 413.1	Sulfide 376.2	Residual Chlorine	total phos (365.3)	NH3, TKN	Special Instructions
TTO	H2O	500ml	1	7/12-13	HNO3	X	X								
↓	↓	↓	1	↓	NAOH			X							
		1 amb	2		H2SO4				X						
		↓	2		HCL					X					
		500ml	1		NAOH/ZN						X				
		50ml	1		—							X			
		500ml	2		H2SO4								X	X	

VB

Relinquished By	Date/Time	Received By	Date/Time
N Foster	7/13/05 2pm		
		[signature]	7-14-05 10:10

Turnaround Time: (check)
Same Day ____ 72 Hours ____
24 Hours ____ 5 days ____
48 hours ____ normal (X)

Sample Integrity: (Check)
Intact ✓ On Ice: ✓ 10°C

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CHAIN OF CUSTODY FORM

2/3

(041)

Client Name/Address: USF Westates

P.O. #:

Project:

Project Manager/Phone Number:

Phone Number:

Sampler:

Fax Number:

ANALYSIS REQUIRED: Color, Por, F, NO3 | NO2, SO4, MBA | 8260B + CS2 | Vin Acet | 2 CVE, Acrolein | Acrylonitrile via 8260B | 8270 + NDMA | 8081 / 8082 | 8151 A

Sample Description	Sample Matrix	Container Type	# of Containers	Sampling Date/Time	Preservation	Color, Por, F, NO3	NO2, SO4, MBA	8260B + CS2	Vin Acet	2 CVE, Acrolein	Acrylonitrile via 8260B	8270 + NDMA	8081 / 8082	8151 A	Special Instructions
TTO	H2O	500ml	2	7/12-13	—	X	X								
↓	↓	VOA	4	↓	HCL			X	X						
		VOA	3		—					X	X				
		LAMB	1		—							X			
		LAMB	1		—								X		
		LAMB	1		—									X	

Relinquished By	Date/Time	Received By	Date/Time
N Foster	7/13/05 2pm		
		[signature]	7-14-05 10:10

Turnaround Time: (check)
Same Day ______ 72 Hours ______
24 Hours ______ 5 days ______
48 hours ______ normal (X)

Sample Integrity: (Check)
Intact ✓ On Ice: ✓ 18°C

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2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

CHAIN OF CUSTODY FORM

Client Name/Address: USF Westates	P.O. #: Project:	ANALYSIS REQUIRED
Project Manager/Phone Number: Sampler:	Phone Number: Fax Number:	549.2 / Extras (041)

Sample Description	Sample Matrix	Container Type	# of Containers	Sampling Date/Time	Preservation	549.2	Extras								Special Instructions
TTO	H2O	LBYN	1	7/12-13	H2SO4	X									
↓	↓	LAMB	4	↓	—		X								

Relinquished By: [signature]	Date/Time: 7/13/05 2pm	Received By	Date/Time:	Turnaround Time: (check) Same Day ___ 72 Hours ___ 24 Hours ___ 5 days ___ 48 hours ___ normal X
Relinquished By	Date/Time:	Received By	Date/Time:	
Relinquished By	Date/Time:	Received By [signature]	Date/Time: 7-14-05 10:10	Sample Integrity: (Check) Intact ✓ On Ice: ✓ 10°C Melting ice

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August 16, 2005

U.S. Filter/ Westates Carbon
P.O. Box 3308
Parker, AZ 85344

Attention: Deborah Foster

Project: Semi-Annual
TTO
Sampled: 07/13/05
Del Mar Analytical Number: IOG0857

Dear Ms. Foster:

Test America Analytical Testing Corporation reperformed the 8151A Herbicides for confirmation purposes in regards to the referenced project above. Please use the following cross-reference table when reviewing your results.

U.S. Filter ID	Del Mar ID	Test America ID
TTO	IOG0857-01	05-A102935

Attached is the original report from the subcontract laboratory. If you have any questions or require further assistance, please contact me at (949) 261-1022, extension 218.

Sincerely yours,
DEL MAR ANALYTICAL

Kathleen A. Robb
Project Manager

Enclosure

TestAmerica
ANALYTICAL TESTING CORPORATION

2960 Foster Creighton Drive • Nashville, Tennessee 37204
800-765-0980 • 615-726-3404 Fax

ANALYTICAL REPORT

DEL MAR ANALYTICAL, IRVINE 11405
MICHELE HARPER
17461 DERIAN, STE 100
IRVINE, CA 92614

Lab Number: 05-A102935
Sample ID: IOG0857-01
Sample Type: Ground water
Site ID:

Project: IOG0857
Project Name:
Sampler:

Date Collected: 7/13/05
Time Collected: 14:00
Date Received: 7/19/05
Time Received: 9:55

Analyte	Result	Units	Report Limit	Dil Factor	Analysis Date	Analysis Time	Analyst	Method	Batch
PESTICIDES/PCB's/HERBICIDES									
2,4-D	ND	mg/l	0.00500	1	7/20/05	19:04	K. Burritt	8151A	440
2,4,5-T	ND	mg/l	0.00050	1	7/20/05	19:04	K. Burritt	8151A	440
2,4,5-TP	ND	mg/l	0.00050	1	7/20/05	19:04	K. Burritt	8151A	440
Dalapon	ND	mg/l	0.0200	1	7/20/05	19:04	K. Burritt	8151A	440
2,4-DB	ND	mg/l	0.00500	1	7/20/05	19:04	K. Burritt	8151A	440
Dicamba	ND	mg/l	0.00050	1	7/20/05	19:04	K. Burritt	8151A	440
Dichlorprop	ND	mg/l	0.00500	1	7/20/05	19:04	K. Burritt	8151A	440
Dinoseb	ND	mg/l	0.00250	1	7/20/05	19:04	K. Burritt	8151A	440
MCPA	ND	mg/l	0.500	1	7/20/05	19:04	K. Burritt	8151A	440
MCPP	ND	mg/l	0.500	1	7/20/05	19:04	K. Burritt	8151A	440
Pentachlorophenol	ND	mg/l	0.00050	1	7/20/05	19:04	K. Burritt	8151A	440
4-Nitrophenol	ND	mg/l	0.00050	1	7/20/05	19:04	K. Burritt	8151A	440

Sample Extraction Data

Parameter	Wt/Vol Extracted	Extract Vol	Date	Time	Analyst	Method
Herbicides	1000 ml	10.0 ml	7/19/05		J. Davis	8151/615

Surrogate	% Recovery	Target Range
surr-DCAA	92.	51. - 136.

Sample report continued . . .

TestAmerica
ANALYTICAL TESTING CORPORATION
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ANALYTICAL REPORT

Laboratory Number: 05-A102935
Sample ID: IOG0857-01

LABORATORY COMMENTS:
ND = Not detected at the report limit.
B = Analyte was detected in the method blank.
J = Estimated Value below Report Limit.
E = Estimated Value above the calibration limit of the instrument.
# = Recovery outside Laboratory historical or method prescribed limits.

End of Sample Report.

TestAmerica
ANALYTICAL TESTING CORPORATION

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PROJECT QUALITY CONTROL DATA
Project Number: IOG0857
Project Name:
Page: 1
Laboratory Receipt Date: 7/19/05

Matrix Spike Recovery

Note: If Blank is referenced as the sample spiked, insufficient volume was received for the defined analytical batch for MS/MSD analysis on an true sample matrix. Laboratory reagent water was used for QC purposes.

Analyte	units	Orig. Val.	MS Val	Spike Conc	Recovery	Target Range	Q.C. Batch	Spike Sample
PEST/PCB/HERB PARAMETERS								
2,4-D	mg/l	< 0.00006	0.00363	0.00500	73	35. - 141.	440	blank
2,4,5-T	mg/l	< 0.00003	0.00341	0.00500	68	25. - 149.	440	blank
2,4,5-TP	mg/l	< 0.00003	0.00431	0.00500	86	31. - 137.	440	blank
Dalapon	mg/l	< 0.00002	0.00018	0.00500	4#	10. - 101.	440	blank
2,4-DB	mg/l	< 0.00009	0.00702	0.00500	140	34. - 153.	440	blank
Dicamba	mg/l	< 0.00006	0.00338	0.00500	68	23. - 157.	440	blank
Dichloroprop	mg/l	< 0.00006	0.00403	0.00500	81	45. - 152.	440	blank
Dinoseb	mg/l	< 0.00005	0.00384	0.00500	77	27. - 129.	440	blank
MCPA	mg/l	< 0.00410	0.214	0.500	43	26. - 139.	440	blank
MCPP	mg/l	< 0.00700	0.539	0.500	108	24. - 164.	440	blank
Pentachlorophenol	mg/l	< 0.00003	0.00297	0.00500	59	25. - 133.	440	blank
4-Nitrophenol	mg/l	< 0.00005	< 0.00050	0.00500	N/A	21. - 133.	440	blank

Matrix Spike Duplicate

Analyte	units	Orig. Val.	Duplicate	RPD	Limit	Q.C. Batch
PEST/PCB/HERB PARAMETERS						
2,4-D	mg/l	0.00363	0.00408	11.67	34.	440
2,4,5-T	mg/l	0.00341	0.00381	11.08	51.	440
2,4,5-TP	mg/l	0.00431	0.00482	11.17	44.	440
Dalapon	mg/l	0.00018	0.00018	0.00	89.	440
2,4-DB	mg/l	0.00702	0.00659	6.32	33.	440
Dicamba	mg/l	0.00338	0.00369	8.77	46.	440
Dichloroprop	mg/l	0.00403	0.00455	12.12	41.	440
Dinoseb	mg/l	0.00384	0.00416	8.00	50.	440
MCPA	mg/l	0.214	0.309	36.33	50.	440
MCPP	mg/l	0.539	0.596	10.04	45.	440
Pentachlorophenol	mg/l	0.00297	0.00335	12.03	49.	440
4-Nitrophenol	mg/l	< 0.00050	0.00373	152.72#	55.	440

Project QC continued . . .

TestAmerica
ANALYTICAL TESTING CORPORATION

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PROJECT QUALITY CONTROL DATA
Project Number: IOG0857
Project Name:
Page: 2
Laboratory Receipt Date: 7/19/05

Laboratory Control Data

Analyte	units	Known Val.	Analyzed Val	% Recovery	Target Range	Q.C. Batch
PEST/PCB/HERB PARAMETERS						
2,4-D	mg/l	0.00500	0.00398	80	35 - 141	440
2,4,5-T	mg/l	0.00500	0.00374	75	33 - 136	440
2,4,5-TP	mg/l	0.00500	0.00477	95	33 - 136	440
Dalapon	mg/l	0.00500	0.00025	5 #	10 - 101	440
2,4-DB	mg/l	0.00500	0.00633	127	38 - 143	440
Dicamba	mg/l	0.00500	0.00361	72	23 - 157	440
Dichloroprop	mg/l	0.00500	0.00443	89	50 - 143	440
Dinoseb	mg/l	0.00500	0.00384	77	28 - 127	440
MCPA	mg/l	0.500	0.311	62	26 - 139	440
MCPP	mg/l	0.500	0.525	105	24 - 164	440
Pentachlorophenol	mg/l	0.00500	0.00328	66	33 - 130	440
4-Nitrophenol	mg/l	0.00500	0.00364	73	23 - 125	440
surr-DCAA	% Rec			102	51 - 136	440

Duplicates

Analyte	units	Orig. Val.	Duplicate	RPD	Limit	Q.C. Batch	Sample Dup'd

Blank Data

Analyte	Blank Value	Units	Q.C. Batch	Date Analyzed	Time Analyzed

Project QC continued . . .

Del Mar Analytical

17461 Derian Ave[illegible]00, Irvine, CA 92614 Ph (949) 261-1022 Fax (949) 261-1228
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9484 Chesapeake Drive, Suite 805, San Diego, CA 92123 Ph (619) 505-9596 Fax (619) 505-9689
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2520 E. Sunset Rd., Suite #3, Las Vegas, NV 89120 Ph (702) 798-3620 Fax (702) 798-3621

423201

SUBCONTRACT ORDER - PROJECT # IOG0857

SENDING LABORATORY:	RECEIVING LABORATORY:
Del Mar Analytical, Irvine	Test America, Inc.
17461 Derian Avenue. Suite 100 11405	2960 Foster Creighton Drive
Irvine, CA 92614	Nashville, TN 37204
Phone: (949) 261-1022	Phone :800/765-0980
Fax: (949) 261-1228	Fax: 615/726-0954
Project Manager: Kathleen A. Robb	

Standard TAT is requested unless specific due date is requested => **Due Date:**__________ **Initials:**______

Analysis	Expiration	Comments	
Sample ID: IOG0857-01 Water	**Sampled: 07/13/05 14:00**		
8151A (Herbicides)	07/20/05 14:00	Needs Arizona Certification	102935

Containers Supplied:
1 L Amber (IOG0857-01Z)

SAMPLE INTEGRITY:

All containers intact: ☒ Yes ☐ No	Sample labels/COC agree: ☒ Yes ☐ No	Samples Received On Ice:: ☒ Yes ☐ No	
Custody Seals Present: ☒ Yes ☐ No	Samples Preserved Properly: ☒ Yes ☐ No	Samples Received at (temp):	5.9°C

Released By	Date	Time	Received By	Date	Time
[signature]	7.18.05	15:30	[signature]	7/19/05	955

Test/America
INCORPORATED

Sample NonConformance/COC Revision Form

Initiated by:	JDJacobs	Phone:	9492611022	NC Closed	☑
Client Name:	DEL MAR ANALYT	Sample Range:	102935	Date Closed	7/19/2005
Client Contact:	MICHELE HARPE	SDG:	423201		
Client Account:	11405	Analyst:	71		
Date Created:	7/19/2005	Supervisor:	Paul Buckingham		
NC #:	102935	NC Type:	NC Analytical 1		
Project Name:		Terminal Manager:			
Project Number:	IOG0857				
Project Origin	AZ				
Regulatory :					

Process:	HERB List?	Corrected By:	Kenny Bundy
Action:	Herb List: Long	Closed: ☑	kbundy

Comments:

Comment added by: JDJacobs on 7/19/2005 2:11:02 PM
NC closed with out comments

****

Comment added by: kbundy on 7/19/2005 2:04:51 PM
Long list herbicides.

****

Added Without Comments

TestAmerica
ANALYTICAL TESTING CORPORATION
Nashville Division

COOLER RECEIPT FORM BC# 423201

Client Name : Del Mar Analytical

Cooler Received/Opened On: 7/19/05 Accessioned By: James D. Jacobs

Log-in Personnel Signature

1. Temperature of Cooler when triaged: 5.7 Degrees Celsius
2. Were custody seals on outside of cooler?........ (YES)...NO....NA
   a. If yes, how many and where: 1 Back
3. Were custody seals on containers?........ (NO)...YES...NA
4. Were the seals intact, signed, and dated correctly?........ (YES)...NO...NA
5. Were custody papers inside cooler?........ (YES)...NO...NA
6. Were custody papers properly filled out (ink, signed, etc)?........ (YES)...NO...NA
7. Did you sign the custody papers in the appropriate place?........ (YES)...NO...NA
8. What kind of packing material used? (Bubblewrap) Peanuts Vermiculite Foam Insert Ziplock baggies Paper Other None
9. Cooling process: Ice (Ice-pack) Ice (direct contact) Dry ice Other None
10. Did all containers arrive in good condition (unbroken)?........ (YES)...NO...NA
11. Were all container labels complete (#, date, signed, pres., etc)?........ (YES)...NO...NA
12. Did all container labels and tags agree with custody papers?........ (YES)...NO...NA
13. Were correct containers used for the analysis requested?........ (YES)...NO...NA
14. a. Were VOA vials received?........ YES..(NO)..NA
    b. Was there any observable head space present in any VOA vial?........ NO...YES..(NA)
15. Was sufficient amount of sample sent in each container?........ (YES)...NO...NA
16. Were correct preservatives used?........ (YES)...NO...NA
    If not, record standard ID of preservative used here__________
17. Was residual chlorine present?........ (NO)..YES...NA
18. Indicate the Airbill Tracking Number (last 4 digits for Fedex only) and Name of Courier below:

1Z1AE5870198963060

Fed-Ex (UPS) Velocity DHL Route Off-street Misc.

19. If a Non-Conformance exists, see attached or comments below:

BIS = Broken in shipment

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2520 E. Sunset Rd., Suite #3, Las Vegas, NV 89120 Ph (702) 798-3620 Fax (702) 798-3621

SUBCONTRACT ORDER - PROJECT # IOG0857

SENDING LABORATORY:	RECEIVING LABORATORY:
Del Mar Analytical, Irvine	Test America, Inc.
17461 Derian Avenue. Suite 100	2960 Foster Creighton Drive
Irvine, CA 92614	Nashville, TN 37204
Phone: (949) 261-1022	Phone :800/765-0980
Fax: (949) 261-1228	Fax: 615/726-0954
Project Manager: Kathleen A. Robb	

Standard TAT is requested unless specific due date is requested => Due Date:__________ Initials:__________

Analysis	Expiration	Comments
Sample ID: IOG0857-01 Water	**Sampled: 07/13/05 14:00**	
8151A (Herbicides)	07/20/05 14:00	Needs Arizona Certification

Containers Supplied:
1 L Amber (IOG0857-01Z)

SAMPLE INTEGRITY:

All containers intact:	☐ Yes ☐ No	Sample labels/COC agree:	☐ Yes ☐ No	Samples Received On Ice::	☐ Yes ☐ No
Custody Seals Present:	☐ Yes ☐ No	Samples Preserved Properly:	☐ Yes ☐ No	Samples Received at (temp):	________

Released By	Date	Time	Received By	Date	Time
Released By	Date	Time	Received By	Date	Time

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LABORATORY REPORT

Prepared For: U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project: TTO

Sampled: 07/13/05
Received: 07/14/05
Issued: 07/27/05 17:35

NELAP #01108CA California ELAP#1197 CSDLAC #10117

The results listed within this Laboratory Report pertain only to the samples tested in the laboratory. The analyses contained in this report were performed in accordance with the applicable certifications as noted. All soil samples are reported on a wet weight basis unless otherwise noted in the report. This Laboratory Report is confidential and is intended for the sole use of Del Mar Analytical and its client. This report shall not be reproduced, except in full, without written permission from Del Mar Analytical. The Chain(s) of Custody, 4 pages, are included and are an integral part of this report.
This entire report was reviewed and approved for release.

SAMPLE CROSS REFERENCE

SUBCONTRACTED Refer to the last page for specific subcontract laboratory information included in this report.

LABORATORY ID	CLIENT ID	MATRIX
IOG0857-01	TTO	Water

Revised 2.4 result

Reviewed By:

Kathleen Robb

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

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U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water)								
Reporting Units: ug/l								
Acrolein	EPA 8260B	5G16003	50	ND	1	7/16/2005	7/16/2005	
Acrylonitrile	EPA 8260B	5G16003	50	ND	1	7/16/2005	7/16/2005	
2-Chloroethyl vinyl ether	EPA 8260B	5G16003	5.0	ND	1	7/16/2005	7/16/2005	
Surrogate: Dibromofluoromethane (80-120%)				*99 %*				
Surrogate: Toluene-d8 (80-120%)				*102 %*				
Surrogate: 4-Bromofluorobenzene (80-120%)				*96 %*				

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

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U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

VOLATILE ORGANICS by GC/MS (EPA 5035/8260B)

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water) - cont.								
Reporting Units: ug/l								
Benzene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Bromobenzene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
Bromochloromethane	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
Bromodichloromethane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Bromoform	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
Bromomethane	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
n-Butylbenzene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
sec-Butylbenzene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
tert-Butylbenzene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
Carbon Disulfide	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
Carbon tetrachloride	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
Chlorobenzene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Chloroethane	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
Chloroform	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Chloromethane	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
2-Chlorotoluene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
4-Chlorotoluene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
Dibromochloromethane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,2-Dibromo-3-chloropropane	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
1,2-Dibromoethane (EDB)	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Dibromomethane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,2-Dichlorobenzene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,3-Dichlorobenzene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,4-Dichlorobenzene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Dichlorodifluoromethane	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
1,1-Dichloroethane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,2-Dichloroethane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,1-Dichloroethene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
cis-1,2-Dichloroethene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
trans-1,2-Dichloroethene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,2-Dichloropropane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,3-Dichloropropane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
2,2-Dichloropropane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,1-Dichloropropene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
cis-1,3-Dichloropropene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
trans-1,3-Dichloropropene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Ethylbenzene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Hexachlorobutadiene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
Isopropylbenzene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
p-Isopropyltoluene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Methylene chloride	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

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U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

VOLATILE ORGANICS by GC/MS (EPA 5035/8260B)

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water) - cont.								
Reporting Units: ug/l								
Naphthalene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
n-Propylbenzene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Styrene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,1,1,2-Tetrachloroethane	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
1,1,2,2-Tetrachloroethane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Tetrachloroethene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Toluene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,2,3-Trichlorobenzene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
1,2,4-Trichlorobenzene	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
1,1,1-Trichloroethane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,1,2-Trichloroethane	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Trichloroethene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Trichlorofluoromethane	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
1,2,3-Trichloropropane	EPA 8260B	5G21019	10	ND	1	7/21/2005	7/21/2005	
1,2,4-Trimethylbenzene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
1,3,5-Trimethylbenzene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Vinyl acetate	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
Vinyl chloride	EPA 8260B	5G21019	5.0	ND	1	7/21/2005	7/21/2005	
o-Xylene	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
m,p-Xylenes	EPA 8260B	5G21019	2.0	ND	1	7/21/2005	7/21/2005	
Surrogate: Dibromofluoromethane (80-120%)				*99 %*				
Surrogate: Toluene-d8 (80-120%)				*104 %*				
Surrogate: 4-Bromofluorobenzene (80-120%)				*95 %*				

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

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SEMI-VOLATILE ORGANICS BY GC/MS (EPA 3520C/8270C)

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water)								
Reporting Units: ug/l								
Acenaphthene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Acenaphthylene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Aniline	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Anthracene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Benzidine	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	L
Benzoic acid	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
Benzo(a)anthracene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Benzo(b)fluoranthene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Benzo(k)fluoranthene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Benzo(g,h,i)perylene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Benzo(a)pyrene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Benzyl alcohol	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
Bis(2-chloroethoxy)methane	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Bis(2-chloroethyl)ether	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Bis(2-chloroisopropyl)ether	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Bis(2-ethylhexyl)phthalate	EPA 8270C	5G17017	50	ND	1	7/17/2005	7/20/2005	
4-Bromophenyl phenyl ether	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Butyl benzyl phthalate	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
4-Chloroaniline	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
2-Chloronaphthalene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
4-Chloro-3-methylphenol	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
2-Chlorophenol	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
4-Chlorophenyl phenyl ether	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Chrysene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Dibenz(a,h)anthracene	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
Dibenzofuran	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Di-n-butyl phthalate	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
1,3-Dichlorobenzene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
1,4-Dichlorobenzene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
1,2-Dichlorobenzene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
3,3-Dichlorobenzidine	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
2,4-Dichlorophenol	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Diethyl phthalate	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
2,4-Dimethylphenol	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
Dimethyl phthalate	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
4,6-Dinitro-2-methylphenol	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
2,4-Dinitrophenol	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
2,4-Dinitrotoluene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
2,6-Dinitrotoluene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Di-n-octyl phthalate	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
Fluoranthene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

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SEMI-VOLATILE ORGANICS BY GC/MS (EPA 3520C/8270C)

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water) - cont.								
Reporting Units: ug/l								
Fluorene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Hexachlorobenzene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Hexachlorobutadiene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Hexachlorocyclopentadiene	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
Hexachloroethane	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Indeno(1,2,3-cd)pyrene	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
Isophorone	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
2-Methylnaphthalene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
2-Methylphenol	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
4-Methylphenol	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Naphthalene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
2-Nitroaniline	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
3-Nitroaniline	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
4-Nitroaniline	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
Nitrobenzene	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
2-Nitrophenol	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
4-Nitrophenol	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
N-Nitrosodiphenylamine	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
N-Nitroso-di-n-propylamine	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Pentachlorophenol	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
Phenanthrene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Phenol	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
Pyrene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
1,2,4-Trichlorobenzene	EPA 8270C	5G17017	10	ND	1	7/17/2005	7/20/2005	
2,4,5-Trichlorophenol	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
2,4,6-Trichlorophenol	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
N-Nitrosodimethylamine	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	C
1,2-Diphenylhydrazine/Azobenzene	EPA 8270C	5G17017	20	ND	1	7/17/2005	7/20/2005	
Surrogate: 2-Fluorophenol (30-120%)				*60 %*				
Surrogate: Phenol-d6 (35-120%)				*70 %*				
Surrogate: 2,4,6-Tribromophenol (45-120%)				*84 %*				
Surrogate: Nitrobenzene-d5 (45-120%)				*71 %*				
Surrogate: 2-Fluorobiphenyl (45-120%)				*75 %*				
Surrogate: Terphenyl-d14 (45-120%)				*80 %*				

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

U.S. Filter/Westates Carbon
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ORGANOCHLORINE PESTICIDES (EPA 3510C/8081A)

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water)								
Reporting Units: ug/l								
Aldrin	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
alpha-BHC	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
beta-BHC	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
delta-BHC	EPA 3510C/8081A	5G20057	0.20	ND	0.971	7/20/2005	7/20/2005	
gamma-BHC (Lindane)	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Chlordane	EPA 3510C/8081A	5G20057	1.0	ND	0.971	7/20/2005	7/20/2005	
4,4'-DDD	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
4,4'-DDE	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
4,4'-DDT	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Dieldrin	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Endosulfan I	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Endosulfan II	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Endosulfan sulfate	EPA 3510C/8081A	5G20057	0.20	ND	0.971	7/20/2005	7/20/2005	
Endrin	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Endrin aldehyde	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Endrin ketone	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Heptachlor	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Heptachlor epoxide	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Methoxychlor	EPA 3510C/8081A	5G20057	0.10	ND	0.971	7/20/2005	7/20/2005	
Toxaphene	EPA 3510C/8081A	5G20057	5.0	ND	0.971	7/20/2005	7/20/2005	
Surrogate: Tetrachloro-m-xylene (35-115%)				*56 %*				
Surrogate: Decachlorobiphenyl (45-120%)				*73 %*				

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Kathleen A. Robb
Project Manager

Del Mar Analytical

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1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
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2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

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POLYCHLORINATED BIPHENYLS (EPA 3510C/8082)

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water)								
Reporting Units: ug/l								
Aroclor 1016	EPA 3510/8082	5G20057	1.0	ND	0.971	7/20/2005	7/22/2005	
Aroclor 1221	EPA 3510/8082	5G20057	1.0	ND	0.971	7/20/2005	7/22/2005	
Aroclor 1232	EPA 3510/8082	5G20057	1.0	ND	0.971	7/20/2005	7/22/2005	
Aroclor 1242	EPA 3510/8082	5G20057	1.0	ND	0.971	7/20/2005	7/22/2005	
Aroclor 1248	EPA 3510/8082	5G20057	1.0	ND	0.971	7/20/2005	7/22/2005	
Aroclor 1254	EPA 3510/8082	5G20057	1.0	ND	0.971	7/20/2005	7/22/2005	
Aroclor 1260	EPA 3510/8082	5G20057	1.0	ND	0.971	7/20/2005	7/22/2005	
Surrogate: Decachlorobiphenyl (45-120%)				*88 %*				

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Kathleen A. Robb
Project Manager

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U.S. Filter/Westates Carbon
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Attention: Deborah Fcster

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METALS

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water)								
Reporting Units: mg/l								
Aluminum	EPA 6010B	5G19086	0.050	**0.082**	1	7/19/2005	7/20/2005	
Antimony	EPA 6010B	5G18097	0.010	ND	1	7/18/2005	7/20/2005	
Arsenic	EPA 6010B	5G18097	0.0050	**0.0052**	1	7/18/2005	7/20/2005	
Barium	EPA 6010B	5G18097	0.010	**0.075**	1	7/18/2005	7/20/2005	
Boron	EPA 6010B	5G19086	0.050	**0.64**	1	7/19/2005	7/20/2005	
Chromium	EPA 6010B	5G18097	0.0050	ND	1	7/18/2005	7/20/2005	
Cobalt	EPA 6010B	5G18097	0.010	ND	1	7/18/2005	7/20/2005	
Copper	EPA 6010B	5G18097	0.010	ND	1	7/18/2005	7/20/2005	
Iron	EPA 6010B	5G19086	0.040	ND	1	7/19/2005	7/20/2005	
Magnesium	EPA 6010B	5G19086	0.020	**29**	1	7/19/2005	7/20/2005	
Manganese	EPA 6010B	5G19086	0.020	ND	1	7/19/2005	7/20/2005	
Mercury	EPA 7470A	5G19037	0.00020	ND	1	7/19/2005	7/19/2005	
Molybdenum	EPA 6010B	5G18097	0.020	ND	1	7/18/2005	7/20/2005	
Silver	EPA 6010B	5G18097	0.0070	ND	1	7/18/2005	7/20/2005	
Strontium	EPA 6010B	5G19086	0.020	**1.7**	1	7/19/2005	7/20/2005	
Thallium	EPA 6010B	5G18097	0.010	ND	1	7/18/2005	7/20/2005	
Tin	EPA 6010B	5G19086	0.10	ND	1	7/19/2005	7/20/2005	
Titanium	EPA 6010B	5G19086	0.0050	ND	1	7/19/2005	7/20/2005	
Vanadium	EPA 6010B	5G18097	0.010	ND	1	7/18/2005	7/20/2005	
Zinc	EPA 6010B	5G18097	0.020	ND	1	7/18/2005	7/20/2005	
Zirconium	EPA 6010B	5G25067	0.20	ND	1	7/25/2005	7/25/2005	

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
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U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

INORGANICS

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water)								
Reporting Units: Color Units								
Color	SM2120B	5G14089	1.0	ND	1	7/14/2005	7/14/2005	pH
Sample ID: IOG0857-01 (TTO - Water)								
Reporting Units: mg/l								
Total Kjeldahl Nitrogen	SM4500-NORG,C	5G19066	0.50	**0.84**	1	7/19/2005	7/19/2005	
Ammonia-N	EPA 350.3	5G22113	0.50	ND	1	7/22/2005	7/22/2005	
Bromide	EPA 300.0	5G14039	0.50	**1.1**	1	7/14/2005	7/14/2005	
Total Cyanide	SM4500-CN-C,E	5G15075	0.025	ND	1	7/15/2005	7/18/2005	
Fluoride	EPA 300.0	5G14039	0.50	**1.8**	1	7/14/2005	7/14/2005	
Nitrate-N	EPA 300.0	5G14039	0.15	**2.7**	1	7/14/2005	7/14/2005	
Nitrite-N	EPA 300.0	5G14039	1.5	ND	10	7/14/2005	7/14/2005	RL-3
Oil & Grease	EPA 413.1	5G20078	5.0	ND	1	7/20/2005	7/20/2005	
Phenols	EPA 420.1	5G22080	0.10	ND	1	7/22/2005	7/22/2005	
Phosphorus	EPA 365.3	5G14075	0.050	**0.15**	1	7/14/2005	7/14/2005	
Residual Chlorine	EPA 330.5	5G14094	0.10	ND	1	7/14/2005	7/14/2005	
Sulfate	EPA 300.0	5G14039	5.0	**480**	10	7/14/2005	7/14/2005	
Sulfide	EPA 376.2	5G15045	0.10	ND	1	7/15/2005	7/15/2005	
Surfactants (MBAS)	SM5540-C	5G14118	0.10	ND	1	7/14/2005	7/14/2005	

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

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U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

NITROGEN, ORGANIC (Calculation)

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water)								
Reporting Units: mg/l								
Organic Nitrogen - N	Calculation	5G25044	0.50	**0.84**	1	7/25/2005	7/25/2005	

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Kathleen A. Robb
Project Manager

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Del Mar Analytical

U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

DIQUAT/PARAQUAT (EPA 549.2)

Analyte	Method	Batch	Reporting Limit	Sample Result	Dilution Factor	Date Extracted	Date Analyzed	Data Qualifiers
Sample ID: IOG0857-01 (TTO - Water)								
Reporting Units: ug/l								
Diquat	EPA 549.2	C5G1809	4.0	ND	1	7/18/2005	7/18/2005	
Paraquat	EPA 549.2	C5G1809	20	ND	1	7/18/2005	7/18/2005	

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

TestAmerica
ANALYTICAL TESTING CORPORATION

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ANALYTICAL REPORT

DEL MAR ANALYTICAL, IRVINE 11405
MICHELE HARPER
17461 DERIAN, STE 100
IRVINE, CA 92614

Lab Number: 05-A102935
Sample ID: IOG0857-01
Sample Type: Ground water
Site ID:

Project: IOG0857
Project Name:
Sampler:

Date Collected: 7/13/05
Time Collected: 14:00
Date Received: 7/19/05
Time Received: 9:55

Analyte	Result	Units	Report Limit	Dil Factor	Analysis Date	Analysis Time	Analyst	Method	Batch
PESTICIDES/PCB's/HERBICIDES									
2,4-D	0.00818	mg/l	0.00500	1	7/20/05	19:04	K. Burritt	8151A	440
2,4,5-T	ND	mg/l	0.00050	1	7/20/05	19:04	K. Burritt	8151A	440
2,4,5-TP	ND	mg/l	0.00050	1	7/20/05	19:04	K. Burritt	8151A	440
Dalapon	ND	mg/l	0.0200	1	7/20/05	19:04	K. Burritt	8151A	440
2,4-DB	ND	mg/l	0.00500	1	7/20/05	19:04	K. Burritt	8151A	440
Dicamba	ND	mg/l	0.00050	1	7/20/05	19:04	K. Burritt	8151A	440
Dichloroprop	ND	mg/l	0.00500	1	7/20/05	19:04	K. Burritt	8151A	440
Dinoseb	ND	mg/l	0.00250	1	7/20/05	19:04	K. Burritt	8151A	440
MCPA	ND	mg/l	0.500	1	7/20/05	19:04	K. Burritt	8151A	440
MCPP	ND	mg/l	0.500	1	7/20/05	19:04	K. Burritt	8151A	440
Pentachlorophenol	ND	mg/l	0.00050	1	7/20/05	19:04	K. Burritt	8151A	440
4-Nitrophenol	ND	mg/l	0.00050	1	7/20/05	19:04	K. Burritt	8151A	440

Sample Extraction Data

Parameter	Wt/Vol Extracted	Extract Vol	Date	Time	Analyst	Method
Herbicides	1000 ml	10.0 ml	7/19/05		J. Davis	8151/615

Surrogate	% Recovery	Target Range
surr-DCAA	92.	51. - 136.

Sample report continued . . .

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ANALYTICAL REPORT

Laboratory Number: 05-A102935
Sample ID: IOG0857-01

LABORATORY COMMENTS:
ND = Not detected at the report limit.
B = Analyte was detected in the method blank.
J = Estimated Value below Report Limit.
E = Estimated Value above the calibration limit of the instrument.
# = Recovery outside Laboratory historical or method prescribed limits.

End of Sample Report.

Del Mar Analytical

17461 Derian Ave., Suite 100., Irvine CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (949) 370-1046
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July 27, 2005

U.S. Filter/ Westates Carbon
P.O. Box 3308
Parker, AZ 85344

Attention: Deborah Foster

Project: Semi-Annual
TTO
Sampled: 07/13/05
Del Mar Analytical Number: IOG0857

Dear Ms. Foster:

Test America Analytical Testing Corporation performed the 8151A Herbicides analysis for the referenced project above. Please use the following cross-reference table when reviewing your results.

U.S. Filter ID	Del Mar ID	Test America ID
TTO	IOG0857-01	05-A102935

Attached is the original report from the subcontract laboratory. If you have any questions or require further assistance, please contact me at (949) 261-1022, extension 218.

Sincerely yours,
DEL MAR ANALYTICAL

Kathleen A. Robb
Project Manager

Enclosure

TestAmerica
ANALYTICAL TESTING CORPORATION
2960 Foster Creighton Drive • Nashville, Tennessee 37204
800-765-0980 • 615-726-3404 Fax

PROJECT QUALITY CONTROL DATA
Project Number: IOG0857
Project Name:
Page: 1
Laboratory Receipt Date: 7/19/05

Matrix Spike Recovery

Note: If Blank is referenced as the sample spiked, insufficient volume was received for the defined analytical batch for MS/MSD analysis on an true sample matrix. Laboratory reagent water was used for QC purposes.

Analyte	units	Orig. Val.	MS Val	Spike Conc	Recovery	Target Range	Q.C. Batch	Spike Sample
PEST/PCB/HERB PARAMETERS								
2,4-D	mg/l	< 0.00006	0.00363	0.00500	73	35. - 141.	440	blank
2,4,5-T	mg/l	< 0.00003	0.00341	0.00500	68	25. - 149.	440	blank
2,4,5-TP	mg/l	< 0.00003	0.00431	0.00500	86	31. - 137.	440	blank
Dalapon	mg/l	< 0.00002	0.00018	0.00500	4#	10. - 101.	440	blank
2,4-DB	mg/l	< 0.00009	0.00702	0.00500	140	34. - 153.	440	blank
Dicamba	mg/l	< 0.00006	0.00338	0.00500	68	23. - 157.	440	blank
Dichloroprop	mg/l	< 0.00006	0.00403	0.00500	81	45. - 152.	440	blank
Dinoseb	mg/l	< 0.00005	0.00384	0.00500	77	27. - 129.	440	blank
MCPA	mg/l	< 0.00410	0.214	0.500	43	26. - 139.	440	blank
MCPP	mg/l	< 0.00700	0.539	0.500	108	24. - 164.	440	blank
Pentachlorophenol	mg/l	< 0.00003	0.00297	0.00500	59	25. - 133.	440	blank
4-Nitrophenol	mg/l	< 0.00005	< 0.00050	0.00500	N/A	21. - 133.	440	blank

Matrix Spike Duplicate

Analyte	units	Orig. Val.	Duplicate	RPD	Limit	Q.C. Batch
PEST/PCB/HERB PARAMETERS						
2,4-D	mg/l	0.00363	0.00408	11.67	34.	440
2,4,5-T	mg/l	0.00341	0.00381	11.08	51.	440
2,4,5-TP	mg/l	0.00431	0.00482	11.17	44.	440
Dalapon	mg/l	0.00018	0.00018	0.00	89.	440
2,4-DB	mg/l	0.00702	0.00659	6.32	33.	440
Dicamba	mg/l	0.00338	0.00369	8.77	48.	440
Dichloroprop	mg/l	0.00403	0.00455	12.12	41.	440
Dinoseb	mg/l	0.00384	0.00416	8.00	50.	440
MCPA	mg/l	0.214	0.309	36.33	50.	440
MCPP	mg/l	0.539	0.596	10.04	45.	440
Pentachlorophenol	mg/l	0.00297	0.00335	12.03	49.	440
4-Nitrophenol	mg/l	< 0.00050	0.00373	152.72#	55.	440

Project QC continued . . .

TestAmerica

ANALYTICAL TESTING CORPORATION

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PROJECT QUALITY CONTROL DATA
Project Number: IOG0857
Project Name:
Page: 2
Laboratory Receipt Date: 7/19/05

Laboratory Control Data

Analyte	units	Known Val.	Analyzed Val	% Recovery	Target Range	Q.C. Batch
PEST/PCB/HERB PARAMETERS						
2,4-D	mg/l	0.00500	0.00399	80	35 - 141	440
2,4,5-T	mg/l	0.00500	0.00374	75	33 - 136	440
2,4,5-TP	mg/l	0.00500	0.00477	95	33 - 136	440
Dalapon	mg/l	0.00500	0.00025	5 #	10 - 101	440
2,4-DB	mg/l	0.00500	0.00633	127	39 - 143	440
Dicamba	mg/l	0.00500	0.00361	72	23 - 157	440
Dichloroprop	mg/l	0.00500	0.00443	89	50 - 143	440
Dinoseb	mg/l	0.00500	0.00384	77	28 - 127	440
MCPA	mg/l	0.500	0.311	62	26 - 139	440
MCPP	mg/l	0.500	0.525	105	24 - 164	440
Pentachlorophenol	mg/l	0.00500	0.00328	66	33 - 130	440
4-Nitrophenol	mg/l	0.00500	0.00364	73	23 - 125	440
surr-DCAA	% Rec			102	51 - 136	440

Duplicates

Analyte	units	Orig. Val.	Duplicate	RPD	Limit	Q.C. Batch	Sample Dup'd

Blank Data

Analyte	Blank Value	Units	Q.C. Batch	Date Analyzed	Time Analyzed

Project QC continued . . .

TestAmerica
ANALYTICAL TESTING CORPORATION

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PROJECT QUALITY CONTROL DATA
Project Number: IOG0857
Project Name:
Page: 3
Laboratory Receipt Date: 7/19/05

PEST/PCB/HERB PARAMETERS					
2,4-D	< 0.00006	mg/l	440	7/20/05	18:01
2,4,5-T	< 0.00003	mg/l	440	7/20/05	18:01
2,4,5-TP	< 0.00003	mg/l	440	7/20/05	18:01
Dalapon	< 0.00002	mg/l	440	7/20/05	18:01
2,4-DB	< 0.00009	mg/l	440	7/20/05	18:01
Dicamba	< 0.00006	mg/l	440	7/20/05	18:01
Dichloroprop	< 0.00006	mg/l	440	7/20/05	18:01
Dinoseb	< 0.00005	mg/l	440	7/20/05	18:01
MCPA	< 0.00410	mg/l	440	7/20/05	18:01
MCPP	< 0.00700	mg/l	440	7/20/05	18:01
Pentachlorophenol	< 0.00003	mg/l	440	7/20/05	18:01
4-Nitrophenol	< 0.00005	mg/l	440	7/20/05	18:01
surr-DCAA	80.	% Rec	440	7/20/05	18:01

= Value outside Laboratory historical or method prescribed QC limits.

End of Report for Project 423201

TestAmerica
ANALYTICAL TESTING CORPORATION

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800-765-0980 • 615-726-3404 Fax

7/22/05

DEL MAR ANALYTICAL, IRVINE 11405
MICHELE HARPER
17461 DERIAN, STE 100
IRVINE, CA 92614

This report includes the analytical certificates of analysis for all samples listed below. These samples relate to your project identified below:

Project Name:
Project Number: IOG0857.
Laboratory Project Number: 423201.

An executed copy of the chain of custody, the project quality control data, and the sample receipt form are also included as an addendum to this report. Any QC recoveries outside laboratory control limits are flagged individually with an #. Sample specific comments and quality control statements are included in the Laboratory notes section of the analytical report for each sample report. If you have any questions relating to this analytical report, please contact your Laboratory Project Manager at 1-800-765-0980. Any opinions, if expressed, are outside the scope of the Laboratory's accreditation.

Sample Identification	Lab Number	Collection Date
IOG0857-01	05-A102935	7/13/05

TestAmerica
ANALYTICAL TESTING CORPORATION

2960 Foster Creighton Drive • Nashville, Tennessee 37204
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Sample Identification	Lab Number	Collection Date

These results relate only to the items tested.
This report shall not be reproduced except in full and with permission of the laboratory.

Report Approved By: [signature] Report Date: 7/22/05

Johnny A. Mitchell, Laboratory Director
Michael H. Dunn, M.S., Technical Director
Pamela A. Langford, Senior Project Manager
Eric S. Smith, QA/QC Director
Sandra McMillin, Technical Services
Gail A. Lage, Senior Project Manager
Glenn L. Norton, Technical Services
Kelly S. Comstock, Technical Services
Roxanne L. Connor, Senior Project Manag
Mark Hollingsworth, Director of Project

Laboratory Certification Number: AZ0473

Del Mar Analytical

17461 Derian Ave. Suite 100, Irvine, CA 92614 Ph (949) 261-1022 Fax (949) 261-1228
1014 E. Cooley Dr., Suite A, Colton, CA 92324 Ph (909) 370-4667 Fax (909) 370-1046
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2520 E. Sunset Rd., Suite #3, Las Vegas, NV 89120 Ph (702) 798-3620 Fax (702) 798-3621

SUBCONTRACT ORDER - PROJECT # IOG0857

SENDING LABORATORY:	RECEIVING LABORATORY:
Del Mar Analytical, Irvine 17461 Derian Avenue. Suite 100 Irvine, CA 92614 Phone: (949) 261-1022 Fax: (949) 261-1228 Project Manager: Kathleen A. Robb	Test America, Inc. 2960 Foster Creighton Drive Nashville, TN 37204 Phone :800/765-0980 Fax: 615/726-0954

Standard TAT is requested unless specific due date is requested => Due Date: ______________ **Initials:** ________

Analysis	Expiration	Comments
Sample ID: IOG0857-01 Water	**Sampled: 07/13/05 14:00**	
8151A (Herbicides)	07/20/05 14:00	Needs Arizona Certification

Containers Supplied:
1 L Amber (IOG0857-01Z)

Scanned + emailed to Mary @ NCA to forward to TA. Nashville

SAMPLE INTEGRITY:

All containers intact:	☐ Yes ☐ No	Sample labels/COC agree:	☐ Yes ☐ No	Samples Received On Ice::	☐ Yes ☐ No
Custody Seals Present:	☐ Yes ☐ No	Samples Preserved Properly:	☐ Yes ☐ No	Samples Received at (temp):	________

Released By	Date	Time	Received By	Date	Time
Released By	Date	Time	Received By	Date	Time

Del Mar Analytical

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2520 E. Sunset Rd., Suite #3, Las Vegas, NV 89120 Ph (702) 798-3620 Fax (702) 798-3621

SUBCONTRACT ORDER - PROJECT # IOG0857

SENDING LABORATORY:	RECEIVING LABORATORY:
Del Mar Analytical, Irvine	Test America, Inc.
17461 Derian Avenue. Suite 100	2960 Foster Creighton Drive
Irvine, CA 92614	Nashville, TN 37204
Phone: (949) 261-1022	Phone :800/765-0980
Fax: (949) 261-1228	Fax: 615/726-0954
Project Manager: Kathleen A. Robb	

Standard TAT is requested unless specific due date is requested => **Due Date:**__________ **Initials:**__________

Analysis	Expiration	Comments
Sample ID: IOG0857-01 Water	**Sampled: 07/13/05 14:00**	
8151A (Herbicides)	07/20/05 14:00	Needs Arizona Certification

Containers Supplied:
1 L Amber (IOG0857-01Z)

SAMPLE INTEGRITY:

All containers intact:	☐ Yes ☐ No	Sample labels/COC agree:	☐ Yes ☐ No	Samples Received On Ice::	☐ Yes ☐ No
Custody Seals Present:	☐ Yes ☐ No	Samples Preserved Properly:	☐ Yes ☐ No	Samples Received at (temp):	________

Released By	Date	Time	Received By	Date	Time
Released By	Date	Time	Received By	Date	Time

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Del Mar Analytical

U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

SHORT HOLD TIME DETAIL REPORT

	Hold Time (in days)	Date/Time Sampled	Date/Time Received	Date/Time Extracted	Date/Time Analyzed
Sample ID: TTO (IOG0857-01) - Water					
EPA 300.0	2	07/13/2005 14:00	07/14/2005 10:10	07/14/2005 16:00	07/14/2005 16:09
Nitrite-N				07/14/2005 16:00	07/14/2005 17:10
EPA 330.5	1	07/13/2005 14:00	07/14/2005 10:10	07/14/2005 16:08	07/14/2005 16:08
SM2120B	2	07/13/2005 14:00	07/14/2005 10:10	07/14/2005 14:00	07/14/2005 15:00
SM5540-C	2	07/13/2005 14:00	07/14/2005 10:10	07/14/2005 23:00	07/14/2005 23:35

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

METHOD BLANK/QC DATA

VOLATILE ORGANICS by GC/MS (EPA 5030B/8260B)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G16003 Extracted: 07/16/05										
Blank Analyzed: 07/16/2005 (5G16003-BLK1)										
Acrolein	ND	50	ug/l							
Acrylonitrile	ND	50	ug/l							
2-Chloroethyl vinyl ether	ND	5.0	ug/l							
Surrogate: Dibromofluoromethane	*23.9*		*ug/l*	*25.0*		*96*	*80-120*			
Surrogate: Toluene-d8	*25.4*		*ug/l*	*25.0*		*102*	*80-120*			
Surrogate: 4-Bromofluorobenzene	*24.2*		*ug/l*	*25.0*		*97*	*80-120*			
LCS Analyzed: 07/16/2005 (5G16003-BS1)										
2-Chloroethyl vinyl ether	29.4	5.0	ug/l	25.0		118	25-170			
Surrogate: Dibromofluoromethane	*24.5*		*ug/l*	*25.0*		*98*	*80-120*			
Surrogate: Toluene-d8	*25.4*		*ug/l*	*25.0*		*102*	*80-120*			
Surrogate: 4-Bromofluorobenzene	*24.8*		*ug/l*	*25.0*		*99*	*80-120*			
Matrix Spike Analyzed: 07/16/2005 (5G16003-MS1)					**Source: IOG0808-01**					
2-Chloroethyl vinyl ether	27.1	5.0	ug/l	25.0	ND	108	25-170			
Surrogate: Dibromofluoromethane	*24.7*		*ug/l*	*25.0*		*99*	*80-120*			
Surrogate: Toluene-d8	*25.4*		*ug/l*	*25.0*		*102*	*80-120*			
Surrogate: 4-Bromofluorobenzene	*24.7*		*ug/l*	*25.0*		*99*	*80-120*			
Matrix Spike Dup Analyzed: 07/16/2005 (5G16003-MSD1)					**Source: IOG0808-01**					
2-Chloroethyl vinyl ether	28.2	5.0	ug/l	25.0	ND	113	25-170	4	25	
Surrogate: Dibromofluoromethane	*25.3*		*ug/l*	*25.0*		*101*	*80-120*			
Surrogate: Toluene-d8	*25.8*		*ug/l*	*25.0*		*103*	*80-120*			
Surrogate: 4-Bromofluorobenzene	*24.4*		*ug/l*	*25.0*		*98*	*80-120*			

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Kathleen A. Robb
Project Manager

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METHOD BLANK/QC DATA

VOLATILE ORGANICS by GC/MS (EPA 5035/8260B)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G21019 Extracted: 07/21/05										
Blank Analyzed: 07/21/2005 (5G21019-BLK1)										
Benzene	ND	2.0	ug/l							
Bromobenzene	ND	5.0	ug/l							
Bromochloromethane	ND	5.0	ug/l							
Bromodichloromethane	ND	2.0	ug/l							
Bromoform	ND	5.0	ug/l							
Bromomethane	ND	5.0	ug/l							
n-Butylbenzene	ND	5.0	ug/l							
sec-Butylbenzene	ND	5.0	ug/l							
tert-Butylbenzene	ND	5.0	ug/l							
Carbon Disulfide	ND	5.0	ug/l							
Carbon tetrachloride	ND	5.0	ug/l							
Chlorobenzene	ND	2.0	ug/l							
Chloroethane	ND	5.0	ug/l							
Chloroform	ND	2.0	ug/l							
Chloromethane	ND	5.0	ug/l							
2-Chlorotoluene	ND	5.0	ug/l							
4-Chlorotoluene	ND	5.0	ug/l							
Dibromochloromethane	ND	2.0	ug/l							
1,2-Dibromo-3-chloropropane	ND	5.0	ug/l							
1,2-Dibromoethane (EDB)	ND	2.0	ug/l							
Dibromomethane	ND	2.0	ug/l							
1,2-Dichlorobenzene	ND	2.0	ug/l							
1,3-Dichlorobenzene	ND	2.0	ug/l							
1,4-Dichlorobenzene	ND	2.0	ug/l							
Dichlorodifluoromethane	ND	5.0	ug/l							
1,1-Dichloroethane	ND	2.0	ug/l							
1,2-Dichloroethane	ND	2.0	ug/l							
1,1-Dichloroethene	ND	5.0	ug/l							
cis-1,2-Dichloroethene	ND	2.0	ug/l							
trans-1,2-Dichloroethene	ND	2.0	ug/l							
1,2-Dichloropropane	ND	2.0	ug/l							
1,3-Dichloropropane	ND	2.0	ug/l							
2,2-Dichloropropane	ND	2.0	ug/l							
1,1-Dichloropropene	ND	2.0	ug/l							
cis-1,3-Dichloropropene	ND	2.0	ug/l							

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

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VOLATILE ORGANICS by GC/MS (EPA 5035/8260B)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G21019 Extracted: 07/21/05										
Blank Analyzed: 07/21/2005 (5G21019-BLK1)										
trans-1,3-Dichloropropene	ND	2.0	ug/l							
Ethylbenzene	ND	2.0	ug/l							
Hexachlorobutadiene	ND	5.0	ug/l							
Isopropylbenzene	ND	2.0	ug/l							
p-Isopropyltoluene	ND	2.0	ug/l							
Methylene chloride	ND	5.0	ug/l							
Naphthalene	ND	5.0	ug/l							
n-Propylbenzene	ND	2.0	ug/l							
Styrene	ND	2.0	ug/l							
1,1,1,2-Tetrachloroethane	ND	5.0	ug/l							
1,1,2,2-Tetrachloroethane	ND	2.0	ug/l							
Tetrachloroethene	ND	2.0	ug/l							
Toluene	ND	2.0	ug/l							
1,2,3-Trichlorobenzene	ND	5.0	ug/l							
1,2,4-Trichlorobenzene	ND	5.0	ug/l							
1,1,1-Trichloroethane	ND	2.0	ug/l							
1,1,2-Trichloroethane	ND	2.0	ug/l							
Trichloroethene	ND	2.0	ug/l							
Trichlorofluoromethane	ND	5.0	ug/l							
1,2,3-Trichloropropane	ND	10	ug/l							
1,2,4-Trimethylbenzene	ND	2.0	ug/l							
1,3,5-Trimethylbenzene	ND	2.0	ug/l							
Vinyl acetate	ND	5.0	ug/l							
Vinyl chloride	ND	5.0	ug/l							
o-Xylene	ND	2.0	ug/l							
m,p-Xylenes	ND	2.0	ug/l							
Surrogate: Dibromofluoromethane	*24.8*		*ug/l*	*25.0*		*99*	*80-120*			
Surrogate: Toluene-d8	*25.4*		*ug/l*	*25.0*		*102*	*80-120*			
Surrogate: 4-Bromofluorobenzene	*23.7*		*ug/l*	*25.0*		*95*	*80-120*			

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

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METHOD BLANK/QC DATA

VOLATILE ORGANICS by GC/MS (EPA 5035/8260B)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G21019 Extracted: 07/21/05										
LCS Analyzed: 07/21/2005 (5G21019-BS1)										
Benzene	20.3	2.0	ug/l	25.0		81	65-120			
Bromobenzene	21.5	5.0	ug/l	25.0		86	70-120			
Bromochloromethane	22.5	5.0	ug/l	25.0		90	65-130			
Bromodichloromethane	20.0	2.0	ug/l	25.0		80	65-135			
Bromoform	19.3	5.0	ug/l	25.0		77	50-130			
Bromomethane	19.4	5.0	ug/l	25.0		78	60-140			
n-Butylbenzene	20.9	5.0	ug/l	25.0		84	70-125			
sec-Butylbenzene	20.0	5.0	ug/l	25.0		80	70-125			
tert-Butylbenzene	20.8	5.0	ug/l	25.0		83	70-125			
Carbon Disulfide	20.9	5.0	ug/l	25.0		84	50-130			
Carbon tetrachloride	19.9	5.0	ug/l	25.0		80	65-140			
Chlorobenzene	20.5	2.0	ug/l	25.0		82	70-125			
Chloroethane	19.5	5.0	ug/l	25.0		78	55-140			
Chloroform	20.9	2.0	ug/l	25.0		84	65-130			
Chloromethane	16.6	5.0	ug/l	25.0		66	40-140			
2-Chlorotoluene	20.9	5.0	ug/l	25.0		84	70-125			
4-Chlorotoluene	20.8	5.0	ug/l	25.0		83	70-125			
Dibromochloromethane	21.4	2.0	ug/l	25.0		86	65-140			
1,2-Dibromo-3-chloropropane	20.2	5.0	ug/l	25.0		81	45-135			
1,2-Dibromoethane (EDB)	22.2	2.0	ug/l	25.0		89	70-125			
Dibromomethane	22.2	2.0	ug/l	25.0		89	65-130			
1,2-Dichlorobenzene	20.3	2.0	ug/l	25.0		81	70-120			
1,3-Dichlorobenzene	19.8	2.0	ug/l	25.0		79	70-125			
1,4-Dichlorobenzene	20.1	2.0	ug/l	25.0		80	70-125			
Dichlorodifluoromethane	13.5	5.0	ug/l	25.0		54	25-155			
1,1-Dichloroethane	21.4	2.0	ug/l	25.0		86	65-130			
1,2-Dichloroethane	20.6	2.0	ug/l	25.0		82	60-140			
1,1-Dichloroethene	20.8	5.0	ug/l	25.0		83	70-130			
cis-1,2-Dichloroethene	20.5	2.0	ug/l	25.0		82	65-125			
trans-1,2-Dichloroethene	20.8	2.0	ug/l	25.0		83	65-130			
1,2-Dichloropropane	21.6	2.0	ug/l	25.0		86	65-125			
1,3-Dichloropropane	22.0	2.0	ug/l	25.0		88	65-125			
2,2-Dichloropropane	21.8	2.0	ug/l	25.0		87	60-145			
1,1-Dichloropropene	20.1	2.0	ug/l	25.0		80	70-130			
cis-1,3-Dichloropropene	21.6	2.0	ug/l	25.0		86	70-130			

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

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1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
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U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

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Sampled: 07/13/05
Received: 07/14/05

METHOD BLANK/QC DATA

VOLATILE ORGANICS by GC/MS (EPA 5035/8260B)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G21019 Extracted: 07/21/05										
LCS Analyzed: 07/21/2005 (5G21019-BS1)										
trans-1,3-Dichloropropene	21.9	2.0	ug/l	25.0		88	65-130			
Ethylbenzene	20.6	2.0	ug/l	25.0		82	70-125			
Hexachlorobutadiene	17.0	5.0	ug/l	25.0		68	60-135			
Isopropylbenzene	22.5	2.0	ug/l	25.0		90	70-125			
p-Isopropyltoluene	19.2	2.0	ug/l	25.0		77	70-125			
Methylene chloride	22.6	5.0	ug/l	25.0		90	60-130			
Naphthalene	20.3	5.0	ug/l	25.0		81	50-140			
n-Propylbenzene	21.9	2.0	ug/l	25.0		88	70-125			
Styrene	22.4	2.0	ug/l	25.0		90	70-130			
1,1,1,2-Tetrachloroethane	21.0	5.0	ug/l	25.0		84	70-135			
1,1,2,2-Tetrachloroethane	25.8	2.0	ug/l	25.0		103	55-130			
Tetrachloroethene	19.4	2.0	ug/l	25.0		78	65-125			
Toluene	21.2	2.0	ug/l	25.0		85	70-125			
1,2,3-Trichlorobenzene	19.5	5.0	ug/l	25.0		78	60-130			
1,2,4-Trichlorobenzene	19.5	5.0	ug/l	25.0		78	65-135			
1,1,1-Trichloroethane	20.0	2.0	ug/l	25.0		80	65-135			
1,1,2-Trichloroethane	22.5	2.0	ug/l	25.0		90	65-125			
Trichloroethene	19.8	2.0	ug/l	25.0		79	70-125			
Trichlorofluoromethane	18.3	5.0	ug/l	25.0		73	60-140			
1,2,3-Trichloropropane	24.5	10	ug/l	25.0		98	55-130			
1,2,4-Trimethylbenzene	19.6	2.0	ug/l	25.0		78	70-125			
1,3,5-Trimethylbenzene	21.0	2.0	ug/l	25.0		84	70-125			
Vinyl acetate	15.6	5.0	ug/l	25.0		62	45-145			
Vinyl chloride	17.6	5.0	ug/l	25.0		70	50-130			
o-Xylene	20.4	2.0	ug/l	25.0		82	70-125			
m,p-Xylenes	40.0	2.0	ug/l	50.0		80	70-125			
Surrogate: Dibromofluoromethane	*25.0*		*ug/l*	*25.0*		*100*	*80-120*			
Surrogate: Toluene-d8	*25.7*		*ug/l*	*25.0*		*103*	*80-120*			
Surrogate: 4-Bromofluorobenzene	*24.7*		*ug/l*	*25.0*		*99*	*80-120*			

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Kathleen A. Robb
Project Manager

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METHOD BLANK/QC DATA

VOLATILE ORGANICS by GC/MS (EPA 5035/8260B)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G21019 Extracted: 07/21/05										
Matrix Spike Analyzed: 07/21/2005 (5G21019-MS1)					**Source: IOG0857-01**					
Benzene	25.1	2.0	ug/l	25.0	ND	100	60-125			
Bromobenzene	25.4	5.0	ug/l	25.0	ND	102	65-125			
Bromochloromethane	27.3	5.0	ug/l	25.0	ND	109	60-135			
Bromodichloromethane	24.6	2.0	ug/l	25.0	ND	98	65-135			
Bromoform	23.0	5.0	ug/l	25.0	2.6	82	50-135			
Bromomethane	25.2	5.0	ug/l	25.0	ND	101	50-145			
n-Butylbenzene	25.7	5.0	ug/l	25.0	ND	103	65-135			
sec-Butylbenzene	24.3	5.0	ug/l	25.0	ND	97	65-125			
tert-Butylbenzene	25.0	5.0	ug/l	25.0	ND	100	65-130			
Carbon Disulfide	23.4	5.0	ug/l	25.0	ND	94	40-140			
Carbon tetrachloride	25.1	5.0	ug/l	25.0	ND	100	65-140			
Chlorobenzene	25.0	2.0	ug/l	25.0	ND	100	70-125			
Chloroethane	24.9	5.0	ug/l	25.0	ND	100	50-140			
Chloroform	25.6	2.0	ug/l	25.0	ND	102	65-135			
Chloromethane	20.5	5.0	ug/l	25.0	ND	82	35-140			
2-Chlorotoluene	24.9	5.0	ug/l	25.0	ND	100	65-135			
4-Chlorotoluene	25.0	5.0	ug/l	25.0	ND	100	65-135			
Dibromochloromethane	26.2	2.0	ug/l	25.0	ND	105	60-140			
1,2-Dibromo-3-chloropropane	23.1	5.0	ug/l	25.0	ND	92	40-150			
1,2-Dibromoethane (EDB)	26.5	2.0	ug/l	25.0	ND	106	65-130			
Dibromomethane	26.1	2.0	ug/l	25.0	ND	104	60-135			
1,2-Dichlorobenzene	24.6	2.0	ug/l	25.0	ND	98	70-125			
1,3-Dichlorobenzene	24.2	2.0	ug/l	25.0	ND	97	70-125			
1,4-Dichlorobenzene	24.4	2.0	ug/l	25.0	ND	98	70-125			
Dichlorodifluoromethane	18.4	5.0	ug/l	25.0	ND	74	15-155			
1,1-Dichloroethane	26.3	2.0	ug/l	25.0	ND	105	60-130			
1,2-Dichloroethane	24.9	2.0	ug/l	25.0	ND	100	60-140			
1,1-Dichloroethene	25.3	5.0	ug/l	25.0	ND	101	60-135			
cis-1,2-Dichloroethene	25.2	2.0	ug/l	25.0	ND	101	60-130			
trans-1,2-Dichloroethene	25.8	2.0	ug/l	25.0	ND	103	60-135			
1,2-Dichloropropane	26.1	2.0	ug/l	25.0	ND	104	60-125			
1,3-Dichloropropane	26.1	2.0	ug/l	25.0	ND	104	60-135			
2,2-Dichloropropane	27.8	2.0	ug/l	25.0	ND	111	60-145			
1,1-Dichloropropene	24.9	2.0	ug/l	25.0	ND	100	65-135			
cis-1,3-Dichloropropene	26.0	2.0	ug/l	25.0	ND	104	65-135			

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

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METHOD BLANK/QC DATA

VOLATILE ORGANICS by GC/MS (EPA 5035/8260B)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G21019 Extracted: 07/21/05										
Matrix Spike Analyzed: 07/21/2005 (5G21019-MS1)					**Source: IOG0857-01**					
trans-1,3-Dichloropropene	25.9	2.0	ug/l	25.0	ND	104	65-140			
Ethylbenzene	25.0	2.0	ug/l	25.0	ND	100	65-130			
Hexachlorobutadiene	20.6	5.0	ug/l	25.0	ND	82	60-135			
Isopropylbenzene	26.2	2.0	ug/l	25.0	ND	105	65-130			
p-Isopropyltoluene	23.2	2.0	ug/l	25.0	ND	93	65-125			
Methylene chloride	28.0	5.0	ug/l	25.0	ND	112	55-130			
Naphthalene	22.9	5.0	ug/l	25.0	ND	92	45-145			
n-Propylbenzene	25.9	2.0	ug/l	25.0	ND	104	65-130			
Styrene	16.4	2.0	ug/l	25.0	ND	66	45-145			
1,1,1,2-Tetrachloroethane	25.6	5.0	ug/l	25.0	ND	102	65-140			
1,1,2,2-Tetrachloroethane	28.9	2.0	ug/l	25.0	ND	116	55-140			
Tetrachloroethene	24.5	2.0	ug/l	25.0	ND	98	60-130			
Toluene	25.5	2.0	ug/l	25.0	ND	102	65-125			
1,2,3-Trichlorobenzene	22.8	5.0	ug/l	25.0	ND	91	55-135			
1,2,4-Trichlorobenzene	23.6	5.0	ug/l	25.0	ND	94	60-135			
1,1,1-Trichloroethane	24.9	2.0	ug/l	25.0	ND	100	65-140			
1,1,2-Trichloroethane	26.2	2.0	ug/l	25.0	ND	105	60-130			
Trichloroethene	24.3	2.0	ug/l	25.0	ND	97	60-125			
Trichlorofluoromethane	23.2	5.0	ug/l	25.0	ND	93	55-145			
1,2,3-Trichloropropane	27.8	10	ug/l	25.0	ND	111	50-135			
1,2,4-Trimethylbenzene	23.5	2.0	ug/l	25.0	ND	94	55-130			
1,3,5-Trimethylbenzene	25.0	2.0	ug/l	25.0	ND	100	65-130			
Vinyl acetate	19.8	5.0	ug/l	25.0	ND	79	40-150			
Vinyl chloride	19.2	5.0	ug/l	25.0	ND	77	40-135			
o-Xylene	24.5	2.0	ug/l	25.0	ND	98	60-125			
m,p-Xylenes	48.8	2.0	ug/l	50.0	ND	98	60-130			
Surrogate: Dibromofluoromethane	*25.0*		*ug/l*	*25.0*		*100*	*80-120*			
Surrogate: Toluene-d8	*25.7*		*ug/l*	*25.0*		*103*	*80-120*			
Surrogate: 4-Bromofluorobenzene	*24.6*		*ug/l*	*25.0*		*98*	*80-120*			

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

METHOD BLANK/QC DATA

VOLATILE ORGANICS by GC/MS (EPA 5035/8260B)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G21019 Extracted: 07/21/05										
Matrix Spike Dup Analyzed: 07/21/2005 (5G21019-MSD1)					**Source: IOG0857-01**					
Benzene	23.8	2.0	ug/l	25.0	ND	95	60-125	5	20	
Bromobenzene	23.3	5.0	ug/l	25.0	ND	93	65-125	9	20	
Bromochloromethane	26.0	5.0	ug/l	25.0	ND	104	60-135	5	25	
Bromodichloromethane	22.7	2.0	ug/l	25.0	ND	91	65-135	8	20	
Bromoform	22.5	5.0	ug/l	25.0	2.6	80	50-135	2	25	
Bromomethane	23.4	5.0	ug/l	25.0	ND	94	50-145	7	25	
n-Butylbenzene	25.0	5.0	ug/l	25.0	ND	100	65-135	3	20	
sec-Butylbenzene	23.6	5.0	ug/l	25.0	ND	94	65-125	3	20	
tert-Butylbenzene	24.0	5.0	ug/l	25.0	ND	96	65-130	4	20	
Carbon Disulfide	23.8	5.0	ug/l	25.0	ND	95	40-140	2	20	
Carbon tetrachloride	23.6	5.0	ug/l	25.0	ND	94	65-140	6	25	
Chlorobenzene	23.7	2.0	ug/l	25.0	ND	95	70-125	5	20	
Chloroethane	23.5	5.0	ug/l	25.0	ND	94	50-140	6	25	
Chloroform	24.5	2.0	ug/l	25.0	ND	98	65-135	4	20	
Chloromethane	19.4	5.0	ug/l	25.0	ND	78	35-140	6	25	
2-Chlorotoluene	23.2	5.0	ug/l	25.0	ND	93	65-135	7	20	
4-Chlorotoluene	23.3	5.0	ug/l	25.0	ND	93	65-135	7	20	
Dibromochloromethane	24.8	2.0	ug/l	25.0	ND	99	60-140	5	25	
1,2-Dibromo-3-chloropropane	23.8	5.0	ug/l	25.0	ND	95	40-150	3	30	
1,2-Dibromoethane (EDB)	25.2	2.0	ug/l	25.0	ND	101	65-130	5	25	
Dibromomethane	25.0	2.0	ug/l	25.0	ND	100	60-135	4	25	
1,2-Dichlorobenzene	23.6	2.0	ug/l	25.0	ND	94	70-125	4	20	
1,3-Dichlorobenzene	22.9	2.0	ug/l	25.0	ND	92	70-125	6	20	
1,4-Dichlorobenzene	23.0	2.0	ug/l	25.0	ND	92	70-125	6	20	
Dichlorodifluoromethane	17.4	5.0	ug/l	25.0	ND	70	15-155	6	30	
1,1-Dichloroethane	25.2	2.0	ug/l	25.0	ND	101	60-130	4	20	
1,2-Dichloroethane	23.3	2.0	ug/l	25.0	ND	93	60-140	7	20	
1,1-Dichloroethene	23.7	5.0	ug/l	25.0	ND	95	60-135	7	20	
cis-1,2-Dichloroethene	24.1	2.0	ug/l	25.0	ND	96	60-130	4	20	
trans-1,2-Dichloroethene	24.8	2.0	ug/l	25.0	ND	99	60-135	4	20	
1,2-Dichloropropane	24.6	2.0	ug/l	25.0	ND	98	60-125	6	20	
1,3-Dichloropropane	25.2	2.0	ug/l	25.0	ND	101	60-135	4	25	
2,2-Dichloropropane	28.5	2.0	ug/l	25.0	ND	114	60-145	2	25	
1,1-Dichloropropene	23.4	2.0	ug/l	25.0	ND	94	65-135	6	20	
cis-1,3-Dichloropropene	24.1	2.0	ug/l	25.0	ND	96	65-135	8	20	

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
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2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

Del Mar Analytical

U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

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Report Number: IOG0857

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METHOD BLANK/QC DATA

VOLATILE ORGANICS by GC/MS (EPA 5035/8260B)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G21019 Extracted: 07/21/05										
Matrix Spike Dup Analyzed: 07/21/2005 (5G21019-MSD1)					**Source: IOG0857-01**					
trans-1,3-Dichloropropene	24.1	2.0	ug/l	25.0	ND	96	65-140	7	25	
Ethylbenzene	23.8	2.0	ug/l	25.0	ND	95	65-130	5	20	
Hexachlorobutadiene	20.9	5.0	ug/l	25.0	ND	84	60-135	1	20	
Isopropylbenzene	24.8	2.0	ug/l	25.0	ND	99	65-130	5	20	
p-Isopropyltoluene	22.6	2.0	ug/l	25.0	ND	90	65-125	3	20	
Methylene chloride	26.4	5.0	ug/l	25.0	ND	106	55-130	6	20	
Naphthalene	24.6	5.0	ug/l	25.0	ND	98	45-145	7	30	
n-Propylbenzene	24.4	2.0	ug/l	25.0	ND	98	65-130	6	20	
Styrene	14.0	2.0	ug/l	25.0	ND	56	45-145	16	30	
1,1,1,2-Tetrachloroethane	24.2	5.0	ug/l	25.0	ND	97	65-140	6	20	
1,1,2,2-Tetrachloroethane	28.7	2.0	ug/l	25.0	ND	115	55-140	1	30	
Tetrachloroethene	23.3	2.0	ug/l	25.0	ND	93	60-130	5	20	
Toluene	23.9	2.0	ug/l	25.0	ND	96	65-125	6	20	
1,2,3-Trichlorobenzene	23.5	5.0	ug/l	25.0	ND	94	55-135	3	20	
1,2,4-Trichlorobenzene	23.6	5.0	ug/l	25.0	ND	94	60-135	0	20	
1,1,1-Trichloroethane	24.3	2.0	ug/l	25.0	ND	97	65-140	2	20	
1,1,2-Trichloroethane	25.0	2.0	ug/l	25.0	ND	100	60-130	5	25	
Trichloroethene	22.5	2.0	ug/l	25.0	ND	90	60-125	8	20	
Trichlorofluoromethane	21.8	5.0	ug/l	25.0	ND	87	55-145	6	25	
1,2,3-Trichloropropane	27.0	10	ug/l	25.0	ND	108	50-135	3	30	
1,2,4-Trimethylbenzene	22.3	2.0	ug/l	25.0	ND	89	55-130	5	25	
1,3,5-Trimethylbenzene	23.6	2.0	ug/l	25.0	ND	94	65-130	6	20	
Vinyl acetate	19.9	5.0	ug/l	25.0	ND	80	40-150	1	30	
Vinyl chloride	18.2	5.0	ug/l	25.0	ND	73	40-135	5	30	
o-Xylene	23.1	2.0	ug/l	25.0	ND	92	60-125	6	20	
m,p-Xylenes	46.6	2.0	ug/l	50.0	ND	93	60-130	5	25	
Surrogate: Dibromofluoromethane	*24.9*		*ug/l*	*25.0*		*100*	*80-120*			
Surrogate: Toluene-d8	*25.2*		*ug/l*	*25.0*		*101*	*80-120*			
Surrogate: 4-Bromofluorobenzene	*24.5*		*ug/l*	*25.0*		*98*	*80-120*			

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

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METHOD BLANK/QC DATA

SEMI-VOLATILE ORGANICS BY GC/MS (EPA 3520C/8270C)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G17017 Extracted: 07/17/05										
Blank Analyzed: 07/20/2005 (5G17017-BLK1)										
Acenaphthene	ND	10	ug/l							
Acenaphthylene	ND	10	ug/l							
Aniline	ND	10	ug/l							
Anthracene	ND	10	ug/l							
Benzidine	ND	20	ug/l							
Benzoic acid	ND	20	ug/l							
Benzo(a)anthracene	ND	10	ug/l							
Benzo(b)fluoranthene	ND	10	ug/l							
Benzo(k)fluoranthene	ND	10	ug/l							
Benzo(g,h,i)perylene	ND	10	ug/l							
Benzo(a)pyrene	ND	10	ug/l							
Benzyl alcohol	ND	20	ug/l							
Bis(2-chloroethoxy)methane	ND	10	ug/l							
Bis(2-chloroethyl)ether	ND	10	ug/l							
Bis(2-chloroisopropyl)ether	ND	10	ug/l							
Bis(2-ethylhexyl)phthalate	ND	50	ug/l							
4-Bromophenyl phenyl ether	ND	10	ug/l							
Butyl benzyl phthalate	ND	20	ug/l							
4-Chloroaniline	ND	10	ug/l							
2-Chloronaphthalene	ND	10	ug/l							
4-Chloro-3-methylphenol	ND	20	ug/l							
2-Chlorophenol	ND	10	ug/l							
4-Chlorophenyl phenyl ether	ND	10	ug/l							
Chrysene	ND	10	ug/l							
Dibenz(a,h)anthracene	ND	20	ug/l							
Dibenzofuran	ND	10	ug/l							
Di-n-butyl phthalate	ND	20	ug/l							
1,3-Dichlorobenzene	ND	10	ug/l							
1,4-Dichlorobenzene	ND	10	ug/l							
1,2-Dichlorobenzene	ND	10	ug/l							
3,3-Dichlorobenzidine	ND	20	ug/l							
2,4-Dichlorophenol	ND	10	ug/l							
Diethyl phthalate	ND	10	ug/l							
2,4-Dimethylphenol	ND	20	ug/l							
Dimethyl phthalate	ND	10	ug/l							

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

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METHOD BLANK/QC DATA

SEMI-VOLATILE ORGANICS BY GC/MS (EPA 3520C/8270C)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G17017 Extracted: 07/17/05										
Blank Analyzed: 07/20/2005 (5G17017-BLK1)										
4,6-Dinitro-2-methylphenol	ND	20	ug/l							
2,4-Dinitrophenol	ND	20	ug/l							
2,4-Dinitrotoluene	ND	10	ug/l							
2,6-Dinitrotoluene	ND	10	ug/l							
Di-n-octyl phthalate	ND	20	ug/l							
Fluoranthene	ND	10	ug/l							
Fluorene	ND	10	ug/l							
Hexachlorobenzene	ND	10	ug/l							
Hexachlorobutadiene	ND	10	ug/l							
Hexachlorocyclopentadiene	ND	20	ug/l							
Hexachloroethane	ND	10	ug/l							
Indeno(1,2,3-cd)pyrene	ND	20	ug/l							
Isophorone	ND	10	ug/l							
2-Methylnaphthalene	ND	10	ug/l							
2-Methylphenol	ND	10	ug/l							
4-Methylphenol	ND	10	ug/l							
Naphthalene	ND	10	ug/l							
2-Nitroaniline	ND	20	ug/l							
3-Nitroaniline	ND	20	ug/l							
4-Nitroaniline	ND	20	ug/l							
Nitrobenzene	ND	20	ug/l							
2-Nitrophenol	ND	10	ug/l							
4-Nitrophenol	ND	20	ug/l							
N-Nitrosodiphenylamine	ND	10	ug/l							
N-Nitroso-di-n-propylamine	ND	10	ug/l							
Pentachlorophenol	ND	20	ug/l							
Phenanthrene	ND	10	ug/l							
Phenol	ND	10	ug/l							
Pyrene	ND	10	ug/l							
1,2,4-Trichlorobenzene	ND	10	ug/l							
2,4,5-Trichlorophenol	ND	20	ug/l							
2,4,6-Trichlorophenol	ND	20	ug/l							
N-Nitrosodimethylamine	ND	20	ug/l							
1,2-Diphenylhydrazine/Azobenzene	ND	20	ug/l							
Surrogate: 2-Fluorophenol	*121*		*ug/l*	*200*		*60*	*30-120*			

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

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1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

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METHOD BLANK/QC DATA

SEMI-VOLATILE ORGANICS BY GC/MS (EPA 3520C/8270C)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G17017 Extracted: 07/17/05										
Blank Analyzed: 07/20/2005 (5G17017-BLK1)										
Surrogate: Phenol-d6	*137*		*ug/l*	*200*		*68*	*35-120*			
Surrogate: 2,4,6-Tribromophenol	*164*		*ug/l*	*200*		*82*	*45-120*			
Surrogate: Nitrobenzene-d5	*71.7*		*ug/l*	*100*		*72*	*45-120*			
Surrogate: 2-Fluorobiphenyl	*77.0*		*ug/l*	*100*		*77*	*45-120*			
Surrogate: Terphenyl-d14	*78.7*		*ug/l*	*100*		*79*	*45-120*			
LCS Analyzed: 07/20/2005 (5G17017-BS1)										M-NR1
Acenaphthene	86.7	10	ug/l	100		87	55-120			
Acenaphthylene	89.0	10	ug/l	100		89	55-120			
Aniline	81.3	10	ug/l	100		81	35-120			
Anthracene	79.9	10	ug/l	100		80	55-120			
Benzidine	173	20	ug/l	100		173	20-160			L
Benzoic acid	69.7	20	ug/l	100		70	35-120			
Benzo(a)anthracene	81.7	10	ug/l	100		82	60-120			
Benzo(b)fluoranthene	89.1	10	ug/l	100		89	50-120			
Benzo(k)fluoranthene	89.2	10	ug/l	100		89	50-120			
Benzo(g,h,i)perylene	93.7	10	ug/l	100		94	40-125			
Benzo(a)pyrene	77.0	10	ug/l	100		77	55-120			
Benzyl alcohol	58.4	20	ug/l	100		58	45-120			
Bis(2-chloroethoxy)methane	84.1	10	ug/l	100		84	55-120			
Bis(2-chloroethyl)ether	83.6	10	ug/l	100		84	50-120			
Bis(2-chloroisopropyl)ether	84.8	10	ug/l	100		85	45-120			
Bis(2-ethylhexyl)phthalate	83.4	50	ug/l	100		83	60-130			
4-Bromophenyl phenyl ether	85.3	10	ug/l	100		85	50-120			
Butyl benzyl phthalate	85.2	20	ug/l	100		85	55-125			
4-Chloroaniline	78.4	10	ug/l	100		78	50-120			
2-Chloronaphthalene	79.5	10	ug/l	100		80	55-120			
4-Chloro-3-methylphenol	84.0	20	ug/l	100		84	60-120			
2-Chlorophenol	77.6	10	ug/l	100		78	45-120			
4-Chlorophenyl phenyl ether	89.9	10	ug/l	100		90	55-120			
Chrysene	87.0	10	ug/l	100		87	60-120			
Dibenz(a,h)anthracene	96.1	20	ug/l	100		96	45-130			
Dibenzofuran	85.1	10	ug/l	100		85	60-120			
Di-n-butyl phthalate	76.3	20	ug/l	100		76	55-125			
1,3-Dichlorobenzene	74.2	10	ug/l	100		74	35-120			
1,4-Dichlorobenzene	72.9	10	ug/l	100		73	35-120			

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

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1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
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U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

METHOD BLANK/QC DATA

SEMI-VOLATILE ORGANICS BY GC/MS (EPA 3520C/8270C)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G17017 Extracted: 07/17/05										
LCS Analyzed: 07/20/2005 (5G17017-BS1)										M-NR1
1,2-Dichlorobenzene	74.8	10	ug/l	100		75	35-120			
3,3-Dichlorobenzidine	90.4	20	ug/l	100		90	45-130			
2,4-Dichlorophenol	77.7	10	ug/l	100		78	55-120			
Diethyl phthalate	86.1	10	ug/l	100		86	55-120			
2,4-Dimethylphenol	63.8	20	ug/l	100		64	30-120			
Dimethyl phthalate	84.3	10	ug/l	100		84	60-120			
4,6-Dinitro-2-methylphenol	85.2	20	ug/l	100		85	50-120			
2,4-Dinitrophenol	89.2	20	ug/l	100		89	40-120			
2,4-Dinitrotoluene	93.9	10	ug/l	100		94	60-120			
2.6-Dinitrotoluene	81.3	10	ug/l	100		81	60-120			
Di-n-octyl phthalate	84.2	20	ug/l	100		84	60-130			
Fluoranthene	82.0	10	ug/l	100		82	55-120			
Fluorene	89.0	10	ug/l	100		89	60-120			
Hexachlorobenzene	85.7	10	ug/l	100		86	50-120			
Hexachlorobutadiene	76.7	10	ug/l	100		77	40-120			
Hexachlorocyclopentadiene	90.5	20	ug/l	100		90	15-120			
Hexachloroethane	76.3	10	ug/l	100		76	35-120			
Indeno(1,2,3-cd)pyrene	90.3	20	ug/l	100		90	40-130			
Isophorone	82.6	10	ug/l	100		83	50-120			
2-Methylnaphthalene	81.0	10	ug/l	100		81	50-120			
2-Methylphenol	79.4	10	ug/l	100		79	45-120			
4-Methylphenol	80.8	10	ug/l	100		81	45-120			
Naphthalene	78.8	10	ug/l	100		79	50-120			
2-Nitroaniline	84.6	20	ug/l	100		85	60-120			
3-Nitroaniline	94.0	20	ug/l	100		94	55-120			
4-Nitroaniline	93.5	20	ug/l	100		94	50-125			
Nitrobenzene	79.1	20	ug/l	100		79	50-120			
2-Nitrophenol	82.1	10	ug/l	100		82	55-120			
4-Nitrophenol	78.4	20	ug/l	100		78	45-120			
N-Nitrosodiphenylamine	86.3	10	ug/l	100		86	55-120			
N-Nitroso-di-n-propylamine	88.8	10	ug/l	100		89	45-120			
Pentachlorophenol	91.4	20	ug/l	100		91	50-120			
Phenanthrene	80.2	10	ug/l	100		80	55-120			
Phenol	77.5	10	ug/l	100		78	45-120			
Pyrene	87.4	10	ug/l	100		87	50-120			

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

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SEMI-VOLATILE ORGANICS BY GC/MS (EPA 3520C/8270C)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G17017 Extracted: 07/17/05										
LCS Analyzed: 07/20/2005 (5G17017-BS1)										**M-NR1**
1,2,4-Trichlorobenzene	75.1	10	ug/l	100		75	45-120			
2,4,5-Trichlorophenol	89.1	20	ug/l	100		89	60-120			
2,4,6-Trichlorophenol	80.8	20	ug/l	100		81	60-120			
N-Nitrosodimethylamine	84.9	20	ug/l	100		85	40-120			
1,2-Diphenylhydrazine/Azobenzene	86.6	20	ug/l	100		87	60-120			
Surrogate: 2-Fluorophenol	*148*		*ug/l*	*200*		*74*	*30-120*			
Surrogate: Phenol-d6	*161*		*ug/l*	*200*		*80*	*35-120*			
Surrogate: 2,4,6-Tribromophenol	*181*		*ug/l*	*200*		*90*	*45-120*			
Surrogate: Nitrobenzene-d5	*80.3*		*ug/l*	*100*		*80*	*45-120*			
Surrogate: 2-Fluorobiphenyl	*81.7*		*ug/l*	*100*		*82*	*45-120*			
Surrogate: Terphenyl-d14	*86.2*		*ug/l*	*100*		*86*	*45-120*			
LCS Dup Analyzed: 07/20/2005 (5G17017-BSD1)										
Acenaphthene	84.0	10	ug/l	100		84	55-120	3	20	
Acenaphthylene	87.2	10	ug/l	100		87	55-120	2	20	
Aniline	76.7	10	ug/l	100		77	35-120	6	25	
Anthracene	80.8	10	ug/l	100		81	55-120	1	20	
Benzidine	99.1	20	ug/l	100		99	20-160	54	35	*R-2*
Benzoic acid	87.7	20	ug/l	100		88	35-120	23	30	
Benzo(a)anthracene	86.0	10	ug/l	100		86	60-120	5	20	
Benzo(b)fluoranthene	88.7	10	ug/l	100		89	50-120	0	25	
Benzo(k)fluoranthene	86.9	10	ug/l	100		87	50-120	3	20	
Benzo(g,h,i)perylene	94.7	10	ug/l	100		95	40-125	1	25	
Benzo(a)pyrene	79.8	10	ug/l	100		80	55-120	4	25	
Benzyl alcohol	60.6	20	ug/l	100		61	45-120	4	20	
Bis(2-chloroethoxy)methane	83.2	10	ug/l	100		83	55-120	1	20	
Bis(2-chloroethyl)ether	81.7	10	ug/l	100		82	50-120	2	20	
Bis(2-chloroisopropyl)ether	81.1	10	ug/l	100		81	45-120	4	20	
Bis(2-ethylhexyl)phthalate	85.2	50	ug/l	100		85	60-130	2	20	
4-Bromophenyl phenyl ether	87.8	10	ug/l	100		88	50-120	3	25	
Butyl benzyl phthalate	83.2	20	ug/l	100		83	55-125	2	20	
4-Chloroaniline	77.3	10	ug/l	100		77	50-120	1	25	
2-Chloronaphthalene	81.4	10	ug/l	100		81	55-120	2	20	
4-Chloro-3-methylphenol	79.2	20	ug/l	100		79	60-120	6	25	
2-Chlorophenol	74.5	10	ug/l	100		74	45-120	4	25	
4-Chlorophenyl phenyl ether	87.0	10	ug/l	100		87	55-120	3	20	

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

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SEMI-VOLATILE ORGANICS BY GC/MS (EPA 3520C/8270C)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G17017 Extracted: 07/17/05										
LCS Dup Analyzed: 07/20/2005 (5G17017-BSD1)										
Chrysene	87.1	10	ug/l	100		87	60-120	0	20	
Dibenz(a,h)anthracene	97.1	20	ug/l	100		97	45-130	1	25	
Dibenzofuran	83.3	10	ug/l	100		83	60-120	2	20	
Di-n-butyl phthalate	77.2	20	ug/l	100		77	55-125	1	20	
1,3-Dichlorobenzene	72.2	10	ug/l	100		72	35-120	3	25	
1,4-Dichlorobenzene	70.2	10	ug/l	100		70	35-120	4	25	
1,2-Dichlorobenzene	72.6	10	ug/l	100		73	35-120	3	25	
3,3-Dichlorobenzidine	89.1	20	ug/l	100		89	45-130	1	25	
2,4-Dichlorophenol	76.5	10	ug/l	100		76	55-120	2	20	
Diethyl phthalate	83.2	10	ug/l	100		83	55-120	3	20	
2,4-Dimethylphenol	63.7	20	ug/l	100		64	30-120	0	25	
Dimethyl phthalate	84.4	10	ug/l	100		84	60-120	0	20	
4,6-Dinitro-2-methylphenol	82.9	20	ug/l	100		83	50-120	3	25	
2,4-Dinitrophenol	86.7	20	ug/l	100		87	40-120	3	25	
2,4-Dinitrotoluene	90.1	10	ug/l	100		90	60-120	4	20	
2,6-Dinitrotoluene	83.0	10	ug/l	100		83	60-120	2	20	
Di-n-octyl phthalate	87.3	20	ug/l	100		87	60-130	4	20	
Fluoranthene	79.8	10	ug/l	100		80	55-120	3	20	
Fluorene	85.8	10	ug/l	100		86	60-120	4	20	
Hexachlorobenzene	89.2	10	ug/l	100		89	50-120	4	20	
Hexachlorobutadiene	74.9	10	ug/l	100		75	40-120	2	25	
Hexachlorocyclopentadiene	88.4	20	ug/l	100		88	15-120	2	30	
Hexachloroethane	73.3	10	ug/l	100		73	35-120	4	25	
Indeno(1,2,3-cd)pyrene	90.1	20	ug/l	100		90	40-130	0	25	
Isophorone	83.7	10	ug/l	100		84	50-120	1	20	
2-Methylnaphthalene	78.7	10	ug/l	100		79	50-120	3	20	
2-Methylphenol	76.8	10	ug/l	100		77	45-120	3	20	
4-Methylphenol	79.3	10	ug/l	100		79	45-120	2	20	
Naphthalene	78.3	10	ug/l	100		78	50-120	1	20	
2-Nitroaniline	83.5	20	ug/l	100		84	60-120	1	20	
3-Nitroaniline	90.4	20	ug/l	100		90	55-120	4	25	
4-Nitroaniline	87.8	20	ug/l	100		88	50-125	6	20	
Nitrobenzene	79.1	20	ug/l	100		79	50-120	0	25	
2-Nitrophenol	79.7	10	ug/l	100		80	55-120	3	25	
4-Nitrophenol	74.7	20	ug/l	100		75	45-120	5	25	

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Kathleen A. Robb
Project Manager

Del Mar Analytical

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SEMI-VOLATILE ORGANICS BY GC/MS (EPA 3520C/8270C)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G17017 Extracted: 07/17/05										
LCS Dup Analyzed: 07/20/2005 (5G17017-BSD1)										
N-Nitrosodiphenylamine	88.2	10	ug/l	100		88	55-120	2	20	
N-Nitroso-di-n-propylamine	86.8	10	ug/l	100		87	45-120	2	20	
Pentachlorophenol	94.4	20	ug/l	100		94	50-120	3	25	
Phenanthrene	79.7	10	ug/l	100		80	55-120	1	20	
Phenol	74.4	10	ug/l	100		74	45-120	4	25	
Pyrene	83.4	10	ug/l	100		83	50-120	5	25	
1,2,4-Trichlorobenzene	75.3	10	ug/l	100		75	45-120	0	20	
2,4,5-Trichlorophenol	88.5	20	ug/l	100		88	60-120	1	20	
2,4,6-Trichlorophenol	82.1	20	ug/l	100		82	60-120	2	20	
N-Nitrosodimethylamine	72.3	20	ug/l	100		72	40-120	16	20	
1,2-Diphenylhydrazine/Azobenzene	82.7	20	ug/l	100		83	60-120	5	25	
Surrogate: 2-Fluorophenol	*133*		*ug/l*	*200*		*66*	*30-120*			
Surrogate: Phenol-d6	*147*		*ug/l*	*200*		*74*	*35-120*			
Surrogate: 2,4,6-Tribromophenol	*181*		*ug/l*	*200*		*90*	*45-120*			
Surrogate: Nitrobenzene-d5	*79.2*		*ug/l*	*100*		*79*	*45-120*			
Surrogate: 2-Fluorobiphenyl	*83.5*		*ug/l*	*100*		*84*	*45-120*			
Surrogate: Terphenyl-d14	*83.1*		*ug/l*	*100*		*83*	*45-120*			

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Kathleen A. Robb
Project Manager

Del Mar Analytical

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METHOD BLANK/QC DATA

ORGANOCHLORINE PESTICIDES (EPA 3510C/8081A)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G20057 Extracted: 07/20/05										
Blank Analyzed: 07/20/2005-07/22/2005 (5G20057-BLK1)										
Aldrin	ND	0.10	ug/l							
alpha-BHC	ND	0.10	ug/l							
beta-BHC	ND	0.10	ug/l							
delta-BHC	ND	0.20	ug/l							
gamma-BHC (Lindane)	ND	0.10	ug/l							
Chlordane	ND	1.0	ug/l							
4,4'-DDD	ND	0.10	ug/l							
4,4'-DDE	ND	0.10	ug/l							
4,4'-DDT	ND	0.10	ug/l							
Dieldrin	ND	0.10	ug/l							
Endosulfan I	ND	0.10	ug/l							
Endosulfan II	ND	0.10	ug/l							
Endosulfan sulfate	ND	0.20	ug/l							
Endrin	ND	0.10	ug/l							
Endrin aldehyde	ND	0.10	ug/l							
Endrin ketone	ND	0.10	ug/l							
Heptachlor	ND	0.10	ug/l							
Heptachlor epoxide	ND	0.10	ug/l							
Methoxychlor	ND	0.10	ug/l							
Toxaphene	ND	5.0	ug/l							
Surrogate: Tetrachloro-m-xylene	*0.352*		*ug/l*	*0.500*		*70*	*35-115*			
Surrogate: Decachlorobiphenyl	*0.446*		*ug/l*	*0.500*		*89*	*45-120*			
LCS Analyzed: 07/20/2005 (5G20057-BS1)										M-NR1
Aldrin	0.356	0.10	ug/l	0.500		71	40-115			
alpha-BHC	0.435	0.10	ug/l	0.500		87	45-115			
beta-BHC	0.397	0.10	ug/l	0.500		79	50-115			
delta-BHC	0.447	0.20	ug/l	0.500		89	55-120			
gamma-BHC (Lindane)	0.431	0.10	ug/l	0.500		86	45-115			
4,4'-DDD	0.462	0.10	ug/l	0.500		92	60-120			
4,4'-DDE	0.446	0.10	ug/l	0.500		89	55-120			
4,4'-DDT	0.443	0.10	ug/l	0.500		89	60-120			
Dieldrin	0.437	0.10	ug/l	0.500		87	55-120			
Endosulfan I	0.417	0.10	ug/l	0.500		83	50-115			
Endosulfan II	0.433	0.10	ug/l	0.500		87	60-125			
Endosulfan sulfate	0.471	0.20	ug/l	0.500		94	60-120			

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ORGANOCHLORINE PESTICIDES (EPA 3510C/8081A)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G20057 Extracted: 07/20/05										
LCS Analyzed: 07/20/2005 (5G20057-BS1)										**M-NR1**
Endrin	0.441	0.10	ug/l	0.500		88	55-125			
Endrin aldehyde	0.443	0.10	ug/l	0.500		89	55-115			
Endrin ketone	0.441	0.10	ug/l	0.500		88	60-115			
Heptachlor	0.370	0.10	ug/l	0.500		74	45-115			
Heptachlor epoxide	0.416	0.10	ug/l	0.500		83	50-115			
Methoxychlor	0.454	0.10	ug/l	0.500		91	60-120			
Surrogate: Tetrachloro-m-xylene	*0.338*		*ug/l*	*0.500*		*68*	*35-115*			
Surrogate: Decachlorobiphenyl	*0.439*		*ug/l*	*0.500*		*88*	*45-120*			
LCS Dup Analyzed: 07/20/2005 (5G20057-BSD1)										
Aldrin	0.341	0.10	ug/l	0.500		68	40-115	4	30	
alpha-BHC	0.422	0.10	ug/l	0.500		84	45-115	3	30	
beta-BHC	0.386	0.10	ug/l	0.500		77	50-115	3	30	
delta-BHC	0.433	0.20	ug/l	0.500		87	55-120	3	30	
gamma-BHC (Lindane)	0.419	0.10	ug/l	0.500		84	45-115	3	30	
4,4'-DDD	0.439	0.10	ug/l	0.500		88	60-120	5	30	
4,4'-DDE	0.425	0.10	ug/l	0.500		85	55-120	5	30	
4,4'-DDT	0.420	0.10	ug/l	0.500		84	60-120	5	30	
Dieldrin	0.417	0.10	ug/l	0.500		83	55-120	5	30	
Endosulfan I	0.398	0.10	ug/l	0.500		80	50-115	5	30	
Endosulfan II	0.411	0.10	ug/l	0.500		82	60-125	5	30	
Endosulfan sulfate	0.445	0.20	ug/l	0.500		89	60-120	6	30	
Endrin	0.421	0.10	ug/l	0.500		84	55-125	5	30	
Endrin aldehyde	0.379	0.10	ug/l	0.500		76	55-115	16	30	
Endrin ketone	0.415	0.10	ug/l	0.500		83	60-115	6	30	
Heptachlor	0.356	0.10	ug/l	0.500		71	45-115	4	30	
Heptachlor epoxide	0.400	0.10	ug/l	0.500		80	50-115	4	30	
Methoxychlor	0.430	0.10	ug/l	0.500		86	60-120	5	30	
Surrogate: Tetrachloro-m-xylene	*0.337*		*ug/l*	*0.500*		*67*	*35-115*			
Surrogate: Decachlorobiphenyl	*0.410*		*ug/l*	*0.500*		*82*	*45-120*			

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

METHOD BLANK/QC DATA

POLYCHLORINATED BIPHENYLS (EPA 3510C/8082)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G20057 Extracted: 07/20/05										
Blank Analyzed: 07/20/2005-07/22/2005 (5G20057-BLK1)										
Aroclor 1016	ND	1.0	ug/l							
Aroclor 1221	ND	1.0	ug/l							
Aroclor 1232	ND	1.0	ug/l							
Aroclor 1242	ND	1.0	ug/l							
Aroclor 1248	ND	1.0	ug/l							
Aroclor 1254	ND	1.0	ug/l							
Aroclor 1260	ND	1.0	ug/l							
Surrogate: Decachlorobiphenyl	*0.513*		*ug/l*	*0.500*		*103*	*45-120*			
LCS Analyzed: 07/22/2005 (5G20057-BS2)										M-NR1
Aroclor 1016	3.51	1.0	ug/l	4.00		88	50-115			
Aroclor 1260	3.67	1.0	ug/l	4.00		92	55-115			
Surrogate: Decachlorobiphenyl	*0.521*		*ug/l*	*0.500*		*104*	*45-120*			
LCS Dup Analyzed: 07/22/2005 (5G20057-BSD2)										
Aroclor 1016	3.23	1.0	ug/l	4.00		81	50-115	8	30	
Aroclor 1260	3.37	1.0	ug/l	4.00		84	55-115	9	25	
Surrogate: Decachlorobiphenyl	*0.479*		*ug/l*	*0.500*		*96*	*45-120*			

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Kathleen A. Robb
Project Manager

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METALS

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Batch: 5G18097 Extracted: 07/18/05										
Blank Analyzed: 07/19/2005 (5G18097-BLK1)										
Antimony	ND	0.010	mg/l							
Arsenic	ND	0.0050	mg/l							
Barium	ND	0.010	mg/l							
Chromium	ND	0.0050	mg/l							
Cobalt	ND	0.010	mg/l							
Copper	ND	0.010	mg/l							
Molybdenum	ND	0.020	mg/l							
Silver	ND	0.0070	mg/l							
Thallium	ND	0.010	mg/l							
Vanadium	ND	0.010	mg/l							
Zinc	ND	0.020	mg/l							
LCS Analyzed: 07/19/2005 (5G18097-BS1)										
Antimony	1.07	0.010	mg/l	1.00		107	80-120			
Arsenic	1.00	0.0050	mg/l	1.00		100	80-120			
Barium	0.954	0.010	mg/l	1.00		95	80-120			
Chromium	0.986	0.0050	mg/l	1.00		99	80-120			
Cobalt	1.02	0.010	mg/l	1.00		102	80-120			
Copper	1.01	0.010	mg/l	1.00		101	80-120			
Molybdenum	0.956	0.020	mg/l	1.00		96	80-120			
Silver	0.507	0.0070	mg/l	0.500		101	80-120			
Thallium	0.962	0.010	mg/l	1.00		96	80-120			
Vanadium	0.988	0.010	mg/l	1.00		99	80-120			
Zinc	0.959	0.020	mg/l	1.00		96	80-120			
Matrix Spike Analyzed: 07/19/2005 (5G18097-MS1)					**Source: IOG0791-01**					
Antimony	0.998	0.010	mg/l	1.00	ND	100	75-125			
Arsenic	0.946	0.0050	mg/l	1.00	0.0099	94	75-125			
Barium	0.888	0.010	mg/l	1.00	0.024	86	75-125			
Chromium	0.897	0.0050	mg/l	1.00	ND	90	75-125			
Cobalt	0.946	0.010	mg/l	1.00	ND	95	75-125			
Copper	1.02	0.010	mg/l	1.00	ND	102	75-125			
Molybdenum	1.09	0.020	mg/l	1.00	0.21	88	75-125			
Silver	0.476	0.0070	mg/l	0.500	ND	95	75-125			
Thallium	0.837	0.010	mg/l	1.00	ND	84	75-125			
Vanadium	0.925	0.010	mg/l	1.00	0.0044	92	75-125			

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Kathleen A. Robb
Project Manager

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G18097 Extracted: 07/18/05										
Matrix Spike Analyzed: 07/19/2005 (5G18097-MS1)					**Source: IOG0791-01**					
Zinc	0.910	0.020	mg/l	1.00	ND	91	75-125			
Matrix Spike Dup Analyzed: 07/19/2005 (5G18097-MSD1)					**Source: IOG0791-01**					
Antimony	0.994	0.010	mg/l	1.00	ND	99	75-125	0	20	
Arsenic	0.945	0.0050	mg/l	1.00	0.0099	94	75-125	0	20	
Barium	0.879	0.010	mg/l	1.00	0.024	86	75-125	1	20	
Chromium	0.886	0.0050	mg/l	1.00	ND	89	75-125	1	20	
Cobalt	0.937	0.010	mg/l	1.00	ND	94	75-125	1	20	
Copper	1.01	0.010	mg/l	1.00	ND	101	75-125	1	20	
Molybdenum	1.08	0.020	mg/l	1.00	0.21	87	75-125	1	20	
Silver	0.471	0.0070	mg/l	0.500	ND	94	75-125	1	20	
Thallium	0.837	0.010	mg/l	1.00	ND	84	75-125	0	20	
Vanadium	0.916	0.010	mg/l	1.00	0.0044	91	75-125	1	20	
Zinc	0.900	0.020	mg/l	1.00	ND	90	75-125	1	20	
Batch: 5G19037 Extracted: 07/19/05										
Blank Analyzed: 07/19/2005 (5G19037-BLK1)										
Mercury	ND	0.00020	mg/l							
LCS Analyzed: 07/19/2005 (5G19037-BS1)										
Mercury	0.00823	0.00020	mg/l	0.00800		103	90-115			
Matrix Spike Analyzed: 07/19/2005 (5G19037-MS1)					**Source: IOG0937-01**					
Mercury	0.00796	0.00020	mg/l	0.00800	ND	100	75-120			
Matrix Spike Dup Analyzed: 07/19/2005 (5G19037-MSD1)					**Source: IOG0937-01**					
Mercury	0.00788	0.00020	mg/l	0.00800	ND	98	75-120	1	20	

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Kathleen A. Robb
Project Manager

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1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
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Batch: 5G19086 Extracted: 07/19/05										
Blank Analyzed: 07/20/2005 (5G19086-BLK1)										
Aluminum	ND	0.050	mg/l							
Boron	ND	0.050	mg/l							
Iron	ND	0.040	mg/l							
Magnesium	ND	0.020	mg/l							
Manganese	ND	0.020	mg/l							
Strontium	ND	0.020	mg/l							
Tin	ND	0.10	mg/l							
Titanium	ND	0.0050	mg/l							
LCS Analyzed: 07/20/2005 (5G19086-BS1)										
Aluminum	0.972	0.050	mg/l	1.00		97	80-120			
Boron	1.01	0.050	mg/l	1.00		101	80-120			
Iron	1.04	0.040	mg/l	1.00		104	80-120			
Magnesium	4.92	0.020	mg/l	5.00		98	80-120			
Manganese	1.02	0.020	mg/l	1.00		102	80-120			
Strontium	0.985	0.020	mg/l	1.00		98	80-120			
Tin	0.973	0.10	mg/l	1.00		97	80-120			
Titanium	1.03	0.0050	mg/l	1.00		103	80-120			
Matrix Spike Analyzed: 07/20/2005 (5G19086-MS1)					**Source: IOG0857-01**					
Aluminum	1.06	0.050	mg/l	1.00	0.082	98	75-125			
Boron	1.66	0.050	mg/l	1.00	0.64	102	75-125			
Iron	0.991	0.040	mg/l	1.00	0.034	96	75-125			
Magnesium	33.0	0.020	mg/l	5.00	29	80	75-125			
Manganese	0.938	0.020	mg/l	1.00	0.010	93	75-125			
Strontium	2.68	0.020	mg/l	1.00	1.7	98	75-125			
Tin	0.933	0.10	mg/l	1.00	0.0053	93	75-125			
Titanium	0.987	0.0050	mg/l	1.00	0.0034	98	75-125			

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Kathleen A. Robb
Project Manager

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1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G19086 Extracted: 07/19/05										
Matrix Spike Dup Analyzed: 07/20/2005 (5G19086-MSD1)					**Source: IOG0857-01**					
Aluminum	1.11	0.050	mg/l	1.00	0.082	103	75-125	5	20	
Boron	1.74	0.050	mg/l	1.00	0.64	110	75-125	5	20	
Iron	1.02	0.040	mg/l	1.00	0.034	99	75-125	3	20	
Magnesium	34.4	0.020	mg/l	5.00	29	108	75-125	4	20	
Manganese	0.977	0.020	mg/l	1.00	0.010	97	75-125	4	20	
Strontium	2.76	0.020	mg/l	1.00	1.7	106	75-125	3	20	
Tin	0.950	0.10	mg/l	1.00	0.0053	94	75-125	2	20	
Titanium	1.02	0.0050	mg/l	1.00	0.0034	102	75-125	3	20	
Batch: 5G25067 Extracted: 07/25/05										
Blank Analyzed: 07/25/2005 (5G25067-BLK1)										
Zirconium	ND	0.20	mg/l							
LCS Analyzed: 07/25/2005 (5G25067-BS1)										
Zirconium	1.01	0.20	mg/l	1.00		101	80-120			
Matrix Spike Analyzed: 07/25/2005 (5G25067-MS1)					**Source: IOG1423-01**					
Zirconium	1.02	0.20	mg/l	1.00	ND	102	75-125			
Matrix Spike Dup Analyzed: 07/25/2005 (5G25067-MSD1)					**Source: IOG1423-01**					
Zirconium	1.03	0.20	mg/l	1.00	ND	103	75-125	1	20	

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G14039 Extracted: 07/14/05										
Blank Analyzed: 07/14/2005 (5G14039-BLK1)										
Bromide	ND	0.50	mg/l							
Fluoride	ND	0.50	mg/l							
Nitrate-N	ND	0.15	mg/l							
Nitrite-N	ND	0.15	mg/l							
Sulfate	ND	0.50	mg/l							
LCS Analyzed: 07/14/2005 (5G14039-BS1)										
Bromide	4.88	0.50	mg/l	5.00		98	90-110			
Fluoride	4.68	0.50	mg/l	5.00		94	90-110			
Nitrate-N	1.08	0.15	mg/l	1.13		96	90-110			
Nitrite-N	1.47	0.15	mg/l	1.52		97	90-110			
Sulfate	9.53	0.50	mg/l	10.0		95	90-110			*M-3*
Matrix Spike Analyzed: 07/14/2005 (5G14039-MS1)					**Source: IOG0829-01**					
Bromide	4.97	0.50	mg/l	5.00	ND	99	80-120			
Fluoride	4.98	0.50	mg/l	5.00	0.18	96	80-120			
Nitrate-N	6.59	0.15	mg/l	1.13	5.2	123	80-120			*M-HA*
Nitrite-N	1.54	0.15	mg/l	1.52	ND	101	80-120			
Matrix Spike Dup Analyzed: 07/14/2005 (5G14039-MSD1)					**Source: IOG0829-01**					
Bromide	4.71	0.50	mg/l	5.00	ND	94	80-120	5	20	
Fluoride	4.91	0.50	mg/l	5.00	0.18	95	80-120	1	20	
Nitrate-N	6.54	0.15	mg/l	1.13	5.2	119	80-120	1	20	
Nitrite-N	1.50	0.15	mg/l	1.52	ND	99	80-120	3	20	
Batch: 5G14075 Extracted: 07/14/05										
Blank Analyzed: 07/14/2005 (5G14075-BLK1)										
Phosphorus	ND	0.050	mg/l							

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G14075 Extracted: 07/14/05										
LCS Analyzed: 07/14/2005 (5G14075-BS1)										
Phosphorus	0.915	0.050	mg/l	1.00		92	80-120			
Matrix Spike Analyzed: 07/14/2005 (5G14075-MS1)					**Source: IOG0784-01**					
Phosphorus	1.25	0.050	mg/l	1.00	0.37	88	65-130			
Matrix Spike Dup Analyzed: 07/14/2005 (5G14075-MSD1)					**Source: IOG0784-01**					
Phosphorus	1.31	0.050	mg/l	1.00	0.37	94	65-130	5	15	
Batch: 5G14089 Extracted: 07/14/05										
Duplicate Analyzed: 07/14/2005 (5G14089-DUP1)					**Source: IOG0808-01**					
Color	10.0	1.0	Color Units		10			0	20	*pH*
Batch: 5G14094 Extracted: 07/14/05										
Duplicate Analyzed: 07/14/2005 (5G14094-DUP1)					**Source: IOG0812-01**					
Residual Chlorine	ND	0.10	mg/l		ND				20	
Batch: 5G14118 Extracted: 07/14/05										
Blank Analyzed: 07/14/2005 (5G14118-BLK1)										
Surfactants (MBAS)	ND	0.10	mg/l							
LCS Analyzed: 07/14/2005 (5G14118-BS1)										
Surfactants (MBAS)	0.255	0.10	mg/l	0.250		102	90-110			

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G14118 Extracted: 07/14/05										
Matrix Spike Analyzed: 07/14/2005 (5G14118-MS1)					**Source: IOG0833-01**					
Surfactants (MBAS)	0.271	0.10	mg/l	0.250	ND	108	50-125			
Matrix Spike Dup Analyzed: 07/14/2005 (5G14118-MSD1)					**Source: IOG0833-01**					
Surfactants (MBAS)	0.299	0.10	mg/l	0.250	ND	120	50-125	10	20	
Batch: 5G15045 Extracted: 07/15/05										
Blank Analyzed: 07/15/2005 (5G15045-BLK1)										
Sulfide	ND	0.10	mg/l							
LCS Analyzed: 07/15/2005 (5G15045-BS1)										
Sulfide	0.567	0.10	mg/l	0.560		101	80-120			
Matrix Spike Analyzed: 07/15/2005 (5G15045-MS1)					**Source: IOG0959-02**					
Sulfide	0.547	0.10	mg/l	0.560	0.010	96	70-130			
Matrix Spike Dup Analyzed: 07/15/2005 (5G15045-MSD1)					**Source: IOG0959-02**					
Sulfide	0.527	0.10	mg/l	0.560	0.010	92	70-130	4	30	
Batch: 5G15075 Extracted: 07/15/05										
Blank Analyzed: 07/18/2005 (5G15075-BLK1)										
Total Cyanide	ND	0.025	mg/l							
LCS Analyzed: 07/18/2005 (5G15075-BS1)										
Total Cyanide	0.191	0.025	mg/l	0.200		96	90-110			

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Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G15075 Extracted: 07/15/05										
Matrix Spike Analyzed: 07/18/2005 (5G15075-MS1)					**Source: IOG0684-02**					
Total Cyanide	0.214	0.025	mg/l	0.200	ND	107	70-115			
Matrix Spike Dup Analyzed: 07/18/2005 (5G15075-MSD1)					**Source: IOG0684-02**					
Total Cyanide	0.188	0.025	mg/l	0.200	ND	94	70-115	13	15	
Batch: 5G19066 Extracted: 07/19/05										
Blank Analyzed: 07/19/2005 (5G19066-BLK1)										
Total Kjeldahl Nitrogen	ND	0.50	mg/l							
LCS Analyzed: 07/19/2005 (5G19066-BS1)										
Total Kjeldahl Nitrogen	11.5	0.50	mg/l	10.0		115	85-120			
LCS Dup Analyzed: 07/19/2005 (5G19066-BSD1)										
Total Kjeldahl Nitrogen	11.2	0.50	mg/l	10.0		112	85-120	3	15	
Matrix Spike Analyzed: 07/19/2005 (5G19066-MS1)					**Source: IOG0863-02**					
Total Kjeldahl Nitrogen	11.8	0.50	mg/l	10.0	0.84	110	85-120			
Matrix Spike Dup Analyzed: 07/19/2005 (5G19066-MSD1)					**Source: IOG0863-02**					
Total Kjeldahl Nitrogen	12.3	0.50	mg/l	10.0	0.84	115	85-120	4	15	
Batch: 5G20078 Extracted: 07/20/05										
Blank Analyzed: 07/20/2005 (5G20078-BLK1)										
Oil & Grease	ND	5.0	mg/l							

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
9830 South 51st St., Suite B-120, Phoenix, AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

U.S. Filter/Westates Carbon
P.O. Box 3308
Parker, AZ 85344
Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

METHOD BLANK/QC DATA

INORGANICS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G20078 Extracted: 07/20/05										
LCS Analyzed: 07/20/2005 (5G20078-BS1)										M-NR1
Oil & Grease	16.0	5.0	mg/l	20.0		80	65-120			
LCS Dup Analyzed: 07/20/2005 (5G20078-BSD1)										
Oil & Grease	15.5	5.0	mg/l	20.0		78	65-120	3	20	
Batch: 5G22080 Extracted: 07/22/05										
Blank Analyzed: 07/22/2005 (5G22080-BLK1)										
Phenols	ND	0.10	mg/l							
LCS Analyzed: 07/22/2005 (5G22080-BS1)										
Phenols	0.508	0.10	mg/l	0.500		102	90-110			
Matrix Spike Analyzed: 07/22/2005 (5G22080-MS1)					**Source: IOG0903-08**					
Phenols	0.508	0.10	mg/l	0.500	ND	102	65-155			
Matrix Spike Dup Analyzed: 07/22/2005 (5G22080-MSD1)					**Source: IOG0903-08**					
Phenols	0.526	0.10	mg/l	0.500	ND	105	65-155	3	20	
Batch: 5G22113 Extracted: 07/22/05										
Blank Analyzed: 07/22/2005 (5G22113-BLK1)										
Ammonia-N	ND	0.50	mg/l							
LCS Analyzed: 07/22/2005 (5G22113-BS1)										
Ammonia-N	0.993	0.50	mg/l	1.00		99	85-115			

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Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

METHOD BLANK/QC DATA

INORGANICS

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: 5G22113 Extracted: 07/22/05										
Matrix Spike Analyzed: 07/22/2005 (5G22113-MS1)					**Source: IOG0857-01**					
Ammonia-N	1.74	0.50	mg/l	2.00	ND	87	75-125			
Matrix Spike Dup Analyzed: 07/22/2005 (5G22113-MSD1)					**Source: IOG0857-01**					
Ammonia-N	1.83	0.50	mg/l	2.00	ND	92	75-125	5	15	

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Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
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P.O. Box 3308
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Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

METHOD BLANK/QC DATA

DIQUAT/PARAQUAT (EPA 549.2)

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Data Qualifiers
Batch: C5G1809 Extracted: 07/18/05										
Blank Analyzed: 07/18/2005 (C5G1809-BLK1)										
Diquat	ND	4.0	ug/l							
Paraquat	ND	20	ug/l							
LCS Analyzed: 07/18/2005 (C5G1809-BS1)										
Diquat	32.5	4.0	ug/l	40.0		81	70-120			
Paraquat	32.7	20	ug/l	40.0		82	65-120			
LCS Dup Analyzed: 07/18/2005 (C5G1809-BSD1)										
Diquat	32.7	4.0	ug/l	40.0		82	70-120	1	20	
Paraquat	33.1	20	ug/l	40.0		83	65-120	1	20	
Matrix Spike Analyzed: 07/18/2005 (C5G1809-MS1)					**Source: COG0352-01**					
Diquat	34.8	4.0	ug/l	40.0	ND	87	70-120			
Paraquat	35.5	20	ug/l	40.0	ND	89	65-120			

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Kathleen A. Robb
Project Manager

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1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
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U.S. Filter/Westates Carbon
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Sampled: 07/13/05
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DATA QUALIFIERS AND DEFINITIONS

C	Calibration Verification recovery was above the method control limit for this analyte. Analyte not detected, data not impacted.
L	Laboratory Control Sample recovery was above the method control limits. Analyte not detected, data not impacted.
M-3	Results exceeded the linear range in the MS/MSD and therefore are not available for reporting. The batch was accepted based on acceptable recovery in the Blank Spike (LCS).
M-HA	Due to high levels of analyte in the sample, the MS/MSD calculation does not provide useful spike recovery information. See Blank Spike (LCS).
M-NR1	There was no MS/MSD analyzed with this batch due to insufficient sample volume. See Blank Spike/Blank Spike Duplicate.
pH	pH = 7
R-2	The RPD exceeded the method control limit.
RL-3	Reporting limit raised due to high concentrations of non-target analytes.
ND	Analyte NOT DETECTED at or above the reporting limit or MDL, if MDL is specified.
RPD	Relative Percent Difference

ADDITIONAL COMMENTS

For 1,2-Diphenylhydrazine:

The result for 1,2-Diphenylhydrazine is based upon the reading of its breakdown product, Azobenzene.

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

17461 Derian Ave., Suite 100, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3297
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Del Mar Analytical

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Attention: Deborah Foster

Project ID: TTO

Report Number: IOG0857

Sampled: 07/13/05
Received: 07/14/05

Certification Summary

Del Mar Analytical, Irvine

Method	Matrix	Nelac	California
Calculation	Water	X	X
EPA 300.0	Water	X	X
EPA 330.5	Water	X	X
EPA 350.3	Water	X	X
EPA 3510/8082	Water	X	X
EPA 3510C/8081A	Water	X	X
EPA 365.3	Water	X	X
EPA 376.2	Water	X	X
EPA 413.1	Water	X	X
EPA 420.1	Water	X	X
EPA 6010B	Water	X	X
EPA 7470A	Water	X	X
EPA 8260B	Water	X	X
EPA 8270C	Water	X	X
SM2120B	Water	N/A	N/A
SM4500-CN-C,E	Water	X	X
SM4500-NORG,C	Water		X
SM5540-C	Water	X	X

Nevada and NELAP provide analyte specific accreditations. Analyte specific information for Del Mar Analytical may be obtained by contacting the laboratory or visiting our website at www.dmalabs.com.

Subcontracted Laboratories

Del Mar Analytical - Colton *California Cert #1169, Arizona Cert #AZ0062, Nevada Cert #CA-242*
1014 E. Cooley Drive, Suite AB - Colton, CA 92324
Method Performed: EPA 549.2
Samples: IOG0857-01

Test America, Inc.
2960 Foster Creighton Drive - Nashville, TN 37204
Analysis Performed: 8151A (Herbicides)
Samples: IOG0857-01

Del Mar Analytical, Irvine
Kathleen A. Robb
Project Manager

Del Mar Analytical

17461 Derian Ave, Suite 100, Irvine, CA 92614 Ph (949) 261-1022 Fax (949) 261-1228
1014 E. Cooley Dr., Suite A, Colton, CA 92324 Ph (909) 370-4667 Fax (909) 370-1046
9484 Chesapeake Drive, Suite 805, San Diego, CA 92123 Ph (619) 505-9596 Fax (619) 505-9689
9830 South 51st Street, Suite B-120, Phoenix, AZ 85044 Ph (480) 785-0043 Fax (480) 785-0851
2520 E. Sunset Rd., Suite #3, Las Vegas, NV 89120 Ph (702) 798-3620 Fax (702) 798-3621

SUBCONTRACT ORDER - PROJECT # IOG0857

SENDING LABORATORY:	RECEIVING LABORATORY:
Del Mar Analytical, Irvine	Del Mar Analytical - Colton
17461 Derian Avenue. Suite 100	1014 E. Cooley Drive, Suite AB
Irvine, CA 92614	Colton, CA 92324
Phone: (949) 261-1022	Phone :(909) 370-4667
Fax: (949) 261-1228	Fax: (909) 370-1046
Project Manager: Kathleen A. Robb	COG0448

Analysis	Expiration	Due	Comments
Sample ID: IOG0857-01 Water Sampled: 07/13/05 14:00			
549.1-Diquat	07/20/05 14:00	07/25/05 12:00	std TAT- sub to DMAC-see comments

Containers Supplied:
1 L Brown Poly (IOG0857-01V)

SAMPLE INTEGRITY:

All containers intact:	☑ Yes ☐ No	Sample labels/COC agree:	☑ Yes ☐ No	Samples Received On Ice::	☑ Yes ☐ No
Custody Seals Present:	☐ Yes ☐ No	Samples Preserved Properly:	☑ Yes ☐ No	Samples Received at (temp):	6°

Released By	Date	Time	Received By	Date	Time
V. Banly			A. Greco	7-14-05	
Anthony Greco	7-14-05	1500	Ashley Banks	7/14/05	1500

Del Mar Analytical

17461 Derian, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3299
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
9830 South 51st St., Suite B-120, Phoenix AZ 85044 (480) 785-0043 FAX (480) 785-0851
2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

CHAIN OF CUSTODY FORM

Client Name/Address: [illegible]	P.O. #: Project: [illegible]	ANALYSIS REQUIRED
Project Manager/Phone Number: [illegible] Sampler: [illegible]	Phone Number: Fax Number:	

Sample Description	Sample Matrix	Container Type	# of Containers	Sampling Date/Time	Preservation										Special Instructions
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	X	X								
		[illegible]	[illegible]		[illegible]			X							
									X						
										X					
		[illegible]			[illegible]						X				
		[illegible]										X			
		[illegible]	[illegible]										X	X	

Relinquished By	Date/Time:	Received By	Date/Time:	
[illegible]	[illegible]			Turnaround Time: (check) Same Day ______ 72 Hours ______
Relinquished By	Date/Time:	Received By	Date/Time:	24 Hours ______ 5 days ______ 48 hours ______ normal X
Relinquished By	Date/Time:	Received By	Date/Time:	Sample Integrity: (Check) Intact ______ On Ice: ______

Del Mar Analytical

17461 Derian, Irvine, CA 92614 (949) 261-1022 FAX (949) 260-3298
1014 E. Cooley Dr., Suite A, Colton, CA 92324 (909) 370-4667 FAX (909) 370-1046
9484 Chesapeake Dr., Suite 805, San Diego, CA 92123 (858) 505-8596 FAX (858) 505-9689
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2520 E. Sunset Rd. #3, Las Vegas, NV 89120 (702) 798-3620 FAX (702) 798-3621

CHAIN OF CUSTODY FORM

Client Name/Address:	P.O. #: Project:	ANALYSIS REQUIRED
Project Manager/Phone Number: Sampler:	Phone Number: Fax Number:	

Sample Description	Sample Matrix	Container Type	# of Containers	Sampling Date/Time	Preservation										Special Instructions
[illegible]	[illegible]	[illegible]	2	[illegible]	[illegible]	X	X								
		[illegible]			[illegible]			X	X						
		[illegible]			[illegible]					X	X				
		[illegible]			[illegible]							X			
		[illegible]			[illegible]								X		
		[illegible]			[illegible]									X	

Relinquished By	Date/Time:	Received By	Date/Time:	Turnaround Time: (check)
[illegible]	[illegible]			Same Day ______ 72 Hours ______
Relinquished By	Date/Time:	Received By	Date/Time:	24 Hours ______ 5 days ______
				48 hours ______ normal X
Relinquished By	Date/Time:	Received By	Date/Time:	Sample Integrity: (Check)
				Intact ______ On Ice: ______

Del Mar Analytical

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CHAIN OF CUSTODY FORM

Client Name/Address:	P.O. #: Project:	ANALYSIS REQUIRED
Project Manager/Phone Number: Sampler:	Phone Number: Fax Number:	

Sample Description	Sample Matrix	Container Type	# of Containers	Sampling Date/Time	Preservation										Special Instructions

Relinquished By	Date/Time:	Received By	Date/Time:	Turnaround Time: (check)
				Same Day ______ 72 Hours ______
Relinquished By	Date/Time:	Received By	Date/Time:	24 Hours ______ 5 days ______
				48 hours ______ normal ______
Relinquished By	Date/Time:	Received By	Date/Time:	Sample Integrity: (Check)
				Intact ______ On Ice: ______

ATTACHMENT G

EXCERPT FROM 2003 WORKING DRAFT
RISK ASSESSMENT WORKPLAN
FOR THE SIEMENS WATER TECHNOLOGIES CORP.
CARBON REACTIVATION FACILITY:

APPENDIX A
PROTOCOL FOR PROVIDING INFORMATION
FROM THE COLORADO RIVER INDIAN TRIBES TO WESTATES
(PREPARED BY THE COLORADO RIVER INDIAN TRIBES)

APPENDIX A
PROTOCOL FOR PROVIDING INFORMATION FROM THE COLORADO RIVER INDIAN TRIBES TO WESTATES
(Prepared by the Colorado River Indian Tribes)

Westates and/or its Consultants need to provide a written request for risk assessment information to the Colorado River Indian Tribes (CRIT) Attorney Generals (AG) office or its designee.

The CRIT AG office will process the request and determine the disposition of the information requested. The disposition may include one of the following:

a) Non-sensitive standard EPA guidance information

b) Non-sensitive site-specific information

c) Sensitive site-specific information

Information requests that qualify under conditions (a) non-sensitive standard and/or (b) non-sensitive site specific, will be processed as follows:

(1) If the response to Westates request is to be in writing, the CRIT AG office or its designee will determine the appropriate CRIT department or person to respond to the information request. The written response will be provided to the CRIT AG office for review and will be submitted by CRIT AG office to Westates.

(2) If response is to be verbal (i.e., telephone conversation, meeting, etc.), the CRIT AG office will determine the appropriate CRIT department or person for disseminating information. A representative of the CRIT AG office or their designee must be present for all communications. No direct contact can be made without a representative of the AG office present. The CRIT AG office or their designee will provide a written summary of phone call or meeting to Westates.

(3) If the requested information qualifies under condition (c) sensitive site-specific, the AG office will process the information according to the protocol listed under separate cover, entitled, “Process for Evaluating Human and Ecological Health Risks Specific to the Colorado Indian River Tribes”. This is a confidential process designed to achieve the following two objectives:

  (a) To ensure protection of human health and ecological risks specific to cultural, medicinal, and/or spiritual practices of the Colorado River Indian Tribes that may be affected by the Westates facility operations, and

  (b) To ensure the confidentiality of this sensitive information within the tribes.

The CRIT AG office or its designee will prepare an appropriate and relevant written response to Westates for inclusion into all risk assessment documents. This response is intended to satisfy any federal or state risk assessment requirements for the Westates facility operations.

Finally, the intent of this protocol is to ensure that Westates’ information needs are met in an appropriate and timely manner and that the CRIT AG office is completely aware of any information the tribe may provide to Westates and/or its consultants. The CRIT AG office will be responsible for obtaining Tribal Council permission for all information requests.

ATTACHMENT G

EXCERPT FROM 2003 WORKING DRAFT RISK ASSESSMENT WORKPLAN FOR THE SIEMENS WATER TECHNOLOGIES CORP. CARBON REACTIVATION FACILITY

PROCESS FOR EVALUATING HUMAN AND ECOLOGICAL HEALTH RISKS SPECIFIC TO THE COLORADO RIVER INDIAN TRIBES

(Prepared by the Colorado River Indian Tribes)

The US EPA guidance to be used by Westates in conducting risk assessment for the facility is a prescriptive document with a standard set of exposure scenarios to be evaluated for potential human health and ecological risk. It is important that exposures to the tribes specific to cultural, medicinal, and/or spiritual activities or special dietary needs be evaluated in the risk assessment. It is equally important that these sacred practices remain confidential.

In order to adequately assess potential public health and ecological risk to the tribes and maintain strictest confidentiality, the following process will be used.

Human Health

1. ARCADIS risk assessor will design a series of questions to determine potential exposures for CRIT members that may not be accounted for in traditional USEPA risk assessment.
2. Information for this assessment of human health risks to be collected via a confidential questionnaire.
3. A follow up telephone conversation to clarify information and/or to seek additional information will be conducted after receipt of the questionnaires and preliminary review. This follow up will include the ARCADIS risk assessor, and a knowledgeable tribe member or designee. The follow up conversation will be conducted, as appropriate, for each tribe.
4. Human health information to be gathered from each of the tribes, to include, but not limited to the following:
    - plants, soil, animals used in cultural, medicinal, spiritual practices or special dietary needs
    - type of potential exposure during these practices, ie, ingestion, inhalation, and/or dermal contact with plants, soil, animals
    - how often/how long is the exposure (ie, 2 hours a day, every day, or once a year, etc.)
    - how much plant, soil, animal matter is used in the practice (one plant, two plants, only the roots, only leaves, only the animal hide, handful of soil, etc.)
    - type plants and/or animals used in practices
    - multiple exposures, i.e., is an individual likely to be exposed to one or more of these practices.
5. Information to be collated and compared to risk exposure calculations already prescribed in USEPA guidance and/or developed by Westates to determine the following:
    - Is the tribe specific exposure accounted for in the existing EPA guidance?

- If not, and the exposure is significant, can existing EPA guidance be modified?
- If not, exposure equations based on the information from the tribes will be created to assess exposure.

6. All information collected will be held in strictest confidence and returned to the tribe after all final risk assessment evaluations have been made.
7. It will not be necessary for assessment procedures for exact rituals or medicinal recipes be disclosed even to ARCADIS risk assessors.
8. Exposure to receptors due to subsistence fishing, hunting, and agriculture developed by Westates consultants will be reviewed by ARCADIS risk assessor to make sure full exposure is accounted for in the risk assessment.
9. ARCADIS will prepare text for inclusion in the risk assessment. This text is will summarize potential risks relative to tribal-specific cultural, medicinal, and/or spiritual activities or special dietary needs evaluated in the risk assessment. This text will be general and reviewed by Tribal council prior to release to Westates.

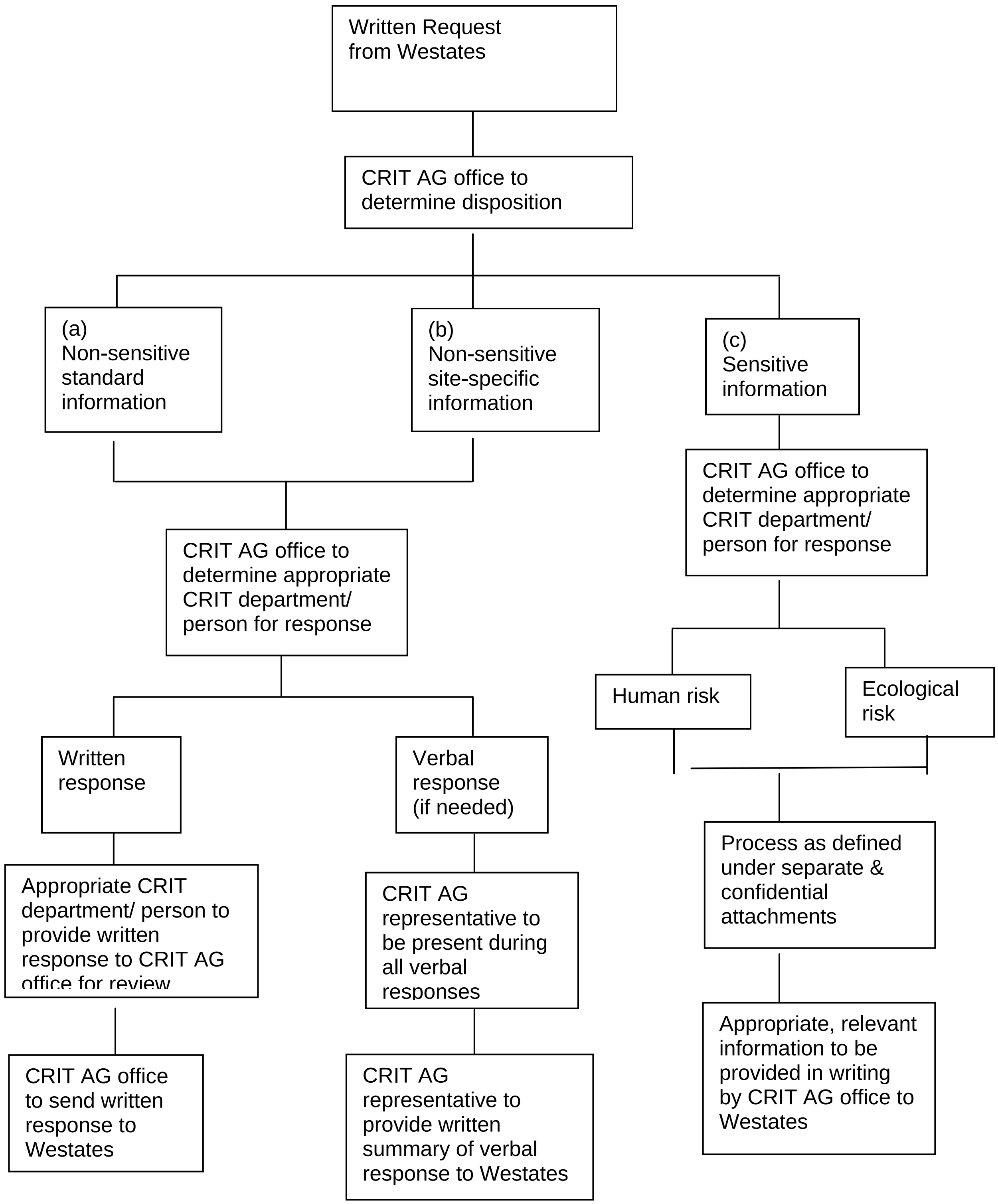
Ecological Health

1. ARCADIS risk assessor to work with tribal environmental officials to identify state and federal threatened and endangered species and species of special concern. The precise locations of prime habitat, nesting areas, etc. do not need to be provided even to ARCADIS. However, all potential critical habitat and threatened and endangered species and species of special concern, need to be identified.
2. ARCADIS will help the tribe prepare confidential survey information to be used in the ecological risk assessment. This may include, but not limited to the following:
    - Review the list of state and federal Threatened and Endangered Species/Species of Special Concern to determine if said species exist on tribal lands
    - Determine nature and extent of critical habitat and/or threatened and endangered species/species of special concern
    - Identify any flora/fauna species of specific tribal concern relative to cultural, medicinal, spiritual practices for each tribe.
    - Determine if existing ecological risk assessment will address all of these special ecological receptors
    - Identify methods for addressing these receptors, e.g. surrogate species, etc. to be included in the ecological risk assessment.
3. ARCADIS will prepare text for inclusion in the risk assessment. This text is will summarize potential risks to threatened and endangered species, species of special concern, and any tribal-specific species relative to cultural, medicinal, and/or spiritual activities. This text will be general and reviewed by Tribal council prior to release to Westates.

ATTACHMENT G

EXCERPT FROM 2003 WORKING DRAFT RISK ASSESSMENT WORKPLAN
FOR THE SIEMENS WATER TECHNOLOGIES CORP.
CARBON REACTIVATION FACILITY

Process Flow Chart
(Prepared by the Colorado River Indian Tribes)



APPENDIX XII

INSPECTON SCHEDULE AND CHECKLISTS

FOR

EVOQUA WATER TECHNOLOGIES

PARKER REACTIVATION FACILITY

PARKER, ARIZONA

Revision 2
April 2014

Evoqua Water Technologies

DAILY RCRA INSPECTION CHECKLIST **40 CFR 264.15**

CONTAINER STORAGE AREA	Acceptable	Unacceptable	Notes
RCRA containers closed during storage			
RCRA containers have required labels			
Check for leaking RCRA containers			
Check storage pad - free of cracks and gaps that would prevent a spill from being contained			
Aisles not blocked and allow inspection			
Sump clean and free of contamination			
Containers in compliance with Subpart CC			

NOTE: Response to Container leaks/spills shall be in accordance with 40 CFR 264.1086(c)(4)(iii).

UNLOADING PAD

Check for cracks/gaps and spills			

STORAGE TANK SYSTEMS/ANCILLIARY EQUIPMENT (SEE GUIDANCE DOCUMENT FOR SPECIFIC DETAILS ON ANCILLARY EQUIPMENT)

T-1 Valves/Leaks/Piping Outside Secondary Containment			
T-1 Tank Corrosion/Signs of Leakage			
T-1 Waste Feed Cutoff (Overfill Control)- Proper Operation			
T-1 construction materials and area immediately surrounding the externally accessible portion of the tank system, including secondary containment system to detect erosion or signs of releases of hazardous waste.			
T-2 Valves/Leaks/Piping Outside Secondary Containment			
T-2 Tank Corrosion/Signs of Leakage			
T-2 Waste Feed Cutoff (Overfill Control) - Proper Operation			
T-2 construction materials and area immediately surrounding the externally accessible portion of the tank system, including secondary containment system to detect erosion or signs of releases of hazardous waste.			
T-5 Valves/Leaks/Piping Outside Secondary Containment			
T-5 Tank Corrosion/Signs of Leakage			
T-5 Waste Feed Cutoff (Overfill Control) - Proper Operation			
T-5 construction materials and area immediately surrounding the externally accessible portion of the tank system, including secondary containment system to detect erosion or signs of releases of hazardous waste.			
T-6 Valves/Leaks/Piping Outside Secondary Containment			
T-6 Tank Corrosion/Signs of Leakage			
T-6 Waste Feed Cutoff (Overfill Control) - Proper Operation			
T-6 construction materials and area immediately surrounding the externally accessible portion of the tank system, including secondary containment system to detect erosion or signs of releases of hazardous waste.			
T-18 Valves/Leaks/Piping			
T-18 Tank Corrosion/Signs of Leakeage			
T-18 Waste Feed Cutoff (Overfill Control) - Proper Operation			
T-18 Internal Tank Integrity/Internal Tank Free of Leaks			
T-18 construction materials and area immediately surrounding the externally accessible portion of the tank system, including secondary containment system to detect erosion or signs of releases of hazardous waste.			

NOTE: Inspections to be conducted according to 40 CFR 264.195. Response to Tank System leaks/spills shall be in accordance with 40 CFR 264.196.

Secondary Containment - Free of Cracks and Gaps			
Secondary Containment Sump - Clean and Free of Contaminants			

Carbon adsorption systems (WS-1, WS-2, WS-3) - Check for leaks, proper operation.			

Evoqua Water Technologies

DAILY RCRA INSPECTION CHECKLIST **40 CFR 264.15**

TRANSFER EQUIPMENT

Hopper H-1 - Leaks/Corrosion			
Hopper H-2 - Leaks/Corrosion			

THERMAL TREATMENT SYSTEM

RF-2 Associated Equipment – Furnace Feed Valve Proper operations and Dewater Screw Corrosion			
RF-2 Associated Equipment - Weigh Belt Corrosion			
Rotary Air Lock			
RF-2 Furnace for leaks and fugitive emissions			
RF-2 Furnace and associated equipment (pumps, valves, conveyors, pipes, etc.) - thorough visual inspection for leaks, spills, fugitive emissions, and signs of tampering.			
RF-2 APC Equipment (Afterburner, Quench/Venturi, Packed bed, WESP, ID Fan, Pumps, etc.) for leaks, drips, spills			
CEMS Operation - Calibration - Proper Working OrderCEMS Operation - Calibration - Proper Working Order including a review of the calibration check data, an inspection of the recording system, an inspection of the control panel warning lights, and an inspection of the sample transport and interface system (e.g., flowmeters, filters, etc.) as appropriate.			
Water Seal Quench Venturi– Inspect for Level/Corrosion			
Process monitoring instrument readouts (Control Room) - Proper Operation			
Alarms - Proper Working Order			

SAFETY EQUIPMENT

Telephone - Proper Working Order			
Lighting - Proper Operation			
SCBA's/Escape Pack - Filled Properly			
Cell Phone - Proper Working Order, charged.			

Date: ____ **Inspector:**____

Evoqua Water Technologies

WEEKLY RCRA INSPECTION CHECKLIST **40 CFR 264.15**

CONTAINER STORAGE AREA	Acceptable	Unacceptable	Notes
RCRA containers closed during storage			
RCRA containers have required labels			
Check for leaking RCRA containers			
Check storage pad - free of cracks and gaps that would prevent a spill from being contained			
Aisles not blocked and allow inspection			

NOTE: Response to Container leaks/spills in accordance with 40 CFR 264.1086(c)(4)(iii).

UNLOADING PAD

Check for cracks/gaps and spills			

FUEL STORAGE

Propane Tank - Proper Working Order			
Gas/Diesel Storage - Proper Storage			
Flammable Cabinet - Grounded/Vents			

SECURITY FENCE

Security Fence - No Breaks/Holes			

DUST COLLECTION SYSTEM

Hopper Dust Collector - Bag Condition/Pressure Drop			

Date: ______________________________ **Inspector:**______________________________

Evoqua Water Technologies

MONTHLY RCRA INSPECTION CHECKLIST — **40 CFR 264.15**

SAFETY EQUIPMENT	Acceptable	Unacceptable	Notes
Eyewash/Shower - Pressure/Sanitation/Walkways Open			
Respirators - Proper Inventory/Inspection			
Spill Control Equipment - Accessable, Inventory			
Paging System - Proper Working Order			
Fire Extinguishers - Pressure Check			
Emergency Lighting - Proper Operation			
Fire Protection System - Alarms/Proper Water Pressure			

WASTE FEED CUT-OFF TEST			
Furnace Feed Rate			
Minimum Afterburner Temperature			
Minimum Venturi/Quench Total Flow			
Minimum Venturi Pressure Drop			
Minimumj Packed Bed pH			
Minimum WESP Secondary Voltage			
Maximum Stack Flow			
Maximum CO Correct to 7% Oxygen			
Maximum Chlorine Feed Rate (12-Hr)			
Maximum Mercury Feed Rate (12-Hr)			
Maximum Semivolatile Feed Rate (Cd+Pb) (12-Hr)			
Maximum Volatile Feed Rate (As + Be + Cr) (12-Hr)			

Date: ____ **Inspector:**____

Evoqua Water Technologies

INSPECTION CHECKLIST - Completed Every 18 Months Maximum

SAFETY EQUIPMENT	Acceptable	Unacceptable	Notes
Furnace Draft Sensor - Check for Buildup and Plugging			
Quench/Venturi Sprays - Visual Inspection			
Quench/Venturi Magnetic Flow Meters Calibration			
Packed Bed Scrubber Sprays Visual Inspection			
Packed Bed Scrubber Packing Inspection Packing Condition			

Date: ____ **Inspector:**____

Inspection Points for Storage Tank Systems
Ancillary Equipment

H1: From the hopper to the warehouse wall there are:
8 – Victaulic Couplings (or equivalent)

T1: From the warehouse wall to the spent carbon storage containment pad:
5 – Victaulic Couplings (or equivalent)

T2: From the warehouse wall to the spent carbon storage containment pad:
5 – Victaulic Couplings (or equivalent)

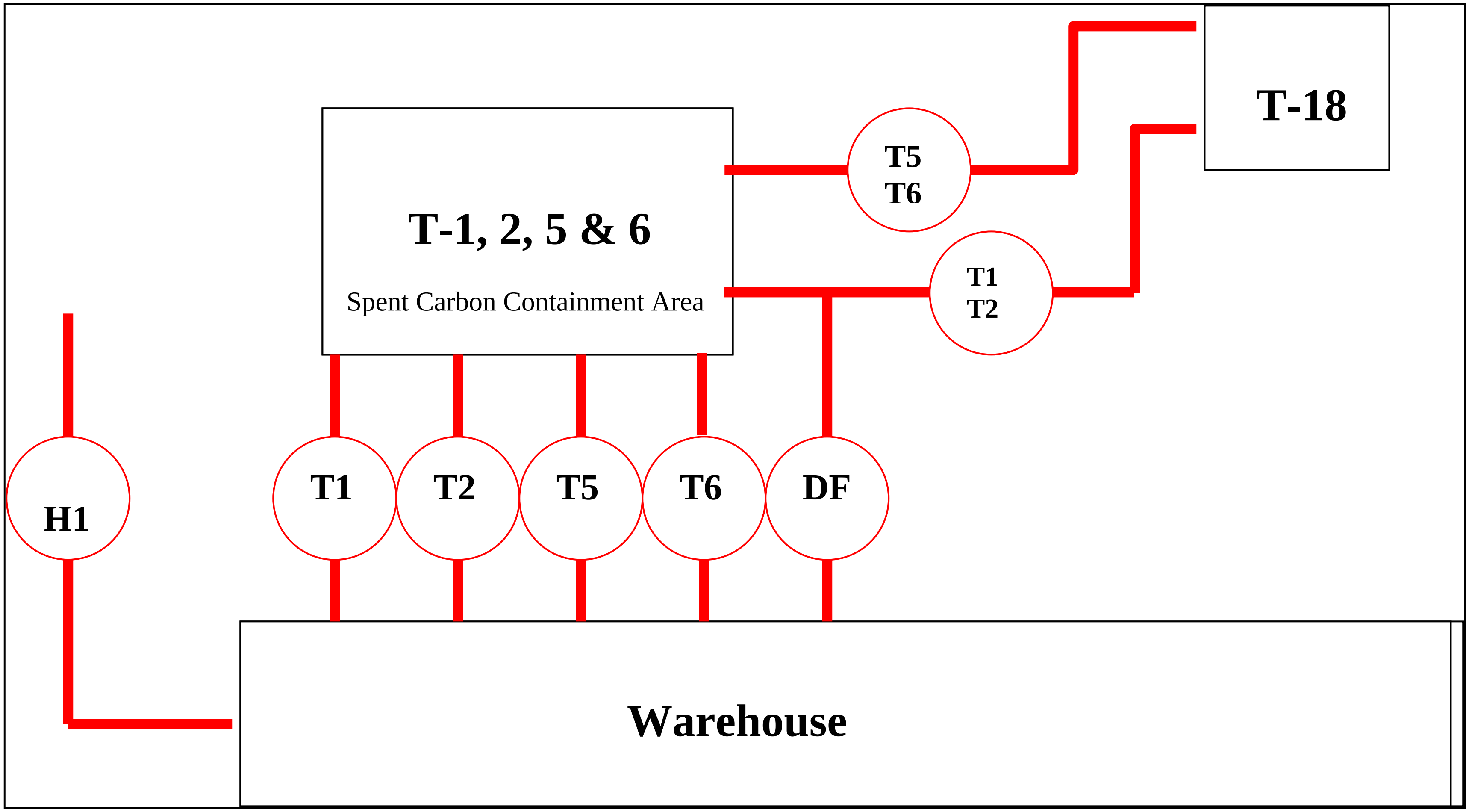
T5: From the warehouse wall to the spent carbon storage containment pad:
6 – Victaulic Couplings (or equivalent)

T6: From the warehouse wall to the spent carbon storage containment pad:
5 – Victaulic Couplings (or equivalent)

T5/6: From the spent carbon storage containment pad to T-18:
13 – Victaulic Couplings (or equivalent)
2 – Ball Valves
1 – Pipe Tee
6 – Welded Flanges
1 – Air Connection
1 – Bushing Reducer

T1/2: From the spent carbon storage containment pad to T-18:
16 – Victaulic Couplings (or equivalent)
2 – Ball Valves
1 – Pipe Tee
6 – Welded Flanges
1 – Air Connection
1 – Sanitary Y Pipe

DF: Direct Feed Bypass line direct from H-2 to T-1 feed line for T-18:
3 – Victaulic Couplings (or equivalent)
1 – Gate Valve
2 – Welded Flanges
2 – Welded Male Cam & Groove Connections
1 – Soft Plumbing with Female Cam & Groove Connections at each end.



Schematic of Piping/Fittings/Couplings to be Inspected

APPENDIX XIII

CONTINGENCY PLAN

Evoqua Water Technologies
2523 Mutahar Street
Parker, Arizona 85344

August 2014
Revision 3

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1.0 INTRODUCTION

The Evoqua Water Technologies (EWT) facility is designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water which could threaten human health or the environment. These conditions are referred to as "emergency situations" throughout this plan.

This Contingency Plan is designed to minimize hazards to human health or the environment in the event of such fires, explosions, or unplanned sudden or non-sudden releases of hazardous waste or hazardous waste constituents to air, soil, or surface water. The provisions of the plan will be carried out immediately whenever such an emergency occurs which could threaten human health or the environment outside the facility boundaries.

The contents of the Contingency Plan are based upon, and meet all criteria set forth in, 40 CFR 264 Subpart D and 40 CFR Part 270.

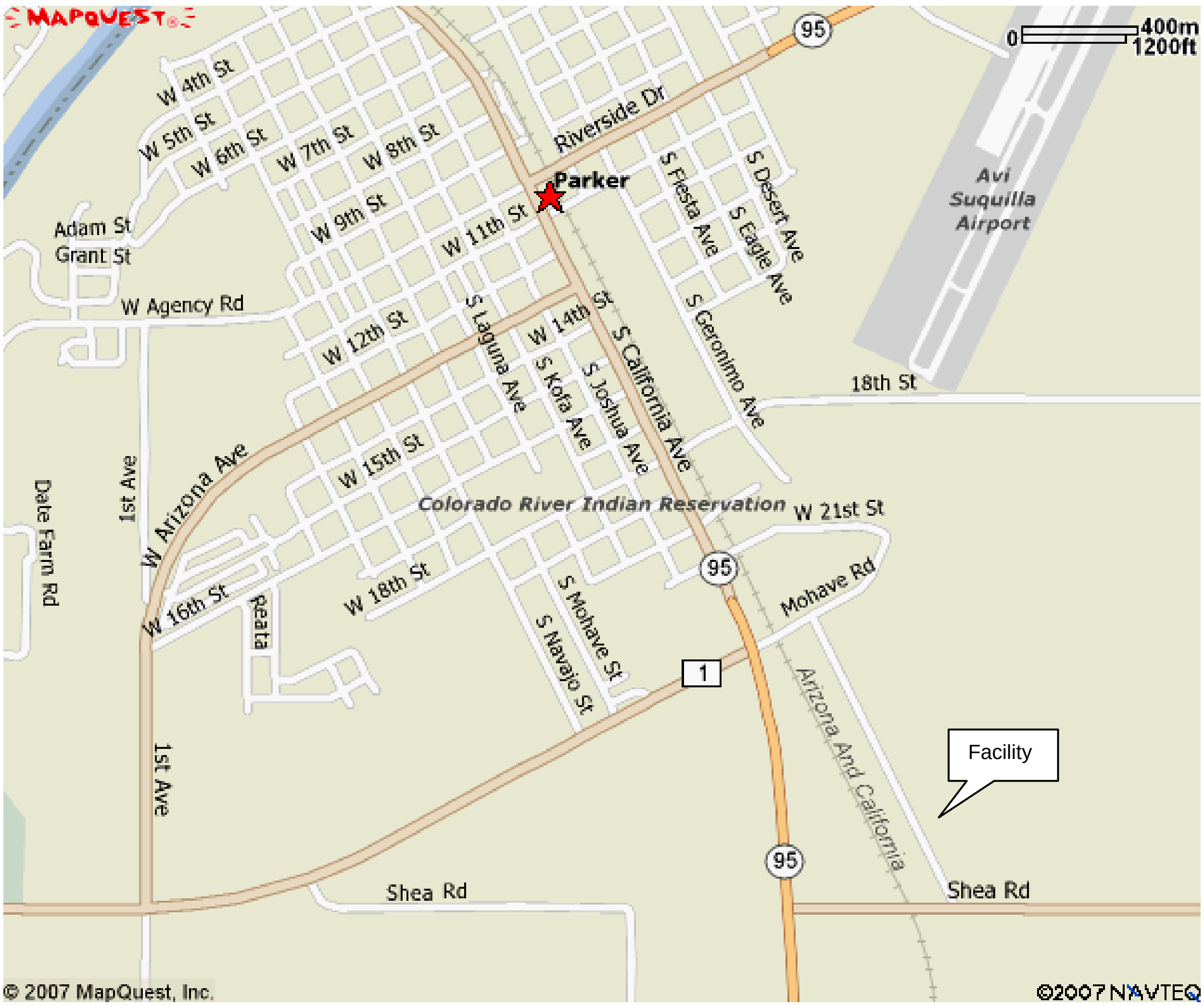
2.0 GENERAL INFORMATION

2.1 FACILITY NAME AND LOCATION

Evoqua Water Technologies
EPA Identification Number – AZD 982 441 263
2523 Mutahar Street
Parker, Arizona 85344
Phone: (928) 669-5758
Fax: (928) 669-5775

Contact: Monte McCue, Director of Plant Operations

The facility is located in the CRIT Industrial Park. A map showing the location is shown below.



2.2 FACILITY OWNER AND OPERATOR

The facility owner and operator is Evoqua Water Technologies The property on which the facility is located is owned by the Colorado River Indian Tribes.

2.3 FACILITY OPERATIONS

Evoqua Water Technologies operates a facility for storage and treatment (reactivation) of used (or "spent") activated carbon. Activated carbon contaminated with a variety of wastes is received and stored at the facility prior to reactivation. Reactivation of spent carbon is currently accomplished in one reactivation unit (RF-2). The facility's capacity during interim status is limited to 2,760 pounds of spent carbon feed per hour.

The reactivation unit will be equipped with an afterburner for the purpose of destroying organic constituents in the off-gas. It will also be equipped with a venturi scrubber for particulate matter control, a packed-bed scrubber for acid-gas control, and a wet electrostatic precipitator for additional particulate matter control. Blowdown from the packed-bed scrubber is permitted for discharge to the local publicly-owned treatment works.

A site plan of the facility is provided in Appendix C. Drawing No. D14789-08 Rev 1 depicts the layout of the facility.

2.4 NATURE OF WASTES

2.4.1 CATEGORIES OF SPENT CARBON

The facility treats spent activated carbon that has typically been used for treating industrial and municipal wastewater, groundwater, surface water, process materials, or for air pollution control.

Constituents in the streams being treated are transported into the porous activated carbon particles by diffusion, where they are adsorbed onto the extensive inner surfaces of the activated carbon. Adsorption continues until the adsorption equilibrium capacity is reached, at which time the influent and effluent concentrations of the constituents in the stream being treated will be equal. However, the purpose of the treatment is to reduce the concentration of certain constituents in the stream being treated and, therefore, it is necessary to replace the activated carbon in the adsorption vessel at or before the point in time when the effluent concentration approaches the treatment objective, which is usually before the activated carbon's equilibrium capacity is reached. The treatment objective is reached either when the activated carbon has been in service for a specified time or when a pre-determined constituent concentration is detected in the effluent stream. The activated carbon is said to be "spent" when the treatment objective is met. Because the treatment objective is to reduce the concentration of certain constituents in the stream being treated, generally only part of the carbon in the adsorption vessel will have reached its equilibrium capacity. Spent carbon can contain approximately 0.3 pounds of adsorbed material per pound of dry carbon at equilibrium capacity.

2.4.2 SPENT CARBON CONSTITUENTS AND EXPECTED CONCENTRATIONS

The facility treats spent activated carbon that has typically been used for treating industrial and municipal wastewater, groundwater, surface water, process materials, or for air pollution control. Constituents in the streams being treated are adsorbed onto the surface and into the internal pores of the activated carbon. The activated carbon is said to be "spent" when it has adsorbed a certain amount of chemicals. The amount of constituents adsorbed will vary from application to application. Historically, the average organic loading data indicate a range of 0.0038 to 0.0071 pounds of organic per pound of dry carbon, with an overall weighted average of 0.0055 pounds of organic per pound of dry carbon.

The number of different regulated constituents adsorbed on the activated carbon from a given source depends on the composition of the stream being treated. The list of organic constituents that may be adsorbed on spent carbon is very extensive, and includes, but is not limited to, volatile organic compounds, polynuclear aromatic hydrocarbons, phthalates, amines, and pesticides. Activated carbon is not customarily used to remove metals from a waste stream, although, low concentrations may be expected in the spent carbon. Actual facility data for the spent activated carbon is included in Tables 2-2 and 2-3. The spent activated carbon will be received, stored and handled as per the Waste Analysis Plan located in the facility's RCRA Part B permit application. The facility will not accept spent carbon containing TSCA-regulated levels of PCBs, infectious wastes, regulated levels of radioactive wastes (as regulated by the Nuclear Regulatory Commission) or spent carbon exhibiting the characteristics of corrosivity or reactivity. Additionally, EWT will not accept spent activated carbon that is classified as a dioxin-listed hazardous wastes (i.e., those carrying EPA Waste Codes F020, F021, F022, F023, F026, and F027).

The generator of the spent carbon and EWT are required to characterize the spent carbon before it is accepted at the facility. EWT will determine whether a particular spent carbon is manageable at the facility based on a review of the pre-acceptance characterization and the generator's determination of the EPA hazardous waste code. Criteria for acceptance of a particular spent carbon are discussed in the Waste Analysis Plan which can be found in Appendix IV of the facility's RCRA Part B permit application. The complete list of RCRA-regulated waste codes acceptable for reactivation at the facility is provided in Table 2-1.

Activated carbon is not customarily used to remove metals from a waste stream, although, low concentrations may be encountered in the spent carbon.

Lists of constituent concentrations (range and mean) expected to be found on spent carbons is provided in Table 2-2 and in Table 2-3. These lists are offered for informational purposes only and are not intended to define the range of constituents, or constituent concentrations that may be received at the facility.

2.4.3 EXPECTED SPENT CARBON HAZARDOUS CHARACTERISTICS

In order for the facility to properly store, manage and treat spent carbon, the hazardous characteristics of the spent carbon need to be identified. The nature and extent of these characteristics guide employee health and safety programs and determine management strategies.

Hazardous characteristics of corrosivity, ignitability, reactivity, and toxicity are defined at 40 CFR Part 261. Spent carbon characterized by the generator as corrosive or reactive is not accepted at the facility.

Spent carbon characterized by the generator as ignitable may be accepted by the facility. Any ignitable waste received by the facility will be mixed with the motive water that is required to transfer the spent carbon into tank storage prior to reactivation to reduce the ignitability of the waste prior to introduction into tank storage and reactivation.

2.4.4 ACCEPTABLE REGULATED WASTES

The hazardous waste codes acceptable for reactivation at the facility are listed and defined in Table 2-1. The complete list of RCRA-regulated wastes that may be adsorbed onto the activated carbon to be processed at the facility is provided in this table. D-series wastes are characteristic wastes, F-series wastes are from non-specific sources, K-series wastes are from specific sources, P-series wastes are acutely hazardous commercial chemical products, and U-series wastes are toxic commercial chemical products.

The only type of waste that the reactivation facility will accept is spent carbon. The facility will not accept spent carbon containing Toxics Substance Control Act (TSCA) - regulated levels of polychlorinated biphenyls (PCBs), F listed dioxin wastes, infectious wastes, radioactive wastes (as regulated by the Nuclear Regulatory Commission) or spent carbon exhibiting the characteristics of corrosivity or reactivity.

3.0 THE CONTINGENCY PLAN

3.1 COPIES

An updated copy of the Contingency Plan will be maintained at the facility administration building file room at all times. In addition, a copy of the plan and copies of all revisions to the plan will be submitted to the following entities that may be called upon to respond to an emergency situation: The Colorado River Indian Tribes Fire Department and Police Department, the Town of Parker Fire Department and Police Department, and the La Paz Regional Hospital. A copy of the contingency plan will also be submitted with the Part B application.

3.2 AMENDMENTS

The Contingency Plan will be reviewed and immediately amended, if necessary, whenever one of the following occurs.

- The facility RCRA Part B permit is revised;
- The plan fails in an emergency;
- The facility changes in its design, construction, operation, maintenance or other circumstances in a way that materially increases the potential for fires, explosions or releases of hazardous waste or hazardous waste constituents or changes the response necessary in an emergency;
- The list of Emergency Coordinators changes; or
- The list of emergency equipment changes.

3.3 TRAINING

Each new employee will be familiarized with the Contingency Plan, including evacuation procedures and emergency response procedures, during the employee's initial orientation. The Contingency Plan training will be documented in the employee's permanent record.

All employees will receive refresher training on the Contingency Plan as necessary. Training sessions will be scheduled after any substantive amendments are made to the plan for those employees who are affected by the amendments.

4.0 RESPONSIBLE AGENCIES

4.1 OFF-SITE RESPONSE AGENCIES

EWT has agreements with several agencies to respond to emergency situations that may require outside assistance. The agencies have received a copy of the Contingency Plan and were familiarized with the layout of the facility including access roads, places where personnel would normally be working, the properties of hazardous wastes handled at the facility and possible evacuation routes. A copy of the acknowledgments with each agency is located in Appendix A.

Below is a list of the response agencies and their responsibilities during an emergency situation.

Colorado River Indian Tribes (C.R.I.T.) Fire Department	**928-662-4388**	Primary Responding Agency Will set up an Incident Command System (ICS) and the senior fire department official would assume the role of Incident Commander. Has authority over all other responding agencies. Responsible for leading all fire fighting efforts, clean-up efforts and evacuation procedures.
C.R.I.T. Police Department	**928-669-9277**	Responsible to C.R.I.T. Fire Department. Will aid in clean-up efforts and evacuation procedures as required.
Parker Fire Department	**928-669-2206**	Responsible to C.R.I.T. Fire Department. Will aid in fire fighting efforts, clean-up efforts and evacuation procedures as required.
Parker Police Department	**928-669-2264**	Responsible to C.R.I.T. Fire Department. Will aid in clean-up efforts and evacuation procedures as required.

4.2 OFF-SITE MEDICAL ASSISTANCE

The medical facility that will handle any casualties occurring during an emergency situation, including paramedic service and hospital care, is:

La Paz Regional Hospital 928-669-9201

The hospital has been familiarized with the properties of hazardous wastes handled at the facility and the types of injuries that could result from fires, explosions or releases at the facility. A copy of the acknowledgment with La Paz Regional Hospital is located in Appendix A.

4.3 OTHER EMERGENCY CONTACTS

The following is a list of other authorities that may be called upon to provide assistance in an emergency situation. All of the agencies would be responsible to the C.R.I.T. Fire Department.

Arizona Highway Patrol	**911**
California Highway Patrol	**911**
Southwest Gas Company	**800-528-4277**
Bureau of Indian Affairs Colorado River Agency (Power Company)	**928-669-7123**
C.R.I.T.	**928-669-9211**
Environmental Compliance Officer	

The following agencies may also be notified in the event of emergency.

U.S. Environmental Protection Agency Region IX	**415-972-4400**
C.R.I.T. Environmental Coordinator	**928-669-9211 OR 928-662-4336**
National Response Center	**800-424-8802**

5.0 EMERGENCY COORDINATOR

5.1 EMERGENCY COORDINATOR AND ALTERNATE

The site has an Emergency Coordinator who is responsible for carrying out the Contingency Plan in the event of an emergency. He/She has the authority to commit any resources needed to carry out the Contingency Plan in an emergency situation. The site also has Alternate Emergency Coordinator(s) who have full authority to perform the functions of the Emergency Coordinator should the Emergency Coordinator be unavailable. In the remaining text, "Emergency Coordinator" will refer to either the Emergency Coordinator or his/her Alternate(s).

The Emergency Coordinator will be on site or on call 24 hours a day. He will normally be at the facility during daytime business hours. If not on site, he will be contacted immediately in the event of an emergency. Until the Emergency Coordinator reaches the site, the Plant Operator will take the role of Acting Emergency Coordinator. If necessary, the Emergency Coordinator will grant the Plant Operator authority to commit the resources needed to carry out the Contingency Plan in his absence.

The Emergency Coordinator, Alternate(s), and Plant Operators will be thoroughly familiar with all aspects of the Contingency Plan, all operations and activities at the facility, the location and characteristics of wastes handled and the location of all records within the facility.

The Emergency Coordinator is:

Name:	**Monte McCue – Director of Operations**
Address:	2523 Mutahar Street; Parker, Arizona
Telephone:	(928) 669-5758
Home Address:	2565 Saratoga Avenue, Lake Havasu City AZ. 86406
Home Phone:	(928)680-7445

The Alternate Emergency Coordinator(s) is:

Name:	**Roy Provins – EHS Manager**
Address:	2523 Mutahar Street; Parker, Arizona
Telephone:	(928) 669-5758
Home Address:	112 South Acoma, Lake Havasu, AZ 86403
Home Phone:	(928) 680-7450
Cell phone:	(724) 799-6667

5.2 EMERGENCY COORDINATOR RESPONSIBILITIES

The Emergency Coordinator is responsible for coordinating the following emergency response measures at the facility in accordance with the requirements of 40 CFR 264.56. If necessary, the Plant Operator will perform Emergency Coordinator functions until the arrival on-site of the Emergency Coordinator. An emergency situation is defined as a fire or explosion, or a significant uncontrolled release of materials that has the potential to threaten human health and the environment.

5.2.1 NOTIFICATION

Whenever there is an imminent or actual emergency situation, the Emergency Coordinator will, where applicable, immediately notify all personnel at the facility via the public address system, alarm system or other direct means, if the public address system is not operational. When hazardous waste is being handled, all employees involved the these activities have immediate access to an internal alarm, or emergency device, either directly or through visual or voice contact with another employee. Communication devices include portable radios, and the site telephone/paging systems located throughout the facility. Employees typically work in pairs when handling hazardous waste.

The Emergency Coordinator will also notify appropriate agencies with designated response roles if their assistance is needed. Section 4.0 contains a list of local agencies and their designated responsibilities.

5.2.2 IDENTIFICATION OF HAZARDOUS MATERIALS

Whenever there is an emergency situation, the Emergency Coordinator will identify, if possible, the character, exact source, amount and a real extent of any spilled or released materials. This may be done by observation, review of facility records, review of manifests or material safety data sheets and, if necessary, by chemical analysis.

5.2.3 ASSESSMENT OF HEALTH EFFECTS

Concurrently, the Emergency Coordinator will assess the possible hazards to human health or the environment that may result from the emergency situation. The assessment will consider both the direct and indirect effects of the release, fire or explosion (e.g., the effects of any toxic, irritating or asphyxiating gases that may be generated or the effects of any hazardous surface water run-off from water or chemical agents used to control fire and heat-induced explosions).

5.2.4 OFF-SITE HEALTH EFFECTS

Should the Emergency Coordinator determine that the emergency situation could threaten human health or the environment outside of the facility boundaries, the Emergency Coordinator will report the findings of his assessments as follows, in accordance with the requirements of 40 CFR 264.56(d):

1) If evacuation of local areas may be advisable, he will immediately notify the Colorado River Indian Tribes Fire Department and the Tribal Environmental Compliance Officer. The Parker Fire Department will be called in by the C.R.I.T Fire Department (see Section 4.0 for a list of off-site emergency response agencies and their responsibilities; see Section 8.0 for evacuation procedures).

2) He will immediately notify the National Response Center at 800-424-8802 and provide the following information:

   - Name and telephone number of reporter
   - Name and address of the facility
   - Time and type of the incident (e.g., fire, explosion or release)
   - Name and quantity of material(s) involved, to the extent known
   - Extent of injuries, if any
   - Possible hazards to human health or the environment outside the facility.

5.2.5 PREVENTION OF SPREAD OR RECURRENCE OF EMERGENCY

It is the responsibility of the Emergency Coordinator during an emergency to take all reasonable measures to ensure that fires, explosions and releases do not occur, recur, or spread to other hazardous wastes at the facility. These measures include, where applicable, stopping operations, collecting and containing released waste and removing or isolating containers.

The Emergency Coordinator will also maintain surveillance of other areas of the facility to make certain they are not affected. Containers may be removed or isolated from the area of the release to prevent contact with released materials or to prevent ignition in the event of a fire. If the facility stops operation in response to an emergency situation, the Emergency Coordinator will monitor the affected areas for imminent hazards (e.g. pressure buildup, ruptured valves or pipes, leaks or gas generation) where appropriate.

5.2.6 CONTAMINATED MATERIALS

After an emergency, the Emergency Coordinator will take all reasonable measures to provide for treating, storing or disposing of recovered waste, contaminated soil or surface water or any other material that results from an emergency situation at the facility. Hazardous wastes will be managed in full compliance with applicable requirements. For example, contaminated materials may be placed in sealed containers and stored within a containment area while the materials are characterized and arrangements are made for proper disposal.

5.2.7 INCOMPATIBLE WASTE AND EMERGENCY EQUIPMENT

In the affected areas of the facility, no hazardous waste that may be incompatible with the contaminated materials will be treated or accepted for storage on site, or disposed of until cleanup procedures are completed. Materials appropriate for use in responding to an emergency include "oil-dry" type sorbents, absorbent boom and barrier materials, activated carbon, sand, water, etc. There are few, if any, reactivity or incompatibility issues associated with the materials treated at the facility. Specific exclusions of reactive wastes are contained in other portions of the permit documents.

5.2.8 COMPLETION OF CLEANUP

In the event the facility is required to stop operations in response to an emergency situation, the emergency equipment used to respond to the emergency situation will be cleaned and/or made fit for its intended use, or replaced, before operations are resumed (see Section 6.0 for a list of emergency equipment and their uses). The Plant Manager will be responsible for notifying EPA and any appropriate local authorities so that the facility has complied with 40 CFR 264.56 (h) and (i) before operations are resumed in the affected areas of the facility. The procedures to be followed before resuming operations are set forth in Section 9.2.

5.2.9 RECORD OF EMERGENCIES

The Emergency Coordinator, or appointed alternate, will record the time, date, and details of any emergency incident in the operating record in accordance with 40 CFR 264.56(i). The Plant Manager is responsible for submitting any required reports (see Section 9.0).

6.0 EMERGENCY EQUIPMENT

A list of all emergency equipment at the Evoqua Water Technologies Parker facility is located in Table 6-1. Appendix D shows the location of all emergency equipment within the facility. All facility communications and alarm systems, fire protection equipment, spill control equipment and decontamination equipment will be tested and maintained as necessary to assure proper operation in time of emergency.

A description of the emergency equipment is provided below.

6.1 FIRE EXTINGUISHERS

EWT has a minimum of nine 10-pound (or greater) ABC dry chemical fire extinguishers located throughout the facility.

6.2 FIRE SPRINKLERS

The main warehouse is equipped with a fire sprinkler system that is automatically activated in the event of a fire. Water pressure checks are included in the monthly inspections and the entire system is inspected annually by an outside firm.

6.3 SPILL CONTROL EQUIPMENT

Absorbent materials and spill cleanup equipment are available in a dedicated storage area at the facility. The spill control kits include the following, at a minimum:

- Inert adsorbents
- Absorbent pads and/or booms
- Shovels
- Neutralizing agents (soda ash and/or lime).

At least one forklift is available for moving palletized absorbent materials and removing containerized spill cleanup residues.

6.4 COMMUNICATIONS EQUIPMENT

It is expected that the facility will be occupied at all times. Telephone service, with a paging system, is available at several locations in the plant. The Emergency Coordinator will remain available (on call) when they are not present at the facility.

When hazardous waste is being handled, all employees involved the these activities have immediate access to an internal alarm, or emergency device, either directly or through visual or voice contact with another employee. Communication devices include portable radios, and the site telephone/paging systems located throughout the facility. Employees typically work in pairs when handling hazardous waste.

6.5 ALARM SYSTEMS

There is a local alarm system with activation points in the storage and warehouse building. The alarm system consists of a control panel located on the west, outside wall of the control room and pull switches separated in four zones. If the alarm sounds, the control panel will display the "zone" (1,2,3 or 4) in which the alarm was pulled. The alarm system provides a warning system at the facility; it is not directly connected to the fire department.

6.6 DECONTAMINATION EQUIPMENT

Two emergency shower and eyewash stations are located in the reactivation area. Detergents are also provided for decontamination of facilities and equipment as necessary. Detergent and water, or water alone, are appropriate decontamination agents for all equipment which may be used in responding to a spill or emergency. Equipment should be thoroughly washed and rinsed, and all decontamination solution will be collected and managed in the facility wastewater treatment system, or sent off-site for disposal.

6.7 OTHER EMERGENCY EQUIPMENT

All waste handling employees are provided with a wide range of personal protective equipment that includes the following.

- Respirators with particulate and organic vapor cartridges
- Self-contained breathing apparatus (minimum of two 30-minute air supply). These units may be used in the event of a major unplanned release of materials such as the rupture of a spent carbon storage tank or a slurry truck. The unit would be used by the employee evaluating the release area for the unlikely presence of toxic fumes.
- Protective clothing (hard hats, gloves, safety glasses, boots)

The facility also has at least one first aid kit to handle injuries that may occur in emergency and non-emergency situations.

TABLE 6-1. EMERGENCY EQUIPMENT

Equipment Type	Quantity (Minimum)	Brand/ Model (or equivalent)	Capabilities/ Specifications
Emergency Alarm w/Four Actuators	1	Fire Lite/ Miniscan 5210 UD	Control panel indicates the zone in which the emergency actuator alarm has been pulled
Emergency Showers/ Eyewashes	2	Encon Model 3581-1900	For flushing eyes and skin
Fire Alarm System - Manual and Automatic	1	Fire Lite	Manual - pull switches; Automatic – when sprinkler system activates
Fire Extinguishers		Amerex	10 pound (or greater) ABC; dry chemical
First Aid Kit	1		General
Protective Clothing - Hard Hats, Gloves, Safety Glasses	Assigned to Each Employee plus Spare Units		
Respirators	Assigned to Each Waste Handling Employee plus Spare Units	Scott/65	With particulate and organic filters
Self-Contained Breathing Apparatus	2	Scott Air Pak 22	30-minute air supply
Spill Control Equipment	1	Spilfyter	95 gallon
Sprinkler Systems	2	Grinnel	314 gpm @ 22.1 psi
Telephones w/Paging System	2	AT&T Partner II	Page throughout plant

7.0 EMERGENCY RESPONSE PROCEDURES

No employee will take an active role responding to an emergency unless they have completed the initial training program for any employee who has the potential to handle hazardous waste as described in the EWT Personnel Training Plan. Any employee who has not completed the program will remain in a clear area as instructed by the Emergency Coordinator until the emergency has passed.

No personnel will respond to an emergency without donning appropriate protective clothing and/or a breathing apparatus, depending on the type of emergency.

The general emergency response procedures for explosions, fires and releases of hazardous waste or hazardous waste constituents are described below. The procedures are summarized in table format in Appendix B.

7.1 EXPLOSIONS AND/OR FIRES

In the event of an explosion or fire, the following actions will be taken, as appropriate.

1) Any person discovering a fire/explosion will immediately sound the alarm and contact the Plant Operator. They will also determine the nature and source of the fire and correct it to the extent that they can do so without significant risk to him/herself or others.

2) The Plant Operator will contact the Emergency Coordinator and will assist in contacting appropriate emergency response agencies (see Section F.3) as determined necessary by the Emergency Coordinator. If Evoqua Water Technologies capabilities are not adequate to extinguish the fire, the C.R.I.T. Fire Department will be notified immediately by dialing (928)662-4388.

3) The Emergency Coordinator shall:

    - Remove all nonessential personnel and equipment from the vicinity of the fire

    - Access available equipment, supplies and trained personnel for use in responding to the incident

    - Utilize trained personnel and/or allow fire department personnel to control and/or extinguish any fire and reduce the chance of further fires or explosion

    - Determine the cause of the explosion or fire and correct it

    - Close down all or part of the facility, if necessary.

4) As long as there is no significant risk to themselves or others, trained employees shall:

   - Shut off the fuel source to the fire, if possible

   - Attempt to control the fire with dry chemical fire extinguishers (for Class A, B and C fires) and/or water (for Class A fires)

   - Shut off any operating equipment, treatment processes, etc. in the vicinity of the fire

   - Shut off electrical power in the area affected by the fire

   - If flammable materials are involved, remove all sources of ignition in the vicinity of the fire.

7.2 RELEASES OF HAZARDOUS WASTE

The response procedures described below are for the release of hazardous waste or hazardous waste constituents to the air or solid/liquid releases to the ground. Special considerations are made based on the location (inside or outside of a containment area) and amount of the release.

7.2.1 RELEASE OF TOXIC EMISSIONS

If there is any indication of the possible presence of toxic fumes that constitute an emergency, the following actions will be taken as appropriate.

1) Any person discovering the fumes or possible presence of fumes will determine the nature, source and location of the fumes and, if appropriate, immediately sound the nearest facility alarm horn or announce the emergency via the plant intercom system and notify the Plant Operator. The person will then correct the problem, if possible without significant risks to themselves or others.

2) The Plant Operator will immediately contact the Emergency Coordinator, or if not available, one of the alternate Emergency Coordinators.

3) If an emergency situation is verified, operations will cease and all personnel will be removed to a well-ventilated location until the situation is corrected. All trained personnel that may assist in correcting the source of the fumes will wear proper respiratory equipment and follow confined space entry procedures.

4) The Emergency Coordinator shall:

- Immediately assess the possible hazards and implement additional emergency procedures if applicable
- Contact the C.R.I.T. Fire Department and the National Response Center if the release could threaten human health or the environment outside of the facility
- Notify the C.R.I.T. Environmental Compliance Officer who may make other State and local notifications at his discretion
- Remove all nonessential personnel and equipment from the vicinity of the fire
- Access available equipment, supplies and trained personnel for use in responding to the incident
- Utilize trained personnel to control and/or reduce the chance of further release
- Determine the cause of the release and correct it
- Close down all or part of the facility, if necessary.

5) As long as there is no significant risk to themselves or others, and if the action is warranted by the emergency situation, trained employees shall:

   - Discontinue the waste transfer operation by closing appropriate valves and de-energizing transfer equipment
   - Secure the lids on any open waste containers
   - Remove all sources of ignition from the area.

7.2.2 RELEASE OF SOLIDS

7.2.2.1 WITHIN CONTAINMENT AREA

The following steps are to be taken by trained personnel in the event of a release of solid material that constitutes an emergency situation within the containment area.

1) Locate the source and stop the release.

2) Notify the Plant Operator of the emergency situation, who will in turn notify the Emergency Coordinator.

3) Clean up the released material and place in a container. Take filled container to the spent carbon storage area and label properly.

4) Decontaminate the area of the spill.

5) Clean any tools used during clean up (with detergents if necessary). The cleaning solution will be containerized or rinsed to the sump.

6) The Emergency Coordinator will inspect the area to identify any further clean-up requirements and provide instructions related to the disposition of the released materials placed in containers.

7.2.2.2 OUTSIDE CONTAINMENT AREA

The following steps are to be taken by trained personnel in the event of a release of solid material that constitutes an emergency situation outside the containment area.

1) Locate the source and stop the release.

2) Notify the Plant Operator of the emergency situation, who will in turn notify the Emergency Coordinator.

3) The Emergency Coordinator will immediately contact the C.R.I.T. Fire Department and the National Response Center if the release could threaten human health or the environment outside the facility.

4) Clean up the released material, and any other materials in the release area that may have come in contact with the released material, and place in a container. Take filled container to the spent carbon storage area and label properly.

5) Clean any tools used during clean up (with detergents if necessary) inside the containment area. The cleaning solution will be containerized or rinsed to the sump.

6) The Emergency Coordinator will inspect the area to identify any further clean-up requirements and provide instructions related to the disposition of the released materials placed in containers.

7.2.3 RELEASE OF LIQUIDS

7.2.3.1 WITHIN CONTAINMENT AREA

The following steps are to be taken in the event of a liquid release that constitutes an emergency situation within the containment area.

1) Locate the source and stop the release, if possible.

2) Notify the Plant Operator of the emergency situation, who will in turn notify the Emergency Coordinator.

3) Allow free liquids to flow to the nearest sump. After as much free liquid as possible has been drained to the sump, place any remaining solid material in a container. Take filled container to the spent carbon storage area and label properly.

4) Decontaminate the area of the spill, directing water to the nearest sump.

5) Clean any tools used during clean up (with detergents if necessary). The cleaning solution will be containerized or rinsed to the sump.

6) The Emergency Coordinator will inspect the area to identify any further clean-up requirements and provide instructions related to the disposition of the released materials placed in containers.

7.2.3.2 OUTSIDE CONTAINMENT AREA

The following steps are to be taken in the event of a liquid release outside the containment area that constitutes an emergency situation.

1) Locate the source and stop the release, if possible.

2) Notify the Plant Operator of the emergency situation, who will in turn notify the Emergency Coordinator.

3) The Emergency Coordinator will coordinate the following actions:

   - The contacting of any appropriate emergency response agencies

   - The removal of all nonessential personnel and equipment from the vicinity of release

   - The provision of equipment and supplies appropriate for use in responding to the incident

   - The utilization of trained personnel and equipment and/or fire department personnel to contain the release in the smallest possible area. Adsorbents, earth and/or containment boom material may be used as appropriate

   - The immediate notification of the C.R.I.T. Fire Department and the National Response Center if a release could threaten human health or the environment outside the facility. Also, the C.R.I.T. Environmental Coordinator must be notified if a spill contacts or threatens surface waters off site.

- The initiation of shutdown of all or part of the facility, if warranted

- The collection of released material, any soil that came into contact with the released material and any adsorbents in containers. The containers will be placed in the spent carbon storage area and labeled properly.

- The inspection of the release area to ensure it is properly cleaned

- The determination of final disposition of any materials placed in containers during the clean-up.

4) Clean any tools used during clean up (with detergents if necessary) inside the containment area. The cleaning solution will be containerized or rinsed to the sump.

7.3 PERSONAL INJURY

Should a person be injured for any reason, immediate steps will be taken to determine the cause and extent of the injury and to apply first aid and/or decontamination if appropriate. A EWT management official will be notified immediately and the paramedics will be called if the injury requires it. If the injured person needs hospital care, they will be transported to the La Paz Regional Hospital. If exposure to a hazardous waste is involved, a copy of the manifest (where applicable), together with any appropriate safety data, will be sent with the injured person. The Emergency Coordinator will remain available for consultation.

In accordance with company policy, any person who receives an on-the-job injury will be required to report the injury to EWT management.

8.0 EVACUATION PROCEDURES

In the event that an emergency situation would pose an imminent threat to personnel health, life or safety, the Emergency Coordinator will evacuate the facility or portions of the facility affected by the incident. If evacuation is warranted, the Emergency Coordinator will advise local public safety agencies of the potential threat to persons in the vicinity of the facility. In all cases when the local fire or police departments respond, the Emergency Coordinator will cooperate fully and comply with their instructions.

8.1 EVACUATION ALERT

All personnel will be alerted by voice over the plant public address system, plant alarm system or directly by supervisory personnel if an accident or incident occurs which requires evacuation of the facility. Employees will be advised immediately if evacuation is required as determined by criteria in Section 8.2 and will be directed to leave via established routes to the designated assembly point. Evacuation routes and the designated assembly point are shown in Appendix E.

8.2 EVACUATION SITUATIONS

Situations that would warrant partial or complete evacuation of the facility are as follows.

8.2.1 Explosions

An actual or imminent explosion would require an evacuation due to potential toxic emissions, heat, pressure and flying debris. At a minimum, personnel will evacuate to the designated assembly point. A greater distance from the hazard or potential hazard may be warranted due to flying debris or toxic fumes or may be requested by the responding C.R.I.T. Fire Department.

8.2.2 Releases or Adverse Chemical Reactions

The major threat from releases or adverse chemical reactions is the potential formation of toxic fumes. All personnel without appropriate respiratory protection equipment will be evacuated in an upwind direction to a point where they are clear of the fumes.

8.2.3 Fire

Fire presents a hazard because of heat and potentially toxic fumes. All personnel not responding to the emergency will evacuate to the designated assembly point. Personnel assisting in the fire fighting efforts will respond to instructions from the C.R.I.T. Fire Department, as necessary.

8.2.4 All Other Incidents

All personnel will be evacuated from the facility and vicinity whenever their personal health and safety cannot be adequately protected.

9.0 REPORTING AND RECORDKEEPING REQUIREMENTS

9.1 OFF-SITE THREATS [40 CFR 264.56(d)]

If an emergency threatens human health or the environment outside the facility boundaries, the Emergency Coordinator will immediately notify the National Response Center as described in Section 5.2.4.

9.2 OPERATING RECORD [40 CFR 264.54, 264.56(i)]

EWT will make a note in the operating record to include the time, date and details of any incident deemed to be an emergency situation that requires the implementation of the Contingency Plan.

The contingency plan will be reviewed, and immediately amended, if necessary, whenever:

- The facility permit is revised;
- The plan fails in an emergency;
- The facility changes—in its design, construction, operation, maintenance, or other circumstances—in a way that materially increases the potential for fires, explosions, or releases of hazardous waste or hazardous waste constituents, or changes the response necessary in an emergency;
- The list of emergency coordinators changes; or
- The list of emergency equipment changes.

9.3 INCIDENT REPORTING [40 CFR 264.56(i)]

Within 15 days after an incident deemed to be an emergency situation that requires implementation of the Contingency Plan, EWT will submit a written report to the U.S. EPA Region IX office. The report will include, at a minimum, the following:

- Name, address and telephone number of the owner or operator
- Name, address and telephone number of the facility
- Date, time and type of incident (e.g., fire, explosion)
- Name and quantity of material(s) involved
- The extent of injuries, if any
- An assessment of actual or potential hazards to human health or the environment, where applicable
- Estimated quantity and disposition of recovered material that resulted from the incident.

9.4 RELEASES TO THE ENVIRONMENT

EWT will report any release to the environment, that may impact human health or the environment, from hazardous waste tank systems or secondary containment systems, to the Regional Administrator within 24 hours of its detection.

If the cause of the release was a spill that has not damaged the integrity of the system, it may be returned to service as soon as the released waste is removed and repairs, if necessary, are made.

If the cause of the release was a leak from the primary tank system into the secondary containment system, the system must be repaired prior to returning the tank system to service.

APPENDIX A

RESPONSE AGENCY ACKNOWLEDGMENTS

SIEMENS Industry

The Siemens Industry, Inc. Contingency Plan for the Parker, AZ facility outlines the following:

1. Layout of the facility
2. Properties of the waste handled at the facility and associated hazards
3. Entrances to the facility
4. Exits from the facility
5. Possible evacuation routes

Attached to this document is a copy of the most recent Contingency Plan for your files. Please be aware that the Colorado River Indian Tribes (CRIT) Fire Department will establish an Incident Command System in the event of a facility emergency.

Organization: PARKER PD

Printed Name: SGT MIKE THOMPSON

Signature: Mike Thompson

Date: 5/6/12

Please acknowledge the receipt of the Contingency Plan by signing, dating and returning this letter to the facility.

Siemens Industry, Inc.
2523 Mutahar Street
Parker, AZ 85344
USA
Tel: +1 928-669-5758
Fax: +1 928-669-5775
www.siemens.com/water

SIEMENS

Industry

RECEIVED JUL 2 3 2012

The Siemens Industry, Inc. Contingency Plan for the Parker, AZ facility outlines the following:

1. Layout of the facility
2. Properties of the waste handled at the facility and associated hazards
3. Entrances to the facility
4. Exits from the facility
5. Possible evacuation routes

Attached to this document is a copy of the most recent Contingency Plan for your files. Please be aware that the Colorado River Indian Tribes (CRIT) Fire Department will establish an Incident Command System in the event of a facility emergency.

Organization: Colorado River Indian Tribes - Law Enforcement Services

Printed Name: Richard M. Armstrong, Chief of Police

Signature: Richard M. Armstrong

Date: 7/18/12

Please acknowledge the receipt of the Contingency Plan by signing, dating and returning this letter to the facility.

SIEMENS Industry

The Siemens Industry, Inc. Contingency Plan for the Parker, AZ facility outlines the following:

1. Layout of the facility
2. Properties of the waste handled at the facility and associated hazards
3. Entrances to the facility
4. Exits from the facility
5. Possible evacuation routes

Attached to this document is a copy of the most recent Contingency Plan for your files. Please be aware that the Colorado River Indian Tribes (CRIT) Fire Department will establish an Incident Command System in the event of a facility emergency.

Organization: C.R.I.T. FIRE DEPARTMENT

Printed Name: TERRILYNN LITTLE

Signature: Terrilynn Little

Date: 4-20-2012

Please acknowledge the receipt of the Contingency Plan by signing, dating and returning this letter to the facility.

Siemens Industry, Inc.

2523 Mutahar Street
Parker, AZ 85344
USA

Tel: +1 928-669-5758
Fax: +1 928-669-5775
www.siemens.com/water

SIEMENS Industry

The Siemens Industry, Inc. Contingency Plan for the Parker, AZ facility outlines the following:

1. Layout of the facility
2. Properties of the waste handled at the facility and associated hazards
3. Entrances to the facility
4. Exits from the facility
5. Possible evacuation routes

Attached to this document is a copy of the most recent Contingency Plan for your files. Please be aware that the Colorado River Indian Tribes (CRIT) Fire Department will establish an Incident Command System in the event of a facility emergency.

Organization: LA Paz Regional Hospital

Printed Name: M Victoria Clark

Signature: [signature]

Date: 4/23/12

Please acknowledge the receipt of the Contingency Plan by signing, dating and returning this letter to the facility.

Siemens Industry, Inc.

2523 Mutahar Street
Parker, AZ 85344
USA

Tel: +1 928-669-5758
Fax: +1 928-669-5775
www.siemens.com/water

Shipment Receipt

Transaction Date: 19 Apr 2012 **Tracking Number:** 1ZA9520E2493206168

1 Address Information

Ship To:	Ship From:	Return Address:
La Paz County LEPC Steve Biro (or successor) 1108 Joshua Avenue PARKER AZ 853445735	Siemens Industry, Inc. Michelle Goodman 2523 Mutahar Street Traffic Controller Office/Side Door Parker AZ 85344 Telephone:928-669-5758 x10	Siemens Industry, Inc. Michelle Goodman 2523 Mutahar Street Traffic Controller Office/Side Door PARKER AZ 85344 Telephone:928-669-5758 x10

2 Package Information

	Weight	Dimensions / Packaging	Declared Value	Reference Numbers
1.	Letter	UPS Letter		Reference#1 - Contingency Plan

3 UPS Shipping Service and Shipping Options

Service:	UPS Next Day Air
Guaranteed By:	End of Day Friday, Apr 20, 2012
Shipping Fees Subtotal:	22.80 USD
Transportation	18.00 USD
Fuel Surcharge	2.80 USD
Delivery Area Surcharge- Extended	
Package 1	2.00 USD

Additional Shipping Options

Delivery Confirmation:	
Package 1: Signature Required	3.50 USD
Total Shipping Charges	**26.30 USD**

4 Payment Information

Bill Shipping Charges to: Shipper's Account A9520E

A discount has been applied to the Daily rates for this shipment

Total Charged:	**26.30 USD**
Negotiated Total:	**12.98 USD**

Note: Your invoice may vary from the displayed reference rates.
* For delivery and guarantee information, see the UPS Service Guide. To speak to a customer service representative, call 1-800-PICK-UPS for domestic services and 1-800-782-7892 for international services.

Responsibility for Loss or Damage
Unless a greater value is recorded in the declared value field as appropriate for the UPS shipping system used, the shipper agrees that the released value of each package covered by this receipt is no greater than $100, which is a reasonable value under the circumstances surrounding the transportation. If additional protection is desired, a shipper may increase UPS's limit of liability by declaring a higher value and paying an additional charge. UPS does not accept for transportation and shipper's requesting service through the Internet are prohibited from shipping packages with a value of more than $50,000. The maximum liability per package assumed by UPS shall not exceed $50,000, regardless of value in excess of the maximum. Claims not made within nine months after delivery of the package (sixty days for international shipments), or in the case of failure to make delivery, nine months after a reasonable time for delivery has elapsed (sixty days for international shipments), shall be deemed waived. The entry of a C.O.D. amount is not a declaration of value for carriage purposes. All checks or other negotiable instruments tendered in payment of C.O.D. will be accepted by UPS at shipper's risk. UPS shall not be liable for any special, incidental, or consequential damages. All shipments are subject to the terms and conditions contained in the UPS Tariff and the UPS Terms and Conditions of Service, which can be found at www.ups.com.

Shipment Receipt

Transaction Date: 19 Apr 2012 **Tracking Number:** 1ZA9520E2490171559 ✓

1 Address Information

Ship To:	Ship From:	Return Address:
CRIT Fire Department Terylyn Little (or Successor) 23701 Mohave Avenue PARKER AZ 853447700	Siemens Industry, Inc. Michelle Goodman 2523 Mutahar Street Traffic Controller Office/Side Door Parker AZ 85344 Telephone:928-669-5758 x10	Siemens Industry, Inc. Michelle Goodman 2523 Mutahar Street Traffic Controller Office/Side Door PARKER AZ 85344 Telephone:928-669-5758 x10

2 Package Information

	Weight	Dimensions / Packaging	Declared Value	Reference Numbers
1.	Letter	UPS Letter		Reference#1 - Contingency Plan

3 UPS Shipping Service and Shipping Options

Service: UPS Next Day Air
Guaranteed By: End of Day Friday, Apr 20, 2012

Shipping Fees Subtotal:	22.80 USD
Transportation	18.00 USD
Fuel Surcharge	2.80 USD
Delivery Area Surcharge- Extended	
Package 1	2.00 USD

Additional Shipping Options

Delivery Confirmation:	
Package 1: Signature Required	3.50 USD
Total Shipping Charges	26.30 USD

4 Payment Information

Bill Shipping Charges to: Shipper's Account A9520E

A discount has been applied to the Daily rates for this shipment

Total Charged:	26.30 USD
Negotiated Total:	12.98 USD

Note: Your invoice may vary from the displayed reference rates.
* For delivery and guarantee information, see the UPS Service Guide. To speak to a customer service representative, call 1-800-PICK-UPS for domestic services and 1-800-782-7892 for international services.

Responsibility for Loss or Damage
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Shipment Receipt

Transaction Date: 19 Apr 2012 **Tracking Number:** 1ZA9520E2490481330

1 Address Information

Ship To:	Ship From:	Return Address:
Parker Fire Department Chief Johnny Rather 1101 Arizona Avenue PARKER AZ 853445743	Siemens Industry, Inc. Michelle Goodman 2523 Mutehar Street Traffic Controller Office/Side Door Parker AZ 85344 Telephone:928-669-5758 x10	Siemens Industry, Inc. Michelle Goodman 2523 Mutahar Street Traffic Controller Office/Side Door PARKER AZ 85344 Telephone:928-669-5758 x10

2 Package Information

	Weight	Dimensions / Packaging	Declared Value	Reference Numbers
1.	Letter	UPS Letter		Reference#1 - Contingency Plan

3 UPS Shipping Service and Shipping Options

Service: UPS Next Day Air
Guaranteed By: End of Day Friday, Apr 20, 2012

Shipping Fees Subtotal:	22.80 USD
Transportation	18.00 USD
Fuel Surcharge	2.80 USD
Delivery Area Surcharge- Extended	
Package 1	2.00 USD

Additional Shipping Options

Delivery Confirmation:

· Package 1: Signature Required	3.50 USD
Total Shipping Charges	26.30 USD

4 Payment Information

Bill Shipping Charges to: Shipper's Account A9520E

A discount has been applied to the Daily rates for this shipment

Total Charged:	26.30 USD
Negotiated Total:	12.98 USD

Note: Your invoice may vary from the displayed reference rates.

*.For delivery and guarantee information, see the UPS Service Guide. To speak to a customer service representative, call 1-800-PICK-UPS for domestic services and 1-800-782-7892 for international services.

Responsibility for Loss or Damage

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Shipment Receipt

Transaction Date: 19 Apr 2012 **Tracking Number:** 1ZA9520E2491229941 ✓

1 Address Information

Ship To:	Ship From:	Return Address:
CRIT Police Department Chief R. Armstrong (or sucessor) 26600 Mohave Road PARKER AZ 853447737	Siemens Industry, Inc. Michelle Goodman 2523 Mutahar Street Traffic Controller Office/Side Door Parker AZ 85344 Telephone:928-669-5758 x10	Siemens Industry, Inc. Michelle Goodman 2523 Mutahar Street Traffic Controller Office/Side Door PARKER AZ 85344 Telephone:928-669-5758 x10

2 Package Information

	Weight	Dimensions / Packaging	Declared Value	Reference Numbers
1.	Letter	UPS Letter		Reference#1 - Contingency Plan

3 UPS Shipping Service and Shipping Options

Service: UPS Next Day Air
Guaranteed By: End of Day Friday, Apr 20, 2012

Shipping Fees Subtotal:	22.80 USD
Transportation	18.00 USD
Fuel Surcharge	2.80 USD
Delivery Area Surcharge- Extended	
Package 1	2.00 USD

Additional Shipping Options

Delivery Confirmation:	
Package 1: Signature Required	3.50 USD
Total Shipping Charges	26.30 USD

4 Payment Information

Bill Shipping Charges to: Shipper's Account A9520E

A discount has been applied to the Daily rates for this shipment

Total Charged:	26.30 USD
Negotiated Total:	12.98 USD

Note: Your invoice may vary from the displayed reference rates.
* For delivery and guarantee information, see the UPS Service Guide. To speak to a customer service representative, call 1-800-PICK-UPS for domestic services and 1-800-782-7892 for international services.

Responsibility for Loss or Damage
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Shipment Receipt

Transaction Date: 19 Apr 2012 **Tracking Number:** 1ZA9520E2492025721

1 Address Information

Ship To:	Ship From:	Return Address:
Parker Police Department Sgt. Thompson (or successor) 1314 11th Street PARKER AZ 853445615	Siemens Industry, Inc. Michelle Goodman 2523 Mutahar Street Traffic Controller Office/Side Door Parker AZ 85344 Telephone:928-669-5758 x10	Siemens Industry, Inc. Michelle Goodman 2523 Mutahar Street Traffic Controller Office/Side Door PARKER AZ 85344 Telephone:928-669-5758 x10

2 Package Information

	Weight	Dimensions / Packaging	Declared Value	Reference Numbers
1.	Letter	UPS Letter		Reference#1 - Contingency Plan

3 UPS Shipping Service and Shipping Options

Service:	UPS Next Day Air	
Guaranteed By:	End of Day Friday, Apr 20, 2012	
Shipping Fees Subtotal:		22.80 USD
Transportation		18.00 USD
Fuel Surcharge		2.80 USD
Delivery Area Surcharge- Extended		
Package 1		2.00 USD

Additional Shipping Options

Delivery Confirmation:	
Package 1: Signature Required	3.50 USD
Total Shipping Charges	**26.30 USD**

4 Payment Information

Bill Shipping Charges to: Shipper's Account A9520E

A discount has been applied to the Daily rates for this shipment

Total Charged:	**26.30 USD**
Negotiated Total:	**12.98 USD**

Note: Your invoice may vary from the displayed reference rates.

* For delivery and guarantee information, see the UPS Service Guide. To speak to a customer service representative, call 1-800-PICK-UPS for domestic services and 1-800-782-7892 for international services.

Responsibility for Loss or Damage

Unless a greater value is recorded in the declared value field as appropriate for the UPS shipping system used, the shipper agrees that the released value of each package covered by this receipt is no greater than $100, which is a reasonable value under the circumstances surrounding the transportation. If additional protection is desired, a shipper may increase UPS's limit of liability by declaring a higher value and paying an additional charge. UPS does not accept for transportation and shipper's requesting service through the Internet are prohibited from shipping packages with a value of more than $50,000. The maximum liability per package assumed by UPS shall not exceed $50,000, regardless of value in excess of the maximum. Claims not made within nine months after delivery of the package (sixty days for international shipments), or in the case of failure to make delivery, nine months after a reasonable time for delivery has elapsed (sixty days for international shipments), shall be deemed waived. The entry of a C.O.D. amount is not a declaration of value for carriage purposes. All checks or other negotiable instruments tendered in payment of C.O.D. will be accepted by UPS at shipper's risk. UPS shall not be liable for any special, incidental, or consequential damages. All shipments are subject to the terms and conditions contained in the UPS Tariff and the UPS Terms and Conditions of Service, which can be found at www.ups.com.

Shipment Receipt

Transaction Date: 19 Apr 2012 **Tracking Number:** 1ZA9520E2493393500

1 Address Information

Ship To:	Ship From:	Return Address:
CRIT EPO Guthria Dick 26600 Mohave Road PARKER AZ 853447737	Siemens Industry, Inc. Michelle Goodman 2523 Mutahar Street Traffic Controller Office/Side Door Parker AZ 85344 Telephone:928-669-5758 x10	Siemens Industry, Inc. Michelle Goodman 2523 Mutahar Street Traffic Controller Office/Side Door Parker AZ 85344 Telephone:928-669-5758 x10

2 Package Information

	Weight	Dimensions / Packaging	Declared Value	Reference Numbers
1.	Letter	UPS Letter		Reference#1 - Contingency Plan

3 UPS Shipping Service and Shipping Options

Service:	UPS Next Day Air
Guaranteed By:	End of Day Friday, Apr 20, 2012
Shipping Fees Subtotal:	22.80 USD
Transportation	18.00 USD
Fuel Surcharge	2.80 USD
Delivery Area Surcharge- Extended	
Package 1	2.00 USD

Additional Shipping Options

Delivery Confirmation:	
Package 1: Signature Required	3.50 USD
Total Shipping Charges	**26.30 USD**

4 Payment Information

Bill Shipping Charges to: Shipper's Account A9520E

A discount has been applied to the Daily rates for this shipment

Total Charged:	**26.30 USD**
Negotiated Total:	**12.98 USD**

Note: Your invoice may vary from the displayed reference rates.
* For delivery and guarantee information, see the UPS Service Guide. To speak to a customer service representative, call 1-800-PICK-UPS for domestic services and 1-800-782-7892 for international services.

Responsibility for Loss or Damage
Unless a greater value is recorded in the declared value field as appropriate for the UPS shipping system used, the shipper agrees that the released value of each package covered by this receipt is no greater than $100, which is a reasonable value under the circumstances surrounding the transportation. If additional protection is desired, a shipper may increase UPS's limit of liability by declaring a higher value and paying an additional charge. UPS does not accept for transportation and shipper's requesting service through the Internet are prohibited from shipping packages with a value of more than $50,000. The maximum liability per package assumed by UPS shall not exceed $50,000, regardless of value in excess of the maximum. Claims not made within nine months after delivery of the package (sixty days for international shipments), or in the case of failure to make delivery, nine months after a reasonable time for delivery has elapsed (sixty days for international shipments), shall be deemed waived. The entry of a C.O.D. amount is not a declaration of value for carriage purposes. All checks or other negotiable instruments tendered in payment of C.O.D. will be accepted by UPS at shipper's risk. UPS shall not be liable for any special, incidental, or consequential damages. All shipments are subject to the terms and conditions contained in the UPS Tariff and the UPS Terms and Conditions of Service, which can be found at www.ups.com.

Shipment Receipt

Transaction Date: 19 Apr 2012 **Tracking Number:** 1ZA9520E2494963115

1 Address Information

Ship To:	Ship From:	Return Address:
La Paz Regional Hospital Vickie Clark (or successor) 1200 Mohave Road PARKER AZ 853446349	Siemens Industry, Inc. Michelle Goodman 2523 Mutahar Street Traffic Controller Office/Side Door Parker AZ 85344 Telephone:928-669-5758 x10	Siemens Industry, Inc. Michelle Goodman 2523 Mutahar Street Traffic Controller Office/Side Door PARKER AZ 85344 Telephone:928-669-5758 x10

2 Package Information

	Weight	Dimensions / Packaging	Declared Value	Reference Numbers
1.	Letter	UPS Letter		Reference#1 - Contingency Plan

3 UPS Shipping Service and Shipping Options

Service: UPS Next Day Air
Guaranteed By: End of Day Friday, Apr 20, 2012

Shipping Fees Subtotal:	22.80 USD
Transportation	18.00 USD
Fuel Surcharge	2.80 USD
Delivery Area Surcharge- Extended	
Package 1	2.00 USD

Additional Shipping Options

Delivery Confirmation:	
Package 1: Signature Required	3.50 USD
Total Shipping Charges	26.30 USD

4 Payment Information

Bill Shipping Charges to: Shipper's Account A9520E

A discount has been applied to the Daily rates for this shipment

Total Charged:	26.30 USD
Negotiated Total:	12.98 USD

Note: Your invoice may vary from the displayed reference rates.
* For delivery and guarantee information, see the UPS Service Guide. To speak to a customer service representative, call 1-800-PICK-UPS for domestic services and 1-800-782-7892 for international services.

Responsibility for Loss or Damage
Unless a greater value is recorded in the declared value field as appropriate for the UPS shipping system used, the shipper agrees that the released value of each package covered by this receipt is no greater than $100, which is a reasonable value under the circumstances surrounding the transportation. If additional protection is desired, a shipper may increase UPS's limit of liability by declaring a higher value and paying an additional charge. UPS does not accept for transportation and shipper's requesting service through the Internet are prohibited from shipping packages with a value of more than $50,000. The maximum liability per package assumed by UPS shall not exceed $50,000, regardless of value in excess of the maximum. Claims not made within nine months after delivery of the package (sixty days for international shipments), or in the case of failure to make delivery, nine months after a reasonable time for delivery has elapsed (sixty days for international shipments), shall be deemed waived. The entry of a C.O.D. amount is not a declaration of value for carriage purposes. All checks or other negotiable instruments tendered in payment of C.O.D. will be accepted by UPS at shipper's risk. UPS shall not be liable for any special, incidental, or consequential damages. All shipments are subject to the terms and conditions contained in the UPS Tariff and the UPS Terms and Conditions of Service, which can be found at www.ups.com.

Shipment Receipt

Transaction Date: 27 May 2014 **Tracking Number:** 1ZA9520E0297270122

1 Address Information

Ship To:
La Paz County LEPC
Steve Biro (or Successor)
1108 Joshua Avenue
PARKER AZ 853445735

Ship From:
Evoqua Water Technologies LLC
Michelle G.
2523 S. Mutahar Street
Parker AZ 85344
Telephone:928-669-5758

Return Address:
Evoqua Water Technologies LLC
Michelle G.
2523 S. Mutahar Street
PARKER AZ 85344
Telephone:928-669-5758

2 Package Information

	Weight	Dimensions / Packaging	Declared Value	Reference Numbers
1.	Letter (Letter billable)	UPS Letter		Reference#1 - Updated Contingency Plan Reference#2 -

3 UPS Shipping Service and Shipping Options

Service: UPS 2nd Day Air

Shipping Fees Subtotal:	17.24 USD
Transportation	13.35 USD
Fuel Surcharge	1.64 USD
Delivery Area Surcharge- Extended Package 1	2.25 USD

Additional Shipping Options

Quantum View Notify E-mail Notifications: No Charge
1 james.r.provins@evoqua.com: Exception, Delivery

4 Payment Information

Bill Shipping Charges to: Shipper's Account A9520E

A discount has been applied to the Daily rates for this shipment

Total Charged: 17.24 USD
Negotiated Total: 6.49 USD

Note: Your invoice may vary from the displayed reference rates.
* For delivery and guarantee information, see the UPS Service Guide. To speak to a customer service representative, call 1-800-PICK-UPS for domestic services and 1-800-782-7892 for international services.

Responsibility for Loss or Damage
UPS's liability for loss or damage to each domestic package or international shipment is limited to $100. Unless a greater value is recorded in the declared value field of the UPS shipping system used, the shipper agrees that the released value of each package covered by this receipt is no greater than $100, which is a reasonable value under the circumstances surrounding the transportation. To increase UPS's limit of liability for loss or damage above $100, the shipper must declare a higher value and pay an additional charge. See the UPS Tariff/Terms and Conditions of Service at www.ups.com for UPS's liability limits, maximum declared values, and other terms of service. UPS does not accept for transportation and shippers are prohibited from shipping packages with a value of more than $50,000. Claims not made within nine months after delivery of the package (sixty days for international shipments), or in the case of failure to make delivery, nine months after a reasonable time for delivery has elapsed (sixty days for international shipments), shall be deemed waived. The entry of a C.O.D. amount is not a declaration of value for carriage purposes. All checks or other negotiable instruments tendered in payment of C.O.D. will be accepted by UPS at shipper's risk. UPS shall not be liable for any special, incidental, or consequential damages. All shipments are subject to the terms and conditions contained in the UPS Tariff/Terms and Conditions of Service (available at www.ups.com).

Shipment Receipt

Transaction Date: 27 May 2014 **Tracking Number:** 1ZA9520E0295260119

1 Address Information

Ship To:
CRIT Fire Department
Terylyn Little or Successor
23701 Mohave Avenue
PARKER AZ 853447700

Ship From:
Evoqua Water Technologies LLC
Michelle G.
2523 S. Mutahar Street
Parker AZ 85344
Telephone:928-669-5758

Return Address:
Evoqua Water Technologies LLC
Michelle G.
2523 S. Mutahar Street
PARKER AZ 85344
Telephone:928-669-5758

2 Package Information

Weight	Dimensions / Packaging	Declared Value	Reference Numbers
1. Letter (Letter billable)	UPS Letter		Reference#1 - Updated Contingency Plan Reference#2 -

3 UPS Shipping Service and Shipping Options

Service:	UPS 2nd Day Air	
Shipping Fees Subtotal:		**17.24 USD**
Transportation		13.35 USD
Fuel Surcharge		1.64 USD
Delivery Area Surcharge- Extended		
Package 1		2.25 USD

Additional Shipping Options

Quantum View Notify E-mail Notifications: No Charge

1 james.r.provins@evoqua.com: Exception, Delivery

4 Payment Information

Bill Shipping Charges to: Shipper's Account A9520E

A discount has been applied to the Daily rates for this shipment

Total Charged: **17.24 USD**
Negotiated Total: **6.49 USD**

Note: Your invoice may vary from the displayed reference rates.
* For delivery and guarantee information, see the UPS Service Guide. To speak to a customer service representative, call 1-800-PICK-UPS for domestic services and 1-800-782-7892 for international services.

Responsibility for Loss or Damage
UPS's liability for loss or damage to each domestic package or international shipment is limited to $100. Unless a greater value is recorded in the declared value field of the UPS shipping system used, the shipper agrees that the released value of each package covered by this receipt is no greater than $100, which is a reasonable value under the circumstances surrounding the transportation. To increase UPS's limit of liability for loss or damage above $100, the shipper must declare a higher value and pay an additional charge. See the UPS Tariff/Terms and Conditions of Service at www.ups.com for UPS's liability limits, maximum declared values, and other terms of service. UPS does not accept for transportation and shippers are prohibited from shipping packages with a value of more than $50,000. Claims not made within nine months after delivery of the package (sixty days for international shipments), or in the case of failure to make delivery, nine months after a reasonable time for delivery has elapsed (sixty days for international shipments), shall be deemed waived. The entry of a C.O.D. amount is not a declaration of value for carriage purposes. All checks or other negotiable instruments tendered in payment of C.O.D. will be accepted by UPS at shipper's risk. UPS shall not be liable for any special, incidental, or consequential damages. All shipments are subject to the terms and conditions contained in the UPS Tariff/Terms and Conditions of Service (available at www.ups.com).

Shipment Receipt

Transaction Date: 27 May 2014 **Tracking Number:** 1ZA9520E0299562901

1 Address Information

Ship To:
CRIT Police Department
Chief William Ponce (or sucessor)
26600 Mohave Road
PARKER AZ 853447737

Ship From:
Evoqua Water Technologies LLC
Michelle G.
2523 S. Mutahar Street
Parker AZ 85344
Telephone:928-669-5758

Return Address:
Evoqua Water Technologies LLC
Michelle G.
2523 S. Mutehar Street
PARKER AZ 85344
Telephone:928-669-5758

2 Package Information

	Weight	Dimensions / Packaging	Declared Value	Reference Numbers
1.	Letter (Letter billable)	UPS Letter		Reference#1 - Updated Contingency Plan Reference#2 -

3 UPS Shipping Service and Shipping Options

Service:	UPS 2nd Day Air	
Shipping Fees Subtotal:		17.24 USD
Transportation		13.35 USD
Fuel Surcharge		1.64 USD
Delivery Area Surcharge- Extended Package 1		2.25 USD

Additional Shipping Options

Quantum View Notify E-mail Notifications: No Charge
1 james.r.provins@evoqua.com: Exception, Delivery

4 Payment Information

Bill Shipping Charges to: Shipper's Account A9520E

A discount has been applied to the Daily rates for this shipment

Total Charged: 17.24 USD
Negotiated Total: 6.49 USD

Note: Your invoice may vary from the displayed reference rates.
* For delivery and guarantee information, see the UPS Service Guide. To speak to a customer service representative, call 1-800-PICK-UPS for domestic services and 1-800-782-7892 for international services.

Responsibility for Loss or Damage
UPS's liability for loss or damage to each domestic package or international shipment is limited to $100. Unless a greater value is recorded in the declared value field of the UPS shipping system used, the shipper agrees that the released value of each package covered by this receipt is no greater than $100, which is a reasonable value under the circumstances surrounding the transportation. To increase UPS's limit of liability for loss or damage above $100, the shipper must declare a higher value and pay an additional charge. See the UPS Tariff/Terms and Conditions of Service at www.ups.com for UPS's liability limits, maximum declared values, and other terms of service. UPS does not accept for transportation and shippers are prohibited from shipping packages with a value of more than $50,000. Claims not made within nine months after delivery of the package (sixty days for international shipments), or in the case of failure to make delivery, nine months after a reasonable time for delivery has elapsed (sixty days for international shipments), shall be deemed waived. The entry of a C.O.D. amount is not a declaration of value for carriage purposes. All checks or other negotiable instruments tendered in payment of C.O.D. will be accepted by UPS at shipper's risk. UPS shall not be liable for any special, incidental, or consequential damages. All shipments are subject to the terms and conditions contained in the UPS Tariff/Terms and Conditions of Service (available at www.ups.com).

Shipment Receipt

Transaction Date: 27 May 2014 **Tracking Number:** 1ZA9520E0299794492

1 Address Information

Ship To:
Parker Fire Department
Chief Johnny Rather (or successor)
1101 Arizona Avenue
PARKER AZ 853445743

Ship From:
Evoqua Water Technologies LLC
Michelle G.
2523 S. Mutahar Street
Parker AZ 85344
Telephone:928-669-5758

Return Address:
Evoqua Water Technologies LLC
Michelle G.
2523 S. Mutahar Street
PARKER AZ 85344
Telephone:928-669-5758

2 Package Information

	Weight	Dimensions / Packaging	Declared Value	Reference Numbers
1.	Letter (Letter billable)	UPS Letter		Reference#1 - Updated Contingency Plan Reference#2 -

3 UPS Shipping Service and Shipping Options

Service:	UPS 2nd Day Air	
Shipping Fees Subtotal:		17.24 USD
Transportation		13.35 USD
Fuel Surcharge		1.64 USD
Delivery Area Surcharge- Extended		
Package 1		2.25 USD

Additional Shipping Options

Quantum View Notify E-mail Notifications: No Charge
1 james.r.provins@evoqua.com: Exception, Delivery

4 Payment Information

Bill Shipping Charges to: Shipper's Account A9520E

A discount has been applied to the Daily rates for this shipment

Total Charged: 17.24 USD
Negotiated Total: 6.49 USD

Note: Your invoice may vary from the displayed reference rates.
* For delivery and guarantee information, see the UPS Service Guide. To speak to a customer service representative, call 1-800-PICK-UPS for domestic services and 1-800-782-7892 for international services.

Responsibility for Loss or Damage
UPS's liability for loss or damage to each domestic package or international shipment is limited to $100. Unless a greater value is recorded in the declared value field of the UPS shipping system used, the shipper agrees that the released value of each package covered by this receipt is no greater than $100, which is a reasonable value under the circumstances surrounding the transportation. To increase UPS's limit of liability for loss or damage above $100, the shipper must declere a higher value and pay an additional charge. See the UPS Tariff/Terms and Conditions of Service at www.ups.com for UPS's liability limits, maximum declared values, and other terms of service. UPS does not accept for transportation and shippers are prohibited from shipping packages with a value of more than $50,000. Claims not made within nine months after delivery of the package (sixty days for international shipments), or in the case of failure to make delivery, nine months after a reasonable time for delivery has elapsed (sixty days for international shipments), shall be deemed waived. The entry of a C.O.D. amount is not a declaration of value for carriage purposes. All checks or other negotiable instruments tendered in payment of C.O.D. will be accepted by UPS at shipper's risk. UPS shall not be liable for any special, incidental, or consequential damages. All shipments are subject to the terms and conditions contained in the UPS Tariff/Terms and Conditions of Service (available at www.ups.com).

Shipment Receipt

Transaction Date: 27 May 2014 **Tracking Number:** 1ZA9520E0297090880

1 Address Information

Ship To:
Parker Police Department
Clay Romo (or successor)
1314 11th Street
PARKER AZ 853445615

Ship From:
Evoqua Water Technologies LLC
Michelle G.
2523 S. Mutahar Street
Parker AZ 85344
Telephone:928-669-5758

Return Address:
Evoqua Water Technologies LLC
Michelle G.
2523 S. Mutahar Street
PARKER AZ 85344
Telephone:928-669-5758

2 Package Information

	Weight	Dimensions / Packaging	Declared Value	Reference Numbers
1.	Letter (Letter billable)	UPS Letter		Reference#1 - Updated Contingency Plan Reference#2 -

3 UPS Shipping Service and Shipping Options

Service:	UPS 2nd Day Air	
Shipping Fees Subtotal:		17.24 USD
Transportation		13.35 USD
Fuel Surcharge		1.64 USD
Delivery Area Surcharge- Extended		
Package 1		2.25 USD

Additional Shipping Options

Quantum View Notify E-mail Notifications: No Charge

1 james.r.provins@evoqua.com: Exception, Delivery

4 Payment Information

Bill Shipping Charges to: Shipper's Account A9520E

A discount has been applied to the Daily rates for this shipment

Total Charged: 17.24 USD
Negotiated Total: 6.49 USD

Note: Your invoice may vary from the displayed reference rates.
* For delivery and guarantee information, see the UPS Service Guide. To speak to a customer service representative, call 1-800-PICK-UPS for domestic services and 1-800-782-7892 for international services.

Responsibility for Loss or Damage
UPS's liability for loss or damage to each domestic package or international shipment is limited to $100. Unless a greater value is recorded in the declared value field of the UPS shipping system used, the shipper agrees that the released value of each package covered by this receipt is no greater than $100, which is a reasonable value under the circumstances surrounding the transportation. To increase UPS's limit of liability for loss or damage above $100, the shipper must declare a higher value and pay an additional charge. See the UPS Tariff/Terms and Conditions of Service at www.ups.com for UPS's liability limits, maximum declared values, and other terms of service. UPS does not accept for transportation and shippers are prohibited from shipping packages with a value of more than $50,000. Claims not made within nine months after delivery of the package (sixty days for international shipments), or in the case of failure to make delivery, nine months after a reasonable time for delivery has elapsed (sixty days for international shipments), shall be deemed waived. The entry of a C.O.D. amount is not a declaration of value for carriage purposes. All checks or other negotiable instruments tendered in payment of C.O.D. will be accepted by UPS at shipper's risk. UPS shall not be liable for any special, incidental, or consequential damages. All shipments are subject to the terms and conditions contained in the UPS Tariff/Terms and Conditions of Service (available at www.ups.com).

Shipment Receipt

Transaction Date: 27 May 2014 **Tracking Number:** 1ZA9520E0298508070

1 Address Information

Ship To:	Ship From:	Return Address:
La Paz Regional Hospital Vickie Clark (or successor) 1200 Mohave Road PARKER AZ 853446349	Evoqua Water Technologies LLC Michelle G. 2523 S. Mutahar Street Parker AZ 85344 Telephone:928-669-5758	Evoqua Water Technologies LLC Michelle G. 2523 S. Mutahar Street PARKER AZ 85344 Telephone:928-669-5758

2 Package Information

	Weight	Dimensions / Packaging	Declared Value	Reference Numbers
1.	Letter (Letter billable)	UPS Letter		Reference#1 - Updated Contingency Plan Reference#2 -

3 UPS Shipping Service and Shipping Options

Service:	UPS 2nd Day Air	
Shipping Fees Subtotal:		17.24 USD
Transportation		13.35 USD
Fuel Surcharge		1.64 USD
Delivery Area Surcharge- Extended		
Package 1		2.25 USD

Additional Shipping Options

Quantum View Notify E-mail Notifications: No Charge

1 james.r.provins@evoqua.com: Exception, Delivery

4 Payment Information

Bill Shipping Charges to: Shipper's Account A9520E

A discount has been applied to the Daily rates for this shipment

Total Charged:	**17.24 USD**
Negotiated Total:	**6.49 USD**

Note: Your Invoice may vary from the displayed reference rates.
* For delivery and guarantee information, see the UPS Service Guide. To speak to a customer service representative, call 1-800-PICK-UPS for domestic services and 1-800-782-7892 for international services.

Responsibility for Loss or Damage
UPS's liability for loss or damage to each domestic package or international shipment is limited to $100. Unless a greater value is recorded in the declared value field of the UPS shipping system used, the shipper agrees that the released value of each package covered by this receipt is no greater than $100, which is a reasonable value under the circumstances surrounding the transportation. To increase UPS's limit of liability for loss or damage above $100, the shipper must declare a higher value and pay an additional charge. See the UPS Tariff/Terms and Conditions of Service at www.ups.com for UPS's liability limits, maximum declared values, and other terms of service. UPS does not accept for transportation and shippers are prohibited from shipping packages with a value of more than $50,000. Claims not made within nine months after delivery of the package (sixty days for international shipments), or in the case of failure to make delivery, nine months after a reasonable time for delivery has elapsed (sixty days for international shipments), shall be deemed waived. The entry of a C.O.D. amount is not a declaration of value for carriage purposes. All checks or other negotiable instruments tendered in payment of C.O.D. will be accepted by UPS at shipper's risk. UPS shall not be liable for any special, incidental, or consequential damages. All shipments are subject to the terms and conditions contained in the UPS Tariff/Terms and Conditions of Service (available at www.ups.com).

Shipment Receipt

Transaction Date: 27 May 2014 **Tracking Number:** 1ZA9520E0299422062

1 Address Information

Ship To:	Ship From:	Return Address:
CRIT EPO Mr. Nabahe 26600 Mohave Road PARKER AZ 853447737	Evoqua Water Technologies LLC Michelle G. 2523 S. Mutahar Street Parker AZ 85344 Telephone:928-669-5758	Evoqua Water Technologies LLC Michelle G. 2523 S. Mutahar Street PARKER AZ 85344 Telephone:928-669-5758

2 Package Information

	Weight	Dimensions / Packaging	Declared Value	Reference Numbers
1.	Letter (Letter billable)	UPS Letter		Reference#1 - Updated Contingency Plan Reference#2 -

3 UPS Shipping Service and Shipping Options

Service:	UPS 2nd Day Air	
Shipping Fees Subtotal:		17.24 USD
Transportation		13.35 USD
Fuel Surcharge		1.64 USD
Delivery Area Surcharge- Extended		
Package 1		2.25 USD

Additional Shipping Options

Quantum View Notify E-mail Notifications: No Charge

1 james.r.provins@evoqua.com: Exception, Delivery

4 Payment Information

Bill Shipping Charges to: Shipper's Account A9520E

A discount has been applied to the Daily rates for this shipment

Total Charged:	**17.24 USD**
Negotiated Total:	**6.49 USD**

Note: Your invoice may vary from the displayed reference rates.
* For delivery and guarantee information, see the UPS Service Guide. To speak to a customer service representative, call 1-800-PICK-UPS for domestic services and 1-800-782-7892 for international services.

Responsibility for Loss or Damage
UPS's liability for loss or damage to each domestic package or international shipment is limited to $100. Unless a greater value is recorded in the declared value field of the UPS shipping system used, the shipper agrees that the released value of each package covered by this receipt is no greater than $100, which is a reasonable value under the circumstances surrounding the transportation. To increase UPS's limit of liability for loss or damage above $100, the shipper must declare a higher value and pay an additional charge. See the UPS Tariff/Terms and Conditions of Service at www.ups.com for UPS's liability limits, maximum declared values, and other terms of service. UPS does not accept for transportation and shippers are prohibited from shipping packages with a value of more than $50,000. Claims not made within nine months after delivery of the package (sixty days for international shipments), or in the case of failure to make delivery, nine months after a reasonable time for delivery has elapsed (sixty days for international shipments), shall be deemed waived. The entry of a C.O.D. amount is not a declaration of value for carriage purposes. All checks or other negotiable instruments tendered in payment of C.O.D. will be accepted by UPS at shipper's risk. UPS shall not be liable for any special, incidental, or consequential damages. All shipments are subject to the terms and conditions contained in the UPS Tariff/Terms and Conditions of Service (available at www.ups.com).

Shipment Receipt

Transaction Date: 21 May 2014 **Tracking Number:** 1ZA9520E0293634497

1 Address Information

Ship To:	Ship From:	Return Address:
CRIT EPO Mr. Wilfred Nabahe 26600 Mohave Road PARKER AZ 853447737	Evoqua Water Technologies LLC Michelle G. 2523 S. Mutahar Street Parker AZ 85344 Telephone:928-669-5758	Evoqua Water Technologies LLC Michelle G. 2523 S. Mutahar Street Parker AZ 85344 Telephone:928-669-5758

2 Package Information

	Weight	Dimensions / Packaging	Declared Value	Reference Numbers
1.	Letter (Letter billable)	UPS Letter		Reference#1 - 2013 TRI REPORT Reference#2 -

3 UPS Shipping Service and Shipping Options

Service:	UPS 2nd Day Air	
Shipping Fees Subtotal:		**17.24 USD**
Transportation		13.35 USD
Fuel Surcharge		1.64 USD
Delivery Area Surcharge- Extended		
Package 1		2.25 USD

Additional Shipping Options

Quantum View Notify E-mail Notifications: No Charge
1 james.r.provins@evoqua.com: Exception, Delivery

4 Payment Information

Bill Shipping Charges to: Shipper's Account A9520E

A discount has been applied to the Daily rates for this shipment

Total Charged:	**17.24 USD**
Negotiated Total:	**6.49 USD**

Note: Your invoice may vary from the displayed reference rates.
* For delivery and guarantee information, see the UPS Service Guide. To speak to a customer service representative, call 1-800-PICK-UPS for domestic services and 1-800-782-7892 for international services.

Responsibility for Loss or Damage
UPS's liability for loss or damage to each domestic package or international shipment is limited to $100. Unless a greater value is recorded in the declared value field of the UPS shipping system used, the shipper agrees that the released value of each package covered by this receipt is no greater than $100, which is a reasonable value under the circumstances surrounding the transportation. To increase UPS's limit of liability for loss or damage above $100, the shipper must declare a higher value and pay an additional charge. See the UPS Tariff/Terms and Conditions of Service at www.ups.com for UPS's liability limits, maximum declared values, and other terms of service. UPS does not accept for transportation and shippers are prohibited from shipping packages with a value of more than $50,000. Claims not made within nine months after delivery of the package (sixty days for international shipments), or in the case of failure to make delivery, nine months after a reasonable time for delivery has elapsed (sixty days for international shipments), shall be deemed waived. The entry of a C.O.D. amount is not a declaration of value for carriage purposes. All checks or other negotiable instruments tendered in payment of C.O.D. will be accepted by UPS at shipper's risk. UPS shall not be liable for any special, incidental, or consequential damages. All shipments are subject to the terms and conditions contained in the UPS Tariff/Terms and Conditions of Service (available at www.ups.com).

APPENDIX B

EMERGENCY RESPONSE PROCEDURES

EMERGENCY RESPONSE PROCEDURES

Fire or Explosion

1. Upon discovering a fire or explosion, sound the alarm and contact the Plant Operator. Follow the directions of the Plant Operator, Emergency Coordinator and off-site Incident Commander, if applicable.

2. Clear the area of all nonessential personnel. Follow evacuation procedures if instructed to do so.

3. <u>Trained employees only</u> (see note below) undertake the following actions if possible without significant risk to yourself or others.

   a. Shut off the fuel source to the fire, if possible.

   b. Attempt to control the fire with dry chemical fire extinguishers (Class A, B and C fires) and/or water (Class A fires).

   c. Shut off any operating equipment, treatment processes, etc. within the vicinity of the fire.

   d. Shut off electrical power in the area affected by the fire.

   e. Isolate or remove all other possible sources of ignition from the vicinity of the fire.

Releases of Toxic Fumes

1. If toxic fumes or vapors are believed to be present, notify the Plant Operator who will then report the incident to the Emergency Coordinator. If human health or the environment outside the facility boundaries could be threatened, the Emergency Coordinator will notify the **Colorado River Indian Tribes Fire Department** and the **National Response Center**.

2. Clear the area of all nonessential personnel. Follow evacuation procedures if instructed to do so.

3. <u>Trained employees only</u> (see note below) undertake the following actions if possible without significant risk to yourself or others and only if you have donned the proper protective clothing and breathing apparatus and followed all confined space entry procedures.

   a. Discontinue the waste transfer operation by closing appropriate valves and de-energizing transfer equipment.

   b. Secure the lids on any open waste containers.

   c. Remove all sources of ignition from the area.

NOTE: Employees who receive 40 hours of initial training in hazardous waste management prior to commencement of duties at Evoqua Water Technologieswill be considered trained to a sufficient level of awareness per 29 CFR 1910.120(p)(8)(iii). They should have sufficient knowledge to actively respond to hazardous materials and hazardous waste emergencies at the facility.

EMERGENCY RESPONSE PROCEDURES

Release of Solids

Inside Containment Area

1. Upon discovering a release of solid material within the containment area, notify the Plant Operator.

2. Locate the source and stop the release.

3. Remove nonessential personnel from the vicinity.

4. Trained employees only (see note below) undertake the following actions if possible without significant risk to yourself or others.

   a. Clean up the released material and place in a container. Take the filled container to the spent carbon storage area and label properly.

   b. After solids are removed, hose down the area of the spill, directing water to the nearest sump.

   c. Clean any tools used during clean-up and hose the cleaning solution to the sump.

Outside Containment Area

1. Upon discovering a release of solid material outside the containment area, notify the Plant Operator.

2. Locate the source and stop the release.

3. Remove nonessential personnel from the vicinity.

4. Trained employees only (see note below) undertake the following actions if possible without significant risk to yourself or others.

   a. Clean up the released material, and any other material in the release area that may have come into contact with the released material, and place in a container. Take the filled container to the spent carbon storage area and label properly.

   b. Clean any tools used during clean-up inside the containment area and hose the cleaning solution to the sump.

NOTE: Employees who receive 40 hours of initial training in hazardous waste management prior to commencement of duties at Evoqua Water Technologieswill be considered trained to a sufficient level of awareness per 29 CFR 1910.120(p)(8)(iii). They should have sufficient knowledge to actively respond to hazardous materials and hazardous waste emergencies at the facility.

EMERGENCY RESPONSE PROCEDURES, continued

Release of Liquids

Inside Containment Area

1. Upon discovering a release of liquid material within the containment area, notify the Plant Operator.

2. Locate the source and stop the release.

3. Remove nonessential personnel from the vicinity.

4. <u>Trained employees only</u> (see note below) undertake the following actions if possible without significant risk to yourself or others.

   a. Allow free liquids to flow to the nearest sump. After as much free liquid as possible has drained, place any remaining solid material in a container. Take the filled container to the spent carbon storage area and label properly.

   b. After solids are removed, hose down the area of the spill, directing water to the nearest sump.

   c. Clean any tools used during clean-up and hose the cleaning solution to the sump.

NOTE: Employees who receive 40 hours of initial training in hazardous waste management prior to commencement of duties at Evoqua Water Technologieswill be considered trained to a sufficient level of awareness per 29 CFR 1910.120(p)(8)(iii). They should have sufficient knowledge to actively respond to hazardous materials and hazardous waste emergencies at the facility.

EMERGENCY RESPONSE PROCEDURES, continued

Release of Liquids, continued

Outside Containment Area

1. Upon discovering a release of liquid material outside the containment area, locate the source and stop the release if possible without risk to yourself or others.

2. Notify the Plant Operator who will in turn notify the Emergency Coordinator. If human health or the environment outside the facility boundaries could be threatened, the Emergency Coordinator will immediately notify the **Colorado River Indian Tribes Fire Department** and the **National Response Center**.

3. Remove nonessential personnel from the vicinity. Follow evacuation procedures if instructed to do so.

4. Trained employees only (see note below) undertake the following actions if possible without significant risk to yourself or others.

   a. Initiate shutdown of part or all of the facility.

   b. Contain liquid in as small an area as possible. Use adsorbent, earth and/or containment boom materials to collect any free liquid. Place adsorbent materials in a container.

   c. Collect and place in a container any materials in the release area that may have come in contact with the released material. Take the filled containers to the spent carbon storage area and label properly.

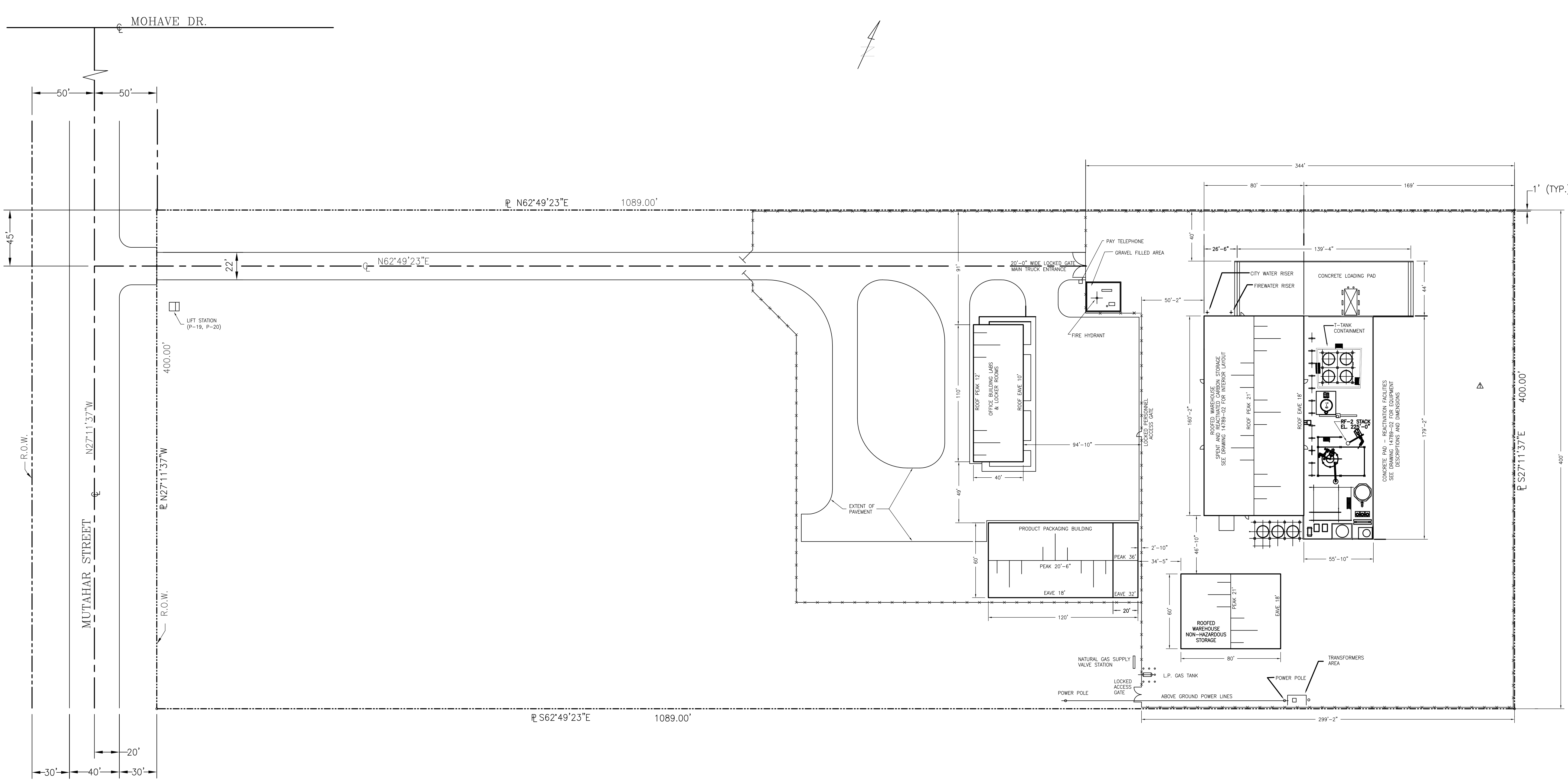
   d. Clean any tools used during clean-up inside the containment area and hose the cleaning solution to the sump.

NOTE: Employees who receive 40 hours of initial training in hazardous waste management prior to commencement of duties at Evoqua Water Technologies will be considered trained to a sufficient level of awareness per 29 CFR 1910.120(p)(8)(iii). They should have sufficient knowledge to actively respond to hazardous materials and hazardous waste emergencies at the facility.

APPENDIX C

SITE PLAN

DWG: D14789-08



NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R
3	3/16/12	NAME CHANGED TO SIEMENS INDUSTRY, INC.	JBE	KEM	
2	1/18/07	UPDATED FOR PERMIT SUBMITTAL	JBE	KEM	
△	6/21/02	REMOVED DUMPSTER PAD	CPG	KEM	

PLOT SCALE: 1"=40'

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No.

DRAWN:	CPG	3/01/02
CHK'D:	KEM	3/01/02
ENG'R:		

SIEMENS INDUSTRY, INC.. Parker, AZ

TITLE: REACTIVATION FACILITY SITE PLAN

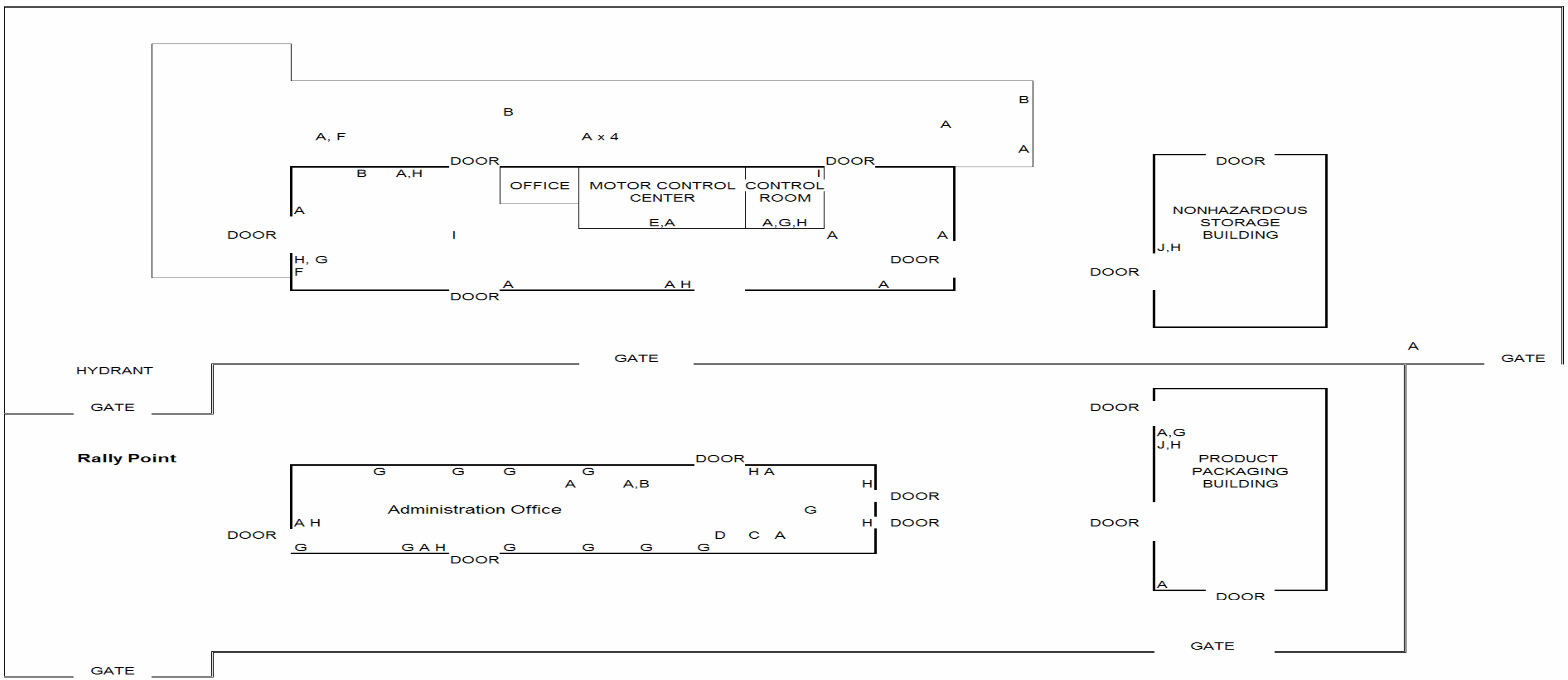
PART No. | DWG No. D14789-08 | REV. 3

PRINT DATE: 4/19/12

APPENDIX D

LOCATION OF EMERGENCY EQUIPMENT

Location of Emergency Equipment (Ground Floor)



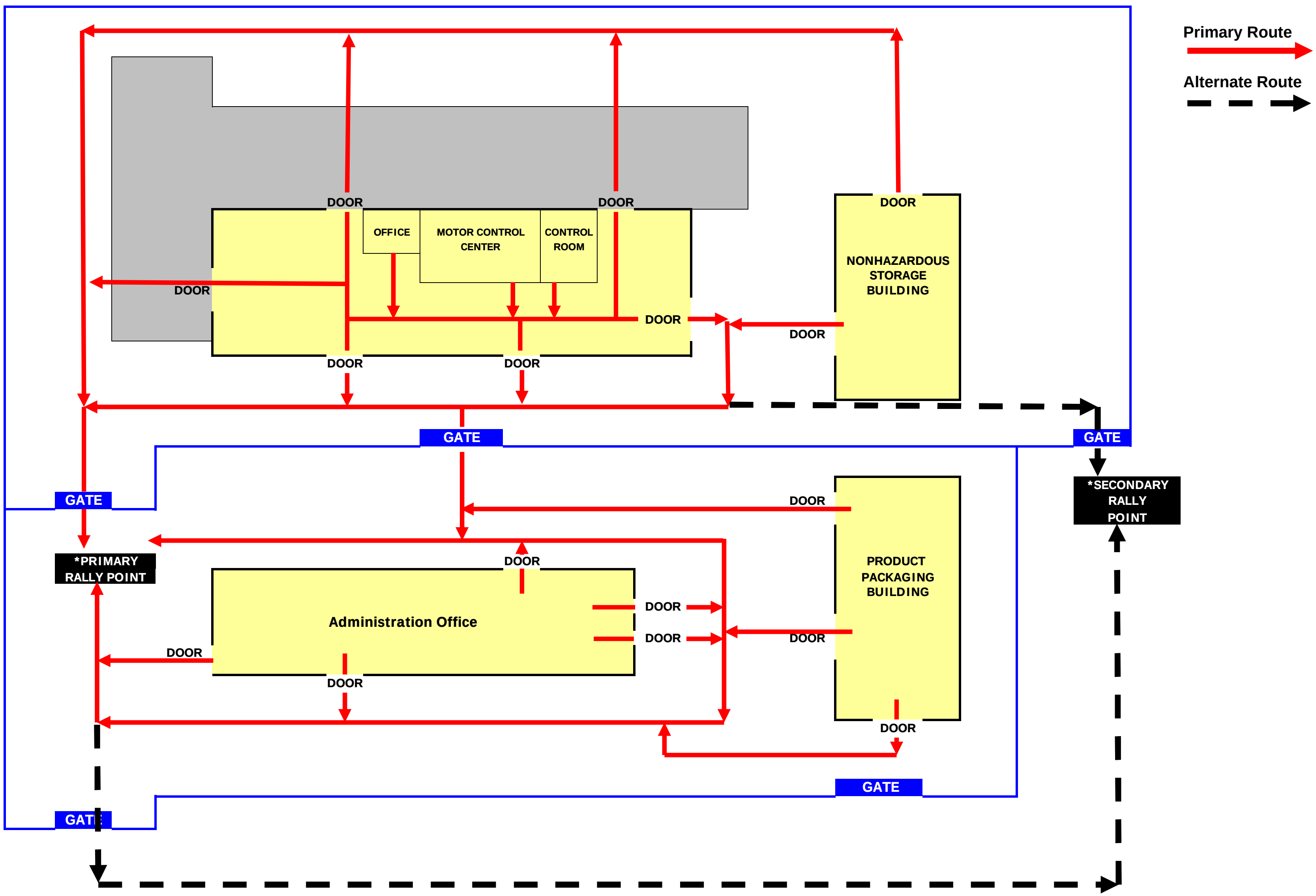
FENCE	A. FIRE EXTINGUISHERS	D. PROTECTIVE CLOTHING	G. PHONES WITH PAGING	J. FIRE HOSE
OUTSIDE PROCESS AREA	B. EMERGENCY SHOWE/EYE \ASH	E. FIRST AID KITS	H. FIRE ALARM	
STORAGE CONTROL & MAINTENANCE	C. RESPIRATORS	F. SPILL CONTROL KITS	I. SPRINKLER SYSTEM	

Evoqua Water Technologies
May 2014
REVISION 2

APPENDIX E

EVACUATION ROUTES

Parker Facility Evacuation Routes and Rally Points



APPENDIX XIV

TRAINING SYLLABUS OUTLINE

AND TRAINING SUMMARY

Siemens Industry, Inc.
2523 Mutahar Street
Parker, Arizona 85344

April 2012
Revision 1

Management at this facility recognizes that the regulatory basis for training, training content, training media, trainee evaluation methods, and documentation methods will periodically change. It is also recognized that contract training firms may be retained to provide training on specific subjects. Contract trainers retained for this purpose will be assessed for effectiveness. Based upon their performance, contract trainers may be changed. As a result, training content may vary. In any regard, training subjects required under 40 CFR Parts 264.16, and the training relevancy pursuant to 40 CFR 270.14(b)(12) will adhere to the training syllabus outline.

TRAINING SYLLABUS OUTLINE

INTRODUCTORY TRAINING under 40 CFR 264.16 will include the following:

1. Procedures for using, inspecting, repairing, and replacing facility emergency and monitoring equipment.

    a. Employees will be familiarized with the use of equipment.
    b. Maintenance repair procedures will be explained and reviewed.
    c. Replacement of equipment will be consistent with current regulatory requirements.

2. Key parameters for automatic waste feed cut-off systems.

    a. Employees will be familiarized with key parameters for the facility's automatic waste feed cut-off systems.

    b. Standard Operating Procedures (SOPs) for waste feed cut-off systems will be communicated to affected employees.

3. Communications and alarm systems.

    a. Communications and emergency alarm systems will be explained in introductory and continuing training.

    b. Methods for testing alarm systems will described.

4. Responses to fires & explosions.

    a. SOPs for alarm, evacuation and response procedures to fires and explosions as listed in the facility contingency plan will be communicated to employees.

5. Prevention and responses to groundwater contamination incidents.

    a. Employees will be familiarized with the types of non-compliant conditions which require preventive action and reporting.

6. Shut down of operations.

    a. SOPs related to safe equipment shutdown, which are unique to this facility, will be explained.

7. Waste Sampling.

    a. Equipment and methods for collecting, labeling, preserving, and shipping (as required) representative samples of incoming spent activated carbon shipments in containers and in bulk.

    b. Equipment and methods for collecting, labeling, preserving, and shipping (as required) representative samples of in-process spent activated carbon.

CONTINUING TRAINING

RCRA training listed in Section H, Table H-1, will consist of an 8 hour review of topics listed under introductory training, which includes 40 CFR Parts 264.16 and the training relevancy pursuant to 40 CFR 270.14(b)(12).

Additionally, a review will be conducted of accidents or incidents during the past year, and any unsatisfactory conditions noted on inspection reports will be discussed.

Siemens Industry, Inc.

Parker, Arizona

TRAINING SUMMARY

EMPLOYEE NAME: ____

JOBTITLE:_________________________________ **FROM:**_________________**TO:**________________

JOB TITLE:________________________________ **FROM:**_________________**TO:**________________

JOBTITLE:_________________________________ **FROM:**_________________**TO:**________________

JOBTITLE:_________________________________ **FROM:**_________________**TO:**________________

JOBTITLE:_________________________________ **FROM:**_________________**TO:**________________

TRAINING COURSE	Type	2006	2007	2008	2009	2010	2011	2012	2013	2014
HAZWOPER Training, 40 hr.	RI									
HAZWOPER, 8 hr. Refresher	RA									
Hazard Communication (Right to-Know)	R									
Benzene Neshap Training	R									
Respiratory Protection Training plus fit-testing	RA									
Lockout/Tagout Training	R									
Permit-Required Confined Space Training	R									
Fire Prevention/Fire Extinguisher Training	RA									
Hearing Conservation	RA									
First Aid & CPR Training	R									
Drum Labels & Inspections	NM*									
RCRA, DOT, EPA Training	NM									
Forklift Operation	R									

TRAINING COURSE	Type	2006	2007	2008	2009	2010	2011	2012	2013	2014
Personal Protective Equipment	R									
Proper Clothing	NM									
Bloodborne Pathogens	NM*									
Heat Stress Prevention	NM*									
Hot Work Training	R									
Spill Control/SPCC Training	NM									
Storm Water Pollution Prevention Plan Training	R									
Fall Protection	R									
Back Injury/CTD Prevention	NM*									
Hazards of the Desert	NM*									
Acid & Caustic Storage/ Handling Procedures	NM*									
Electrical Safety	R									
Decontamination	R*									
Hazardous Debris Management	NM									
Burn Prevention	R									
Communication/Alarm Systems	R*									
Parameters For Auto Waste Feed Cut-Off	R									
Procedures For Using/Inspecting/	R									
Replacing Emergency And Monitoring Systems	R									
Responses to Fires and Explosions	R									

TRAINING COURSE	Type	2006	2007	2008	2009	2010	2011	2012	2013	2014
Prevention and Responses to Groundwater Contamination Incidents	R									
Emergency Shutdown & Evacuation Procedures	R*									
Contingency Plan Training	R									
Proper Management of Hazardous Waste at the Facility	R									
Annual Physicals	R									
Waste Sampling	NM									

RI - Required Initially **RA-Required Annually** **R-Required** **NM-Non-Mandatory**

*** - Can Be Included With Other Training**

APPENDIX XV

RCRA FACILITY CLOSURE PLAN

Evoqua Water Technologies
2523 Mutahar Street
Parker, Arizona 85344
928-669-5758

June 2014
Revision 4

TABLE OF CONTENTS

Section **Page No.**

LIST OF TABLES

Table No. **Page**

LIST OF ATTACHMENTS

Attachment

1.0 INTRODUCTION

The Evoqua Water Technologies (EWT) facility accepts spent activated carbon in containers (drums and bulk) from various customers. The spent activated carbon is identified as both hazardous and non-hazardous waste and is managed at the facility in the container storage area, five storage tanks (T1, T2, T5, T6, and T18), and ultimately in the carbon reactivation unit (RF-2).

The Closure Plan for the EWT facility covers activities related to the eventual closure of the hazardous waste portions of the facility, including all hazardous waste management units (HWMUs) described in the facility's Part A application. The contents of the Closure Plan are based upon, and meet all the criteria set forth in 40 CFR Part 264, Subparts G and H. The goal of this plan is to achieve clean closure. In short, this means that all hazardous wastes will be removed from the RCRA regulated units, and that any releases at or from the units will be remediated so that further regulatory control under RCRA Subtitle C is not necessary to protect human health and the environment. In the event clean closure cannot be achieved, further investigation and remediation work will be performed. Closure of the inactive RF-1 unit is covered in a separate closure plan.

Activities associated with closure of the HWMUs will include treatment and/or removal of all hazardous waste inventory, decontamination of storage and treatment equipment and containment areas, evaluation of decontamination results (including sampling and analysis, as necessary) to ensure that decontamination is adequate, sampling and analysis to determine if soil contamination has occurred, and certification of closure by the facility owner and/or operator and a registered professional engineer. The Closure Plan also includes a cost estimate and financial assurance mechanism for the closure activities. A Sampling and Analysis Plan (SAP) for closure activities, detailing the collection of samples, laboratory analysis, and interpretation of analytical results is included as a separate appendix to the RCRA Part B Permit Application.

Since the closure activities will result in clean closure, the EWT Parker facility is not considered to be subject to post-closure requirements. However, post-closure requirements may become applicable if soil contamination is found and EWT is unable to adequately remediate that contamination. Further, there are no underground storage tanks or other treatment and disposal units at the facility that require the submittal of a contingent post-closure plan per 40 CFR 264.118.

There are no land disposal units at the EWT facility. In addition, no hazardous waste will be left in place. Therefore a “survey plat” and “notice in deed and certification” are not required.

1.1 SITE CONDITIONS

This section describes the existing environment at the location of the facility. Included is information on land features, geologic setting, soils, and water resources. The living resources described include wildlife, vegetation, ecosystems and adjacent agricultural resources. The available cultural, historic and archeological information for the site is also discussed.

1.1.1 CLIMATE

The climate is typical of the Sonoran Desert Region. Winters are mild with minimum temperatures above freezing. The summers are long, hot, and dry with temperatures commonly exceeding 100°F. Average total precipitation is approximately 3.82 inches per year. Precipitation is sporadic, occurring mainly in the time intervals of July -September and December -February. The evaporation rate in this area is 86 inches per year.

1.1.2 WATER

1.1.2.1 Groundwater

Groundwater in the Parker area occurs as both confined and unconfined aquifers. Most of the wells are completed in the Colorado River gravels (alluvium), where unconfined or water table conditions prevail. The Miocene(?) Fanglomerate (gravel deposits at base of mountains) and the lower part of the Bouse Formation contain confined aquifers (artesian). The (?) signifies the geological age is not certain. The city wells in Parker obtain most of their water from the Miocene(?) Fanglomerate. Sources of recharge to the groundwater supply of the area are the Colorado River, precipitation, and underflow from areas bordering the Parker Valley.

In this area, a large amount of the groundwater is lost through evapotranspiration in the Parker area. Direct recharge from precipitation is limited. Loss of water from the Colorado River provides almost 50% of the recharge to the groundwater near Parker.

The groundwater level near Parker is approximately 350 feet. The depth to water in the areas bordering the flood plain ranges from 70 to 300 feet below the land surface.

The production from wells screened in the Colorado River alluvium comes from highly permeable beds of sand and gravel. The Colorado River gravel has the highest transmissivity of the water-bearing sediments in the area. Wells which penetrate sufficient thicknesses of the gravel may produce more than 100 gpm per foot of drawdown (specific capacity).

1.1.2.2 Water Quality

The chemical quality of the groundwater in the Parker area is generally related to the source and movement of the water. The chemical quality of the groundwater is influenced by evaporation, transpiration by native vegetation, former flooding of the river, irrigation developments, and to a marked degree, by the local geology. The groundwater beneath the flood plain is relatively poor in quality, except where irrigation water has entered the aquifer. The shallow groundwater in the non-irrigated part of the valley has twice the mineral content as the Colorado River water.

An explanation for the water composition of many of the wells can be understood by assuming that the groundwater originated as infiltration from the Colorado River associated with irrigation canals, field irrigation, or the river channel. The water composition has been changed by evaporation and concentration.

The results of chemical analyses of water from wells in T.9N.R.20W, near Parker, Arizona show the change. The chloride concentrations for these wells varies between 107 and 208 mg/liter. It is assumed the dissolved minerals now in the ground water must have come from the Colorado River.

1.1.3 GEOLOGY

1.1.3.1 Regional Physiography

The area has a hot, arid climate and is characterized by roughly parallel mountain ranges separated by alluvial basins. The elevation of the basins varies between sea level and 1000 feet. The Colorado River is the major stream in the area. The Colorado River flood plain is between three and nine miles wide. It is less than one mile wide near Parker, and increases to nine miles in the Parker Valley. The flood plain is that part of the Colorado River Valley that has been covered by floods of the Colorado River, prior to construction of Hoover Dam. The elevation of the flood plain near Parker is approximately 360 feet above sea level. The mountains are rugged and rise abruptly from the Colorado River or from alluvial slopes. The highest mountain summits in the region reach an average elevation of around 3300 feet. Between the flood plain and the mountains are piedmont slopes, which are dissected by washes from the mountains and, in a few exceptions, into adjacent and topographically distinct basins. The facility is located on relatively flat terrain (slopes 0-3 percent), and is outside the floodplain.

1.1.3.2 Regional Geology

The geologic units considered important to water resources development near the site are the Miocene(?) Fanglomerate, the Bouse Formation and the alluvium of the Colorado River and its tributaries.

The rocks of the mountains are relatively impermeable, and form the boundaries of the groundwater reservoirs. Interbasin water movement is limited by the impermeable bedrock and limited to groundwater movement in surface sediments, where intermittent surface drainage exits from a basin.

The bedrock includes all rocks older than the Miccene(?) Fanglomerate, and contains sedimentary, metamorphic, and igneous rocks. These Miocene beds are gravel deposits that have eroded from the mountains and filled the basins. The thickness of these beds varies widely across the basins. The Fanglomerate is a potentially important aquifer as near Parker, where wells with a yield of 15 gallons per minute per foot of drawdown have been developed in the Fanglomerate, (Metzger, et al, 1973).

Sediments at the site, identified from geologic maps, are Qe (Eolian Deposits, Holocene) and QTr (Old Fluvial Deposits). Samples taken at the site indicated that only the eolian windblown sand and silt (Qe) are present. The eolian sand is tan to light tan and fine to medium grained, occurring as a deposit on the surface throughout the area.

1.1.3.3 Soils

The descriptions and delineations of soils for the Colorado River Indian Reservation Soil Survey do not always correlate with those of adjacent soil survey maps. The differences are related to differences in mapping intensity, extent of soils within the survey, change in knowledge about soils, and modifications in soil classification. The soil map shows that the soil present at the site is classified as Superstition series, which is a gravelly loamy fine sand that develops on zero to three percent slopes. Samples collected at the site show the same type of material. Chemical analyses of the soil samples revealed no evidence of any existing site contamination. Vegetation supported by Superstition soils is white bursage, creosotebush, turkshead and big gulleta.

2.0 SCOPE OF CLOSURE PLAN

The scope of this Closure Plan includes the closure of the container storage area, as well as the closure of the tanks, associated ancillary equipment, and the surrounding containment area, as necessary. The plan also addresses the closure of the carbon reactivation unit (RF-2), and the surrounding containment, as necessary. Closure of the inactive RF-1 unit is addressed in a separate Closure Plan. A facility diagram is shown in Appendix III of the RCRA Part B Permit Application. Table 2-1 identifies the applicable units covered by this Closure Plan. This plan applies to partial as well as final closure.

In accordance with 40 CFR 264.112(c), this Closure Plan will be reviewed and amended, if necessary, whenever one of the following occurs:

- There is a change in operating plans or facility design that affects the Closure Plan;
- There is a change in the expected year of closure; or
- In conducting closure activities, unexpected events require a modification of the approved Closure Plan.

If EWT and/or EPA determine that the Closure Plan needs to be amended, EWT will submit a notification for, or request for, a permit modification based on the classification of the modification. An amended Closure Plan will be submitted as part of the permit modification.

TABLE 2-1. EQUIPMENT/ITEMS FOR CLOSURE

Equipment/Item	Use or Purpose	Size/Design Capacity[1]	Hazardous Waste Codes
Container Storage Area	Storage of Containerized Spent Carbon	~80' x 70'; 100,000 gallons	See Below[2]
Tank System T1[3]	Storage of Spent Carbon	8,319 gallons	See Below[2]
Tank System T2[3]	Storage of Spent Carbon	8,319 gallons	See Below[2]
Tank System T5[3]	Storage of Spent Carbon	8,319 gallons	See Below[2]
Tank System T6[3]	Storage of Spent Carbon	8,319 gallons	See Below[2]
Tank System T18[3]	Carbon Reactivation Unit Feed	6,500 gallons	See Below[2]
Tank containment area	Containment of leaks, drip, or spills from tank systems	~31.5' x 30'	See Below[2]
Carbon Reactivation Unit RF-2[4]	Carbon Reactivation	12'-10" dia x 19'-8" high; 3,049 lb/hr	See Below[2]
RF-2 Afterburner[4]	Carbon reactivation off-gas treatment	5' dia (inside refractory) x 33' high	See Below[2]
RF-2 Quench/Venturi[4]	Carbon reactivation off-gas treatment	4'-7" dia x 22' high	See Below[2]
RF-2 Packed bed scrubber[4]	Carbon reactivation off-gas treatment	6' dia x 34' high	See Below[2]
RF-2 Wet electrostatic precipitator[4]	Carbon reactivation off-gas treatment	10' dia x 27' high	See Below[2]
RF-2 induced draft fan[4]	Carbon reactivation off-gas handling	126" dia x 56" wide	See Below[2]
RF-2 stack[4]	Carbon reactivation off-gas handling	3'-8" dia x 110' high	See Below[2]
RF-2 containment area	Containment of leaks, drips, or spills from the RF-2 equipment	~180' x 55'	See Below[2]
Satellite Accumulation Areas (4 each)	Collection of Various Debris	≤ 55 gallons (metal or plastic)	See Below[2]

[1] Design capacity is calculated based on a tank height as defined by the level at which a high level alarm is initiated.

[2] See Attachment 1 for applicable hazardous waste codes.

[3] Tank system consists of the tank and ancillary piping, pumps, valves, etc.

[4] RF-2 equipment includes interconnecting piping, ducts, pumps, valves, sumps, etc.

3.0 GENERAL FACILITY INFORMATION

The following is general information pertaining to the EWT facility:

Facility Name:	Evoqua Water Technologies
Address:	2523 Mutahar Street Parker, Arizona 85344
Facility Contact:	Monte McCue, Director – Plant Operations
Telephone Number:	(928) 669-5758
EPA ID Number:	AZD 982 441 263

4.0 CONTAINER STORAGE AREA, TANKS, ANCILLARY EQUIPMENT AND CARBON REACTIVATION UNIT

This section of the Closure Plan provides a description of the waste streams managed at the facility, the container storage area, the storage tanks and their associated ancillary equipment, and the carbon reactivation unit.

4.1 WASTE PHYSICAL PROPERTIES

The sole hazardous waste stream managed at the facility consists of spent activated carbon. The waste codes associated with this waste stream are identified in Attachment 1. This waste stream is a solid at ambient temperatures. Steam or water is normally used as the solvent for decontamination of equipment used for managing this waste stream.

4.2 EQUIPMENT EVALUATION

EWT has evaluated the management of this waste stream for development of this Closure Plan. This evaluation defined three groups of equipment for consideration: (1) the container storage area; (2) the tanks, containment areas, and ancillary equipment associated with the tanks; and (3) the RF-2 carbon reactivation unit. The evaluation process is discussed in the following sections.

4.2.1 CONTAINER STORAGE AREA SUMMARY

The Container Storage Area consists of a covered, reinforced concrete pad with perimeter curbs. The perimeter curbs on all four sides of the concrete pad are constructed of reinforced concrete. The base is maintained free of cracks or gaps and is liquid tight to contain liquid in the event of spills or leaks. For the purposes of this Closure Plan, the facility assumes the container storage area will be full to its maximum capacity (100,000 gallons, or approximately 1,818 – 55 gallon drums) at the time of closure.

4.2.2 TANKS AND ASSOCIATED ANCILLARY EQUIPMENT EVALUATION SUMMARY

The facility stores spent activated carbon in 5 tanks meeting applicable EPA standards for the storage of hazardous wastes. Tank detail sheets showing tank dimensions, shell thickness, supports, foundations, and other information for the tanks are provided in the Part B Permit Application. The tank capacities are identified in Table 2-1. For the purposes of this Closure Plan, the facility assumes that the tanks will be full to their maximum capacity at the time of closure.

The tanks at the facility are constructed of steel. The tanks are of closed top design and are integrally constructed. The ancillary equipment for each tank includes items such as piping, pumps, valves, and flow meters leading from the loading areas to the tanks, between the tanks, and from the tanks to the carbon reactivation unit. The ancillary equipment is constructed mainly of steel, and flexible hoses may be used in certain areas. Secondary containment for the tanks is provided and is constructed of reinforced concrete with perimeter dikes to prevent migration of spillage, leakage, or contaminated stormwater.

4.2.3 CARBON REACTIVATION UNIT SUMMARY

The facility reactivates the spent carbon in the carbon reactivation furnace (RF-2). The design capacity for the furnace is identified in Table 2-1. The RF-2 carbon reactivation unit is constructed of steel and is approximately 12’-10” in diameter by 19’-8” feet tall. The RF-2 carbon reactivation unit includes five internal hearths and a center shaft with rabble arms to agitate the spent carbon.

Equipment associated with the RF-2 carbon reactivation unit include:

- Afterburner
- Quench and venturi scrubber
- Packed tower scrubber with scrubber packing
- Wet electrostatic precipitator
- Induced draft fan
- Stack.

Containment for the carbon reactivation unit is provided and is constructed of reinforced concrete with perimeter dikes to prevent migration of spillage, leakage, or contaminated stormwater. The containment has regularly been inspected by EWT and is free of cracks and gaps, which will prevent migration of materials through the concrete.

5.0 CLOSURE REQUIREMENTS

EWT has prepared this Closure Plan in compliance with the 40 CFR 264 Subparts G, I, J, and X requirements. Closure shall be performed in such a manner as to:

- Minimize the need for further maintenance;
- Control, minimize, or eliminate, to the extent necessary to protect human health and the environment, the post-closure escape of hazardous wastes, hazardous leachates, contaminated runoff, or hazardous waste decomposition products to the groundwater, surface water, or the atmosphere;
- Comply with the closure requirements of 40 CFR 264 Subpart G, including, but not limited to, the requirements of 40 CFR 264.178 for containers, 40 CFR 264.197 for tanks, and 40 CFR 264 Subpart X for the carbon reactivation unit; and
- Confirm that any structures left in place on site meet the performance standards established for site closure.

The goal of this plan is to achieve clean closure. In short, this means that all hazardous wastes will be removed from the RCRA regulated units, and that any releases at or from the units will be remediated so that further regulatory control under RCRA Subtitle C is not necessary to protect human health and the environment. In the event clean closure cannot be achieved, further investigation and remediation work will be performed.

The closure of each hazardous waste management unit at the facility will be accomplished by:

- Decontaminating all contaminated equipment, containment system components and associated structures to specified closure performance standards;
- Verifying whether equipment has been decontaminated successfully based on the intended disposition;
- Dismantling and removing equipment that has either been decontaminated successfully or will be disposed;
- Decontaminating containment structures and verifying that they have been successfully decontaminated and removing any contaminated concrete;
- Determining whether soil contamination beneath the containment pads has occurred; and
- If soil contamination is found, remediating contaminated areas so that further regulatory control under RCRA Subtitle C is not necessary to protect human health and the environment.

5.1 CLEAN CLOSURE PERFORMANCE STANDARDS

Hazardous waste management units will be considered clean closed if they meet the following closure requirements:

5.1.1 PROCESS EQUIPMENT

Process equipment includes such items as tanks, piping, pumps, valves, the carbon reactivation furnace vessels, interconnecting ductwork, and air pollution control equipment. Process equipment will be considered clean closed if the decontaminated surfaces meet the Clean Debris Surface Standard (40 CFR 268.45, Table 1, Section A.1.e).

In smaller equipment items, where surfaces are not amenable to thorough visual inspection, a sample of the final decontamination rinsate from each item (or batch of small equipment items) will be collected and analyzed for a set of selected contaminants of concern (COCs). Those analytical results will be compared to the analytical results of decontamination water before it is used. If the COC concentration of the final rinsate sample is equal to or less than the COC concentration of the unused decontamination water (with 95% confidence) the equipment will be confirmed to be decontaminated.

5.1.2 CONCRETE CONTAINMENT PADS AND SUPPORT STRUCTURES

Concrete containment pads and steel structures will be considered clean closed if the decontaminated surfaces meet the Clean Debris Surface Standard (40 CFR 268.45, Table 1, Section A.1.a, b, c, d, or e).

5.1.3 SOILS

Soils will be considered clean if detectable metal constituents are at or below the mean of background sample results plus two standard deviations, and detectable organic constituents are below EPA Region 9's Preliminary Remediation Goals (PRGs) for Industrial Soil. If levels exceeding these standards at statistically significant levels are detected in soil, appropriate corrective action will be implemented.

5.2 ALTERNATIVE TO MEETING CLEAN CLOSURE PERFORMANCE STANDARDS

For some or all of the items subject to closure, EWT may choose to dismantle the item and dispose of it as hazardous waste or as hazardous debris at an appropriate TSDF. Disposal in this manner may be done if decontamination efforts are not sufficient to satisfy the clean closure performance standards described above, or may be done instead of decontamination. In either of these cases, the removal of the contaminated item constitutes clean closure, rather than decontamination and evaluation against the performance standards described above.

6.0 CLOSURE ACTIVITIES

This section describes both the general and specific closure activities for the container storage area, the storage tanks and their associated ancillary equipment, and the carbon reactivation unit.

6.1 GENERAL CLOSURE ACTIVITIES

The following sections of the Closure Plan are written from the perspective that third party contractors will perform the closure activities in conjunction with site personnel. The closure costs identified in Section 11.0 were developed based on the "worst case" scenario of only using contractors. EWT may perform the closure activities using EWT personnel (except for the Professional Engineer). In addition, the following sections are written to address the container storage area, the storage tanks and their associated ancillary equipment, and the carbon reactivation unit identified above, assuming that metallic components can be scrapped rather than being disposed. The cost estimates include the cost of dismantling each major piece of equipment identified in Table 2-1, but do not include any credit which may be realized from the sale of scrap materials.

EWT will utilize contractors to ensure that all activities are performed to minimize the need for future maintenance, maximize, to the extent necessary, the protection of human health and the environment, and eliminate post-closure escape of hazardous waste, hazardous constituents, contaminated run-off and/or hazardous waste decomposition products.

EWT will utilize facility health and safety and waste management procedures to address the following items prior to initiating closure:

(1) PPE and respiratory protection criteria;
(2) Air monitoring methods and techniques;
(3) Run-on/off controls for site activities;
(4) Site safety meeting criteria and schedule;
(5) Detailed site organization responsibilities;
(6) Impermeable barrier techniques and materials to be used to protect non-closure affected areas;
(7) Waste handling methods;
(8) Site material storage scenarios to segregate hazardous and nonhazardous materials;
(9) Fire protection mechanisms and techniques;
(10) Site specific Contingency Plan to address potential response activities;
(11) Proof of training and medical monitoring to satisfy OSHA compliance; and
(12) Certification and permits for any subcontractor services (if necessary).

In general, the closure activities will be performed during daylight hours. Also, site activities will be scheduled to allow personnel to secure the closure areas before leaving each day. A 10 hour workday is anticipated.

In the event that specific closure activities do not allow a safe or effective shutdown and activities are required to be performed at night, EWT will provide the necessary lighting and equipment to complete the work in a safe manner.

Contractors will perform all Confined Space activities pursuant to a Confined Space Entry program. Similar criteria are applicable for the Lock-Out/Tag-Out programs associated with confined space activities. The closure site boundary will be clearly delineated by barricades, signs, and other markers, as necessary, to ensure closure site security. Site security mechanisms will be installed at the end of each working day.

A site-specific Health and Safety Plan (HASP) will be developed by the contractor hired to perform the closure activities.

During the closure activities, utilities (i.e., electricity, water, steam, etc.) will be provided by EWT. The closure cost estimate includes the costs for providing these utility services.

All debris and other miscellaneous materials will be collected and stored as necessary on a daily basis. No waste, hazardous or otherwise, will be left in the units to be closed at closure completion. Site inspection will be performed to ensure that all hazardous waste and residuals are removed from the closure area to prevent any post-closure escape of hazardous waste, hazardous constituents, contaminated run-off, or hazardous waste decomposition products that could potentially affect groundwater, surface waters, or the atmosphere.

Site activities will be performed with the necessary barricades to prevent migration of hazardous waste during closure activities. This includes all site storage areas, temporary decontamination stations, etc. Potential prevention methods and equipment include:

- Silt fences;
- Straw boundary barricades; and
- Temporary decontamination stations, etc.

Spill response activities will be specified per the EWT Contingency Plan. Berm construction will consist of the use of visqueen and/or HDPE liners placed on the containment pad nearest to the equipment, anchored by weights such as sand, oil dry, or other suitable materials. Lay down areas will include only the area within containment, and direct placement into the macroencapsulation debris roll-off boxes, where used. The macroencapsulation debris roll-off boxes will be placed in the vicinity of the equipment being dismantled.

Temporary barriers, liners, etc. will be utilized during closure activities to prevent contamination of soil or groundwater. Inspections will be performed to address potential contributions from closure activities. Evidence of potential contributions will initiate immediate corrective action activities.

An independent Registered Professional Engineer will confirm that all closure activities have been performed in accordance with the approved Closure Plan. This individual will be responsible for making site inspections, on an as needed basis, for confirmation of certification requirements. The engineer will ensure that all activities are being performed pursuant to the Closure Plan and in compliance with 40 CFR 264 Subparts G, I, J, and X.

6.2 SPECIFIC CLOSURE ACTIVITIES

This section identifies the specific closure activities for the container storage area, the storage tanks and their associated ancillary equipment, and the carbon reactivation unit.

Decontamination activities during closure will include the following:

- Tanks, piping, pumps, valves, and other small equipment will be decontaminated and either sold for reuse, recycled, or disposed as nonhazardous waste, or transported offsite to an appropriate TSDF for disposal.
- Contaminated secondary containment structures will be decontaminated, if possible, to achieve the closure performance standards if they are to be left on-site. As an option, contaminated structures, storage tanks, and associated equipment that may not be decontaminated will be demolished and/or cut up, and transported offsite as a hazardous waste to an appropriate TSDF.
- Contaminated soil identified during site closure will be removed and transported offsite to an appropriate TSDF for disposal or otherwise remediated.
- All equipment, including mobile equipment and earth moving equipment that comes in contact with hazardous waste constituents during closure, will be decontaminated using detergent and water (or water alone), before leaving the contaminated area or removal from the facility.
- Any residues generated during decontamination activities will be handled in accordance with all applicable hazardous waste requirements of 40 CFR 261, 262, 263, and 268.34.
- Rinse water and wastewater generated during decontamination activities will be treated in the on-site wastewater treatment unit and discharged to the POTW.

Depending on the type and condition of each surface to be decontaminated, one or more of the following technologies will be utilized for decontamination:

- Physically scraping the surfaces with appropriate hand tools to remove attached materials;
- Rinsing with low-pressure water or a detergent/surfactant cleaning solution to remove scaling and surface debris;
- Hydroblasting and/or pressure washing with high-pressure water to scour the surface to remove contaminants and carry them away from the surface; or
- Steam cleaning to remove contaminants that cannot be adequately removed by other means.

6.2.1 CONTAINER STORAGE AREA

When the container storage area is to be closed, the facility will first remove all containers of hazardous waste from the area. For purposes of the closure cost estimate, it is assumed that the spent activated carbon in the container storage area will be shipped off-site for incineration at an appropriate TSDF. Alternatively, the contents of the containers will be transferred into the tank system, and the empty containers will be sent for reconditioning or disposal. If the alternative is used, the spent carbon will be subsequently treated in carbon reactivation unit RF-2.

Residuals potentially generated during transfer activities may include drips, leaks, and spills. These will be collected in containers, liners, pads, and absorbent materials, as necessary, for any drips, leaks, or spills that occur. Any residuals generated will be cleaned up immediately to maintain site integrity. All residuals will be consolidated for off-site disposal as hazardous waste.

Operators and all other personnel involved in work activities will be equipped with the proper PPE during all closure activities. Personnel will be made aware of the proper PPE as well as the proper operating techniques of all pumps, trucks, etc. necessary to perform the activity prior to implementation. PPE will be collected in designated containers for off-site disposal.

All concrete containment surfaces within the container storage area will be decontaminated to the maximum extent possible. The decontamination procedures will also apply to the sump collection systems within these containment structures. If it is determined that a containment area cannot be successfully decontaminated, then the structures may be demolished, removed, and disposed of off-site at a permitted TSDF.

The containment surfaces will initially be inspected for any cracks, gaps or other major structural defects prior to decontamination to determine potential subsurface soil sampling locations. An initial survey was conducted as part of the development of this Closure Plan, and preliminary soil sampling locations have been selected as shown on the figure included in the Sampling and Analysis Plan. Any cracks that are observed to extend through the entire thickness of the concrete slab will be sealed prior to decontamination of the unit. The containment pads then will be decontaminated by an appropriate decontamination technology. Areas with extensive staining or impacted contamination will be noted and addressed. All scarified materials removed from the concrete surfaces and wash water generated during decontamination will be isolated and contained within the containment pad using appropriate engineering controls, such as sand bags, visqueen plastic sheeting, and temporary absorbent barriers.

Upon verification that the containment area has met the closure performance standards, the area will be marked and isolated, or demolished and removed for disposal off site as a non-hazardous waste.

The following miscellaneous decontamination items will be considered during the container storage area closure activities:

- Disposable tools (i.e., brushes, etc.) will be collected in a designated area for off-site disposal as hazardous waste; and

- Non-disposable tools (i.e., wrenches, etc.) will be decontaminated using detergent and water (or water alone) prior to leaving the closure area.

6.2.2 TANKS AND ASSOCIATED ANCILLARY EQUIPMENT

Once the decision to initiate closure has been made, the lines to each of the five tanks will be locked out. For this reason, the maximum inventory of spent carbon expected to be present in each of the tanks is the amount identified in Table 2-1. For purposes of the closure cost estimate, it is assumed that the spent activated carbon in the tanks will be loaded onto trucks and shipped off-site for incineration at an appropriate TSDF. Alternatively, this material will be removed for treatment in carbon reactivation unit RF-2. The waste will be removed from the tanks and all associated ancillary equipment with existing site pumps, tanker loading equipment, and pressure washing and/or steaming, as necessary. Following the processing of all waste contained in the tanks, the lines associated with each of the tanks will be drained to the greatest extent possible and will be disconnected and blinded.

Decontamination and closure activities associated with the tanks will be limited to those surfaces that the waste stream contacted or potentially contacted. These will include the ancillary equipment previously identified, the internals of the tanks, and the containment area surrounding the tanks.

Residuals potentially generated during decontamination activities may include drips, leaks, and spills from piping and other equipment. These will be collected in containers, liners, pads, and absorbent materials, as necessary, for any drips, leaks, or spills that occur. Any residuals generated will be cleaned up immediately to maintain site integrity. All residuals will be consolidated for off-site disposal as hazardous waste.

Operators and all other personnel involved in work activities will be equipped with the proper PPE during all closure activities. Personnel will be made aware of the proper PPE as well as the proper operating techniques of all pumps, trucks, blenders, etc. necessary to perform the activity prior to implementation. PPE will be collected in designated containers for off-site disposal.

The ancillary equipment associated with the tanks will be removed. Non-metallic items will be collected and placed into roll-off boxes for macroencapsulation and disposal as hazardous debris. The piping and metallic ancillary equipment will be removed, cut into manageable pieces, and closed as follows:

- Pressure washing and/or steam cleaning will be performed, as necessary, to remove any residue;
- Collection vessels for wash waters will be provided for consolidation and subsequent treatment in the in-house wastewater treatment system prior to discharge to the POTW;
- Upon completion of the decontamination activities, the ancillary equipment will be evaluated to ensure that it has met the closure performance standards;

- For small equipment items that are not amenable to thorough visual inspection, a sample of the final rinsate will be collected and analyzed for confirmation that the performance standards have been met;
- The decontaminated ancillary equipment will be disassembled, removed, and sent as scrap metal for recycling;
- Any items not meeting the closure performance standards will either undergo further decontamination or will be disposed of at an appropriate TSDF as hazardous debris.

The following closure activities associated with the decontamination of the tanks will be performed:

- Any remaining liquid and sludge will be removed from the tanks as possible using physical (e.g., pumping, etc.) means;
- The tanks will be purged of vapor and the tank will be opened to allow access to personnel;
- Confined Space Entry procedures will be utilized;
- Lock-Out/Tag-Out procedures will be utilized;
- Contractors will enter the tanks and remove any residual sludge through physical means;
- Pressure washing and/or steam will be used to remove any remaining contamination until the tanks meet the closure performance standards. Decontamination fluids will be collected for treatment in the in-house wastewater treatment system prior to discharge to the POTW.

Upon completion of the decontamination activities, the tanks will be evaluated to ensure the tank internals meet the closure performance standards. The outside of the tanks and surrounding areas will also be inspected (and decontaminated, if necessary). Decontaminated tanks that meet the closure performance standard may be re-used at a TSDF, sold for re-use at a TSDF or other industrial application, left in place, or cut into manageable pieces and sent to a scrap metal reclaimer. The cost estimate includes the cost for dissembling, cutting and shipping the tanks for scrap. No credit has been taken for any revenue received for scrap sales.

All concrete containment surfaces associated with the tanks will be decontaminated to the maximum extent possible. The decontamination procedures will also apply to the sump collection systems within these containment structures. If it is determined that a containment area cannot be successfully decontaminated, then the structures may be demolished, removed, and disposed of off-site at a permitted TSDF.

The containment surfaces will initially be inspected for any cracks, gaps or other major structural defects prior to decontamination to determine potential subsurface soil sampling locations. An initial survey was conducted as part of the development of this Closure Plan, and preliminary soil sampling locations have been selected as shown on the figure included in the Sampling and Analysis Plan. Any cracks that are observed to extend through the entire thickness of the concrete slab will be sealed prior to decontamination of the unit. The containment pads then will be decontaminated by an appropriate decontamination technology. Areas with extensive staining or impacted contamination will be noted and addressed. All scarified materials removed from the concrete surfaces and wash water generated during decontamination will be isolated and contained within the containment pad using appropriate engineering controls, such as sand bags, visqueen plastic sheeting, and temporary absorbent barriers.

Upon verification that the containment area has met the closure performance standards, the area will be marked and isolated, or demolished and removed for disposal off site as a non-hazardous waste.

The following miscellaneous decontamination items will be considered during the tank closure activities:

- Disposable tools (i.e., brushes, etc.) will be collected in a designated area for off-site disposal as hazardous waste; and
- Non-disposable tools (i.e., wrenches, etc.) will be decontaminated with detergent and water (or waste alone), prior to leaving the closure area.

6.2.3 CARBON REACTIVATION UNIT RF-2

Once the decision to initiate closure has been made, the lines to the carbon reactivation unit will be locked out, and will only be utilized to treat the material remaining in the containers and tanks, as identified above. The spent carbon stored in bulk and in containers will be treated by reactivation in carbon reactivation unit RF-2 and subsequently packaged for reshipment to customers. A maximum of 100,000 gallons of spent activated carbon from containers and approximately 45,000 gallons of spent activated carbon in bulk will be on site at the time of closure.

Slurry recycle water is consumed in the carbon reactivation process and it is anticipated that most of it will be consumed during the treatment of the spent activated carbon inventory during closure. The slurry water that is not consumed will be treated in the in-house wastewater treatment system prior to being discharged to the POTW. Additionally, makeup water may be required to complete the reactivation of all the spent carbon inventory. It is anticipated that a portion of the makeup water will be supplied by decontamination wash water produced during closure. Scrubber blowdown will be discharged to the local POTW consistent with the facility's discharge permit.

Upon completion of this treatment, carbon reactivation unit RF-2 will be operated at or above the minimum permitted temperatures, using auxiliary fuels only, and without processing any additional spent carbon, for a period of four hours to ensure that the unit is organically decontaminated. After this period, the unit will be shut down, cooled, locked out, and all lines to the unit will be removed as identified above. Therefore, the material remaining in the carbon reactivation unit and associated downstream equipment will be residual in nature, and only inorganic contaminants (metals) may remain. (See EPA memo regarding closure of hazardous waste incinerators in Attachment 2). The material remaining in the carbon reactivation unit will be removed with existing site pumps, tanker loading equipment, manual techniques, and pressure washing and/or steaming, as necessary.

Decontamination and closure activities associated with the carbon reactivation unit will be limited to those surfaces that the waste stream or treatment residuals contacted or potentially contacted. These will include the internals of the carbon reactivation unit and downstream equipment, and the containment pad for the carbon reactivation unit.

Residuals potentially generated during decontamination activities may include drips, leaks, and spills. These will be collected in containers, liners, pads, and absorbent materials, as necessary, for any drips, leaks, or spills that occur. Any residuals generated will be cleaned up immediately to maintain site integrity. All residuals will be consolidated for off-site disposal as hazardous waste.

Operators and all other personnel involved in work activities will be equipped with the proper PPE during all closure activities. Personnel will be made aware of the proper PPE as well as the proper operating techniques of all pumps, trucks, blenders, etc. necessary to perform the activity prior to implementation. PPE will be collected in designated containers for off-site disposal.

The following closure activities associated with the decontamination of the carbon reactivation unit will be performed:

- Any remaining liquid and sludge will be removed from the carbon reactivation unit off gas treatment equipment using physical (e.g., pumping, etc.) means. Liquids will be treated in the in-house wastewater treatment system prior to being discharged to the POTW. Sludges will be placed into a roll-off box for macroencapsulation and disposal as hazardous debris;
- The carbon reactivation unit and downstream equipment will be purged of vapor and the carbon reactivation unit will be opened to allow access to personnel;
- Confined Space Entry procedures will be utilized;
- Lock-Out/Tag-Out procedures will be utilized;
- Contractors will enter the carbon reactivation unit and downstream equipment and remove any residual material (sludge, carbon, or slag) through physical means using hand tools;
- Scrubber packing will be physically removed and placed in a roll-off box for macroencapsulation for disposal as hazardous debris;
- Residual sludge, activated carbon, and slag should be minimal based on experience with periodic maintenance of the unit, and will be placed into roll-off boxes for macroencapsulation, or a 55-galllon drum of incinerables for off-site disposal;
- The refractory in the RF-2 furnace, afterburner, and connecting ductwork will be removed using hand tools and placed into a roll-off box for disposal as hazardous debris using macroencapsulation;
- Pressure washing and/or steam will be used to remove any remaining contamination until the carbon reactivation unit and downstream equipment meets the closure performance standards. Decontamination fluids will be

collected and treated through the in-house wastewater treatment system prior to discharge to the POTW;
- For small equipment items that are not amenable to thorough visual inspection, a sample of the final rinsate will be collected and analyzed for confirmation that the performance standards have been met.

Upon completion of the decontamination activities, the carbon reactivation unit and downstream equipment will be inspected to ensure the internals meet the closure performance standards. The outside of each equipment item and surrounding areas will also be inspected (and decontaminated, if necessary).

Once the carbon reactivation unit and downstream equipment have been determined to be cleaned, equipment will be dismantled. Metallic items will be scrapped. Fiberglass, plastic, and other non-metalic components will be disposed of as non-hazardous debris. Packed scrubber internals will be macroencapsulated and disposed of as hazardous debris.

All concrete containment surfaces associated with the carbon reactivation unit and downstream equipment will be decontaminated to the maximum extent possible. The decontamination procedures will also apply to the sump collection systems within these containment structures. If it is determined that a containment area cannot be successfully decontaminated, then the structures may be demolished, removed, and disposed of off-site at a permitted TSDF.

The containment surfaces will initially be inspected for any cracks, gaps or other major structural defects prior to decontamination to determine potential subsurface soil sampling locations. An initial survey was conducted as part of the development of this Closure Plan, and preliminary soil sampling locations have been selected as shown on the figure included in the Sampling and Analysis Plan. Any cracks that are observed to extend through the entire thickness of the concrete slab will be sealed prior to decontamination of the unit. The containment pads then will be decontaminated by an appropriate decontamination technology. Areas with extensive staining or impacted contamination will be noted and addressed. All scarified materials removed from the concrete surfaces and wash water generated during decontamination will be isolated and contained within the containment pad using appropriate engineering controls, such as sand bags, visqueen plastic sheeting, and temporary absorbent barriers.

Upon verification that the containment area has met the closure performance standards, the area will be marked and isolated, or demolished and removed for disposal off site as a non-hazardous waste.

The following miscellaneous decontamination items will be considered during the carbon reactivation unit closure activities:

- Disposable tools (i.e., brushes, etc.) will be collected in a designated area for off-site disposal as hazardous waste; and
- Non-disposable tools (i.e., wrenches, etc.) will be decontaminated with detergent and water (or water alone), prior to leaving the closure area.

6.2.4 SOIL INVESTIGATION

Following decontamination and partial dismantlement of the containment structures, storage tanks, and equipment at the site, soils beneath the HWMUs will be investigated. By drilling borings through the secondary containment pads, the soils will be sampled and analyzed to confirm that no residual contamination is present. The purpose of soil sampling and analysis is to identify areas where remediation may be necessary as a result of past practices and to meet the soil closure performance standards.

All collection and analysis of soil samples will be in accordance with the SAP, which includes provisions for using standard test methods, a state-certified laboratory for analyses, proper chain-of-custody procedures, and quality control/quality assurance samples such as field blanks, trip blanks, and duplicate samples.

Soils beneath each of the HWMUs will be sampled at a minimum of two to five points. Additional sample locations within each structure will be based on locations of cracks or stains in the secondary containment systems.

Background samples will also be collected from three separate locations according to the SAP. The locations are shown in the SAP, and have been selected outside of the facility's operational areas during a site survey conducted during 2011 in cooperation with the EPA Project Manager (Mr. Mike Zabaneh) and will represent constituent concentrations that have not been impacted by site operations. The results of these soil samples will be used in the development of metals closure performance standards for the site.

Soil samples will be collected at a series of depths starting just below the concrete slab. Shallow samples will be collected using a Geoprobe direct push method or hand-auger, while deeper borings will be drilled with a larger sonic or hollow stem auger rig.

After the samples are collected, each boring will be backfilled with grout. The collected soil samples will be transferred to the laboratory for analysis by the methods specified in the SAP.

If the analytical results of these soil samples meet the cleanup criteria specified in this Closure Plan, then the soils will be considered clean closed. If the samples do not meet the cleanup performance criteria, then additional soil sampling will be conducted in the area near where the contamination was found, in order to determine the extent of contamination, and appropriate remedial action will be taken. For purposes of the closure cost estimate, it has been assumed that soil borings to groundwater will be conducted at three locations, with additional sampling and analysis at 5 depths in each boring.

7.0 SAMPLING AND ANALYSIS

EWT has utilized the EPA Guidance Document "Draft of Guidance of Incinerator Closure" (June 29, 1990) in the preparation of this Closure Plan. A copy of this guidance is included in Attachment 2. It is suggested by USEPA to utilize the techniques discussed in this document to clean close all combustion related facilities. In this document, EPA recommends (in the section entitled "Approach to Incinerator Closure") operating the thermal equipment at or above minimum permit temperatures for a period of four hours to remove organic contaminants from the system. The guidance also suggests using a water rinse to remove residual inorganic contaminants to decontaminate equipment.

As described in detail in Section 6.0, decontaminated surfaces will be visually examined to determine if the Clean Debris Surface Standard of 40 CFR 268.45 Table 1, Section A is met. For equipment and other items that are not amenable to a thorough visual inspection, samples of the final rinse for each piece or batch of equipment/items will be obtained for comparison to the decontamination standards. Soil samples will be collected from background (non-process) locations and from several borings under the concrete containment pads. A summary list of the samples to be obtained is provided as Table 7-1. The samples will be obtained in accordance with a site specific "Sampling and Analysis Plan" (SAP) contained in a separate appendix to the RCRA Part B Permit Application. In addition, the samples will be handled and analyzed in accordance with site specific "Quality Assurance Objectives" which are addressed in the SAP. The SAP identifies items such as the appropriate sample containers, sampling techniques, sample preservation, chain-of-custody procedures, specific analytical procedures, and detailed QA/QC procedures, etc. General information for sample analysis and QA/QC is provided with this closure plan.

Each of the samples identified in Table 7-1 associated with the decontamination of equipment/items will be analyzed for a set of selected Compounds of Concern (COCs) that will be used to assess the decontamination of equipment/items. Based on a review of the waste codes received at the site (Attachment 1) and the constituents associated with those codes, EWT has selected COCs for closure purposes. Those selections include metals, halogenated volatile organics, aromatic and unsaturated volatile organics, nonhalogenated volatile organics,halogenated and nonhalogenated semivolatile organics, polyaromatic compounds, phenolic compounds, nitriles, nitrogen and phosphorous containing pesticides, and organochlorine and other organohalide pesticides. The closure COCs are listed in Attachment 3.

For the assessment of soil contamination, each soil sample identified in Table 7-1 will be analyzed for the same group of metals identified above, and will also receive a full scan volatile and semivolatile organic analysis for comparison to PRGs.

TABLE 7-1. SAMPLES FOR CLOSURE CERTIFICATION

ITEM	ESTIMATED NUMBER OF SAMPLES TO BE OBTAINED	ANALYSES
Container Storage Area		
Equipment rinsate	1 (small equipment batch)	Metals[1], Organics[2]
Soil (initial sampling)	9 (assume 3 locations, 3 depths each)	Metals[1], Organics[3]
Tanks and Ancillary Equipment		
Equipment rinsate	5 (1 small equipment batch for each tank system)	Metals[1], Organics[2]
Soil (initial sampling)	21 (assume 7 locations, 3 depths each)	Metals[1], Organics[3]
Carbon Reactivation Unit		
Equipment rinsate	3 (1 small equipment batch for each RF-2 furnace/afterburner, APCD, Fan/stack)	Metals[1]
Soil (RF-1 and RF-2 areas, initial sampling)	9 (assume 3 locations, 3 depths each)	Metals[1], Organics[3]
Un-used decontamination water	3	Metals[1], Organics[2]
Background Soil	9 (3 locations, 3 depths, each)	Metals[1]
Soil (borings to groundwater if initial sampling shows contamination)	15 (3 locations, 5 depths each)	Metals[1], Organics[3]

Sample analyses:

[1] Metals by SW-846 Method 6010 and 7470 for the target metal analytes listed in Attachment 3.

[2] Organics by SW-846 Methods 8260, 8270, and 8141 for the compounds listed in Attachment 3.

[3.]Organics: Full scan volatiles (SW-846 Method 8260) and full scan semivolatiles (SW-846 Method 8270) for comparison to PRGs for soil.

In all cases, the latest version of the analytical methods will be used.

The background concentration for the metal constituents will be the metals closure performance standard for closure certification of soils. The EPA Region 9 Preliminary Remediation Guide (PRG) concentrations for the organic constituents in Industrial Soils will serve as the organic closure performance standards for closure certification of soils.

For equipment or other items that cannot be adequately inspected or may not meet the Clean Debris Surface Standard of 40 CFR 268.45 Table 1, Section A, a sample of the final rinsate from the decontamination process associated with each piece of equipment/item will be collected, and the analytical results for the metal and organic COCs will be compared to the analysis of unused decontamination water.

Equipment/items meeting the clean closure performance standards defined in Section 5.0 of this document will be deemed to be clean and can be removed from RCRA Subtitle C regulation. For equipment/items not meeting the clean closure performance standards, the facility will perform additional decontamination (i.e., repeat the decontamination as specified for that piece of equipment/item) and re-evaluate the decontaminated equipment/item against the clean closure performance standards.

If, after a number of attempts are made to decontaminate equipment/items and the clean closure performance standards are not met, the facility will dispose of the equipment/item off-site as hazardous waste.

Rather than decontaminating equipment/items, the facility may alternatively elect to ship the piece of equipment/item offsite for treatment/disposal as a hazardous waste. This would remove the equipment/item from the site. Therefore no threat to human health or the environment would be applicable for that piece of equipment at the facility. This decision would be based on the size and geometry of the equipment/item, the cost of treatment and/or disposal, the cost of further decontamination, etc.

8.0 CLOSURE SCHEDULE

The closure activities, as necessary, are scheduled to be performed in general accordance with the following schedule:

Task	**Days**
Notification of Closure to Regulatory Agency	0 (initiating period)
A. Preparation of Closure Bid Package	7 days (calendar)
B. Submission and Contractor Review	7 days
C. Site Visit for Contractors	7 days
D. Contractor Bid Package Preparation/Submittal	14 days
E. Contractor Award/Contract/Notice to Proceed	7 days
F. Preparation and Submittal of Health & Safety Plan	30 days
G. Contractor Mobilization	14 days
H. Closure Activity Implementation	70 days
i. Container Storage Area Decontamination (20 days)	
ii. Tanks and Ancillary Equipment Decontamination (20 days)	
iii. Carbon Reactivation Unit Decontamination (20 days)	
iv. Soil Investigation (10 days)	
I. Obtain Sample Results	30 days
J. Profiling/Shipment of Materials to be Disposed Off-site as Hazardous Waste/Debris	30 days
K. Submittal of Certification of Closure	60 days
L. Force Majeure	14 days
M. Schedule Contingency	<u>20 days</u>
TOTAL	310 days (calendar)
TOTAL ALLOWED TIME	310 days

This schedule will be utilized for the closure of the container storage area, tanks and associated ancillary equipment, and the carbon reactivation unit. Certain activities (e.g., decontamination of the container storage area, tanks and associated ancillary equipment, and carbon reactivation unit) may be conducted concurrently. The facility will notify EPA of the intent to initiate closure as specified in Section 9.0.

9.0 CLOSURE ACTIVITY NOTIFICATION

EWT will notify the EPA in writing at least 60 days prior to the date that EWT expects to initiate closure. EWT will complete all closure activities within 310 days of initiating closure in accordance with the approved Closure Plan. An extension may be requested if EWT determines that additional time will be necessary to complete closure.

10.0 CERTIFICATION OF CLOSURE

In accordance with the requirements of 40 CFR 264.115, within sixty (60) days of completing closure, EWT will notify the EPA, by registered mail, that closure activities have been completed in compliance with the specifications of the approved Closure Plan by submission of a Certification of Closure.

The Certification of Closure will include signatures from the EWT Owner/Operator and the independent Registered Professional Engineer. EWT will retain documentation necessary to support the independent Registered Professional Engineer's certification. Support documentation will be submitted to the EPA on request.

Financial assurance documentation will be retained by EWT until the EPA has officially released EWT from the financial assurance requirements for Final Closure as required by 40 CFR 264.143(i) and EWT confirms receipt of this release. In addition, upon receipt of this release, EWT will consider the container storage area, tanks and ancillary equipment, and carbon reactivation unit closed and all permit requirements identified in the RCRA permit will cease to apply to the container storage area, tanks and associated ancillary equipment, and carbon reactivation unit.

If the facility performs partial closure of any portion of the facility, this Closure Plan will be modified to include only the remaining equipment. In addition, the closure cost estimate will be amended to include only the remaining equipment.

11.0 CLOSURE COST ESTIMATE

The cost estimate for performing the above closure activities pertaining to the container storage area, tanks and associated ancillary equipment and carbon reactivation unit is included as Attachment 4 of this Closure Plan.

Note: Analytical costs have been estimated on the following basis:
- Metals (excluding Hg) $200/analysis
- Mercury $45/analysis
- Volatile organics $195/analysis
- Semivolatile organics $370/analysis
- Nitrogen and phosphorous pesticides $200/analysis

12.0 FINANCIAL ASSURANCE

The financial assurance mechanism currently in effect for closing the entire facility is included as Appendix XVIII to the RCRA Part B Permit Application.

APPENDIX XVI

RF-1 UNIT CLOSURE PLAN

FOR

SIEMENS INDUSTRY, INC.

PARKER REACTIVATION FACILITY

PARKER, ARIZONA

Revision 6
April 2012

APPENDIX XVI

RF-1 CLOSURE PLAN

Siemens Industry, Inc.
2523 Mutahar Street
Parker, Arizona 85344
928-669-5758

April 2012
Revision 6

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1.0 INTRODUCTION

The Siemens Industry, Inc. (SII) facility accepts spent activated carbon in containers (drums and bulk) from various customers. The spent activated carbon is identified as both hazardous and non-hazardous waste and is managed at the facility in the container storage area, five storage tanks (T1, T2, T5, T6, and T18), and ultimately in the carbon reactivation unit (RF-2). Previously, the spent activated carbon was reactivated using carbon reactivation unit (RF-1), which is now inactive.

The facility, including RF-1, began construction in 1991 and operations commenced in August 1992. The RF-1 unit treated spent activated carbon exclusively during the time of operation. The RF-1 unit was shut down, after wastes were removed, in June of 1996 to allow for the final construction phase and startup of RF-2 in July 1996 to full interim status capacity.

Currently RF-1 does not share any equipment with RF-2. With a few exceptions, all RF-1 equipment (which includes the reactivation furnace, APC equipment/piping, and fan) remains on site.

This Closure Plan covers only the partial closure activities associated with the inactive RF-1 unit. A separate RCRA Facility Closure Plan for the remainder of the SII facility has been prepared which covers activities related to the eventual closure of all other hazardous waste portions of the facility, including all hazardous waste management units (HWMUs) described in the facility's Part A application.

The contents of this RF-1 Closure Plan are based upon, and meet all the criteria set forth in 40 CFR Part 264, Subparts G and H. The goal of this plan is to achieve clean closure of the inactive RF-1 carbon reactivation unit. In short, this means that all hazardous wastes will be removed from the RF-1 unit, and that any releases at or from this unit will be remediated so that further regulatory control under RCRA Subtitle C is not necessary to protect human health and the environment. In the event clean closure cannot be achieved, the RF-1 components will be disposed as hazardous waste.

Activities associated with closure of the RF-1 unit will include decontamination of treatment equipment, evaluation of decontamination results (including sampling and analysis, as necessary) to ensure that decontamination is adequate, and certification of closure by the facility owner and/or operator and a registered professional engineer. The Closure Plan also includes a cost estimate and financial assurance mechanism for the closure activities. A Sampling and Analysis Plan (SAP) for closure activities, detailing the collection of samples, laboratory analysis, and interpretation of analytical results is included as a separate appendix to the RCRA Part B Permit Application.

1.1 SITE CONDITIONS

This section describes the existing environment at the location of the facility. Included is information on land features, geologic setting, soils, and water resources. The living resources described include wildlife, vegetation, ecosystems and adjacent agricultural resources. The available cultural, historic and archeological information for the site is also discussed.

1.1.1 CLIMATE

The climate is typical of the Sonoran Desert Region. Winters are mild with minimum temperatures above freezing. The summers are long, hot, and dry with temperatures commonly exceeding 100°F. Average total precipitation is approximately 3.82 inches per year. Precipitation is sporadic, occurring mainly in the time intervals of July -September and December -February. The evaporation rate in this area is 86 inches per year.

1.1.2 WATER

1.1.2.1 Groundwater

Groundwater in the Parker area occurs as both confined and unconfined aquifers. Most of the wells are completed in the Colorado River gravels (alluvium), where unconfined or water table conditions prevail. The Miocene(?) Fanglomerate (gravel deposits at base of mountains) and the lower part of the Bouse Formation contain confined aquifers (artesian). The (?) signifies the geological age is not certain. The city wells in Parker obtain most of their water from the Miocene(?) Fanglomerate. Sources of recharge to the groundwater supply of the area are the Colorado River, precipitation, and underflow from areas bordering the Parker Valley.

In this area, a large amount of the groundwater is lost through evapotranspiration in the Parker area. Direct recharge from precipitation is limited. Loss of water from the Colorado River provides almost 50% of the recharge to the groundwater near Parker.

The groundwater level near Parker is approximately 350 feet. The depth to water in the areas bordering the flood plain ranges from 70 to 300 feet below the land surface.

The production from wells screened in the Colorado River alluvium comes from highly permeable beds of sand and gravel. The Colorado River gravel has the highest transmissivity of the water-bearing sediments in the area. Wells which penetrate sufficient thicknesses of the gravel may produce more than 100 gpm per foot of drawdown (specific capacity).

1.1.2.2 Water Quality

The chemical quality of the groundwater in the Parker area is generally related to the source and movement of the water. The chemical quality of the groundwater is influenced by evaporation, transpiration by native vegetation, former flooding of the river, irrigation developments, and to a marked degree, by the local geology. The groundwater beneath the flood plain is relatively poor in quality, except where irrigation water has entered the aquifer. The shallow groundwater in the non-irrigated part of the valley has twice the mineral content as the Colorado River water.

An explanation for the water composition of many of the wells can be understood by assuming that the groundwater originated as infiltration from the Colorado River associated with irrigation canals, field irrigation, or the river channel. The water composition has been changed by evaporation and concentration.

The results of chemical analyses of water from wells in T.9N.R.20W, near Parker, Arizona show the change. The chloride concentrations for these wells varies between 107 and 208 mg/liter. It is assumed the dissolved minerals now in the ground water must have come from the Colorado River.

1.1.3 GEOLOGY

1.1.3.1 Regional Physiography

The area has a hot, arid climate and is characterized by roughly parallel mountain ranges separated by alluvial basins. The elevation of the basins varies between sea level and 1000 feet. The Colorado River is the major stream in the area. The Colorado River flood plain is between three and nine miles wide. It is less than one mile wide near Parker, and increases to nine miles in the Parker Valley. The flood plain is that part of the Colorado River Valley that has been covered by floods of the Colorado River, prior to construction of Hoover Dam. The elevation of the flood plain near Parker is approximately 360 feet above sea level. The mountains are rugged and rise abruptly from the Colorado River or from alluvial slopes. The highest mountain summits in the region reach an average elevation of around 3300 feet. Between the flood plain and the mountains are piedmont slopes, which are dissected by washes from the mountains and, in a few exceptions, into adjacent and topographically distinct basins. The facility is located on relatively flat terrain (slopes 0-3 percent), and is outside the floodplain.

1.1.3.2 Regional Geology

The geologic units considered important to water resources development near the site are the Miocene(?) Fanglomerate, the Bouse Formation and the alluvium of the Colorado River and its tributaries.

The rocks of the mountains are relatively impermeable, and form the boundaries of the groundwater reservoirs. Interbasin water movement is limited by the impermeable bedrock and limited to groundwater movement in surface sediments, where intermittent surface drainage exits from a basin.

The bedrock includes all rocks older than the Miccene(?) Fanglomerate, and contains sedimentary, metamorphic, and igneous rocks. These Miocene beds are gravel deposits that have eroded from the mountains and filled the basins. The thickness of these beds varies widely across the basins. The Fanglomerate is a potentially important aquifer as near Parker, where wells with a yield of 15 gallons per minute per foot of drawdown have been developed in the Fanglomerate, (Metzger, et al, 1973).

Sediments at the site, identified from geologic maps, are Qe (Eolian Deposits, Holocene) and QTr (Old Fluvial Deposits). Samples taken at the site indicated that only the eolian windblown sand and silt (Qe) are present. The eolian sand is tan to light tan and fine to medium grained, occurring as a deposit on the surface throughout the area.

1.1.3.3 Soils

The descriptions and delineations of soils for the Colorado River Indian Reservation Soil Survey do not always correlate with those of adjacent soil survey maps. The differences are related to differences in mapping intensity, extent of soils within the survey, change in knowledge about soils, and modifications in soil classification. The soil map shows that the soil present at the site is classified as Superstition series, which is a gravelly loamy fine sand that develops on zero to three percent slopes. Samples collected at the site show the same type of material. Chemical analyses of the soil samples revealed no evidence of any existing site contamination. Vegetation supported by Superstition soils is white bursage, creosotebush, turkshead and big gulleta.

2.0 SCOPE OF CLOSURE PLAN

The scope of this Closure Plan includes the partial closure of carbon reactivation unit RF-1 and the ancillary equipment associated with carbon reactivation unit RF-1 that will not be utilized for further management of the spent activated carbon, as necessary. Specifically, the items associated with RF-1 to be closed include:

- RF-1 Furnace with Center Shaft and Rabble Arms;
- The Carbon Slurry Lines;
- Tank T-8 Overflow Line;
- Afterburner AB-1;
- Packed Tower Scrubber with Scrubber Packing;
- Induced Draft Fan;
- Spent Carbon Dewatering Screw; and
- Tank T-8.

Table 2-1 identifies the applicable equipment for partial closure. Each piece of equipment to be closed is described in more detail in later sections of this Closure Plan.

In accordance with 40 CFR 264.112(c), this Closure Plan will be reviewed and amended, if necessary, whenever one of the following occurs:

- There is a change in operating plans or facility design that affects the Closure Plan;
- There is a change in the expected year of partial closure; or
- In conducting partial closure activities, unexpected events require a modification of the approved Closure Plan.

If SII and/or EPA determine that the Closure Plan needs to be amended, SII will submit a notification for, or request for, a permit modification based on the classification of the modification. An amended Closure Plan will be submitted as part of the permit modification.

TABLE 2-1. EQUIPMENT/ITEMS FOR CLOSURE

Equipment/Item	Use or Purpose	Size/Design Capacity[1]	Hazardous Waste Codes
Carbon Reactivation Unit RF-1[2]	Carbon Reactivation	9.25 foot diameter by 15 feet tall (Surface Area = 494 ft^2)	See Below[1]
RF-1 Carbon Slurry Lines (2)[2]	Transfer of Carbon for Reactivation	45 feet by 3 inches	See Below[1]
Tank T-8 Overflow Line[2]	Transfer of Water	145 feet by 6 inches	See Below[1]
RF-1 Afterburner AB-1[2]	Treatment of Vapors from Carbon Reactivation	14 feet by 8.33 feet by 8.5 feet (Surface Area = 992 ft^2)	See Below[1]
RF-1 Packed Tower Scrubber[2]	Treatment of Vapors from Carbon Reactivation	3.5 foot diameter by 21.25 feet tall	See Below[1]
RF-1 Induced Draft Fan[2]	Movement of Vapors from Carbon Reactivation	8.25 feet tall by 4.5 feet wide by 5.75 feet deep	See Below[1]
Tank T-8[2]	Transfer of Carbon for Reactivation	5 foot diameter by 12 feet tall (Surface Area = 228 ft^2)	See Below[1]
RF-1 Spent Carbon Dewatering Screw[2]	Transfer of Carbon for Reactivation	4 foot diameter converging in 5 feet to 1 foot diameter for 7 feet	See Below[1]

[1] See Attachment 1 for applicable hazardous waste codes.

[2] RF-1 equipment includes interconnecting piping, ducts, pumps, valves, sumps, etc.

3.0 GENERAL FACILITY INFORMATION

The following is general information pertaining to the SII facility:

Facility Name: Siemens Industry, Inc.

Address: 2523 Mutahar Street
Parker, Arizona 85344

Facility Contact: Monte McCue, Director – Plant Operations

Telephone Number: (928) 669-5758

EPA ID Number: AZD 982 441 263

4.0 WASTE PHYSICAL PROPERTIES AND EQUIPMENT EVALUATION

This section of the Closure Plan provides a description of the waste streams managed at the RF-1 unit, and an evaluation of the equipment associated with the RF-1 carbon reactivation unit.

4.1 WASTE PHYSICAL PROPERTIES

The sole hazardous waste stream managed at the RF-1 unit consists of spent activated carbon. The waste codes associated with this waste stream are identified in Attachment 1. This waste stream is a solid at ambient temperatures. Steam or water is normally used as the solvent for decontamination of equipment used for managing this waste stream.

4.2 EQUIPMENT EVALUATION

SII has evaluated the management of this waste stream for development of this Closure Plan. This evaluation defined the following equipment for consideration: (1) carbon reactivation unit RF-1; and (2) the ancillary equipment associated with carbon reactivation unit RF-1 that will not be utilized for further management of the spent activated carbon. The evaluation process is discussed in the following sections.

4.2.1 CARBON REACTIVATION UNIT RF-1 SUMMARY

The RF-1 carbon reactivation unit is constructed of steel and is approximately 9.25 feet in diameter by 15 feet tall in size (Internal Surface Area = approximately 494 ft^2). The RF-1 carbon reactivation unit includes a center shaft with rabble arms to agitate the spent carbon. Containment for the carbon reactivation unit is provided and is constructed of reinforced concrete with perimeter dikes to prevent migration of spillage, leakage, or contaminated storm water. The containment has regularly been inspected by Siemens and is free of cracks and gaps, which will prevent migration of materials through the concrete. The containment is also utilized for Carbon Reactivation Unit RF-2 and is therefore not applicable to the scope of this closure. The containment will be closed as part of the "facility wide" closure.

4.2.2 CARBON SLURRY LINES SUMMARY

The Carbon Slurry Lines associated with RF-1 are two pipes constructed of carbon steel. Each line is approximately 45 feet long and 3 inches in diameter.

4.2.3 TANK T-8 OVERFLOW LINE SUMMARY

The Tank T-8 Overflow Line associated with RF-1 is one pipe constructed of carbon steel. The line is approximately 145 feet long and 6 inches in diameter.

4.2.4 AFTERBURNER AB-1

Afterburner AB-1 is constructed of steel and is approximately 14 feet by 8.33 feet by 8.5 feet tall in size (Internal Surface Area = approximately 992 ft^2). There is no additional equipment associated with Afterburner AB-1.

4.2.5 PACKED TOWER SCRUBBER WITH SCRUBBER PACKING

The Packed Tower Scrubber is constructed of reinforced fiberglass plastic and is approximately 3.5 feet in diameter by 21.25 feet tall in size. The Packed Tower Scrubber contains approximately 7 cubic yards of plastic scrubber packing.

4.2.6 INDUCED DRAFT FAN

The Induced Draft Fan is constructed of steel and is approximately 8.25 feet tall by 4.5 feet wide by 5.75 feet deep in size. There is no additional equipment associated with the Induced Draft Fan.

4.2.7 SPENT CARBON DEWATERING SCREW

The Spent Carbon Dewatering Screw is constructed of steel and is approximately 4 feet in diameter converging within 5 feet to 1 foot in diameter for another 7 feet in length. There is no additional equipment associated with the Spent Carbon Dewatering Screw.

4.2.8 TANK T-8

Tank T-8 was the spent carbon feed hopper for RF-1 reactivation furnace. It is constructed of stainless steel (316 SS) and is approximately 5 feet by 12 feet in size.

5.0 CLOSURE REQUIREMENTS

SII has prepared this Closure Plan in compliance with the 40 CFR 264 Subparts G, and X requirements. Closure shall be performed in such a manner as to:

- Minimize the need for further maintenance;
- Control, minimize, or eliminate, to the extent necessary to protect human health and the environment, the post-closure escape of hazardous wastes, hazardous leachates, contaminated runoff, or hazardous waste decomposition products to the groundwater, surface water, or the atmosphere;
- Comply with the closure requirements of 40 CFR 264 Subpart G, including, but not limited to, the requirements of 40 CFR 264 Subpart X for the carbon reactivation unit; and
- Confirm that any structures left in place on site meet the performance standards established for site closure.

The closure of the RF-1 unit will be accomplished by:

- Decontaminating all contaminated equipment and associated structures to specified closure performance standards;
- Verifying whether equipment has been decontaminated successfully based on the intended disposition;
- Dismantling and removing equipment that has either been decontaminated successfully or will be disposed.

5.1 CLEAN CLOSURE PERFORMANCE STANDARDS

5.1.1

Process equipment includes such items as piping, pumps, valves, the carbon reactivation furnace vessels, interconnecting ductwork, and air pollution control equipment. Process equipment will be considered clean closed if the decontaminated surfaces meet the Clean Debris Surface Standard (40 CFR 268.45, Table 1, Section A.1.e).

In smaller equipment items, where surfaces are not amenable to thorough visual inspection, a sample of the final decontamination rinsate from each item (or batch of small equipment items) will be collected and analyzed for a set of selected contaminants of concern (COCs). Those analytical results will be compared to the analytical results of decontamination water before it is used. If the COC concentration of the final rinsate sample is equal to or less than the COC concentration of the unused decontamination water (with 95% confidence) the equipment will be confirmed to be decontaminated.

5.2 ALTERNATIVE TO MEETING CLEAN CLOSURE PERFORMANCE STANDARDS

For some or all of the items subject to closure, SII may choose to dismantle the item and dispose of it as hazardous waste or as hazardous debris at an appropriate TSDF. Disposal in this manner may be done if decontamination efforts are not sufficient to satisfy the clean closure performance standards described above, or may be done instead of decontamination. In either of these cases, the removal of the contaminated item constitutes clean closure, rather than decontamination and evaluation against the performance standards described above.

6.0 CLOSURE ACTIVITIES

This section describes both the general and specific closure activities for the carbon reactivation unit RF-1.

6.1 GENERAL CLOSURE ACTIVITIES

The following sections of the Closure Plan are written from the perspective that third party contractors will perform the closure activities in conjunction with site personnel. The closure costs identified in Section 11.0 were developed based on the "worst case" scenario of only using contractors. SII may perform the closure activities using SII personnel (except for the Professional Engineer). In addition, the following sections are written assuming that metallic components can be scrapped rather than being disposed. The cost estimates include the cost of dismantling each major piece of equipment identified in Table 2-1, but do not include any credit which may be realized from the sale of scrap materials.

SII will utilize contractors to ensure that all activities are performed to minimize the need for future maintenance, maximize, to the extent necessary, the protection of human health and the environment, and eliminate post-closure escape of hazardous waste, hazardous constituents, contaminated run-off and/or hazardous waste decomposition products.

SII will utilize facility health and safety and waste management procedures to address the following items prior to initiating closure:

(1) PPE and respiratory protection criteria;
(2) Air monitoring methods and techniques;
(3) Run-on/off controls for site activities;
(4) Site safety meeting criteria and schedule;
(5) Detailed site organization responsibilities;
(6) Impermeable barrier techniques and materials to be used to protect non-closure affected areas;
(7) Waste handling methods;
(8) Site material storage scenarios to segregate hazardous and nonhazardous materials;
(9) Fire protection mechanisms and techniques;
(10) Site specific Contingency Plan to address potential response activities;
(11) Proof of training and medical monitoring to satisfy OSHA compliance; and
(12) Certification and permits for any subcontractor services (if necessary).

In general, the closure activities will be performed during daylight hours. Also, site activities will be scheduled to allow personnel to secure the closure areas before leaving each day. A 10 hour workday is anticipated.

In the event that specific closure activities do not allow a safe or effective shutdown and activities are required to be performed at night, SII will provide the necessary lighting and equipment to complete the work in a safe manner.

Contractors will perform all Confined Space activities pursuant to a Confined Space Entry program. Similar criteria are applicable for the Lock-Out/Tag-Out programs associated with confined space activities. The closure site boundary will be clearly delineated by barricades, signs, and other markers, as necessary, to ensure closure site security. Site security mechanisms will be installed at the end of each working day.

A site-specific Health and Safety Plan (HASP) will be developed by the contractor hired to perform the closure activities.

During the closure activities, utilities (i.e., electricity, water, steam, etc.) will be provided by SII. The closure cost estimate includes the costs for providing these utility services.

All debris and other miscellaneous materials will be collected and stored as necessary on a daily basis. No waste, hazardous or otherwise, will be left in the unit to be closed at closure completion. Site inspection will be performed to ensure that all hazardous waste and residuals are removed from the closure area to prevent any post-closure escape of hazardous waste, hazardous constituents, contaminated run-off, or hazardous waste decomposition products that could potentially affect groundwater, surface waters, or the atmosphere.

Site activities will be performed with the necessary barricades to prevent migration of hazardous waste during closure activities. This includes all site storage areas, temporary decontamination stations, etc. Potential prevention methods and equipment include:

- Silt fences;
- Straw boundary barricades; and
- Temporary decontamination stations, etc.

Spill response activities will be specified per the SII Contingency Plan. Berm construction will consist of the use of visqueen and/or HDPE liners placed on the containment pad nearest to the equipment, anchored by weights such as sand, oil dry, or other suitable materials. Lay down areas will include only the area within containment, and direct placement into the macroencapsulation debris roll-off boxes, where used. The macroencapsulation debris roll-off boxes will be placed in the vicinity of the equipment being dismantled.

Temporary barriers, liners, etc. will be utilized during closure activities to prevent contamination of soil or groundwater. Inspections will be performed to address potential contributions from closure activities. Evidence of potential contributions will initiate immediate corrective action activities.

An independent Registered Professional Engineer will confirm that all closure activities have been performed in accordance with the approved Closure Plan. This individual will be responsible for making site inspections, on an as needed basis, for confirmation of certification requirements. The engineer will ensure that all activities are being performed pursuant to the Closure Plan and in compliance with 40 CFR 264 Subparts G and X.

6.2 SPECIFIC CLOSURE ACTIVITIES

This section identifies the specific closure activities for the container storage area, the storage tanks and their associated ancillary equipment, and the carbon reactivation unit.

Decontamination activities during closure will include the following:

- Piping, pumps, valves, and other small equipment will be decontaminated and either sold for reuse, recycled, or disposed as nonhazardous waste, or transported offsite to an appropriate TSDF for disposal.
- Contaminated structures and associated equipment will be decontaminated, if possible, to achieve the closure performance standards if they are to be left on-site. As an option, contaminated structures and associated equipment that may not be decontaminated will be demolished and/or cut up, and transported offsite as a hazardous waste to an appropriate TSDF.
- All equipment, including mobile equipment and earth moving equipment that comes in contact with hazardous waste constituents during closure, will be decontaminated using detergent and water (or water alone), before leaving the contaminated area or removal from the facility.
- Any residues generated during decontamination activities will be handled in accordance with all applicable hazardous waste requirements of 40 CFR 261, 262, 263, and 268.34.
- Rinse water and wastewater generated during decontamination activities will be treated in the on-site wastewater treatment unit and discharged to the POTW.

Depending on the type and condition of each surface to be decontaminated, one or more of the following technologies will be utilized for decontamination:

- Physically scraping the surfaces with appropriate hand tools to remove attached materials;
- Rinsing with low-pressure water or a detergent/surfactant cleaning solution to remove scaling and surface debris;
- Hydroblasting and/or pressure washing with high-pressure water to scour the surface to remove contaminants and carry them away from the surface; or
- Steam cleaning to remove contaminants that cannot be adequately removed by other means.

Carbon Reactivation Unit RF-1 has been removed from service and is not utilized for further management of spent activated carbon. Therefore, the material remaining in the carbon reactivation unit is residual in nature. Decontamination and partial closure activities associated with the carbon reactivation unit will be limited to those surfaces that the waste stream contacted or potentially contacted. These will include the internals of the carbon reactivation unit.

Residuals potentially generated during decontamination activities may include drips, leaks, and spills. These will be collected in containers, liners, pads, and absorbent materials, as necessary, for any drips, leaks, or spills that occur. Any residuals generated will be cleaned up immediately to maintain site integrity. All residuals will be consolidated for off-site disposal as hazardous waste.

Operators and all other personnel involved in work activities will be equipped with the proper PPE during all closure activities. Personnel will be made aware of the proper PPE as well as the proper operating techniques of all pumps, trucks, blenders, etc. necessary to perform the activity prior to implementation. PPE will be collected in designated containers for off-site disposal.

The following closure activities associated with the decontamination of the carbon reactivation unit and associated equipment identified in Table 2-1 will be performed:

- Any remaining liquid and sludge will be removed from the carbon reactivation unit off gas treatment equipment using physical (e.g., pumping, etc.) means. Liquids will be treated in the in-house wastewater treatment system prior to being discharged to the POTW. Sludges will be placed into a roll-off box for macroencapsulation and disposal as hazardous debris;
- The carbon reactivation unit and downstream equipment will be purged of vapor and the carbon reactivation unit will be opened to allow access to personnel;
- Confined Space Entry procedures will be utilized;
- Lock-Out/Tag-Out procedures will be utilized;
- Contractors will enter the carbon reactivation unit and downstream equipment and remove any residual material (sludge, carbon, or slag) through physical means using hand tools;
- Scrubber packing will be physically removed and placed in a roll-off box for macroencapsulation for disposal as hazardous debris;
- Residual sludge, activated carbon, and slag should be minimal based on experience with periodic maintenance of the unit, and will be placed into roll-off boxes for macroencapsulation, or a 55-galllon drum of incinerables for off-site disposal;
- The refractory in the RF-1 furnace, afterburner, and connecting ductwork will be removed using hand tools and placed into a roll-off box for disposal as hazardous debris using macroencapsulation;
- Pressure washing and/or steam will be used to remove any remaining contamination until the carbon reactivation unit and downstream equipment meets the closure performance standards. Decontamination fluids will be collected and treated through the in-house wastewater treatment system prior to discharge to the POTW;
- For small equipment items that are not amenable to thorough visual inspection, a sample of the final rinsate will be collected and analyzed for confirmation that the performance standards have been met.

Upon completion of the decontamination activities, the carbon reactivation unit and associated equipment will be inspected to ensure the internals meet the closure performance standards. The outside of each equipment item and surrounding areas will also be inspected (and decontaminated, if necessary).

Once the carbon reactivation unit and associated equipment have been determined to be cleaned, equipment will be dismantled. Metallic items will be scrapped. Fiberglass, plastic, and other non-metalic components will be disposed of as non-hazardous debris. Packed scrubber internals will be macroencapsulated and disposed of as hazardous debris.

The following miscellaneous decontamination items will be considered during the carbon reactivation unit closure activities:

- Disposable tools (i.e., brushes, etc.) and PPE will be collected in a designated area for off-site disposal as hazardous waste; and
- Non-disposable tools (i.e., wrenches, etc.) will be decontaminated with detergent and water (or water alone), prior to leaving the closure area.

7.0 SAMPLING AND ANALYSIS

SII has utilized the EPA Guidance Document "Draft of Guidance of Incinerator Closure" (June 29, 1990) in the preparation of this Closure Plan. A copy of this guidance is presented in Attachment 2. It is suggested by USEPA to utilize the techniques discussed in this document to clean close all combustion related facilities. In this document, EPA recommends (in the section entitled "Approach to Incinerator Closure") operating the thermal equipment at or above minimum permit temperatures for a period of four hours to remove organic contaminants form the system. The guidance also suggests using a water rinse to remove residual inorganic contaminants to decontaminate equipment. Prior to taking the RF-1 unit out of service, it was operated at temperature, without treating spent activated carbon, to remove organic contaminants.

As described in detail in Section 6.0, decontaminated surfaces will be visually examined to determine if the Clean Debris Surface Standard of 40 CFR 268.45 Table 1, Section A is met. For equipment and other items that are not amenable to a thorough visual inspection, samples of the final rinse for each piece or batch of equipment/items will be obtained for comparison to the decontamination standards. A summary list of the samples to be obtained is provided as Table 7-1. The samples will be obtained in accordance with a site specific "Sampling and Analysis Plan" (SAP) contained in a separate appendix to the RCRA Part B Permit Application. In addition, the samples will be handled and analyzed in accordance with site specific "Quality Assurance Objectives" which are addressed in the SAP. The SAP identifies items such as the appropriate sample containers, sampling techniques, sample preservation, chain-of-custody procedures, specific analytical procedures, and detailed QA/QC procedures, etc. General information for sample analysis and QA/QC is provided with this closure plan.

Each of the samples identified in Table 7-1 will be analyzed for a set of selected Compounds of Concern (COCs) that will be used to assess the decontamination of equipment/items. Based on a review of the waste codes received at the site (Attachment 1) and the constituents associated with those codes, SII has selected COCs for closure purposes.
Those selections include metals, halogenated volatile organics, aromatic and unsaturated volatile organics, nonhalogenated volatile organics,halogenated and nonhalogenated semivolatile organics, polyaromatic compounds, phenolic compounds, nitriles, nitrogen and phosphorous containing pesticides, and organochlorine and other organohalide pesticides. The closure COCs are listed in Attachment 3.

TABLE 7-1. SAMPLES FOR CLOSURE CERTIFICATION

ITEM	ESTIMATED NUMBER OF SAMPLES TO BE OBTAINED	ANALYSES
Carbon Reactivation Unit		
Equipment rinsate (RF-1 furnace and afterburner)	2 (1 small equipment batch for each RF-1 furnace/ afterburner, and APCD/Fan/Stack)	Metals[1]
Equipment rinsate (Tank T-8)	1	Metals[1], Organics[2]
Un-used decontamination water	3	Metals[1], Organics[2]

Sample analyses:
[1] Metals by SW-846 Methods 6010 and 7470, for the target metal analytes listed in Attachment 3.
[2] Organics by SW-846 Methods 8260, 8270, and 8141 for the compounds listed in Attachment 3.

In all cases, the latest version of the analytical methods will be used.

For equipment or other items that cannot be adequately inspected or may not meet the Clean Debris Surface Standard of 40 CFR 268.45 Table 1, Section A, a sample of the final rinsate from the decontamination process associated with each piece of equipment/item will be collected, and the analytical results for the metal and organic COCs will be compared to the analysis of unused decontamination water.

Equipment/items meeting the clean closure performance standards defined in Section 5.0 of this document will be deemed to be clean and can be removed from RCRA Subtitle C regulation. For equipment/items not meeting the clean closure performance standards, the facility will perform additional decontamination (i.e., repeat the decontamination as specified for that piece of equipment/item) and re-evaluate the decontaminated equipment/item against the clean closure performance standards.

If, after a number of attempts are made to decontaminate equipment/items and the clean closure performance standards are not met, the facility will dispose of the equipment/item off-site as hazardous waste.

Rather than decontaminating equipment/items, the facility may alternatively elect to ship the piece of equipment/item offsite for treatment/disposal as a hazardous waste. This would remove the equipment/item from the site. Therefore no threat to human health or the environment would be applicable for that piece of equipment at the facility. This decision would be based on the size and geometry of the equipment/item, the cost of treatment and/or disposal, the cost of further decontamination, etc.

8.0 CLOSURE SCHEDULE

The closure activities, as necessary, are scheduled to be performed in general accordance with the following schedule:

Task	**Days**
Notification of Closure to Regulatory Agency	0 (initiating period)
A. Preparation of Closure Bid Package	7 days (calendar)
B. Submission and Contractor Review	7 days
C. Site Visit for Contractors	7 days
D. Contractor Bid Package Preparation/Submittal	14 days
E. Contractor Award/Contract/Notice to Proceed	7 days
F. Contractor Mobilization	14 days
G. Closure Activity Implementation	60 days
i. Carbon Reactivation Unit RF-1 Decontamination (30 days)	
ii. Ancillary Equipment Decontamination (30 days)	
H. Obtain Sample Results	30 days
I. Force Majeure	14 days
J. Schedule Contingency	20 days
TOTAL	180 days (calendar)
TOTAL ALLOWED TIME	180 days

This schedule will be utilized for the closure of the carbon reactivation unit RF-1 and associated ancillary equipment. Certain activities may be conducted concurrently. The facility will notify EPA of the intent to initiate closure as specified in Section 9.0.

9.0 CLOSURE ACTIVITY NOTIFICATION

SII will notify the EPA in writing at least 60 days prior to the date that SII expects to initiate closure of the RF-1 unit. SII will complete all closure activities within 180 days of initiating closure in accordance with the approved Closure Plan. An extension may be requested if SII determines that additional time will be necessary to complete closure.

10.0 CERTIFICATION OF CLOSURE

In accordance with the requirements of 40 CFR 264.115, within sixty (60) days of completing closure, SII will notify the EPA, by registered mail, that closure activities have been completed in compliance with the specifications of the approved Closure Plan by submission of a Certification of Closure.

The Certification of Closure will include signatures from the SII Owner/Operator and the independent Registered Professional Engineer. SII will retain documentation necessary to support the independent Registered Professional Engineer's certification. Support documentation will be submitted to the EPA on request.

Financial assurance documentation will be retained by SII until the EPA has officially released SII from the financial assurance requirements for Final Closure as required by 40 CFR 264.143(i) and SII confirms receipt of this release. In addition, upon receipt of this release, SII will consider the carbon reactivation unit RF-1 closed and all permit requirements identified in the RCRA permit related to RF-1 and its associated equipment will cease to apply.

11.0 CLOSURE COST ESTIMATE

The cost estimate for performing the above closure activities pertaining to the carbon reactivation unit RF-1 is included as Attachment 4 of this Closure Plan.

Note: Analytical costs have been estimated on the following basis:
Metals (excluding Hg) $200/analysis
Mercury $45/analysis
Volatile organics $195/analysis
Semivolatile organics $370/analysis
Nitrogen and phosphorous pesticides $200/analysis

12.0 FINANCIAL ASSURANCE

The financial assurance mechanism currently in effect for closing the entire facility is included as Appendix XVIII of the RCRA Part B Permit Application.

ATTACHMENT 1

WASTE CODES

ATTACHMENT 1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
D001	A SOLID WASTE THAT EXHIBITS THE CHARACTERISTIC OF IGNITABILITY
D004	ARSENIC
D005	BARIUM
D006	CADMIUM
D007	CHROMIUM
D008	LEAD
D009	MERCURY
D010	SELENIUM
D011	SILVER
D012	ENDRIN
D013	LINDANE
D014	METHOXYCHLOR
D015	TOXAPHENE
D016	2,4-D
D017	2,4,5-(SILVEX)
D018	BENZENE
D019	CARBON TETRACHLORIDE
D020	CHLORDANE
D021	CHLOROBENZENE
D022	CHLOROFORM
D023	O-CRESOL
D024	M-CRESOL
D025	P-CRESOL
D026	CRESOL
D027	1,4-DICHLOROBENZENE
D028	1,2-DICHLOROETHANE
D029	1,1-DICHLOROETHYLENE
D030	2,4-DITROTOLUENE
D031	HEPTACHLOR (AND ITS EPOXIDE)
D032	HEXACHLOROBENZENE
D033	HEXACHLOROBUTADIENE
D034	HEXACHLOROETHANE
D035	METHYL ETHYL KETONE
D036	NITROBENZENE
D037	PENTRACHLOROPHENOL

ATTACHMENT 1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
D038	PYRIDINE
D039	TETRACHLOROETHYLENE
D040	TRICHLOROETHYLENE
D041	2,4,5-TRICHLOROPHENOL
D042	2,4,6-TRICHLOROPHENOL
D043	VINYL CHLORIDE
F001	SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLOROETHYLENE, METHYLENE CHLORIDE, 1,1,1 TRICHLOROETHANE, CARBON TETRACHLORIDE, CHLORINATED FLUOROCARBONS; AND MIXTURES/BLENDS CONTAINING A TOTAL OF TEN PERCENT OR MORE (BY VOLUME) BEFORE USE OF ONE OR MORE OF THE ABOVE SOLVENTS OR SOLVENTS LISTED IN F002, F004 AND F005; AND STILL BOTTOMS FROM THE RECOVERY OF SPENT SOLVENTS AND MIXTURES
F002	TETRACHLOROETHYLENE, METHYLENE CHLORIDE, TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE, CHLOROBENZENE, 1,1,2-TRICHLOROETHANE; AND MIXTURES/BLENDS CONTAINING A TOTAL OF 10% OR MORE (BY VOLUME) BEFORE USE OF ONE OR MORE OF THE ABOVE SOLVENTS OR SOLVENTS LISTED IN F002, F004 AND F005 AND STILL BOTTOMS FROM RECOVERY OF SPENT SOLVENTS AND MIXTURES
F003	XYLENE, ACETONE ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYCLOHEXANANE, METHANOL; MIXTURES/BLENDS OF ABOVE; AND 10% OR MORE (BY VOLUME) OF F001, F002, F004, F005; AND STILL BOTTOMS FROM RECOVERY OF SPENT SOLVENTS
F004	CRESOLS AND CRESYLIC ACID, NOTROBENZENE; SOLVENT MIXTURES/BLENDS OF 10% OR MORE BEFORE USE OF ONE OR MORE OF ABOVE OR F001, F002, F005; STILL BOTTOMS FROM RECOVERY OF SPENT SOLVENTS
F005	TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL, 2-NITROPROPANE; MIXTURES/BLENDS OF 10% OR MORE (BY VOLUME) OF ABOVE OR SOLVENTS LISTED IN F001, F002, F004 AND STILL BOTTOMS FROM RECOVERY OF SOLVENTS
F006	WASTEWATER TREATMENT SLUDGES FROM ELECTROPLATING OPERATIONS EXCEPT FROM SULFURIC ACID ANODIZING OF ALUMINUM; TIN PLATING ON CARBON STEEL; ZINC PLATING ON CARBON STEEL; ALUMINUM, ZINC ALUMINUM PLATING ON CARBON STEEL; CLEANING/STRIPPING ASSOCIATED WITH TIN, ZINC AND ALUMINUM PLATING ON CARBON STEEL; AND CHEMICAL ETCHING AND MILLING OF ALUMINUM
F012	QUENCHING WASTEWATER TREATMENT SLUDGES FROM METAL HEAT TREATING OPERATIONS WHERE CYANIDES ARE USED
F019	WASTEWATER TREATMENT SLUDGES FROM CHEMICAL CONVERSION COATING OF ALUMINUM EXCEPT ZIRCONIUM PHOSPHATING IN ALUMINUM CAN WASHING

ATTACHMENT 1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
F025	CONDENSED LIGHT ENDS, SPENT FILTERS AND AIDS, SPENT DESICCANT WASTES FROM PRODUCTION OF CERTAIN CHLORINATED ALIPHATIC HYDROCARBONS (HAVING CARBON CHAIN LENGTHS RANGING FROM 1-5 WITH VARYING AMOUNTS AND POSITIONS OF CHLORINE SUBSTITUTION) BY FREE RADICAL CATALYZED PROCESSES.
F035	WASTEWATERS, PROCESS RESIDUALS, PRESERVATIVE DRIPPAGE, AND SPENT FORMULATIONS FORM WOOD PRESERVING PROCESS GENERATED AT PLANTS THAT USE INORGANIC PRESERVATIVES CONTAINING ARSENIC OR CHROMIUM. DOES NOT INCLUDE K001 BOTTOM SEDIMENT SLUDGE FROM TREATMENT OF WASTEWATER FROM WOOD PRESERVING PROCESSES USING CREOSOTE AND/OR PENTACHLOROPHENOL
F037	PETROLEUM REFINERY PRIMARY OIL/WATER/SOLIDS SEPARATION SLUDGE. SLUDGE FROM GRAVITATIONAL SEPARATION OF OIL/WATER/SOLIDS DURING STORAGE OR TREATMENT OF PROCESS WASTEWATERS AND OILY COOLING WASTEWATERS FROM PETROLEUM REFINERIES. (OIL/WATER/SOLIDS SEPARATORS; TANKS AND IMPOUNDMENTS; DITCHES/CONVEYANCES; SUMPS; STORMWATER UNITS. SLUDGES FROM NON-CONTACT ONCE-THROUGH COOLING WATERS, SLUDG3ES FROM AGRESSIVE BIOLOGICAL TREATMENT UNITS, K051 WASTES
F038	PETROLEUM REFINERY SECONDARY (EMULSIFIED) OIL/WATER/SOLIDS SEPARATION SLUDGE-ANY SLUDGE AND/OR FLOAT GENERATED FROM THE PHYSICAL AND/OR CHEMICAL SEPARATION OF OIL/WATER/SOLIDS IN PROCESS WASTEWATERS AND OILY COOLING WASTEWATERS FROM PETROLEUM REFINERIES. SUCH WASTES INCLUDE, BUT ARE NOT LLIMITED TO, ALL SLUDGES AND FLOATS GENERATED IN: INDUCED AIR FLOTATION (IAF) UNITS, TANKS AND IMPOUNDMENTS, AND ALL SLUDGES GENERATED IN DAF UNITS. SLUDGES GENERATED IN STORMWATER UNITS THAT DO NBOT RECEIVE DRY WEATHER FLOW, SLUDGES GENERATED FROM NON-CONTACT ONCE-THROUGH COOLING WATERS SEGREGATED FOR TREATMENT FROM OTHER PROCESS OR OILY COOLING WATERS, SLUDGES AND FLOATS GENERATED IN AGRESSIVE BIOLOGICAL TREATMENT UNITS (INCLUDING SLUDGES AND FLOATS GENERATED IN ONE OR MORE ADDITIONAL UNITS AFTER WASTEWATERS HAVE BEEN TREATED IN AGGRESSIVE GIOLOGICAL TREATMENT UNITS) AND F037,K048, AND K051 WASTES ARE NOT INCLUDED IN THIS LISTING.
F039	LEACHATE FROM DISPOSAL OF MORE THAN ONE RESTRICTED WASTE (HAZARDOUS UNDER SUBPART D; RESULTING FROM THE DISPOSAL OF ONE OR MORE OF EPA HAZARDOUS WASTES: F020, F021, F022, F026, F027, AND/OR F028)
K001	WASTEWATER TREATMENT SLUDGE BOTTOM SEDIMENT THAT USE CREOSOTE AND/OR PENTACHLOROPHENOL
K002	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF CHROME YELLOW AND ORANGE PIGMENTS
K003	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF MOLYBDATE ORANGE PIGMENTS
K004	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF ZINC YELLOW PIGMENTS

ATTACHMENT 1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
K005	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF CHROME GREEN PIGMENTS
K006	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF CHROME OXIDE GREEN PIGMENTS (ANHYDROUS AND HYDRATED)
K007	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF IRON BLUE PIGMENTS
K008	OVEN RESIDUE FROM PRODUCTION OF CHROME OXIDE GREEN PIGMENTS
K009	DISTILLATION BOTTOMS FROM THE PRODUCTION OF ACETALDEHYDE FROM ETHYLENE
K010	DISTILLATION SIDE CUTS FROM PRODUCTION OF ACETALDEHYDE FROM ETHYLENE
K014	VICINALS FROM THE PURIFICATION OF TOLUENEDIAMINE IN THE PRODUCTION OF TOLUENEDIAMINE VIA THE HYDROGENATION OF DINITROTOLUENE
K015	STILL BOTTOMS FROM DISTILLATION OF BENZYL CHLORIDE
K016	HEAVY ENDS OR DISTILLATION RESIDUES FROM PRODUCTION OF CARBON TETRACHLORIDE
K017	HEAVY ENDS (STILL BOTTOMS) FROM PURIFICATION COLUMN IN PRODUCTION OF EPICHLOROHYDRIN
K018	HEAVY ENDS FROM FRACTIONATION COLUMN IN ETHYL CHLORIDE PRODUCTION
K019	HEAVY ENDS FORM THE DISTILLATION OF ETHYLENE DICHLORIDE IN ETHYLENE DICHLORIDE PRODUCTION
K020	HEAVY ENDS FROM DISTILLATION OF VINYL CHLORIDE IN VINYL CHLORIDE MONOMER PRODUCTION
K022	DISTILLATION BOTTOM TARS FROM PRODUCTION OF PHENOL/ACETONE FROM CUMENE
K023	DISTILLATION LIGHT ENDS FROM PRODUCTION OF PHTHALIC ANHYDRIDE FROM NAPHTHALENE
K024	DISTILLATION BOTTOMS FROM PRODUCTION OF PHTHALIC ANHYDRIDE FROM NAPHTHALENE
K025	DISTILLATION BOTTOMS FROM THE PRODUCTION OF NITROBENZENEBY THE NITRATION OF BENZENE
K026	STRIPPING STILL TAILS FROM PRODUCTION OF METHY ETHYL PYRIDINES
K029	WASTE FROM PRODUCT STEAM STRIPPER IN PRODUCTION OF 1,1,1-TRICHLOROETHANE
K030	COLUMN BOTTOMS OR HEAVY ENDS FROM COMBINED PRODUCTION OF TRICHLOROETHYLENE AND PERCHLOROETHYLENE
K031	BY-PRODUCT SALTS GENERATED IN PRODUCTION OF MSMA AND CACODYLIC ACID
K032	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF CHLORDANE
K033	WASTEWATER TREATMENT AND SCRUB WATER FROM CHLORINATION OF CYCLOPENTADIENE IN PRODUCTION OF CHLORDANE

ATTACHMENT 1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
K034	FILTER SOLIDS FROM FILTRATION OF HEXACHLOROCYCLOPENTADIENE IN PRODUCTION OF CHLORDANE
K035	WASTEWATER TREATMENT SLUDGES GENERATED IN PRODUCTION OF CREOSOTE
K036	STILL BOTTOMS FROM TOLUENE RECLAMATION DISTILLATION IN PRODUCTION OF DISULFOTON
K037	WASTEWATER TREATMENT SLUDGES FROM PRODUCTION DISULFOTON
K038	WASTEWATER FROM WASHING AND STRIPPING OF PHORATE PRODUCTION
K039	FILTER CAKE FROM FILTRATIN OF DIETHYLPHOSPHORODITHIOIC ACID IN PRODUCTION OF PHORATE
K040	WASTEWATER TREATMENT SLUDGE FROM PRODUCTION OF PHORATE
K041	WASTEWATER TREATMENT SLUDGE FORM PRODUCTION OF TOXAPHENE
K042	HEAVY ENDS OR DISTILLATION RESIDUES FROM DISTILLATION OF TETRACHLOROBENZENE IN PRODUCTION OF 2,4,5-T
K046	WASTEWATER TREATMENT SLUDGES FROM THE MANUFACTURING, FORMULATION AND LOADING OF LEAD-BASED INTIATING COMPOUNDS.
K048	DISSOLVED AIR FLOTATION FLOAT FROM PETROLEUM REFINING INDUSTRY
K049	SLOP OIL EMULSION SOLIDS FROM PETROLEUM REFINING INDUSTRY
K050	HEAT EXCHANGER BUNDLE CLEANING SLUDGE FROM PETROLEUM REFINING INDUSTRY
K051	API SEPARATOR SLUDGE FROM PETROLEUM REFINING INDUSTRY
K052	TANK BOTTOMS (LEADED) FROM PETROLEUM REFINING INDUSTRY
K061	EMISSION CONTROL DUST/SLUDGE FROM PRIMARY PRODUCTION OF STEEL IN ELECTRIC FURNACES
K064	ACID PLANT BLOWDOWN SLURRY/SLUDGE RESULTING FROM THE THICKENING OF BLOWDOWN SLURRY FROM PRIMARY COPPER PRODUCTION
K065	SURFACE IMPOUNDMENT SOLIDS CONTAINED IN AND DREDGED FROM SURFACE IMPOUNDMENTS AT PRIMARY LEAD SMELTING FACILITIES.
K066	SLUDGE FROM TREATMENT OF PROCESS WASTEWATER AND/OR ACID PLANT BLOWDOWN FROM PRIMARY ZINC PRODUCTION
K071	BRINE PURIFICATION MUDS FROM MERCURY CELL PROCESS IN CHLORINE PRODUCTION WHERE SEPARATELY PREPURIFIED BRINE IS NOT USED
K073	CHLORINATED HYDROCARBON WASTE FROM PURIFICAITON STEP OF THE DIAPHRAGM CELL PROCESS USING GRAPHITE ANODES IN CHLORINE PRODUCTION
K083	DISTILLATION BOTTOMS FROM ANILINE PRODUCTION
K084	WASTEWATER TREATMENT SLUDGES GENERATED DURING PRODUCTION OF VETERINARY PHARMACEUTICALS FROM ARSENIC OR ORGANO-ARSENIC COMPOUNDS
K085	DISTILLATION OR FRACTIONATION COLUMN BOTTOMS FROM PRODUCTION OF CHLOROBENZENES

ATTACHMENT 1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
K086	SOLVENT WASHES AND SLUDGES, CAUSTIC WASHES AND SLUDGES, OR WATER WASHES AND SLUDGES FROM CLEANING TUBS AND EQUIPMENT USED IN FORMULATION OF INK FROM PIGMENTS, DRIERS, SOAPS, STABILIZERS CONTAINING CHROMIUM AND LEAD
K087	DECANTER TANK TAR SLUGE FROM COKING
K088	SPENT POTLINERS FROM PRIMARY ALUMINUM REDUCTION
K090	EMISSION CONTROL DUST OR SLUDGE FROM FERROCHROMIUMSILICON PRODUCTION
K091	EMISSION CONTROL DUST OR SLUDGE FROM FERROCHROMIUM PRODUCTION
K093	DISTILLAION LIGHT ENDS FROM PRODUCTION OF PHTHALIC ANHYDRIDE FROM ORTHO-XYLENE
K094	DISTILLATION BOTTOMS FROM PRODUCTION OF PHTHALIC ANHYDRIDE FROM ORTHO-XYLENE
K095	DISTILLAION BOTTOMS FROM PRODUCTION OF 1,1,1-TRICHLOROETHANE
K096	HEAVY ENDS FROM HEAVY ENDS COLUMN FROM PRODUCTION OF 1,1,1-TRICHLOROETHANE
K097	VACUUM STRIPPER DISCHARGE FROM CHLORDANE CHLORINATOR IN PRODUCTION OF CHLORDANE
K098	UNTREATED PROCESS WASTEWATER FROM PRODUCTION OF TOXAPHENE
K100	WASTE LEACHING SOLUTION FROM ACID LEACHING OF EMISSION CONTROL DUST/SLUDGE FROM SECONDARY LEAD SMELTING
K101	DISTILLATION TAR RESIDUES FROM DISTILLATIONOF ANILINE-BASED COMPOUNDS IN PRODUCTION OF VETERINARY PHARMACEUTICALS FROM ARSENIC OR ORGANO-ARSENIC COMPOUNDS
K102	RESIDUE FROM USE OF ACTIVATED CARBON FOR DECOLORIZATION IN PRODUCTION OF VETERINARY PHARMACEUTICALS FRO ARSENIC OR ORGANO-ARSENIC COMPOUNDS
K103	PROCESS RESIDUES FROM ANILINE EXTRACTION FROM PRODUCTIONOF ANILINE
K104	COMBINED WASTEWATER STREAMS GENERATED FROM NITROBENZENE/ANILINE PRODUCTION
K105	SEPARATED AQUEOUS STREAM FROM THE REACTOR PRODUCT WASHING STEP IN PRODUCTION OF CHLOROBENZENES
K106	WASTEWATER TREATMENT SLUDGE FROM MERCURY CELL PROCESS IN CHLORINE PRODUCTION
K112	REACTION BY-PRODUCT WATER FROM THE DRYING COLUMN IN PRODUCTION OF TOLUENEDIAMINE VIA HYDROGENATION OF DINITROTOLUENE
K113	CONDENSED LIQUID LIGHT ENDS FROM THE PURIFICATIONOF TOLUENEDIAMINE IN PRODUCTION OF TOLUENEDIAMINE VIA HYDROGENATION OF DINITROTOLUENE
K114	VICINALS FROM PURIFICAITON OF TOLUENEDIAMINE IN PRODUCTION OF TOLUENEDIAMINE VIA HYDROGENATION OF DINITROTOLUENE

ATTACHMENT 1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
K115	HEAVY ENDS FROM THE PURIFICATION OF TOLUENEDIAMINE IN PRODUCTION OF TOLUENEDIAMINE VIA HYDROGENATION OF DINITROTOLUENE
K116	ORGANIC CONDENSATE FROM SOLVENT RECOVERY COLUMN IN PRODUCTION OF TOLUENE DIISOCYANATE VIA PHOSGENATION OF TOLUENEDIAMINE
K117	WASTEWATER FROM THE REACTOR VENT GAS SCRUBBER IN PRODUCTION OF ETHYLENE DIBROMIDE VIA BROMINATION OF ETHENE
K118	SPENT ADSORBENT SOLIDS FROM PURIFICATION OF ETHYLENE DIBROMIDE IN PRODUCTION OF ETHYLENE DIBROMIDE VIA BROMINATION OF ETHENE
K125	FILTRATION, EVAPORATION, AND CENTRIFUGATION SOLIDS FROM THE PRODUCTION OF ETHYLENEBISDITHIOCARBAMIC ACID AND ITS SALTS.
K126	BAGHOUSE DUST AND FLOOR SWEEPINGS IN MILLING AND PACKAGING OPERATIONS FROM PRODUCTION OR FORMULATION OF ETHYLENE BIS DITHIOCARBAMIC ACID AND ITS SALTS
P001	2H-1-BENZOPYRAN-2-ONE, 4-HYDROXY-3-(3-OXO-1-PHENYLBUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS GREATER THAN 0.3% WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRAIONS GREATER THAN 0.3%
P002	ACETAMINE, N-(AMINOTHIOXOMETHYL); Also known as 1-ACETYL-2-THIOUREA
P003	ACROLEIN; Also known as 2-PROPENAL
P004	ALDRIN; Also known as 1,4,5,8-DIMETHANONAPHTHALENE, 1,2,3,4,10,10-HEXA-CHLORO-1,4,4A,5,8,8A,-HEXAHYDRO, (ALPHA, 4ALPHA, 4 ABETA, 5 ALPHA, 8ALPHA, 8ABETA)-
P005	ALLYL ALCOHOL; Also known as 2-PROPEN-1-OL
P007	5-(AMINOMETHYL)-3-ISOXAZOLOL; Also known as 3(2H)-ISOXAZOLONE, 5-(AMINOMETHYL)-
P008	4-AMINOPYRIDINE; Also known as 4-PYRIDINAMINE
P010	ARSENIC ACID H_3ASO_4
P011	ARSENIC OXIDE AS_2O_5; Also known as ARSENIC PENTOXIDE
P012	ARSENIC OXIDE AS_2O_3; Also known as ARSENIC TRIOXIDE
P013	BARIUM CYANIDE
P014	BENZENETHIOL; Also known as THIOPHENOL
P015	BERYLLIUM
P016	DICHLOROMETHYL ETHER; Also known as METHANE, OXYBIS[CHLORO-
P017	BROMOACETONE; Also known as 2-PROPANONE, 1-BROMO-
P018	BRUCINE
P020	DIOSEB; Also known as PHENOL, 2-(1-METHYLPROPYL)-4,6-DINITRO-
P021	CALCIUM CYANIDE; Also known as CALCIUM CYANIDE $CA(CN)_2$
P022	CARBON DISULFIDE
P023	ACETALDEHYDE, CHLORO-; Also known as CHLOROACETALDEHYDE

ATTACHMENT 1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
P024	BENZENAMINE, 4-CHLORO-; Also known as P-CHLORANILINE
P026	1-(O-CHLOROPHENYL)THIOUREA; Also known as THIOUREA, (2-CHLOROPHENYL)-
P027	PROPANENITRILE, 3-CHLORO-; Also known as 3-CHLOROPROPIONITRILE
P028	BENZENE, (CHLOROMETHYL)-; Also known as BENZYL CHLORIDE
P029	COPPER CYANIDE; Also known as COPPER CYANIDE CU(CN)
P030	CYANIDES (SOLUBLE CYANIDE SALTS), NOT OTHERWISE SPECIFIED
P031	CYANOGEN; Also known as ETHANEDINITRILE
P033	CYANOGEN CHLORIDE; Also known as CYANOGEN CHLORIDE (CN)CL
P034	2-CYCLOHEXYL-4,6-DINITROPHENOL; Also known as PHENOL, 2-CYCLOHEXYL-4,6-DINITRO-
P036	ARSONOUS DICHLORIDE, PHENYL-; Also known as DICHLOROPHENYLARSINE
P037	DIELDRIN; Also known as 2,7:3,6-DIMETHANONAPHTH[2,3-B]OXIRENE, 3,4,5,6,9,9-HEXACHLORO-1A,2,2A,3,6,6A,7,7A-OCTAHYDRO-, (1AALPHA, 2BETS, 2AALPHA, 3BETAK, 6BETA, 6AALPHA, 7BETA, 7AALPHA)-
P038	ARSINE, DIETHYL-; Also known as DIETHYLARSINE
P039	PHOSPHORODITHIOIC ACID, O,O-DIETHYL S-[2-(ETHYLTHIO)ETHYL]ESTER; Also known as DISULFOTON
P040	O,O-DIETHYL O-PYRAZINYL PHOSPHOROTHIOATE; Also known as PHOSPHOROTHIOIC ACID, O, O-DIMETHYL O-(4 NITROPHENYL) ESTER
P041	PHOSPHORIC ACID, DIETHYL 4-NITROPHENYL ESTER; Also known as DIETHYL-P-NITROPHENYL PHOSPHATE
P042	1,2-BENZENEDIOL, 4-[HYDROXY-2-(METHYLAMINO)ETHYL]-,(R)-; Also known as EPINEPHRINE
P043	DIISOPROPYLFLUOROPHOSPHATE (DFP); Also known as PHOSPHOROFLUORIDIC ACID, BIS (1-METHYLETHYL)ESTER
P044	DIMETHOATE; Also known as PHOSPHORODITHIOIC ACID,O, O-DIMETHYL S-[2-(METHYLAMINO)-2-OXOETHYL]ESTER
P045	2-BUTANONE, 3, 3-DIMETHYL-1-(METHYITHIO)-,O-[METHYLOAMINO)CARBONYL]OXIME; Also known as THIOFANOX
P046	BENZENEETHANAMINE, ALPHA,ALPHA-DIMETHYL-; Also known as ALPHA,ALPHA-DIMETHYLPHENETHYLAMINE
P047	4,6-DINITRO-O-CRESOL, & SALTS; Also known as PHENOL,2-METHYL-4,6-DINITRO-, & SALTS
P048	2,4-DINITROPHENOL; Also known as PHENOL, 2,4-DINITRO-
P049	DITHIOBIURET; Also known as THIOIMIDODICARBONIC DIAMIDE $[H_2N)C(S)]_2NH$
P050	ENDOSULFAN; Also known as 6M9-METHANO-2,4,3-BENZODIOXATHIEPIN, 6,7,8,9,10,1K0-HEXACHLORO-1,5,5A,6,9,91-HEXAHYDRO-,3-OXIDE

ATTACHMENT 1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
P051	2,7:3,6-DIMETHANONAPHTH [2,3-B]OXIRENE, 3,4,5,6,9,9-HEXACHLORO-1A,2,2A,3,6,6A,7,7A-OCTAHYDRO-, (1AALPHA, 2BETA, 2ABETA, 3ALPHA, 6ALPHA, 6ABETA, 7BETA, 7AALPHA)-, & METABOLITES; Also known as ENDRIN; Also known as ENDRIN, & METABOLITES
P054	AZIRIDINE; Also known as ETHYLENEIMINE
P056	FLUORINE
P057	ACETAMIDE, 2-FLUORO-; Also known as FLUOROACETAMIDE
P058	ACETIC ACID, FLUORO-,SODIUM SALT; Also known as FLUOROACETIC ACIDE, SODIUM SALT
P059	HEPTACHLOR; Also known as 4,7-METHANO-1H-INDENE, 1,4,5,6,7,8,-HEPTACHLORO-3A,4,7,7A-TETRAHYDRO-
P060	1,4,5,8-DIMETHANONAPHTHALENE,1,2,3,4,10,10-HEXA- CHLORO-1,4,4A,5,7,8,8A-HEXAHYDRO-(1ALPHA, 4ALPHA, 4ABETA, 5BETA,8BETA,8ABETA)-; Also known as ISODRIN
P062	HEXAETHYL TETRAPHOSPHATE; Also known as TETRAPHOSPHORIC ACID, HEXAETHYL ESTER
P063	HYDROCYANIC ACID; Also known as HYDROGEN CYANIDE
P064	METHANE, ISOCYANATO-
P066	ETHANIMIDOTHIOIC ACID, N-[[(METHYLAMINO)CARBONYL]OXY]-, METHYL ESTER; Also known as METHOMYL
P067	AZINIDINE, 2-METHYL; Also known as 1,2-PROPYLENIMINE
P068	HYDRAZINE, METHYL-; Also known as METHYL HYDRAZINE
P069	2-METHYLLACTONITRILE; Also known as PROPANENITRILE, 2-HYDROXY-2-METHYL-
P070	ALDICARB; Also known as PROPANAL, 2-METHYL-2-(METHYLTHIO)-, O-[(METHYLAMINO)CARBONYL]OXIME
P071	METHYL PARATHION; Also known as PHOSPHOROTHIOIC ACID, O, O,-DIMETHYL O-(4-NITROPHENYL)ESTER
P072	ALPHA-NAPHTHYLTHIOUREA; Also known as THIOUREA, 1-NAPHTHALENYL-
P073	NICKEL CARBONYL; Also known as NICKEL CARBONYL $NI(CO)_4$, (T-4)-
P074	NICKEL CYANIDE; Also known as NICKEL CYNAIDE $NI(CN)_2$
P075	NICOTINE, & SALTS; Also known as PYRIDINE, 3-(1-METHYL-2-PYRROLIDINYL)-, (S)-, & SALTS
P077	BENZENAMINE, 4-NITRO-; Also known as P-NITROANILINE
P078	NITROGEN DIOXIDE; Also known as NITROGEN OXIDE NO_2
P082	METHANAMINE, N-METHYL-N-NITROSO-; Also known as N-NITROSODIMETHYLAMINE
P084	N-NITROSOMETHYLVINYLAMINE; Also known as VINYLAMINE, N-METHYL-N-NITROSO-
P085	DIPHOSPHORAMIDE, OCTAMETHYL-; Also known as OCTAMETHYLPYROPHOSPHORAMIDE
P087	OSMIUM OXIDE OSO_4, (T-4)-; Also known as OSMIUM TETROXIDE

ATTACHMENT 1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
P088	ENDOTHALL; Also known as 7-OXABICYCLO[2.2.1]HEPTANE-2,3-DICARBOXYLIC ACID
P089	PARATHION; Also known as PHOSPHORIC ACID, O,O-DIETHYL O-(4-NITROPHENYL)ESTER
P092	MERCURY, (ACETATO-O)PHENYL-; Also known as PHENYLMERCURY ACETATE
P093	PHENYLTHIOUREA; Also known as THIOUREA, PHENYL-
P094	PHORATE; Also known as PHOSPHORODITHIOIC ACID, O,O-DIETHYL; Also known as S-[ETHYLTHIO)METHYL] ESTER
P095	CARBONIC DICHLORIDE; Also known as PHOSGENE
P096	HYDROGEN PHOSPHIDE; Also known as PHOSPHINE
P097	FAMPHUR; Also known as PHOSPHOTHIOIC ACID, O-[4-[(DIMETHYLAMINO)SULFONYL]PHENYL] O,O-DIMETHYL ESTER
P098	POTASSIUM CYANIDE
P099	ARGENTATE(1-), BIS(CYANO-C)-, POTASSIUM; Also known as POTASSIUM SILVER CYANIDE
P101	ETHYL CYANIDE; Also known as PROPANENITRILE
P102	PROPARGYL ALCOHOL; Also known as 1-PROPYN-1-OL
P103	SELENOUREA
P104	SILVER CYANIDE
P105	SODIUM AZIDE
P108	STRYCHNIDIN-10-ONE, & SALTS; Also known as STRYCHNINE, & SALTS
P109	TETRAETHYLDITHIOPYROPHOSPHATE; Also known as THIODIPHOSPHIRIC ACID, TETRAETHYL ESTER
P110	TETRAETHYL LEAD
P113	THALLIUM OXIDE TL_2O_3
P114	THALLIUM(L) SELENITE
P115	THALLIUM(L) SULFATE
P116	THIOSEMICARBAZIDE
P118	TRICHLOROMETHANETHIOL
P119	VANADIC ACID, AMMONIUM SALT
P120	VANADIUM PENTOXIDE
P121	ZINC CYANIDE
P123	TOXAPHENE
U001	ACETALDEHYDE (I); Also known as ETHANAL (I)
U002	ACETONE (I); Also known as 2-PROPANONE (I)
U003	ACETONITRILE (I,T)
U004	ACETONITRILE (I,T)

ATTACHMENT 1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
U005	2, ACETYLAMINOFLUORENE; Also known as ACETAMIDE, N-9H-FLUOREN-2-YL-
U007	ACRYLAMIDE; Also known as 2-PROPENAMIDE
U008	ACRYLIC ACID (I); Also known as 2-PROPENOIC ACID (I)
U009	ACRYLONITRILE; Also known as 2-PROPENENITRILE
U010	AZIRINO[2',3':3,4]PYRROLO[1,2-a]INDOLE-4,7-DIONE,6-AMINO-8-[[(AMINOCARBONYL)OXY]METHYL]-1,1a,2,8,8a,8b-HEXAHYDRO-8a-METHOXY-5-METHYL-, [1aS-(1AALPHA, 8BETA, 8AALPHA, 8BALPHA)]-; Also known as MITOMYCIN C
U011	AMITROLE; Also known as 1H-1,2,-TRIAZOL-3-AMINE
U012	ANILINE (I,T); Also known as BENZENAMINE (I,T)
U014	AURAMINE; Also known as BENZENAMINE, 4,4'-CARBONIMIDOYLBIS[N,N-DIMETHYL-
U015	AZASERINE; Also known as L-SERINE, DIAZOACETATE (ESTER)
U016	BENZ[C]ACRIDINE
U017	BENZAL CHLORIDE; Also known as BENZENE,(DICHLOROMETHYL)-
U018	BENZ[A]ANTHRACENE
U019	BENZENE (I,T)
U022	BENZO[A]PYRENE
U024	DICHLOROMETHOXY ETHANE; Also known as ETHANE, 1,1'-[METHYLENEBIS(OXY)]BIS[2-CHLORO-
U025	DICHLOROETHYL ETHER; Also known as ETHANE,1,1'-OXYBIS[2-CHLORO-
U026	CHLORNAPHAZIN; Also known as NAPHTHALENAMINE, N,N'-BIS(2-CHLOROETHYL)-
U027	DICHLOROISOPROPYL ETHER; Also known as PROPANE, 2,2'-OXYBIS[2-CHLORO-
U028	1,2-BENZENEDICARBOXYLIC ACID, BIS(2-ETHYLHEXYL) ESTER; Also known as DIETHYLHEXYL PHTHALATE
U029	METHANE, BROMO-; Also known as METHYL BROMIDE
U030	BENZENE, 1-BROMO-4-PHENOXY-; Also known as 4-BROMOPHENYL PHENYL ETHER
U031	1-BUTANOL (I); Also known as N-BUTYL ALCOHOL (I)
U032	CHROMIC ACID H_2CRO_4, CALCIUM SALT; Also known as CALCIUM CHROMATE
U034	CHLORAL; Also known as ACETALDEHYDE, TRICHLORO-
U035	CHLORAMBUCIL; Also known as BENZENEBUTANOIC ACID, 4-[BIS(2-CHLOROETHYL)AMINO]-
U036	CHLORDANE, ALPHA & GAMMA ISOMERS; Also known as 4,7-METHANO-1H-INDENE, 1,2,4,5,6,7,8,8-OCTACHLORO-2,3,3A,4,7,7A-HEXAHYDRO-
U037	CHLOROBENZENE; Also known as BENZENE, CHLORO-
U038	CHLOROBENZILATE; Also known as BENZENEACETIC ACID, 4-CHLORO-ALPHA-(4-CHLOROPHENYL)-ALPHA-HYDROXY-, ETHYL ESTER
U039	P-CHLORO-M-CRESOL; Also known as PHENOL, 4-CHLORO-3-METHYL-
U041	EPICHLOROHYDRIN; Also known as OXIRANE, (CHLOROMETHYL)-

ATTACHMENT 1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
U042	2-CHLOROETHYL VINYL ETHER; Also known as ETHENE, (2-CHLOROETHOXY)-
U043	VINYL CHLORIDE; Also known as ETHENE, CHLORO-
U044	CHLOROFORM; Also known as METHANE, TRICHLORO-
U045	METHANE, CHLORO- (I,T); Also known as METHYL CHLORIDE (I,T)
U046	CHLOROMETHYL METHYL ETHER; Also known as METHANE, CHLOROMETHOXY-
U047	BETA-CHLORONAPHTHALENE; Also known as NAPHTHALENE, 2-CHLORO-
U048	O-CHLOROPHENOL; Also known as PHENOL, 2-CHLORO-
U049	4-CHLORO-O-TOLUIDINE, HYDROCHLORIDE; Also known as BENZENAMINE, 4-CHLORO-2-METHYL, HYDROCHLORIDE
U050	CHRYSENE
U051	CREOSOTE
U052	CRESOL (CRESYLIC ACID); Also known as PHENOL, METHYL-
U053	CROTONALDEHYDE; Also known as 2-BUTENAL
U055	CUMENE (I); Also known as BENZENE, (1-METHYLETHYL)- (I)
U056	BENZENE, HEXAHYDRO- (I); Also known as CYCLOHEXANE (I)
U057	CYCLOHEXANONE (I)
U058	CYCLOPHOSPHAMIDE; Also known as 2H-1,3,2-OXAZAPHOSPHORIN-2-AMINE, N,N-BIS (2-CHLOROETHYL)TETRAHYDRO-, 2-OXIDE
U059	DAUNOMYCIN; Also known as 5,12-NAPHTHACENEDIONE, 8-ACETYL-10-[(3-AMINO-2,3,6-TRIDEOXY)-ALPHS-L-LYXO-HEXOPYRANOSY)OXY]-7,8,9,10-TETRAHYDRO-6,8,11-TRIHYDROXY-1-METHOXY-, (8S-CIS)-
U060	DDD; Also known as BENZENE, 1,1'-(2,2-DICHLOROETHYLIDENE)BIS[4-CHLORO-
U061	DDT; Also known as BENZENE, 1,1'-(2,2,2-TRICHLOROETHYLIDENT)BIS[4-CHLORO-
U062	DIALLATE; Also known as CARBAMOTHIOIC ACID, BIS(1-METHYLETHYL)-, S-(2,3-DICHLORO-2-PROPENYL) ESTER
U063	DIBENZ[A,H]ANTHRACENE
U064	DIBENZO[A,I]PYRENE; Also known as BENZO[RST]PENTAPHENE
U066	1,2-DIBROMO-3-CHLOROPROPANE; Also known as PROPANE, 1,2-DIBROMO-3-CHLORO-
U067	ETHANE, 1,2-DIBROMO-; Also known as ETHYLENE DIBROMIDE
U068	METHANE, DIBROMO-; Also known as METHYLENE BROMIDE
U069	DIBUTYL PHTHALATE; Also known as 1,2-BENZENEDICARBOXYLIC ACID, DIBUTYL ESTER
U070	o-DICHLOROBENZENE; Also known as BENZENE, 1,2-DICHLORO-
U071	m-DICHLOROBENZENE; Also known as BENZENE, 1,3-DICHLORO-
U072	p-DICHLOROBENZENE; Also known as BENZENE, 1,4-DICHLORO-

ATTACHMENT 1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
U073	3,3'-DICHLOROBENZIDINE; Also known as [1,1'-BIPHENYL]-4,4'-DIAMINE, 3,3'DICHLORO-
U074	1,4-DICHLORO-2-BUTENE (I,T); Also known as 2-BUTENE, 1,4-DICHLORO- (I,T)
U075	DICHLORODIFLUOROMETHANE; Also known as METHANE, DICHLORODIFLUORO-
U076	ETHANE, 1,1-DICHLORO-; Also known as ETHYLIDENE DICHLORIDE
U077	ETHANE, 1,2-DICHLORO-; Also known as ETHYLENE DIBROMIDE
U078	1,1-DICHLOROETHYLENE; Also known as ETHENE, 1,1-DICHLORO-
U079	1,2-DICHLOROETHYLENE; Also known as ETHENE, 1,2-DICHLORO-, (E)
U080	METHANE, DICHLORO-; Also known as METHYLENE CHLORIDE
U081	2,4-DICHLOROPHENOL; Also known as PHENOL, 2,4-DICHLORO-
U082	2,6-DICHLOROPHENOL; Also known as PHENOL,2,6-DICHLORO-
U083	PROPANE, 1,2-DICHLORO-; Also known as PROPYLENE DICHLORIDE
U084	1,3-DICHLOROPROPENE; Also known as 1-PROPENE, 1,3-DICHLORO-
U085	1,2:3,4--DIEPOXYBUTANE (I,T); Also known as 2,2'-BIOXIRANE
U086	N,N'-DIETHYLHYDRAZINE; Also known as HYDRAZINE, 1,2,-DIETHYL-
U087	O,O-DIETHYL S-METHYL DITHIOPHOSPHATE; Also known as PHOSPHORODITHIOIC ACID, 0,0-DIETHYL S-METHYL ESTER
U088	DIETHYL PHTHALATE; Also known 1,2-BENZENEDICARBOXYLIC ACID, DIETHYL ESTER
U089	DIETHYLSTILBESTEROL; Also known as PHENOL, 4,4'-(1,2-DIETHYL-1,2-ETHENEDIYL)BIS-, (E)
U090	DIHYDROSAFROLE; Also known as 1,3-BENZODIOXOLE, 5-PROPYL-
U091	3,3'-DIMETHOXYBENZIDINE; Also known as [1,1'-BIPHENYL]-4,4'-DIAMINE, 3,3'DIMETHOXY-
U092	DIMETHYLAMINE (I); Also known as METHANAMINE, N-METHYL- (I)
U093	BENZENAMINE, N,N-DIMETHYL-4-(PHENYLAZO)-; Also known as P-DIMETHYLAMINOAZOBENZENE
U094	BENZ[A]ANTHRACENE, 7,12-DIMETHYL-; Also known as 7,12-DIMETHYLBENZ[A]ANTHRACENE
U095	3,3'-DIMETHYLBENZIDINE; Also known as [1,1'-BIPHENYL]-4,4'-DIAMINE, 3,3'DIMETHYL-
U097	DIMETHYLCARBAMOYL CHLORIDE; Also known as CARBAMIC CHLORIDE, DIMETHYL-
U098	1,1-DIMETHYLHYDRAZINE; Also known as HYDRAZINE, 1,1-DIMETHYL-
U099	1,2-DIMETHYLHYDRAZINE; Also known as HYDRAZINE, 1,2,-DIMETHYL-
U101	2,4-DIMETHYLPHENOL; Also known as PHENOL, 2,4-DIMETHYL-
U102	DIMETHYL PHTHALATE; Also known as 1,2-BENZENEDICARBOXYLIC ACID, DIMETHYL ESTER
U103	DIMETHYL SULFATE; Also known as SULFURIC ACID, DIMETHYL ESTER

ATTACHMENT 1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	WASTE DESCRIPTION
U105	2,4-DINITROTOLUENE; Also known as BENZENE, 1-METHYL-2,4-DINITRO-
U106	2,6-DINITROTOLUENE; Also known as BENZENE, 2-METHYL-1,3-DINITRO-
U107	DI-N-OCTYL PHTHALATE; Also known as 1,2-BENZENEDICARBOXYLIC ACID, DIOCTYL ESTER
U108	1,4-DIETHYLENEOXIDE; Also known as 1,4-DIOXANE
U109	1,2-DIPHENYLHYDRAZINE; Also known as HYDRAZINE, 1,2-DIPHENYL-
U110	DIPROPYLAMINE (I); Also known as 1-PROPANAMINE, N-PROPYL- (I)
U111	DI-N-PROPYLNITROSAMINE; Also known as 1-PROPANAMINE, N-NITROSO-N-PROPYL-
U112	ACETIC ACID ETHYL ESTER (I); Also known as ETHYL ACETATE (I)
U113	ETHYL ACRYLATE (I); Also known as 2-PROPENOIC ACID, ETHYL ESTER (I)
U114	ETHYLENEBISDITHIOCARBAMIC ACID, SALTS & ESTERS; Also known as CARBAMODITHIOIC ACID, 1,2- ETHANEDIYLBIS-, SALTS & ESTERS
U115	ETHYLENE OXIDE (I,T); Also known as OXIRANE (I,T)
U116	ETHYLENETHIOUREA; Also known as 2-IMIDAZOLIDINETHIONE
U117	ETHANE, 1,1'-OXYBIS-(I); Also known as ETHYL ETHER (I)
U118	ETHYL METHACRYLATE; Also known as 2-PROPENOIC ACID, 2-METHYL-, ETHYL ESTER
U119	ETHYL METHANESULFONATE; Also known as METHANESULFONIC ACID, ETHYL ESTER
U120	FLUORANTHENE
U121	TRICHLOROMONOFLUOROMETHANE; Also known as METHANE, TRICHLOROFLUORO-
U122	FORMALDEHYDE
U124	FURAN (I); Also known as FURFURAN (I)
U125	2-FURANCARBOXALDEHYDE (I); Also known as FURFURAL (I)
U126	GLYCIDYLALDEHYDE; Also known as OXIRANECARBOXYALDEHYDE
U127	HEXACHLOROBENZENE; Also known as BENZENE, HEXACHLORO-
U128	HEXACHLOROBUTADIENE; Also known as 1,3-BUTADIENE, 1,1,2,3,4,4-HEXACHLORO-
U129	LINDANE; Also known as CYCLOHEXANE, 1,2,3,4,5,6- HEXACHLORO-, (1ALPHA, 2ALPHA, 3BETA, 4ALPHA, 5ALPHA, 6BETA)-
U130	HEXACHLOROCYCLOPENTADIENE; Also known 1,3-CYCLOPENTADIENE, 1,2,3,4,5,5-HEXACHLORO-
U131	HEXACHLOROETHANE; Also known as ETHANE, HEXACHLORO-
U132	HEXACHLOROPHENE; Also known as PHENOL, 2,2'-METHYLENEBIS[3,4,6-TRICHLORO-
U135	HYDROGEN SULFIDE; Also known HYDROGEN SULFIDE H_2S
U136	ARSINIC ACID, DIMETHYL-; Also known as CACODYLIC ACID
U137	INDENO[1,2,3-CD]PYRENE

ATTACHMENT 1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
U138	METHANE, IODO-; Also known as METHYL IODIDE
U140	ISOBUTYL ALCOHOL, (I,T); Also known as 1-PROPANOL, 2-METHYL-, (I,T)
U141	ISOSAFROLE; Also known as 1,3-BENZODIOXOLE, 5-(1-PROPENYL)-
U142	KEPONE; Also known as 1,3,4-METHENO-2H-CYCLOBUTA[CD]PENTALEN-2-ONE, 1,1A,3,3A,4,5,5A,5B,6- DECACHLOROOCTAHYDRO-
U143	LASIOCARPINE; Also known as 2-BUTENOIC ACID, 2-METHYL-, 7-[2,3-DIHYDROXY-2-(1-METHOXYETHYL)-3-METHYL-1- OXOBUTOXY]METHYL]-2,3,5,6A-TETRAHYDRO-1H-PYRROLIZIN-1-YL ESTER,[1S-1ALPHA(Z),7(2S*,3R*),7AALPHA]]-
U144	ACETIC ACID, LEAD(2+) SALT; Also known as LEAD ACETATE
U145	LEAD PHOSPHATE; PHOSPHORIC ACID, LEAD(2+) SALT (2:3)
U146	LEAD, BIS(ACETATO-O) TETRAHYDROXYTRI-; Also known as LEAD SUBACETATE
U147	MALEIC ANHYDRIDE; Also known as 2,5-FURANDIONE
U148	MALEIC HYDRAZIDE; Also known as 3,6-PYRIDAZINEDIONE, 1,2-DIHYDRO-
U149	MALONONITRILE; Also known as PROPANEDINITRILE
U150	MELPHALAN; Also known as L-PHENYLALANINE, 4-[BIS(2-CHLOROETHYL)AMINO]-
U151	MERCYR
U152	METHACRYLONITRILE (I,T); Also known as 2-PROPENENITRILW, 2-METHYL- (I,T)
U153	METHANETHIOL (I,T); Also known as THIOMETHANOL (I,T)
U154	METHANOL (I); Also known as METHYL ALCOHOL (I)
U155	METHAPYRILENE; Also known 1,2-ETHANEDIAMINE, N,N- DIMETHYL-N'-W-PYRIDINYL-N'-(2- THIENYLMETHYL)-
U156	METHYL CHLOROCARBONATE (I,T); Also known CARBONOCHLORIDIC ACID, METHYL ESTER (I,T)
U157	BENZ[I]ACEANTHRYLENE, 1,2-DIHYDRO-3-METHYL-; Also known as 3-METHYLCHOLANTHRENE
U158	BENZENAMINE, 4,4'METHYLENEBIS[2-CHLORO-; Also known as 4,4'-METHYLENEBIS(2-CHLOROANILINE)
U159	METHYL ETHYL KETONE (MEK) (I,T); Also known as 2-BUTANONE (I,T)
U161	METHYL ISOBUTYL KETONE (I); Also known as 4-METHYL-2-PENTANONE (I) and PENTANOL, 4-METHYL-
U162	METHYL METHACRYLATE (I,T); Also known as 2-PROPENOIC ACID, 2-METHYL-, METHYL ESTER (I,T)
U163	MNNG; Also known as GUANIDINE, N-METHYL-N'-NITRO-N- NITROSO-
U164	METHYLTHIOURACIL; Also known as 4(1H)-PYRIMIDINONE, 2,3-DIHYDRO-6-METHYL-2-THIOXO-
U165	NAPHTHALENE
U166	1,4-NAPHTHALENEDIONE; Also known as 1,4-NAPHTHOQUINONE

ATTACHMENT 1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
U167	1-NAPHTHALENAMINE; Also known as ALPHA-NAPHTHYLAMINE
U168	2-NAPHTHALENAMINE; Also known as BETA-NAPHTHYLAMINE
U169	NITROBENZENE (I,T); Also known as BENZENE, NITRO-
U170	P-NITROPHENOL; Also known as PHENOL, 4-NITRO
U171	2-NITROPROPANE (I,T); Also known as PROPANE, 2-NITRO (I,T)
U172	N-NITROSODI-N-BUTYLAMINE; Also known as 1-BUTANAMINE, N-BUTYL-N-NITROSO-
U173	N-NITROSODIETHANOLAMINE; Also known as ETHANOL, 2,2'-(NITROSOIMINO)BIS-
U174	N-NITROSODIETHYLAMINE; Also known as ETHANAMINE, N-ETHYL-N-NITROSO-
U176	N-NITROSO-N-ETHYLUREA; Also known as UREA, N-ETHYL-N-NITROSO-
U177	N-NITROSO-N-METHYLUREA; Also known as UREA, N-METHYL-N-NITROSO-
U178	N-NITROSO-N-METHYLURETHANE; Also known as CARBAMIC ACID, METHYLNITROSO-,ETHYL ESTER
U179	N-NITROSOPIPERIDINE; Also known as PIPERIDINE, 1-NITROSO-
U180	N-NITROSOPYRROLIDINE; Also known as PYRROLIDINE, 1-NITROSO-
U181	BENZENAMINE, 2-METHYL-5-NITRO-; Also known as 5-NITRO-O-TOLUIDINE
U182	PARALDEHYDE; Also known as 1,3,5-TRIOXANE, 2,4,6- TRIMETHYL-
U183	PENTACHLOROBENZENE; Also known as BENZENE, PENTACHLORO-
U184	PENTACHLOROETHANE; Also known as ETHANE, PENTACHLORO-
U185	PENTACHLORONITROBENZENE (PCNB); Also known as BENZENE, PENTACHLORONITRO-
U186	1,3-PENTADIENE (I); Also known as 1-METHYLBUTADIENE (I)
U187	ACETAMIDE, N-(4-ETHOXYPHENYL)-; Also known as PHENACETIN
U188	PHENOL
U190	PHTHALIC ANHYDRIDE; Also known as 1,3-ISOBENZOFURANDIONE
U191	2-PICOLINE; Also known as PYRIDINE, 2-METHYL-
U192	BENZAMIDE,3,5-DICHLORO-N-(1,1-DIMETHYL-2-PROPYNYL)-; Also known as PRONAMIDE
U193	1,3-PROPANE SULTONE; Also known as 1,2-OXATHIOLANE, 2,2-DIOXIDE
U194	1-PROPANAMINE (I,T); Also known as N-PROPYLAMINE (I,T)
U196	PYRIDINE
U197	P-BENZOQUINONE; Also known as 2,5-CYCLOHEXADIENE-1,4-DIONE
U200	RESERPINE; Also known as YOHIMBAN-16-CARBOXYLIC ACID, 11,17-DIMETHOXY-18-[(3,4,5-TRIMETHOXYBENZOYL)OXY]-, METHYL ESTER, (3BETA, 16BETA, 17ALPHA, 18BETA, 20ALPHA)-
U201	RESORCINOL; Also known as 1,3-BENZENEDIOL
U202	SACCHARIN, & SALTS; Also known as 1,2-BENZISOTHIAZOL-3(2H)-ONE, 1,1-DIOXIDE, & SALTS

ATTACHMENT 1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
U203	SAFROLE; Also known as 1,3-BENZODIOXOLE, 5-(2- PROPENYL)-
U204	SELENIOUS ACID; Also known as SELENIUM DIOXIDE
U206	STREPTOZOTOCIN; Also known as GLUCOPYRANOSE, 2-DEOXY-2-(3-METHYL-3-NITROSOUREIDO)-, D-D-GLUCOSE, 2-DEOXY-2-[[(METHYLNITROSOAMINO)-CARBONYL]AMINO]-
U207	1,2,4,5-TETRACHLOROBENZENE; Also known as BENZENE, 1,2,4,5-TETRACHLORO-
U208	1,1,1,2-TETRACHLOROETHANE; Also known as ETHANE, 1,1,1,2-TETRACHLORO-
U209	1,1,2,2-TETRACHLOROETHANE; Also known as ETHANE, 1,1,2,2-TETRACHLORO-
U210	TETRACHLOROETHYLENE; Also known as ETHENE, TETRACHLORO-
U211	CARBON TETRACHLORIDE; Also known as METHANE, TETRACHLORO-
U213	TETRAHYDROFURAN (I); Also known as FURAN, TETRAHYDRO-(I)
U214	ACETIC ACID, THALLIUM(1+) SALT; Also known as THALLIUM(I) ACETATE
U215	THALLIUM(I) CARBONATE; Also known as CARBONIC ACID, DITHALLIUM(1+) SALT
U216	THALLIUM(I) CHLORIDE; Also known as THALLIUM CHLORIDE TLCL
U217	THALLIUM(I) NITRATE; Also known as NITRIC ACID, THALLIUM(1+) SALT
U218	THIOACETAMIDE; Also known as ETHANETHIOAMIDE
U219	THIOUREA
U220	TOLUENE; Also known as BENZENE, METHYL-
U221	TOLUENEDIAMINE; Also known as BENZENEDIAMINE, AR-METHYL-
U222	BENZENAMINE, 2-METHYL-, Also known as HYDROCHLORIDE O-TOLUIDINE HYDROCHLORIDE
U225	BROMOFORM; Also known as METHANE, TRIBROMO-
U226	ETHANE, 1,1,1-TRICHLORO-; Also known as METHYL CHLOROFORM
U227	1,1,2-TRICHLOROETHANE; Also known as ETHANE, 1,1,2-TRICHLORO-
U228	TRICHLOROETHYLENE; Also known as ETHENE, TRICHLORO-
U235	TRIS(2,3-DIBROMOPROPYL) PHOSPHATE; Also known as 1-PROPANOL, 2,3-DIBROMO-, PHOSPHATE (3:1)
U236	TRYPAN BLUE; Also known as 2,7-NAPHTHALENEDISULFONIC ACID, 3,3'-[(3,3'-DIMETHYL[1,1'-BIPHENYL]-4,4'- DIYL)BIS(AZO)BIS[5-AMINO-4-HYDROXY]-, TETRASODIUM SALT
U237	URACIL MUSTARD; Also known as 2,4-(1H,3H)-PYRIMIDINEDIONE, 5-[BIS(2-CHLOROETHYL)AMINO]-
U238	CARBAMIC ACID, ETHYL ESTER; Also known as ETHYL CARBAMATE (URETHANE)
U239	XYLENE (I); Also known as BENZENE, DIMETHYL- (I,T)
U240	ACETIC ACID, 92,4-DICHLOROPHENOXY)-, SALTS & ESTERS; Also known as 2,4-D, SALTS & ESTERS
U243	HEXACHLOROPROPENE; Also known as 1-PROPENE, 1,1,2,3,3,3- HEXACHLORO-

ATTACHMENT 1 -- HAZARDOUS WASTES RECEIVED AT THE PARKER FACILITY	
EPA WASTE CODE	**WASTE DESCRIPTION**
U244	THIOPEROXYDICARBONIC DIAMIDE $[(H_2N)C(S)]_2S_2$, TETRAMETHYL-; Also known as THIRAM
U246	CYANOGEN BROMIDE (CN)Br
U247	BENZENE, 1,1'(2,2,2-TRICHLOROETHYLIDENE)BIS[4-METHOXY-; Also known as METHOXYCHLOR
U248	WARFARIN, & SALTS, WHEN PRESENT AT CONCENTRATIONS OF 0.3% OR LESS; Also known as 2H-1-BENZOPYRAN-2-ONE, 4- HYDROXY-3-(3-OXO-1-PHENYL-BUTYL)-, & SALTS, WHEN PRESENT AT CONCENTRATIONS OF 0.3% OR LESS
U249	ZINC PHOSPHIDE Zn_3P_2 WHEN PRESENT AT CONCENTRATIONS OF 10% OR LESS
U328	BENZENAMINE, 2-METHYL-; Also known as o-TOLUIDINE
U353	BENZENAMINE, 4-METHYL-; Also known as p-TOLUIDINE
U359	ETHANOL, 2-ETHOXY-; Also known as ETHYLENE GLYCOL MONOETHYL ETHER

ATTACHMENT 2

EPA INCINERATOR CLOSURE GUIDANCE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

MEMORANDUM

SUBJECT: Draft Guidance on Incinerator Closure

FROM: Lionel Vega, Chemical Engineer
Alternative Technology Section

TO: Addressees

Attached is the draft guidance on incinerator closure for your review and comment. As described in the agenda, I will be asking for your comments on this eight-page draft guidance in our Workgroup meeting scheduled for November 7-9 in Denver, Colorado.

Attachment

Addressees:

Stephen Yee, Region I
John Brogard, Region II
Gary Gross, Region III
Betty Willis, Region IV
Glen Hay, Region IV
Hugh Hazen, Region IV
Y.J. Kim, Region V
Mardi Klevs, Region V
Stan Burger, Region VI
Joe Galbraith, Region VII
Nat Miullo, Region VIII
Larry Bowerman, Region IX
Cathy Massimino, Region X

Larry Johnson, ORD
Joe McSorley, ORD
C.C. Lee, ORD
Donald Oberacker, ORD
George Huffman, ORD
Justice Manning, ORD
Bob Mouringham, ORD

cc: Lionel Vega
Sonya Sasseville
Bob Holloway
Shiva Garg
Dwight Hlustick
Kate Anderson, OWPE
Charles Perry, OWPE
Winston Lue, OTS
Cristina Gaines, OWEP

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DRAFT OF GUIDANCE OF INCINERATOR CLOSURE

Draft Final Report

For U.S. Environmental Protection Agency

Submitted by:

Midwest Research Institute
5109 Leesburg Pike
Suite 414
Falls Church, Virginia

EPA Contract No. 68-01-7310
Work Assignment 134
MRI Project No. 8962-34

June 29, 1990

PREFACE

This draft document was prepared by Midwest Research Institute (MRI) for the U.S. Environmental Protection Agency (EPA) under subcontract to NUS Corporation on EPA Contract No. 68-01-7310. The document was developed by Bruce Boomer.

MIDWEST RESEARCH INSTITUTE

Andrea C. Hall, Ph.D.
Program Manager

June 29, 1990

DRAFT
GUIDANCE ON CLOSURE PROCEDURES FOR
HAZARDOUS WASTE INCINERATOR FACILITIES

INTRODUCTION

This memo provides RCRA permit writers with recommended procedures for the incinerator-specific portion of a closure plan. Owners and operators of a hazardous waste incinerator facility must develop a plan for closing the facility and must keep the plan on file at the facility until closure is completed and certified. The closure plan is a required portion of a RCRA Part B permit application and is thus subject to the approval of RCRA permit writers.

This memo addresses closure of the incinerator and ancillary equipment. Issues addressed below include initial decontamination and burnout of any residual organic contamination, further decontamination methods, confirmatory sampling methods, and criteria for closure certification. This memo does not address tank closure or other general facility closure requirements such as the cleanup of any spills or contaminated soils.

Typically, the closure of a permitted RCRA incinerator is not an issue with significant environmental impact. If the facility had been operating in compliance with permit conditions prior to closure, the amount and extent of residual contamination within the incinerator and ancillary equipment is expected to be minimal; the recommendations discussed in this memo address this expectation of minimal contamination.

EPA PRECEDENT

An issue associated with incinerator closure is defining an "acceptable" level of residual contamination to allow material previously in contact with hazardous wastes to be recycled or disposed as a nonhazardous waste. In a letter to Mr. Thomas Jorling dated June 19, 1989, Jonathan Cannon, Acting Assistant Administrator of EPA (see Attachment 1), noted that contaminated environmental media must be managed as if they were hazardous until they no longer contain the listed wastes. Options mentioned in the letter include: (1) delisting, (2) removing the contamination by treatment, or (3) decontamination to an acceptable minimal level of contamination. The letter notes that for the third option, EPA is investigating de minimus levels for hazardous constituents, below which materials (such as contaminated environmental media) would no longer have to be managed as hazardous wastes.

The sections below provide a closure approach for potentially contaminated incinerator media that involves, to some extent, options number two and three above.

APPROACH TO INCINERATOR CLOSURE

Residual contamination of environmental concern within an incineration system will result from the organic and metals content of the wastes fed to the incinerator. The following steps (summarized in Table 1) provide a basis for organic decontamination and determination of residual metal contamination.) The first step of incinerator closure involves the incineration of all existing hazardous waste inventories and proper treatment, disposal, or removal of residual wastes such as incinerator ash, scrubber effluents, and baghouse ash. For most facilities, this step effectively removes the most significant source of residual contamination for closure.

The second step involves the active decontamination of waste feed mechanisms by use of chemical and/or physical action. This step may be coordinated with affiliated storage tank or drum closure activities, which parallel and inter-relate to incinerator closure.

During the second step, feed mechanisms (e.g., liquid/sludge feed lines, solid feed mechanisms) are rinsed with kerosene or other appropriate solvents to remove surface contaminants. Table 2 provides a general guide to the solubility of several contaminant categories in water, dilute acids, dilute bases, and organic solvents. Feed mechanisms also may be scrubbed or scraped using brushes, scrapers, or sponges and water-compatable solvent cleaning solutions. All rinsate is to be collected and incinerated prior to step 3.

The third step is a burnout of any residual organic contamination within the incinerator. Following the completion of step 2, the incinerator will be operated with only auxiliary fuel for an appropriate time period not less than 4 hr, maintaining at least the minimum temperature specified in the permit for each combustion chamber. This is expected to combust any remaining organic contaminants within the incinerator system.

After the completion of step 3, the incinerator and its ancillary equipment may be considered to be organically decontaminated. Organic contamination is not expected downstream from the combustion chambers (e.g., air pollution control devices). However, residual contamination with metals remains a concern. Step 4 addresses the decontamination and wipe sampling of incinerator components in regard to metals. The following are examples of components of concern:

- Feed mechanisms (piping, pumps, conveyors, etc.);
- Refractory of combustion chambers;
- Gas ducts;
- Ash handling system;
- Internal surfaces of air pollution control equipment; and,
- Stack.

(Excluded from the decontamination procedures are fabric filter bags and scrubber packing materials which can be disposed as hazardous wastes.)

The recommendations for step 4 include:

- Optional rinse/scrub of above equipment with detergent;
- Wipe sampling (minimum 10 locations scattered throughout above).

The optional rinse/scrub may involve a combination of both physical and chemical means to remove contaminants. As previously discussed for step 2, individual components (detached as appropriate) may be scrubbed or scraped using brushes, scrapers or sponges, and water-compatible solvent cleaning solutions. Contaminants may be removed with a water or solvent rinse using pressurized or gravity flow, or using steam jets. On metal surfaces, pressurized cleaning may present problems with metals etching compounding the effective removal of contaminants. In addition, caution should be exercised to ensure that pressurized or steam cleaning sprays/emissions are appropriately contained (i.e., curtains, enclosures, or spray booths may be necessary to reduce or eliminate cross-contamination).

Wipe sampling will involve sampling surfaces exposed to either hazardous wastes or the exhaust gases/residuals derived from waste incineration in the above equipment. Samples are collected by applying deionized water or a detergent (e.g., household liquid cleaner) to a piece of 11-cm diameter filter paper (e.g., Whatman 40 ashless, Whatman "50" smear tabs, or equivalent) or gauze pad. This moistened filter paper or gauze pad is used to thoroughly swab a 100-cm² area, as can be measured by a sampling template.

The use of a template can assist the sampler in the collection of a 100-cm² sample. Different templates may be used for the variously shaped areas which must be sampled (e.g., a 10 cm x 10 cm square). When a template is used, it should be thoroughly cleaned between samples to prevent contamination of subsequent samples by the template.

The wipes and the liquid used to wet the wipes should be tested for residual metals before use in taking samples from the incinerator. The wipe samples should be stored in precleaned glass jars and stored no longer than the allowable holding times stated in SW-846. Samples will be digested and analyzed for As, Be, Cd, Cr, Sb, Ba, Hg, Pb, Tl, and Ag (the metals regulated in incinerator emissions). Samples can be composited if desired, but compositing reduces opportunities for identifying localized contamination areas. At least one blank sample per sampling day must be prepared. Wiping only gives an indication of surface contamination which can easily be removed. Incinerator components with a large amount of strongly entrained residuals might need to be scraped with a paint scraper and the scrapings analyzed. Criteria for acceptable levels of residual contamination are discussed below.

As an alternative to step 4, an incinerator owner may elect to dispose all incineration equipment as a hazardous waste.

CERTIFICATION OF ADEQUATE CLOSURE

The effectiveness of the closure decontamination process for organic contamination may be estimated by visual observation of any discolorations, stains, or gross pockets of apparent organic solids. This visual assessment is anticipated to be a suitable measure of possible organic contamination when followed by a rinse or cleanup of the affected areas with an appropriate solvent.

Effectiveness of metals decontamination may be determined by wipe sampling (as previously discussed), or by analyzing rinsate for contaminants left in the solvent solution. However, analysis of rinsate should be evaluated with regards to the total amount of rinsate in contact with the total area of the incinerator surfaces. Rinsate values could be elevated due to a leaching effect on the metallic surfaces of the incinerator. Evidence of elevated levels of contaminants in the wipe samples (as discussed below) suggest that additional cleaning and rinsing is necessary. Elevated contaminate concentrations also may indicate that an alternative contaminate removal method (e.g., sand-blasting, surface sealing, etc.) is necessary to remove or permanently contain contaminates.

Until EPA develops <u>de minimus</u> levels for the metals of concern, a suggested guide is to compare the results of incinerator wipe sampling with background levels as indicated by taking wipe samples of exterior building surfaces on or near the incineration site. This wipe sample should reflect background ambient air quality, including the impact of local mineralogy. An incinerator wipe sample that demonstrates a surface concentration at least 100 times greater than the background value for any metal should serve as an indicator that additional decontamination is needed prior to closure. Failure to meet the criteria would require a repeat of the optional rinse/scrub of equipment (in step 4) followed by a repeat of wipe sampling; disposal of contaminated material as a hazardous waste is another alternative. Care should be taken in selecting areas for background sampling since such materials as painted surfaces and stainless steel may contain significant levels of some of the analytes.

The incinerator owner/operator will submit full documentation of the closure process to the permitting agency to receive certification of closure. A report should be submitted to the Agency describing each step of closure activities and the results of wipe sampling. Certification will allow the owner/operator to recycle the incinerator materials or dispose of the materials as a nonhazardous waste. Alternatively, closure certification may note the adequate disposal of incinerator equipment as a hazardous waste.

DELAY OF CLOSURE

The above approach assumes that the incineration facility is being closed and dismantled. If a facility is being closed as a RCRA facility but will either continue to operate as a nonhazardous waste facility or remain intact in storage for indefinite future operation, step 4 above could be delayed until dismantling occurs. However, the incineration facility will be subject to RCRA security requirements and, ultimately, RCRA closure requirements.

Table 1. SUMMARY OF RCRA INCINERATOR CLOSURE RECOMMENDATIONS

Step 1	Incineration of all remaining waste feeds and removal of all ash and scrubber effluent wastes
Step 2	Flush waste feed lines and mechanisms with kerosene or an equivalent solvent and incinerate rinsate
Step 3	Operate incinerator for at least 4 hr at the minimum permitted temperature with auxiliary fuel only, to provide burnout of any organic residues
Step 4	Optional decontamination of incinerator components with detergent, followed by mandatory wipe sampling of surfaces potentially contaminated with toxic metals (additional decontamination and wipe sampling would be conducted if needed)
Step 5	Certification of adequate closure based upon analytical results

Table 2. GENERAL GUIDE TO SOLUBILITY OF CONTAMINANTS IN FOUR SOLVENT TYPES

Solvent	Soluble contaminants
Water	Low-chain hydrocarbons. Soluble inorganic compounds. Salts. Some organic acids and other polar compounds.
Aqueous Detergents	Many water soluble contaminants and insoluble particulates.
Dilute Acids	Basic (caustic) compounds. Amines. Hydrazines.
Dilute Bases For example: -detergent -soap	Acidic compounds. Phenols. Thiols. Some nitro and sulfonic compounds.
Organic Solvents For example: -alcohols -ethers -ketones -aromatics -straight-chain alkanes (e.g., hexane) -common petroleum products (e.g., fuel oil, kerosene) -chlorinated solvents	Many nonpolar or polar organic compounds.

Attachment 1

THIS LETTER WAS REKEYED TO BE ELECTRONICALLY AVAILABLE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

June 19, 1989

Mr. Thomas C. Jorling
Commissioner
Department of Environmental Conservation
State of New York
Albany, New York 12233-1010

Dear Mr. Jorling:

I am writing in response to your letter of May 5, 1989, in which you ask numerous questions concerning the regulatory status, under the Resource Conservation and Recovery Act (RCRA), of environmental media (ground water, soil, and sediment) contaminated with RCRA-listed hazardous waste.

As you point out in your letter, it is correct that the Agency's "contained-in" interpretation is that contaminated environmental media must be managed as if they were hazardous wastes until they no longer contain the listed waste, or are delisted. This leads to the critical question of when an environmental medium contaminated by listed hazardous waste ceases to be a listed hazardous waste. In your letter, you discuss three possible answers (based on previous EPA positions and documents) which you believe address this question, and request the Agency to clarify its interpretation. Each of these is discussed below.

The first possible answer you cite would be that the contaminated media would be a hazardous waste unless and until it is delisted, based on the "mixture" and "derived-from" rules. As you correctly state in your letter, a waste that meets a listing description due to the application of either of these rules remains a listed hazardous waste until it is delisted. However, these two rules do not pertain to contaminated environmental media. Unlike our regulations, contaminated media are not considered solid wastes in the sense of being abandoned, recycled, or inherently waste-like as those terms are defined in the regulations. Therefore, contaminated environmental media cannot be considered a hazardous waste via the "mixture" rule (i.e., to have a hazardous waste mixture, a hazardous waste must be mixed with a solid waste per 40 CFR 261.3(a)(2)(iv). Similarly, the "derived" from" rule does not apply to contaminated media. Our basis for stating that contaminated environmental media must be managed as hazardous wastes is that they "contain" listed hazardous waste. These environmental media must be managed as hazardous waste because, and only as long as, they "contain" a listed hazardous waste, (i.e., until decontaminated).

The second possibility you mention is that environmental media contaminated with a RCRA listed waste no longer have to be managed as a hazardous waste if the hazardous constituents are completely removed by treatment. This is consistent with the Agency's "contained-in" interpretation and represents the Agency's current policy.

THIS LETTER WAS REKEYED TO BE ELECTRONICALLY AVAILABLE

The third possibility you discuss comes from Sylvia Lawrence's January 24, 1989, memorandum that you cited in your letter. This memorandum indicates that OSW has not issued any definitive guidance as to when, or at what levels, environmental media contaminated with listed hazardous waste are no longer considered to contain that hazardous waste. It also states that until such definitive guidance is issued, the Regions may determine these levels on a case-specific basis. Where this determination involves an authorized State, such as New York, our policy is that the State may also make such a determination.

Related to such a determination, you ask whether a risk assessment approach that addressed the public health and environmental impacts of hazardous constituents remaining in treatment residuals would be acceptable. This approach would be acceptable for contaminated media provided you assumed a direct exposure scenario, but would not be acceptable for "derived-from" wastes under our current rules. Additionally, consistent with the statute, you could substitute more stringent standards or criteria for contaminated environmental media than those recommended by the Federal EPA if you determined it to be appropriate.

The Agency is currently involved in a rulemaking effort directed at setting de minimis levels for hazardous constituents below which eligible listed wastes, treatment residuals from those wastes, and environmental media contaminated with those listed wastes would no longer have to be managed as hazardous wastes. This approach being contemplated in the De Minimis program would be similar to that used in the proposed RCRA Clean Closure Guidance in terms of the exposure scenario (direct ingestion), the management scenario (not in a waste management unit), and the levels (primarily health-based).

Your final question related to whether the "remove and decontaminate" procedure set forth in the March 19,1987 Federal Register preamble to the conforming regulations on closing surface impoundments applies when making complete removal determinations for soil. These procedures do apply when one chooses to clean close a hazardous waste surface impoundment by removing the waste. The preamble language states that the Agency interprets the term "remove" and "decontaminate" to mean removal of all wastes, liners, and/or leachate (including ground water) that pose a substantial present or potential threat to human health or the environment (52 FR 8706). Further discussion of these requirements is provided in a clarification notice published on March 28, 1988, (53 FR 1144) and in OSWER Policy Directive # 9476.00-18 on demonstrating equivalence of Part 265 clean closure with Part 264 requirements (copy enclosed).

I hope that this response will be helpful to you in establishing and implementing New York's hazardous waste policies on related issues. Should you have additional questions, please contact Bob Dellinger, Chief of the Waste Characterization Branch at (202) 475-8551.

Sincerely yours,

(original letter was signed by a representative of Jonathan Cannon)
Jonathan Z. Cannon
Acting Assistant Administrator

ATTACHMENT 3

LIST OF CLOSURE COMPOUNDS OF CONCERN

List of Closure Compounds of Concern

CAS Number	Name	Description	Analysis
100-41-4	Ethylbenzene	Ethylbenzene	8260
100-42-5	Styrene	Styrene	8260
103-65-1	n-propylbenzene	n-propylbenzene	8260
105-67-9	2,4-Dimethylphenol	2,4-Dimethylphenol	8270
106-44-5	4-Methylphenol	4-Methylphenol	8270
106-46-7	1,4, -dichlorobenzene	1,4,-dichlorobenzene	8270
106-93-4	1,2,dibromoethane	Ethylene Dibromide (EDB)	8260
107-06-2	1,2,dichloroethane	EDC	8260
107-13-1	acrylonitrile	acrylonitrile	8260
108-05-4	vinyl acetate	vinyl acetate	8260
108-88-3	Toluene	Toluene	8260
108-90-7	Chlorobenzene	Chlorobenzene	8260
108-95-2	Phenol	Phenol	8270
109-99-9	tetrahydrofuran	tetrahydrofuran	8260
111-44-4	Bis(2-chloroethyl)ether	Bis(2-chloroethyl)ether	8270
117-81-7	bis (2-ethylhexyl) phthalate	bis (2-ethylhexyl) phthalate	8270
120-12-7	Anthracene	Anthracene	8270
120-82-1	1,2,4-Trichlorobenzene	1,2,4-Trichlorobenzene	8270
123-91-1	1,4-Dioxane	1,4-Dioxane	8270
124-48-1	Dibromochloromethane	Dibromochloromethane	8260
127-18-4	Tetrachloroethylene	PCE	8260
131-11-3	Demethyl phthalate	Demethyl phthalate	8270
132-64-9	Dibenzofuran	Dibenzofuran	8270
1330-20-7	Xylene	xylene	8260
1912-24-9	Atrazine	2-chloro-4-(ethylamino)-6-(isopropylamino)-	8141
121-75-5	Malathion	Malathion	8141
206-44-0	Fluoranthene	Fluoranthene	8270
208-96-8	Acenaphthylene	Acenaphthylene	8270
218-01-9	Chrysene	Chrysene	8270
309-00-2	Aldrin	Aldrin	8270
319-84-6	Alpha-BHC	Alpha-Hexachlorocyclohexane	8270
78-59-1	Isophorone	Isophorone	8270
51-28-5	2,4,Dinitrophenol	2,4,-Dinitrophenol	8270
541-73-1	1,3-dichlorobenzene	1,3-dichlorobenzene	8270
56-23-5	Carbon Tetrachloride	Carbon Tetrachloride	8260
56-55-3	Benz(a)anthracene	1	8270
57-74-9	Chlordane	Chlordane	8270
58-89-9	Lindane	Lindane	8270
591-78-6	2-Hexanone	2-Hexanone	8260
62-53-3	Aniline	Aniline	8270
67-64-1	acetone	acetone	8260
67-66-3	Chloroform	Chloroform	8260
71-43-2	Benzene	Benzene	8260
71-55-6	1,1,1trichloroethane	1,1,1trichloroethane	8260
72-20-8	Endrin	Endrin	8270
72-43-5	Methoxychlor	Methoxychlor	8270
72-54-8	4.4'-DDD		8270
7429-90-5	Aluminum	Fume or Dust Only	6010

Note: Most recent version of analytical methods will be used.

List of Closure Compounds of Concern

CAS Number	Name	Description	Analysis
7439-92-1	Lead	Lead	6010
7439-96-5	Manganese	Manganese	6010
7439-97-6	Mercury	Mercury	7470
7440-02-0	Nickel	Nickel	6010
7440-22-4	Silver	Silver	6010
7440-36-0	Antimony	Antimony	6010
7440-38-2	Arsenic	Arsenic	6010
7440-39-3	Barium	barium	6010
7440-41-7	Beryllium	Beryllium	6010
7440-43-9	Cadmium	Cadmium	6010
7440-46-4	Copper	Copper	6010
7440-47-3	Chromium	Chromium	6010
7440-48-4	Cobalt	Cobalt	6010
7440-62-2	Vanadium	Vanadium	6010
7440-66-6	Zinc	Zinc	6010
74-83-9	Bromomethane	Bromomethane	8260
74-87-3	chloromethane	methyl chloride	8260
75-00-3	chloroethane	chloroethane	8260
75-09-2	Methylene chloride	Methylene Chloride	8260
75-15-0	Carbon Disulfide	Carbon Disulfide	8260
75-25-2	Bromoform	Bromoform	8260
75-27-4	Bromodichloromethane	Bromodichloromethane	8260
75-34-3	1,1dichlorethane	1,1,dichloroethane	8260
75-35-4	1,1dichloroethene	1,1dichloroethene	8260
75-69-4	Trichlorofluoromethane		8260
75-71-8	Dichlorodifluoromethane	Dichlorodifluoromethane	8260
76-13-1	Freon 113	Freon 113	8260
129-00-0	Pyrene	Pyrene	8270
76-44-8	Heptachlor	Heptachlor	8270
78-87-5	1,2,dichloropropane	1,2,dichloropropane	8260
78-93-3	Methyl ethyl ketone	MEK	8260
79-00-5	1,1,2-Trichloroethane	1,1,2-Trichloroethane	8260
79-01-6	Trichloroethylene	TCE	8260
79-34-5	1,1,2,2,-Tetrachloroethane	1,1,2,2,-Tetrachloroethane	8260
8001-35-2	Toxaphene	Toxaphene	8270
80-62-6	Methyl methacrylate	Methyl methacrylate	8260
82870-81-3	Thallium	Thallium	6010
83-32-9	Acenaphthene	Acenaphthene	8270
84-66-2	Diethylphthalate	Diethylphthalate	8270
84-74-2	Dibutyl Phthalate	Dibutyl Phthalate	8270
85-01-8	Phenanthrene	Phenanthrene	8270
86-73-7	Fluorene	Fluorene	8270
87-68-3	1,3 - Hexachlorobutadiene	1,3-Hexachlorobutadiene	8270
87-86-5	Pentachlorophenol	PCP	8270
88-74-4	2-Nitroaniline	2-Nitroaniline	8270
91-20-3	Naphthalene		8270
91-57-6	2-Methylnaphthalene	2-Methylnaphthalene	8270
95-47-6	o-Xylene	o-Xylene	8260

Note: Most recent version of analytical methods will be used.

List of Closure Compounds of Concern

CAS Number	Name	Description	Analysis
95-48-7	2-Methylphenol	2-Methylphenol	8270
95-50-1	1,2, dichlorobenzene	1,2 dichlorobenzene	8270
95-63-6	1,2,4,trimethylbenzene	1,2,4,trimethylbenzene	8260
96-18-4	1,2,3,trichloropropane	1,2,3,trichloropropane	8260
98-86-2	Acetophenone	Acetophenone	8270
98-95-3	Nitrobenzene	Nitrobenzene	8270
99-09-2	3-Nitroaniline	3-Nitroaniline	8270

Note: Most recent version of analytical methods will be used.

ATTACHMENT 4

RF-1 CLOSURE COST ESTIMATE

RF-1 Closure Cost Estimate

Date: April 2012

Item/Activity	Number	Units	Cost per unit	Associated Item/Activity Cost
CARBON REACTIVATION UNIT CLOSURE COSTS				
Removal of residuals (sludge, activated carbon, slag) 1 unit x 16 hours/unit x $30/hour x 3 Persons	48	manhours	$30	$1,440
Disposal of residuals drums 2 x 55 gal drums x $1,000/drum	2	drums	$1,000	$2,000
RF-1 refractory removal (1 unit x 40 hours x $50/hr x 3 persons)	120	manhours	$50	$6,000
Disposal of refractory ($500/yd x 20 yd/macro box x 3 boxes)	60	yards	$500	$30,000
Carbon reactivation unit decontamination (1 equipment item x 16 hours/item x $50/hour x 3 persons)	48	manhours	$50	$2,400
Rental of decontamination equipment 5 days x $100/day	5	days	$100	$500
Disposal of rinsate at POTW	1	disposal	$1,000	$1,000
One sample of rinsate (plus MS/MSD for QC) will be required for 1 small equipment batch at $1,010/sample (1 batch x 3 samples, metals & organic COCs)	3	samples	$1,010	$3,030
Rental of vaccuum truck 1 truck x 2 days x $500/day	2	days	$500	$1,000
Disassembly of carbon reactivation unit RF-1 (80 manhours x $50/hr)	80	manhours	$50	$4,000
Rental of 70 Ton Crane (Crane @ $200/hr and Rigger @$55/hr) 40 hours @ $255/hour (includes 1 hour mobilization/1 hour demobilization)	40	hours	$255	$10,200
Shipment of disassembled carbon reactivation unit offsite for scrap metal (1 load x $565/load)	1	truck loads	$565	$565
Supervision and management (includes PPE and incidentals) 40 hours x $50/hour	40	manhours	$50	$2,000
				$64,135
AFTERBURNER (AB-1) UNIT CLOSURE COST				
Removal of residuals (sludge, activated carbon, slag) 1 unit x 40 hours/unit x $30/hour x 3 Persons	120	manhours	$30	$3,600
Disposal of residuals drums 2 x 55 gal drums x $1,000/drum	2	drums	$1,000	$2,000
AB-1 afterburner refractory removal (1 unit x 16 hours x $50/hr x 3 persons)	120	manhours	$50	$6,000
Disposal of refractory ($500/yd x 20 yd/macro box x 2 boxes)	40	yards	$500	$20,000
Afterburner decontamination (1 equipment item x 16 hours/item x $50/hour x 3 persons)	48	manhours	$50	$2,400
Rental of decontamination equipment 2 days x $100/day	2	days	$100	$200
Disposal of rinsate at POTW	1	disposal	$1,000	$1,000
One sample of rinsate (plus MS/MSD for QC) will be required for 1 small equipment batche at $1,010/sample (1 batch x 3 samples, metals & organic COCs)	3	samples	$1,010	$3,030
Rental of vaccuum truck 1 truck x 2 days x $500/day	2	days	$500	$1,000
Disassembly of carbon reactivation unit (RF-2, afterburner, Quench/Venturi, Packed Bed scrubber, WESP, ID Fan, Stack) (80 manhours x $50/hr)	80	manhours	$50	$4,000
Rental of 70 Ton Crane (Crane @ $200/hr and Rigger @$55/hr) 40 hours @ $255/hour (includes 1 hour mobilization/1 hour demobilization)	40	hours	$255	$10,200
Shipment of disassembled carbon reactivation unit offsite for scrap metal (1 load x $565/load)	1	truck loads	$565	$565
Supervision and management (includes PPE and incidentals) 40 hours x $50/hour	40	manhours	$50	$2,000
				$55,995
CARBON SLURRY LINES CLOSURE COSTS				
Removal of Lines 16 hours x $30/hour x 2 persons	32	manhours	$30	$960
Rental of 70 Ton Crane (Crane @ $200/hr and Rigger @$55/hr) 4 hours @ $255/hour (includes 1 hour mobilization/1 hour demobilization)	4	hours	$255	$1,020
Disposal of lines (macroencapsulation) $500/yard x 20 yards/box x 0.33 Boxes	6.666667	yards	$500	$3,333
Transportation 700 Miles x $2.75/mile x 0.33 boxes	0.33	loads	$1,925	$635
				$5,949

RF-1 Closure Cost Estimate

Date: April 2012

Item/Activity	Number	Units	Cost per unit	Associated Item/Activity Cost
TANK T-8 OVERFLOW LINE CLOSURE COSTS				
Removal of Line 16 hours x $30/hour x 2 persons	32	manhours	$30	$960
Rental of 70 Ton Crane (Crane @ $200/hr and Rigger @$55/hr) 8 hours @ $255/hour (includes 1 hour mobilization/1 hour demobilization)	8	hours	$255	$2,040
Disposal of lines (macroencapsulation) $500/yard x 20 yards/box x 0.33 Boxes	6.666667	yards	$500	$3,333
Transportation 700 Miles x $2.75/mile x 0.33 boxes	0.33	loads	$1,925	$635
				$6,969
TANK T-8 CLOSURE COSTS				
Removal of residuals (sludge, activated carbon) 1 unit x 16 hours/unit x $30/hour x 3 Persons	48	manhours	$30	$1,440
Disposal of residuals drums 2 x 55 gal drums x $1,000/drum	2	drums	$1,000	$2,000
Tank decontamination 1 tanks x 16 hours/tank x $30/hour x 3 people	16	manhours	$30	$480
Rental of decontamination equipment 2 days x $100/day	2	days	$100	$200
Decontamination of tank containment 24 man hours x $30/hour	24	manhours	$30	$720
Disposal of rinsate at POTW	1	disposal	$1,000	$1,000
One sample of rinsate (plus MS/MSD for QC) will be required for 1 small equipment batch at $1,010/sample (1 batch x 3 samples, metals & organic COCs)	3	samples	$1,010	$3,030
Disassembly of tanks (80 manhours/tank x $50/hr x 5 tanks)	400	manhours	$50	$20,000
Shipment of tanks offsite for scrap metal (5 loads x $565/load)	5	truck loads	$565	$2,825
Supervision and management (includes PPE and incidentals) 40 hours x $50/hour	40	manhours	$50	$2,000
				$33,695
PACKED TOWER SCRUBBER AND SCRUBBER PACKING CLOSURE COSTS				
Removal of residuals (any residual liquids) 1 unit x 16 hours/unit x $30/hour x 3 Persons	48	manhours	$30	$1,440
Disposal of Residuals Drum 1 x 55 gallon drums @ $1,000/drum	1	drums	$1,000	$1,000
Removal of Scrubber Packing 1 unit x 16 hours/unit x $30/hour x 3 Persons	48	manhours	$30	$1,440
Removal of and Demolition of Packed Tower 40 hours/unit x $30/hour x 3 Persons	120	manhours	$30	$3,600
Rental of 70 Ton Crane (Crane @ $200/hr and Rigger @$55/hr) 8 hours @ $255/hour (includes 1 hour mobilization/1 hour demobilization)	8	hours	$255	$2,040
Disposal of Scrubber, Packing, PPE, etc. (macroencapsulation) $500/yard x 20 yards/box x 0.5 Boxes	10	yards	$500	$5,000
Transportation 700 Miles x $2.75/mile x 0.5 boxes	0.5	loads	$1,925	$963
				$15,483
INDUCED DRAFT FAN CLOSURE COSTS				
Removal of Fan 16 hours x $30/hour x 2	16	manhours	$30	$480
Rental of 70 Ton Crane (Crane @ $200/hr and Rigger @$55/hr) 4 hours @ $255/hour (includes 1 hour mobilization/1 hour demobilization)	4	hours	$255	$1,020
Disposal of Fan, PPE, etc. (macroencapsulation) $500/yard x 20 yards/box x 0.5 Boxes	10	yards	$500	$5,000
Transportation 700 Miles x $2.75/mile x 0.5 boxes	0.5	loads	$1,925	$963
				$7,463
SPENT CARBON DEWATERING SCREW CLOSURE COSTS				
Removal of Screw 16 hours x $30/hour x 2	16	manhours	$30	$480
Rental of 70 Ton Crane (Crane @ $200/hr and Rigger @$55/hr) 4 hours @ $255/hour (includes 1 hour mobilization/1 hour demobilization)	4	hours	$255	$1,020
Disposal of Screw, PPE, etc. (macroencapsulation) $500/yard x 20 yards/box x 0.33 Boxes	6.666667	yards	$500	$3,333
Transportation 700 Miles x $2.75/mile x 0.33 boxes	0.33	loads	$1,925	$635
				$5,469

RF-1 Closure Cost Estimate

Date: April 2012

Item/Activity	Number	Units	Cost per unit	Associated Item/Activity Cost
UN-USED DECONTAMINATION WATER				
3 samples of un-used decontamination water (plus MS/MSD for QC) $1,010/sample (5 samples, metals & organic COCs)	5	samples	$1,010	$5,050
				$5,050
SCRAP METAL HANDLING COSTS				
Removal of Scrap Metal and Hauling for Recycling $1,500/trip x 2 trips	2	loads	$1,500	$3,000
				$3,000
SAMPLING LABOR				
5 Sampling events x 8 hr/event x $30/hr	40	manhours	$30	$1,200
				$1,200
PROFESSIONAL ENGINEER CERTIFICATION AND REPORT				
Professional Engineer certification and report	1	report	$4,000	$4,000
				$4,000
Subtotal Closure Costs (All RF-1 Activities)				**$208,406**
Project Management, Engineering, Planning (10%)				**$20,841**
Estimated Total Closure Costs (No Contingency)				**$229,246**
Contingency (10%)				**$22,926**
GRAND TOTAL CLOSURE COST ESTIMATE				**$252,172**

APPENDIX XVII

CLOSURE ACTIVITIES
SAMPLING AND ANALYSIS PLAN
AND
CLOSURE ACTIVITIES
QUALITY ASSURANCE PROJECT PLAN

FOR

SIEMENS INDUSTRY, INC.

PARKER REACTIVATION FACILITY

PARKER, ARIZONA

Revision 2
April 2012

CLOSURE ACTIVITY

SAMPLING AND ANALYSIS PLAN

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List of Acronyms

APC	Air Pollution Control
CRIT	Colorado River Indian Tribes
COC	Chain of Custody
CVAAS	Cold Vapor Atomic Adsorption Spectrometer
DOT	Department of Transportation
EPA	Environmental Protection Agency
IATA	International Air Transportation Association
ICP	Inductively Coupled Plasma Spectrometer
PRG	Preliminary Remediation Goal
PPE	Personal Protective Equipment
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
RFA	Request for Analysis
SW846	Test Methods for Evaluating Solid Waste, Third Edition, November 1986
VOA	Volatile Organic Analysis

1.0 SITE BACKGROUND

Siemens Industry, Inc. (SII) operates a carbon reactivation facility located in the Colorado River Indian Tribes (CRIT) Industrial Park near Parker, Arizona. The facility treats spent activated carbon that has been used by industry, state and federal government agencies, and municipalities for the removal of organic compounds from liquid and vapor phase process waste streams. The spent activated carbon is identified as both hazardous and non-hazardous waste. Spent activated carbon is stored at the facility in containers and in tanks, and is eventually treated (by thermal reactivation) in carbon reactivation unit RF-2, and was formerly managed at the facility in carbon reactivation unit RF-1.

The facility, including RF-1, began construction in 1991 and operation commenced in August 1992. The facility has treated spent activated carbon exclusively during the time of operation. The RF-1 unit was shut down, after wastes were removed, in June of 1996 to allow for the final construction phase and start up of RF-2 in July 1996 to full interim status capacity.

Currently RF-1 does not share any equipment with RF-2 although with a few exceptions, all RF-1 equipment (which includes the reactivation furnace, APC equipment/piping, and fan) remain on site.

1.1 SCOPE OF CLOSURE

Two closure plans have been prepared for the facility. One plan covers the closure of only the RF-1 unit and associated equipment, while the other closure plan covers the remainder of the facility, which includes RF-2, container storage area, waste storage tanks and associated equipment, and the containment areas for all hazardous waste management units (HWMUs). It is anticipated that since RF-1 is inactive, it may be closed prior to closure of the remainder of the facility, which is the reason a separate closure plan for the RF-1 unit was developed.

1.2 SCOPE OF SAMPLING AND ANALYSIS PLAN

The objective of this Sampling and Analysis Plan is to set into place the protocols necessary to determine that equipment cleaned during either the partial closure of the RF-1 unit, or during closure of the complete facility, meet the closure performance standards established in the Closure Plans. An additional objective is to set into place the protocols necessary to establish that the soils underlying the HWMUs meet the closure performance standards established in the RCRA Facility Closure Plan.

Where applicable, sampling and analysis will be performed on the final rinsate of decontaminated equipment and on soil samples from beneath the HWMUs, as defined in the Closure Plans.

Background samples will also be collected from soil and from un-used decontamination water. The analyses of these samples will establish background levels of designated contaminants for comparison to the actual equipment and site soil samples.

2.0 SAMPLING OBJECTIVES

The objectives the activities described in this Sampling and Analysis Plan are to determine that equipment cleaned during the partial closure of the RF-1 unit, and/or the final closure of the facility has been properly cleaned and that contaminants are not present in the final rinse water at levels exceeding the closure performance standards, and that soils underlying the HWMUs do not contain specific contaminants at levels exceeding the closure performance standards. These objectives will be met by collecting and analyzing representative samples from decontamination rinsate, and borings from concrete, asphalt and soil.

Once collected, samples will be analyzed for a list of closure compounds of concern, that covers the range of possible constituents present in the hazardous waste managed at the facility. Attachment 1 lists the closure compounds of concern.

For the assessment of soil contamination, each soil sample will be analyzed for the same group of metals identified in Attachment 1, and will also receive a full scan volatile and semivolatile organic analysis for comparison to EPA Region 9's Preliminary Remediation Goals (PRGs) for Industrial Soil.

3.0 SAMPLE LOCATION AND FREQUENCY

Two types of samples will be collected during closure activities; rinsate and soil. Rinsate samples will be collected from the unused rinse water and from the rinsate collected during the final rinse of equipment being decontaminated. The location of rinsate sampling will be at each piece or each batch of equipment being decontaminated, which include the Carbon Reactivation Unit RF-1, Carbon Reactivation Unit RF-2, Afterburner AB-1, Afterburner AB-2, RF-2 air pollution control equipment, Tank T-8, container storage area equipment, tanks and ancillary equipment. The unused rinse water sample will be collected directly from the rinse water hose.

The rinsate from each piece of equipment or equipment batch will only be sampled once unless the sample collected does not meet the closure performance standards as described in the Closure Plans. If all of the constituents indicated in Section 2 of this Sampling and Analysis Plan meet the closure performance standards, the equipment will be deemed to have been decontaminated for closure purposes. Equipment that requires additional cleaning may be recleaned in the same manner as it was originally cleaned and the final rinsate sampled and analyzed for any contaminant found exceeding the closure performance standards. All equipment not meeting the closure performance standards for any constituent may continue to be cleaned and resampled and analyzed as specified in the Closure Plan, or may be disposed as hazardous waste.

Soil samples will be collected after removal of equipment and decontamination of containment structures. The initial soil sampling locations will be from borings taken at the locations indicated on Figure 3-1, and described below:

- Container Storage Area – 3 locations, 3 depths each.
- Tanks and Ancillary Equipment Area – 7 locations, 3 depths each.
- RF-1 and RF-2 Process Area – 3 locations, 3 depths each.

Sampling locations and depths were selected by SII and the USEPA Project Manager (Mr. Mike Zabaneh) as being representative of those areas potentially most affected by facility operations. Soil samples will be collected at a series of depths starting just below the concrete slab. Shallow samples will be collected using a Geoprobe direct push method or hand-auger, while deeper borings will be drilled with a larger sonic or hollow stem auger rig. After the samples are collected, each boring will be backfilled with grout.

Background soil samples will also be collected from three separate locations (at 3 depths each) as shown on Figure 3-2. The locations are outside of the facility's operational areas and will represent constituent concentrations that have not been impacted by site operations. The results of these soil samples will be used in the development of metals closure performance standards for the site.

Figure 3-1. Closure Plan Sample Locations

(Following Page)

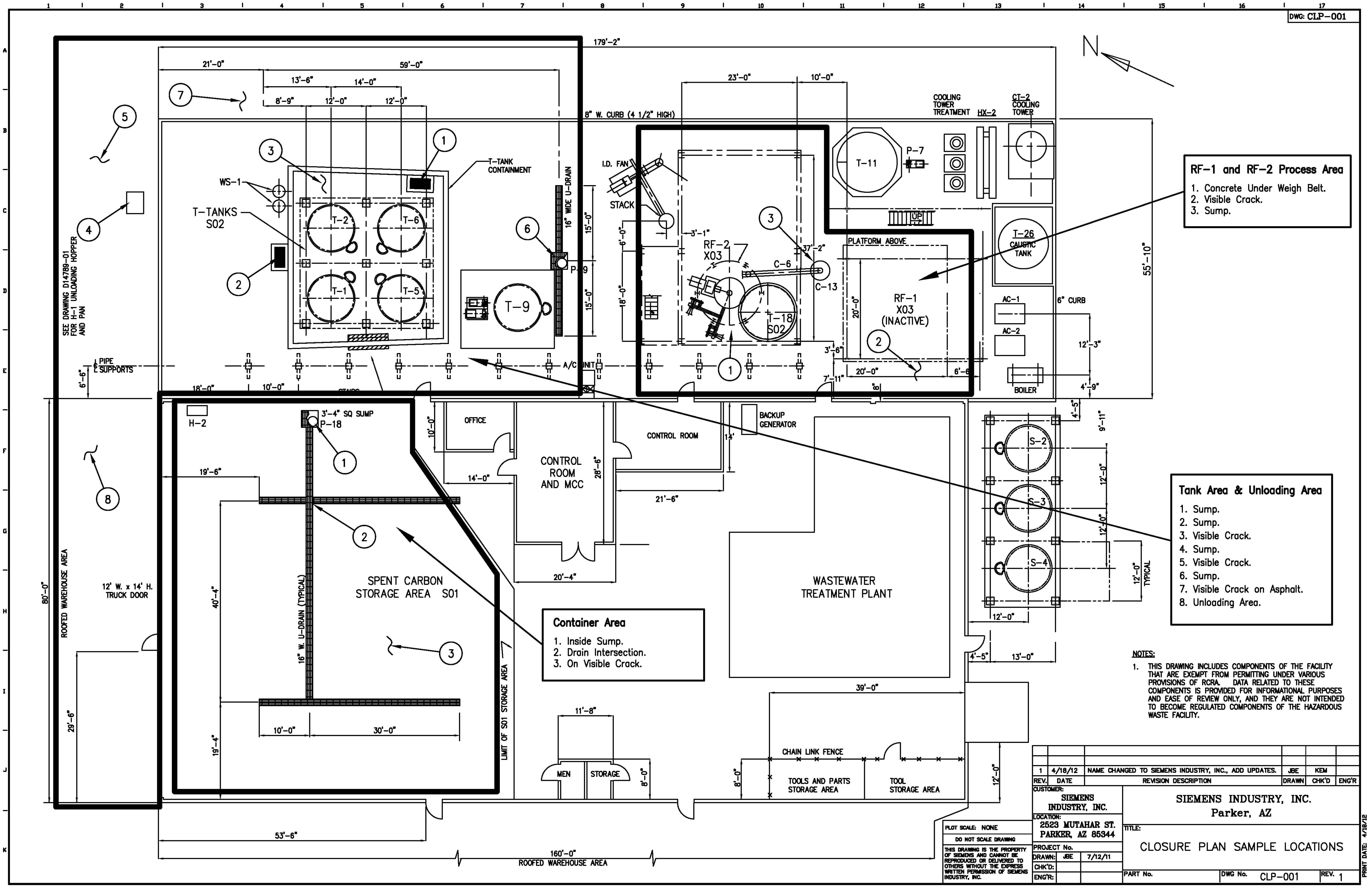
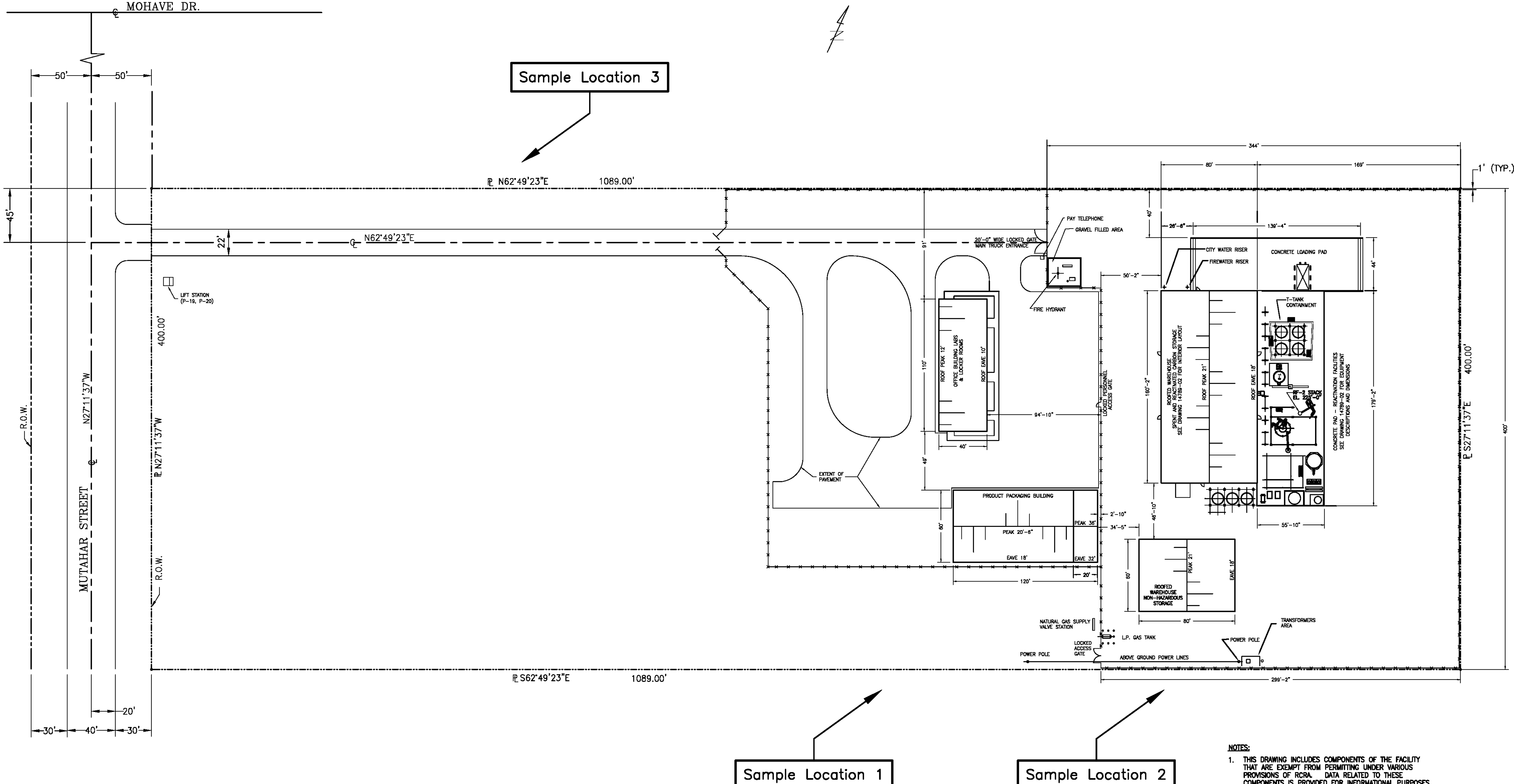

DWG: CLP-001
179'-2"
21'-0"
59'-0"
13'-6"
14'-0"
8'-9"
12'-0"
12'-0"
23'-0"
10'-0"
8" W. CURB (4 1/2" HIGH)
COOLING TOWER TREATMENT
HX-2
CT-2 COOLING TOWER
T-TANK CONTAINMENT
WS-1
T-TANKS S02
T-2
T-6
T-1
T-5
T-9
P-9
16" WIDE U-DRAIN
I.D. FAN
STACK
RF-2 X03
C-6
C-13
T-18 S02
T-11
P-7
T-26 CAUSTIC TANK
PLATFORM ABOVE
RF-1 X03 (INACTIVE)
AC-1
AC-2
6" CURB
BOILER
55'-10"
12'-3"
4'-9"
SEE DRAWING D14789-01 FOR H-1 UNLOADING HOPPER AND FAN
PIPE SUPPORTS
A/C UNIT
H-2
3'-4" SQ SUMP
P-18
OFFICE
CONTROL ROOM AND MCC
CONTROL ROOM
BACKUP GENERATOR
WASTEWATER TREATMENT PLANT
S-2
S-3
S-4
12'-0" TYPICAL
SPENT CARBON STORAGE AREA S01
16" W. U-DRAIN (TYPICAL)
LIMIT OF S01 STORAGE AREA
ROOFED WAREHOUSE AREA
12' W. x 14' H. TRUCK DOOR
80'-0"
29'-6"
40'-4"
19'-4"
19'-6"
10'-0"
30'-0"
53'-6"
160'-0"
ROOFED WAREHOUSE AREA
MEN
STORAGE
CHAIN LINK FENCE
TOOLS AND PARTS STORAGE AREA
TOOL STORAGE AREA
39'-0"
11'-8"
RF-1 and RF-2 Process Area
1. Concrete Under Weigh Belt.
2. Visible Crack.
3. Sump.
Tank Area & Unloading Area
1. Sump.
2. Sump.
3. Visible Crack.
4. Sump.
5. Visible Crack.
6. Sump.
7. Visible Crack on Asphalt.
8. Unloading Area.
Container Area
1. Inside Sump.
2. Drain Intersection.
3. On Visible Crack.
NOTES:
1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.
1 | 4/18/12 | NAME CHANGED TO SIEMENS INDUSTRY, INC., ADD UPDATES. | JBE | KEM
REV. DATE REVISION DESCRIPTION DRAWN CHK'D ENG'R
PLOT SCALE: NONE
DO NOT SCALE DRAWING
THIS DRAWING IS THE PROPERTY OF SIEMENS AND CANNOT BE REPRODUCED OR DELIVERED TO OTHERS WITHOUT THE EXPRESS WRITTEN PERMISSION OF SIEMENS INDUSTRY, INC.
CUSTOMER: SIEMENS INDUSTRY, INC.
LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344
PROJECT No.
DRAWN: JBE 7/12/11
CHK'D:
ENG'R:
SIEMENS INDUSTRY, INC.
Parker, AZ
TITLE:
CLOSURE PLAN SAMPLE LOCATIONS
PART No.
DWG No. CLP-001
REV. 1
PRINT DATE: 4/18/12

Figure 3-2. Closure Plan – Location of Background Soil Samples

(Following Page)

DWG: CLP-002



NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

REV.	DATE	REVISION DESCRIPTION	DRAWN	CHK'D	ENG'R

PLOT SCALE: 1"=40'

DO NOT SCALE DRAWING

CUSTOMER: SIEMENS INDUSTRY, INC.

LOCATION: 2523 MUTAHAR ST. PARKER, AZ 85344

PROJECT No.		
DRAWN:	JBE	7/13/11
CHK'D:		
ENG'R:		

SIEMENS INDUSTRY, INC.
Parker, AZ

TITLE:

CLOSURE PLAN – LOCATION OF BACKGROUND SOIL SAMPLES

PART No. | DWG No. CLP–002 | REV. 0

PRINT DATE: 4/19/12

4.0 SAMPLING EQUIPMENT AND PROCEDURES

4.1 SAMPLE RATIONAL

Samples for all equipment to be decontaminated will be collected using the same type of sampling equipment and the same procedures. The samples will be collected using composite sampling as allowed in the Draft of Guidance of Incinerator Closure, June 29, 1990 in the section entitled "Certification of Adequate Closure." These composite samples are also collected in accordance with the guidance provided in EPA QA/G-5S Guidance for Choosing a Sampling Design for Environmental Data Collection, December 2002.

Samples from large equipment, such as the carbon reactivation units, afterburners, and tanks, will be collected by compositing eight aliquots of the final rinse from four locations on the equipment (at 90º intervals) at two different elevations (at approximately ⅓ and ⅔ of the equipment height) within each piece of equipment (8 total samples aliquots). This will ensure that a "representative" sample is obtained. For samples from small equipment batches, eight aliquots will be collected during the course of the final rinse operation, and composited to form a single sample per equipment batch.

Samples of soils will be collected using the same type of equipment and the same procedures. Soil samples will be collected at a series of depths starting just below the concrete slab (if present), or just below the surface (if no concrete slab is present).. Shallow samples will be collected using a Geoprobe direct push method or hand-auger, while deeper borings will be drilled with a larger sonic or hollow stem auger rig.

4.2 SAMPLING EQUIPMENT

Sampling equipment will include the dedicated equipment for each piece of equipment or location being sampled. There will be no need for decontamination of the equipment since there will be no cross contamination between sample locations. Sampling equipment will include:

- 500 ml glass beaker or wide mouth glass jar;
- 1 gallon or 4 liter wide mouth amber glass jar;
- 1 liter amber glass sample bottles;
- 500 ml amber glass sample bottles;
- 40 ml VOA vials (for liquids);
- Stainless steel bowl;
- Stainless steel scoop or spoon;
- 125 ml wide mouth VOA jars (for soils); and
- Personal protective equipment (PPE) as required by the site Health and Safety Plan.

Once use of the sampling equipment is complete, the equipment, with the exception of the sample bottle transported to the laboratory for analysis, will be collected in a designated area for off-site disposal.

4.3 EQUIPMENT SAMPLING PROCEDURE

All sampling will be performed in a safe manner and will follow all applicable site Health and Safety Plan. Additionally, the samplers will follow Confined Space Entry Program requirements when sampling in a space considered a confined space by this program. The samplers will similarly follow Lock-Out/Tag-Out program requirements, as necessary.

4.3.1 Large Equipment

Large equipment is defined, for purposes of this Sampling and Analysis Plan, as equipment which can be entered to collect samples of wash water from interior surfaces. In accordance with the Closure Plans, these equipment items will be visually inspected to determine if the closure performance standards are met. Sampling of the rinsate from large equipment items is not anticipated to be necessary to demonstrate compliance with the closure performance standards, however a procedure is presented here in case visual inspection is not adequate. Sample collection from these units will commence only if a visual inspection of the unit has been completed and it has been determined that the unit requires rinsate sampling.

Eight sample aliquots will be collected in a grid fashion, following the protocol described in Figure 4-1. Four approximately 500 ml samples will be collected at ⅓ the total height of the unit at 90º intervals along the interior wall and four approximately 500 ml samples will be collected at ⅔ the total height of the unit at 90º intervals along the interior wall. These aliquots will be combined to form a single representative sample of the decontaminated surface of the unit. The sample will then be split for the various analyses to be performed.

4.3.2 Small Equipment Batches

Small equipment is defined, for purposes of this Sampling and Analysis Plan, as equipment which cannot be entered to collect samples of wash water from interior surfaces. Sample collection from these items will commence once a visual inspection of the equipment has been completed and the equipment is determined visually clean.

Eight approximately 500 ml sample aliquots will be collected as the final rinse water is being collected from the equipment decontamination batch. following the protocol described in Figure 4-1. Following sample aliquot collection, they will be combined to form a single representative sample of the decontaminated equipment. The sample will then be split for the various analyses to be performed.

4.3.3 Wash Water

A wash water sample will be collected directly from the wash water source on-site into three 1 liter amber glass sample bottles, a 500 ml amber glass sample bottle, and two VOA vials and labeled as indicated in the Quality Assurance Project Plan (QAPP).

4.4 SOIL SAMPLING PROCEDURE

All sampling will be performed in a safe manner and will follow all applicable site Health and Safety Plan. Soil samples will be collected from the sampling device (geoprobe, split spoon, etc.) and placed into a large bowl. The sampling personnel will use a stainless steel spoon to thoroughly mix the sample and then will fill 3 500 ml wide mouth jars (for metals and semivolatile organic analysis) and 2 125 ml wide mouth jars (for volatile organic analysis), according to the procedure described in Figure 4-2.

Figure 4-1. Rinse Water Composite Sampling Method

Sample name:	Final rinse water sample
Sampler:	Sample Custodian or designee
Location:	Each unit being decontaminated Carbon Reactivation Units RF-1 and RF-2 Afterburners AB-1 and AB-2 APCDs, Fans, and Stacks Tanks Unused wash water
Equipment:	500 ml glass beaker or wide mouth glass jars 1 gallon or 4 liter wide mouth amber glass jar with Teflon lined lids 1 liter amber glass bottles with Teflon lined lids 500 ml amber glass bottles with Teflon lined lids Amber glass VOA vials (40-mL) with plastic screw caps and Teflon septa Personal Protective Equipment as required
Frequency:	During final rinse
Procedure Summary:	The glass beaker or wide mouth glass jar is used to collect eight sample aliquots of the final rinse as it is being performed into a one gallon or four liter wide moth glass jar ensuring that the compositing jar is securely sealed in between the introduction of each aliquot collected. Once sampling is complete, the jar is sealed and the grab sample mixed and transferred into three 1 liter amber glass sample bottles, one 500 ml amber glass sample bottle, and two VOA vials and labeled as indicated in the Quality Assurance Project Plan. Any residual composited sample will be added to the other decontamination fluids and treated through the in-house wastewater treatment system. At the conclusion of sampling, the Sample Custodian accepts custody of the samples and record numbers and collection data in a field logbook. Samples are placed on ice (if required) in dedicated shipping containers and stored in a sample storage area separate from the container supply area.

Figure 4-2. Soil Sampling Method

Sample name:	Soil sample
Sampler:	Sample Custodian or designee
Location:	Each soil borehole (various depths)
Equipment:	Geoprobe, split spoon, etc. Large stainless steel bowl Stainless steel scoop of spoon 500 ml wide mouth glass jars with Teflon lined lids Amber glass VOA jars (125 mL) with Teflon lined lids Personal Protective Equipment as required
Frequency:	Various depths at each borehole
Procedure Summary:	As each sampling depth is reached, a Geoprobe, split spoon, or other appropriate sampling device is used to collect a soil sample of sufficient size to almost fill the large stainless steel bowl. The sampler will mix the sample in the bowl using a stainless steel spoon or scoop to ensure uniformity. Once sampling is complete, the portions are transferred into three 500 ml wide mouth amber glass sample bottles, and two 125 ml wide mouth amber glass VOA jars and labeled as indicated in the Quality Assurance Project Plan. Any residual composited sample will be added to the other borehole cuttings at the site. At the conclusion of sampling, the Sample Custodian accepts custody of the samples and record numbers and collection data in a field logbook. Samples are placed on ice (if required) in dedicated shipping containers and stored in a sample storage area separate from the container supply area.

5.0 SAMPLE HANDLING AND ANALYSIS

5.1 SAMPLE HANDLING AND CUSTODY

A sample will be considered to be in the custody of a person if it is in his or her possession, in his or her sight, or secured by that person in an approved location accessible only to authorized personnel.

The sampling contractor or laboratory will prepare sampling media, reagents, and sample containers according to the specifications of the methods as described in Section 2 and will ship them to the site in sealed containers.

During sampling and until the samples arrive at the analytical laboratory; the samples are the responsibility of the Sample Custodian. When overnight couriers are utilized, the airbill will serve to document the transfer of custody from the Sample Custodian to the courier. The courier's air bill becomes part of the chain of custody record. Upon transfer of the samples from the courier to the analytical laboratory, sample custody will be maintained by the analytical laboratory performing the analysis.

Collected samples will be shipped from the site to the laboratory in sealed containers with request for analysis (RFA) and chain-of-custody (COC) forms. Examples of acceptable RFA and COC forms are provided as Figures 5-1 and 5-2, respectively.

Upon receipt of samples at the laboratory, the receiver will accept custody for the shipment by an exchange of signatures with the delivery agent. The shipping containers will be opened by the Laboratory Analysis Coordinator or his designee and inspected. The container contents will be verified against the accompanying COC. Any damage to the contents of the shipping container or deviations from the original shipment documents will be noted on the COC and the Registered Professional Engineer overseeing the project will be notified. Transfer of custody within the laboratory is addressed in the Laboratory's QA manual. Upon completion of analysis, samples will be maintained at the laboratory under COC until they are released for proper disposal.

5.2 SAMPLE LABELING

An example sample label format is presented in Figure 5-3. Each sample container will be labeled to show the source of the sample; the project identification; sampler's initials; laboratory to which the sample will be shipped; an unique alpha-numeric sample number; date and time; sample description; test number; and run number.

Project samples will be tracked via the assigned unique alpha-numeric sample numbers. The sample number will appear on the sample label, the RFA, and the COC. The alpha-numeric system for sample identification for this project is presented in Figure 5-4. The numbering system presented will result in unique numbers being assigned to every sample.

Figure 5-1. Example Request For Analysis Form

REQUEST FOR ANALYSIS

Focus Environmental, Inc.

Client: ___________________

Location: _________________

Description: _________________

Project No.: _________________

Sample Identification

T8-MET-1

Test No.: 1

Run No.: 1

Description:

Tank T8 Metals

Lab: Analytical Laboratory

Container: 500 ml amber glass

Number of Containers: 1

Requested Preparation/Analyses:	**Preparation Method:**
Metals – Mercury – Liquids CVAAS (SW846-7470)	N/A
Metals – Multiple (Specify) ICP (SW846-6010)	Acid Digestion – Stack Gas Multi-Metals

Preservation

None required

Hold Time

180 days/28 days for Hg

Special Instructions

Analyze for metals: Sb, As, Ba, Be, Cd, total Cr, Pb, Hg, Ni, Se, Ag, Tl, and V.

Figure 5-2. Example of Chain of Custody Form

Custody Record

Focus Environmental, Inc.

Client:

Location:

Description:

Project No.:

Note: This form is to be accompanied by a "Request for Analysis" which specifies the preparation and analysis to be performed for each sample.

Sample ID	Description	Container	No.	Grab/Comp	Date	Time	Remarks
RF-MET-1	Carbon Reactivation Unit RF-1 metals sample	500 ml amber glass bottle		Comp.	01/01/01	01:00	

Sampler: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)

Figure 5-3. Example Sample Label Format

CLIENT:
PROJECT:
SAMPLER:
LAB:
SAMPLE NO.:
DATE: TIME:
DESCRIPTION:
CONTAINER __ of __

Figure 5-4. Planned Sample Identification Code

RF- MET- 1

<u>Sample Number</u>

1, 2, 3, … etc.

<u>Sample Type</u>

MET	Total Metals
VOA	Volatile Organics
SVOA	Semivolatile Organics
OCP	Organophosphorus Compounds
ACH	Archive

<u>Sample Location</u>

RF1	Carbon Reactivation Unit RF-1
T8	Tank T-8
AB1	Afterburner AB-1
BG	Background
WW	Wash Water

5.3 REQUEST FOR ANALYSIS/CHAIN OF CUSTODY

The Sample Custodian will complete the COC and RFA for every sample. The samples will be preserved as needed and secured by the Sample Custodian and must remain in his or her possession or secured in a location accessible only to authorized personnel until custody is transferred to a courier for delivery to the laboratory.

Each sample container will be clearly identified using standard container labels. It is imperative that information on the COC form, RFA form, and the container label match in every respect. Field samples may be transported directly to the analytical laboratory by the test management or the sampling contractor. If the samples are shipped via overnight courier, an individual trained in Federal Department of Transportation (DOT) and International Air Transportation Association (IATA) regulations will package the samples to assure compliance with the applicable portions of the regulations.

5.4 SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES

Table 5-1 shows the appropriate containers, preservation, and holding times for all samples to be collected during the closure activities.

Table 5-1. Sample Containers, Preservation, and Holding Times

Parameter	Sample Name	Containers	Preservation	Maximum Holding Time
Metals	Final Rinse Water	Glass bottle, Teflon lined cap	HNO_3 pH $\leq$ 2	180 days/28 days for Hg
	Soils	Glass wide mouth jar; Teflon lined lid	None	180 days/28 days for Hg
Volatile Organic Compounds	Final Rinse Water	VOA vials	Chill to 4 $\pm$2ºC	14 days
	Soils	Glass wide mouth jar; Teflon lined lid	Chill to 4 $\pm$2ºC	14 days
Organophosphorus Compounds	Final Rinse Water	Glass bottle, Teflon lined cap	Chill to 4 $\pm$2ºC	14 days to extraction and 40 days from extraction to analysis
Semivolatile Organic Compounds	Final Rinse Water	Glass bottle, Teflon lined cap	Chill to 4 $\pm$2ºC	14 days to extraction and 40 days from extraction to analysis
	Soils	Glass wide mouth jar; Teflon lined lid	Chill to 4 $\pm$2ºC	14 days to extraction and 40 days from extraction to analysis

5.5 SAMPLE ANALYSIS

Analytical procedures and methods are summarized in Table 5-2, and described in the Closure Quality Assurance Project Plan - QAPP. Individual analytical methods are described in detail in the QAPP. During the course of sampling and analysis, situations may arise that require modifying the specific sampling or analytical procedures included or referenced in the Closure Plans. The laboratory SOPs, which include a number of procedures for special circumstances, will be followed. In cases where the laboratory finds it necessary to make adjustments to the analysis methods, the changes will be documented following the corrective action procedures noted in the QAPP. The Professional Engineer must approve any such changes.

Table 5-2. Analytical Procedures and Methods

Sample Name	Analysis	Number of Samples	Preparation Method	Analytical Method[a]
Carbon Reactivation Unit RF-1 Small equipment batches	Total Metals[b]	2	Acid digestion (SW846-3010A or 3015 and 7470A)	ICP (SW846-6010B) and CVAAS (SW846-7470A)
Tank T-8	Total Metals[b]	1	Acid digestion (SW846-3010A or 3015 and 7470A)	ICP (SW846-6010B) and CVAAS (SW846-7470A)
	Volatiles[c]	1	Purge and trap	Volatile Organics (SW846-8260B)
	Organophosphorus Compounds[d]	1	Solvent extraction (SW846-3500 Series)	Organophosorus Compounds (SW846-8141A)
	Semivolatiles[e]	1	Solvent extraction (SW846-3500 Series)	Semivolatile Organics (SW846-8270C)
Carbon Reactivation Unit RF-2 Small equipment batches	Total Metals[b]	3	Acid digestion (SW846-3010A or 3015 and 7470A)	ICP (SW846-6010B) and CVAAS (SW846-7470A)

Table 5-2. Analytical Procedures and Methods (Continued)

Sample Name	Analysis	Number of Samples	Preparation Method	Analytical Method[a]
Container area equipment final rinsate	Total Metals[b]	1	Acid digestion (SW846-3010A or 3015 and 7470A)	ICP (SW846-6010B) and CVAAS (SW846-7470A)
	Volatiles[c]	1	Purge and trap	Volatile Organics (SW846-8260B)
	Organophosphorus Compounds[d]	1	Solvent extraction (SW846-3500 Series)	Organophosorus Compounds (SW846-8141A)
	Semivolatiles[e]	1	Solvent extraction (SW846-3500 Series)	Semivolatile Organics (SW846-8270C)
Tank T-1 and Ancillary Equipment	Total Metals[b]	1	Acid digestion (SW846-3010A or 3015 and 7470A)	ICP (SW846-6010B) and CVAAS (SW846-7470A)
	Volatiles[c]	1	Purge and trap	Volatile Organics (SW846-8260B)
	Organophosphorus Compounds[d]	1	Solvent extraction (SW846-3500 Series)	Organophosorus Compounds (SW846-8141A)
	Semivolatiles[e]	1	Solvent extraction (SW846-3500 Series)	Semivolatile Organics (SW846-8270C)
Tank T-2 and Ancillary Equipment	Total Metals[b]	1	Acid digestion (SW846-3010A or 3015 and 7470A)	ICP (SW846-6010B) and CVAAS (SW846-7470A)
	Volatiles[c]	1	Purge and trap	Volatile Organics (SW846-8260B)
	Organophosphorus Compounds[d]	1	Solvent extraction (SW846-3500 Series)	Organophosorus Compounds (SW846-8141A)
	Semivolatiles[e]	1	Solvent extraction (SW846-3500 Series)	Semivolatile Organics (SW846-8270C)
Tank T-5 and Ancillary Equipment	Total Metals[b]	1	Acid digestion (SW846-3010A or 3015 and 7470A)	ICP (SW846-6010B) and CVAAS (SW846-7470A)
	Volatiles[c]	1	Purge and trap	Volatile Organics (SW846-8260B)
	Organophosphorus Compounds[d]	1	Solvent extraction (SW846-3500 Series)	Organophosorus Compounds (SW846-8141A)
	Semivolatiles[e]	1	Solvent extraction (SW846-3500 Series)	Semivolatile Organics (SW846-8270C)

Tank T-6 and Ancillary Equipment	Total Metals[b]	1	Acid digestion (SW846-3010A or 3015 and 7470A)	ICP (SW846-6010B) and CVAAS (SW846-7470A)
	Volatiles[c]	1	Purge and trap	Volatile Organics (SW846-8260B)
	Organophosphorus Compounds[d]	1	Solvent extraction (SW846-3500 Series)	Organophosorus Compounds (SW846-8141A)
	Semivolatiles[e]	1	Solvent extraction (SW846-3500 Series)	Semivolatile Organics (SW846-8270C)
Tank T-18 and Ancillary Equipment	Total Metals[b]	1	Acid digestion (SW846-3010A or 3015 and 7470A)	ICP (SW846-6010B) and CVAAS (SW846-7470A)
	Volatiles[c]	1	Purge and trap	Volatile Organics (SW846-8260B)
	Organophosphorus Compounds[d]	1	Solvent extraction (SW846-3500 Series)	Organophosorus Compounds (SW846-8141A)
	Semivolatiles[e]	1	Solvent extraction (SW846-3500 Series)	Semivolatile Organics (SW846-8270C)
Wash Water (Unused)	Total Metals[b]	3	Acid digestion (SW846-3010A or 3015 and 7470A)	ICP (SW846-6010B) and CVAAS (SW846-7470A)
	Volatiles[c]	3	Purge and trap	Volatile Organics (SW846-8260B)
	Organophosphorus Compounds[d]	3	Solvent extraction (SW846-3500 Series)	Organophosorus Compounds (SW846-8141A)
	Semivolatiles[e]	3	Solvent extraction (SW846-3500 Series)	Semivolatile Organics (SW846-8270C)
Soil (Container area)	Total Metals[b]	9	Acid digestion (SW846-3010A or 3015 and 7470A)	ICP (SW846-6010B) and CVAAS (SW846-7470A)
	Volatiles[c]	9	Purge and trap	Volatile Organics (SW846-8260B)
	Organophosphorus Compounds[d]	9	Solvent extraction (SW846-3500 Series)	Organophosorus Compounds (SW846-8141A)
	Semivolatiles[e]	9	Solvent extraction (SW846-3500 Series)	Semivolatile Organics (SW846-8270C)
Soil (Tanks and ancillary equipment area)	Total Metals[b]	21	Acid digestion (SW846-3010A or 3015 and 7470A)	ICP (SW846-6010B) and CVAAS (SW846-7470A)
	Volatiles[c]	21	Purge and trap	Volatile Organics (SW846-8260B)

	Organophosphorus Compounds[d]	21	Solvent extraction (SW846-3500 Series)	Organophosorus Compounds (SW846-8141A)
	Semivolatiles[e]	21	Solvent extraction (SW846-3500 Series)	Semivolatile Organics (SW846-8270C)
Soil (RF-1/RF-2 process area)	Total Metals[b]	9	Acid digestion (SW846-3010A or 3015 and 7470A)	ICP (SW846-6010B) and CVAAS (SW846-7470A)
	Volatiles[c]	9	Purge and trap	Volatile Organics (SW846-8260B)
	Organophosphorus Compounds[d]	9	Solvent extraction (SW846-3500 Series)	Organophosorus Compounds (SW846-8141A)
	Semivolatiles[e]	9	Solvent extraction (SW846-3500 Series)	Semivolatile Organics (SW846-8270C)
Soil (Background)	Total Metals[b]	9	Acid digestion (SW846-3010A or 3015 and 7470A)	ICP (SW846-6010B) and CVAAS (SW846-7470A)
	Volatiles[c]	9	Purge and trap	Volatile Organics (SW846-8260B)
	Organophosphorus Compounds[d]	9	Solvent extraction (SW846-3500 Series)	Organophosorus Compounds (SW846-8141A)
	Semivolatiles[e]	9	Solvent extraction (SW846-3500 Series)	Semivolatile Organics (SW846-8270C)

[a] "SW846" refers to Test Methods for Evaluating Solid Waste, Third Edition, November 1986, and Updates. In all cases the most recent versions of the analytical methods will be used.
[b] Metal analytes are identified in Attachment 1.
[c] Volatile compound analytes are identified in Attachment 1.
[d] Organophosphorus compoundanalytes are identified in Attachment 1.
[e] Semivolatile Compound analytes are identified in Attachment 1.

ATTACHMENT 1

LIST OF CLOSURE COMPOUNDS OF CONCERN

List of Closure Compounds of Concern

CAS Number	Name	Description	Analysis
100-41-4	Ethylbenzene	Ethylbenzene	8260
100-42-5	Styrene	Styrene	8260
103-65-1	n-propylbenzene	n-propylbenzene	8260
105-67-9	2,4-Dimethylphenol	2,4-Dimethylphenol	8270
106-44-5	4-Methylphenol	4-Methylphenol	8270
106-46-7	1,4, -dichlorobenzene	1,4,-dichlorobenzene	8270
106-93-4	1,2,dibromoethane	Ethylene Dibromide (EDB)	8260
107-06-2	1,2,dichloroethane	EDC	8260
107-13-1	acrylonitrile	acrylonitrile	8260
108-05-4	vinyl acetate	vinyl acetate	8260
108-88-3	Toluene	Toluene	8260
108-90-7	Chlorobenzene	Chlorobenzene	8260
108-95-2	Phenol	Phenol	8270
109-99-9	tetrahydrofuran	tetrahydrofuran	8260
111-44-4	Bis(2-chloroethyl)ether	Bis(2-chloroethyl)ether	8270
117-81-7	bis (2-ethylhexyl) phthalate	bis (2-ethylhexyl) phthalate	8270
120-12-7	Anthracene	Anthracene	8270
120-82-1	1,2,4-Trichlorobenzene	1,2,4-Trichlorobenzene	8270
123-91-1	1,4-Dioxane	1,4-Dioxane	8270
124-48-1	Dibromochloromethane	Dibromochloromethane	8260
127-18-4	Tetrachloroethylene	PCE	8260
131-11-3	Demethyl phthalate	Demethyl phthalate	8270
132-64-9	Dibenzofuran	Dibenzofuran	8270
1330-20-7	Xylene	xylene	8260
1912-24-9	Atrazine	2-chloro-4-(ethylamino)-6-(isopropylamino)-	8141
121-75-5	Malathion	Malathion	8141
206-44-0	Fluoranthene	Fluoranthene	8270
208-96-8	Acenaphthylene	Acenaphthylene	8270
218-01-9	Chrysene	Chrysene	8270
309-00-2	Aldrin	Aldrin	8270
319-84-6	Alpha-BHC	Alpha-Hexachlorocyclohexane	8270
78-59-1	Isophorone	Isophorone	8270
51-28-5	2,4,Dinitrophenol	2,4,-Dinitrophenol	8270
541-73-1	1,3-dichlorobenzene	1,3-dichlorobenzene	8270
56-23-5	Carbon Tetrachloride	Carbon Tetrachloride	8260
56-55-3	Benz(a)anthracene	1	8270
57-74-9	Chlordane	Chlordane	8270
58-89-9	Lindane	Lindane	8270
591-78-6	2-Hexanone	2-Hexanone	8260
62-53-3	Aniline	Aniline	8270
67-64-1	acetone	acetone	8260
67-66-3	Chloroform	Chloroform	8260
71-43-2	Benzene	Benzene	8260
71-55-6	1,1,1trichloroethane	1,1,1trichloroethane	8260
72-20-8	Endrin	Endrin	8270
72-43-5	Methoxychlor	Methoxychlor	8270
72-54-8	4.4'-DDD		8270
7429-90-5	Aluminum	Fume or Dust Only	6010

Note: Most recent version of analytical methods will be used.

List of Closure Compounds of Concern

CAS Number	Name	Description	Analysis
7439-92-1	Lead	Lead	6010
7439-96-5	Manganese	Manganese	6010
7439-97-6	Mercury	Mercury	7470
7440-02-0	Nickel	Nickel	6010
7440-22-4	Silver	Silver	6010
7440-36-0	Antimony	Antimony	6010
7440-38-2	Arsenic	Arsenic	6010
7440-39-3	Barium	barium	6010
7440-41-7	Beryllium	Beryllium	6010
7440-43-9	Cadmium	Cadmium	6010
7440-46-4	Copper	Copper	6010
7440-47-3	Chromium	Chromium	6010
7440-48-4	Cobalt	Cobalt	6010
7440-62-2	Vanadium	Vanadium	6010
7440-66-6	Zinc	Zinc	6010
74-83-9	Bromomethane	Bromomethane	8260
74-87-3	chloromethane	methyl chloride	8260
75-00-3	chloroethane	chloroethane	8260
75-09-2	Methylene chloride	Methylene Chloride	8260
75-15-0	Carbon Disulfide	Carbon Disulfide	8260
75-25-2	Bromoform	Bromoform	8260
75-27-4	Bromodichloromethane	Bromodichloromethane	8260
75-34-3	1,1dichlorethane	1,1,dichloroethane	8260
75-35-4	1,1dichloroethene	1,1dichloroethene	8260
75-69-4	Trichlorofluoromethane		8260
75-71-8	Dichlorodifluoromethane	Dichlorodifluoromethane	8260
76-13-1	Freon 113	Freon 113	8260
129-00-0	Pyrene	Pyrene	8270
76-44-8	Heptachlor	Heptachlor	8270
78-87-5	1,2,dichloropropane	1,2,dichloropropane	8260
78-93-3	Methyl ethyl ketone	MEK	8260
79-00-5	1,1,2-Trichloroethane	1,1,2-Trichloroethane	8260
79-01-6	Trichloroethylene	TCE	8260
79-34-5	1,1,2,2,-Tetrachloroethane	1,1,2,2,-Tetrachloroethane	8260
8001-35-2	Toxaphene	Toxaphene	8270
80-62-6	Methyl methacrylate	Methyl methacrylate	8260
82870-81-3	Thallium	Thallium	6010
83-32-9	Acenaphthene	Acenaphthene	8270
84-66-2	Diethylphthalate	Diethylphthalate	8270
84-74-2	Dibutyl Phthalate	Dibutyl Phthalate	8270
85-01-8	Phenanthrene	Phenanthrene	8270
86-73-7	Fluorene	Fluorene	8270
87-68-3	1,3 - Hexachlorobutadiene	1,3-Hexachlorobutadiene	8270
87-86-5	Pentachlorophenol	PCP	8270
88-74-4	2-Nitroaniline	2-Nitroaniline	8270
91-20-3	Naphthalene		8270
91-57-6	2-Methylnaphthalene	2-Methylnaphthalene	8270
95-47-6	o-Xylene	o-Xylene	8260

Note: Most recent version of analytical methods will be used.

List of Closure Compounds of Concern

CAS Number	Name	Description	Analysis
95-48-7	2-Methylphenol	2-Methylphenol	8270
95-50-1	1,2, dichlorobenzene	1,2 dichlorobenzene	8270
95-63-6	1,2,4,trimethylbenzene	1,2,4,trimethylbenzene	8260
96-18-4	1,2,3,trichloropropane	1,2,3,trichloropropane	8260
98-86-2	Acetophenone	Acetophenone	8270
98-95-3	Nitrobenzene	Nitrobenzene	8270
99-09-2	3-Nitroaniline	3-Nitroaniline	8270

Note: Most recent version of analytical methods will be used.

CLOSURE ACTIVITIES

QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN APPROVAL FORM AND DISTRIBUTION LIST

Project: SII – Parker, Arizona: Closure for Carbon Reactivation Facility

Approved Plan Submittal Date: ______________

Scheduled Closure Start Date: ______________

<u>Key Test Personnel Approvals and Distribution</u>

Name/Function/Organization	Signature	Date
Plant Manager		
Registered Professional Engineer		
Quality Assurance Officer		
Sample Custodian		
Laboratory Analysis Coordinator – Lab 1		
Laboratory Analysis Coordinator – Lab 2		

1. The individuals above have received, read, and agreed to the appropriate information pertaining to their project responsibilities listed and provided in this QAPP.
2. The sampling and analytical methods listed in this document will be followed and conducted as referenced.

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List of Acronyms

AAS	Atomic Absorption Spectrometry
APC	Air pollution control
BFB	4-Bromofluorobenzene
CAR	Corrective Action Request
CCC	Calibration Check Compounds
CCV	Continuing Calibration Verification
CLP	Contract Laboratory Program
COC	Chain of Custody
CRIT	Colorado River Indian Tribes
CVAAS	Cold Vapor Atomic Adsorption Spectrometry
DOT	Department of Transportation
EPA	Environmental Protection Agency
FPD	Flame Photometric Detector
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
GFAAS	Graphite Furnace Atomic Absorption Spectrometry
IATA	International Air Transportation Association
ICB	Initial Calibration Blank
ICP	Inductively Coupled Plasma Atomic Emission Spectroscopy
ICV	Initial Calibration Verification
LAC	Laboratory Analysis Coordinator
LCS	Laboratory Control Sample
MDL	Method Detection Limit
ml	Milliliter
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NPD	Nitrogen-Phosphorus Detector

QA	Quality Assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	Quality Control
RDL	Reliable Detection Limit
RFA	Request for Analysis
RPD	Relative Percent Difference
RRF	Relative Response Factor
RSD	Relative Standard Deviation
RT	Retention Time
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
SPCC	System Performance Check Compound
SQL	Sample Quantitation Limit
VOA	Volatile Organic Analysis

1.0 PROJECT DESCRIPTION

Siemens Industry, Inc.. (SIISII) operates a carbon reactivation facility located in the Colorado River Indian Tribes (CRIT) Industrial Park near Parker, Arizona. The facility treats spent activated carbon that has been used by industry, state and federal government agencies, and municipalities for the removal of organic compounds from liquid and vapor phase process waste streams. The spent activated carbon is identified as both hazardous and non-hazardous waste and was formerly managed at the facility in carbon reactivation unit RF-1.

The facility, including RF-1, began construction in 1991 and operation commenced in August 1992. The unit treated spent activated carbon exclusively during the time of operation. The unit was shut down, after waste were removed, in June of 1996 to allow for the final construction phase and start up of RF-2 in July 1996 to full interim status capacity.

Currently RF-1 does not share any equipment with RF-2 although with a few exceptions, all RF-1 equipment (which includes the reactivation furnace, APC equipment/piping, and fan) remain on site.

1.1 SCOPE OF CLOSURE

SII has prepared two separate closure plans. One plan covers the closure of the inactive RF-1 Carbon Reactivation Unit, and associated equipment, while the other plan addresses the closure of the remaining portions of the RCRA Facility. This QAPP, and the accompanying Sampling and Analysis Plan address the activities related to all closure activities.

1.2 SCOPE OF QUALITY ASSURANCE PROJECT PLAN

This Quality Assurance Project Plan (QAPP) presents the organization, objectives, functional activities, and specific Quality Assurance (QA) and Quality Control (QC) activities for the partial closure activities being performed at the facility. This QAPP also describes the specific protocols that will be followed for sampling, sample handling and storage, chain-of-custody, and laboratory analysis during the partial closure project.

All QA/QC procedures will be in accordance with applicable professional technical standards, government regulations and guidelines, and specific project goals and requirements. This QAPP has been prepared in accordance with all Environmental Protection Agency (EPA) guidance documents, in particular the following:

- EPA Requirements for Quality Assurance Project Plans EPA QA/R-5 (EPA/240/B-01/003; and
- EPA Guidance for Quality Assurance Project Plans EPA QA/G-5 (EPA/600/R-98/018.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

During the closure of carbon reactivation unit RF-1, the SII Plant Manager has responsibility for all activities performed at this site. As such, the Plant Manager will assign responsibilities to all of the contractors and site personnel involved with closure activities including informing all contractors of site specific requirements for health and safety (e.g., confined spaces, lock-out/tag-out, etc.). This individual will also be responsible for ensuring that the containment for the RF-1 carbon reactivation unit is inspected prior to beginning closure activities. The containment will be inspected for cracks or gaps to prevent migration of spillage, leakage, or contaminated storm water.

A project team consisting of representatives of SII and the selected contractors will implement the closure program. The Professional Engineer will be a consulting contractor who is experienced in the technical coordination and QA/QC associated with environmental projects. The Sample Custodian for this project will be a contractor or SII representative who is experienced in conducting sampling for environmental programs. Analytical services will be provided by contract laboratories experienced in the analysis of environmental test samples. The Laboratory Coordinators, Sample Custodian, and Engineer will provide QA/QC.

The Professional Engineer or his designee is responsible for the development of the Closure Plan. During closure activities, the Engineer is responsible for the overall implementation of closure activities. He/she will serve as the focal point between the contractors, SII representatives, and regulatory agencies for matters concerning closure and will coordinate activities among various project team members. The Professional Engineer or his designee will also serve as the Quality Assurance Officer (QAO) during closure activities. Specific responsibilities will include:

- Developing the Closure Plan including the QAPP and Sampling and Analysis Plan (SAP);
- Coordinating reviews of the Closure Plan including the QAPP and SAP by all participants prior to project initiation;
- Ensuring compliance with the Closure Plan including the QAPP and SAP by all project team members during the project;
- Documenting closure activities in a field logbook;
- Providing coordination between decontamination activities and sampling activities, especially regarding decisions concerning the final rinse of each piece of applicable equipment;
- Providing field review of sample collection chain of custody forms and request for analysis forms;
- Interfacing with the Laboratory Analysis Coordinators (LAC) while samples are being analyzed; and
- Certifying that partial closure activities have been completed.

QAO responsibilities will include (the QAO may be the same individual as the Professional Engineer):

- Reviewing QA/QC activities and communicating the results of those activities to the Professional Engineer or Plant manager as appropriate;
- Making recommendations to the Plant Manager, and/or Professional Engineer regarding any problems that may be detected;
- Ensuring that appropriate corrective actions are taken if problems are detected;
- Conducting or coordinating any required audits of field, office, or laboratory procedures to ensure compliance with the Closure Plan QAPP; and
- Verifying that test data are adequately recorded and maintained and that data are properly reduced, validated, and interpreted.

The Sample Custodian will have overall responsibility for the collection and handling of all samples. His/her duties will include:

- Ensuring that sampling equipment, sample containers, and shipping containers are available at the site;
- Directing and/or participating in sampling activities;
- Overseeing recovery of samples and preservation of samples in the field;
- Performing all QA activities required by the sampling method;
- Documenting sampling activities;
- Assigning and recording sample numbers;
- Preparing samples and packaging them for shipment to the laboratory;
- Preparing chain of custody and request for analysis forms for all samples; and
- Shipping samples to the laboratory.

One Laboratory Analysis Coordinator will be appointed for each laboratory that provides analytical services for the project. His/her responsibilities will include:

- Reviewing all Data Quality Objectives (DQO) listed in the QAPP and SAP and verifying that they match those used by the laboratory and if they do not, notifying the Professional Engineer or QAO so that appropriate revisions may be made and a request for approvals submitted to the regulatory agency as necessary;
- Receiving, verifying, and documenting that incoming field samples correspond to the sample chain of custody information;
- Notifying the QAO or Professional Engineer of any discrepancies or problems in the chain of custody information, preservation, or sample condition;
- Maintaining records of incoming samples;
- Tracking samples through processing, analysis, and disposal;
- Preparing QC samples for analysis during the project;

- Verifying that personnel are trained and qualified in specified laboratory QC and analytical procedures;
- Verifying that laboratory QC and analytical procedures are being followed as specified in the QA/QC Plan and the specific analytical SOPs;
- Reviewing QC and sample data during analysis and determining if repeat samples or analyses are needed;
- Monitoring the laboratory internal notice of nonconformance procedures when implemented and notifying the QAO or Professional Engineer when a non-conformance has occurred that may impact the reliability of the test data;
- Submitting certified QC and sample analysis results and data packages to the Professional Engineer or QAO; and
- Archiving analytical data.

3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT

The overall quality assurance objective of this project is to identify the complete set of data necessary to provide a complete quality assessment of the sample results. These data include all the quality indicators generated during the project, and the adherence of the test data to the acceptance criteria for precision and accuracy that are used to assess the data quality. The specific quality objective is to produce a complete data set that can be used to certify partial closure of the RF-1 unit.

QA/QC objectives for precision, accuracy, representativeness, completeness, and sensitivity are addressed in this section. Procedures and formulas for determining accuracy and precision are discussed in Section 11 of this document. The following definitions briefly describe the meaning of each QA/QC objective:

Precision: A measure of mutual agreement among individual measurements of the same property, usually under "prescribed similar conditions." Various measures of precision exist depending on the prescribed similar conditions. If the number of samples is less than 4, the precision is described as relative percent difference (RPD) from the average of replicate measured values for analysis of the same parameter. If the number of samples is four or greater, precision is best described in terms of relative standard deviation (RSD).

Accuracy: The degree of agreement of a measurement (or an average of measurements of the same parameter) X, with an accepted reference or true value, T. Accuracy is usually expressed as the difference between the two values, X - T, or the difference as a percentage of the reference or true value, 100 (X - T)/T, and sometimes expressed as a ratio, X/T. In some cases, accuracy is described as the percentage recovery of a known quantity of material added to a sample prior to analysis. Accuracy is a measure of the bias in a system.

Representativeness: The degree to which data accurately and precisely represent a characteristic of a population, parameter variation at a sampling point, process condition, or an environmental condition.

Completeness: A measure of the amount of valid data obtained compared to the amount expected to be collected under normal conditions. Completeness is usually expressed as a percentage.

Sensitivity: The ability of a measurement system to accurately and precisely determine a desired property within the limits needed to assess the measurement result against established criteria. For this type of program the required sensitivity is a function of assessment criteria, sample size, and analytical detection limit.

Data quality objectives for the measurement parameters associated with this project are presented in Table 3-1. Precision estimates presented in the table represent variability for replicate measurements of the same parameters, expressed in terms of relative percent difference or relative standard deviation, as appropriate. Accuracy values include components of both random error and bias, expressed as a percentage of the true value (for reference materials) or percent analyte recovery (for spiked samples).

3.1 PRECISION AND ACCURACY

A number of procedures will be used to meet the precision and accuracy objectives of the analytical program. All sampling and analytical activities will be conducted following referenced procedures. All reference materials used as calibration standards, surrogate compounds, or laboratory control samples will be of the highest purity commercially available. The calibration of instruments used during analysis will be verified each day that samples are analyzed as described in later sections of this QAPP. Assessment of data precision and accuracy will be accomplished by evaluating the results from multiple analyses of the same parameter, analysis of standards, and the analysis of spiked samples. Field and/or laboratory contamination will be assessed through the analysis of reagent or method blanks, field blanks, and trip blanks.

Precision estimates presented in Table 3-1 represent variability for replicate measurements of the same parameters, expressed in terms of RPD. For analyses of samples with detectable concentrations of the target analytes, precision is evaluated by conducting duplicate analyses of unspiked or spiked samples and assessing the RPD. If the variance in the duplicate analyses bring into question the analytical precision, additional analyses, if allowable by the method, will be performed to better determine the actual value or to evaluate the potential reason(s) for the measurement variability.

Accuracy values in Tables 3-1 and 3-2 include components of both random error and bias, expressed as a percentage of the “true” or “known” value (for reference material) or percentage analyte recovery (for spiked samples). The QA/QC program will focus upon controlling measurement error within the estimated limits of measurement uncertainty, as specified in Tables 3-1 and 3-2. It should be noted that these limits are estimates that are, in most cases, described in the referenced analytical methods or in QA/QC guidance for hazardous waste incineration. They represent that range of results that can be expected from these methods based on actual field sampling results and laboratory-based studies. Therefore it is reasonable to expect that the measurement errors associated with this project will be within the objectives shown in Table 3-1. QA/QC determinations which fall outside of the target range will be flagged and an assessment usability of the data will be made. Specifically, if Matrix Spike/Matrix Spike Duplicate (MS/MSD) percent recoveries fall outside the control limits, the Laboratory Control Samples (LCSs) and field blanks will be reviewed to determine the effect of the matrix on spike recovery.

Table 3-1. Analytical Data Quality Objectives

Sample Matrix	Test Parameters	Accuracy Objectives	Precision Objectives	Other Objectives
Decontamination Water	Total Metals	70 - 130% recoveries for each metal of concern spiked into an aliquot of one sample. The spiking level should be the greater of either 1 - 2 times the apparent concentration in the unspiked sample, or at least 10 times the detection limits. (Matrix Spike).	< 35% RPD for duplicate analyses conducted for one sample from each matrix. This criterion only applies to individual metals with an apparent concentration greater than the lowest calibration standard used in the analyses and/or < 35% RPD for duplicate analysis of the spiked sample. (Matrix Spike Duplicate).	Analysis of one method blank per sample batch, carried through all preparation and analysis steps, should be less than 20% of sample levels or below the detection limit.
Decontamination Water	Volatile Organics	Matrix Spike % recoveries as specified in Table 3-2. Surrogate % recoveries (Table 3-2) spiked onto every field sample.	< 35% RPD for duplicate preparation and analysis for one sample and/or <35% RPD for matrix spike/matrix spike duplicate analysis.	Analysis of one method blank per sample batch carried through all preparation and analysis steps. Results should be less than the lowest calibration standard.
Decontamination Water	Organophosphorus Compounds	Matrix Spike % recovery reported Surrogate % recovery reported.	< 35% RPD for duplicate preparation and analysis for one sample and/or <35% RPD for matrix spike/matrix spike duplicate analysis.	Analysis of one method blank per sample batch carried through all preparation and analysis steps. Results should be less than the lowest calibration standard.

Continued next page

Table 3-1. Analytical Data Quality Objectives (Continued)

Sample Matrix	Test Parameters	Accuracy Objectives	Precision Objectives	Other Objectives
Decontamination Water	Semivolatile Organics	Matrix Spike % recoveries as specified in Table 3-2. Surrogate % recoveries (Table 3-2) spiked onto every field sample.	< 35% RPD for duplicate preparation and analysis for one sample and/or <35% RPD for matrix spike/matrix spike duplicate analysis.	Analysis of one method blank per sample batch carried through all preparation and analysis steps. Results should be less than the lowest calibration standard.

$$\text{Relative Percent Difference (RPD)} = \frac{\text{highest value} - \text{lowest value}}{\text{average value}} \times 100$$

$$\%\ \text{Accuracy} = \frac{\text{found concentration}}{\text{actual concentration}} \times 100\ \text{(for reference materials)}$$

$$\text{Relative Standard Deviation} = \frac{\text{standard deviation}}{\text{average value}} \times 100$$

$$\%\ \text{Recovery} = \frac{\text{found - native}}{\text{amount spiked}} \times 100$$

Table 3-2. Organic Surrogate Spike and Matrix Spike Recovery Limits

Sample Matrix	QA Parameter	Spiking Compound	Recovery Limits
Decontamination Water, Soils	Volatile Organics in Organic & Aqueous Liquid Matrices and Solid Matrices		
	Surrogate Spikes	Toluene-d_8	50 – 130%
		4-Bromofluorobenzene	50 – 130%
		1,2-Dichloroethane-d_4	50 – 130%
	Matrix Spikes	Chlorobenzene	50 – 130%
		Tetrachloroethene	50 – 130%
		1,1-Dichloroethene	50 – 130%
		Trichloroethene	50 – 130%
		Benzene	50 – 130%
		Toluene	50 – 130%
	Internal Standards (area count compared to continuing calibration)	Fluorobenzene	50 – 200%
		Chlorobenzene-d_5	50 – 200%
		1,4-dichlorobenzene-d_4	50 – 200%
Decontamination Water, Soils	Semivolatile Organics in Organic & Aqueous Liquid Matrices		
			23 - 120%
	Surrogate Spikes	Nitrobenzene-d_5	30 - 115%
		2-Fluorobiphenyl	24 - 113%
		Phenol-d_5	25 - 121%
		2-Fluorophenol	19 - 122%
		2,4,6-Tribromophenol	
			50 – 200%
	Internal Standards (area count compared to continuing calibration)	1,4-Dichlorobenzene-d_4	50 – 200%
		Naphthalene-d_8	50 – 200%
		Acenaphthene-d_{10}	50 – 200%
		Phenanthrene-d_{10}	50 – 200%
		Chrysene-d_{12}	50 – 200%
		Perylene-d_{12}	

If during the course of sample analyses, an analytical result exceeds that calibrated range for an indicator constituent, or any other analytical anomalies are noted with any sample, the Professional Engineer or QAO is to be contacted by the laboratory immediately to discuss the results/issues and possible options before proceeding with the subject analyses. If ongoing QA/QC procedures reveal that a measurement's error has exceeded the established data quality limits, the source of the excessive error will be identified and corrective action will be taken, as described in Section 12. If data fall outside the acceptable range of precision and accuracy, even after corrective action has been taken, those data points will be flagged and a determination of their usability will be made. Also, alternative procedures (either sampling or analytical) may be considered and recommended if possible.

The analytical laboratory conducting the analyses of the samples will be required to have standard operating procedures (SOPs) for each analysis to be performed. The laboratory will also be required to have procedures for preparing, reviewing, modifying, and controlling distribution of analytical procedures.

3.2 DETECTION LIMITS

For all applicable analyses, the laboratory report will provide both the method detection limit (MDL) and the reliable detection limit (RDL). The laboratory will maintain on record the documentation detailing how each MDL and RDL was derived. All non-detects for indicator constituents will be reported and assessed at the laboratory-determined MDL. If an analyte is detectable at some value between the MDL and RDL, the detected value will be reported and flagged as estimated. If matrix interference(s) occurs or sample dilutions are necessary, a sample specific MDL or sample quantitation limit (SQL) may be reported. If sample specific MDL or SQL is applicable, the documentation of the serial dilutions or other measures taken to arrive at the SQL will be documented in the analytical report.

3.3 COMPLETENESS

Data completeness represents the percentage of valid data collected from the total number of valid samples collected. As it applies to this type of sampling program, data must be essentially 100 percent complete. Any sample with results that are deemed not valid will require resampling or reanalysis.

3.4 REPRESENTATIVENESS, SENSITIVITY AND COMPARABILITY

Sensitivity for this sampling event is a function of the sample matrix, the sample size, and the analytical detection limit. The sampling procedures chosen for the test are designed to be representative by using composite samples collected using a grid format. The sample sizes chosen are such that the collected sample is greater than the sample volume/mass required for each analytical method to obtain an acceptable quantitation limit for the project.

If ongoing QA/QC procedures reveal that a measurement's error has exceeded the estimated data quality limits, the source of the excessive error will be identified and corrective action will be taken, as described in Section 12. If data fall outside the acceptable range of precision and accuracy, even after corrective action has been taken, those data points will be flagged and a determination of their usability will be made. Also, alternative procedures (either sampling or analytical) may be considered and recommended if possible. All parties before implementation would necessarily agree to any changes or additions.

The analytical laboratory conducting the analysis of the samples will be required to have standard operating procedures for each analysis to be performed. The laboratory will also be required to have procedures for preparing, reviewing, modifying, and controlling distribution of analytical procedures.

4.0 SAMPLING PROCEDURES

The objective of this test program is the collection of representative final rinse samples that demonstrate that the partial closure objectives have been met. To meet this objective requires minimizing the potential sources of sample contamination or bias imparted to the samples by the sampling equipment, ambient conditions, handling, and preservation. The test program samples will be collected using the method described in Figures 4-1 and 4-2o f the SAP. The total number of field samples expected to be generated during the test program are summarized in Table 4-1.

The analytical procedures to be used during the test program are located in Tables 4-2 through 4-6. During the course of the sampling and analysis, situations may arise that require modifying the specific sampling or analytical procedure included in these tables or referenced in this plan. In cases where the sampler or laboratory finds it necessary to make adjustments to the sampling or analytical methods, the changes will be documented following the corrective action procedures noted in Section 12. Any such changes must be approved by the Professional Engineer or Quality Assurance Officer.

All samples will be collected using dedicated sampling equipment at each sampling location, thus eliminating the potential for cross contamination from one sample to another. New sampling equipment will be used if retesting is required. After use, sampling equipment will be collected for disposal offsite.

Sample tracking is documented using unique sample numbering applied to every sample (Figure 4-1), sample labels, completed request for analysis (RFAs) forms, and completed chain of custody (COC) forms (Figures 4-2 through 4-4).

Table 4-1. Summary of Expected Field Samples

Sample	Container	Number of Samples
Carbon Reactivation Unit RF-1, Afterburner, APCD, Fan, Stack		
Total Metals	500 ml amber glass	2
Archive	500 ml amber glass	2
Subtotal		4
Carbon Reactivation Unit RF-2, Afterburner, APCD, Fan, Stack		
Total Metals	500 ml amber glass	3
Archive	500 ml amber glass	3
Subtotal		6
Tank T-8 & Ancillary Equipment		
Total Metals	500 ml amber glass	1
Volatile Organics	Two 40 ml VOA vials	1
Semivolatile Organics	1 liter amber glass	1
Organophosphorus Compounds	1 liter amber glass	1
Archive	1 liter amber glass	1
Subtotal		5
Tank T-1 & Ancillary Equipment		
Total Metals	500 ml amber glass	1
Volatile Organics	Two 40 ml VOA vials	1
Semivolatile Organics	1 liter amber glass	1
Organophosphorus Compounds	1 liter amber glass	1
Archive	1 liter amber glass	1
Subtotal		5
Tank T-2 & Ancillary Equipment		
Total Metals	500 ml amber glass	1
Volatile Organics	Two 40 ml VOA vials	1
Semivolatile Organics	1 liter amber glass	1
Organophosphorus Compounds	1 liter amber glass	1
Archive	1 liter amber glass	1
Subtotal		5
Tank T-5 & Ancillary Equipment		
Total Metals	500 ml amber glass	1
Volatile Organics	Two 40 ml VOA vials	1
Semivolatile Organics	1 liter amber glass	1
Organophosphorus Compounds	1 liter amber glass	1
Archive	1 liter amber glass	1
Subtotal		5
Tank T-6 & Ancillary Equipment		
Total Metals	500 ml amber glass	1
Volatile Organics	Two 40 ml VOA vials	1
Semivolatile Organics	1 liter amber glass	1
Organophosphorus Compounds	1 liter amber glass	1
Archive	1 liter amber glass	1
Subtotal		5

Sample	Container	Number of Samples
Tank T-18 & Ancillary Equipment		
Total Metals	500 ml amber glass	1
Volatile Organics	Two 40 ml VOA vials	1
Semivolatile Organics	1 liter amber glass	1
Organophosphorus Compounds	1 liter amber glass	1
Archive	1 liter amber glass	1
Subtotal		5
Wash Water (Unused)		
Total Metals	500 ml amber glass	3
Volatile Organics	Two 40 ml VOA vials	3
Semivolatile Organics	1 liter amber glass	3
Organophosphorus Compounds	1 liter amber glass	3
Archive	1 liter amber glass	3
Subtotal		15
Soil (Container area)		
Total Metals	500 ml amber glass	9
Volatile Organics	Two 40 ml VOA vials	9
Semivolatile Organics	1 liter amber glass	9
Organophosphorus Compounds	1 liter amber glass	9
Archive	1 liter amber glass	9
Subtotal		45
Soil (Tanks and ancillary equipment area)		
Total Metals	500 ml amber glass	21
Volatile Organics	Two 40 ml VOA vials	21
Semivolatile Organics	1 liter amber glass	21
Organophosphorus Compounds	1 liter amber glass	21
Archive	1 liter amber glass	21
Subtotal		105
Soil (RF-1 and RF-2 Process areas)		
Total Metals	500 ml amber glass	9
Volatile Organics	Two 40 ml VOA vials	9
Semivolatile Organics	1 liter amber glass	9
Organophosphorus Compounds	1 liter amber glass	9
Archive	1 liter amber glass	9
Subtotal		45
Soil (Background)		
Total Metals	500 ml amber glass	9
Volatile Organics	Two 40 ml VOA vials	9
Semivolatile Organics	1 liter amber glass	9
Organophosphorus Compounds	1 liter amber glass	9
Archive	1 liter amber glass	9
Subtotal		45
Total Samples Collected		**295**

Table 4-2. Analysis of Multiple Metals Samples Using SW-846 Method 6010 (ICP)

Matrix: Final Rinse Water, Soils

Procedure Summary: **SW-846 Method 6010**

Before using this procedure there must be data available documenting initial demonstration of performance including the selection criteria of background correction points, analytical dynamic ranges, applicable equations, and written verification of interelement correction equations or other routines for correcting spectral interference. The analyst should follow the instructions provided by the manufacturer for operating conditions. Prior to sample analysis, the instrument must be setup with proper operating parameters as detailed in the Method and allowed to become thermally stable.

To begin analysis of samples, reset the nebulizer gas flow rate to the determined optimized flow. The instrument should then be profiled and an initial calibration should be performed in accordance with the manufacture's instructions. The calibration should consist of a minimum of a blank and a standard. An analysis of an initial calibration verification sample (ICV), a calibration blank (ICB), and a continuing calibration verification sample (CCV) should immediately follow the daily calibration. An interference check sample should also be run at the beginning of each analytical run. The results of this check sample should be within ± 20% of the true value. A calibration blank and either an ICV or a CCV must be analyzed after every tenth sample and at the end of the run. The system should be rinsed between each sample. Check standards and calibration verifications must be within 10% of the calibration with relative standard deviation < 5% from replicate (minimum of two) integrations. If the calibration cannot be verified within limits, the sample analysis must be discontinued, the cause determined and the instrument recalibrated.

Quality Control: One laboratory method blank will be analyzed for every batch of samples analyzed. The method blank is a performance control sample that is prepared in the laboratory and processed in a manner identical to the field sample.

To document the effect of the matrix, a minimum of at least one matrix spike and one duplicate or one matrix spike/matrix spike duplicate pair should be analyzed.

A laboratory control sample (LCS or method spike) should be included with each analytical batch. The LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight and volume. The LCS is spiked with the same analytes at the same concentrations as the matrix spike. When the matrix spike results indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.

References: Metals analytical Methods 6010 Test Methods for Evaluating Solid Waste, SW-846, Third Edition, 1986 and updates.

Table 4-3. Analysis of Mercury Samples Using SW-846 Method 7470 (CVAA)

Matrix:	Final Rinse Water, Soils
Procedure Summary:	**<u>SW-846 Method 7470</u>** Prior to sample analysis, a calibration curve should be created by plotting the absorbances of standards versus micrograms of mercury. A minimum of a calibration blank and three standards should be used for this calibration. After the calibration, the curve must be verified by the use of at least a calibration blank and a calibration check standard. The check standard must be within 10% of the true value for the curve to be considered valid. If more than ten samples are analyzed, the curve must be verified by measuring a mid-range standard after every tenth sample. This calibration check value must be within 20% of the true value or the previous ten samples must be reanalyzed. To determine the absorbance of samples or standards, the circulating pump should be adjusted to 1 liter/minute and allowed to run continuously during analysis. Remove the aeration apparatus from the BOD bottle and allow the sample or standard to stand quietly without manual agitation. Attach the stopper and frit to the BOD bottle. The absorbance should reach a maximum within 30 seconds. As soon as the recorder pen levels off (approximately 1 minute), open the bypass valve and continue aeration until the absorbance returns to its minimum value. Close the bypass valve, remove the stopper and frit from the BOD bottle, and continue aeration.
Quality Control:	One laboratory method blank will be analyzed for every batch of samples analyzed. The method blank is a performance control sample that is prepared in the laboratory and processed in a manner identical to the field sample. To document the effect of the matrix, a minimum of at least one matrix spike and one duplicate or one matrix spike/matrix spike duplicate pair should be analyzed. A laboratory control sample (LCS or method spike) should be included with each analytical batch. The LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight and volume. The LCS is spiked with the same analytes at the same concentrations as the matrix spike. When the matrix spike results indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.
References:	Metals analytical Method 7470 Test Methods for Evaluating Solid Waste, SW-846, Third Edition, 1986 and updates.

Table 4-4. Analysis of Volatile Organics Using SW-846 Method 8260

Matrix:	Final Rinse Water, Soils
Procedure Summary:	**<u>Volatile Organic Analysis – Method 8260</u>** Prior to calibration, the system must be hardware tuned to meet the BFB criteria. Calibration of the instrument must be performed using the same introduction technique as the same. Calibration standards should be prepared from the secondary dilution standards. The initial calibration must contain at least five different calibration standards. The mean response factor (RF) and relative standard deviation (RSD) of the response factor are calibrated for each target analyte. Prior to using the calibration, the mean RF of the five system performance check compounds (SPCC) and the RSD of the six calibration check compounds (CCC) are evaluated against the method criteria. If the SPCCs do not meet the minimum assigned mean response factor or if the CCCs report an RSD greater than 30%, the curve should not be used. All target compounds must report RSDs less than 15% or one of the calibration options listed in section 7.0 of method 8000 must be applied to the compound. Calibration verification should be performed at the beginning of each twelve-hour shift. To verify the calibration, a BFB standard is introduced to the system followed by a midrange calibration standard and a method blank. If any of the standards do not meet the criterion set forth in section 7.4 of this method, corrective action must be taken prior to sample analysis. Samples will be spiked with surrogate and internal standards and introduced through to the GC/MS via a purge-and –trap unit. An inert gas is bubbled through a potion of the sample at ambient temperature transferring the volatile components from an aqueous phase to a vapor phase. The vapor is then swept into the sorbent column. The quantitative identification of compounds determined by this method is based on retention time and on comparison of the sample mass spectrum. The reference mass spectrum must be generated by the laboratory using the conditions of this method. The characteristic ions from the reference mass spectrum are defined as the three ions of greatest relative intensity, or any ions over 30% relative intensity, if less than three such ions occur in the reference spectrum. If sample concentrations exceed the calibration range, the sample should, if sufficient volume is available, be diluted and reanalyzed. If insufficient volume is available for reanalysis, the results may be flagged as extrapolated beyond the calibration range.
Quality Control:	One method blank should be analyzed with each group of 20 or less sample analyzed on the same instrument during the same shift. Field blanks and trip blanks should be prepared with the samples and taken to the field. The caps of the field blanks are removed in the field during recovery of the sample. At least one pair of field blanks and trip blanks should be included during each sampling event. Laboratory control samples (LCS) and matrix spike/matrix spike duplicates (MS/MSD) must be analyzed to determine accuracy of the analysis and should be included with each analytical batch.
References:	Method 8260, Volatile Organics by GC/MS, Test Methods for Evaluating Solid Waste, SW-846, Third Edition, November 1986, and Updates.

Table 4-5. Analysis of SVOC Using SW-846 Method 8270

Matrix:	Final Rinse Water, Soils
Procedure Summary:	**Semivolatile Organic Analysis- Method 8270** Prior to analysis, the sample extracts should be allowed to warm to room temperature and internal quantitation standards should be added. Extracts may then be cleaned up using appropriate cleanup method if necessary. An aliquot of extract is then injected into the GC/MS system using the same operating conditions as used for the calibration. Target analytes are identified and analyzed by gas chromatography/mass spectrometry according to the procedures in SW-846 Method 8270. The quantitative identification of compounds determined by this method is based on retention time and on comparison of the sample mass spectrum. The reference mass spectrum must be generated by the laboratory using the conditions of this method. The characteristic ions from the reference mass spectrum are defined as the three ions of greatest relative intensity, or any ions over 30% relative intensity, if less than three such ions occur in the reference spectrum. If the response for any quantitation ion exceeds the initial calibration range of the GC/MS system, the sample extract must be diluted and reanalyzed.
Quality Control:	One laboratory method blank will be analyzed for every batch of samples analyzed. The method blank is a performance control sample that is prepared in the laboratory and processed in a manner identical to the field sample. To document the effect of the matrix, a minimum of at least one matrix spike and one duplicate or one matrix spike/matrix spike duplicate pair should be analyzed. A laboratory control sample (LCS or method spike) should be included with each analytical batch. The LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight and volume. The LCS is spiked with the same analytes at the same concentrations as the matrix spike. When the matrix spike results indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.
References:	Method 8270, Semivolatile Organics by Gas Chromatography, Mass Spectrometry (GC/MS), Test Methods for Evaluating Solid Waste, SW-846, Third Edition, November 1986, and Updates.

Table 4-6. Analysis of Organophosphorus Compounds in Aqueous Samples Using SW-846 Method 8141A

Matrix:	Final Rinse Water
Procedure Summary:	**<u>Organophosphorus Compounds Analysis- Method 8141A</u>** Prior to analysis, the sample extracts should be allowed to warm to room temperature and internal quantitation standards should be added. Extracts may then be cleaned up using the appropriate cleanup method if necessary. An aliquot of extract is then injected into the GC/FPD or GC/NPD system using the same operating conditions as used for the calibration. Target analytes are identified and analyzed by gas chromatograph/flame photometric detector or gas chromatograph/nitrogen-phosphorus detector according to the procedures in SW-846 Method 8141A. The quantitative identification of compounds determined by this method is based on retention time and confirmation may be made using a comparison of the sample mass spectrum from GC/MS analysis. If the response for any sample exceeds the initial calibration range of the GC system, the sample extract must be diluted and reanalyzed.
Quality Control:	One laboratory method blank will be analyzed for every batch of samples analyzed. The method blank is a performance control sample that is prepared in the laboratory and processed in a manner identical to the field sample. To document the effect of the matrix, a minimum of at least one matrix spike and one duplicate or one matrix spike/matrix spike duplicate pair should be analyzed. A laboratory control sample (LCS or method spike) should be included with each analytical batch. The LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight and volume. The LCS is spiked with the same analytes at the same concentrations as the matrix spike. When the matrix spike results indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix.
References:	Method 8141A, Organophosphorus Compounds by Gas Chromatography: Capillary Column Technique, Test Methods for Evaluating Solid Waste, SW-846, Third Edition, November 1986, and Updates.

Figure 4-1. Planned Sample Identification Code

RF- MET- 1

<u>Sample Number</u>

1, 2, 3, … etc.

<u>Sample Type</u>

MET	Total Metals
VOA	Volatile Organics
SVOA	Semivolatile Organics
OCP	Organophosphorus Compounds
ACH	Archive

<u>Sample Location</u>

RF	Carbon Reactivation Unit RF-1
T8	Tank T-8
AB	Afterburner AB-1
BG	Background
WW	Wash Water

Figure 4-2. Example Sample Label Format

CLIENT:

PROJECT:

SAMPLER:

LAB:

SAMPLE NO.:

DATE: TIME:

DESCRIPTION:

CONTAINER __ of __

Figure 4-3. Example Request For Analysis Form

REQUEST FOR ANALYSIS

Focus Environmental, Inc.

Client: ___________________

Description: _________________

Location: _________________

Project No.: _________________

Sample Identification

T8-MET-1

Test No.: 1

Run No.: 1

Description:

Tank T8 Metals

Lab: Analytical Laboratory

Container: 500 ml amber glass

Number of Containers: 1

Requested Preparation/Analyses:	**Preparation Method:**
Metals – Mercury – Liquids CVAAS (SW846-7470)	N/A
Metals – Multiple (Specify) ICP (SW846-6010)	Acid Digestion – Stack Gas Multi-Metals

Preservation

None required

Hold Time

180 days/28 days for Hg

Special Instructions

Analyze for metals: Sb, As, Ba, Be, Cd, total Cr, Pb, Hg, Ni, Se, Ag, Tl and V.

Figure 4-4. Example of Chain of Custody Form

Custody Record ***Focus Environmental, Inc.***	**Client:** **Location:**	**Description:** **Project No.:**	Note: This form is to be accompanied by a "Request for Analysis" which specifies the preparation and analysis to be performed for each sample.

Sample ID	Description	Container	No.	Grab/Comp	Date	Time	Remarks
RF-MET-1	Carbon Reactivation Unit RF-1 metals sample	500 ml amber glass bottle		Comp.	01/01/01	01:00	

Sampler: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)

5.0 SAMPLE HANDLING, TRACEABILITY AND HOLDING TIMES

5.1 SAMPLE HANDLING AND CUSTODY

A sample will be considered to be in the custody of a person if it is in his or her possession, in his or her sight, or secured by that person in an approved location accessible only to authorized personnel.

The sampling contractor or laboratory will prepare sampling media, reagents, and sample containers according to the specifications of the methods as described in Section 4 and will ship them to the site in sealed containers.

During sampling and until the samples arrive at the analytical laboratory; the samples are the responsibility of the Sample Custodian. When overnight couriers are utilized, the airbill will serve to document the transfer of custody from the Sample Custodian to the courier. The courier's air bill becomes part of the COC record. Upon transfer of the samples from the courier to the analytical laboratory, sample custody will be maintained by the analytical laboratory performing the analysis.

Collected samples will be shipped from the site to the laboratory in sealed containers with a COC and RFA forms. Examples of acceptable RFA and COC forms are provided as Figures 4-3 and 4-4.

Upon receipt of samples at the laboratory, the receiver will accept custody for the shipment by an exchange of signatures with the delivery agent. The shipping containers will be opened by the Laboratory Analysis Coordinator or his designee and inspected. The container contents will be verified against the accompanying COC. Any damage to the contents of the shipping container or deviations from the original shipment documents will be noted on the COC and the Professional Engineer overseeing the project will be notified. Transfer of custody within the laboratory is addressed in the Laboratory's QA manual. Upon completion of analysis, samples will be maintained at the laboratory under COC until they are released for proper disposal.

5.2 SAMPLE LABELING

An example sample label format is presented in Figure 4-2. Each sample container will be labeled to show the source of the sample; the project identification; sampler's initials; laboratory to which the sample will be shipped; an unique alphanumeric sample number; date and time; sample description; test number; and run number.

Project samples will be tracked via the assigned unique alpha-numeric sample numbers. The sample number will appear on the sample label, the RFA, and the COC. The alpha-numeric system for sample identification for this project is presented in Figure 4-1. The numbering system presented will result in unique numbers being assigned to every sample.

5.3 REQUEST FOR ANALYSIS/CHAIN OF CUSTODY

The Sample Custodian will complete the COC and RFA for every sample. The samples will be preserved as needed and secured by the Sample Custodian and must remain in his or her possession or secured in a location accessible only to authorized personnel until custody is transferred to a courier for delivery to the laboratory.

Each sample container will be clearly identified using standard container labels. It is imperative that information on the COC form, RFA form, and the container label match in every respect. Field samples may be transported directly to the analytical laboratory by the test management or the sampling contractor. If the samples are shipped via overnight courier, an individual trained in Federal Department of Transportation (DOT) and International Air Transportation Association (IATA) regulations will package the samples to assure compliance with the applicable portions of the regulations.

5.4 SAMPLE CONTAINERS, PRESERVATION, AND HOLDING TIMES

Table 5-1 shows the appropriate containers, preservation, and holding times for all samples to be collected during the project.

Table 5-1. Sample Containers, Preservation, and Holding Times

Parameter	Sample Name	Containers	Preservation	Maximum Holding Time
Metals	Final Rinse Water	Glass bottle, Teflon lined cap	HNO_3 pH $\leq$ 2	180 days/28 days for Hg
	Soil	Glass wide mouth jar; Teflon lined lid	None	180 days/28 days for Hg
Volatile Organic Compounds	Final Rinse Water	VOA vials with Teflon septa	Chill to 4 $\pm$2ºC	14 days
	Soil	Glass wide mouth jar; Teflon lined lid	Chill to 4 $\pm$2ºC	14 days
Organophosphorus Compounds	Final Rinse Water	Glass bottle, Teflon lined cap	Chill to 4 $\pm$2ºC	14 days to extraction and 40 days from extraction to analysis
Semivolatile Organic Compounds	Final Rinse Water	Glass bottle, Teflon lined cap	Chill to 4 $\pm$2ºC	14 days to extraction and 40 days from extraction to analysis
	Soil	Glass wide mouth jar; Teflon lined lid	Chill to 4 $\pm$2ºC	14 days to extraction and 40 days from extraction to analysis

6.0 CALIBRATION PROCEDURES

Calibration procedures for all analytical equipment used in the analysis of project samples will be performed in accordance with the prescribed method and the laboratory's SOPs.

7.0 ANALYTICAL PROCEDURES

Analytical procedures and methods are summarized in Table 7-1, and described in detail in Tables 4-2 through 4-6. During the course of sampling and analysis, situations may arise that require modifying the specific sampling or analytical procedures included or referenced in this Plan. The laboratory SOPs, which include a number of procedures for special circumstances, will be followed. In cases where the laboratory finds it necessary to make adjustments to the analysis methods, the changes will be documented following the corrective action procedures noted in Section 12. Any such changes must be approved by the Professional Engineer or the test-designated QAO. All analytical methods used in this test program are found in Test Methods for Evaluating Solid Waste, SW-846 (SW-846), Third Edition, November 1986 and Updates. The most recent versions of the analytical methods will be used.

Table 7-1. Analytical Procedures and Methods

Analysis	Preparation Method	Analytical Method[a]
Total Metals[b]	Acid digestion (SW846-3010A or 3015 and 7470A)	ICP (SW846-6010B) and CVAAS (SW846-7470A)
Volatiles[c]	Purge and trap	Volatile Organics (SW846-8260B)
Organophosphorus Compounds[d]	Solvent extraction (SW846-3500 Series)	Organophosorus Compounds (SW846-8141A)
Semivolatiles[e]	Solvent extraction (SW846-3500 Series)	Semivolatile Organics (SW846-8270C)

a "SW846" refers to Test Methods for Evaluating Solid Waste, Third Edition, November 1986, and Updates.
b Metal analytes are identified in Attachment 1.
c Volatile compound analytes are identified in Attachment 1.
d Organophosphorus compound analytes are identified in Attachment 1
e Semivolatile Compound analytes are identified in Attachment 1.

8.0 INTERNAL QUALITY CONTROL INFORMATION

8.1 DEFINITIONS

The various types of QA/QC checks that may be performed as part of the compliance test, both for sampling and analysis, are defined below. One or more of these QA/QC checks are associated with each measurement system in order to assess the compliance of the data to the DQOs established in Section 3. Table 8-1 is a summary of all the sample analyses and their associated internal quality control checks associated with this test program.

Audit Sample An audit sample is a field or alternate laboratory prepared blank spike submitted to the compliance test laboratory to assess accuracy or potential sample degradation.

Blank, Field A field blank is a sampling train or sampling component that is set up in the field but is not used for compliance test sampling. The field blank is used to assess background contamination that may affect the representativeness of the field samples.

Blank, Method A method blank is a sample of unused media that is prepared and analyzed in the compliance test laboratory to assess background contamination that may exist in the laboratory, on glassware, or in the analytical system.

Blank, Spike A blank spike is a laboratory prepared sample of blank media that is spiked with a known amount of target analyte(s) used to assess the accuracy of the analytical method.

Blank, System An aliquot of uncontaminated reagent used to clean out the analytical system after high level samples have been analyzed or before analysis begins.

Blank, Trip A trip blank is an unused sample component that is shipped to the field along with the sampling equipment/media and/or returned to the laboratory without having been exposed to field conditions. If contamination is encountered in the field blank(s), the trip blank is analyzed to assess whether or not the contamination originates in the field, is inherent in the equipment/media, or results from exposure during shipping and handling.

Calibration Check A standard solution from a source other than the calibration standards used to verify the integrity of an instrument's calibration.

Calibration Standards The laboratory will use traceable standards and submit standard preparation logs as part of the deliverables package.

Table 8-1. Summary of Laboratory Analytical Quality Control Checks, Frequencies, Acceptance Criteria, and Corrective Actions

Parameter/Method	Quality Control Check	Method of Determination	Frequency	Acceptance Criteria	Corrective Action
Metals by ICP or AAS (SW846 6010/6020 ICP and SW846 7470A CVAA)	Initial calibration	Multiple standards (AAS) or 1 standard (ICP) and a calibration blank, bracketing the expected concentrations. Critical level should be at least twice the lowest calibration standard.	Prior to sample analysis	Correlation coefficient of linear plot >0.995 (AAS). Not applicable for ICP.	Recalibrate
	Reagent blank	Analysis of blank	After every 10 samples and at end of analysis	Less than instrument detection limit (IDL)	Reanalyze if greater than the reporting limit and discuss in case narrative if greater than the IDL
	Calibration check	Analysis of independent calibration check standard	Once after initial calibration	90 - 110% of theoretical value	Reanalyze and recalibrate, if necessary
	Serial dilution	Analysis of serial dilution (DF=5)	Once per matrix for high level analytes (ICP only)	90 - 110% of undiluted sample value (ICP samples > 50 times the IDL)	Flag data; discuss in case narrative
	Post digestion spike (GFAAS only)	Analysis of post digest spike, spiked at 2 to 5 times the original sample value	Each sample analyzed by GFAAS	85 - 115% of theoretical value	Flag data; discuss in case narrative
	Calibration accuracy (ICP only)	Reanalysis of high level standard	After every initial calibration	90 - 110% of theoretical value	Recalibrate and recheck
	Interference check (ICP only)	Analysis of interference sample	After every initial calibration and at the end of each run	80 - 120% of theoretical value	Recalibrate and recheck

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Table 8-1. Summary of Laboratory Analytical Quality Control Checks, Frequencies, Acceptance Criteria, and Corrective Actions (Cont.)

Parameter/Method	Quality Control Check	Method of Determination	Frequency	Acceptance Criteria	Corrective Action
Metals by ICP or AAS, (Continued)	Continuing calibration	Midlevel standard and blank	Beginning and end of each analysis period and after every 10 samples	AAS - Midlevel standard 80 - 120% of theoretical value; blank <50% of lowest calibration standard. ICP - Midlevel standard 90 - 110% of theoretical value; blank <50% of lowest calibration standard or within 3 SD of average blank.	Identify and correct problems; reanalyze samples run since last acceptable continuing calibration check.
Volatile organics by GC or GC/MS (SW846 8260)	Initial calibration	3 - 5 standards bracketing expected concentrations	Prior to sample analysis	Variability of average RRF less than or equal to 30% RSD for POHCs and CCCs SPCCs (chlorobenzene and 1,1,2,2-tetrachloroethane) will be $\geq$ 0.3, and SPCCs (chloromethane, 1,1-dichloroethane, and bromoform) will be $\geq$ 0.1	Recalibrate
	Continuing calibration	Midlevel standard	Prior to sample analysis, then every 12 hours or after sample set	RRF for POHCs and CCCs within 25% difference of the initial calibration average RRF. SPCCs (chlorobenzene and 1,1,2,2-tetrachloroethane) will be $\geq$ 0.3, and SPCCs (chloromethane, 1,1-dichloroethane, and bromoform) will be $\geq$ 0.1	Reanalyze standard. If second analysis does not meet criteria, recalibrate and reanalyze samples or justify acceptance of sample results since the last successful check.

Continued next page

Table 8-1. Summary of Laboratory Analytical Quality Control Checks, Frequencies, Acceptance Criteria, and Corrective Actions (Cont.)

Parameter/Method	Quality Control Check	Method of Determination	Frequency	Acceptance Criteria	Corrective Action
Volatile organics by GC or GC/MS (SW846 8260)	Consistency in chromatography	For MS methods, monitor internal standard retention time and area. For non-MS methods, monitor retention time windows for compounds of interest.	Every sample, standard, and blank	Retention time within 30 seconds of last calibration check. Area within -50 to +100% of last calibration check	Perform calibration standard check. Reanalyze sample if possible, or flag data.
	Calibration check or LCS	Analysis of independent calibration check standard	In association with each initial calibration	Within 3 std. deviations of historical mean (laboratory specific)	Recalibrate and recheck.
	Method Blank	Analysis of blank	Analyze one with each analytical batch	Result less than method detection limit	Flag data and discuss in case narrative.
Semivolatile organics GC/MS (SW846 8270C)	Initial calibration	5 standards bracketing expected concentrations. Critical level should be at least 10 times higher than lowest standard	Prior to sample analysis	Variability of average RRF less than or equal to 30% RSD for CCCs. SPCCs greater than or equal to 0.05.	Recalibrate
	Calibration verification	Midlevel standard	Prior to sample analysis, then every 12 hours or after sample set	RRF for CCCs within 30% of initial calibration average RRF. SPCCs greater than or equal to 0.05.	Reanalyze standard. If second analysis does not meet criteria, recalibrate and reanalyze samples or justify acceptance of sample results since the last successful check.
	Consistency in chromatography	For MS methods, monitor internal standard retention time and area. For non-MS methods, monitor retention time window for compounds of interest.	Every sample, standard, and blank	Retention time within 30 seconds of last calibration check. Area within -50 to +100% of last calibration check	Perform calibration standard check. Reanalyze sample if possible, or flag data.

Continued next page

Table 8-1. Summary of Laboratory Analytical Quality Control Checks, Frequencies, Acceptance Criteria, and Corrective Actions (Cont.)

Parameter/Method	Quality Control Check	Method of Determination	Frequency	Acceptance Criteria	Corrective Action
Semivolatile organics GC/MS (SW846 8270C) cont.	Calibration check	Analysis of independent calibration check standard	In association with each initial calibration	Within 3 std. deviations of historical mean (laboratory specific)	Recalibrate and recheck
	Method Blank	Analysis of blank	Analyze one with each analytical batch	Results less than method detection limit	Flag data and discuss in the case narrative.
Organophosphate GC (SW846 8141A)	Initial calibration	Minimum of 3 standards bracketing expected concentrations analyzed in duplicate	Prior to sample analysis	Laboratory specific	Recalibrate
	Calibration verification	Midlevel standard	After each set of 10 samples	Laboratory specific	Reanalyze standard. If second analysis does not meet criteria, recalibrate and reanalyze samples or justify acceptance of sample results since the last successful check.
	Calibration check	Analysis of independent calibration check standard	In association with each initial calibration	Within 3 std. deviations of historical mean (laboratory specific)	Recalibrate and recheck
	Method Blank	Analysis of blank	Analyze one with each analytical batch	Results less than method detection limit	Flag data and discuss in the case narrative

Contingency Sample An additional field sample from the same location as other field samples that is held in reserve in case of breakage or QA/QC failure during the handling or analysis of the primary sample.

Continuing Calibration Verification A midpoint standard, from the same calibration source as the initial calibration solution analyzed periodically to verify that calibration conditions have not drifted from the initial calibration.

Duplicate Analysis A duplicate is a sample that is split in the laboratory and prepared and analyzed twice. The results of the two analyses are compared as a measure of precision.

Duplicate Injection A second analysis of a single sample preparation. This QC test may be used to assess analytical QC failures, matrix interference, or as a measure of analytical system precision.

Initial Calibration A series of analyses of solutions that have known concentrations, used to establish the correspondence between the amount of an analyte present in the solution and the instrument's response across the expected analytical range of the samples. Initial calibrations also establish retention time windows for identification purposes in chromatographic methods.

Interference Check An interference check sample is analyzed, for ICP analysis only, to assess the possible error in analytical results arising from the interaction of various metals in the sample under the conditions of analysis.

Internal Standard Recovery Internal standards are non-target spikes added to samples for quantitation purposes. The percent recovery of the internal standards is checked to assess whether or not significant matrix interference may affect the accuracy and precision of analytical results.

Proficiency Test A series of blank spikes analyzed in the compliance test laboratory to demonstrate an analyst's ability to successfully perform the method with acceptable precision and accuracy.

Replicate One of a series of identical samples or splits of a single sample used to assess precision.

Serial Dilution The result of the analysis of a highly contaminated sample, run undiluted, is compared to the results for the same sample after serial dilution. The two results are expected to match to within method specified criteria. This test is a measure of the linearity of ICP calibration and the analysis technique.

Surrogates Non-target or isotopically labeled analytes spiked into field samples as a measure of method efficiency and accuracy.

8.2 SPECIFIC QUALITY CONTROL CHECKS AND ACCEPTANCE CRITERIA

A variety of QC checks are required both in the field and in the laboratory to ensure the collection of samples that accurately represent the field conditions under study, to assess compliance with data quality objectives (DQOs), and to assess biases in the measurement system.

8.2.1 Field Activities

In order to ensure the representativeness of samples collected during the compliance test, and to ensure integrity of field measurements, a variety of QC checks and controls will be implemented throughout the sampling program. These checks and controls will include:

- Standard field notebooks will be used to document field activities and for data collection.
- The strict adherence to detailed operating procedures as documented in the various projects controlling documents and related SOPs.
- Project personnel will be selected based on appropriate levels of training and experience and will receive project specific training prior to working on-site. Training will include health and safety requirements; security requirements; briefings on overall project goals, objectives, and schedules; and, specific technical training related to their assigned tasks. Training will be documented in the project files.
- Field QC samples will be submitted as required by this QAPP.

Field audits/surveillances will be performed periodically by the Professional Engineer or the QAO to assess conformance to specifications. If nonconforming conditions are noted, the corrective action provisions of the QA plan will be invoked.

8.2.2 Laboratory Activities

Standard laboratory QA procedures, required of each laboratory, provide discussions related to QA/QC checks and controls within the laboratory. Specific data quality objectives, calibration requirements, acceptance criteria, and corrective action requirements for this test program are presented in Table 3-1 and Table 8-1 of this plan.

9.0 DATA REDUCTION, REVIEW, AND REPORTING INFORMATION

9.1 DATA REDUCTION

Data reduction in the laboratory is covered in the Laboratory's QA Manual and SOPs. The laboratory's data reduction process will include at a minimum the following:

- Transcription of data results from raw data printouts to data report forms. This will include any calculations required to report the data in the required units.

Transcription of QA/QC data onto summary forms to provide the required information for evaluation of the validity of the data. The requirement for each type of data is included below in this section.

9.2 DATA REVIEW

Upon the return of the analytical results from the laboratory data will be reviewed and then further reduced to data tables. The data review will include:

- Review of QA summaries for compliance with the DQO.
- Review of field sample results to determine if field sample results were below the PCTL.

The data tables will contain the following information:

- Information identifying exactly the samples represented on the tables (e.g., sample location, matrix, etc.).
- The compounds for which the samples were tested.
- The results for each compound.

9.3 DATA REPORTING

The laboratory deliverable package is expected to include the following elements:

The following forms for all metals analyses:

- Narrative and sample identification cross reference.
- Copies of Chain of Custody documentation.
- Method summaries and references.
- Inorganic analysis data sheet (CLP Form 1 or equivalent).
- Initial and continuing calibration verification (CLP Form 2 or equivalent).
- Blanks summary (CLP Form 3 or equivalent).
- Spike sample recovery/Post digest spike sample recovery (CLP Form 5 or equivalent).
- Interference checks sample results (CLP Form 4 or equivalent).
- Serial dilution results (CLP Form 9 or equivalent).

- Duplicate results (CLP Form 6 or equivalent).
- Laboratory control sample results (CLP Form 7 or equivalent).
- Raw data sample preparation logs and, instrument run logs.
- Documentation of all nonconformances and the actions taken.
- Sample receipt information including temperature and pH information if preservation is required.
- Examples of all calculations performed.

The following forms for all organics analyses using Gas Chromatography/Mass Spectroscopy methods:

- Narrative and sample identification cross reference.
- Copies of Chain of Custody documentation.
- Method summaries and references.
- Organic analysis data sheet for samples and blanks (CLP Form 1 or equivalent).
- System monitoring compound/surrogate recoveries summary (CLP Form 2 or equivalent).
- Duplicate analysis summary (CLP Form 3 or equivalent if MS/MSD).
- QC Check Sample summary.
- Method blank summary (CLP Form 4 or equivalent) and results.
- Instrument performance check summary (CLP Form 5 or equivalent).
- Initial calibration summary (CLP Form 6 or equivalent).
- Continuing calibration check (CLP Form 7 or equivalent).
- Internal standard area and RT summary (CLP Form 8 or equivalent).
- Raw data: run logs, mass spectra, quantitation reports and chromatograms for samples.
- Sample receipt information including temperature and pH information if preservation is required.
- Documentation of all nonconformances and the actions taken.
- Examples of all calculations performed.

The following forms for all organics analyses using Gas Chromatography:

- Narrative and sample identification cross reference.
- Copies of Chain of Custody documentation.
- Method summaries and references.
- Organic analysis data sheet for samples and blanks (CLP Form 1 or equivalent).
- System monitoring compound/surrogate recoveries summary (CLP Form 2 or equivalent).
- Matrix spike/Matrix spike duplicate summary (CLP Form 3 or equivalent).
- QC Check Sample summary.

- Method blank summary and results (CLP Form 4 or equivalent).
- Initial calibration summary (CLP Form 6 or equivalent).
- Calibration verification summary (CLP Form 7 or equivalent).
- Graphic Representation of Curve Fit, with Correlation Coefficient.
- Analytical Sequence (run logs).
- Raw data: quantitation reports and chromatograms for each column in all samples, sample preparation logs and run logs.
- Sample receipt information including temperature and pH information if preservation is required.
- Documentation of all nonconformances and the actions taken.
- Examples of all calculations performed.

Upon the completion of the data review and reduction, the results will be included in the certification of closure report which will be submitted to the EPA.

10.0 ROUTINE MAINTENANCE

The laboratories perform regular maintenance on all analytical instruments. An inventory of replacement parts is kept to prevent downtime. Manufacturers' service representatives are also contracted, as required, for major instrument repairs.

Preventive and routine maintenance is covered in each of the laboratory's QA Manuals and SOPs or in accordance with manufacturer recommendations (i.e., instrument manuals). Daily maintenance (such as replacement of injector septa, etc.) is covered in instrument SOPs. Inoperative equipment is tagged as non-usable until repairs are performed. Logbooks are maintained for each instrument to record usage, maintenance, and repairs.

11.0 DATA ASSESSMENT PROCEDURES

The QA activities implemented in this study will provide a basis for assessing the accuracy and precision of the analytical measurements. Section 3 discusses the QA activities that will generate the accuracy and precision data for each sample type. The generalized forms of the equations that will be used to calculate accuracy and precision are presented below.

11.1 ACCURACY

When a reference standard material is used in the analysis, percent Accuracy (A) will be calculated as follows:

$$A = \frac{\text{Found concentration}}{\text{True concentration}} \times 100$$

Percent analyte Recovery (R) will be calculated as follows:

$$R = \frac{X - N}{S} \times 100$$

where X is the experimentally determined value, N is the amount of native material in the sample, and S is the amount of spiked material of the species being measured. Recoveries are used to determine accuracy when standards are not available.

11.2 PRECISION

When less than four analyses of the same parameter are available, precision will be calculated as a Relative Percent Difference (RPD) from the average of replicate measurements according to:

$$\text{RPD} = \frac{(X_1 - X_2)}{\text{Average } X} \times 100$$

Where X_1 and X_2 are the highest and lowest results of replicate measurements.

Where 4 or more analyses of the same parameter are available, the precision will be determined as the Relative Standard Deviation (RSD) according to:

$$\mathrm{RSD} = \frac{\text{Standard deviation}}{\text{Average X}} \times 100$$

11.3 COMPLETENESS

Completeness of data generated from a test program is usually calculated as follows:

$$\%\ \text{Completeness} = \frac{\text{Valid data}}{\text{Expected data}} \times 100$$

Data completeness for this project requires that all field samples be judged to be valid. The completeness objective for this test program is to generate sufficient data to certify closure activities.

12.0 CORRECTIVE ACTION PROCEDURES AND PERFORMANCE AUDITING AND REPORTING

12.1 CORRECTIVE ACTION PROCEDURES

The following procedures have been established to ensure those nonconforming conditions, such as malfunctions, deficiencies, deviations and errors are promptly investigated, documented, evaluated, and corrected. Every person employed in the closure sampling activities is expected to function as a QC inspector to ensure the quality of the final product. Quality, as it relates to this project, is defined as "performing the work according to the agreed upon specifications contained in the Closure Plan and relevant SOPs or causing the specification to be changed in a controlled manner." Each individual is encouraged to identify any condition adverse to the successful completion of the work or any modification to the specifications that might result in a better end product. These improvements might be framed in terms of higher quality, greater safety, greater efficiency, and/or lower cost. However, it cannot be stressed strongly enough, that only documented and approved changes to the specifications are allowable.

12.2 FIELD

When a nonconforming condition or an opportunity for improvement is noted at the site or contractor location, the corrective action provisions of this plan will be invoked to identify the condition and recommend corrective action. Condition identification, cause, reference documents and the corrective action planned to be taken will be documented and reported at a minimum to the employee's immediate supervisor.

A Corrective Action Request (CAR), an example of which is shown in Figure 12-1, should be used to identify the adverse condition or opportunity for improvement, reference document(s) and recommended corrective action(s). The CAR is directed to the Professional Engineer. The Professional Engineer affixes his signature and the date to the corrective action block and states the cause of the condition(s) and corrective action(s) to be taken. The Professional Engineer then forwards the requested response to the QAO (if different from the Professional Engineer) for follow-up and filing. The QAO maintains the log for status control of CARs and responses confirms the adequacy of the intended corrective action(s) and verifies its implementation. The QAO will issue and distribute copies of completed CARs to the originator, Professional Engineer and the involved contractor(s) if any. CARs are transmitted to the project file for future reference.

12.3 LABORATORY

The laboratories' QA Manuals and the related SOPs, contain detailed discussions of corrective actions to be taken if established criteria fail during laboratory analysis. The laboratory has the responsibility to immediately notify the Professional Engineer and/or QAO when any analytical QC nonconformance occurs, so a mutually acceptable course of action can be pursued.

Figure 12-1. Example Corrective Action Request Form

Number:
Date:
File Name: SII

To:

You are hereby requested to take corrective actions indicated below and as otherwise determined by you (A) to resolve the noted condition and (B) to prevent it from recurring. Your written response is to be returned to the project Quality Assurance Officer or other responsible manager by:

Condition:

Reference Documents:

Recommended Corrective Actions:

Originator	Date	Approval	Date	Approval	Date

RESPONSE

Cause of Condition:

Resolution:

Prevention:

Affected Documents:

Signature	Date	QA Follow-up on Corrective Action Verified	Date

12.4 PERFORMANCE AUDITS AND QUALITY REVIEWS

This section presents information related to the procedures used by the QA staff to assess conformance of the project staff to specifications contained in the SAP and QAPP. Further auditing may be employed to assess the ability of subcontractors to successfully perform the work.

The QAO or Professional Engineer will conduct audits of the sampling at the site to ensure that work is being performed in accordance with the SAP and QAPP. He/she may also choose to audit the laboratory at any time during the course of the project.

The QAO or Professional Engineer will also review the analytical data to determine compliance with the QAPP, the referenced method and SOPs.

The QAO or Professional Engineer will document performance audits and quality reviews. These reviews will include:

- Overview of activities and significant events related to QA/QC;
- Review of corrective action request status;
- Laboratory QA/QC reports;
- Data reviews; and
- Summary of significant changes in procedures or QA/QC programs.

APPENDIX XVIII

FINANCIAL ASSURANCE INSTRUMENT

FOR

SIEMENS INDUSTRY, INC.

PARKER REACTIVATION FACILITY

PARKER, ARIZONA

Revision 1
April 2012

BNP PARIBAS
CORPORATE & INVESTMENT BANKING

BNP PARIBAS
TRADE FINANCE OPERATIONS
787 SEVENTH AVENUE
NEW YORK, NY 10019

DATE: FEBRUARY 21, 2012

AMENDMENT TO IRREVOCABLE STANDBY LETTER OF CREDIT 91914758

BENEFICIARY:
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGIONAL ADMINISTRATOR OF REGION 9
75 HAWTHORNE STREET
SAN FRANCISCO, CA 94612

WE ARE INSTRUCTED BY SIEMENS INDUSTRY, INC. TO AMEND CREDIT 91914758 IN YOUR FAVOR AS FOLLOWS:

THIS AMENDMENT IS AN INTEGRAL PART OF THE ORIGINAL CREDIT.

AMENDED TERMS:
AMOUNT INCREASED BY: USD 1,139,553.83

LETTER OF CREDIT BALANCE NOW READS: 1,699,293.00

ALL OTHER TERMS AND CONDITIONS REMAIN UNCHANGED.

BNP PARIBAS
BY BNP PARIBAS RCC, INC., AS AUTHORIZED AGENT

AUTHORIZED SIGNATURE   AUTHORIZED SIGNATURE

APPENDIX XIX

SUBPART BB COMPLIANCE PLAN

Siemens Industry, Inc.

2523 Mutahar Street

Parker, Arizona 85344

928-669-5758

April 2012

Revision 1

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LIST OF ATTACHMENTS

1.0 GENERAL FACILITY INFORMATION

Siemens Water Technologies, Inc. (Siemens) operates a carbon reactivation facility in Parker, Arizona (the "Facility"). The Facility manages spent activated carbon classified as hazardous waste from a wide variety of sources. Prior to processing, the spent material is temporarily stored in containers and tanks. The spent carbon is processed in a multiple hearth reactivation furnace to restore specific product quality standards. The off-gases from the reactivation furnace are vented to an air pollution control system consisting of an afterburner and several wet scrubbing devices.

Both containerized and bulk shipments are received at the Facility. Upon receipt, all shipments are inspected, sampled and tested in accordance with the Facility's Waste Analysis Plan. Upon approval, containerized shipments are stored in properly designated areas or immediately charged to the feed system. Bulk shipments are off-loaded dry or in a wet slurry form directly into the feed system. In all cases, the spent carbon is placed into hoppers and is mixed with water to form a slurry, which is then transported using water educators to holding tanks and a feed tank.

The spent carbon slurry is discharged from the feed tank to a dewatering screw which conveys the spent carbon to a weigh belt and into the reactivation furnace. The motive water separated from the spent carbon is collected and reused within the facility.

2.0 APPLICABILITY

The equipment leak standards outlined in the RCRA Subpart BB regulations apply to emissions from equipment including valves, pumps, compressors, and lines in contact with hazardous waste streams with organic concentrations in excess of 10% by weight.

The specific requirements for pumps (§264.1052 and §264.1058), compressors (§264.l053), sampling connection systems (§264.1055) and closed vent systems (§264.1060) do not apply to the Facility because that equipment is not used for the management of spent activated carbon. The specific requirements for pressure relief devices in gas/vapor service (§264.1054) do not apply because the hazardous wastes managed at the Facility are not in gas or vapor form.

The other equipment listed in the regulations (valves, flanges, and other pressure relief devices) may be used at the facility when slurrying spent carbon/water mixtures between bulk shipment vessels, feed hoppers, storage tanks and the feed tank.

3.0 COMPLIANCE PLAN

Siemens proposes a three (3) tier approach to demonstrate compliance with the RCRA Subpart BB standards.

3.1 Tier 1 - Exempt from Subpart BB Standards

Siemens has conducted a waste determination and has determined that the organic loading of materials currently being managed at the facility is less than 10% by weight. Therefore the RCRA Subpart BB standards do not apply. Information regarding the waste determination is presented in Attachment 1.

The waste determination calculates the organic loading on the spent activated carbon as it is received at the Facility, which would result in an organic loading of 10 wt% after the slurring operation. These calculations show that the “as received” carbon must contain an organic loading of at least 55 wt% in order for the final slurried carbon handled at the Facility to contain an organic loading of 10 wt% and being potentially subject to the RCRA Subpart BB standards. Should Siemens accept spent activated carbon waste streams with greater than 55% by weight organics, stream specific waste determinations, similar to the determination presented in Attachment 1, will be made. The stream specific waste determinations will be made based on information provided on the specific Spent Carbon profile sheets, specific information regarding how the material will be water slurried, and specific analytical data (as required). Provided the waste determination indicates less than 10% organics of the spent carbon/water slurry mixture, the Subpart BB standards do not apply.

Siemens will demonstrate compliance with this section by:

1. Profile Sheets

A profile sheet for each spent carbon waste stream managed at the facility is included in the Facility’s operating records. The profile sheet includes information regarding loading of each spent carbon stream which can be compared to the waste determination.

2. Waste Determinations

Batch specific waste determinations, similar to the analysis presented in Attachment 1, will be made as required. The waste determination(s) will be completed in accordance with §264.1063(d) and will be included in the operating record.

3.2 Tier 2 - Exempt if Less Than 300 Hours per Calendar Year Operation

As stated above, the waste determination demonstrating the organic content of the spent carbon/water mixtures managed at the facility are less than 10% by weight is based on a maximum loading of 55% by weight organics on the carbon. A review of operating records indicate that the vast majority of carbon streams received at the Facility have an organic loading that is much lower than 55 wt%. There are however, a few instances in which Siemens would receive a spent carbon containing greater than 55% by weight organics. Per §264.1050(f), provided that the operations involving these materials is less than 300 hours per calendar year, the Subpart BB standards do not apply.

Siemens will demonstrate compliance with this section by including data in the operating record on the hours of operations involving spent carbon/water mixtures greater than 10% by weight. In particular, detailed logs identifying applicable equipment in contact with the specific waste streams and the hours that the specific equipment was used for the slurry operations involving those waste streams will be maintained at the facility. These data will be used to develop the list of equipment required by §264.1064(g)(6).

3.3 Tier 3 - Compliance with Subpart BB Standards

Should Siemens manage spent carbon/water mixtures with greater than 10% by weight organics for greater than 300 hours per calendar year, Siemens will comply with the RCRA Subpart BB standards. The specific equipment that will be used at the facility for slurrying spent carbon/water mixtures between bulk shipment vessels, storage tanks and the feed tank will be operated and marked in accordance with the applicable standards of §264.1052 through 1063. All applicable recordkeeping and reporting requirements will be included in the Facility's operating record.

As stated above, detailed logs recording applicable equipment and hours of use will be maintained. In preparation of demonstrating compliance with the Subpart BB standards, at 200 hours of operation, each applicable piece of equipment will be marked as specified in 40 CFR §264.1050(d).

At least 30 days before operating under Tier 3 compliance, Siemens will submit notification to EPA enumerating the specific requirements from 40 CFR §264.1050 through 264.1065 to the operations at the Facility.

ATTACHMENT 1

RCRA SUBPART BB WASTE DETERMINATION

RCRA SUBPART BB WASTE DETERMINATION

OBJECTIVE: Calculate the maximum organic loading on “as received” carbon that will result in a 10 wt% organic loading after slurry operations.

BASIS: Worst case carbon loading is on Vapor Phase carbon.

According to Process Flow calculations for vapor phase carbon (Siemens Drawing PC-1466-PR-003, Rev 1, 2-12-2007), there is 13,154 pounds of water added to 1,237 pounds of carbon (dry, organic-free basis). This is the lowest water-to-carbon ratio shown on any of the process calculations reviewed for this waste determination, so it will result in the highest final organic concentration after slurrying.

A maximum organic loading of 10 wt% after slurrying is allowable without triggering RCRA Subpart BB applicability.

CALCULATIONS:

Carbon, as received:	1,237 lb C 75 lb water
Slurrying water added:	13,154 lb
Final composition (organic free):	1,236 lb C 13,229 lb water 14,266 lb total

At 10 wt% organics, the total carbon, plus water is equal to 90% of the total mass, thus:

$$\frac{14{,}466\ lb}{0.90} = 16{,}073\ lb\ total\ mass\ (carbon + water + organics)$$

Organic content = $16{,}073 - 14{,}466 = 1{,}607\ lb\ organics$

On an “as received” basis, the maximum organic loading on the carbon that will result in 10 wt% organic loading after slurrying is:

$$\frac{1{,}607\ lb\ organic}{(1{,}237\ lb\ C + 75\ lb\ H_2O + 1{,}607\ lb\ organic)} \times 100\% = 55\ wt\%\ organics$$

CONCLUSION:

Spent activated carbon received at the Facility with organic loadings of less than 55 wt% will not trigger RCRA Subpart BB applicability.

ATTACHMENT 2

LIST OF EQUIPMENT ITEMS THAT MAY CONTAIN OR CONTACT WASTE WITH GREATER THAN 10% ORGANICS FOR LESS THAN 300 HOURS PER YEAR

LIST OF EQUIPMENT ITEMS THAT MAY CONTAIN OR CONTACT WASTE WITH GREATER THAN 10% ORGANICS FOR LESS THAN 300 HOURS PER YEAR

Flanges between the Spent Carbon Unloading Hoppers (H-1 and H-2) and the Spent Carbon Storage Tanks (T-1, T-2, T-5, and T-6)

Flanges between the Spent Carbon Storage Tanks (T-1, T-2, T-5, and T-6) and the Furnace Feed Tank (T-18)

APPENDIX XX

SUBPART CC COMPLIANCE PLAN

FOR

EVOQUA WATER TECHNOLOGIES

PARKER REACTIVATION FACILITY

PARKER, ARIZONA

Revision 6
July 2014

Subpart CC Compliance Plan

Hazardous Waste Treatment, Storage and Disposal Facilities
and Hazardous Waste Generators; Organic Air Emission
Standards for Tanks, Surface Impoundments and Containers

Evoqua Water Technologies

Parker, Arizona

Revision 6
July 2014

Evoqua Water Technologies
Subpart CC Compliance Plan
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Evoqua Water Technologies

Subpart CC Compliance Plan

1. Introduction

This document summarizes the applicable air emission standards that apply to tanks, surface impoundments and containers used to manage hazardous waste relative to the Evoqua Water Technologies, Parker, Arizona facility under the U.S. Environmental Protection Agency (EPA) final Subpart CC regulations, and provides the plan to assure compliance with these standards. As discussed below, the Subpart CC regulations specifically exempt waste management operations performed in tanks and containers that comply with the National Emission Standards for Benzene Waste Operations promulgated by the EPA under the Section 112 of the Clean Air Act - National Emission Standards for Hazardous Air Pollutants (NESHAP), codified at 40 CFR Part 61, Subpart FF.

2. Facility Description

A detailed description of the facility operations is provided in Section D of the facility's Part B application dated April 2012.

3. Management Summary of Rule Requirements

Under Section 3004(n) of the authority of the Resource Conservation and Recovery Act (RCRA), the EPA has established standards to control air emissions from hazardous waste treatment, storage and disposal facilities as may be necessary to protect human health and the environment. Briefly, the EPA has established air emission standards for the following hazardous waste management units:

- ***Process Vents*** - referred to as Subpart AA regulations (codified at 40 CFR §264.1030, *et seq*. For permitted Treatment Storage and Disposal Facilities (TSDF) and 40 CFR §265.1030, *et seq.* for TSDFs allowed to manage hazardous waste under interim status.)

- ***Equipment Leaks from Pumps, Valves and Compressors*** - referred to as Subpart BB regulations (codified at 40 CFR §264.1050, *et seq.* or permitted Treatment Storage and Disposal Facilities (TSDF) and 40 CFR §265.1050, *et seq.* for TSDFs allowed to manage hazardous waste under interim status.

- ***Tanks, Surface Impounds and Containers*** - referred to as Subpart CC regulations (codified at 40 CFR §264.1080, *et seq.* or permitted Treatment Storage and Disposal Facilities (TSDF) and 40 CFR §265.1080, *et seq.* for TSDFs allowed to manage hazardous waste under interim status.) [1]

None of the waste management units at the facility are subject to Subpart AA or BB. Briefly, the facility is not subject to Subpart AA as there are no process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction, or air or steam stripping (§265.130). Evoqua has conducted a waste determination and has determined that the organic loading of materials currently being managed at the facility is less than 10% by weight. Therefore the RCRA Subpart BB standards do not apply. Information regarding the waste determination is presented in Appendix XIX of the Part B Application. (§265.1050(b)). This compliance plan deals only with EPA Subpart CC standards that apply to tanks, surface impounds and containers that manage hazardous waste at the facility.

Relative to the Parker facility, the facility manages wastes in tanks and containers but not in surface impoundments. The tanks at the facility that are used for waste management are exempt from *all* Subpart CC emission control, monitoring, sampling, testing, reporting and record keeping requirements *provided* the facility certifies that these waste management units are equipped and operated with air emission controls in accordance with the Benzene Waste Operations NESHAP (40 CFR §61.340, *et seq.*). The final standards, as amended on November 25, 1996 provide in pertinent part that:

> **(*b*) *The requirements of this subpart [Subpart CC] do not apply to the following waste management units at the facility:***
>
> * * * * * * * * * * * * *
>
> ***(7) A hazardous waste management unit that the owner or operator certifies is equipped with and operating air emission controls in accordance with the requirements of an applicable Clean Air Act regulation codified under 40 CFR 60, 61 or part 63. For the purpose of complying with this paragraph, a tank for***

---

[1] Subpart CC regulations have a lengthy regulatory history. Briefly, the final standards were originally promulgated on December 6, 1994 (59 FR 69826). The final rule caused much confusion and met with substantial opposition from the regulated community. The effective date of the rule was extended on three separate occasions (60 FR 26828, May 19, 1995; 60 FR 56952, November 13, 1995 and 61 FR 28508, June 5, 1996); EPA issued three subsequent final interpretive ruling to clarify Subpart CC requirements and to request additional public comment (60 FR 41870, August 14, 1995 and 61 FR 4903, February 9, 1996 and 61 FR 59932, November 25, 1996).

***which the air emission control includes an enclosure, as opposed to a cover, must be in compliance with the enclosure and control device requirements of §265.1085(I), except as provided in §265.1080(c)(5). [40 CFR §265.1080(b)(7)*]**

A tank or container for which all hazardous waste entering the unit has an average volatile organic (VO) concentration at the point of waste origination of less than 500 parts per million by weight (ppmw) is subject to Subpart CC, but is exempt from air emissions control requirements (§265.1082(c)). The average VO concentration is to be determined either by sampling and testing as directed by Subpart CC or by operator knowledge of the waste (§264.1084). If test data are used as the basis for knowledge, then the operator must document the test method, sampling protocol, and the means by which sampling and analytic variability are accounted for in determination of average VO concentration (§265.1084(b)(4)(ii)). Operators that rely on average VO concentration in a hazardous waste to exempt a unit from air emission controls must review and update, as necessary, this determination at least once every 12 months following the initial determination ((§265.1082(c)(1)).

For containers at the facility that are used for waste management, those that contain hazardous waste with an average VO concentration greater than 500 ppmw (and are not subject to the Benzene Waste NESHAP) must comply with prescribed air emission control requirements, testing, monitoring and reporting provisions of Subpart CC (§§265.1085-1088). Currently, only certain containers at the facility meet these prerequisites and are subject to air control requirements of Subpart CC. This plan applies to those containers as described below.

4. Evoqua Water Technologies Subpart CC Compliance Plan

The Subpart CC compliance plan for the Evoqua Water Technologies facility identifies three types of waste management units:

- Waste management units (containers) that are regulated per Subpart CC requirements:
- Waste management units that are exempt from Subpart CC requirements because they are otherwise regulated under the Benzene Waste Operation NESHAP; and
- Waste management units that have a volatile organic (VO) concentration less than 500 ppmw, and are therefore exempt from the Subpart CC air emissions control requirements ((§§265.1085-1087). Record keeping and monitoring requirements under Subpart CC apply to these exempt units §§265.1082(c)(1 and 1090(f)).

Compliance requirements for each of these categories of waste management units is discussed below.

4.1 Subpart CC Applicability

4.1.1 Tanks Standards

Under the final Subpart CC regulations, tanks that are equipped with and comply with the Benzene Waste Operations NESHAP (Subpart FF) are exempt from all Subpart CC requirements (see 40 CFR §265.1080(b)(7)). Therefore, the facility will demonstrate compliance with Subpart CC regulations by assuring that all tanks used to manage hazardous waste are equipped with appropriate air emission controls as required by, and operate in compliance with, Subpart FF.

4.1.2 Container Standards 40 CFR 264.1086 (c)

For containers that are not regulated under Subpart FF, a variety of container types are used to store and manage spent carbon at the Facility. All of these containers, including bulk bags, drums, various types of spent carbon adsorption vessels, and other portable vessels, must meet the performance standards for containers in 40 CFR §264.1086 when managing Subpart CC regulated hazardous waste. This section applies only to those containers not regulated under Subpart FF.

1. Container Requirements for Subpart CC

A. Containers with a design capacity less than or equal to 26.4 gallons are exempt from Subpart CC requirements. 40 CFR §264.1080(b)(2).

B. Containers with a design capacity greater than 26.4 gallons and no more than 119 gallons are subject to Level 1 controls.

C. Containers with a design capacity of greater than 119 gallons that <u>are not</u> in light material service are subject to Level 1 controls.

D. Containers with a design capacity of greater than 119 gallons that <u>are</u> in light material service are subject to Level 2 controls.

E. Containers with a design capacity of greater than 26.4 gallons that are used for treatment of a hazardous waste by a waste stabilization process are subject to Level 3 controls. The Facility does not treat hazardous waste in containers using a waste stabilization process and therefore Level 3 controls are not further discussed.

In light material service is defined as managing a material for which both of the following conditions apply: (i) the vapor pressure of one or more of the organic constituents in the material is greater than 0.3 kPa at 20° C; and (ii) the total concentration of the pure organic constituents having a vapor pressure great than 0.3 kPa at 20° C is equal to or greater than 20 percent by weight. 40 CFR §265.1081.

4.1.2.1 Containers - Level 1 Controls.

For containers subject to Level 1 controls, the Facility complies with Subpart CC as follows:

A. All Level 1 containers are subject to the following requirements:

(i) Level 1 containers must be compliant with US DOT hazardous material packaging requirements - *i.e.,* these containers meet the requirements of 49 CFR Parts 178 and 179, and waste is managed in accordance with 49 CFR Parts 107 (subpart B), 172, 173 and 180 (no exceptions to 178 or 179 are allowed for this purpose) (see 40 CFR §264.1086(f)); <u>or</u>

(ii) Level 1 containers must be equipped with a cover and closure devices that form a continuous barrier such that there are no visible holes, gaps or other open spaces.

B. All containers are inspected upon receipt (on or before the date of acceptance at the Facility), and repairs are conducted where defects are observed, as follows:

(i) visual inspections are conducted to ensure the containers are equipped with a cover and closure devices that form a continuous barrier over the container openings such that when the cover and closure devices are secured in a closed position there are no visible cracks, holes, gaps or other open spaces into the interior of the containers. 40 CFR §264.1086(c)(1)(ii) and 264.1086(c)(4)(i); and

(ii) visual inspections also confirm that the containers meet the applicable US DOT requirements on packaging hazardous materials for transportation in 49 CFR Parts 107, 172, 173, 178, and 180. 40 CFR §264.1086(d)(i) and 1086(f) see 40 CFR §264.1086(c)(1)(i)); and

(iii) where defects in containers are detected, the Facility makes first attempts to repair no later than 24 hours from detection and completes repair with as soon as possible and in any event within 5 calendar days, or alternatively transfers the waste to an intact container or tank.

C. Where containers are initially placed in service at the Facility, the inspection occurs when the cover is applied to the container. If containers were to remain in use at the Facility for a period of one year or more, the Facility would conduct a visual inspection at least once every 12 months as discussed in item A above. (Since storage of hazardous waste is currently prohibited for more than one year, these inspections are not anticipated.) See 40 CFR §264.1086(c)(4)(ii).

D. The Facility's operating practice is to only open containers subject to Level 1 controls for the following reasons:

(i) to remove wastes in a continuous process until the container is RCRA empty (40 CFR §261.7(b)); or to remove waste in batches, in which case containers are closed upon completion of the batch removal for 15 minutes or if the operator leaves the immediate vicinity;

(ii) to perform routine activities other than waste transfer, provided that the containers are promptly closed; and

(iii) to open a safety device to avoid an unsafe condition.

4.1.2.2 Containers - Level 2 Controls

For containers subject to Level 2 controls, the Facility complies with Subpart CC as follows:

A. All Level 2 containers are subject to the following requirements:

(i) Level 2 containers must be compliant with US DOT hazardous material packaging requirements - *i.e.,* containers meet the requirements of 49 CFR Parts 178 and 179, and waste is managed in accordance with 49 CFR Parts 107 (subpart B), 172, 173 and 180 (no exceptions to 178 or 179 are allowed for this purpose) (*see* 40 CFR §264.1086(f)); <u>or</u>

(ii) Level 2 containers must be tested upon receipt to confirm that they operate with no detectable organic emissions as determined though Method 21.

B. All containers are inspected upon receipt (on or before the date of acceptance at the Facility), and repairs are conducted where defects are observed, as follows:

(i) visual inspections confirm that the containers are equipped with a cover and closure devices that form a continuous barrier over the container openings such that when the cover and closure devices are secured in a closed position there are no visible cracks, holes, gaps or other open spaces into the interior of the containers. 40 CFR §264.1086(d)(4)(i);

(ii) visual inspections also confirm that the containers meet the applicable US DOT requirements on packaging hazardous materials for transportation in 49 CFR Parts 107, 172, 173, 178, and 180. 40 CFR §264.1086(d)(i) and 1086(f); and

(iii) where defects in containers are detected, the Facility makes first attempts to repair no later than 24 hours from detection and completes repair with as soon as possible and in any event within 5 calendar days, or alternatively transfers the waste to an intact container or tank. 40 CFR §264.1086(d)(4)(iii).

C. Where a container is initially placed in service at the Facility, the inspection occurs when the cover is applied to the container. 61 Fed. Reg. 59947. If containers remain in use at the Facility for a period of one year or more, the Facility conducts a visual inspection at least once every 12 months as discussed in item B above. (Since storage of hazardous waste is currently prohibited for more than one year, these annual inspections are not anticipated.) 40 CFR §264.1086(d)(4)(ii).[

D. All transfers of hazardous waste subject to Subpart CC out of a container is conducted to minimize exposure of the waste to the atmosphere, to the extent practical, considering the physical properties of the waste and good engineering and safety practices for handling the wastes.

4.1.2.3 Container Recordkeeping

Level 1 and Level 2 containers are subject to very limited recordkeeping requirements under Subpart CC. *See* 61 Fed. Reg. 59947 (Nov. 25, 1996). The facility's Waste Tally sheet is used to document that the containers meet USDOT and visual inspection requirements.

Listed below, in Table 1, are the waste management units at the facility that are potentially subject to Subpart CC requirements, together with the applicable Benzene NESHAP Subpart FF requirement:

Table 1

I.D. NO.	DESCRIPTION	APPLICABLE SUBPART FF STANDARD (40 CFR §)	COMMENTS
N/A	Spent Carbon Containers Subject to Subpart FF	§61.345	Subpart FF wastes are stored in drums and other containers. All RCRA drums and containers received at the facility that are also regulated under Subpart FF are managed as Subpart FF-affected wastes.
N/A	Debris Bin and Associated Drums.	§61.345 §61.34(f)	All RCRA waste drums at the facility are managed as Subpart FF-affected wastes. Benzene wastes shipped offsite must meet container and offsite shipment requirements.
H-1 **H-2**	Spent carbon unloading hoppers, Nos. 1 and 2.	§61.348	Both hoppers H-1 and H-2 receive spent carbon from containers and are managed as Subpart FF-affected units. Emissions from these hoppers are directed to WS-2.
T-1	Spent Carbon Storage Tank	§61.343	Tank T-1 is managed as a Subpart FF-affected unit. Tank vapors are controlled by carbon adsorber (WS-1).
I.D. NO.	**DESCRIPTION**	**APPLICABLE SUBPART FF STANDARD (40 CFR §)**	**COMMENTS**
	Spent Carbon Storage		Tank T-2 is managed as a Subpart

T-2	Tank	§61.343	FF-affected unit. Tank vapors are controlled by carbon adsorber (WS-1).
T-5	Spent Carbon Storage Tank	§61.343	Tank T-5 is managed as a Subpart FF-affected unit. Tank vapors are controlled by carbon adsorber (WS-1).
T-6	Spent Carbon Storage Tank	§61.343	Tank T-6 is managed as a Subpart FF-affected unit. Tank vapors are controlled by carbon adsorber (WS-1).
T-11	Scrubber/Recycle/Boiler and Cooling Tower Blow- Down Water Storage Tank	§61.342(c)	Exempt from treatment since benzene concentration is less than 10 ppmw.
T-19	Packed Bed Scrubber Recirculation Tank	§61.342(c)	Exempt from treatment since benzene concentration is less than 10 ppmw.
RF-2 AB-2	Reactivation Furnace No.2 and Afterburner No. 2	§61.348	Regenerated carbon must contain less than 10 ppmw benzene and the unit must meet 99+% benzene destruction efficiency.
WS-1	Carbon Adsorber No.1	§61.349	Carbon canister, used to control volatile emissions from Tanks T-1, T-2, T-5, T-6, and T-9.
WS-2	Carbon Adsorber No.2	§61.349	Carbon canister, used to control volatile emissions from Hoppers H-1 and H-2.
WS-3	Carbon Adsorber No.3	§61.349	Carbon canister, used to control volatile emissions from Tank T-18 (T-18 is not a RCRA-regulated tank).

Listed below, in Table 2, are the waste management units at the facility that are subject to Subpart CC requirements as they are not regulated under Subpart FF.

Table 2

I.D. NO.	DESCRIPTION	APPLICABLE SUBPART CC STANDARD (40 CFR §)	COMMENTS
N/A	Spent Carbon Containers	40 CFR 264.1086 (c)	All non-FF RCRA containers received at the facility are managed in accordance with the applicable portions of the US DOT hazardous material packaging requirements - *i.e.,* for containers, 49 CFR Parts 178and for waste, 49 CFR Parts 107 (subpart B), 172, 173 and 180 (no exceptions to 178 or 179 are allowed for this purpose) (*see* 40 CFR §264.1086(f)). Each container is equipped with a cover and/or closure devices that form a continuous barrier such that there are no visible holes, gaps or other open spaces.

As summarized above, all process units, debris bins and waste management containers at the facility are subject to the Benzene Waste NESHAPs with the exception Tanks T-19 and T-11. Tank T-19 recirculates water to the packed bed scrubber and is the introduction point for makeup water added to the scrubber system. City water is used for makeup. Tank T-11 collects scrubber water blow down, cooling water blow down, boiler blow down and excess recycle water. T-11 is therefore potentially subject to regulation under Subpart CC, as it is not regulated under the Benzene Waste Operations NESHAP.

4.2 Waste Management Units Exempt From Subpart CC Control Requirements

As summarized in Section 4.1, Tank T-11 is subject to Subpart CC because it is not is not regulated under the Benzene Waste Operations NESHAP, and not otherwise exempt under §265.1080. As demonstrated below, Tank T-11 is not subject to the Subpart CC air emission control requirements because the average VO concentration in the waste entering the unit is less than 500 ppmw (§264.1082(c)(1)). Tank T-11 is, however, subject to monitoring and record keeping requirements (§§265.1082(c)(1) and 1090(f)(1)), which are discussed below.

4.3 VO Concentration Determination Procedures

4.3.1 Initial VO Concentration Determination

Operator knowledge provides the basis to conclude that the average VO concentration of hazardous waste entering Tank T-11 is less than 500 ppmw from T-9. The following test data from sampling previously conducted confirm that the average VO concentration of waste entering Tank T-11 is less than 500 ppmw:

- On November 30, 1994, the facility sampled the recycle water that drains from Tank T-12 to Tank T-11. Samples were collected from the process line that connects these two tanks. This sampling point was selected to assure that the sample will be representative of the VO concentration at the point of generation. A sample cannot be obtained directly from T-11, as the tank also receives scrubber water blow down, boiler blow down and cooling tower blow down. Further, obtaining a sample from the process line assures that there will be no gravitational or phase separation of VO constituents, which may bias the sample.

- On February 22, 1994, December 19, 1994 and October 12, 1995, the facility sampled the water discharged from Tank T-11 prior to discharge, under permit, to the sanitary sewer. This sampling point was selected as representative of the average VO concentration at the point of discharge.

The sample collection and handling procedures were in accordance with EPA Publication No. SW-846, "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", as amended by Update I, November 15, 1992. Briefly, screw cap VOA vials with Teflon lined silicone septa were used to collect the sample. Care was taken to assure that no air bubbles were entrained in the vial prior to closure. Samples were preserved as required in the applicable methods, stored at 4° C, and analyzed within holding times. Concentration of VO constituents were determined by EPA Methods 8260 (volatile organics), 8270 (semi-volatile organics), 8080 (organochlorine pesticides and PCBs) and 8015 (GC/FID Alcohol Screen).

Total VO concentration reported in each of these four sampling events are summarized in Table 2, below:

Table 3

Summary of VO Concentration Reported in Prior Sampling of Tank T-11

Sampling Event	Reported Total VO Concentration
November 30, 1994	519 µg/l
February 22, 1994	Below Detection Limits
December 19, 1994	22 µg/l
October 12, 1995	23 µg/l

4.3.2 Future VO Concentration Determinations

The facility must review, and as necessary, update this VO determination every 12 months (§265.1082(c)(1)). The annual confirmatory analyses of the annual samples can be found in Appendix B. If the Facility staff determines that the initial VO concentration determination defined in Section 4.2.1 is no longer valid, additional waste determination sampling must be performed. Such sampling must comply with requirements outlined in (§§265.1084(a)(2) and (3), which are briefly summarized below:

- Must identify and record the point of origination for the hazardous waste (§265.1084(a)(3)(I)).

- Sampling must be performed pursuant to a sampling plan, and must meet the following requirements:

    - Identification of where in the process the samples are to be taken.

    - The appropriate averaging period to be used to determine the average VO concentration in the sample. The averaging period cannot exceed one (1) year. Record the date, time and location that each sample is collected and maintain these data in the Subpart CC sampling plan.

    - The sample collection method used to minimize volatilization of organic compounds contained in the sample. At least four (4) samples are required to calculate the average volatile organic concentration.

    - The analytic methods used to determine concentrations of volatile organic compounds. Acceptable analytic methods include: Method 25D, Methods 8260(latest version) and 8270(latest version) as defined in SW-846, Methods 624, 625, 1624 and 1625 as defined in 40 CFR Part 136. If any method aside from Method 25D is used, the facility must demonstrate that all target compounds in the sample are included amount those compounds listed by the EPA as ones for which the method is considered appropriate. If target compounds are not on this list, additional requirements will apply to the analytic methods (see §265.1084(a)(3)(iii)). The sampling plan must include a quality assurance plan to document the specific procedures used to minimize loss of VO compounds due to volatilization, reaction, biodegradation, or sorption during the sample collection, storage, and preparation steps, and a measurement of the overall accuracy and precision of the specific procedures. Further, if analytic methods other than Method 25D are used, the facility may exclude those organics with a Henry's Law constant values less than 0.1 mole-fraction-in-the-gas-phase/mole-faction-in-the-liquid-phase. A list of all such compounds is included in Appendix VI to the final Subpart CC regulations.

Sampling locations are shown in Figure 1. A sampling plan is provided in Appendix C. EPA reference analytical methods are shown in Appendix D. Laboratory SOPs for the analytical methods are presented in Appendix E.

4.4 Monitoring Requirements

Provided the VO concentration of liquids contained in Tank T-11 remains below 500 ppmw, the facility must perform the following monitoring of its operations:

- Assure that the facility complies with all applicable requirements as defined in the Benzene Waste Operations NESHAP - Subpart FF.

- Review the waste determination for Tank T-11 on an annual basis, no later than December 4 of each calendar year (see §265.1083(c)(1)).

This section must be updated should either the exemption status of T-11 change or if the applicability determinations for Subpart FF are modified.

4.5 Record Keeping Requirements

The Facility must maintain the following records as part of the Subpart CC Plan:

- Maintain the sampling data attached in Appendix B ((see §265.1090(f)(1).

This section must be updated should either the exemption status of T-11 change or if the applicability determinations for Subpart FF be modified.

4.6 Reporting Requirements

Under the final regulations promulgated on November 25, 1996, Subpart CC applicability was amended to exempt any hazardous waste management unit that the facility certifies is equipped with and operating air emission controls in accordance with the Benzene Waste Operations NESHAP (Subpart FF). The notification and reporting provisions included in the final Subpart CC regulations do not specifically require that the facility send such a certification to the U.S. EPA (see §265.1090). However, to assure compliance with this revised applicability standard, the facility has made this certification in letter to the U.S. EPA, Region IX. A copy of this letter is attached at Appendix A.

Under 40 CFR Part 270, facilities that manage hazardous waste under interim status must amend their Part B permit application to define the inspection and control systems employed at the facility to comply with Subpart CC requirements. As discussed above, no such inspection or control requirements apply to the facility, as all waste units are either exempt under §265.1080(b)(7), or are exempt from control requirements under §265.1083(c). Thus there is no requirement to modify the Part B permit application for the facility. The letter certifying compliance with Subpart CC advises EPA Region IX that no such modification to the Part B permit application is required for the facility.

APPENDIX XXI

RECORDS RETENTION REQUIREMENTS

FOR

EVOQUA WATER TECHNOLOGIES

PARKER REACTIVATION FACILITY

PARKER, ARIZONA

Revision 2
June 2014

Evoqua Water Technologies

CORPORATE RECORDS RETENTION PLAN

The objective of this plan is to establish guidelines for retention of facility records to ensure consistency with regulatory requirements and company policy. The records that are subject to this guideline may exist in a variety of physical forms, including paper documents, electronic data, video tape, audio tape, microfilm, microfiche, and other forms of data storage.

All facility records are to be retained for the longest period required by either applicable law or company policy. Upon the conclusion of the longer record retention period, records should be destroyed to reduce the costs of storage, indexing and handling the large quantity of records which would otherwise accumulate.

Destruction of records identified in this guideline should take place only in compliance with these provisions in order to avoid any inference that a particular record was inappropriately destroyed. Records that are no longer necessary to retain under this guideline may need to be retained for other unusual circumstances, such as litigation or government investigation. If for any reason there is a question about whether a document should be retained due to such unusual circumstances, company legal counsel should be consulted prior to record destruction.

The attached records retention list contains the legal retention requirement and the company's retention requirement for specific identified forms of records, and the longer of the two retention periods shall apply.

Regulatory Records Retention Requirements

EVOQUA WATER TECHNOLOGIES – PARKER FACILITY

Document	Regulation	Regulatory Requirement	Evoqua Water Technologies Requirement
Generator Requirements	***40 CFR 262***		
Waste reclamation agreement	262.20 (e)(2)	3 years from termination or expiration	
Generator copy of manifest	262.40 (a)	3 years* from date of acceptance by transporter	
Biennial Report & Exception Report	262.40 (b)	3 years* from due date	
Waste analyses	262.40 (c)	3 years* from date sent for on-site/off-site TSD	
Treatment Storage, and Disposal Facilities	***40 CFR 264****		
Inspection log	264.15 (d)	3 years from date of inspection	
Training records on current personnel	264.16 (e)	Until closure of facility	
Training records on former personnel	264.16 (e)	3 years from last day of work at facility	
TSD Facility's copy of manifest	264.71 (a)(5)	3 years from date of delivery	
Shipping papers in lieu of manifest	264.71 (b)(5)	3 years from date of delivery	
Operating Record, including (1) Description and quantity of each haz waste rec'd, methods and dates of tsd at the facility; (2) Location of each haz waste w/in facility and quantity at each location; ** (3) Records and results of waste analyses. waste determinations and trial tests performed as required by: • 264.13 Waste Analysis Plan • 264.17 Ignitable, Reactive or Incompatible Waste • 264.314 Landfills • 264.341 Incinerators	264.73	Until Closure of Facility (Unless otherwise noted)	

Document	Regulation	Regulatory Requirement	Evoqua Water Technologies Requirement
• 264.1034 Subpart AA Process Vent Emissions • 264.1063 Subpart BB Equipment Leaks • 264.1084 Subpart CC Tank and Container Emissions • 268.4(a) and 268.7 Land Disposal (4) Summary reports and details of all incidents requiring implementation of contingency plan; (5) Inspection records required by 264.15(d) (only retain for 3 years); (6) Monitoring, testing or analytical data and corrective action required by: • 264.19 CQA Program • 264.191, 193, and .195 Tank Systems • 265.222, .223, and .226 Surface Impoundments • 264.252-264.254 Waste Piles • 264.276, .278, and .280(d)(1) Land Treatment • 264.302, .303, .304 and .309 Landfills • 264.347 Incinerators • 264.602 Miscellaneous Units • 264.1034(c)-(f) and .1035 Subpart AA Process Vent Emissions • 264.1063(d)-(i) and .1064 Subpart BB Equipment Leaks • 264.1082-.1090 Subpart CC Tank and Container Emissions • 264.12(b) Notices to generators (7) Closure cost estimates; (8) Waste minimization (9) Records of quantities and dates of haz waste placed in land disposal units under an LDR		3 years	

Document	Regulation	Regulatory Requirement	Evoqua Water Technologies Requirement
extension (see §268.5-8); (10) For off-site treatment, LDR notice, certification and demonstration, if applicable (§268.7 or 8); (11) For on-site treatment, LDR notice, certification and demonstration, if applicable (§268.7 or 8); (12) For off-site land disposal, LDR notice, certification and demonstration, if applicable (§268.7 or 8); (13) For off-site storage, LDR notice, certification and demonstration, if applicable (§268.7 or 8); (14) For on-site storage, LDR notice, certification and demonstration, if applicable (§268.7 or 8). (15) Records required by 264.1(j)(13).			
Monitoring records for closed-vent systems & control devices	264.1035 (d)	3 years from date of activity	
Demonstration of non-applicability of air emission standards	264.1064(k)(3)	Up-to-date in operating record	
Land Disposal Restrictions	***40 CFR 268***		
Generator notices, certifications, waste analyses, and other LDR documentation	268.7 (a)(8)	3 years from date sent for tsd	
SQG tolling agreement	268.7 (e)(2)	3 years after termination or expiration	
NESHAP – Subpart FF – Benzene Waste Operations	***40 CFR Part 61, Subparts A and FF***		
Records of monitoring data, calibration checks, and occurrence and duration of monitoring system malfunction or inoperation	61.14(f)	2 years	
Records of emission test results and other data needed to determine emissions	61.13(g)	2 years	
All other records required to be maintained under	61.356(a)	2 years from date information is	

Document	Regulation	Regulatory Requirement	Evoqua Water Technologies Requirement
Subpart FF		recorded	
Toxic Chemical Release Reporting	***40 CFR 372***		
Form R and supporting documentation	372.10	3 years from submittal	
Industrial Wastewater Discharge Permit	***CSSJV***		
All records, books, correspondence, reports, and info related to monitoring, sampling and chemical analysis	Permit No. 1002-96	3 years (or until related enforcement or litigation activities are completed)	

* Periods above extended during enforcement action or at the request of Administrator. 40 CFR 262.40(d), 40 CFR 265.74(b), 40 CFR 268.7(a)(8).
** A copy of all records of waste disposal locations and quantities must be submitted to the Regional Administrator and local land authority upon closure of the facility. 40 CFR 264.119(a).

Operating and Maintenance Manuals Maintained on Site

Equipment *	Manufacturer/ Supplier **	Purpose
Spent Carbon GAC Probes	Dynatrol	Spent Tank Level Control
Eductors	Penberthy	Transferring Spent Carbon
Spent Carbon Storage Tanks	Unknown	Storing Spent Carbon
Carbon Vessels	Siemens	Vapor Control for Spent Tanks
T-Tank PRV	Tyco	Spent Tanks Pressure Relief Valve
T-18 Furnace Feed Tank	Modern	Storing Spent Carbon
Furnace Feed Valve	Linatex	Feed Valve
Dewater Screw	B.W. Sinclair	Dewater Spent Carbon
Weigh Belt	Merrick	Measuring Spent Carbon Feed Rate
Rotary Air Lock	Wm. Meyer	Transfer Spent Carbon

LMI Chemical Pumps	LMI	Off Gas pH control
Magnetic Flow Meters	Rosemount	Off Gas Liquid Flow
Scrubber Pumps	Goulds	Venturi/Packed Bed Pumps
Quench/Venturi Scrubber	Clean Gas Inc.	Air Pollution Control
Packed Bed Scrubber	Clean Gas Inc.	Air Pollution Control
WESP	Clean Gas Inc.	Air Pollution Control
ID Fan	Barron	Gas
Stack	Warren Environmental	Gas Dispersion
CEMS Carbon Monoxide	TECO/Siemens	Measure Carbon Monoxide
CEMS Oxygen Analyzers	Ametek	Measure Oxygen
Stack Flow Meter	Cemtek	Measure Stack Flow Rate
Reactivation Furnace (RF-2)	Hankin Environmental	Reactivate Spent Carbon
Afterburner (AB-2)	Hankin Environmental	Destruction of Organics
Natural Gas Burners	North American	Temperature Control
Thermocouples	Pyco	Temperature Monitoring

***** Note - This table includes components of the facility that are exempt from permitting. Data related to these components is provided for informational purposes and ease of review only and they are not intended to become regulated components of the hazardous waste facility. .

****** Note – Manufactures are listed for informational purposes only. Facility may elect to use other vendors with comparable products.

APPENDIX XXII

STARTUP SHUTDOWN MALFUNCTION PLAN

FOR

EVOQUA WATER TECHNOLOGIES

PARKER REACTIVATION FACILITY

PARKER, ARIZONA

Revision 1
June 2014

STARTUP, SHUTDOWN, AND MALFUNCTION PLAN

EVOQUA WATER TECHNOLOGIES
2523 MUTAHAR STREET
PARKER, ARIZONA 85344

JUNE, 2014
REVISION: 1

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List of Acronyms

acfh	Actual cubic feet per hour
acfm	Actual cubic feet per minute
APC	Air pollution control
AWFCO	Automatic waste feed cutoff
Btu	British thermal unit
CAA	Clean Air Act
CEM or CEMS	Continuous emission monitor or Continuous emission monitoring system
CFR	Code of Federal Regulations
CMS	Continuous monitoring system
CO	Carbon monoxide
CRIT	Colorado River Indian Tribes
cu. ft.	Cubic foot
DC	Direct current
DRE	Destruction and removal efficiency
dscf	Dry standard cubic foot
dscfm	Dry standard cubic feet per minute
EPA	United States Environmental Protection Agency
ESV	Emergency Stack Vent
ft	Feet
gpm	U.S. Gallons per minute
gr	Grain (equals 1/7000 pound)
HAP	Hazardous air pollutant
HCl	Hydrogen chloride
hr	Hour
ID	Induced draft
in	Inch
in w.c.	Inches of water column (pressure measurement)
L	Liter
lb	Pound
mg	Milligram
ml	Milliliter
MTEC	Maximum theoretical emission concentration
NDIR	Non-dispersive infrared
ng	Nanogram
P&ID	Piping and instrumentation diagram

PCDD/PCDF	Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo furans
PDT	Performance Demonstration Test
PDTP	Performance Demonstration Test Plan
PFD	Process flow diagram
PLC	Programmable logic controller
POTW	Publicly Owned Treatment Works
ppm	Parts per million
ppmv	Parts per million by volume
ppmvd	Parts per million by volume, dry basis
RCRA	Resource Conservation and Recovery Act
rpm	Revolution per minute
scfm	Standard cubic feet per minute
EWT	Evoqua Water Technologies
SOP	Standard Operating Procedure
sq. ft.	Square feet
SSMP	Startup, Shutdown, and Malfunction Plan
TCDD	Tetrachloro dibenzo-p-dioxin
TEQ	Toxicity equivalent (related to 2,3,7,8-TCDD)
TSCA	Toxic Substances Control Act
ug	Microgram
USEPA	United States Environmental Protection Agency
WESP	Wet electrostatic precipitator

1.0 INTRODUCTION

Evoqua Water Technologies (EWT) operates a carbon reactivation facility located in the Colorado River Indian Tribes (CRIT) Industrial Park near Parker, Arizona. The facility treats spent activated carbon that has been used by industry, state and federal government agencies, and municipalities for the removal of organic compounds from liquid and vapor phase process waste streams. Once the carbon has been used and is spent, it must be either disposed of or reactivated at a facility such as EWT. A Carbon Reactivation Furnace (RF-2) is used by EWT to reactivate the spent carbon. Some of the carbon received at the Parker facility is designated as a hazardous waste under the Resource Conservation and Recovery Act (RCRA) regulations. Much of the spent activated carbon received at the facility is not a RCRA hazardous waste, as it is neither a characteristic nor a listed waste as defined by 40 CFR 261. The carbon reactivation facility is operating under the RCRA Interim Status standards of 40 CFR 265 and is currently in the process of obtaining a RCRA permit.

The carbon reactivation process thermally treats spent activated carbon in a multiple hearth furnace consisting of five hearths. The spent carbon is introduced into the top hearth and flows downward through the remaining four hearths. Reactivated carbon exits the bottom hearth through a cooling screw. Natural gas burners are provided to ensure adequate heat input to the reactivation unit for all of the spent carbons that are reactivated at the facility. The hot gases generated in the reactivation furnace are routed to an afterburner to ensure the thermal oxidation of any organic matter that is not oxidized in the reactivation unit. The afterburner is equipped with two burners that utilize natural gas as the fuel source. From the afterburner, the gases are quenched by direct water contact and routed through a variable throat venturi scrubber for particulate matter control. From the venturi scrubber, the gases are routed to a packed bed scrubber for acid gas control. From the packed bed scrubber, the gases flow through a wet electrostatic precipitator, used for fine particulate matter and metals control. From the wet electrostatic precipitator, the gases are routed through a stack to the atmosphere. The motive force for moving the gases through the air pollution control system is supplied by an induced draft fan. The air pollution control equipment uses a closed loop recycle water system. Scrubber blowdown from reactivation furnace air pollution control equipment is treated in an exempt wastewater treatment unit, or discharged directly to a Publicly Owned Treatment Works (POTW).

RF-2 is not a hazardous waste incinerator. "Incinerator" is defined in 40 CFR 260.10 as "any enclosed device that: (1) Uses controlled flame combustion and <u>neither meets the criteria for classification as a boiler, sludge dryer or</u> <u>carbon regeneration unit</u>, nor is listed as an industrial furnace; or (2) Meets the definition of infrared incinerator or plasma arc incinerator." The multiple hearth furnace is designated by Subpart X of the RCRA regulations as a Miscellaneous Unit.

EPA Region 9 has requested that EWT prepare a Startup, Shutdown and Malfunction Plan (SSMP) as part of the permitting process for the reactivation furnace. The purpose of the SSMP, which will take effect once the final Part B permit is approved, is to do the following:

- To ensure that the reactivation furnace unit, including emission control equipment is operated and maintained in fulfillment of EWT's general duty to minimize emissions to the greatest extent in a manner consistent with good air pollution control practices
- To ensure that owners and operators are prepared to correct malfunctions as soon as practicable
- To minimize the reporting burden associated with excess emissions. The SSMP should address startup, shutdown, and malfunction events of the thermal treatment process that could result in an emission or operating limit exceedance

To meet these SSMP objectives, this Plan includes a description of:

- Procedures for operating and maintaining the source during periods of startup, shutdown, and malfunction
- The corrective action program for responding to malfunctioning process, air pollution control, and related monitoring equipment used to comply with the SSMP standard
- Potential causes of the identified malfunctions that may result in excess emissions of hazardous air pollutants (HAPs), and actions to be taken to minimize the frequency and severity of those malfunctions

Emission standards and operating limits do not apply during periods of startup, shutdown, and malfunction. Facilities are exempted from emission standard and operating limit violations during startup, shutdown, and malfunction events, provided the SSMP procedures are followed and compliance with the SSMP is properly documented. The specific procedures that address startup, shutdown, and response to possible malfunctions of the thermal treatment process, and how facility personnel must document compliance with these procedures, are described in this plan.

In order to ensure that the plan comprehensively identifies potential malfunctions, the plant's reaction to those malfunctions, and the measures in place to prevent them, a EWT cross-functional team reviewed the process and its operational factors via the following:

- independent consideration of the malfunction potential and impact of each relevant piece in the APC system
- planned actions to be taken in response to malfunctions, and
- a determination of the scope and adequacy (with adjustment as needed) of the measures in place to prevent malfunctions from occurring

The cross-functional team consisted of and obtained input from staff in the operations, maintenance, and environmental departments of the Parker facility. In addition, consultative support on this effort was provided via internal corporate and external resources.

2.0 PLAN ORGANIZATION AND OBJECTIVES

This SSMP has been developed to provide guidance for operating and maintaining the spent carbon thermal treatment process during startup, shutdown, and occurrence of malfunctions in a manner consistent with safety and good air pollution control practices for minimizing emissions. Preventative measures as well as corrective measures associated with the malfunctions are also key aspects of this Plan. The SSMP is organized as follows:

- Section 3.0 provides a description of EWT's spent carbon reactivation process
- Section 4.0 defines startup, shutdown, and malfunction as they apply to this Plan, and provides details for complying with the plan. Instructions for preparing new Plan procedures and revising existing procedures are also discussed.
- Section 5.0 describes the decisions, actions and required records associated with the occurrence of startups, shutdowns, or potential malfunction events
- Section 6.0 describes procedures to be followed during startup and shutdown of the thermal treatment process.
- Section 7.0 addresses features of the thermal treatment process intended to prevent system malfunctions, and corrective measures to be taken in the event of malfunctions.
- Section 8.0 describes the SSMP record keeping requirements
- Section 9.0 describes the SSMP reporting requirements.

3.0 CARBON REACTIVATION PROCESS DESCRIPTION

Provided in this section is a general process description of the carbon reactivation process. Included are functional descriptions of each system component as they apply to achieving compliance with the emission limits and operating parameter limits. A block flow diagram of EWT's carbon reactivation system is provided as Figure 3-1. This section also includes a discussion of hazardous waste residence time, which is a critical parameter associated with implementation of this plan.

3.1 CARBON REACTIVATION SYSTEM

The carbon reactivation system is a multiple hearth furnace, consisting of five hearths followed by an afterburner. Spent carbon in an aqueous slurry form is introduced into the top hearth of the reactivation unit by a dewatering screw and flows downward through the remaining four hearths. The top two hearths are unfired hearths. Hot combustion gases generated in the bottom three hearths flow upward through the top hearths and are used to complete the dewatering of the spent carbon. The bottom three hearths are fired hearths where the reactivation process occurs. Rabble arms, with teeth, each connected to a rotating center shaft, are located above each hearth. The rabble arms plow the carbon material across the hearth surface and towards drop holes. The carbon falls through the drop holes to the next lower hearth, and eventually to the outlet of the reactivation unit. Reactivated carbon exits the bottom hearth through a cooling screw. The reactivation furnace is equipped with a primary combustion air fan, and two center shaft cooling fans. Natural gas burners are provided to ensure adequate heat input to the reactivation unit for all carbons that are reactivated at the facility. A Performance Demonstration Test was conducted at the reactivation furnace unit, and demonstrated compliance with all of the performance and emissions standards in 40 CFR 60, Subpart EEE, while processing 3,049 pounds per hour of wet spent carbon feed.

3.1.1 Multiple Hearth Furnace

Following dewatering the spent granular carbon is fed to the top section of the multiple-hearth furnace. In the pre-drying and drying zones (the top hearths), the water retained in the pores and the surface of the carbon is evaporated by the counter-current flow of hot combustion gases coming from the lower hearths. The temperature of the carbon in the top hearths is raised to approximately 210°F. Upon application of heat, water will evaporate freely when the particle temperature goes over 200°F. The adsorbed water is freed at temperatures of approximately 212°F to 230°F. After the water is evaporated from the carbon, the carbon starts to increase in temperature.

At temperatures over 600°F, high molecular weight organic impurities in the carbon will crack to produce gaseous hydrocarbons, hydrogen and water vapor which escape the pores of the granular carbon. Some fixed carbon is formed by pyrolytic (low oxygen) cracking of the organic and is retained in the pores of the granules. In these pre-heating and decomposition zones (middle hearths) the temperature of the carbon is increased to about 750°F in a virtually oxygen-free atmosphere. Under these conditions the adsorbed organic impurities in the pores of the carbon are pyrolyzed and all volatile materials are driven off.

3.1.2 Afterburner

The afterburner is a self supporting vertical cylindrical chamber approximately 33 feet high with an inside diameter of approximately 5 feet. The design incorporates a mixing zone, choke ring and a minimum residence time, at temperature, of greater than one second. The afterburner shell is constructed of steel plate and is internally lined with firebrick and castable insulation. The afterburner is equipped with two low NO_x burners, which utilize heated combustion air. The afterburner chamber is fitted with a total of six air injection nozzles which are placed to provide combustion air and turbulence to promote the oxidation of organic materials in the flue gas from the multiple hearth furnace. The afterburner is designed to thermally oxidize greater than 99.99 percent of all organic matter entering the afterburner in the furnace off gas. A cross section of the afterburner and the afterburner specification can be found in Appendix X of the RCRA Part B Permit Application.

3.1.3 Residence Time Determination

The hazardous waste residence time for the carbon reactivation process following waste feed cutoff, based on calculations of the time for spent activated carbon to exit the bottom hearth and emitted gases to be treated in the afterburner, is 38 minutes at a rabble arm shaft speed of approximately 1 revolution per minute (rpm).

The hazardous waste residence time is a critical parameter for establishing, following automatic or manual shutoff of the spent carbon, whether exceedances from permit limits are or could be counted as permit violations. Additional discussion of the significance of hazardous waste residence time as it applies to this SSMP is provided in Section 4.0.

3.2 BURNER AND FEED SYSTEMS

Six natural gas burners are installed in the reactivation furnace, two per hearth on hearths 3, 4, and 5. Two natural gas burners are installed in the afterburner. Depending on temperature requirements in the unit, not all burners will be required to be operated at any one time.

3.2.1 Burner Description

The six burners installed in the reactivation furnace are North American Manufacturing Company burners (NA 6422-6) or equivalent. The two burners installed in the afterburner are North American Manufacturing Company burners (NA 6514-8B) or equivalent. Literature describing these burners can be found in Appendix X of the RCRA Part B Permit Application.

3.2.2 Spent Activated Carbon Feed System

The spent activated carbon feed system to the reactivation furnace consists of a feed tank, a dewatering screw, and a weigh belt conveyor. The spent carbon/recycle water slurry is discharged from the feed tank to the dewatering screw via a control valve. The dewatered spent carbon is discharged from the dewatering screw on to the weigh belt conveyor, which is used to measure the feed rate to the reactivation furnace.

3.2.3 Auxiliary Fuel System

The six burners in the reactivation furnace and the two burners in the afterburner are fired with natural gas, supplied by the local utility company via pipeline.

3.2.4 Combustion Air

Combustion air is supplied to the six reactivation furnace burners and two afterburner burners by a combustion air blower. The blower is designed to supply approximately 351,600 actual cubic feet per hour (acfh) of preheated combustion air. Fan specifications are located in Appendix X of the RCRA Part B Permit Application.

3.3 REACTIVATED CARBON HANDLING SYSTEM

The reactivated carbon exiting from the reactivation furnace is a product and hence not regulated under RCRA. No solid residues are produced by the reactivation furnace. The reactivated carbon is discharged from the reactivation furnace into a screw cooler and from the screw cooler into one of three reactivated carbon product storage tanks. From the reactivated carbon storage tanks, the reactivated carbon product is transported through an enclosed conveyor to a product packaging facility. At the product packaging facility, the reactivated carbon is removed from the storage tanks and placed in appropriate containers for shipment to customers.

Scrubber blowdown from the reactivation furnace air pollution control equipment is treated in a RCRA-exempt wastewater treatment unit, or discharged directly to the POTW. The discharge to the POTW is continuously monitored for pH, total dissolved solids, flow and temperature to ensure compliance with the discharge limitations found in the facility's industrial wastewater discharge permit.

3.4 AIR POLLUTION CONTROL (APC) SYSTEM

The APC system for the reactivation furnace includes a quench/venturi scrubber, a packed bed scrubber and a wet electrostatic precipitator. The APC system does not include an Emergency Stack Vent (ESV). Exhaust gases from the carbon reactivation system are continuously routed through the APC equipment, and cannot by-pass the APC equipment under any circumstances. The individual components of the APC equipment are described in the following sections.

3.4.1 Quench/Venturi Scrubber

The Quench/Venturi Scrubber is a dual-purpose device used to rapidly quench the hot combustion gases exiting the afterburner and to remove particulate matter. The quench section uses water sprays to cool the afterburner exit gas to the point of adiabatic saturation (approximately 170 to 190°F). The venturi scrubber has an adjustable throat, and is a low energy, vertical down flow type. The throat area is adjusted by a pneumatic cylinder actuator and an electro/pneumatic positioner. The remotely adjustable throat is automatically controlled to maintain a constant pressure differential. The venturi scrubber is located directly below the quench section and is connected by a flooded elbow to the packed bed scrubber. The elbow incorporates a water-filled gas impact section directly beneath the throat to prevent erosion of the shell. The water supply for venturi irrigation is recirculated scrubber water at a total flow of approximately 7.5 gpm/1000 acfm.

The design data and equipment descriptions for the Quench/Venturi Scrubber as well as a description of the physical dimensions of the venturi scrubber section can be found in Appendix X of the RCRA Part B Permit Application.

3.4.2 Packed Bed Scrubber

The packed bed scrubber consists of a vertical up flow and cylindrical disengaging section followed by a packed bed section and mist eliminator. The bottom portion of the scrubber is used to separate entrained water droplets from the gas prior to entering the packed section of the scrubber. The packed bed scrubber is designed to remove a minimum of 99 percent of the incoming hydrogen chloride.

The design data and equipment description for the packed bed scrubber as well as a description of the physical dimensions of the packed bed scrubber can be found in Appendix X of the RCRA Part B Permit Application.

3.4.3 Wet Electrostatic Precipitator

The wet electrostatic precipitator (WESP) is a vertical tubular design with self irrigating tubes. The WESP consists of inlet gas distribution to promote even distribution of the process gas flow entering the WESP, inlet and outlet plenums and a collecting electrode tube bundle. The WESP is equipped with outboard high voltage insulator compartments which include a purge air system, high voltage distribution-support grids, high intensity rigid tube type charging/precipitating discharge electrodes, high voltage power supply (transformer/rectifier and controller) system, ground sticks, safety key interlocks, warning labels, and electronic control logic equipment and valving.

The WESP, in conjunction with the venturi scrubber, is designed to achieve a maximum outlet particulate matter grain loading of 0.015 grains/dscf adjusted to 7 percent oxygen. The design data and equipment description for the WESP as well as a description of the physical dimensions of the WESP can be found in Appendix X of the RCRA Part B Permit Application.

3.4.4 ID Fan

A variable speed induced draft fan is provided to exhaust combustion gases from the furnace and afterburner and through the air pollution control system. Design specifications for the fan can be found in Appendix X of the RCRA Part B Permit Application.

3.4.5 Stack

The cleaned gas stream is exhausted to the atmosphere via a 110 foot high stack with an inside diameter of two feet and a gas outlet that is 19.75 inches in diameter. A stack drawing is provided in Appendix X of the RCRA Part B Permit Application.

3.5 PROCESS MONITORING, CONTROL, AND OPERATION

The facility is equipped with a programmable logic control (PLC) system which monitors and/or controls process variables to ensure proper facility operation. The reactivation furnace system is equipped with instrumentation to monitor and control process flows, temperatures, and pressures, and to transmit signals to the main control system. The automation system has the capabilities of controlling valves, motors, pumps, and fans as well as alarming and initiating waste feed cutoff interlocks if process conditions deviate from established limits.

Figure 3-2 shows the location of pertinent instrumentation related to permit compliance. Complete Piping and Instrumentation Diagrams (P&IDs) are included in Appendix VI of the RCRA Part B Permit Application. It is important to note that these drawings include many components of the facility that are exempt from permitting under various provisions of RCRA. These components are provided for informational purposes and ease of review only, and they are not intended to become regulated components of the facility. Information concerning major process instruments associated with regulatory compliance is presented in Table 3-1. Calibration schedules are based on manufacturer's recommendations and EWT operating experience.

Process monitoring and emissions monitoring performed for regulatory compliance is conducted on a continuous basis in accordance with USEPA definitions of continuous monitors.

A "Continuous Monitor" is a device (or series of devices) which continuously samples the regulated parameter without interruption, evaluates the detector response at least once every 15 seconds, and computes and records the average value at least every 60 seconds, except during periods of calibration or as otherwise allowed by the applicable regulations or guidelines. For many parameters, rolling averages are calculated. A "Rolling Average" is defined as the arithmetic mean of a defined number of the most recent one-minute average values calculated by the continuous monitor. For example, an hourly rolling average would incorporate the 60 most recent one-minute average values. As each new one-minute average value is computed, the least recent of the 60 values is discarded and a new hourly rolling average is calculated and recorded. Twelve hour rolling averages use 720 one-minute average values rather than 60.

Two subsets of continuous monitoring systems are employed on the reactivation furnace: process continuous monitoring systems (CMS) and continuous emissions monitoring systems (CEMS). The following is a discussion of each type of continuous monitoring system.

3.5.1 Process Continuous Monitoring System (CMS)

The carbon reactivation process utilizes a continuous monitoring system (CMS) to monitor regulated stack gas emissions and operating parameters. The CMS consists of a combination of continuous emissions monitoring systems (CEMS) and instruments (parameter CMSs) that monitor and record parameter data from the operations of the process.

Parameter CMSs are process instruments that continuously monitor and record parameter data from the operation of the carbon reactivation process. The instruments consist of weigh belts, flowmeters, pressure transducers, thermocouples and other devices that collect process information on key regulatory parameters. The parameter CMSs sample each regulated parameter without interruption, evaluate the detector response at least once every 15 seconds, and compute and record the average values at least once every 60 seconds. The specified operating parameter limits are shown in Table 3-2. The parameter CMSs that will be used to continuously demonstrate compliance with the operating parameter limits are shown in Table 3-1.

Figure 3-2 shows the general location and function of the parameter CMSs that monitor temperature, pressure, and flow indicating and control devices for the system. The specifications for these devices are shown in Table 3-1. The following is a discussion of each type of process monitoring and control to be performed in the reactivation furnace system for regulatory compliance purposes.

<u>Spent Activated Carbon Feed Rate</u>

The flow rate of the spent activated carbon is monitored and controlled using a weigh belt conveyor and carbon slurry feed valve. When the feed valve is open, carbon slurry drops into the dewatering screw and is then discharged onto the weight belt conveyor, which feeds the carbon to the reactivation furnace. The feed rate control system consists of a weigh cell, weight transmitting element, weight indicating controller, variable timed open/closed carbon slurry feed valve, and continuous weight feed rate recorder. The desired spent activated carbon feed rate is achieved by the control system adjusting the time that the carbon slurry feed valve is open and closed. Automatic waste feed cutoff interlocks stop the weigh belt conveyor and hold the carbon slurry valve closed which stops the feed of carbon to the reactivation furnace.

Regulated Constituent Feed Rates

The total feed rate of mercury, semivolatile metals (the combination of cadmium plus lead), and low volatility metals (the combination of arsenic, beryllium and chromium) is continuously monitored and recorded. This is accomplished by the process computer which continuously monitors the flow rate of spent activated carbon, and multiplies that flow rate by the constituent concentration, which is input to the computer whenever the feedstream characterization is updated as described in the facility Waste Analysis Plan.

Afterburner Temperature

The reactivation furnace afterburner combustion temperature is continuously measured by a thermocouple located in the bottom of the afterburner chamber. The automatic waste feed cutoff interlock is activated during low temperature conditions. The automatic temperature controller accepts the signal from the thermocouple and manipulates the auxiliary fuel feed rate.

Venturi Pressure Differential

Venturi scrubber pressure differential is measured and controlled as an indicator of the energy supplied for particulate matter removal. A minimum pressure differential is necessary for proper control efficiency. The pressure differential is continuously measured by a pressure differential indicator with pressure taps located at the inlet and outlet of the venturi. The pressure differential is controlled by changing the position of the venturi throat control valve elements.

Quench/Venturi Scrubber Liquid Flow Rate

The recycle flow rate is continuously monitored using magnetic flow meters in the recycle water lines. A minimum recycle water flow rate is maintained in order to provide sufficient cooling and scrubbing water for particle removal. A low total recycle flow rate will initiate an automatic waste feed cutoff.

Packed Bed Scrubber pH and Flow Rate

The packed bed scrubber recycle pH and the flow rate of recycled liquid to the packed bed scrubber influence the effectiveness of acid gas removal. The pH is measured continuously by an in-line pH probe installed in the recycle liquid piping. The recycle flow rate is continuously monitored using a magnetic flow meter in the recycle water line. Either low pH or low packed bed scrubber recycle flow rate will initiate an automatic waste feed cutoff.

Packed Bed Scrubber Pressure Differential

The differential pressure across the packed bed is measured as an indicator of proper liquid and gas distribution in the tower. The pressure differential is continuously measured by a differential pressure element with taps located at the inlet and outlet of the packed bed scrubber.

WESP Secondary Voltage

EWT monitors the secondary voltage as an indicator of proper collection of fine particles and metals. A minimum secondary voltage has been established based upon the operating conditions during the Performance Demonstration Test.

Scrubber Blowdown Flowrate

In order to conserve water, EWT recycles most of the liquid from the air pollution control system. In order to prevent the buildup of dissolved solids, EWT bleeds water from the system. As water is bled, fresh makeup water is added. The APC system blowdown flow rate is continuously monitored using a magnetic flowmeter, and a low flow rate will trigger an automatic waste feed cutoff.

Stack Gas Flow Rate

The flow rate of stack gases is used as the indicator of combustion gas velocity prescribed by the applicable regulations. A flow sensor located in the stack provides the direct flow measurement. High stack gas flow rate will initiate an automatic waste feed cutoff.

3.5.2 Continuous Emissions Monitoring System (CEMS)

The exhaust gases are continuously monitored for carbon monoxide and oxygen content as an indicator of proper operation of the combustion process.

The oxygen analyzer is a paramagnetic analyzer. The carbon monoxide analyzer is a non-dispersive infrared monitor having a dual range of 0-100 ppm and 0-1000 ppm. Performance specifications for the CEMS, as well as a drawing of the sampling system can be found in Appendix X of the RCRA Part B Permit Application.

3.5.3 Process Control System

The carbon reactivation facility is equipped with a programmable logic control (PLC) system which monitors and/or controls process variables to ensure proper facility operation. The reactivation furnace system is equipped with instrumentation to monitor and control process flows, temperatures, and pressures, and to transmit signals to the main control system. The automation system has the capabilities of controlling valves, motors, pumps and fans as well as alarming and initiating waste feed cutoff interlocks if process conditions deviate from established limits.

The process control system maintains the operations within desired operating conditions, and manages continuously monitored process data required for compliance demonstration and specific operational purposes. Regulatory and safety interlocks as well as shutdown features are important aspects of the process control system. Safety shutdown responses are relayed to various equipment items when process limits are not met so that the equipment will go to a fail-safe mode.

3.5.4 Safety and Automatic Waste Feed Cutoffs

The control system includes automatic waste feed cutoff (AWFCO) system that stops the feed of spent activated carbon when operating conditions are at or near limits necessary to comply with specific permit conditions. A listing of the AWFCO parameters is provided in Table 3-2. When any of these parameters deviates from the established limit, an electronic signal from the control system will stop the carbon weigh belt feeder.

The parameter CMSs and CEMS described in this plan are integrated with the AWFCO system. The AWFCO system also incorporates safety related parameters that are not regulated by the facility's operating limits that are tied into the burner management and combustion control systems. The safety shutdown responses are relayed to various equipment and instruments when process limits are not met so that the equipment will enter a fail-safe mode. An AWFCO will occur following any of the below conditions:

- When the measured emission level of a regulated compound reaches or exceeds the AWFCO setpoint
- When the monitoring input of a regulated operating parameter reaches or exceeds its AWFCO setpoint
-

On a monthly basis, during reactivation furnace operations, the AWFCO system will be tested by running a software routine to check PLC logic functions associated with the AWFCO subsystem. Each of the regulatory AWFCOs will be tested by using a control system console to input a software value which corresponds to an exceedance of the permit limit. The AWFCO test will be documented, via the Monthly RCRA Inspection Checklist. It should be noted that during the brief period of time when the AWFCO parameters are being tested, regulatory AWFCOs will be precluded. Non-regulatory AWFCOs will not be affected by the test.

3.6 PROCEDURES TO RAPIDLY STOP SPENT ACTIVATED CARBON FEEDS AND CONTROL EMISSIONS

3.6.1 Rapidly Stopping Spent Activated Carbon Feeds

The reactivation furnace is controlled by a process control computer. EWT has included alarms and waste feed cutoff interlock setpoints which will automatically stop the feed of spent activated carbon. In the event any of these preprogrammed operating setpoints are reached, the computer will take automatic action to stop the carbon weigh belt conveyer to immediately stop spent activated carbon feed to the system. The same action to cease spent activated carbon feed can be activated from the control room by operating personnel. These actions do not necessarily constitute a shutdown of the reactivation furnace; only a stoppage of spent activated carbon feed. The reactivation furnace will normally operate on auxiliary fuel after spent activated carbon feed is ceased to maintain operating temperature.

3.6.2 Shutting Down the System

Reactivation furnace system shutdowns may occur for three reasons:

- A loss or malfunction of systems or controllers critical to maintaining performance standards and operating requirements.
- Plant-wide electrical power or natural gas outage or loss of external water service.
- A scheduled shutdown for normal maintenance or other operational purposes.

In the event of a system failure, the reactivation furnace system is equipped with spent activated carbon feed and fuel shutoff valves which fail to the “safe” (closed or off) position. Operations personnel have the ability to initiate an emergency system shutdown manually from the control room, although a controlled shutdown is preferred. Complete shutdown of the reactivation furnace system can be undertaken as required in an orderly fashion to allow for a proper rate of cooling.

3.6.3 Controlling Emissions During Equipment Malfunctions

Equipment shells and interconnecting ductwork are free from openings or gaps. Emissions from the spent activated carbon feed point are prevented through the use of a rotary air lock on the multiple hearth furnace feed port. Emissions from the rotating parts in the multiple hearth are prevented by a sand seal. Daily inspections are conducted in accordance with the inspection procedures of the RCRA permit application. Process gases are always directed through the emissions control equipment, and there are no provisions to bypass the air pollution control system. In addition, the emissions control equipment is among the last equipment to be taken off-line under any circumstance. In the event of an equipment malfunction affecting reactivation furnace system performance, spent activated carbon feed is automatically discontinued. Stopping the spent activated carbon feed immediately eliminates the flow of untreated spent activated carbon into the reactivation furnace system, however since the spent activated carbon takes 38 minutes to travel through the reactivation furnace hearths, a slight potential for emissions remains during this time. To the greatest extent possible, the afterburner and emissions control equipment will continue to operate while the malfunction is corrected. Spent activated carbon feed may be resumed once operating conditions have been returned within the permit limits. If the malfunction can not be corrected in a reasonable time frame or requires the unit to be taken off line, the reactivation furnace, afterburner, and APC systems will be shut down in an orderly fashion according to standard operating procedures. Spent activated carbon feed will not resume until the malfunction has been corrected and the entire reactivation furnace system has been returned to operating conditions within the permitted limits.

3.6.4 Emergency Safety Vent Operations

The EWT reactivation furnace design does not require or utilize an emergency safety vent. Process gases are always directed through the emissions control equipment, and there are no provisions to bypass the air pollution control system.

4.0 SSMP IMPLEMENTATION

The presumption is that startup, shutdown, and malfunction events have a higher chance of excess emissions or operating limit exceedances compared to normal operation. Although the carbon reactivation system's sophisticated process monitoring and control system is configured to shutoff spent activated carbon upon a malfunction, potential operating limit exceedances could occur during the spent activated carbon residence time in the multiple hearth and gaseous residence time in the afterburners (after the spent activated carbon has been shutoff). This section defines the periods of startup, shutdown and malfunctions as it applies to the SSMP, and describes activities and responsibilities for following and documenting compliance with the SSMP procedures.

4.1 APPLICABILITY

4.1.1 Startup

For the purposes of this SSMP, startup will begin when the system begins firing natural gas in any of the bottom three hearths or the afterburner during a "cold startup". Startup ends when spent activated carbon feed to the multiple hearth is initiated.

4.1.2 Shutdown

For the EWT carbon reactivation system, shutdown includes the period when natural gas feed is being ramped down and the spent activated carbon reactivation system is being cooled. Shutdown will begin when spent activated carbon feed is discontinued to the multiple hearth furnace and the hazardous waste residence time of 38 minutes has expired. Permit limits are not applicable when spent carbon is not in the furnace.

4.1.3 Malfunction

A malfunction is defined as any sudden, infrequent, and not reasonably preventable failure of air pollution control, monitoring equipment, process equipment, or a process to operate in a normal or usual manner which causes, or has the potential to cause, the emission limitations in an applicable standard to be exceeded. The emission limitations refer to the CO standard and various parameter operating limits.

4.2 FOLLOWING THE STARTUP, SHUTDOWN, AND MALFUNCTION PLAN

One purpose of the SSMP is to ensure that EWT fulfils its general duty to operate and maintain the unit, including emission control equipment, in a manner consistent with safety and good air pollution control practices during periods of startup and shutdown, and in responding to potential malfunctions. The instructions in this SSMP must be followed during all startups, shutdowns, and malfunctions. Also, documentation of whether the SSMP steps were followed during startups, shutdowns, and malfunctions must be maintained, as well as numerous specific details associated with these startup, shutdowns and malfunctions. For the purposes of documenting the duration of an exceedance as a result of a malfunction, the exceedance will begin once an emission standard or operating limit is exceeded while spent carbon is in the multiple hearth. The exceedance will end once the spent activated carbon has cleared the multiple hearth furnace or once the emissions and operating parameters are reestablished within their respective permit limits, which ever occurs sooner. Additional detailed discussions for operating the activated carbon reactivation process during startups and shutdowns, responding to known or potential malfunctions, and abiding by all required recordkeeping and reporting requirements, are addressed in the remainder of this SSMP.

4.3 METHODOLOGY FOR IDENTIFICATION OF MALFUNCTIONS

This SSMP was developed to be both proactive and reactive to malfunctions. Malfunctions involving process equipment, instrumentation/CMS, and the process control system were included in the malfunction evaluation. After identifying these potential malfunctions, proactive measures were identified that would be expected to prevent these malfunctions from occurring as well as the reactive procedures that provide instructions for operating and controlling the system in the event that the malfunctions actually occurred. The primary work product of this team consists of a spreadsheet entitled "Potential Malfunctions From the Spent Activated Carbon Reactivation Furnace That May Result in Emission Exceedances". This spreadsheet is attached and incorporated into this plan by reference as Table 3-3. Additional discussions on procedures to respond to malfunctions are included in Section 7.0 of this plan.

In addition to the potential malfunctions identified in Table 3-3, future unexpected malfunctions could occur that might require compliance documentation, and that could possibly require revision of this SSMP to include the unexpected malfunctions. As such, operational personnel should be prepared to recognize incidents that may qualify as malfunctions that have not been previously identified. Indication that a potential malfunction is occurring or has occurred may be signaled by:

- Exceedance of an emission standard or operating limit
- Alarm
- Automatic waste feed cutoff
- Inspection or general observation of operational data

For the purposes of this plan, equipment problems that do not or could not cause an exceedance will not be considered a malfunction. Determining whether an equipment problem is a malfunction may require additional review of the process data and circumstances surrounding the event.

4.4 DOCUMENTATION OF COMPLIANCE WITH THE SSMP

During operational periods when the SSMP is applicable, process control operators will use the information contained in it to make regulatory compliance related decisions about the operation of the system, and to document what is needed to ensure compliance. It includes determining whether a potential malfunction event qualifies as a malfunction according to the Plan and how personnel document actions taken that are consistent or not consistent with the Plan. EWT has taken measures to train the control room operators and other key personnel on the importance of maintaining a thorough SSMP and following the procedures referenced in the plan. EWT has also provided extensive training on the procedures referenced in this plan. Exceedances of emission limits or operating parameters that occur when actions taken are consistent with the plan are not considered violations, even if hazardous waste is present in the combustion chamber.

EWT will use a checklist similar to the ones identified in the Appendix of this plan to document compliance with the SSMP during startup, shutdown, and malfunction events.

4.5 PROCEDURE DEVELOPMENT AND MAINTENANCE

This plan includes information on potential malfunctions and the reactive and proactive nature of EWT malfunction activities. In the event that any part of this plan or the referenced attachments requires revisions, new or modified procedures are needed, or changes are made to the review and approval process. Two basic circumstances may prompt these changes:

- Periodic changes in equipment or procedures that are addressed by the SSMP, and
- Revisions to the SSMP if the plan fails to address an event that occurs and that meets the characteristics of a malfunction.

If the SSMP fails to address or inadequately addresses an event that meets the characteristics of a malfunction, EWT will revise the SSMP within 45 days after the event to include detailed procedures for operating and maintaining the spent activated carbon reactivation process during similar malfunction events and a program of corrective action.

4.6 AUTOMATIC WASTE FEED CUTOFF SYSTEM REQUIREMENTS DURING MALFUNCTIONS

The AWFCO requirements will continue to apply during malfunctions. If an emission limit or operation limit is exceeded during a malfunction, the automatic waste feed cutoff system must immediately cutoff spent activated carbon feeds. If the malfunction itself prevents immediate and automatic cutoff of spent activated carbon feed, EWT will cease feeding spent activated carbon as quickly as possible.

Although AWFCO requirements continue to apply during malfunctions, an exceedance of an emission standard or operating limit is not a violation if corrective measures taken during the malfunction are consistent with procedures prescribed in the SSMP.

4.7 PROJECTED OXYGEN CORRECTION FACTOR ASSOCIATED WITH STARTUP AND SHUTDOWN

The stack gas oxygen concentration is used to calculate an oxygen correction factor which is applied to the stack gas CO concentration to develop a CO concentration, corrected to 7% oxygen. The oxygen correction factor is determined by the following equation:

$$OCF = \left(\frac{21 - 7}{21 - O_2} \right)$$

where: OCF = oxygen correction factor

O_2 = stack gas oxygen concentration (vol %)

During startup or shutdown, conditions may be such that the stack gas oxygen concentration approaches 21%, resulting in an oxygen correction factor approaching infinity. The CO values during the startup, shutdown and when spent carbon feed is not in the furnace will not be valid or considered a permit violation.

5.0 DECISIONS, ACTIONS, AND RECORDS ASSOCIATED WITH STARTUPS, SHUTDOWNS, OR MALFUNCTIONS

When a startup, shutdown or malfunction occurs, whether actions taken were consistent or not consistent with the SSMP will be documented in the facility operating record. Also, if it is a malfunction that occurs, the duration and a brief description of the malfunction must be included in the operating record. A determination must then be made as to whether an emission standard or operating limit exceedance occurred while spent activated carbon was in the multiple hearth during the startup, shutdown, or malfunction. If an exceedance did occur while spent activated carbon was in the multiple hearth, the occurrence and duration of the exceedance will be recorded in the operating record. The duration of the exceedance will be determined from the time the exceedance occurred until spent activated carbon is no longer in the multiple hearth (i.e. the hazardous waste residence time has expired) or once the emissions and operating parameters are reestablished within their respective permit limits, which ever occurs sooner.

If an exceedance did not occur while spent activated carbon was in the multiple hearth, determine whether the SSMP adequately addressed the SSM event. If the SSMP adequately addressed the event, no further action is required. If the SSMP did not adequately address the event, the SSMP will be revised.

A determination must then be made as to whether the exceedance was a result of a malfunction. In order to qualify as a malfunction, the event must be sudden, infrequent, and not reasonably preventable.

If the event was caused by a malfunction, investigate whether the malfunction was adequately addressed in the SSMP and whether actions taken in response to the event were consistent with the SSMP.

6.0 STARTUP AND SHUTDOWN PROCEDURES

The procedures for operating the carbon reactivation process during startup and shutdown are delineated in the facility's operating manuals for the operation of the reactivation process. Conceptual startup and shutdown procedures are provided below.

6.1 STARTUP PROCEDURES

The sequence below is a general summary of the procedures used for startup of the spent activated carbon reactivation system:

- Verification of power supply to all motors and process equipment/instrumentation
- Verification of utility supplies to all process equipment and instrumentation
- Startup of the afterburner forced draft fans
- Startup of the process induced draft fan
- Startup of the multiple hearth furnace shaft cooling fan
- Startup of the afterburner pilot
- Startup of multiple hearth furnace burner pilot
- Bring spent activated carbon reactivation system to operating temperature
- Startup of multiple hearth furnace air motor
- Startup of the multiple hearth furnace rabble arm drive
- Startup of multiple hearth furnace carbon product discharge system
- Startup of spent activated carbon feed.

Once the power and utility supply to all motors and process equipment/instrumentation is verified, the startup of the carbon reactivation system is initiated. This includes the startup of the afterburner forced draft fans, ID Fan, multiple hearth furnace cooler forced draft fans, quench/venturi scrubber, packed bed scrubber and the WESP. The afterburner system natural gas burners are lighted followed by the multiple hearth furnace natural gas burners. The multiple hearth furnace activated carbon product discharge system is activated prior to initiating waste feed. Additionally, all automatic waste feed cutoffs (AWFCOs) must be satisfied in order to initiate a feed start.

6.2 SHUTDOWN PROCEDURES

In general, normal shutdown procedures are in reverse to the sequence used for startup. In the case of any interruptions, either AWFCOs or mechanical of short duration, the APCS continues to operate at permitted levels ensuring no excess particulate, metals and hydrogen chloride (HCl) emissions from the combustion system.

Emergency shutdown procedures occur either automatically via automatic shutdown control loops or by manual control. Conditions of unsafe operations for either the equipment or personnel (as defined by the safety interlock system) can result in emergency shutdown. In the event any emergency shutdown occurs, the reason for the condition occurring and the corrective action taken must be documented according to the SSMP requirements found in this plan.

7.0 PROCEDURES TO RESPOND TO MALFUNCTIONS

Section 4.3 described the methodology that EWT utilized to identify possible malfunctions of the carbon reactivation process that, if they occurred, could possibly lead to an exceedance of an emission limit or operating parameter. This section provides information on the procedures for responding to these identified malfunctions. The procedures listed in Table 3-3 are a combination of procedures that provide proactive measures to prevent malfunctions and procedures that provide responses to such malfunctions. For potential malfunctions, the following is provided as referenced above:

- A description of how the malfunction could credibly occur and lead to an exceedance.
- Design and operational proactive measures that have been taken to prevent occurrence of the malfunction, and
- Corrective measures that should be taken in response to the malfunction

Proactive measures included in EWT carbon reactivation process control system and in routine inspection procedures are briefly described in the following subsections.

7.1 CARBON REACTIVATION PROCESS CONTROL SYSTEM

The carbon reactivation process is operated by a sophisticated control system. The control system is programmed to adjust the unit when operating conditions warrant and respond to certain malfunctions. The control system notifies the operators via alarms when operating conditions are outside optimal ranges.

7.2 INSPECTIONS

EWT performs many proactive measures to identify potential problems with the system before they result in malfunctions. Such measures include daily inspections in which EWT visually inspects the reactivation furnace and associated equipment. The inspection includes a walk through around the carbon reactivation equipment and associated air pollution control system for leaks, spills, and fugitive emissions.

8.0 RECORDKEEPING REQUIREMENTS

EWT will keep records for events of startup, shutdown, or corrective measures resulting from a malfunction which document that the procedures referenced in this Plan were followed. Records will also be maintained for events that occur where the procedures were not followed, and for malfunction events that occur where no corresponding response to malfunction procedures exist in the SSMP. The occurrence and duration of all startups, shutdowns, and malfunctions must be maintained in the operating record.

- Complete an investigation of the cause of each exceedance
- Evaluate approaches to minimize the frequency, duration, and severity of each exceedance
- Revise the SSMP as warranted by the investigation
- The results of the investigation and evaluation will be recorded in the operating record.
- A summary of the investigation and evaluation, and any changes to the SSMP

9.0 REPORTING REQUIREMENTS

Details on the SSMP reports are provided below:

9.1 PERIODIC STARTUP, SHUTDOWN, AND MALFUNCTION REPORTS

These reports will be kept in the facility's operating record and will contain the following:

- If action taken during a startup, shutdown, or malfunction event are consistent with the procedures specified in EWT's SSMP,
- The identification of each instance if actions taken during a startup, shutdown, or malfunction event are not consistent with the SSMP, but no exceedance occurs.
- Number, duration and a brief description of each malfunction.
- Summary of any changes to the SSMP during the last review period

9.2 IMMEDIATE STARTUP, SHUTDOWN, AND MALFUNCTION DOCUMENTATION

- Any time an action taken during a startup, shutdown, or malfunction event is inconsistent with the procedures specified in the EWT SSMP and an exceedance of an emission standard or operating limit occurs while spent activated carbon is in the multiple hearth, EWT will document the details in the facility operating record.

9.3 INVESTIGATION AND EVALUATION SUMMARY REPORT

This investigation and evaluation must include the following:

- Investigation of the cause of each exceedance
- Evaluation of approaches to minimize the frequency, duration, and severity of each exceedance
- Revision of the SSMP as warranted by the investigation

The results of the investigation and evaluation will be recorded in the operating record.

Table 3-1 - Summary of Key Regulatory CMS Instrumentation

Parameter	Identification Number of Sensor/Transmitter (a)	Instrument Type	Units	Range	Expected Operating Point or Range	Calibration frequency	Averaging	AWFCO (Y/N)
Feed rate of spent activated carbon	WE/WT-427	Weigh cell	lb/h	0-6000	< 3049	Semi-annually	1-hr Block	Y
Total feed rate of mercury	Computer	Calculated	lb/h	NA	0 – 1.9E-03	NA	12-hr RA	N
Total feed rate of SVM	Computer	Calculated	lb/h	NA	0 – 1.0	NA	12-hr RA	N
Total feed rate of LVM	Computer	Calculated	lb/h	NA	0 – 1.2	NA	12-hr RA	N
Afterburner gas temperature	TE-464A/B	T/C	F	0-2400	>1750	Annually	1-hr RA	Y
Venturi scrubber pressure differential	PDIT-556	Pressure sensor	in w.c.	0-50	>15	Annually	1-hr RA	Y
Venturi/Quench scrubber recycle liquid flow rate (Total Flow)	FI-562 (Total of FE/FIT-553, 554, & 555)	Sum of Magnetic flow meters (Dynac Function)	gpm	0-656	>75	Annually	1-hr RA	Y
Packed bed scrubber pH	AE/AIT-590	pH probe	pH	0-14	5	Quarterly	1-hr RA	Y
Packed bed scrubber recycle liquid flow rate	FE/FIT-552	Magnetic flow meter	gpm	0-200	>60	Annually	1-hr RA	Y
Packed bed scrubber pressure differential	PDIT-560	Pressure sensors	in w.c.	0-10	>0.1	Annually	1-hr RA	N
Scrubber blowdown flow rate	FE/FIT-605	Magnetic flow meter	gpm	0-691	>30	Annually	1-hr RA	Y
WESP secondary DC voltage	EI-558	Voltmeter	kVDC	0-80	14-22	NA	1-hr RA	Y
Stack gas flow rate	FE/FIT-700	Ultrasonic meter	acfm	Not available	<10,000	Annually	1-hr RA	Y
Stack gas carbon monoxide (b)	AE-575	Nondispersive infrared CEMS	ppmvd @7% O_2	0-100 0-1000	< 100	Daily/ Quarterly/	1-hr RA	Y
Stack gas oxygen (b)	AE-576	Paramagnetic CEMS	vol%, dry	0-25	7	Daily/ Quarterly/	None	N

RA = Rolling average.

(a) Instrument identification from P&IDs.

(b) CEMS calibrations include daily zero and span check and quarterly cylinder gas audit,.

Table 3-2. Evoqua Operating Parameter Limits

Control Parameters[a]	Operating Limit	Comments[b]
GROUP A1 PARAMETERS		
Maximum spent carbon feed rate (lb/hr)	3049	Block hour AWFCO
Minimum afterburner temperature (^{o}F)	1760	Hourly rolling average AWFCO
Minimum hearth #5 temperature (^{o}F)	1350	Hourly rolling average AWFCO
Minimum venturi scrubber pressure differential (in. w.c.)	18	Hourly rolling average AWFCO
Minimum quench/venturi scrubber total liquid flow rate (gpm)	75	Hourly rolling average AWFCO
Minimum packed bed scrubber pH	4.4	Hourly rolling average AWFCO
Minimum packed bed scrubber liquid flow rate (gpm)	63	Hourly rolling average AWFCO
Minimum wet scrubber blowdown flow rate (gpm)	58	Hourly rolling average AWFCO
Minimum WESP secondary voltage (kVDC)	22	Hourly rolling average AWFCO
Maximum stack gas flow rate acfm	9,550	Hourly rolling average AWFCO
GROUP A2 PARAMETERS		
Maximum stack gas carbon monoxide (ppmvd, @7% oxygen)[c]	100	Hourly rolling average AWFCO
GROUP B PARAMETERS		
Allowable hazardous constituents	All except dioxin wastes and TSCA PCBs	Class 1 POHC demonstrated
Maximum total chlorine and chloride feed rate (lb/hr)	60	12-hour rolling average
Maximum mercury feed rate (lb/hr)	1.8E-03	12-hour rolling average
Maximum semivolatile metal (Cd + Pb) feed rate (lb/hr)	1.0E-01	12-hour rolling average
Maximum low volatility metal (As + Be + Cr) feed rate (lb/hr)	1.5E+00	12-hour rolling average
GROUP C PARAMETERS		
Minimum packed bed scrubber pressure differential (in. w.c.)	0.1	Hourly rolling average

(a) Group A1 parameters are continuously monitored and recorded, and are interlocked with the automatic waste feed cutoff system. The values for the Group A1 parameters are based on the performance demonstration test operating conditions.
Group A2 parameters are continuously monitored and recorded, and are interlocked with the automatic waste feed cutoff system. The values for the Group A2 parameters are based on regulatory standards or good operating practice rather than performance demonstration test operating conditions.

Group B parameters are continuously monitored and recorded, but are not interlocked with the automatic waste feed cutoff system. Values for the group B parameters are based on the performance demonstration test operating conditions.

Group C parameters are continuously monitoring and recording, but are not interlocked with the automatic waste feed cutoff system. The values for the Group C parameters are based on manufacturer's specifications and/or operational and safety considerations rather than performance demonstration test operating conditions.

(b) AWFCO = Automatic waste feed cutoff.

(c) AWFCO interlock will not be active during the daily CEM calibration period.

Table 3-3. Potential Malfunctions from EWT Spent Activated Carbon Reactivation Furnace that may Result Permit Exceedances

	Area	Malfunction	Potential Exceedance	Preventative Measures	Reactive Response
1	***SPENT CARBON FEED SYSTEM***	Control system failure on weigh scale (Weigh cell, controller, encoder, recorder, etc.) allowing too much waste to enter combustion chamber.	DRE, particulate, dioxins, metals, chlorides, CO.	(1) Interlocks are set to stop spent activated carbon feed before reaching permitted parameter limit based on weigh belt. (2) Weigh belt is routinely checked as per inspection schedule. (3) inspection by operators.	If the automated preventative measures do not detect and stop spent activated carbon feed, an operator will manually stop spent activated carbon feed upon identification of the malfunction.
2		Conveyor weigh belt continues to feed spent carbon during an AWFCO.	DRE, particulate, dioxins, metals, chlorides, CO.	(1) Weigh belt motor shut off is routinely tested during AWFCO testing. Operator will make sure that rotary airlock valve (RV-1) is closed.	Operator will manually shut the weigh belt off to prevent waste from entering the multiple hearth.
3		Rotary Air Lock Fails	Fugitive emissions.	(1) Rotary air lock is periodically checked during the an inspection schedule. (2) Inspections by operators. (3) Operator will make sure that rotary airlock valve (RV-1) is functioning properly.	If preventative measures fail to manage problem, spent activated carbon feed will manually be stopped by the operator upon identification of malfunction.
4		Sand Seal Fails	Fugitive emissions.	(1) Sand seal is periodically checked during the plant inspections. (2) Inspections by operators.	If preventative measures fail to manage problem, spent activated carbon feed will manually be stopped by the operator upon identification of malfunction.
5		Drop Chute Fails	Fugitive emissions.	(1) Drop chute is periodically checked during the plant inspections. (2) Inspections by operators.	If preventative measures fail to manage problem, spent activated carbon feed will manually be stopped by the operator upon identification of malfunction.
6	***MULTIPLE HEARTH FURNACE (RF-2)***	Shaft cooling air starts leaking into RF and may cause emissions from RF seals.	Fugitive emissions.	(1) Interlocks are set to stop spent activated carbon feed. (2) Cooling air shaft is periodically checked during plant inspections. (3) Inspections by operators.	If preventative measures fail to manage problem, spent activated carbon feed will manually be stopped by the operator upon identification of malfunction.
7		Loss of ID Fan because coupling breaks causing pressure increase in RF that results in seal leaks.	Fugitive emissions.	(1) ID fan is periodically checked during plant inspections. (2) Inspections by operators	If preventative measures fail to manage problem, spent activated carbon feed will manually be stopped by the operator upon identification of malfunction.
8		ID Fan shuts down because of vibration causing pressure increase in RF that results in seal leaks.	Fugitive emissions.	(1) ID fan is periodically checked during plant inspections. (2) Inspections by operators	If preventative measures fail to manage problem, spent activated carbon feed will manually be stopped by the operator upon identification of malfunction.
9		Loss of ID Fan because of variable frequency drive (VFD) malfunction or controller tripped requiring reset	Fugitive emissions.	(1) ID fan is periodically checked during plant inspections. (2) Inspections by operators	If preventative measures fail to manage problem, spent activated carbon feed will manually be stopped by the operator upon identification of malfunction.

Table 3-3. Potential Malfunctions from EWT Spent Activated Carbon Reactivation Furnace that may Result Permit Exceedances

	Area	Malfunction	Potential Exceedance	Preventative Measures	Reactive Response
10		Loss of ID Fan because of impeller failure	Fugitive emissions.	(1) ID fan is periodically checked during the plant outages. (2) Inspections by operators	If preventative measures fail to manage problem, spent activated carbon feed will manually be stopped by the operator upon identification of malfunction.
11		Loss of ID Fan due to moisture buildup in fan housing from condensation.	Fugitive emissions.	(1) ID fan is periodically checked during plant inspections. (2) Inspections by operators	If preventative measures fail to manage problem, spent activated carbon feed will manually be stopped by the operator upon identification of malfunction.
12		Draft Sensor plugged up	Fugitive emissions.	(1) Sensor port periodically checked during plant inspections. (2) Inspections by operators	If preventative measures fail to manage problem, spent activated carbon feed will manually be stopped by the operator upon identification of malfunction.
13		Malfunction of thermocouples in furnace	DRE, dioxins, CO	Thermocouple elements are located in the Reactivation Furnace (RF-2). (1) Failure of thermocouples causes burner system to shut down (2) Thermocouples are periodically checked during plant inspections and thermowells are visually inspected during shutdowns. (3) Inspections by operators.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
14		Furnace roof arch fails	Fugitive emissions.	(1) Roof checked inspected during plant outages (2) Inspections by operators and/or maintenance personnel.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
15		Furnace hearth door fails.	Fugitive emissions.	(1) Doors periodically checked during plant outages. (2) Inspections by operators and/or maintenance personnel.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
16		Furnace hearth brickwork	Fugitive emissions possible.	(1) Brickwork periodically checked during plant outages. (2) Inspections by operators and/or maintenance personnel.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
17		Furnace Discharge Chute Fails	Fugitive emissions possible.	(1) Outlet chute periodically checked during plant outages. (2) Inspections by operators and/or maintenance personnel.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
18	***AFTERBURNER (AB-2)***	Slag buildup on burner in Afterburner causes low Afterburner temperature while spent activated carbon is in the multiple hearth.	DRE, dioxins, CO	(1) Interlocks are set to stop spent activated carbon feed before reaching permitted parameter limit and to increase natural gas feed rate to increase temperature. (2) Inspection of burners by operators and/or maintenance personnel.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.

Table 3-3. Potential Malfunctions from EWT Spent Activated Carbon Reactivation Furnace that may Result Permit Exceedances

	Area	Malfunction	Potential Exceedance	Preventative Measures	Reactive Response
19		Slag buildup on burner in multiple hearth causes low temperature of combustion gas entering afterburner. Afterburner burners not able to maintain minimum afterburner temperature while spent activated carbon is in the multiple hearth.	DRE, dioxins, CO	(1) Interlocks are set to stop spent activated carbon feed before reaching permitted parameter limit and to increase natural gas feed rate to increase temperature. (2) Inspection of burners by operators and/or maintenance personnel..	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
20		Slag buildup in Afterburner causes restrictions in flow which, in turn, causes the loss of the water seal	DRE, dioxins, CO	(1) Water Seal level is routinely checked measured each shift by operators.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
21		Malfunction of thermocouples in combustion chamber	DRE, dioxins, CO	A thermocouple element is located in the Afterburner (AB-2). (1) Failure of thermocouples causes burner system to shut down (2) Thermocouples are periodically checked and thermowells are visually inspected during shutdowns. (3) Inspections by operators and/or maintenance personnel.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
22		Failure of flame to be present due to flame detector failure.	DRE, dioxins, CO	(1) Flame detectors are present, a failure will not shut the system down. Two failures will cause an AWFCO and burner shutdown. (2) UV flame detectors are periodically inspected. (3) Inspection by operators and/or maintenance personnel.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
23		Loss of natural gas because of failure of NG pressure regulator. (APC continues running)	DRE, dioxins, CO	(1) Interlocks are set to stop spent activated carbon feed on loss of gas pressure. (2) Loss of gas will cause low Afterburner combustion zone temperature and stop of spent activated carbon feed.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
24		Loss of natural gas because of failure of supplier to supply required amount (APC continues running)	DRE, dioxins, CO	(1) Interlocks are set to stop spent activated carbon feed on loss of gas pressure. (2) Loss of gas will cause immediate shut down of the feed system.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
25		Loss of combustion air fan	DRE, dioxins, CO	Burners will shut down and spent activated carbon feed to multiple hearth will be stopped. Air Pollution Control (APC) equipment will continue running.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
26		Loss or Inadequate levels of secondary combustion air	DRE, dioxins, CO	Burners will shut down and spent activated carbon feed to multiple hearth will be stopped. Air Pollution Control (APC) equipment will continue running.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.

Table 3-3. Potential Malfunctions from EWT Spent Activated Carbon Reactivation Furnace that may Result Permit Exceedances

	Area	Malfunction	Potential Exceedance	Preventative Measures	Reactive Response
27	***QUENCH VENTURI SYSTEM (SC-11)***	Low Quench/Venturi pressure differential because of failure of DP instrumentation.	Particulate, dioxins, metals, chlorides.	(1) Interlocks are set to stop spent activated carbon feed upon reaching permitted parameter limit. (2) The instruments are on a calibration and inspection schedule. (3) Inspections by operators.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
28		Low Quench/Venturi pressure differential because of dampers hung up	Particulate, dioxins, metals, chlorides.	(1) Interlocks are set to stop spent activated carbon feed upon reaching permitted parameter limit. (2) The instruments are on a Preventive Maintenance Program. (3) Inspections by operators.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
29		Water Seal Fails	Particulate, dioxins, metals, chlorides.	Monitor water seal at least twice per day to determine the level. Low level may be caused by lack of water flow or a restriction in the off-gas system.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
30		Pump failure causes low total water flow to Quench/Venturi (temperature out of Q/V does not exceed high-high setting for TSHH-557 and Afterburner burners stay on).	Particulate, dioxins, metals, chlorides.	(1) There are two sources of make-up water. The first is from the city water booster pumps (P 17A/B). The second is from the city water supply. (2) Interlocks are set to stop spent activated carbon feed and increase the city water flow upon reaching permitted parameter limit. (3) The instruments are on the routine inspection schedule. (4) If leakage in the waste lines after the flow meters are present, they will be detected during routine walkthroughs of the area.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
31		Pump failure causes low total water flow to Quench/Venturi (temperature out of Q/V does exceed high-high setting for TSHH-557 and Afterburner burners shut off).	DRE, particulate, dioxins, metals, chlorides, CO.	(1) There are two sources of make-up water. The first is from the city water booster pumps (P 17A/B). The second is from the city water supply. (2) Interlocks are set to stop spent activated carbon feed and increase the city water flow before reaching permitted parameter limit. (3) The instruments are on a calibration and inspection schedule.. (4) If leakage in the waste lines after the flow meters are present, they will be detected during routine walkthroughs of the area.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
32		TDS instrument failure causes low Quench/Venturi blowdown rate	Particulate, dioxins, metals, chlorides.	(1) Interlocks are set to stop spent activated carbon feed upon reaching permitted parameter limit. (2) The instruments are on Preventive Maintenance Program. (3) Inspections by operators.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
33		Flow control instrument failure causes low Quench/Venturi blowdown rate	Particulate, dioxins, metals, chlorides.	(1) Interlocks are set to stop spent activated carbon feed before reaching permitted parameter limit. (2) The instruments are on calibration and inspection checklist. (3) Inspections by operators.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.

Table 3-3. Potential Malfunctions from EWT Spent Activated Carbon Reactivation Furnace that may Result Permit Exceedances

	Area	Malfunction	Potential Exceedance	Preventative Measures	Reactive Response
34		Pump, impeller, sprays/strainer plugged	Particulate, metals, chlorides.	Packing, strainer and impeller will be inspected routinely during selected shutdowns.	Packing will be adjusted (if needed), based on routine inspections during select shutdowns.
35		Motor-pump coupling failure causes loss of pump (P-22) to provide recycle water to Quench/Venturi	Particulate, dioxins, metals, chlorides.	(1) Interlocks are set to stop spent activated carbon feed. (2) When temperature out the Q/V exceeds the High-High limit, the city water will flow to the Q/V. (3) The recycle water pump P-22) is on a inspection schedule. (3) Inspections by operators.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
36		Motor failure or overload causes loss of pump (P-22) to provide recycle water to Quench/Venturi	Particulate, dioxins, metals, chlorides.	(1) Interlocks are set to stop spent activated carbon feed. (2) When flowrate is below to the permit limit the feed is stopped. (3) The recycle water pump (P-22) is on a routine inspection schedule. (3) Inspections by operators.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
37		Low flow caused by sprays in quench/venturi plugging up	Particulate, dioxins, metals, chlorides.	(1) Interlocks are set to stop spent activated carbon feed. (2) When temperature out the Q/V exceeds the High-High limit, the city water will flow to the Q/V. (3) The recycle water pump P-22) is on a inspection schedule. (3) Inspections by operators.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
38		Failure of level control instrument causes low level in PBS Tank shuts down PBS recycle water pump (P-22)	Particulate, metals, chlorides.	(1) Low PBS recycle water flow from P-22 initiates interlock to stop spent activated carbon feed. (2) The scrubber water equalization tank (SC-12) level gages are on a inspection checklist. (3) Inspection by operators.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
39		Low flow caused by impeller malfunction or plugging.	Particulate, dioxins, metals, chlorides.	(1) Interlocks are set to stop spent activated carbon feed. (2) The recycle water pump (P-22) is on a Preventive Maintenance Program. (3) Inspections by operators.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
40		High cross-over temperature due to low quench/venturi flow creating ID fan shutdown	Fugitive emissions.	(1) Sprays are periodically checked as part of an inspection schedule (2) Inspections by operators	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
41	***PACKED BED SCRUBBER (SC-12)***	Flow control instrument failure causes low total water flow to packed bed scrubber (PBS) (temperature out of PBS does not exceed high-high setting for TSHH-557 and Afterburner burners stay on).	Particulate, metals, chlorides.	(1) There are two sources of make-up water. The first is from the city water booster pumps (P 17A/B). The second is from the city water supply. (2) Interlocks are set to stop spent activated carbon feed and increase the city water flow before reaching permitted parameter limit. (3) The instruments are on a calibration and inspection checklist. (4) If leakage in the waste lines after the flow meters are present, they will be detected during routine walkthroughs of the area.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.

Table 3-3. Potential Malfunctions from EWT Spent Activated Carbon Reactivation Furnace that may Result Permit Exceedances

	Area	Malfunction	Potential Exceedance	Preventative Measures	Reactive Response
42		Flow control instrument failure causes low total water flow to PBS (temperature out of PBS does exceed high-high setting for TSHH-557 and Afterburner burners shut off).	DRE, particulate, dioxins, metals, chlorides, CO.	(1) There are two sources of make-up water. The first is from the city water booster pumps (P 17A/B). The second is from the city water supply. (2) Interlocks are set to stop spent activated carbon feed and increase the city water flow before reaching permitted parameter limit. (3) The instruments are on the Preventive Maintenance Program . (4) If leakage in the waste lines after the flow meters are present, they will be detected during routine walkthroughs of the area.	If the automated preventative measures do not detect and stop spent activated carbon feed, an operator will manually stop waste flow upon identification of the malfunction.
43		Loss of pH meter control instrument in pump (P-27) recycle water line.	Chlorides	(1) Interlocks are set to stop waste feed on the permitted parameter limit. (2) The pH control instruments are on a plant inspection checklist (3) inspection by operators.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
44		Failure of caustic addition system (pump P-28 and/or P-29, pH meter, flow meter, low ambient temperatures causing caustic to congeal and therefore be unpumpable, etc.)	Chlorides	(1) Interlocks are set to stop spent activated carbon feed. (2) The pH control instruments are on a calibration and inspection checklist. (3) inspection by operators and/or maintenance personnel.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
45		Failure of DP instrument causes low packed bed differential pressure drop.	Chlorides	(1) A low packed bed differential pressure will cause an alarm. (2) The instrument is on a calibration and inspection program. (3) Inspection by operators and/or maintenance personnel.	After hearing the alarm, the operator will shut feed off to the furnace.
46		Poor water distribution through the packing due to plugging in the packed bed scrubber.	Particulate, metals, chlorides.	Packing will be inspected routinely during select shutdowns.	Packing will be adjusted (if needed), based on routine inspections during select shutdowns.
47		Pump, impeller, sprays/strainer plugged	Particulate, metals, chlorides.	Packing and impeller will be inspected routinely during select shutdowns.	Packing will be adjusted (if needed), based on routine inspections during select shutdowns.
48		Failure or overload of pump motor causes loss of pump (P-27) to provide recycle water to PBS	Particulate, dioxins, metals, chlorides.	(1) Interlocks are set to stop spent activated carbon feed. (2) The PBS recycle water pump (P-27) is routinely inspected. (3) Inspections by operators and/or maintenance personnel..	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
49		Failure of level control instrument causes low level in Scrubber Water Equalization Tank (T-19) shuts down PBS recycle water pump (P-27)	Particulate, metals, chlorides.	(1) Low PBS recycle water flow from P-27 initiates interlock to stop spent activated carbon feed. (2) The scrubber water equalization tank (T-19) level gages are on a plant inspection checklist. (3) Inspection by operators and/or maintenance personnel..	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.

Table 3-3. Potential Malfunctions from EWT Spent Activated Carbon Reactivation Furnace that may Result Permit Exceedances

	Area	Malfunction	Potential Exceedance	Preventative Measures	Reactive Response
50		Failure of makeup water addition (city water) which could be caused by outside utility or failure of an air compressor that feeds air actuated valve.	Particulate, metals, chlorides.	(1) Low PBS recycle water flow from P-27 initiates interlock to stop spent activated carbon feed. (2) The air compressors are on a plant inspection checklist. (3) Inspection by operators and/or maintenance personnel..	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
51	***WESP (W-11)***	Failure of secondary voltage instrument causes low WESP secondary voltage	Particulate, metals	(1) Interlocks are set to stop spent activated carbon feed before reaching permitted parameter limit. (2) Inspections by operators and/or maintenance personnel..	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
52		WESP failure due to arcs and sparks causing low secondary voltage.	Particulate, metals	(1) The WESP is on a inspected during plant outages. (2) Inspections by operators and/or maintenance personnel..	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
53		WESP failure due to wet insulators causing excessive arcs and sparks which in turn causes low secondary voltage.	Particulate, metals	(1) The WESP is on a routine inspection schedule during plant maintenance outages. (2) Inspections by operators and/or maintenance personnel..	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
54		Breakage of WESP electrode causes low secondary voltage.	Particulate, metals	(1) The WESP is on a routine inspection schedule during plant maintenance outages. (2) Inspections by operators and/or maintenance personnel..	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
55	***ID FAN (B-15)***	Failure of ID Fan motor causes process shutdown.	DRE, particulate, dioxins, metals, chlorides, CO.	(1) Interlocks are set to stop spent activated carbon feed. (2) The ID fan is on a Preventive Maintenance Program. (3) Inspections by operators and/or maintenance personnel..	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
56		Failure or malfunction of VFD	DRE, particulate, dioxins, metals, chlorides, CO.	(1) Interlocks are set to stop spent activated carbon feed. (2) The ID fan is on an inspection checklist. (3) Inspections by operators and/or maintenance personnel..	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
57		Failure of Damper, VFD instrumentation	DRE, particulate, dioxins, metals, chlorides, CO.	(1) Interlocks are set to stop spent activated carbon feed. (2) The ID fan is on a inspection checklist (3) Inspection by operators.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
58		Over amp or over volt DC bus link on ID Fan	DRE, particulate, dioxins, metals, chlorides, CO.	(1) Interlocks are set to stop spent activated carbon feed. (2) The ID fan is on an inspection checklist. (3) Inspection by operators.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.

Table 3-3. Potential Malfunctions from EWT Spent Activated Carbon Reactivation Furnace that may Result Permit Exceedances

	Area	Malfunction	Potential Exceedance	Preventative Measures	Reactive Response
59	***STACK***	Failure of flow control instrument causes high stack gas flowrate (high combustion gas velocity)	DRE, dioxins, CO.	(1) Interlocks are set to stop spent activated carbon feed at the permitted parameter limit. (2) The stack flowmeter is on a calibration and inspection checklist. (3) Inspection by operators and/or maintenance personnel.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
60	***CEMS STACK MONITORS***	Failure of CEMS oxygen monitor	DRE, dioxins, CO	(1) Interlocks are set to stop spent activated carbon feed at the permitted parameter limit. (2) The CEMS units are on a calibration and inspection schedule. (3) Inspection by operators and/or maintenance personnel.	If preventative measures fail to manage the problem, spent activated carbon feed will be manually stopped by the operator after malfunction is identified.
61	***PROGRAMMABLE LOGIC CONTROLLER (PLC)***	Failure of electronic component in PLC causes loss of Programmable Logic Controller (PLC) system	DRE, particulate, dioxins, metals, chlorides, CO.	(1) The PLC is inspected by maintenance personnel for proper operation.	Operators will shutdown RF and APC if PLC fails.
62	***ALPHA SERVER/WORK STATIONS***	Failure of Alpha server operator interface	DRE, particulate, dioxins, metals, chlorides, CO.	(1) The Alpha Server is routinely checked for operation regularly. (3) Inspection by maintenance personnel.	Operators will shutdown RF and APC if Server fails.
63	***UTILITIES***	Failure of air compressor causes loss of instrument air.	DRE, particulate, dioxins, metals, chlorides, CO.	(1) Loss of instrument air will cause interlocks to stop spent activated carbon feed. (2) The instrument air supply equipment is on a (1) The compressors are on a routine inspection schedule (2) Inspections by operators and/or maintenance personnel..	Operators will shutdown RF and APC because of instrument air failure.
64		Failure of flow control instrument causes loss of natural gas.	DRE, particulate, dioxins, metals, chlorides, CO.	(1) Loss of natural gas supply will cause interlocks to stop spent activated carbon feed. (2) Inspection by operators.	Operators will shutdown RF and APC because of natural gas failure.
65		Failure of Duplex Pump Controller causes loss of city water booster pumps (P-17A/B).	DRE, particulate, dioxins, metals, chlorides, CO.	(1) Loss of city water will cause interlocks to stop spent activated carbon feed. (2) The city water supply equipment is routinely inspected. (3) Inspection by operators and/or maintenance personnel.	Operators will shutdown RF and APC because of loss of water supply.
66		Power Outage caused by trip of Main Breaker (GFI or overload)	DRE, particulate, dioxins, metals, chlorides, CO.	(1) Loss of electrical power will shut the whole plant down immediately.	Operators will shutdown RF and APC because of loss of electrical power.
67		Storm or other unforeseen occurrence causes loss of power to facility	DRE, particulate, dioxins, metals, chlorides, CO.	(1) Loss of electrical power will shut the whole plant down immediately.	Operators will shutdown RF and APC because of loss of power .
68		Storm or other unforeseen occurrence causes loss of power to facility (City water not available to APC)	DRE, particulate, dioxins, metals, chlorides, CO.	(1) Loss of electrical power will shut the whole plant down immediately.	Operators will shutdown RF and APC because of loss of power .

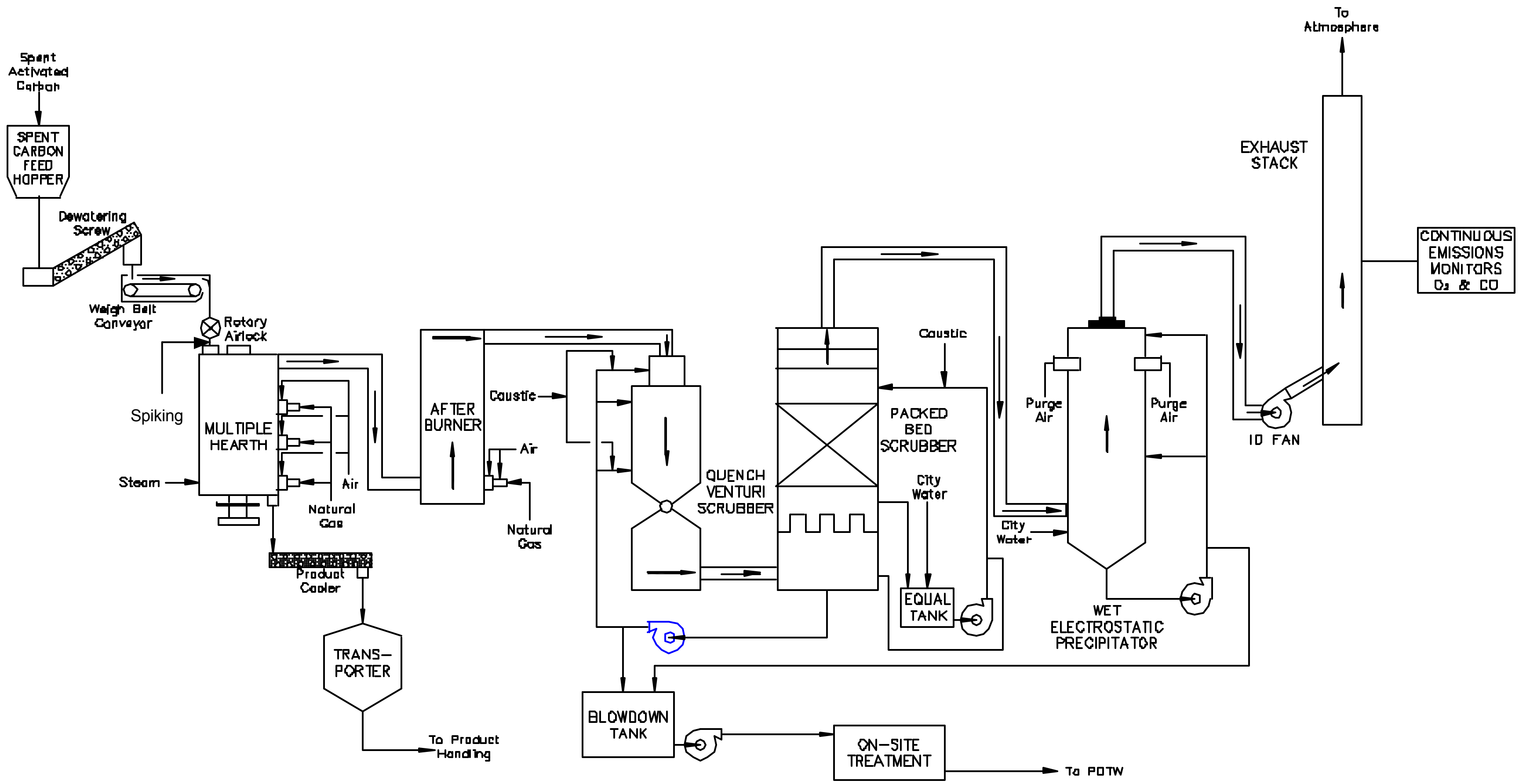

Figure 3-1. Carbon Reactivation Furnace System Block Flow Diagram

- F1 Spent Activated Carbon Feed Rate
- F2 Quench/Venturi Scrubber Recycle Flow Rate (Total)
- F3 Packed Bed Scrubber Recycle Flow Rate
- F4 Scrubber Blowdown Flow Rate
- F5 Stack Gas Flow Rate
- P1 Venturi Scrubber Pressure Differential
- P2 Packed Bed Scrubber Pressure Differential
- A1 Packed Bed Scrubber pH
- A2 Stack Gas Carbon Monoxide
- A3 Stack Gas Oxygen
- E1 WESP Secondary Voltage
- T1 Afterburner Temperature

See Table 3–1 And P&IDs For Additional Details

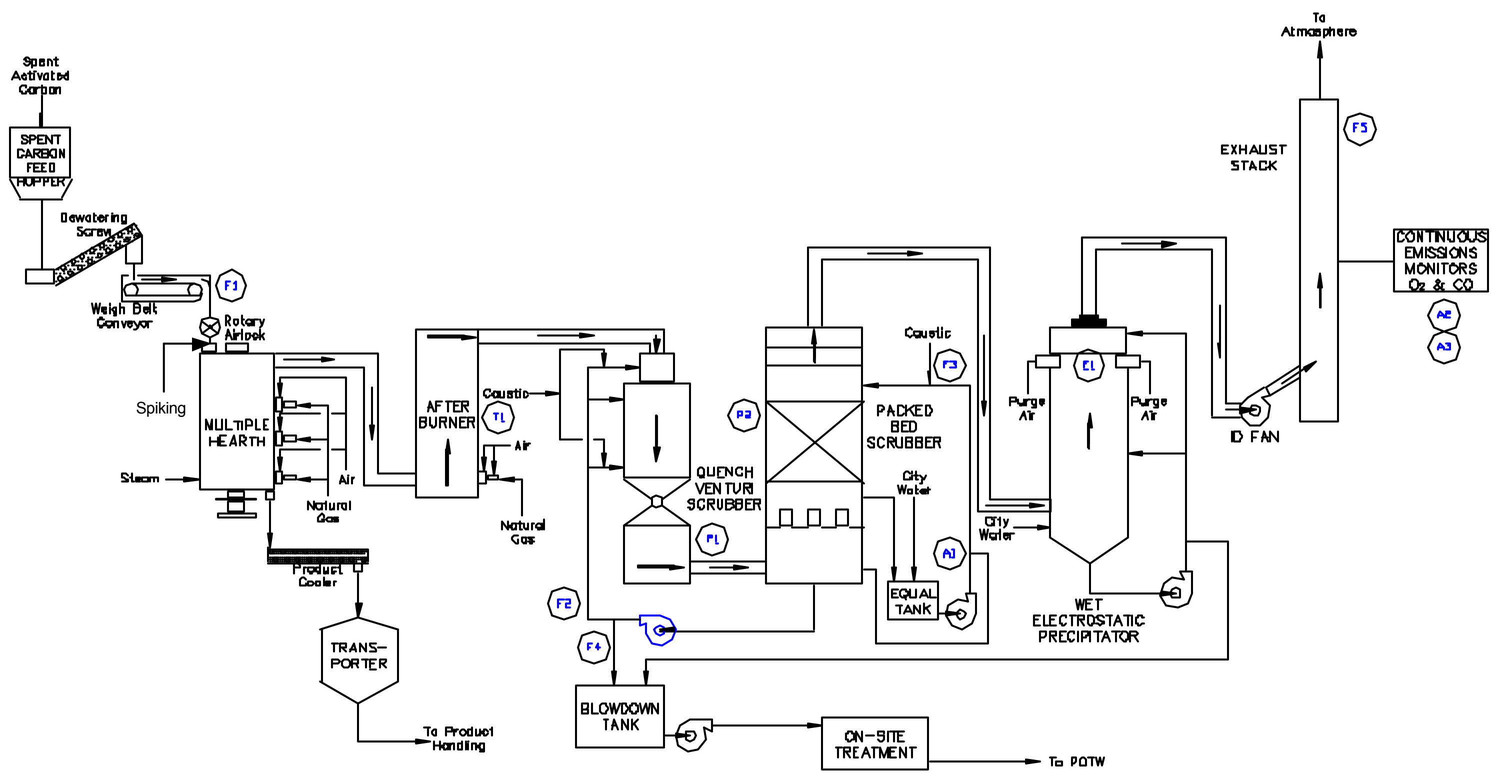

Figure 3-2. Location of Critical Process Instruments

Exhibit A-1: Documentation of Startup, Shutdown, or Malfunction

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SECTION 1

Event was a: ☐ Startup ☐ Shutdown ☐ Malfunction (known or potential)

☐ Power Outage

Brief description of event: ____

Date/time SSM commenced: __________________ Date/time SSM ended: ____________________

Is the SSM addressed in the SSMP? ☐ Yes ☐ No

Check all that apply associated with SSM:

1) ______ Actions taken were consistent with SSMP/ SOP
2) ______ Actions taken were not consistent with SSMP/ SOP
3) ______ Permit Limit exceedance did not occur
4) ______ Permit Limit exceedance did occur.

SECTION 2

Description of startup, shutdown, or malfunction: ____

____

____

____

Response/corrective action taken: ____

____

____

____

Reason(s) for not following the SSMP (complete if 2 above is checked) ____________________

____

____

____

Suggested measures to prevent reoccurrence of malfunction: ______________________________

____

____

____

Suggested SSMP revisions or improvements ____

____

____

OPERATOR		ENVIRONMENTAL HEALTH AND SAFETY MANAGER	
Print name:	____________________	Print name:	____________________
Signature	____________________	Signature	____________________
Date:	____________________	Date:	____________________

Summary of All Malfunction Events and,
Any instances during a startup, shutdown, or malfunction where the SSMP was not followed and no exceedance occurred

Event Occurrence				Event Duration	Event Description	Exceedance occurred during event?	SSMP/ Procedures Followed?	**Comments**
Begin		End						
Date	Time	Date	Time	(Hrs)[1]		(Yes/ No)[2]	(Yes/ No)[3]	

[1] Duration for a malfunction defined as time exceedance occurring due to malfunction and hazardous waste is in the combustion chamber
[2] If "yes" to exceedance occurred during event?, provide description of exceedance(s) in Comments column
[3] If "no" to SSMP/ procedures followed?, and "no" to exceedance occurred, explain in Comments column. If "no" to SSMP/ procedure followed, and "Yes" to exceedance occurred, event is not required to be included in this report, but is required in the Immediate Startup Shutdown and Malfunction Report per 63.10(d)(5)(ii)

APPENDIX XXIII

SUBPART FF COMPLIANCE PLAN

EVOQUA WATER TECHNOLOGIES

PARKER REACTIVATION FACILITY

PARKER, ARIZONA

Revision 9
March 2014

SUBPART FF
COMPLIANCE PLAN

Revision 9 –March 2014

EVOQUA WATER TECHNOLOGIES
PARKER, ARIZONA FACILITY

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1. INTRODUCTION

This document summarizes the applicable National Emission Standards for Hazardous Air Pollutants (NESHAP) for Benzene Waste Operations (Subpart FF) requirements and compliance plan for the Evoqua Water Technologies, Parker, Arizona facility. The main purpose of the document is to assist facility management and staff in understanding the relevant NESHAP Subpart FF requirements, and provide a tool for maintaining and tracking compliance documentation. Portions of the Facility's operations are also subject to RCRA Subpart CC, which controls emissions of volatile organics, including benzene. Subpart CC has provisions that can be more or less stringent than Subpart FF, and it also contains an exemption for certain facilities equipped with and operating air emission controls in compliance with Subpart FF. This plan does not address Subpart CC requirements.

The NESHAP regulations covered include:

- Subpart A - General Provisions (40 CFR 61.01, et seq.)
- Subpart FF - National Emission Standard for Benzene Waste Operations (40 CFR §61.340, et seq.)

Subpart A details the general provisions of the NESHAP regulations and applies to all facilities that trigger one or more of the emission standards outlined in the subsequent subparts. Subpart FF details the specific requirements for controlling benzene emissions from chemical manufacturing plants, petroleum refineries, and coke by-product recovery plants. This subpart also applies to facilities that treat wastes generated by facilities subject to Subpart FF; it is for this reason that the Parker, Arizona facility must comply with Subpart FF requirements (see §61.340(b)). The relevant texts from Subparts A and FF are provided in Appendix A for reference.

This document assumes that the total annual benzene quantity (TAB) for the Facility is less than 10 megagrams (Mg) per year. The Facility implements a TAB tracking system to closely monitor the facility TAB throughout the year, as changes to Facility practices, including additional controls, must be implemented before the Facility TAB equals or exceeds 10 Mg/yr.

The sections that follow describe the treatment processes at the Parker, Arizona facility, summarize the relevant rule requirements, and outline the facility's compliance plan.

2. FACILITY DESCRIPTION

The Parker, Arizona facility reactivates spent carbon from both facilities subject to and exempt from the requirements of Subpart FF. The spent carbon is deposited in one of two hoppers (H-1 and H-2) whose emissions are controlled by carbon absorber WS-2. The spent carbon is stored in tanks (T-1, T-2, T-5, and T-6) prior to treatment. From the storage tanks, the slurry is pumped to the furnace feed tank (T-18) and is then dewatered before being introduced into the reactivation unit. The storage tanks and furnace feed tank are connected to carbon adsorbers (WS-1 and WS-3) to treat any volatile organic compounds (VOC) that may be present in the tank vapors.

Spent carbon is reactivated in the facility reactivation treatment unit, which consists of a multiple hearth furnace (RF-2) and an afterburner (AB-2). In this treatment unit, organic contaminants such as benzene are thermally destroyed by high temperatures to achieve destruction and removal efficiency greater than 99%. Under the language of Subpart FF and EPA guidance, the regenerated carbon is considered a product, not a waste. As such, the Facility is not required to demonstrate compliance with the benzene removal or destruction requirements in the regenerated carbon, provided the carbon is legitimately redeployed as a regenerated carbon product. The Facility confirms this by ensuring its regenerated carbon meets product specifications and is placed into inventory for reuse.

Reactivated carbon product is cooled before it is stored, packaged, and shipped. The hot gases from the reactivation treatment unit are further treated by air pollution control equipment prior to being routed through a stack to atmosphere.

The Parker, Arizona facility currently operates as an interim status facility under the Resource Conservation and Recovery Act (RCRA) and is limited to a maximum spent carbon feed to the furnace of 2760 lb/hr.

Sources of potential benzene emissions from Subpart FF waste include:

- Carbon adsorbers (WS-1, WS-2, and WS-3), which control spent carbon storage and furnace feed tank VOC emissions, including benzene.
- Emissions associated with the reactivation treatment unit (RF-2 and AB-2).
- Fugitive emissions from the unloading of spent carbon into hoppers H-1 and H-2.
- Fugitive emissions from containers of Subpart FF waste.

The processes subject to Benzene Neshap compliance are highlighted in the facility process flow diagram located in Appendix L.

3.0 MANAGEMENT SUMMARY OF RULE REQUIREMENTS

3.1 Applicability Criteria for Designation of Affected Facilities (40 CFR §60.340)

Subpart FF applies to chemical manufacturing plants, coke by-product recovery plants, and petroleum refineries, and to treatment, storage and disposal facilities (TSDFs) that treat, store, or dispose, of hazardous wastes containing benzene generated by these facilities (e.g., the Facility) (see §61.340(a) and (b)). Because the Facility's TAB is less than 10 Mg/yr, it is subject only to TAB recordkeeping and reporting requirements under this section of the rule.

Subpart FF also applies to any facility that receives waste that is accompanied by a notice that the waste must be managed in accordance with Subpart FF (See 40 CFR §61.342(f)). The Facility receives wastes that have been designated as Subpart FF wastes under these provisions. All incoming wastes with a Subpart FF notice, including any subsequentmixtures of these wastes with any other materials, must be managed in compliance with Subpart FF requirements.

Incoming wastes from plants that are subject to Subpart FF (e.g., wastes from refineries, coke by-product recovery plants and chemical plants) which do not have a Subpart FF notice are presumed to not require Subpart FF controls at the Facility. If a generator provides a Subpart FF notice for a type of waste after prior shipments of that type have already been received, it is presumed that Subpart FF controls are required only from the date the Subpart FF notice is received.

3.2 Definitions (40 CFR 61.02 and 61.341)

Outlined below is a list of useful definitions that apply under NESHAP regulations. This list is not exhaustive and facility staff should reference the applicable subpart for additional information.

- ***Chemical Manufacturing Plant*** - any facility engaged in the production of chemicals by chemical, thermal, physical, or biological processes for use as a product, co-product, by-product, or intermediate including but not limited to industrial organic chemicals, organic pesticide products, pharmaceutical preparations, paint and allied products, fertilizers, and agricultural chemicals. See the definition at 40 CFR §61.341 for examples of some of the applicable process units.

- ***Capital Expenditure*** - An expenditure for a physical or operational change to a stationary source which exceeds a minimum threshold. The importance of the capital expenditure provisions is that modifications to existing facilities that result in an increase in emissions are not subject to NESHAP permitting requirements if the modifications can be accomplished without a “capital expenditure”. The difficulty with determining whether a modification triggers the “capital expenditure” threshold is that the Internal Revenue Service (IRS) guidelines cited by EPA as the means of making this determination are no longer published. EPA recognizes that the IRS form is no longer available, and intends to modify this definition. In the meantime, EPA uses the following definition:

  Capital Expenditure > (Original Equipment Cost)(0.07)

  Capital expenditures are analyzed on a per project basis to determine if a modification will result from a change in operation.

- ***Closed Vent System*** - A system that is not open to the atmosphere and is composed of piping, ductwork, connections, and, if necessary, flow inducing devices that transport gas or vapor from an emission source to a control device.

- ***Coke By-Product Recovery Plant*** - any facility designed and operated for the separation and recovery of coal tar derivatives (by-products) evolved from coal during the coking process of a coke oven battery.

- ***Commencement of Construction*** - Construction commences when an owner or operator has undertaken a continuous program of construction or modification, or when an owner has entered into a contractual obligation to undertake and complete, within a reasonable time, a continuous program of construction or modification. Under a strict reading of this definition, construction commences when an owner signs a contract for the construction of a new or modified emission unit subject to NESHAP regulations. However, this is not how EPA applies this definition. EPA has issued guidance to the effect that construction commences when any component of an emissions unit subject to NESHAP is affixed to a foundation. Under this guidance, the laying of a foundation or permanent installation of piping or electrical conduit associated with a NESHAP source is considered to be commencement of construction. Notably, EPA does allow the shipment of pre-fabricated equipment to a site, provided that equipment is not affixed to a foundation upon arrival at the NESHAP facility.

- ***Construction*** - Fabrication, erection, or installation of a facility subject to NESHAP regulations. More notably, construction of a facility subject to NESHAP regulations cannot be commenced without a permit from EPA or its delegated administrator.

- ***Container*** - Any portable waste management unit in which a material is stored, transported, treated, or otherwise handled. Examples of containers are drums, barrels, tank trucks, dumpsters, tank cars, and dump trucks.

- ***Cover*** - A device or system which is placed on or over a waste placed in a waste management unit so that the entire waste surface area is enclosed and sealed to minimize air emissions. A cover may have openings necessary for operation, inspection, and maintenance of the waste management unit such as access hatches, sampling ports, and gauge wells provided that each opening is closed and sealed when not in use. Examples of covers include a fixed roof installed on a tank, a lid installed on a container, and an air-supported enclosure installed over a waste management unit.

- ***Individual Drain System*** – A system used to convey waste from a process unit, product storage tank, or waste management unit to a waste management unit. This term includes all process drains and associated sewer lines down to the receiving waste management unit.

- ***No Detectable Emissions*** - Less than 500 parts per million by volume (ppmv) above background levels, as measured by a detection instrument reading in accordance with the procedures specified in §61.355(h) of this subpart.

- ***Modification*** - Any physical or operational change to an existing facility that results in an increase in the emission rate to which a NESHAP regulation applies. The following changes are not considered modifications:

  - Maintenance, repair, and routine replacement, if such physical change does not increase the maximum potential to emit of a pollutant to which NESHAP regulations apply.

  - An increase in production rate (i.e., feed rate) if that increase can be accomplished without a capital expenditure.

  - An increase in the hours of operation.

  The relocation or change in ownership of a stationary source. However, such activities must be reported to EPA, as discussed in Section 3.4 below.

- ***Petroleum Refinery*** - any facility engaged in producing gasoline, kerosene, distillate fuel oils, residual fuel oils, lubricants, or other products through the distillation of petroleum, or through the redistillation, cracking, or reforming of unfinished petroleum derivatives.

- ***Point of Waste Generation*** - The location where the waste stream exits the process unit component or storage tank prior to handling or treatment in an operation that is not an integral part of the production process, or in the case of waste management units that generate new wastes.

- ***Tank*** - A stationary waste management unit that is designed to contain an accumulation of waste and is constructed primarily of non-earthen materials which provide structural support.

- ***Total Annual Benzene Quantity (TAB)*** - the sum of the annual benzene quantity for each hazardous waste stream from a chemical manufacturing plant, a coke by-product recovery plant, or a petroleum refinery received at the Facility that has a flow-weighted annual average water content greater than 10 percent or that is mixed with water, or other wastes, at any time and the mixture has an annual average water content greater than 10 percent, calculated in accordance with 40 CFR §61.355.

- ***Waste*** - Any material resulting from industrial, commercial, mining or agricultural operations, or from community activities that is discarded or is being accumulated, stored, or physically, chemically, thermally, or biologically treated prior to being discarded, recycled, or discharged.

- ***Waste Management Unit*** – A piece of equipment, structure, or transport mechanism used in handling, storage, treatment, or disposal of waste. Examples of a waste management unit include a tank, surface impoundment, container, oil-water separator, individual drain system, steam stripping unit, thin-film evaporation unit, waste incinerator, and landfill.

- ***Waste stream*** - The waste generated by a particular process unit, product tank, or waste management unit. The characteristics of the waste stream (e.g., flow rate, benzene concentration, water content) are determined at the point of waste generation. Examples of a waste stream include process wastewater, product tank drawdown, sludge and slop oil removed from waste management units, and landfill leachate.

3.3 Permitting for New and Modified Facilities (40 CFR §§61.07 - 61.08)

Prior to commencement of construction or modification of a facility subject to NESHAP regulations, an owner or operator must submit an application to EPA or its delegated administrator. For the Parker, Arizona facility, the application should be submitted to EPA Region IX at the following address:

Mr. Jack Broadbent
Director, Air and Toxics Division (A-1)
United States Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105

The contents of the application should include:

- The name and address of the applicant.
- The location of the proposed source.
- Technical information describing the proposed nature, size, design, operating design capacity, and method of operation, including a description of any equipment to be used to control emissions. Such technical information shall include calculations of emissions in sufficient detail so that EPA can assess the validity of the calculations and determine compliance with the applicable standards.
- Applications for modifications should also include a description of the proposed nature of the changes, the productive capacity of the facility before and after the changes are completed, and calculations of emissions before and after the changes are completed. The calculations should be in sufficient detail so that EPA can validate them and determine compliance with applicable standards.

After submittal of the application, EPA Region IX will determine if the application is complete. If deemed complete, EPA will notify the applicant within 60 days of its intention to approve or deny the application. If EPA determines that the new or modified source will comply with the applicable NESHAP standards, construction will be approved.

Construction may be commenced as soon as EPA issues its approval of the application.

3.4 Notifications (40 CFR §§61.09, 61.10, 61.13(c), and 61.342(f))

The following written notifications shall be submitted to EPA Region IX:

- Anticipated start-up notification. This notification shall be provided no more than 60 days nor less than 30 days before start-up.
- Actual start-up notification. The notification of actual start-up shall be submitted within 15 days after the date of start-up.
- Existing source notification. This notification should have been submitted by April 7, 1993. The contents of this notification are outlined in 40 CFR 61.10
- Change in information notification. If any of the information provided in a permit application or in the existing source notification is changed even though the change does not constitute a modification (e.g., change in ownership, address, etc.), a notification shall be submitted within 30 days after the change.
- Emission testing notification. This notification should be submitted at least 30 days prior to testing.
- Subpart FF waste disposal notification. If Subpart FF wastes are shipped offsite for treatment at another facility, a notification must accompany each shipment stating that the wastes contain benzene, which is required to be managed and treated in accordance with the provisions of Subpart FF (See 40 CFR §61.342(f)).

3.5 General Standards for Treatment Facilities (40 CFR §61.348)

The facility shall treat the waste received from Subpart FF waste generators to at least one of the following standards:

1. Remove benzene from the waste stream to a level less than 10 ppmw on a flow weighted annual average basis. The reduction of benzene concentration by dilution is not allowed [§61.348(a)(1)(I)].

2. Remove benzene from the waste stream by 99 percent or more on a mass basis [§61.348(a)(1)(ii)].

3. Destroy benzene in the waste stream by incinerating the waste in a combustion unit that achieves a destruction efficiency of 99 percent or greater for benzene [§61.348(a)(1)(iii)].

4. Return the waste to a process to generate a new product [§61.342(c)(1)(iii)].

Under the language of Subpart FF and EPA guidance, the regenerated carbon is considered a product, not a waste. As such, the Facility is not required to demonstrate compliance with the benzene removal or destruction requirements in the regenerated carbon, provided the carbon is legitimately redeployed as a regenerated carbon product.

The Facility confirms this by ensuring its regenerated carbon meets product specifications and is placed into inventory for reuse. However, all equipment used to manage the spent carbon up to and including the multiple hearth and afterburner must be managed in accordance with Subpart FF equipment standards. These standards are set forth in 40 CFR §61.343 through §61.349 (as applicable). The requirements for each type of equipment are covered in the following section except for surface impoundments and oil-water separators, which are not present at the Facility.

The Facility may occasionally generate a wastewater from the discard of motive water used in the Facility's production process to slurry incoming spent carbon prior to reactivation. The motive water is assumed to become a waste at the point that the Facility determines it is no longer useable for its intended purpose. At that point of waste generation, if the wastewater has a flow-weighted annual average benzene content of less than 10 ppmw, then it is exempt from further control requirements under §61.342(c)(2). If the flow-weighted annual average benzene concentration of discarded motive water is 10 ppmw or greater, the wastewater would need to be treated using a control device regulated by Subpart FF to achieve either a benzene content below 10 ppmw on a flow weighted annual average or 99% or more benzene removal on a mass basis, pursuant to §61.348(a)(1)(i) or (ii), or sent to a facility with a 61.342(f) notice that Subpart FF treatment is required.

All access doors or other potential openings shall be sealed and kept closed at all times when waste is being treated, except during inspection and maintenance. Visual inspections of each sealed opening shall be performed initially and quarterly thereafter to ensure that no cracks or gaps occur and that openings are sealed closed. All repairs of any identified gaps or broken seals shall be made within 15 days. Repairs may be delayed until the next unit shutdown if they cannot be completed without a partial or complete facility shutdown.

Facilities complying with standards numbered one and two above must also comply with the standards of 40 CFR §61.343 through §61.347, and §61.349 (if applicable). These sections provide the requirements for tanks, containers, surface impoundments, individual drain systems, oil-water separators, and closed vent systems. Since the Parker, Arizona facility does not operate surface impoundments, and oil-water separators subject to NESHAP regulations, these requirements will not be covered in the following section.

3.6 Standards for Tanks, Containers, Individual Drain Systems and Closed Vent Systems (40 CFR §§61.343, 61.345, 61.346, and 61.349)

Table 1 summarizes the equipment design, inspection, and repair requirement outlined in 40 CFR 60.343, 61.345, 61.346 and 61.349. These standards apply to:

- Tanks
- Containers
- Individual Drain Systems

- Closed Vent Systems
- Control Devices

Defects or other problems detected during equipment inspections must be corrected within the time frames outlined in Table 1. Repair may be delayed until the next facility shutdown if it is technically infeasible to make the repair or correction without a partial or complete facility shutdown.

Table 1 – Summary of Subpart FF Requirements

Component	Equipment Design	Inspection Methods	Inspection Frequency	Repair Deadline
Tanks (§61.343)	Fixed roof connected by closed vent to a control device; all potential openings shall be sealed closed except during inspection, repair, maintenance, removal, or sampling; the closed vent system and control device shall meet the requirements of §61.349 (discussed below).	Visual inspection for cracks and broken seals; Method 21 to verify fugitives < 500 ppmv.	Initial and quarterly visual inspections; Initial and annual Method 21 inspections.	45 days
	Fixed roof with pressure relief device maintained in a closed position except during relief events (limitations apply, see note below).	Visual inspection for cracks and broken seals; Method 21 to verify fugitives < 500 ppmv.	Initial and quarterly visual inspections; Initial and annual Method 21 inspections.	45 days
Note: *A tank may be operated without a closed vent system if:* *1) average water content is less than 10% by volume and maximum organic vapor pressure is less than 0.75 psia;* *2) maximum organic vapor pressure is less than 4.0 psia and tank capacity is less than 40,000 gallons;* **or** 3) *maximum organic vapor pressure is less than 11.1 psia and tank capacity is less than 20,000 gallons.*				
Containers (§61.345)	All containers shall remain sealed closed except during periods of loading, unloading, inspection, or sampling; liquids pumped into a container must be done with a submerged fill pipe.	Visual inspection for cracks and broken seals; Method 21 to verify fugitives < 500 ppmv for containers >111 gallons	Initial and quarterly visual inspections; Annual Method 21 inspections.	15 days
Note: *Wastes treated within containers must be equipped with a closed vent system meeting the requirements of §61.349 (discussed below). Containers shipped offsite for treatment must meet the notification requirements of §61.342(f).*				

Component	Equipment Design	Inspection Methods	Inspection Frequency	Repair Deadline
Individual Drain Systems (§61.346)	*Compliance option of §61.346(a):* Each individual drain system opening must be equipped with a closed vent system and control device. *Compliance option of §61.346(b):* Each drain must be equipped with water seal controls or a tightly sealed cap or plug; each sewer line shall be covered or enclosed with no visual gaps or cracks.	Visual inspection for cracks and broken seals. Method 21 to verify fugitive emissions <500 ppmv	Initial and quarterly visual inspections. Initial and annual Method 21 inspections.	15 days
Treatment Processes (§61.348)	Each treatment process must remove benzene to < 10 ppmw (dilution is not allowed), or remove or destroy benzene by 99 wt%; each treatment process must comply with the standards of §§61.343 - 61.347; compliance must be demonstrated either by engineering calculations (§61.356(e)) or performance tests (§61.355); all potential openings shall be sealed closed except during inspection and maintenance or return waste to a process to generate a new product (§61.342(c)(1)(iii).	Visual inspection for cracks and broken seals; inspection of units according to §§61.343 - 61.347.	Initial and quarterly visual inspections; inspection of units according to §§61.343 - 61.34 7.	15 days
Closed-vent Systems and Control Devices(§61.349)	The vent system shall remain closed and connected to a control device; bypass lines shall have a flow indicator or a car-seal or lock-and-key seal; all gauging and sampling devices shall be gas-tight except when gauging or sampling; control device must be monitored according to §61.354(c) (see note below); control device must be operated at all times when waste is present, except for maintenance and repair requires shutdown;	Visual inspection; Method 21 to verify fugitives < 500 ppmv.	Initial and quarterly visual inspections; Initial and annual Method 21 inspections.	First attempt: 5 days; Full repair: 15 days.
	An enclosed combustion device (e.g., a vapor incinerator, boiler, or process heater) must: reduce organic emissions by 95 wt%; achieve organic concentration 20 ppmv, corrected to 3% oxygen; or provide minimum residence time of 0.5 sec at minimum temperature of 760°C; vent must be introduced into flame zone of boiler or process heater (§61.349(a)(2)(i)).	Visual inspection; monitoring according to §61.354(c) (see note below).	Initial and quarterly visual inspections; daily monitoring device inspections (see note below).	First attempt: 5 days; Full repair: 15 days.

Component	Equipment Design	Inspection Methods	Inspection Frequency	Repair Deadline
	A vapor recovery system (e.g., carbon adsorption system or condenser) must: recover or control organic emissions by 95 wt%, or recover or control benzene emissions by 98 wt%; carbon canisters must be replaced immediately upon breakthrough (§61.349(a)(2)(ii)).	Visual inspection; monitoring according to §61.354(c) (see note below).	Initial and quarterly visual inspections; daily monitoring device inspections (see note below).	First attempt: 5 days; Full repair: 15 days.
	Any other control device must achieve organic control of 95 wt% or benzene control of 98 wt%.	Visual inspection; monitoring according to §61.354(c) (see note below).	Initial and quarterly visual inspections; daily monitoring device inspections (see note below).	First attempt: 5 days; Full repair: 15 days.

Note: *§61.354(c) specifies the following required monitoring of operations for control devices subject to §61.349; the data recorded by the monitoring equipment must be inspected at least* ***once*** *each operating day to ensure proper operation of the control device, which in pertinent part are as follows:*
(1) for a thermal vapor incinerator, a temperature monitoring device equipped with a continuous recorder;
(2) for a control device subject to §61.349(a)(2)(iv) (other devices), devices to monitor the parameters specified in §61.349(a)(2)(iv)(C); **and**
§61.354(d) specifies the required monitoring of carbon adsorption systems that do not regenerate the carbon bed directly on site (e.g., carbon canisters): organic or benzene outlet concentrations shall be monitored daily, or *at intervals no greater than 20% of the design carbon replacement interval (whichever is greater), to indicate when breakthrough has occurred or replace carbon earlier than the design breakthrough period.*

3.7 Compliance Demonstration (40 CFR §§61.13, 61.355, and 61.356(e) - (f))

Subpart FF requires the owner or operator to demonstrate compliance with the applicable general standards for hazardous waste treatment facilities and the applicable standards for closed vent systems and control devices. Compliance may be demonstrated either through engineering calculations or performance testing, which are discussed in turn below.

3.7.1 Engineering Calculations (40 CFR §61.348(c)(1))

Compliance with the general standards for hazardous waste treatment facilities [§61.348(a)(1)(I) - (iii)] may be demonstrated with engineering calculations. These calculations must demonstrate compliance at maximum waste flow rate and maximum benzene content conditions and be available prior to facility start-up. As discussed in Section 3.9, these calculations shall be maintained for the life of the facility and include all supporting technical information (e.g., design specifications, drawings, etc.). See 40 CFR 61.356(e)(2) for additional information.

Carbon canisters and their associated closed vent systems must meet specific calculation requirements of 40 CFR 61.356(f)(2)(i)(G). Briefly, this analysis must consider the vent stream composition, benzene and constituent concentration, flow rate, relative humidity, and temperature. Based on these data, the operator must calculate the effective control capacity of the carbon canister and define the appropriate replacement interval to assure that the carbon canister maintains its control effectiveness.

For the afterburner, the specific calculation requirements are set forth in 40 CFR §61.356(f)(2)(i)(A). In general, this analysis must consider the vent stream composition, constituent concentrations, and flow rate. The design analysis shall also establish the design minimum and average temperature in the combustion zone and the combustion zone residence time.

3.7.2 Performance Testing (40 CFR §61.348(c)(2))

If emissions testing is used to demonstrate compliance, the tests must be performed within 90 days of start-up for new units, or April 7, 1993 for existing units. Additionally, the EPA can at anytime require that such testing be performed to demonstrate compliance with Subpart FF requirements [40 CFR 61.13(b)]. The results of the emissions tests shall be reported to EPA Region IX within 31 days following the completion of testing. As discussed in Section 3.9, the results should be retained for the life of the facility.

The specific source tests that may be performed in lieu of engineering calculations are as follows:

COMPLIANCE STANDARD	TEST METHODS REFERENCE
Remove benzene to a 10 ppmw concentration [§61.348(a)(1)(i)]	See §61.355(d)
Remove benzene from the waste stream by 99 percent or more on a mass basis	See §61.355(e)

COMPLIANCE STANDARD	TEST METHODS REFERENCE
[§61.348(a)(1)(ii)]	
Destroy benzene in the waste stream by incinerating the waste in a combustion unit that achieves a destruction efficiency of 99 percent or greater for benzene [§61.348(a)(1)(iii)]	See §61.355(f)
Meet control device performance requirements specified in §61.349(a)(2)	See §61.355(i)

3.7.3 Method 21 Testing (40 CFR §61.355(h))

All inspections performed using an organic vapor analyzer (OVA) shall be performed consistent with the requirements of EPA Method 21 from Appendix A of 40 CFR 60. Calibrations and testing shall also be performed consistent with 40 CFR 61.355(h).

3.8 Monitoring of Operations (40 CFR §§61.14 and 61.354)

Compliance monitoring must be performed as outlined below:

COMPLIANCE STANDARD	MONITORING METHODS AND FREQUENCY
Remove benzene to a 10 ppmw concentration [§61.348(a)(1)(I)].	Sample exiting streams on a monthly basis using the methods prescribed by §61.355(c); or, monitor a parameter or parameters on a continuous basis to assure proper system operation and inspect recorded data daily for each monitored parameter.
Remove benzene from the waste stream by 99 percent or more on a mass basis [§61.348(a)(1)(ii)].	Monitor a parameter or parameters on a continuous basis to assure proper system operation and inspect recorded data daily for each monitored parameter.
Destroy benzene in the waste stream by incinerating the waste in a combustion unit that achieves a destruction efficiency of 99 percent or greater for benzene [§61.348(a)(1)(iii)].	Monitor a parameter or parameters (e.g., temperature) on a continuous basis to assure proper system operation and inspect recorded data daily for each monitored parameter.

COMPLIANCE STANDARD	MONITORING METHODS AND FREQUENCY
Meet control device performance requirements for carbon canisters as specified in §61.349(a)(2)	Replace canister at a specified interval as determined through engineering calculations; or, monitor the VOC content in the exhaust on a daily basis or at an interval not to exceed 20% of the design carbon replacement interval.

3.9 Recordkeeping Requirements (40 CFR §61.356)

All records required by Subpart FF shall be maintained in a readily accessible location at the facility site for a period not less than two years, unless otherwise specified below. The records that must be maintained include:

- A list of the streams subject to Subpart FF compliance and whether or not the waste stream is controlled for benzene emissions (§61.356(b)).
- For each waste stream not controlled in accordance with Subpart FF, all test results and other documentation used to define the stream identification, water content, whether or not the waste stream is process wastewater, annual waste quantity, range of benzene concentrations, annual average flow-weighted benzene concentration, and annual benzene quantity (§61.356(b)(1)).
- For each waste shipment sent offsite for treatment, the date the waste is shipped offsite, quantity of waste shipped offsite, the name and address of the facility receiving the waste, and a copy of the notice sent with the waste shipment (§61.356(c)).
- Engineering design documentation for all control equipment. The documentation should be retained for the life of the facility (§61.356(d)).
- A signed and dated statement certifying that the treatment unit is designed to operate at the documented performance level when the waste stream entering the facility is at the highest flow rate and benzene concentration. This signed statement should be retained for the life of the facility (§61.356(e)(1)).
- For closed-vent systems and control devices, a signed and dated statement certifying that each system and device is designed to operate at the documented performance level when the waste management unit vented to the control device is or would be operating at the highest load or capacity expected to occur. This signed statement must be retained for the life of the unit (§61.356(f)).
- If engineering calculations are used to demonstrate compliance with the general standards for treatment facilities [§61.348(a)(1)(I) - (iii)], a complete design analysis that includes supporting technical information (e.g., design specifications, etc.) should be maintained for the life of the facility (§61.356(e)(2)).

- For all performance test results used to demonstrate compliance with the general standards for treatment facilities [§61.348(a)(1)(I) - (iii)], maintain for the life of the facility the documentation required in 40 CFR §61.356(e)(3).

- A signed and dated statement certifying that the closed vent system and control device is designed to operate at the documented performance level at the highest load or capacity expected to occur (§61.356(f)(1)).

- If engineering calculations are used to determine control device performance, then a design analysis should be retained for the life of the control device that includes specifications, drawings, and other documentation supporting the calculations. For carbon canisters, the design analysis should include information required in 40 CFR §61.356(f)(2)(I)(G).

- For all test results used to determine control device performance, maintain testing results for the life of the control device as outlined in 40 CFR §61.356(f)(3).

- Visual inspection records that include the date of each inspection, the treatment unit or control equipment inspected, description of any problem identified, a description of the corrective action taken, and the date the corrective action was completed (§61.356(g)).

- Method 21 inspection records that include the dates of inspection, background level measured, and the maximum concentration measured at each potential leak interface. If a leak is detected, then the records shall include the location where the leak was detected, a description of the problem, a description of the corrective action taken, and the date the corrective action was completed (§61.356(h)).

- Dates of start-up and shutdown of the treatment unit, and periods when the treatment unit is not operating as designed (§61.356(i)(1) & (5)).

- Dates of start-up and shutdown of the closed-vent system, and periods when the closed-vent system is not operating as designed (§61.356(i)(1) & (3)).

- Testing results from all monthly waste stream sampling performed in accordance with 40 CFR §61.354(a)(1). The results should also include the date each test is performed (§61.356(i)(2)).

- Descriptions of any process parameters that are monitored to ensure the treatment unit is operating in compliance with Subpart FF. The descriptions should include reasons why the parameter(s) was/were selected. This documentation should be maintained for the life of the facility (§61.356(i)(3)).

- Descriptions of any process parameters that are continuously monitored to ensure the control device is operating in compliance with Subpart FF. The descriptions should include the control device’s specifications, and reasons why the parameter(s) was/were selected. This documentation should be maintained for the life of the facility (§61.356(j)(2)).

- Periods and durations when the closed-vent system and control device are not operated as designed (§61.356(j)(3)).

- Date and time when the carbon canisters are monitored (if applicable), when breakthrough is measured (if applicable), and when the canister is replaced (§61.356(j)(10)).

3.10 Reporting Requirements (40 CFR §§61. 13(f) and 61.357)

The following reports shall be submitted to EPA Region IX:

- Performance test reports. These reports shall be submitted within 31 days following testing and should include the information required in 40 CFR §61.356(e)(3) or §61.356(f)(3), as applicable (§61.13(f)).

- Initial Subpart FF report. This report should have been submitted by April 7, 1993 for existing facilities, and be submitted at start-up for facilities constructed after January 7, 1993. The contents of the report are outlined in 40 CFR §61.357(a)(1) - (3).

Annual Subpart FF TAB report (Appendix D).1 As outlined in the rules, if the total amount of benzene waste included in the Facility TAB is equal to or greater than 1.0 Mg/yr (1.1 ton/yr), but less than 10 Mg/yr (11 ton/yr), the operator shall submit a report by April 7 each year updating the TAB, identifying the controlled/uncontrolled and organic/aqueous designations of each waste stream, along with other data described in 40 CFR §61.357(a)(1)-(3) (§61.357(c)).[2] If the Facility's TAB is 10 Mg/yr or greater, additional reporting is required pursuant to 40 CFR §61.357(d), including certification of equipment installation and quarterly reporting. The Facility may be deemed to know its TAB calculation throughout the year as wastes are received, and it is therefore essential that the Facility track this information continuously so that it can respond immediately before its TAB ever equals or exceeds 10 Mg/yr.

4.0 EVOQUA WATER TECHNOLOGIES, PARKER, ARIZONA FACILITY COMPLIANCE PLAN

4.1 NESHAP Subpart FF Applicability to the Parker, Arizona Facility

NESHAP Subparts A and FF apply to the spent carbon storage and treatment processes within the facility. All affected process units and storage tanks are equipped with controls

1 If the facility TAB is less than 1 Mg/yr, then no TAB report is required unless there is a change that could cause the TAB to increase to 1 Mg/yr or more.
2 Chemical plants, coke by-product recovery plants and refineries with a TAB equal to or greater than 1 Mg and less than 10 Mg/yr are usually not subject to BWON control requirements. 40 C.F.R. §61.342(a). Thus, the purpose of the annual report for these facilities is typically to confirm that the TAB remains below 10 Mg. However, TSD facilities that treat BWON-regulated wastes received from off-site facilities must provide the same degree of control as the generating facility would so they may be subject to BWON control even if their TAB is less than 10 Mg/yr.

to benzene emissions to the atmosphere.

The specific process components subject to Subpart FF compliance are as follows:

I.D. NO.	DESCRIPTION	APPLICABLE STANDARD	COMMENTS
N/A	Spent Carbon Containers	§61.345	Subpart FF wastes are stored in drums, vessels, and supersacks.
N/A	Debris Bin and Associated Drums	§61.345 §61.342(f)	Benzene wastes shipped offsite must meet the container reqts., and offsite shipment reqts.
H-1 H-2	Spent Carbon Unloading Hoppers Nos. 1 and 2 and associated transfer lines	§61.346(b)	These hoppers are individual drain systems, which are equipped with covers; additional controls of fugitive emissions from the hoppers is provided by carbon adsorption (WS-2).
T-1	Spent Carbon Storage Tank	§61.343	Tank vapors controlled by carbon adsorption (WS-1).
T-2	Spent Carbon Storage Tank	§61.343	Tank vapors controlled by carbon adsorption (WS-1).
T-5	Spent Carbon Storage Tank	§61.343	Tank vapors controlled by carbon adsorption (WS-1).
T-6	Spent Carbon Storage Tank	§61.343	Tank vapors controlled by carbon adsorption (WS-1).
T-9	Recycle Water Tank	§61.343	Tank vapors controlled by carbon adsorption (WS-1).
T-18	Furnace Feed Hopper	§61.343	Tank vapors controlled by carbon adsorption (WS-3)
RF-2	Reactivation Furnace No.2	§61.348	Regenerated carbon must meet product specifications
AB-2	Afterburner No. 2	§61.349(a)(2)(i)(c)	Minimum residence time of 0.5 seconds at a minimum temperature of 1400 F
C-5	Dewater Screw	§61.346(a)	Emissions routed to the afterburner (AB-2)
C-16	Weight belt	§61.346(a)	Emissions routed to the afterburner (AB-2)
WS-1	Carbon Adsorber No. 1	§61.349	Carbon Canister replaced prior to design breakthrough
WS-2	Carbon Adsorber No. 2	§61.349	Carbon Canister replaced prior to design breakthrough
WS-3	Carbon Adsorber No. 3	§61.349	Carbon Canister replaced prior to design breakthrough

The Parker, Arizona facility is required to regenerate spent carbon to a useful product. Compliance with 40 CFR §61.348 also requires that the upstream tanks, containers, individual drain systems and control devices noted in the table above must meet the applicable requirements of Subpart FF (i.e., §61.343, §61.345, §61.346 and §61.349).

The debris bin and associated drums, which are used to store FF wastes from the facility, must not only meet the container requirements of 40 CFR §61.345, but also the requirements of 40 CFR §342(f). Section 342(f) requires that a notice accompany each waste shipment indicating that the wastes must be treated in accordance with the standards of Subpart FF. Records must be maintained indicating the date the waste is shipped offsite, quantity of waste shipped offsite, the name and address of the facility receiving the waste, and a copy of the notice sent with the waste shipment (§61.356(c)).

Hoppers H-1 and H-2 are used to convey Subpart FF wastes from containers and other waste management units to the regeneration system. As such, these units are considered individual drain systems, which meet Subpart FF requirements under 61.346(b). Each of the units is equipped with a cover, which is kept closed when the hoppers are not being used to convey Subpart FF wastes. The associated lines that convey Subpart FF wastes from H-1 and H-2 to the Spent Carbon Storage Tanks (T-1, T-2, T-5 and T-6) are hard piping are inspected quarterly for any evidence of leaks (open valves, indications of low liquid levels, rips, tears, or cracks in equipment, etc.). Any repairs that are identified as required during these quarterly inspections are performed within 15 days, as required (See Section 4.4, below).

The process wastewater stream associated with the wet scrubber control system has been specifically excluded from NESHAP applicability since it does not come in contact with Subpart FF waste streams. Additionally, water that comes in contact with Subpart FF waste is also exempt from Subpart FF treatment requirements under 40 CFR §61.342(c) since it contains less than 10 ppmw total benzene on an annual weighted average basis. The drain system is also exempt from Subpart FF compliance since it does not handle Subpart FF waste. Subpart FF wastes, which are contained in closed drums and roll-offs are managed so that none of these materials is allowed to enter the maintenance drains within the facility during surface cleaning operations.

4.2 Compliance Responsibilities

The Plant Manager has the primary responsibility for overseeing the NESHAP Subpart FF compliance program for the Parker, Arizona facility. More specifically, the Plant Manager assures that all permitting, notifications, monitoring, inspections, recordkeeping, and reporting are performed in accordance with the applicable regulations. The Plant Manager is responsible for assuring that all needed repairs and other maintenance activities are performed as required. The Plant Operator is responsible for monitoring the day-to-day operation of the facility.

4.3 Permitting and Notifications

All proposed changes to the Parker, Arizona facility are reviewed by the Plant Manager or his designee to determine if the modification provisions of the NESHAP regulations have been triggered. In making this determination, the Environmental Plant Manager or his/her designee will determine whether or not the changes can potentially increase benzene emissions. If the changes will not increase benzene emissions, then the NESHAP modification provisions are not triggered. If the changes have the potential to increase facility benzene emissions, then the Environmental Health and Safety Manager or his/her designee will determine if the capital expenditure threshold will be exceeded by the project. As noted in Section 3.2, a capital expenditure is incurred for NESHAP applicability when the cost of the changes exceeds seven percent of the original facility cost.

If the changes are deemed as “modifications”, the Environmental Health and Safety Manager or his/her designee will prepare a permit application that conforms to the requirement of Section 3.3 and submit it to EPA Region IX. No facility changes will be made until EPA approves the application.

The Environmental Health and Safety Manager or his/her designee is responsible for making all notifications required by NESHAP Subpart A and Subpart FF. The contents of these notifications are outlined in Section 3.4. Copies of relevant notifications are maintained in Appendix B of this plan.

4.4 Inspection and Repair

The Environmental Health and Safety Manager or his/her designee performs all routine quarterly visual inspections of the facility. During these inspections, the Environmental Health and Safety Manager or his/her designee examines the stationary equipment listed in Section 4.1 and its interconnecting piping for cracks, gaps, or other problems. In addition, the Environmental Health and Safety Manager or his/her designee visually inspects all spent carbon containers maintained onsite for more than one quarter year. Each visual inspection is documented on the Visual Inspection Form and copies of completed forms are maintained in Appendix E.

The Environmental Health and Safety Manager or his/her designee performs the Method 21 inspections annually during periods when the facility is processing Subpart FF waste. During these inspections, the Environmental Health and Safety Manager or his/her designee inspects all potential leak sources listed on the Annual Method 21 Inspection Form (See Appendix F). The Environmental Health and Safety Manager or his/her designee documents the results of the inspection on the Annual Method 21 Inspection Form and maintains copies of the completed forms in Appendix F. Spent carbon containers maintained onsite for more than one year must be included in this inspection.

The initial inspections of Subpart FF waste containers delivered to the Parker, Arizona facility are completed by the respective generator of the waste. This inspection includes both a visual inspection of the container and a Method 21 inspection of all potential leak interfaces. As noted above, containers maintained for more than one quarter year at the facility, will be visually inspected by the Environmental Health and Safety Manager or his/her designee during the routine quarterly visual inspection. Furthermore, containers maintained onsite for more than one year must be inspected using Method 21.

The debris bin and baghouse drum shall be visually inspected and inspected using Method 21 by the Environmental Health and Safety Manager or his designee following initial loading with Subpart FF containing wastes. In addition, the debris bin and containers will be visually re-inspected if it is onsite for more than 90 days (with the exception of the debris bin which cannot be stored longer than 90 days). These inspections shall be documented in the Debris Bin and Associated Drums Inspection Log found in Appendix G.

All leaks (defined as an instrument reading exceeding 500 ppmv over background), openings, cracks or other problems identified during the visual and Method 21 inspections will be repaired within the time frames established in Table 1 (see Section 3.6, above). The Environmental Health and Safety Manager or his/her designee who detects the leak will work with the Plant Manager or his/her designee to complete the repair. Completed repairs will be documented on the affected inspection forms in Appendices F, G, or H.

If a repair cannot be completed within the specified time without a partial or complete facility shutdown, the Environmental Health and Safety Manager or his/her designee will document in the affected inspection form in Appendices F, G, or H the reason why the repair is delayed. The Environmental Health and Safety Manager or his/her designee will ensure that all repairs are completed during the next process unit shutdown, and document in the affected inspection form the completion of the repair.

4.5 Monitoring

Compliance with the general treatment requirements are monitored as follows:

EQUIPMENT COMPONENT / MATERIAL	APPLICABLE STANDARD	MONITORING METHOD	FREQUENCY
Afterburner (AB-2)	§61.349(a)(2)(i)(c)	Temperature	Continuous
Wastewater in Contact with Spent Carbon Discharged to POTW	§61.342(c)(2)	Benzene concentration (minimum of three (3) samples) determined by methods prescribed by §61.355(c)(2)	Annual
Carbon Adsorber (WS-1)	§61.349(a)(2)(ii)	Calculations in Appendix C show that the canister must be replaced at least every 7.88 days.	7.88 days at a maximum or more frequently
Carbon Adsorber (WS-2)	§61.349(a)(2)(ii)	Calculations in Appendix C show that the canister must be replaced at least every 100 days.	100 days at a maximum or more frequently
Carbon Adsorber (WS-3)	§61.349(a)(2)(ii)	Calculations in Appendix C show that the canister must be replaced at least every 38 days.	38 days at a maximum or more frequently

The Plant Operator reviews all temperature readings on a daily basis to assure that the reactivation furnace is operating as designed, and the afterburner is maintained at a temperature greater than 760°C (1400°F). If the temperature data for the afterburner indicate a performance problem, the Plant Operator will correct the problem as soon as possible. The reasons justifying the use of temperature as the main monitoring parameter are provided in Appendix H.

To comply with the requirements of 40 CFR §61.356(b), the Environmental Health and Safety Manager or his/her designee shall verify on an annual basis the annual flow rate and the benzene concentration in the untreated wastewater in contact with spent carbon (minimum of 3 samples). Determinations shall assure that the benzene concentration in the wastewater is less than 10 ppmw and records will be maintained in Appendix J.

The Plant Manager or his/her designee will replace the carbon in adsorbers WS-1, WS-2, and WS-3 in accordance with the schedule identified above. Immediately following adsorber replacement, the Plant Manager or his designee will document the change-out in the Carbon Canister Replacement Log included in Appendix I.

Any periods of malfunction, equipment start-up and shutdown will be logged by the Plant Operator in the Process Monitoring log. These logs are maintained in the file room.

4.6 Performance Testing

No emissions testing has been performed to demonstrate compliance with the applicable standards of Subpart FF. All compliance determinations have been performed through engineering calculations. Calculations documenting the performance of the carbon adsorbers are included in Appendix C.

4.7 Recordkeeping

The following table identifies all applicable Subpart A and FF records required to be maintained at the Parker, Arizona facility, the individual responsible for its maintenance, and the location where the records are stored. Unless otherwise noted in the table, the records will be maintained for a minimum of two years, as required by NESHAP regulations.

NESHAP FF RECORDKEEPING PLAN
EVOQUA WATER TECHNOLOGIES
PARKER, ARIZONA FACILITY

Record Description	Individual Responsible	Comments/Location
Notifications (§§61.09, 61.10, 61.13(c), and 61.342(f)) – *Note: the initial notification should be retained for the life of the facility*	Plant Manager	Appendix B of the Compliance Plan (see Section 3.4)
List of streams subject to Subpart FF	Plant Manager	Section 4.1 of the Compliance Plan

NESHAP FF RECORDKEEPING PLAN
EVOQUA WATER TECHNOLOGIES
PARKER, ARIZONA FACILITY

Record Description	Individual Responsible	Comments/Location
Total annual benzene reports	Plant Manager	Appendix D of the Compliance Plan
Date the debris bin and associated drums shipped offsite, quantity of waste shipped offsite, name and address of facility receiving waste (§61.356(c))	Plant Manager	Waste manifests in Plant Manager's office
Engineering design documentation of control equipment (§61.356(d))*	Plant Manager	Plant Manager's office
Engineering calculations demonstrating Control Equipment performance (§61.356(f)(2)(i)(G))*	Plant Manager	Appendix C of Compliance Plan
Test results demonstrating control equipment performance (§61.356(f)(3))*	N/A	Not Applicable. Calculations have been used in lieu of testing results.
Visual inspection records (§61.356(g))	Plant Manager	Appendices F and H of the Compliance Plan
Method 21 inspection records (§61.356(h))	Plant Manager	Appendices G and H of the Compliance Plan
Dates of start-up, shutdown, and malfunction of treatment unit (§61.356(i)(1) & (5))	Plant Operator	Process Monitoring Log maintained in Plant Manager's office
Testing results from all monthly sampling (§61.356(i)(3))	N/A	Not Applicable. No monthly sampling of regenerated carbon required since regenerated carbon is a product
Descriptions of process parameters monitored to ensure treatment unit performance (§61.356(i)(3))*	Plant Manager	Appendix H of the Compliance Plan
Dates of startup, shutdown, and malfunction of the carbon absorbers (§61.356(j)(1) & (3))	Plant Operator	Process Monitoring Log maintained in Plant Manager's office
Descriptions of process parameters monitored to ensure control device performance (§61.356(j)(2))*	N/A	Not Applicable. The Carbon Absorbers (WS-1, WS-2 and WS-3) are changed-out on a predetermined frequency; no monitoring is performed. See Appendix C of the Compliance Plan.
Date and time when the carbon	Plant Manager	Replacement Logs are

NESHAP FF RECORDKEEPING PLAN
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Record Description	Individual Responsible	Comments/Location
absorbers are monitored and replaced (§61.356(j)(10))		maintained in Appendix I of the Compliance Plan; monitoring for these units not required.

Records noted with an asterisk (*) must be maintained for the life of the facility. Otherwise, facility is to maintain records for two years (§61.356(a)).

4.8 Reporting

The Environmental Health and Safety Manager or his/her designee shall prepare the Annual Subpart FF Report and submit it to EPA to EPA Region IX by April 7th of each year whenever the facility TAB is 1 Mg/yr or greater. This report will cover the previous calendar year's activities and meet the requirements of 40 CFR 61.357(a)(1)-(3). Copies of the report will be maintained in Appendix D.

APPENDIX A - RELEVANT TEXT OF NESHAP SUBPARTS A AND FF

for a source that has an initial startup date after the effective date.

(1) Periods of operation where there were exceedances of monitored parameters recorded under § 61.305(b).

(2) All periods recorded under § 61.305(c)(1) when the vent stream is diverted from the control device.

(3) All periods recorded under § 61.305(d) when the steam generating unit or process heater was not operating.

(4) All periods recorded under § 61.305(e) in which the pilot flame of the flare was absent.

(5) All times recorded under § 61.305(c)(2) when maintenance is performed on car-sealed valves, when the car seal is broken, and when the valve position is changed.

(g) The owner or operator of an affected facility shall keep the vapor-tightness documentation required under § 61.302 (d) and (e) on file at the affected facility in a permanent form available for inspection.

(h) The owner or operator of an affected facility shall update the documentation file required under § 61.302 (d) and (e) for each tank truck, railcar, or marine vessel at least once per year to reflect current test results as determined by the appropriate method. The owner or operator shall include, as a minimum, the following information in this documentation:

(1) Test title;

(2) Tank truck, railcar, or marine vessel owner and address;

(3) Tank truck, railcar, or marine vessel identification number;

(4) Testing location;

(5) Date of test;

(6) Tester name and signature;

(7) Witnessing inspector: name, signature, and affiliation; and

(8) Test results, including, for railcars and tank trucks, the initial pressure up to which the tank was pressured at the start of the test.

(i) Each owner or operator of an affected facility complying with § 61.300(b) or § 61.300(d) shall record the following information. The first year after promulgation the owner or operator shall submit a report containing the requested information to the Director of the Emission Standards Division, (MD–13), U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711. After the first year, the owner or operator shall continue to record; however, no reporting is required. The information shall be made available if requested. The information shall include, as a minimum:

(1) The affected facility's name and address;

(2) The weight percent of the benzene loaded;

(3) The type of vessel loaded (i.e., tank truck, railcar, or marine vessel); and

(4) The annual amount of benzene loaded into each type of vessel.

[55 FR 8341, Mar. 7, 1990, as amended at 65 FR 62159, Oct. 17, 2000]

§ 61.306 Delegation of authority.

(a) In delegating implementation and enforcement authority to a State under section 112(d) of the Act, the authorities contained in paragraph (b) of this section shall be retained by the Administrator and not transferred to a State.

(b) Authorities which will not be delegated to States: No restrictions.

Subparts CC–EE [Reserved]

Subpart FF—National Emission Standard for Benzene Waste Operations

SOURCE: 55 FR 8346, Mar. 7, 1990, unless otherwise noted.

§ 61.340 Applicability.

(a) The provisions of this subpart apply to owners and operators of chemical manufacturing plants, coke by-product recovery plants, and petroleum refineries.

(b) The provisions of this subpart apply to owners and operators of hazardous waste treatment, storage, and disposal facilities that treat, store, or dispose of hazardous waste generated by any facility listed in paragraph (a) of this section. The waste streams at hazardous waste treatment, storage, and disposal facilities subject to the provisions of this subpart are the benzene-containing hazardous waste from any facility listed in paragraph (a) of this section. A hazardous waste treatment, storage, and disposal facility is a facility that must obtain a hazardous waste management permit under subtitle C of the Solid Waste Disposal Act.

(c) At each facility identified in paragraph (a) or (b) of this section, the following waste is exempt from the requirements of this subpart:

(1) Waste in the form of gases or vapors that is emitted from process fluids:

(2) Waste that is contained in a segregated stormwater sewer system.

(d) At each facility identified in paragraph (a) or (b) of this section, any gaseous stream from a waste management unit, treatment process, or wastewater treatment system routed to a fuel gas system, as defined in §61.341, is exempt from this subpart. No testing, monitoring, recordkeeping, or reporting is required under this subpart for any gaseous stream from a waste management unit, treatment process, or wastewater treatment unit routed to a fuel gas system.

[55 FR 8346, Mar. 7, 1990, as amended at 55 FR 37231, Sept. 10, 1990; 58 FR 3095, Jan. 7, 1993; 67 FR 68531, Nov. 12, 2002]

§61.341 Definitions.

Benzene concentration means the fraction by weight of benzene in a waste as determined in accordance with the procedures specified in §61.355 of this subpart.

Car-seal means a seal that is placed on a device that is used to change the position of a valve (e.g., from opened to closed) in such a way that the position of the valve cannot be changed without breaking the seal.

Chemical manufacturing plant means any facility engaged in the production of chemicals by chemical, thermal, physical, or biological processes for use as a product, co-product, by-product, or intermediate including but not limited to industrial organic chemicals, organic pesticide products, pharmaceutical preparations, paint and allied products, fertilizers, and agricultural chemicals. Examples of chemical manufacturing plants include facilities at which process units are operated to produce one or more of the following chemicals: benzenesulfonic acid, benzene, chlorobenzene, cumene, cyclohexane, ethylene, ethylbenzene, hydroquinone, linear alklylbenzene, nitrobenzene, resorcinol, sulfolane, or styrene.

Closed-vent system means a system that is not open to the atmosphere and is composed of piping, ductwork, connections, and, if necessary, flow inducing devices that transport gas or vapor from an emission source to a control device.

Coke by-product recovery plant means any facility designed and operated for the separation and recovery of coal tar derivatives (by-products) evolved from coal during the coking process of a coke oven battery.

Container means any portable waste management unit in which a material is stored, transported, treated, or otherwise handled. Examples of containers are drums, barrels, tank trucks, barges, dumpsters, tank cars, dump trucks, and ships.

Control device means an enclosed combustion device, vapor recovery system, or flare.

Cover means a device or system which is placed on or over a waste placed in a waste management unit so that the entire waste surface area is enclosed and sealed to minimize air emissions. A cover may have openings necessary for operation, inspection, and maintenance of the waste management unit such as access hatches, sampling ports, and gauge wells provided that each opening is closed and sealed when not in use. Example of covers include a fixed roof installed on a tank, a lid installed on a container, and an air-supported enclosure installed over a waste management unit.

External floating roof means a pontoon-type or double-deck type cover with certain rim sealing mechanisms that rests on the liquid surface in a waste management unit with no fixed roof.

Facility means all process units and product tanks that generate waste within a stationary source, and all waste management units that are used for waste treatment, storage, or disposal within a stationary source.

Fixed roof means a cover that is mounted on a waste management unit in a stationary manner and that does not move with fluctuations in liquid level.

Floating roof means a cover with certain rim sealing mechanisms consisting of a double deck, pontoon single deck, internal floating cover or covered floating roof, which rests upon and is supported by the liquid being contained, and is equipped with a closure seal or seals to close the space between the roof edge and unit wall.

Flow indicator means a device which indicates whether gas flow is present in a line or vent system.

Fuel gas system means the offsite and onsite piping and control system that gathers gaseous streams generated by facility operations, may blend them with sources of gas, if available, and transports the blended gaseous fuel at suitable pressures for use as fuel in heaters, furnaces, boilers, incinerators, gas turbines, and other combustion devices located within or outside the facility. The fuel is piped directly to each individual combustion device, and the system typically operates at pressures over atmospheric.

Individual drain system means the system used to convey waste from a process unit, product storage tank, or waste management unit to a waste management unit. The term includes all process drains and common junction boxes, together with their associated sewer lines and other junction boxes, down to the receiving waste management unit.

Internal floating roof means a cover that rests or floats on the liquid surface inside a waste management unit that has a fixed roof.

Liquid-mounted seal means a foam or liquid-filled primary seal mounted in contact with the liquid between the waste management unit wall and the floating roof continuously around the circumference.

Loading means the introduction of waste into a waste management unit but not necessarily to complete capacity (also referred to as filling).

Maximum organic vapor pressure means the equilibrium partial pressure exerted by the waste at the temperature equal to the highest calendar-month average of the waste storage temperature for waste stored above or below the ambient temperature or at the local maximum monthly average temperature as reported by the National Weather Service for waste stored at the ambient temperature, as determined:

(1) In accordance with § 60.17(c); or

(2) As obtained from standard reference texts; or

(3) In accordance with § 60.17(a)(37); or

(4) Any other method approved by the Administrator.

No detectable emissions means less than 500 parts per million by volume (ppmv) above background levels, as measured by a detection instrument reading in accordance with the procedures specified in § 61.355(h) of this subpart.

Oil-water separator means a waste management unit, generally a tank or surface impoundment, used to separate oil from water. An oil-water separator consists of not only the separation unit but also the forebay and other separator basins, skimmers, weirs, grit chambers, sludge hoppers, and bar screens that are located directly after the individual drain system and prior to additional treatment units such as an air flotation unit, clarifier, or biological treatment unit. Examples of an oil-water separator incude an API separator, parallel-plate interceptor, and corrugated-plate interceptor with the associated ancillary equipment.

Petroleum refinery means any facility engaged in producing gasoline, kerosene, distillate fuel oils, residual fuel oils, lubricants, or other products through the distillation of petroleum, or through the redistillation, cracking, or reforming of unfinished petroleum derivatives.

Petroleum means the crude oil removed from the earth and the oils derived from tar sands, shale, and coal.

Point of waste generation means the location where the waste stream exits the process unit component or storage tank prior to handling or treatment in an operation that is not an integral part of the production process, or in the case of waste management units that generate new wastes after treatment, the location where the waste stream exits the waste management unit component.

Process unit means equipment assembled and connected by pipes or ducts to produce intermediate or final products. A process unit can be operated independently if supplied with sufficient fuel or raw materials and sufficient product storage facilities.

Process unit turnaround means the shutting down of the operations of a process unit, the purging of the contents of the process unit, the maintenance or repair work, followed by restarting of the process.

Process unit turnaround waste means a waste that is generated as a result of a process unit turnaround.

Process wastewater means water which comes in contact with benzene during manufacturing or processing operations conducted within a process unit. Process wastewater is not organic wastes, process fluids, product tank drawdown, cooling tower blowdown, steam trap condensate, or landfill leachate.

Process wastewater stream means a waste stream that contains only process wastewater.

Product tank means a stationary unit that is designed to contain an accumulation of materials that are fed to or produced by a process unit, and is constructed primarily of non-earthen materials (e.g., wood, concrete, steel, plastic) which provide structural support.

Product tank drawdown means any material or mixture of materials discharged from a product tank for the purpose of removing water or other contaminants from the product tank.

Safety device means a closure device such as a pressure relief valve, frangible disc, fusible plug, or any other type of device which functions exclusively to prevent physical damage or permanent deformation to a unit or its air emission control equipment by venting gases or vapors directly to the atmosphere during unsafe conditions resulting from an unplanned, accidental, or emergency event. For the purpose of this subpart, a safety device is not used for routine venting of gases or vapors from the vapor headspace underneath a cover such as during filling of the unit or to adjust the pressure in this vapor headspace in response to normal daily diurnal ambient temperature fluctuations. A safety device is designed to remain in a closed position during normal operations and open only when the internal pressure, or another relevant parameter, exceeds the device threshold setting applicable to the air emission control equipment as determined by the owner or operator based on manufacturer recommendations, applicable regulations, fire protection and prevention codes, standard engineering codes and practices, or other requirements for the safe handling of flammable, ignitable, explosive, reactive, or hazardous materials.

Segregated stormwater sewer system means a drain and collection system designed and operated for the sole purpose of collecting rainfall runoff at a facility, and which is segregated from all other individual drain systems.

Sewer line means a lateral, trunk line, branch line, or other enclosed conduit used to convey waste to a downstream waste management unit.

Slop oil means the floating oil and solids that accumulate on the surface of an oil-water separator.

Sour water stream means a stream that:

(1) Contains ammonia or sulfur compounds (usually hydrogen sulfide) at concentrations of 10 ppm by weight or more;

(2) Is generated from separation of water from a feed stock, intermediate, or product that contained ammonia or sulfur compounds; and

(3) Requires treatment to remove the ammonia or sulfur compounds.

Sour water stripper means a unit that:

(1) Is designed and operated to remove ammonia or sulfur compounds (usually hydrogen sulfide) from sour water streams;

(2) Has the sour water streams transferred to the stripper through hard piping or other enclosed system; and

(3) Is operated in such a manner that the offgases are sent to a sulfur recovery unit, processing unit, incinerator, flare, or other combustion device.

Surface impoundment means a waste management unit which is a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials (although it may be lined with man-made materials), which is designed to hold an accumulation of liquid wastes or waste containing free liquids, and which is not an injection well. Examples of surface impoundments are holding, storage, settling, and aeration pits, ponds, and lagoons.

Tank means a stationary waste management unit that is designed to contain an accumulation of waste and is constructed primarily of nonearthen materials (e.g., wood, concrete, steel, plastic) which provide structural support.

Treatment process means a stream stripping unit, thin-film evaporation unit, waste incinerator, or any other process used to comply with § 61.348 of this subpart.

Vapor-mounted seal means a foam-filled primary seal mounted continuously around the perimeter of a waste management unit so there is an annular vapor space underneath the seal. The annular vapor space is bounded by the bottom of the primary seal, the unit wall, the liquid surface, and the floating roof.

Waste means any material resulting from industrial, commercial, mining or agricultural operations, or from community activities that is discarded or is being accumulated, stored, or physically, chemically, thermally, or biologically treated prior to being discarded, recycled, or discharged.

Waste management unit means a piece of equipment, structure, or transport mechanism used in handling, storage, treatment, or disposal of waste. Examples of a waste management unit include a tank, surface impoundment, container, oil-water separator, individual drain system, steam stripping unit, thin-film evaporation unit, waste incinerator, and landfill.

Waste stream means the waste generated by a particular process unit, product tank, or waste management unit. The characteristics of the waste stream (e.g., flow rate, benzene concentration, water content) are determined at the point of waste generation. Examples of a waste stream include process wastewater, product tank drawdown, sludge and slop oil removed from waste management units, and landfill leachate.

Wastewater treatment system means any component, piece of equipment, or installation that receives, manages, or treats process wastewater, product tank drawdown, or landfill leachate prior to direct or indirect discharge in accordance with the National Pollutant Discharge Elimination System permit regulations under 40 CFR part 122. These systems typically include individual drain systems, oil-water separators, air flotation units, equalization tanks, and biological treatment units.

Water seal controls means a seal pot, p-leg trap, or other type of trap filled with water (e.g., flooded sewers that maintain water levels adequate to prevent air flow through the system) that creates a water barrier between the sewer line and the atmosphere. The water level of the seal must be maintained in the vertical leg of a drain in order to be considered a water seal.

[55 FR 8346, Mar. 7, 1990; 55 FR 12444, Apr. 3, 1990, as amended at 58 FR 3095, Jan. 7, 1993; 67 FR 68531, Nov. 12, 2002]

§ 61.342 Standards: General.

(a) An owner or operator of a facility at which the total annual benzene quantity from facility waste is less than 10 megagrams per year (Mg/yr) (11 ton/yr) shall be exempt from the requirements of paragraphs (b) and (c) of this section. The total annual benzene quantity from facility waste is the sum of the annual benzene quantity for each waste stream at the facility that has a flow-weighted annual average water content greater than 10 percent or that is mixed with water, or other wastes, at any time and the mixture has an annual average water content greater than 10 percent. The benzene quantity in a waste stream is to be counted only once without multiple counting if other waste streams are mixed with or generated from the original waste stream. Other specific requirements for calculating the total annual benzene waste quantity are as follows:

(1) Wastes that are exempted from control under §§ 61.342(c)(2) and 61.342(c)(3) are included in the calculation of the total annual benzene quantity if they have an annual average water content greater than 10 percent, or if they are mixed with water or other wastes at any time and the mixture has an annual average water content greater than 10 percent.

(2) The benzene in a material subject to this subpart that is sold is included in the calculation of the total annual benzene quantity if the material has an annual average water content greater than 10 percent.

(3) Benzene in wastes generated by remediation activities conducted at the facility, such as the excavation of contaminated soil, pumping and treatment of groundwater, and the recovery of product from soil or groundwater, are not included in the calculation of total annual benzene quantity for that facility. If the facility's total annual benzene quantity is 10 Mg/yr (11 ton/yr) or more, wastes generated by remediation activities are subject to the requirements of paragraphs (c) through (h) of this section. If the facility is managing remediation waste generated offsite, the benzene in this waste shall be included in the calculation of total annual benzene quantity in facility waste, if the waste streams have an annual average water content greater than 10 percent, or if they are mixed with water or other wastes at any time and the mixture has an annual average water content greater than 10 percent.

(4) The total annual benzene quantity is determined based upon the quantity of benzene in the waste before any waste treatment occurs to remove the benzene except as specified in § 61.355(c)(1)(i) (A) through (C).

(b) Each owner or operator of a facility at which the total annual benzene quantity from facility waste is equal to or greater than 10 Mg/yr (11 ton/yr) as determined in paragraph (a) of this section shall be in compliance with the requirements of paragraphs (c) through (h) of this section no later than 90 days following the effective date, unless a waiver of compliance has been obtained under § 61.11, or by the initial startup for a new source with an initial startup after the effective date.

(1) The owner or operator of an existing source unable to comply with the rule within the required time may request a waiver of compliance under § 61.10.

(2) As part of the waiver application, the owner or operator shall submit to the Administrator a plan under § 61.10(b)(3) that is an enforceable commitment to obtain environmental benefits to mitigate the benzene emissions that result from extending the compliance date. The plan shall include the following information:

(i) A description of the method of compliance, including the control approach, schedule for installing controls, and quantity of the benzene emissions that result from extending the compliance date;

(ii) If the control approach involves a compliance strategy designed to obtain integrated compliance with multiple regulatory requirements, a description of the other regulations involved and their effective dates; and

(iii) A description of the actions to be taken at the facility to obtain mitigating environmental benefits, including how the benefits will be obtained, the schedule for these actions, and an estimate of the quantifiable benefits that directly result from these actions.

(c) Each owner or operator of a facility at which the total annual benzene quantity from facility waste is equal to or greater than 10 Mg/yr (11 ton/yr) as determined in paragraph (a) of this section shall manage and treat the facility waste as follows:

(1) For each waste stream that contains benzene, including (but not limited to) organic waste streams that contain less than 10 percent water and aqueous waste streams, even if the wastes are not discharged to an individual drain system, the owner or operator shall:

(i) Remove or destroy the benzene contained in the waste using a treatment process or wastewater treatment system that complies with the standards specified in § 61.348 of this subpart.

(ii) Comply with the standards specified in §§ 61.343 through 61.347 of this subpart for each waste management unit that receives or manages the waste stream prior to and during treatment of the waste stream in accordance with paragraph (c)(1)(i) of this section.

(iii) Each waste management unit used to manage or treat waste streams that will be recycled to a process shall comply with the standards specified in §§ 61.343 through 61.347. Once the waste stream is recycled to a process, including to a tank used for the storage of production process feed, product, or product intermediates, unless this tank is used primarily for the storage of wastes, the material is no longer subject to paragraph (c) of this section.

(2) A waste stream is exempt from paragraph (c)(1) of this section provided that the owner or operator demonstrates initially and, thereafter, at least once per year that the flow-weighted annual average benzene concentration for the waste stream is less than 10 ppmw as determined by the procedures specified in § 61.355(c)(2) or § 61.355(c)(3).

(3) A waste stream is exempt from paragraph (c)(1) of this section provided that the owner or operator demonstrates initially and, thereafter, at least once per year that the conditions specified in either paragraph (c)(3)(i) or (c)(3)(ii) of this section are met.

(i) The waste stream is process wastewater that has a flow rate less than 0.02 liters per minute (0.005 gallons per minute) or an annual wastewater quantity of less than 10 Mg/yr (11 ton/yr); or

(ii) All of the following conditions are met:

(A) The owner or operator does not choose to exempt process wastewater under paragraph (c)(3)(i) of this section,

(B) The total annual benzene quantity in all waste streams chosen for exemption in paragraph (c)(3)(ii) of this section does not exceed 2.0 Mg/yr (2.2 ton/yr) as determined in the procedures in § 61.355(j), and

(C) The total annual benzene quantity in a waste stream chosen for exemption, including process unit turnaround waste, is determined for the year in which the waste is generated.

(d) As an alternative to the requirements specified in paragraphs (c) and (e) of this section, an owner or operator of a facility at which the total annual benzene quantity from facility waste is equal to or greater than 10 Mg/yr (11 ton/yr) as determined in paragraph (a) of this section may elect to manage and treat the facility waste as follows:

(1) The owner or operator shall manage and treat facility waste other than process wastewater in accordance with the requirements of paragraph (c)(1) of this section.

(2) The owner or operator shall manage and treat process wastewater in accordance with the following requirements:

(i) Process wastewater shall be treated to achieve a total annual benzene quantity from facility process wastewater less than 1 Mg/yr (1.1 ton/yr). Total annual benzene from facility process wastewater shall be determined by adding together the annual benzene quantity at the point of waste generation for each untreated process wastewater stream plus the annual benzene quantity exiting the treatment process for each process wastewater stream treated in accordance with the requirements of paragraph (c)(1)(i) of this section.

(ii) Each treated process wastewater stream identified in paragraph (d)(2)(i) of this section shall be managed and treated in accordance with paragraph (c)(1) of this section.

(iii) Each untreated process wastewater stream identified in paragraph (d)(2)(i) of this section is exempt from the requirements of paragraph (c)(1) of this section.

(e) As an alternative to the requirements specified in paragraphs (c) and (d) of this section, an owner or operator of a facility at which the total annual benzene quantity from facility waste is equal to or greater than 10 Mg/yr (11 ton/yr) as determined in paragraph (a) of this section may elect to manage and treat the facility waste as follows:

(1) The owner or operator shall manage and treat facility waste with a flow-weighted annual average water content of less than 10 percent in accordance with the requirements of paragraph (c)(1) of this section; and

(2) The owner or operator shall manage and treat facility waste (including remediation and process unit turnaround waste) with a flow-weighted annual average water content of 10 percent or greater, on a volume basis as total water, and each waste stream that is mixed with water or wastes at any time such that the resulting mixture has an annual water content greater than 10 percent, in accordance with the following:

(i) The benzene quantity for the wastes described in paragraph (e)(2) of this section must be equal to or less than 6.0 Mg/yr (6.6 ton/yr), as determined in § 61.355(k). Wastes as described in paragraph (e)(2) of this section that are transferred offsite shall be included in the determination of benzene quantity as provided in § 61.355(k). The provisions of paragraph (f) of this section shall not apply to any owner or operator who elects to comply with the provisions of paragraph (e) of this section.

(ii) The determination of benzene quantity for each waste stream defined in paragraph (e)(2) of this section shall be made in accordance with § 61.355(k).

(f) Rather than treating the waste onsite, an owner or operator may elect to comply with paragraph (c)(1)(i) of this section by transferring the waste offsite to another facility where the waste is treated in accordance with the requirements of paragraph (c)(1)(i) of this section. The owner or operator transferring the waste shall:

(1) Comply with the standards specified in §§ 61.343 through 61.347 of this subpart for each waste management unit that receives or manages the waste prior to shipment of the waste offsite.

(2) Include with each offsite waste shipment a notice stating that the waste contains benzene which is required to be managed and treated in accordance with the provisions of this subpart.

(g) Compliance with this subpart will be determined by review of facility records and results from tests and inspections using methods and procedures specified in § 61.355 of this subpart.

(h) Permission to use an alternative means of compliance to meet the requirements of §§ 61.342 through 61.352 of this subpart may be granted by the Administrator as provided in § 61.353 of this subpart.

[55 FR 8346, Mar. 7, 1990, as amended at 58 FR 3095, Jan. 7, 1993; 65 FR 62159, 62160, Oct. 17, 2000]

§ 61.343 Standards: Tanks.

(a) Except as provided in paragraph (b) of this section and in § 61.351, the owner or operator must meet the standards in paragraph (a)(1) or (2) of this section for each tank in which the waste stream is placed in accordance with § 61.342 (c)(1)(ii). The standards in this section apply to the treatment and storage of the waste stream in a tank, including dewatering.

(1) The owner or operator shall install, operate, and maintain a fixed-roof and closed-vent system that routes all organic vapors vented from the tank to a control device.

(i) The fixed-roof shall meet the following requirements:

(A) The cover and all openings (e.g., access hatches, sampling ports, and gauge wells) shall be designed to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppmv above background, as determined initially and thereafter at least once per year by the methods specified in § 61.355(h) of this subpart.

(B) Each opening shall be maintained in a closed, sealed position (e.g., covered by a lid that is gasketed and latched) at all times that waste is in the tank except when it is necessary to use the opening for waste sampling or removal, or for equipment inspection, maintenance, or repair.

(C) If the cover and closed-vent system operate such that the tank is maintained at a pressure less than atmospheric pressure, then paragraph (a)(1)(i)(B) of this section does not apply to any opening that meets all of thefollowing conditions:

(*1*) The purpose of the opening is to provide dilution air to reduce the explosion hazard;

(*2*) The opening is designed to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppmv above background, as determined initially and thereafter at least once per year by the methods specified in § 61.355(h); and

(*3*) The pressure is monitored continuously to ensure that the pressure in the tank remains below atmospheric pressure.

(ii) The closed-vent system and control device shall be designed and operated in accordance with the requirements of § 61.349 of this subpart.

(2) The owner or operator must install, operate, and maintain an enclosure and closed-vent system that routes all organic vapors vented from the tank, located inside the enclosure, to a control device in accordance with

the requirements specified in paragraph (e) of this section.

(b) For a tank that meets all the conditions specified in paragraph (b)(1) of this section, the owner or operator may elect to comply with paragraph (b)(2) of this section as an alternative to the requirements specified in paragraph (a)(1) of this section.

(1) The waste managed in the tank complying with paragraph (b)(2) of this section shall meet all of the following conditions:

(i) Each waste stream managed in the tank must have a flow-weighted annual average water content less than or equal to 10 percent water, on a volume basis as total water.

(ii) The waste managed in the tank either:

(A) Has a maximum organic vapor pressure less than 5.2 kilopascals (kPa) (0.75 pounds per square inch (psi));

(B) Has a maximum organic vapor pressure less than 27.6 kPa (4.0 psi) and is managed in a tank having design capacity less than 151 m^3 (40,000 gal); or

(C) Has a maximum organic vapor pressure less than 76.6 kPa (11.1 psi) and is managed in a tank having a design capacity less than 75 m^3 (20,000 gal).

(2) The owner or operator shall install, operate, and maintain a fixed roof as specified in paragraph (a)(1)(i).

(3) For each tank complying with paragraph (b) of this section, one or more devices which vent directly to the atmosphere may be used on the tank provided each device remains in a closed, sealed position during normal operations except when the device needs to open to prevent physical damage or permanent deformation of the tank or cover resulting from filling or emptying the tank, diurnal temperature changes, atmospheric pressure changes or malfunction of the unit in accordance with good engineering and safety practices for handling flammable, explosive, or other hazardous materials.

(c) Each fixed-roof, seal, access door, and all other openings shall be checked by visual inspection initially and quarterly thereafter to ensure that no cracks or gaps occur and that access doors and other openings are closed and gasketed properly.

(d) Except as provided in § 61.350 of this subpart, when a broken seal or gasket or other problem is identified, or when detectable emissions are measured, first efforts at repair shall be made as soon as practicable, but not later than 45 calendar days after identification.

(e) Each owner or operator who controls air pollutant emissions by using an enclosure vented through a closed-vent system to a control device must meet the requirements specified in paragraphs (e)(1) through (4) of this section.

(1) The tank must be located inside a total enclosure. The enclosure must be designed and operated in accordance with the criteria for a permanent total enclosure as specified in ''Procedure T—Criteria for and Verification of a Permanent or Temporary Total Enclosure'' in 40 CFR 52.741, appendix B. The enclosure may have permanent or temporary openings to allow worker access; passage of material into or out of the enclosure by conveyor, vehicles, or other mechanical means; entry of permanent mechanical or electrical equipment; or direct airflow into the enclosure. The owner or operator must perform the verification procedure for the enclosure as specified in section 5.0 of Procedure T initially when the enclosure is first installed and, thereafter, annually. A facility that has conducted an initial compliance demonstration and that performs annual compliance demonstrations in accordance with the requirements for Tank Level 2 control requirements 40 CFR 264.1084(i) or 40 CFR 265(i) is not required to make repeat demonstrations of initial and continuous compliance for the purposes of this subpart.

(2) The enclosure must be vented through a closed-vent system to a control device that is designed and operated in accordance with the standards for control devices specified in § 61.349.

(3) Safety devices, as defined in this subpart, may be installed and operated as necessary on any enclosure, closed-vent system, or control device used to comply with the requirements of paragraphs (e)(1) and (2) of this section.

(4) The closed-vent system must be designed and operated in accordance with the requirements of § 61.349.

[55 FR 8346, Mar. 7, 1990, as amended at 55 FR 18331, May 2, 1990; 58 FR 3096, Jan. 7, 1993; 67 FR 68532, Nov. 12, 2002; 68 FR 6082, Feb. 6, 2003; 68 FR 67935, Dec. 4, 2003]

§ 61.344 Standards: Surface impoundments.

(a) The owner or operator shall meet the following standards for each surface impoundment in which waste is placed in accordance with § 61.342(c)(1)(ii) of this subpart:

(1) The owner or operator shall install, operate, and maintain on each surface impoundment a cover (e.g., air-supported structure or rigid cover) and closed-vent system that routes all organic vapors vented from the surface impoundment to a control device.

(i) The cover shall meet the following requirements:

(A) The cover and all openings (e.g., access hatches, sampling ports, and gauge wells) shall be designed to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppmv above background, initially and thereafter at least once per year by the methods specified in § 61.355(h) of this subpart.

(B) Each opening shall be maintained in a closed, sealed position (e.g., covered by a lid that is gasketed and latched) at all times that waste is in the surface impoundment except when it is necessary to use the opening for waste sampling or removal, or for equipment inspection, maintenance, or repair.

(C) If the cover and closed-vent system operate such that the enclosure of the surface impoundment is maintained at a pressure less than atmospheric pressure, then paragraph (a)(1)(i)(B) of this section does not apply to any opening that meets all of the following conditions:

(*1*) The purpose of the opening is to provide dilution air to reduce the explosion hazard;

(*2*) The opening is designed to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppmv above background, as determined initially and thereafter at least once per year by the methods specified in § 61.355(h) of this subpart; and

(*3*) The pressure is monitored continuously to ensure that the pressure in the enclosure of the surface impoundment remains below atmospheric pressure.

(D) The cover shall be used at all times that waste is placed in the surface impoundment except during removal of treatment residuals in accordance with 40 CFR 268.4 or closure of the surface impoundment in accordance with 40 CFR 264.228. (Note: the treatment residuals generated by these activities may be subject to the requirements of this part.)

(ii) The closed-vent system and control device shall be designed and operated in accordance with § 61.349 of this subpart.

(b) Each cover seal, access hatch, and all other openings shall be checked by visual inspection initially and quarterly thereafter to ensure that no cracks or gaps occur and that access hatches and other openings are closed and gasketed properly.

(c) Except as provided in § 61.350 of this subpart, when a broken seal or gasket or other problem is identified, or when detectable emissions are measured, first efforts at repair shall be made as soon as practicable, but not later than 15 calendar days after identification.

[55 FR 8346, Mar. 7, 1990, as amended at 58 FR 3097, Jan. 7, 1993]

§ 61.345 Standards: Containers.

(a) The owner or operator shall meet the following standards for each container in which waste is placed in accordance with § 61.342(c)(1)(ii) of this subpart:

(1) The owner or operator shall install, operate, and maintain a cover on each container used to handle, transfer, or store waste in accordance with the following requirements:

(i) The cover and all openings (e.g., bungs, hatches, and sampling ports) shall be designed to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppmv above background, initially and thereafter at least once per year by the methods specified in § 61.355(h) of this subpart.

(ii) Except as provided in paragraph (a)(4) of this section, each opening shall be maintained in a closed, sealed position (e.g., covered by a lid that is gasketed and latched) at all times that waste is in the container except when it is necessary to use the opening for waste loading, removal, inspection, or sampling.

(2) When a waste is transferred into a container by pumping, the owner or operator shall perform the transfer using a submerged fill pipe. The submerged fill pipe outlet shall extend to within two fill pipe diameters of the bottom of the container while the container is being loaded. During loading of the waste, the cover shall remain in place and all openings shall be maintained in a closed, sealed position except for those openings required for the submerged fill pipe, those openings required for venting of the container to prevent physical damage or permanent deformation of the container or cover, and any openings complying with paragraph (a)(4) of this section.

(3) Treatment of a waste in a container, including aeration, thermal or other treatment, must be performed by the owner or operator in a manner such that while the waste is being treated the container meets the standards specified in paragraphs (a)(3)(i) through (iii) of this section, except for covers and closed-vent systems that meet the requirements in paragraph (a)(4) of this section.

(i) The owner or operator must either:

(A) Vent the container inside a total enclosure which is exhausted through a closed-vent system to a control device in accordance with the requirements of paragraphs (a)(3)(ii)(A) and (B) of this section; or

(B) Vent the covered or closed container directly through a closed-vent system to a control device in accordance with the requirements of paragraphs (a)(3)(ii)(B) and (C) of this section.

(ii) The owner or operator must meet the following requirements, as applicable to the type of air emission control equipment selected by the owner or operator:

(A) The total enclosure must be designed and operated in accordance with the criteria for a permanent total enclosure as specified in section 5 of the ''Procedure T—Criteria for and Verification of a Permanent or Temporary Total Enclosure'' in 40 CFR 52.741, appendix B. The enclosure may have permanent or temporary openings to allow worker access; passage of containers through the enclosure by conveyor or other mechanical means; entry of permanent mechanical or electrical equipment; or direct airflow into the enclosure. The owner or operator must perform the verification procedure for the enclosure as specified in section 5.0 of ''Procedure T—Criteria for and Verification of a Permanent or Temporary Total Enclosure'' initially when the enclosure is first installed and, thereafter, annually. A facility that has conducted an initial compliance demonstration and that performs annual compliance demonstrations in accordance with the Container Level 3 control requirements in 40 CFR 264.1086(e)(2)(i) or 40 CFR 265.1086(e)(2)(i) is not required to make repeat demonstrations of initial and continuous compliance for the purposes of this subpart.

(B) The closed-vent system and control device must be designed and operated in accordance with the requirements of § 61.349.

(C) For a container cover, the cover and all openings (*e.g.*, doors, hatches) must be designed to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppmv above background, initially and thereafter at least once per year by the methods specified in § 61.355(h).

(iii) Safety devices, as defined in this subpart, may be installed and operated as necessary on any container, enclosure, closed-vent system, or control device used to comply with the requirements of paragraph (a)(3)(i) of this section.

(4) If the cover and closed-vent system operate such that the container is maintained at a pressure less than atmospheric pressure, the owner or operator may operate the system with an opening that is not sealed and kept closed at all times if the following conditions are met:

(i) The purpose of the opening is to provide dilution air to reduce the explosion hazard;

(ii) The opening is designed to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppmv above background, as determined initially and thereafter at least once per year by methods specified in § 61.355(h); and

(iii) The pressure is monitored continuously to ensure that the pressure in the container remains below atmospheric pressure.

(b) Each cover and all openings shall be visually inspected initially and quarterly thereafter to ensure that they are closed and gasketed properly.

(c) Except as provided in § 61.350 of this subpart, when a broken seal or gasket or other problem is identified, first efforts at repair shall be made as soon as practicable, but not later than 15 calendar days after identification.

[55 FR 8346, Mar. 7, 1990, as amended at 58 FR 3097, Jan. 7, 1993; 67 FR 68532, Nov. 12, 2002; 68 FR 67936, Dec. 4, 2003]

§ 61.346 Standards: Individual drain systems.

(a) Except as provided in paragraph (b) of this section, the owner or operator shall meet the following standards for each individual drain system in which waste is placed in accordance with § 61.342(c)(1)(ii) of this subpart:

(1) The owner or operator shall install, operate, and maintain on each drain system opening a cover and closed-vent system that routes all organic vapors vented from the drain system to a control device.

(i) The cover shall meet the following requirements:

(A) The cover and all openings (e.g., access hatches, sampling ports) shall be designed to operate with no detactable emissions as indicated by an instrument reading of less than 500 ppmv above background, initially and thereafter at least once per year by the methods specified in § 61.355(h) of this subpart.

(B) Each opening shall be maintained in a closed, sealed position (e.g., covered by a lid that is gasketed and latched) at all times that waste is in the drain system except when it is necessary to use the opening for waste sampling or removal, or for equipment inspection, maintenance, or repair.

(C) If the cover and closed-vent system operate such that the individual drain system is maintained at a pressure less than atmospheric pressure, then paragraph (a)(1)(i)(B) of this section does not apply to any opening that meets all of the following conditions:

(*1*) The purpose of the opening is to provide dilution air to reduce the explosion hazard;

(*2*) The opening is designed to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppmv above background, as determined initially and thereafter at least once per year by the methods specified in § 61.355(h); and

(*3*) The pressure is monitored continuously to ensure that the pressure in the individual drain system remains below atmospheric pressure.

(ii) The closed-vent system and control device shall be designed and operated in accordance with § 61.349 of this subpart.

(2) Each cover seal, access hatch, and all other openings shall be checked by visual inspection initially and quarterly thereafter to ensure that no cracks or gaps occur and that access hatches and other openings are closed and gasketed properly.

(3) Except as provided in § 61.350 of this subpart, when a broken seal or gasket or other problem is identified, or when detectable emissions are measured, first efforts at repair shall be made as soon as practicable, but not later than 15 calendar days after identification.

(b) As an alternative to complying with paragraph (a) of this section, an owner or operator may elect to comply with the following requirements:

(1) Each drain shall be equipped with water seal controls or a tightly sealed cap or plug.

(2) Each junction box shall be equipped with a cover and may have a vent pipe. The vent pipe shall be at least 90 cm (3 ft) in length and shall not exceed 10.2 cm (4 in) in diameter.

(i) Junction box covers shall have a tight seal around the edge and shall be kept in place at all times, except during inspection and maintenance.

(ii) One of the following methods shall be used to control emissions from the junction box vent pipe to the atmosphere:

(A) Equip the junction box with a system to prevent the flow of organic vapors from the junction box vent pipe to the atmosphere during normal operation. An example of such a system includes use of water seal controls on the junction box. A flow indicator shall be installed, operated, and maintained on each junction box vent pipe to ensure that organic vapors are not vented from the junction box to the atmosphere during normal operation.

(B) Connect the junction box vent pipe to a closed-vent system and control device in accordance with § 61.349 of this subpart.

(3) Each sewer line shall not be open to the atmosphere and shall be covered or enclosed in a manner so as to have no visual gaps or cracks in joints, seals, or other emission interfaces.

(4) Equipment installed in accordance with paragraphs (b)(1), (b)(2), or (b)(3) of this section shall be inspected as follows:

(i) Each drain using water seal controls shall be checked by visual or physical inspection initially and thereafter quarterly for indications of low water levels or other conditions that would reduce the effectiveness of water seal controls.

(ii) Each drain using a tightly sealed cap or plug shall be visually inspected initially and thereafter quarterly to ensure caps or plugs are in place and properly installed.

(iii) Each junction box shall be visually inspected initially and thereafter quarterly to ensure that the cover is in place and to ensure that the cover has a tight seal around the edge.

(iv) The unburied portion of each sewer line shall be visually inspected initially and thereafter quarterly for indication of cracks, gaps, or other problems that could result in benzene emissions.

(5) Except as provided in § 61.350 of this subpart, when a broken seal, gap, crack or other problem is identified, first efforts at repair shall be made as soon as practicable, but not later than 15 calendar days after identification.

[55 FR 8346, Mar. 7, 1990, as amended at 55 FR 37231, Sept. 10, 1990; 58 FR 3097, Jan. 7, 1993]

§ 61.347 Standards: Oil-water separators.

(a) Except as provided in § 61.352 of this subpart, the owner or operator shall meet the following standards for each oil-water separator in which waste is placed in accordance with § 61.342(c)(1)(ii) of this subpart:

(1) The owner or operator shall install, operate, and maintain a fixed-roof and closed-vent system that routes all organic vapors vented from the oil-water separator to a control device.

(i) The fixed-roof shall meet the following requirements:

(A) The cover and all openings (e.g., access hatches, sampling ports, and gauge wells) shall be designed to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppmv above background, as determined initially and thereafter at least once per year by the methods specified in § 61.355(h) of this subpart.

(B) Each opening shall be maintained in a closed, sealed position (e.g., covered by a lid that is gasketed and latched) at all times that waste is in the oil-water separator except when it is necessary to use the opening for waste sampling or removal, or for equipment inspection, maintenance, or repair.

(C) If the cover and closed-vent system operate such that the oil-water separator is maintained at a pressure less than atmospheric pressure, then paragraph (a)(1)(i)(B) of this section does not apply to any opening that meets all of the following conditions:

(*1*) The purpose of the opening is to provide dilution air to reduce the explosion hazard;

(*2*) The opening is designed to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppmv above background, as determined initially and thereafter at least once per year by the methods specified in § 61.355(h); and

(*3*) The pressure is monitored continuously to ensure that the pressure in the oil-water separator remains below atmospheric pressure.

(ii) The closed-vent system and control device shall be designed and operated in accordance with the requirements of § 61.349 of this subpart.

(b) Each cover seal, access hatch, and all other openings shall be checked by visual inspection initially and quarterly thereafter to ensure that no cracks or gaps occur between the cover and oil-water separator wall and that access hatches and other openings are closed and gasketed properly.

(c) Except as provided in § 61.350 of this subpart, when a broken seal or gasket or other problem is identified, or when detectable emissions are measured, first efforts at repair shall be made as soon as practicable, but not later than 15 calendar days after identification.

[55 FR 8346, Mar. 7, 1990, as amended at 58 FR 3098, Jan. 7, 1993]

§ 61.348 Standards: Treatment processes.

(a) Except as provided in paragraph (a)(5) of this section, the owner or operator shall treat the waste stream in accordance with the following requirements:

(1) The owner or operator shall design, install, operate, and maintain a treatment process that either:

(i) Removes benzene from the waste stream to a level less than 10 parts per million by weight (ppmw) on a flow-weighted annual average basis,

(ii) Removes benzene from the waste stream by 99 percent or more on a mass basis, or

(iii) Destroys benzene in the waste stream by incinerating the waste in a combustion unit that achieves a destruction efficiency of 99 percent or greater for benzene.

(2) Each treatment process complying with paragraphs (a)(1)(i) or (a)(1)(ii) of this section shall be designed and operated in accordance with the appropriate waste management unit standards specified in §§ 61.343 through 61.347 of this subpart. For example, if a treatment process is a tank, then the owner or operator shall comply with § 61.343 of this subpart.

(3) For the purpose of complying with the requirements specified in paragraph (a)(1)(i) of this section, the intentional or unintentional reduction in the benzene concentration of a waste stream by dilution of the waste stream with other wastes or materials is not allowed.

(4) An owner or operator may aggregate or mix together individual waste streams to create a combined waste stream for the purpose of facilitating treatment of waste to comply with the requirements of paragraph (a)(1) of this section except as provided in paragraph (a)(5) of this section.

(5) If an owner or operator aggregates or mixes any combination of process wastewater, product tank drawdown, or landfill leachate subject to § 61.342(c)(1) of this subpart together with other waste streams to create a combined waste stream for the purpose of facilitating management or treatment of waste in a wastewater treatment system, then the wastewater treatment system shall be operated in accordance with paragraph (b) of this section. These provisions apply to above-ground wastewater treatment systems as well as those that are at or below ground level.

(b) Except for facilities complying with § 61.342(e), the owner or operator that aggregates or mixes individual waste streams as defined in paragraph (a)(5) of this section for management and treatment in a wastewater treatment system shall comply with the following requirements:

(1) The owner or operator shall design and operate each waste management unit that comprises the wastewater treatment system in accordance with the appropriate standards specified in §§ 61.343 through 61.347 of this subpart.

(2) The provisions of paragraph (b)(1) of this section do not apply to any waste management unit that the owner or operator demonstrates to meet the following conditions initially and, thereafter, at least once per year:

(i) The benzene content of each waste stream entering the waste management unit is less than 10 ppmw on a flow-weighted annual average basis as determined by the procedures specified in § 61.355(c) of this subpart; and

(ii) The total annual benzene quantity contained in all waste streams managed or treated in exempt waste management units comprising the facility wastewater treatment systems is less than 1 Mg/yr (1.1 ton/yr). For this determination, total annual benzene quantity shall be calculated as follows:

(A) The total annual benzene quantity shall be calculated as the sum of the individual benzene quantities determined at each location where a waste stream first enters an exempt waste management unit. The benzene quantity discharged from an exempt waste management unit shall not be included in this calculation.

(B) The annual benzene quantity in a waste stream managed or treated in an enhanced biodegradation unit shall not be included in the calculation of the total annual benzene quantity, if the enhanced biodegradation unit is the first exempt unit in which the waste is managed or treated. A unit shall be considered enhanced biodegradation if it is a suspended-growth process that generates biomass, uses recycled biomass, and periodically removes biomass from the process. An enhanced biodegradation unit typically operates at a food-to-microorganism ratio in the range of 0.05 to 1.0 kg of biological oxygen demand per kg of biomass per day, a mixed liquor suspended solids ratio in the range of 1 to 8 grams per liter (0.008 to 0.7 pounds per liter), and a residence time in the range of 3 to 36 hours.

(c) The owner and operator shall demonstrate that each treatment process or wastewater treatment system unit, except as provided in paragraph (d) of this section, achieves the appropriate conditions specified in paragraphs (a) or (b) of this section in accordance with the following requirements:

(1) Engineering calculations in accordance with requirements specified in § 61.356(e) of this subpart; or

(2) Performance tests conducted using the test methods and procedures that meet the requirements specified in § 61.355 of this subpart.

(d) A treatment process or waste stream is in compliance with the requirements of this subpart and exempt from the requirements of paragraph (c) of this section provided that the owner or operator documents that the treatment process or waste stream is in compliance with other regulatory requirements as follows:

(1) The treatment process is a hazardous waste incinerator for which the owner or operator has been issued a final permit under 40 CFR part 270 and complies with the requirements of 40 CFR part 264, subpart O;

(2) The treatment process is an industrial furnace or boiler burning hazardous waste for energy recovery for which the owner or operator has been issued a final permit under 40 CFR part 270 and complies with the requirements of 40 CFR part 266, subpart D;

(3) The waste stream is treated by a means or to a level that meets benzene-specific treatment standards in accordance with the Land Disposal Restrictions under 40 CFR part 268, and the treatment process is designed and operated with a closed-vent system and control device meeting the requirements of § 61.349 of this subpart;

(4) The waste stream is treated by a means or to a level that meets benzene-specific effluent limitations or performance standards in accordance with the Effluent Guidelines and Standards under 40 CFR parts 401–464, and the treatment process is designed and operated with a closed-vent system and control device meeting the requirements of § 61.349 of this subpart; or

(5) The waste stream is discharged to an underground injection well for which the owner or operator has been issued a final permit under 40 CFR part 270 and complies with the requirements of 40 CFR part 122.

(e) Except as specified in paragraph (e)(3) of this section, if the treatment process or wastewater treatment system unit has any openings (e.g., access doors, hatches, etc.), all such openings shall be sealed (e.g., gasketed, latched, etc.) and kept closed at all times when waste is being treated, except during inspection and maintenance.

(1) Each seal, access door, and all other openings shall be checked by visual inspections initially and quarterly thereafter to ensure that no cracks or gaps occur and that openings are closed and gasketed properly.

(2) Except as provided in § 61.350 of this subpart, when a broken seal or gasket or other problem is identified, first efforts at repair shall be made as

soon as practicable, but not later than 15 calendar days after identification.

(3) If the cover and closed-vent system operate such that the treatment process and wastewater treatment system unit are maintained at a pressure less than atmospheric pressure, the owner or operator may operate the system with an opening that is not sealed and kept closed at all times if the following conditions are met:

(i) The purpose of the opening is to provide dilution air to reduce the explosion hazard;

(ii) The opening is designed to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppmv above background, as determined initially and thereafter at least once per year by the methods specified in § 61.355(h); and

(iii) The pressure is monitored continuously to ensure that the pressure in the treatment process and wastewater treatment system unit remain below atmospheric pressure.

(f) Except for treatment processes complying with paragraph (d) of this section, the Administrator may request at any time an owner or operator demonstrate that a treatment process or wastewater treatment system unit meets the applicable requirements specified in paragraphs (a) or (b) of this section by conducting a performance test using the test methods and procedures as required in § 61.355 of this subpart.

(g) The owner or operator of a treatment process or wastewater treatment system unit that is used to comply with the provisions of this section shall monitor the unit in accordance with the applicable requirements in § 61.354 of this subpart.

[55 FR 8346, Mar. 7, 1990, as amended at 55 FR 37231, Sept. 10, 1990; 58 FR 3098, Jan. 7, 1993; 65 FR 62160, Oct. 17, 2000]

§ 61.349 Standards: Closed-vent systems and control devices.

(a) For each closed-vent system and control device used to comply with standards in accordance with §§ 61.343 through 61.348 of this subpart, the owner or operator shall properly design, install, operate, and maintain the closed-vent system and control device in accordance with the following requirements:

(1) The closed-vent system shall:

(i) Be designed to operate with no detectable emissions as indicated by an instrument reading of less than 500 ppmv above background, as determined initially and thereafter at least once per year by the methods specified in § 61.355(h) of this subpart.

(ii) Vent systems that contain any bypass line that could divert the vent stream away from a control device used to comply with the provisions of this subpart shall install, maintain, and operate according to the manufacturer's specifications a flow indicator that provides a record of vent stream flow away from the control device at least once every 15 minutes, except as provided in paragraph (a)(1)(ii)(B) of this section.

(A) The flow indicator shall be installed at the entrance to any bypass line that could divert the vent stream away from the control device to the atmosphere.

(B) Where the bypass line valve is secured in the closed position with a carseal or a lock-and-key type configuration, a flow indicator is not required.

(iii) All gauging and sampling devices shall be gas-tight except when gauging or sampling is taking place.

(iv) For each closed-vent system complying with paragraph (a) of this section, one or more devices which vent directly to the atmosphere may be used on the closed-vent system provided each device remains in a closed, sealed position during normal operations except when the device needs to open to prevent physical damage or permanent deformation of the closed-vent system resulting from malfunction of the unit in accordance with good engineering and safety practices for handling flammable, explosive, or other hazardous materials.

(2) The control device shall be designed and operated in accordance with the following conditions:

(i) An enclosed combustion device (e.g., a vapor incinerator, boiler, or process heater) shall meet one of the following conditions:

(A) Reduce the organic emissions vented to it by 95 weight percent or greater;

(B) Achieve a total organic compound concentration of 20 ppmv (as the sum of the concentrations for individual compounds using Method 18) on a dry basis corrected to 3 percent oxygen; or

(C) Provide a minimum residence time of 0.5 seconds at a minimum temperature of 760 °C (1,400 °F). If a boiler or process heater issued as the control device, then the vent stream shall be introduced into the flame zone of the boiler or process heater.

(ii) A vapor recovery system (e.g., a carbon adsorption system or a condenser) shall recover or control the organic emissions vented to it with an efficiency of 95 weight percent or greater, or shall recover or control the benzene emissions vented to it with an efficiency of 98 weight percent or greater.

(iii) A flare shall comply with the requirements of 40 CFR 60.18.

(iv) A control device other than those described in paragraphs (a)(2) (i) through (iii) of this section may be used provided that the following conditions are met:

(A) The device shall recover or control the organic emissions vented to it with an efficiency of 95 weight percent or greater, or shall recover or control the benzene emissions vented to it with an efficiency of 98 weight percent or greater.

(B) The owner or operator shall develop test data and design information that documents the control device will achieve an emission control efficiency of either 95 percent or greater for organic compounds or 98 percent or greater for benzene.

(C) The owner or operator shall identify:

(*1*) The critical operating parameters that affect the emission control performance of the device;

(*2*) The range of values of these operating parameters that ensure the emission control efficiency specified in paragraph (a)(2)(iv)(A) of this section is maintained during operation of the device; and

(*3*) How these operating parameters will be monitored to ensure the proper operation and maintenance of the device.

(D) The owner or operator shall submit the information and data specified in paragraphs (a)(2)(iv) (B) and (C) of this section to the Administrator prior to operation of the alternative control device.

(E) The Administrator will determine, based on the information submitted under paragraph (a)(2)(iv)(D) of this section, if the control device subiect to paragraph (a)(2)(iv) of this section meets the requirements of § 61.349. The control device subject to paragraph (a)(2)(iv) of this section may be operated prior to receiving approval from the Administrator. However, if the Administrator determines that the control device does not meet the requirements of § 61.349, the facility may be subject to enforcement action beginning from the time the control device began operation.

(b) Each closed-vent system and control device used to comply with this subpart shall be operated at all times when waste is placed in the waste management unit vented to the control device except when maintenance or repair of the waste management unit cannot be completed without a shutdown of the control device.

(c) An owner and operator shall demonstrate that each control device, except for a flare, achieves the appropriate conditions specified in paragraph (a)(2) of this section by using one of the following methods:

(1) Engineering calculations in accordance with requirements specified in § 61.356(f) of this subpart; or

(2) Performance tests conducted using the test methods and procedures that meet the requirements specified in § 61.355 of this subpart.

(d) An owner or operator shall demonstrate compliance of each flare in accordance with paragraph (a)(2)(iii) of this section.

(e) The Administrator may request at any time an owner or operator demonstrate that a control device meets the applicable conditions specified in paragraph (a)(2) of this section by conducting a performance test using the test methods and procedures as required in § 61.355, and for control devices subject to paragraph (a)(2)(iv) of this section, the Administrator may specify alternative test methods and procedures, as appropriate.

(f) Each closed-vent system and control device shall be visually inspected initially and quarterly thereafter. The visual inspection shall include inspection of ductwork and piping and connections to covers and control devices for evidence of visable defects such as holes in ductwork or piping and loose connections.

(g) Except as provided in § 61.350 of this subpart, if visible defects are observed during an inspection, or if other problems are identified, or if detectable emissions are measured, a first effort to repair the closed-vent system and control device shall be made as soon as practicable but no later than 5 calendar days after detection. Repair shall be completed no later than 15 calendar days after the emissions are detected or the visible defect is observed.

(h) The owner or operator of a control device that is used to comply with the provisions of this section shall monitor the control device in accordance with § 61.354(c) of this subpart.

[55 FR 8346, Mar. 7, 1990; 55 FR 12444, Apr. 3, 1990, as amended at 55 FR 37231, Sept. 10, 1990; 58 FR 3098, Jan. 7, 1993; 65 FR 62160, Oct. 17, 2000]

§ 61.350 Standards: Delay of repair.

(a) Delay of repair of facilities or units that are subject to the provisions of this subpart will be allowed if the repair is technically impossible without a complete or partial facility or unit shutdown.

(b) Repair of such equipment shall occur before the end of the next facility or unit shutdown.

§ 61.351 Alternative standards for tanks.

(a) As an alternative to the standards for tanks specified in § 61.343 of this subpart, an owner or operator may elect to comply with one of the following:

(1) A fixed roof and internal floating roof meeting the requirements in 40 CFR 60.112b(a)(1);

(2) An external floating roof meeting the requirements of 40 CFR 60.112b (a)(2); or

(3) An alternative means of emission limitation as described in 40 CFR 60.114b.

(b) If an owner or operator elects to comply with the provisions of this section, then the owner or operator is exempt from the provisions of § 61.343 of this subpart applicable to the same facilities.

[55 FR 8346, Mar. 7, 1990, as amended at 55 FR 37231, Sept. 10, 1990]

§ 61.352 Alternative standards for oil-water separators.

(a) As an alternative to the standards for oil-water separators specified in § 61.347 of this subpart, an owner or operator may elect to comply with one of the following:

(1) A floating roof meeting the requirements in 40 CFR 60.693–2(a); or

(2) An alternative means of emission limitation as described in 40 CFR 60.694.

(b) For portions of the oil-water separator where it is infeasible to construct and operate a floating roof, such as over the weir mechanism, a fixed roof vented to a vapor control device that meets the requirements in §§ 61.347 and 61.349 of this subpart shall be installed and operated.

(c) Except as provided in paragraph (b) of this section, if an owner or operator elects to comply with the provisions of this section, then the owner or operator is exempt from the provisions in § 61.347 of this subpart applicable to the same facilities.

§ 61.353 Alternative means of emission limitation.

(a) If, in the Administrator's judgment, an alternative means of emission limitation will achieve a reduction in benzene emissions at least equivalent to the reduction in benzene emissions from the source achieved by the applicable design, equipment, work practice, or operational requirements in §§ 61.342 through 61.349, the Administrator will publish in the FEDERAL REGISTER a notice permitting the use of the alternative means for purposes of compliance with that requirement. The notice may condition the permission on requirements related to the operation and maintenance of the alternative means.

(b) Any notice under paragraph (a) of this section shall be published only after public notice and an opportunity for a hearing.

(c) Any person seeking permission under this section shall collect, verify, and submit to the Administrator information showing that the alternative means achieves equivalent emission reductions.

[55 FR 8346, Mar. 7, 1990, as amended at 58 FR 3099, Jan. 7, 1993]

§ 61.354 Monitoring of operations.

(a) Except for a treatment process or waste stream complying with § 61.348(d), the owner or operator shall monitor each treatment process or wastewater treatment system unit to ensure the unit is properly operated and maintained by one of the following monitoring procedures:

(1) Measure the benzene concentration of the waste stream exiting the treatment process complying with § 61.348(a)(1)(i) at least once per month by collecting and analyzing one or more samples using the procedures specified in § 61.355(c)(3).

(2) Install, calibrate, operate, and maintain according to manufacturer's specifications equipment to continuously monitor and record a process parameter (or parameters) for the treatment process or wastewater treatment system unit that indicates proper system operation. The owner or operator shall inspect at least once each operating day the data recorded by the monitoring equipment (e.g., temperature monitor or flow indicator) to ensure that the unit is operating properly.

(b) If an owner or operator complies with the requirements of § 61.348(b), then the owner or operator shall monitor each wastewater treatment system to ensure the unit is properly operated and maintained by the appropriate monitoring procedure as follows:

(1) For the first exempt waste management unit in each waste treatment train, other than an enhanced biodegradation unit, measure the flow rate, using the procedures of § 61.355(b), and the benzene concentration of each waste stream entering the unit at least once per month by collecting and analyzing one or more samples using the procedures specified in § 61.355(c)(3).

(2) For each enhanced biodegradation unit that is the first exempt waste management unit in a treatment train, measure the benzene concentration of each waste stream entering the unit at least once per month by collecting and analyzing one or more samples using the procedures specified in § 61.355(c)(3).

(c) An owner or operator subject to the requirements in § 61.349 of this subpart shall install, calibrate, maintain, and operate according to the manufacturer's specifications a device to continuously monitor the control device operation as specified in the following paragraphs, unless alternative monitoring procedures or requirements are approved for that facility by the Administrator. The owner or operator shall inspect at least once each operating day the data recorded by the monitoring equipment (e.g., temperature monitor or flow indicator) to ensure that the control device is operating properly.

(1) For a thermal vapor incinerator, a temperature monitoring device equipped with a continuous recorder. The device shall have an accuracy of ±1 percent of the temperature being monitored in °C or ±0.5 °C, whichever is greater. The temperature sensor shall be installed at a representative location in the combustion chamber.

(2) For a catalytic vapor incinerator, a temperature monitoring device equipped with a continuous recorder. The device shall be capable of monitoring temperature at two locations, and have an accuracy of ±1 percent of the temperature being monitored in °C or ±0.5 °C, whichever is greater. One temperature sensor shall be installed in the vent stream at the nearest feasible point to the catalyst bed inlet and a second temperature sensor shall be installed in the vent stream at the nearest feasible point to the catalyst bed outlet.

(3) For a flare, a monitoring device in accordance with 40 CFR 60.18(f)(2) equipped with a continuous recorder.

(4) For a boiler or process heater having a design heat input capacity less than 44 MW (150×10^6 BTU/hr), a temperature monitoring device equipped with a continuous recorder. The device shall have an accuracy of ±1 percent of the temperature being monitored in °C

or ±0.5 °C, whichever is greater. The temperature sensor shall be installed at a representative location in the combustion chamber.

(5) For a boiler or process heater having a design heat input capacity greater than or equal to 44 MW (150×10^6 BTU/hr), a monitoring device equipped with a continuous recorder to measure a parameter(s) that indicates good combustion operating practices are being used.

(6) For a condenser, either:

(i) A monitoring device equipped with a continuous recorder to measure either the concentration level of the organic compounds or the concentration level of benzene in the exhaust vent stream from the condenser; or

(ii) A temperature monitoring device equipped with a continuous recorder. The device shall be capable of monitoring temperature at two locations, and have an accuracy of ±1 percent of the temperature being monitored in °C or ±0.5 °C, whichever is greater. One temperature sensor shall be installed at a location in the exhaust stream from the condenser, and a second temperature sensor shall be installed at a location in the coolant fluid exiting the condenser.

(7) For a carbon adsorption system that regenerates the carbon bed directly in the control device such as a fixed-bed carbon adsorber, either:

(i) A monitoring device equipped with a continuous recorder to measure either the concentration level of the organic compounds or the benzene concentration level in the exhaust vent stream from the carbon bed; or

(ii) A monitoring device equipped with a continuous recorder to measure a parameter that indicates the carbon bed is regenerated on a regular, predetermined time cycle.

(8) For a vapor recovery system other than a condenser or carbon adsorption system, a monitoring device equipped with a continuous recorder to measure either the concentration level of the organic compounds or the benzene concentration level in the exhaust vent stream from the control device.

(9) For a control device subject to the requirements of § 61.349(a)(2)(iv), devices to monitor the parameters as specified in § 61.349(a)(2)(iv)(C).

(d) For a carbon adsorption system that does not regenerate the carbon bed directly on site in the control device (e.g., a carbon canister), either the concentration level of the organic compounds or the concentration level of benzene in the exhaust vent stream from the carbon adsorption system shall be monitored on a regular schedule, and the existing carbon shall be replaced with fresh carbon immediately when carbon breakthrough is indicated. The device shall be monitored on a daily basis or at intervals no greater than 20 percent of the design carbon replacement interval, whichever is greater. As an alternative to conducting this monitoring, an owner or operator may replace the carbon in the carbon adsorption system with fresh carbon at a regular predetermined time interval that is less than the carbon replacement interval that is determined by the maximum design flow rate and either the organic concentration or the benzene concentration in the gas stream vented to the carbon adsorption system.

(e) An alternative operation or process parameter may be monitored if it can be demonstrated that another parameter will ensure that the control device is operated in conformance with these standards and the control device's design specifications.

(f) Owners or operators using a closed-vent system that contains any bypass line that could divert a vent stream from a control device used to comply with the provisions of this subpart shall do the following:

(1) Visually inspect the bypass line valve at least once every month, checking the position of the valve and the condition of the car-seal or closure mechanism required under § 61.349(a)(1)(ii) to ensure that the valve is maintained in the closed position and the vent stream is not diverted through the bypass line.

(2) Visually inspect the readings from each flow monitoring device required by § 61.349(a)(1)(ii) at least once each operating day to check that vapors are being routed to the control device as required.

(g) Each owner or operator who uses a system for emission control that is maintained at a pressure less than atmospheric pressure with openings to provide dilution air shall install, calibrate, maintain, and operate according to the manufacturer's specifications a device equipped with a continuous recorder to monitor the pressure in the unit to ensure that it is less than atmospheric pressure.

[55 FR 8346, Mar. 7, 1990, as amended at 58 FR 3099, Jan. 7, 1993; 65 FR 62160, Oct. 17, 2000]

§ 61.355 Test methods, procedures, and compliance provisions.

(a) An owner or operator shall determine the total annual benzene quantity from facility waste by the following procedure:

(1) For each waste stream subject to this subpart having a flow-weighted annual average water content greater than 10 percent water, on a volume basis as total water, or is mixed with water or other wastes at any time and the resulting mixture has an annual average water content greater than 10 percent as specified in § 61.342(a), the owner or operator shall:

(i) Determine the annual waste quantity for each waste stream using the procedures specified in paragraph (b) of this section.

(ii) Determine the flow-weighted annual average benzene concentration for each waste stream using the procedures specified in paragraph (c) of this section.

(iii) Calculate the annual benzene quantity for each waste stream by multiplying the annual waste quantity of the waste stream times the flow-weighted annual average benzene concentration.

(2) Total annual benzene quantity from facility waste is calculated by adding together the annual benzene quantity for each waste stream generated during the year and the annual benzene quantity for each process unit turnaround waste annualized according to paragraph (b)(4) of this section.

(3) If the total annual benzene quantity from facility waste is equal to or greater than 10 Mg/yr (11 ton/yr), then the owner or operator shall comply with the requirements of § 61.342 (c), (d), or (e).

(4) If the total annual benzene quantity from facility waste is less than 10 Mg/yr (11 ton/yr) but is equal to or greater than 1 Mg/yr (1.1 ton/yr), then the owner or operator shall:

(i) Comply with the recordkeeping requirements of § 61.356 and reporting requirements of § 61.357 of this subpart; and

(ii) Repeat the determination of total annual benzene quantity from facility waste at least once per year and whenever there is a change in the process generating the waste that could cause the total annual benzene quantity from facility waste to increase to 10 Mg/yr (11 ton/yr) or more.

(5) If the total annual benzene quantity from facility waste is less than 1 Mg/yr (1.1 ton/yr), then the owner or operator shall:

(i) Comply with the recordkeeping requirements of § 61.356 and reporting requirements of § 61.357 of this subpart; and

(ii) Repeat the determination of total annual benzene quantity from facility waste whenever there is a change in the process generating the waste that could cause the total annual benzene quantity from facility waste to increase to 1 Mg/yr (1.1 ton/yr) or more.

(6) The benzene quantity in a waste stream that is generated less than one time per year, except as provided for process unit turnaround waste in paragraph (b)(4) of this section, shall be included in the determination of total annual benzene quantity from facility waste for the year in which the waste is generated unless the waste stream is otherwise excluded from the determination of total annual benzene quantity from facility waste in accordance with paragraphs (a) through (c) of this section. The benzene quantity in this waste stream shall not be annualized or averaged over the time interval between the activities that resulted in generation of the waste, for purposes of determining the total annual benzene quantity from facility waste.

(b) For purposes of the calculation required by paragraph (a) of this section, an owner or operator shall determine the annual waste quantity at the point of waste generation, unless otherwise provided in paragraphs (b) (1), (2), (3), and (4) of this section, by one of the methods given in paragraphs (b) (5) through (7) of this section.

(1) The determination of annual waste quantity for sour water streams that are processed in sour water strippers shall be made at the point that the water exits the sour water stripper.

(2) The determination of annual waste quantity for wastes at coke by-product plants subject to and complying with the control requirements of § 61.132, 61.133, 61.134, or 61.139 of subpart L of this part shall be made at the location that the waste stream exits the process unit component or waste management unit controlled by that subpart or at the exit of the ammonia still, provided that the following conditions are met:

(i) The transfer of wastes between units complying with the control requirements of subpart L of this part, process units, and the ammonia still is made through hard piping or other enclosed system.

(ii) The ammonia still meets the definition of a sour water stripper in § 61.341.

(3) The determination of annual waste quantity for wastes that are received at hazardous waste treatment, storage, or disposal facilities from offsite shall be made at the point where the waste enters the hazardous waste treatment, storage, or disposal facility.

(4) The determination of annual waste quantity for each process unit turnaround waste generated only at 2 year or greater intervals, may be made by dividing the total quantity of waste generated during the most recent process unit turnaround by the time period (in the nearest tenth of a year) between the turnaround resulting in generation of the waste and the most recent preceding process turnaround for the unit. The resulting annual waste quantity shall be included in the calculation of the annual benzene quantity as provided in paragraph (a)(1)(iii) of this section for the year in which the turnaround occurs and for each subsequent year until the unit undergoes the next process turnaround. For estimates of total annual benzene quantity as specified in the 90-day report, required under § 61.357(a)(1), the owner or operator shall estimate the waste quantity generated during the most recent turnaround, and the time period between turnarounds in accordance with good engineering practices. If the owner or operator chooses not to annualize process unit turnaround waste, as specified in this paragraph, then the process unit turnaround waste quantity shall be included in the calculation of the annual benzene quantity for the year in which the turnaround occurs.

(5) Select the highest annual quantity of waste managed from historical records representing the most recent 5 years of operation or, if the facility has been in service for less than 5 years but at least 1 year, from historical records representing the total operating life of the facility;

(6) Use the maximum design capacity of the waste management unit; or

(7) Use measurements that are representative of maximum waste generation rates.

(c) For the purposes of the calculation required by §§ 61.355(a) of this subpart, an owner or operator shall determine the flow-weighted annual average ben- zene concentration in a manner that meets the requirements given in paragraph (c)(1) of this section using either of the methods given in paragraphs (c)(2) and (c)(3) of this section.

(1) The determination of flow-weighted annual average benzene concentration shall meet all of the following criteria:

(i) The determination shall be made at the point of waste generation except for the specific cases given in paragraphs (c)(1)(i)(A) through (D) of this section.

(A) The determination for sour water streams that are processed in sour water strippers shall be made at the point that the water exits the sour water stripper.

(B) The determination for wastes at coke by-product plants subject to and complying with the control requirements of § 61.132, 61.133, 61.134, or 61.139 of subpart L of this part shall be made at the location that the waste stream exits the process unit component or waste management unit controlled by that subpart or at the exit of the ammonia still, provided that the following conditions are met:

(*1*) The transfer of wastes between units complying with the control requirements of subpart L of this part, process units, and the ammonia still is made through hard piping or other enclosed system.

(*2*) The ammonia still meets the definition of a sour water stripper in § 61.341.

(C) The determination for wastes that are received from offsite shall be made at the point where the waste enters the hazardous waste treatment, storage, or disposal facility.

(D) The determination of flow-weighted annual average benzene concentration for process unit turnaround waste shall be made using either of the methods given in paragraph (c)(2) or (c)(3) of this section. The resulting flow-weighted annual average benzene concentration shall be included in the calculation of annual benzene quantity as provided in paragraph (a)(1)(iii) of this section for the year in which the turnaround occurs and for each subsequent year until the unit undergoes the next process unit turnaround.

(ii) Volatilization of the benzene by exposure to air shall not be used in the determination to reduce the benzene concentration.

(iii) Mixing or diluting the waste stream with other wastes or other materials shall not be used in the determination—to reduce the benzene concentration.

(iv) The determination shall be made prior to any treatment of the waste that removes benzene, except as specified in paragraphs (c)(1)(i)(A) through (D) of this section.

(v) For wastes with multiple phases, the determination shall provide the weighted-average benzene concentration based on the benzene concentration in each phase of the waste and the relative proportion of the phases.

(2) *Knowledge of the waste.* The owner or operator shall provide sufficient information to document the flow-weighted annual average benzene concentration of each waste stream. Examples of information that could constitute knowledge include material balances, records of chemicals purchases, or previous test results provided the results are still relevant to the current waste stream conditions. If test data are used, then the owner or operator shall provide documentation describing the testing protocol and the means by which sampling variability and analytical variability were accounted for in the determination of the flow-weighted annual average benzene concentration for the waste stream. When an owner or operator and the Administrator do not agree on determinations of the flow-weighted annual average benzene concentration based on knowledge of the waste, the procedures under paragraph (c)(3) of this section shall be used to resolve the disagreement.

(3) Measurements of the benzene concentration in the waste stream in accordance with the following procedures:

(i) Collect a minimum of three representative samples from each waste stream. Where feasible, samples shall be taken from an enclosed pipe prior to the waste being exposed to the atmosphere.

(ii) For waste in enclosed pipes, the following procedures shall be used:

(A) Samples shall be collected prior to the waste being exposed to the atmosphere in order to minimize the loss of benzene prior to sampling.

(B) A static mixer shall be installed in the process line or in a by-pass line unless the owner or operator demonstrates that installation of a static mixer in the line is not necessary to accurately determine the benzene concentration of the waste stream.

(C) The sampling tap shall be located within two pipe diameters of the static mixer outlet.

(D) Prior to the initiation of sampling, sample lines and cooling coil shall be purged with at least four volumes of waste.

(E) After purging, the sample flow shall be directed to a sample container and the tip of the sampling tube shall be kept below the surface of the waste during sampling to minimize contact with the atmosphere.

(F) Samples shall be collected at a flow rate such that the cooling coil is able to maintain a waste temperature less than 10 °C (50 °F).

(G) After filling, the sample container shall be capped immediately (within 5 seconds) to leave a minimum headspace in the container.

(H) The sample containers shall immediately be cooled and maintained at a temperature below 10 °C (50 °F) for transfer to the laboratory.

(iii) When sampling from an enclosed pipe is not feasible, a minimum of three representative samples shall be collected in a manner to minimize exposure of the sample to the atmosphere and loss of benzene prior to sampling.

(iv) Each waste sample shall be analyzed using one of the following test methods for determining the benzene concentration in a waste stream:

(A) Method 8020, Aromatic Volatile Organics, in ''Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,'' EPA Publication No. SW–846 (incorporation by reference as specified in §61.18 of this part);

(B) Method 8021, Volatile Organic Compounds in Water by Purge and Trap Capillary Column Gas Chromatography with Photoionization and Electrolytic Conductivity Detectors in Series in ''Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,'' EPA Publication No. SW–846 (incorporation by reference as specified in §61.18 of this part);

(C) Method 8240, Gas Chromatography/Mass Spectrometry for Volatile Organics in ''Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,'' EPA Publication No. SW–846 (incorporation by reference as specified in §61.18 of this part);

(D) Method 8260, Gas Chromatography/Mass Spectrometry for Volatile Organics: Capillary Column Technique in ''Test Methods for Evaluating Solid Waste, Physical/Chemical Methods,'' EPA Publication No. SW–846 (incorporation by reference as specified in §61.18 of this part);

(E) Method 602, Purgeable Aromatics, as described in 40 CFR part 136, appendix A, Test Procedures for Analysis of Organic Pollutants, for wastewaters for which this is an approved EPA methods; or

(F) Method 624, Purgeables, as described in 40 CFR part 136, appendix A, Test Procedures for Analysis of Organic Pollutants, for wastewaters for which this is an approved EPA method.

(v) The flow-weighted annual average benzene concentration shall be calculated by averaging the results of the sample analyses as follows:

$$\overline{C} = \frac{1}{Q_t} \times \sum_{i=1}^{n} (Q_i)(C_i)$$

Where:

$\bar{C}$=Flow-weighted annual average benzene concentration for waste stream, ppmw.

Q_t=Total annual waste quantity for waste stream, kg/yr (lb/yr).

n=Number of waste samples (at least 3).

Q_i=Annual waste quantity for waste stream represented by C_i, kg/yr (lb/yr).

C_i=Measured concentration of benzene in waste sample i, ppmw.

(d) An owner or operator using performance tests to demonstrate compliance of a treatment process with §61.348 (a)(1)(i) shall measure the flow-weighted annual average benzene concentration of the waste stream exiting the treatment process by collecting and analyzing a minimum of three representative samples of the waste stream using the procedures in paragraph (c)(3) of this section. The test shall be conducted under conditions that exist when the treatment process is operating at the highest inlet waste stream flow rate and benzene content expected to occur. Operations during periods of startup, shutdown, and malfunction shall not constitute representative conditions for the purpose of a test. The owner or operator shall record all process information as is necessary to document the operating conditions during the test.

(e) An owner or operator using performance tests to demonstrate compliance of a treatment process with §61.348(a)(1)(ii) of this subpart shall determine the percent reduction of benzene in the waste stream on a mass basis by the following procedure:

(1) The test shall be conducted under conditions that exist when the treatment process is operating at the highest inlet waste stream flow rate and benzene content expected to occur. Operations during periods of startup, shutdown, and malfunction shall not constitute representative conditions for the purpose of a test. The owner or operator shall record all process information as is necessary to document the operating conditions during the test.

(2) All testing equipment shall be prepared and installed as specified in the appropriate test methods.

(3) The mass flow rate of benzene entering the treatment process (E_b) shall be determined by computing the product of the flow rate of the waste stream entering the treatment process, as determined by the inlet flow meter, and the benzene concentration of the waste stream, as determined using the sampling and analytical procedures specified in paragraph (c)(2) or (c)(3) of this section. Three grab samples of the waste shall be taken at equally spaced time intervals over a 1-hour period. Each 1-hour period constitutes a run, and the performance test shall consist of a minimum of 3 runs conducted over a 3-hour period. The mass flow rate of benzene entering the treatment process is calculated as follows:

$$E_b = \frac{K}{n \times 10^6}\left[\sum_{i=1}^{n} V_i C_i\right]$$

Where:

E_b = Mass flow rate of benzene entering the treatment process, kg/hr (lb/hr).

K = Density of the waste stream, kg/m^3 (lb/ft^3).

V_i = Average volume flow rate of waste entering the treatment process during each run i, m^3/hr (ft^3/hr).

C_i = Average concentration of benzene in the waste stream entering the treatment process during each run i, ppmw.

n = Number of runs.

10^6 = Conversion factor for ppmw.

(4) The mass flow rate of benzene exiting the treatment process (E_a) shall be determined by computing the product of the flow rate of the waste stream exiting the treatment process, as determined by the outlet flow meter or the inlet flow meter, and the benzene concentration of the waste stream, as determined using the sampling and analytical procedures specified in paragraph (c)(2) or (c)(3) of this section. Three grab samples of the waste shall be taken at equally spaced time intervals over a 1-hour period. Each 1-hour period constitutes a run, and the performance test shall consist of a minimum of 3 runs conducted over the same 3-hour period at which the mass flow rate of benzene entering the treatment process is determined. The mass flow rate of benzene exiting the treatment process is calculated as follows:

$$E_a = \frac{K}{n \times 10^6}\left[\sum_{i=1}^{n} V_i C_i\right]$$

Where:

E_a = Mass flow rate of benzene exiting the treatment process, kg/hr (lb/hr).

K = Density of the waste stream, kg/m^3 (lb/ft^3).

V_i = Average volume flow rate of waste exiting the treatment process during each run i, m^3/hr (ft^3/hr).

C_i = Average concentration of benzene in the waste stream exiting the treatment process during each run i, ppmw.

n = Number of runs.

10^6 = Conversion factor for ppmw.

(f) An owner or operator using performance tests to demonstrate compliance of a treatment process with § 61.348(a)(1)(iii) of this subpart shall determine the benzene destruction efficiency for the combustion unit by the following procedure:

(1) The test shall be conducted under conditions that exist when the combustion unit is operating at the highest inlet waste stream flow rate and benzene content expected to occur. Operations during periods of startup, shutdown, and malfunction shall not constitute representative conditions for the purpose of a test. The owner or operator shall record all process information necessary to document the operating conditions during the test.

(2) All testing equipment shall be prepared and installed as specified in the appropriate test methods.

(3) The mass flow rate of benzene entering the combustion unit shall be determined by computing the product of the flow rate of the waste stream entering the combustion unit, as determined by the inlet flow meter, and the benzene concentration of the waste stream, as determined using the sampling procedures in paragraph (c)(2) or (c)(3) of this section. Three grab samples of the waste shall be taken at equally spaced time intervals over a 1-hour period. Each 1-hour period constitutes a run, and the performance test shall consist of a minimum of 3 runs conducted over a 3-hour period. The mass flow rate of benzene into the combustion unit is calculated as follows:

$$E_b = \frac{K}{n \times 10^6}\left[\sum_{i=1}^{n} V_i C_i\right]$$

Where:

E_b = Mass flow rate of benzene entering the combustion unit, kg/hr (lb/hr).
K = Density of the waste stream, kg/m^3 (lb/ft^3).
V_i = Average volume flow rate of waste entering the combustion unit during each run i, m^3/hr (ft^3/hr).
C_i = Average concentration of benzene in the waste stream entering the combustion unit during each run i, ppmw.
n = Number of runs.
10^6 = Conversion factor for ppmw.

(4) The mass flow rate of benzene exiting the combustion unit exhaust stack shall be determined as follows:

(i) The time period for the test shall not be less than 3 hours during which at least 3 stack gas samples are collected and be the same time period at which the mass flow rate of benzene entering the treatment process is determined. Each sample shall be collected over a 1-hour period (e.g., in a tedlar bag) to represent a time-integrated composite sample and each 1-hour period shall correspond to the periods when the waste feed is sampled.

(ii) A run shall consist of a 1-hour period during the test. For each run:

(A) The reading from each measurement shall be recorded;

(B) The volume exhausted shall be determined using Method 2, 2A, 2C, or 2D from appendix A of 40 CFR part 60, as appropriate.

(C) The average benzene concentration in the exhaust downstream of the combustion unit shall be determined using Method 18 from appendix A of 40 CFR part 60.

(iii) The mass of benzene emitted during each run shall be calculated as follows:

$$M_i = D_b VC\left(10^{-6}\right)$$

Where:

M_i = Mass of benzene emitted during run i, kg (lb).
V = Volume of air-vapor mixture exhausted at standard conditions, m^3 (ft^3).
C = Concentration of benzene measured in the exhaust, ppmv.
D_b = Density of benzene, 3.24 kg/m^3 (0.202 lb/ft^3).
10^6 = Conversion factor for ppmv.

(iv) The benzene mass emission rate in the exhaust shall be calculated as follows:

$$E_a = \left(\sum_{i=1}^{n} M_i\right) / T$$

Where:

E_a = Mass flow rate of benzene emitted from the combustion unit, kg/hr (lb/hr).
M_i = Mass of benzene emitted from the combustion unit during run i, kg (lb).
T = Total time of all runs, hr.
n = Number of runs.

(5) The benzene destruction efficiency for the combustion unit shall be calculated as follows:

$$R = \frac{E_b - E_a}{E_b} \times 100$$

Where:

R = Benzene destruction efficiency for the combustion unit, percent.
E_b = Mass flow rate of benzene entering the combustion unit, kg/hr (lb/hr).
E_a = Mass flow rate of benzene emitted from the combustion unit, kg/hr (lb/hr).

(g) An owner or operator using performance tests to demonstrate compliance of a wastewater treatment system unit with § 61.348(b) shall measure the flow-weighted annual average benzene concentration of the wastewater stream where the waste stream enters an exempt waste management unit by collecting and analyzing a minimum of three representative samples of the waste stream using the procedures in paragraph (c)(3) of this section. The test shall be conducted under conditions that exist when the wastewater treatment system is operating at the highest inlet wastewater stream flow rate and benzene content expected to occur. Operations during periods of startup, shutdown, and malfunction shall not constitute representative conditions for the purpose of a test. The owner or operator shall record all process information as is necessary to document the operating conditions during the test.

(h) An owner or operator shall test equipment for compliance with no detectable emissions as required in §§ 61.343 through 61.347, and § 61.349 of this subpart in accordance with the following requirements:

(1) Monitoring shall comply with Method 21 from appendix A of 40 CFR part 60.

(2) The detection instrument shall meet the performance criteria of Method 21.

(3) The instrument shall be calibrated before use on each day of its use by the procedures specified in Method 21.

(4) Calibration gases shall be:

(i) Zero air (less than 10 ppm of hydrocarbon in air); and

(ii) A mixture of methane or n-hexane and air at a concentration of approximately, but less than, 10,000 ppm methane or n-hexane.

(5) The background level shall be determined as set forth in Method 21.

(6) The instrument probe shall be traversed around all potential leak interfaces as close as possible to the interface as described in Method 21.

(7) The arithmetic difference between the maximum concentration indicated by the instrument and the background level is compared to 500 ppm for determining compliance.

(i) An owner or operator using a performance test to demonstrate compliance of a control device with either the organic reduction efficiency requirement or the benzene reduction efficiency requirement specified under § 61.349(a)(2) shall use the following procedures:

(1) The test shall be conducted under conditions that exist when the waste management unit vented to the control device is operating at the highest load or capacity level expected to occur. Operations during periods of startup, shutdown, and malfunction shall not constitute representative conditions for the purpose of a test. The owner or operator shall record all process information necessary to document the operating conditions during the test.

(2) Sampling sites shall be selected using Method 1 or 1A from appendix A of 40 CFR part 60, as appropriate.

(3) The mass flow rate of either the organics or benzene entering and exiting the control device shall be determined as follows:

(i) The time period for the test shall not be less than 3 hours during which at least 3 stack gas samples are collected. Samples of the vent stream entering and exiting the control device shall be collected during the same time period. Each sample shall be collected over a 1-hour period (e.g., in a tedlar bag) to represent a time-integrated composite sample.

(ii) A run shall consist of a 1-hour period during the test. For each run:

(A) The reading from each measurement shall be recorded;

(B) The volume exhausted shall be determined using Method 2, 2A, 2C, or 2D from appendix A of 40 CFR part 60, as appropriate;

(C) The organic concentration or the benzene concentration, as appropriate, in the vent stream entering and exiting the control shall be determined using Method 18 from appendix A of 40 CFR part 60.

(iii) The mass of organics or benzene entering and exiting the control device during each run shall be calculated as follows:

$$M_{aj} = \frac{K_1 V_{aj}}{10^6} \left(\sum_{i=1}^{n} C_{ai} MW_i \right)$$

$$M_{bj} = \frac{K_1 V_{bj}}{10^6} \left(\sum_{i=1}^{n} C_{bi} MW_i \right)$$

M_{aj} = Mass of organics or benzene in the vent stream entering the control device during run j, kg (lb).

M_{bj} = Mass of organics or benzene in the vent stream exiting the control device during run j, kg (lb).

V_{aj} = Volume of vent stream entering the control device during run j, at standard conditions, m^3 (ft^3).

V_{bj} = Volume of vent stream exiting the control device during run j, at standard conditions, m^3 (ft^3).

C_{ai} = Organic concentration of compound i or the benzene concentration measured in the vent stream entering the control device as determined by Method 18, ppm by volume on a dry basis.

C_{bi} = Organic concentration of compound i or the benzene concentration measured in the vent stream exiting the control device as determined by Method 18, ppm by volume on a dry basis.

MW_i = Molecular weight of organic compound i in the vent stream, or the molecular weight of benzene, kg/kg-mol (lb/lb-mole).

n = Number of organic compounds in the vent stream; if benzene reduction efficiency is being demonstrated, then n=1.

K_1 = Conversion factor for molar volume at standard conditions (293 K and 760 mm Hg (527 R and 14.7 psia))

= 0.0416 kg-mol/m^3 (0.00118 lb-mol/ft^3)

10^{-6}=Conversion factor for ppmv.

(iv) The mass flow rate of organics or benzene entering and exiting the control device shall be calculated as follows:

$$E_a - \left(\sum_{j=1}^{n} M_{aj}\right) / T$$

$$E_b - \left(\sum_{j=1}^{n} M_{bj}\right) / T$$

Where:

E_a = Mass flow rate of organics or benzene entering the control device, kg/hr (lb/hr).

E_b = Mass flow rate of organics or benzene exiting the control device, kg/hr (lb/hr).

M_{aj} = Mass of organics or benzene in the vent stream entering the control device during run j, kg (lb).

M_{bj} = Mass of organics or benzene in the vent stream exiting the control device during run j, kg (lb).

T = Total time of all runs, hr.

n = Number of runs.

(4) The organic reduction efficiency or the benzene reduction efficiency for the control device shall be calculated as follows:

$$R = \frac{E_a - E_b}{E_a} \times 100$$

Where:

R = Total organic reduction of efficiency or benzene reduction efficiency for the control device, percent.

E_b = Mass flow rate of organics or benzene entering the control device, kg/hr (lb/hr).

E_a = Mass flow rate of organic or benzene emitted from the control device, kg/hr (lb/hr).

(j) An owner or operator shall determine the benzene quantity for the purposes of the calculation required by §61.342 (c)(3)(ii)(B) according to the provisions of paragraph (a) of this section, except that the procedures in paragraph (a) of this section shall also apply to wastes with a water content of 10 percent or less.

(k) An owner or operator shall determine the benzene quantity for the purposes of the calculation required by §61.342(e)(2) by the following procedure:

(1) For each waste stream that is not controlled for air emissions in accordance with §61.343. 61.344, 61.345, 61.346, 61.347, or 61.348(a), as applicable to the waste management unit that manages the waste, the benzene quantity shall be determined as specified in paragraph (a) of this section, except that paragraph (b)(4) of this section shall not apply, i.e., the waste quantity for process unit turnaround waste is not annualized but shall be included in the determination of benzene quantity for the year in which the waste is generated for the purposes of the calculation required by §61.342(e)(2).

(2) For each waste stream that is controlled for air emissions in accordance with §61.343. 61.344, 61.345, 61.346, 61.347, or 61.348(a), as applicable to the waste management unit that manages the waste, the determination of annual waste quantity and flow-weighted annual average benzene concentration shall be made at the first applicable location as described in paragraphs (k)(2)(i), (k)(2)(ii), and (k)(2)(iii) of this section and prior to any reduction of benzene concentration through volatilization of the benzene, using the methods given in (k)(2)(iv) and (k)(2)(v) of this section.

(i) Where the waste stream enters the first waste management unit not complying with §§61.343, 61.344, 61.345, 61.346, 61.347, and 61.348(a) that are applicable to the waste management unit,

(ii) For each waste stream that is managed or treated only in compliance with §§61.343 through 61.348(a) up to the point of final direct discharge from the facility, the determination of benzene quantity shall be prior to any reduction of benzene concentration through volatilization of the benzene, or

(iii) For wastes managed in units controlled for air emissions in accordance with §§61.343, 61.344, 61.345, 61.346, 61.347, and 61.348(a), and then transferred offsite, facilities shall use the first applicable offsite location as described in paragraphs (k)(2)(i) and (k)(2)(ii) of this section if they have documentation from the offsite facility of the benzene quantity at this location. Facilities without this documentation for offsite wastes shall use the benzene quantity determined at the point where the transferred waste leaves the facility.

(iv) Annual waste quantity shall be determined using the procedures in paragraphs (b)(5), (6), or (7) of this section, and

(v) The flow-weighted annual average benzene concentration shall be determined using the procedures in paragraphs (c)(2) or (3) of this section.

(3) The benzene quantity in a waste stream that is generated less than one time per year, including process unit turnaround waste, shall be included in the determination of benzene quantity as determined in paragraph (k)(6) of this section for the year in which the waste is generated. The benzene quantity in this waste stream shall not be annualized or averaged over the time interval between the activities that resulted in generation of the waste for purposes of determining benzene quantity as determined in paragraph (k)(6) of this section.

(4) The benzene in waste entering an enhanced biodegradation unit, as defined in § 61.348(b)(2)(ii)(B), shall not be included in the determination of benzene quantity, determined in paragraph (k)(6) of this section, if the following conditions are met:

(i) The benzene concentration for each waste stream entering the enhanced biodegradation unit is less than 10 ppmw on a flow-weighted annual average basis, and

(ii) All prior waste management units managing the waste comply with §§ 61.343, 61.344, 61.345, 61.346, 61.347 and 61.348(a).

(5) The benzene quantity for each waste stream in paragraph (k)(2) of this section shall be determined by multiplying the annual waste quantity of each waste stream times its flow-weighted annual average benzene concentration.

(6) The total benzene quantity for the purposes of the calculation required by § 61.342(e)(2) shall be determined by adding together the benzene quantities determined in paragraphs (k)(1) and (k)(5) of this section for each applicable waste stream.

(7) If the benzene quantity determined in paragraph (6) of this section exceeds 6.0 Mg/yr (6.6 ton/yr) only because of multiple counting of the benzene quantity for a waste stream, the owner or operator may use the following procedures for the purposes of the calculation required by § 61.342(e)(2):

(i) Determine which waste management units are involved in the multiple counting of benzene;

(ii) Determine the quantity of benzene that is emitted, recovered, or removed from the affected units identified in paragraph (k)(7)(i) of this section, or destroyed in the units if applicable, using either direct measurements or the best available estimation techniques developed or approved by the Administrator.

(iii) Adjust the benzene quantity to eliminate the multiple counting of benzene based on the results from paragraph (k)(7)(ii) of this section and determine the total benzene quantity for the purposes of the calculation required by § 61.342(e)(2).

(iv) Submit in the annual report required under § 61.357(a) a description of the methods used and the resulting calculations for the alternative procedure under paragraph (k)(7) of this section, the benzene quantity determination from paragraph (k)(6) of this section, and the adjusted benzene quantity determination from paragraph (k)(7)(iii) of this section.

[55 FR 8346, Mar. 7, 1990; 55 FR 12444, Apr. 3, 1990, as amended at 55 FR 37231, Sept. 10, 1990; 58 FR 3099, Jan. 7, 1993; 65 FR 62160, Oct. 17, 2000]

§ 61.356 Recordkeeping requirements.

(a) Each owner or operator of a facility subject to the provisions of this subpart shall comply with the recordkeeping requirements of this section. Each record shall be maintained in a readily accessible location at the facility site for a period not less than two years from the date the information is recorded unless otherwise specified.

(b) Each owner or operator shall maintain records that identify each waste stream at the facility subject to this subpart, and indicate whether or not the waste stream is controlled for benzene emissions in accordance with this subpart. In addition the owner or operator shall maintain the following records:

(1) For each waste stream not controlled for benzene emissions in accordance with this subpart, the records shall include all test results, measurements, calculations, and other documentation used to determine the following information for the waste stream: waste stream identification, water content, whether or not the waste stream is a process wastewater stream, annual waste quantity, range of benzene concentrations, annual average flow-weighted benzene concentration, and annual benzene quantity.

(2) For each waste stream exempt from § 61.342(c)(1) in accordance with § 61.342(c)(3), the records shall include:

(i) All measurements, calculations, and other documentation used to determine that the continuous flow of process wastewater is less than 0.02 liters (0.005 gallons) per minute or the annual waste quantity of process wastewater is less than 10 Mg/yr (11 ton/yr) in accordance with § 61.342(c)(3)(i), or

(ii) All measurements, calculations, and other documentation used to determine that the sum of the total annual benzene quantity in all exempt waste streams does not exceed 2.0 Mg/yr (2.2 ton/yr) in accordance with § 61.342(c)(3)(ii).

(3) For each facility where process wastewater streams are controlled for benzene emissions in accordance with § 61.342(d) of this subpart, the records shall include for each treated process wastewater stream all measurements, calculations, and other documentation used to determine the annual benzene quantity in the process wastewater stream exiting the treatment process.

(4) For each facility where waste streams are controlled for benzene emissions in accordance with § 61.342(e), the records shall include for each waste stream all measurements, including the locations of the measurements, calculations, and other documentation used to determine that the total benzene quantity does not exceed 6.0 Mg/yr (6.6 ton/yr).

(5) For each facility where the annual waste quantity for process unit turnaround waste is determined in accordance with § 61.355(b)(5), the records shall include all test results, measurements, calculations, and other documentation used to determine the following information: identification of each process unit at the facility that undergoes turnarounds, the date of the most recent turnaround for each process unit, identification of each process unit turnaround waste, the water content of each process unit turnaround waste, the annual waste quantity determined in accordance with § 61.355(b)(5), the range of benzene concentrations in the waste, the annual average flow-weighted benzene concentration of the waste, and the annual benzene quantity calculated in accordance with § 61.355(a)(1)(iii) of this section.

(6) For each facility where wastewater streams are controlled for benzene emissions in accordance with § 61.348(b)(2), the records shall include all measurements, calculations, and other documentation used to determine the annual benzene content of the waste streams and the total annual benzene quantity contained in all waste streams managed or treated in exempt waste management units.

(c) An owner or operator transferring waste off-site to another facility for treatment in accordance with § 61.342(f) shall maintain documentation for each offsite waste shipment that includes the following information: Date waste is shipped offsite, quantity of waste shipped offsite, name and address of the facility receiving the waste, and a copy of the notice sent with the waste shipment.

(d) An owner or operator using control equipment in accordance with §§ 61.343 through 61.347 shall maintain engineering design documentation for all control equipment that is installed on the waste management unit. The documentation shall be retained for the life of the control equipment. If a control device is used, then the owner or operator shall maintain the control device records required by paragraph (f) of this section.

(e) An owner or operator using a treatment process or wastewater treatment system unit in accordance with § 61.348 of this subpart shall maintain the following records. The documentation shall be retained for the life of the unit.

(1) A statement signed and dated by the owner or operator certifying that the unit is designed to operate at the documented performance level when the waste stream entering the unit is at the highest waste stream flow rate and benzene content expected to occur.

(2) If engineering calculations are used to determine treatment process or wastewater treatment system unit performance, then the owner or operator shall maintain the complete design analysis for the unit. The design analysis shall include for example the following information: Design specifications, drawings, schematics, piping and instrumentation diagrams, and other documentation necessary to demonstrate the unit performance.

(3) If performance tests are used to determine treatment process or wastewater treatment system unit performance, then the owner or operator shall maintain all test information necessary to demonstrate the unit performance.

(i) A description of the unit including the following information: type of treatment process; manufacturer name and model number; and for each waste stream entering and exiting the unit, the waste stream type (e.g., process wastewater, sludge, slurry, etc.), and the design flow rate and benzene content.

(ii) Documentation describing the test protocol and the means by which sampling variability and analytical variability were accounted for in the determination of the unit performance. The description of the test protocol shall include the following information: sampling locations, sampling method, sampling frequency, and analytical procedures used for sample analysis.

(iii) Records of unit operating conditions during each test run including all key process parameters.

(iv) All test results.

(4) If a control device is used, then the owner or operator shall maintain the control device records required by paragraph (f) of this section.

(f) An owner or operator using a closed-vent system and control device in accordance with § 61.349 of this subpart shall maintain the following records. The documentation shall be retained for the life of the control device.

(1) A statement signed and dated by the owner or operator certifying that the closed-vent system and control device is designed to operate at the documented performance level when the waste management unit vented to the control device is or would be operating at the highest load or capacity expected to occur.

(2) If engineering calculations are used to determine control device performance in accordance with § 61.349(c), then a design analysis for the control device that includes for example:

(i) Specifications, drawings, schematics, and piping and instrumentation diagrams prepared by the owner or operator, or the control device manufacturer or vendor that describe the control device design based on acceptable engineering texts. The design analysis shall address the following vent stream characteristics and control device operating parameters:

(A) For a thermal vapor incinerator, the design analysis shall consider the vent stream composition, constituent concentrations, and flow rate. The design analysis shall also establish the design minimum and average temperature in the combustion zone and the combustion zone residence time.

(B) For a catalytic vapor incinerator, the design analysis shall consider the vent stream composition, constituent concentrations, and flow rate. The design analysis shall also establish the design minimum and average temperatures across the catalyst bed inlet and outlet.

(C) For a boiler or process heater, the design analysis shall consider the vent stream composition, constituent concentrations, and flow rate. The design analysis shall also establish the design minimum and average flame zone temperatures, combustion zone residence time, and description of method and location where the vent stream is introduced into the flame zone.

(D) For a flare, the design analysis shall consider the vent stream composition, constituent concentrations, and flow rate. The design analysis shall also consider the requirements specified in 40 CFR 60.18.

(E) For a condenser, the design analysis shall consider the vent stream composition, constituent concentration, flow rate, relative humidity, and temperature. The design analysis shall also establish the design outlet organic compound concentration level or the design outlet benzene concentration level, design average temperature of the condenser exhaust vent stream, and the design average temperatures of the coolant fluid at the condenser inlet and outlet.

(F) For a carbon adsorption system that regenerates the carbon bed directly on-site in the control device such as a fixed-bed adsorber, the design analysis shall consider the vent stream composition, constituent concentration, flow rate, relative humidity, and temperature. The design analysis shall also establish the design exhaust vent stream organic compound concentration level or the design exhaust vent stream benzene concentration level, number and capacity of carbon beds, type and working capacity of activated carbon used for carbon beds, design total steam flow over the period of each complete carbon bed regeneration cycle, duration of the carbon bed steaming and cooling/drying cycles, design carbon bed temperature after regeneration, design carbon bed regeneration time, and design service life of carbon.

(G) For a carbon adsorption system that does not regenerate the carbon bed directly on-site in the control device, such as a carbon canister, the design analysis shall consider the vent stream composition, constituent concentration, flow rate, relative humidity, and temperature. The design analysis shall also establish the design exhaust vent stream organic compound concentration level or the design exhaust vent stream benzene concentration level, capacity of carbon bed, type and working capacity of activated carbon used for carbon bed, and design carbon replacement interval based on the total carbon working capacity of the control device and source operating schedule.

(H) For a control device subject to the requirements of §61.349(a)(2)(iv), the design analysis shall consider the vent stream composition, constituent concentration, and flow rate. The design analysis shall also include all of the information submitted under §61.349 (a)(2)(iv).

(ii) [Reserved]

(3) If performance tests are used to determine control device performance in accordance with §61.349(c) of this subpart:

(i) A description of how it is determined that the test is conducted when the waste management unit or treatment process is operating at the highest load or capacity level. This description shall include the estimated or design flow rate and organic content of each vent stream and definition of the acceptable operating ranges of key process and control parameters during the test program.

(ii) A description of the control device including the type of control device, control device manufacturer's name and model number, control device dimensions, capacity, and construction materials.

(iii) A detailed description of sampling and monitoring procedures, including sampling and monitoring locations in the system, the equipment to be used, sampling and monitoring frequency, and planned analytical procedures for sample analysis.

(iv) All test results.

(g) An owner or operator shall maintain a record for each visual inspection required by §§61.343 through 61.347 of this subpart that identifies a problem (such as a broken seal, gap or other problem) which could result in benzene emissions. The record shall include the date of the inspection, waste management unit and control equipment location where the problem is identified, a description of the problem, a description of the corrective action taken, and the date the corrective action was completed.

(h) An owner or operator shall maintain a record for each test of no detectable emissions required by §§61.343

through 61.347 and § 61.349 of this subpart. The record shall include the following information: date the test is performed, background level measured during test, and maximum concentration indicated by the instrument reading measured for each potential leak interface. If detectable emissions are measured at a leak interface, then the record shall also include the waste management unit, control equipment, and leak interface location where detectable emissions were measured, a description of the problem, a description of the corrective action taken, and the date the corrective action was completed.

(i) For each treatment process and wastewater treatment system unit operated to comply with § 61.348, the owner or operator shall maintain documentation that includes the following information regarding the unit operation:

(1) Dates of startup and shutdown of the unit.

(2) If measurements of waste stream benzene concentration are performed in accordance with § 61.354(a)(1) of this subpart, the owner or operator shall maintain records that include date each test is performed and all test results.

(3) If a process parameter is continuously monitored in accordance with § 61.354(a)(2) of this subpart, the owner or operator shall maintain records that include a description of the operating parameter (or parameters) to be monitored to ensure that the unit will be operated in conformance with these standards and the unit's design specifications, and an explanation of the criteria used for selection of that parameter (or parameters). This documentation shall be kept for the life of the unit.

(4) If measurements of waste stream benzene concentration are performed in accordance with § 61.354(b), the owner or operator shall maintain records that include the date each test is performed and all test results.

(5) Periods when the unit is not operated as designed.

(j) For each control device, the owner or operator shall maintain documentation that includes the following information regarding the control device operation:

(1) Dates of startup and shutdown of the closed-vent system and control device.

(2) A description of the operating parameter (or parameters) to be monitored to ensure that the control device will be operated in conformance with these standards and the control device's design specifications and an explanation of the criteria used for selection of that parameter (or parameters). This documentation shall be kept for the life of the control device.

(3) Periods when the closed-vent system and control device are not operated as designed including all periods and the duration when:

(i) Any valve car-seal or closure mechanism required under § 61.349(a)(1)(ii) is broken or the by-pass line valve position has changed.

(ii) The flow monitoring devices required under § 61.349(a)(1)(ii) indicate that vapors are not routed to the control device as required.

(4) If a thermal vapor incinerator is used, then the owner or operator shall maintain continuous records of the temperature of the gas stream in the combustion zone of the incinerator and records of all 3-hour periods of operation during which the average temperature of the gas stream in the combustion zone is more than 28 °C (50 °F) below the design combustion zone temperature.

(5) If a catalytic vapor incinerator is used, then the owner or operator shall maintain continuous records of the temperature of the gas stream both upstream and downstream of the catalyst bed of the incinerator, records of all 3-hour periods of operation during which the average temperature measured before the catalyst bed is more than 28 °C (50 °F) below the design gas stream temperature, and records of all 3-hour periods of operation during which the average temperature difference across the catalyst bed is less than 80 percent of the design temperature difference.

(6) If a boiler or process heater is used, then the owner or operator shall maintain records of each occurrence when there is a change in the location at which the vent stream is introduced into the flame zone as required by

§ 61.349(a)(2)(i)(C). For a boiler or process heater having a design heat input capacity less than 44 MW (150 × 106 BTU/hr), the owner or operator shall maintain continuous records of the temperature of the gas stream in the combustion zone of the boiler or process heater and records of all 3-hour periods of operation during which the average temperature of the gas stream in the combustion zone is more than 28 °C (50 °F) below the design combustion zone temperature. For a boiler or process heater having a design heat input capacity greater than or equal to 44 MW (150 × 106 BTU/hr), the owner or operator shall maintain continuous records of the parameter(s) monitored in accordance with the requirements of § 61.354(c)(5).

(7) If a flare is used, then the owner or operator shall maintain continuous records of the flare pilot flame monitoring and records of all periods during which the pilot flame is absent.

(8) If a condenser is used, then the owner or operator shall maintain records from the monitoring device of the parameters selected to be monitored in accordance with § 61.354(c)(6). If concentration of organics or concentration of benzene in the control device outlet gas stream is monitored, then the owner or operator shall record all 3-hour periods of operation during which the concentration of organics or the concentration of benzene in the exhaust stream is more than 20 percent greater than the design value. If the temperature of the condenser exhaust stream and coolant fluid is monitored, then the owner or operator shall record all 3-hour periods of operation during which the temperature of the condenser exhaust vent stream is more than 6 °C (11 °F) above the design average exhaust vent stream temperature, or the temperature of the coolant fluid exiting the condenser is more than 6 °C (11 °F) above the design average coolant fluid temperature at the condenser outlet.

(9) If a carbon adsorber is used, then the owner or operator shall maintain records from the monitoring device of the concentration of organics or the concentration of benzene in the control device outlet gas stream. If the concentration of organics or the concentration of benzene in the control device outlet gas stream is monitored, then the owner or operator shall record all 3-hour periods of operation during which the concentration of organics or the concentration of benzene in the exhaust stream is more than 20 percent greater than the design value. If the carbon bed regeneration interval is monitored, then the owner or operator shall record each occurrence when the vent stream continues to flow through the control device beyond the predetermined carbon bed regeneration time.

(10) If a carbon adsorber that is not regenerated directly on site in the control device is used, then the owner or operator shall maintain records of dates and times when the control device is monitored, when breakthrough is measured, and shall record the date and time then the existing carbon in the control device is replaced with fresh carbon.

(11) If an alternative operational or process parameter is monitored for a control device, as allowed in § 61.354(e) of this subpart, then the owner or operator shall maintain records of the continuously monitored parameter, including periods when the device is not operated as designed.

(12) If a control device subject to the requirements of § 61.349(a)(2)(iv) is used, then the owner or operator shall maintain records of the parameters that are monitored and each occurrence when the parameters monitored are outside the range of values specified in § 61.349(a)(2)(iv)(C), or other records as specified by the Administrator.

(k) An owner or operator who elects to install and operate the control equipment in § 61.351 of this subpart shall comply with the recordkeeping requirements in 40 CFR 60.115b.

(l) An owner or operator who elects to install and operate the control equipment in § 61.352 of this subpart shall maintain records of the following:

(1) The date, location, and corrective action for each visual inspection required by 40 CFR 60.693–2(a)(5), during which a broken seal, gap, or other problem is identified that could result in benzene emissions.

(2) Results of the seal gap measurements required by 40 CFR 60.693–2(a).

(m) If a system is used for emission control that is maintained at a pressure less than atmospheric pressure with openings to provide dilution air, then the owner or operator shall maintain records of the monitoring device and records of all periods during which the pressure in the unit is operated at a pressure that is equal to or greater than atmospheric pressure.

(n) Each owner or operator using a total enclosure to comply with control requirements for tanks in § 61.343 or the control requirements for containers in § 61.345 must keep the records required in paragraphs (n)(1) and (2) of this section. Owners or operators may use records as required in 40 CFR 264.1089(b)(2)(iv) or 40 CFR 265.1090(b)(2)(iv) for a tank or as required in 40 CFR 264.1089(d)(1) or 40 CFR 265.1090(d)(1) for a container to meet the recordkeeping requirement in paragraph (n)(1) of this section. The owner or operator must make the records of each verification of a total enclosure available for inspection upon request.

(1) Records of the most recent set of calculations and measurements performed to verify that the enclosure meets the criteria of a permanent total enclosure as specified in ''Procedure T—Criteria for and Verification of a Permanent or Temporary Total Enclosure'' in 40 CFR 52.741, appendix B;

(2) Records required for a closed-vent system and control device according to the requirements in paragraphs (d) (f), and (j) of this section.

[55 FR 8346, Mar. 7, 1990; 55 FR 12444, Apr. 3, 1990; 55 FR 18331, May 2, 1990, as amended at 58 FR 3103, Jan. 7, 1993; 65 FR 62161, Oct. 17, 2000; 67 FR 68533, Nov. 12, 2002]

§ 61.357 Reporting requirements.

(a) Each owner or operator of a chemical plant, petroleum refinery, coke by-product recovery plant, and any facility managing wastes from these industries shall submit to the Administrator within 90 days after January 7, 1993, or by the initial startup for a new source with an initial startup after the effective date, a report that summarizes the regulatory status of each waste stream subject to § 61.342 and is determined by the procedures specified in § 61.355(c) to contain benzene. Each owner or operator subject to this subpart who has no benzene onsite in wastes, products, byproducts, or intermediates shall submit an initial report that is a statement to this effect. For all other owners or operators subject to this subpart, the report shall include the following information:

(1) Total annual benzene quantity from facility waste determined in accordance with § 61.355(a) of this subpart.

(2) A table identifying each waste stream and whether or not the waste stream will be controlled for benzene emissions in accordance with the requirements of this subpart.

(3) For each waste stream identified as not being controlled for benzene emissions in accordance with the requirements of this subpart the following information shall be added to the table:

(i) Whether or not the water content of the waste stream is greater than 10 percent;

(ii) Whether or not the waste stream is a process wastewater stream, product tank drawdown, or landfill leachate;

(iii) Annual waste quantity for the waste stream;

(iv) Range of benzene concentrations for the waste stream;

(v) Annual average flow-weighted benzene concentration for the waste stream; and

(vi) Annual benzene quantity for the waste stream.

(4) The information required in paragraphs (a) (1), (2), and (3) of this section should represent the waste stream characteristics based on current configuration and operating conditions. An owner or operator only needs to list in the report those waste streams that contact materials containing benzene. The report does not need to include a description of the controls to be installed to comply with the standard or other information required in § 61.10(a).

(b) If the total annual benzene quantity from facility waste is less than 1 Mg/yr (1.1 ton/yr), then the owner or operator shall submit to the Administrator a report that updates the information listed in paragraphs (a)(1) through (a)(3) of this section whenever there is a change in the process generating the waste stream that could cause the total annual benzene quantity from facility waste to increase to 1 Mg/yr (1.1 ton/yr) or more.

(c) If the total annual benzene quantity from facility waste is less than 10 Mg/yr (11 ton/yr) but is equal to or greater than 1 Mg/yr (1.1 ton/yr), then the owner or operator shall submit to the Administrator a report that updates the information listed in paragraphs (a)(1) through (a)(3) of this section. The report shall be submitted annually and whenever there is a change in the process generating the waste stream that could cause the total annual benzene quantity from facility waste to increase to 10 Mg/yr (11 ton/yr) or more. If the information in the annual report required by paragraphs (a)(1) through (a)(3) of this section is not changed in the following year, the owner or operator may submit a statement to that effect.

(d) If the total annual benzene quantity from facility waste is equal to or greater than 10 Mg/yr (11 ton/yr), then the owner or operator shall submit to the Administrator the following reports:

(1) Within 90 days after January 7, 1993, unless a waiver of compliance under § 61.11 of this part is granted, or by the date of initial startup for a new source with an initial startup after the effective date, a certification that the equipment necessary to comply with these standards has been installed and that the required initial inspections or tests have been carried out in accordance with this subpart. If a waiver of compliance is granted under § 61.11, the certification of equipment necessary to comply with these standards shall be submitted by the date the waiver of compliance expires.

(2) Beginning on the date that the equipment necessary to comply with these standards has been certified in accordance with paragraph (d)(1) of this section, the owner or operator shall submit annually to the Administrator a report that updates the information listed in paragraphs (a)(1) through (a)(3) of this section. If the information in the annual report required by paragraphs (a)(1) through (a)(3) of this section is not changed in the following year, the owner or operator may submit a statement to that effect.

(3) If an owner or operator elects to comply with the requirements of § 61.342(c)(3)(ii), then the report required by paragraph (d)(2) of this section shall include a table identifying each waste stream chosen for exemption and the total annual benzene quantity in these exempted streams.

(4) If an owner or operator elects to comply with the alternative requirements of § 61.342(d) of this subpart, then he shall include in the report required by paragraph (d)(2) of this section a table presenting the following information for each process wastewater stream:

(i) Whether or not the process wastewater stream is being controlled for benzene emissions in accordance with the requirements of this subpart;

(ii) For each process wastewater stream identified as not being controlled for benzene emissions in accordance with the requirements of this subpart, the table shall report the following information for the process wastewater stream as determined at the point of waste generation: annual waste quantity, range of benzene concentrations, annual average flow-weighted benzene concentration, and annual benzene quantity;

(iii) For each process wastewater stream identified as being controlled for benzene emissions in accordance with the requirements of this subpart, the table shall report the following information for the process wastewater stream as determined at the exit to the treatment process: Annual waste quantity, range of benzene concentrations, annual average flow-weighted benzene concentration, and annual benzene quantity.

(5) If an owner or operator elects to comply with the alternative requirements of § 61.342(e), then the report required by paragraph (d)(2) of this section shall include a table presenting the following information for each waste stream:

(i) For each waste stream identified as not being controlled for benzene emissions in accordance with the requirements of this subpart; the table shall report the following information for the waste stream as determined at the point of waste generation: annual waste quantity, range of benzene concentrations, annual average flow-weighted benzene concentration, and annual benzene quantity;

(ii) For each waste stream identified as being controlled for benzene emissions in accordance with the requirements of this subpart; the table shall report the following information for the waste stream as determined at the applicable location described in § 61.355(k)(2): Annual waste quantity, range of benzene concentrations, annual average flow-weighted benzene concentration, and annual benzene quantity.

(6) Beginning 3 months after the date that the equipment necessary to comply with these standards has been certified in accordance with paragraph (d)(1) of this section, the owner or operator shall submit quarterly to the Administrator a certification that all of the required inspections have been carried out in accordance with the requirements of this subpart.

(7) Beginning 3 months after the date that the equipment necessary to comply with these standards has been certified in accordance with paragraph (d)(1) of this section, the owner or operator shall submit a report quarterly to the Administrator that includes:

(i) If a treatment process or wastewater treatment system unit is monitored in accordance with § 61.354(a)(1) of this subpart, then each period of operation during which the concentration of benzene in the monitored waste stream exiting the unit is equal to or greater than 10 ppmw.

(ii) If a treatment process or wastewater treatment system unit is monitored in accordance with § 61.354(a)(2) of this subpart, then each 3-hour period of operation during which the average value of the monitored parameter is outside the range of acceptable values or during which the unit is not operating as designed.

(iii) If a treatment process or wastewater treatment system unit is monitored in accordance with § 61.354(b), then each period of operation during which the flow-weighted annual average concentration of benzene in the monitored waste stream entering the unit is equal to or greater than 10 ppmw and/or the total annual benzene quantity is equal to or greater than 1.0 mg/yr.

(iv) For a control device monitored in accordance with § 61.354(c) of this subpart, each period of operation monitored during which any of the following conditions occur, as applicable to the control device:

(A) Each 3-hour period of operation during which the average temperature of the gas stream in the combustion zone of a thermal vapor incinerator, as measured by the temperature monitoring device, is more than 28 °C (50 °F) below the design combustion zone temperature.

(B) Each 3-hour period of operation during which the average temperature of the gas stream immediately before the catalyst bed of a catalytic vapor incinerator, as measured by the temperature monitoring device, is more than 28 °C (50 °F) below the design gas stream temperature, and any 3-hour period during which the average temperature difference across the catalyst bed (i.e., the difference between the temperatures of the gas stream immediately before and after the catalyst bed), as measured by the temperature monitoring device, is less than 80 percent of the design temperature difference.

(C) Each 3-hour period of operation during which the average temperature of the gas stream in the combustion zone of a boiler or process heater having a design heat input capacity less than 44 MW (150 × 106 BTU/hr), as mesured by the temperature monitoring device, is more than 28 °C (50 °F) below the design combustion zone temperature.

(D) Each 3-hour period of operation during which the average concentration of organics or the average concentration of benzene in the exhaust gases from a carbon adsorber, condenser, or other vapor recovery system is more than 20 percent greater than the design concentration level of organics or benzene in the exhaust gas.

(E) Each 3-hour period of operation during which the temperature of the condenser exhaust vent stream is more than 6 °C (11 °F) above the design average exhaust vent stream temperature, or the temperature of the coolant fluid exiting the condenser is more than 6 °C (11 °F) above the design average coolant fluid temperature at the condenser outlet.

(F) Each period in which the pilot flame of a flare is absent.

(G) Each occurrence when there is a change in the location at which the vent stream is introduced into the flame zone of a boiler or process heater as required by § 61.349(a)(2)(i)(C) of this subpart.

(H) Each occurrence when the carbon in a carbon adsorber system that is regenerated directly on site in the control device is not regenerated at the predetermined carbon bed regeneration time.

(I) Each occurrence when the carbon in a carbon adsorber system that is not regenerated directly on site in the control device is not replaced at the predetermined interval specified in § 61.354(c) of this subpart.

(J) Each 3-hour period of operation during which the parameters monitored are outside the range of values specified in § 61.349(a)(2)(iv)(C), or any other periods specified by the Administrator for a control device subject to the requirements of § 61.349(a)(2)(iv).

(v) For a cover and closed-vent system monitored in accordance with § 61.354(g), the owner or operator shall submit a report quarterly to the Administrator that identifies any period in which the pressure in the waste management unit is equal to or greater than atmospheric pressure.

(8) Beginning one year after the date that the equipment necessary to comply with these standards has been certified in accordance with paragraph (d)(1) of this section, the owner or operator shall submit annually to the Administrator a report that summarizes all inspections required by §§ 61.342 through 61.354 during which detectable emissions are measured or a problem (such as a broken seal, gap or other problem) that could result in benzone emissions is identified, including information about the repairs or corrective action taken.

(e) An owner or operator electing to comply with the provisions of §§ 61.351 or 61.352 of this subpart shall notify the Administrator of the alternative standard selected in the report required under § 61.07 or § 61.10 of this part.

(f) An owner or operator who elects to install and operate the control equipment in § 61.351 of this subpart shall comply with the reporting requirements in 40 CFR 60.115b.

(g) An owner or operator who elects to install and operate the control equipment in § 61.352 of this subpart shall submit initial and quarterly reports that identify all seal gap measurements, as required in 40 CFR 60.693–2(a), that are outside the prescribed limits.

[55 FR 8346, Mar. 7 1990; 55 FR 12444, Apr. 3, 1990, as amended at 55 FR 37231, Sept. 10, 1990; 58 FR 3105, Jan. 7, 1993; 65 FR 62161, Oct. 17, 2000]

§ 61.358 Delegation of authority.

(a) In delegating implementation and enforcement authority to a State under section 112(d) of the Clean Air Act, the authorities contained in paragraph (b) of this section shall be retained by the Administrator and not transferred to a State.

(b) Alternative means of emission limitation under § 61.353 of this subpart will not be delegated to States.

§ 61.359 [Reserved]

APPENDIX B
COPIES OF
NOTIFICATIONS

Westates Carbon-Arizona, Inc.
2523 Mutahar Street
Post Office Box E
Parker, AZ 85344
Tel. 602-669-5758
Fax. 602-669-5775/5776

BY HAND DELIVERY

June 6, 1995

Mr. David Howecamp
Director, Air and Toxics Division (A-1)
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105

FILE COPY

RE: Westates Carbon-Arizona, Inc. (WCAI)
Notifications Pursuant to Benzene NESHAP

Dear Mr. Howecamp:

Please find enclosed one copy of the following documents with respect to the WCAI facility in Parker, Arizona:

1) Existing Source Notification as required by 40 CFR §61.10;

2) Supplement to regulatory status notification as required by 40 CFR §61.357(a); and

3) Subpart FF annual reports for calendar years 1993 and 1994.

Representatives of WCAI discussed the applicability of Subpart FF with Mr. Eric Auer of EPA Region IX by telephone on May 25, 1995, and requested a meeting to discuss related issues.

A meeting has been scheduled at Region IX on the date of this letter and is expected to include representatives of WCAI and Mr. Auer and Ms. Jennifer Fox of EPA Region IX.

As discussed previously with Mr. Auer, WCAI conducted an extensive internal compliance audit earlier this year and determined that Subpart FF requirements were applicable at its facility to an extent not previously understood. WCAI immediately located and hired a consultant with experience in Subpart FF compliance who prepared a program to ensure our facility would fully comply with all Subpart FF requirements. The enclosed documents are a direct result of these activities and ensure that WCAI achieves full compliance with Subpart FF.

We anticipate a discussion of these documents with Mr. Auer and Ms. Fox today and remain ready to work with Region IX to ensure continuous compliance with this complex set of regulations.

Sincerely,

Monte McCue
Plant Manager

EXISTING SOURCE NOTIFICATION REQUIRED BY 40 CFR 61.10
WESTATES CARBON - ARIZONA, INC.

The following information is provided as required by 40 CFR 61.10:

1. **Name and Address of the Owner or Operator [§61.10(a)(1)]:**

   Westates Carbon - Arizona, Inc.
   P.O. Box E
   2523 Mutahar Street
   Parker, Arizona 85344

   Contact: Mr. Monte McCue, Plant Manager
   Phone: (520) 669 - 5758
   FAX: (520) 669 - 5775

2. **The Location of the Source [§61.10(a)(2)]:**

   The facility is located in La Paz County, Arizona near the city of Parker. The facility is located within the Colorado River Indian Tribes (CRIT) reservation lands. EPA retains jurisdiction over this facility as its authority has not been delegated to tribal authorities [See 40 CFR 52.120 et seq.].

3. **Type of Hazardous Air Pollutants Emitted [§61.10(a)(3)]:**

   This facility potentially emits benzene, a substance which is regulated under Subpart FF - National Emission Standard for Benzene Waste Operations (§61.340 et seq.). Additional hazardous air pollutants potentially emitted from the facility in trace amounts include, but are not limited to the following:

Aniline	Benzo(a)Anthracene
Benzo(b)Fluoranthene	Carbon Tetrachloride
Chlorobenzene	Chloroform
Cresol	Dibenzofuran
Dioxane (1,4 -)	Ethylbenzene
Hexane	Hexane (1 -)
Methyl Ethyl Ketone	Methyl Isobutyl Ketone
Methyltertiarybutyl Ether	Naphthalene
Pentachlorophenol	Phenol
Propylbenzene	Tetrahydrofuran
Toluene	Triethylamine
Xylene	Arsenic
Cadmium	Chromium
Beryllium	Lead
Mercury	Nickel
Selenium	Antimony

The above list is a conservative representation of potential hazardous air pollutants emitted from the facility because it has been based on analyses of Subpart FF waste received, and not upon emission testing results. The remaining sections of this notice will discuss the control of benzene emissions as it is the only hazardous air pollutant regulated by Subpart FF.

4. **Brief Description of the Operation [§61.10(a)(4)]:**

The Westates Carbon-Arizona, Inc. (WCAI) Parker, Arizona facility is an existing carbon reactivation facility. Activated carbon is used in pollution control equipment to remove organic compounds and other materials from liquid and vapor phase process and waste streams. Once the carbon is "spent" (i.e., utilized to its adsorptive capacity), it must either be disposed of or reactivated at a facility such as WCAI's Parker, Arizona facility. Some of the spent carbon processed at the Parker facility is received from facilities subject to Subpart FF.

Spent carbon is reactivated in the facility reactivation treatment unit, which consists of a multiple hearth furnace (RF-1) and an afterburner (AB-1). In this treatment unit, organic contaminants such as benzene are thermally destroyed by high temperatures to achieve a destruction and removal efficiency greater than 99%. Reactivated carbon is produced from the treatment unit such that the reactivated carbon contains less than 10 ppmw benzene.

The facility currently operates as an interim status facility under the Resource Conservation and Recovery Act (RCRA) and is limited to a maximum production capacity of 1200 lb/hr of reactivated carbon. However, the existing reactivation treatment unit has a nominal production capacity of 600 lb/hr of reactivated carbon.

Sources of potential benzene emissions from Subpart FF waste include:

- Carbon adsorbers (WS-1 and WS-2), which control spent carbon storage and furnace feed tank volatile organic compound (VOC) emissions, including benzene.
- Emissions associated with the reactivation treatment unit (RF-1 and AB-1).
- Fugitive emissions from the unloading of spent carbon into hoppers H-1 and H-2.

5. **The Average Weight Per Month of Hazardous Materials Processed [§61.10(a)(5)]:**

The facility commenced operation in August 1992 and processed 90.24 pounds of benzene prior to May 1, 1993. The average weight per month of benzene processed was approximately 10 pounds. This monthly amount of benzene processed has been averaged over the nine month period from August 1992 though April 1993.

6. **Description of Existing Control Equipment [§61.10(a)(6)]:**

<u>WS-1 and WS-2</u>

Carbon adsorbers WS-1 and WS-2 remove VOCs from the spent carbon storage and furnace feed tanks. WS-1 is a carbon canister that contains approximately 1,000 pounds of activated carbon. WS-2 contains 4,500 pounds of activated carbon. These devices are designed to control organic emissions by at least 95%, or benzene by at least 98%.

<u>H-1 and H-2</u>

No specific Subpart FF emissions standards apply to the unloading hoppers (H-1 and H-2). However, in an effort to minimize fugitive dust emissions that potentially contain benzene, WCAI has implemented water spray controls during the unloading operation.

7. **Statement of Compliance [§61.10(a)(7)]:**

The emissions from the WCAI Parker, Arizona facility can meet the emission limitations contained in the National Emission Standards as of the date of this notification.

____

Mr. Monte McCue
Manager

6-6-95
____

Date

Westates Carbon-Arizona, Inc.

2523 Mutahar Street
Post Office Box E
Parker, AZ 85344
Tel. 520-669-5758
Fax. 520-669-5775/5776

VIA CERTIFIED MAIL - RECEIPT # Z 371 117 810

July 17, 1996

FILE COPY

Mr. David Howekamp (or Successor)
Director, Air and Toxics Division (A-1)
United States Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105

Re: Subpart FF Startup Notification - 40 CFR 61.09
Westates Carbon-Arizona, Inc. - Unit RF-2
EPA ID # AZD 982 441 263

Dear Mr. Howekamp:

In accordance with the Westates Carbon-Arizona, Inc. (WCAI) Benzene Neshap Compliance Plan and 40 CFR 61.09, which requires notification within 15 days after actual startup, this letter will serve as the notification that the expanded facility (2760 lb/hr) started operations on July 11, 1996.

Recently, our EH&S manager departed WCAI and as I reviewed the file for the first notice required by 40 CFR 61.09 (notification to EPA no more than 60 days and not less than 30 days prior to startup), I did not find a copy in our file. I would like to confirm with your office that it was in fact sent by the EH&S manager.

As an additional note, a letter was sent on June 10, 1996 to Mr. Michael Feeley, Chief, Permits and Solid Waste Branch that the RF-1 unit had been disabled and the commencement of the RF-2 (2760 lb/hr) unit phase II construction had begun. Approximately 32 days had elapsed between the letter sent to Mr. Feeley and the actual startup.

If you have any questions, please feel free to call the undersigned at (520) 669-5758.

Sincerely,

Monte McCue
Plant Manager

cc: Bill Carlson (WESI-Shasta)
Matt Killeen (WESI-Hampton)
Steve Richmond (WESI-Hampton)
B/N Compliance Plan File

APPENDIX C
ENGINEERING CALCULATIONS SUPPORTING CONTROL DEVICE PERFORMANCE

Appendix C
Engineering Calculations Supporting Control Device Performance

The Siemens Water Technologies, Inc. (SWT) Parker, Arizona facility operates three carbon adsorbers (WS-1, WS-2, and WS-3), which will treat the vapors from the spent carbon storage tanks, recycle water tank and furnace feed tank. WS-1 treats vapors from spent carbon storage tanks T-1, T-2, T-5, T-6 and T-9. WS-2 treats the vapors from hoppers H-1 and H-2. WS-3 treats vapors from furnace feed tank T-18. These control devices have been designed as follows:

DESIGN PARAMETER	WS-1 (T-1,2,5,6,9)	WS-2 (H-1, H-2)	WS-3 (T-18)
Maximum Flow Rate (cfm)	115	2500	5.9
Inlet Benzene Concentration (ppmv)	4,540	4	4,540
Relative Humidity (%)	50%	50%	50%
Temperature	Ambient	Ambient	Ambient
Type of Carbon	Granulated Activated Carbon	Granulated Activated Carbon	Granulated Activated Carbon
Capacity of Carbon Canister (lbs.)	4000	4500	1000
Working Capacity of Activated Carbon	30%	6.5%	30%
Source Operating Schedule	Continuous	Continuous	Continuous
Theoretical Design Control Efficiency (%)	100	100	100
Design Carbon Replacement Period (Days)	7.88	100	38
Theoretical Outlet Benzene Concentration (ppmv)	0	0	0

Calculations and technical data to support the above design parameters are provided below:

Flow Rate

The flow rates to WS-1 and WS-3 are based on the actual observed maximum flow rates. The maximum daily flow rates used in the calculations below more accurately reflect maximum conditions anticipated during the life of each carbon bed. The flow rate to WS-2 is based on the capacity of fan that pushes the vapors to the control device.

Inlet Benzene Concentration

The inlet vent stream composition consists of air, water vapor, and entrained hydrocarbon from the spent carbon received at the facility. In preparing this analysis, it is assumed that the total hydrocarbon concentration of the spent carbon can be as high as 30%, and that the maximum benzene concentration can be as high as 15%.

The inlet benzene concentration for WS-1 is calculated assuming that all of the benzene absorbed by the water in contact with spent carbon is liberated in the spent carbon storage tanks. Using the attached isotherm, a 15% benzene concentration in the waste would correspond to a 30 ppmw (mg/l) concentration of benzene in the water. The inlet benzene concentration is determined for WS-1 as follows:

- Determine the amount of benzene being liberated from the water in the spent carbon storage tanks.

  $\mathbf{B_{WS1}}$ = $(FR)(C)(WF)(28.32\ L/ft^3)(2.2 \times 10^{-6}\ lb/mg)\ (60\ min/hr)$

  where:

  $\mathbf{B_{WS1}}$ = Amount of Benzene Directed to WS-1 (lb/hr)
  FR = Amount of Slurry Being Added to the Tanks or Vapor Directed to WS-1 (cfm)
  C = Concentration of Benzene in the Water (30 mg/L)
  WF = Fraction of Water by Volume in the Slurry(0.50)

  $\mathbf{B_{WS1}}$ = $(115\ cfm)(30\ mg/L)(0.5)(28.32\ L/ft^3)(2.2 \times 10^{-6}\ lb/mg)(60\ min/hr)$

  $\mathbf{B_{WS1}}$ = 6.448 lb/hr

- Determine the concentration of benzene (ppmv) being liberated to WS-1**.**

  $$\mathbf{CONC} = \frac{[(B_{WS1}) / (MW_B)](1{,}000{,}000)]}{[(FR)(60\ min/hr)] / (MVOL)]}$$

  where:

  CONC = The Inlet Benzene Concentration to WS-1 (ppmv)
  $\mathbf{B_{WS1}}$ = Amount of Benzene Directed to WS-1 (lb/hr)

MW_B	= Molecular Weight of Benzene (78.12 lb/lb-mol)
FR	= Vapor Flow Rate to WS-1 (cfm)
MVOL	= Molar Volume of Gas (379 ft^3/lb-mol)

$$\textbf{CONC} = \frac{[(6.448\ \text{lb/hr}) / (78.12\ \text{lb/lb-mol})](1{,}000{,}000)]}{[(115\ \text{cfm})(60\ \text{min/hr})] / (379\ \text{ft}^3/\text{lb-mol})]}$$

CONC = 4,534 ppmv

For calculation purposes, the concentration of benzene is assumed the same at WS-1 and WS-3.

The maximum inlet benzene concentration at WS-2 is assumed to be 4 ppmv. This is based on organic vapor analyzer (OVA) data collected at the site. To be conservative, all hydrocarbon detected is assumed to be benzene.

Working Capacity of the Activated Carbon

The working capacity of the carbon is determined using the attached isotherm. This isotherm indicates that the working capacity of WS-1 and WS-3 is approximately 30% for benzene. For WS-2, the working capacity is approximately 6.5% for benzene.

Design Replacement Period

The design replacement period is calculated using the following equation:

$$\textbf{Y} = \frac{(\text{ACgac} / 100)\ (\text{Wgac})}{[(\text{Ci} - \text{Co}) / 10^6](\text{Qf})(\text{D})(1440\ \text{min/day})]}$$

where:

Y	= Carbon Bed Life (days)
ACgac	= Adsorption Capacity of Carbon for Benzene (wt. %)
Wgac	= Mass of Carbon Bed (lb)
Ci	= Inlet Concentration Benzene (ppmv)
Co	= Outlet Concentration Benzene (0 ppmv)
Qf	= Gas Flow Rate Through Adsorber (cfm)
D	= Density of Benzene (0.2028 lb/ft^3)

- Calculate the design carbon replacement period for **WS-1** using the above equation.

$$\textbf{Y} = \frac{(30 / 100)(4000\ \text{lb})}{((4540 - 0) / 10^6)(115\ \text{cfm})(0.2028\ \text{lb/ft}^3)(1440\ \text{min/day}))}$$

$Y = $ **7.88 days**

- Calculate the design carbon replacement period for **WS-2** using the above equation.

$$Y = \frac{(6.5 / 100)(5000 \text{ lb})}{((80 - 0) / 10^6)(2500 \text{ cfm})(0.2028 \text{ lb/ft}^3)(1440 \text{ min/day}))}$$

$Y = $ **100 days**

- Calculate the design carbon replacement period for **WS-3** using the above equation.

$$Y = \frac{(30 / 100)(1000 \text{ lb})}{((4534 - 0) / 10^6)(5.9 \text{ cfm})(0.2028 \text{ lb/ft}^3)(1440 \text{ min/day}))}$$

$Y = $ **38 days**

CALCULATION OF BENZENE REMOVAL IN THE
12'-10" OD X 5 HEARTH CARBON REACTIVATION FURNACE (RF-2)

EVOQUA WATER TECHNOLOGIES
PARKER, AZ FACILITY

Assumptions:

1) Inlet benzene concentration = 150,000 ppmwd.
2) Outlet benzene concentration <_ 10 ppmwd.

Given:

1) RF-2 capacity = 1200 lbs/hr dry regenerated carbon.

2) RF-2 carbon residence time = 37.8 minutes total at centershaft speed of one revolution per 54 seconds (50% on VFD).

3) Only vapor-phase carbon can contain 15% by weight benzene and is subject to 40CFR61, Subpart FF. Maximum adsorbate loading on vapor-phase carbon is thirty percent by weight (on-half of loading is benzene). Maximum adsorbate loading on liquid-phase carbon is only five percent by weight.

4) RF-2 furnace temperature profile during regeneration of vapor-phase carbon:

	Gas Temperatures, °F
Hearth 1	500
Hearth 2	700
Hearth 3	1000
Hearth 4	1400
Hearth 5	1400

All temperatures shown are minimum values, actual gas phase temperatures during reactivation of vapor-phase carbons with 30 wt.% adsorbate loading will typically be 100°F to 500°F higher.

5) RF-2 is a 12'10" OD X 5 hearth furnace with a total of 356 ft^2 hearth area:

Hearth 1	= 60.0 ft^2
Hearth 2	= 77.0 ft^2
Hearth 3	= 60.0 ft^2
Hearth 4	= 77.0 ft^2
Hearth 5	= 81.5 ft^2
Total	= 355.5 ft^2

6) The overall heat transfer coefficient, U, with the units of BTU/hr-ft^2-°F can be approximated by Tgas/100 in a multiple hearth furnace.

Calculate the location in RF-2 when carbon reaches the critical temperature for benzene (553°F):

Inlet benzene mass rate = 1200 lbs/hr X 150,000 ppmwd / 1,000,000
= 180 lbs/hr benzene

Outlet benzene mass rate <_ 1200 lbs/hr X 10 ppmwd / 1,000,000
<_ 0.012 lbs/hr benzene

Minimum benzene removal = 180 - 0.012 = 179.988 lbs/hr benzene
= (180 - 0.012)/180 X 100 = 99.993%

Calculate feed carbon composition:

Feed is 40% by weight water
Dry feed = 1,200 lbs/hr carbon + 180 lbs/hr benzene + 180 lbs/hr "other" adsorbate"
= 1,560 lbs/hr
Wet feed = 1,560/.60 = 2,600 lbs/hr
Water in feed = 2,600 - 1,560 = 1,040 lbs/hr

Hearth 1: hearth area = 60 ft^2, gas temp. = 500°F

Heat transfer to bed required to heat carbon, benzene and water to 134°F

$$Qbed = U \cdot A \cdot \Delta T$$

$$= 500/100 \cdot 60 \cdot \frac{[(500-60) - (500-134)]}{\quad}$$

$$\ln [(500-60)/(500-134)]$$

$$= 5 \cdot 60 \cdot [(440 - 366) / \ln (440/366)]$$

$$= 5 \text{ BTU/hr-ft}^2\text{-°F} \cdot 60 \text{ ft}^2 \cdot 401.9\text{°F}$$

$$= 120{,}560 \text{ BTU/hr}$$

Heat carbon, benzene, "other" adsorbate and water to 134°F:

$$Qc = W \cdot Cp \cdot \Delta T$$
$$= 1200 \text{ lbs/hr} \cdot 0.33 \text{ BTU/lb-°F} \cdot (134-60)\text{°F}$$
$$= 29{,}304 \text{ BTU/hr for carbon}$$

$$Qb = W \cdot Cp \cdot \Delta T$$
$$= 180 \text{ lbs/hr} \cdot 0.50 \text{ BTU/lb-°F} \cdot (134-60)\text{°F}$$
$$= 6{,}660 \text{ BTU/hr for benzene}$$

$$Qo = W \cdot Cp \cdot \Delta T$$
$$= 180 \text{ lbs/hr} \cdot 0.50 \text{ BTU/lb-°F} \cdot (134-60)\text{°F}$$
$$= 6{,}660 \text{ BTU/hr for "other" adsorbate}$$

$$Qw = W \cdot Cp \cdot \Delta T$$
$$= 1{,}040 \text{ lbs/hr} \cdot 1 \text{ BTU/lb-°F} \cdot (134-60)\text{°F}$$
$$= 76{,}960 \text{ BTU/hr for water}$$

$$Qt = Qc + Qb + Qo + Qw = 29{,}304 + 6{,}660 + 6{,}660 + 76{,}960 = 119{,}584 \text{ BTU/hr}$$

Hearth 2: hearth area = 77 ft², gas temp. = 700°F

Heat transfer to bed:

$$Qbed = U \cdot A \cdot \Delta T$$

$$= 700/100 \cdot 77 \cdot \frac{[(800-134) - (800-212)]}{\ln [(800-134)/(800-212)]}$$

$$= 7 \cdot 77 \cdot [(566 - 488) / \ln (566/488)]$$

$$= 7 \text{ BTU/hr-ft}^2\text{-°F} \cdot 77 \text{ ft}^2 \cdot 526.0\text{°F}$$

$$= 283{,}534 \text{ BTU/hr}$$

Heat carbon, benzene, "other" adsorbate and water from 134°F to 212°F:

$Qc = W \cdot Cp \cdot \Delta T$
$= 1200 \text{ lbs/hr} \cdot 0.33 \text{ BTU/lb-°F} \cdot (212 - 134)\text{°F}$
$= 30{,}888$ BTU/hr for carbon

$Qb = W \cdot Cp \cdot \Delta T$
$= 180 \text{ lbs/hr} \cdot 0.50 \text{ BTU/lb-°F} \cdot (212 - 134)\text{°F}$
$= 7{,}020$ BTU/hr for benzene

$Qo = W \cdot Cp \cdot \Delta T$
$= 180 \text{ lbs/hr} \cdot 0.50 \text{ BTU/lb-°F} \cdot (212-134)\text{°F}$
$= 7{,}020$ BTU/hr for "other" adsorbate

$Qw = W \cdot Cp \cdot \Delta T$
$= 1{,}040 \text{ lbs/hr} \cdot 1 \text{ BTU/lb-°F} \cdot (212 - 134)\text{°F}$
$= 81{,}120$ BTU/hr for water

$Qt = Qc + Qb + Qo + Qw = 30{,}888 + 7{,}020 + 7{,}020 + 81{,}120 = 126{,}048$ BTU/hr

Remaining energy to evaporate water:

$Qe = Qbed - Qt = 283{,}534 - 126{,}048 = 157{,}486$ BTU/hr

@ 212°F one pound of water requires 970 BTU/lb for evaporation

157,486 BTU/hr / 970 BTU/lb = 162.4 lbs/hr water evaporated from hearth 2

water remaining = 920 - 162.4 = 877.6 lbs/hr water

Hearth 3: hearth area = 60 ft², gas temp. = 1000°F

Heat transfer to bed:

$Qbed = U \cdot A \cdot \Delta T$

$= 1000/100 \cdot 60 \cdot (1000 - 212)$

$= 10 \text{ BTU/hr-ft}^2\text{-°F} \cdot 60 \text{ ft}^2 \cdot 788\text{°F}$

$= 472{,}800$ BTU/hr

Evaporate water:

472,800 BTU/hr / 970 BTU/lb = 487.4 lbs/hr water evaporated from hearth 3

water remaining = 877.6 - 487.4 = 390.2 lbs/hr water

Hearth 4: hearth area = 77 ft^2, gas temp. = 1400°F

Evaporate remaining water:

390.2 lbs/hr water · 970 BTU/lb = 378,514 BTU/hr

Hearth area required to evaporate remaining water:

$A = Q / (U \cdot \Delta T)$

$= 378{,}514$ BTU/hr / [14 BTU/hr-ft^2-°F · (1400 - 212)°F

$= 22.8\ ft^2$

Hearth area remaining = 77 - 22.8 = 54.2 ft^2

Heat required to raise temperature of carbon, benzene, and "other" adsorbate from 212°F to 553°F:

$Qc = W \cdot Cp \cdot \Delta T$
= 1200 lbs/hr · 0.33 BTU/lb-°F · (553 - 212)°F
= 135,036 BTU/hr for carbon

$Qb = W \cdot Cp \cdot \Delta T$
= 180 lbs/hr · 0.33 BTU/lb-°F · (553 - 212)°F
= 30,060 BTU/hr for benzene

$Qb = W \cdot Cp \cdot \Delta T$
= 180 lbs/hr · 0.33 BTU/lb-°F · (553 - 212)°F
= 30,060 BTU/hr for "other" adsorbate

Qt = Qc + Qb = 135,036 + 30,060 + 30,060 = 196,416 BTU/hr

Hearth area required to temperature of carbon and benzene to 553°F:

$A = Q / (U \cdot \Delta T)$

$$= 196{,}416 / \left(14 \cdot \frac{[(1400-212) - (1400-553)]}{\ln [(1400-212)/(1400-553)]}\right)$$

$$= 196{,}416 / (14 \cdot [(118 - 847) / \ln (1108/847)])$$

$$= 196{,}416 \text{ BTU/hr} / (14 \text{ BTU/hr-ft}^2\text{-°F} \cdot 1007.9\text{°F})$$

$$= 13.9 \text{ ft}^2$$

Hearth area remaining = 54.2 - 13.9 ft² = 40.3 ft²

Percentage of hearth 4 area remaining = 40.3 / 77 · 100 = 52 %

After 4½ minutes on hearth 4 of RF-2, temperature of the carbon, benzene and "other" adsorbate is above 553°F (the critical temperature for benzene). By definition, benzene cannot be liquefied (adsorbed) by pressure alone above this temperature and exerts a vapor pressure in excess of 60 atmospheres. The carbon remains above the critical temperature for an additional 12½ minutes until discharged from the furnace.

Due to the extreme volatility of benzene at elevated temperatures and the length of time at which the carbon is subjected to temperatures above the critical temperature for benzene, all benzene is removed (vaporized) from the carbon prior to discharge from RF-2. Since gas flow is counter-current to solids flow in a multiple hearth furnace and the lower half of the furnace is maintained above the critical temperature of benzene, there is no possibility of desorbed benzene being re-adsorbed onto the reactivated product.

Siemens Water Technologies Corp.
Parker, AZ

RF-2 Solids Residence Time Calculation

Reference: Hankin Environmental Systems, Inc. Drawing No. F-014 Rabble Teeth Assembly

Given: Centershaft speed = 54 seconds per revolution (50% on VFD)

Hearth No.	Type	Centershaft Revolutions Required To Move Carbon Across Hearth
1	out	6
2	in	9
3	out	10
4	in	9
5	out	8
Total Revolutions =		42

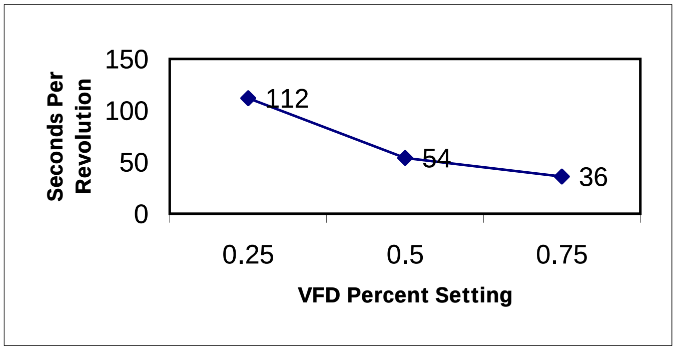
Solids Residence Time = 42 revolutions X 54 seconds per revolution / 60 seconds per minute

= 37.8 minutes

Siemens Water Technologies Corp.
Parker, AZ

RF-2 Centershaft Rotational Speed Versus VFD Setting

VFD Setting	Seconds per Revolution	RPM
25%	112	0.54
50%	54	1.11
75%	36	1.67



Siemens Water Technologies Corp.
Parker, Arizona
Performance Demonstration Test One-Minute Average Monitoring Data

Run 1
March 28, 2006
12:10 - 16:44

Date	Time	Furnace Shaft VFD Setpoint (%)
28-Mar-06	12:10	50
28-Mar-06	12:11	50
28-Mar-06	12:12	50
28-Mar-06	12:13	50
28-Mar-06	12:14	50
28-Mar-06	12:15	50
28-Mar-06	12:16	50
28-Mar-06	12:17	50
28-Mar-06	12:18	50
28-Mar-06	12:19	50
28-Mar-06	12:20	50
28-Mar-06	12:21	50
28-Mar-06	12:22	50
28-Mar-06	12:23	50
28-Mar-06	12:24	50
28-Mar-06	12:25	50
28-Mar-06	12:26	50
28-Mar-06	12:27	50
28-Mar-06	12:28	50
28-Mar-06	12:29	50
28-Mar-06	12:30	50
28-Mar-06	12:31	50
28-Mar-06	12:32	50
28-Mar-06	12:33	50
28-Mar-06	12:34	50
28-Mar-06	12:35	50
28-Mar-06	12:36	50
28-Mar-06	12:37	50
28-Mar-06	12:38	50
28-Mar-06	12:39	50
28-Mar-06	12:40	50
28-Mar-06	12:41	50

Run 2
March 29, 2006
11:15 - 17:00

Date	Time	Furnace Shaft VFD Setpoint (%)
29-Mar-06	11:15	50
29-Mar-06	11:16	50
29-Mar-06	11:17	50
29-Mar-06	11:18	50
29-Mar-06	11:19	50
29-Mar-06	11:20	50
29-Mar-06	11:21	50
29-Mar-06	11:22	50
29-Mar-06	11:23	50
29-Mar-06	11:24	50
29-Mar-06	11:25	50
29-Mar-06	11:26	50
29-Mar-06	11:27	50
29-Mar-06	11:28	50
29-Mar-06	11:29	50
29-Mar-06	11:30	50
29-Mar-06	11:31	50
29-Mar-06	11:32	50
29-Mar-06	11:33	50
29-Mar-06	11:34	50
29-Mar-06	11:35	50
29-Mar-06	11:36	50
29-Mar-06	11:37	50
29-Mar-06	11:38	50
29-Mar-06	11:39	50
29-Mar-06	11:40	50
29-Mar-06	11:41	50
29-Mar-06	11:42	50
29-Mar-06	11:43	50
29-Mar-06	11:44	50
29-Mar-06	11:45	50
29-Mar-06	11:46	50

Run 3
March 30, 2006
11:50 - 12:39, 15:30 - 19:16

Date	Time	Furnace Shaft VFD Setpoint (%)
30-Mar-06	11:50	50
30-Mar-06	11:51	50
30-Mar-06	11:52	50
30-Mar-06	11:53	50
30-Mar-06	11:54	50
30-Mar-06	11:55	50
30-Mar-06	11:56	50
30-Mar-06	11:57	50
30-Mar-06	11:58	50
30-Mar-06	11:59	50
30-Mar-06	12:00	50
30-Mar-06	12:01	50
30-Mar-06	12:02	50
30-Mar-06	12:03	50
30-Mar-06	12:04	50
30-Mar-06	12:05	50
30-Mar-06	12:06	50
30-Mar-06	12:07	50
30-Mar-06	12:08	50
30-Mar-06	12:09	50
30-Mar-06	12:10	50
30-Mar-06	12:11	50
30-Mar-06	12:12	50
30-Mar-06	12:13	50
30-Mar-06	12:14	50
30-Mar-06	12:15	50
30-Mar-06	12:16	50
30-Mar-06	12:17	50
30-Mar-06	12:18	50
30-Mar-06	12:19	50
30-Mar-06	12:20	50
30-Mar-06	12:21	50

Run 1
March 28, 2006
12:10 - 16:44

Date	Time	Furnace Shaft VFD Setpoint (%)
28-Mar-06	12:42	50
28-Mar-06	12:43	50
28-Mar-06	12:44	50
28-Mar-06	12:45	50
28-Mar-06	12:46	50
28-Mar-06	12:47	50
28-Mar-06	12:48	50
28-Mar-06	12:49	50
28-Mar-06	12:50	50
28-Mar-06	12:51	50
28-Mar-06	12:52	50
28-Mar-06	12:53	50
28-Mar-06	12:54	50
28-Mar-06	12:55	50
28-Mar-06	12:56	50
28-Mar-06	12:57	50
28-Mar-06	12:58	50
28-Mar-06	12:59	50
28-Mar-06	13:00	50
28-Mar-06	13:01	50
28-Mar-06	13:02	50
28-Mar-06	13:03	50
28-Mar-06	13:04	50
28-Mar-06	13:05	50
28-Mar-06	13:06	50
28-Mar-06	13:07	50
28-Mar-06	13:08	50
28-Mar-06	13:09	50
28-Mar-06	13:10	50
28-Mar-06	13:11	50
28-Mar-06	13:12	50
28-Mar-06	13:13	50
28-Mar-06	13:14	50
28-Mar-06	13:15	50
28-Mar-06	13:16	50
28-Mar-06	13:17	50

Run 2
March 29, 2006
11:15 - 17:00

Date	Time	Furnace Shaft VFD Setpoint (%)
29-Mar-06	11:47	50
29-Mar-06	11:48	50
29-Mar-06	11:49	50
29-Mar-06	11:50	50
29-Mar-06	11:51	50
29-Mar-06	11:52	50
29-Mar-06	11:53	50
29-Mar-06	11:54	50
29-Mar-06	11:55	50
29-Mar-06	11:56	50
29-Mar-06	11:57	50
29-Mar-06	11:58	50
29-Mar-06	11:59	50
29-Mar-06	12:00	50
29-Mar-06	12:01	50
29-Mar-06	12:02	50
29-Mar-06	12:03	50
29-Mar-06	12:04	50
29-Mar-06	12:05	50
29-Mar-06	12:06	50
29-Mar-06	12:07	50
29-Mar-06	12:08	50
29-Mar-06	12:09	50
29-Mar-06	12:10	50
29-Mar-06	12:11	50
29-Mar-06	12:12	50
29-Mar-06	12:13	50
29-Mar-06	12:14	50
29-Mar-06	12:15	50
29-Mar-06	12:16	50
29-Mar-06	12:17	50
29-Mar-06	12:18	50
29-Mar-06	12:19	50
29-Mar-06	12:20	50
29-Mar-06	12:21	50
29-Mar-06	12:22	50

Run 3
March 30, 2006
11:50 - 12:39, 15:30 - 19:16

Date	Time	Furnace Shaft VFD Setpoint (%)
30-Mar-06	12:22	50
30-Mar-06	12:23	50
30-Mar-06	12:24	50
30-Mar-06	12:25	50
30-Mar-06	12:26	50
30-Mar-06	12:27	50
30-Mar-06	12:28	50
30-Mar-06	12:29	50
30-Mar-06	12:30	50
30-Mar-06	12:31	50
30-Mar-06	12:32	50
30-Mar-06	12:33	50
30-Mar-06	12:34	50
30-Mar-06	12:35	50
30-Mar-06	12:36	50
30-Mar-06	12:37	50
30-Mar-06	12:38	50
30-Mar-06	15:30	50
30-Mar-06	15:31	50
30-Mar-06	15:32	50
30-Mar-06	15:33	50
30-Mar-06	15:34	50
30-Mar-06	15:35	50
30-Mar-06	15:36	50
30-Mar-06	15:37	50
30-Mar-06	15:38	50
30-Mar-06	15:39	50
30-Mar-06	15:40	50
30-Mar-06	15:41	50
30-Mar-06	15:42	50
30-Mar-06	15:43	50
30-Mar-06	15:44	50
30-Mar-06	15:45	50
30-Mar-06	15:46	50
30-Mar-06	15:47	50
30-Mar-06	15:48	50

Run 1
March 28, 2006
12:10 - 16:44

Date	Time	Furnace Shaft VFD Setpoint (%)
28-Mar-06	13:18	50
28-Mar-06	13:19	50
28-Mar-06	13:20	50
28-Mar-06	13:21	50
28-Mar-06	13:22	50
28-Mar-06	13:23	50
28-Mar-06	13:24	50
28-Mar-06	13:25	50
28-Mar-06	13:26	50
28-Mar-06	13:27	50
28-Mar-06	13:28	50
28-Mar-06	13:29	50
28-Mar-06	13:30	50
28-Mar-06	13:31	50
28-Mar-06	13:32	50
28-Mar-06	13:33	50
28-Mar-06	13:34	50
28-Mar-06	13:35	50
28-Mar-06	13:36	50
28-Mar-06	13:37	50
28-Mar-06	13:38	50
28-Mar-06	13:39	50
28-Mar-06	13:40	50
28-Mar-06	13:41	50
28-Mar-06	13:42	50
28-Mar-06	13:43	50
28-Mar-06	13:44	50
28-Mar-06	13:45	50
28-Mar-06	13:46	50
28-Mar-06	13:47	50
28-Mar-06	13:48	50
28-Mar-06	13:49	50
28-Mar-06	13:50	50
28-Mar-06	13:51	50
28-Mar-06	13:52	50
28-Mar-06	13:53	50

Run 2
March 29, 2006
11:15 - 17:00

Date	Time	Furnace Shaft VFD Setpoint (%)
29-Mar-06	12:23	50
29-Mar-06	12:24	50
29-Mar-06	12:25	50
29-Mar-06	12:26	50
29-Mar-06	12:27	50
29-Mar-06	12:28	50
29-Mar-06	12:29	50
29-Mar-06	12:30	50
29-Mar-06	12:31	50
29-Mar-06	12:32	50
29-Mar-06	12:33	50
29-Mar-06	12:34	50
29-Mar-06	12:35	50
29-Mar-06	12:36	50
29-Mar-06	12:37	50
29-Mar-06	12:38	50
29-Mar-06	12:39	50
29-Mar-06	12:40	50
29-Mar-06	12:41	50
29-Mar-06	12:42	50
29-Mar-06	12:43	50
29-Mar-06	12:44	50
29-Mar-06	12:45	50
29-Mar-06	12:46	50
29-Mar-06	12:47	50
29-Mar-06	12:48	50
29-Mar-06	12:49	50
29-Mar-06	12:50	50
29-Mar-06	12:51	50
29-Mar-06	12:52	50
29-Mar-06	12:53	50
29-Mar-06	12:54	50
29-Mar-06	12:55	50
29-Mar-06	12:56	50
29-Mar-06	12:57	50
29-Mar-06	12:58	50

Run 3
March 30, 2006
11:50 - 12:39, 15:30 - 19:16

Date	Time	Furnace Shaft VFD Setpoint (%)
30-Mar-06	15:49	50
30-Mar-06	15:50	50
30-Mar-06	15:51	50
30-Mar-06	15:52	50
30-Mar-06	15:53	50
30-Mar-06	15:54	50
30-Mar-06	15:55	50
30-Mar-06	15:56	50
30-Mar-06	15:57	50
30-Mar-06	15:58	50
30-Mar-06	15:59	50
30-Mar-06	16:00	50
30-Mar-06	16:01	50
30-Mar-06	16:02	50
30-Mar-06	16:03	50
30-Mar-06	16:04	50
30-Mar-06	16:05	50
30-Mar-06	16:06	50
30-Mar-06	16:07	50
30-Mar-06	16:08	50
30-Mar-06	16:09	50
30-Mar-06	16:10	50
30-Mar-06	16:11	50
30-Mar-06	16:12	50
30-Mar-06	16:13	50
30-Mar-06	16:14	50
30-Mar-06	16:15	50
30-Mar-06	16:16	50
30-Mar-06	16:17	50
30-Mar-06	16:18	50
30-Mar-06	16:19	50
30-Mar-06	16:20	50
30-Mar-06	16:21	50
30-Mar-06	16:22	50
30-Mar-06	16:23	50
30-Mar-06	16:24	50

Run 1
March 28, 2006
12:10 - 16:44

Date	Time	Furnace Shaft VFD Setpoint (%)
28-Mar-06	13:54	50
28-Mar-06	13:55	50
28-Mar-06	13:56	50
28-Mar-06	13:57	50
28-Mar-06	13:58	50
28-Mar-06	13:59	50
28-Mar-06	14:00	50
28-Mar-06	14:01	50
28-Mar-06	14:02	50
28-Mar-06	14:03	50
28-Mar-06	14:04	50
28-Mar-06	14:05	50
28-Mar-06	14:06	50
28-Mar-06	14:07	50
28-Mar-06	14:08	50
28-Mar-06	14:09	50
28-Mar-06	14:10	50
28-Mar-06	14:11	50
28-Mar-06	14:12	50
28-Mar-06	14:13	50
28-Mar-06	14:14	50
28-Mar-06	14:15	50
28-Mar-06	14:16	50
28-Mar-06	14:17	50
28-Mar-06	14:18	50
28-Mar-06	14:19	50
28-Mar-06	14:20	50
28-Mar-06	14:21	50
28-Mar-06	14:22	50
28-Mar-06	14:23	50
28-Mar-06	14:24	50
28-Mar-06	14:25	50
28-Mar-06	14:26	50
28-Mar-06	14:27	50
28-Mar-06	14:28	50
28-Mar-06	14:29	50

Run 2
March 29, 2006
11:15 - 17:00

Date	Time	Furnace Shaft VFD Setpoint (%)
29-Mar-06	12:59	50
29-Mar-06	13:00	50
29-Mar-06	13:01	50
29-Mar-06	13:02	50
29-Mar-06	13:03	50
29-Mar-06	13:04	50
29-Mar-06	13:05	50
29-Mar-06	13:06	50
29-Mar-06	13:07	50
29-Mar-06	13:08	50
29-Mar-06	13:09	50
29-Mar-06	13:10	50
29-Mar-06	13:11	50
29-Mar-06	13:12	50
29-Mar-06	13:13	50
29-Mar-06	13:14	50
29-Mar-06	13:15	50
29-Mar-06	13:16	50
29-Mar-06	13:17	50
29-Mar-06	13:18	50
29-Mar-06	13:19	50
29-Mar-06	13:20	50
29-Mar-06	13:21	50
29-Mar-06	13:22	50
29-Mar-06	13:23	50
29-Mar-06	13:24	50
29-Mar-06	13:25	50
29-Mar-06	13:26	50
29-Mar-06	13:27	50
29-Mar-06	13:28	50
29-Mar-06	13:29	50
29-Mar-06	13:30	50
29-Mar-06	13:31	50
29-Mar-06	13:32	50
29-Mar-06	13:33	50
29-Mar-06	13:34	50

Run 3
March 30, 2006
11:50 - 12:39, 15:30 - 19:16

Date	Time	Furnace Shaft VFD Setpoint (%)
30-Mar-06	16:25	50
30-Mar-06	16:26	50
30-Mar-06	16:27	50
30-Mar-06	16:28	50
30-Mar-06	16:29	50
30-Mar-06	16:30	50
30-Mar-06	16:31	50
30-Mar-06	16:32	50
30-Mar-06	16:33	50
30-Mar-06	16:34	50
30-Mar-06	16:35	50
30-Mar-06	16:36	50
30-Mar-06	16:37	50
30-Mar-06	16:38	50
30-Mar-06	16:39	50
30-Mar-06	16:40	50
30-Mar-06	16:41	50
30-Mar-06	16:42	50
30-Mar-06	16:43	50
30-Mar-06	16:44	50
30-Mar-06	16:45	50
30-Mar-06	16:46	50
30-Mar-06	16:47	50
30-Mar-06	16:48	50
30-Mar-06	16:49	50
30-Mar-06	16:50	50
30-Mar-06	16:51	50
30-Mar-06	16:52	50
30-Mar-06	16:53	50
30-Mar-06	16:54	50
30-Mar-06	16:55	50
30-Mar-06	16:56	50
30-Mar-06	16:57	50
30-Mar-06	16:58	50
30-Mar-06	16:59	50
30-Mar-06	17:00	50

Run 1
March 28, 2006
12:10 - 16:44

Date	Time	Furnace Shaft VFD Setpoint (%)
28-Mar-06	14:30	50
28-Mar-06	14:31	50
28-Mar-06	14:32	50
28-Mar-06	14:33	50
28-Mar-06	14:34	50
28-Mar-06	14:35	50
28-Mar-06	14:36	50
28-Mar-06	14:37	50
28-Mar-06	14:38	50
28-Mar-06	14:39	50
28-Mar-06	14:40	50
28-Mar-06	14:41	50
28-Mar-06	14:42	50
28-Mar-06	14:43	50
28-Mar-06	14:44	50
28-Mar-06	14:45	50
28-Mar-06	14:46	50
28-Mar-06	14:47	50
28-Mar-06	14:48	50
28-Mar-06	14:49	50
28-Mar-06	14:50	50
28-Mar-06	14:51	50
28-Mar-06	14:52	50
28-Mar-06	14:53	50
28-Mar-06	14:54	50
28-Mar-06	14:55	50
28-Mar-06	14:56	50
28-Mar-06	14:57	50
28-Mar-06	14:58	50
28-Mar-06	14:59	50
28-Mar-06	15:00	50
28-Mar-06	15:01	50
28-Mar-06	15:02	50
28-Mar-06	15:03	50
28-Mar-06	15:04	50
28-Mar-06	15:05	50

Run 2
March 29, 2006
11:15 - 17:00

Date	Time	Furnace Shaft VFD Setpoint (%)
29-Mar-06	13:35	50
29-Mar-06	13:36	50
29-Mar-06	13:37	50
29-Mar-06	13:38	50
29-Mar-06	13:39	50
29-Mar-06	13:40	50
29-Mar-06	13:41	50
29-Mar-06	13:42	50
29-Mar-06	13:43	50
29-Mar-06	13:44	50
29-Mar-06	13:45	50
29-Mar-06	13:46	50
29-Mar-06	13:47	50
29-Mar-06	13:48	50
29-Mar-06	13:49	50
29-Mar-06	13:50	50
29-Mar-06	13:51	50
29-Mar-06	13:52	50
29-Mar-06	13:53	50
29-Mar-06	13:54	50
29-Mar-06	13:55	50
29-Mar-06	13:56	50
29-Mar-06	13:57	50
29-Mar-06	13:58	50
29-Mar-06	13:59	50
29-Mar-06	14:00	50
29-Mar-06	14:01	50
29-Mar-06	14:02	50
29-Mar-06	14:03	50
29-Mar-06	14:04	50
29-Mar-06	14:05	50
29-Mar-06	14:06	50
29-Mar-06	14:07	50
29-Mar-06	14:08	50
29-Mar-06	14:09	50
29-Mar-06	14:10	50

Run 3
March 30, 2006
11:50 - 12:39, 15:30 - 19:16

Date	Time	Furnace Shaft VFD Setpoint (%)
30-Mar-06	17:01	50
30-Mar-06	17:02	50
30-Mar-06	17:03	50
30-Mar-06	17:04	50
30-Mar-06	17:05	50
30-Mar-06	17:06	50
30-Mar-06	17:07	50
30-Mar-06	17:08	50
30-Mar-06	17:09	50
30-Mar-06	17:10	50
30-Mar-06	17:11	50
30-Mar-06	17:12	50
30-Mar-06	17:13	50
30-Mar-06	17:14	50
30-Mar-06	17:15	50
30-Mar-06	17:16	50
30-Mar-06	17:17	50
30-Mar-06	17:18	50
30-Mar-06	17:19	50
30-Mar-06	17:20	50
30-Mar-06	17:21	50
30-Mar-06	17:22	50
30-Mar-06	17:23	50
30-Mar-06	17:24	50
30-Mar-06	17:25	50
30-Mar-06	17:26	50
30-Mar-06	17:27	50
30-Mar-06	17:28	50
30-Mar-06	17:29	50
30-Mar-06	17:30	50
30-Mar-06	17:31	50
30-Mar-06	17:32	50
30-Mar-06	17:33	50
30-Mar-06	17:34	50
30-Mar-06	17:35	50
30-Mar-06	17:36	50

Run 1
March 28, 2006
12:10 - 16:44

Date	Time	Furnace Shaft VFD Setpoint (%)
28-Mar-06	15:06	50
28-Mar-06	15:07	50
28-Mar-06	15:08	50
28-Mar-06	15:09	50
28-Mar-06	15:10	50
28-Mar-06	15:11	50
28-Mar-06	15:12	50
28-Mar-06	15:13	50
28-Mar-06	15:14	50
28-Mar-06	15:15	50
28-Mar-06	15:16	50
28-Mar-06	15:17	50
28-Mar-06	15:18	50
28-Mar-06	15:19	50
28-Mar-06	15:20	50
28-Mar-06	15:21	50
28-Mar-06	15:22	50
28-Mar-06	15:23	50
28-Mar-06	15:24	50
28-Mar-06	15:25	50
28-Mar-06	15:26	50
28-Mar-06	15:27	50
28-Mar-06	15:28	50
28-Mar-06	15:29	50
28-Mar-06	15:30	50
28-Mar-06	15:31	50
28-Mar-06	15:32	50
28-Mar-06	15:33	50
28-Mar-06	15:34	50
28-Mar-06	15:35	50
28-Mar-06	15:36	50
28-Mar-06	15:37	50
28-Mar-06	15:38	50
28-Mar-06	15:39	50
28-Mar-06	15:40	50
28-Mar-06	15:41	50

Run 2
March 29, 2006
11:15 - 17:00

Date	Time	Furnace Shaft VFD Setpoint (%)
29-Mar-06	14:11	50
29-Mar-06	14:12	50
29-Mar-06	14:13	50
29-Mar-06	14:14	50
29-Mar-06	14:15	50
29-Mar-06	14:16	50
29-Mar-06	14:17	50
29-Mar-06	14:18	50
29-Mar-06	14:19	50
29-Mar-06	14:20	50
29-Mar-06	14:21	50
29-Mar-06	14:22	50
29-Mar-06	14:23	50
29-Mar-06	14:24	50
29-Mar-06	14:25	50
29-Mar-06	14:26	50
29-Mar-06	14:27	50
29-Mar-06	14:28	50
29-Mar-06	14:29	50
29-Mar-06	14:30	50
29-Mar-06	14:31	50
29-Mar-06	14:32	50
29-Mar-06	14:33	50
29-Mar-06	14:34	50
29-Mar-06	14:35	50
29-Mar-06	14:36	50
29-Mar-06	14:37	50
29-Mar-06	14:38	50
29-Mar-06	14:39	50
29-Mar-06	14:40	50
29-Mar-06	14:41	50
29-Mar-06	14:42	50
29-Mar-06	14:43	50
29-Mar-06	14:44	50
29-Mar-06	14:45	50
29-Mar-06	14:46	50

Run 3
March 30, 2006
11:50 - 12:39, 15:30 - 19:16

Date	Time	Furnace Shaft VFD Setpoint (%)
30-Mar-06	17:37	50
30-Mar-06	17:38	50
30-Mar-06	17:39	50
30-Mar-06	17:40	50
30-Mar-06	17:41	50
30-Mar-06	17:42	50
30-Mar-06	17:43	50
30-Mar-06	17:44	50
30-Mar-06	17:45	50
30-Mar-06	17:46	50
30-Mar-06	17:47	50
30-Mar-06	17:48	50
30-Mar-06	17:49	50
30-Mar-06	17:50	50
30-Mar-06	17:51	50
30-Mar-06	17:52	50
30-Mar-06	17:53	50
30-Mar-06	17:54	50
30-Mar-06	17:55	50
30-Mar-06	17:56	50
30-Mar-06	17:57	50
30-Mar-06	17:58	50
30-Mar-06	17:59	50
30-Mar-06	18:00	50
30-Mar-06	18:01	50
30-Mar-06	18:02	50
30-Mar-06	18:03	50
30-Mar-06	18:04	50
30-Mar-06	18:05	50
30-Mar-06	18:06	50
30-Mar-06	18:07	50
30-Mar-06	18:08	50
30-Mar-06	18:09	50
30-Mar-06	18:10	50
30-Mar-06	18:11	50
30-Mar-06	18:12	50

Run 1
March 28, 2006
12:10 - 16:44

Date	Time	Furnace Shaft VFD Setpoint (%)
28-Mar-06	15:42	50
28-Mar-06	15:43	50
28-Mar-06	15:44	50
28-Mar-06	15:45	50
28-Mar-06	15:46	50
28-Mar-06	15:47	50
28-Mar-06	15:48	50
28-Mar-06	15:49	50
28-Mar-06	15:50	50
28-Mar-06	15:51	50
28-Mar-06	15:52	50
28-Mar-06	15:53	50
28-Mar-06	15:54	50
28-Mar-06	15:55	50
28-Mar-06	15:56	50
28-Mar-06	15:57	50
28-Mar-06	15:58	50
28-Mar-06	15:59	50
28-Mar-06	16:00	50
28-Mar-06	16:01	50
28-Mar-06	16:02	50
28-Mar-06	16:03	50
28-Mar-06	16:04	50
28-Mar-06	16:05	50
28-Mar-06	16:06	50
28-Mar-06	16:07	50
28-Mar-06	16:08	50
28-Mar-06	16:09	50
28-Mar-06	16:10	50
28-Mar-06	16:11	50
28-Mar-06	16:12	50
28-Mar-06	16:13	50
28-Mar-06	16:14	50
28-Mar-06	16:15	50
28-Mar-06	16:16	50
28-Mar-06	16:17	50

Run 2
March 29, 2006
11:15 - 17:00

Date	Time	Furnace Shaft VFD Setpoint (%)
29-Mar-06	14:47	50
29-Mar-06	14:48	50
29-Mar-06	14:49	50
29-Mar-06	14:50	50
29-Mar-06	14:51	50
29-Mar-06	14:52	50
29-Mar-06	14:53	50
29-Mar-06	14:54	50
29-Mar-06	14:55	50
29-Mar-06	14:56	50
29-Mar-06	14:57	50
29-Mar-06	14:58	50
29-Mar-06	14:59	50
29-Mar-06	15:00	50
29-Mar-06	15:01	50
29-Mar-06	15:02	50
29-Mar-06	15:03	50
29-Mar-06	15:04	50
29-Mar-06	15:05	50
29-Mar-06	15:06	50
29-Mar-06	15:07	50
29-Mar-06	15:08	50
29-Mar-06	15:09	50
29-Mar-06	15:10	50
29-Mar-06	15:11	50
29-Mar-06	15:12	50
29-Mar-06	15:13	50
29-Mar-06	15:14	50
29-Mar-06	15:15	50
29-Mar-06	15:16	50
29-Mar-06	15:17	50
29-Mar-06	15:18	50
29-Mar-06	15:19	50
29-Mar-06	15:20	50
29-Mar-06	15:21	50
29-Mar-06	15:22	50

Run 3
March 30, 2006
11:50 - 12:39, 15:30 - 19:16

Date	Time	Furnace Shaft VFD Setpoint (%)
30-Mar-06	18:13	50
30-Mar-06	18:14	50
30-Mar-06	18:15	50
30-Mar-06	18:16	50
30-Mar-06	18:17	50
30-Mar-06	18:18	50
30-Mar-06	18:19	50
30-Mar-06	18:20	50
30-Mar-06	18:21	50
30-Mar-06	18:22	50
30-Mar-06	18:23	50
30-Mar-06	18:24	50
30-Mar-06	18:25	50
30-Mar-06	18:26	50
30-Mar-06	18:27	50
30-Mar-06	18:28	50
30-Mar-06	18:29	50
30-Mar-06	18:30	50
30-Mar-06	18:31	50
30-Mar-06	18:32	50
30-Mar-06	18:33	50
30-Mar-06	18:34	50
30-Mar-06	18:35	50
30-Mar-06	18:36	50
30-Mar-06	18:37	50
30-Mar-06	18:38	50
30-Mar-06	18:39	50
30-Mar-06	18:40	50
30-Mar-06	18:41	50
30-Mar-06	18:42	50
30-Mar-06	18:43	50
30-Mar-06	18:44	50
30-Mar-06	18:45	50
30-Mar-06	18:46	50
30-Mar-06	18:47	50
30-Mar-06	18:48	50

Run 1
March 28, 2006
12:10 - 16:44

Date	Time	Furnace Shaft VFD Setpoint (%)
28-Mar-06	16:18	50
28-Mar-06	16:19	50
28-Mar-06	16:20	50
28-Mar-06	16:21	50
28-Mar-06	16:22	50
28-Mar-06	16:23	50
28-Mar-06	16:24	50
28-Mar-06	16:25	50
28-Mar-06	16:26	50
28-Mar-06	16:27	50
28-Mar-06	16:28	50
28-Mar-06	16:29	50
28-Mar-06	16:30	50
28-Mar-06	16:31	50
28-Mar-06	16:32	50
28-Mar-06	16:33	50
28-Mar-06	16:34	50
28-Mar-06	16:35	50
28-Mar-06	16:36	50
28-Mar-06	16:37	50
28-Mar-06	16:38	50
28-Mar-06	16:39	50
28-Mar-06	16:40	50
28-Mar-06	16:41	50
28-Mar-06	16:42	50
28-Mar-06	16:43	50
Average		50
Minimum		50
Maximum		50

Run 2
March 29, 2006
11:15 - 17:00

Date	Time	Furnace Shaft VFD Setpoint (%)
29-Mar-06	15:23	50
29-Mar-06	15:24	50
29-Mar-06	15:25	50
29-Mar-06	15:26	50
29-Mar-06	15:27	50
29-Mar-06	15:28	50
29-Mar-06	15:29	50
29-Mar-06	15:30	50
29-Mar-06	15:31	50
29-Mar-06	15:32	50
29-Mar-06	15:33	50
29-Mar-06	15:34	50
29-Mar-06	15:35	50
29-Mar-06	15:36	50
29-Mar-06	15:37	50
29-Mar-06	15:38	50
29-Mar-06	15:39	50
29-Mar-06	15:40	50
29-Mar-06	15:41	50
29-Mar-06	15:42	50
29-Mar-06	15:43	50
29-Mar-06	15:44	50
29-Mar-06	15:45	50
29-Mar-06	15:46	50
29-Mar-06	15:47	50
29-Mar-06	15:48	50
29-Mar-06	15:49	50
29-Mar-06	15:50	50
29-Mar-06	15:51	50
29-Mar-06	15:52	50
29-Mar-06	15:53	50
29-Mar-06	15:54	50
29-Mar-06	15:55	50
29-Mar-06	15:56	50
29-Mar-06	15:57	50
29-Mar-06	15:58	50

Run 3
March 30, 2006
11:50 - 12:39, 15:30 - 19:16

Date	Time	Furnace Shaft VFD Setpoint (%)
30-Mar-06	18:49	50
30-Mar-06	18:50	50
30-Mar-06	18:51	50
30-Mar-06	18:52	50
30-Mar-06	18:53	50
30-Mar-06	18:54	50
30-Mar-06	18:55	50
30-Mar-06	18:56	50
30-Mar-06	18:57	50
30-Mar-06	18:58	50
30-Mar-06	18:59	50
30-Mar-06	19:00	50
30-Mar-06	19:01	50
30-Mar-06	19:02	50
30-Mar-06	19:03	50
30-Mar-06	19:04	50
30-Mar-06	19:05	50
30-Mar-06	19:06	50
30-Mar-06	19:07	50
30-Mar-06	19:08	50
30-Mar-06	19:09	50
30-Mar-06	19:10	50
30-Mar-06	19:11	50
30-Mar-06	19:12	50
30-Mar-06	19:13	50
30-Mar-06	19:14	50
30-Mar-06	19:15	50
Average		50
Minimum		50
Maximum		50

Run 1
March 28, 2006
12:10 - 16:44

Date	Time	Furnace Shaft VFD Setpoint (%)

Run 2
March 29, 2006
11:15 - 17:00

Date	Time	Furnace Shaft VFD Setpoint (%)
29-Mar-06	15:59	50
29-Mar-06	16:00	50
29-Mar-06	16:01	50
29-Mar-06	16:02	50
29-Mar-06	16:03	50
29-Mar-06	16:04	50
29-Mar-06	16:05	50
29-Mar-06	16:06	50
29-Mar-06	16:07	50
29-Mar-06	16:08	50
29-Mar-06	16:09	50
29-Mar-06	16:10	50
29-Mar-06	16:11	50
29-Mar-06	16:12	50
29-Mar-06	16:13	50
29-Mar-06	16:14	50
29-Mar-06	16:15	50
29-Mar-06	16:16	50
29-Mar-06	16:17	50
29-Mar-06	16:18	50
29-Mar-06	16:19	50
29-Mar-06	16:20	50
29-Mar-06	16:21	50
29-Mar-06	16:22	50
29-Mar-06	16:23	50
29-Mar-06	16:24	50
29-Mar-06	16:25	50
29-Mar-06	16:26	50
29-Mar-06	16:27	50
29-Mar-06	16:28	50
29-Mar-06	16:29	50
29-Mar-06	16:30	50
29-Mar-06	16:31	50
29-Mar-06	16:32	50
29-Mar-06	16:33	50
29-Mar-06	16:34	50

Run 3
March 30, 2006
11:50 - 12:39, 15:30 - 19:16

Date	Time	Furnace Shaft VFD Setpoint (%)

Run 1
March 28, 2006
12:10 - 16:44

Date	Time	Furnace Shaft VFD Setpoint (%)

Run 2
March 29, 2006
11:15 - 17:00

Date	Time	Furnace Shaft VFD Setpoint (%)
29-Mar-06	16:35	50
29-Mar-06	16:36	50
29-Mar-06	16:37	50
29-Mar-06	16:38	50
29-Mar-06	16:39	50
29-Mar-06	16:40	50
29-Mar-06	16:41	50
29-Mar-06	16:42	50
29-Mar-06	16:43	50
29-Mar-06	16:44	50
29-Mar-06	16:45	50
29-Mar-06	16:46	50
29-Mar-06	16:47	50
29-Mar-06	16:48	50
29-Mar-06	16:49	50
29-Mar-06	16:50	50
29-Mar-06	16:51	50
29-Mar-06	16:52	50
29-Mar-06	16:53	50
29-Mar-06	16:54	50
29-Mar-06	16:55	50
29-Mar-06	16:56	50
29-Mar-06	16:57	50
29-Mar-06	16:58	50
29-Mar-06	16:59	50
Average		50
Minimum		50
Maximum		50

Run 3
March 30, 2006
11:50 - 12:39, 15:30 - 19:16

Date	Time	Furnace Shaft VFD Setpoint (%)

APPENDIX D
SUBPART FF ANNUAL REPORTS

APPENDIX E
QUARTERLY VISUAL INSPECTION RECORDS

Map Form No. 11

SIEMENS INDUSTRY, INC.

Benzene Neshap Quarterly Inspection
Process Equipment Assessment For Potential Air Emissions

40 CFR 61.343, 345, 348

Quarter: 2ND **Year:** 2014

Equipment Description	Mechanical Integrity			Corrective Action Or Maintenance	Reviewed By	Review Date
Carbon Adsorber WS-1	Breach in container, visible leakage, or corrosion?	Yes ☐	No ☑	☑ No corrective action/maintenance required at present.	[illegible]	5/13/14
	Carbon replacement within specified time period?	Yes ☑	No ☐	☐ Corrective action or maintenance is required; describe :		
	Carbon replacement dates recorded?	Yes ☑	No ☐			
	(As verified against " Carbon Canister Replacement Log")					
Carbon Adsorber WS-2	Breach in container, visible leakage, or corrosion?	Yes ☐	No ☑	☑ No corrective action/maintenance required at present.		
	Carbon replacement within specified time period?	Yes ☑	No ☐	☐ Corrective action or maintenance is required; describe :		
	Carbon replacement dates recorded?	Yes ☑	No ☐			
	(As verified against " Carbon Canister Replacement Log")					
Carbon Adsorber WS-3	Breach in container, visible leakage, or corrosion?	Yes ☐	No ☑	☑ No corrective action/maintenance required at present.		
	Carbon replacement within specified time period?	Yes ☑	No ☐	☐ Corrective action or maintenance is required; describe :		
	Carbon replacement dates recorded?	Yes ☑	No ☐			
	(As verified against " Carbon Canister Replacement Log")					
Drums, Vessels or Bags In Storage	All drums/vessels sealed?	Yes ☐	No ☑	☑ No corrective action/maintenance required at present.		
	Breach in drums/vessels, visible leakage or corrosion?	Yes ☑	No ☐	☐ Corrective action or maintenance is required; describe :		
	Any bags torn or leaking?	Yes ☑	No ☐			
Recycle and Spent Carbon Tanks	T-1 Manways sealed, flanges blinded, no leakage?	Yes ☑	No ☐	☑ No corrective action/maintenance required at present.		
	T-2 Manways sealed, flanges blinded, no leakage?	Yes ☑	No ☐	☐ Corrective action or maintenance is required; describe :		
	T-5 Manways sealed, flanges blinded, no leakage?	Yes ☑	No ☐			
	T-6 Manways sealed, flanges blinded, no leakage?	Yes ☑	No ☐			
	T-9 Manways sealed, flanges blinded, no leakage?	Yes ☑	No ☐			
	T-18 Manways sealed, flanges blinded, no leakage?	Yes ☑	No ☐			
Dewater Screw	Any visible fugitive emissions or leakage?	Yes ☐	No ☑	☑ No corrective action/maintenance required at present.		
				☐ Corrective action or maintenance is required; describe :		
Afterburner	Temperature at or above 1800 F at all times?	Yes ☑	No ☐	☑ No corrective action/maintenance required at present.		
	(As verified against the afterburner temperature on the process monitoring logs)			☐ Corrective action or maintenance is required; describe :		
Slurry Piping	Any corrosion?	Yes ☐	No ☑	☑ No corrective action/maintenance required at present.		
	Any leakage?	Yes ☐	No ☑	☐ Corrective action or maintenance is required; describe :		
	Any cracking or metal fatigue?	Yes ☐	No ☑			

Map Form No. 11

SIEMENS INDUSTRY, INC.

Benzene Neshap Quarterly Inspection
Process Equipment Assessment For Potential Air Emissions

40 CFR 61.343, 345, 348

Quarter: 1st Year: 2014

Equipment Description	Mechanical Integrity	Corrective Action Or Maintenance	Reviewed By	Review Date
Carbon Adsorber WS-1	Breach in container, visible leakage, or corrosion? Yes ☐ No ☑ Carbon replacement within specified time period? Yes ☑ No ☐ Carbon replacement dates recorded? Yes ☑ No ☐ (As verified against " Carbon Canister Replacement Log")	☑ No corrective action/maintenance required at present. ☐ Corrective action or maintenance is required; describe :	MM	3/19/14
Carbon Adsorber WS-2	Breach in container, visible leakage, or corrosion? Yes ☐ No ☑ Carbon replacement within specified time period? Yes ☑ No ☐ Carbon replacement dates recorded? Yes ☑ No ☐ (As verified against " Carbon Canister Replacement Log")	☑ No corrective action/maintenance required at present. ☐ Corrective action or maintenance is required; describe :	"	"
Carbon Adsorber WS-3	Breach in container, visible leakage, or corrosion? Yes ☐ No ☑ Carbon replacement within specified time period? Yes ☑ No ☐ Carbon replacement dates recorded? Yes ☑ No ☐ (As verified against " Carbon Canister Replacement Log")	☑ No corrective action/maintenance required at present. ☐ Corrective action or maintenance is required; describe :	"	"
Drums, Vessels or Bags In Storage	All drums/vessels sealed? Yes ☑ No ☐ Breach in drums/vessels, visible leakage or corrosion? Yes ☐ No ☑ Any bags torn or leaking? Yes ☐ No ☑	☑ No corrective action/maintenance required at present. ☐ Corrective action or maintenance is required; describe :	"	"
Recycle and Spent Carbon Tanks	T-1 Manways sealed, flanges blinded, no leakage? Yes ☑ No ☐ T-2 Manways sealed, flanges blinded, no leakage? Yes ☑ No ☐ T-5 Manways sealed, flanges blinded, no leakage? Yes ☑ No ☐ T-6 Manways sealed, flanges blinded, no leakage? Yes ☑ No ☐ T-9 Manways sealed, flanges blinded, no leakage? Yes ☑ No ☐ T-18 Manways sealed, flanges blinded, no leakage? Yes ☑ No ☐	☑ No corrective action/maintenance required at present. ☐ Corrective action or maintenance is required; describe :	"	"
Dewater Screw	Any visible fugitive emissions or leakage? Yes ☐ No ☑	☑ No corrective action/maintenance required at present. ☐ Corrective action or maintenance is required; describe :	"	"
Afterburner	Temperature at or above 1800 F at all times? Yes ☑ No ☐ (As verified against the afterburner temperature on the process monitoring logs)	☑ No corrective action/maintenance required at present. ☐ Corrective action or maintenance is required; describe :	"	"
Slurry Piping	Any corrosion? Yes ☐ No ☑ Any leakage? Yes ☐ No ☑ Any cracking or metal fatigue? Yes ☐ No ☑	☑ No corrective action/maintenance required at present. ☐ Corrective action or maintenance is required; describe :	"	"

Map Form No. 11

0242 Ex

SIEMENS INDUSTRY, INC.

Benzene Neshap Quarterly Inspection
Process Equipment Assessment For Potential Air Emissions

40 CFR 61.343, 345, 348

Quarter: 4TH **Year:** 2013

Equipment Description	Mechanical Integrity	Yes	No	Corrective Action Or Maintenance	Reviewed By	Review Date
Carbon Adsorber WS-1	Breach in container, visible leakage, or corrosion?	☐	☑	☑ No corrective action/maintenance required at present.	[signature]	12/18/13
	Carbon replacement within specified time period? 12/19/13	☑	☐	☐ Corrective action or maintenance is required; describe :		
	Carbon replacement dates recorded?	☑	☐			
	(As verified against " Carbon Canister Replacement Log")					
Carbon Adsorber WS-2	Breach in container, visible leakage, or corrosion?	☐	☑	☑ No corrective action/maintenance required at present.		
	Carbon replacement within specified time period? 12/4/13	☑	☐	☐ Corrective action or maintenance is required; describe :		
	Carbon replacement dates recorded?	☑	☐			
	(As verified against " Carbon Canister Replacement Log")					
Carbon Adsorber WS-3	Breach in container, visible leakage, or corrosion?	☐	☑	☑ No corrective action/maintenance required at present.		
	Carbon replacement within specified time period?	☑	☐	☐ Corrective action or maintenance is required; describe :		
	Carbon replacement dates recorded?	☑	☐			
	(As verified against " Carbon Canister Replacement Log")					
Drums, Vessels or Bags In Storage	All drums/vessels sealed?	☑	☐	☑ No corrective action/maintenance required at present.		
	Breach in drums/vessels, visible leakage or corrosion?	☐	☑	☐ Corrective action or maintenance is required; describe :		
	Any bags torn or leaking?	☐	☑			
Recycle and Spent Carbon Tanks	T-1 Manways sealed, flanges blinded, no leakage?	☑	☐	☑ No corrective action/maintenance required at present.		
	T-2 Manways sealed, flanges blinded, no leakage?	☑	☐	☐ Corrective action or maintenance is required; describe :		
	T-5 Manways sealed, flanges blinded, no leakage?	☑	☐			
	T-6 Manways sealed, flanges blinded, no leakage?	☑	☐			
	T-9 Manways sealed, flanges blinded, no leakage?	☑	☐			
	T-18 Manways sealed, flanges blinded, no leakage?	☑	☐			
Dewater Screw	Any visible fugitive emissions or leakage?	☐	☑	☑ No corrective action/maintenance required at present.		
				☐ Corrective action or maintenance is required; describe :		
Afterburner	Temperature at or above 1800 F at all times?	☑	☐	☑ No corrective action/maintenance required at present.		
	(As verified against the afterburner temperature on the process monitoring logs)			☐ Corrective action or maintenance is required; describe :		
Slurry Piping	Any corrosion?	☐	☑	☑ No corrective action/maintenance required at present.		
	Any leakage?	☐	☑	☐ Corrective action or maintenance is required; describe :		
	Any cracking or metal fatigue?	☐	☑			

Map Form No. 11

SIEMENS INDUSTRY, INC.

Benzene Neshap Quarterly Inspection
Process Equipment Assessment For Potential Air Emissions

40 CFR 61.343, 345, 348

Quarter: 3RD **Year:** 2013

Equipment Description	Mechanical Integrity	Corrective Action Or Maintenance	Reviewed By	Review Date
Carbon Adsorber WS-1	Breach in container, visible leakage, or corrosion? Yes ☐ No ☑ Carbon replacement within specified time period? Yes ☑ No ☐ Carbon replacement dates recorded? Yes ☑ No ☐ (As verified against " Carbon Canister Replacement Log")	☑ No corrective action/maintenance required at present. ☐ Corrective action or maintenance is required; describe :	[illegible]	9/19/13
Carbon Adsorber WS-2	Breach in container, visible leakage, or corrosion? Yes ☐ No ☑ Carbon replacement within specified time period? Yes ☑ No ☐ Carbon replacement dates recorded? Yes ☑ No ☐ (As verified against " Carbon Canister Replacement Log")	☑ No corrective action/maintenance required at present. ☐ Corrective action or maintenance is required; describe :	(↓)	(↓)
Carbon Adsorber WS-3	Breach in container, visible leakage, or corrosion? Yes ☐ No ☑ Carbon replacement within specified time period? Yes ☑ No ☐ Carbon replacement dates recorded? Yes ☑ No ☐ (As verified against " Carbon Canister Replacement Log")	☑ No corrective action/maintenance required at present. ☐ Corrective action or maintenance is required; describe :	(↓)	(↓)
Drums, Vessels or Bags In Storage	All drums/vessels sealed? Yes ☑ No ☐ Breach in drums/vessels, visible leakage or corrosion? Yes ☐ No ☑ Any bags torn or leaking? Yes ☐ No ☑	☑ No corrective action/maintenance required at present. ☐ Corrective action or maintenance is required; describe :	(↓)	(↓)
Recycle and Spent Carbon Tanks	T-1 Manways sealed, flanges blinded, no leakage? Yes ☑ No ☐ T-2 Manways sealed, flanges blinded, no leakage? Yes ☑ No ☐ T-5 Manways sealed, flanges blinded, no leakage? Yes ☑ No ☐ T-6 Manways sealed, flanges blinded, no leakage? Yes ☑ No ☐ T-9 Manways sealed, flanges blinded, no leakage? Yes ☑ No ☐ T-18 Manways sealed, flanges blinded, no leakage? Yes ☑ No ☐	☑ No corrective action/maintenance required at present. ☐ Corrective action or maintenance is required; describe :	(↓)	(↓)
Dewater Screw	Any visible fugitive emissions or leakage? Yes ☐ No ☑	☑ No corrective action/maintenance required at present. ☐ Corrective action or maintenance is required; describe :	(↓)	(↓)
Afterburner	Temperature at or above 1800 F at all times? Yes ☑ No ☐ (As verified against the afterburner temperature on the process monitoring logs)	☐ No corrective action/maintenance required at present. ☐ Corrective action or maintenance is required; describe :	(↓)	(↓)
Slurry Piping	Any corrosion? Yes ☐ No ☑ Any leakage? Yes ☐ No ☑ Any cracking or metal fatigue? Yes ☐ No ☑	☐ No corrective action/maintenance required at present. ☐ Corrective action or maintenance is required; describe :	(↓)	(↓)

Map Form No. 11

SIEMENS INDUSTRY, INC.

Benzene Neshap Quarterly Inspection
Process Equipment Assessment For Potential Air Emissions

40 CFR 61.343, 345, 348

Quarter: 2ND **Year:** 2013

Equipment Description	Mechanical Integrity	Corrective Action Or Maintenance	Reviewed By	Review Date
Carbon Adsorber WS-1	Breach in container, visible leakage, or corrosion? Yes [ ] No [x] Carbon replacement within specified time period? Yes [x] No [ ] Carbon replacement dates recorded? Yes [x] No [ ] (As verified against " Carbon Canister Replacement Log")	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe : 6/5/13	WK	6/6/13
Carbon Adsorber WS-2	Breach in container, visible leakage, or corrosion? Yes [ ] No [x] Carbon replacement within specified time period? Yes [x] No [ ] Carbon replacement dates recorded? Yes [x] No [ ] (As verified against " Carbon Canister Replacement Log")	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe : 6/6/13		
Carbon Adsorber WS-3	Breach in container, visible leakage, or corrosion? Yes [ ] No [x] Carbon replacement within specified time period? Yes [x] No [ ] Carbon replacement dates recorded? Yes [x] No [ ] (As verified against " Carbon Canister Replacement Log")	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe : 5/31/13		
Drums, Vessels or Bags In Storage	All drums/vessels sealed? Yes [x] No [ ] Breach in drums/vessels, visible leakage or corrosion? Yes [ ] No [x] Any bags torn or leaking? Yes [ ] No [x]	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe :		
Recycle and Spent Carbon Tanks	T-1 Manways sealed, flanges blinded, no leakage? Yes [x] No [ ] T-2 Manways sealed, flanges blinded, no leakage? Yes [x] No [ ] T-5 Manways sealed, flanges blinded, no leakage? Yes [x] No [ ] T-6 Manways sealed, flanges blinded, no leakage? Yes [x] No [ ] T-9 Manways sealed, flanges blinded, no leakage? Yes [x] No [ ] T-18 Manways sealed, flanges blinded, no leakage? Yes [x] No [ ]	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe :		
Dewater Screw	Any visible fugitive emissions or leakage? Yes [ ] No [x]	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe :		
Afterburner	Temperature at or above 1800 F at all times? Yes [x] No [ ] (As verified against the afterburner temperature on the process monitoring logs)	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe :		
Slurry Piping	Any corrosion? Yes [ ] No [x] Any leakage? Yes [ ] No [x] Any cracking or metal fatigue? Yes [ ] No [x]	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe :		

Map Form No. 11

SIEMENS INDUSTRY, INC.

Benzene Neshap Quarterly Inspection
Process Equipment Assessment For Potential Air Emissions

40 CFR 61.343, 345, 348

Quarter: 1st **Year:** 2013

Equipment Description	Mechanical Integrity	Corrective Action Or Maintenance	Reviewed By	Review Date
Carbon Adsorber WS-1	Breach in container, visible leakage, or corrosion? Yes [ ] No [x] Carbon replacement within specified time period? Yes [x] No [ ] Carbon replacement dates recorded? Yes [x] No [ ] (As verified against " Carbon Canister Replacement Log")	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe :	[illegible]	3/13
Carbon Adsorber WS-2	Breach in container, visible leakage, or corrosion? Yes [ ] No [x] Carbon replacement within specified time period? Yes [x] No [ ] Carbon replacement dates recorded? Yes [x] No [ ] (As verified against " Carbon Canister Replacement Log")	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe :		
Carbon Adsorber WS-3	Breach in container, visible leakage, or corrosion? Yes [ ] No [x] Carbon replacement within specified time period? Yes [x] No [ ] Carbon replacement dates recorded? Yes [x] No [ ] (As verified against " Carbon Canister Replacement Log")	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe :		
Drums, Vessels or Bags In Storage	All drums/vessels sealed? Yes [x] No [ ] Breach in drums/vessels, visible leakage or corrosion? Yes [ ] No [x] Any bags torn or leaking? Yes [ ] No [x]	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe :		
Recycle and Spent Carbon Tanks	T-1 Manways sealed, flanges blinded, no leakage? Yes [x] No [ ] T-2 Manways sealed, flanges blinded, no leakage? Yes [x] No [ ] T-5 Manways sealed, flanges blinded, no leakage? Yes [x] No [ ] T-6 Manways sealed, flanges blinded, no leakage? Yes [x] No [ ] T-9 Manways sealed, flanges blinded, no leakage? Yes [x] No [ ] T-18 Manways sealed, flanges blinded, no leakage? Yes [x] No [ ]	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe :		
Dewater Screw	Any visible fugitive emissions or leakage? Yes [ ] No [x]	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe :		
Afterburner	Temperature at or above 1800 F at all times? Yes [x] No [ ] (As verified against the afterburner temperature on the process monitoring logs)	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe :		
Slurry Piping	Any corrosion? Yes [ ] No [x] Any leakage? Yes [ ] No [x] Any cracking or metal fatigue? Yes [ ] No [x]	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe :		

Map Form No. 11

SIEMENS INDUSTRY, INC.

Benzene Neshap Quarterly Inspection
Process Equipment Assessment For Potential Air Emissions

40 CFR 61.343, 345, 348

Quarter: 4TH Year: 2012

Equipment Description	Mechanical Integrity			Corrective Action Or Maintenance	Reviewed By	Review Date
Carbon Adsorber WS-1	Breach in container, visible leakage, or corrosion?	Yes ☐	No ☑	☑ No corrective action/maintenance required at present.	[signature]	12/10/12
	Carbon replacement within specified time period?	Yes ☑	No ☐	☐ Corrective action or maintenance is required; describe :		
	Carbon replacement dates recorded?	Yes ☑	No ☐	CHANGED 12/10 4K		
	(As verified against " Carbon Canister Replacement Log")					
Carbon Adsorber WS-2	Breach in container, visible leakage, or corrosion?	Yes ☐	No ☑	☑ No corrective action/maintenance required at present.	↓	↓
	Carbon replacement within specified time period?	Yes ☑	No ☐	☐ Corrective action or maintenance is required; describe :		
	Carbon replacement dates recorded?	Yes ☑	No ☐	CHANGED 12/10 5K		
	(As verified against " Carbon Canister Replacement Log")					
Carbon Adsorber WS-3	Breach in container, visible leakage, or corrosion?	Yes ☐	No ☑	☑ No corrective action/maintenance required at present.	↓	↓
	Carbon replacement within specified time period?	Yes ☑	No ☐	☐ Corrective action or maintenance is required; describe :		
	Carbon replacement dates recorded?	Yes ☑	No ☐			
	(As verified against " Carbon Canister Replacement Log")					
Drums, Vessels or Bags In Storage	All drums/vessels sealed?	Yes ☐	No ☐	☐ No corrective action/maintenance required at present.	↓	↓
	Breach in drums/vessels, visible leakage or corrosion?	Yes ☐	No ☐	☐ Corrective action or maintenance is required; describe :		
	Any bags torn or leaking?	Yes ☐	No ☐			
Recycle and Spent Carbon Tanks	T-1 Manways sealed, flanges blinded, no leakage?	Yes ☑	No ☐	☑ No corrective action/maintenance required at present.	↓	↓
	T-2 Manways sealed, flanges blinded, no leakage?	Yes ☑	No ☐	☐ Corrective action or maintenance is required; describe :		
	T-5 Manways sealed, flanges blinded, no leakage?	Yes ☑	No ☐			
	T-6 Manways sealed, flanges blinded, no leakage?	Yes ☑	No ☐			
	T-9 Manways sealed, flanges blinded, no leakage?	Yes ☑	No ☐			
	T-18 Manways sealed, flanges blinded, no leakage?	Yes ☑	No ☐			
Dewater Screw	Any visible fugitive emissions or leakage?	Yes ☐	No ☑	☑ No corrective action/maintenance required at present.	↓	↓
				☐ Corrective action or maintenance is required; describe :		
Afterburner	Temperature at or above 1800 F at all times?	Yes ☑	No ☐	☑ No corrective action/maintenance required at present.	↓	↓
	(As verified against the afterburner temperature on the process monitoring logs)			☐ Corrective action or maintenance is required; describe :		
Slurry Piping	Any corrosion?	Yes ☐	No ☑	☑ No corrective action/maintenance required at present.	↓	↓
	Any leakage?	Yes ☐	No ☑	☐ Corrective action or maintenance is required; describe :		
	Any cracking or metal fatigue?	Yes ☐	No ☑			

Map Form No. 11

SIEMENS WATER TECHNOLOGIES CORP.

Benzene Neshap Quarterly Inspection
Process Equipment Assessment For Potential Air Emissions

40 CFR 61.343, 345, 348

Quarter: 3RD **Year:** 2012

Equipment Description	Mechanical Integrity	Yes	No	Corrective Action Or Maintenance	Reviewed By	Review Date
Carbon Adsorber WS-1	Breach in container, visible leakage, or corrosion?	☐	☑	☑ No corrective action/maintenance required at present.	[signature]	9/28/12
	Carbon replacement within specified time period?	☑	☐	☐ Corrective action or maintenance is required; describe :		
	Carbon replacement dates recorded?	☑	☐			
	(As verified against " Carbon Canister Replacement Log")					
Carbon Adsorber WS-2	Breach in container, visible leakage, or corrosion?	☐	☑	☑ No corrective action/maintenance required at present.	↓	↓
	Carbon replacement within specified time period?	☑	☐	☐ Corrective action or maintenance is required; describe :		
	Carbon replacement dates recorded?	☑	☐			
	(As verified against " Carbon Canister Replacement Log")					
Carbon Adsorber WS-3	Breach in container, visible leakage, or corrosion?	☐	☑	☑ No corrective action/maintenance required at present.	↓	↓
	Carbon replacement within specified time period?	☑	☐	☐ Corrective action or maintenance is required; describe :		
	Carbon replacement dates recorded?	☑	☐			
	(As verified against " Carbon Canister Replacement Log")					
Drums, Vessels or Bags In Storage	All drums/vessels sealed?	☑	☐	☑ No corrective action/maintenance required at present.	↓	↓
	Breach in drums/vessels, visible leakage or corrosion?	☐	☑	☐ Corrective action or maintenance is required; describe :		
	Any bags torn or leaking?	☐	☑			
Recycle and Spent Carbon Tanks	T-1 Manways sealed, flanges blinded, no leakage?	☑	☐	☑ No corrective action/maintenance required at present.	↓	↓
	T-2 Manways sealed, flanges blinded, no leakage?	☑	☐	☐ Corrective action or maintenance is required; describe :		
	T-5 Manways sealed, flanges blinded, no leakage?	☑	☐			
	T-6 Manways sealed, flanges blinded, no leakage?	☑	☐			
	T-9 Manways sealed, flanges blinded, no leakage?	☑	☐			
	H-18 Manways sealed, flanges blinded, no leakage?	☑	☐			
Dewater Screw	Any visible fugitive emissions or leakage?	☐	☑	☑ No corrective action/maintenance required at present.	↓	↓
				☐ Corrective action or maintenance is required; describe :		
Afterburner	Temperature at or above 1800 F at all times?	☑	☐	☐ No corrective action/maintenance required at present.	↓	↓
	(As verified against the afterburner temperature on the process monitoring logs)			☐ Corrective action or maintenance is required; describe :		
Slurry Piping	Any corrosion?	☐	☑	☑ No corrective action/maintenance required at present.	↓	↓
	Any leakage?	☐	☑	☐ Corrective action or maintenance is required; describe :		
	Any cracking or metal fatigue?	☐	☑			

Map Form No. 11

SIEMENS WATER TECHNOLOGIES CORP.

Benzene Neshap Quarterly Inspection

Process Equipment Assessment For Potential Air Emissions

40 CFR 61.343, 345, 348

Quarter: 2ND Year: 2012

Equipment Description	Mechanical Integrity	Corrective Action Or Maintenance	Reviewed By	Review Date
Carbon Adsorber WS-1	Breach in container, visible leakage, or corrosion? Yes [ ] No [x] Carbon replacement within specified time period? Yes [x] No [ ] Carbon replacement dates recorded? Yes [x] No [ ] (As verified against " Carbon Canister Replacement Log")	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe :	MW	6/4/12
Carbon Adsorber WS-2	Breach in container, visible leakage, or corrosion? Yes [ ] No [x] Carbon replacement within specified time period? Yes [x] No [ ] Carbon replacement dates recorded? Yes [x] No [ ] (As verified against " Carbon Canister Replacement Log")	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe :	↓	↓
Carbon Adsorber WS-3	Breach in container, visible leakage, or corrosion? Yes [ ] No [x] Carbon replacement within specified time period? Yes [x] No [ ] Carbon replacement dates recorded? Yes [x] No [ ] (As verified against " Carbon Canister Replacement Log")	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe :	↓	↓
Drums, Vessels or Bags In Storage	All drums/vessels sealed? Yes [x] No [ ] Breach in drums/vessels, visible leakage or corrosion? Yes [ ] No [x] Any bags torn or leaking? Yes [ ] No [x]	[ ] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe :	↓	↓
Recycle and Spent Carbon Tanks	T-1 Manways sealed, flanges blinded, no leakage? Yes [x] No [ ] T-2 Manways sealed, flanges blinded, no leakage? Yes [x] No [ ] T-5 Manways sealed, flanges blinded, no leakage? Yes [x] No [ ] T-6 Manways sealed, flanges blinded, no leakage? Yes [x] No [ ] T-9 Manways sealed, flanges blinded, no leakage? Yes [x] No [ ] H-18 Manways sealed, flanges blinded, no leakage? Yes [x] No [ ]	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe :	↓	↓
Dewater Screw	Any visible fugitive emissions or leakage? Yes [ ] No [x]	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe :	↓	↓
Afterburner	Temperature at or above 1800 F at all times? Yes [x] No [ ] (As verified against the afterburner temperature on the process monitoring logs)	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe :	↓	↓
Slurry Piping	Any corrosion? Yes [ ] No [x] Any leakage? Yes [ ] No [x] Any cracking or metal fatigue? Yes [ ] No [x]	[x] No corrective action/maintenance required at present. [ ] Corrective action or maintenance is required; describe :	↓	↓

SIEMENS WATER TECHNOLOGIES CORP.

Benzene Neshap Quarterly Inspection
Process Equipment Assessment For Potential Air Emissions

40 CFR 61.343, 345, 348

Quarter: 1ST **Year:** 2012

Equipment Description	Mechanical Integrity	Yes	No	Corrective Action Or Maintenance	Reviewed By	Review Date
Carbon Adsorber WS-1	Breach in container, visible leakage, or corrosion?	☐	☑	☑ No corrective action/maintenance required at present.	WW	1/18/12
	Carbon replacement within specified time period?	☑	☐	☐ Corrective action or maintenance is required; describe :		
	Carbon replacement dates recorded?	☑	☐			
	(As verified against " Carbon Canister Replacement Log")					
Carbon Adsorber WS-2	Breach in container, visible leakage, or corrosion?	☐	☑	☑ No corrective action/maintenance required at present.	↓	↓
	Carbon replacement within specified time period?	☑	☐	☐ Corrective action or maintenance is required; describe :		
	Carbon replacement dates recorded?	☑	☐			
	(As verified against " Carbon Canister Replacement Log")					
Carbon Adsorber WS-3	Breach in container, visible leakage, or corrosion?	☐	☑	☐ No corrective action/maintenance required at present.		
	Carbon replacement within specified time period?	☑	☐	☐ Corrective action or maintenance is required; describe :		
	Carbon replacement dates recorded?	☑	☐			
	(As verified against " Carbon Canister Replacement Log")					
Drums, Vessels or Bags In Storage	All drums/vessels sealed?	☑	☐	☐ No corrective action/maintenance required at present.		
	Breach in drums/vessels, visible leakage or corrosion?	☐	☑	☐ Corrective action or maintenance is required; describe :		
	Any bags torn or leaking?	☐	☑			
Recycle and Spent Carbon Tanks	T-1 Manways sealed, flanges blinded, no leakage?	☑	☐	☑ No corrective action/maintenance required at present.		
	T-2 Manways sealed, flanges blinded, no leakage?	☑	☐	☐ Corrective action or maintenance is required; describe :		
	T-5 Manways sealed, flanges blinded, no leakage?	☑	☐			
	T-6 Manways sealed, flanges blinded, no leakage?	☑	☐			
	T-9 Manways sealed, flanges blinded, no leakage?	☑	☐			
	H-18 Manways sealed, flanges blinded, no leakage?	☑	☐			
Dewater Screw	Any visible fugitive emissions or leakage?	☐	☑	☑ No corrective action/maintenance required at present.		
				☐ Corrective action or maintenance is required; describe :		
Afterburner	Temperature at or above 1800 F at all times?	☑	☐	☑ No corrective action/maintenance required at present.		
	(As verified against the afterburner temperature on the process monitoring logs)			☐ Corrective action or maintenance is required; describe :		
Slurry Piping	Any corrosion?	☐	☑	☑ No corrective action/maintenance required at present.	↓	↓
	Any leakage?	☐	☑	☐ Corrective action or maintenance is required; describe :		
	Any cracking or metal fatigue?	☐	☑			

APPENDIX F
ANNUAL METHOD 21
INSPECTION RECORDS

SEE ATTACHED CAL SHEET FOR FID

Siemens Industry, Inc.

Annual Method 21 Testing

40 CFR 61.343, 345, 349

Tested By: Monte McCue [signature] 5/6/13

Instrument Used: Foxboro TVA 1000 FID

No.	Location ID	Date Inspected	Measured Concentration (PPMV)	Background Concentration (PPMV)	Leak Detected? (Y/N) *	Description Of Problem	Corrective Action Taken	Date Of Successful Repair **
1	B-1 Baghouse Doors	5/6/13	<5	<5	N			NA
2	B-1 Dust Collector Blower Outlet Flanges	5/6/13	<5	<5	N			NA
3	H-1 Hopper Lid	5/6/13	<5	<5	N			NA
4	H-1 Hopper Eductor, Piping and Victaulics	5/6/13	<5	<5	N			NA
5	H-1 Hopper Flanges, Piping and Victaulics	5/6/13	<5	<5	N			NA
6	H-1 Hopper Vault Door	5/6/13	<5	<5	N			NA
7	H-2 Hopper Lid	5/6/13	<5	<5	N	Not in Use	Not in Use	NA
8	H-2 Hopper Eductor Flanges and Victaulics	5/6/13	<5	<5	N	Not in Use	Not in Use	NA
9	H-2 Hopper Piping and Victaulics	5/6/13	<5	<5	N	Not in Use	Not in Use	NA
10	H-2 Hopper Vent Piping	5/6/13	<5	<5	N	Not in Use	Not in Use	NA
11	RF-2 Hearth 1 Door West	5/6/13	<5	<5	N			NA
12	RF-2 Seal Welded Flat - between 1 and 2	5/6/13	<5	<5	N			NA
13	RF-2 Hearth 2 Door East	5/6/13	<5	<5	N			NA
14	RF-2 Seal Welded Flat - between 2 and 3	5/6/13	<5	<5	N			NA
15	RF-2 Hearth 3 Door East	5/6/13	<5	<5	N			NA

*A leak is detected if the container is not sealed closed, or if the instrument reading exceeds 500 ppmv over the background concentration.

**Repair must be completed within 15 days.

Siemens Industry, Inc.

Annual Method 21 Testing

40 CFR 61.343, 345, 349

Tested By: Monte McCue

Instrument Used: Foxboro TVA 1000 FID

No.	Location ID	Date Inspected	Measured Concentration (PPMV)	Background Concentration (PPMV)	Leak Detected? (Y/N) *	Description Of Problem	Corrective Action Taken	Date Of Successful Repair **
16	RF-2 Seal Welded Flat - between 3 and 4	5/6/13	<5	<5	N			NA
17	RF-2 Hearth 4 Door East	5/6/13	<5	<5	N			NA
18	RF-2 Seal Welded Flat - between 4 and 5	5/6/13	<5	<5	N			NA
19	RF-2 Hearth 5 Door East	5/6/13	<5	<5	N			NA
20	RF-2 Welded Seam on Furnace Bottom	5/6/13	<5	<5	N			NA
21	RF-2 Top Sand Seal	5/6/13	<5	<5	N			NA
22	RF-2 Bottom Sand Seal	5/6/13	<5	<5	N			NA
23	RF-2 Carbon Outlet Piping and Flanges	5/6/13	<5	<5	N			NA
24	T-1 Ball Valves	5/6/13	<5	<5	N			NA
25	T-1 Couplings	5/6/13	<5	<5	N			NA
26	T-1 Eductor & Fittings	5/6/13	<5	<5	N			NA
27	T-1 Fill Slurry Lines & Vics From H-1, H-2	5/6/13	<5	<5	N			NA
28	T-1 Fittings & Valves	5/6/13	<5	<5	N			NA
29	T-1 (SEE ATTACHMENT No. 1)	5/6/13			N			NA
30	T-1 Pressure Relief Valve	5/6/13	<5	<5	N			NA

*A leak is detected if the container is not sealed closed, or if the instrument reading exceeds 500 ppmv over the background concentration. **Repair must be completed within 15 days.

Siemens Industry, Inc.

Annual Method 21 Testing

40 CFR 61.343, 345, 349

Tested By: Monte McCue

Instrument Used: Foxboro TVA 1000 FID

No.	Location ID	Date Inspected	Measured Concentration (PPMV)	Background Concentration (PPMV)	Leak Detected? (Y/N) *	Description Of Problem	Corrective Action Taken	Date Of Successful Repair **
31	T-1 Slurry Line	5/6/13	<5	<5	N			NA
32	T-1 Tank Flanges	5/6/13	<5	<5	N			NA
33	T-1 Vent Pipe To WS-1	5/6/13	<5	<5	N			NA
34	T-2 Ball Valves	5/6/13	<5	<5	N			NA
35	T-2 Couplings	5/6/13	<5	<5	N			NA
36	T-2 Eductor & Fittings	5/6/13	<5	<5	N			NA
37	T-2 Fill Slurry Lines & Vics From H-1, H-2	5/6/13	<5	<5	N			NA
38	T-2 Fittings & Valves	5/6/13	<5	<5	N			NA
39	T-2 Tank (SEE ATTACHMENT No. 1)	5/6/13			N			NA
40	T-2 Pressure Relief Valve	5/6/13	<5	<5	N			NA
41	T-2 Slurry Line	5/6/13	<5	<5	N			NA
42	T-2 Tank Flanges	5/6/13	<5	<5	N			NA
43	T-2 Vent Pipe To WS-1	5/6/13	<5	<5	N			NA
44	T-5 Ball Valves	5/6/13	<5	<5	N			NA
45	T-5 Couplings	5/6/13	<5	<5	N			NA

*A leak is detected if the container is not sealed closed, or if the instrument reading exceeds 500 ppmv over the background concentration. **Repair must be completed within 15 days.

Siemens Industry, Inc.

Annual Method 21 Testing

40 CFR 61.343, 345, 349

Tested By: Monte McCue

Instrument Used: Foxboro TVA 1000 FID

No.	Location ID	Date Inspected	Measured Concentration (PPMV)	Background Concentration (PPMV)	Leak Detected? (Y/N) *	Description Of Problem	Corrective Action Taken	Date Of Successful Repair **
46	T-5 Eductor & Fittings	5/6/13	<5	<5	N			NA
47	T-5 Fill Slurry Lines & Vics From H-1, H-2	5/6/13	<5	<5	N			NA
48	T-5 Fittings & Valves	5/6/13	<5	<5	N			NA
49	T-5 (SEE ATTACHMENT No. 2)	5/6/13			N			NA
50	T-5 Pressure Relief Valve	5/6/13	<5	<5	N			NA
51	T-5 Slurry Line	5/6/13	<5	<5	N			NA
52	T-5 Tank Flanges	5/6/13	<5	<5	N			NA
53	T-5 Vent Pipe To WS-1	5/6/13	<5	<5	N			NA
54	T-6 Ball Valves	5/6/13	<5	<5	N			NA
55	T-6 Couplings	5/6/13	<5	<5	N			NA
56	T-6 Eductor & Fittings	5/6/13	<5	<5	N			NA
57	T-6 Fill Slurry Lines & Vics From H-1, H-2	5/6/13	<5	<5	N			NA
58	T-6 Fittings & Valves	5/6/13	<5	<5	N			NA
59	T-6 (SEE ATTACHMENT No. 2)	5/6/13			N			NA
60	T-6 Pressure Relief Valve	5/6/13	<5	<5	N			NA

*A leak is detected if the container is not sealed closed, or if the instrument reading exceeds 500 ppmv over the background concentration. **Repair must be completed within 15 days.

Siemens Industry, Inc.

Annual Method 21 Testing

40 CFR 61.343, 345, 349

Tested By: Monte McCue

Instrument Used: Foxboro TVA 1000 FID

No.	Location ID	Date Inspected	Measured Concentration (PPMV)	Background Concentration (PPMV)	Leak Detected? (Y/N) *	Description Of Problem	Corrective Action Taken	Date Of Successful Repair **
61	T-6 Slurry Line	5/6/13	<5	<5	N			NA
62	T-6 Tank Flanges	5/6/13	<5	<5	N			NA
63	T-6 Vent Pipe To WS-1	5/6/13	<5	<5	N			NA
64	T-9 (SEE ATTACHMENT No. 3)	5/6/13			N			NA
65	T-9 Level Transmitter	5/6/13	<5	<5	N			NA
66	T-9 Main Bottom Manway Door	5/6/13	<5	<5	N			NA
67	T-9 Return Line and Fittings From T Tanks	5/6/13	<5	<5	N			NA
68	T-9 Return Line and Fittings From T-18	5/6/13	<5	<5	N			NA
69	T-9 Sump Pump Fittings	5/6/13	<5	<5	N			NA
70	T-9 Vent Line and Fittings To WS-1	5/6/13	<5	<5	N			NA
71	T-9/P-4 Pump - Inlet Pipe and Fittings	5/6/13	<5	<5	N			NA
72	T-9/P-5 Pump - Inlet Pipe and Fittings	5/6/13	<5	<5	N			NA
73	T-9/P-4 Pump - Outlet Pipe and Fittings	5/6/13	<5	<5	N			NA
74	T-9/P-5 Pump - Outlet Pipe and Fittings	5/6/13	<5	<5	N			NA
75	H-18 Feed Hose & Couplings	5/6/13	<5	<5	N			NA

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Siemens Industry, Inc.

Annual Method 21 Testing

40 CFR 61.343, 345, 349

Tested By: Monte McCue

Instrument Used: Foxboro TVA 1000 FID

No.	Location ID	Date Inspected	Measured Concentration (PPMV)	Background Concentration (PPMV)	Leak Detected? (Y/N) *	Description Of Problem	Corrective Action Taken	Date Of Successful Repair **
76	H-18 Feed Valve & Piping	5/6/13	<5	<5	N			NA
77	H-18 Level Indicators	5/6/13	<5	<5	N			NA
78	H-18 Lids (SEE ATTACHMENT No. 4)	5/6/13			N			NA
79	H-18 Return Line, Couplings and Vics	5/6/13	<5	<5	N			NA
80	H-18 Piping and Couplings From T-Tanks	5/6/13	<5	<5	N			NA
81	WS-1 Hatches & Sample Port	5/6/13	<5	<5	N			NA
82	WS-1 Inlet	5/6/13	<5	<5	N			NA
83	WS-1 Outlet	5/6/13	25	<5	N			NA
84	WS-2 Hatches & Sample Port	5/6/13	<5	<5	N			NA
85	WS-2 Inlet	5/6/13	<5	<5	N			NA
86	WS-2 Outlet	5/6/13	<5	<5	N			NA
87	WS-3 Hatches & Sample Port	5/6/13	<5	<5	N			NA
88	WS-3 Inlet	5/6/13	<5	<5	N			NA
89	WS-3 Outlet	5/6/13	<5	<5	N			NA
90	Dewater Screw (SEE ATTACHMENT No. 4)	5/6/13			N			NA

*A leak is detected if the container is not sealed closed, or if the instrument reading exceeds 500 ppmv over the background concentration.

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Siemens Industry, Inc.

Annual Method 21 Testing

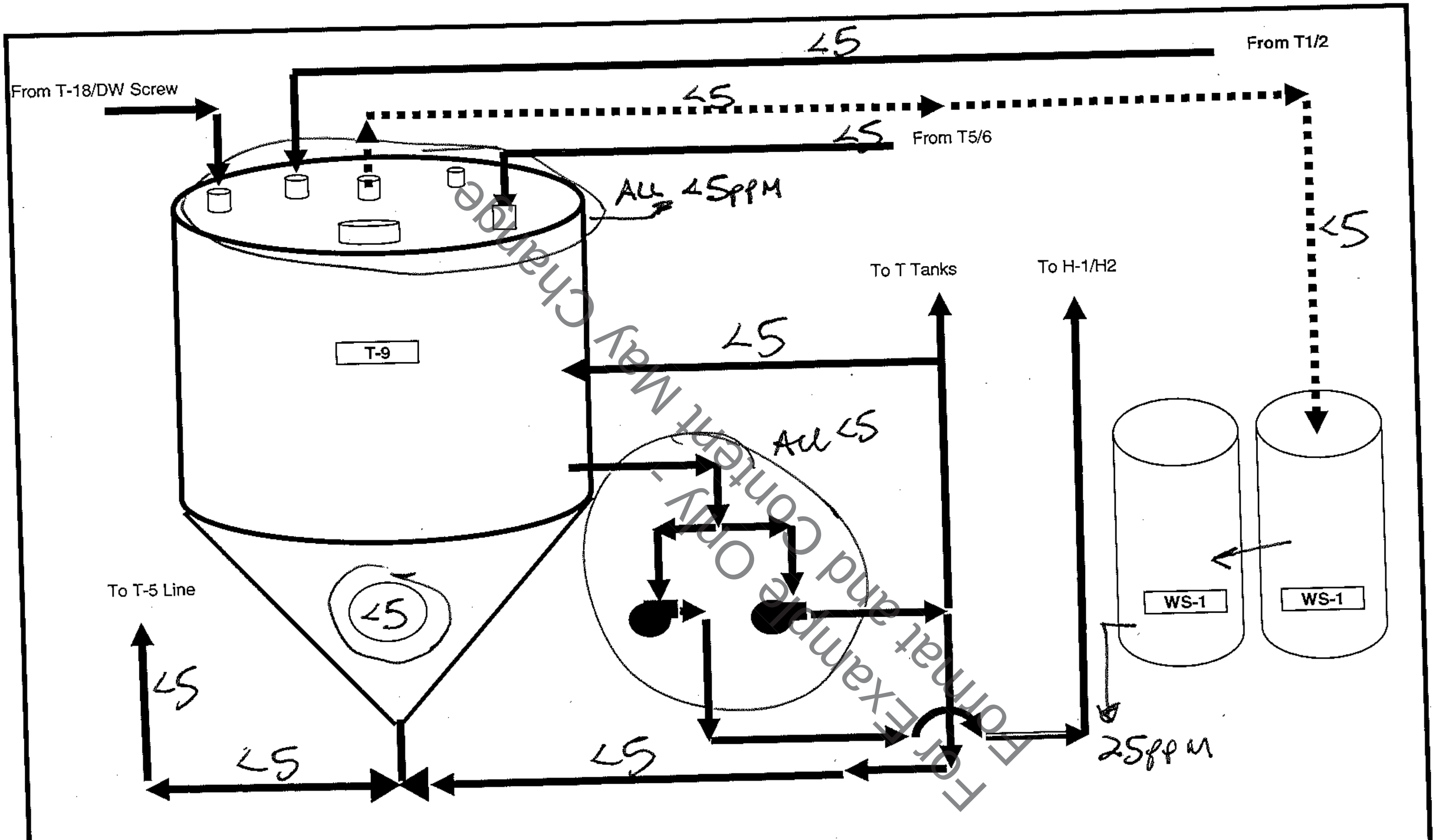
40 CFR 61.343, 345, 349

Tested By: Monte McCue

Instrument Used: Foxboro TVA 1000 FID

No.	Location ID	Date Inspected	Measured Concentration (PPMV)	Background Concentration (PPMV)	Leak Detected? (Y/N) *	Description Of Problem	Corrective Action Taken	Date Of Successful Repair **
91	Weigh Belt Feeder (SEE ATTACHMENT No. 4)	5/6/13			N			NA
92	Rotary Valve (SEE ATTACHMENT No. 4)	5/6/13			N			NA
93								
94								
95								
96								
97								
98								
99								
100								

*A leak is detected if the container is not sealed closed, or if the instrument reading exceeds 500 ppmv over the background concentration. **Repair must be completed within 15 days.



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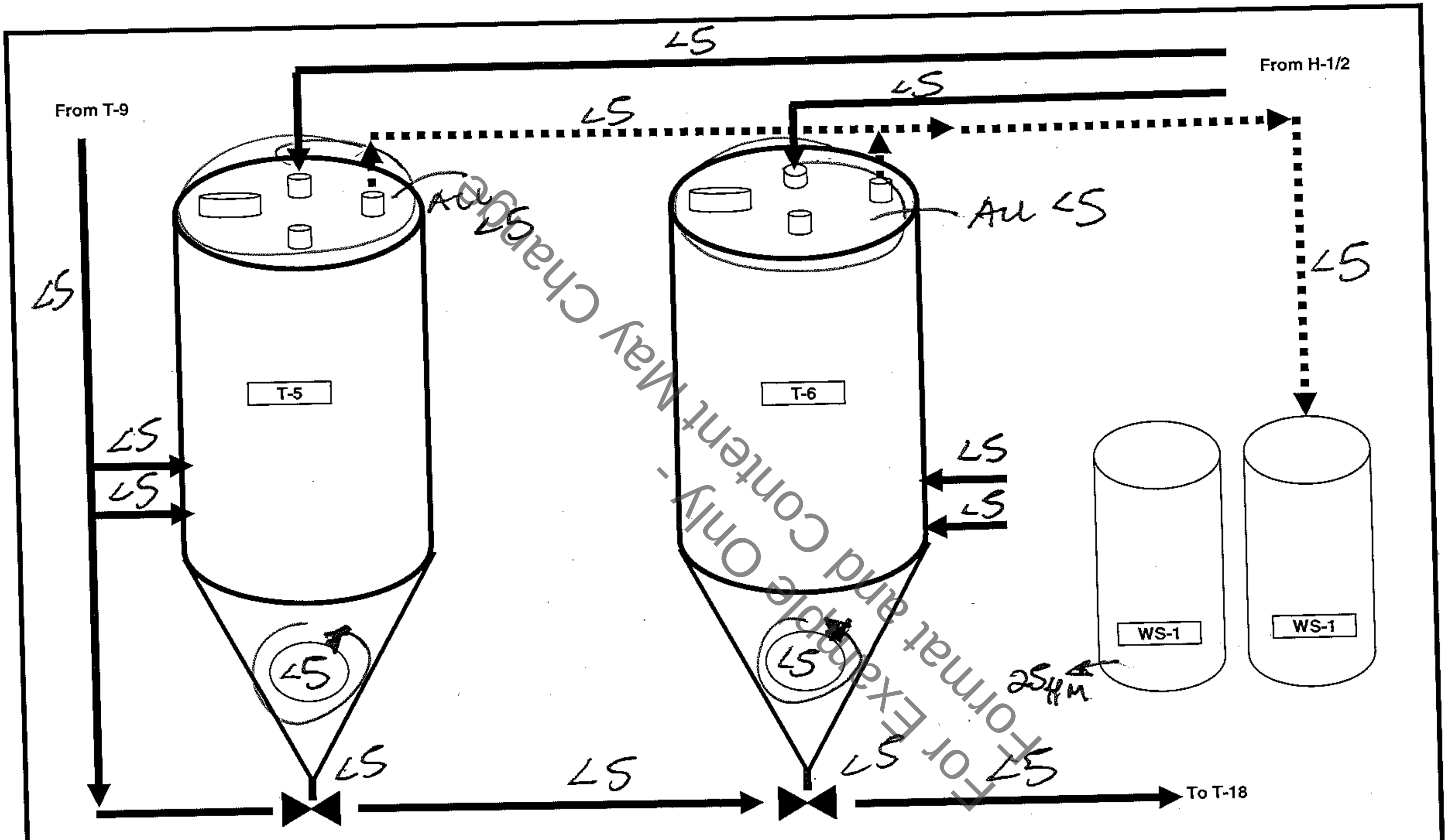

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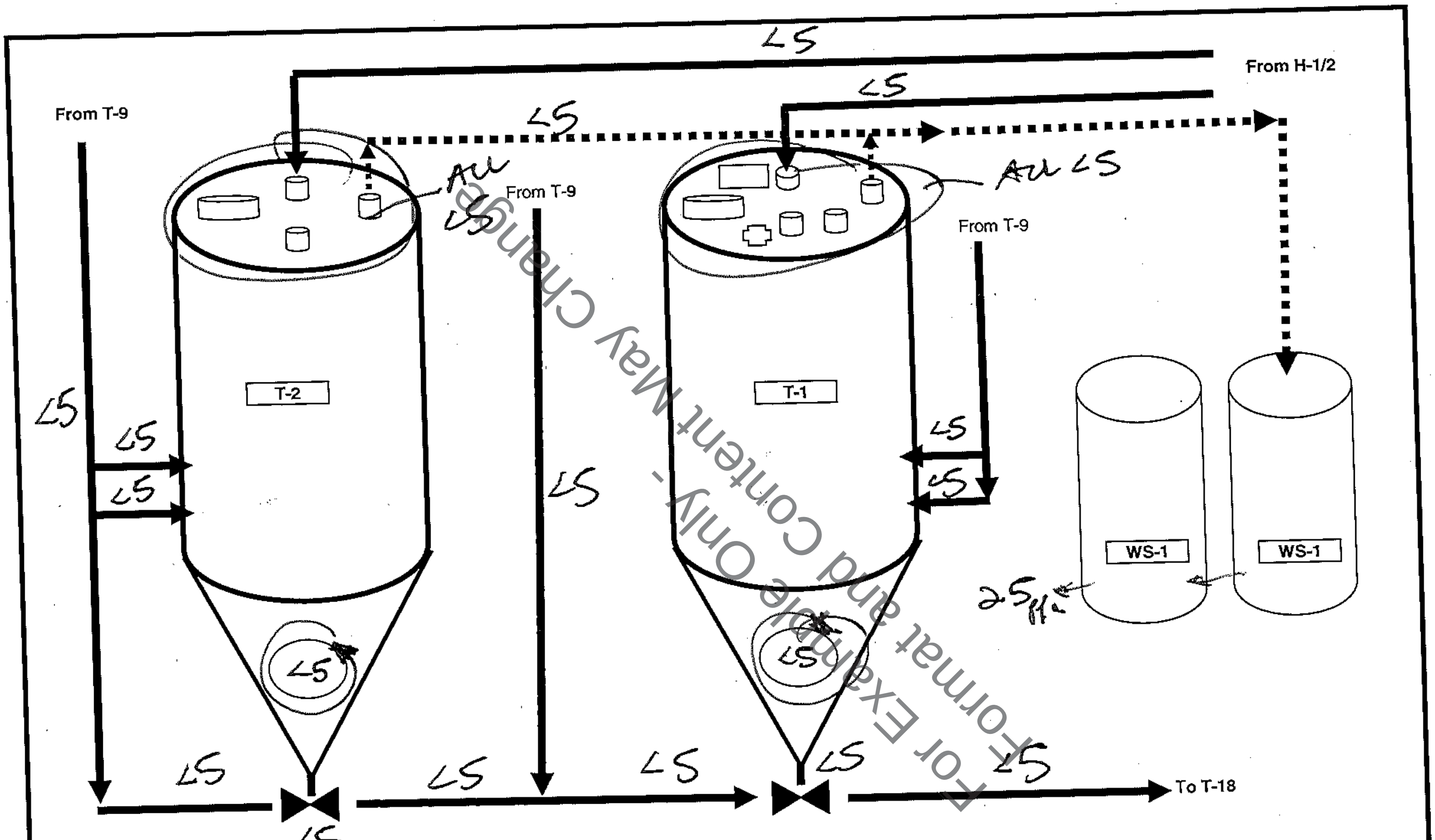

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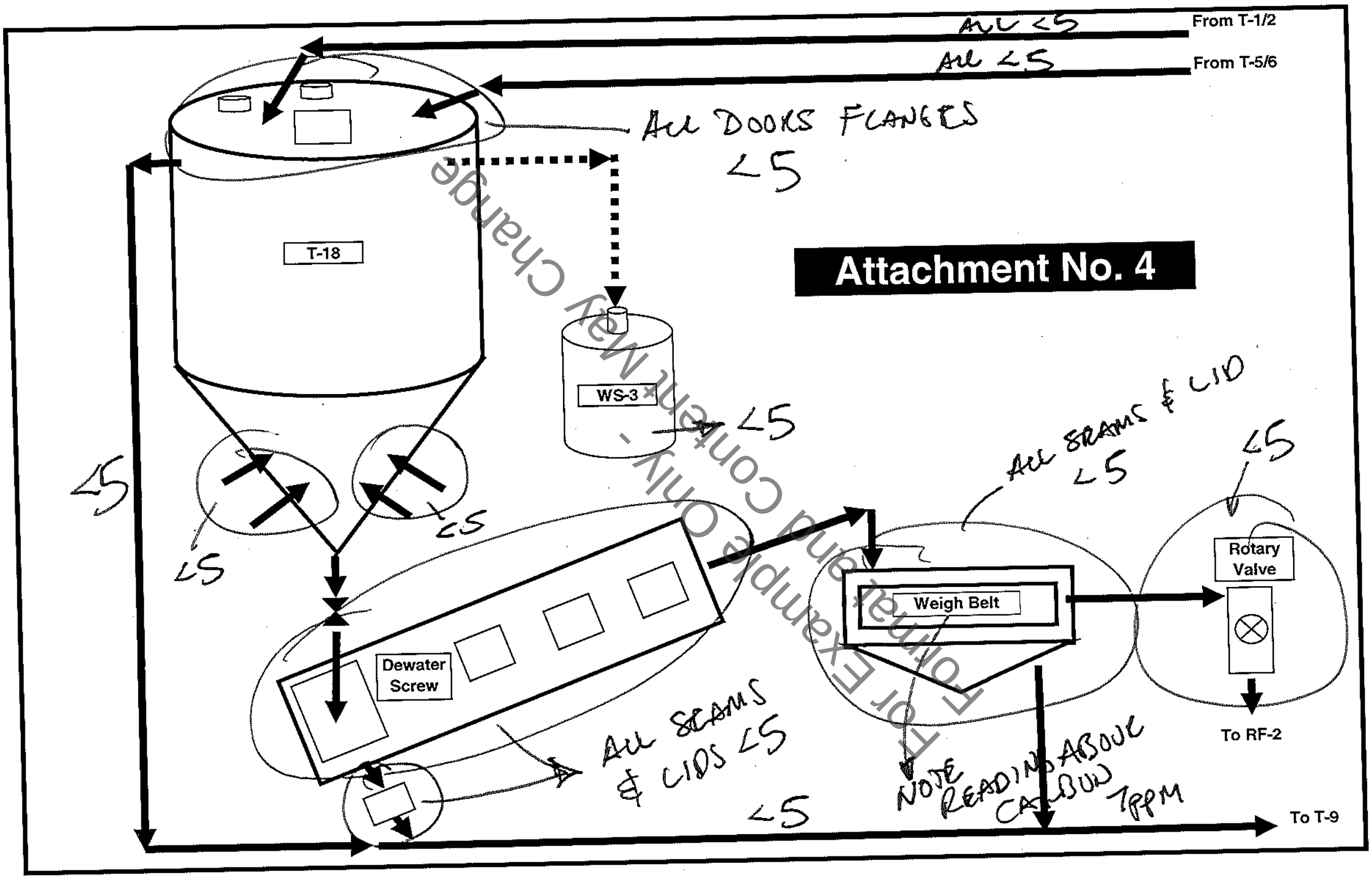
Attachment No. 4
From T-1/2
From T-5/6
T-18
WS-3
Dewater Screw
Weigh Belt
Rotary Valve
To RF-2
To T-9

Foxboro TVA1000A Calibration Record
Calibration Documentation
Serial Number: 11575766

Calibrated By: Monte McCue Date: 6-May-2013

Test No.	Time * Sec.	H/L	Response ppm	Gas Value ppm	Difference ppm
	X	X	0.90	0.5	X
1	4.07	H	9,900	10,000	-100
2	5.11	H	10,100	10,000	100
3	4.67	H	9,800	10,000	-200

* Denotes seconds to reach 90% of the gas value

Methane Values: HIGH 10,000

LOW 0.1

CALCULATIONS: H AVG. = 4.62 seconds

	High
ABSOLUTE MEAN DIFFERENCE	66.67
CALIBRATION ERROR (CE)	0.67%

Calibration Precision Requirements (8.1.2)

1. Calibration must be less than or equal 10% of the gas value
2. Response time must be less than or equal to 30 seconds to reach 90% of gas value
3. The calibration test must be completed prior to placing the analyzer into service and at subsequent 3-month intervals or at next use, whichever is later.

Siemens Water Technologies Corp.

Annual Method 21 Testing

40 CFR 61.343, 345, 349

Tested By: Monte McCue 5/31/12

Instrument Used: Foxboro TVA 1000 FID

No.	Location ID	Date Inspected	Measured Concentration (PPMV)	Background Concentration (PPMV)	Leak Detected? (Y/N) *	Description Of Problem	Corrective Action Taken	Date Of Successful Repair **
1	B-1 Baghouse Doors	5/31/12	<2	<2	N	NA	NA	NA
2	B-1 Dust Collector Blower Outlet Flanges	5/31/12	<2	<2	N	NA	NA	NA
3	H-1 Hopper Lid	5/31/12	<2	<2	N	NA	NA	NA
4	H-1 Hopper Eductor, Piping and Victaulics	5/31/12	<2	<2	N	NA	NA	NA
5	H-1 Hopper Flanges, Piping and Victaulics	5/31/12	<2	<2	N	NA	NA	NA
6	H-1 Hopper Vault Door	5/31/12	<2	<2	N	NA	NA	NA
7	H-2 Hopper Lid	5/31/12	<2	<2	N	NA	NA	NA
8	H-2 Hopper Eductor Flanges and Victaulics	5/31/12	<2	<2	N	NA	NA	NA
9	H-2 Hopper Piping and Victaulics	5/31/12	<2	<2	N	NA	NA	NA
10	H-2 Hopper Vent Piping	5/31/12	<2	<2	N	NA	NA	NA
11	RF-2 Hearth 1 Door West	5/31/12	<2	<2	N	NA	NA	NA
12	RF-2 Seal Welded Flat - between 1 and 2	5/31/12	<2	<2	N	NA	NA	NA
13	RF-2 Hearth 2 Door East	5/31/12	4	<2	N	NA	NA	NA
14	RF-2 Seal Welded Flat - between 2 and 3	5/31/12	<2	<2	N	NA	NA	NA
15	RF-2 Hearth 3 Door East	5/31/12	3	<2	N	NA	NA	NA

*A leak is detected if the container is not sealed closed, or if the instrument reading exceeds 500 ppmv over the background concentration.

**Repair must be completed within 15 days.

Siemens Water Technologies Corp.

Annual Method 21 Testing

40 CFR 61.343, 345, 349

Instrument Used: Foxboro TVA 1000 FID

Tested By: Monte McCue

No.	Location ID	Date Inspected	Measured Concentration (PPMV)	Background Concentration (PPMV)	Leak Detected? (Y/N) *	Description Of Problem	Corrective Action Taken	Date Of Successful Repair **
16	RF-2 Seal Welded Flat - between 3 and 4	5/31/12	4	<2	N	NA	NA	NA
17	RF-2 Hearth 4 Door East	5/31/12	<2	<2	N	NA	NA	NA
18	RF-2 Seal Welded Flat - between 4 and 5	5/31/12	<2	<2	N	NA	NA	NA
19	RF-2 Hearth 5 Door East	5/31/12	<2	<2	N	NA	NA	NA
20	RF-2 Welded Seam on Furnace Bottom	5/31/12	<2	<2	N	NA	NA	NA
21	RF-2 Top Sand Seal	5/31/12	<2	<2	N	NA	NA	NA
22	RF-2 Bottom Sand Seal	5/31/12	<2	<2	N	NA	NA	NA
23	RF-2 Carbon Outlet Piping and Flanges	5/31/12	<2	<2	N	NA	NA	NA
24	T-1 Ball Valves	5/31/12	<2	<2	N	NA	NA	NA
25	T-1 Couplings	5/31/12	<2	<2	N	NA	NA	NA
26	T-1 Eductor & Fittings	5/31/12	<2	<2	N	NA	NA	NA
27	T-1 Fill Slurry Lines & Vics From H-1, H-2	5/31/12	<2	<2	N	NA	NA	NA
28	T-1 Fittings & Valves	5/31/12	<2	<2	N	NA	NA	NA
29	T-1 (SEE ATTACHMENT No. 1)	5/31/12			N	NA	NA	NA
30	T-1 Pressure Relief Valve	5/31/12	<2	<2	N	NA	NA	NA

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Siemens Water Technologies Corp.

Annual Method 21 Testing

40 CFR 61.343, 345, 349

Instrument Used: Foxboro TVA 1000 FID

Tested By: Monte McCue

No.	Location ID	Date Inspected	Measured Concentration (PPMV)	Background Concentration (PPMV)	Leak Detected? (Y/N) *	Description Of Problem	Corrective Action Taken	Date Of Successful Repair **
31	T-1 Slurry Line	5/31/12	<2	<2	N	NA	NA	NA
32	T-1 Tank Flanges	5/31/12	<2	<2	N	NA	NA	NA
33	T-1 Vent Pipe To WS-1	5/31/12	<2	<2	N	NA	NA	NA
34	T-2 Ball Valves	5/31/12	<2	<2	N	NA	NA	NA
35	T-2 Couplings	5/31/12	<2	<2	N	NA	NA	NA
36	T-2 Eductor & Fittings	5/31/12	<2	<2	N	NA	NA	NA
37	T-2 Fill Slurry Lines & Vics From H-1, H-2	5/31/12	<2	<2	N	NA	NA	NA
38	T-2 Fittings & Valves	5/31/12	<2	<2	N	NA	NA	NA
39	T-2 Tank (SEE ATTACHMENT No. 1)	5/31/12			N	NA	NA	NA
40	T-2 Pressure Relief Valve	5/31/12	<2	<2	N	NA	NA	NA
41	T-2 Slurry Line	5/31/12	<2	<2	N	NA	NA	NA
42	T-2 Tank Flanges	5/31/12	<2	<2	N	NA	NA	NA
43	T-2 Vent Pipe To WS-1	5/31/12	<2	<2	N	NA	NA	NA
44	T-5 Ball Valves	5/31/12	<2	<2	N	NA	NA	NA
45	T-5 Couplings	5/31/12	<2	<2	N	NA	NA	NA

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Annual Method 21 Testing

40 CFR 61.343, 345, 349

Tested By: Monte McCue

Instrument Used: Foxboro TVA 1000 FID

No.	Location ID	Date Inspected	Measured Concentration (PPMV)	Background Concentration (PPMV)	Leak Detected? (Y/N) *	Description Of Problem	Corrective Action Taken	Date Of Successful Repair **
46	T-5 Eductor & Fittings	5/31/12	<2	<2	N	NA	NA	NA
47	T-5 Fill Slurry Lines & Vics From H-1, H-2	5/31/12	<2	<2	N	NA	NA	NA
48	T-5 Fittings & Valves	5/31/12	<2	<2	N	NA	NA	NA
49	T-5 (SEE ATTACHMENT No. 2)	5/31/12			N	NA	NA	NA
50	T-5 Pressure Relief Valve	5/31/12	<2	<2	N	NA	NA	NA
51	T-5 Slurry Line	5/31/12	<2	<2	N	NA	NA	NA
52	T-5 Tank Flanges	5/31/12	<2	<2	N	NA	NA	NA
53	T-5 Vent Pipe To WS-1	5/31/12	<2	<2	N	NA	NA	NA
54	T-6 Ball Valves	5/31/12	<2	<2	N	NA	NA	NA
55	T-6 Couplings	5/31/12	<2	<2	N	NA	NA	NA
56	T-6 Eductor & Fittings	5/31/12	<2	<2	N	NA	NA	NA
57	T-6 Fill Slurry Lines & Vics From H-1, H-2	5/31/12	<2	<2	N	NA	NA	NA
58	T-6 Fittings & Valves	5/31/12	<2	<2	N	NA	NA	NA
59	T-6 (SEE ATTACHMENT No. 2)	5/31/12			N	NA	NA	NA
60	T-6 Pressure Relief Valve	5/31/12	<2	<2	N	NA	NA	NA

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Annual Method 21 Testing

40 CFR 61.343, 345, 349

Tested By: Monte McCue

Instrument Used: Foxboro TVA 1000 FID

No.	Location ID	Date Inspected	Measured Concentration (PPMV)	Background Concentration (PPMV)	Leak Detected? (Y/N) *	Description Of Problem	Corrective Action Taken	Date Of Successful Repair **
61	T-6 Slurry Line	5/31/12	<2	<2	N	NA	NA	NA
62	T-6 Tank Flanges	5/31/12	<2	<2	N	NA	NA	NA
63	T-6 Vent Pipe To WS-1	5/31/12	<2	<2	N	NA	NA	NA
64	T-9 (SEE ATTACHMENT No. 3)	5/31/12			N	NA	NA	NA
65	T-9 Level Transmitter	5/31/12	<2	<2	N	NA	NA	NA
66	T-9 Main Bottom Manway Door	5/31/12	<2	<2	N	NA	NA	NA
67	T-9 Return Line and Fittings From T Tanks	5/31/12	<2	<2	N	NA	NA	NA
68	T-9 Return Line and Fittings From T-18	5/31/12	<2	<2	N	NA	NA	NA
69	T-9 Sump Pump Fittings	5/31/12	<2	<2	N	NA	NA	NA
70	T-9 Vent Line and Fittings To WS-1	5/31/12	<2	<2	N	NA	NA	NA
71	T-9/P-4 Pump - Inlet Pipe and Fittings	5/31/12	<2	<2	N	NA	NA	NA
72	T-9/P-5 Pump - Inlet Pipe and Fittings	5/31/12	<2	<2	N	NA	NA	NA
73	T-9/P-4 Pump - Outlet Pipe and Fittings	5/31/12	<2	<2	N	NA	NA	NA
74	T-9/P-5 Pump - Outlet Pipe and Fittings	5/31/12	<2	<2	N	NA	NA	NA
75	H-18 Feed Hose & Couplings	5/31/12	<2	<2	N	NA	NA	NA

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Annual Method 21 Testing

40 CFR 61.343, 345, 349

Tested By: Monte McCue

Instrument Used: Foxboro TVA 1000 FID

No.	Location ID	Date Inspected	Measured Concentration (PPMV)	Background Concentration (PPMV)	Leak Detected? (Y/N) *	Description Of Problem	Corrective Action Taken	Date Of Successful Repair **
76	H-18 Feed Valve & Piping	5/31/12	<2	<2	N	NA	NA	NA
77	H-18 Level Indicators	5/31/12	<2	<2	N	NA	NA	NA
78	H-18 Lids (SEE ATTACHMENT No. 4)	5/31/12			N	NA	NA	NA
79	H-18 Return Line, Couplings and Vics	5/31/12	<2	<2	N	NA	NA	NA
80	H-18 Piping and Couplings From T-Tanks	5/31/12	<2	<2	N	NA	NA	NA
81	WS-1 Hatches & Sample Port	5/31/12	<2	<2	N	NA	NA	NA
82	WS-1 Inlet	5/31/12	150	<2	N	NA	NA	NA
83	WS-1 Outlet	5/31/12	<2	<2	N	NA	NA	NA
84	WS-2 Hatches & Sample Port	5/31/12	<2	<2	N	NA	NA	NA
85	WS-2 Inlet	5/31/12	4	<2	N	NA	NA	NA
86	WS-2 Outlet	5/31/12	<2	<2	N	NA	NA	NA
87	WS-3 Hatches & Sample Port	5/31/12	<2	<2	N	NA	NA	NA
88	WS-3 Inlet	5/31/12	<2	<2	N	NA	NA	NA
89	WS-3 Outlet	5/31/12	<2	<2	N	NA	NA	NA
90	Dewater Screw (SEE ATTACHMENT No. 4)	5/31/12			N	NA	NA	NA

*A leak is detected if the container is not sealed closed, or if the instrument reading exceeds 500 ppmv over the background concentration.

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Annual Method 21 Testing

40 CFR 61.343, 345, 349

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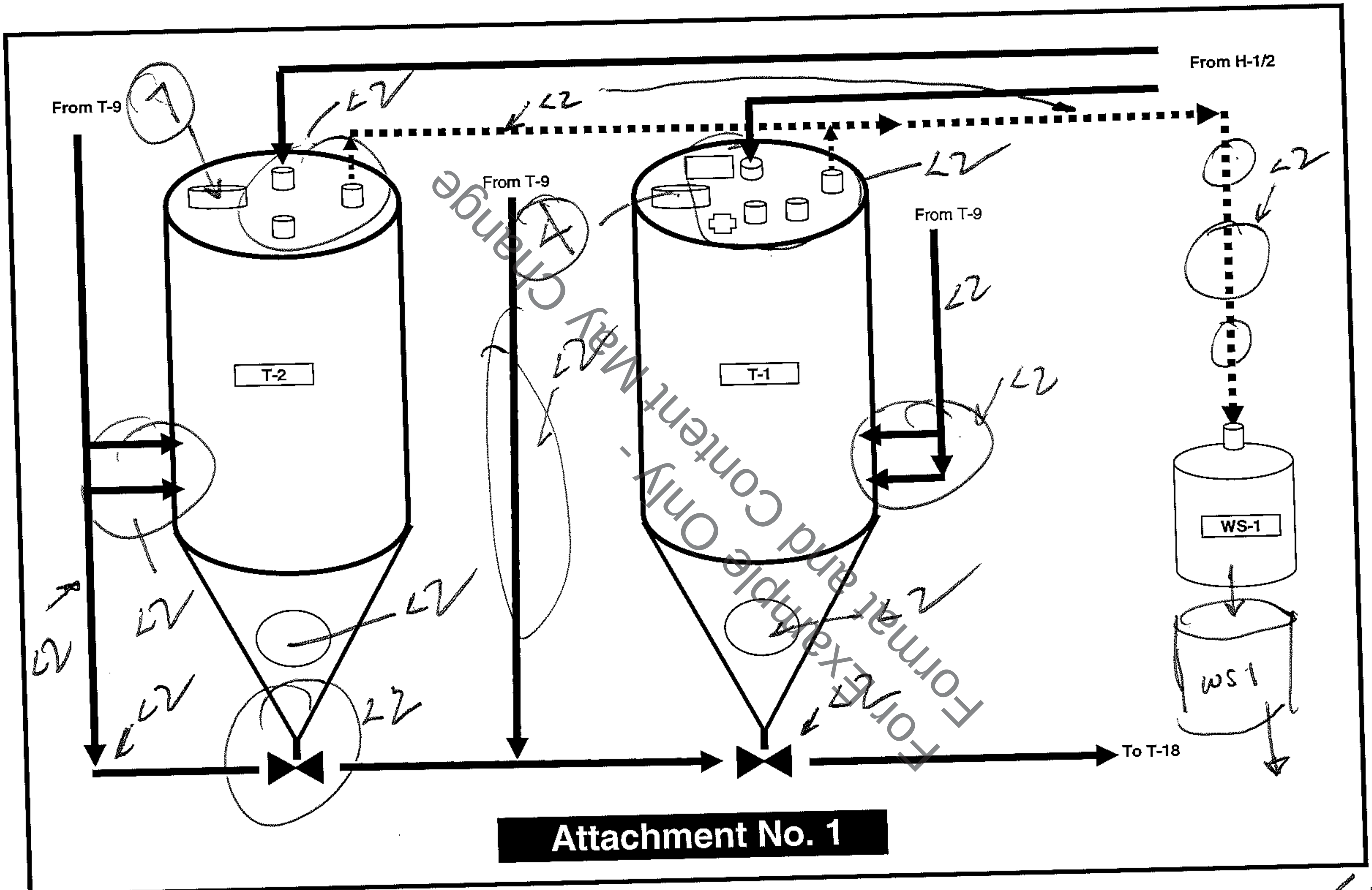
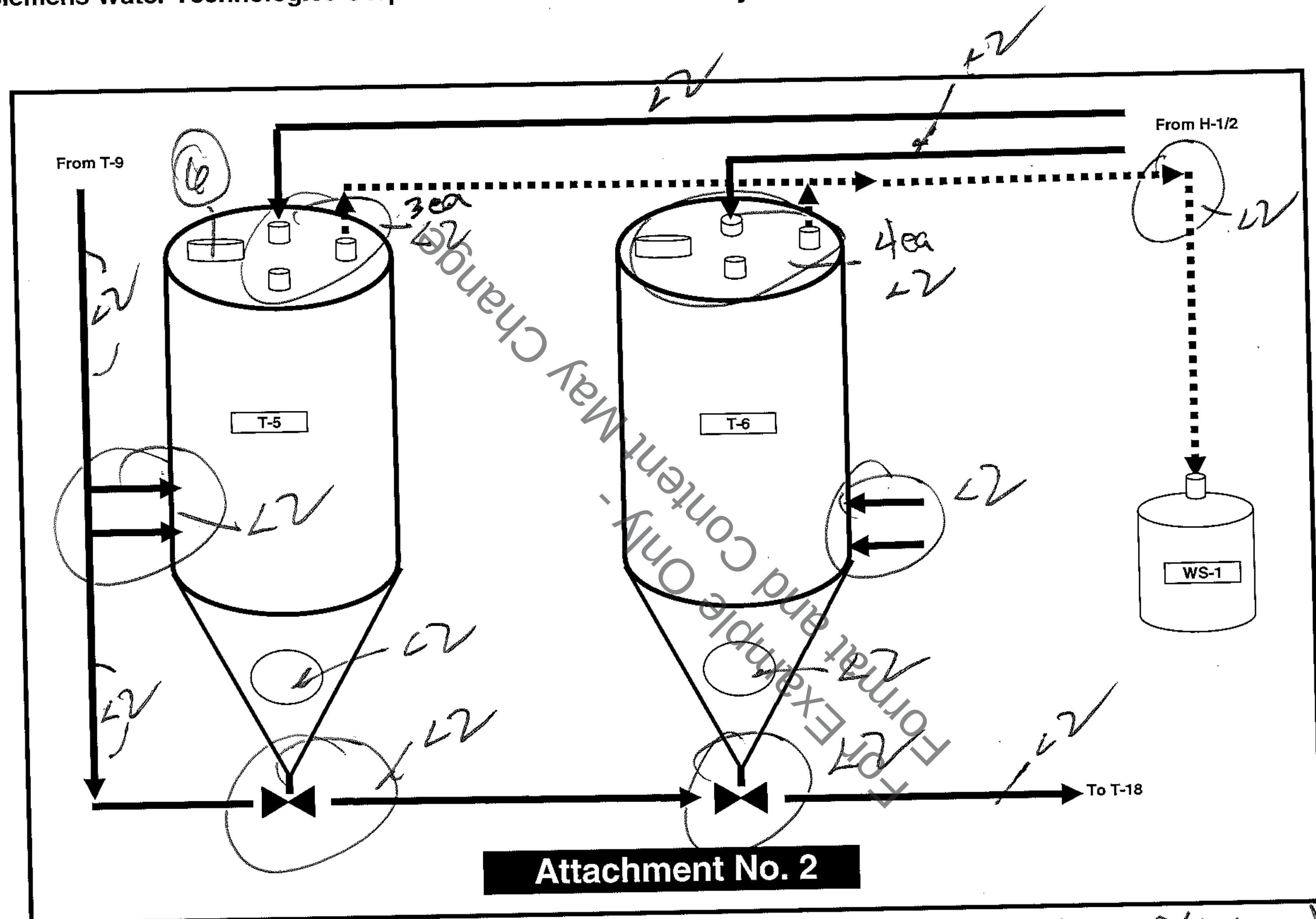
Instrument Used: Foxboro TVA 1000 FID

No.	Location ID	Date Inspected	Measured Concentration (PPMV)	Background Concentration (PPMV)	Leak Detected? (Y/N) *	Description Of Problem	Corrective Action Taken	Date Of Successful Repair **
91	Weigh Belt Feeder (SEE ATTACHMENT No. 4)	5/31/12			N	NA	NA	NA
92	Rotary Valve (SEE ATTACHMENT No. 4)	5/31/12			N	NA	NA	NA
93								
94								
95								
96								
97								
98								
99								
100								

*A leak is detected if the container is not sealed closed, or if the instrument reading exceeds 500 ppmv over the background concentration. **Repair must be completed within 15 days.


From T-9
From T-9
From T-9
From H-1/2
T-2
T-1
WS-1
To T-18
Attachment No. 1

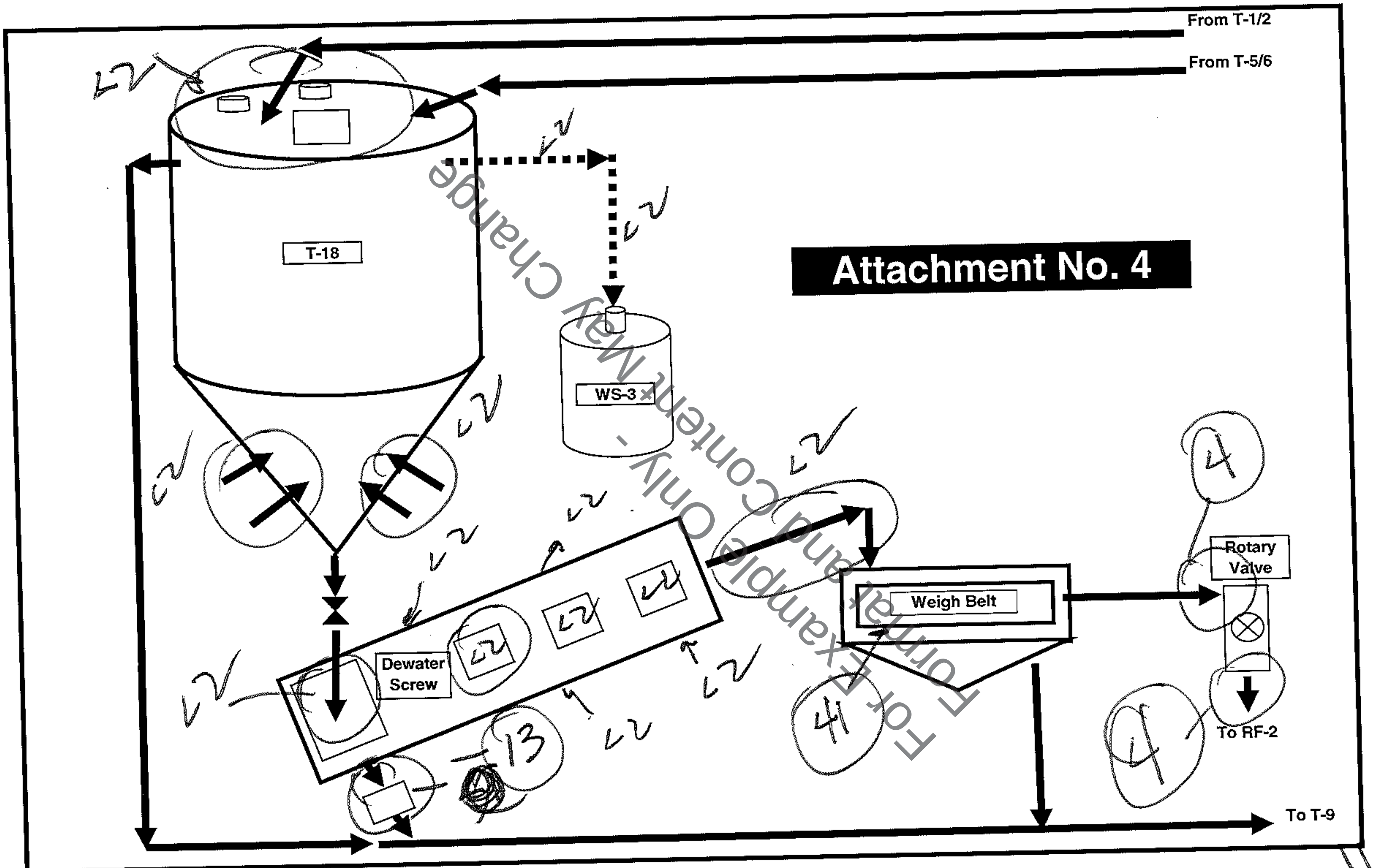
5/31/12



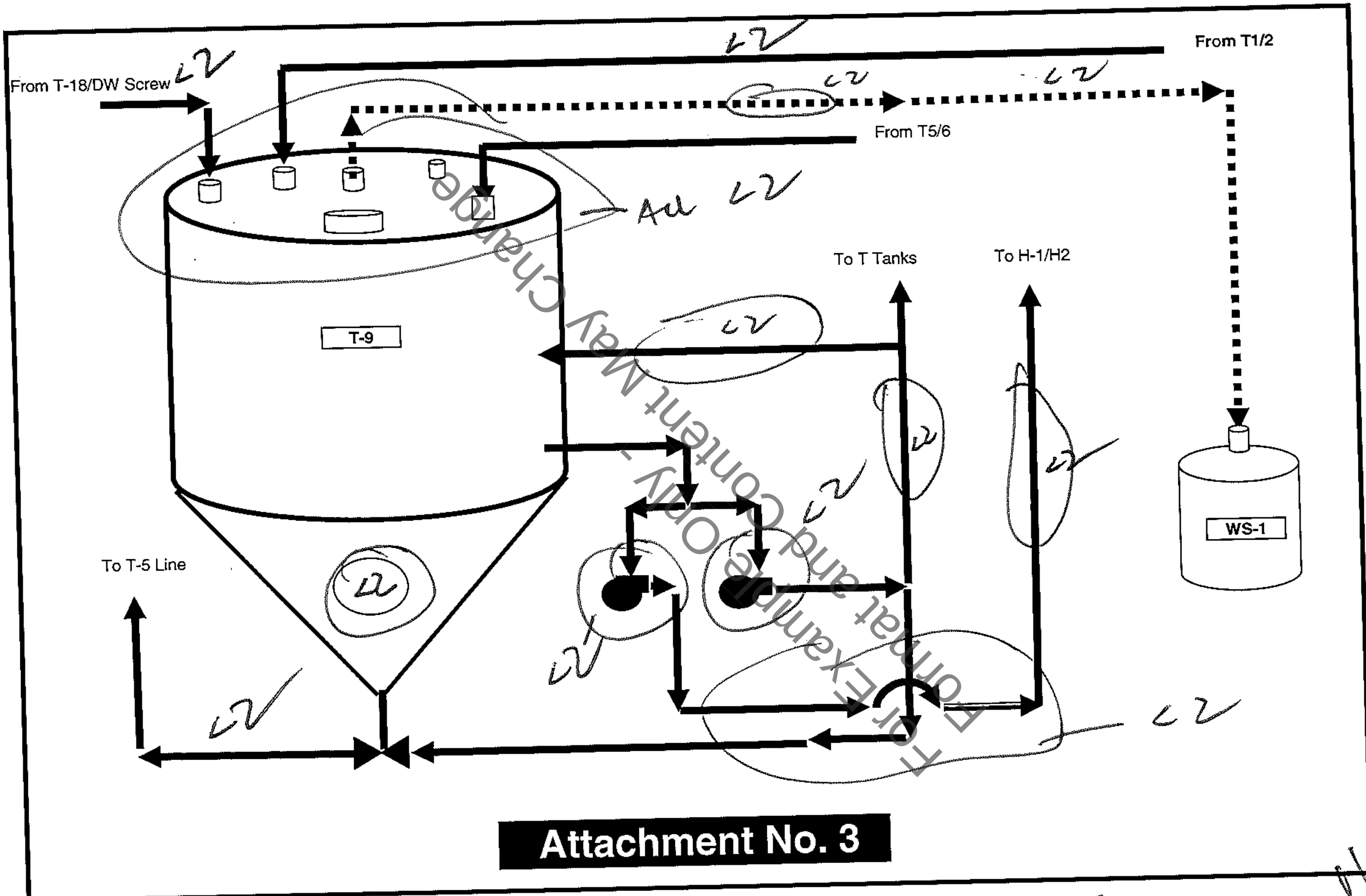
T-1,2,5,6 All lines with exception of to absorber are slurry lines – no class

5/31/12

Attachment No. 4

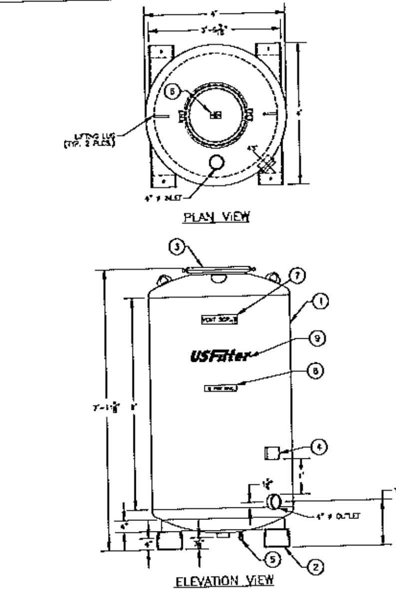


5/31/12



All lines are recycle water and leaks discovered 5/31/12

STD: 2-0600-8X11A | INT'L REF:



LIST OF COMPONENTS

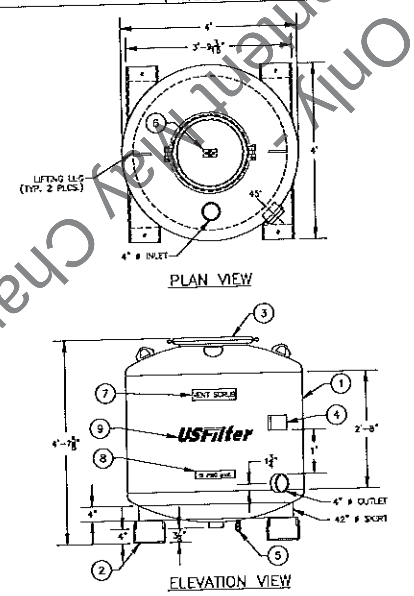
ITEM	QTY	DESCRIPTION
1	1	TANK ASSEMBLY
2	1	SKID ASSEMBLY
3	1	MANWAY ASSEMBLY, 18" DIA.
4	1	PLATE, I.D. & SERIAL NUMBER
5	1	BRONZE BALL VALVE, 3/4"
6	1	DECAL, "FOR VAPOR USE ONLY", 2 1/2" x 4 1/4"
7	2	DECAL, "VENT-SCRUB", WHITE MYLAR
8	2	DECAL, "15 PSIG MAX", WHITE MYLAR
9	2	DECAL, "USFILTER/WESTATES" WHITE MYLAR W/BLUE LETTERS

NOTES:

1. DESIGN DATA:
   48" DIAMETER PRESSURE VESSEL-15 PSIG(MAX)
   VACUUM RATING – 15" HG
   @ 120F–NOT ASME CODE STAMPED FOR VAPOR USE ONLY
   600 CFM
   2000 LBS. ACTIVATED CARBON
2. MATERIAL:
   HEADS – SA 36-HR
   SHELL – SA 36-HR
   SKID – SA 36-HR
3. SURFACE PREPARATION:
   INTERIOR:
   SANDBLAST: SSPC-SP-5 WHITE METAL
   ABRASIVE: GARNET OR GRIT – PROFILE: 1.5–2 MILS
   COATING: 3M BRAND SCOTCHKOTE 134
   THICKNESS: 10–15 DFMT – COLOR: GREEN
   EXTERIOR:
   SANDBLAST: SSPC-SP-10 NEAR WHITE METAL
   ABRASIVE: GARNET OR GRIT – PROFILE: 1.5–2 MILS
   PRIMER COAT: RUST PREVENTATIVE EPOXY PRIMER (CARBOLINE 893)
   THICKNESS: 4–6 DFMT – COLOR: RED
   FINISH COAT: HIGH BUILD POLYURETHANE (CARBOLINE 134HG)
   THICKNESS: 3–4 DFMT – COLOR: WHITE (FED. I.D.#17925)
4. LIFTING REQUIREMENTS:
   5200 LBS. MINIMUM RATING
   EST. WEIGHTS:
   1190 LBS. – EMPTY VESSEL
   3190 LBS. – WITH CARBON

DESIGNER: AJA	DATE: 10-8-01	TITLE: VSC2000 GENERAL ASSEMBLY
CHECKER	DATE	CLIENT
ENGINEER	DATE	USFilter — USFILTER/WESTATES, RED BLUFF, CA, 1-800-795-2654
MANAGER	DATE	
FILE:		PROJECT / DRAWING: VSC2000SHEET1.DWG / SHEET: 1 OF 5 / REV
SCALE: NONE		

STD: 2-0600-8X11A | INT'L REF:



LIST OF COMPONENTS

ITEM	QTY	DESCRIPTION
1	1	TANK ASSEMBLY
2	1	SKID ASSEMBLY
3	1	MANWAY ASSEMBLY, 18" DIA.
4	1	PLATE, I.D. & SERIAL NUMBER
5	1	BRONZE BALL VALVE, 3/4"
6	1	DECAL, "FOR VAPOR USE ONLY", 2 1/2" x 4 1/4"
7	2	DECAL, "VENT-SCRUB", WHITE MYLAR
8	2	DECAL, "15 PSIG MAX", WHITE MYLAR
9	2	DECAL, "USFILTER/WESTATES" WHITE MYLAR W/BLUE LETTERS

NOTES:

1. DESIGN DATA:
   48" DIAMETER PRESSURE VESSEL-15 PSIG(MAX)
   VACUUM RATING – 15" HG
   @ 120F–NOT ASME CODE STAMPED FOR VAPOR USE ONLY
   600 CFM
   1000 LBS. ACTIVATED CARBON
2. MATERIAL:
   HEADS – SA 36-HR
   SHELL – SA 36-HR
   SKID – SA 36-HR
3. SURFACE PREPARATION:
   INTERIOR:
   SANDBLAST: SSPC-SP-5 WHITE METAL
   ABRASIVE: GARNET OR GRIT – PROFILE: 1.5–2 MILS
   COATING: 3M BRAND SCOTCHKOTE 134
   THICKNESS: 10–15 DFMT – COLOR: GREEN
   EXTERIOR:
   SANDBLAST: SSPC-SP-10 NEAR WHITE METAL
   ABRASIVE: GARNET OR GRIT – PROFILE: 1.5–2 MILS
   PRIMER COAT: RUST PREVENTATIVE EPOXY PRIMER (CARBOLINE 893)
   THICKNESS: 4–6 DFMT – COLOR: RED
   FINISH COAT: HIGH BUILD POLYURETHANE (CARBOLINE 134HG)
   THICKNESS: 3–4 DFMT – COLOR: WHITE (FED. I.D.#17925)
4. LIFTING REQUIREMENTS:
   5200 LBS. MINIMUM RATING
   EST. WEIGHTS:
   890 LBS. – EMPTY VESSEL
   1890 LBS. – WITH CARBON

COMPANY CONFIDENTIAL
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DESIGNER: AJA	DATE: 10-8-01	TITLE: VSC1000 GENERAL ASSEMBLY
CHECKER	DATE	CLIENT
ENGINEER	DATE	USFilter — USFILTER/WESTATES, RED BLUFF, CA, 1-800-795-2654
MANAGER	DATE	
FILE:		PROJECT / DRAWING: VSC1000SHEET1.DWG / SHEET: 1 OF 2 / REV
SCALE: NONE		

Foxboro TVA1000A Calibration Record
Calibration Documentation
Serial Number: 11575766

Calibrated By: ___Mccue__________ **Date:** ___5/31/12____

Test No.	Time * Sec.	H/L	Response ppm	Gas Value ppm	Difference ppm
	X	X	0.90	0.5	X
1	4.64	H	9,900	10,000	-100
2	4.5	H	10,100	10,000	100
3	4.12	H	10,100	10,000	100

* Denotes seconds to reach 90% of the gas value

Methane Values:

HIGH 10,000

LOW 0.1

CALCULATIONS: H AVG. = 4.42 seconds

	High
ABSOLUTE MEAN DIFFERENCE	33.33
CALIBRATION ERROR (CE)	0.33%

Calibration Precision Requirements (8.1.2)

1. Calibration must be less than or equal 10% of the gas value
2. Response time must be less than or equal to 30 seconds to reach 90% of gas value
3. The calibration test must be completed prior to placing the analyzer into service and at subsequent 3-month intervals or at next use, whichever is later.

Siemens Water Technologies Corp.

Annual Method 21 Testing

40 CFR 61.343, 345, 349

Instrument Used: Foxboro TVA 1000 FID

Tested By: Monte McCue 5/11/11

No.	Location ID	Date Inspected	Measured Concentration (PPMV)	Background Concentration (PPMV)	Leak Detected? (Y/N) *	Description Of Problem	Corrective Action Taken	Date Of Successful Repair **
1	B-1 Baghouse Doors	5/11/11	<2	<2	N			
2	B-1 Dust Collector Blower Outlet Flanges	5/11/11	<2	<2	N			
3	H-1 Hopper Lid	5/11/11	12	<2	N			
4	H-1 Hopper Eductor, Piping and Victaulics	5/11/11	5	<2	N			
5	H-1 Hopper Flanges, Piping and Victaulics	5/11/11	4	<2	N			
6	H-1 Hopper Vault Door	5/11/11	5	<2	N			
7	H-2 Hopper Lid	5/11/11	<2	<2	N			
8	H-2 Hopper Eductor Flanges and Victaulics	5/11/11	<2	<2	N			
9	H-2 Hopper Piping and Victaulics	5/11/11	<2	<2	N			
10	H-2 Hopper Vent Piping	5/11/11	<2	<2	N			
11	RF-2 Hearth 1 Door West	5/11/11	<2	<2	N			
12	RF-2 Seal Welded Flat - between 1 and 2	5/11/11	<2	<2	N			
13	RF-2 Hearth 2 Door East	5/11/11	<2	<2	N			
14	RF-2 Seal Welded Flat - between 2 and 3	5/11/11	<2	<2	N			
15	RF-2 Hearth 3 Door East	5/11/11	<2	<2	N			

*A leak is detected if the container is not sealed closed, or if the instrument reading exceeds 500 ppmv over the background concentration. **Repair must be completed within 15 days.

Siemens Water Technologies Corp.

Annual Method 21 Testing

40 CFR 61.343, 345, 349

Instrument Used: Foxboro TVA 1000 FID

Tested By: Monte McCue

No.	Location ID	Date Inspected	Measured Concentration (PPMV)	Background Concentration (PPMV)	Leak Detected? (Y/N) *	Description Of Problem	Corrective Action Taken	Date Of Successful Repair **
16	RF-2 Seal Welded Flat - between 3 and 4	5/11/11	<2	<2	N			
17	RF-2 Hearth 4 Door East	5/11/11	<2	<2	N			
18	RF-2 Seal Welded Flat - between 4 and 5	5/11/11	<2	<2	N			
19	RF-2 Hearth 5 Door East	5/11/11	<2	<2	N			
20	RF-2 Welded Seam on Furnace Bottom	5/11/11	<2	<2	N			
21	RF-2 Top Sand Seal	5/11/11	<2	<2	N			
22	RF-2 Bottom Sand Seal	5/11/11	<2	<2	N			
23	RF-2 Carbon Outlet Piping and Flanges	5/11/11	<2	<2	N			
24	T-1 Ball Valves	5/11/11	<2	<2	N			
25	T-1 Couplings	5/11/11	<2	<2	N			
26	T-1 Eductor & Fittings	5/11/11	<2	<2	N			
27	T-1 Fill Slurry Lines & Vics From H-1, H-2	5/11/11	<2	<2	N			
28	T-1 Fittings & Valves	5/11/11	<2	<2	N			
29	T-1 (SEE ATTACHMENT No. 1)	5/11/11		<2	N			
30	T-1 Pressure Relief Valve	5/11/11	<5	<2	N			

*A leak is detected if the container is not sealed closed, or if the instrument reading exceeds 500 ppmv over the background concentration. **Repair must be completed within 15 days.

Siemens Water Technologies Corp.

Annual Method 21 Testing

40 CFR 61.343, 345, 349

Instrument Used: Foxboro TVA 1000 FID

Tested By: Monte McCue

No.	Location ID	Date Inspected	Measured Concentration (PPMV)	Background Concentration (PPMV)	Leak Detected? (Y/N) *	Description Of Problem	Corrective Action Taken	Date Of Successful Repair **
31	T-1 Slurry Line	5/11/11	<2	<2	N			
32	T-1 Tank Flanges	5/11/11	<2	<2	N			
33	T-1 Vent Pipe To WS-1	5/11/11	<2	<2	N			
34	T-2 Ball Valves	5/11/11	<2	<2	N			
35	T-2 Couplings	5/11/11	<2	<2	N			
36	T-2 Eductor & Fittings	5/11/11	<2	<2	N			
37	T-2 Fill Slurry Lines & Vics From H-1, H-2	5/11/11	<2	<2	N			
38	T-2 Fittings & Valves	5/11/11	<2	<2	N			
39	T-2 Tank (SEE ATTACHMENT No. 1)	5/11/11		<2	N			
40	T-2 Pressure Relief Valve	5/11/11	<5	<2	N			
41	T-2 Slurry Line	5/11/11	<2	<2	N			
42	T-2 Tank Flanges	5/11/11	<2	<2	N			
43	T-2 Vent Pipe To WS-1	5/11/11	<2	<2	N			
44	T-5 Ball Valves	5/11/11	<2	<2	N			
45	T-5 Couplings	5/11/11	<2	<2	N			

*A leak is detected if the container is not sealed closed, or if the instrument reading exceeds 500 ppmv over the background concentration. **Repair must be completed within 15 days.

Siemens Water Technologies Corp.

Annual Method 21 Testing

40 CFR 61.343, 345, 349

Instrument Used: Foxboro TVA 1000 FID

Tested By: Monte McCue

No.	Location ID	Date Inspected	Measured Concentration (PPMV)	Background Concentration (PPMV)	Leak Detected? (Y/N) *	Description Of Problem	Corrective Action Taken	Date Of Successful Repair **
46	T-5 Eductor & Fittings	5/11/11	<2	<2	N			
47	T-5 Fill Slurry Lines & Vics From H-1, H-2	5/11/11	<2	<2	N			
48	T-5 Fittings & Valves	5/11/11	<2	<2	N			
49	T-5 (SEE ATTACHMENT No. 2)	5/11/11		<2	N			
50	T-5 Pressure Relief Valve	5/11/11	<5	<2	N			
51	T-5 Slurry Line	5/11/11	<2	<2	N			
52	T-5 Tank Flanges	5/11/11	<2	<2	N			
53	T-5 Vent Pipe To WS-1	5/11/11	<2	<2	N			
54	T-6 Ball Valves	5/11/11	<2	<2	N			
55	T-6 Couplings	5/11/11	<2	<2	N			
56	T-6 Eductor & Fittings	5/11/11	<2	<2	N			
57	T-6 Fill Slurry Lines & Vics From H-1, H-2	5/11/11	<2	<2	N			
58	T-6 Fittings & Valves	5/11/11	<2	<2	N			
59	T-6 (SEE ATTACHMENT No. 2)	5/11/11		<2	N			
60	T-6 Pressure Relief Valve	5/11/11	<5	<2	N			

*A leak is detected if the container is not sealed closed, or if the instrument reading exceeds 500 ppmv over the background concentration. **Repair must be completed within 15 days.

Siemens Water Technologies Corp.

Annual Method 21 Testing

40 CFR 61.343, 345, 349

Instrument Used: Foxboro TVA 1000 FID

Tested By: Monte McCue

No.	Location ID	Date Inspected	Measured Concentration (PPMV)	Background Concentration (PPMV)	Leak Detected? (Y/N) *	Description Of Problem	Corrective Action Taken	Date Of Successful Repair **
61	T-6 Slurry Line	5/11/11	<2	<2	N			
62	T-6 Tank Flanges	5/11/11	<2	<2	N			
63	T-6 Vent Pipe To WS-1	5/11/11	<2	<2	N			
64	T-9 (SEE ATTACHMENT No. 3)	5/11/11		<2	N			
65	T-9 Level Transmitter	5/11/11	<3	<2	N			
66	T-9 Main Bottom Manway Door	5/11/11	<2	<2	N			
67	T-9 Return Line and Fittings From T Tanks	5/11/11	<2	<2	N			
68	T-9 Return Line and Fittings From T-18	5/11/11	<2	<2	N			
69	T-9 Sump Pump Fittings	5/11/11	<2	<2	N			
70	T-9 Vent Line and Fittings To WS-1	5/11/11	<4	<2	N			
71	T-9/P-4 Pump - Inlet Pipe and Fittings	5/11/11	<4	<2	N			
72	T-9/P-5 Pump - Inlet Pipe and Fittings	5/11/11	<4	<2	N			
73	T-9/P-4 Pump - Outlet Pipe and Fittings	5/11/11	<3	<2	N			
74	T-9/P-5 Pump - Outlet Pipe and Fittings	5/11/11	<4	<2	N			
75	H-18 Feed Hose & Couplings	5/11/11	<5	<2	N			

*A leak is detected if the container is not sealed closed, or if the instrument reading exceeds 500 ppmv over the background concentration. **Repair must be completed within 15 days.

Siemens Water Technologies Corp.

Annual Method 21 Testing

40 CFR 61.343, 345, 349

Instrument Used: Foxboro TVA 1000 FID

Tested By: Monte McCue

No.	Location ID	Date Inspected	Measured Concentration (PPMV)	Background Concentration (PPMV)	Leak Detected? (Y/N) *	Description Of Problem	Corrective Action Taken	Date Of Successful Repair **
76	H-18 Feed Valve & Piping	5/11/11	<5	<2	N			
77	H-18 Level Indicators	5/11/11	<5	<2	N			
78	H-18 Lids (SEE ATTACHMENT No. 4)	5/11/11		<2	N			
79	H-18 Return Line, Couplings and Vics	5/11/11	<5	<2	N			
80	H-18 Piping and Couplings From T-Tanks	5/11/11	<5	<2	N			
81	WS-1 Hatches & Sample Port	5/11/11	<2	<2	N			
82	WS-1 Inlet	5/11/11	4200	<2	N			
83	WS-1 Outlet	5/11/11	124	<2	N			
84	WS-2 Hatches & Sample Port	5/11/11	<2	<2	N			
85	WS-2 Inlet	5/11/11	<4	<2	N			
86	WS-2 Outlet	5/11/11	<2	<2	N			
87	WS-3 Hatches & Sample Port	5/11/11	<2	<2	N			
88	WS-3 Inlet	5/11/11	<14	<2	N			
89	WS-3 Outlet	5/11/11	<2	<2	N			
90	Dewater Screw (SEE ATTACHMENT No. 4)	5/11/11		<2	N			

*A leak is detected if the container is not sealed closed, or if the instrument reading exceeds 500 ppmv over the background concentration. **Repair must be completed within 15 days.

Siemens Water Technologies Corp.

Annual Method 21 Testing

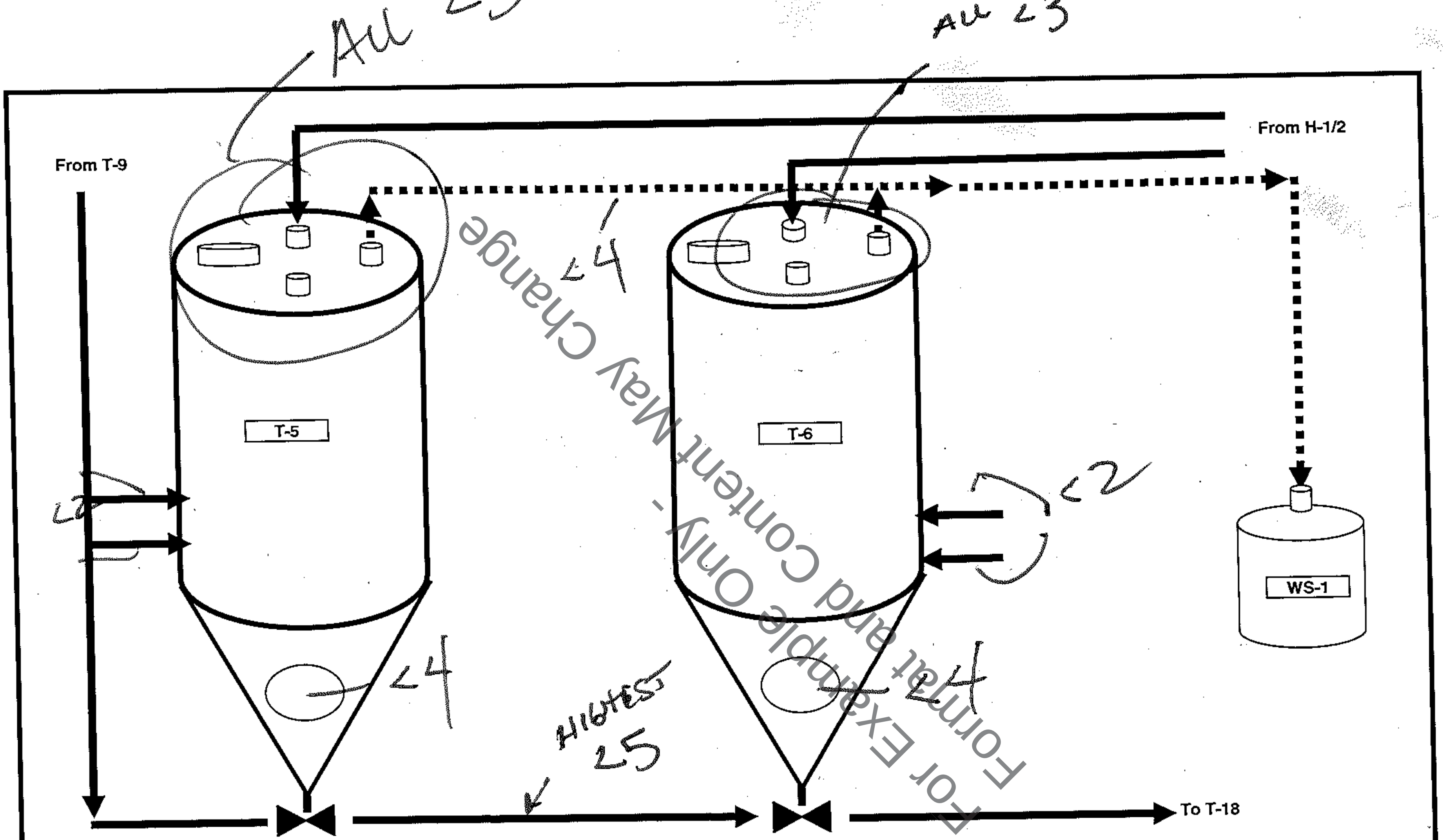
40 CFR 61.343, 345, 349

Instrument Used: Foxboro TVA 1000 FID

Tested By: Monte McCue

No.	Location ID	Date Inspected	Measured Concentration (PPMV)	Background Concentration (PPMV)	Leak Detected? (Y/N) *	Description Of Problem	Corrective Action Taken	Date Of Successful Repair **
91	Weigh Belt Feeder (SEE ATTACHMENT No. 4)	5/11/11		<2	N			
92	Rotary Valve (SEE ATTACHMENT No. 4)	5/11/11		<2	N			
93								
94								
95								
96								
97								
98								
99								
100								

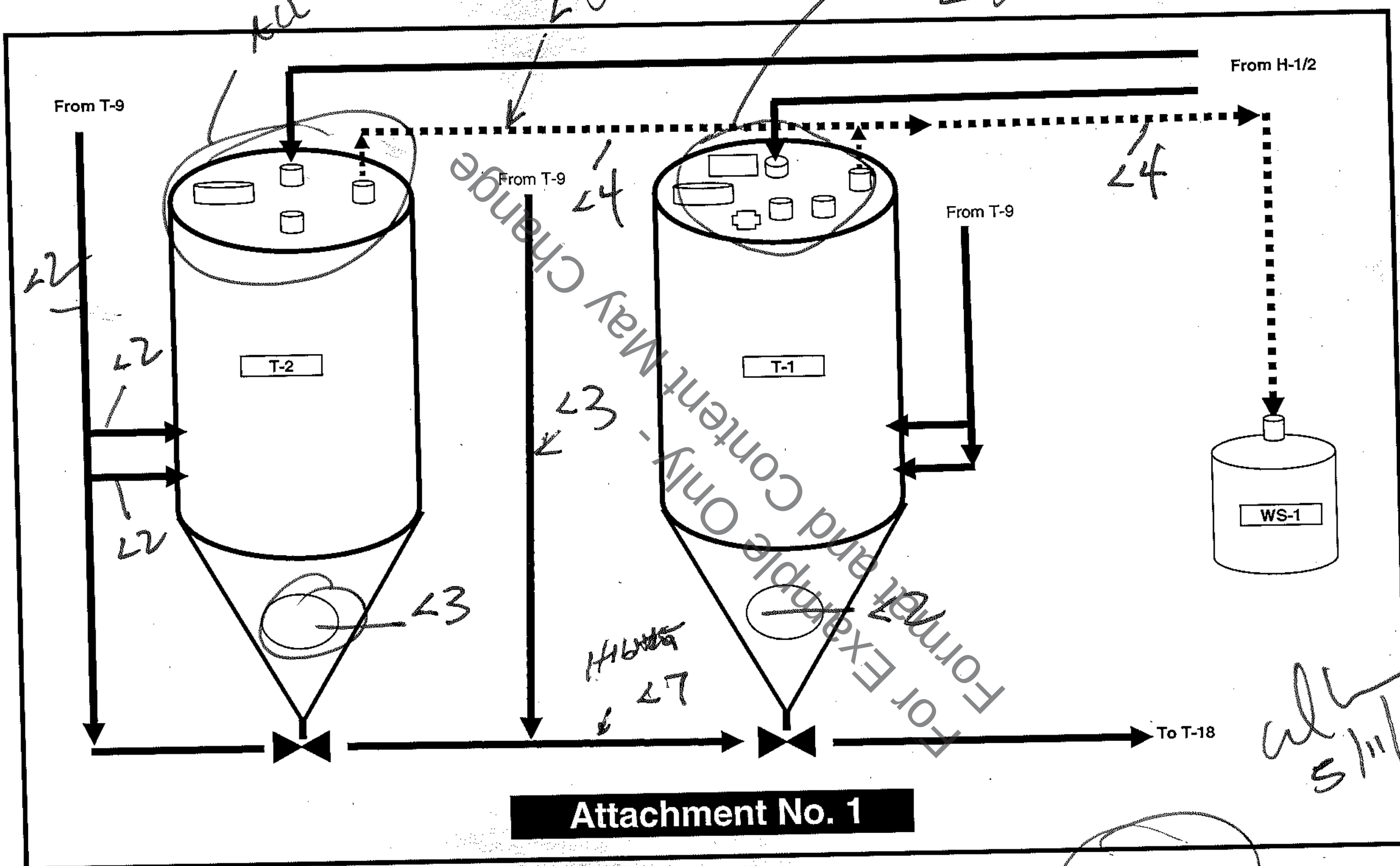
*A leak is detected if the container is not sealed closed, or if the instrument reading exceeds 500 ppmv over the background concentration. **Repair must be completed within 15 days.

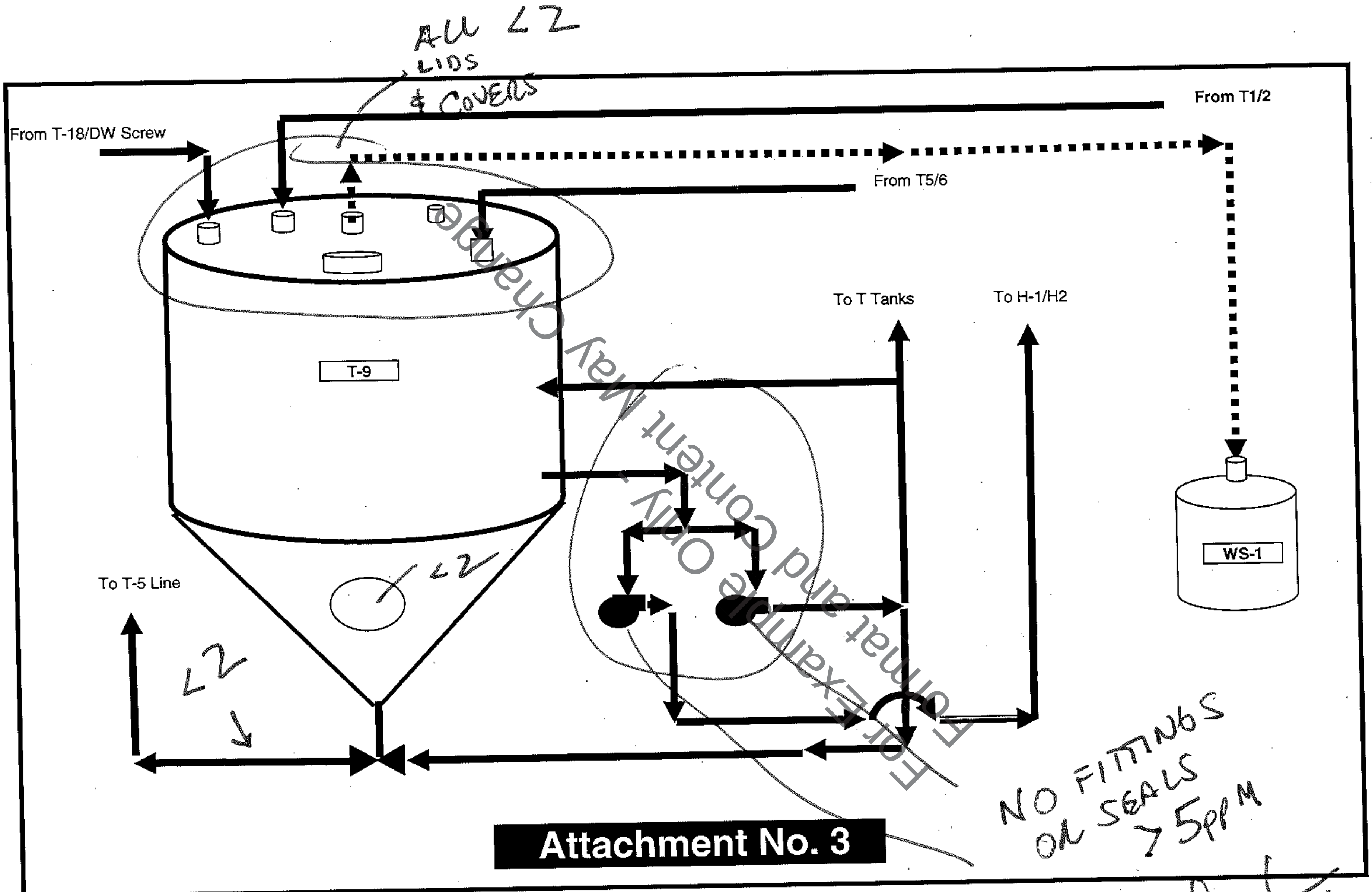


Attachment No. 2

PRV's <5

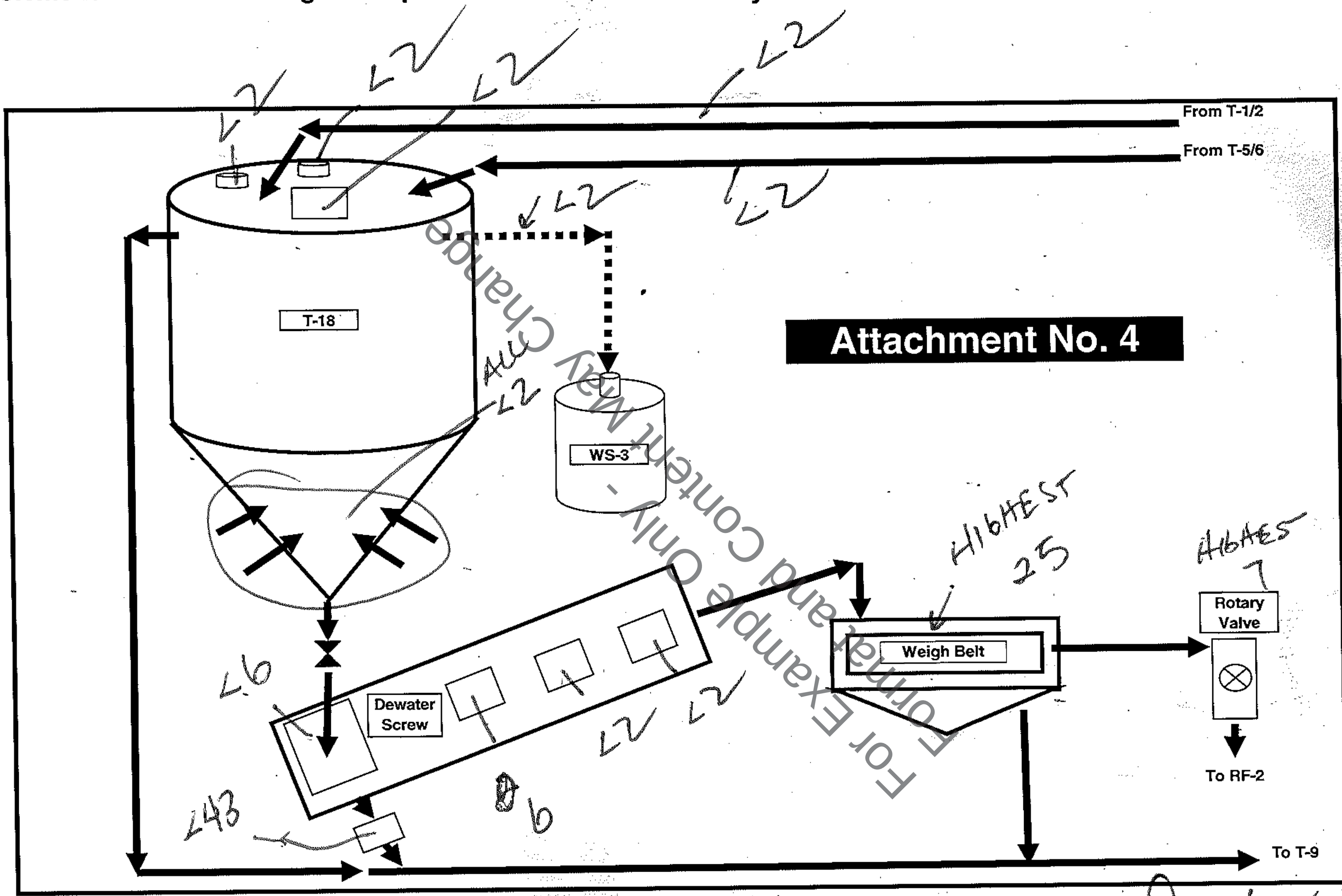
5/11/11


From H-1/2
From T-9
From T-9
From T-9
T-2
T-1
WS-1
To T-18
Attachment No. 1



Attachment No. 3

5/11/11


Attachment No. 4
From T-1/2
From T-5/6
T-18
WS-3
Dewater
Screw
Weigh Belt
Rotary
Valve
To RF-2
To T-9
For Example Only -
Format and Content May Change

5/11/11

Foxboro TVA1000A Calibration Record
Calibration Documentation
Serial Number: 11575766

Calibrated By: ___Mccue/Hargis_________ **Date:** ___5/11/11____

Test No.	Time * Sec.	H/L	Response ppm	Gas Value ppm	Difference ppm
	X	X	0.90	0.5	X
1	4.89	H	10,700	10,000	700
2	4.3	H	10,400	10,000	400
3	4.02	H	10,300	10,000	300

* Denotes seconds to reach 90% of the gas value

Methane Values: HIGH 10,000

LOW 0.1

CALCULATIONS: H AVG. = 4.40 seconds ←

	High
ABSOLUTE MEAN DIFFERENCE	466.67
CALIBRATION ERROR (CE)	4.67% ←

Calibration Precision Requirements (8.1.2)

1. Calibration must be less than or equal 10% of the gas value
2. Response time must be less than or equal to 30 seconds to reach 90% of gas value
3. The calibration test must be completed prior to placing the analyzer into service and at subsequent 3-month intervals or at next use, whichever is later.

APPENDIX G
DEBRIS BIN AND ASSOCIATED DRUMS INSPECTION RECORDS

Debris Bin Testing Summary

Date Shipped	Manifest Number	Bin Number	Accumulation Days	First Addition	Background Reading	Highest Reading Around Lid	Last Load Sealed	Background Reading	Highest Reading Around Lid
1/7/2011	004433832 FLE	**CHHT40039**	**85**	**10/14/2010**	**<5**	**<5**	**1/6/2011**	**<5**	**<15**
3/24/2011	004440076 FLE	**WCPU7021**	**77**	**1/6/2011**	**<5**	**<5**	**3/24/2011**	**<5**	**<5**
5/17/2011	004778198 FLE	**WCPU7020**	**50**	**3/28/2011**	**<5**	**<5**	**5/17/2011**	**<5**	**<5**
8/11/2011	004737673 FLE	**WCPU7020**	**86**	**5/17/2011**	**<5**	**<5**	**8/11/2011**	**<5**	**<5**
10/5/2011	004746409 FLE	**CHHT40028**	**55**	**8/11/2011**	**<5**	**<5**	**10/5/2011**	**<5**	**<5**
11/29/2011	004880992 FLE	**WCPU7020**	**54**	**10/6/2011**	**<5**	**<5**	**11/29/2011**	**<5**	**<5**
12/21/2011	004881344 FLE	**CHHT40014**	**21**	**11/30/2011**	**<5**	**<5**	**12/21/2011**	**<5**	**<13**
3/6/2012	005275460 FLE	**WCPU7020**	**76**	**12/21/2011**	**<5**	**<5**	**3/5/2012**	**<5**	**<5**
5/10/2012	003458248 FLE	**CHIU258131**	**65**	**3/6/2012**	**<5**	**<5**	**4/18/2012**	**<5**	**<5**
6/12/2012	005273077 FLE	**WCPU7020**	**32**	**5/11/2012**	**<5**	**<5**	**6/12/2012**	**<5**	**<5**
9/10/2012	005628064 FLE	**CHHT40028**	**89**	**6/13/2012**	**<5**	**<5**	**9/10/2012**	**<5**	**<5**
10/2/2012	000088280 JJK	**WCPU7021**	**21**	**9/11/2012**	**<5**	**<5**	**10/1/2012**	**<5**	**<10**
10/23/2012	005627241 FLE	**CHHT40039**	**20**	**10/3/2012**	**<5**	**<5**	**10/23/2012**	**<5**	**<5**
11/28/2012	006089784 FLE	**CLHA258174**	**35**	**10/24/2012**	**<5**	**<5**	**11/7/2012**	**<5**	**<5**
1/15/2013	006117584 FLE	**CHHT40028**	**13**	**1/2/2013**	**<5**	**<5**	**1/15/2013**	**<5**	**<5**
3/19/2013	006114999 FLE	**CHHY40002**	**18**	**3/1/2013**	**<5**	**<5**	**3/19/2013**	**<5**	**<5**
5/14/2013	006565465 FLE	**CHHY40001**	**55**	**3/20/2013**	**<5**	**<5**	**5/14/2013**	**<5**	**<5**
6/18/2013	006566529 FLE	**CHHT40082**	**34**	**5/15/2013**	**<5**	**<5**	**6/18/2013**	**<5**	**<5**
8/27/2013	006787221 FLE	**CHHT40067**	**72**	**6/16/2013**	**<5**	**<5**	**8/23/2013**	**<5**	**<5**
9/10/2013	006787272 FLE	**CHHY40001**	**44**	**7/28/2013**	**<5**	**<5**	**8/28/2013**	**<5**	**<5**
10/29/2013	004746586 FLE	**CHHT40235**	**60**	**8/30/2013**	**<5**	**<5**	**9/15/2013**	**<5**	**<5**
11/22/2013	006162808 FLE	**VB27642**	**2**	**11/20/2013**	**<5**	**<5**	**11/21/2013**	**<5**	**<5**
11/25/2013	006162811 FLE	**VB2804**	**5**	**11/20/2013**	**<5**	**<5**	**11/22/2013**	**<5**	**<5**
1/8/2014	006777464 FLE	**CHHT 40245**	**84**	**10/16/2013**	**<5**	**<5**	**1/7/2014**	**<5**	**<5**
1/8/2014	009686688 JJK	**276508**	**49**	**11/20/2013**	**<5**	**<5**	**11/22/2013**	**<5**	**<5**
1/29/2014	006162785 FLE	**V2872**	**70**	**11/20/2013**	**<5**	**<5**	**11/22/2013**	**<5**	**<5**
1/29/2014	006162786 FLE	**VB12084**	**70**	**11/20/2013**	**<5**	**<5**	**11/22/2013**	**<5**	**<5**
2/2/2014	006162790 FLE	**VB27598**	**74**	**11/20/2013**	**<5**	**<5**	**11/22/2013**	**<5**	**<5**
2/2/2014	006162791 FLE	**CHVB0145**	**74**	**11/20/2013**	**<5**	**<5**	**11/22/2013**	**<5**	**<5**
2/5/2014	006162839 FLE	**V2868**	**77**	**11/20/2013**	**<5**	**<5**	**11/22/2013**	**<5**	**<5**
2/5/2014	006162840 FLE	**V2686**	**77**	**11/20/2013**	**<5**	**<5**	**11/22/2013**	**<5**	**<5**
3/24/2014	007512188 FLE	**CHHT 40041**	**76**	**1/7/2014**	**<5**	**<5**	**3/21/2014**	**<5**	**<5**
		CHTT 40218							

Note: To test Bin, the FID is moved all around the seal of the lid. No readings exceed the "less than" valu

APPENDIX H
DESCRIPTIONS OF PROCESS PARAMETERS MONITORED

DESCRIPTION OF PROCESS PARAMETERS MONITORED
EVOQUA WATER TECHNOLOGIES, PARKER, ARIZONA FACILITY
Revised May 2014

PROCESS PARAMETER MONITORED	REASON FOR SELECTING PARAMETER
Temperature Indicators on Afterburner (AB-2)	Temperature is the best parameter for detecting proper afterburner combustion and performance, and assuring compliance with Subpart FF.
Temperature Indicators on hearths 3-5 on Reactivation Furnace (RF-2)	Temperature is the best parameter for detecting proper reactivation furnace combustion and performance, and assuring compliance with Subpart FF.

THE TREATMENT UNIT DESIGN SPECIFICATIONS ARE MAINTAINED IN THE ADMINISTRATION OFFICE

APPENDIX I
CARBON CANISTER REPLACEMENT LOGS

WS-2 (100 days)

Change Out	Last Change	Days	Carbon Used for Change Out
2/2/2012	12/6/2011	58	Batch 2012007 bags 81,82,83,84,85
5/3/2012	2/2/2012	91	Batch 2012037 bags 55,56,57,58,59
8/1/2012	5/3/2012	90	Batch 2012069 bags 95,96,97,98 Batch 2012073 bag 3
9/18/2012	8/1/2012	48	Batch 2012093 bags 14,15,16,17,20
12/10/2012	9/18/2012	83	Batch 2012127 bags, 87,89,90,91,92
3/7/2013	12/10/2012	87	Batch 2013029 bags 32,33,34,35
6/6/2013	3/7/2013	91	Batch 2013073 Bags 56,57,58,59,60
9/5/2013	6/6/2013	91	Batch 2013115 Bags 3,96,97,94,95
12/14/2013	9/5/2013	100	Batch 2013163 bags 34,35,36,37,38
3/18/2014	12/14/2013	94	Batch 2014031 bags 97,98,99,100 Batch 2014033 bag 5
6/25/2014	3/18/2014	99	

4000 lbs

WS-1 (7.8 Days)

Periodic Test Before Changeout	Change Out	Last Change	Days	Day	Carbon Used for Change Out	
	5/14/2012	5/11/2012	3	Mon	Batch 2012041 bags 64,65,66,67	4000
	5/16/2012	5/14/2012	2	Wed	Batch 2012043 bags 14,15,16,17	4000
	5/18/2012	5/16/2012	2	Fri	Batch 2012043 bags 66,67,68,69	4000
	5/21/2012	5/18/2012	3	Mon	Batch 2012043 bags 87,88,89,90	4000
	5/23/2012	5/21/2012	2	Wed	Batch 2012045 bags 69,70,71,72	4000
	5/25/2012	5/23/2012	2	Fri	Batch 2012047 bags 3,4,5,6	4000
	5/28/2012	5/25/2012	3	Mon	Batch 2012047 bags 26,27,28,29	4000
	5/30/2012	5/28/2012	2	Wed	Batch 2012049 bags 1,2,3,4	4000
15 ppm	6/1/2012	5/30/2012	2	Fri	Batch 2012049 bags 22,23,24,25	4000
	6/4/2012	6/1/2012	3	Mon	Batch 2012049 bags 42,43,44,45	4000
10 ppm	6/6/2012	6/4/2012	2	Wed	Batch 2012049 bags 48,49,50,51	4000
	6/8/2012	6/6/2012	2	Fri	Batch 2012049 bags 75,76,77,78	4000
	6/11/2012	6/8/2012	3	Mon	Batch 2012051 bags 33,34,35,36	4000
	6/13/2012	6/11/2012	2	Wed	Batch 2012051 bags 41,42,43,44	4000
	6/15/2012	6/13/2012	2	Fri	Batch 2012051 bags 50,51,52,53	4000
	6/18/2012	6/15/2012	3	Mon	Batch 2012051 bags 60,61,62,63	4000
	6/20/2012	6/18/2012	2	Wed	Batch 2012053 bag 100, Batch 2012055 bags 1,4,5	4000
	6/22/2012	6/20/2012	2	Fri	Batch 2012053 bags 32,33,46,47	4000
	6/25/2012	6/22/2012	3	Mon	Batch 2012055 bags 50,51,56,57	4000
	6/27/2012	6/25/2012	2	Wed	Batch 2012055 bags 96,97,98,99	4000
2 ppm	6/29/2012	6/27/2012	2	Fri	Batch 2012057 bags 82,83,92,93	4000
	7/2/2012	6/29/2012	3	Mon	Batch 2012059 bags 57,58,,61,62	4000
	7/4/2012	7/2/2012	2	Wed	Batch 2012061 bags 16,17,18,19	4000
	7/6/2012	7/4/2012	2	Fri	Batch 2012061 bags 43,44,47,48	4000
14 ppm	7/9/2012	7/6/2012	3	Mon	Batch 2012063 bags 12,13,14,15	4000
	7/11/2012	7/9/2012	2	Wed	Batch 2012061 bags 65,66 Batch 2012063 bags 44,45	4000
	7/13/2012	7/11/2012	2	Fri	Batch 2012065 bgs 4,5,6,7	4000
	7/16/2012	7/13/2012	3	Mon	Batch 2012065 bags 78,79,80,81	4000
	7/18/2012	7/16/2012	2	Wed	Batch 2012065 bags 84,85,100 Batch 2012067 bag 1	4000
	7/20/2012	7/18/2012	2	Fri	Batch 2012067 bags 42,43,44,45	4000
	7/23/2012	7/20/2012	3	Mon	Batch 2012067 bags 62,63,64,65	4000
	7/25/2012	7/23/2012	2	Wed	Batch 2012069 bags 28,29,30,31	4000
	7/27/2012	7/25/2012	2	Fri	Batch 2012069 bags 93,94,95,96	4000
	7/30/2012	7/27/2012	3	Mon	Batch 2012069 bags 97,98,99,100	4000
5 ppm	8/1/2012	7/30/2012	2	Wed	Batch 2012073 bags 2,4,5,6	4000
	8/3/2012	8/1/2012	2	Fri	Batch 2012073 bags 38,39,40,41	4000
	8/6/2012	8/3/2012	3	Mon	Batch 2012073 bags 49,50,51,52	4000
	8/8/2012	8/6/2012	2	Wed	Batch 2012075 bags 63,64,65,66	4000
	8/10/2012	8/8/2012	2	Fri	Batch 2012077 bags 11,12,13,14	4000
	8/13/2012	8/10/2012	3	Mon	Batch 2012077 bags 61,62,63,64	4000
	8/15/2012	8/13/2012	2	Wed	Batch 2012079 bags 3,4,5,6	4000
	8/17/2012	8/15/2012	2	Fri	Batch 2012079 bags 53,54,55,56	4000
115 ppm	8/20/2012	8/17/2012	3	Mon	Batch 2012079 bags 83,84 Batch 2012081 bags 15,16	4000
	8/22/2012	8/20/2012	2	Wed	Batch 2012081 bags 57,58,59,60	4000
	8/24/2012	8/22/2012	2	Fri	Batch 2012083 bags 1,2,3,4	4000
	8/27/2012	8/24/2012	3	Mon	Batch 2012083 bags 37,38,43,44	4000
	8/29/2012	8/27/2012	2	Wed	Batch 2012083 bags 89,90,91,92	4000
	8/31/2012	8/29/2012	2	Fri	Batch 2012085 bags 45,46,47,48	4000
	9/3/2012	8/31/2012	3	Mon	Batch 2012085 bags 45,46,47,48	4000
	9/5/2012	9/3/2012	2	Wed	Batch 2012085 bags 52,53,54,55	4000
	9/7/2012	9/5/2012	2	Fri	Batch 2012087 bags 96,97,98,99	4000
25 ppm	9/10/2012	9/7/2012	3	Mon	Batch 2012089 bags 51,52,53,54	4000
	9/12/2012	9/10/2012	2	Wed	Batch 2012089 bags 76,77,74,75	4000
	9/14/2012	9/12/2012	2	Fri	Batch 2012089 bags 90,91,92,93	4000
	9/17/2012	9/14/2012	3	Mon	Batch 2012091 bags 16,17,18,19	4000
	9/19/2012	9/17/2012	2	Wed	Batch 2012091 bags 90,91 Batch 2012093 bags 10,11	4000
10 ppm	9/21/2012	9/19/2012	2	Fri	Batch 2012093 bags 93,94,95,96	4000
	9/24/2012	9/21/2012	3	Mon	Batch 2012095 bags 15,16,17,18	4000
	9/26/2012	9/24/2012	2	Wed	Batch 2012093 bags 91,92,97,98	4000
	9/28/2012	9/26/2012	2	Fri	Batch 2012095 bags 5,6,7,8	4000
	10/1/2012	9/28/2012	3	Mon	Batch 2012095 bags 61,62,63,64	4000
	10/3/2012	10/1/2012	2	Wed	Batch 2012097 bags 49,50,81,82	4000
	10/5/2012	10/3/2012	2	Fri	Batch 2012097 bags 60,61,62,63	4000
	10/8/2012	10/5/2012	3	Mon	Batch 2012099 bags 28,29,30,31	4000
12 ppm	10/10/2012	10/8/2012	2	Wed	Batch 2012099 bags 44,45,46,47	4000
	10/12/2012	10/10/2012	2	Fri	Batch 2012101 bags 88,89,90,91	4000
	10/15/2012	10/12/2012	3	Mon	Batch 2012101 bag 100 Batch 2012103 bags 1,2,3	4000
	10/17/2012	10/15/2012	2	Wed	Batch 2012013 bags 46,47,48,49	4000
	10/19/2012	10/17/2012	2	Fri	Batch 2012103 bags 81,82,83,84	4000
	10/22/2012	10/19/2012	3	Mon	Batch 2012105 bags 50,51,52,53	4000
	10/24/2012	10/22/2012	2	Wed	Batch 2012105 bags 26,27,28,29	4000
	10/26/2012	10/24/2012	2	Fri	Batch 2012107, bags 46,47,50,51	4000
	10/29/2012	10/26/2012	3	Mon	Batch 2012107 bag 100 Batch 2012109 bags 1,4,5	4000
	10/31/2012	10/29/2012	2	Wed	Batch 2012109 bags 70,71,72,73	4000
	11/2/2012	10/31/2012	2	Fri	Batch 2012111 bags 8,9,10,11	4000
45 ppm	11/5/2012	11/2/2012	3	Mon	Batch 2012111 bags 25,26,27,28	4000
	11/7/2012	11/5/2012	2	Wed	Batch 2012113 bags 55,56,57,58	4000
	11/9/2012	11/7/2012	2	Fri	Batch 2012113 bags 97,98,99,100	4000
	11/12/2012	11/9/2012	3	Mon	Batch 2012115 bags 39,40,41,42	4000
	11/14/2012	11/12/2012	2	Wed	Batch 2012117 bags 38,39,40,41	4000
	11/16/2012	11/14/2012	2	Fri	Batch 2012115 bags 91,92,93,94	4000
	11/19/2012	11/16/2012	3	Mon	Batch 2012119 bags 1,2,23,24	4000
	11/21/2012	11/19/2012	2	Wed	Batch 2012121 bags 11,12,13,14	4000
	11/23/2012	11/21/2012	2	Fri	Batch 2012121 bags 15,16,17,18	4000
	11/26/2012	11/23/2012	3	Mon	Batch 2012121 bags 53,54,55,56,	4000

4000 lbs

WS-1 (7.8 Days)

Periodic Test Before Changeout	Change Out	Last Change	Days	Day	Carbon Used for Change Out	
223 ppm	11/28/2012	11/26/2012	2	Wed	Batch 2012123 bags 1,2,3,4	4000
	11/30/2012	11/28/2012	2	Fri	Batch 2012123 bags 47,48,49,50	4000
	12/3/2012	11/30/2012	3	Mon	Batch 2012123 bags 87,88,89,90	4000
	12/5/2012	12/3/2012	2	Wed	Batch 2012125 bags 52,53,68,69	4000
	12/7/2012	12/5/2012	2	Fri	Batch 2012127 bags 16,17,18,19	4000
	12/10/2012	12/7/2012	3	Mon	Batch 2012127 bags 93,94,95,96	4000
<2 ppm	12/12/2012	12/10/2012	2	Wed	Batch 2012129 bags 27,28,29,30	4000
	12/14/2012	12/12/2012	2	Fri	Batch 2012129 bags 9,96,97,98	4000
	12/17/2012	12/14/2012	3	Mon	Batch 2012131 bags 3,36,37,38	4000
	12/19/2012	12/17/2012	2	Wed	Batch 2012131 bags 96,97,98 Batch 2012129 bag 60	4000
	12/21/2012	12/19/2012	2	Fri	Batch 2012133 bags 51,52,53,54	4000
	12/24/2012	12/21/2012	3	Mon	Batch 2012133 bags 75,76,77,78	4000
	12/26/2012	12/24/2012	2	Wed	Batch 2012135 bags 21,22,23,24	4000
	12/28/2012	12/26/2012	2	Fri	Batch 2012135 bags 25,26,27,28	4000
	12/31/2012	12/28/2012	3	Mon	Batch 2012135 bags 17,18,19,20	4000
19 ppm	1/2/2013	12/31/2012	2	Wed	Batch 2012135 bags 67,68,69,70	4000
	1/4/2013	1/2/2013	2	Fri	Batch 2012135 bags 97,97,73,74	4000
	1/7/2013	1/4/2013	3	Mon	Batch 2013001 bags 93,94,95,96	4000
	1/9/2013	1/7/2013	2	Wed	Batch 2013001 bags 71,72,73,74	4000
	1/11/2013	1/9/2013	2	Fri	Batch 2013003 bags 41,42,43,44	4000
	1/14/2013	1/11/2013	3	Mon	Batch 2013005 bags 17,18,19,20	4000
	1/16/2013	1/14/2013	2	Wed	Batch 2013005 bags 68,69,70,71	4000
	1/18/2013	1/16/2013	2	Fri	Batch 2013005 bags 64,65,66,67	4000
	1/21/2013	1/18/2013	3	Mon	Batch 2013009 bags 9,10,11,12	4000
	1/23/2013	1/21/2013	2	Wed	Batch 2013009 bags 69,70,71,72	4000
	1/25/2013	1/23/2013	2	Fri	Batch 2013011 bags 35,35 Batch 2013007 bags 47,48	4000
	1/28/2013	1/25/2013	3	Mon	Batch 2013011 bags 97,98,99,100	4000
	1/30/2013	1/28/2013	2	Wed	Batch 2013013 bags 21,22,23,24	4000
5 ppm	2/1/2013	1/30/2013	2	Fri	Batch 2013013 bags 71,72.73.74	4000
	2/4/2013	2/1/2013	3	Mon	Batch 2013015 bags 38.39.40.41	4000
	2/6/2013	2/4/2013	2	Wed	Batch 2013015 bags 69,70,71,72	4000
	2/8/2013	2/6/2013	2	Fri	Batch 2013017 bags 16,17,18,19	4000
	2/11/2013	2/8/2013	3	Mon	Batch 2013017 bags 38,39,40,41	4000
	2/13/2013	2/11/2013	2	Wed	Batch 2013019 bags 30,31,32,33	4000
	2/15/2013	2/13/2013	2	Fri	Batch 2013019 bags 36,37,69,70	4000
	2/18/2013	2/15/2013	3	Mon	Batch 2013019 bags 58,59,60,61	4000
	2/20/2013	2/18/2013	2	Wed	Batch 2013021 bags 8,9,10,11	4000
	2/22/2013	2/20/2013	2	Fri	Batch 2013023 bags 50,51,52,53	4000
	2/25/2013	2/22/2013	3	Mon	Batch 2013025 bags 12,13,14,15	4000
	2/27/2013	2/25/2013	2	Wed	Batch 2013025 bags 16,17,18,19	4000
2 ppm	3/1/2013	2/27/2013	2	Fri	Batch 2013023 bags 68,69 Batch 2013025 bags 99,100	4000
	3/4/2013	3/1/2013	3	Mon	Batch 2013027 bags 82,83,84,85	4000
	3/6/2013	3/4/2013	2	Wed	Batch 2013027 bags 100 Batch 2013029 bags 1,2,3	4000
	3/8/2013	3/6/2013	2	Fri	Batch 2013029 bags 60,61,62,63	4000
	3/11/2013	3/8/2013	3	Mon	Batch 2013031 bags 40,41,42,43	4000
	3/13/2013	3/11/2013	2	Wed	Batch 2013031 bags 12,13,14,15	4000
	3/15/2013	3/13/2013	2	Fri	Batch 2013031 bags 8,9,10,11	4000
	3/18/2013	3/15/2013	3	Mon	Batch 2013033 bags 27,28,29,30	4000
	3/20/2013	3/18/2013	2	Wed	Batch 2013033 bags 67,68,97,98	4000
	3/22/2013	3/20/2013	2	Fri	Batch 2013035 bags 51,2,53,54	4000
	3/25/2013	3/22/2013	3	Mon	Batch 2013037 bags 19,20,21,22	4000
	3/27/2013	3/25/2013	2	Wed	Batch 2013037 bags 87,88,89,90	4000
	3/29/2013	3/27/2013	2	Fri	Barch 2013037 bags 82,83,84,85	4000
	4/1/2013	3/29/2013	3	Mon	Batch 2013039 bags 52,53,54,55	4000
	4/3/2013	4/1/2013	2	Wed	Batch 2013039 bags 88,89,90,91	4000
	4/5/2013	4/3/2013	2	Fri	Batch2013039 bags 84,85,100 Batch 2013041 bag 1	4000
	4/8/2013	4/5/2013	3	Mon	Batch 2013043 bags 1,2,3,4	4000
	4/10/2013	4/8/2013	2	Wed	Batch 2013043 bags 22,23,24,25	4000
	4/12/2013	4/10/2013	2	Fri	Batch 2013045 bags 40,41,42,43	4000
	4/15/2013	4/12/2013	3	Mon	Batch 2013045 bags 62,63,64,65	4000
	4/17/2013	4/15/2013	2	Wed	Batch 2013045 bags 90,91,92,93	4000
	4/19/2013	4/17/2013	2	Fri	Batch 2013047 bags 32,33,34,35	4000
9 ppm	4/22/2013	4/19/2013	3	Mon	Batch 2013047 bags 97,98,99,100	4000
	4/24/2013	4/22/2013	2	Wed	Batch 2013047 bags 87,88,89,90	4000
	4/26/2013	4/24/2013	2	Fri	Batch 2013051 bags 19,20,21,22	4000
	4/29/2013	4/26/2013	3	Mon	Batch 2013053 bags 8,9,10,11	4000
	5/1/2013	4/29/2013	2	Wed	Batch 2013053 bags 34,35,40,41	4000
	5/3/2013	5/1/2013	2	Fri	Batch 2013051 bags 66,67,68,69	4000
25 ppm	5/6/2013	5/3/2013	3	Mon	Batch 2013055 bags 33,34,35,36	4000
	5/8/2013	5/6/2013	2	Wed	Batch 2013055 bags 19,20,21,22	4000
	5/10/2013	5/8/2013	2	Fri	Batch 2013059 bags 20,21,22,23	4000
	5/13/2013	5/10/2013	3	Mon	Batch 2013059 bags 90,91,92,93	4000
	5/15/2013	5/13/2013	2	Wed	Batch 2013061 bags 76,77,78,79	4000
	5/17/2013	5/15/2013	2	Fri	Batch 2013063 bags 36,37,38,39	4000
	5/20/2013	5/17/2013	3	Mon	Batch 2013063 bags 86,87,88,89	4000
	5/22/2013	5/20/2013	2	Wed	Batch 2013067 bags 6,7,8,9	4000
	5/24/2013	5/22/2013	2	Fri	Batch 2013067 bags 34,35,36,37	4000
	5/27/2013	5/24/2013	3	Mon	Batch 2013067 bags 44,45,46,47	4000
	5/29/2013	5/27/2013	2	Wed	Batch 2013069 bags 72,73,74,75	4000
	5/31/2013	5/29/2013	2	Fri	Batch 2013069 bags 66,67,94,95	4000
12 ppm	6/3/2013	5/31/2013	3	Mon	Batch 2013071 bags 81,82,83,84	4000
	6/5/2013	6/3/2013	2	Wed	Batch 2013073 bags 29,30,31,32	4000
	6/7/2013	6/5/2013	2	Fri	Batch 2013073 bags 63,64,91,92	4000
	6/10/2013	6/7/2013	3	Mon	Batch 2013075 bags 45,46,47,48	4000
	6/12/2013	6/10/2013	2	Wed	Batch 2013075 bags 88,89,90,91	4000

4000 lbs

WS-1 (7.8 Days)

Periodic Test Before Changeout	Change Out	Last Change	Days	Day	Carbon Used for Change Out	
	6/14/2013	6/12/2013	2	Fri	Batch 2013077 bags 30,31,32,33	4000
	6/17/2013	6/14/2013	3	Mon	Batch 2013077 bags 68,69,70,71	4000
	6/19/2013	6/17/2013	2	Wed	Batch 2013079 bags 44,45,46,47	4000
	6/21/2013	6/19/2013	2	Fri	Batch 2013079 bags 94,95,96,97	4000
	6/24/2013	6/21/2013	3	Mon	Batch 2013081 bags 62.63.64.65	4000
	6/26/2013	6/24/2013	2	Wed	Batch 2013083 bags 10,11,12,13	4000
	6/28/2013	6/26/2013	2	Fri	Batch 2013083 bags 44,45,66,67	4000
	7/1/2013	6/28/2013	3	Mon	Batch 2013085 bags 40,41,42,43	4000
	7/3/2013	7/1/2013	2	Wed	Batch 2013085 bags 71,72,73,74	4000
	7/5/2013	7/3/2013	2	Fri	Batch 2013087 bags 36.37.38,39	4000
95 ppm	7/8/2013	7/5/2013	3	Mon	Batch 2013085 bags 96 Batch 2013087 bags 15,50,51	4000
	7/10/2013	7/8/2013	2	Wed	Batch 2013089 bags 70,71,72,73	4000
	7/12/2013	7/10/2013	2	Fri	Batch 2013091 bags 20,21,22,23	4000
	7/15/2013	7/12/2013	3	Mon	Batch 2013093 bags 4,5,6,7	4000
	7/17/2013	7/15/2013	2	Wed	Batch 2013093 bags 56,57,58,59	4000
	7/19/2013	7/17/2013	2	Fri	Batch 2013095 bags 2,3,4,5	4000
	7/22/2013	7/19/2013	3	Mon	Batch 2013095 bags 25,26,27,28	4000
	7/24/2013	7/22/2013	2	Wed	Batch 2013097 bags 1,2 Batch 2013095 bags 99,100	4000
	7/26/2013	7/24/2013	2	Fri	Batch 2013097 bags 50,51,52,53	4000
	7/29/2013	7/26/2013	3	Mon	Batch 2013099 bags 14,15,16,17	4000
	7/31/2013	7/29/2013	2	Wed	Batch 2013099 bags 70,71 Batch 2013097 bags 62,63	4000
	8/2/2013	7/31/2013	2	Fri	Batch 2013101 bags 22,23,24,25	4000
52 ppm	8/5/2013	8/2/2013	3	Mon	Batch 2013101 bags 62,63,64,65	4000
	8/7/2013	8/5/2013	2	Wed	Batch 2013103 bags 45,46,47,48	4000
	8/9/2013	8/7/2013	2	Fri	Batch 2013103 bags 98,99,100 Batch 2013105 bag 1	4000
	8/12/2013	8/9/2013	3	Mon	Batch 2013105 bags 24,25,26,27	4000
	8/14/2013	8/12/2013	2	Wed	Batch 2013105 bags 88,89,90,91	4000
	8/16/2013	8/14/2013	2	Fri	Batch 2013107 bags 24,25,26,27	4000
	8/19/2013	8/16/2013	3	Mon	Batch 2013107 bags 78,79,80,81	4000
	8/21/2013	8/19/2013	2	Wed	Batch 2013109 bags 36,37,38,39	4000
	8/23/2013	8/21/2013	2	Fri	Bath 2013109 bags 75,76,77,78	4000
	8/26/2013	8/23/2013	3	Mon	Batch 2013111 bags 44,45,46,47	4000
	8/28/2013	8/26/2013	2	Wed	Batch 2013111 bags 93,94,95,96	4000
	8/30/2013	8/28/2013	2	Fri	Batch 2013113 bags 43,44,45,46	4000
	9/2/2013	8/30/2013	3	Mon	Batch 2012113 bags 54,65,66,67	4000
	9/4/2013	9/2/2013	2	Wed	Batch 2013115 bags 68,69,70,71	4000
	9/6/2013	9/4/2013	2	Fri	Batch 2013117 bags 18,19,20,21	4000
10 ppm	9/9/2013	9/6/2013	3	Mon	Batch 2013117 bags 70,71,72,73	4000
	9/11/2013	9/9/2013	2	Wed	Batch 2013119 bags 25,26,27,28	4000
	9/13/2013	9/11/2013	2	Fri	Batch 2013119 bags 74,75,76,77	4000
	9/16/2013	9/13/2013	3	Mon	Batch 2013121 bags 47,48,49,50	4000
	9/18/2013	9/16/2013	2	Wed	Batch 2013121 bags 97,98,99,100	4000
	9/20/2013	9/18/2013	2	Fri	Batch 2013123 bags 31,32,33,34	4000
	9/23/2013	9/20/2013	3	Mon	Batch 2013125 bags 30,31,32,33	4000
	9/25/2013	9/23/2013	2	Wed	Batch 2013125 bags 84,85,86,87	4000
	9/27/2013	9/25/2013	2	Fri	Batch 2013127 bags 56,57,58,59	4000
	9/30/2013	9/27/2013	3	Mon	Batch 2013129 bags 44,45,46,47	4000
	10/2/2013	9/30/2013	2	Wed	Batch 2013131 bags 1,2,3,4	4000
	10/4/2013	10/2/2013	2	Fri	Batch 2013131 bags 46,47,48,49	4000
	10/7/2013	10/4/2013	3	Mon	Plant Down - No spent carbon feeding in tanks or furnace	Shutdown
15 ppm	10/9/2013	10/7/2013	2	Wed	Plant Down - No spent carbon feeding in tanks or furnace	Shutdown
	10/11/2013	10/9/2013	2	Fri	Batch 2013131 bags 50,51,52,53	4000
	10/14/2013	10/11/2013	3	Mon	Batch 2013131 bags 70,71,72,73	4000
	10/16/2013	10/14/2013	2	Wed	Batch 2013131 bags 96,97 Batch 2013133 bags 28,29	4000
	10/18/2013	10/16/2013	2	Fri	Batch 2013133 bags 80,81,82,83	4000
	10/21/2013	10/18/2013	3	Mon	Batch 2013135 bags 78,79,80,81	4000
	10/23/2013	10/21/2013	2	Wed	Batch 2013137 bags 26,27,28,29	4000
	10/25/2013	10/23/2013	2	Fri	Batch 2013137 bags 62,63,64,65	4000
	10/28/2013	10/25/2013	3	Mon	Batch 2013139 bags 66,67,68,69	4000
	10/30/2013	10/28/2013	2	Wed	Batch 2013139 bags 74,75,76,77	4000
	11/1/2013	10/30/2013	2	Fri	Batch 2013141 bags 76,77,78,79	4000
55 ppm	11/4/2013	11/1/2013	3	Mon	Batch 2013143 bags 70,71,72,73	4000
	11/6/2013	11/4/2013	2	Wed	Batch 2013145 bags 23,24,25,26	4000
	11/8/2013	11/6/2013	2	Fri	Batch 2013145 bags 69,70,71,72	4000
	11/11/2013	11/8/2013	3	Mon	Batch 2013147 bags 48,49,50,51	4000
	11/13/2013	11/11/2013	2	Wed	Batch 2013149 bags 11,12,13,14,	4000
	11/15/2013	11/13/2013	2	Fri	Batch 2013149 bags 62,63,64,65	4000
	11/18/2013	11/15/2013	3	Mon	Batch 2013151 bags 3,4,5,6	4000
	11/20/2013	11/18/2013	2	Wed	Batch 2013149 bags 87,88 Batch 2013151 bags 77,78	4000
	11/22/2013	11/20/2013	2	Fri	Batch 2013153 bags 31,32,33,34	4000
	11/25/2013	11/22/2013	3	Mon	Batch 2013153 bags 85,86,87,88	4000
	11/27/2013	11/25/2013	2	Wed	Batch 2013155 bags 38,39,40,41	4000
	11/29/2013	11/27/2013	2	Fri	Batch 2013155 bags 32,33,34,35	4000
	12/2/2013	11/29/2013	3	Mon	Batch 2013157 bags 67,68,69,70	4000
	12/4/2013	12/2/2013	2	Wed	Batch 2013159 bags 25,26,27,28	4000
	12/6/2013	12/4/2013	2	Fri	Batch 2013159 bags 47,48,49,50	4000
	12/9/2013	12/6/2013	3	Mon	Batch 2013161 bags 9,10,11,12	4000
15 ppm	12/11/2013	12/9/2013	2	Wed	Batch 2013161 bags 74,75,76,77	4000
	12/13/2013	12/11/2013	2	Fri	Batch 2013163 bags 8,9,10,11	4000
	12/16/2013	12/13/2013	3	Mon	Batch 2013165 bags 25,26,27,28	4000
	12/18/2013	12/16/2013	2	Wed	Batch 2013165 bags 63,64,65,66	4000
	12/20/2013	12/18/2013	2	Fri	Batch 2013167 bags 11,12,13,14	4000
	12/23/2013	12/20/2013	3	Mon	Batch 2013167, bags 95, 96, 97, 98	4000
	12/25/2013	12/23/2013	2	Wed	Batch 2013167 bag 100, Batch 2013169, 1,2,3	4000
	12/27/2013	12/25/2013	2	Fri	Batch 2013169, bags 64,65,66,67	4000

WS-1 (7.8 Days)

4000 lbs

Periodic Test Before Changeout	Change Out	Last Change	Days	Day	Carbon Used for Change Out	
	12/30/2013	12/27/2013	**3**	Mon	Batch 2013171, bags 34, 35, 36, 37	4000
	1/1/2014	12/30/2013	2	Wed	Batch 2013171 bags 6,7,8,9	4000
	1/3/2014	1/1/2014	2	Fri	Batch 2013171 bags 18,19,20,21	4000
22 ppm	1/6/2014	1/3/2014	**3**	Mon	Batch 2014001 bags 62,63,64,65	4000
	1/8/2014	1/6/2014	2	Wed	Batch 2014001 bags 5,6,22,23	4000
	1/10/2014	1/8/2014	2	Fri	Batch 2014003 bags 32,33,34,35	4000
	1/13/2014	1/10/2014	**3**	Mon	Batch 2014003 bags 32,33,34,35	4000
	1/15/2014	1/13/2014	2	Wed	Batch 2014005 bags 48,49,50,51	4000
	1/17/2014	1/15/2014	2	Fri	Batch 2014007 bags 6,7,10,11	4000
	1/20/2014	1/17/2014	**3**	Mon	Batch 2014007 bags 96,97,98,99	4000
	1/22/2014	1/20/2014	2	Wed	Batch 2014009 bags 30,31,32,33	4000
	1/24/2014	1/22/2014	2	Fri	Batch 2014009 bags 76,77,78,79	4000
13 ppm	1/27/2014	1/24/2014	**3**	Mon	Batch 2014011 bags 54,5,56,57	4000
	1/29/2014	1/27/2014	2	Wed	Batch 2014011 bags 98,99,100 Batch 2014013 bag 1	4000
	1/31/2014	1/29/2014	2	Fri	NA	Shutdown
	2/3/2014	1/31/2014	**3**	Mon	NA	Shutdown
10 ppm	2/5/2014	2/3/2014	2	Wed	NA	Shutdown
	2/7/2014	2/5/2014	2	Fri	Batch 2014013 bags 13,18,19,20	4000
	2/10/2014	2/7/2014	**3**	Mon	Batch 2014013 bags 81,82,83,84	4000
	2/12/2014	2/10/2014	2	Wed	Batch 2014015 bags 31,32,33,34	4000
	2/14/2014	2/12/2014	2	Fri	Batch 2014015 bags 83,84,85,86	4000
	2/17/2014	2/14/2014	**3**	Mon	Batch 2014017 bags 69,70,71,72	4000
	2/19/2014	2/17/2014	2	Wed	Batch 2014019 bags 21,22,23,24	4000
	2/21/2014	2/19/2014	2	Fri	Batch 2014019 bags 67,68,69,70	4000
	2/24/2014	2/21/2014	**3**	Mon	Batch 2014021 bags 77,78,79,80	4000
	2/26/2014	2/24/2014	2	Wed	Batch 2014023 bags 1,2,3,4	4000
	2/28/2014	2/26/2014	2	Fri	Batch 2014023 bags 43,44,45,46	4000
15 ppm	3/3/2014	2/28/2014	**3**	Mon	Batch 2014025 bags 8,9,10,11	4000
	3/5/2014	3/3/2014	2	Wed	Batch 2014025 bags 84,85,86,87	4000
	3/7/2014	3/5/2014	2	Fri	Batch 2014027 bags 31,32,33,34	4000
	3/10/2014	3/7/2014	**3**	Mon	Batch 2014029 bags 2,3,4,5	4000
	3/12/2014	3/10/2014	2	Wed	Batch 2014029 bags 46,47,48,49	4000
	3/14/2014	3/12/2014	2	Fri	Batch 2014029 bags 56,57,76,77	4000
	3/17/2014	3/14/2014	**3**	Mon	Batch 2014031 bags 71,72,73,74	4000
	3/19/2014	3/17/2014	2	Wed	Batch 2014033 bags 20,21,22,23	4000
	3/21/2014	3/19/2014	2	Fri	Batch 2014033 bags 70,71,72,73	4000
	3/24/2014	3/21/2014	**3**	Mon	Batch 2014035 bags 50,51,52,53	4000
	3/26/2014	3/24/2014	2	Wed	Batch 2014035 bag 100 Batch 2014037 bags 1,2,3	4000
	3/28/2014	3/26/2014	2	Fri	Batch 2014037 bags 41,42,43,44	4000
	3/31/2014	3/28/2014	**3**	Mon	Batch 2014039 bags 20,21,22,23	4000
	4/2/2014	3/31/2014	2	Wed	Batch 2014039 bags 85,86,87,88	4000
	4/4/2014	4/2/2014	2	Fri	Batch 2014041 bags 41,42,43,44	4000
	4/7/2014	4/4/2014	**3**	Mon	Batch 2014043 bags 11,12,16,14	4000
	4/9/2014	4/7/2014	2	Wed	Batch 2014043 bags 61,62,63,64	4000
	4/11/2014	4/9/2014	2	Fri	Batch 2014043 bags 97,98,99,100	4000
	4/14/2014	4/11/2014	**3**	Mon	Batch 2014045 bags 81,82,83,84	4000
	4/16/2014	4/14/2014	2	Wed	Batch 2014047 bags 23,24,25,26	4000
	4/18/2014	4/16/2014	2	Fri	Batch 2014047 bags 77,78,79,80	4000
26 ppm	4/21/2014	4/18/2014	**3**	Mon	Batch 2014049 bags 43,44,45,46	4000
	4/23/2014	4/21/2014	2	Wed	Batch 2014049 bags 73,74,75,76	4000
	4/25/2014	4/23/2014	2	Fri	Batch 2014051 bags 19,20,21,22	4000
	4/28/2014	4/25/2014	**3**	Mon	Batch 2014053 bags 1,2,3,4	4000
	4/30/2014	4/28/2014	2	Wed	Batch 2014053 bags 43,44,45,46	4000
	5/2/2014	4/30/2014	2	Fri	Batch 2014055 bags 17,18,19,20	4000
	5/5/2014	5/2/2014	**3**	Mon	Batch 2014055 bags 38,39,40,41	4000
	5/7/2014	5/5/2014	2	Wed	Batch 2014057 bags 57,58,59,60	4000
	5/9/2014	5/7/2014	2	Fri	Batch 2014059 bags 15,16,17,18	4000
	5/12/2014	5/9/2014	**3**	Mon	Batch 2014059 bags 93,94,95,96	4000
	5/14/2014	5/12/2014	2	Wed	Batch 2014061 bags 23,24,25,26	4000
	5/16/2014	5/14/2014	2	Fri	Batch 2014061 bags 67,68,69,70	4000

1000 lbs

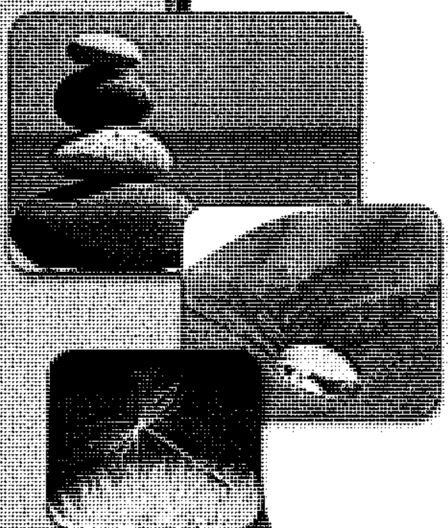
WS-3 (38 days)

Periodic Test Before Changeout	Change Out	Last Change	Days	Carbon Used for Change Out	
<2 ppm	6/1/2012	5/1/2012	31	2012047 Bag 98	1000
<2 ppm	7/1/2012	6/1/2012	30	2012059 Bag 33	1000
<2 ppm	8/1/2012	7/1/2012	31	2012073 Bag 1	1000
<2 ppm	8/31/2012	8/1/2012	30	Batch 2012 Bag 44	1000
<2 ppm	10/2/2012	8/31/2012	32	Batch 2012097 Bag 53	1000
<2 ppm	11/2/2012	10/2/2012	31	Batch 2012111 Bag 14	1000
<2 ppm	12/2/2012	11/2/2012	30	Batch 2012123 Bag 86	1000
<2 ppm	1/2/2013	12/2/2012	31	Batch 2012135 Bag 15	1000
<2 ppm	1/30/2013	1/2/2013	28	Batch 2013013 Bag 63	1000
<2 ppm	3/1/2013	1/30/2013	30	Batch 2013027 Bag 1	1000
<2 ppm	4/1/2013	3/1/2013	31	Batch 2013039 Bag 30	1000
<2 ppm	5/2/2013	4/1/2013	31	Batch 20130053 Bag 96	1000
<2 ppm	5/31/2013	5/2/2013	29	Batch 2013069 Bag 96	1000
<2 ppm	7/1/2013	5/31/2013	31	Batch 2013083 Bag 44	1000
<2 ppm	8/5/2013	7/1/2013	35	Batch 2013103 Bag 6	1000
<2 ppm	8/30/2013	8/5/2013	25	Batch 2013113 Bag 55	1000
<2 ppm	9/30/2013	8/30/2013	31	Batch 2013129 Bag 48	1000
<2 ppm	11/4/2013	9/30/2013	35	Batch 2013143 bag 76	1000
<2 ppm	12/1/2013	11/4/2013	27	Batch 2013155 bag 86	1000
<2 ppm	1/2/2014	12/1/2013	32	Batch 2013171 bag 23	1000
<2 ppm	1/29/2014	1/2/2014	27	Batch 2014011 bag 96	1000
<2 ppm	3/3/2014	1/29/2014	33	Batch 2014025 bag 34	1000
<2 ppm	3/31/2014	3/3/2014	28	Batch 2014039 bag 42	1000
<2 ppm	5/2/2014	3/31/2014	32	Batch 2014055 bag 21	1000

APPENDIX J
BENZENE ANALYTICAL

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING



ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614-5817
Tel: (949)261-1022

TestAmerica Job ID: 440-60604-1
Client Project/Site: Subpart FF Annual Recycle Water

For:
Siemens Industry Inc
PO BOX 3308 (2523 Mutahar St.)
IMA065
Parker, Arizona 85344

Attn: Roy Provins

Authorized for release by:
11/6/2013 9:16:22 PM

Sushmitha Reddy, Project Manager I
(949)261-1022
sushmitha.reddy@testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Sample Summary

Client: Siemens Industry Inc
Project/Site: Subpart FF Annual Recycle Water

TestAmerica Job ID: 440-60604-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
440-60604-1	Subpart FF VOA 40ml (1A)	Water	10/23/13 08:00	10/23/13 11:00
440-60604-2	Subpart FF VOA 40ml (2A)	Water	10/23/13 08:00	10/23/13 11:00
440-60604-3	Subpart FF VOA 40ml (3A)	Water	10/23/13 08:00	10/23/13 11:00
440-60604-4	Subpart FF VOA 40ml (1B)	Water	10/23/13 08:00	10/23/13 11:00
440-60604-5	Subpart FF VOA 40ml (2B)	Water	10/23/13 08:00	10/23/13 11:00
440-60604-6	Subpart FF VOA 40ml (3B)	Water	10/23/13 08:00	10/23/13 11:00
440-60604-7	Subpart FF VOA 40ml (1C)	Water	10/23/13 08:00	10/23/13 11:00
440-60604-8	Subpart FF VOA 40ml (2C)	Water	10/23/13 08:00	10/23/13 11:00
440-60604-9	Subpart FF VOA 40ml (3C)	Water	10/23/13 08:00	10/23/13 11:00
440-60604-10	Subpart FF VOA 40ml (1D)	Water	10/23/13 08:00	10/23/13 11:00
440-60604-11	Subpart FF VOA 40ml (2D)	Water	10/23/13 06:00	10/23/13 11:00
440-60604-12	Subpart FF VOA 40ml (3D)	Water	10/23/13 08:00	10/23/13 11:00
440-60604-13	Extra	Water	10/23/13 08:00	10/23/13 11:00

Job ID: 440-60604-1

Laboratory: TestAmerica Irvine

Narrative

Job Narrative
440-60604-1

Comments
No additional comments.

Receipt
The samples were received on 10/23/2013 11:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.8° C.

GC VOA
No analytical or quality issues were noted.

VOA Prep
No analytical or quality issues were noted.

Client: Siemens Industry Inc
Project/Site: Subpart FF Annual Recycle Water

TestAmerica Job ID: 440-60604-1

1 2 3 4 5 6 7 8 9 10 11 12 13

Client Sample ID: Subpart FF VOA 40ml (1A)

Lab Sample ID: 440-60604-1

Date Collected: 10/23/13 08:00
Date Received: 10/23/13 11:00

Matrix: Water

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	26		8.0		ug/L			10/28/13 21:55	20

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*77*		*65 - 135*		*10/28/13 21:55*	*20*

Client Sample ID: Subpart FF VOA 40ml (2A)

Lab Sample ID: 440-60604-2

Date Collected: 10/23/13 08:00
Date Received: 10/23/13 11:00

Matrix: Water

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	49		8.0		ug/L			11/05/13 12:19	20

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*67*		*65 - 135*		*11/05/13 12:19*	*20*

Client Sample ID: Subpart FF VOA 40ml (3A)

Lab Sample ID: 440-60604-3

Date Collected: 10/23/13 08:00
Date Received: 10/23/13 11:00

Matrix: Water

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	28		8.0		ug/L			11/05/13 13:57	20

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*88*		*65 - 135*		*11/05/13 13:57*	*20*

Client Sample ID: Subpart FF VOA 40ml (1B)

Lab Sample ID: 440-60604-4

Date Collected: 10/23/13 08:00
Date Received: 10/23/13 11:00

Matrix: Water

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	7.7		4.0		ug/L			11/05/13 19:13	10

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*87*		*65 - 135*		*11/05/13 19:13*	*10*

Client Sample ID: Subpart FF VOA 40ml (2B)

Lab Sample ID: 440-60604-5

Date Collected: 10/23/13 08:00
Date Received: 10/23/13 11:00

Matrix: Water

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	8.1		4.0		ug/L			11/05/13 19:42	10

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*87*		*65 - 135*		*11/05/13 19:42*	*10*

1 2 3 4 5 6 7 8 9 10 11 12 13

Client Sample ID: Subpart FF VOA 40ml (3B)

Lab Sample ID: 440-60604-6

Date Collected: 10/23/13 08:00
Date Received: 10/23/13 11:00

Matrix: Water

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	22		8.0		ug/L			11/05/13 15:23	20

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*87*		*65 - 135*		*11/05/13 15:23*	*20*

Client Sample ID: Subpart FF VOA 40ml (1C)

Lab Sample ID: 440-60604-7

Date Collected: 10/23/13 08:00
Date Received: 10/23/13 11:00

Matrix: Water

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	64		8.0		ug/L			11/05/13 15:52	20

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*85*		*65 - 135*		*11/05/13 15:52*	*20*

Client Sample ID: Subpart FF VOA 40ml (2C)

Lab Sample ID: 440-60604-8

Date Collected: 10/23/13 08:00
Date Received: 10/23/13 11:00

Matrix: Water

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	63		8.0		ug/L			11/05/13 20:11	20

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*85*		*65 - 135*		*11/05/13 20:11*	*20*

Client Sample ID: Subpart FF VOA 40ml (3C)

Lab Sample ID: 440-60604-9

Date Collected: 10/23/13 08:00
Date Received: 10/23/13 11:00

Matrix: Water

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	64		8.0		ug/L			11/05/13 16:49	20

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*85*		*65 - 135*		*11/05/13 16:49*	*20*

Client Sample ID: Subpart FF VOA 40ml (1D)

Lab Sample ID: 440-60604-10

Date Collected: 10/23/13 08:00
Date Received: 10/23/13 11:00

Matrix: Water

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	66		4.0		ug/L			11/05/13 17:18	10

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*87*		*65 - 135*		*11/05/13 17:18*	*10*

Client Sample ID: Subpart FF VOA 40ml (2D)

Lab Sample ID: 440-60604-11

Date Collected: 10/23/13 08:00
Date Received: 10/23/13 11:00
Matrix: Water

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	100		40		ug/L			11/05/13 20:39	100

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*77*		*65 - 135*		*11/05/13 20:39*	*100*

Client Sample ID: Subpart FF VOA 40ml (3D)

Lab Sample ID: 440-60604-12

Date Collected: 10/23/13 08:00
Date Received: 10/23/13 11:00
Matrix: Water

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	73		4.0		ug/L			11/05/13 18:15	10

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*87*		*65 - 135*		*11/05/13 18:15*	*10*

Client Sample ID: Extra

Lab Sample ID: 440-60604-13

Date Collected: 10/23/13 08:00
Date Received: 10/23/13 11:00
Matrix: Water

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	85		40		ug/L			11/05/13 21:47	100

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*89*		*65 - 135*		*11/05/13 21:47*	*100*

Method	Method Description	Protocol	Laboratory
8021B	Volatile Organic Compounds (GC)	SW846	TAL IRV

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022

Lab Chronicle

Client: Siemens Industry Inc
Project/Site: Subpart FF Annual Recycle Water

TestAmerica Job ID: 440-60604-1

Client Sample ID: Subpart FF VOA 40ml (1A) — **Lab Sample ID: 440-60604-1**
Date Collected: 10/23/13 08:00 — **Matrix: Water**
Date Received: 10/23/13 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		20	10 mL	10 mL	140765	10/28/13 21:55	TL	TAL IRV

Client Sample ID: Subpart FF VOA 40ml (2A) — **Lab Sample ID: 440-60604-2**
Date Collected: 10/23/13 08:00 — **Matrix: Water**
Date Received: 10/23/13 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		20	10 mL	10 mL	142205	11/05/13 12:19	TL	TAL IRV

Client Sample ID: Subpart FF VOA 40ml (3A) — **Lab Sample ID: 440-60604-3**
Date Collected: 10/23/13 08:00 — **Matrix: Water**
Date Received: 10/23/13 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		20	10 mL	10 mL	142205	11/05/13 13:57	TL	TAL IRV

Client Sample ID: Subpart FF VOA 40ml (1B) — **Lab Sample ID: 440-60604-4**
Date Collected: 10/23/13 08:00 — **Matrix: Water**
Date Received: 10/23/13 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		10	10 mL	10 mL	142205	11/05/13 19:13	TL	TAL IRV

Client Sample ID: Subpart FF VOA 40ml (2B) — **Lab Sample ID: 440-60604-5**
Date Collected: 10/23/13 08:00 — **Matrix: Water**
Date Received: 10/23/13 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		10	10 mL	10 mL	142205	11/05/13 19:42	TL	TAL IRV

Client Sample ID: Subpart FF VOA 40ml (3B) — **Lab Sample ID: 440-60604-6**
Date Collected: 10/23/13 08:00 — **Matrix: Water**
Date Received: 10/23/13 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		20	10 mL	10 mL	142205	11/05/13 15:23	TL	TAL IRV

1 2 3 4 5 6 7 8 9 10 11 12 13

Client Sample ID: Subpart FF VOA 40ml (1C)

Lab Sample ID: 440-60604-7
Date Collected: 10/23/13 08:00
Matrix: Water
Date Received: 10/23/13 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		20	10 mL	10 mL	142205	11/05/13 15:52	TL	TAL IRV

Client Sample ID: Subpart FF VOA 40ml (2C)

Lab Sample ID: 440-60604-8
Date Collected: 10/23/13 08:00
Matrix: Water
Date Received: 10/23/13 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		20	10 mL	10 mL	142205	11/05/13 20:11	TL	TAL IRV

Client Sample ID: Subpart FF VOA 40ml (3C)

Lab Sample ID: 440-60604-9
Date Collected: 10/23/13 08:00
Matrix: Water
Date Received: 10/23/13 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		20	10 mL	10 mL	142205	11/05/13 16:49	TL	TAL IRV

Client Sample ID: Subpart FF VOA 40ml (1D)

Lab Sample ID: 440-60604-10
Date Collected: 10/23/13 08:00
Matrix: Water
Date Received: 10/23/13 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		10	10 mL	10 mL	142205	11/05/13 17:18	TL	TAL IRV

Client Sample ID: Subpart FF VOA 40ml (2D)

Lab Sample ID: 440-60604-11
Date Collected: 10/23/13 08:00
Matrix: Water
Date Received: 10/23/13 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		100	10 mL	10 mL	142205	11/05/13 20:39	TL	TAL IRV

Client Sample ID: Subpart FF VOA 40ml (3D)

Lab Sample ID: 440-60604-12
Date Collected: 10/23/13 08:00
Matrix: Water
Date Received: 10/23/13 11:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		10	10 mL	10 mL	142205	11/05/13 18:15	TL	TAL IRV

Lab Chronicle

Client: Siemens Industry Inc
Project/Site: Subpart FF Annual Recycle Water

TestAmerica Job ID: 440-60604-1

Client Sample ID: Extra
Date Collected: 10/23/13 08:00
Date Received: 10/23/13 11:00

Lab Sample ID: 440-60604-13
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		100	10 mL	10 mL	142205	11/05/13 21:47	TL	TAL IRV

Laboratory References:

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022

Client: Siemens Industry Inc
Project/Site: Subpart FF Annual Recycle Water

TestAmerica Job ID: 440-60604-1

Method: 8021B - Volatile Organic Compounds (GC)

Lab Sample ID: MB 440-140765/6
Matrix: Water
Analysis Batch: 140765

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.40		ug/L			10/28/13 21:26	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*104*		*65 - 135*		*10/28/13 21:26*	*1*

Lab Sample ID: LCS 440-140765/4
Matrix: Water
Analysis Batch: 140765

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	20.0	19.0		ug/L		95	65 - 115

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*108*		*65 - 135*

Lab Sample ID: LCSD 440-140765/5
Matrix: Water
Analysis Batch: 140765

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	20.0	18.9		ug/L		94	65 - 115	1	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*107*		*65 - 135*

Lab Sample ID: 440-60604-1 MS
Matrix: Water
Analysis Batch: 140765

Client Sample ID: Subpart FF VOA 40ml (1A)
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	26		400	369		ug/L		86	60 - 130

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*85*		*65 - 135*

Lab Sample ID: 440-60604-1 MSD
Matrix: Water
Analysis Batch: 140765

Client Sample ID: Subpart FF VOA 40ml (1A)
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	26		400	366		ug/L		85	60 - 130	1	20

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*85*		*65 - 135*

1 2 3 4 5 6 7 8 9 10 11 12 13

Method: 8021B - Volatile Organic Compounds (GC) (Continued)

Lab Sample ID: MB 440-142205/5
Client Sample ID: Method Blank
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 142205

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.40		ug/L			11/05/13 11:50	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*102*		*65 - 135*		*11/05/13 11:50*	*1*

Lab Sample ID: LCS 440-142205/3
Client Sample ID: Lab Control Sample
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 142205

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	20.0	18.8		ug/L		94	85 - 115

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*104*		*65 - 135*

Lab Sample ID: LCSD 440-142205/4
Client Sample ID: Lab Control Sample Dup
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 142205

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	20.0	18.9		ug/L		95	85 - 115	1	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*105*		*65 - 135*

Lab Sample ID: 440-60604-2 MS
Client Sample ID: Subpart FF VOA 40ml (2A)
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 142205

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	49		400	392		ug/L		86	60 - 130

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*82*		*65 - 135*

Lab Sample ID: 440-60604-2 MSD
Client Sample ID: Subpart FF VOA 40ml (2A)
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 142205

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	49		400	478		ug/L		107	60 - 130	20	20

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*72*		*65 - 135*

QC Association Summary

Client: Siemens Industry Inc
Project/Site: Subpart FF Annual Recycle Water

TestAmerica Job ID: 440-60604-1

GC VOA

Analysis Batch: 140765

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-80604-1	Subpart FF VOA 40ml (1A)	Total/NA	Water	8021B	
440-80604-1 MS	Subpart FF VOA 40ml (1A)	Total/NA	Water	8021B	
440-60604-1 MSD	Subpart FF VOA 40ml (1A)	Total/NA	Water	8021B	
LCS 440-140785/4	Lab Control Sample	Total/NA	Water	8021B	
LCSD 440-140765/5	Lab Control Sample Dup	Total/NA	Water	8021B	
MB 440-140765/6	Method Blank	Total/NA	Water	8021B	

Analysis Batch: 142205

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-60604-2	Subpart FF VOA 40ml (2A)	Total/NA	Water	8021B	
440-60604-2 MS	Subpart FF VOA 40ml (2A)	Total/NA	Water	8021B	
440-60604-2 MSD	Subpart FF VOA 40ml (2A)	Total/NA	Water	8021B	
440-60604-3	Subpart FF VOA 40ml (3A)	Total/NA	Water	8021B	
440-60604-4	Subpart FF VOA 40ml (1B)	Total/NA	Water	8021B	
440-60604-5	Subpart FF VOA 40ml (2B)	Total/NA	Water	8021B	
440-60604-6	Subpart FF VOA 40ml (3B)	Total/NA	Water	8021B	
440-60604-7	Subpart FF VOA 40ml (1C)	Total/NA	Water	8021B	
440-60604-8	Subpart FF VOA 40ml (2C)	Total/NA	Water	8021B	
440-80604-9	Subpart FF VOA 40ml (3C)	Total/NA	Water	8021B	
440-80604-10	Subpart FF VOA 40ml (1D)	Total/NA	Water	8021B	
440-80604-11	Subpart FF VOA 40ml (2D)	Total/NA	Water	8021B	
440-60604-12	Subpart FF VOA 40ml (3D)	Total/NA	Water	8021B	
440-60604-13	Extra	Total/NA	Water	8021B	
LCS 440-142205/3	Lab Control Sample	Total/NA	Water	8021B	
LCSD 440-142205/4	Lab Control Sample Dup	Total/NA	Water	8021B	
MB 440-142205/5	Method Blank	Total/NA	Water	8021B	

Client: Siemens Industry Inc
Project/Site: Subpart FF Annual Recycle Water

TestAmerica Job ID: 440-60604-1

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Certification Summary

Laboratory: TestAmerica Irvine

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Alaska	State Program	10	CA01531	06-30-14
Arizona	State Program	9	AZ0671	10-13-14
California	LA Cty Sanitation Districts	9	10256	01-31-14
California	NELAP	9	1108CA	01-31-14
California	State Program	9	2706	06-30-14
Guam	State Program	9	Cert. No. 12.002r	01-28-14 *
Hawaii	State Program	9	N/A	01-31-14
Nevada	State Program	9	CA015312007A	07-31-14
New Mexico	State Program	6	N/A	01-31-14
Northern Mariana Islands	State Program	9	MP0002	01-31-14
Oregon	NELAP	10	4005	09-12-14
USDA	Federal		P330-09-00080	06-06-14
USEPA UCMR	Federal	1	CA01531	01-31-15

* Expired certification is currently pending renewal and is considered valid.

TestAmerica
ANALYTICAL TESTING CORPORATION

CHAIN OF CUSTODY RECORD

☐ Nashville, TN ☐ Orlando, FL ☐ Cedar Falls, IA ☐ Dayton, OH ☐ Watertown, WI ☐ Pontiac, MI ☐ Indianapolis, IN ■ Irvine, CA

8.8. 10-24-13 1:15

To assist us in using the proper analytical methods, is this work being conducted for regulatory purposes?

Compliance Monitoring? Yes No

Enforcement Action? Yes No

Client Name/Account #: Siemens Water Technologies req 471922

Address: POB 3308 / 2523 Mutahar St

City/State/Zip: Parker, AZ 85344

Project Manager: S. Reddy

Telephone Number: (928) 669-5758 **Fax No.:** (928) 669-5775

Sampler Name: (Print) Roy Provins

Sampler Signature:

Report To: monte.mccue@siemens.com

Invoice To:

TA Quote #:

Project ID: Subpart FF Annual Recycle Water

Project #:

Sample ID / Description	Date Sampled (2013)	Time Sampled	No. of Containers Shipped	Grab	Composite	Field Filtered	Preservative: Ice	HNO_3 (Red Label)	[illegible]	NaOH (Orange Label)	H_2SO_4 Plastic (Yellow Label)	H_2SO_4 Glass (Yellow Label)	None (Black Label)	Other (Specify)	Matrix: Groundwater	Motive Water	Drinking Water	Sludge	Soil	Other (specify):	Analyze For: 8021B - Benzene	RUSH TAT (Pre-Schedule)	Standard TAT	Fax Results	Send QC with report
Subpart FF VOA 40ml (1A)	10/23	8:00am	1	X			X		X							X					X		X		
Subpart FF VOA 40ml (2A)	10/23	8:00am	1	X			X		X							X					X		X		
Subpart FF VOA 40ml (3A)	10/23	8:00am	1	X			X		X							X					X		X		
Subpart FF VOA 40ml (1B)	10/23	8:00am	1	X			X		X							X					X		X		
Subpart FF VOA 40ml (2B)	10/23	8:00am	1	X			X		X							X					X		X		
Subpart FF VOA 40ml (3B)	10/23	8:00am	1	X			X		X							X					X		X		

440-60604 Chain of Custody

SR 10/24/13 15:00

Special Instructions:

Method of Shipment: FEDEX

Laboratory Comments:
Temperature Upon Receipt 4.6/3.8°C IR-6A
VOCs Free of Headspace? Y N

Relinquished by:	Date	Time	Received by:	Date	Time
Provins	10/23/2013				
Relinquished by:	**Date**	**Time**	**Received by TestAmerica:**	**Date**	**Time**
			[signature]	10/24/13	11:00

12

ℒ ℒ. 10-24-13 1115

TestAmerica
ANALYTICAL TESTING CORPORATION

CHAIN OF CUSTODY RECORD

☐ Nashville, TN ☐ Orlando, FL ☐ Cedar Falls, IA ☐ Dayton, OH ☐ Watertown, WI ☐ Pontiac, MI ☐ Indianapolis, IN ■ Irvine, CA

To assist us in using the proper analytical methods, is this work being conducted for regulatory purposes?

Compliance Monitoring? Yes No

Enforcement Action? Yes No

Client Name/Account #: Siemens Water Technologies req 471922

Address: POB 3308 / 2523 Mutahar St

City/State/Zip: Parker, AZ 85344

Project Manager: S. Reddy

Telephone Number: (928) 669-5758 Fax No.: (928) 669-5775

Sampler Name: (Print) Roy Provins

Sampler Signature:

Report To: monte.mccue@siemens.com

Invoice To:

TA Quote #:

Project ID: Subpart FF Annual Recycle Water

Project #:

Sample ID / Description	Date Sampled (2013)	Time Sampled	No. of Containers Shipped	Grab	Composite	Field Filtered	Preservative: Ice	HNO_3 (Red Label)	[illegible]	NaOH (Orange Label)	H_2SO_4 Plastic (Yellow Label)	H_2SO_4 Glass (Yellow Label)	None (Black Label)	Other (Specify)	Matrix: Groundwater	Motive Water	Drinking Water	Sludge	Soil	Other (specify):	Analyze For: 8021B - Benzene	RUSH TAT (Pre-Schedule	Standard TAT	Fax Results	Send QC with report
Subpart FF VOA 40ml (1C)	10/23	8:00am	1																						
Subpart FF VOA 40ml (2C)	10/23	8:00am	1																						
Subpart FF VOA 40ml (3C)	10/23	8:00am	1																						
Subpart FF VOA 40ml (1D)	10/23	8:00am	1																						
Subpart FF VOA 40ml (2D)	10/23	8:00am	1																						
Subpart FF VOA 40ml (3D)	10/23	8:00am	1																						
Extra	10/27	8:00am	1	X			X		X							X					X		X		

Special Instructions:

Method of Shipment: FEDEX

Relinquished by:	Date	Time	Received by:	Date	Time
Roy Provins	10/23/2013	1430			
Relinquished by:	**Date**	**Time**	**Received by TestAmerica:**	**Date**	**Time**
			[signature]	10/24/13	11:00

Laboratory Comments:

Temperature Upon Receipt: 4.6/3.8 IR-64

VOCs Free of Headspace? Y N

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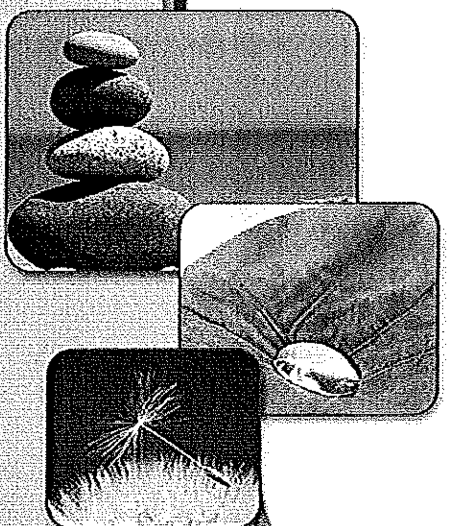
Login Sample Receipt Checklist

Client: Siemens Industry Inc | Job Number: 440-60604-1

Login Number: 60604
List Number: 1
Creator: Freitag, Kevin R

List Source: TestAmerica Irvine

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Irvine
17461 Derian Ave
Suite 100
Irvine, CA 92614-5817
Tel: (949)261-1022

TestAmerica Job ID: 440-26975-1
Client Project/Site: Subpart FF Annual Recycle Water

For:
Siemens Industry Inc
PO BOX 3308 (2523 Mutahar St.)
IMA065
Parker, Arizona 85344

Attn: Monte Mccue

Authorized for release by:
10/31/2012 4:45:00 PM
Philip Sanelle
Project Manager I
philip.sanelle@testamericainc.com

Designee for

Sushmitha Reddy
Project Manager I
sushmitha.reddy@testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Sample Summary

Client: Siemens Industry Inc
Project/Site: Subpart FF Annual Recycle Water

TestAmerica Job ID: 440-26975-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
440-26975-1	Subpart FF VOA 40ml (1A)	Water	10/15/12 09:00	10/17/12 10:00
440-26975-2	Subpart FF VOA 40ml (2A)	Water	10/15/12 09:00	10/17/12 10:00
440-26975-3	Subpart FF VOA 40ml (3A)	Water	10/15/12 09:00	10/17/12 10:00
440-26975-4	Subpart FF VOA 40ml (1B)	Water	10/15/12 09:00	10/17/12 10:00
440-26975-5	Subpart FF VOA 40ml (2B)	Water	10/15/12 09:00	10/17/12 10:00
440-26975-6	Subpart FF VOA 40ml (3B)	Water	10/15/12 09:00	10/17/12 10:00
440-26975-7	Subpart FF VOA 40ml (1C)	Water	10/15/12 09:00	10/17/12 10:00
440-26975-8	Subpart FF VOA 40ml (2C)	Water	10/15/12 09:00	10/17/12 10:00
440-26975-9	Subpart FF VOA 40ml (3C)	Water	10/15/12 09:00	10/17/12 10:00
440-26975-10	Subpart FF VOA 40ml (4A)	Water	10/15/12 09:00	10/17/12 10:00
440-26975-11	Subpart FF VOA 40ml (4B)	Water	10/15/12 09:00	10/17/12 10:00
440-26975-12	Subpart FF VOA 40ml (4C)	Water	10/15/12 09:00	10/17/12 10:00

Job ID: 440-26975-1

Laboratory: TestAmerica Irvine

Narrative

Job Narrative
440-26975-1

Comments
No additional comments.

Receipt
The samples were received on 10/17/2012 10:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 5.6° C.

GC VOA
Method(s) 8021B: The following sample(s) was received with headspace in the sample vial: All samples arrived with headspace. Subpart FF VOA 40ml (1A) (440-26975-1), Subpart FF VOA 40ml (2B) (440-26975-5), Subpart FF VOA 40ml (3A) (440-26975-3), Subpart FF VOA 40ml (3C) (440-26975-9), Subpart FF VOA 40ml (4A) (440-26975-10), Subpart FF VOA 40ml (4C) (440-26975-12).

Method(s) 8021B: The following sample(s) submitted for volatiles analysis was received with insufficient preservation pH is 7. :Subpart FF VOA 40ml (1A) (440-26975-1), Subpart FF VOA 40ml (2B) (440-26975-5), Subpart FF VOA 40ml (3A) (440-26975-3), Subpart FF VOA 40ml (3C) (440-26975-9), Subpart FF VOA 40ml (4A) (440-26975-10), Subpart FF VOA 40ml (4C) (440-26975-12).

Method(s) 8021B: Arizona samples ran with LCS and LCSD. Sample 3/4 top layer was water and the 1/4 bottem was a black tar like substance. For analysis only water was tested.Subpart FF VOA 40ml (1A) (440-26975-1), Subpart FF VOA 40ml (2B) (440-26975-5), Subpart FF VOA 40ml (3A) (440-26975-3), Subpart FF VOA 40ml (3C) (440-26975-9), Subpart FF VOA 40ml (4A) (440-26975-10), Subpart FF VOA 40ml (4C) (440-26975-12)

Method(s) 8021B: The following sample(s) submitted for volatiles analysis was received with insufficient preservation (pH >2): Subpart FF VOA 40ml (1B) (440-26975-4), Subpart FF VOA 40ml (1C) (440-26975-7), Subpart FF VOA 40ml (2A) (440-26975-2), Subpart FF VOA 40ml (2C) (440-26975-8), Subpart FF VOA 40ml (3B) (440-26975-6). pH=7.

Method(s) 8021B: The following sample(s) was received with headspace in the sample vial: Subpart FF VOA 40ml (1B) (440-26975-4), Subpart FF VOA 40ml (1C) (440-26975-7), Subpart FF VOA 40ml (2A) (440-26975-2), Subpart FF VOA 40ml (2C) (440-26975-8), Subpart FF VOA 40ml (3B) (440-26975-6).

Method(s) 8021B: Arizona samples ran with LCS and LCSD. Sample 3/4 top layer was water and the 1/4 bottem was a black tar like substance. For analysis only water was tested.Subpart FF VOA 40ml (4B) (440-26975-11), Subpart FF VOA 40ml (4C) (440-26975-12)

Method(s) 8021B: The following sample(s) was received with headspace in the sample vial: Subpart FF VOA 40ml (4B) (440-26975-11), Subpart FF VOA 40ml (4C) (440-26975-12).

Method(s) 8021B: The following sample(s) submitted for volatiles analysis was received with insufficient preservation (pH >2): Subpart FF VOA 40ml (4B) (440-26975-11), Subpart FF VOA 40ml (4C) (440-26975-12). pH=7.

No other analytical or quality issues were noted.

VOA Prep
No analytical or quality issues were noted.

Client Sample Results

Client: Siemens Industry Inc
Project/Site: Subpart FF Annual Recycle Water

TestAmerica Job ID: 440-26975-1

Client Sample ID: Subpart FF VOA 40ml (1A)

Lab Sample ID: 440-26975-1

Date Collected: 10/15/12 09:00
Date Received: 10/17/12 10:00

Matrix: Water

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	370		15		ug/L			10/24/12 18:49	50

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	68		65 - 135		10/24/12 18:49	50

Client Sample ID: Subpart FF VOA 40ml (2A)

Lab Sample ID: 440-26975-2

Date Collected: 10/15/12 09:00
Date Received: 10/17/12 10:00

Matrix: Water

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	570		30		ug/L			10/20/12 01:26	100

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	77		65 - 135		10/20/12 01:26	100

Client Sample ID: Subpart FF VOA 40ml (3A)

Lab Sample ID: 440-26975-3

Date Collected: 10/15/12 09:00
Date Received: 10/17/12 10:00

Matrix: Water

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	300		6.0		ug/L			10/24/12 19:15	20

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	68		65 - 135		10/24/12 19:15	20

Client Sample ID: Subpart FF VOA 40ml (1B)

Lab Sample ID: 440-26975-4

Date Collected: 10/15/12 09:00
Date Received: 10/17/12 10:00

Matrix: Water

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	500		30		ug/L			10/20/12 02:19	100

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	73		65 - 135		10/20/12 02:19	100

Client Sample ID: Subpart FF VOA 40ml (2B)

Lab Sample ID: 440-26975-5

Date Collected: 10/15/12 09:00
Date Received: 10/17/12 10:00

Matrix: Water

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	410		30		ug/L			10/24/12 16:36	100

Surrogate	%Recovery	Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	73		65 - 135		10/24/12 16:36	100

Client: Siemens Industry Inc
Project/Site: Subpart FF Annual Recycle Water

TestAmerica Job ID: 440-26975-1

Client Sample ID: Subpart FF VOA 40ml (3B)

Lab Sample ID: 440-26975-6
Date Collected: 10/15/12 09:00
Matrix: Water
Date Received: 10/17/12 10:00

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	670		60		ug/L			10/19/12 22:20	200

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*89*		*65 - 135*		*10/19/12 22:20*	*200*

Client Sample ID: Subpart FF VOA 40ml (1C)

Lab Sample ID: 440-26975-7
Date Collected: 10/15/12 09:00
Matrix: Water
Date Received: 10/17/12 10:00

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	610		30		ug/L			10/19/12 22:46	100

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*79*		*65 - 135*		*10/19/12 22:46*	*100*

Client Sample ID: Subpart FF VOA 40ml (2C)

Lab Sample ID: 440-26975-8
Date Collected: 10/15/12 09:00
Matrix: Water
Date Received: 10/17/12 10:00

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	1000		30		ug/L			10/19/12 23:13	100

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*68*		*65 - 135*		*10/19/12 23:13*	*100*

Client Sample ID: Subpart FF VOA 40ml (3C)

Lab Sample ID: 440-26975-9
Date Collected: 10/15/12 09:00
Matrix: Water
Date Received: 10/17/12 10:00

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	580		30		ug/L			10/24/12 17:02	100

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*75*		*65 - 135*		*10/24/12 17:02*	*100*

Client Sample ID: Subpart FF VOA 40ml (4A)

Lab Sample ID: 440-26975-10
Date Collected: 10/15/12 09:00
Matrix: Water
Date Received: 10/17/12 10:00

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	240		6.0		ug/L			10/24/12 19:42	20

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*65*		*65 - 135*		*10/24/12 19:42*	*20*

Client: Siemens Industry Inc
Project/Site: Subpart FF Annual Recycle Water

TestAmerica Job ID: 440-26975-1

Client Sample ID: Subpart FF VOA 40ml (4B)
Lab Sample ID: 440-26975-11
Date Collected: 10/15/12 09:00
Matrix: Water
Date Received: 10/17/12 10:00

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	300		30		ug/L			10/24/12 17:56	100

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*96*		*65 - 135*		*10/24/12 17:56*	*100*

Client Sample ID: Subpart FF VOA 40ml (4C)
Lab Sample ID: 440-26975-12
Date Collected: 10/15/12 09:00
Matrix: Water
Date Received: 10/17/12 10:00

Method: 8021B - Volatile Organic Compounds (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	320		30		ug/L			10/24/12 18:22	100

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*84*		*65 - 135*		*10/24/12 18:22*	*100*

Client: Siemens Industry Inc
Project/Site: Subpart FF Annual Recycle Water

TestAmerica Job ID: 440-26975-1

Client Sample ID: Subpart FF VOA 40ml (1A) — **Lab Sample ID: 440-26975-1**
Date Collected: 10/15/12 09:00 — **Matrix: Water**
Date Received: 10/17/12 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		50	10 mL	10 mL	61419	10/24/12 18:49	TL	TAL IRV

Client Sample ID: Subpart FF VOA 40ml (2A) — **Lab Sample ID: 440-26975-2**
Date Collected: 10/15/12 09:00 — **Matrix: Water**
Date Received: 10/17/12 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		100	10 mL	10 mL	60450	10/20/12 01:26	TL	TAL IRV

Client Sample ID: Subpart FF VOA 40ml (3A) — **Lab Sample ID: 440-26975-3**
Date Collected: 10/15/12 09:00 — **Matrix: Water**
Date Received: 10/17/12 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		20	10 mL	10 mL	61419	10/24/12 19:15	TL	TAL IRV

Client Sample ID: Subpart FF VOA 40ml (1B) — **Lab Sample ID: 440-26975-4**
Date Collected: 10/15/12 09:00 — **Matrix: Water**
Date Received: 10/17/12 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		100	10 mL	10 mL	60450	10/20/12 02:19	TL	TAL IRV

Client Sample ID: Subpart FF VOA 40ml (2B) — **Lab Sample ID: 440-26975-5**
Date Collected: 10/15/12 09:00 — **Matrix: Water**
Date Received: 10/17/12 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		100	10 mL	10 mL	61419	10/24/12 16:36	TL	TAL IRV

Client Sample ID: Subpart FF VOA 40ml (3B) — **Lab Sample ID: 440-26975-6**
Date Collected: 10/15/12 09:00 — **Matrix: Water**
Date Received: 10/17/12 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		200	10 mL	10 mL	60450	10/19/12 22:20	TL	TAL IRV

Client Sample ID: Subpart FF VOA 40ml (1C) — **Lab Sample ID: 440-26975-7**
Date Collected: 10/15/12 09:00 — **Matrix: Water**
Date Received: 10/17/12 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		100	10 mL	10 mL	60450	10/19/12 22:46	TL	TAL IRV

Client: Siemens Industry Inc
Project/Site: Subpart FF Annual Recycle Water

TestAmerica Job ID: 440-26975-1

Client Sample ID: Subpart FF VOA 40ml (2C)
Lab Sample ID: 440-26975-8
Date Collected: 10/15/12 09:00
Matrix: Water
Date Received: 10/17/12 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		100	10 mL	10 mL	60450	10/19/12 23:13	TL	TAL IRV

Client Sample ID: Subpart FF VOA 40ml (3C)
Lab Sample ID: 440-26975-9
Date Collected: 10/15/12 09:00
Matrix: Water
Date Received: 10/17/12 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		100	10 mL	10 mL	61419	10/24/12 17:02	TL	TAL IRV

Client Sample ID: Subpart FF VOA 40ml (4A)
Lab Sample ID: 440-26975-10
Date Collected: 10/15/12 09:00
Matrix: Water
Date Received: 10/17/12 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		20	10 mL	10 mL	61419	10/24/12 19:42	TL	TAL IRV

Client Sample ID: Subpart FF VOA 40ml (4B)
Lab Sample ID: 440-26975-11
Date Collected: 10/15/12 09:00
Matrix: Water
Date Received: 10/17/12 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		100	10 mL	10 mL	61419	10/24/12 17:56	TL	TAL IRV

Client Sample ID: Subpart FF VOA 40ml (4C)
Lab Sample ID: 440-26975-12
Date Collected: 10/15/12 09:00
Matrix: Water
Date Received: 10/17/12 10:00

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	8021B		100	10 mL	10 mL	61419	10/24/12 18:22	TL	TAL IRV

Laboratory References:

TAL IRV = TestAmerica Irvine, 17461 Derian Ave, Suite 100, Irvine, CA 92614-5817, TEL (949)261-1022

Client: Siemens Industry Inc
Project/Site: Subpart FF Annual Recycle Water

TestAmerica Job ID: 440-26975-1

Method: 8021B - Volatile Organic Compounds (GC)

Lab Sample ID: MB 440-60450/4
Matrix: Water
Analysis Batch: 60450

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.30		ug/L			10/19/12 17:50	1

Surrogate	MB %Recovery	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
4-Bromofluorobenzene (Surr)	*97*		*65 - 135*		*10/19/12 17:50*	*1*

Lab Sample ID: LCS 440-60450/3
Matrix: Water
Analysis Batch: 60450

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	20.0	18.6		ug/L		93	85 - 115

Surrogate	LCS %Recovery	LCS Qualifier	Limits
4-Bromofluorobenzene (Surr)	*90*		*65 - 135*

Lab Sample ID: LCSD 440-60450/10
Matrix: Water
Analysis Batch: 60450

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	20.0	17.3		ug/L		87	85 - 115	7	20

Surrogate	LCSD %Recovery	LCSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	*96*		*65 - 135*

Lab Sample ID: 440-26975-A-1 MS
Matrix: Water
Analysis Batch: 60450

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	440		20000	18800		ug/L		92	60 - 130

Surrogate	MS %Recovery	MS Qualifier	Limits
4-Bromofluorobenzene (Surr)	*99*		*65 - 135*

Lab Sample ID: 440-26975-A-1 MSD
Matrix: Water
Analysis Batch: 60450

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	440		20000	19100		ug/L		93	60 - 130	1	20

Surrogate	MSD %Recovery	MSD Qualifier	Limits
4-Bromofluorobenzene (Surr)	*94*		*65 - 135*

Client: Siemens Industry Inc
Project/Site: Subpart FF Annual Recycle Water

TestAmerica Job ID: 440-26975-1

Method: 8021B - Volatile Organic Compounds (GC) (Continued)

Lab Sample ID: MB 440-61419/5
Matrix: Water
Analysis Batch: 61419

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	ND		0.30		ug/L			10/24/12 13:42	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
4-Bromofluorobenzene (Surr)	*96*		*65 - 135*		*10/24/12 13:42*	*1*

Lab Sample ID: LCS 440-61419/3
Matrix: Water
Analysis Batch: 61419

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	20.0	17.9		ug/L		89	85 - 115

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*101*		*65 - 135*

Lab Sample ID: LCSD 440-61419/4
Matrix: Water
Analysis Batch: 61419

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	20.0	17.3		ug/L		87	85 - 115	3	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*98*		*65 - 135*

Lab Sample ID: 440-26975-A-3 MS
Matrix: Water
Analysis Batch: 61419

Client Sample ID: Matrix Spike
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Benzene	380		2000	2070		ug/L		85	60 - 130

Surrogate	*MS %Recovery*	*MS Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*96*		*65 - 135*

Lab Sample ID: 440-26975-A-3 MSD
Matrix: Water
Analysis Batch: 61419

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Benzene	380		2000	2060		ug/L		84	60 - 130	1	20

Surrogate	*MSD %Recovery*	*MSD Qualifier*	*Limits*
4-Bromofluorobenzene (Surr)	*94*		*65 - 135*

QC Association Summary

Client: Siemens Industry Inc
Project/Site: Subpart FF Annual Recycle Water

TestAmerica Job ID: 440-26975-1

GC VOA

Analysis Batch: 60450

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-26975-2	Subpart FF VOA 40ml (2A)	Total/NA	Water	8021B	
440-26975-4	Subpart FF VOA 40ml (1B)	Total/NA	Water	8021B	
440-26975-6	Subpart FF VOA 40ml (3B)	Total/NA	Water	8021B	
440-26975-7	Subpart FF VOA 40ml (1C)	Total/NA	Water	8021B	
440-26975-8	Subpart FF VOA 40ml (2C)	Total/NA	Water	8021B	
440-26975-A-1 MS	Matrix Spike	Total/NA	Water	8021B	
440-26975-A-1 MSD	Matrix Spike Duplicate	Total/NA	Water	8021B	
LCS 440-60450/3	Lab Control Sample	Total/NA	Water	8021B	
LCSD 440-60450/10	Lab Control Sample Dup	Total/NA	Water	8021B	
MB 440-60450/4	Method Blank	Total/NA	Water	8021B	

Analysis Batch: 61419

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
440-26975-1	Subpart FF VOA 40ml (1A)	Total/NA	Water	8021B	
440-26975-3	Subpart FF VOA 40ml (3A)	Total/NA	Water	8021B	
440-26975-5	Subpart FF VOA 40ml (2B)	Total/NA	Water	8021B	
440-26975-9	Subpart FF VOA 40ml (3C)	Total/NA	Water	8021B	
440-28975-10	Subpart FF VOA 40ml (4A)	Total/NA	Water	8021B	
440-26975-11	Subpart FF VOA 40ml (4B)	Total/NA	Water	8021B	
440-26975-12	Subpart FF VOA 40ml (4C)	Total/NA	Water	8021B	
440-26975-A-3 MS	Matrix Spike	Total/NA	Water	8021B	
440-26975-A-3 MSD	Matrix Spike Duplicate	Total/NA	Water	8021B	
LCS 440-61419/3	Lab Control Sample	Total/NA	Water	8021B	
LCSD 440-61419/4	Lab Control Sample Dup	Total/NA	Water	8021B	
MB 440-61419/5	Method Blank	Total/NA	Water	8021B	

Client: Siemens Industry Inc
Project/Site: Subpart FF Annual Recycle Water

TestAmerica Job ID: 440-26975-1

1 2 3 4 5 6 7 8 9 10 11 12

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Certification Summary

Laboratory: TestAmerica Irvine

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Arizona	State Program	9	AZ0671	10-13-13
California	LA Cty Sanitation Districts	9	10256	01-31-13
California	NELAC	9	1108CA	01-31-13
California	State Program	9	2706	06-30-14
Guam	State Program	9	Cert. No. 12.002r	01-23-13
Hawaii	State Program	9	N/A	01-31-13
Nevada	State Program	9	CA015312007A	07-31-13
New Mexico	State Program	6	N/A	01-31-13
Northern Mariana Islands	State Program	9	MP0002	01-31-13
Oregon	NELAC	10	4005	09-12-13
USDA	Federal		P330-09-00080	06-06-14
USEPA UCMR	Federal	1	CA01531	01-31-13

440-26975

CHAIN OF CUSTODY RECORD

TestAmerica
ANALYTICAL TESTING CORPORATION

☐ Nashville, TN ☐ Dayton, OH ☐ Indianapolis, IN
☐ Orlando, FL ☐ Watertown, WI ■ Irvine, CA
☐ Cedar Falls, IA ☐ Pontiac, MI

To assist us in using the proper analytical methods, is this work being conducted for regulatory purposes?

Compliance Monitoring? Yes No
Enforcement Action? Yes No

Client Name/Account #: Siemens Water Technologies req 471922
Address: POB 3308 / 2523 Mutahar St
City/State/Zip: Parker, AZ 85344
Project Manager: S. Reddy
Telephone Number: (928) 669-5758 Fax No.: (928) 669-5775
Sampler Name: (Print) Monte McCue
Sampler Signature:

Report To: monte.mccue@siemens.com
Invoice To:
TA Quote #:
Project ID: Subpart FF Annual Recycle Water
Project #:

Sample ID / Description	Date Sampled	Time Sampled	No. of Containers Shipped	Grab	Composite	Field Filtered	Preservative: Ice	HNO_3 (Red Label)	[illegible]	NaOH (Orange Label)	H_2SO_4 Plastic (Yellow Label)	H_2SO_4 Glass (Yellow Label)	None (Black Label)	Other (Specify)	Matrix: Groundwater	Mollve Water	Drinking Water	Sludge	Soil	Other (specify):	Analyze For: 8021B - Benzene											RUSH TAT (Pre-Schedule)	Standard TAT	Fax Results	Send QC with report
Subpart FF VOA 40ml (1A)	10/15	9000	1	X			X									X					X												X		
Subpart FF VOA 40ml (2A)	10/15	9000	1	X			X									X					X												X		
Subpart FF VOA 40ml (3A)	10/15	9000	1	X			X									X					X												X		
Subpart FF VOA 40ml (1B)	10/15	9000	1	X			X									X					X												X		
Subpart FF VOA 40ml (2B)	10/15	9000	1	X			X									X					X												X		
Subpart FF VOA 40ml (3B)	10/15	9000	1	X			X									X					X												X		
Subpart FF VOA 40ml (1C)	10/15	9000	1	X			X									X					X												X		
Subpart FF VOA 40ml (2C)	10/15	9000	1	X			X									X					X												X		
Subpart FF VOA 40ml (3C)	10/15	9000	1	X			X									X					X												X		

Special Instructions:

Method of Shipment: FEDEX

Relinquished by:	Date	Time	Received by:	Date	Time
Roy Provins	10/15/2012	1430			
Relinquished by:	Date	Time	Received by TestAmerica:	Date	Time
			V. w Baule	10/17/12	10:00

Laboratory Comments:
Temperature Upon Receipt: 6.0 °C
VOCs Free of Headspace? Y N

440.26975

TestAmerica
ANALYTICAL TESTING CORPORATION

CHAIN OF CUSTODY RECORD

☐ Nashville, TN ☐ Orlando, FL ☐ Cedar Falls, IA ☐ Dayton, OH ☐ Watertown, WI ☐ Pontiac, MI ☐ Indianapolis, IN ■ Irvine,CA

To assist us in using the proper analytical methods, is this work being conducted for regulatory purposes?

Compliance Monitoring? Yes No

Enforcement Action? Yes No

Client Name/Account #: Siemens Water Technologies req 471922

Address: POB 3308 / 2523 Mutahar St

City/State/Zip: Parker, AZ 85344

Project Manager: S. Reddy

Telephone Number: (928) 669-5758 Fax No.: (928) 669-5775

Sampler Name: (Print) Monte McCue

Sampler Signature:

Report To: monte.mccue@siemens.com

Invoice To:

TA Quote #:

Project ID: Subpart FF Annual Recycle Water

Project #:

Sample ID / Description	Date Sampled	Time Sampled	No. of Containers Shipped	Grab	Composite	Field Filtered	Preservative: Ice	HNO_3 (Red Label)	[illegible]	NaOH (Orange Label)	H_2SO_4 Plastic (Yellow Label)	H_2SO_4 Glass(Yellow Label)	None (Black Label)	Other (Specify)	Matrix: Groundwater	Motive Water	Drinking Water	Sludge	Soil	Other (specify):	Analyze For: 8021B - Benzene	RUSH TAT (Pre-Schedule	Standard TAT	Fax Results	Send QC with report
Subpart FF VOA 40ml (4A)	10/15	9:00	1	■			■		■							■					■		■		
Subpart FF VOA 40ml (4B)	10/15	9:00	1	■			■		■							■					■		■		
Subpart FF VOA 40ml (4C)	10/15	9:00	1	■			■		■							■					■		■		
XTRA	11/17	0:00	0	■			■		■							■					■		■		

Special Instructions:

Method of Shipment: FEDEX

Relinquished by:	Date	Time	Received by:	Date	Time
Roy Provins	10/15/2012	1000			
Relinquished by:	Date	Time	Received by TestAmerica:	Date	Time
			V~Bauly	10/17/12	10:00

Laboratory Comments:

Temperature Upon Receipt: 6.0 °C

VOCs Free of Headspace? Y N

Login Sample Receipt Checklist

Client: Siemens Industry Inc

Job Number: 440-26975-1

Login Number: 26975
List Number: 1
Creator: Freitag, Kevin R

List Source: TestAmerica Irvine

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	Monte McCue
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

SIEMENS

Parker Facility

January 2012 - December 2012

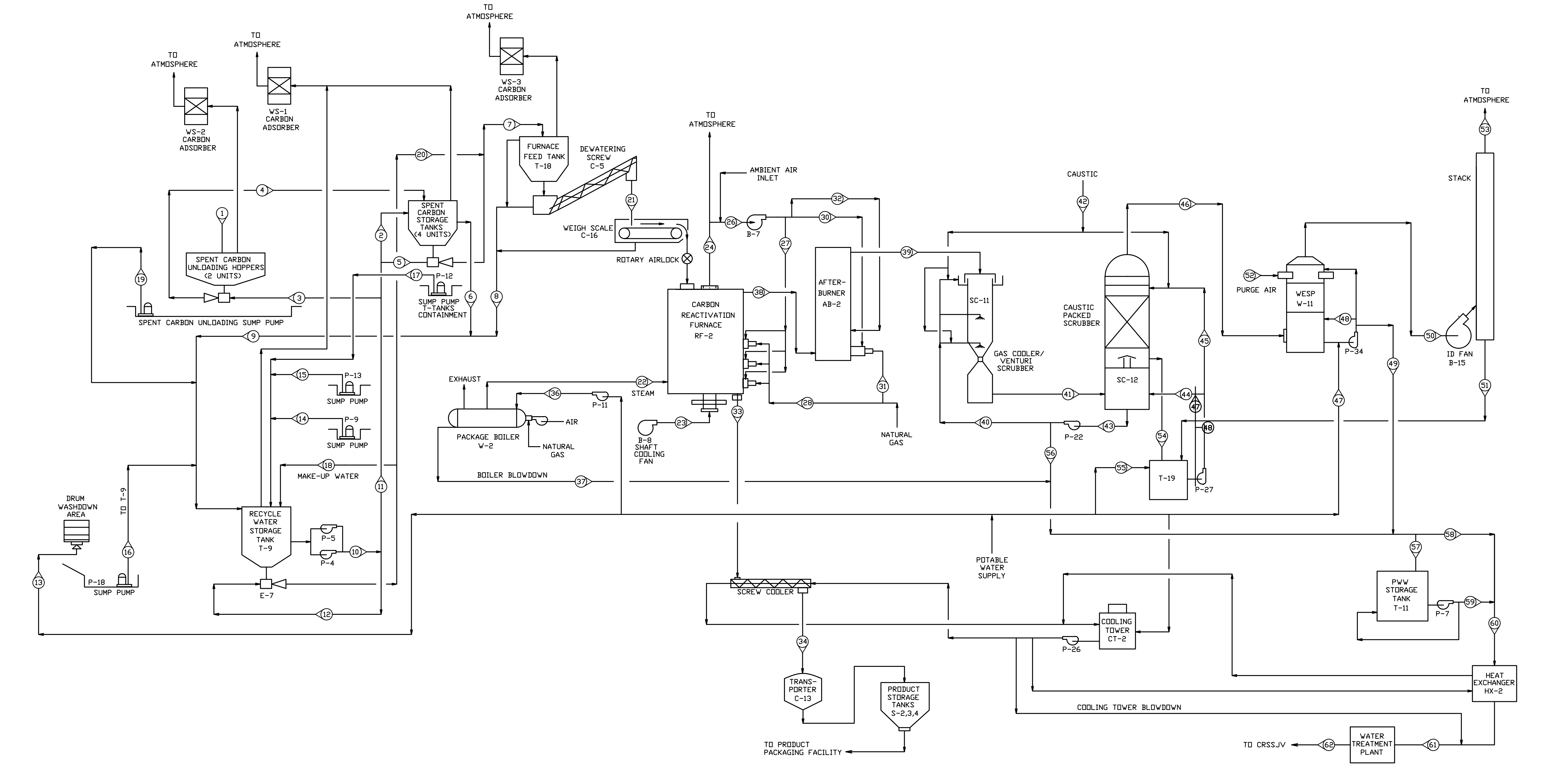
Benzene NESHAP Report

Gen Name:	Profile	Gen EPA ID	FF	Arrival Date	Manifest Do	Qty	Container	PPM	Pounds
BASF Corporation	W10080RH-5	LAD040776809	☑	3/9/2012	008185374JJ	1	Slurry 2	274	10.96
BASF Corporation	W10080RH-5	LAD040776809	☑	6/25/2012	008185492JJ	1	Slurry 2	274	10.96
BASF Corporation	W10080RH-5	LAD040776809	☑	8/16/2012	008185902 J	1	Slurry 2	274	10.96
BASF Corporation	W10080RH-5	LAD040776809	☑	12/28/2012	008184853JJ	1	Slurry 1	274	5.48
						Profile Total Pounds			38.36
BASF Corporation - Freeport	W120051RH	TXD008081697	☑	4/5/2012	004405231FL	6	VSC 1200	120000	720.0
						Profile Total Pounds			720.0
ConocoPhillips - Wilmington Plant	W110250RH	CAD008237679	☑	2/28/2012	008182609JJ	4	Drum	2300	1.656
						Profile Total Pounds			1.656
ExxonMobil Chemicals	W30610RH-3	LAD000812818	☑	8/8/2012	010206083JJ	3	Drum	0.013	0.00000702
						Profile Total Pounds			0.00000702
Paramount Petroleum Corp.	990674RH-6	CAD008371098	☑	11/27/2012	007357243 J	2	Drum	307	0.11052
						Profile Total Pounds			0.11052
Paramount Petroleum Corp.	W110225RH	CAD008371098	☑	5/15/2012	007357227 J	1	Drum	10.2	0.001836
						Profile Total Pounds			0.001836
Paramount Petroleum Corp.	W80036RH-1	CAD008371098	☑	1/17/2012	007357216 J	24	Drum	0.4	0.001728
						Profile Total Pounds			0.001728
Paramount Petroleum Corporation	W80036RH-2	CAD008371098	☑	5/8/2012	007357225 J	24	Drum	0.01	0.0000432
Paramount Petroleum Corporation	W80036RH-2	CAD008371098	☑	5/8/2012	007357226 J	48	Drum	0.01	0.0000864
Paramount Petroleum Corporation	W80036RH-2	CAD008371098	☑	5/15/2012	007357227 J	37	Drum	0.01	0.0000666
Paramount Petroleum Corporation	W80036RH-2	CAD008371098	☑	7/3/2012	007357230 J	40	Drum	0.01	0.000072
Paramount Petroleum Corporation	W80036RH-2	CAD008371098	☑	10/9/2012	007357241JJ	50	Drum	0.01	0.00009
Paramount Petroleum Corporation	W80036RH-2	CAD008371098	☑	10/16/2012	007357239JJ	48	Drum	0.01	0.0000864
Paramount Petroleum Corporation	W80036RH-2	CAD008371098	☑	11/27/2012	007357242 J	44	Drum	0.01	0.0000792
Paramount Petroleum Corporation	W80036RH-2	CAD008371098	☑	11/27/2012	007357243 J	28	Drum	0.01	0.0000504
						Profile Total Pounds			0.0005742
Rubicon	W110277RH	LAD008213191	☑	1/27/2012	00050839	1	PV500	0.19	0.00019
						Profile Total Pounds			0.00019

INCLUDES WET WEIGHTS FOR AQUA PHASE CARBON

Gen Name:	Profile	Gen EPA ID	FF	Arrival Date	Manifest Do	Qty	Container	PPM	Pounds
Tesoro Refining	W110148RH	CAD041520644	☑	3/6/2012	008186006 J	14	Drum	15.2	0.038304
Tesoro Refining	W110148RH	CAD041520644	☑	5/22/2012	008186031 J	7	Drum	15.2	0.019152
Tesoro Refining	W110148RH	CAD041520644	☑	9/25/2012	008186080JJ	7	Drum	15.2	0.019152
						Profile Total Pounds			0.076608
Tesoro Refining	W20362RH-5	CAD041520644	☑	10/16/2012	008186089JJ	11	Drum	87.5	0.17325
Tesoro Refining	W20362RH-5	CAD041520644	☑	11/27/2012	008186123 J	10	Drum	87.5	0.1575
						Profile Total Pounds			0.33075
Tesoro Refining and Marketing	W20362RH-4	CAD041520644	☑	1/31/2012	003215995 J	11	Drum	0.1	0.000198
Tesoro Refining and Marketing	W20362RH-4	CAD041520644	☑	4/24/2012	008186024JJ	11	Drum	0.1	0.000198
Tesoro Refining and Marketing	W20362RH-4	CAD041520644	☑	6/12/2012	008186033	10	Drum	0.1	0.00018
Tesoro Refining and Marketing	W20362RH-4	CAD041520644	☑	8/7/2012	008186057JJ	10	Drum	0.1	0.00018
						Profile Total Pounds			0.000756
Total Petrochemicals	940012RH-8	LAD020877361	☑	2/24/2012	000717563FL	1	Bag	21900	21.9
Total Petrochemicals	940012RH-8	LAD020877361	☑	4/17/2012	000717564FL	2	Drum	21900	7.884
Total Petrochemicals	940012RH-8	LAD020877361	☑	7/31/2012	000717567 F	2	Bag	21900	43.8
Total Petrochemicals	940012RH-8	LAD020877361	☑	10/2/2012	000717569FL	2	Drum	21900	7.884
Total Petrochemicals	940012RH-8	LAD020877361	☑	10/2/2012	000717569FL	1	Bag	21900	21.9
						Profile Total Pounds			103.368
Westlake Styrene Terminal	W120195RH	LAD985221951	☑	9/11/2012	001274382 J	12	Bag	67900	814.8
						Profile Total Pounds			814.8
						Report Total Pounds			1,678.70696922

APPENDIX K
PROCESS FLOW DIAGRAM



NOTES:

1. THIS DRAWING INCLUDES COMPONENTS OF THE FACILITY THAT ARE EXEMPT FROM PERMITTING UNDER VARIOUS PROVISIONS OF RCRA. DATA RELATED TO THESE COMPONENTS IS PROVIDED FOR INFORMATIONAL PURPOSES AND EASE OF REVIEW ONLY, AND THEY ARE NOT INTENDED TO BECOME REGULATED COMPONENTS OF THE HAZARDOUS WASTE FACILITY.

NO	DWN	CK'D	APP	REVISIONS	DATE
1	JBE	KEM		UPDATED FOR PERMIT SUBMITTAL	2-8-07

CBE CHAVOND-BARRY ENGINEERING CORP.
400 Route 518 • P.O. Box 205 • Blawenburg, New Jersey 08504

SIEMENS WATER TECHNOLOGIES CORP.
2523 MUTAHAR STREET, PARKER, AZ 85344

FACILITY PROCESS FLOW DIAGRAM

DRAWN	DATE	CHECKED	DATE	APPROVED	DATE
AJW	11/27/96	KEM	11/27/96		

SCALE	DWG. NO.	REV.
NONE	1525-PR-001	1

PRINT DATE: 2/15/07