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2025 Confirmatory Performance Test Plan and Periodic RCRA and PCB DRE Sampling and Analysis Plan – Rev 2

Veolia ES Technical Solutions, L.L.C.
Port Arthur, Texas

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Quality information

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1. Introduction

Veolia ES Technical Solutions, L.L.C. (Veolia) operates a hazardous waste incinerator at its facility in Port Arthur, Texas. The incinerator treats hazardous wastes under RCRA Permit HW-50212 and Air Permit 42450 issued by the Texas Commission on Environmental Quality (TCEQ), and a TSCA approval issued by EPA. The incinerator operates in compliance with the requirements of the RCRA, Air, TSCA, and the Final Replacement Standards of the *National Emission Standards for Hazardous Air Pollutants (NESHAPs) from Hazardous Waste Combustors* (Title 40 of the Code of Federal Regulations, Part 63 [40 CFR Part 63], Subpart EEE) that were promulgated on October 12, 2005 - often called the Hazardous Waste Combustor (HWC) MACT.

The previous Comprehensive Performance Test (CPT) for the Final Replacement Standards of the HWC MACT commenced on August 31st, 2022 with the performance of a RATA of the CO and O_2 CEMS on the stack of the incinerator, and was completed on October 14, 2022. The report of the CPT and a Notification of Compliance (NOC) for the Final Replacement Standards of the HWC MACT were submitted on January 20, 2023.

Per the requirements of the HWC MACT at 40 CFR 63.1207(d)(2), a Confirmatory Performance Test for polychlorinated dibenzodioxins and polychlorinated dibenzofurans (dioxins/furans) “must commence…no later than 31 months after the date of commencing the previous comprehensive performance test”. The Confirmatory Performance Test (CfPT) must start by March 31st, 2025. A CfPT Plan and a Continuous Monitoring System Performance Evaluation Test Plan (CMS PETP) must be submitted at least 60 calendar days before the start of the test as required by §63.1207(e)(1)(ii). Veolia plans to commence the CfPT beginning with a RATA that will start on or before March 31, 2025.

Section V.H.6. of the RCRA permit for the facility requires that periodic testing be performed every two and one-half years. The permit specifies that sampling and analysis of the waste and exhaust emissions be conducted to verify compliance with the feedrate limits in Table V.H.3. (of the permit) and the emission limits in Table V.H.4. (of the permit) and to ensure achievement of the performance standards of 40 CFR 264.343. This CfPT Plan/RCRA Periodic Test Plan and associated Quality Assurance Project Plan (QAPjP) include the testing required by the HWC MACT and the RCRA permit. Veolia plans to conduct the combined CfPT and RCRA Periodic Test beginning with a RATA that will start on or before March 31, 2025 with CfPT testing during the week of April 14, 2025.

Section III.B.1 of the Polychlorinated Biphenyls (PCB) approval issued pursuant to Section 6(e) of the TSCA requires that a PCB Trial Burn occur in conjunction with the CfPT to confirm compliance with the incineration requirements in 40 CFR 761.70. Veolia plans to conduct the combined CfPT and a PCB Trial Burn beginning with a RATA that will start on or before March 31, 2025 with CfPT testing during the week of April 14, 2025. DRE will be demonstrated using 1,2-dichlorobenzene a surrogate for PCBs while injecting liquid and solid waste streams fed to the rotary Kiln and aqueous waste streams into the secondary combustion chamber (SCC).

This document, the *Confirmatory Performance Test Plan and Periodic RCRA and PCB DRE Test Sampling and Analysis Plan* (”Test”), presents Veolia’s plan for testing the incinerator at the Port Arthur facility and the technical approach for collecting the data necessary to show compliance with the HWC MACT standard for dioxins/furans specified in 40 CFR Part 63.1219(a)(1), Section III.B.1 of the PCB approval issued pursuant to Section 6(e) of the TSCA, and the testing required by the RCRA permit. This document not only includes the CfPT/RCRA Periodic and PCB DRE Test Plan, but also the CMS PETP, and the *“Quality Assurance Project Plan for the 2025 Confirmatory Performance Test and RCRA Periodic Testing*” (QAPjP).

1.1 Test Objectives

The test will be conducted to meet HWC MACT, TSCA, and RCRA test objectives concurrently. The test objectives are:

- Demonstrate compliance with HWC MACT emission standard for dioxins/furans of 40 CFR 63.1219(a)(1)(ii);
- Demonstrate compliance with Section III.B.1 of the PCB approval issued pursuant to Section 6(e) of the TSCA:
- Establish new operating parameter limits (OPLs) for PCB feedrate to the incinerator for liquid and solid PCB waste streams combined.
- Demonstrate compliance during incineration of PCBs as per 40 CFR 761.70.
- Conduct a Continuous Monitoring System (CMS) performance evaluation test for the OPLs used to demonstrate compliance with the HWC MACT standard for dioxins/furans;
- Conduct a Relative Accuracy Test Audit (RATA) for the CO and O_2 Continuous Emissions Monitoring Systems (CEMS); and
- Satisfy the periodic testing requirements of Provision V.H.6. of the RCRA permit.

Per 40 CFR 63.1206(b)(7)(i)(A) of the HWC MACT, compliance with the DRE standard is required to be demonstrated only one time, and a minimum of 99.99% destruction and removal efficiency (DRE) of principal organic hazardous constituents (POHCs) for the incinerator was demonstrated in the 2006 Comprehensive Performance Test (CPT) for the Interim Standards of the HWC MACT. The HWC MACT requires that DRE only be demonstrated once as long as “you do not modify the source after the DRE test in a manner that could affect the ability of the source to achieve the DRE standard” (§ 63.1206(b)(7)(i)(A)) and you do not feed hazardous waste at locations other than the normal flame zone (§ 63.1206(b)(7)(ii)(A)). The incinerator meets these requirements.

No Operating Parameter Limits (OPLs) or limits for the HWC MACT or the current RCRA permit are to be developed from the results of this test, but a new fee rate limit for solid and liquid PCBs combined will be established. Both the HWC MACT requirements for a Confirmatory Performance Test and the periodic testing required by the RCRA permit are to be conducted between the 12-month average of the applicable operating parameters and permitted limit in either the NOC for the HWC MACT or the RCRA permit. It is expected that the test will be performed within the range of the average value over the previous 12 months and the maximum or minimum allowed (i.e., limit) as shown in **Table 4-1** of Section 4.

In addition to a new PCB feedrate limit, the Test will be used to demonstrate compliance with a combustion efficiency of 99.9% or more and PCB DRE of 99.9999% or more during incineration of liquid and non-liquid (solid) PCB per 40 CFR 761.70.

If a RATA of the CO and O_2 CEMS has not been conducted within 60 days of the Test, a RATA of the CO and O_2 CEMS must be conducted prior to or during the test. The pre-test CO and O_2 CEMS RATA will be performed during the week of March 31, 2025 with CfPT emissions compliance testing to begin on or before April 14, 2025.

The feedrate limits in Table V.H.3.and the emission limits in Table V.H.4. in the RCRA permit for metals, chlorine, and ash are shown in **Table 1-1**.

Table 1-1. RCRA Permit Feedrate and Emission Limits

Constituent or Parameter	RCRA Permit Feedrate Limit All Feedstreams (lb/hr)[1]	RCRA Permit Feedrate Limit Pumpable Feedstreams (lb/hr)[2]	RCRA Permit Emission Limit (lb/hr)[3]
Arsenic[4]	4.82	4.82	0.0271
Arsenic[5]	4.82	0.26	
Beryllium	13.2	2.7	0.00842
Cadmium	21.6	21.6	0.0421
Chromium, Total	26.7	26.7	0.0430
Chromium, Hexavalent			0.00981
Antimony	150	150	2.10
Barium	65.6	57.5	2.09
Lead	156.74	156.74	1.06
Mercury[4]	0.0417	0.0417	0.0191
Mercury[5]	0.101	0.101	
Nickel, Pumpable	131	113	0.323
Nickel, Solids Mode	1042	13.7	
Selenium	175	175	0.532
Silver	19	19	0.0419
Thallium	75	75	0.423
Zinc	7,170	7,170	21.5
Total Chlorine	3,782		
Hydrogen Chloride			4.0
Free Chlorine			3.65
Ash to Afterburner		240	
Particulate Matter			0.08 grains/dscf

[1] From Table V.H.3. of RCRA Permit 50212 for “All Feedstreams”.

[2] From Table V.H.3. of RCRA Permit 50212 for “Pumpable Feedstreams”.

[3] From Table V.H.4. from RCRA Permit 50212.

[4] Feedrate when not using proprietary technology to control mercury emissions.

[5] Feedrate when using proprietary technology to control mercury emissions.

1.2 Test Protocol Summary

The objectives for the Test will be accomplished under one test condition, to be performed with triplicate runs. A brief description of the test condition is provided below.

1.2.1 HWC MACT

At §63.1207(b)(2), the HWC MACT states that “you must conduct confirmatory performance tests to:

i) Demonstrate compliance with the dioxin/furan emission standard when the source operates under normal operating conditions”. “Normal operating conditions” are defined as:

   1) the average carbon monoxide emission level over the previous 12 months to the maximum allowed;

2) the operating limits established to maintain compliance with the dioxin/furan standard within the range of the average value over the previous 12 months and the maximum, or minimum, allowed; and

3) chlorine feedrate at normal or greater. As required by §63.1207(g)(2)(ii), the average operating conditions do not include calibration data, startup data, shutdown data, malfunction data, and data obtained when not burning hazardous waste.

The approach for accomplishing the testing required by the HWC MACT is to operate the incinerator at a single test condition representative of typical operations. To accomplish this, a mix of waste streams that are representative of typical operations will be fed to the incinerator and the following parameters will be operated between the previous 12-month average and the maximum, or minimum, allowed (i.e., the OPLs for control of dioxins and furans in the NOC:

- Minimum combustion chamber temperature in the kiln;
- Minimum combustion chamber temperature in the SCC;
- Total hazardous waste feedrate to the kiln;
- Pumpable hazardous waste feedrate to the kiln;
- Total (pumpable) hazardous waste feedrate to the SCC; and
- Stack gas flowrate.

The feedrate of chlorine will be at normal, or higher, levels during the Test.

The average operating values over the previous 12 months were developed from the recorded HRA (hourly rolling averages) for the 12 months preceding the preparation of the Test Plan (i.e., September 2023 through August 2024). The maximum, or minimum, allowed for each value is the OPL from the NOC for that value.

The OPL in the NOC for Operation of Waste Firing System (an OPL required in association with the standard for DRE) is Minimum Burner Atomization Pressure (Air or Steam) of 20 psig. The atomization pressure to all burners in service will be maintained above 20 psig during the Test, as in normal operation.

A variance is being requested for the concentration of carbon monoxide (CO) in the stack gas to allow the operation of the incinerator to maintain the CO concentration below the HWC MACT emission limit of 100 ppm corrected to 7% oxygen (See Section 4.4).

The following operating parameters are controlled by the HWC MACT, and are not included in the RCRA permit. Although not required, the following operating parameters will be maintained between the 12-month average and the minimum in the NOC:

- Minimum Liquid Feed Pressure to the Absorbers;
- Minimum Power to the WESP; and
- Minimum Tank Level in the WESP.

Veolia has an EPA-approved Alternative Monitoring Application that waives an OPL for minimum pressure drop across the absorbers, and minimum tank level in the IWS.

1.2.2 RCRA Periodic Test

Section V.H.6. of the RCRA permit requires that a periodic test be conducted to verify compliance with the feedrate limits in Table V.H.3. and the emission limits of Table V.H.4.. and to ensure achievement of the RCRA performance standards for incinerators at normal operating conditions. The operating parameters specified in Table V.H.2 (of the RCRA permit) must be held within the range of the average value over the past 12 months (i.e., September 2023 through August 2024) and the maximum or minimum allowable limit. These operating parameters are:

- Maximum Total Hazardous Waste Feedrate to Kiln and SCC;
- Maximum Total Hazardous Waste Solids to Kiln;
- Maximum Total Aqueous Waste Feedrate to Kiln and SCC;
- Maximum Aqueous Waste Feedrate to SCC;
- Maximum Non-Aqueous Waste Feedrate to SCC;
- Maximum Total Pumpable Hazardous Waste Feedrate to Kiln;
- Maximum Total Pumpable Hazardous Waste Mass Feedrate to SCC;
- Minimum Combustion Temperatures in the Kiln;
- Minimum Combustion Temperature in the SCC;
- Maximum Combustion Temperatures in the Kiln;
- Maximum Combustion Temperature in the SCC;
- Maximum Combustion Gas Velocity Indicator (Fan RPM Correlation);
- Minimum Atomization Air Pressure;
- Minimum Atomization Steam Pressure;
- Metals Feedrates (Arsenic, Beryllium, Cadmium, Total Chromium, Antimony, Barium, Lead, Mercury, Nickel, Selenium, Silver, Thallium, and Zinc);
- Total Chlorine Feedrate;
- Ash to Afterburner;
- Stack CO;
- Maximum Combustion Zone Pressure;
- Minimum Ionizing Wet Scrubber (IWS) Voltage;
- Minimum Ionizing Wet Scrubber Water Flow;
- Minimum Absorber Liquid to Gas Ratio (L/G); and
- Minimum pH at Cooling Tower Inlet.

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1.2.3 PCB DRE Test

EPA has determined that a PCB trial burn is needed to demonstrate compliance during incineration of liquid and non-liquid PCB as per 40 CFR 761.70. The Test will be used to demonstrate combustion efficiency of 99.9 percent or more and will be computed as follows:

$$\mathbf{CE} = \frac{\mathbf{C_{CO2}}}{\mathbf{(C_{CO2} + C_{CO})}} \mathbf{x\ 100}$$

Where

CE = Combustion efficiency (expressed as a percent)

C_{CO_2} = Concentration of carbon dioxide.

C_{CO} = Concentration of carbon monoxide.

The Test will be used to demonstrate PCB of 99.9999 percent or more per TSCA regulation and will be computed on a mass basis as follows:

$$\mathrm{DRE} = \frac{W_{in} - W_{out}}{W_{in}}$$

Where:

DRE = Destruction Removal Efficiency (expressed as a percent)

W_{in} = total mass feedrate of PCB in all the waste feed streams and spiking solutions combined; and

W_{out} = mass emission rate of PCB in the stack gas.

Veolia is targeting the total PCB feedrate limit to the incinerator at 1,400 pounds per hour for this test.

See sample calculations below for an example of how it will be demonstrated that the mass air emissions do not exceed 0.001g PCB/kg of the PCB introduced into the incinerator as specified in 40 CFR761.70(b)(1).

Sample Calculation

W_{in} = Total mass feed rate of PCB in all the waste feed streams and spiking solutions combined; anticipated to be 1400 lb/hr; and

W_{out} = Mass emission rate of PCB in the stack gas @ the DRE limit.

Target DRE = 99.99999%

$W_{out} = (1-0.9999999) \times W_{in}$

$W_{out} = 0.0014$ lb/hr

Stack incinerator flow rate emissions Qstd = 39,000 dscfm

$$\mathrm{Wout} = \frac{0.0014}{3900\ x\ 60}\ lb/dscf$$

$$\mathrm{Wout} = 5.98 \times 10^{-10}\ \mathrm{lb/dscf}$$

Minimum Sample Volume S_v= 106 dscf/sample

$W_{out} = 5.98 \times 10^{-10}$ lb/dscf x 106 dscf/sample

$W_{out} = 6.34 \times 10^{-8}$ lb/sample

$W_{out} = 6.34 \times 10^{-8} \times 453.59$ g/lb

$W_{out} = 2.876 \times 10^{-5}$ g/sample

$W_{out} = 2.876 \times 10^{-5} \times 10^{6}$ µg/g

$W_{out} = 28.76$ µg/sample

The outlet will not exceed 28.76 µg/sample. The laboratory method limit is 200 pg/sample.

1.2.4 Testing During the CfPT and RCRA Periodic and PCB DRE Test

The Test will include one test condition, and three test runs. During each test run, emissions of the following parameters will be measured:

- Dioxins/Furans (PCDD/PCDF);
- Polychlorinated Biphenyls (PCB);
- Total Chlorinated Organic Compounds (RCl);
- Metals (Arsenic, Beryllium, Cadmium, Total Chromium, Antimony, Barium, Lead, Mercury, Nickel, Selenium, Silver, Thallium, and Zinc);
- Chromium VI (Hexavalent Chromium);
- Hydrogen Chloride (HCl) and Chlorine (Cl_2); and
- Particulate Matter (PM).

In addition, waste feed streams will be sampled and analyzed to determine:

- Metals (Arsenic, Beryllium, Cadmium, Total Chromium, Antimony, Barium, Lead, Mercury, Nickel, Selenium, Silver, Thallium, and Zinc);
- Total Chlorine;
- PCB; and
- Ash to the Afterburner.

Process data will be collected during the Test to document that the incinerator was operated within the target conditions during the test. During each test run, stack gas samples will be collected for determination of the emissions parameters, and the waste feed streams will be sampled and analyzed to determine the feedrates of constituents required by the RCRA permit and TSCA approval by the methods described in Section 5.0 of this plan. The schedule for testing is discussed in Section 6.0.

2. Waste Characterization

Veolia's Port Arthur incinerator is capable of burning pumpable liquids (including sludges), solids, and injected containerized gases. The suitability of a waste for incineration is determined in the pre-acceptance stage of Veolia's waste control practices as currently outlined in the HWC MACT Feedstream Analysis Plan and RCRA Waste Analysis Plan. The commercial incineration facility receives and manages nearly every type of hazardous waste identified in 40 CFR Part 261.

2.1 Feedstream Description

The wastes treated at the Veolia incinerator include:

- Household hazardous waste;
- Waste generated by commercial establishments (e.g., dry cleaners, mechanic shops, printing offices);
- Waste generated by industrial facilities (e.g., petroleum refining and petrochemical plants, pulp and paper mills, semiconductor plants);
- PCB waste including liquids, sludges, and solids (e.g. dielectric fluids, oils, and soils);
- Containerized gases; and
- Non-hazardous industrial solid waste.

Wastes which the facility does not accept are:

- Radioactive wastes;
- Explosive material as defined by Department of Transportation (DOT) under 49 CFR Part 173;
- Municipal garbage.

2.1.1 Hazardous Waste Feeds

The incinerator is used for commercial purposes and the physical and chemical properties of the waste feed vary considerably. To facilitate operations, wastes are categorized as energetic and aqueous liquids, pumpable sludge, solids, and contained gaseous wastes. The chemical characteristics of the waste streams are discussed in Section 2.2., and the feed mechanisms for the waste streams are described in Section 3.0.

2.1.2 Auxiliary Fuel

At the incinerator, auxiliary fuels include liquid and gas fossil fuel or other fuel. Auxiliary fuel is burned in the incinerator during start-up, shutdown, or to maintain combustion temperature.

2.1.3 Process/Combustion Air

Wastes are moved from storage to the Bulk Material Handling Building where waste transfers and waste processing such as shredding and mixing occur. During waste transfer or processing operations, the ventilation system of the buildings captures any emissions created during these operations. A portion of the ventilation air for the BMHB is used as combustion air for the incinerator. The remainder of the air within the building is routed to the RTO (Regenerative Thermal Oxidizer).

2.2 Waste Stream Characterization

As a commercial incinerator, the facility receives and treats nearly every type of hazardous waste and, therefore, all HAPs can be expected to be in the waste feed streams at any given time at any concentration.

3. Detailed Engineering and Process Information

The incinerator at the Port Arthur facility consists of waste receiving and waste feeding equipment, a rotary kiln, an ash/slag removal system, a secondary combustion chamber (SCC), a quench tower, two acid gas absorbers, four cooling towers, a four-stage ionizing wet scrubber, a wet electrostatic precipitator, an induced draft fan, an exhaust stack, and a scrubber water treatment/recycle system. **Figure 3-1** is a Simplified Process Flow Diagram, showing the integration of these functional groups.

The shell of the rotary kiln is rolled welded carbon steel. It measures 60-feet in length and is supported by two steel trunnion assemblies located 17-feet and 16-feet from the feed and discharge ends, respectively. The slope of the kiln from inlet to ash discharge is approximately one (1) degree. The drive for the kiln is a girth gear and gear reducer powered by a variable speed, 100-hp motor. The nominal rotation speed is 0.5 rpm with an average solids residence time of approximately 1½ hours. In the event of mechanical failure of the main drive motor or a general power failure, a 10-hp motor, which can be powered by an auxiliary diesel generator, rotates the kiln slowly to prevent kiln and refractory damage.

The shell of the kiln is 16-feet in inside diameter and is lined with refractory material which protects the carbon steel shell from the high temperatures of incineration. The inside diameter of the kiln with the insulation in place is approximately 14-feet.

The kiln is normally operated under negative pressure maintained between zero and one inch water column vacuum to prevent fugitive emissions from the kiln ends. To prevent fugitive emissions from the kiln ends shrouds have been installed around the seals at both ends of the incinerator. The shrouds are continually evacuated by fan and routed to the transition duct between the rotary kiln and SCC.

The kiln temperature is measured with three thermocouples inserted through the roof of the ash dropout chamber, approximately 4-feet past the end of the kiln. The first thermocouple is on the centerline of the kiln. The other two thermocouples are 3-feet 6-inches off the centerline.

The DCS (Distributed Control System) takes the three temperatures and averages them. Next, it computes the deviation of each temperature from the average. If any one temperature is outside an established range it is discarded and the average of the two remaining temperatures is recorded. The thermocouple that exceeded range is then replaced with a new thermocouple. This system is used on both the kiln and SCC.

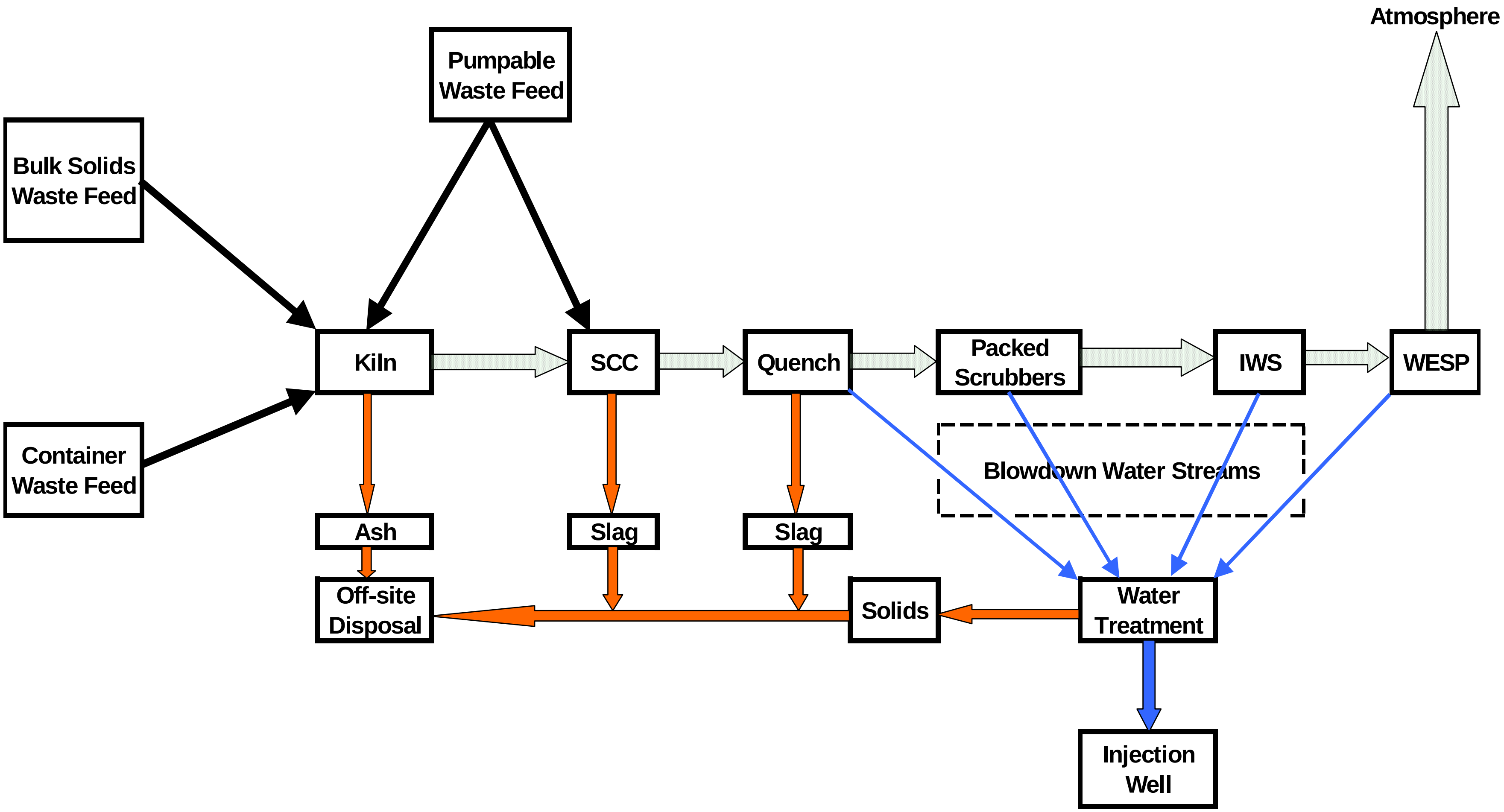


Figure 3-1. Simplified Process Flow Diagram

3.1 Kiln Solids Feed Systems

Bulk and containerized solids are currently charged to the kiln through systems which feed through the faceplate.

The incinerator train receives bulk solids such as contaminated soil, solid, and sludge process waste and plant trash. The Bulk Materials Handling Building was put into service in February 2004 to modernize bulk solids and container feed handling systems. Containerized waste is also fed into the kiln through the kiln container ram feeder.

The Bulk Material Handling Building consists of five miscellaneous units (two mixing pits, a blender, and two shredders) and two container storage areas (the north and south drum staging areas).

All suitable wastes authorized for receipt at the Port Arthur facility may be processed within the Bulk Material Handling Building. Typically, operations in this building will be performed in conjunction with subsequent feeding of the resultant waste blends to the incinerator. Based on analytical information for the wastes, a blend plan will be prepared for mixing/shredding to achieve the desired waste blend characteristics. The building also supports the mixing of wastes for incineration at a later time and the transloading of wastes from customer bulk carriers into site roll-off boxes. The Bulk Material Handling Building has two separate waste feed trains: one for ignitable wastes, also referred to as “low-flash” wastes (closed cup flash point less than 140°F); and one for non-ignitable wastes, also referred to as “regular wastes” (closed cup flash point greater than or equal to 140°F).

In the non-ignitable waste feed train, bulk solids can be off-loaded into the Regular Waste Pit which has a nominal capacity of 840 cubic yards. Non-ignitable, containerized waste to be bulked will typically be staged in the South Drum Staging Area on pallets. Pallets of containers are moved by forklift onto a conveyor, transferred from the conveyor to a drum lift, and hoisted via the drum lift to the shredder conveyor. The shredder conveyor feeds directly to a shear shredder. The container conveying and shredding system accommodates pallets containing four drums. Shredded materials discharge via a chute into the Regular Waste Pit.

Mixing and movement of bulk materials and shredding operations are remotely controlled by operators in an enclosed room, assisted by video cameras. Operators, using a remotely operated arm mounted grapple clam bucket, mix wastes in the Regular Waste Pit. A bridge crane and clamshell transfers the blended waste feed mix to an apron conveyor feed hopper; the hopper discharges to an apron conveyor that moves waste from the building to the bulk solids feed chute at the kiln. The bridge crane and clamshell can also be used by the operator to move materials from the pit to the shredder hopper. In the event of an automatic waste feed cutoff for the kiln, the apron conveyor is interlocked to stop waste feed to the kiln feed gates. The kiln feed gates are also interlocked to stop bulk waste feed in the event of an automatic waste feed cutoff.

The bulk solid waste passes through the kiln feed gates to the kiln feed chute. The kiln feed chute is constructed from a heat-resistant alloy installed at a 60-degree angle from horizontal.

The ignitable (low-flash) waste feed train includes a container conveying and shredding system nearly identical to the system used in the non-ignitable waste feed train. The low-flash container conveying and shredding system is located at the north end of the Bulk Material Handling Building. The North Container Staging Area provides staging and storage capacity for both the direct drum feed and the low-flash container conveying and shredding system.

The low-flash feed train incorporates design features and process controls to allow the safe handling of ignitable wastes. In addition, this process train may be used to blend and feed non-ignitable wastes.

Containers of ignitable waste are conveyed to the low-flash shredder. The low-flash shredder system also accommodates pallets containing four drums. The shredder discharges through a chute that feeds a rotary paddle blender. The blender mixes the shredded waste with liquids and sorbent materials, as necessary, to achieve the correct consistency for the ram feeder. The ram feeder feeds the waste blend directly to the kiln faceplate through a 10-inch diameter pipe.

The entire shredding/blending circuit, from the shredder through the ram feeder, is equipped with nitrogen blanketing. Nitrogen is added to the enclosed system to maintain oxygen content below a pre-set level. The shredding and blending are shut down if the oxygen content within the system exceeds the pre-set level.

Bulk low-flash waste is received in the Low-Flash Pit, which has a nominal capacity of 176 cubic yards. This material is fed to the low-flash shredder using a bridge crane and clamshell dedicated to the low-flash feed train. LEL monitors are located over the pit and the shredder hopper to insure adequate ventilation and safe operation of the bulk low-flash feed system.

Incompatible waste materials are scheduled for processing in a sequence that precludes mixing incompatible wastes in the processing units, thereby preventing adverse reactions.

The air space in the area where the bridge crane, clamshell, low-flash pit and shredder feed hopper operate is segregated by partition walls, ceiling and flooring from all other areas of the ignitable waste train processing area and the remainder of the Bulk Material Handling Building.

The low-flash waste train is isolated from the atmosphere. Both bulk and containerized waste is fed to the equipment train through double slide gate, air-lock systems. The clamshell deposits bulk waste feed into the bulk waste feed hopper for entry into a double slide gate air-lock chamber over the shredder; as described above. Drum feed to the low-flash shredder initiates in the north warehouse portion of the building. Drums are conveyed to the drum lift and onto the roller conveyor that feeds the low-flash shredder. The drum feed pusher moves a pallet of containers from the roller conveyor outside the low-flash area through an external slide gate of the drum feed air-lock chamber over the shredder. Once the external air-lock slide gate has been closed, the air-lock chamber is purged with nitrogen, and the remainder of the equipment train operates under a nitrogen blanketing system to maintain a non-ignitable atmosphere within the equipment. Oxygen content is monitored at several locations within the nitrogen-blanketed operating environment. Automatic system controls function in low-flash operating mode to allow operation only when system conditions are acceptable.

In both operating modes, the processing equipment is interlocked to prevent operation of upstream equipment when downstream equipment is not ready for upstream equipment output and when downstream equipment is not operating. In addition, in low-flash operating mode, equipment is controlled by operating conditions within the equipment, such as temperature, pressure, and oxygen content. For example, the internal slide gates in each of the air-lock chambers interlock with the external slide gates so that the external gates must be in the closed position before the internal slide gates can open. In addition, permissives for the internal slide gates only allow operation when the shredder is operational and the conditions within the shredder feed chute (oxygen and pressure) are within acceptable ranges. Similarly, automatic control logic allows operation of the shredder only when shredder feed chamber, shredder discharge chamber, and blender conditions are within acceptable ranges.

Further, the ram feeder is interlocked with the kiln automatic waste cutoff operating parameter limits to stop operation of the ram feeder at any time an automatic waste feed cutoff is initiated for the kiln. Stopping the ram feeder also stops the waste feed from the blender to the ram feeder. Operation of the low-flash system with the design features and controls described above minimize the hazards inherent in handling ignitable wastes.

Containerized materials such as off-specification products, contaminated soils, contaminated personal protective clothing and process waste liquids and sludges are fed to the incinerator. Container types vary and may include boxes, fiber, plastic, and steel drums and buckets, and 85-gallon over packs.

Containers selected for direct feeds into the kiln are moved by forklift from the container storage buildings to the incinerator feed staging area. The containers are transferred to a platform and then placed on a powered conveyor in accordance with the waste feed schedule. The powered conveyor transports the containers from the incinerator feed staging area to the hydraulic ram charge chamber.

After a slide gate on the kiln feed chamber opens, a hydraulic ram pushes each charge into the kiln feed chamber. The slide gate closes and a high temperature fire door between the kiln feed chamber and the kiln opens. The kiln container feed hydraulic ram traverses the length of the charge chamber and forces the container into the kiln. Containers are fed to the kiln at variable, pre-determined rates depending on the nature of the container material.

3.2 Kiln Pumpable Waste Feed System

All pumpable wastes are charged to the rotary kiln through various mechanisms located on the kiln faceplate. The method by which a waste is injected depends upon its physical state and caloric value. Direct feeding to the kiln from tanker trucks, drums, and tote bins is performed for materials that are not suitable for placing into tankage. The following is a discussion of each of the liquid feed mechanisms on the faceplate of the kiln.

Non-energetic sludges are fed directly to the kiln through a 3-inch diameter pipe identified as the non-energetic sludge nozzle. The nozzle extends approximately 30 inches inside the kiln faceplate and is axially centered and supported by a sleeve. Forced air flows through the sleeve of the sludge nozzle to cool the inner pipe. The waste typically fed through the non-energetic nozzle is of low heating value. The sludge is pumped from the selected tank or container through a flow measuring device directly into the kiln through the nozzle. The material is atomized with air and/or steam.

Energetic sludges and glove/tote box direct feeds are introduced into the kiln through two atomizing sludge nozzles that use steam and/or air as the atomizing medium. Eight-inch diameter mounting pipes are located on the kiln faceplate to support the nozzles. A feed pump transports the energetic sludge from the tank farm to one of these nozzles. The energetic sludge that is fed through the atomizing nozzle is generally a higher BTU waste. The glove box waste feed system is arranged to feed liquid waste from drums and other containers and to minimize exposure to the contents.

Aqueous waste and process water is fed into the kiln through two 1½-inch diameter internal steam or air atomizing nozzles. A 6-inch diameter concentric mounting pipe surrounds each nozzle and channels air around the nozzles for cooling and combustion. Process water can be fed into the kiln whenever sufficient aqueous waste is not available or as determined to be necessary for the proper operation of the incinerator.

The kiln primary burner is located on the faceplate near the center of the faceplate. This forced air burner is capable of releasing up to 40 million BTU/hr through a fossil fuel nozzle or through two atomized liquid nozzles in the burner box. Energetic liquid from the tank farm and kiln direct inject energetic liquids from tank trucks, totes and other containers are fed to the two burner nozzles. The burner has a turndown ratio of approximately 3 to 1. During incinerator startup, shutdown, or upset conditions, auxiliary fuel is burned in place of energetic liquid waste.

3.3 Secondary Combustion Chamber Design

Hot flue gases from the transition section enter the cylindrical secondary combustion chamber (SCC) approximately 14-feet above the base of the tower. The SCC is equipped with eight burners. The SCC is 78-feet tall and is fabricated of rolled, welded carbon steel plate. A nominal 12-inch firebrick composite lines the 18-foot diameter shell resulting in a cross-sectional area of 201 square feet per foot.

The combustion gases are raised to a minimum of 1,955° F. The active volume of the SCC is defined as the space between the centerline of the burners and the first temperature measuring device located in the outlet duct. Flue gases exit from the SCC through a refractory-lined 12-foot inside diameter duct.

The roof of the SCC supports a refractory-lined, 6-foot inside diameter, 8.5-foot tall thermal relief vent. A counterweighted cover seals the vent during normal operation. The thermal relief vent (TRV) serves to create a natural draft to allow for the evacuation of combustion gases during emergency situations such as loss of electric power or failure of the ID fan. In all instances, waste feed is automatically shut off prior to or simultaneously with the vent opening. The TRV is also used during normal shutdown to allow convective cooling of the kiln and SCC once all waste has passed out of the systems.

Eight burners are evenly arranged around the perimeter of the SCC tower. The burners, which fire tangentially, are rated at 15 million BTU/hr each. The burners are dual fuel burners and have the capability to fire waste liquid and/or fossil fuel. The burners are equipped with external steam and air atomizers and natural gas fired pilot lights. A forced-draft combustion air fan delivers a nominal 24,000 scfm of ambient air to the eight burners.

Four of the eight burners operate independently of the other four and of one another. These four burners are piped separately to allow independent firing of fossil fuel and/or waste liquids and gases from containers. Direct feeding to the SCC from tanker trucks, drums, cylinders, and tote bins is performed for materials that are not suitable for placing into tankage.

A compressed gas cylinder feed system is designed to feed waste gases to the secondary combustion chamber. The compressed gas feed system has a complete enclosure and engineering controls are utilized to safely introduce gases into the SCC.

The SCC temperature is measured with three thermocouples inserted through the top of the hot cross-over duct between the SCC and quench, approximately 7.5-feet downstream of the SCC. The first thermocouple is on the centerline of the duct. The other two thermocouples are 2-feet 6-inches off the centerline.

The DCS takes the three temperatures and averages them. Next, it computes the deviation of each temperature from the average. If any one temperature is outside an established range it is discarded and the average of the two remaining temperatures is recorded. The thermocouple that exceeded the range is then replaced with a new thermocouple. This system is used on both the kiln and SCC.

3.4 Quench Tower

Cooling of the combustion gases occurs in the quench tower. Flue gases exit from the SCC through a refractory-lined 12-foot inside diameter duct. The gas stream enters the top center of an 11.5-foot outside diameter quench tower. The quench tower is constructed of rolled, welded carbon steel plate and is lined with acid-proof brick. Three rows of water spray nozzles are arranged around the circumference of the tower and spray water directly into the hot combustion gas. As the gas flows downward it is cooled to an adiabatic saturation temperature of about 185°F. Water is supplied from the scrubber water recycle loops and from clean process water. A caustic solution is added to the quench water for initial neutralization of acid gases. The ash particulate collected by the water sprays falls to the bottom of the quench tower. The bottom of the tower is sloped to direct these solids to an auger which removes the solids from the tower.

3.5 Air Pollution Control System

Removal of particulate matter and acid gases occur in the APCS. The APCS consists of the following equipment:

- Two parallel Acid Gas Absorbers;
- An Ionizing Wet Scrubber; and
- A Wet Electrostatic Precipitator.

These systems are discussed in detail in the following sections.

3.5.1 Acid Gas Absorbers

A fiberglass reinforced plastic (FRP) duct conveys the cooled flue gas from the quench tower to two absorbers arranged in parallel. The 11-foot outside diameter, corrosion-resistant FRP vessels are 25-feet tall and contain 10-feet of polypropylene Tellerette®, or equivalent, packing. The plastic packing material provides increased surface area for greater contact between the gas and scrubbing solution and thus increases the gas to liquid mass transfer capacity. Four packed bed, forced draft cooling towers are used to cool the recirculating absorber water.

The pH control system feeds caustic to the outlet of the absorber pumps and a second (trim) caustic feed is injected in front of the cooling tower pumps, which discharge to the absorbers. The pH is measured in the discharge line of the absorber pumps and adequate caustic is added to raise the pH, as necessary. The pH is monitored in the absorber inlet and a trim stream of caustic is injected into the suction of the cooling tower pumps to maintain the pH at the absorber inlet at approximately 7.0.

3.5.2 Ionizing Wet Scrubber

Following the absorbers are two parallel four-stage ionizing wet scrubbers (IWS). The IWS utilizes high voltage ionization to electrostatically charge the particulate in the gas stream before the particles enter a packed section in each of the four stages arranged in series. The packing in each of the packed sections is similar to the packing that is used in the absorbers. The charged particles leaving the ionization section impinge on and/or are attracted to the surfaces of the packing. A circulating water stream continuously flushes the particles off the packing. The gas stream moves horizontally through the IWS while the scrubber liquid flows vertically downward. Process water is added to the IWS plate wash and a blowdown from the circulating recycle loop is directed to the absorber-cooling tower loop and the quench.

High-voltage DC power for the ionizing section is provided by a high-voltage transformer/rectifier for each stage. The shell and most internal parts of the IWS are constructed of FRP and corrosion resistant metals.

Periodically (approximately every two hours) the IWS goes through a cleaning cycle to rinse particulate matter from the ionization plates. The cleaning cycle occurs sequentially through the four stages of the IWS. The power to a stage is turned off as that stage is being cleaned.

3.5.3 Wet Electrostatic Precipitator

The wet electrostatic precipitator (WESP) is installed following the IWS. Process gas enters the WESP and passes through a distribution system to evenly distribute the gas in the ionization and collection tubes of the vessel. The gas may be saturated with water sprays to create additional water droplets in the gas stream, as necessary. Each tube has a wire electrode suspended through the center of the tube. The electrode wire generates a high voltage DC corona field that ionizes the particulate and water droplets in the gas stream with a negative charge as the gas passes through the tubes. The negatively charged particulate and water droplets are attracted to the positively grounded walls of the tubes. The condensed water droplets serve to clean the particulate from the tube walls and maintain clean tube walls to maximize the particulate collection efficiency. The condensed water flows down the tubes into a sump in the bottom of the vessel. Approximately 7.0 gpm (on average) of the condensed water will be blown down to the existing scrubber water treatment system and replaced with make-up water.

For seven minutes every 22 hours, the tubes of the WESP are washed to remove particulate matter. The water in the sump is used for this periodic washing. During the cleaning cycle, power to the WESP is turned off.

3.5.4 Fans and Stack

To minimize the possibility of CO excursions, Veolia has installed an oxygen injection lance in the top section of the SCC to increase the level of oxygen in that zone. Due to the rapid release of BTUs in the kiln or SCC which consumes available oxygen, the level of CO increases. The introduced oxygen facilitates the combustion of CO that is formed in the kiln or SCC as a result of such excursions.

From the WESP, the flue gases pass into the FRP induced draft (ID) fan. The fan moves the approximately 110°F flue gas at an average rate of approximately 39,000 DSCFM, and can achieve a flow above 50,000 DSCFM. The fan is direct driven by a 250 hp variable speed motor that is controlled by a variable frequency drive controller. The fan is sized to maintain a negative pressure in the rotary kiln and

SCC, as well as to move combustion gases through the emission control train and out the stack. The pressure measurement at the feed end of the rotary kiln is used to determine the fan speed during operation. The fan speed (RPMs) is determined by the variable frequency drive controller and used as an indication of stack flow.

Stack gas flowrate is measured on a continuous basis by monitoring the RPMs of the ID fan and correlating the fan RPMs to stack gas flowrate. The correlation between the ID fan RPMs and the stack gas flowrate was developed by measuring the stack gas flowrate, using EPA Methods 1 - 4, and relating that value to the average ID fan RPMs from the test period. A RATA of the stack gas flowrate monitoring system is performed annually.

Flue gas is forced through an FRP stack that is 5.5-feet in inside diameter. The stack is supported by a steel frame tower. The discharge of the stack is 130-feet above ground level. Ladders and platforms provide access for stack testing.

3.6 Automatic Waste Feed Cutoff

The automated distributed control system (DCS) facilitates operation of the multi-feed incinerator and associated emission control equipment. The process control system includes automatic waste feed cutoff capabilities in the event of specified abnormal operating conditions.

Shutdown of the incineration system may occur automatically or be initiated by the operator. Automatic shutdown takes place if the unit experiences: 1) an overall power failure, 2) failure of the induced draft fan, or 3) a high temperature in the quench tower exit gas.

In the event of a power failure, a generator automatically starts to supply power to the auxiliary kiln drive, the SCC combustion air fan, emergency lighting, critical instrumentation, and the emergency quench water system. All waste feed to the incinerator will cease and the induced draft fan will stop if necessary. One SCC burner will remain firing on auxiliary fuel or be immediately restarted to maintain the ability to destroy organic constituents in the kiln exit gas. Operation will continue in this manner until the system can be restarted or a decision to shut down becomes final. The kiln is rotated to prevent structural damage and to process the residues left in it at the time of the failure.

Failure of the induced draft fan triggers an automatic cut off of all waste feeds to the kiln and the SCC. One SCC burner will remain firing on auxiliary fuel or be immediately restarted to maintain the ability to destroy organic constituents in the kiln exit gas. Operation will continue in this manner until the system can be restarted or a decision to shut down becomes final.

In the event of an uncontrolled high temperature in the exit gas from the quench tower, a similar emergency shutdown will occur. A backup water supply for the quench section spray nozzles is provided to minimize the chance of this occurrence. However, in the event that all quench systems fail, a high-temperature alarm will trigger a waste feed cutoff and an opening of the thermal relief vent. Again, one SCC burner will remain firing on auxiliary fuel or be immediately restarted to maintain the ability to destroy organic constituents in the kiln exit gas. Operation will continue in this manner until the system can be restarted or a decision to shut down becomes final.

The operator may also initiate a total system shutdown. A manual key switch will cause an automatic waste feed cutoff and a cessation of operation of the induced draft fan. One SCC burner will remain firing on auxiliary fuel or be immediately restarted to maintain the ability to destroy organic constituents in the kiln exit gas. Operation will continue in this manner until the system can be restarted or a decision to shut down becomes final.

A number of interlocks have been installed to shut off all waste feed as required to ensure that the incinerator operates at all times within permit conditions. In general, an upset condition in the SCC will warrant shutdown of waste feed to the entire incineration system while an upset condition in the rotary kiln will affect only the operation of that unit. Instrumentation is installed that will trigger an alarm at a value that approaches the permit value in order to warn the operator and provide an opportunity to avoid the automatic waste feed cutoff.

After an automatic waste feed cutoff has shut down the feeding of waste, the system is typically maintained at temperature with auxiliary fuel. If the situation can be corrected, waste feed is resumed as soon as permissives are established. If the correction cannot be accomplished with the incinerator at temperature, the operator will maintain temperature for approximately one hour to allow burnout of waste in the kiln. The normal shutdown sequence will then be initiated.

3.7 Process Monitoring and Operator Training

The Veolia Facility personnel are subject to the Operator Training and Certification Program (OTC Program) as required by 40 CFR 63.1206(c)(6) and conducted in accordance with facility plans and procedures. Facility training documentation will be available for review upon request.

A group of trained personnel operates the incinerator on a 24-hour basis managed by a shift supervisor. The group includes two control operators, one focused on combustion and one focused on air emissions control. An outside operator, a shift mechanic, and a shift Instrumentation & Electrical technician support them. In addition, several operators control the equipment that supplies waste feed to the incinerator. The facility has implemented an Operator Training and Certification Program in accordance with 40 CFR 63.1206(c)(6) and conducts operations in accordance with their Operation and Maintenance Plan as per 40 CFR 63.1206(c)(7).

4. Test Design and Protocol

This section describes the regulatory requirements to be satisfied during the Test and the protocols to be used to accomplish the test objectives.

4.1 Test Objectives

40 CFR 63.1207(b)(2) of the HWC MACT requires that a confirmatory performance test (CfPT) be performed within 31 months of the previous CPT to demonstrate compliance with the applicable dioxins/furans emission standard, and conduct a performance evaluation of continuous monitoring systems required for compliance assurance with the dioxins/furans standard. Additionally, Veolia's RCRA permit requires that the incinerator be tested every two and one-half years to verify compliance with the feedrate limits in Table V.H.3. (of the permit) and the emission limits in Table V.H.4. (of the permit), and to ensure achievement of the performance standards in 40 CFR 264.343.

This Test Plan presents Veolia's plan for testing the incinerator to demonstrate the requirements for the CfPT and for the periodic testing required by the RCRA permit. The plan presents the technical approach for collecting the data necessary to show compliance with the HWC MACT standard for dioxins/furans specified in 40 CFR 63.1219(a)(1)(ii) and to demonstrate the periodic testing required by Provision V.H.6. of the RCRA permit.

4.1.1 CfPT for the HWC MACT

40 CFR 63.1207(b)(2) of the HWC MACT requires that a confirmatory performance test (CfPT) be performed to demonstrate compliance with the applicable dioxins/furans emission standard and conduct a performance evaluation of continuous monitoring systems required for compliance assurance with the dioxins/furans standard. 40 CFR 63.1207(d)(2) requires that the CfPT commence no later than 31 months after the date of commencing the previous comprehensive performance test. Section III.B.1 of the PCB approval issued pursuant to Section 6(e) of the TSCA requires that a PCB Trial Burn occur in conjunction with the CfPT to confirm compliance with the incineration requirements in 40 CFR 761.70. The previous comprehensive performance test for the Port Arthur incinerator began on August 31, 2022, so the CfPT must begin by March 31, 2025. Veolia plans to conduct the Test beginning with a CO/O_2 CEMS RATA during the week of March 31, 2025.

This Test Plan presents Veolia's strategy for testing the incinerator and the technical approach for collecting the data necessary to document compliance with the applicable HWC MACT standard for dioxins and furans at 40 CFR 63.1219(a)(1)(B) and 40 CFR 761.70. The applicable dioxins/furans emission standard for Veolia's Port Arthur incinerator is 0.40 ng TEQ/dscm, corrected to 7% O_2 since the incinerator is equipped with a wet particulate matter control device. The air permit does not have a emission limit for PCBs.

4.1.2 RCRA Permit Periodic Testing

Section V.H.6. of Veolia's RCRA permit requires that the incinerator be tested every two and one-half years to verify compliance with the feedrate limits in Table V.H.3. (of the permit) and the emission limits in Table V.H.4. (of the permit), and to ensure achievement of the performance standards of 40 CFR 264.343. The previous testing required by the RCRA permit was completed on October 14, 2022. Veolia plans to conduct the Test the week of April 14, 2025.

The RCRA permit periodic test objectives are:

- Demonstrate waste feedrate limits in Table V.H.3. of the RCRA permit:
  - Arsenic;
  - Beryllium;
  - Cadmium;

  - Total Chromium;
  - Antimony;
  - Barium;
  - Lead;
  - Mercury;
  - Nickel, Pumpable Mode;
  - Nickel, Solids Mode;
  - Selenium;
  - Silver;
  - Thallium;
  - Zinc;
  - Total Chlorine; and
  - Ash to Afterburner.
- Demonstrate emission limits in Table V.H.4. of the RCRA permit:
  - Arsenic;
  - Beryllium;
  - Cadmium;
  - Chromium, Hexavalent;
  - Chromium, Total;
  - Antimony;
  - Barium;
  - Lead;
  - Mercury;
  - Nickel;
  - Selenium;
  - Silver;
  - Thallium;
  - Zinc;
  - Hydrogen Chloride;
  - Free Chlorine; and
  - Particulate Matter.
- Demonstrate the RCRA incinerator performance standards at 40 CFR 264.343:
  - A minimum 99.99% destruction and removal efficiency (DRE) of principal organic hazardous constituents (POHCs) was demonstrated in the 2006 Comprehensive Performance Test (CPT) for the Interim Standards of the HWC MACT. POHC DRE will not be re-demonstrated during the RCRA Periodic Test;
  - Control of hydrogen chloride emissions to less than 4 lb/hr or 1.0% of the HCl generated in the combustion process; and

- Control of particulate emissions to less than 0.08 grain per dry standard cubic foot as corrected to 7% oxygen in the stack gas.

4.1.3 PCB Trial Burn

EPA has determined that a PCB trial burn is needed to demonstrate compliance during incineration of liquid and non-liquid PCB as per 40 CFR 761.70.

The target conditions to be demonstrated and the standards to be achieved while feeding liquid and non-liquid PCBs are:

- The mass air emissions from the incinerator shall be no greater than 0.001g PCB/kg of the PCB introduced into the incinerator.
- Maximum liquid and non-liquid PCB feedrate to the incinerator of 1,400 pounds per hour;
- Minimum 99.9999% DRE for PCBs (liquid and non-liquid combined); and
- Combustion efficiency of at least 99.9%.

4.2 Test Protocol

The approach for accomplishing the test objectives is to operate the incinerator at a single representative test condition. To accomplish this, a mix of waste streams will be fed to the incinerator typical of normal operations. A general description of these waste feed streams is provided in Section 2.0 of this plan. Waste feed selection and operating conditions are presented in Sections 4.3 and 4.4.

The testing will consist of a series of three test runs (i.e., three distinct test periods). During each test run, samples will be collected to measure the following parameters in the stack gas emissions. The sampling and analytical methods that will be used for this test are described in Section 5.0.

- Dioxins/Furans (PCDD/PCDF);
- Polychlorinated biphenyls (PCB);
- Total chlorinated organic compounds (RCl);
- Metals (Arsenic, Beryllium, Cadmium, Total Chromium, Antimony, Barium, Lead, Mercury, Nickel, Selenium, Silver, Thallium, and Zinc);
- Chromium (VI);
- Hydrogen Chloride (HCl) and Chlorine (Cl_2); and
- Particulate Matter (PM).

In addition, waste feed streams will be sampled and analyzed to determine:

- Metals (Arsenic, Beryllium, Cadmium, Total Chromium, Antimony, Barium, Lead, Mercury, Nickel, Selenium, Silver, Thallium, and Zinc);
- Total Chlorine;
- PCBs; and
- Ash to the Afterburner.

Process data will be collected during the Test to document that the incinerator was operated within the target operating ranges during the test. A Continuous Monitoring System Performance Evaluation Test (CMS PET) will be performed prior to the Test to document performance of instrumentation used to monitor OPLs and parameters in association with the dioxins/furans standard of the HWC MACT.

Instrumentation that measures waste feedrates, combustion temperatures, stack gas flowrate, and the concentrations of CO and O_2 in the stack gas will be calibrated prior to the Test.

4.3 Waste Feed Characteristics and Selection

Veolia proposes to feed a mix of wastes that are representative of typical operations. Veolia will identify chlorine-containing waste streams, or otherwise purchase chlorine, as may be needed to achieve, as a minimum, the average chlorine feedrate for a 12-month period prior to the Test. The 12-month period, based on the most recent data available when this test plan was written, is September 2023 through August 2024.

The OPL for chlorine is a 12-hour rolling average. Hourly rolling averages were used to calculate the annual average for this parameter because this approach is more indicative of the feedrate of chlorine, and the HRA of the chlorine feedrate will be used to demonstrate the chlorine feedrate during testing.

For the Test, the actual waste feed streams and target feedrates will be established to achieve the target operating conditions based on actual inventory of the waste streams at the time of testing. It is possible that the waste feed streams and feedrates during the test may not demonstrate the 12-month average feedrates for the metals in Table V.H.3. of Veolia's RCRA permit. To assure that the 12-month average feedrates of the 13 metals in Table V.H.3. are demonstrated, Veolia will spike three metals during the test. The three metals that will be spiked will serve as surrogates for the other ten (10) metals, one metal spiked for each group of metals according to their volatility as Group 3 - volatile, Group 2 - semivolatile, and Group 1 - low-volatile.

For the PCB testing, it is expected that low concentration liquid and solid PCB waste will be available. As described in Section 4.5, the intent is to spike both liquid and solid waste feed streams with a concentrated 1,2 dichlorobenzene liquid as a surrogate for PCBs.

4.4 Operating Requirements

Testing requirements for the Confirmatory Performance Test of the HWC MACT and the periodic testing required by the RCRA permit both require that the incinerator be operated between the average of the operating parameters over the previous 12 months and the maximum or minimum limit. The operating parameters that must be controlled are different for the CfPT and the RCRA Periodic Test. The feedrate and emission limits and performance standards will be demonstrated while burning nonpumpable wastes (bulk, drums, and/or Putzmeister), sludges, and liquid hazardous waste. Energetic liquid hazardous waste streams will be fed to both the kiln and the SCC. Aqueous waste will be fed to the kiln but will not be fed to the SCC since the 12-month average for that operating parameter is de minimis. A proprietary mercury control technology will be used to control mercury emissions. **Table 4-1** lists the operating parameters, and ranges of operation, that must be maintained and monitored for the Test.

Both the HWC MACT and the RCRA permit require that the CfPT and the periodic testing be performed within the range of the average value over the previous 12 months and the maximum or minimum allowed (i.e., limit). The average operating values over the previous 12 months were developed from the recorded HRA (hourly rolling averages) for the 12 months preceding the preparation of the Test Plan (i.e., September 2023 through August 2024). The maximum, or minimum, allowed for each targeted operating parameter for the CfPT is the OPL from the NOC for that value, or the RCRA permit limit for the RCRA Periodic Test. **Table 4-1** presents the operating parameters for the Test; the 12-month average of each; limits for those parameters in the NOC of the HWC MACT and the RCRA permit; and the operating range during the test.

With the exception of the feedrate of chlorine and metals, these parameters are all in the units of the OPL or permit limit (i.e., as hourly rolling averages – HRAs). The OPLs for chlorine and metals (under the HWC MACT) are 12-HRA. HRAs were used to develop the 12-month average feedrate of chlorine and metals. During the Test, Veolia will maintain each of the parameters listed in **Table 4-1** between the 12-month average and the limit in the NOC dated January 20, 2023, and the limit in the RCRA permit.

The requirements of the periodic testing in Provision V.H.6. of the RCRA permit are that the operating conditions in Table V.H.2 of the RCRA permit be maintained between the 12-month average and the maximum or minimum allowed. Table V.H.2 limits maximum feedrates of the metals antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, nickel, selenium, silver, thallium, and zinc. Twelve (12)-month average feedrates of all of the 13 metals regulated by the RCRA permit may not be achieved during the RCRA Periodic Test because the concentrations of the metals in the waste streams and their feedrates may not be adequate to demonstrate the 12-month average metals feedrates. Ensuring that the feedrates of all of the metals are above the 12-month average requires that some metals be spiked during the test.

For CO, Veolia requests an alternative (i.e., wider) operating range during the test per §63.1207(g)(2)(v) so that it will not be necessary to tune the incinerator to be above the 12-month average CO concentration (corrected to 7% oxygen). The average CO concentration corrected to 7% O_2 is 3.0 ppm, from September 2023 through August 2024. During the Test, the concentration of CO in the stack gas will not be maintained between the 12-month average and the NOC limit (i.e., the HWC MACT standard of 100 ppm corrected to 7% oxygen). During the Test, the concentration of CO will be maintained less than the HWC MACT standard and the limit for CO in the RCRA permit.

The following clarifications are reflected in **Table 4-1**.

- The RCRA permit has limits for the maximum temperature in the kiln and SCC, in addition to minimum temperature. The target operations for combustion zone temperature in the kiln and SCC are between the minimum combustion zone temperature limits and the 12-month average.
- While there is no OPL for ash feedrate in the NOC (authorized by approval of an AMA), there is a limit in the RCRA permit for ash to the afterburner. While a total ash feedrate to the incinerator will not be measured in the Test, the feedrate of ash to the afterburner (i.e., SCC) will be measured during the test.
- The requirement for maximum combustion pressure in the kiln is met by the operation of an evacuation system (powered by a fan) of shrouds around both ends of the rotary kiln. While this system is expected to always be in operation, if the shroud evacuation system is not operational, a minimum pressure is maintained at the front-face of the kiln, monitored on an instantaneous basis.
- The OPLs for control of HCl and Cl_2 (including maximum total chlorine/chloride feedrate, minimum pH at the cooling tower inlet, minimum L/G in the absorbers, and minimum liquid feed pressure to the absorbers) are waived when the stack monitor for HCl emissions is in operation. It is expected that the HCl CEMS is always in operation, and will be in operation during the Test. Although the HCl CEMS will be in operation during the test, the OPLs for control of HCl and Cl_2 will be monitored and controlled during this test, between the historical average and the NOC limit.
- There are different feedrate limits for mercury in the RCRA permit for when the proprietary mercury control system is in-service or out-of-service. In service: 0.101 lb/hr. Out of service: 0.0417 lb/hr. The proprietary mercury control system is expected to be in service during the Test.

The OPL for mercury feedrate in the NOC for the HWC MACT (dated January 20, 2023) is 0.456 lb/hr with the proprietary mercury control system in service.

4.5 Waste Feed Spiking

During the Test, the 12-month average feedrate of total chlorine/chloride will be achieved by feeding waste streams containing chlorine or by feeding purchased chlorine. Ash will not be spiked during the Test. There is a limit in Table V.H.3. of the RCRA permit for “Ash to Afterburner”. “Ash to Afterburner” is not an operating target for the Test because it is considered that the limit for “Ash to Afterburner” is a legacy of previous permitting of the incinerator. Under the HWC MACT, there is no OPL for the feedrate of ash to the incinerator. An Alternative Monitoring Application (AMA) was approved by TCEQ on October 20, 2005 stating “Onyx (now Veolia) has provided sufficient documentation that neither the ash feedrate limit nor an alternative operating parameter limit is needed to ensure compliance with the emission standard for particulate matter”. The particulate matter standard of the HWC MACT is more stringent (i.e., lower) than the RCRA particulate matter standard. It is likely however that ash will be fed to the Afterburner (SCC) in the waste liquid(s) fed to the Afterburner during the test. The ash content of waste streams will be determined during the test, and the feedrate of ash to the Afterburner will then be calculated.

Veolia will use 1,2-dichlorobenzene as a surrogate for PCBs to spike the liquid waste feed stream to the Kiln and SCC and the solid waste feed stream entering the Kiln. As the new PCB total waste feed target is 1,400 pounds PCBs per hour, it is anticipated that 1,120 pounds per hour of 1,2-dichlorobenzene will be spiked to the Kiln and 280 pounds per hour of 1,2-dichlorobenzene will be spiked to the SCC.

Veolia's RCRA permit (in Tables V.H.3. and V.H.4.) includes feedrate limits and emission limits for 13 metals and an emission limit for hexavalent chromium. During the Test, the incinerator will be operated with normal "as received" waste streams. It is possible that available waste streams cannot be identified and obtained to allow the incinerator to be operated within the range of the allowable limit and the 12-month averages of the metals feedrates and achieve, at a minimum, the 12-month average feedrate of metals. To achieve a minimum of the 12-month average for the feedrate of the metals, metals will be spiked into waste feed streams to the incinerator to demonstrate the feedrate limits of the metals in the RCRA permit. Due to the thermal similarity of many of the metals, as well as for safety and health reasons, Veolia has determined that it is not necessary to spike all 13 metals. Three (3) metals will be spiked during the: Mercury, Lead, and Arsenic.

Mercury will be spiked into the kiln of the incineration system as a liquid. Lead and arsenic will be spiked into the rotary kiln as solid oxides, added in pre-weighed packets attached to, or in, containerized waste (i.e., drums) fed to the kiln. Metals spiking rates are presented in Table 4-2, and target feedrates of each of the waste streams to the incinerator, and the metals spiking rates, are presented in **Table 4-1**.

The spiking rates of the three metals that will be spiked will be more than the 12-month average feedrate of that metal and less than limits in the NOC of the HWC MACT and the RCRA permit. The three metals that will be spiked will serve as surrogates, for the other ten (10) metals. Justification to only spike three (3) of the 13 permitted metals is based on the EPA document "Risk Burn Guidance for Hazardous Waste Combustion Facilities". Based on the Risk Burn Guidance document (in Chapter 6: Metal Emissions), metals can be grouped according to their volatility as Group 3 - volatile, Group 2 - semivolatile, and Group 1 - low-volatile. Figure 6-2 of the Risk Burn Guidance presents groupings of metals among these three groups. While silver, one of the 13 metals in the RCRA permit, is not included in this figure, the text in Chapter 6 of the Risk Burn Guidance document states that silver "would likely be classified as a low-volatile metal". Figure 4-1 presents the metal groupings, based on volatility, taken from Risk Burn Guidance for Hazardous Waste Combustion Facilities. Mercury will be spiked as the Group 3 – volatile metal; lead will be spiked as Group 2 – semivolatile metal; and arsenic will be spiked as the Group 1 - low-volatile metal. Mercury is regulated as a volatile metal under the HWC MACT; lead is regulated as a semivolatile metal under the HWC MACT, and arsenic is regulated as a low-volatile metal under the HWC MACT.

Table 4-2 presents the metals of the RCRA permit; the RCRA allowable feedrate of that metal; the RCRA allowable emission rate of that metal; and the metals spiking rates. There is one metal to be spiked for Group 3 – volatile, one metal to be spiked for Group 2 – semivolatile, and one metal to be spiked for Group 1 - low-volatile. Spiking rates are greater than, the 12-month average feedrate of the spiked metal, and less than the allowable limit for any of the individual metals of the group of metals – grouped as Group 3 - volatile, Group 2 - semivolatile, or Group 1 - low-volatile. The emission rates of all of the 13 metals, and hexavalent chromium, will be measured during the Test.

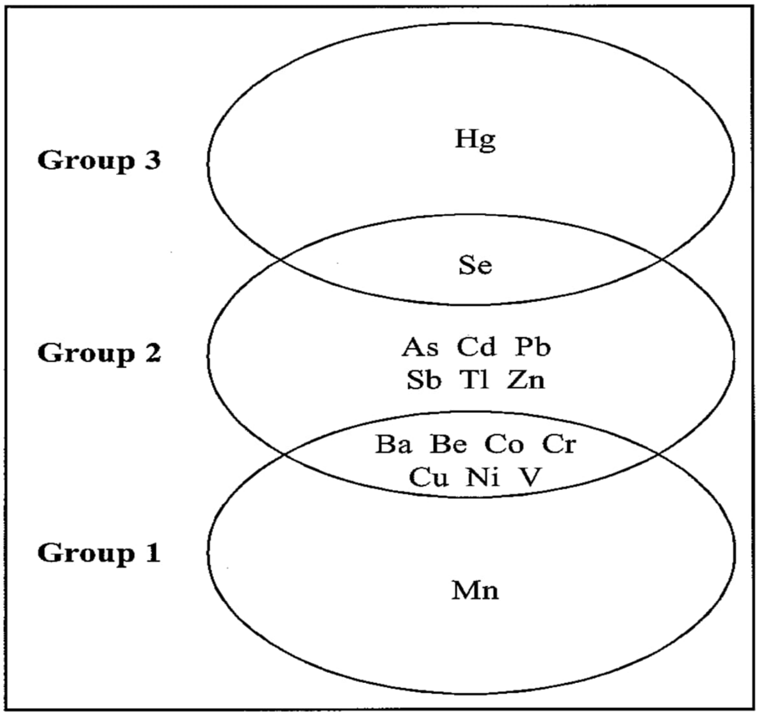
Arsenic and lead will be spiked as solids (arsenic oxide and lead oxide) with a nonpumpable waste stream (i.e., drums) fed to the kiln. Mercury will be spiked into the kiln of the incineration system as a liquid. The water-soluble mercury spiking compound will be $Hg(NO_3)_2$.

The liquid spiking system consists of a variable-stroke pump, a calibrated weigh scale, a mass flow meter, and a PC-based injection rate control and data acquisition system. A 55-gallon steel drum of the liquid spiking material is placed on the weigh scale and connected with flexible suction hose to a skid-mounted metering pump and the mass flow meter. At the skid, the liquid spiking material flows through the pump and the mass flow meter, and into a flexible delivery hose, which is connected to the waste feed line. Spiking rate will be adjusted by modulating stroke on the variable-stroke pump.

Spiking rate is measured and reported using weight measured over time of the weigh scale on which the drum of spiking material is located. The accuracy of the weigh scale is demonstrated using NIST-traceable standards. The weigh scale will be used as the official spiking rate measurement device. The mass flow meter provides a direct measurement of flowrate and will be used to set the spiking rate.

The spiking system will be manned by trained personnel at all times in order to shut down the spiking equipment in the event of a waste feed cutoff as well as monitor the continuing operation of the spiking system.

Lead (Pb) and arsenic (As) will be spiked as solids to the rotary kiln. Drums will be fed to the rotary kiln during the test and will contribute to the feedrate of nonpumpable (solid) wastes. The target feedrate of drums is 25 drums per hour. Arsenic and lead will be spiked as oxides of the respective metals as PbO and As_2O_3. Pre-weighed packets containing the lead oxide and arsenic oxide will be attached to each drum fed to the rotary kiln.



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Risk Burn Guidance for
Hazardous Waste Combustion Facilities
July 2001
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Figure 4-1. Metal Volatility Groups

Table 4-1. Test Feedrates and Operating Conditions

Operating Parameter Limit	Process Tag	Units	12-Month **Average**[1]	**NOC Limit**[1,2]	Required for CfPT	RCRA Permit Limit	Required for RCRA Periodic Test	**TSCA Approval Limit**	Target Operating **Range**[3]
Maximum Total Hazardous Waste Feedrate to Kiln and SCC	WASTE-MAV	lb/hr	19,285			57,198	X		19,285 – 57,198
Maximum Total Hazardous Waste Feedrate to the Kiln	KILN-TOT-WST	lb/hr	17,502	46,839	X	42,761[20]			17,502 – 42,761
Maximum Total Hazardous Waste Solids to the Kiln	KILN-SOLID	lb/hr	7,537			39,400	X		7,537 – 39,400
Maximum Total Aqueous Waste Feedrate to Kiln and SCC	AY-060L5	lb/hr	7,333			16,786	X		7,333 – 16,786
Maximum Aqueous Waste Feedrate to SCC	AY-060L4	lb/hr	137			4,763	X		-- [15]
Maximum Non-Aqueous Waste Feedrate to SCC	AY-061L2	lb/hr	1,646			9,009	X		1,646 – 9,009
Maximum Pumpable Hazardous Waste Feedrate to the Kiln	KILN-LIQUID	lb/hr	9,965	24,847	X	20,299[20]	X		8,243 –20,299
Maximum Total (Pumpable) Hazardous Waste Feedrate to the SCC	SCC-TOT-WASTE	lb/hr	1,784	7,330	X	5,704[20]	X		1,784 – 5,704
Minimum Combustion Chamber Temperature in the Kiln	HRA-512	°F	1,623	1,339	X	1,368[20]	X		1,368 – 1,623
Minimum Combustion Chamber Temperature in the SCC	SCC-TEMP-AVG	°F	2,063	1,948	X	1,954[20]	X		1,945 – 2,063
Maximum Combustion Chamber Temperature in the Kiln	HRA-512	°F	1,623			2,125[20]	X		1,368 – 1,623[4]
Maximum Combustion Chamber Temperature in the SCC	SCC-TEMP-AVG	°F	2,063			2,326[20]	X		1,945 – 2,063[4]
Maximum Flue Gas (Stack Gas) Flowrate	HRA-576	Dscfm	29,985	39,605	X	39,248	X		29,985 – 39,248
Maximum Stack CO Concentration[5]	STACK-CO-AVG	ppmv at 7% O_2	3.0	100	X	100	X		0 – 100[5]
Maximum Total Chlorine/Chloride Feedrate[6]	HRA12-051L1	lb/hr	1,326[3]	4,888[6]	X	2,775	X		1,326 – 2,775[7]
Maximum Ash to the Afterburner	AY-052L1	lb/hr				240	X		-- [8]
Maximum Combustion Zone pressure		Psia				14.7	X		-- [8]

Operating Parameter Limit	Process Tag	Units	12-Month Average[1]	**NOC Limit[1,2]**	Required for CfPT	RCRA Permit Limit	Required for RCRA Periodic Test	**TSCA Approval Limit**	Target Operating **Range[3]**
Minimum IWS Water Flow	HRA-548	Gpm	3,844			2,954	X		2,954 – 3,844
Operation of Waste Firing System; Minimum Burner Atomization Pressure (Air or Steam)9		Psig	--	20		20	X		>20
Minimum Liquid-to-Gas Ratio in the Absorbers	HRA-LOVG	--	0.14	0.107		0.106	X		0.106 – 0.14
Minimum Liquid Feed Pressure to the Absorbers	HRA-PI573	Psig	21.3	7					7-21.3
Minimum pH at Cooling Tower Inlet	HRA-571	pH	5.33	3.55		6.0	X		4.55 – 5.33
Minimum Scrubber Blowdown Rate (Blowdown to Deepwell)	HRA12-616	gpm	123.6	88.7[2]					95.4 – 123.6
Maximum Conductivity of Scrubber Water	HRA-616C	µmho	49,532	95,807 [2]					49,532 – 124,859
Voltage to the IWS[11]	XA-IWS-HV	kV	--	10		10	X		>10
Minimum Power to the WESP	HRA-KV577	kVA	20.5	16.2					15.8 – 20.5
Minimum Tank Level in the WESP	HRA12-LI577	%	74.7	40.0 [2]					44.0 – 74.7
Arsenic Feedrate	AY-056L4	lb/hr	0.35			4.82[21]	X		>0.5 [16]
Pumpable Arsenic Feedrate	HRA-P056L4	lb/hr	0.03	0.25		0.26 [12]	X		--[19]
Beryllium Feedrate	AY-057L1	lb/hr	0.29			13.2[21]	X		--[19]
Cadmium Feedrate	AY-056L1	lb/hr	0.21			21.6[21]	X		--[19]
Chromium Feedrate	AY-057L2	lb/hr	0.83			26.7[21]	X		--[19]
Antimony Feedrate	AY-054L4	lb/hr	0.87			150[21]	X		--[19]
Barium Feedrate	AY-055L3	lb/hr	1.07			65.6[21]	X		--[19]
Lead Feedrate	AY-055L4	lb/hr	0.76			156.74[21]	X		>4.0 [17]
Mercury Feedrate	HRA12-056L3	lb/hr	0.007	0.456		0.0417[13] 0. 0.101 [14, 21]	X		>0.01 [18]
PCB Feedrate	AY-059L4	lb/hr	20.6					1,606	1,400*
(Pumpable) Nickel Feedrate	HRA-P057L3	lb/hr	0.11			13.7	X		--[19]
Selenium Feedrate	AY-055L1	lb/hr	0.87			175[21]	X		--[19]
Silver Feedrate	AY-054L3	lb/hr	0.52			19[21]	X		--[19]

Operating Parameter Limit	Process Tag	Units	12-Month **Average[1]**	**NOC Limit[1,2]**	Required for CfPT	RCRA Permit Limit	Required for RCRA Periodic Test	**TSCA Approval Limit**	Target Operating **Range[3]**
Thallium Feedrate	AY-064L1	lb/hr	0.38			75[21]	X		-- 19
Zinc Feedrate	AY-055L2	lb/hr	15.7			7,170	X		-- 19

[1] 12-Month Average from September 2023 through August 2024.

[2] From the Notification of Compliance dated January 20, 2023.

[3] Hourly Rolling Average (HRA)

[4] The combustion zone temperatures will be maintained between the minimum limits and the 12-month average.

[5] Requesting a wider operating range per 63.1207(g)(2)(v).

[6] 12-HRA

[7] The OPL for the maximum feedrate of total chlorine/chloride is a 12-HRA, however, the target feedrate for chlorine/chloride for the CfPT will be as a HRA because a HRA will be more indicative of the real-time feedrate of chlorine/chloride than a 12-HRA.

[8] No target is defined for this parameter, other than to be within compliance with the permit and NOC limits.

[9] Based on manufacturer’s specification. An AWFCO occurs if the atomizing medium pressure falls below 20 psig.

[10] Included at the request of EPA Region 6 prior to the 2014 CfPT/RCRA Periodic Test.

[11] Voltage to the IWS is established based on “manufacturer’s specification. For each IWS unit, voltage across the resistor in the alarm circuit is monitored. The voltage will vary from zero to a maximum value in direct response to the IWS control logic. If for any reason the maximum voltage of 10 kV is not achieved during any two-minute period, the under voltage alarm will occur (for instance, during a cleaning cycle). In the event that four units are in under voltage alarm simultaneously and Automatic Waste Feed Cutoff (AWFCO) will occur.

[12] This is a limit on arsenic in pumpable waste when using the proprietary technology to control mercury emissions.

[13] Feedrate of mercury when not using the proprietary technology to control mercury emissions.

[14] Feedrate of mercury when using the proprietary technology to control mercury emissions.

[15] Aqueous waste will not be fed to the SCC because the 12-month average Aqueous Waste Feedrate to SCC is inconsequential.

[16] The spiking rate of arsenic will be 0.5 lb/hr. The feedrate of arsenic during the test will include the spiking rate and arsenic fed with waste streams.

[17] The spiking rate of lead will be 4.0 lb/hr. The feedrate of lead during the test will include the spiking rate and lead fed with waste streams.

[18] The spiking rate of mercury will be 0.01 lb/hr. The feedrate of mercury during the test will include the spiking rate and mercury fed with waste streams.

[19] Demonstration of the 12-month average feedrate will be according to volatility as Group 3 - volatile, Group 2 - semivolatile, and Group 1 - low-volatile from the EPA document “Risk Burn Guidance for Hazardous Waste Combustion Facilities”.

[20] Table V.H.2. of Permit No. 50212.

[21] Table V.H.3 of Permit No. 50212.

*1,2 dichlorobenzene will be used as a surrogate for PCB during the Test

Table 4-2. Metals Spiking Rates

Constituent or Parameter		RCRA Permit Feedrate Limit All Feedstreams (lb/hr)[1]	RCRA Permit Feedrate Limit Pumpable Feedstreams (lb/hr)[2]	RCRA Permit Emission Limit (lb/hr)[3]	12-Month Average Feedrate (lb/hr)	Spiking Rate (lb/hr)
Group 3	Mercury	0.101[4] 0.0417[5]	0.101[4] 0.0417[5]	0.0191	0.007	0.01
Group 2a	Arsenic	4.82 [5]	4.82[5]	0.0271	0.35	0.5
		4.82 [4]	0.26[4]			
	Cadmium	21.3	21.6	0.0421	0.21	
	Selenium	175	175	0.532	0.87	
Group 2b	Antimony	150	150	2.10	0.87	
	Lead	156.74	156.74	1.06	0.76	4.0
	Thallium	75	75	0.423	0.38	
	Zinc	7,170	7,170	21.5	15.7	
Group 1	Barium	65.6	57.5	2.09	1.07	
	Beryllium	13.2	2.7	0.00842	0.29	
	Chromium	26.7	26.5	0.0430	0.83	
	Nickel, Pumpable	131	113		0.11	
	Nickel, Solids Mode	1,042	13.7			
	Nickel			0.323		
	Silver	19	19	0.0419	0.52	

[1] From Table V.H.3. of RCRA Permit 50212 for “All Feedstreams”.

[2] From Table V.H.3. of RCRA Permit 50212 for “Pumpable Feedstreams”.

[3] From Table V.H.4. from RCRA Permit 50212.

[4] Feedrate when using proprietary technology to control mercury emissions.

[5] Feedrate when not using proprietary technology to control mercury emissions.

4.6 CMS Performance Evaluation

The Continuous Monitoring System (CMS) will be used to monitor and record operating parameters throughout the testing. A CMS Performance Evaluation Test Plan (CMS PETP) has been prepared which details requirements for the evaluation of the OPLs and parameters in association with the dioxins/furans standard of the HWC MACT. The plan is provided as Appendix A.

A relative accuracy test audit (RATA) of the CEMS on the stack of the incinerator is performed annually. A RATA of the CO and O_2 CEMS will be conducted to coincide with the Test. A RATA of the CO and O_2 CEMS will occur just prior to, or during, the CfPT if a RATA of the CO and O_2 CEMS has not been performed within 60 days of the Test. The CO and O_2 CEMS RATA is scheduled to be performed during the week beginning March 31, 2025.

4.7 System Operation to Achieve Steady-state Conditions

The performance testing requirements in 40 CFR 63.1207(g)(1)(iii) require that, prior to obtaining performance test data, the incinerator must operate under performance test conditions until a steady-state condition has been achieved. The rule places emphasis on the operating parameters for which a limit is to be established. During the Test, sampling will not be initiated without the following conditions being met:

- The set point of any operating parameter will not be modified for a period of 30 minutes; and
- The feedrate(s) of liquid wastes will not have changed more than 5% for a period of 15 minutes.

As presented in Section 4.9, the residence time of solids in the kiln can range from 15.5 minutes to 155 minutes based on kiln rotational speeds ranging from 0.3 to 3 rpm. Normally, the kiln rotational speed is nominally 0.5 rpm, and at this rotational speed the solids residence time is 93 minutes.

The water treatment system of the incinerator at Port Arthur is linked among the quench, the absorbers, the IWS, and the WESP. Water losses from the system are due to evaporation of water into the flue gas, and blowdown (to the deep-well). Fresh water is fed to the system into the WESP and IWS. As the absorbers require water, they draw water from the IWS, and as the quench requires water, it draws water from the absorbers. Each of these systems includes its own recirculation circuit. Based on the water volumes of the quench, absorbers, and IWS and the water flowrates of these three systems, the respective water residence times are 3.2 minutes, 9.3 minutes, and 0.6 minutes. The residence time of water in the WESP is even less.

Mercury spiked as a liquid into the kiln vaporizes almost immediately on being exposed to the elevated temperatures of the SCC. The residence times of gases in the kiln and SCC are on the order of seconds, therefore metals spiked as liquids will proceed in the gas phase to the water system of the incinerator within seconds of being injected (i.e., spiked).

For a well-mixed system, 95% of equilibrium is achieved with three (3) residence times. The absorbers have the largest water residence time of any of the four water circuits of the water treatment system of the incinerator. 95% of equilibrium of the water of the absorbers is achieved within 27.9 minutes (i.e., 3 times 9.3 minutes). Therefore, metals should be fed at their maximum rates for at least this amount of time before starting sampling.

Arsenic and lead spiked as solids (arsenic oxide and lead oxide) will be spiked into the rotary kiln for at least 93 minutes before the start of testing, based on a nominal kiln rotational speed of 0.5 rpm. Mercury spiked into the SCC of the incinerator as a liquid will be fed for 30 minutes before sampling is started.

4.8 AWFCO System During the Test

Since the Test will be conducted at normal operating conditions, the AWFCO system will remain operational during the test. If the operation of the incinerator should deviate significantly from the desired range of operation during the Test, the AWFCO system will shut off waste feeds to the incinerator.

4.9 Determination of Hazardous Waste Residence Time

The incinerator burns solids, liquids, containerized gases, and vent streams. The hazardous waste residence time is in effect the residence time of the solids through the kiln because the residence time for solids is substantially greater than liquids and vent streams. The residence time of solids in the kiln is calculated using the following formula:

$$\mathbf{T = \frac{0.19 \times kl}{rpm \times id \times sl}}$$

Where:

T = residence time, minutes;

kl = kiln length, feet (60 feet);

rpm = kiln rotational speed, rpm (normally varies between 0.3 and 1.0 rpm);

id = kiln inside diameter, feet (14 feet); and

sl = slope, feet/feet (0.0175).

Using this formula and the physical dimensions of the kiln, the formula calculates a residence time between 155 minutes and 15.5 minutes depending upon the kiln rotational speed (between 0.3 and 3.0 rpm) as follows:

$$\mathbf{T = \frac{0.19 \times 60}{0.3 \times 14 \times 0.0175} = 155 \text{ minutes at } 0.3 \text{ rpm}}$$

$$\mathbf{T = \frac{0.19 \times 60}{3.0 \times 14 \times 0.0175} = 15.5 \text{ minutes at } 1.0 \text{ rpm}}$$

The nominal kiln rotational speed is 0.5 rpm. At 0.5 rpm, the formula calculates a residence time of 93 minutes. This compares to the statement in Section 3.0, “The nominal rotation speed is 0.5 rpm with an average solids residence time of approximately 1½ hours.”

5. Sampling, Analysis, and Monitoring Procedures

The Test will be conducted at one operating condition to demonstrate compliance with the dioxins/furans emission standard of the HWC MACT; to demonstrate compliance with the PCB approval issued pursuant to Section 6(e) of the TSCA; and to perform the periodic testing requirements of the RCRA permit.

The single test condition of the Test will include three replicate sampling runs. **Table 5-1** summarizes the parameters that will be measured during the Test and the frequency of measurement.

5.1 Sampling

Samples of the stack gas and solid and liquid waste feeds will be collected during the Test. **Table 5-2** lists the sampling methods and the parameters that will be determined by each method. Since most of the proposed methods are standard reference methods, only brief, summary-type descriptions are presented. Detailed descriptions of the sampling and analytical methods for the testing are provided in the document entitled *Quality Assurance Project Plan for the Confirmatory Performance Test and RCRA Periodic Testing* (QAPjP), which is submitted as Appendix B. The QAPjP encompasses detailed quality procedures for the sampling and analytical portions of the testing.

5.1.1 Stack Gas Sampling Procedures

The stack gas emissions will be collected for determination of the parameters indicated in **Tables 5-1** and **5-2**. The methods that will be employed are described below.

5.1.1.1 Sample Port Location

The stack is 130-feet high and has an inside diameter of 5.5-feet. There are two sets of two orthogonal ports located at two different levels. The number of sampling points is determined in accordance with EPA Method 1 and is discussed further in the QAPjP.

5.1.1.2 EPA Methods 2, 3A, and 4 (Flowrate, Gas Composition, and Moisture)

Concurrent with the performance of the other isokinetic sampling methods, measurements will be made to determine gas velocity in accordance with EPA Method 2. CO_2 and O_2 will be monitored using Method 3A to determine the stack gas composition (i.e., molecular weight). Nitrogen will be determined by difference. Moisture by EPA Method 4 will be measured in conjunction with the isokinetic sampling trains. Stack gas concentrations for dioxins and furans will be corrected to 7% oxygen using the concentration of oxygen measured by EPA Method 3A during the stack sampling for dioxins/furans.

Table 5-1. Sample Frequency

Stream/Parameter	Sampling Method	Frequency
Stack Gas		
Dioxins/Furans (PCDD/PCDF)	SW-846 Method 0023A	3 (6 for 0030)
Polychlorinated biphenyls (PCB)	SW-846 Method 0023A	
Total Chlorinated Organics (RCl)	SW-846 Methods 0030 and 0023A	
Particulate Matter (PM) HCl/Cl_2	EPA Method 5 and EPA Method 26A	
Metals [1]	EPA Method 29	
Chromium VI	SW-846 Method 0061	
Moisture	EPA Method 4	
Oxygen Carbon Dioxide	EPA Method 3A	
Carbon Monoxide [2] Oxygen	Plant Instrumentation	
Spiking Materials [3]		
Liquids	Tap (Method S004)	3
Solids	Grab	
Waste Feed		
Ash Chlorine Moisture Heating Value Viscosity [4] Density [4] PCB Metals [1]	Solids: Scoop (Method S007) Liquids: Tap (Method S004)	3 for each waste stream

[1] Metals include arsenic, beryllium, cadmium, chromium, antimony, barium, lead, mercury, nickel, selenium, silver, thallium and zinc.

[2] CO, corrected to 7% O_2, will be monitored by plant instrumentation.

[3] Spiking materials will be archived and analyzed if warranted.

[4] Solid waste feed will not be analyzed for viscosity and density.

Table 5-2. Summary of Sampling Procedures

Stream	Sampling Method	Sampling Approach	Sample Size	Analytical Parameters
Stack Gas	EPA Method 2	Concurrent with isokinetic sampling	N/A	Flowrate
	EPA Method 3A	Continuously during isokinetic sampling	N/A	O_2, CO_2
	EPA Method 4	Concurrent with isokinetic sampling	As defined in isokinetic methods below	Moisture
	SW-846 Method 0030	20 min samples collected at 1 L/min non-isokinetically	20 L	Volatile chlorinated organics
	SW-846 Method 0023A	≥3 hours collected isokinetically	≥2.5 dscm (88.3 dscf)	Dioxins/Furans,
	SW-846 Method 0023A	≥3 hours collected isokinetically	≥3.0 dscm (106 dscf)	Polychlorinated Biphenyls
	SW-846 Method 0023A	≥3 hours collected isokinetically	≥3.0 dscm (106 dscf)	Semi-volatile chlorinated organics
	EPA Methods 5/26A	≥2 hours collected isokinetically	1.7 dscm (60 dscf)	Particulate Matter HCl/Cl_2
	EPA Method 29	≥2 hours collected isokinetically	1.7 dscm (60 dscf)	Metals [1]
	SW-846 Method 0061	≥2 hours collected isokinetically	45 dscf	Chromium VI
Spiking Materials	Liquids: Tap (S004)	Beginning and end of each test period		Archive
	Solids: Grab	Each test period		Archive
Waste Feed	Liquids: Tap (Method S004)	Sub-sample collected every 30 minutes Prepare a composite for each sample run	100 mLs	Ash Chlorine Moisture Heating Value Viscosity Density PCB Metals [1]
	Solids: Scoop (Method S007)	Sub-sample collected at beginning and end of each run. Prepare a composite for each sample run for analysis. If drummed solids are used, sub-samples collected during drum preparation. Prepare a composite based on drums used in each run.	100 grams	Ash Chlorine Moisture Heating Value PCB Metals [1]

N/A = Not Applicable

[1] Metals include arsenic, beryllium, cadmium, chromium, antimony, barium, lead, mercury, nickel, selenium, silver, thallium and zinc.

5.1.1.3 SW-846 Method 0030 (Chlorinated VOCs)

Stack gas emissions samples will be collected for chlorinated VOCs using SW-846 Method 0030.

This method describes the collection of volatile principal organic hazardous constituents (POHCs) from the stack gas effluents of hazardous waste incinerators. For the purpose of definition, volatile POHCs are those POHCs with boiling points less than 100 °C. If the boiling point of a POHC of interest is less than 30 °C, the POHC may break through the sorbent under the conditions of the sample collection procedure.

This method employs a 20-liter sample of effluent gas containing volatile POHCs which is withdrawn from a gaseous effluent source at a flow rate of 1 L/min, using a glass-lined probe and a volatile organic sampling train (VOST). (Operation of the VOST under these conditions has been called FAST-VOST.) The gas stream is cooled to 20°C by passage through a water-cooled condenser and volatile POHCs are collected on a pair of sorbent resin traps. Liquid condensate is collected in an impinger placed between the two resin traps. The first resin trap (front trap) contains approximately 1.6 g Tenax and the second trap (back trap) contains approximately 1 g each of Tenax and petroleum-based charcoal (SKC Lot 104 or equivalent), 3:1 by volume. A total of six pairs of sorbent traps may be used to collect volatile POHCs from the effluent gas stream.

Sampling will involve collecting samples non-isokinetically at a single sampling point within the centroidal area of the stack cross-section. The sampling rate will be approximately 1.0 liters per minute (Lpm). A volume of 20 liters will be collected over a sampling time of 20 minutes per set. A test includes six sets collected.

5.1.1.4 SW-846 Method 0023A (Dioxins/Furans)

Stack gas emission samples will be collected for measurement of the concentration of dioxins/furans using SW-846 Method 0023A. The sampling train consists of a heated probe, heated filter, sorbent module, and pumping and metering unit. A gooseneck nozzle of proper size to allow isokinetic sample collection is attached to the probe. S-type pitot differential pressure is monitored to determine the isokinetic sampling rate.

From the heated filter, sample gas enters the sorbent module. The sorbent module consists of a water-cooled condenser followed by the XAD-2 resin trap. After the resin trap is a dry modified Greenburg-Smith impinger that collects the aqueous condensate. The stem of this impinger is short to reduce carryover of collected aqueous condensate. Following the condensate trap is a standard Greenburg-Smith impinger that contains approximately 100 milliliters of HPLC-grade water followed by a modified Greenburg-Smith impinger that contains approximately 100 milliliters of HPLC-grade water. The fourth and final impinger contains a desiccant to dry the sample gas before metering. A pump and dry gas meter are used to control and monitor the sample gas flowrate.

Sampling of the stack gases will be conducted in accordance with published protocol. This will involve collecting samples isokinetically across both diagonals of the stack. The sampling rate will be between 0.5 and 1.0 dry standard cubic feet per minute (dscfm). 40 CFR 63.1208(b)(1)(ii) of the HWC MACT requires that a minimum sample volume of 2.5 dscm (88.3 dscf) be collected over a minimum of three hours.

5.1.1.5 SW-846 Method 0023A (PCBs)

Stack gas emissions samples will be collected for PCBs using SW-846 Method 0023A.

The sampling system consists of a heated probe, heated filter, sorbent module, and pumping and metering unit. A gooseneck nozzle of proper size to allow isokinetic sample collection is attached to the probe. S-type pitot differential pressure is monitored to determine the isokinetic sampling rate.

From the heated filter, sample gas enters the sorbent module. The sorbent module consists of a water-cooled condenser followed by the XAD-2 resin trap. After the resin trap is a dry modified Greenburg-Smith impinger which collects the aqueous condensate. The stem of this impinger is short to reduce carryover of collected aqueous condensate. Following the condensate trap are two impingers containing 100 mL of DI water to collect any mist carryover from the condensate trap and a final impinger containing a desiccant to dry the sample gas before metering. A pump and dry gas meter are used to control and monitor the sample gas flowrate.

Sampling will involve collecting samples isokinetically across both diagonals of the stack. The sampling rate will be no more than 0.75 dry standard cubic feet per minute. A minimum of 106 dry standard cubic feet will be collected over a minimum sampling time of 3 hours.

5.1.1.6 SW-846 Method 0023A (Chlorinated SVOCs)

Stack gas emissions samples will be collected for chlorinated SVOCs using SW-846 Method 0023A.

The sampling system consists of a heated probe, heated filter, sorbent module, and pumping and metering unit. A gooseneck nozzle of proper size to allow isokinetic sample collection is attached to the probe. S-type pitot differential pressure is monitored to determine the isokinetic sampling rate.

From the heated filter, sample gas enters the sorbent module. The sorbent module consists of a water-cooled condenser followed by the XAD-2 resin trap. After the resin trap is a dry modified Greenburg-Smith impinger which collects the aqueous condensate. The stem of this impinger is short to reduce carryover of collected aqueous condensate. Following the condensate trap are two impingers containing 100 mL of DI water to collect any mist carryover from the condensate trap and a final impinger containing a desiccant to dry the sample gas before metering. A pump and dry gas meter are used to control and monitor the sample gas flowrate.

Sampling will involve collecting samples isokinetically across both diagonals of the stack. The sampling rate will be no more than 0.75 dry standard cubic feet per minute. A minimum of 106 dry standard cubic feet will be collected over a minimum sampling time of 3 hours.

5.1.1.7 EPA Method 5 (PM) / EPA Method 26A (HCl/Cl2)

Samples for the determination of particulate matter (PM), HCl, and Cl2 in stack emissions will be collected using a single sampling train meeting the requirements of both EPA Method 5 and Method 26A. Back-half, or condensable, particulate matter will not be measured.

This sample train consists of the following components:

- Glass (quartz) nozzle;
- Heated, glass (quartz)-lined probe;
- Heated Teflon mat filter with a Teflon filter support;
- Optional empty knockout impinger;
- Greenburg-Smith impinger containing 100 mL of 0.1 N H2SO4;
- Greenburg-Smith impinger containing 100 mL of 0.1 N H2SO4;
- Modified Greenburg-Smith impinger containing 100 mL of 0.1 N NaOH;
- Modified Greenburg-Smith impinger containing 100 mL of 0.1 N NaOH; and
- Modified Greenburg-Smith impinger containing silica gel.

The procedures specified in EPA Method 5 protocol will be used to determine particulate matter. These procedures require the isokinetic extraction of particulate matter on a filter maintained at a controlled temperature. In accordance with the requirements of EPA Method 26A, the filter and probe will be kept at a temperature between 248°F and 273°F, and a Teflon-backed filter will be used. A Teflon union will be used to connect the quartz nozzle to the quartz probe liner. The particulate mass, which includes all material that condenses at or above the filtration temperature, is determined gravimetrically, after desiccation.

Chloride analysis will be performed on the impinger contents using ion chromatography according to Method 26A.

5.1.1.8 EPA Method 29 (Metals)

Samples of the stack gas emissions will be collected isokinetically for the metals included in the RCRA permit arsenic, beryllium, cadmium, chromium, antimony, barium, lead, mercury, nickel, selenium, silver, thallium, and zinc using Method 29 from 40 CFR Part 60, Appendix A.

This method is basically an EPA Method 5 sampling train with some very specific modifications:

- The nozzle and probe liner will be glass or quartz. All connections will be glass or Teflon;
- The filter will be quartz or glass fiber, with a fritted glass or Teflon support;
- The first impinger will be empty (optional);
- The second and third impingers will contain a nitric acid/hydrogen peroxide solution;
- The fourth impinger will be empty;
- The fifth and sixth impingers will contain acidic potassium permanganate; and
- Modified Greenburg-Smith impinger containing silica gel.

A brush containing no metal will be used for the probe and nozzle rinse. The probe and nozzle will be rinsed with 0.1 normal nitric acid.

Sampling will involve collecting samples isokinetically across both diagonals of the stack. The sampling rate for each train will be between 0.5 and 0.75 dry standard cubic feet per minute. A minimum of 60 dry standard cubic feet will be collected over a minimum sampling time of 120 minutes.

5.1.1.9 SW-846 Method 0061 (Chromium VI)

The stack gas will be sampled for determination of hexavalent chromium (Chromium VI) using SW-846 Method 0061. The sampling train consists of the following components:

- Glass nozzle;
- Heated, glass-lined probe;
- Teflon impinger containing 150 mL of 0.5 N KOH, and a pumping system capable of recirculating impinger solution through the probe;
- Teflon impinger containing 75 mL of 0.5 N KOH;
- Teflon impinger containing 75 mL of 0.5 N KOH;
- Dry Teflon impinger; and
- Modified Greenburg-Smith impinger containing silica gel.

5.1.1.10 Continuous Emissions Monitoring (CO, O_2 and CO_2)

Continuous monitors will be used to monitor the concentrations of CO, O_2, and CO_2 in the stack gas. CO and O_2 results will be reported for the stack gases from permanent installation CEMS of the incinerator facility to demonstrate compliance with the emission standard/limit for CO corrected to 7% O_2. Carbon dioxide (CO_2) and oxygen (O_2) continuous monitors will be provided by the test contractor conducting the test.

The concentrations of CO_2 and O_2 in the stack gas will be determined by the test contractor conducting the test using EPA Method 3A. CO_2 and O_2 will be monitored using Method 3A to determine the stack gas composition (i.e., molecular weight) to determine the flowrate of the stack gas. Measurements for CO_2 and O_2 performed using EPA Method 3A utilize continuous monitors. Stack gas concentrations for dioxins and furans will be corrected to 7% oxygen using the concentration of oxygen measured by EPA Method 3A during the stack sampling for dioxins/furans.

5.1.2 Liquid Waste Sampling Procedures

Samples of the liquid waste feeds will be collected in amber glass bottles with Teflon™ cap liners. Liquid spiking materials (i.e., mercury) will be sampled at the beginning and end of each test period. Samples of the spiking materials will be archived. Pre-cleaned bottles will be purchased and used to collect the samples.

Liquid samples will be collected using the tap sampling procedure specified in U.S. EPA Method S004, "Sampling and Analysis Methods for Hazardous Waste Combustion." The sample tap will be flushed each time by allowing the sample to flow briefly before the sample is collected. This will ensure that any stagnant accumulation of solids, or other contaminants that may be present in the tap, does not affect the sample integrity or its representation of the stream being sampled.

At 30-minute intervals throughout each test period, a grab sample, approximately 100 milliliters, of each liquid stream will be collected. The grab samples collected will be composited on site to provide one sample per waste feed per test run. Appendix A of the QAPjP has a Standard Operating Procedure (SOP) for the sampling of liquid waste streams.

5.1.3 Solid Waste Sampling Procedures

Solid wastes may be fed to the incinerator through multiple systems that will require different sampling approaches if those waste streams are fed during the test. Solid wastes may be fed as bulk solids or in drums. Bulk solids may be fed as "low flash" and "regular" wastes. Because of safety considerations, samples of bulk solids will be collected by Veolia personnel in accordance with procedures in the Feedstream Analysis Plan for the facility. Solid wastes identified for the test will be added to and blended in the waste pit of the Bulk Materials Handling Building (BMHB). Samples will be collected at the beginning and end of each test run. The two samples collected per test run will be composited and analyzed.

Solid waste feeds may also be fed as drummed wastes. Drummed solid waste feed samples will also be collected by Veolia personnel, possibly in advance of the test if drums wastes are identified prior to the test. Approximately 10% of the waste feed drums will be sampled. Individual samples will be composited based on drums processed during a test period.

During the sampling of the solid wastes collected from the BMHB, or 10% of the waste drums, approximately 100 grams of sample of the respective streams will be collected. To ensure that each subsample is approximately of equal size, an appropriately sized bottle, glass container, or scoop will be used to collect each subsample. The subsampling bottle will be filled when individual samples are collected. The individual samples will be composited for analysis.

If consumer products are fed during the test, they will not be sampled or analyzed. The feedrate of consumer products would be used to determine the solids feedrate, but consumer wastes will not contribute to constituent feedrates.

Packets of the solid spiking materials (i.e., arsenic and lead) will be collected each test period. Samples of the spiking materials will be archived.

5.2 Analytical Procedures

Stack gas collected during the testing will be analyzed for the parameters shown in Table 5-3. This section briefly describes the analytical methods. More detailed descriptions of these analytical methods are provided in the QAPjP.

Table 5-3. Summary of Analytical Methods

Parameter	Stream	Analytical Method
Dioxins/Furans	Stack Gas	HRGC/MS – SW-846 Method 8290A
Polychlorinated Biphenyls	Stack Gas	GC/MS SW-846 Method 8270
Chlorinated Semi-volatile Organics	Stack Gas	GC/MS SW-846 Method 8270
Chlorinated Volatile Organics	Stack Gas	GC/MS SW-846 Method 8260
Particulate Matter	Stack Gas	Gravimetric – EPA Method 5
HCl/Cl_2	Stack Gas	IC - EPA Method 26A
Metals [1]	Stack Gas	ICPES - SW-846 Method 6010B CVAAS - Hg, SW-846 Method 7470A or 7471A
	Waste Feeds	ICPES - SW-846 Method 6010B CVAAS - Hg, SW-846 Method 7470A or 7470A
Chromium VI	Stack Gas	IC – SW-846 Method 7199
Ash Chlorine Moisture Heating Value Viscosity [2] PCBs Density [2]	Waste Feed	ASTM Standard Methods

1 Metals include arsenic, beryllium, cadmium, chromium, antimony, barium, lead, mercury, nickel, selenium, silver, thallium and zinc.

2 Solid waste feed will not be analyzed for viscosity and density.

Methods cited refer to the latest promulgated method during the preparation of this document. Specific method numbers and suffix designations used in the implementation of the project will be documented in the final project report.

5.2.1 Composition and Physical Parameters Analysis

Samples of the liquid waste feeds will be collected for determination of a number of chemical and physical parameters, including:

- Ash;
- Total chlorine;
- Moisture;
- Heating value;
- Density;
- PCBs; and
- Viscosity.

Solid waste feed samples will be analyzed for:

- Ash;
- Total chlorine;

- Moisture;
- PCBs; and
- Heating value.

These analyses will be performed using appropriate ASTM standard methods.

5.2.2 Particulate Matter Analysis

The particulate matter concentration of the stack gas will be determined following 40 CFR 60, Appendix A, Method 5 protocols. The wash from the nozzle, probe liner, and glassware prior to the filter on the sampling train will be evaporated, and the mass determined on an analytical balance. The filter will be removed from the sampling train, desiccated, and weighed to determine the mass of particulate on the filter. The combined mass from the filter and the evaporated wash are then related to the total volume of gas sampled to determine the concentration of particulate matter.

5.2.3 HCl and Cl_2 Analysis

The sulfuric acid and sodium hydroxide impinger catches from Method 5/26A sampling will be analyzed for chloride ion concentrations. Chloride analysis will be performed using EPA Method 26A, an IC technique.

5.2.4 Dioxins/Furans Analysis

Samples of the stack gas will be analyzed for dioxins and furans using SW-846 Method 8290A, a high resolution gas chromatography (HRGC) with high resolution mass spectroscopy (HRMS) analytical technique. The analytical protocol includes quantitation of all dioxins and furans including four or more chlorine atoms. The method provides congener class definition for each of the five congener groups (tetra, penta, hexa, hepta, and octa). In addition, each individual isomer containing the 2,3,7,8-substitution pattern will be individually quantified.

5.2.5 PCBs and Chlorinated SVOCs Analysis

Analysis of stack gas samples for PCBs and chlorinated SVOCs will be performed using EPA Method 8270. This method is a high-resolution GC/MS technique. The analysis for PCBs is performed for each of the 209 individual isomers. Results are added for each of the 10 congener classes representing degree of chlorine substitution (i.e., mono- through deca-). Prior to analysis, appropriate sample extraction techniques are employed (SW-846 Method 3510 or 3520 for liquids and 3540 or 3550 for solids). The resulting extraction solvent is then exchanged to hexane and analyzed. If necessary, cleanup procedures (SW-846 Method 3620 or Method 3620, followed by Method 3660) may be used to eliminate interferences in the analysis. The extracts of all components of the sampling train will be combined prior to analysis. The results are quantitated as chlorinated biphenyl congeners.

5.2.6 Metals Analysis

Waste feed samples will be analyzed for metals using a trace level inductively coupled argon plasma emission spectroscopy (ICPES) and atomic absorption spectroscopy. Samples will be prepared for analysis using SW-846 Method 3050B. The metals to be analyzed by ICPES (SW-846 Method 6010B) are arsenic, beryllium, cadmium, chromium, antimony, barium, lead, nickel, selenium, silver, thallium and zinc. Mercury will be analyzed using Method 7471A of SW-846.

The Method 29 sampling train will be used to collect samples of the stack gas for metals. The samples will be analyzed using ICPES according to SW-846 Method 6010B, and mercury will be analyzed using Method 7470A of SW-846. The metals to be analyzed by ICPES are arsenic, beryllium, cadmium, chromium, antimony, barium, lead, nickel, selenium, silver, thallium and zinc.

5.2.7 Chromium VI Analysis

Stack gas samples will be analyzed for chromium (VI) using Method 7199 of SW-846. The method uses ion chromatography for determination of chromium (VI) in the potassium hydroxide impinger solutions and associated rinses. The ion chromatograph is run with a post column reagent (PCR) mixing and delivery system.

5.3 Quality Assurance/Quality Control (QA/QC) Procedures

An effective QA/QC strategy is essential to ensure the usefulness and reliability of data collected in any source testing effort. A comprehensive QA/QC protocol tailored to meet the specific needs of the program has been designed. This QA/QC program is documented in a program-specific QAPjP that is submitted in Appendix B as a stand-alone document in conjunction with the submittal of this CfPT Plan and Periodic RCRA and PCB DRE Sampling and Analysis Plan. The QAPjP conforms to the specifications detailed in *Guidance for Quality Assurance Project Plans*, U.S. EPA, December 2002, (QA/G-5, EPA/240/R-02/009).

The primary objective of the QA/QC effort is to provide the mechanism whereby the quality of the measurement data are known and documented and are subject to ongoing evaluation throughout the course of the project. To achieve this objective, the QA/QC program serves two functions. One function is to provide a QC database that can be used to assess measurement data quality in terms of precision and accuracy. Inherent in this assessment function is a second, parallel function of controlling data quality within prescribed limits of acceptability and having the assessment tools needed to make corrective actions as needed to ensure that project and measurement objectives are met.

The QAPjP delineates specific sampling and analytical procedures, calibration requirements, internal QC checks, data reduction and validation procedures, and sample custody requirements for each sampling/analytical activity. It also addresses general QA/QC considerations such as:

- Data recording;
- Documentation procedures;
- Project organization and responsibilities;
- Preventative maintenance operations;
- Reporting requirements; and
- Corrective action mechanisms.

In addition to these general considerations, the QAPjP specifies schedules for performance and the required duration of stack gas sampling to provide adequate method detection limits, and to meet the requirements of the HWC MACT and the RCRA permit. The QAPjP also presents the internal QC checks that will be used to ensure that the measurement data meet data quality requirements. These QC checks include procedures such as:

- Daily calibration of analytical instruments;
- Calibration of sampling equipment and apparatus; and
- Analytical checks using QC standards to assess bias and precision.

The following sections present a brief overview of the QA/QC activities that are an integral part of the sampling and analytical tasks of this test program. The QAPjP summarizes and describes the QA/QC samples that will be collected, prepared, and analyzed during this Test.

5.3.1 Sampling QA/QC Procedures

The QAPjP prescribes QC procedures to be implemented during all sampling activities and specifies guidelines for:

- Equipment calibration;
- Sampling protocol; and
- Sample handling techniques.

The checkout and calibration of sampling equipment is an important function in maintaining data quality. Referenced calibration procedures are prescribed, and the results will be properly documented and retained. Calibrations will be performed prior to field deployment.

Sampling techniques to be used during the Test will be EPA references. Sample collection will be done in accordance with the methods prescribed in the QAPjP. The QA procedure checks will include the use of standard data forms and source sampling data sheet checklists. Other checks will include performance of the following:

- Visual inspections of sampling systems;
- System leak checks before and after sampling;
- Heating system checks;
- Impinger ice checks;
- Isokinetic sampling rate checks; and
- Daily data review and calculation checks.

After the samples have been properly obtained in the field, their subsequent handling during transfer to the analytical laboratories becomes an important factor in the successful performance of a stack test program. All collected samples will be labeled with adequate descriptions of the samples to prevent confusion among multiple samples. Samples will be inventoried against logbook records before shipment. All sample container closures will be verified to be tight and then taped to ensure against sample leakage during shipment. The frequency of performance of specific activities for the stack testing is presented in the QAPjP.

5.3.2 Analytical Quality Control Procedures

A full description of the analytical QA/QC requirements will be specified in the QAPjP. Those procedures will use a variety of checks to determine the validity of analyses. These include:

- Calibration standards;
- Certified standards;
- In-lab standards;
- Blanks;
- Spikes; and
- Replicates.

QA begins with the sample log and continues through the reporting of data. The unique identifying number assigned in the field and recorded in the sample log facilitates tracking and identification and prevents mix ups during the analysis process. Chain-of-custody reports will be used to monitor samples through analytical laboratories.

Chemical characterization of emission samples will be performed using standard techniques (GC/MS, IC, ICPES and gravimetric analysis). The accuracy and precision of analyses will be documented through the QA/QC programs specified in the QAPjP. Accuracy will be evaluated through analysis of standards and use of blank and spiked samples. Precision will be monitored by replication of analysis on 5% to 20% of samples to establish background concentrations and potential interferences.

5.4 Process Monitoring Procedures

Veolia’s Port Arthur incinerator is monitored to ensure that it is operating in accordance with the permitted limits. The monitoring system is described in Section 3.6 and these same parameters will be monitored during the Test. Process monitoring information pertinent to the testing will be obtained from the incinerator process monitoring system (see Table 4-1). Veolia will use the chlorine feedrate from the DCS to confirm that chlorine is being fed at a normal or greater feedrate.

6. Test Schedule

The schedule for the Test is based upon the approval of the Test Plan, Continuous Monitoring System Performance Evaluation Test Plan, and QAPjP.

6.1 Planned Test Dates

Veolia plans to conduct the Test, beginning with the CO and O_2 CEMS RATA, during the week of March 31, 2025.

6.2 Duration of Each Test

The Test will be conducted under a single test condition comprised of three replicate sampling runs. In the absence of any unforeseen problems, each run will require approximately four hours to complete. This includes the three-and-a-half hours necessary to collect all stack gas sampling trains (including port changes) and 30 minutes to prepare for the start of the next run. Given a 2-hour preparation and process equilibration period at the beginning of the test, the test will require a minimum of 16 hours to complete all sampling activities (i.e., coming up to steady-state conditions and 1-hour operating at steady-state for each of the two test days, sampling preparation and demobilization activities, performing actual sampling runs).

6.3 Detailed Schedule of Planned Test Activities

The three runs are scheduled to be completed over three days, with approximately four hours of stack gas sampling for each run. Additionally, a day for setup and a day for demobilization/contingency have been scheduled.

On the first day of the Test, tentatively scheduled for March 31, 2025 the mobile lab will be sited, instrumentation needed to conduct the RATAs will be setup and checked to begin the RATA and the pre-Test RATAs of the CEMS (CO and O_2) system on the stack will be performed. On the second day the pre-Test RATAs of the CEMS (CO and O2) systems will be finished, if not completed on the first day. On the third day of the test, tentatively scheduled for April 14, 2025 the first performance sampling run of the emissions test will be performed. Preparation and sampling activities for the first run will require about two hours with about one hour required to bring the incinerator to steady-state operations followed by four hours to complete sampling. Then the samples from the first run will be recovered and preparations for the sampling of the second run the next day will take place. Sampling for the second run will require about the same schedule as on the first test day. Unit operations for the first run on the fourth day of the test should be completed in about 5-6 hours. On the fifth day of the test, preparation and sampling activities for the first run of the day – the second run of the test - will require about five hours with about one hour required to bring the incinerator to steady-state operations followed by four hours to complete sampling. Unit operations for the fifth day of the test should be completed in about 5-6 hours. The schedule to perform the third test run on the sixth day will follow the same pattern.

The planned daily activities for the Test are as follows:

- Day 1 – RATA sampling team will mobilize to site and setup/checkout CEMS RATA equipment. Coordination meeting will be conducted. Test RATAs of the CEMS (CO and O_2) monitoring system on the stack will begin.
- Day 2 – RATAs on the stack will be finished if not completed on the previous day.
- Day 3 – The Test team will mobilize to site and setup/checkout emissions performance test equipment. Coordination meeting will be conducted.
- Day 4 – The unit will be brought to the desired steady-state operating conditions while the sampling team completes preparations for conducting the first run. When all preparations are complete,

sampling will begin and will continue, with only short interruptions for port changes and leak checks, until the first run is complete.

- Day 5 – The 2nd test run of the Test will be performed as for the previous run.
- Day 6 – The third test run of the Test will be performed as for the previous run.
- Day 7 – Equipment will be demobilized.

6.4 Quantity of Waste to Be Burned

Table 6-1 presents an estimate of the quantity of wastes to be burned during the Test. The estimate assumes that waste feedrates are at mid-points of the required range of operation in Table 4-1 and upon the operation and sampling times identified in Section 6.3. A contingency of 50% is also included.

Table 6-1. Waste Quantities for the Test

	Quantity			
Waste	Rate (lb/hr)	Hours[1]	Total Feed Required (lb)	Total with 50% Contingency (lb)
Liquid Waste – Kiln	14,300	15	214,500	321,750
Solid Waste – Kiln	23,200	15	348,000	522,000
Liquid Waste – SCC	4,100	15	61,500	92,250

1 Hours are based on approximately one hour required to bring the incinerator to steady-state operations, and four hours to complete sampling.

6.5 Test Report

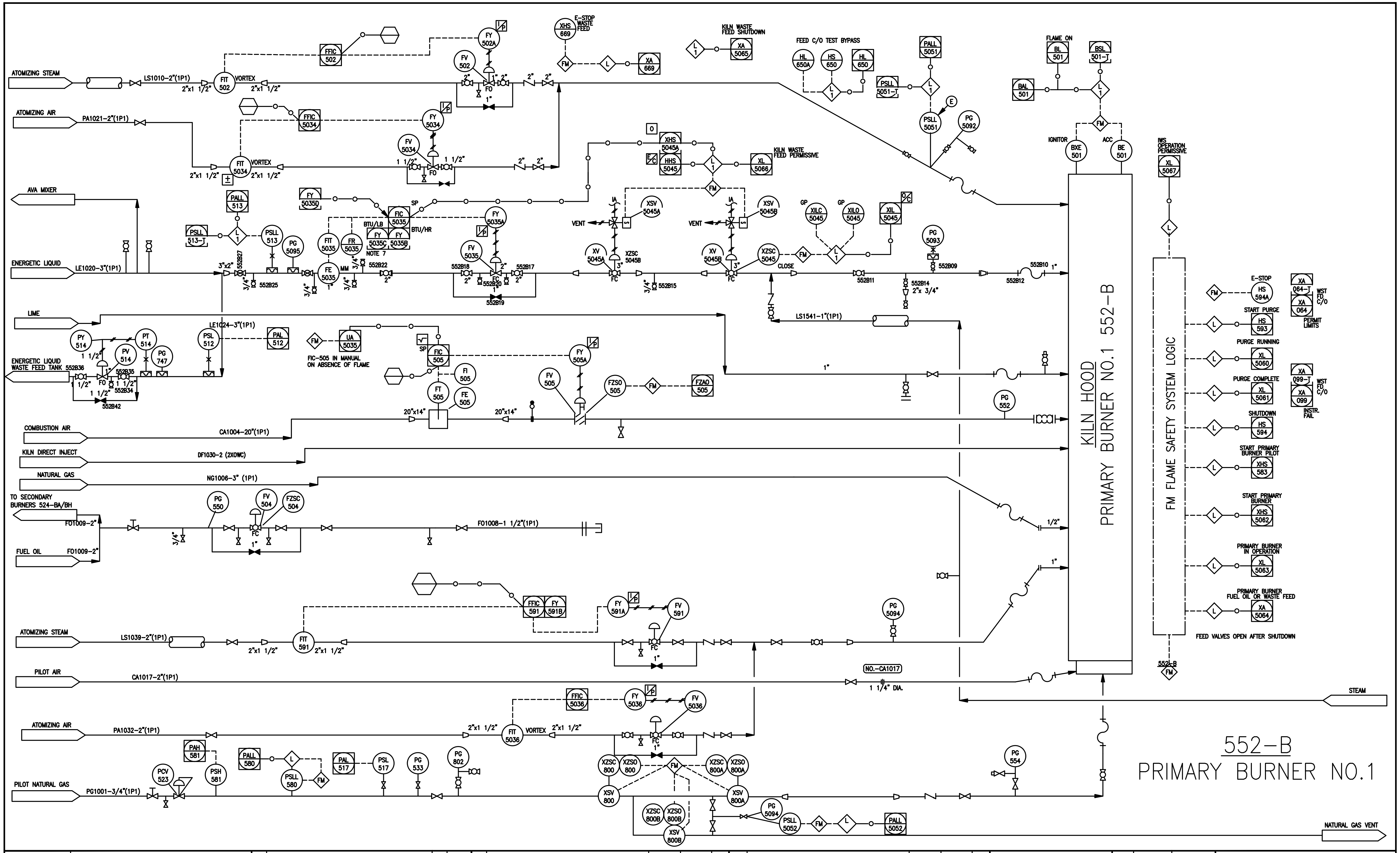
A report of the Test and a NOC documenting compliance with the applicable dioxins/furans standard of the HWC MACT will be submitted to TCEQ within 90 days of the completion of the test. In addition, the report will be submitted ot US EPA within the same time frame to demonstrate compliance with the performance standards in 40 CFR 761.70.

The name, address, and qualifications of persons who will review analytical results and other pertinent data, and who will perform a technical evaluation of the effectiveness of the trial burn are included in the QAPjP associated with this Test Plan.

Attachment A

Piping & Instrumentation Diagrams of Veolia’s Port Arthur Incinerator

Appendix A Continuous Monitoring Systems Performance Evaluation Test Plan for the Confirmatory Performance Test of Veolia's Port Arthur Incinerator



552-B
PRIMARY BURNER NO.1

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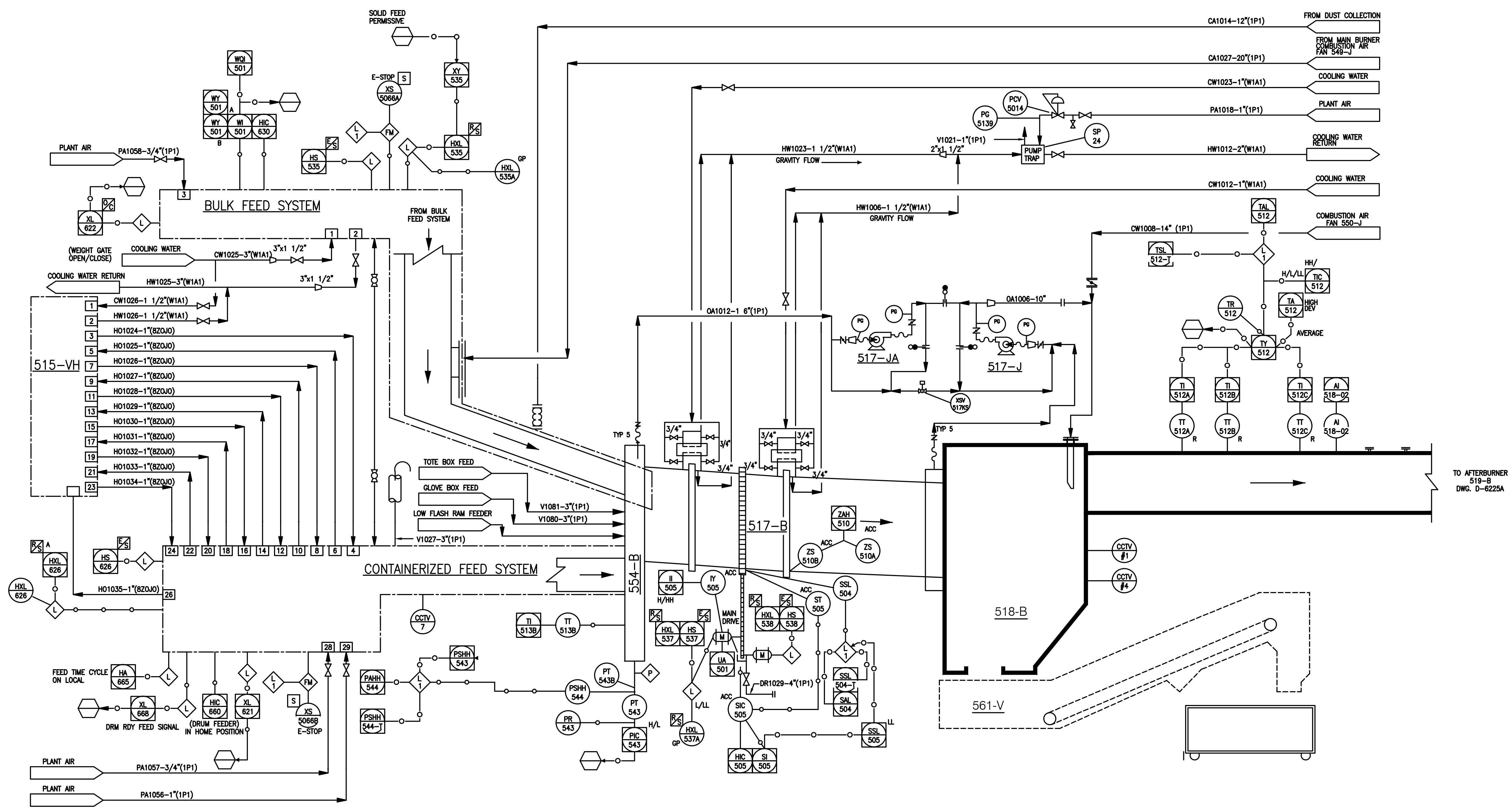
SCALE NTS
DATE
LAST PLOT
SHT.____ of ____
DR'N.
CHK'D.
APP'D.
DATE

INCINERATION SYSTEM
PIPING & INSTRUMENTATION DIAGRAM
PRIMARY
BURNER

VEOLIA

CAD FILE No. D6216
REVISION
DRAWING No. D-6216



515-VH
RAM FEEDER HYDRAULIC

554-B
KILN HOOD

517-B
ROTARY KILN

517-JA
KILN SHROUD VENT FAN

517-J
KILN SHROUD VENT FAN

518-B
DISENGAGING CHAMBER

561-V
PAN CONVEYOR

REV.	DESCRIPTION	BY	DATE	APP'D BY	REV.	DESCRIPTION	BY	DATE	APP'D BY	REV.	DESCRIPTION	BY	DATE	APP'D. BY	REV.	DESCRIPTION	BY	DATE	APP'D BY

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VEOLIA

INCINERATION SYSTEM
PIPING & INSTRUMENTATION DIAGRAM
ROTARY KILN AND DRUM FEED

CAD FILE No.

REVISION

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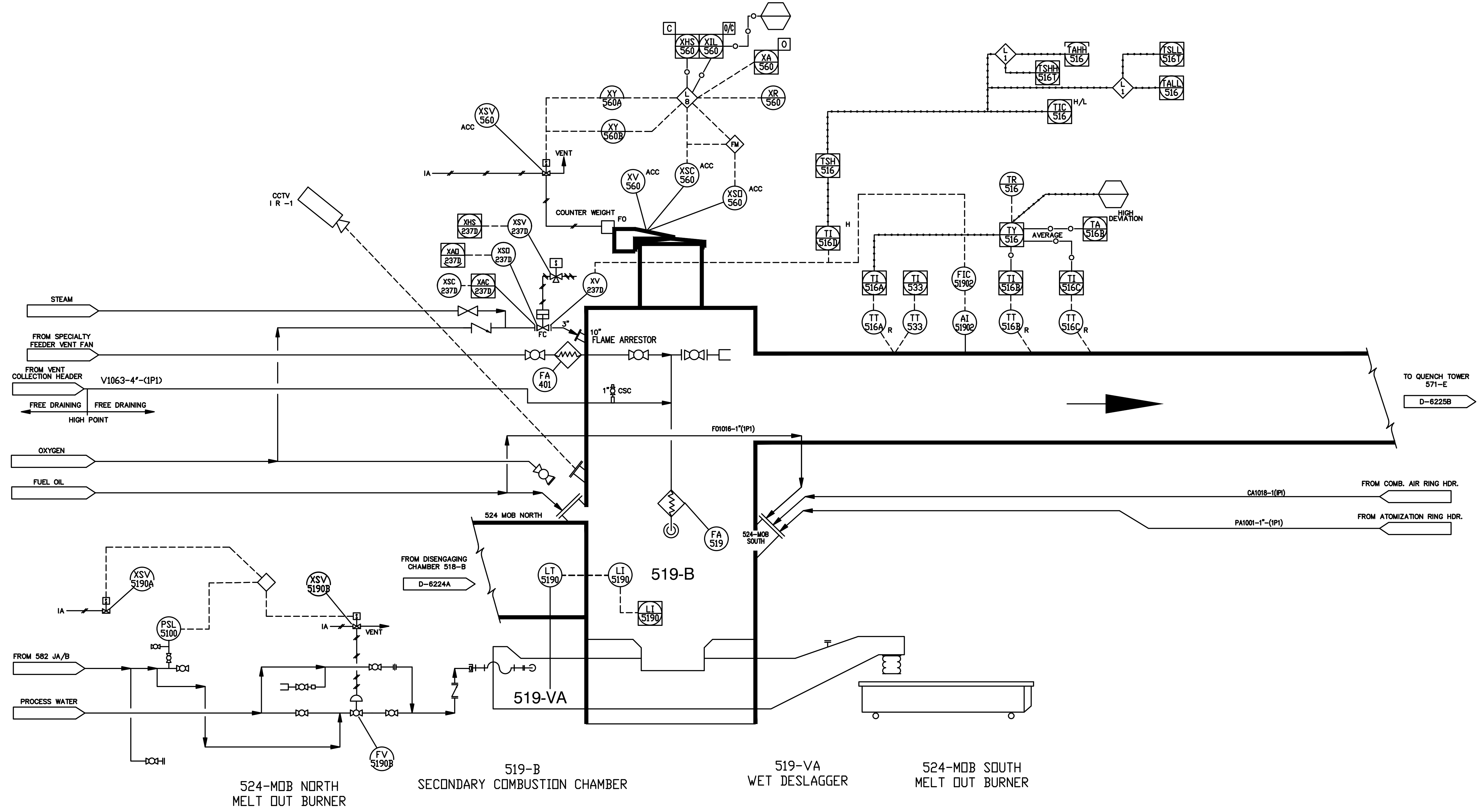
D-6224A



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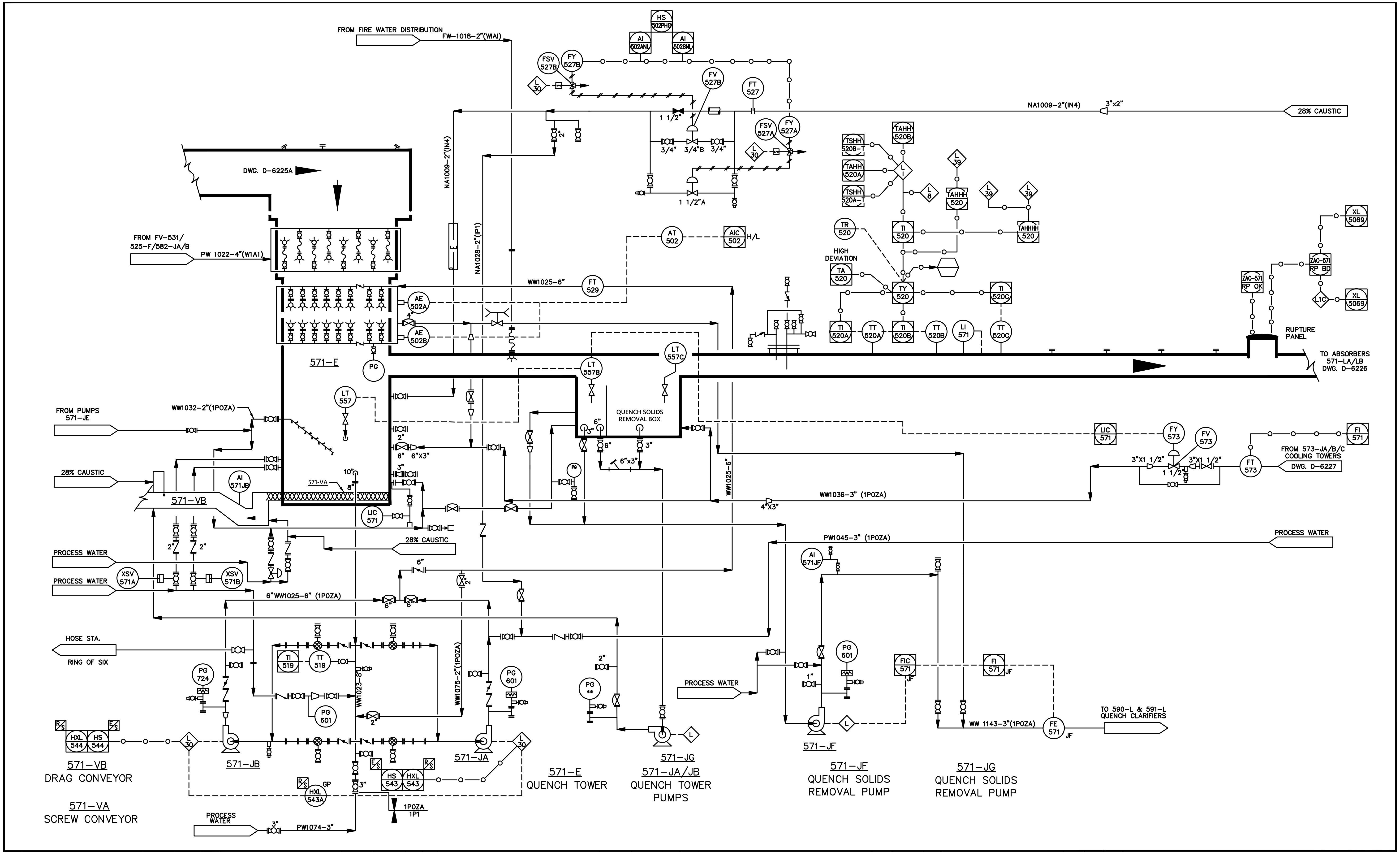
CHK'D.

INCINERATION SYSTEM
PIPING & INSTRUMENTATION DIAGRAM
AFTERBURNER AND
QUENCH TOWER

VEOLIA

CAD FILE No. D6225A
REVISION 18
DRAWING No. D-6225A



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DATE

INCINERATION SYSTEM
PIPING & INSTRUMANTION DIAGRAM
QUENCH TOWER

VEOLIA

CAD FILE No. D6225B
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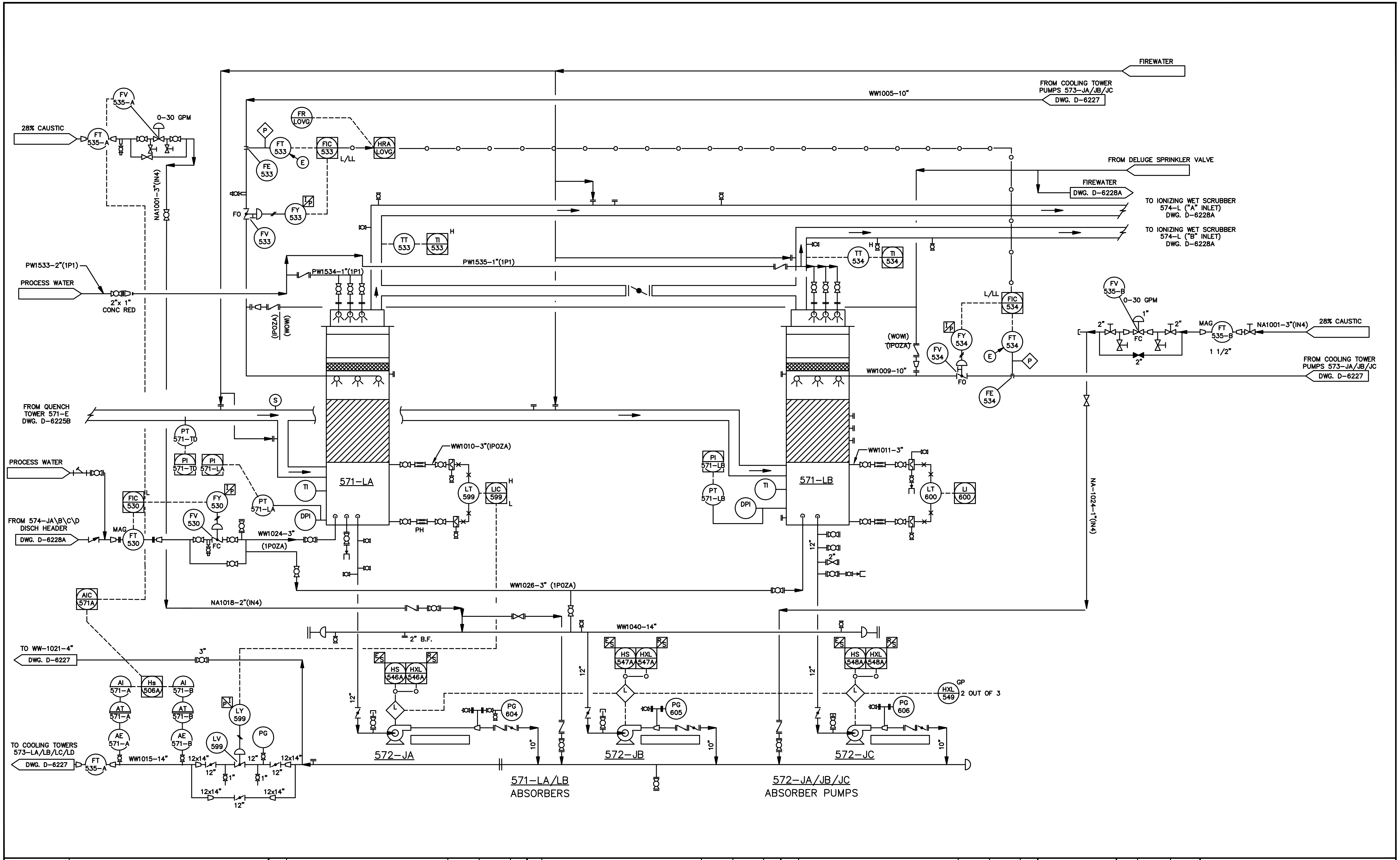

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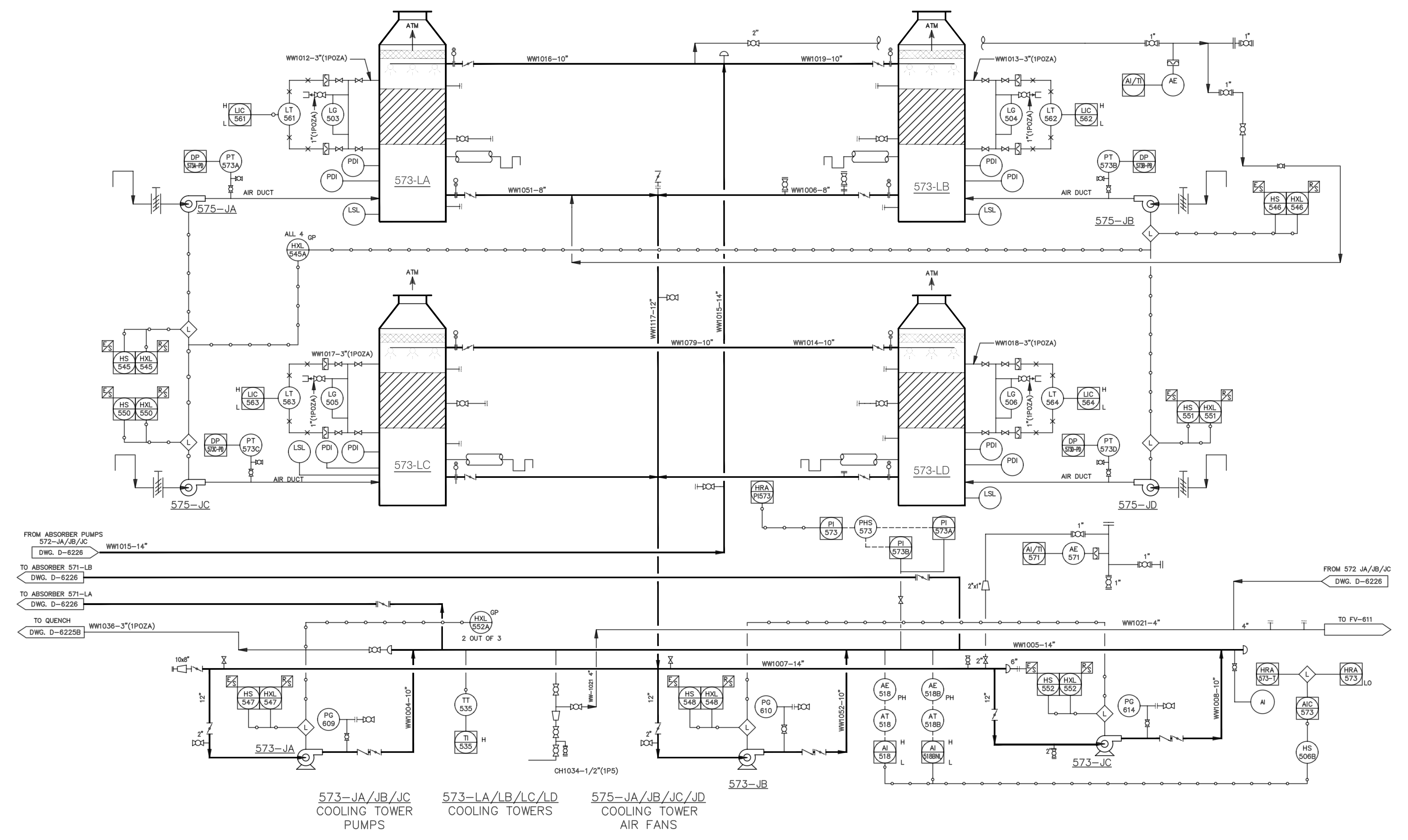
APP'D..
NONE
DATE

VEOLIA

INCINERATION SYSTEM
PIPING & INSTRUMENT DIAGRAM
FLUE GAS ABSORBERS

CAD FILE No. D6226
REV
DRAWING No. D–6226



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VEOLIA

INCINERATION SYSTEM
PIPING & INSTRUMENTATION DIAGRAM
COOLING TOWERS

CAD FILE No. D6227
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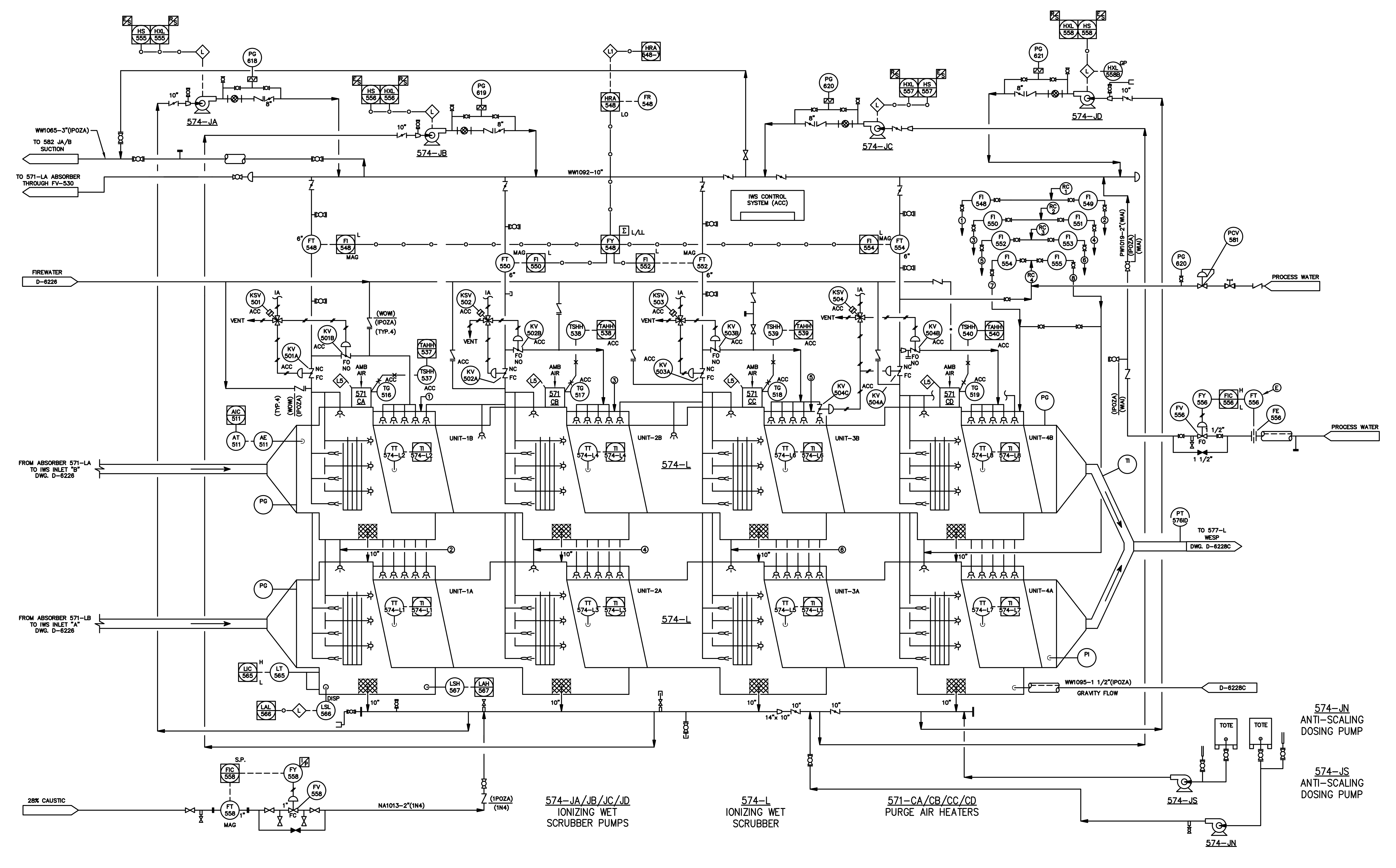

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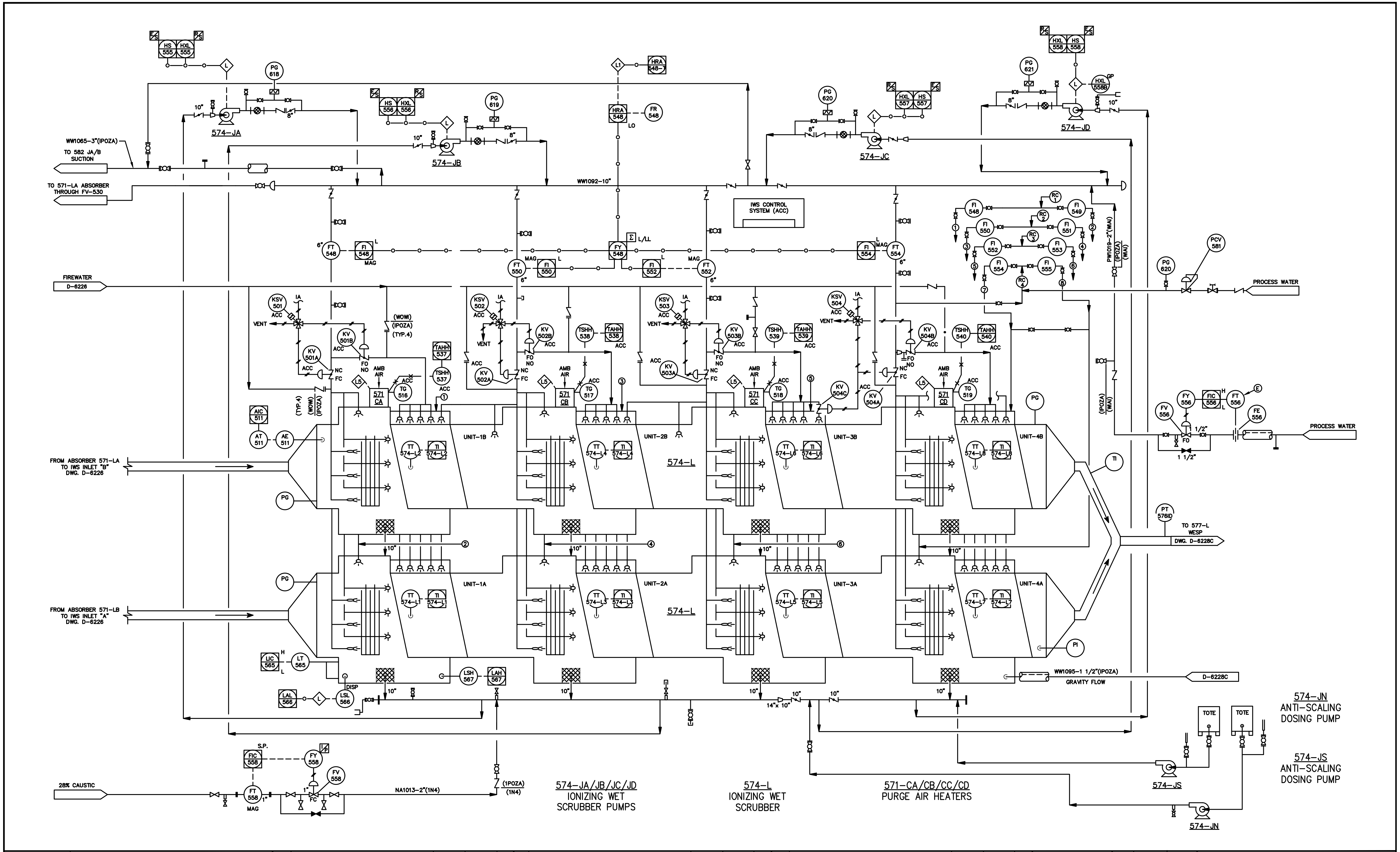
VEOLIA

INCINERATION SYSTEM
PIPING & INSTRUMENTATION DIAGRAM
IONIZING WET SCRUBBER

CAD FILE No. D6228A
REV
DRAWING No. D–6228A



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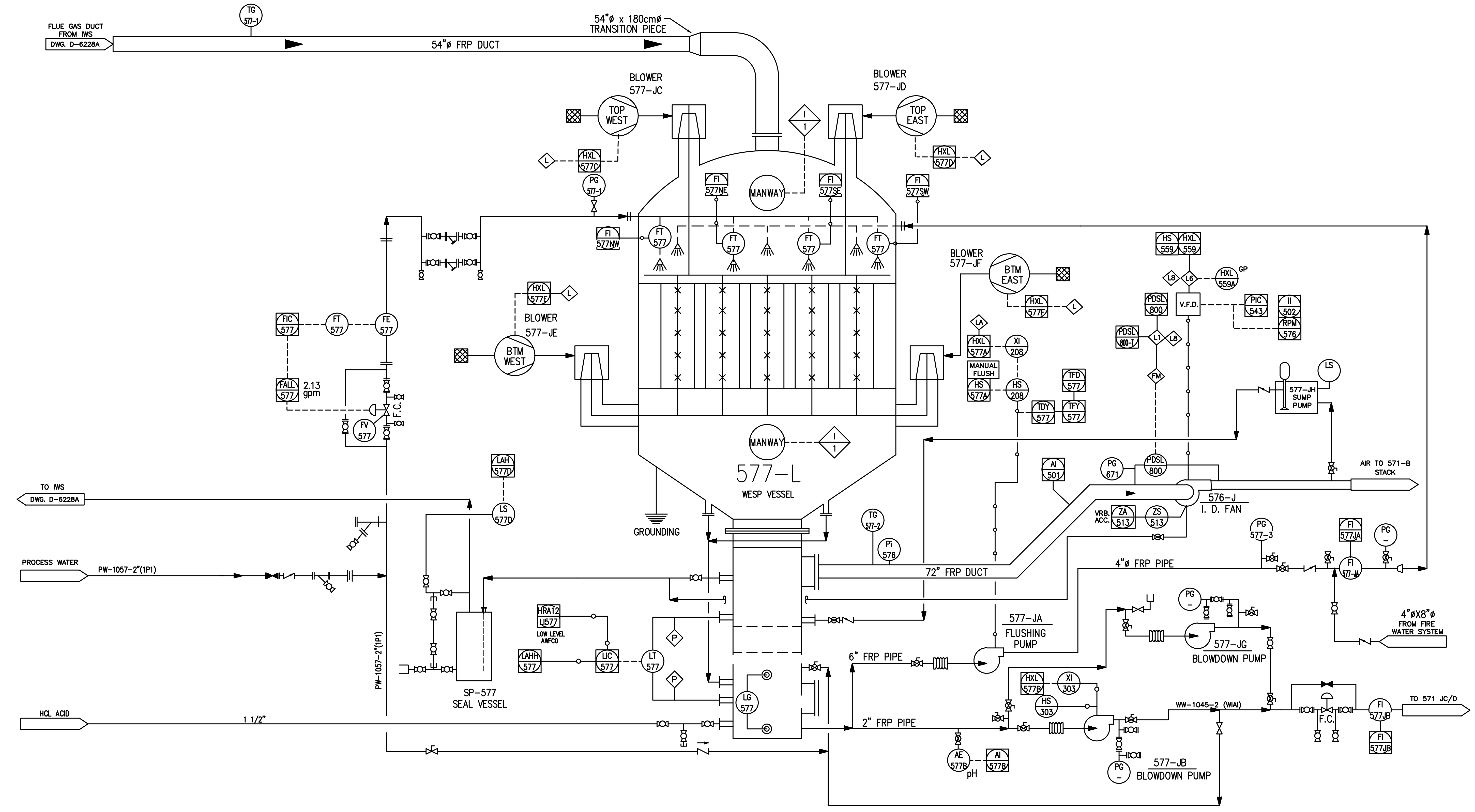
APP'D.
APP'D.
DATE

INCINERATION SYSTEM
PIPING & INSTRUMENTATION DIAGRAM
IONIZING WET SCRUBBER

VEOLIA

CAD FILE No. D6228A
REV
DRAWING No. D–6228A



SP-577
SEAL VESSEL

577-JC/D/E/F
PURGE AIR
BLOWER

577-L
WET ELECTROSTATIC
PRECIPITATOR

576-J
I. D. FAN

577-JA
FLUSHING PUMP

577-JB/JG
BLOWDOWN PUMPS

577-JH
SUMP PUMP

DRAWING NO.	REFERENCE DRAWING TITLE	REV.	DESCRIPTION	BY	DATE	APP'D. BY	REV.	DESCRIPTION	BY	DATE	APP'D. BY	REV.	DESCRIPTION	BY	DATE	APP'D. BY

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VEOLIA

INCINERATOR SYSTEM
PIPING & INSTRUMENTATION DIAGRAM
WET ELECTROSTATIC PRECIPITATOR

CAD FILE No. D6228C
REV
DRAWING No. D-6228C

AECOM

Continuous Monitoring System Performance Evaluation Test Plan for the Confirmatory Performance Test

Veolia ES Technical Solutions Incinerator
Port Arthur, Texas

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Page

1.0 Introduction

Veolia ES Technical Solutions, L.L.C. (Veolia) operates a rotary kiln incinerator (incinerator) at their facility in Port Arthur, Texas. A Confirmatory Performance Test Plan (CfPT Plan) presents plans for testing required by the Hazardous Waste Combustor (HWC) MACT [40 CFR Part 63 Subpart EEE]. This Continuous Monitoring System Performance Evaluation Test Plan is an appendix to the CfPT Plan.

The HWC MACT addresses the use of continuous monitoring systems (CMS) to demonstrate compliance with applicable operating parameters and emission standards. The CMS can be divided into two types: continuous emission monitoring systems (CEMS), which measure stack gas concentration (e.g., carbon monoxide, oxygen) and process parameters CMS (e.g., thermocouples, flow meters, pH probes), which measure process operating parameters from the combustor and the associated air pollution control system. This Continuous Monitoring System (CMS) Performance Evaluation Test Plan (PETP) describes how Veolia plans to conduct a CMS Performance Evaluation Test for the continuous monitoring systems used to assure compliance with the dioxins/furans standard of the HWC MACT as required by 40 CFR 63.1207(b)(2)(ii).

2.0 Performance Evaluation Test Plan Objectives

Veolia submits this CMS Performance Evaluation Test Plan (PETP) in compliance with 40 CFR 63.1207(e)(1)(ii) of the HWC MACT. The objective of this site specific CMS PETP is to demonstrate that the components of the CMS used to assure compliance with the dioxins/furans standard are installed, calibrated, and collecting quality data during operation of the Veolia incinerator. Veolia will use appropriate promulgated performance specifications provided in 40 CFR Part 60 Appendix B for CEMS. Because no performance specifications exist for process parameter CMS, manufacturer's written specifications or recommendations will be used as a minimum.

Prior to the CfPT, Veolia will also perform an automatic waste feed cutoff (AWFCO) system test to verify that the CMS is properly interlocked.

This CMS PETP was developed in accordance with 40 CFR 63.8(d) and (e) of the MACT General Provisions.

3.0 Continuous Monitoring Systems (CMS) Description

The Veolia incinerator uses both process parameter CMS and CEMS. Descriptions of the process parameter CMS and CEMS are provided in the following sections.

3.1 Process Parameter CMS

The incinerator uses process instruments, which include thermocouples, flowmeters, pH meters, and pressure transmitters to document compliance with applicable operating parameters. The process instruments continuously monitor and record operating parameters of the incinerator. The process instruments used to monitor operating parameters required by the HWC MACT to assure compliance with the dioxins/furans standard are listed in Table 3-1.

3.2 Continuous Emission Monitoring Systems (CEMS)

Veolia operates two identical EcoChem MC3 multi-component gas analyzers (one for compliance and one for redundancy). The single multi-component instrument analyzes the stack gas for O_2, CO, CO_2, SO_2 and HCl. Only the CO and O_2 CEMS are used for compliance with the dioxins/furans standard of the HWC MACT.

The ranges of the CO CEMS are 0-200 ppmv, and 0-3,000 ppmv and 0-10,000 ppmv. The calibration range for the O_2 component is 0-25% and the calibration range for the HCl component is 0-250 ppmv. Although Veolia is authorized in an AMA approved by EPA and TCEQ to have the third range of the CO CEMS 0 – 6,000 ppm, the third range of the CO CEMS is 0 – 10,000 ppm.

3.3 Data Management

The process instruments and analyzers transmit operating data to a data acquisition and management system (DA/MS) that performs the required data manipulations and calculations. The DA/MS compares computed values to the respective AWFCO limits. Process data is recorded in the facility computer database that is a part of the facility operating record.

As defined in 40 CFR 63.1209(b)(3) of the HWC MACT, the process instruments monitor the regulated parameters without interruption. The DA/MS system evaluates the instrument response at least once every 15 seconds and computes and records the average values at least every 60 seconds. The calculations of rolling averages are performed as defined in 40 CFR 63.1209(b)(5).

The DA/MS does not use data collected during instrument calibration periods in the rolling average calculations. Once one-minute data is available again, the first one-minute data is added to the previous one-minute data to calculate rolling averages.

Table 3-1. Veolia Incinerator Continuous Monitoring System Instrumentation to Assure Compliance with the Dioxins/Furans Standard

Operating Parameter	Location	Method	Control Tag	Instrument Tag	Range
Combustion Gas CO Concentration	Stack	CEMS: EcoChem MC3/CO	AI-507 - AI-509 AI-507B – AI-509B AI-507C – AI509C	AT-507 - AI509	0-200 ppm 0-3,000 ppm 0-10,000 ppm
Combustion Gas Oxygen Concentration	Stack	CEMS: EcoChem MC3/O_2	AI-522 – AI-523	AT-522 - AT-523	0-25%
Total Hazardous Waste Feedrate to the Kiln	Kiln	DCS[1]		KILN-TOT-WST	N/A
Pumpable Hazardous Waste Feedrate to the Kiln	Kiln	DCS[1]		KILN-LIQUID	N/A
Total (Pumpable) Hazardous Waste Feedrate to the SCC	SCC	DCS[1]		SCC-LIQUID	N/A
Kiln Direct Feed	Kiln	Rate of Change	FIC-400	WI-400RC	0 – 9,000 PPH
Glove Box	Kiln	Rate of Change	FIC-401	WI-401RC	0 – 2,000 PPH
Tote Feeder	Kiln	Rate of Change	FIC-410	WI-410ARC / WI-410BRC	0 – 2,000 PPH
SCC (BE) Direct Feed	SCC	Rate of Change	FIC-500	WI-500RC	0 – 9,000 PPH
Aqueous	Kiln	Mass Flow Meter	FIC-511	FT-511	0 – 20,000 PPH
E-Sludge	Kiln	Mass Flow Meter	FIC-514	FT-514	0 – 7,500 PPH
NE-Sludge	Kiln	Mass Flow Meter	FIC-517	FT-517	0 – 10,000 PPH
SCC (BA) Direct Feed	SCC	Rate of Change	FIC-5024	WI-5024RC	0 – 9,000 PPH
Kiln ELW	Kiln	Mass Flow Meter	FIC-5035	FT-5035	0 – 7,500 PPH
SCC Ring ELW	SCC	Mass Flow Meter	FIC-5040	FT-5040	0 – 7,500 PPH
Bulk Feed	Kiln	Scale	WI-501	WI-501	0 – 4,000 LBS
Container Feed	Kiln	Scale	Multiple container scales	LAST-WEIGHT	0 - 5,000 LBS
Combustion Temperature	Kiln	Type K Thermocouple : Transmation 2800 NI	TI-512A/ TI-512B/ TI-512C	TT-512A/ TT-512B/ TT-512C	0-2,500°F
Combustion Temperature	SCC	Type R Thermocouple : Transmation 2800 NI	TI-516A/ TI-516B/ TI-516C	TT-516A/ TT-516B/ TT-516C	0-2,500°F
Combustion Gas Flowrate	Stack	Correlation with I.D. fan RPM	FI-576 INS	576-VFD	0-60,000 DSCFM

[1] Feedrates are tabulated within the DCS using measured individual stream feedrates. Total Hazardous Waste Feedrate to the Kiln, Pumpable Hazardous Waste Feedrate to the Kiln, and Total (Pumpable) Hazardous Waste Feedrate to the SCC are summations of the applicable individual waste feedrates. Chlorine feedrate is calculated based on the stream feedrates and chlorine analytical results of the applicable waste streams.

4.0 Performance Evaluation Program Summary

Veolia's Performance Evaluation Program has the objective of ensuring that components of the CMS are installed, calibrated, operated, and maintained so that valid operating data is collected to demonstrate the Veolia incinerator's compliance with the HWC MACT. As part of the Confirmatory Performance Test, Veolia will conduct a test of the monitoring systems used to assure compliance with the dioxins/furans standard that will use appropriate promulgated performance specifications for CEMS provided in 40 CFR Part 60 Appendix B. Because no performance specifications exist for process parameter CMS, manufacturer's written specifications or recommendations will be used as a minimum.

4.1 Process Parameter CMS

4.1.1 Installation

As defined in 40 CFR 63.8(c)(2), all CMS shall be installed such that representative measurements of process parameters from the affected source are obtained. Veolia has installed all process parameter CMS per manufacturer's written specifications or recommendations to obtain representative measurements.

4.1.2 Calibration

CMS components used to assure compliance with the dioxins/furans standard are calibrated using manufacturer's written specifications or recommendations. Instrument calibration will be part of Veolia's CMS performance evaluation test and the procedures will be in the CEM Performance Evaluation Plan, required under the HWC MACT. All instruments that are used to assure compliance with the dioxins/furans standard will be calibrated before the CfPT.

4.1.3 Operation and Maintenance

CMS components are operated and maintained by using manufacturer's written specifications or recommendations.

4.1.4 Automatic Waste Feed Cutoff (AWFCO) System

The CMS process parameters are integrated with the AWFCO system. The AWFCO system operates on a continuous basis and is designed for a partial system shutdown, which discontinues hazardous waste feed to the incinerator whenever one or more operating parameter or emission limits is exceeded. In addition, if the span of any process parameter CMS is exceeded, this will initiate an AWFCO. These limits exist to ensure that the incinerator is operating properly to meet compliance emission standards. Any attempt to operate outside of these limits will trigger an AWFCO. The AWFCO system is set at just below allowable limits to avoid any exceedences. During an AWFCO, the control system activates an alarm and interrupts the hazardous waste feed to the incinerator. Hazardous waste feed to the incinerator will not resume until all parameters are within proper operating limits.

Testing of the AWFCO system will be performed during Veolia's CMS Performance Evaluation Test prior to the CfPT.

4.2 Continuous Emission Monitoring Systems (CEMS)

Performance evaluation of Veolia's CO and O_2 CEMS has been performed according to 40 CFR Part 60 Appendix B Performance Specification 4B – "Specifications and Test Methods for CO and O_2 CEMS in Stationary Sources". There is no Performance Specification for the HCl CEMS. The performance of this monitor is assessed using the protocols of PS 2 and EPA reference Method 26A for the accuracy assessment.

4.2.1 Installation

As defined in 40 CFR 63.8(c)(2), all CEMS are installed such that representative measurements of emissions from the affected source are obtained. Veolia has installed redundant CO and O_2 CEMS according to Performance Specification 4B.

4.2.2 Calibration and Performance Testing

The CEMS Performance Evaluation included four elements. Each element is described in the following sections and includes:

- Calibration Drift,
- Calibration Error,
- Relative Accuracy,
- Response Time.

4.2.2.1 Calibration Drift (CD)

A CD test compares the difference in the CEMS output readings from the established reference value after a stated period of operation during which no unscheduled maintenance, repair, or adjustments take place. The CD test is performance to demonstrate the stability of the CEMS calibration over time.

A CD test is conducted at 24-hour intervals for seven consecutive days using calibration gases at zero and high concentration levels. The two calibration gases are introduced into the sampling system as close to a sampling probe as practical. The CEMS response is recorded and subtracted from the reference value (calibration gas concentration).

4.2.2.2 Calibration Error (CE)

A CE test compares the difference between the concentration indicated by the CEMS and the known concentration of cylinder gases (zero, mid, and high). A CE test procedure is performed to document the accuracy and linearity of the monitoring equipment over the entire measurement range.

4.2.2.3 Relative Accuracy (RA)

A RA test is a comparison of the CEMS response to a value measurement by a standard Reference Method (RM). The RA test is used to validate the calibration technique and verify the ability of the CEMS to provide representative and accurate measurements.

The RM tests are conducted in such a way that the results will be representative of the emissions from the source and can be correlated to the CEMS data. A minimum of nine RM tests must be used to determine the RA. More than nine RM tests may be performed, however, a maximum of three tests may be rejected from the RA determination and all test results must be reported.

A RATA of the CO and O_2 CEMS will be performed to coincide with the CfPT (i.e., within 60 days of the CfPT).

4.2.2.4 Response Time (RT)

A RT test measures the time interval between the start of a step change in the system input and when the pollutant analyzer output reaches 95% of the final value.

During a RT test, the calibration gases are introduced at the probe as near as to the sample location as possible. First, the zero gas is introduced into the system. When the system output has stabilized (no change greater than 1% of full scale in 30 seconds), the monitor is switched to stack effluent and remains until a stable value is reached. The time (upscale response) required for the system to reach 95% of the final stable value is recorded. Next, the high-level calibration gas is introduced into the system to determine the downscale response. The above procedure is repeated three times. The upstream and downstream mean RTs are compared. The longer of the two mean RTs will be the system RT. To meet the RT specification, the RT may not exceed two minutes for both CO and O_2 CEMS.

4.2.3 Operation and Maintenance

CEMS are operated and maintained in accordance with Performance Specification 4B and manufacturer's written specifications or recommendations.

4.2.4 Automatic Waste Feed Cutoff (AWFCO) System

The CEMS are integrated with the AWFCO system. The AWFCO system operates on a continuous basis and is designed to cut off hazardous waste feed when one or more AWFCO parameters exceed allowable limits. These limits exist to ensure that the incinerator is operating properly to meet compliance emission standards. Any attempt to operate outside of these limits will trigger an AWFCO. During an AWFCO, the control system activates an alarm and interrupts the hazardous waste feed to the incinerator. Hazardous waste feed to the incinerator does not resume until all parameters are within proper operating limits.

Testing of the AWFCO system will be performed during the CMS Performance Evaluation Test prior to the CfPT.

5.0 Performance Evaluation Schedule

The CMS PETP will be performed in accordance with manufacturers written specifications or applicable EPA promulgated Performance Specifications. The process parameter CMS testing will be performed within 60 days prior to the CfPT.

6.0 Quality Assurance Program

6.1 Data Quality Objectives (DQO)

The CMS components are maintained to provide accurate and precise results.

6.2 Internal Quality Assurance

The internal quality assurance program includes the activities planned by routine operators and analysts to provide assessment of CMS performance. This program contains the following:

- Daily walk through audits (WTA) to check CMS and make necessary adjustments;
- Daily calibration drift to assess CEMS accuracy; and
- CMS calibration tests to verify components are capable of meeting performance criteria.

6.3 External Quality Assurance

The external quality assurance program includes system audits that include the opportunity for on-site evaluation by the Administrator of instrument calibration, data validation, sample logging, and documentation of quality control data and field maintenance activities. This program contains the following:

- Quarterly Cylinder Gas Audits (CGA) for CEMS to provide a more rigorous and independent assessment of CEMS accuracy and reliability than is provided by the daily calibration;
- Annual Relative Accuracy Test Audits (RATA) for CEMS to provide a more rigorous and independent quality assurance assessment of the CEMS accuracy and reliability than is provided by quarterly CGA;
- Review of CMS calibration, operation and maintenance procedures; and
- Review of calibration, operation and maintenance facility records.

Appendix B

Quality Assurance Project Plan for the 2025 Confirmatory Performance Test and RCRA and PCB DRE Periodic Test

Quality Assurance Project Plan for the 2025 Confirmatory Performance Test and Periodic RCRA and PCB DRE Test – Rev 2

Veolia ES Technical Solutions, L.L.C.
Port Arthur, TX

Project number: 60736471

September 2024

Quality Information

Prepared by	**Checked by**	**Approved by**
Wayne W. Washburn		Laura Faletto
Wayne Washburn, QSTI Air Quality Scientist	Phaneendra Uppalapati Air Quality Engineer	Laura Faletto, AVP Air Quality Manager

Quality Assurance Project Plan for the 2025 Confirmatory Performance Test and Periodic RCRA and PCB DRE Test

Veolia ES Technical Solutions, LLC
Port Arthur, Texas

APPROVALS

Don Icard Test Manager Veolia ES Technical Solutions, L.L.C.	Date
Laura Faletto Project Manager AECOM	Date
Wayne Washburn, QSTI Project QA/QC Coordinator AECOM	Date
Courtney Adkins Laboratory Project Manager Eurofins TestAmerica Laboratories	Date
Anna Barlozhetskaya QA/QC Manager Eurofins TestAmerica Laboratories	Date
Scott Neal Senior Specialist Superior Spiking Industries	Date

Note:

1) The individuals listed above have received, read, and agreed to the appropriate information pertaining to their project responsibilities listed and provided in this QAPjP.

2) The individuals listed above agree that no testing methods have been modified other than the modifications identified in this document.

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Tables and Figures

Appendices

1. Introduction

Veolia ES Technical Solutions, L.L.C. (Veolia) operates a hazardous waste incinerator at its facility in Port Arthur, Texas. The incinerator treats hazardous wastes under the Resource Conservation and Recovery Act (RCRA) Permit HW-50212, Air Permit 42450 issued by the Texas Commission on Environmental Quality (TCEQ), and a Toxic Substances Control Act (TSCA) approval issued by the United States Environmental Protection Agency (US EPA). The incinerator operates in compliance with the requirements of the RCRA, Air, TSCA, and the Final Replacement Standards of the *National Emission Standards for Hazardous Air Pollutants (NESHAPs) from Hazardous Waste Combustors* (Title 40 of the Code of Federal Regulations, Part 63 [40 CFR Part 63], Subpart EEE) that were promulgated on October 12, 2005 - often called the Hazardous Waste Combustor (HWC) Maximum Achievable Control Technology (MACT) standards.

The previous Comprehensive Performance Test (CPT) for the Final Replacement Standards of the HWC MACT commenced on August 31, 2022 with the performance of a Relative Accuracy Test Audit (RATA) of the carbon monoxide (CO) and oxygen (O_2) Continuous Emission Monitoring System (CEMS) on the stack of the incinerator, and was completed on October 14, 2022. The report of the CPT and a Notification of Compliance (NOC) for the Final Replacement Standards of the HWC MACT were submitted on January 20, 2023.

Per the requirements of the HWC MACT at 40 CFR 63.1207(d)(2), a Confirmatory Performance Test for polychlorinated dibenzodioxins and polychlorinated dibenzofurans (dioxins/furans) “must commence…no later than 31 months after the date of commencing the previous comprehensive performance test”. Therefore, the Confirmatory Performance Test (CfPT) must start by March 31, 2025. A CfPT Plan and a Continuous Monitoring System Performance Evaluation Test Plan (CMS PETP) must be submitted at least 60 calendar days before the start of the test as required by §63.1207(e)(1)(ii).

Section V.H.6. of the RCRA permit for the facility requires that periodic testing be performed every two and one-half years. The permit specifies that sampling and analysis of the waste and exhaust emissions be conducted to verify compliance with the feedrate limits in Table V.H.3. (of the permit) and the emission limits in Table V.H.4. (of the permit) and to ensure achievement of the performance standards of 40 CFR 264.343.

The CfPT Plan and Periodic RCRA and PCB DRE Test Plan (“Test Plan”) and associated Quality Assurance Project Plan (QAPjP) include the testing required by the HWC MACT and the RCRA permit. The Test is expected to begin with a CO/O_2 CEMS RATA performed beginning the week of March 31, 2025. Veolia plans to conduct the combined CfPT and Periodic RCRA and PCB DRE Test sampling for emission parameters commencing with the week of April 14, 2025. In addition to sampling for dioxins/furans to meet HWC MACT test requirements, this QAPjP will include sampling for particulate matter (PM), polychlorinated biphenyls (PCB), hydrogen chloride (HCl), chlorine (Cl_2), Metals, and Chromium VI, which will serve to meet RCRA, Air, and TSCA test requirements.

This document is a QAPjP for the upcoming 2025 Test. The Test Plan presents Veolia’s plan for testing of the incinerator to demonstrate compliance with the applicable HWC MACT incinerator emissions standard for dioxins/furans as well as the RCRA permit feedrate and emissions limits and TSCA approval conditions and emission limits. The QAPjP provides specifications for the testing described in the Test Plan. An engineering description of the incinerator located at the Port Arthur facility is provided in the Test Plan.

2. Project Organization

The project organization for the performance and reporting of the Test of the incinerator at Veolia's Port Arthur facility is presented in **Figure 2-1**. The responsibilities of the key personnel are outlined in this section. Qualifications of key personnel are included in Appendix B to the QAPjP; Resumes.

Don Icard is the Veolia Test Manager and is located at 7665 Highway 73 Beaumont, TX 77705. Mr. Icard will be responsible for the overall performance and coordination of the test effort and for all agency communications concerning the Test. Mr. Icard will coordinate with Veolia facility staff who will be responsible for spiking of 1,2-dichlorobenzene as a surrogate for PCBs. Veolia will determine the amount and rate of 1,2-dichlorobenzene spiking required during the Test. Veolia staff will be responsible for sampling the liquid and solid waste streams and will follow the SOP for collecting waste samples included as Appendix A to this QAPjP.

AECOM Staff will serve as the performance test coordinator and will perform stack gas sampling for the test. AECOM's responsibilities include coordination of unit operations, the collection of stack gas samples, transport of collected samples to the laboratory, analysis of all samples (using a subcontract laboratory), and preparation of the test report and NOC. The AECOM Sampling Field Staff collecting gas samples will be under the direct supervision of the Field Sampling Coordinator. AECOM Staff have received training on each of the sample collection methods that they will be assigned during this project.

Laura Faletto of AECOM is located at 100 N. Broadway, Suite 20000, St. Louis, MO 63102 and will serve as the Project Manager. In this role, she has the overall responsibility for the success and quality of the AECOM effort. Ms. Faletto will have primary authority for all decisions concerning sampling and analysis. In addition, she will maintain lines of communication with the Field Sampling Coordinator who will coordinate incinerator operations with sampling and analysis activities during the test program.

Ms. Faletto will also be responsible for coordinating the analysis phase of this program. She, along with the Field Sampling Coordinator, will be the focal point for communication between the field team and the analytical laboratories, as well as the key for receipt of data, and support information from the laboratories. She is responsible that the laboratories implement the QA/QC requirements in this document. She will be responsible for coordination of all analyses and preliminary review of analytical data.

Jack Hoard of AECOM is located at 2301 N. Brazosport Blvd, Freeport, TX 77541 and will serve as the Field Sampling Coordinator. In this role, he will be responsible for the day-to-day performance of the AECOM activities in the field and will be responsible for sample shipment to the laboratories. Mr. Hoard will have primary authority for decisions concerning sampling and analysis. Mr. Hoard will also be responsible for the organization and execution of the mobilization effort and will be responsible for the acquisition and calibration of all equipment and supplies. Mr. Hoard holds Qualified Source Testing Individual Certification.

Wayne Washburn of AECOM is located at 401 S. Salina St., Syracuse, NY 13202 and will serve as QA/QC Officer. He is responsible for the development of the QA/QC activities, as well as data review and reporting from a quality and data validation perspective. He will prepare the QA/QC section of the final report, focusing on data quality issues. If further discussions are required, they will be included in appropriate sections of the Test Report.

There will not be an independent 3rd party providing QA/QC oversight for the Test. Mr. Washburn will perform data validation for the Test. He is the Quality Control Officer of Source Testing for AECOM and has over 25 years of experience including document preparation; test protocol design and preparation; laboratory coordination; method development; plan implementation; and interpretation and reporting of sampling, analysis and QA/QC results.

Mr. Washburn will have the responsibility for preparation of the final report and NOC. Data review and reporting will be the responsibility of the task leaders described above.

Analysis of all samples collected during the Test of the incinerator at Veolia's Port Arthur facility will be performed by Eurofins TestAmerica Laboratories in Knoxville, TN (Eurofins TestAmerica).

Spiking of waste streams for RCRA compliance, and preparation of these spiking materials, will be performed by Superior Spiking Industries of Pasadena, TX. Resumes of key project personnel will be included as an appendix with the Test Report.

Laboratory Staff. The principal point of contact for the AECOM Management Team will be Ms. Courtney Adkins, the Project Manager at Eurofins TestAmerica Laboratories, located at 5815 Middlebrook Pike, Knoxville, TN 37921. Ms. Adkins will oversee project execution, completeness, and deliverables and ensure that objectives are met. She will manage the shipment and receipt of samples, track analytical progress, and review the reported data for completeness. Anna Barlozhetskaya located at 5815 Middlebrook Pike, Knoxville, TN 37921 is the laboratory quality assurance (QA) manager and will oversee QA requirements with all laboratory staff to ensure compliance with data quality objectives. The Laboratory QA/QC Manager will validate all data generated by the laboratory for this program and provide the necessary documentation for the final report.

Spiking Specialist. Superior Spiking Industries will serve as the provider of spiking materials for this program. Mr. Scott Neal located at 3926 Bolivia Dr., Pasadena, TX 77504 will coordinate with AECOM and Veolia to determine the required spiking materials and rates. He will be responsible for administering the spiking at the specified rates during the test program and will ensure that all necessary documentation is provided for inclusion in the final report at the conclusion of the program.

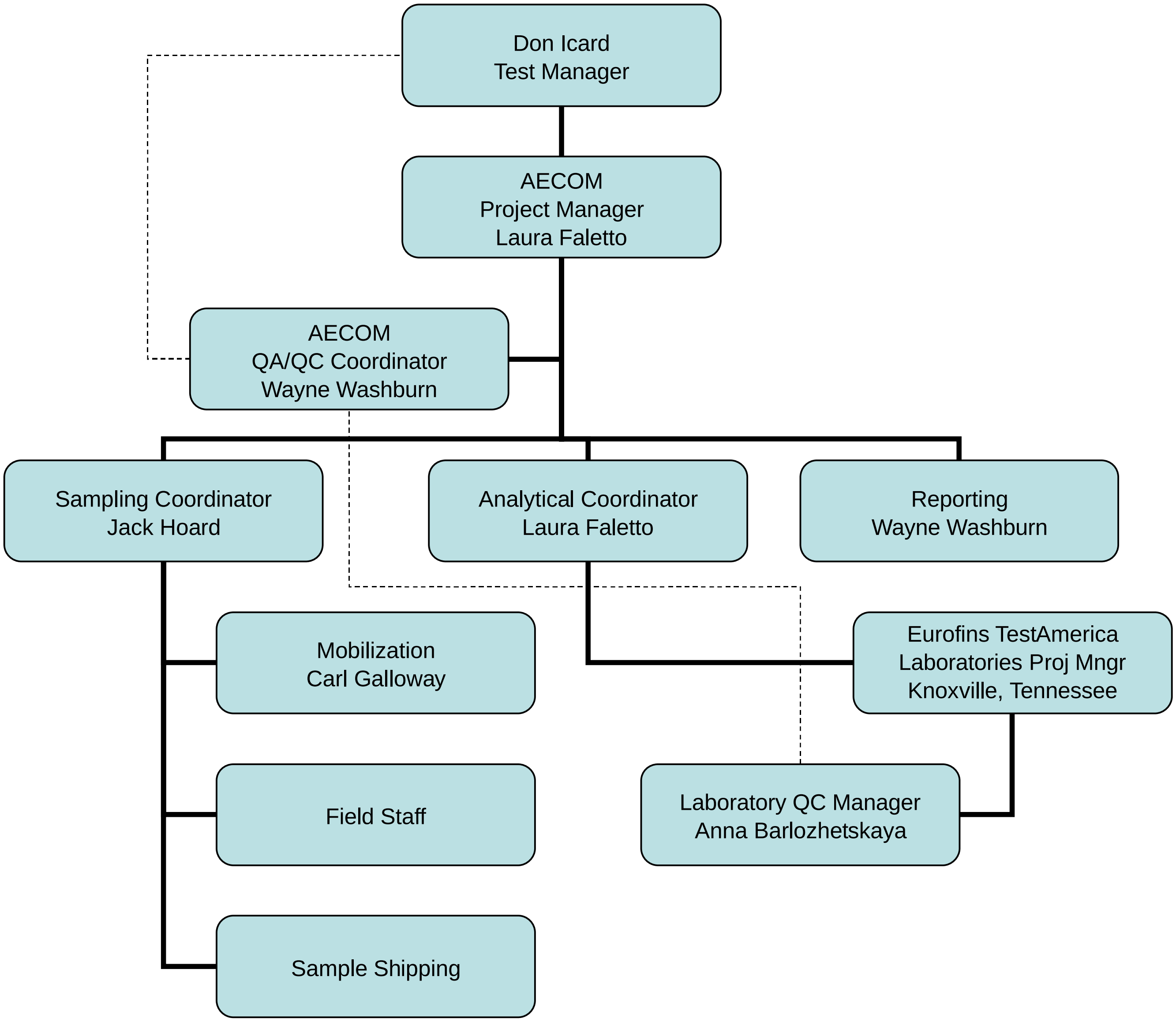


Figure 2-1. Project Organization Chart

3. Quality Assurance Objectives

This section presents quality assurance (QA) objectives for the following critical measurement parameters of the Test:

- Particulate matter in the stack gas;
- HCl and Cl_2 in the stack gas;
- Metals in the stack gas;
- Chromium VI in the stack gas;
- Dioxins/furans in the stack gas;
- Polychlorinated biphenyls (PCB) in the stack gas;
- Total Chlorinated Organic Compounds (RCl) in the stack gas;
- Metals in waste feeds;
- PCB in waste feeds; and
- Chlorine in waste feeds.

Critical measurement parameters are defined as those measurements that directly contribute to the demonstration objectives of the test. The objectives and goals of the test are delineated in Section 1.0 of this document.

Table 3-1 summarizes the QA objectives for the critical measurement parameters in terms of accuracy, precision, and completeness.

No precision or accuracy measurement for particulate matter in the stack gas, while a critical measurement, is listed in **Table 3-1** because they cannot be readily measured in a test. Adherence to the method protocol, which includes performance-related activities such as sampling equipment calibration, isokinetic sampling, balance calibration, desiccating filters to a constant weight, et cetera, is the basis for achieving acceptable method accuracy. For other critical measurement parameters, the performance objectives are expressed by conditions that can be appraised experimentally.

The completeness objective reflects the requirement to provide three valid determinations of the target measurement. There will be three runs conducted at one operating condition. The completeness objective of 100% in the table below reflects the need to develop three valid determinations. Since additional samples cannot be collected after the test, any loss of anticipated data through sample breakage or mishandling after the field portion of the test will be carefully evaluated with respect to the impact of project objectives. All QA/QC data will be thoroughly interpreted in the final report.

Table 3-1. Quality Assurance Objectives

Parameter	Precision [1]	Accuracy [2]	Completeness [3]
HCl/Cl_2 in Stack Gas	10% RPD for duplicate analysis for each sample	75-125% recovery for matrix spike	100%
Metals in Stack Gas	20% RPD for matrix spike/matrix spike duplicate As necessary, these will be post-digestion spikes or post-digestion spike duplicates	75-125% recovery for matrix spikes. As necessary, these will be post-digestion spikes	100%
Chromium VI in Stack Gas	RPD <20% for all duplicate analyses	90-110% recovery for matrix spikes	100%
Dioxins/Furans/PCB/RCl in Stack Gas	30% RSD for pooled surrogate recoveries [3,4]	70-130% recovery of method-specified surrogates [5]	100%
Metals in Waste Feeds	20% RPD for matrix spike/matrix spike duplicate	75-125% recovery for matrix spikes for all except mercury	100%
PCB in Waste Feeds	25% RSD for pooled surrogate recoveries [3,4]	70-130% recovery of method-specified surrogates [5]	100%
Chlorine in Waste Feeds	10% RPD for matrix spike/matrix spike duplicate	80-120% recovery for matrix spikes	100%

[1] Precision is expressed according to the type of measurement. For surrogate spikes, precision is expressed as percent relative standard deviation (RSD) for the set of spike recoveries or assay results. For objectives measured by matrix spike duplicates (MSD) or duplicate analyses, precision is expressed as the relative percent difference (RPD) between MS/MSD recoveries or duplicate analyses.

[2] Accuracy is expressed in terms of percent error, or difference between a measured value and the theoretical value, expressed as a percentage of the theoretical. For assays, the objective is based on the mean measured value. For surrogate and matrix spike (MS) recoveries, the objective is based on single measurement results.

[3] Completeness is the total number of valid measurement results, expressed as a percentage of the number planned.

[4] Pooled over all samples

[5] For surrogate spiked before sampling.

If the QA objectives for accuracy and precision are not met, careful interpretation of the analytical data will be made to evaluate the associated impact on the performance demonstration. Results that are outside of these objectives may indicate matrix interferences that are sometimes present in stack emission samples. As such, results that are outside these specifications do not necessarily invalidate the data, but rather indicate the need to evaluate the data carefully and explain potential biases and/or limitations in the use of the data. The evaluation for data validity will be based (among other things) on the evaluation of the laboratory's adherence to the QC and corrective action specifications.

Other QA objectives are representativeness and comparability. Representativeness is a function of sampling strategy. Representative stack gas samples will be collected by following approved reference methods, which are specifically developed to acquire representative samples (i.e., collection over time period, sample volume, etc.). All samples will be collected only under stable and specific operating conditions.

Comparability is the degree to which data from a given study can be compared to data from other similar studies. Data comparability will be ensured by adhering to the standard methods specified in this document. Analytical results will also be presented in appropriate standard units according to industry conventions.

4. Program Summary

40 CFR 63.1207(b)(2) of the HWC MACT requires that a confirmatory performance test (CfPT) be performed within 31 months of the previous CPT to demonstrate compliance with the applicable dioxins/furans emission standard, and conduct a performance evaluation of continuous monitoring systems required for compliance assurance with the dioxins/furans standard. Veolia's RCRA permit requires that the incinerator be tested every two and one-half years to verify compliance with the feedrate limits in Table V.H.3. (of the permit) and the emission limits in Table V.H.4.. (of the permit), and to ensure achievement of the performance standards of 40 CFR 264.343.

The test will be conducted to meet both HWC MACT and RCRA test objectives concurrently. The test objectives are:

- Demonstrate compliance with HWC MACT emission standard for dioxins/furans of 40 CFR 63.1219(a)(1)(ii);
- Demonstrate compliance with Section III.B.1 of the PCB approval issued pursuant to Section 6(e) of the TSCA.
- Conduct a Continuous Monitoring System (CMS) performance evaluation test for the Operating Parameter Limit (OPLs) used to demonstrate compliance with the HWC MACT standard for dioxins/furans;
- Conduct a Relative Accuracy Test Audit (RATA) for the CO and O_2 Continuous Emissions Monitoring Systems (CEMS); and
- Satisfy the periodic testing requirements of Provision V.H.6. of the RCRA permit.

The test objective for the CfPT portion of this combined test program is to verify that the total emission concentration of dioxins/furans is less than the applicable standard at 40 CFR 63.1219(a)(1)(i)(B). The applicable dioxins/furans emission standard is 0.40 ng TEQ/dscm, corrected to 7% O_2 since the incinerator has a wet particulate matter control device.

The test objectives for the RCRA periodic test portion of this combined test program are to verify the limits from the RCRA permit as detailed below:

- Demonstrate waste feedrate limits in Table V.H.3. of the RCRA permit:
  - Arsenic;
  - Beryllium;
  - Cadmium;
  - Total Chromium;
  - Antimony;
  - Barium;
  - Lead;
  - Mercury;
  - Nickel, Pumpable Mode;
  - Nickel, Solids Mode;
  - Selenium;
  - Silver;
  - Thallium;

  - Zinc;
  - Total Chlorine; and
  - Ash to Afterburner.

- Demonstrate emission limits in Table V.H.4. of the RCRA permit:
  - Arsenic;
  - Beryllium;
  - Cadmium;
  - Chromium, Hexavalent;
  - Chromium, Total;
  - Antimony;
  - Barium;
  - Lead;
  - Mercury;
  - Nickel;
  - Selenium;
  - Silver;
  - Thallium;
  - Zinc;
  - Hydrogen Chloride;
  - Free Chlorine; and
  - Particulate Matter.

- Demonstrate the RCRA incinerator performance standards at 40 CFR 264.343:
  - A minimum 99.99% destruction and removal efficiency (DRE) of principal organic hazardous constituents (POHCs) was demonstrated in the 2006 Comprehensive Performance Test (CPT) for the Interim Standards of the HWC MACT. POHC DRE will not be re-demonstrated during the Test;
  - Control of hydrogen chloride emissions to less than 4 lb/hr or 1.0% of the HCl generated in the combustion process; and
  - Control of particulate emissions to less than 0.08 grain per dry standard cubic foot as corrected to 7% oxygen in the stack gas.

A relative accuracy test audit (RATA) of the CEMS on the stack of the incinerator is performed annually. A full annual RATA of all of the CEMS monitors (i.e., CO, CO_2, O_2, SO_2, and HCl) and the stack gas flowrate monitoring system will be conducted in the second Quarter of 2025. As required in the HWC MACT, a RATA of the CO and O_2 monitors will be conducted ust prior to the CfPT (and Periodic RCRA and PCB DRE testing).

The target conditions to be demonstrated and the standards to be achieved while feeding liquid and non-liquid PCBs are:

- The mass air emissions from the incinerator shall be no greater than 0.001g PCB/kg of the PCB introduced into the incinerator.

- Maximum liquid and non-liquid PCB feedrate to the incinerator of 1,400 pounds per hour;
- Minimum 99.9999% DRE for PCBs (liquid and non-liquid combined); and
- Combustion efficiency of at least 99.9%.

4.1 Waste Selection

Veolia proposes to feed a mix of wastes to the incinerator that is representative of typical operations. The average waste feedrates were determined for the 12-month period previous to the preparation of the Test Plan (i.e., September 2023 through August 2024). For the Test, the actual waste feedstreams and target feedrates will be established to achieve the target operating conditions based on actual inventory of the waste streams at the time of testing. It is possible that the waste feedstreams and feedrates during the test may not demonstrate the 12-month average feedrates for the metals in Table V.H.3. of Veolia's RCRA permit. To assure that the 12-month average feedrates of the 13 metals in Table V.H.3. are demonstrated, Veolia will spike three metals during the test.

4.2 Operating Conditions

For the Test, the target operating conditions must be within a particular operating range, created to reflect normal operating conditions, per §63.1207(g)(2) and RCRA Permit HW-50212. As discussed in the Test Plan, target operating values will be within the previous 12-month average of plant process data reported in the units of the OPL (i.e., as hourly rolling averages – HRAs) recorded every minute. During the Test, Veolia will maintain each of the parameters listed in **Table 4-1** between the 12-month average and the NOC limit. The 12-month period selected to provide data to develop the 12-month average, based on the most recent data available when the CfPT/RCRA Periodic Test Plan was written, is September 2023 through August 2024.

For CO, a wider operating range is requested for the Test per §63.1207(g)(2)(v). The concentration of CO in the stack gas will not be targeted to be maintained between the 12-month average and the NOC limit (i.e., the HWC MACT standard of 100 ppm corrected to 7% oxygen). During the Test, the concentration of CO will be maintained less than the HWC MACT standard, and the limit for CO in the RCRA permit.

4.3 Test Protocol

The approach for accomplishing the test objectives is to operate the incinerator at a single representative test condition. To accomplish this, a mix of waste streams will be fed to the incinerator typical of normal operations.

The testing will consist of a series of three test runs (i.e., three distinct test periods). During each test run, samples will be collected to measure the following parameters in the stack gas emissions.

- Dioxins/Furans/PCB/RCl;
- Metals (Arsenic, Beryllium, Cadmium, Total Chromium, Antimony, Barium, Lead, Mercury, Nickel, Selenium, Silver, Thallium, and Zinc);
- Chromium (VI);
- Hydrogen Chloride (HCl) and Chlorine (Cl_2); and
- Particulate Matter.

In addition, waste feed streams will be sampled and analyzed to determine:

- Metals (Arsenic, Beryllium, Cadmium, Total Chromium, Antimony, Barium, Lead, Mercury, Nickel, Selenium, Silver, Thallium, and Zinc);

- Total Chlorine;
- PCB; and
- Ash to the Afterburner.

Process data will be collected during the Test to document that the incinerator was operated within the target operating ranges during the test. A Continuous Monitoring System Performance Evaluation Test (CMS PET) will be performed prior to the Test to document performance of instrumentation used to monitor OPLs and parameters in association with the dioxins/furans standard of the HWC MACT. Instrumentation that measures waste feedrates, combustion temperatures, stack gas flowrate, and the concentrations of CO and O_2 in the stack gas will be calibrated prior to the Test.

Table 4-1. CfPT and Periodic RCRA and PCB DRE Test Feedrates and Operating Conditions

Operating Parameter Limit	Process Tag	Units	12-Month Average [1]	NOC Limit [1,2]	Required for CfPT	RCRA Permit Limit	Required for RCRA Periodic Test	TSCA Approval Limit	Target Operating Range [3]
Maximum Total Hazardous Waste Feedrate to Kiln and SCC	WASTE-MAV	lb/hr	19,285			57,198	X		19,285 – 57,198
Maximum Total Hazardous Waste Feedrate to the Kiln	KILN-TOT-WST	lb/hr	17,502	46,839	X	42,761 [20]			17,502 – 42,761
Maximum Total Hazardous Waste Solids to the Kiln	KILN-SOLID	lb/hr	7,537			39,400	X		7,537 – 39,400
Maximum Total Aqueous Waste Feedrate to Kiln and SCC	AY-060L5	lb/hr	7,333			16,786	X		7,333 – 16,786
Maximum Aqueous Waste Feedrate to SCC	AY-060L4	lb/hr	137			4,763	X		-- [15]
Maximum Non-Aqueous Waste Feedrate to SCC	AY-061L2	lb/hr	1,646			9,009	X		1,646 – 9,009
Maximum Pumpable Hazardous Waste Feedrate to the Kiln	KILN-LIQUID	lb/hr	9,965	24,847	X	20,299 [20]	X		8,243 –20,299
Maximum Total (Pumpable) Hazardous Waste Feedrate to the SCC	SCC-TOT-WASTE	lb/hr	1,784	7,330	X	5,704 [20]	X		1,784 – 5,704
Minimum Combustion Chamber Temperature in the Kiln	HRA-512	°F	1,623	1,339	X	1,368 [20]	X		1,368 – 1,623
Minimum Combustion Chamber Temperature in the SCC	SCC-TEMP-AVG	°F	2,063	1,948	X	1,954 [20]	X		1,945 – 2,063
Maximum Combustion Chamber Temperature in the Kiln	HRA-512	°F	1,623			2,125	X		1,368 – 1,623 [4]
Maximum Combustion Chamber Temperature in the SCC	SCC-TEMP-AVG	°F	2,063			2,326	X		1,945 – 2,063 [4]
Maximum Flue Gas (Stack Gas) Flowrate	HRA-576	Dscfm	29,985	39,605	X	39,248	X		29,985 – 39,248
Maximum Stack CO Concentration[5]	STACK-CO-AVG	ppmv at 7% O_2	3.0	100	X	100	X		0 – 100 [5]
Maximum Total Chlorine/Chloride Feedrate[6]	HRA12-051L1	lb/hr	1,326 [3]	4,888 [6]	X	2,775	X		1,326 – 2,775 [7]

Operating Parameter Limit	Process Tag	Units	12-Month Average [1]	NOC Limit [1,2]	Required for CfPT	RCRA Permit Limit	Required for RCRA Periodic Test	TSCA Approval Limit	Target Operating Range [3]
Maximum Ash to the Afterburner	AY-052L1	lb/hr				240	X		-- [8]
Maximum Combustion Zone pressure		Psia				14.7	X		-- [8]
Minimum IWS Water Flow	HRA-548	Gpm	3,844			2,954	X		2,954 – 3,844
Operation of Waste Firing System; Minimum Burner Atomization Pressure (Air or Steam)[9]		Psig	--	20 [10]		20	X		>20
Minimum Liquid-to-Gas Ratio in the Absorbers	HRA-LOVG	--	0.14	0.107 [10]		0.106	X		0.106 – 0.14
Minimum Liquid Feed Pressure to the Absorbers	HRA-PI573	Psig	21.3	7					7-21.3
Minimum pH at Cooling Tower Inlet	HRA-571	pH	5.33	3.55		6.0	X		4.55 – 5.33
Minimum Scrubber Blowdown Rate (Blowdown to Deepwell)	HRA12-616	Gpm	123.6	88.7					95.4 – 123.6
Maximum Conductivity of Scrubber Water	HRA-616C	µmho	49,532	85,807					49,532 – 124,859
Voltage to the IWS[11]	XA-IWS-HV	kV	--	10		10	X		>10
Minimum Power to the WESP	HRA-KV577	kVA	20.5	16.[2]					15.8 – 20.5
Minimum Tank Level in the WESP	HRA12-LI577	%	74.7	40.0 [2]					44.0 – 74.7
Arsenic Feedrate	AY-056L4	lb/hr	0.35			4.82 [21]	X		>0.5 [16]
Pumpable Arsenic Feedrate	HRA-P056L4	lb/hr	0.03	0.25		0.26 [12]	X		-- [19]
Beryllium Feedrate	AY-057L1	lb/hr	0.29			13.2 [21]	X		-- [19]
Cadmium Feedrate	AY-056L1	lb/hr	0.21			21.6 [21]	X		-- [19]
Chromium Feedrate	AY-057L2	lb/hr	0.83			26.7 [21]	X		-- [19]
Antimony Feedrate	AY-054L4	lb/hr	0.87			150 [21]	X		-- [19]
Barium Feedrate	AY-055L3	lb/hr	1.07			65.6 [21]	X		-- [19]
Lead Feedrate	AY-055L4	lb/hr	0.76			156.72 [21]	X		>4.0 [17]
Mercury Feedrate	HRA12-056L3	lb/hr	0.007	0.456		0.0417 [13] 0.101 [14, 21]	X		>0.01 [18]

Operating Parameter Limit	Process Tag	Units	12-Month Average [1]	NOC Limit [1,2]	Required for CfPT	RCRA Permit Limit	Required for RCRA Periodic Test	TSCA Approval Limit	Target Operating Range [3]
PCB Feedrate	AY-059L4	lb/hr	20.6					1,606	1,400*
(Pumpable) Nickel Feedrate	HRA-P057L3	lb/hr	0.11			13.7	X		-- [19]
Selenium Feedrate	AY-055L1	lb/hr	0.87			175 [21]	X		-- [19]
Silver Feedrate	AY-054L3	lb/hr	0.52			19 [21]	X		-- [19]
Thallium Feedrate	AY-064L1	lb/hr	0.38			75 [21]	X		-- [19]
Zinc Feedrate	AY-055L2	lb/hr	15.7			7,170	X		-- [19]

Notes:

[1] 12-Month Average from September 2023 through August 2024.

[2] From the Notification of Compliance dated January 20, 2023.

[3] Hourly Rolling Average (HRA)

[4] The combustion zone temperatures will be maintained between the minimum limits and the 12-month average.

[5] Requesting a wider operating range per 63.1207(g)(2)(v).

[6] 12-HRA

[7] The OPL for the maximum feedrate of total chlorine/chloride is a 12-HRA, however, the target feedrate for chlorine/chloride for the CfPT will be as a HRA because a HRA will be more indicative of the real-time feedrate of chlorine/chloride than a 12-HRA.

[8] No target is defined for this parameter, other than to be within compliance with the permit and NOC limits.

[9] Based on manufacturer’s specification. An AWFCO occurs if the atomizing medium pressure falls below 20 psig.

[10] Included at the request of EPA Region 6 prior to the 2014 CfPT/RCRA Periodic Test.

[11] Voltage to the IWS is established based on “manufacturer’s specification. For each IWS unit, voltage across the resistor in the alarm circuit is monitored. The voltage will vary from zero to a maximum value in direct response to the IWS control logic. If for any reason the maximum voltage of 10 kV is not achieved during any two-minute period, the under voltage alarm will occur (for instance, during a cleaning cycle). In the event that four units are in under voltage alarm simultaneously and Automatic Waste Feed Cutoff (AWFCO) will occur.

[12] This is a limit on arsenic in pumpable waste when using the proprietary technology to control mercury emissions.

[13] Feedrate of mercury when not using the proprietary technology to control mercury emissions.

[14] Feedrate of mercury when using the proprietary technology to control mercury emissions.

[15] Aqueous waste will not be fed to the SCC because the 12-month average Aqueous Waste Feedrate to SCC is inconsequential.

[16] The spiking rate of arsenic will be 0.5 lb/hr. The feedrate of arsenic during the test will include the spiking rate and arsenic fed with waste streams.

[17] The spiking rate of lead will be 4.0 lb/hr. The feedrate of lead during the test will include the spiking rate and lead fed with waste streams.

[18] The spiking rate of mercury will be 0.01 lb/hr. The feedrate of mercury during the test will include the spiking rate and mercury fed with waste streams.

[19] Demonstration of the 12-month average feedrate will be according to volatility as Group 3 - volatile, Group 2 - semivolatile, and Group 1 - low-volatile from the EPA document “Risk Burn Guidance for Hazardous Waste Combustion Facilities”.

[20] Table V.H.2. of Permit No. 50212.

[21] Table V.H.3 of Permit No. 50212.

* 1,2 dichlorobenzene will be used as a surrogate for PCBs during the Test.

4.4 Waste Feed Spiking

During the Test, the 12-month average feedrate of total chlorine/chloride will be achieved by feeding waste streams containing chlorine. Ash will not be spiked during the Test. There is a limit in Table V.H.3. of the RCRA permit for “Ash to Afterburner”. “Ash to Afterburner” is not an operating target for the Test because it is considered that the limit for “Ash to Afterburner” is a legacy of previous permitting of the incinerator. Under the HWC MACT, there is no OPL for the feedrate of ash to the incinerator. An Alternative Monitoring Application (AMA) was approved by TCEQ on October 20, 2005 stating “Onyx (now Veolia) has provided sufficient documentation that neither the ash feedrate limit nor an alternative operating parameter limit is needed to ensure compliance with the emission standard for particulate matter”. The particulate matter standard of the HWC MACT is more stringent (i.e., lower) than the RCRA particulate matter standard. It is likely however that ash will be fed to the Afterburner (SCC) in the waste liquid(s) fed to the Afterburner during the test. The ash content of waste streams will be determined during the test, and the feedrate of ash to the Afterburner will be determined.

Veolia will use 1,2-dichlorobenzene as a surrogate for PCBs to spike the liquid waste feed stream entering the Kiln and SCC and the solid waste feed stream entering the Kiln. As the new PCB total waste feed target is 1,400 pounds PCBs per hour, it is anticipated that 1,120 pounds per hour of 1,2-dichlorobenzene will be spiked to the Kiln and 280 pounds per hour of 1,2-dichlorobenzene will be spiked to the SCC.

Veolia’s RCRA permit (in Tables V.H.3. and V.H.4.) includes feedrate limits and emission limits for 13 metals, and an emission limit for hexavalent chromium. During the Test, the incinerator will be operated with normal “as received” waste streams. It is possible that available waste streams cannot be identified and obtained to allow the incinerator to be operated within the range of the allowable limit and the 12-month averages of the metals feedrates, and achieve at a minimum the 12-month average feedrate of metals. To achieve a minimum of the 12-month average for the feedrate of the metals, metals will be spiked into waste feedstreams to the incinerator to demonstrate the feedrate limits of the metals in the RCRA permit. Due to the thermal similarity of many of the metals and for safety and health reasons, Veolia has determined that it is not necessary to spike all 13 metals. Three (3) metals will be spiked during the RCRA Periodic Test: Mercury, Lead, and Arsenic.

Mercury will be spiked into the kiln of the incineration system as a liquid. Lead and arsenic will be spiked into the rotary kiln as solid oxides, added in pre-weighed packets attached to, or in, solid waste (i.e., drums) fed to the kiln. Metals spiking rates are presented in **Table 4-2**, and target feedrates of each of the waste streams to the incinerator, and the metals spiking rates, are presented in **Table 4-1**.

Table 4-2. Metals Spiking Rates

Constituent or Parameter	RCRA Permit Feedrate Limit All Feedstreams	RCRA Permit Feedrate Limit Pumpable Feedstreams	RCRA Permit Emission Limit	12-Month Average Feedrate	Spiking Rate	
	(lb/hr)[1]	(lb/hr)[2]	(lb/hr)[3]	(lb/hr)	(lb/hr)	
Group 3	Mercury	0.101[4] 0.0417[5]	0.101[4] 0.0417[5]	0.0191	0.007	0.01
Group 2a	Arsenic	4.82 [5] 4.82 [4]	4.82[5] 0.26[4]	0.0271	0.35	0.5
	Cadmium	21.3	21.6	0.0421	0.21	
	Selenium	175	175	0.532	0.87	
Group 2b	Antimony	150	150	2.10	0.87	
	Lead	156.74	156.74	1.06	0.76	4.0
	Thallium	75	75	0.423	0.38	
	Zinc	7,170	7,170	21.5	15.7	
Group 1	Barium	65.6	57.5	2.09	1.07	
	Beryllium	13.2	2.7	0.00842	0.29	
	Chromium	26.7	26.5	0.0430	0.83	
	Nickel, Pumpable	131	113		0.11	
	Nickel, Solids Mode	1,042	13.7			
	Nickel			0.323		
	Silver	19	19	0.0419	0.52	

[1] From Table V.H.3. of RCRA Permit 50212 for “All Feedstreams”.

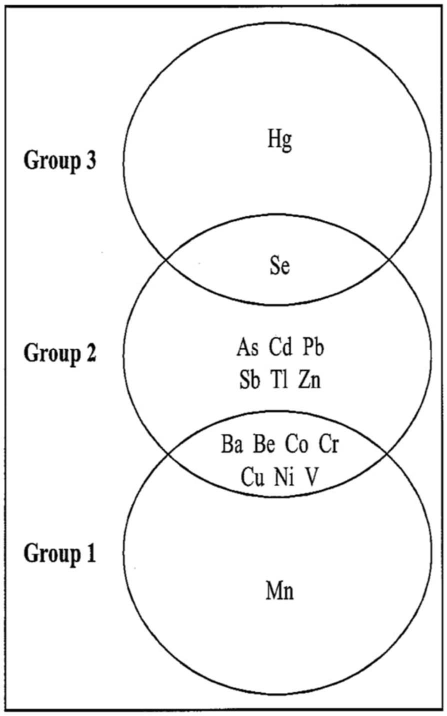
[2] From Table V.H.3. of RCRA Permit 50212 for “Pumpable Feedstreams”.

[3] From Table V.H.4. from RCRA Permit 50212.

[4] Feedrate when using proprietary technology to control mercury emissions.

[5] Feedrate when not using proprietary technology to control mercury emissions.

The spiking rates of the three metals that will be spiked will be more than the 12-month average feedrate of that metal, but less than permitted feedrate limits. The three metals that will be spiked will serve as surrogates, for the other ten (10) metals. Justification to only spike three (3) of the 13 permitted metals is taken from the EPA document “Risk Burn Guidance for Hazardous Waste Combustion Facilities”. Based on the Risk Burn Guidance document (in Chapter 6 Metal Emissions), metals can be grouped according to their volatility as Group 3 - volatile, Group 2 - semivolatile, and Group 1 - low-volatile. Figure 6-2 of the Risk Burn Guidance presents groupings of metals among these three groups. While silver, one of the 13 metals in the RCRA permit, is not included in this figure, the text in Chapter 6 of the Risk Burn Guidance document states that silver “would likely be classified as a low-volatile metal”. **Figure 4-1** presents the metal groupings, based on volatility, taken from *Risk Burn Guidance for Hazardous Waste Combustion Facilities*. Mercury will be spiked as the Group 3 – volatile metal; lead will be spiked as Group 2 – semivolatile metal; and arsenic will be spiked as the Group 1 - low-volatile metal. Mercury is regulated as a volatile metal under the HWC MACT; lead is regulated as a semivolatile metal under the HWC MACT, and arsenic is regulated as a low-volatile metal under the HWC MACT.



Reproduced from Clark and Sloss (1992)

Risk Burn Guidance for
Hazardous Waste Combustion Facilities
July 2001
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Figure 4-1. Metal Volatility Groups

Table 4-2 presents the metals of the RCRA permit; the RCRA allowable feedrate of that metal; the RCRA allowable emission rate of that metal; and the metals spiking rates. There is one metal to be spiked for Group 3 – volatile, one metal to be spiked for Group 2 – semivolatile, and one metal to be spiked for Group 1 - low-volatile. Spiking rates are greater than, the 12-month average feedrate of the spiked metal, and less than the allowable limit for any of the individual metals of the group of metals – grouped as Group 3 - volatile, Group 2 - semivolatile, or Group 1 - low-volatile. The emission rates of all of the 13 metals, and hexavalent chromium, will be measured during the Test.

Arsenic and lead will be spiked as solids (arsenic oxide and lead oxide) with a nonpumpable waste stream (i.e., drums) fed to the kiln. Mercury will be spiked into the kiln of the incineration system as a liquid. The water-soluble mercury spiking compound will be $Hg(NO_3)_2$.

The liquid spiking system consists of a variable-stroke pump, a calibrated weigh scale, a mass flow meter, and a PC-based injection rate control and data acquisition system. A 55-gallon steel drum of the liquid spiking material is placed on the weigh scale and connected with flexible suction hose to a skid-mounted metering pump and the mass flow meter. At the skid, the liquid spiking material flows through the pump and the mass flow meter, and into a flexible delivery hose, which is connected to the waste feed line. Spiking rate will be adjusted by modulating stroke on the variable-stroke pump.

Spiking rate is measured and reported using weight measured over time of the weigh scale on which the drum of spiking material is located. The accuracy of the weigh scale is demonstrated using NIST-traceable standards. The weigh scale will be used as the official spiking rate measurement device. The mass flow meter provides a direct measurement of flowrate, and will be used to set the spiking rate.

The spiking system will be manned by trained personnel at all times in order to shut down the spiking equipment in the event of a waste feed cutoff as well as monitor the continuing operation of the spiking system.

Lead (Pb) and arsenic (As) will be spiked as solids to the rotary kiln. Drums will be fed to the rotary kiln during the test, and will contribute to the feedrate of nonpumpable (solid) wastes. The target feedrate of drums is 25 drums per hour. Arsenic and lead will be spiked as oxides of the respective metals as PbO and As_2O_3. Pre-weighed packets containing the lead oxide and arsenic oxide will be attached to, and fed with, each drum fed to the rotary kiln.

Spiking of mercury into a waste stream to the kiln, and preparation of the solid spiking materials packets, will be performed by Superior Spiking Industries of Pasadena, TX.

4.5 System Operation to Achieve Steady-state Conditions

The incinerator should operate under the targeted conditions until a steady-state condition has been achieved. For the CfPT/RCRA Periodic Test, sampling will not be initiated without the following conditions being met:

- The set point of any operating parameter will not be modified for a period of 30 minutes; and
- The waste feedrates will not have changed more than 5% for a period of 15 minutes.

As presented in Section 4.9 of the Test Plan, the residence time of solids in the kiln can range from 15.5 minutes to 155 minutes, based on kiln rotational speeds ranging from 0.3 to 3 rpm. Normally, the kiln rotational speed is nominally 0.5 rpm, and at this rotational speed the solids residence time is 93 minutes.

The water treatment system of the incinerator at Port Arthur is linked among the quench, the absorbers, the IWS, and the WESP. Water losses from the system are due to evaporation of water into the flue gas, and blowdown (to the deepwell). Fresh water is fed to the system into the WESP and IWS. As the absorbers require water, they draw water from the IWS, and as the quench requires water, it draws water from the absorbers. Each of these systems includes its own recirculation circuit. Based on the water volumes of the quench, absorbers, and IWS and the water flowrates of these three systems, the respective water residence times are 3.2 minutes, 9.3 minutes, and 0.6 minutes. The residence time of water in the WESP is even less.

Mercury, spiked as a liquid into the kiln, vaporizes almost immediately on being exposed to the elevated temperatures of the SCC. The residence times of gases in the kiln and SCC are on the order of seconds, therefore metals spiked as liquids into the kiln or SCC will proceed in the gas phase to the water system of the incinerator within seconds of being injected (i.e., spiked).

For a well-mixed system, 95% of equilibrium is achieved with three (3) residence times. The absorbers have the largest water residence time of any of the four water circuits of the water treatment system of the incinerator. 95% of equilibrium of the water of the absorbers is achieved within 27.9 minutes (i.e., 3 times 9.3 minutes). Therefore, metals should be fed at their maximum rates for at least this amount of time before starting sampling.

Arsenic and lead spiked as solids (arsenic oxide and lead oxide) will be spiked into the rotary kiln approximately 45 to 60 minutes before the start of testing. Mercury spiked into the kiln of the incinerator as a liquid will be fed for 30 minutes before sampling is started.

4.6 Test Schedule

The schedule for the CfPT/RCRA Periodic Test is based upon the approval of the test plan and QAPjP. **Table 4-3** presents the tentative schedule for the test.

Table 4-3. Tentative Schedule for the CfPT and Periodic RCRA and PCB DRE Test

Activity	Schedule
1. Submit Test Plan, CMS PETP, and QAPjP	September 30, 2024
2. Submit revised Test Plan, CMS PETP, and QAPjP, as needed	November 30, 2024
3. Contact TCEQ/EPA Offices for Pretest Meeting	60 Days Prior to Test
4. Submit Notification of Intent to Conduct the Test	60 Days Prior to Test
5. Issue Public Notice and Make Test Plan Available to the Public	60 Days Prior to Test
6. Pretest Meeting with TCEQ Regional Office	30 – 60 Days Prior to Test
7. Begin Mobilization for Test	30 Days Prior to Test
8. Approval of Test Plan and QAPjP	30 Days Prior to Test
9. Conduct pre-Test CO/O_2 CEMS RATA	Week of March 31, 2025
9. Conduct Test	Week of April 14, 2025
10. Submit Results of Test	Within 90 Days of Completion of CfPT/RCRA Periodic Test
11. Submit Notification of Compliance	Within 90 Days of Completion of CfPT/RCRA Periodic Test

4.6.1 Planned Test Dates

The Test is expected to begin with a CO/O_2 CEMS RATA performed beginning the week of March 31, 2025 with compliance emissions testing performed during the week of April 14, 2025.

4.6.2 Duration of Each Test

The Test will be conducted under a single test condition comprised of three replicate sampling runs. The three (3) runs of the Test are scheduled to be completed over three days, with approximately four hours of stack gas sampling for each run conducted one run per day. A day for setup and a day for demobilization/contingency have also been scheduled during the emissions compliance test week. Pre-Test RATAs of the CEMS (CO and O_2) monitoring system on the stack will be performed prior to the Test.

4.6.3 Detailed Schedule of Planned Test Activities

The three (3) runs of the Test are scheduled to be completed over three days, with approximately four hours of stack gas sampling for each run during each day. Additionally, a day for setup and a day for demobilization/contingency have been scheduled. RATAs of the CO and O_2 CEMS on the stack will be performed within 60 days prior to initiation of the Test.

On the first day of the Test, tentatively scheduled for March 31, 2025 the mobile lab will be sited, instrumentation needed to conduct the RATAs will be setup and checked to begin the RATA and the pre-Test RATAs of the CEMS (CO and O_2) system on the stack will be performed. On the second day the pre-Test RATAs of the CEMS (CO and O2) systems will be finished, if not completed on the first day. On the third day of the test, tentatively scheduled for April 14, 2025 the first performance sampling run of the emissions test will be performed. Preparation and sampling activities for the first run will require about two hours with about one hour required to bring the incinerator to steady-state operations followed by four hours to complete sampling. Then the samples from the first run will be recovered and preparations for the sampling of the second run the next day will take place. Sampling for the second run will require about the same schedule as on the first test day. Unit operations for the first run on the fourth day of the test should be completed in about 5-6 hours. On the fifth day of the test, preparation and sampling activities for the first run of the day – the second run of the test - will require about five hours with about one hour required to bring the incinerator to steady-state operations followed by four hours to complete sampling. Unit operations for the fifth day of the test should be completed in about 5-6 hours. The schedule to perform the third test run on the sixth day will follow the same pattern.

The planned daily activities for the CfPT/RCRA Periodic Test are as follows:

- Day 1 – RATA sampling team will mobilize to site and setup/checkout CEMS RATA equipment. Coordination meeting will be conducted. Test RATAs of the CEMS (CO and O_2) monitoring system on the stack will begin.
- Day 2 – RATAs on the stack will be finished if not completed on the previous day.
- Day 3 – The Test team will mobilize to site and setup/checkout emissions performance test equipment. Coordination meeting will be conducted.
- Day 4 – The unit will be brought to the desired steady-state operating conditions while the sampling team completes preparations for conducting the first run. When all preparations are complete, sampling will begin and will continue, with only short interruptions for port changes and leak checks, until the first run is complete.
- Day 5 – The 2nd test run of the Test will be performed as for the previous run.
- Day 6 – The third test run of the Test will be performed as for the previous run.
- Day 7 – Equipment will be demobilized.

The schedule for the Test is shown in more detail in **Table 4-4**.

Table 4-4. Daily Schedule for the CfPT and Periodic RCRA and PCB DRE Test

Day	Start	Stop	Activity
1	8:00	17:00	On-Site Mobilization of RATA test crew and equipment. Begin RATAs of the CO and O_2 CEMS monitoring system.
2	8:00	17:00	Complete RATAs if not completed on previous day, then demobilize equipment and crew for a number of weeks
3	8:00	17:00	On-Site Mobilization of full compliance test crew and test equipment
4	7:00	8:00	Incinerator Line Out
	7:30	9:00	Begin Spiking
	9:00	14:00	Run 1
		17:00	Complete Sample Recovery
5	7:00	8:00	Incinerator Line Out
	7:30	9:00	Begin Spiking
	9:00	14:00	Run 2
		17:00	Complete Sample Recovery
6	7:00	8:00	Incinerator Line Out
	7:30	9:00	Begin Spiking
	9:00	14:00	Run 3
		17:00	Complete Sample Recovery
7	8:00	17:00	Pack and Ship Samples, Demobilize from Plant

5. Sampling and Monitoring Procedures

The performance of Veolia's incinerator will be demonstrated during the Test at one operating condition that is described in detail in the Test Plan. During the test, stack gas and waste feeds will be sampled from locations detailed in **Table 5-1**. **Table 5-2** presents the parameters that will be measured during the Test. **Table 5-3** summarizes the sampling methods, compositing approach, and analytical parameters for the emission test (i.e., the sampling and analytical matrix). **Table 5-4** summarizes the emissions sampling specifications (i.e., minimum sample volume and duration).

In addition to the collection of emission samples, plant instrumentation will be used to continuously monitor several stack gas parameters, process parameters, and control equipment operating parameters. A listing of monitored process parameters that must be reported is included in the Test Plan in **Table 4-1**.

Table 5-1. Sampling Locations

Stream	Sample Point	Location
Stack Gases	Ports	Stack
Energetic Liquids and Sludges to the Rotary Kiln	Sample Tap	Pump Discharge/Sample Tap
Energetic Liquids to the SCC	Sample Tap	Pump Discharge/Sample Tap
Aqueous Waste to the Rotary Kiln	Sample Tap	Pump Discharge/Sample Tap
Solid Wastes to the Rotary Kiln	Scoop	BMHB Mixing Pit; or 10% of Drums

Table **5-2.** Sampling Frequency for the **CfPT and Periodic RCRA and PCB DRE Test**

Stream/Parameter	Sampling Method	Frequency
Stack Gas		
Dioxins/Furans/PCB	SW-846 Method 0023A	3
Total Chlorinated Organics (RCl)	SW-846 Methods 0030 and 0023A	3
Particulate Matter HCl/Cl_2	EPA Methods 5 and 26A	3
Metals [1]	EPA Method 29	3
Chromium VI	SW-846 Method 0061	3
Moisture	EPA Method 4	3
Oxygen Carbon Dioxide	EPA Method 3A	3
Carbon Monoxide Oxygen [2]	Plant Instrumentation	3
Spiking Materials		
Liquids	Tap (Method S004)	3
Solids	Grab	

Stream/Parameter	Sampling Method	Frequency
Waste Feeds		
Ash Chlorine Moisture Heating Value Viscosity [3] Density [3] PCB Metals [1]	Solids: Scoop (Method S007) Liquids: Tap (Method S004)	3 for each waste stream

[1] Metals include arsenic, beryllium, cadmium, chromium, antimony, barium, lead, mercury, nickel, selenium, silver, thallium and zinc.

[2] CO and O_2 will be monitored by plant instrumentation, and reported as CO corrected to 7% O_2.

[3] Solid waste feed will not be analyzed for viscosity and density.

Table 5-3. Sampling Methods

Stream	Sampling Method	Sampling Frequency	Compositing Approach	Analytical Parameters
Waste Feeds	Liquids: Tap (Method S004)	Sub-sample collected every 30 minutes Prepare a composite for each sample run	100 mLs	Ash Chlorine Moisture Heating Value Viscosity Density PCB Metals [1]
	Solids: Scoop (Method S007)	Sub-sample collected at beginning and end of each run. Prepare a composite for each sample run If drummed solids are used, sub-samples collected during drum preparation. Prepare a composite based on drums used in each run.	100 grams	Ash Chlorine Moisture Heating Value PCB Metals [1]
Spiking Materials	Liquids: Tap (S004)	Beginning and end of each test period		Archive
	Solids: Grab	Each test period		Archive
Stack Gas	EPA Method 2	Concurrent with isokinetic sampling	NR	Flowrate
	EPA Method 3A	Continuous	NR	O_2, CO_2
	EPA Method 4	Concurrent with isokinetic sampling	NR	Moisture
	EPA Method 5 EPA Method 26A	2+ hour collected isokinetically	NR	PM HCl/Cl_2
	EPA Method 29	2+ hour collected isokinetically	NR	Metals [1]
	SW-846 Method 0061	2+ hour collected isokinetically	NR	Chromium VI
	SW-846 Method 0023A	3+ hour collected isokinetically	NR	Dioxins/Furans
	SW-846 Method 0023A	≥3 hours collected isokinetically	≥3.0 dscm (106 dscf)	Polychlorinated Biphenyls
	SW-846 Method 0023A	≥3 hours collected isokinetically	≥3.0 dscm (106 dscf)	Semi-volatile chlorinated organics*
	SW-846 Method 0030	20 min samples collected at 1 L/min non-isokinetically	NR	Volatile chlorinated organics*

Plant CEMS	Continuous	NR	CO, O_2

[1] Metals include arsenic, beryllium, cadmium, chromium, antimony, barium, lead, mercury, nickel, selenium, silver, thallium and zinc.

NR = Not Required

*Total chlorinated organic compounds (RCl) is the sum of volatile and semi-volatile chlorinated organics.

Table 5-4. Emissions Sampling Specifications

Parameter	Sampling Method	Minimum Sample Size	Minimum Sampling Duration
Particulate Matter, HCl and Cl_2	EPA Methods 5 and 26A	1.7 dscm (60 dscf)	2 hours
Metals [1]	EPA Method 29	1.7 dscm (60 dscf)	2 hours
Chromium VI	SW-846 Method 0061	45 dscf	2 hours
Dioxins/Furans	SW-846 Method 0023A	2.5 dscm (88 dscf)	3 hours
Polychlorinated Biphenyls	SW-846 Method 0023A	≥3.0 dscm (106 dscf)	3 hours
Volatile chlorinated organics	SW-846 Method 0030	20L	20 min collected at 1 L/min
Semi-volatile chlorinated organics	SW-846 Method 0023A	≥3.0 dscm (106 dscf	3 hours
CO, O_2	Plant CEMS Certified per 40 CFR 60, App. B PS 4B	N/A[2]	Sampled over entire test run
Flowrate	40 CFR 60, Appendix A, Method 1, 2	N/A	With all isokinetic methods
CO_2, O_2	EPA Method 3A	N/A	Sampled over entire test run
Moisture	40 CFR 60, Appendix A, Method 4	N/A	With all isokinetic methods

1 Metals include arsenic, beryllium, cadmium, chromium, antimony, barium, lead, mercury, nickel, selenium, sliver, thallium and zinc.

2 N/A – Not Applicable

5.1 Method Modifications

A number of sampling and analytical method deviations were proposed and approved for use during the Comprehensive Performance Test of the incinerator performed in November/ December 2011. The requested sampling and analytical method deviations are practices that are routinely followed and are incorporated into the approved SOPs at AECOM and at the NELAC certified laboratory (Eurofins TestAmerica Knoxville). EPA commented on and disapproved a number of the requested method modifications, and in response, Eurofins TestAmerica Knoxville provided a response to EPA's comments or withdrew its request for those method modifications disapproved by EPA. The method modifications were re-submitted to EPA prior to the conduct of the 2011 CPT.

Table 5-5 presents the requested method modifications for this test effort; EPA's approval or disapproval of the originally requested method modification; and Eurofins Test America Knoxville's position regarding the method modifications. These were submitted to EPA Region 6 in a QAPjP dated November 8, 2011. EPA approved these method modifications and responses prior to the conduct of the 2011 CPT.

Table 5-5. Method Modifications

Modification	Justification	Proposed Category	Category Determination	Approved/ Disapproved
II. Metals Sampling Modifications – EPA METHOD 29				
3. A Teflon® transfer line will be used between the filter and the first impinger of the sampling train.	This is done to address space limitations on the stack, to allow for ease in probe moving and to minimize potential hazards moving the very large and heavy impinger box. Additional Information The use of a sample transfer line is authorized/discussed in EPA Method 26A, EPA Method 23 and SW-846 Method 0023A. Method 26A states that if a "flexible" line is used (i.e., a transfer line) it must be rinsed into the first impinger. Methods 23 and 0023A state that the transfer line must be Teflon®, and must be heated. The sample transfer lines for EPA Methods 5/26A and 29 will not be heated. The sample lines will be recovered in the fashions prescribed in the methods for the back-half of the filter holder into the container for the first impinger.	Minor	Minor	**3. Previously Approved**
III. Metals Analysis Modifications – KNOX-MT-0006 based on EPA METHOD 29				
5. The digestates from each fraction will be reduced to final volumes that are lower than the volumes specified in EPA Method 29. This is done to achieve lower reporting limits. The concentrations of the reagents will be maintained at the same concentrations as stated in EPA Method 29.	This is done to achieve lower reporting limit. A lower acid volume is added to a lower final volume to keep the acid concentration constant.	Minor	Minor	**Approved**
7. Laboratory reagent water is used rather than ASTM Type II water.	The laboratory reagent water meets the ASTM criteria for electrical conductivity, but is not tested for all ASTM Type II criteria. The laboratory uses the term reagent water rather than ASTM Type II water since not all ASTM Type II criteria are evaluated. For example, the reagent water is not tested for Total Organic Carbon since this parameter is not tested for Total Organic Carbon since this parameter is not relevant to the analytical method.	Minor	Intermediate	**Approved***

Modification	Justification	Proposed Category	Category Determination	Approved/ Disapproved
8. The initial measurement of impinger samples from nitric acid/hydrogen peroxide can be made by weighing to ± 0.5 grams or measuring volume to ± 2.5 mL (± 5 mL for large volume samples).	This information is not used by the laboratory to calculate sample results and is recorded on the laboratory benchmark and provided to the client for information only.	Minor	Minor	Approved
9. The samples are not analyzed in duplicate. Instrument and method precision are measured by analyzing the LCS/LCSD.	Eurofins TestAmerica Knoxville does not require the reporting of separate duplicate analyses for mercury as specified in Section 9.2.3 of EPA Method 29. Method 29 was written allowing the use of an Atomic Absorption Spectrometer with a CVAAS attachment using a BOD bottle for sample analysis. The reference to this older style instrumentation may have required the duplicate analysis of mercury samples due to the use of BOD bottles for sample preparation and analysis. The use of automated instrumentation used for mercury analysis is referenced in section 11.1.3. Note 2. It states that “Optionally, Hg can be analyzed by using the CVAAS analysis procedures given by some instrument manufacturer’s directions. Upon completion of the digestion described in (1), analyze the sample according to the instrument manufacturer’s directions. This approach allows multiple (including duplicate) automated analyses of a digested sample aliquot.” The use of automated instrumentation allows for multiple automated analyses and processes the results of multiple readings for each sample to provide a final averaged result for mercury. For example, during a ten second period, the instrument takes a reading every 0.1 second for a total of 100 replicate measurements. The average of these replicate readings is used to determine the absorbance and resulting sample concentration. Test America Knoxville provides relevant mercury precision data for the method by performing one of the following depending on the train fraction: LCS/LCSD, MS/MSD or PDS/PDSD.	Minor	Minor	**Approved**

Modification	Justification	Proposed Category	Category Determination	Approved/ Disapproved
10. Boric acid is added after the HF microwave digestion of the front-half samples. Hydrofluoric acid is sequestered by the addition of boric acid, protecting glassware and instrumentation.	Hydrofluoric acid is sequestered by the addition of boric acid, protecting glassware and instrumentation. Do you have any data showing that the Boric acid addition does not negatively impact the metals analysis? Yes, We have MDL data and Demonstration of capability data.	Minor	Intermediate	**Approved***
11. The aliquot for mercury analysis of the nitric acid/hydrogen peroxide impingers is taken from the sample after it is reduced in volume to 100 mL. This is done to provide lower reporting limits.	This is done to provide lower reporting limit for mercury by taking an aliquot after sample concentration.	Minor	Minor	Approved
IV. Metals Analysis Modifications – KNOX-MT-0007 based on SW-846 METHOD 6010B				
12. Mixed calibration standard solutions are purchased from approved vendors.	For ICP Atomic Emission Spectroscopy, a vendor prepared mixed standard containing the analytes of interest is used to calibrate the instrument rather than using individual solutions of the elements.	Minor	Minor	**Approved**
13. SW-846 Method 6010B states that if the correction routine is operating properly, the determined apparent analyte(s) concentration from analysis of each interference solution should fall within a specific concentration range around the calibration blank. In determining inter-element correction factors, the laboratory uses the procedure in EPA CSP ILMO4.0.	In determining IEC's, because lack of definition in Method 6010B, the laboratory has adopted the procedure in EPA CLP ILM4.0 for the "concentration range around the calibration blank."	Minor	Intermediate	**Approved**
14. ICSA (interference check sample A) results from the non-interfering elements must fall within ± 1 RL from zero. If this is not achieved, the field sample data must be evaluated.	This is a clarification of the criteria used by the laboratory since it is not specified in the reference method.	Minor	Intermediate	**Approved**

Modification	Justification	Proposed Category	Category Determination	Approved/ Disapproved
15. The calibration blank is prepared in 5% nitric acid and 5% hydrochloric acid, rather than 2% nitric acid and 10% hydrochloric acid.	The matrix used by the laboratory provides for improved performance relative to the wide variety of digestate acid matrices which result from the various EPA preparation protocols applied.	Minor	Intermediate	**Approved**
16. Method blanks are considered acceptable if they are below the reporting limit, rather than the method detection limit.	Method 6010B does not list air as one of the applicable matrices although Method 29 references 6010. The method blank criteria have been set to support the reporting limits provided for the air matrix and is qualified to the laboratory MDL.	Minor	Intermediate	**Approved**
	XI. PM and HCl/Cl_2 Sampling Modifications			
3. A Teflon® transfer line will be used between the filter and the first impinger of the sampling train.	This is done to address space limitations on the stack, to allow for ease in probe moving and to minimize potential hazards moving the very large and heavy impinger box. Additional Information The use of a sample transfer line is authorized/discussed in EPA Method 26A, EPA Method 23 and SW-846 Method 0023A. Method 26A states that if a “flexible” line is used (i.e., a transfer line) it must be rinsed into the first impinger. Methods 23 and 0023A state that the transfer line must be Teflon®, and must be heated. The sample transfer lines for EPA Methods 5/26A and 29 will not be heated. The sample lines will be recovered in the fashions prescribed in the methods for the back-half of the filter holder into the container for the first impinger.	Minor	Minor	**Approved**

XIII. Dioxins/Furans Analysis Method Modifications – SW-846 METHOD 0023A/8290A
(Eurofins TestAmerica Laboratories, Inc. Knoxville)

Modification	Justification	Proposed Category	Category Determination	Approved/ Disapproved
48. 8290A – Toluene volumes and cycle rates for Soxhlet extractors have been optimized for the specific size of glassware used.		Minor	Minor	**Conditionally Approved** The cycle time requirement in the Method must be met.

Eurofins TestAmerica Knoxville Response:
Section 7.3.5 of Method 0023A states the following: "Sample extraction - Place the thimble in the extractor and add the toluene contained in the beaker to the

Modification	Justification	Proposed Category	Category Determination	Approved/ Disapproved
solvent reservoir. Pour additional toluene to fill the reservoir approximately two-thirds full. Add Teflon® boiling chips and assemble the apparatus. Adjust the heat source to cause the extractor to cycle three times per hour. Extract the sample for 16 hours." Eurofins TestAmerica Knoxville's procedure provides for a cycling time of 4 to 5 times per hour which meets the method requirement.				
49a. 8290A - The carbon column used in this procedure is based on the column specified in method 8280. Silica gel is used as the carbon column support instead of Celite 545® as specified in methods 8290A and 1613B. It has been determined that silica gel is less likely to contain contaminants and interferences which are not removed by the pre-cleaning procedures than Celite 545®, yet it performs similarly. The solvents and elution schemes used are as specified in method 8280 rather than 8290A and 1613B.		Minor	Intermediate	**Conditionally Approved** The laboratory must meet the recovery criteria for samples cleaned with this mixture. (34. Previously Approved* Method 8290A – URS Table)

Modification	Justification	Proposed Category	Category Determination	Approved/ Disapproved
Eurofins TestAmerica Knoxville Response: We agree.				
51. 8290A - Disposable glassware (40 mL VOA vials) is used in the acid-base cleanup procedure instead of a separatory funnels. Reagent volumes are adjusted as appropriate for the size of the vials.	Modifications have been made to reduce sample cross contamination and/or reduce preparation related waste.	Minor	Minor Recategorized Intermediate	**Conditionally Approved** Provided that care is taken to ensure that the removal of aqueous wash layers is performed in a way that avoids loss of the extraction solvent and associated sample. In particular, the glass pipette used to remove the bottom layer should be rinsed with fresh solvent after the final aqueous layer removal to ensure sample adsorbed to the surface of the pipette is recovered and returned to the sample solution.
Eurofins TestAmerica Knoxville Response: We agree. We will rinse the pipet.				
53. 8290A - The Window Defining Standard and Isomer Specificity Standard are combined with the Continuing Calibration CS3 Standard into one solution.		Minor	Minor Recategorized Intermediate	Conditionally Approved Provided that the standard is used at the required steps to either calibrate the analytical system (Calibration point 3) or evaluate the GC Column Performance subsequent to initial calibration. The individual concentration of unlabeled or labeled standards in this solution must not exceed 100 ng/mL within analytical error.

Modification	Justification	Proposed Category	Category Determination	Approved/ Disapproved

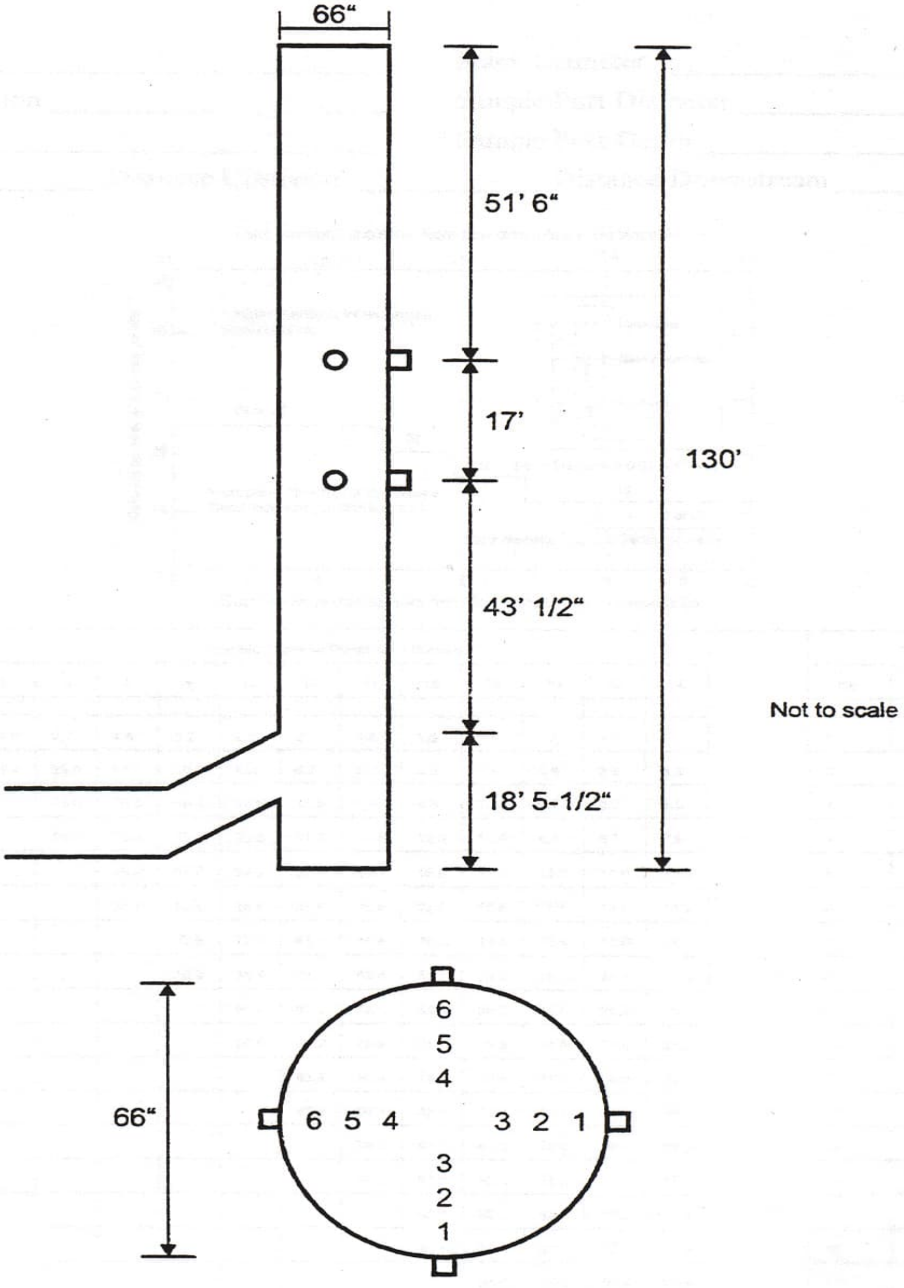
Eurofins TestAmerica Knoxville Response:
Eurofins TestAmerica Knoxville analyzes the Calibration Verification (CS3) and GC Column performance standard at the frequency defined in the reference method and at a concentration at or below that required by the reference method (i.e., all are less than 100 ng/mL with the exception of $^{13}C_{12}$-OCDD which is at 200 ng/mL).

5.2 Stack Gas Sampling Procedures

Stack gas samples will be collected from ports located on the stack, which has an inner diameter of 5.5 feet (66 inches). There are two sets of two orthogonal ports located at two different levels. Level 1 is 43 feet downstream of the closest upstream disturbance (i.e., 7.8 stack diameters), and 68 feet 6 inches upstream of the stack discharge point (i.e., almost 12 ½ stack diameters). Level 2 is 60 feet downstream of the closest upstream disturbance (i.e., 10.9 stack diameters), and 51 feet 6 inches upstream of the stack discharge point (i.e., 9.4 stack diameters). Per EPA Method 1, isokinetic sampling must be performed at 12 traverse points at Level 1 and at 8 traverse points at Level 2. To be consistent, isokinetic sampling is conducted using the more conservative 12 traverse points at both stack sampling levels. The configuration of the stack sampling ports and the locations of the 12 traverse points are shown in **Figure 5-1**.

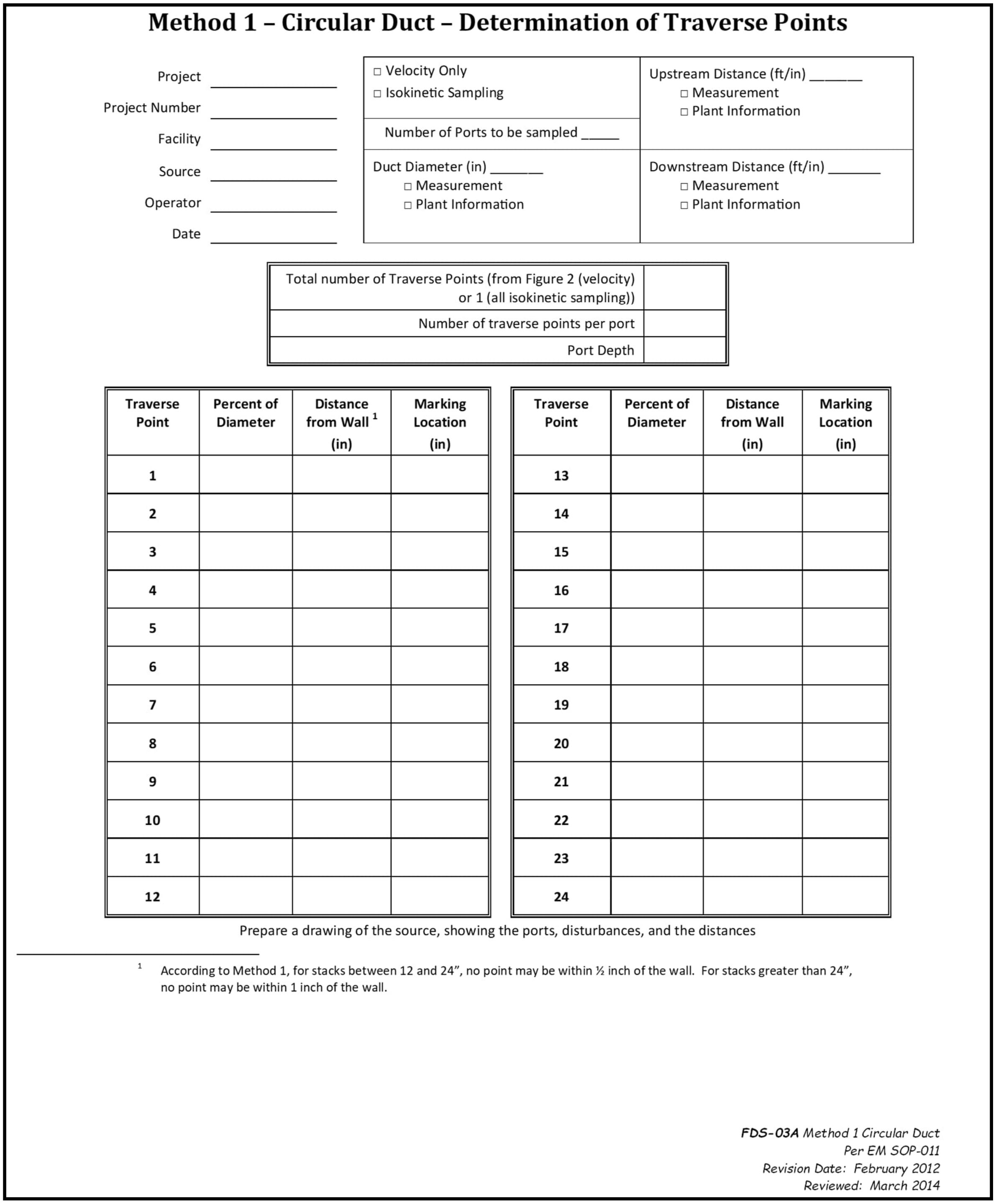
Prior to the collection of any stack gas samples, the stack will be measured, and traverse points verified, per the requirements of EPA Method 1. Also, the absence of cyclonic flow will be verified by performing a cyclonic flow check of both stack traverse diameters. The Method 1 measurement will be documented on the data sheet presented as **Figure 5-2**.

During the isokinetic sampling trains velocity, flowrate, and moisture will be determined according to EPA Methods 2, 3A, and 4. During the collection of each isokinetic sampling train, differential pressure measurements across a Type-S pitot tube will be recorded to determine the isokinetic sampling rate (EPA Method 2). These data will be collected on a data sheet, an example is presented as **Figure 5-3**. The pitot tube measurements, along with the stack gas composition (CO_2 and O_2 by EPA Method 3A with N_2 by difference), moisture content (EPA Method 4), and cross-sectional area of the stack, will be used to determine the volumetric flowrate of the stack gas. The moisture content of the stack gas will be determined from the total weight gain of the impingers used for each isokinetic sampling train. The SW-846 Method 0061 sampling train for chromium VI includes alkaline impingers (0.5N KOH). The alkaline impingers will collect CO_2 in addition to condensed water, positively biasing the impinger weight gains used to determine the moisture content of the stack gas. For this reason, the moisture content of the stack gas will not be measured in the SW-846 Method 0061 sampling train. The determination of the stack gas velocity and flowrate, and the isokinetic sampling rate, for the SW-846 Method 0061 sampling train will be determined using the average moisture content of the stack gas determined by the other isokinetic sampling trains.



Traverse Point No.	Percent of Diameter	Point Location from End of Port (in.)
1	4.4	2-7/8"
2	14.6	9-5/8"
3	29.6	19-1/2"
4	70.4	46-1/2"
5	85.4	56-3/8"
6	95.6	63-1/8"

Figure 5-1. Stack Schematic



Method 1 – Circular Duct – Determination of Traverse Points

Project ________________

Project Number ________________

Facility ________________

Source ________________

Operator ________________

Date ________________

☐ Velocity Only
☐ Isokinetic Sampling

Number of Ports to be sampled _____

Upstream Distance (ft/in) _______
☐ Measurement
☐ Plant Information

Duct Diameter (in) _______
☐ Measurement
☐ Plant Information

Downstream Distance (ft/in) _______
☐ Measurement
☐ Plant Information

Total number of Traverse Points (from Figure 2 (velocity) or 1 (all isokinetic sampling))	
Number of traverse points per port	
Port Depth	

Traverse Point	Percent of Diameter	Distance from Wall [1] (in)	Marking Location (in)	Traverse Point	Percent of Diameter	Distance from Wall (in)	Marking Location (in)
1				**13**			
2				**14**			
3				**15**			
4				**16**			
5				**17**			
6				**18**			
7				**19**			
8				**20**			
9				**21**			
10				**22**			
11				**23**			
12				**24**			

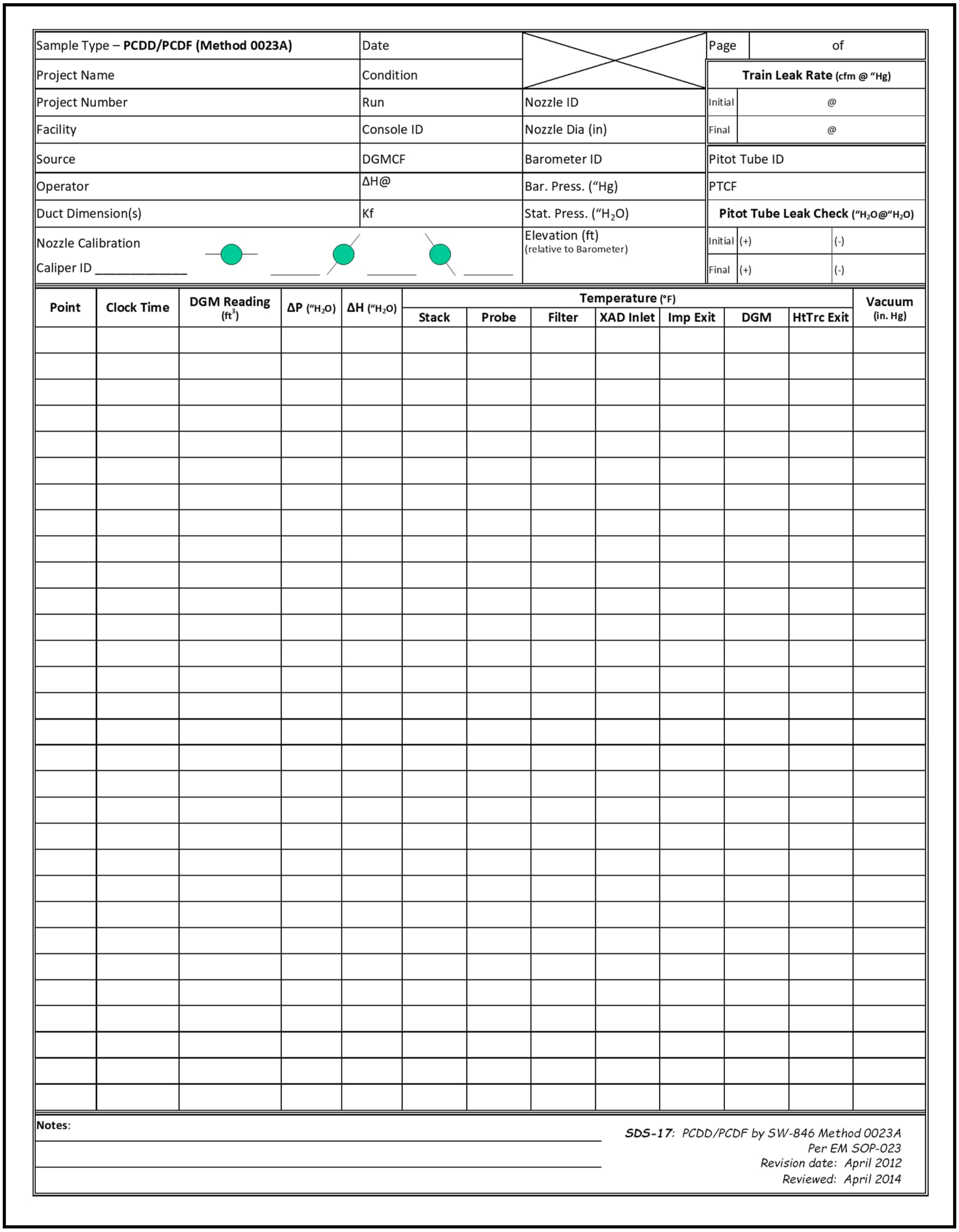
Prepare a drawing of the source, showing the ports, disturbances, and the distances

---

[1] According to Method 1, for stacks between 12 and 24”, no point may be within ½ inch of the wall. For stacks greater than 24”, no point may be within 1 inch of the wall.

***FDS-03A** Method 1 Circular Duct*
Per EM SOP-011
Revision Date: February 2012
Reviewed: March 2014

Figure 5-2. Example Traverse Point Data Sheet



Sample Type – **PCDD/PCDF (Method 0023A)**	Date		Page	of
Project Name	Condition		**Train Leak Rate** (cfm @ "Hg)	
Project Number	Run	Nozzle ID	Initial	@
Facility	Console ID	Nozzle Dia (in)	Final	@
Source	DGMCF	Barometer ID	Pitot Tube ID	
Operator	ΔH@	Bar. Press. ("Hg)	PTCF	
Duct Dimension(s)	Kf	Stat. Press. ("H_2O)	**Pitot Tube Leak Check** ("H_2O@"H_2O)	
Nozzle Calibration Caliper ID ______________ ________ ________ ________		Elevation (ft) (relative to Barometer)	Initial (+)	(-)
			Final (+)	(-)

Point	**Clock Time**	**DGM Reading** (ft^3)	**ΔP** ("H_2O)	**ΔH** ("H_2O)	**Temperature** (°F)							**Vacuum** (in. Hg)
					Stack	**Probe**	**Filter**	**XAD Inlet**	**Imp Exit**	**DGM**	**HtTrc Exit**	

Notes:

SDS-17: PCDD/PCDF by SW-846 Method 0023A
Per EM SOP-023
Revision date: April 2012
Reviewed: April 2014

Figure 5-3. Example Isokinetic Sampling Data Sheet

5.2.1 EPA Methods 2, 3A, and 4 (Flowrate, Gas Composition, and Moisture)

Concurrent with the performance of the isokinetic methods, measurements will be made to determine gas velocity in accordance with 40 CFR Part 60, Appendix A, Method 2. Moisture by EPA Method 4 will be performed in conjunction with the isokinetic sampling trains SW-846 Method 0023A, EPA Method 29, and EPA Methods 5/26A. The dry stack gas composition (CO_2, O_2, and N_2) will be determined by EPA Method 3A using continuous instrumental analyzers. Nitrogen will be determined by difference. Stack gas concentrations for dioxins and furans will be corrected to 7% oxygen using the concentration of oxygen measured by EPA Method 3A during the stack sampling for dioxins/furans.

Prior to the collection of any stack gas samples, the stack will be measured, and traverse points verified, per the requirements of EPA Method 1. Also, the absence of cyclonic flow will be verified by performing a cyclonic flow check of both stack traverse diameters.

5.2.2 EPA Method 5 (Particulate Matter) and EPA Method 26A (HCl, Cl_2)

During the Test, samples for the determination of particulate matter and HCl and Cl_2 will be collected using a single sampling train meeting the requirements of both EPA Method 5 and EPA Method 26A. Back-half, i.e., condensable, particulate matter will not be determined. A schematic diagram of this sampling train (excluding the optional impinger) is shown in **Figure 5-4**. This sample train consists of the following components:

- Glass (quartz) nozzle;
- Heated, glass (quartz)-lined probe;
- Heated Teflon mat filter with a Teflon® filter support;
- Teflon® transfer line;
- Optional empty knockout impinger;
- Greenburg-Smith impinger containing 100 mL of 0.1 N H_2SO_4;
- Greenburg-Smith impinger containing 100 mL of 0.1 N H_2SO_4;
- Modified Greenburg-Smith impinger containing 100 mL of 0.1 N NaOH;
- Modified Greenburg-Smith impinger containing 100 mL of 0.1 N NaOH; and
- Modified Greenburg-Smith impinger containing silica gel.

A minimum sampling duration and sample volume are specified in **Table 5-4**.

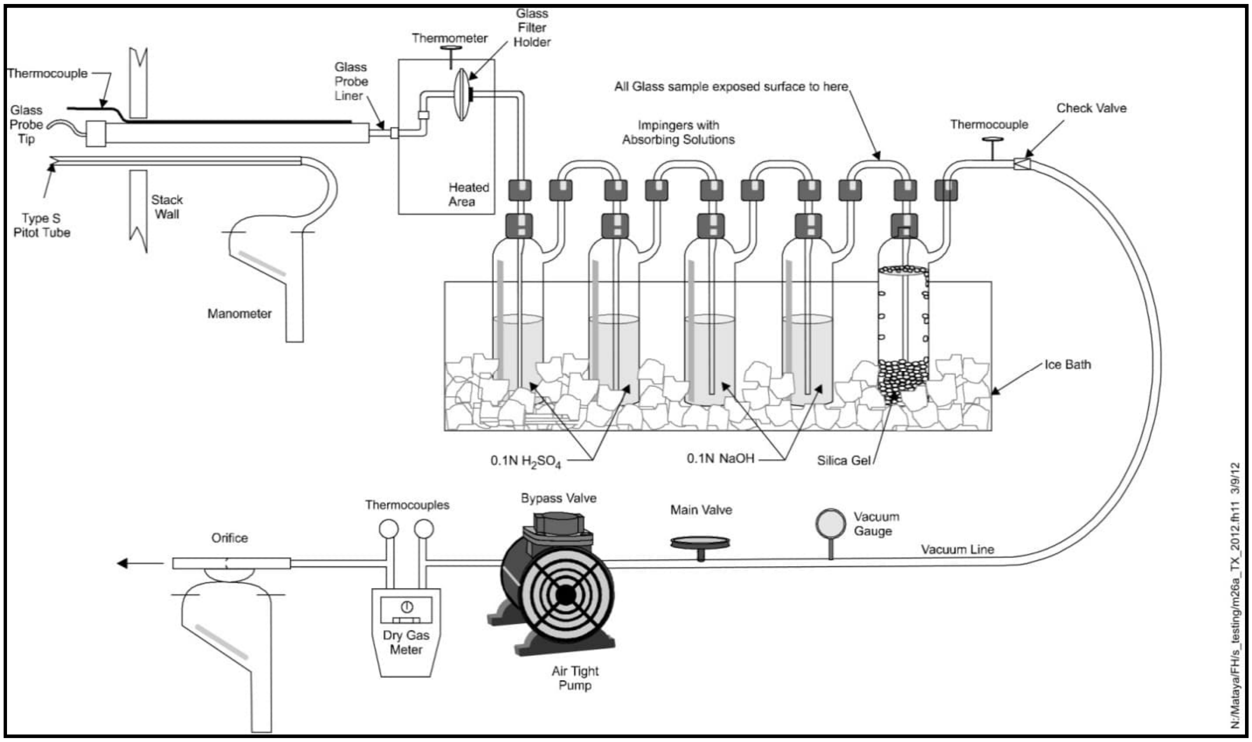


Figure 5-4. Sampling Train Schematic - PM, HCl, and Cl_2 by EPA Method 5/26A

The procedures specified in EPA Method 5 will be used to determine particulate matter. This procedure requires the isokinetic extraction of particulate matter on a filter maintained at a controlled temperature between 223 and 273ºF. However, to meet the requirements of EPA Method 26A, the filter and probe will be kept at a temperature above 248ºF, and a Teflon®-backed filter will be used. A Teflon® union will be used to connect the glass or quartz nozzle to the glass or quartz probe liner. EPA Methods 2, 3A, and 4 will be performed in conjunction with this sampling method to determine the isokinetic sampling rate. The particulate mass, which includes all material that condenses at or above the filtration temperature, is determined gravimetrically, after desiccation.

If moisture is visible on the filter at the completion of sampling, the sampling train will be purged according to Section 8.1.6 of Method 26A

A Teflon® transfer line will be used between the filter and the first impinger train. This is done to address space limitations on the stack, to allow for ease in probe moving and to minimize potential hazards moving the very large and heavy impinger box. The transfer line will be rinsed with water and combined with the contents and rinses of the acidic impingers.

After successful completion of each run, the PM, HCl and Cl_2 samples will be recovered into the following components:

- Probe and nozzle rinse with acetone for PM determination;
- Filter for PM determination;
- Rinse of transfer line and contents and rinses of the acidic impingers (and optional knockout impinger) for determination of hydrogen chloride; and
- Contents and rinses of the alkaline impingers for determination of chlorine.

PM determinations will be done according to the gravimetric method described in EPA Method 5. HCl and Cl_2, determinations will be done according to the ion chromatography method described in EPA Method

26A. Per Section 8.2.4 of Method 26A, sodium thiosulfate will be added to the collected alkaline impinge sample. This will be done in the analytical laboratory.

5.2.3 EPA Method 29 (Metals)

The multiple metals sampling train procedure described in EPA Method 29 will be used to collect stack samples isokinetically for the determination of emission rates for 13 metals, antimony (Sb), arsenic (As), barium (Ba), beryllium (Be), cadmium (Cd), chromium (Cr), lead (Pb), mercury (Hg), nickel (Ni), selenium (Se), silver (Ag), thallium (Tl), and zinc (Zn). The multiple metals train, shown in **Figure 5-5**, consists of the following components:

- Glass nozzle;
- Heated, glass-lined probe;
- Heated filter;
- Teflon® transfer line;
- Empty modified Greenburg-Smith impinger (optional);
- Modified Greenburg-Smith impinger containing 100 mL of 5% HNO_3 and 10% H_2O_2;
- Greenburg-Smith impinger containing 100 mL of 5% HNO_3 and 10% H_2O_2;
- Empty modified Greenburg-Smith impinger;
- Modified Greenburg-Smith impinger containing 100 mL of 4% $KMnO_4$ and 10% H_2SO_4;
- Modified Greenburg-Smith impinger containing 100 mL of 4% $KMnO_4$ and 10% H_2SO_4; and
- Modified Greenburg-Smith impinger containing silica gel.

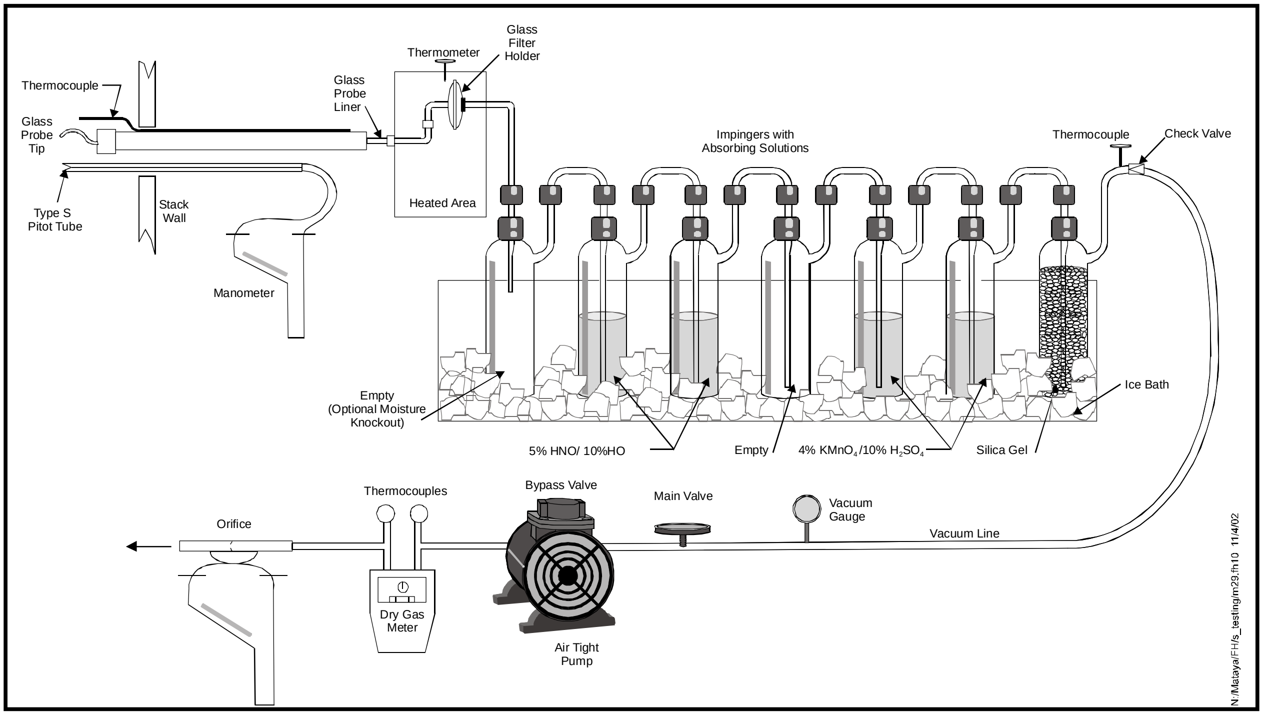


Figure 5-5. Sampling Train Schematic - Multiple Metals by EPA Method 29

The guidelines presented in EPA Method 1 will be employed to determine the number of sampling points required across the diameter of the stack for measuring the average stack gas velocity and particulate loading. EPA Methods 2, 3A and 4 will be performed in conjunction with this sampling train to determine the isokinetic sampling rate, and to measure the stack gas velocity and volumetric flowrate. The sampling will be conducted at equal time intervals along the selected traverse points, as described in the method. Minimum sample times and volumes for the Method 29 sample train are provided in **Table 5-4**.

A Teflon® transfer line will be used between the filter and the first impinger train. This is done to address space limitations on the stack, to allow for ease in probe moving and to minimize potential hazards moving the very large and heavy impinger box. The transfer line will be rinsed with 0.1 N HNO_3 and combined with the contents and rinses of the HNO_3 and H_2O_2 impingers.

Following sampling, the Method 29 sampling train will be recovered into the following six components:

- Nitric acid probe and nozzle rinse using 100 mLs of 0.1 N HNO_3;
- Filter;
- Using 100 mLs of 0.1 N HNO_3, the rinses of the transfer line and contents and rinses of knock-out impinger and HNO_3/H_2O_2 impingers;
- Using 100 mLs of 0.1 N HNO_3, the rinse of empty impinger between the HNO_3/H_2O_2 impingers and the $H_2SO_4/KMnO_4$ impingers;
- Combined contents of $H_2SO_4/KMnO_4$ impingers with impinger rinses with 100 mls of the acidic permanganate solution and 100 mLs of water; and
- HCl rinse of $H_2SO_4/KMnO_4$ impingers using 25 mLs of 8N HCl and 200 mLs of water.

The probe and nozzle rinse, filter, and contents and rinses from the knockout impinger and HNO_3/H_2O_2 impinger will be analyzed for 12 metals using Method 6010B from SW-846, including antimony (Sb), arsenic (As), barium (Ba), beryllium (Be), cadmium (Cd), chromium (Cr), lead (Pb), nickel (Ni), selenium (Se), silver (Ag), thallium (Tl), and zinc (Zn) by SW-846 Method 6010B. These components as well as the $H_2SO_4/KMnO_4$ and HCl rinse will be analyzed for mercury by SW-846 Method 7470A.

5.2.4 Chromium VI (SW-846 Method 0061)

Samples of stack gas for determination of hexavalent chromium (Chromium VI) will be collected using SW-846 Method 0061. The sampling train (**Figure 5-6**) consists of the following components:

- Glass nozzle;
- Glass-lined probe;
- Teflon impinger containing 150 mL of 0.5 N KOH, and a pumping system capable of recirculating impinger solution through the probe;
- Teflon impinger containing 75 mL of 0.5 N KOH;
- Teflon impinger containing 75 mL of 0.5 N KOH;
- Dry Teflon impinger; and
- Modified Greenburg-Smith impinger containing silica gel.

Method 0061 samples will be collected according to the sampling rates and volumes provided in **Table 5-4**.

The method specifies the use of 0.1 or 0.5 M KOH as reagent in this train, and further specifies that the pH of the solution in the first impinger be above 8.5 at the conclusion of sampling. If the pH is below 8.5, the sample will be invalid. For this test effort, 0.5 M KOH will be used, and if necessary, the suggestions within the method (Section 7.1.6) will be followed.

Periodically during sampling, the pH of the first impinger solution will be checked. If necessary to maintain a pH greater than 8.5, 0.5 N KOH will be added to the first impinger.

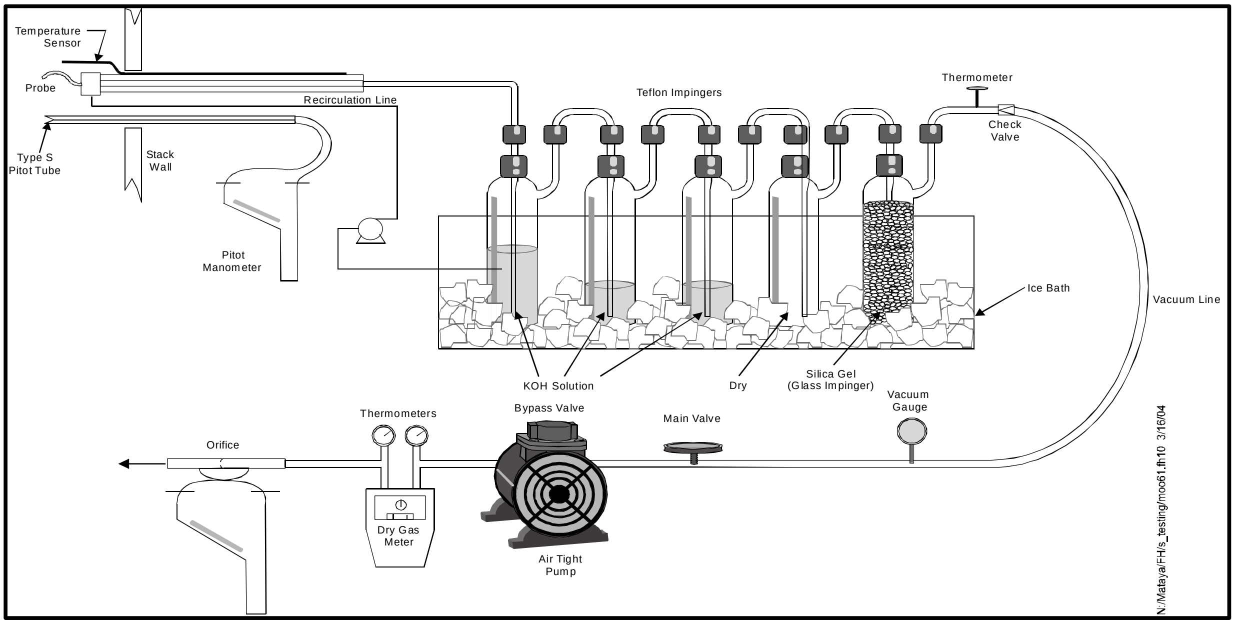


Figure 5-6. Sampling Train Schematic – Chromium VI by SW-46 Method 0061

The guidelines presented in EPA Method 1 will be employed to determine the number of sampling points required across the diameter of the stack for measuring the average stack gas velocity and particulate loading. EPA Methods 2 and 3A will be performed in conjunction with this sampling train to determine the isokinetic sampling rate, and to measure the stack gas velocity and volumetric flowrate. Due to the nature of this sampling train, moisture will not be measured in the Method 0061 train. The average moisture determination of the other isokinetic sampling trains will be used to calculate the isokinetic sampling rate and stack gas flowrate.

After sampling, the impinger solutions will be preserved by purging with nitrogen, at a rate of 10 liters per minute for 30 minutes. After weighing, the impingers will be rinsed with water, and the rinses combined with the impinger solutions. The sample will then be filtered through a 0.45 micron filter to remove any particulate matter. There will be no determination of moisture on this sampling train.

The filtered sample will be shipped to the laboratory and analyzed for chromium VI using ion chromatography coupled with a post column reactor (IC/PCR).

5.2.5 SW-846 Method 0023A (Dioxins/Furans/PCB)

Samples for the determination of dioxins/furans/PCB in stack gas will be collected according to SW-846 Method 0023A. The sampling train is shown in **Figure 5-7**.

The sampling train consists of the following components:

- Glass nozzle;
- Heated, glass-lined probe;
- Heated filter;
- Heated Teflon® transfer line;
- Sorbent module;
- Knock-out impinger;
- Greenburg-Smith impinger containing 100 mL water;

- Modified Greenburg-Smith impinger containing 100 mL water; and
- Modified Greenburg-Smith impinger containing silica gel.

From the heated filter, sample gas passes through a heated Teflon® transfer line before entering the sorbent module. The sorbent module consists of a water-cooled condenser and a resin trap containing XAD-2® resin. The condenser is used to ensure that the gas entering the resin trap is below 68^{o}F. EPA Methods 2, 3A, and 4 will be performed in conjunction with this sampling method to determine the isokinetic sampling rate.

The sampling method includes several unique preparation steps which ensure that the sampling train components are not contaminated with organics that may interfere with analysis. The glassware, glass fiber filters, and absorbing resin will be cleaned and the filters and resin will be checked for residues before they are packed using standard laboratory procedures.

Isotopically-labeled dioxins/furans will be spiked onto the XAD-2® resin both before field sampling (surrogate standards) and into appropriate places in the preparation prior to analysis after returning from the field. Following the completion of sampling, the SW-846 Method 0023A sampling train is recovered into the various fractions presented in Section 8.1 of this document. The recovery of the labeled compounds, spiked onto the XAD-2® resin before sampling, is used to evaluate sampling recovery, and recovery of the labeled compounds, spiked prior to analysis, is used to evaluate analytical recovery, of dioxins/furans samples.

The modifications to accommodate PCB analysis in this method include the addition of analyte specific surrogates and recovery standards, retention of the condensate and condensate rinse for analysis, and altering the sample preparation scheme to provide separate aliquots for each analysis.

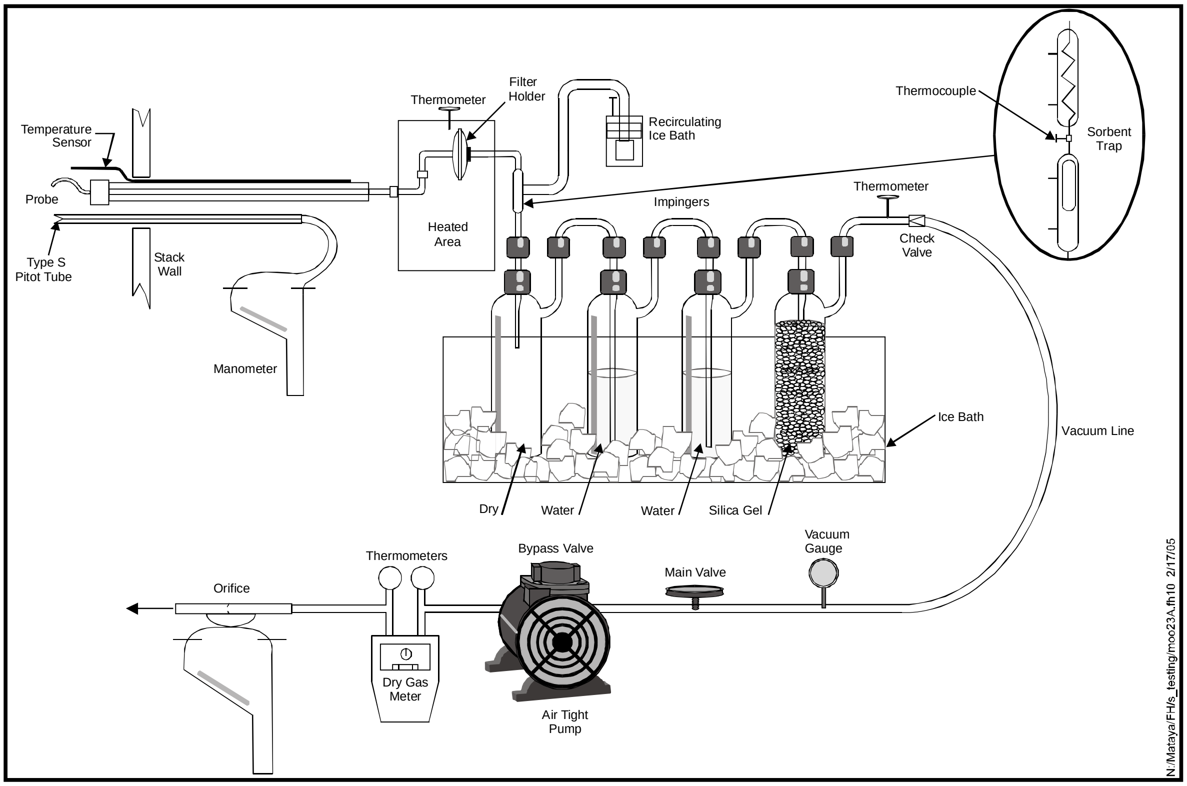


Figure 5-7. Sampling Train Schematic – Dioxins/Furans/PCB by SW-846 Method 0023A

Sampling train preparation and sample recovery will be performed in a controlled environment to reduce the possibility of sample contamination. Prior to assembly, each component of the sampling train will be rinsed thoroughly with methylene chloride. The quartz filter will also be pre-rinsed with methylene chloride. All connections in the sampling train will be installed dry or with Teflon® to reduce the possibility of contamination. Once the sampling train has been assembled, the nozzle and exit port will be sealed. After sample collection, the ends of the sampling train will once again be sealed, and the train will be returned to the clean-up area for sample retrieval. The filter will be recovered and placed in a methylene chloride-rinsed glass Petri dish. All components of the sampling train, from the nozzle through the sorbent module, including the nozzle, probe, filter glassware, and impinger glassware, will be rinsed thoroughly. The nozzle and probe will be cleaned using a Teflon® brush followed by rinsing with solvents.

The sample train returned from the sampling location will be recovered into the following components:

- Filter;
- Rinse of all glassware between the nozzle and filter with acetone, methylene chloride, and toluene;
- Rinse of all glassware between the filter and sorbent with acetone, methylene chloride, and toluene; and
- XAD-2® sorbent.

The recovered fractions will be combined to provide two extracts for analysis:

- Combination of the filter and all the rinses between the nozzle and filter; and
- Combination of the sorbent and all the rinses between the filter and sorbent.

The samples will be analyzed according to SW-846 Methods 0023A and 8290A for dioxins/furans/PCB.

5.2.6 SW-846 Method 0030 (Chlorinated VOCs)

Stack gas emissions samples will be collected for chlorinated VOCs using SW-846 Method 0030.

This method describes the collection of volatile principal organic hazardous constituents (POHCs) from the stack gas effluents of hazardous waste incinerators. For the purpose of definition, volatile POHCs are those POHCs with boiling points less than 100 oC. If the boiling point of a POHC of interest is less than 30 oC, the POHC may break through the sorbent under the conditions of the sample collection procedure.

This method employs a 20-liter sample of effluent gas containing volatile POHCs which is withdrawn from a gaseous effluent source at a flow rate of 1 L/min, using a glass-lined probe and a volatile organic sampling train (VOST). (Operation of the VOST under these conditions has been called FAST-VOST.) The gas stream is cooled to 20°C by passage through a watercooled condenser and volatile POHCs are collected on a pair of sorbent resin traps. Liquid condensate is collected in an impinger placed between the two resin traps. The first resin trap (front trap) contains approximately 1.6 g Tenax and the second trap (back trap) contains approximately 1 g each of Tenax and petroleum-based charcoal (SKC Lot 104 or equivalent), 3:1 by volume. A total of six pairs of sorbent traps may be used to collect volatile POHCs from the effluent gas stream.

Sampling will involve collecting samples non-isokinetically at a single sampling point within the centroidal area of the stack cross-section. The sampling rate will be approximately 1.0 liters per minute (Lpm). A volume of 20 liters will be collected over a sampling time of 20 minutes per set. A test includes six sets collected.

5.2.7 Continuous Monitoring (EPA Method 3A for O_2 and CO_2)

The concentrations of oxygen and carbon dioxide in the stack gas will be determined using EPA Method 3A. This method utilizes continuous monitors. A schematic of the monitoring system is presented in **Figure 5-8**.

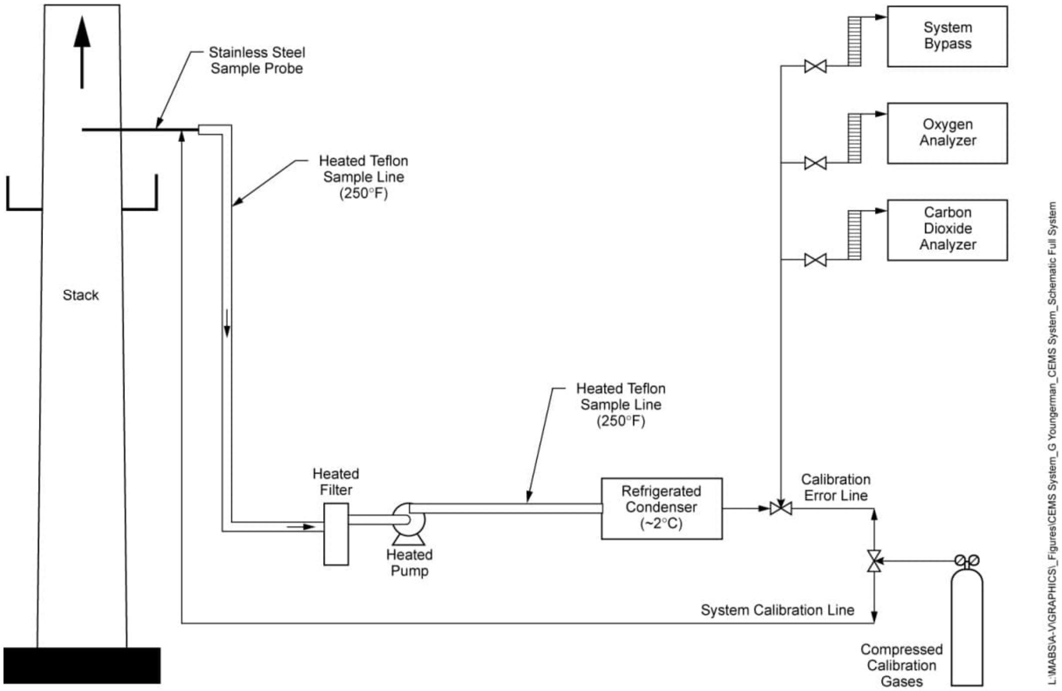


Figure 5-8. Continuous Emission Monitoring System

5.3 Waste Feed Sampling Procedures

Samples will be collected of both the liquid and solid waste feed streams. Amber glass bottles with Teflon® cap liners will be used to collect samples of the liquid and solid waste feed streams. Each sample bottle will be purchased pre-cleaned from the supplier.

The samples collected will be composited to provide one sample per test period for analysis of parameters, as indicated in **Table 5-3**. The sub-sampling container will be filled at each designated sampling time, and the collected material will be transferred into a larger container for compositing. For each sub-sampling event, the sampler will record the time and volume on the process data sampling data sheet (**Figure 5-9**).

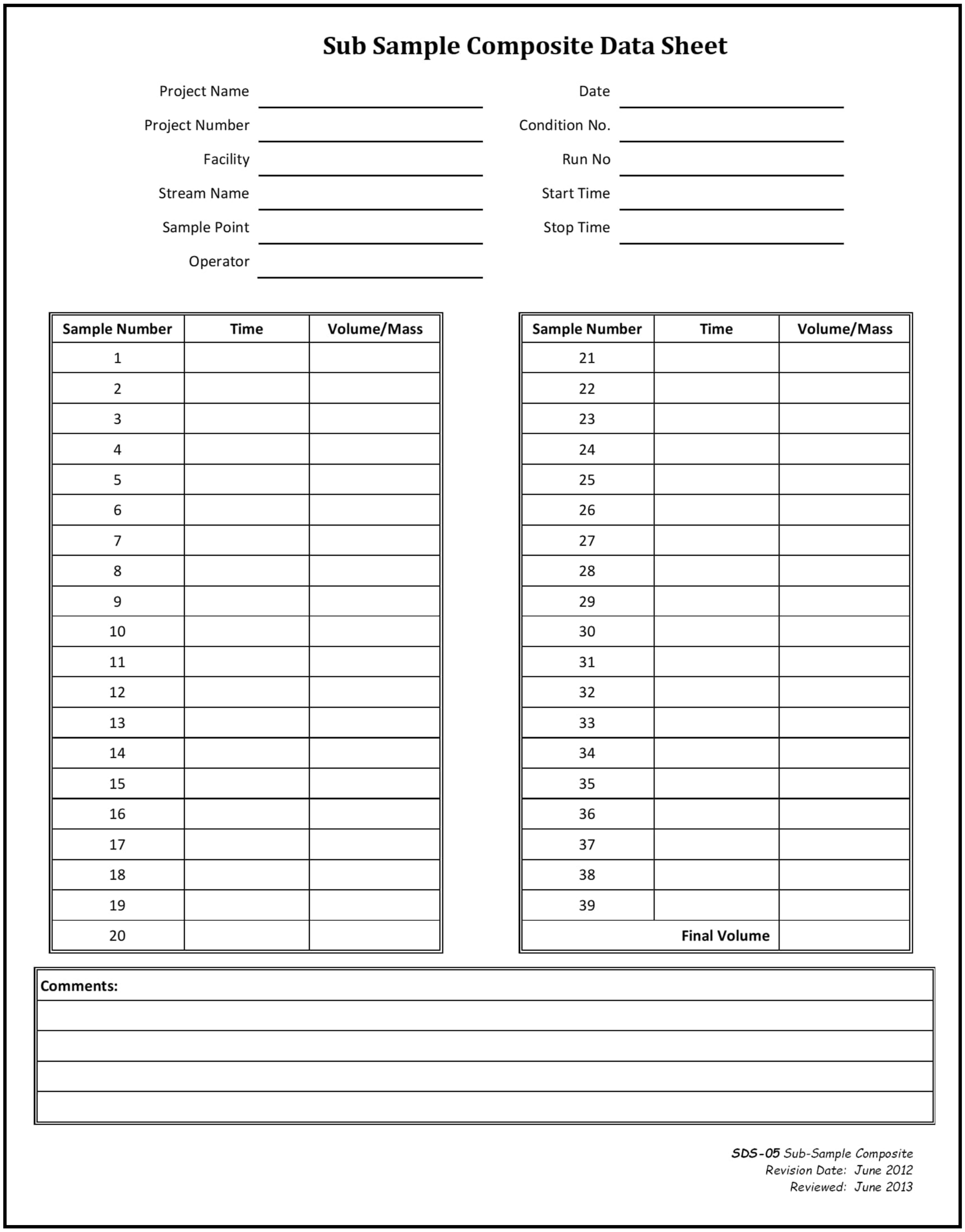
5.3.1 Liquid Waste Sampling Procedures

Samples of the liquid waste feeds will be collected in amber glass bottles with Teflon™ cap liners. Liquid spiking materials (i.e., mercury) will be sampled at the beginning and end of each test period. Samples of the spiking materials will be archived. Pre-cleaned bottles will be purchased and used to collect the samples.

Liquid samples will be collected using the tap sampling procedure specified in U.S. EPA Method S004, "Sampling and Analysis Methods for Hazardous Waste Combustion." The sample tap will be flushed each time by allowing the sample to flow briefly before the sample is collected. This will ensure that any stagnant accumulation of solids, or other contaminants that may be present in the tap, does not affect the sample integrity or its representation of the stream being sampled.

At 30-minute intervals throughout each test period, a grab sample, approximately 100 milliliters, of each liquid stream will be collected. The grab samples collected will be composited on site to provide one sample per waste feed per test run. Appendix A of the QAPjP has a Standard Operating Procedure (SOP) for the sampling of liquid waste streams.

Liquid spiking materials (i.e., mercury) will be sampled at the beginning and end of each test period. Packets of the solid spiking materials (i.e., arsenic and lead) will be collected each test period. Samples of the spiking materials will be archived and analyzed only if results dictate.



Sub Sample Composite Data Sheet

Project Name ____________
Project Number ____________
Facility ____________
Stream Name ____________
Sample Point ____________
Operator ____________

Date ____________
Condition No. ____________
Run No ____________
Start Time ____________
Stop Time ____________

Sample Number	Time	Volume/Mass
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

Sample Number	Time	Volume/Mass
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
	Final Volume	

Comments:

SDS-05 *Sub-Sample Composite*
Revision Date: June 2012
Reviewed: June 2013

Figure 5-9. Example Process Sampling Data Sheet

5.3.2 Solid Waste Sampling Procedures

Solid wastes may be fed to the incinerator through multiple systems that will require different sampling approaches, if those waste streams are fed during the test. Solid wastes may be fed as bulk solids or in drums. Bulk solids may be fed as “low flash” and regular wastes”. Because of safety considerations, samples of bulk solids will be collected by Veolia personnel in accordance with procedures in the Feedstream Analysis Plan for the facility. Solid wastes identified for the test will be added to and blended in the waste pit of the Bulk Materials Handling Building (BMHB). Samples will be collected at the beginning and end of each test run. The two samples collected per test run will be composited and analyzed.

Solid waste feeds may also be fed as drummed wastes. Drummed solid waste feed samples will also be collected by Veolia personnel, possibly in advance of the test if drums wastes are identified prior to the test. Approximately 10% of the waste feed drums will be sampled. Individual samples will be composited based on drums processed during a test period.

During the sampling of the solid wastes collected from the BMHB, or 10% of the waste drums, approximately 100 grams of sample of the respective streams will be collected. To ensure that each subsample is approximately of equal size, an appropriately sized bottle, glass container, or scoop will be used to collect each subsample. The subsampling bottle will be filled when individual samples are collected. The individual samples will be composited for analysis.

If consumer products are fed during the test, they will not be sampled or analyzed. The feedrate of consumer products would be used to determine the solids feedrate, but consumer wastes will not contribute to constituent feedrates.

Packets of the solid spiking materials (i.e., arsenic and lead) will be collected each test period. Samples of the spiking materials will be archived and analyzed only if results dictate.

6. Sample Handling, Traceability, and Holding Times

Sample handling procedures, including labeling, preserving, storing, and transporting samples, will be conducted in a way to ensure the integrity of the samples and to provide an unambiguous link between the results of the analyses and the physical conditions they represent. The following sections describe general sample handling concerns, the sample labeling scheme, sample tracking procedures, and sample preservation and holding time requirements.

A case narrative will be prepared for each analysis by the analytical laboratory, Eurofins TestAmerica Laboratories of Knoxville, TN. A general statement may be added for the test method, or for all test methods, that states that the QC conditions were met except as otherwise noted. Exceptions to standard operating procedure or quality control results that are outside the target acceptance limits are identified in the narrative by including a non-conformance memo (NCM) statement, or by adding a flag or qualifier with a listed definition. Applicable SOPs will be made available, upon request. Detailed case narratives for each analysis will be provided in the final report.

6.1 Sample Handling

Samples will be protected from evaporation, contamination, and degradation. Following collection, samples will be handled in clean, ventilated work areas and will be removed to dark, cool storage, as necessary and as soon as possible. Sample containers will be labeled using waterproof ink.

The samples will be packaged for transport. All sample containers will be wiped clean before packaging. Absorbent paper, vermiculite, or equivalent material will be used to absorb shock and spills. A sample transfer form will be transported with the samples, identifying each sample and the analytical requirements. The samples will either be shipped overnight by carrier, or AECOM personnel will drive the samples to Eurofins TestAmerica Laboratories in Knoxville, Tennessee.

The samples will be locked every night inside the field laboratory and during the day they will always be in the possession of AECOM personnel. AECOM will complete portions of the chain-of-custody on the date of recovery; these portions will include sample ID and date and time of recovery. In addition, the sample logbook will be completed on the date of recovery that will contain the same information as the chain of custody with the addition of tare and final weights for each sample bottle. Sample custody will transfer when samples are handed over to the analytical laboratory by AECOM personnel.

Filters from stack sampling for dioxins/furans will be placed in glass Petri dishes, sealed with Teflon® tape, and placed in individual zip-lock plastic bags in coolers with other stack sample fractions for transport to the laboratory. Ice contained in double plastic bags will be added and refreshed, as necessary, for the duration of transport.

Chain-of-custody records will accompany the samples during transport to the laboratory. These documents will be enclosed in a waterproof plastic bag.

High-level samples (i.e., waste feed material) will be kept separate from low-level samples (i.e., stack sampling train components) during all aspects of sample handling and shipment.

Upon receipt of samples, the laboratory sample custodian will open each shipping container and check the contents for evidence of breakage or leakage. The contents of the shipping container will be inspected for chain-of-custody documents and other information or instructions. The condition of the samples, including the temperature of the samples, will be noted on the chain-of-custody document. The sample custodian will verify that all information on the sample bottle labels is correct and consistent with the chain-of-custody forms, and will acknowledge receipt on the custody form. The chain-of-custody form and the bill of lading will be retained in the project file.

Any discrepancy between the samples and the chain-of-custody information, any broken or leaking sample bottles, or any other nonconformance will be reported immediately to the Analytical Coordinator and corrective action options will be discussed and implemented. Notations of the problem and resolution will be made on the chain-of-custody or an addendum to the chain-of-custody form, initialed, and dated by the sample custodian. The Veolia Test Manager, AECOM Project Manager, and QA/QC Coordinator will be kept informed of all issues and responses.

6.2 Traceability

Traceability refers to the link between the results of analyses and the physical reality they represent. This link includes not only sample custody but also documentation of preparation of reagents or supplies that become an integral part of the sample (e.g., filters and absorbing reagents, documentation of the exact location, and specific considerations associated with sample acquisition, documentation of sample preservation, etc.). This type of data will be recorded in field logbooks and through the use of prepared sample labels and standardized field tracking forms.

Accurate documentation of field sampling data, sample collection and handling records will be maintained throughout the program by all participants involved in data and sample collection, transport, and analysis. Team leaders have been designated for the field testing effort (Section 2.0) and will be responsible for ensuring the completion of all data sheets, sample log book entries, and transfer forms. Field personnel involved in the sample collection and recovery will assist in this effort as their individual responsibility dictates.

All sampling data, including sampling times, locations, identification codes, and other pertinent and specific sample information will be recorded on pre-printed data sheets or in bound notebooks. Samples of data sheets are provided in Section 5.0. For individual samples, all pertinent information will be logged in the master sample logbook.

A master logbook will be kept for tracking and identifying all samples taken during the test effort. Each sample will be given a unique log number that will identify the project, run number, and an identification code based upon the sample type and fraction. An example of the log number format follows:

Proj-XY-ABC

Where:

Proj is a project specific identification,

XY represent the condition and run number, and

ABC is an alphanumeric sequence describing the particular sample.

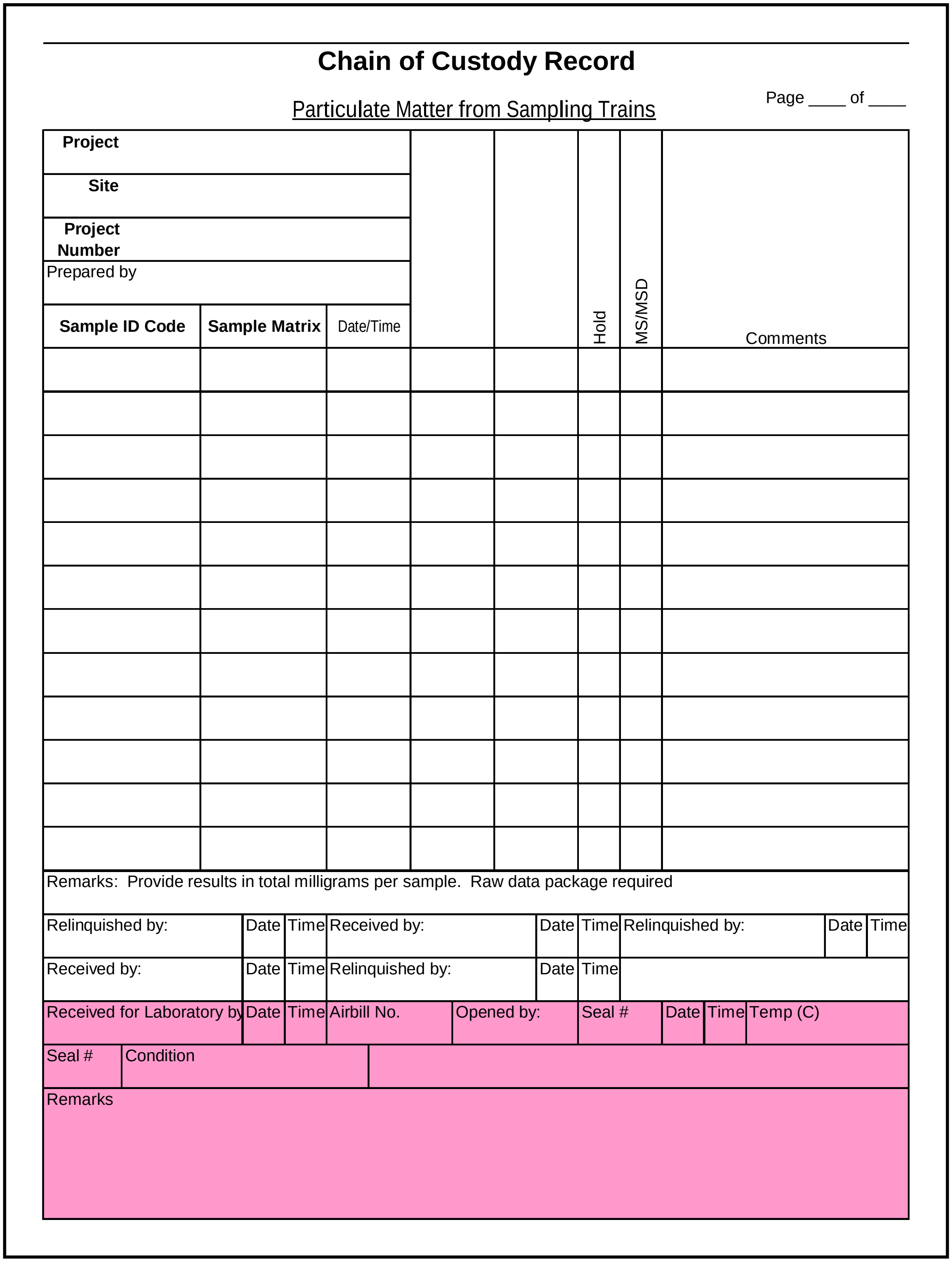
Sample labels will be affixed to all sample bottles used for sample collection. The label will be marked to include date and time(s) of collection, the sampler’s initials, and tare weight and gross weight (as appropriate), and the sample log number. Transfer forms will be completed by field personnel involved in the sample handling prior to transfer for off-site analysis. **Figure 6-1** shows an example of the transfer form.

6.3 Holding Times

A summary of sample preservation and holding times is presented in **Table 6-1**. Storage conditions will be checked on-site and upon receipt of samples at the laboratory. Any deficiencies will be recorded on the chain-of-custody and laboratory shipment receipt forms.

6.4 Sample Shipping and Logistics

Eurofins TestAmerica Laboratories in Knoxville, Tennessee will analyze the samples collected during the CfPT/RCRA Periodic Test. Samples will be packed by AECOM in the field, and either transported by overnight carrier or by AECOM personnel to the laboratory.



Chain of Custody Record

Particulate Matter from Sampling Trains

Page ____ of ____

Project

Site

Project Number

Prepared by

Sample ID Code	**Sample Matrix**	Date/Time			Hold	MS/MSD	Comments

Remarks: Provide results in total milligrams per sample. Raw data package required

Relinquished by:	Date	Time	Received by:	Date	Time	Relinquished by:	Date	Time
Received by:	Date	Time	Relinquished by:	Date	Time			

Received for Laboratory by	Date	Time	Airbill No.	Opened by:	Seal #	Date	Time	Temp (C)

Seal #	Condition	

Remarks

Figure 6-1. Example Transfer Form for Samples

Table 6-1. Summary of Sample Preservation and Holding Time Requirements

Parameter	Sample Type	Preservation	Holding Time
Particulate Matter	Stack Gas	Plastic or glass containers	Analyze within 28 days
HCl, Cl_2	Stack Gas	Plastic or glass containers	Analyze within 28 days
Metals	Stack Gas	Plastic or glass containers	Analyze within 180 days Analyze Hg within 28 days
Dioxins/Furans/PCB	Stack Gas	Sealed with glass or Teflon plugs or caps; resin traps wrapped with aluminum foil; cool, ≤6°C	Extract within 30 days; Analyze within 45 days of extraction
Chlorinated Semi-volatile Organics	Stack Gas	Sealed with glass or Teflon plugs or caps; resin traps wrapped with aluminum foil; cool, ≤6°C	Extract within 30 days; Analyze within 45 days of extraction
Chlorinated Volatile Organics	Stack Gas	Sealed with glass or Teflon plugs or caps; resin traps wrapped with aluminum foil; cool, ≤6°C	Extract within 30 days; Analyze within 45 days of extraction
Metals	Waste Feed	Glass containers	Analyze within 180 days Analyze Hg within 28 days
Chromium VI	Stack Gas	Plastic or glass containers, cool, ≤6°C	Analyze within 14 days
Ash Chlorine Moisture Density Viscosity PCB Heating Value	Waste Feeds	Glass containers	Analyze within 30 days

7. Calibration Procedures

Information presented in this section pertains to the calibration of sampling systems. Included are descriptions of each procedure or references to applicable standard operating procedures, the frequency of calibrations, and the calibration standards to be used.

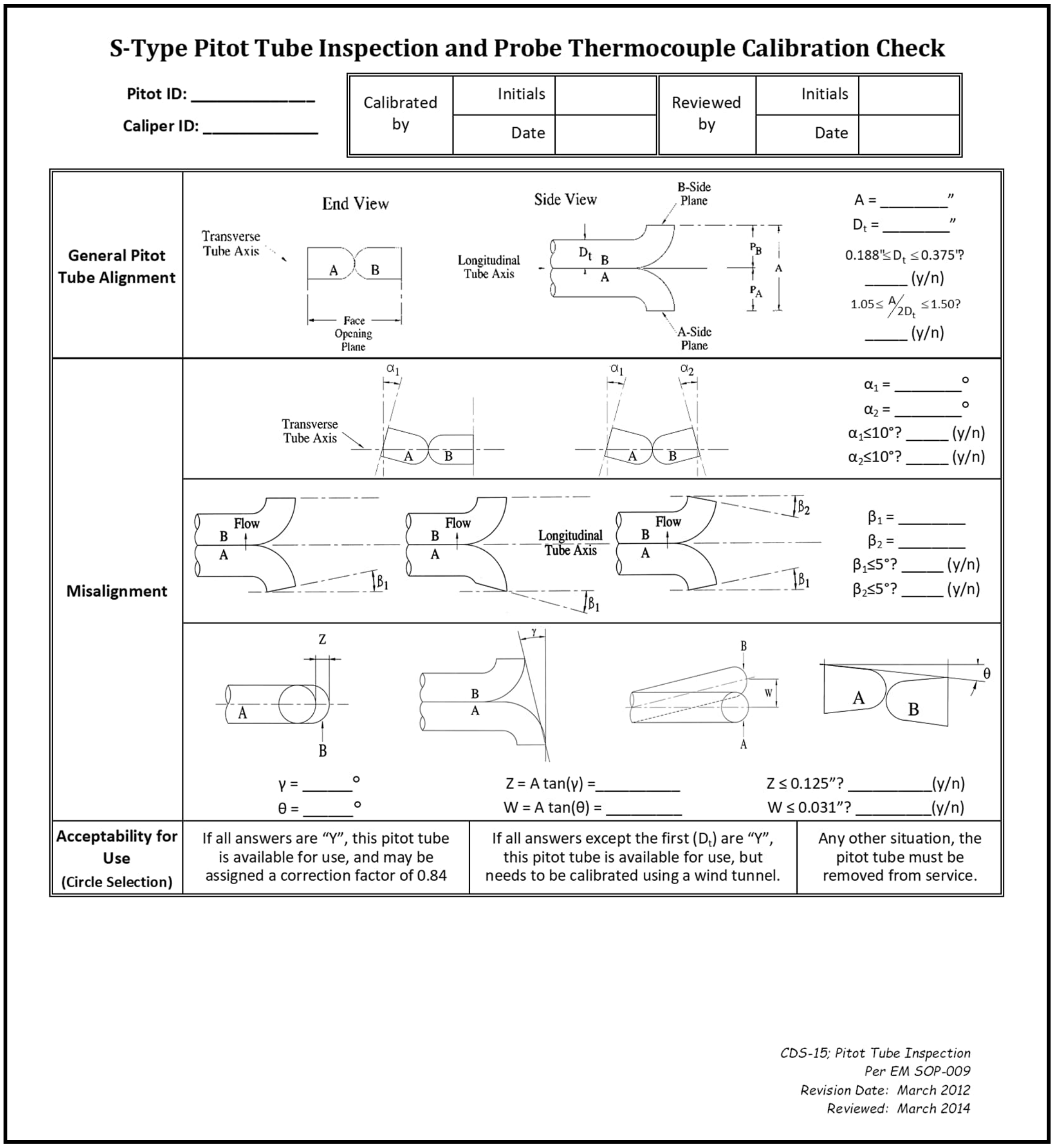
An important function in maintaining data quality is the checkout and calibration of the source sampling equipment. Prior to field sampling, the equipment will be calibrated using referenced procedures, and the results will be documented and retained. If a referenced calibration technique for a particular piece of apparatus is not available, then state-of-the-art techniques will be used. A discussion of the procedures used to calibrate this equipment is presented below.

7.1 Type-S Pitot Tube Calibration

EPA has specified guidelines concerning the construction and geometry of an acceptable Type-S pitot tube. If the specified design and construction guidelines are met, a pitot tube coefficient of 0.84 can be used. Information related to the design, construction and inspection of the Type-S pitot tube is presented in detail in Calibration Procedure 2 in *Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III, Stationary Source-Specific Methods, EPA Document 600/R-94/038c*. Only Type-S pitot tubes meeting the required EPA specifications will be used during this project. Prior to the field sampling, the pitot tubes will be inspected and documented as meeting EPA specifications. An example of the pitot tube inspection sheet is presented in **Figure 7-1**.

7.2 Sampling Nozzle Calibration

Calculation of the isokinetic sampling rate requires that the cross-sectional area of the sampling nozzle be accurately and precisely known. All nozzles used for isokinetic sampling will be thoroughly cleaned, visually inspected, and calibrated according to the procedure outlined in Calibration Procedure 5b in *Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III, Stationary Source-Specific Methods, EPA Document 600/R-94/038c.*



S-Type Pitot Tube Inspection and Probe Thermocouple Calibration Check

Pitot ID: ______________

Caliper ID: ______________

Calibrated by	Initials		Reviewed by	Initials	
	Date			Date	

General Pitot Tube Alignment	A = ________" D_t = ________" 0.188" ≤ D_t ≤ 0.375"? _____ (y/n) $1.05 \le A/2D_t \le 1.50$? _____ (y/n)		
Misalignment	α_1 = ________° α_2 = ________° $\alpha_1 \le 10°$? _____ (y/n) $\alpha_2 \le 10°$? _____ (y/n)		
	β_1 = ________ β_2 = ________ $\beta_1 \le 5°$? _____ (y/n) $\beta_2 \le 5°$? _____ (y/n)		
	γ = ______° θ = ______°	Z = A tan(γ) =__________ W = A tan(θ) = _________	Z ≤ 0.125"? _________(y/n) W ≤ 0.031"? _________(y/n)
Acceptability for Use **(Circle Selection)**	If all answers are "Y", this pitot tube is available for use, and may be assigned a correction factor of 0.84	If all answers except the first (D_t) are "Y", this pitot tube is available for use, but needs to be calibrated using a wind tunnel.	Any other situation, the pitot tube must be removed from service.

CDS-15; Pitot Tube Inspection
Per EM SOP-009
Revision Date: March 2012
Reviewed: March 2014

Figure 7-1. Example Pitot Tube Inspection Sheet

According to this procedure, three measurements of the inside diameter of the nozzle will be made on different cross sections. Using a caliper, measurements will be made to the nearest 0.001 inch. Nozzles will be considered acceptable if the difference between any two measurements is more than 0.004 inches. Nozzle calibrations are recorded on the field sampling data sheets. An example data sheet is presented as **Figure 5-3**.

7.3 Temperature Measuring Device Calibration

During source sampling, accurate temperature measurements are required. Thermocouple temperature sensors are calibrated at a single point against a NIST-traceable thermometer, and the linearity is confirmed using a traceable precision voltage generator. A temperature readout calibration data sheet is presented in **Figure 7-2**.

7.4 Dry Gas Meter and Orifice Calibration

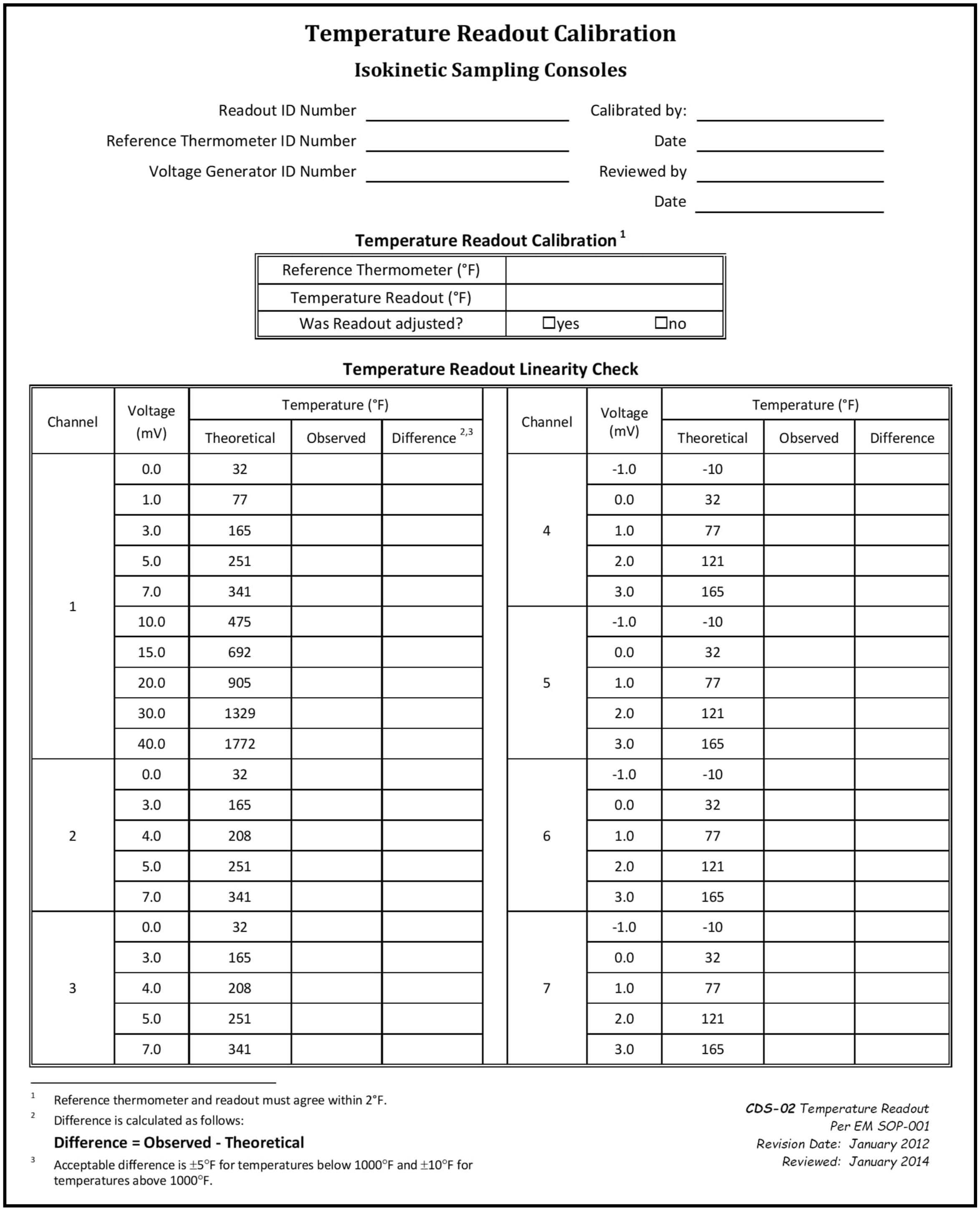
Dry gas meters (DGMs) will be used in all sampling trains to monitor the sampling rate and to measure the sample volume. Critical orifices are used as calibration tools.

All dry gas meters will be calibrated before the departure of the equipment to the field and a documented correction factor at standard conditions will be assigned. Dry gas meters are calibrated against traceable critical orifices. A 5-point calibration (at five different orifices or flowrates) is performed on each dry gas meter every 12 months. A 3-point calibration is performed as a pre-test and post-test calibration check. The 3-point calibrations must agree within 5% of the 5-point calibration. A post-test calibration check will be performed as soon as possible after the equipment has returned from the field.

A positive pressure leak-check of the system will be performed prior to calibration. To perform the leak-check, the system will be placed under approximately ten inches of water pressure and a gauge oil manometer will be used to determine if the pressure decrease can be detected over a one-minute period. If leaks are detected, they will be eliminated before actual calibrations are performed.

Before calibration of a dry gas meter, the pump is allowed to run for five minutes after the sampling console is assembled and leak-checked. Once the pump and dry gas meter are warmed up, the critical orifice is attached, and air is pulled through the dry gas meter at the specified flowrate. After ten minutes, the valve is closed and the volume of gas read by the meter is compared to the volume of gas passing through the critical orifice. Duplicate calibrations are performed at each of the five flowrates. If necessary, additional maintenance and calibrations are conducted until the calibration results (Y_1) vary by no more than 2%. The average Y_1 is then calculated and recorded on the DGM calibration data sheet. An example DGM calibration data sheet is presented in **Figure 7-3** and a post-test calibration check form is shown in **Figure 7-4**.

The critical orifice is calibrated by comparison to an independently calibrated dry gas meter. An orifice calibration factor is calculated for each of the 18 flow settings during a full calibration. The arithmetic average of the values obtained during the calibration is used.



Temperature Readout Calibration

Isokinetic Sampling Consoles

Readout ID Number ____________________ Calibrated by: ____________________
Reference Thermometer ID Number ____________________ Date ____________________
Voltage Generator ID Number ____________________ Reviewed by ____________________
Date ____________________

Temperature Readout Calibration [1]

Reference Thermometer (°F)	
Temperature Readout (°F)	
Was Readout adjusted?	☐yes ☐no

Temperature Readout Linearity Check

Channel	Voltage (mV)	Temperature (°F)			Channel	Voltage (mV)	Temperature (°F)		
		Theoretical	Observed	Difference [2,3]			Theoretical	Observed	Difference
1	0.0	32			4	-1.0	-10		
	1.0	77				0.0	32		
	3.0	165				1.0	77		
	5.0	251				2.0	121		
	7.0	341				3.0	165		
	10.0	475			5	-1.0	-10		
	15.0	692				0.0	32		
	20.0	905				1.0	77		
	30.0	1329				2.0	121		
	40.0	1772				3.0	165		
2	0.0	32			6	-1.0	-10		
	3.0	165				0.0	32		
	4.0	208				1.0	77		
	5.0	251				2.0	121		
	7.0	341				3.0	165		
3	0.0	32			7	-1.0	-10		
	3.0	165				0.0	32		
	4.0	208				1.0	77		
	5.0	251				2.0	121		
	7.0	341				3.0	165		

---

[1] Reference thermometer and readout must agree within 2°F.

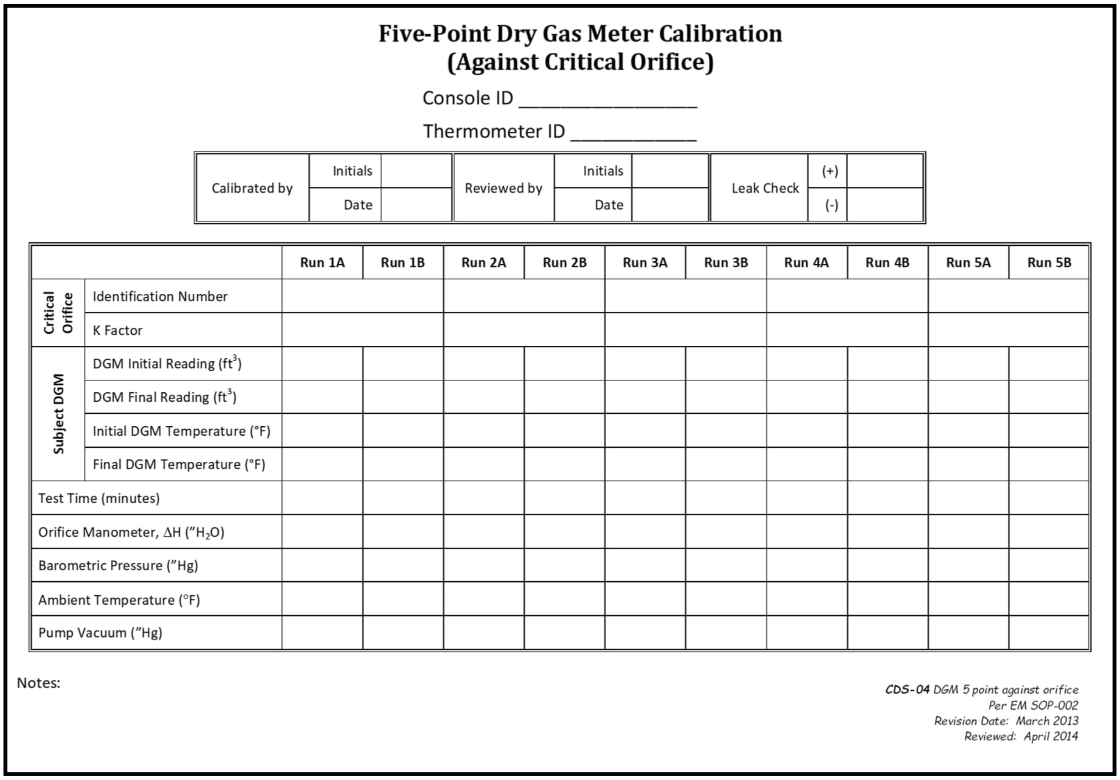
[2] Difference is calculated as follows:

Difference = Observed - Theoretical

[3] Acceptable difference is ±5°F for temperatures below 1000°F and ±10°F for temperatures above 1000°F.

CDS-02 *Temperature Readout*
Per EM SOP-001
Revision Date: January 2012
Reviewed: January 2014

Figure 7-2. Example Temperature Readout Calibration Data Sheet



Five-Point Dry Gas Meter Calibration
(Against Critical Orifice)

Console ID ___________________

Thermometer ID _____________

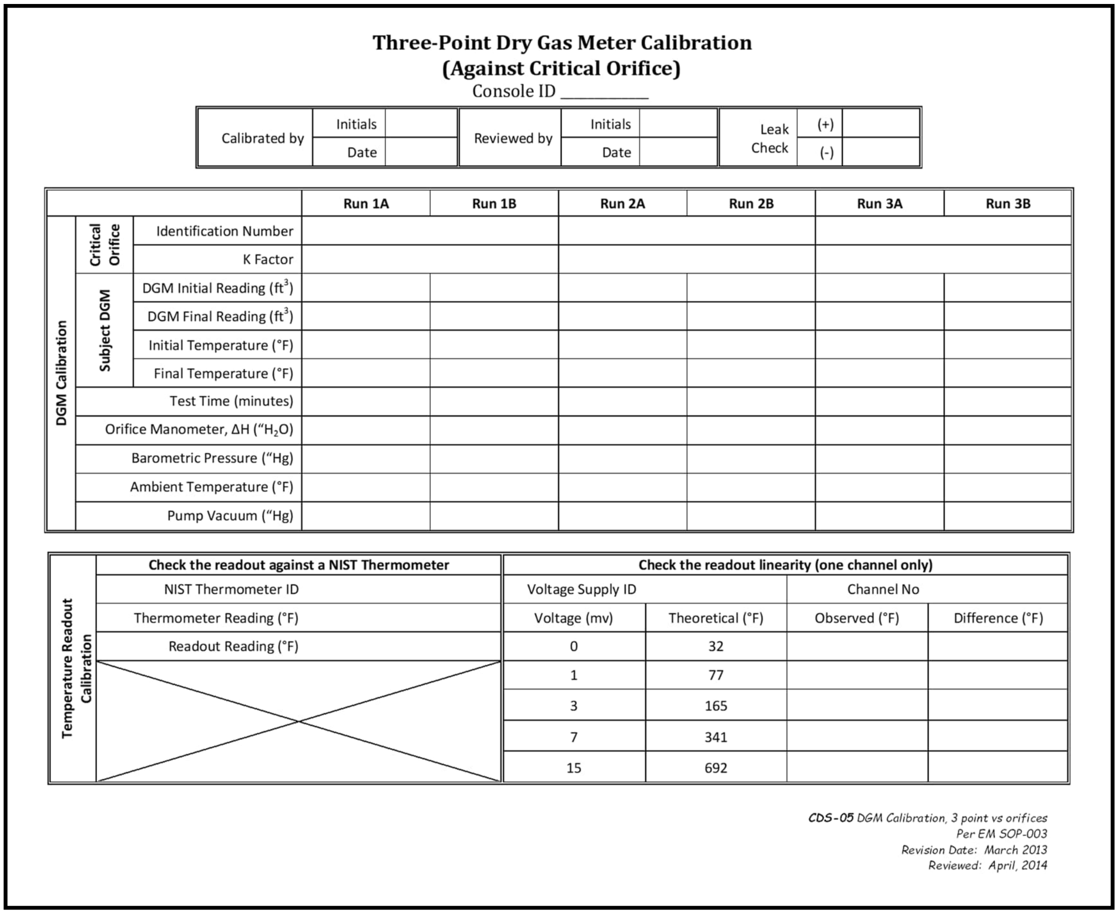
Calibrated by	Initials		Reviewed by	Initials		Leak Check	(+)	
	Date			Date			(-)	

		Run 1A	Run 1B	Run 2A	Run 2B	Run 3A	Run 3B	Run 4A	Run 4B	Run 5A	Run 5B
Critical Orifice	Identification Number										
	K Factor										
Subject DGM	DGM Initial Reading (ft^3)										
	DGM Final Reading (ft^3)										
	Initial DGM Temperature (°F)										
	Final DGM Temperature (°F)										
Test Time (minutes)											
Orifice Manometer, ΔH (”H_2O)											
Barometric Pressure (”Hg)											
Ambient Temperature (°F)											
Pump Vacuum (”Hg)											

Notes:

CDS-04 DGM 5 point against orifice
Per EM SOP-002
Revision Date: March 2013
Reviewed: April 2014

Figure 7-3. Example Dry Gas Meter Calibration Data Sheet



Three-Point Dry Gas Meter Calibration
(Against Critical Orifice)
Console ID ___________

Calibrated by	Initials		Reviewed by	Initials		Leak Check	(+)	
	Date			Date			(-)	

			Run 1A	Run 1B	Run 2A	Run 2B	Run 3A	Run 3B
DGM Calibration	**Critical Orifice**	Identification Number						
		K Factor						
	Subject DGM	DGM Initial Reading (ft^3)						
		DGM Final Reading (ft^3)						
		Initial Temperature (°F)						
		Final Temperature (°F)						
		Test Time (minutes)						
		Orifice Manometer, ΔH (“H_2O)						
		Barometric Pressure (“Hg)						
		Ambient Temperature (°F)						
		Pump Vacuum (“Hg)						

Temperature Readout Calibration

	Check the readout against a NIST Thermometer	
Temperature Readout Calibration	NIST Thermometer ID	
	Thermometer Reading (°F)	
	Readout Reading (°F)	

Check the readout linearity (one channel only)			
Voltage Supply ID		Channel No	
Voltage (mv)	Theoretical (°F)	Observed (°F)	Difference (°F)
0	32		
1	77		
3	165		
7	341		
15	692		

CDS-05 DGM Calibration, 3 point vs orifices
Per EM SOP-003
Revision Date: March 2013
Reviewed: April, 2014

Figure 7-4. Example Post Test DGM Calibration Data Sheet

8. Analytical Procedures

Samples collected during the field test effort will be analyzed for the parameters specified in **Tables 5-1** and **5-2**. All analyses will be performed by Eurofins TestAmerica Laboratories in Knoxville, Tennessee. AECOM and Eurofins TestAmerica will maintain communications throughout the project, from planning stages to reporting. Eurofins TestAmerica has reviewed and approved the QAPjP. AECOM and Eurofins TestAmerica recognize that all due efforts are to be made to provide the lowest possible detection limits. Analytical reports provided by Eurofins TestAmerica Knoxville present a detection limit, and a reporting limit, for each analyte in every sample analyzed. The numerical value of the detection limit reported by Eurofins TestAmerica will be documented in appropriate tables of the Test Report.

This section describes the analytical methods that will be employed for each parameter and/or sample matrix. Most of the methods are standard reference methods with any modifications to the methods appropriately explained and detailed. The analytical methods are summarized in **Table 8-1**.

Table 8-1. Summary of Analytical Methods

Parameter	Stream	Analytical Method
Particulate Matter	Stack Gas	Gravimetric - EPA Method 5
HCl/Cl_2	Stack Gas	IC - EPA Method 26A
Metals [1]	Stack Gas Waste Feed	ICPES - SW-846 Method 6010B CVAAS - Hg, SW-846 Method 7470A or 7471A
Chromium VI	Stack Gas	SW-846 Method 7199
Dioxins/Furans	Stack Gas	HRGC/HRMS - SW-846 Method 8290A
PCB	Stack Gas	GC/MS SW-846 Method 8270
Ash	Waste Feed	ASTM Method D-482
Total Chlorine	Waste Feed	SW-846 Methods 5050 and 9056A
Moisture	Waste Feed	ASTM E-203 (Karl-Fischer titration) for liquid waste; ASTM D-5142 or D160.3 (loss on drying) for solid waste
Calorific (Heating) Value	Waste Feed	ASTM Method D-5865/D-240
Density	Waste Feed – Liquid Only	ASTM Method D-1475
PCB	Waste Feed	ASTM Method D-6160
Chlorinated Semi-volatile Organics	Stack Gas	GC/MS SW-846 Method 8270
Chlorinated Volatile Organics	Stack Gas	GC/MS SW-846 Method 8260
Viscosity	Waste Feed – Liquid Only	ASTM Method D-445

[1] Analysis is for As, Be, Cd, Cr, Sb, Ba, Pb, Hg, Ni, Se, Ag, Tl, and Zn.

8.1 Analysis of Stack Gas Samples for Particulate Matter

Samples for determination of particulate matter in the stack gas will be collected in a single sampling train meeting the requirements of EPA Method 5 for PM and EPA Method 26A for HCl and Cl_2, as described in Section 5.2.2. The acetone wash from the nozzle, probe liner, and glassware prior to the filter on the Method 5 sampling trains will be evaporated and desiccated and the mass will be determined using an analytical balance. The filter from the Method 5 sampling train is desiccated and weighed to determine the mass of particulate present on the filter. The weight gain of the filter and evaporated acetone wash are summed as the particulate catch.

The analytical balance will be calibrated daily, prior to weighing, using a standard set of weights and an internal calibration weight. Measured values of the standards must agree to as follows:

- The 5g weight must be within 0.1 mg of the true value;
- The 50g weight must be within 0.3 mg of the true value; and
- The 100 g weight must be within 0.5 mg of the true value.

Balance calibration data will be recorded in the laboratory notebook. Method 5 particulate matter detection limits are specified in **Table 8-2**.

Table 8-2. Method 5 Target Analyte List, Analytical Methods, and Reporting Limits

Analyte	Sampling Method	Analysis Method	Stack Emission Target Detection Limit [1,2] (mg)
Particulate Matter	EPA Method 5	EPA Method 5	0.5

[1] Based on recent data from Eurofins Test America-Knoxville.

[2] If analytical interferences are present, samples will be diluted, which will raise analytical detection limits.

8.2 Analysis of Stack Gas Samples for Hydrogen Chloride and Chlorine

Samples for the determination of hydrogen chloride (HCl) and chlorine (Cl_2) in the stack gas are collected using a sampling train meeting the requirements of EPA Methods 5 and 26A. According to this method, sampled gas is collected isokinetically, filtered, and bubbled through a series of impingers. As described in Section 5.2.2, the sampling train is recovered to provide a solution of sulfuric acid, which removes the HCl, and a solution of sodium hydroxide, which removes the Cl_2. Both impinger solutions are analyzed for chloride by ion chromatography (IC) for determination of chloride. The chloride found in the acid impingers is reported as HCl, and the chloride determined in the alkaline impingers is reported as Cl_2. In ion chromatography, the ions in solution are separated by an ion exchange column and detected conductimetrically. Sodium thiosulfate will be added to the collected alkaline impinger sample in the analytical laboratory before analysis.

The IC will be calibrated for each sample set analyzed. This is accomplished by introducing different standard concentrations of chloride into the instrument and measuring the response for each concentration. Calibration standards will be prepared from certified standards.

A minimum of four standard concentrations for each analyte will be used to generate a calibration curve. The calibration curve is considered acceptable if the correlation coefficient is greater than 0.995.

According to Method 26A, each sample will be analyzed in duplicate. HCl and Cl_2 detection limits are specified in **Table 8-3**.

Table 8-3. Method 26A Target Analyte List, Analytical Methods, and Reporting Limits

Analyte	Sampling Method	Analysis Method	Stack Emission Target Detection Limit [1,2] (mg)

Hydrogen chloride	EPA Method 26A	EPA Method 26A	10.3
Chlorine	EPA Method 26A	EPA Method 26A	10.0

[1] Based on recent data from Eurofins Test America-Knoxville.

[2] If analytical interferences are present, samples will be diluted, which will raise analytical detection limits.

8.3 Analysis of Stack Gas Samples for Metals

Samples of the stack gas collected using EPA Method 29, will be analyzed for 12 metals using Method 6010B from SW-846, including antimony (Sb), arsenic (As), barium (Ba), beryllium (Be), cadmium (Cd), chromium (Cr), lead (Pb), nickel (Ni), selenium (Se), silver (Ag), thallium (Tl), and zinc (Zn). Method 6010B uses an inductively coupled plasma emission spectrometer (ICPES). Mercury (Hg) will be determined using Method 7470A of SW-846, a cold vapor atomic absorption spectrometry (CVAAS).

Samples for determination of metals in stack gas will be collected in an EPA Method 29 sampling train, as described in Section 5.2.3. The target metals and respective detection limits are specified in **Table 8-4**. Six separate fractions are recovered from the Method 29 sampling train and submitted to the laboratory for analysis:

- Nitric acid probe and nozzle rinse;
- Filter;
- Contents of knock-out impinger and HNO_3/H_2O_2 impinger (and rinses);
- Rinse of empty impinger between the HNO_3/H_2O_2 impingers and the $H_2SO_4/KMnO_4$ impinger;
- Contents (and rinses) of $H_2SO_4/KMnO_4$ impingers; and
- HCl rinse of $H_2SO_4/KMnO_4$ impingers.

The filter from the multiple metals sampling train will be combined with the probe and nozzle rinse and digested using hydrofluoric acid (HF), HCl, and HNO_3 in a microwave-assisted process. This fraction (the front half) will be analyzed for all target metals. The knock-out impinger and HNO_3/H_2O_2 impingers (combined in the field) will be combined and have an aliquot removed for analysis of mercury before concentration and analysis for other metals.

The remaining three fractions will be analyzed for mercury. In all cases, the analytical methodology is specified in Method 29. Mercury analysis will be conducted using Method 7470A, cold vapor atomic absorption, and analysis for all other metals will be conducted using Method 6010B, inductively coupled plasma emission spectroscopy (ICPES).

Table 8-4. Method 29 Target Analytes for Determination of Metals

Metal	Sampling Method	Analytical Method	Stack Emission Target Detection Limit [1,2] (µg/m^3)
Antimony (Sb)	EPA Method 29	SW-846 Method 6010B	0.96
Arsenic (As)	EPA Method 29	SW-846 Method 6010B	0.46
Barium (Ba)	EPA Method 29	SW-846 Method 6010B	0.52
Beryllium (Be)	EPA Method 29	SW-846 Method 6010B	0.19
Cadmium (Cd)	EPA Method 29	SW-846 Method 6010B	0.078
Chromium (Cr)	EPA Method 29	SW-846 Method 6010B	0.39
Lead (Pb)	EPA Method 29	SW-846 Method 6010B	0.35

Mercury (Hg)	EPA Method 29	SW-846 Method 7470A (stack and liquid waste) SW-846 Method 7471A (solid and sludge waste)	1.40
Nickel (Ni)	EPA Method 29	SW-846 Method6010B	0.68
Selenium (SE)	EPA Method 29	SW-846 Method 6010B	0.46
Silver (Ag)	EPA Method 29	SW-846 Method 6010B	0.76
Thallium (Tl)	EPA Method 29	SW-846 Method 6010B	0.73
Zinc (Zn)	EPA Method 29	SW-846 Method 6010B	0.55

[1] Based on recent data from Test America-Knoxville, and a gas sample volume of 45 dscf.

[2] If analytical interferences are present, samples will be diluted, which will raise analytical detection limits.

8.4 Analysis of Stack Gas Samples for Chromium VI

Stack samples for the determination of chromium VI will be collected using SW-846 Method 0061. Analysis will be performed using Method 7199 of SW-846. The method uses ion chromatography for determination of chromium VI in the potassium hydroxide impinger solutions and associated rinses. The ion chromatograph is run with a post column reagent (PCR) mixing and delivery system.

Chromium VI detection limits are specified in **Table 8-5**.

Table 8-5. Method 0061 Target Analyte List, Analytical Methods, and Reporting Limits

Analyte	Sampling Method	Analysis Method	Stack Emission Target Detection Limit [1,2] (ng)
Chrome VI	SW-846 Method 0061	SW-846 Method 7199	0.05

[1] Based on recent data from Eurofins Test America-Knoxville.

[2] If analytical interferences are present, samples will be diluted, which will raise analytical detection limits.

8.5 Analysis of Stack Gas Samples for Dioxins/Furans/PCB

Samples of the stack gas for determination of dioxins/furans/PCB will be collected in a SW-846 Method 0023A sampling train, as described in Section 5.2.5.

Samples will be extracted and concentrated as described in the method 0023A for dioxins/furans with appropriate modifications made to accommodate PCB analysis using the same extracts.

Analysis for dioxins/furans will be performed using high-resolution capillary column GC/MS in accordance with SW-846 Method 8290A. This method uses matrix specific extraction and analyte specific cleanup techniques for sample preparation. Calibration of the GC/MS will be accomplished with internal standards and calibrating solutions. Acceptance criteria as outlined in the method will be met before any samples are analyzed.

Analysis for PCBs will be accomplished using the same sample employing high-resolution capillary column GC/MS in accordance with EPA Method 1668A/SW-846 Method 8270C. This includes collecting the condensate as an analytical fraction to be analyzed only for PCBs.

As described in Section 5.2.4, the sampling train is recovered to provide the following fractions:

- Filter;
- Rinse of all glassware between the nozzle and filter with acetone, methylene chloride, and toluene;
- Rinse of all glassware between the filter and sorbent with acetone, methylene chloride, and toluene; and
- XAD-2® sorbent.

The recovered fractions will be combined to provide two extracts for analysis:

- Combination of the filter and all the rinses between the nozzle and filter; and
- Combination of the sorbent and all the rinses between the filter and sorbent.

After sample cleanup and concentration procedures at the analytical laboratory, front-half extracts (i.e., probe and nozzle rinse and filter) will be combined and analyzed for dioxins/furans, and back-half extracts (i.e., mid-train rinse and XAD-2® sorbent) will be combined and analyzed for dioxins/furans. The front-half and back-half components will be analyzed separately as required by SW-846 Method 0023A. The samples will be analyzed according to SW-846 Method 8290A and EPA Method 1668A/SW-846 Method 8270C. Each individual isomer containing the 2,3,7,8-substitution pattern will be individually quantified.

Table 8-6. Method 0023A Target Analyte List, Analytical Methods, and Reporting Limits

Analyte	Sampling Method	Analysis Method	Stack Emission Target Detection Limit ^{1,2} (pg)
2,3,7,8-TCDD	SW-846 Method 0023A	SW-846 Method 8290A	30
1,2,3,7,8-PeCDD	SW-846 Method 0023A	SW-846 Method 8290A	150
1,2,3,4,7,8-HxCDD	SW-846 Method 0023A	SW-846 Method 8290A	150
1,2,3,6,7,8-HxCDD	SW-846 Method 0023A	SW-846 Method 8290A	150
1,2,3,7,8,9-HxCDD	SW-846 Method 0023A	SW-846 Method 8290A	150
1,2,3,4,6,7,8-HpCDD	SW-846 Method 0023A	SW-846 Method 8290A	150
OCDD	SW-846 Method 0023A	SW-846 Method 8290A	150
2,3,7,8-TCDF	SW-846 Method 0023A	SW-846 Method 8290A	30
1,2,3,7,8-PeCDF	SW-846 Method 0023A	SW-846 Method 8290A	150
2,3,4,7,8-PeCDF	SW-846 Method 0023A	SW-846 Method 8290A	150
1,2,3,4,7,8-HxCDF	SW-846 Method 0023A	SW-846 Method 8290A	150
1,2,3,6,7,8-HxCDF	SW-846 Method 0023A	SW-846 Method 8290A	150
2,3,4,6,7,8-HxCDF	SW-846 Method 0023A	SW-846 Method 8290A	150
1,2,3,7,8,9-HxCDF	SW-846 Method 0023A	SW-846 Method 8290A	150
1,2,3,4,6,7,8-HpCDF	SW-846 Method 0023A	SW-846 Method 8290A	150
1,2,3,4,7,8,9-HpCDF	SW-846 Method 0023A	SW-846 Method 8290A	150
OCDF	SW-846 Method 0023A	SW-846 Method 8290A	150

Polychlorinated Biphenyls

Analyte	Sampling Method	Analysis Method	Stack Emission Target Detection Limit ^{1,2} (ng)
3,3',4,4'-TetraCB (PCB 77)	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	0.300
3,4,4',5-TetraCB (PCB 81)	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	0.300

2,3,3',4,4'-PentaCB (PCB 105)	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	0.300
2,3,4,4',5-PentaCB (PCB 114)	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	0.300
2,3',4,4',5-PentaCB (PCB 118)	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	0.300
2',3,4,4',5-PentaCB (PCB 123)	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	0.300
3,3',4,4',5-PentaCB (PCB 126)	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	0.300
2,3,3',4,4',5-HexaCB (PCB 156)	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	0.600
2,3,3',4,4',5'-HexaCB (PCB 157)	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	0.600
2,3',4,4',5,5'-HexaCB (PCB 167)	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	0.300
3,3',4,4',5,5'-HexaCB (PCB 169)	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	0.300
2,3,3',4,4',5,5'-HeptaCB (PCB 189)	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	0.300
Total Monochlorobiphenyl	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	0.300
Total Dichlorobiphenyl	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	0.600
Total Trichlorobiphenyl	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	0.600
Total Tetrachlorobiphenyl	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	1.20
Total Pentachlorobiphenyl	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	1.80
Total Hexachlorobiphenyl	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	1.20
Total Heptachlorobiphenyl	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	0.600
Total Octachlorobiphenyl	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	0.600
Total Nonachlorobiphenyl	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	0.300
Decachlorobiphenyl	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	0.300
Total Polychlorinated Biphenyls	SW-846 Method 0023A	SW-846 Method 1668A/ 8270C	7.50

[1] Based on recent data from Eurofins Test America-Knoxville.

[2] If analytical interferences are present, samples will be diluted, which will raise analytical detection limits.

8.6 Analysis of Stack Gas Samples for PCBs and Chlorinated SVOC

Analysis of stack gas samples for PCBs and chlorinated SVOCs will be performed using EPA Method 8270. This method is a high-resolution GC/MS technique. The analysis for PCBs is performed for each of the 209 individual isomers. Results are added for each of the 10 congener classes representing degree of chlorine substitution (i.e., mono- through deca-). Prior to analysis, appropriate sample extraction techniques are employed (SW-846 Method 3510 or 3520 for liquids and 3540 or 3550 for solids). The resulting extraction solvent is then exchanged to hexane and analyzed. If necessary, cleanup procedures (SW-846 Method 3620 or Method 3620, followed by Method 3660) may be used to eliminate interferences in the analysis. The extracts of all components of the sampling train will be combined prior to analysis. The results are quantitated as chlorinated biphenyl congeners.

8.7 Analysis of Waste Feeds

As described in Section 5.3, samples of waste feeds will be collected during each test period.

Waste feed samples will be analyzed for 13 metals. Twelve (12) of the metals will be analyzed by a trace level inductively coupled argon plasma emission spectroscopy (ICPES) using SW-846 Method 6010B. Samples will be prepared for analysis using SW-846 Method 3050B. The metals to be analyzed are antimony (Sb), arsenic (As), barium (Ba), beryllium (Be), cadmium (Cd), chromium (Cr), lead (Pb), nickel (Ni), selenium (Se), silver (Ag), thallium (Tl), and zinc (Zn). Waste feed samples will also be analyzed for mercury (Hg) by cold vapor atomic absorption spectroscopy (CVAAS) using Method 7470A or 7471A of SW-846.

In addition, the composite waste feed samples will be analyzed for calorific value, ash, moisture, total chlorine/chloride, density (liquid waste only), PCB and viscosity (liquid waste only).

After preparation, the samples are analyzed for the following parameters, by the referenced standard methods:

- Ash – ASTM Method ASTM D-482;
- Total chlorine – SW-846 Methods 5050 and 9056A;
- Moisture - ASTM E-203 or D-4017 (Karl-Fischer titration) for liquid waste; ASTM D-5142 or D160.3 (loss on drying) for waste sludge;
- Calorific value – ASTM Method D-5865 or D-240;
- Density – ASTM Method D-1475;
- Viscosity – ASTM Method D-445;
- PCB – ASTM Method D-6160 and
- Metals – SW-846 Method 6010B (all except mercury) with sample preparation by SW-846 Method 3050B, and SW-846 Method 7470A or 7471A for mercury. The target species for metals analysis are presented in **Table 8-4**.

9. Internal Quality Control Checks

Specific QC procedures will be followed to ensure the production of useful and valid data for the CfPT/RCRA Periodic Test. Standard reference methods for sampling and analysis are detailed in Sections 5.0 and 8.0 of this document. QC procedures will be followed as described in these referenced methods. Strict adherence to prescribed procedures is quite often the most applicable QC check. This section describes procedures that are specific to this test and sets a schedule for collection of QC samples used to assess data quality.

Table 9-1 presents a summary of specific QC samples planned to assess overall measurement data quality. These include field blanks, reagent blanks, matrix spike/matrix spike duplicate (MS/MSD) pairs, laboratory control sample/laboratory control sample duplicate (LCS/LCSD), and duplicate samples or analyses.

Table 9-1. Summary of Sampling and Analytical QC Requirements[1]

	Field Blank [2]	Trip Blank [3]	Surrogate Spike	MS/MSD[4]	LCS/LCSD	Duplicate Sample or Analysis [5]
Particulate Matter (Stack Gas)	1	1				--
HCl/Cl_2 (Stack Gas)	1	1		1	1	All
PCDD/PCDF/PCB (Stack Gas)	1	1	All		1	
Metals (Stack Gas)	1	1		1	1	
Chromium VI (Stack Gas)	1	1				All
Metals (Waste Feeds)				1	1	
Composition (Waste Feeds)				1 [7]		1 [6]

[1] Table indicates number of QC samples planned per incinerator stack test.

[2] The field blank for stack gas samples is recovered from an assembled train that has been leak checked but through which no gas sample has passed. The field blank will be analyzed.

[3] Trip blanks consist of applicable filters, sorbents, and solutions. These will be archived and analyzed only if necessary based on field blank analysis results.

[4] Matrix spiked samples will be spiked prior to sample preparation (digestion/extraction), except for metals train samples, which will be spiked following digestion.

[5] Field duplicates of waste feeds will be collected as duplicate sets of subsamples for compositing.

[6] Field duplicates will only be collected of the liquid waste feeds.

[7] MS/MSD for chlorine only.

Field blanks for stack gas samples will be prepared by recovering assembled trains that have been treated as other trains except that no stack gas will be passed through the blank trains. Media blanks consist of sampling media that are stored and shipped from the facility and handled as ordinary samples, but are never assembled in trains. Trip blanks collected will not be analyzed unless needed to identify sources of contamination found in the samples or field blanks.

A discussion of sampling and analytical QC checks to be implemented during this program is presented below.

9.1 Sampling Quality Control Checks

A sampling matrix that shows the sampling method, frequency, and analytical parameters is presented in Section 5.0. QC procedures associated with the sampling are described in the cited methods and summarized briefly below, along with specific procedures pertinent to this test.

9.1.1 Stack Gas Sampling

Prior to actual sampling on site, all of the applicable sampling equipment will be thoroughly checked to ensure that each component is clean and operable. A file of the equipment calibration data forms will be compiled and reviewed for completeness and adequacy to ensure the acceptability of the equipment. Sampling equipment calibration is described in Section 6.0. All glassware used in sampling trains will be cleaned before transport to the plant. This includes soap and water washing, as well as a 4-hour soak in a solution of 10% nitric acid. In addition, all glassware is rinsed on site with the recovery solution for that train before the assembly of a particular train. Upon arrival on site, the equipment will be unloaded, inspected for possible damage, and then assembled for use. Any damaged or faulty equipment will be tagged and removed from service until it can be repaired.

For all stack gas sampling, reagent grade solutions, including HPLC water, will be used for sample train preparation and recovery.

The following QC checks are generally applicable to source sampling techniques. If any corrective actions are taken in response to results for these QC checks or in response to supervisor review of QC procedures, the corrective action taken will be documented in the field.

The specific actions shown below follow good sampling practice and are a result of close adherence to the methods:

- Each sampling train will be inspected visually for proper assembly before every use.
- Assembly and recovery of the sample trains will be performed in a clean environment.
- All cleaned glassware, hardware, and prepared sorbent traps will be kept closed with caps (Teflon or stainless steel), precleaned foil, or Teflon film until assembly of the sample train in the field. The sorbent traps will be immediately re-capped when the train is disassembled.
- The numbers and locations of the sampling traverse points will be checked before taking measurements.
- The inclined oil manometer used to indicate the differential pressure (ΔP) across the Type-S pitot tube will be leveled and zeroed.
- The temperature measurement system will be checked visually for damage and operability by measuring the ambient temperature.
- Prior to sampling, calculations will be made to determine the proper size nozzle required for isokinetic sampling.
- The sampling nozzle will be inspected visually for damage before and after each run.
- The Type-S pitot tube will be inspected visually for damage before and after each run.
- During sampling, the roll and pitch axis of the Type-S pitot tube and the sampling nozzle will be properly maintained.
- Handling of the filters will be performed in clean areas out of drafts. Teflon-coated tweezers will be used at all times to transfer the filters.
- The field balance will be checked daily against standard weights to read within ±0.5% of the standard, or a calibration curve will be prepared for the balance. This will be documented in the field logbook.
- Any unusual conditions or occurrences will be noted on the appropriate data form during each run.

- The sampling train will be purged prior to sample collection. This will occur during the leak-checking operation and will be documented on the sampling data sheet.
- The sampling probe will be sealed properly to prevent air in-leakage.

The following activities have to do with preparation and use of material for sampling:

- All reagents will be prepared and stored according to the recipes provided in the methods.
- Separate dispensing containers will be assigned to each reagent to prevent cross-contamination.
- Sample filters will be inspected for pin-holes, tears, or other compromising conditions before use.

The following activities will be documented on the pre-printed data sheets:

- All sampling data will be recorded on standard data forms that will serve as pre-test checklists.
- Each leg of the Type-S pitot tube will be leaked-checked before and after each run.
- Dry gas meter readings, ΔP and ΔH readings, temperature readings, and pump vacuum readings will be made properly while sampling at each traverse point.
- The sampling trains will be leak-checked before and after each run. If a sampling train is moved from one sampling port to another during a run, the train will be leak-checked between ports.
- Ice will be maintained in the ice bath throughout each run.
- Filters and sorbent traps will be maintained at the proper temperature throughout the test run.
- Impingers will be weighed to the nearest 0.1 gram before and after sampling, as needed for moisture determination.

The following activities are specified and will be performed:

- A cyclonic flow check of the stack gas (both stack traverse diameters) will be performed prior to sampling to verify the absence or presence of cyclonic flow.
- A field blank will be collected by assembling and recovering one complete sampling train. The blank sample train will be leak-checked at the sampling location. No gaseous sample will be passed through the sampling train. A sampling data sheet will be filled out for the blank sample. It will be treated as an actual sample, except that no stack gas will be sampled.
- Reagent blanks consisting of sampling media that have been either prepared or transported to the site will be collected and will be analyzed in the event of suspected contamination. These samples will be assigned log numbers and will appear in the logbook and on the chain-of-custody forms.
- Isokinetic sampling will be achieved within ±10%. Calculations of isokinetic sampling rate will be performed on site, as quickly as possible after sampling is concluded.

QC procedures specific to each sampling method are discussed in the following sections.

EPA Methods 5 and 26A

Particulate matter, hydrogen chloride and chlorine will be determined in the stack gas according to EPA Methods 5 and 26A, as described above. The probe and filter holder will be maintained at a temperature between 248 and 273oF. The methods require that the leakage rate at the end of the run not exceed 0.02 cubic feet per minute. Final leak checks will be performed to confirm this. In addition, leak checks will be performed before the test, during port change, and any time a component is changed out. A component change-out may be replacement of a filter or impinger, or just emptying an impinger. All leak checks will be recorded on the sampling data sheet.

A field blank will be prepared by assembling and leak testing a sampling train, but without drawing any stack gas through the system. Media blanks of the filter, acid impinger solution, and caustic impinger solution will be prepared and retained for possible analysis. The field blank samples will be analyzed.

Isokinetic sampling will be maintained within ±10%. A field blank for the trains will be prepared by assembling and leak testing a sample train, but without drawing any gas through the system.

EPA Method 29

Metals will be determined in the stack gas during the test using EPA Method 29. The probe and the filter holder will be maintained at 248 ±25oF. The method requires that the leakage rate at the end of the run not exceed 0.02 cubic feet per minute. Final leak checks will be performed to confirm this. In addition, leak checks will be performed before the test, during port change, and any time a component is changed out. A component change-out may be replacement of a filter or impinger, or just emptying an impinger. All leak checks will be recorded on the sampling data sheet.

A field blank will be prepared by assembling and leak testing a sampling train, but without drawing any stack gas through the system. Media blanks of the filter and the impinge solutions and chemicals will be prepared and retained for possible analysis. The field blank samples will be analyzed.

Isokinetic sampling will be maintained within ±10%. A field blank will be prepared by assembling and leak testing a sample train, but without drawing any gas through the system.

SW-846 Method 0061

Chromium VI will be determined in the stack gas during the test using SW-846 Method 0061. The method requires that the leakage rate at the end of the run not exceed 0.02 cubic feet per minute. Final leak checks will be performed to confirm this. In addition, leak checks will be performed before the test, during port change, and any time a component is changed out. A component change-out may be replacement of a filter or impinger, or just emptying an impinger. All leak checks will be recorded on the sampling data sheet.

A field blank will be prepared by assembling and leak testing a sampling train, but without drawing any stack gas through the system. Media blanks of the caustic impinger solution and chemicals will be prepared and retained for possible analysis. The field blank samples will be analyzed.

Periodically during sampling, the pH of the first impinger solution will be checked. If necessary to maintain a pH greater than 8.5, 0.5 N KOH will be added to the first impinger.

SW-846 Method 0023A (Dioxins/Furans/PCB)

SW-846 Method 0023A sampling trains will be collected and analyzed for dioxins/furans/PCB. The temperature of the probe liner, filter holder, and Teflon transfer line from the filter to the impingers and sorbent module will be maintained at 248±25oF. The temperature of the gas entering the XAD-2 sorbent trap shall not exceed 68oF. The system will be leak-checked before and after each run to ensure leakage rates of less than 0.02 cfm. If leakage rates exceed this limit, sample volumes will be adjusted accordingly, as described in the methods. Isokinetic sampling will be maintained within ±10%.

A field blank will be prepared by assembling and leak testing a sampling train, but without drawing any stack gas through the system. An XAD-2 media blank will be prepared and retained for possible analysis. The field blank samples will be analyzed.

Reagent blank samples will also be prepared by collecting portions of reagents and media (filter and XAD sorbent) that have been brought to the plant and kept in the recovery area. These samples will never have contact with stack gas. The reagent blank samples will be archived and analyzed only if necessary based on stack gas and field blank analysis results.

Continuous Emission Monitoring

Oxygen (O_2) and carbon dioxide (CO_2) will be monitored in the stack gas during the test using EPA Method 3A. QC procedures include the following:

- Calibration per the manufacturer's specification;
- Use of calibration gases of appropriate range;
- Use of documented, traceable standards;
- Performance of calibration error checks; and
- Performance of zero and upscale drift checks.

9.1.2 Waste Sampling

Liquid and sludge samples will be collected using the tap sampling procedures specified in EPA Method S-004. Individually collected liquid and sludge samples will be composited according to the schedule indicated in Section 5.0. Individual solid stream samples will be collected by Veolia personnel, using Veolia procedures, and composited for analysis as indicated in Section 5.0.

Liquid sampling QC procedures will include the following:

1. The sample tap will be flushed each time before sample is collected;
2. A new subsampling bottle will be used for each test run; and
3. A pre-printed data sheet will be used.

A Standard Operating Procedures (SOP) is included in Appendix A for the collection of liquid (including sludges) waste streams.

9.2 Analytical Quality Control Activities

A summary of analytical methods to be used for each parameter and sample stream is presented in Section 8.0 of this document. Analytical QC procedures will be followed as described in the referenced methods. This section presents a summary of QC checks used to control method performance within acceptable limits and provides details or modifications specifically designed to assess precision and accuracy in the actual sample matrices.

9.2.1 QC for Determination of Particulate Matter in Stack Gas

Samples of the stack gas for determination of particulate matter will be collected using a single sampling train meeting the requirements of EPA Methods 5 and 26A. These samples will be analyzed by Eurofins TestAmerica Knoxville for total weight gain, by gravimetric analysis. This will be done according to the procedures in EPA Method 5. All method QA/QC activities and requirements will be followed and met.

9.2.2 QC for Determination of Hydrogen Chloride and Chlorine in Stack Gas

Concentrations of hydrogen chloride and chlorine in stack gas will be determined by measuring the chloride ion concentration in the acidic and caustic impinger solutions from the EPA Methods 5 and 26A sampling train. The analysis will be performed by ion chromatography, according to Method 26A. In addition to routine analytical method QC requirements (which include duplicate analysis of all samples) an MS/MSD will be performed on splits of one sample from each condition to assess accuracy and precision in the sample matrix. Two splits of the samples will be spiked identically with chloride at appropriate levels.

A summary of routine analytical QC checks for these methods is presented in **Table 9-2**.

Accuracy and precision estimates will be calculated from matrix spike recoveries. Note that the method requirement for duplicate analysis is repeated measurements within 5% of the mean, with a corrective action of analysis of another duplicate pair. For this test, the requirement has been defined as RPD <10%, with the determination of a third value.

Table 9-2. Summary of QC Checks for Hydrogen Chloride and Chlorine Analysis[1]

Parameter	Quality Control Check	Frequency	Acceptance Criteria	Corrective Action[1]
Chloride	Multi-point calibration	Daily	R > 0.995	Repeat calibration.
	QC check sample	Every 10th analysis	+ 10% error	Repeat calibration.
	Method blank	One per batch	None detected	Determine source of contamination. Reanalyze affected samples.
	Duplicate analyses	All samples	RPD <10%	1) Repeat duplicate analysis; and 2) Average all 4 results.
	Matrix spike (Cl- only)	Once	85-115% recovery	Flag data.

1 All corrective action will be noted on laboratory reports and discussed in the QA/QC section of the final report.

9.2.3 QC for Determination of Metals in Stack Gas and Waste

Samples of the stack gas collected using EPA Method 29, will be analyzed for antimony (Sb), arsenic (As), barium (Ba), beryllium (Be), cadmium (Cd), chromium (Cr), lead (Pb), nickel (Ni), selenium (Se), silver (Ag), thallium (Tl), and zinc (Zn) using Method 6010B from SW-846. Method 6010B uses an inductively coupled plasma emission spectrometer (ICPES). Mercury (Hg) will be determined using Method 7470A of SW-846, a cold vapor atomic absorption spectrometry (CVAAS).

Samples of the waste feeds will be analyzed for the same 13 metals using Method 6010B and Method 7470A or Method 7471A. A summary of the QC procedures for analysis of metals is presented in **Table 9-3A** and **Table 9-3B**.

Table 9-3A. Summary of Analytical QC Checks for Metals in Waste Feeds

Parameter	Quality Control Check	Frequency	Acceptance Criteria	Corrective Action [a]
Metals (ICPES), except Hg	Initial mixed standard calibration	Daily, prior to analysis	Measured value for the initial calibration verification is within 10% of expected value	Repeat calibration
	Calibration check sample	Following calibration; 10% during sample analysis	Within 10% of expected value	Evaluate system; recalibrate
	Calibration blank	10%	< reporting limit	Repeat; evaluate system; recalibrate
	ICP interference check	Run at beginning	80-120% of true value	Repeat calibration

Parameter	Quality Control Check	Frequency	Acceptance Criteria	Corrective Action [a]
	Method Blank	1 per batch of maximum 20 samples	< reporting limit	Flag data
	Laboratory Control Sample	1 per batch of maximum 20 samples	80-120% recovery	Flag data
	Post Digestion Spike	1 per batch of maximum 20 samples	75-125% recovery	Flag data
	MS/MSD	1 per batch of maximum 20 samples	20% RPD; 70-130% recovery	Flag data; notify lab project manager
Mercury (CVAAS)	Multi-point calibration plus zero	Daily, prior to analysis	Correlation coefficient >0.995	Repeat calibration.
	Calibration check	Following calibration; 10% during sample analysis	Recovery between 80 – 120%	Repeat calibration.
	Calibration blank	10%	< reporting limit or 1/10th the lower samples level	Repeat; evaluate system; recalibrate
	Method Blank	1 per batch of maximum 20 samples	< reporting limit	Flag data
	Laboratory Control Sample	1 per batch of maximum 20 samples	80-120% recovery	Flag data
	MS/MSD	1 per batch, max 20 samples per batch	20% RPD; 75-125% recovery	Flag data; notify lab manager; notify QA officer

a All corrective action will be noted on laboratory reports, and discussed in the QA/QC section of the final report.

Table 9-3B. Summary of Analytical QC Checks for Metals in Stack Gas (Method 29)

Parameter	Quality Control Check	Frequency	Acceptance Criteria	Corrective Action [a]
Metals (ICPES), except Hg	Initial mixed standard calibration	Daily, prior to analysis	Measured value for the initial calibration verification is within 10% of expected value	Repeat calibration
	Calibration check sample	Following calibration; 2 runs during sample analysis	Within 10% of expected value	Evaluate system; recalibrate
	Calibration blank	2 runs during sample analysis	< reporting limit	Repeat; evaluate system; recalibrate

Parameter	Quality Control Check	Frequency	Acceptance Criteria	Corrective Action [a]
	ICP interference check	Run at beginning	80-120% of true value	Repeat calibration
	Method Blank	1 per batch of maximum 20 samples	< reporting limit	Flag data
	Laboratory Control Sample	1 per batch of maximum 20 samples	80-120% recovery	Flag data
	Post Digestion Spike	1 per batch of maximum 20 samples	75-125% recovery	Flag data
	MS/MSD	1 per batch of maximum 20 samples	20% RPD; 70-130% recovery	Flag data; notify lab project manager
	Duplicate analysis	1 per batch of maximum 20 samples	Within 20% of average	Flag data; notify lab project manager
Mercury (CVAAS)	Multi-point calibration plus zero	Daily, prior to analysis	Correlation coefficient >0.995	Repeat calibration.
	Calibration check	Following calibration; 2 runs during sample analysis	Recovery between 80 – 120%	Repeat calibration.
	Calibration blank	2 runs during sample analysis	< reporting limit or 1/10th the lower samples level	Repeat; evaluate system; recalibrate
	Method Blank	1 per batch of maximum 20 samples	< reporting limit	Flag data
	Laboratory Control Sample	1 per batch of maximum 20 samples	80-120% recovery	Flag data
	MS/MSD	1 per batch, max 20 samples per batch	20% RPD; 75-125% recovery	Flag data; notify lab manager; notify QA officer
	Duplicate analysis	1 per batch of maximum 20 samples	Within 20% of average	Flag data; notify lab project manager

[a] All corrective action will be noted on laboratory reports, and discussed in the QA/QC section of the final report.

9.2.4 QC for Determination of Chromium VI

The concentration of chromium VI in the stack gas will be determined by analyzing the potassium hydroxide solution from the chromium VI sampling train, SW-846 Method 0061. The analysis is performed using ion chromatography. The QC checks associated with this analysis are presented in **Table 9-4**.

Table 9-4. Summary of Analytical QC Checks for Chromium VI Analysis [1]

Quality Control Check	Frequency	Acceptance Criteria	Corrective Action [2]
Multipoint Calibration	Daily, prior to analysis	Correlation coefficient >0.995	Repeat calibration
Duplicate analysis	All samples	RPD ≤20%	Repeat duplicate analysis
QC check sample	Every 10th analysis	± 10% of expected value	Repeat calibration
Method blank	One per batch	None detected	Determine source of contamination; reanalyze affected samples; flag data
MS/MSD	Once	90 - 110% recovery	Flag data

1 Analysis to be performed by Eurofins TestAmerica Knoxville.

2 All corrective action will be noted on laboratory reports and discussed in the QA/QC section of the final report.

9.2.5 QC for Determination of Dioxins/Furans/PCB in Stack Gas

The concentration of dioxins/furans in the stack gas will be determined by analysis of the recovered components of the SW-846 Method 0023A sampling train. Samples will be analyzed for dioxins/furans using HRGC/HRMS according to SW-846 Method 8290A and EPA Method SW-846 Method 1668A/ 8270C. A summary of method QC checks is presented in **Table 9-5**.

Table **9-5.** Summary of Analytical QC Checks **for Dioxins/Furans/PCB Analysis by HRGC/HRMS [1]**

Quality Control Check	Frequency	Acceptance Criteria	Corrective Action [2]
Mass Resolution Check	Daily	10,000 resolution	Adjust
GC Column Performance Check	At beginning of 12-hour shifts	≤25% valley	Recalibrate or column maintenance
Initial Calibration	Prior to analyzing samples.	≤25 or 30% RSD for multi-point calibration. See Table 5 in SW-846 Method 0023A. 3 Ion ratios between 0.65 and 1.78. See SW-846 Method 0023A, Table 4. [3]	Perform repairs, maintenance, or adjustments, repeat.
Calibration/Retention Time Window Check	At beginning of 12-hour shifts	1st and last eluters within window.	Adjust group times
Continuing Calibration	At beginning of 12-hour shifts	Within 25 or 30% of relative response factor from initial calibration. See Table 5 in SW-846 Method 0023A. [3]	Adjust and re-analyze Continuing Calibration Standard
Method Blank 4	At beginning of 12-hour shifts	Less than the lowest calibration standard	Re-analyze all positive samples in batch
Internal Standards	All samples	40-130% recovery for tetra, penta- and hexa- substituted species. 25-130% recovery for hepta- and octa- substituted species.	Flag Data
LCS/LCSD	Once per Batch	70-130% Recovery	Flag Data

Quality Control Check	Frequency	Acceptance Criteria	Corrective Action [2]
Surrogate Spiking	All samples	70-130% recovery for all five surrogates	Flag Data

1 Analysis to be performed by Test America Knoxville.

2 All corrective action will be noted on laboratory reports and discussed in the QA/QC section of the final report.

3 Refer to method for specific isomers.

4 Method blank consists of an extraction of clean XAD, taken through concentration and analysis

9.2.6 QC for Determination of Composition by ASTM Methods

Samples of the waste feeds will be analyzed for ash, total chlorine, moisture, heating value, viscosity, and density using EPA and ASTM standard methods. The measurement parameters and corresponding reference methods are listed in Section 8 of this document. Routine QC procedures as defined in the methods will be followed for all analyses. This usually includes the analysis of a standard reference material to determine recovery and demonstrate the method performance. The QC procedures for the compositional analyses are presented in **Table 9-6**.

Table **9-6.** Summary of Analytical QC Checks for Analysis of Waste Feed Samples **for Heating Value, Density, Ash, Viscosity and Total Chlorine** [1,2]

Parameter	Quality Control Check	Frequency	Acceptance Criteria	Corrective Action [3]
Heating Value	Initial Calibration—running average of 10 daily calibration standards	Prior to analysis	%RSD <1%	Correct problem; add standards until %RSD criterion is met.
	Calibration Check Standard (also added to running list of 10 previous calibrations)	Daily	%Difference <1%	Correct problem, retest
	Laboratory Control Sample (LCS)	One per sample batch of up to 20 samples	98-102% of accepted value.	Retest. If the re-test fails, correct the cause and retest all samples.
	Laboratory Control Sample Duplicate (LCSD)	One per sample batch of up to 20 samples	RPD ≤2.0%.	Retest. If the re-test fails, correct the cause and retest all samples.
	Laboratory Duplicate	One per sample batch of up to 20 samples or one per trial burn.	RPD ≤10.0%.	Flag the data, note in narrative.
Density (Liquid Wastes Only)	Pycnometer Calibration	Prior to use	3 Measurements, %RSD < 0.5%	Repeat Calibration
	Calibration Check	Daily	Pycnometer Mass Difference < 0.01g	Recalibrate
	Laboratory Control Sample (LCS)	One per sample preparation batch of up to 20 samples.	Percent accuracy within 99-101%	Determine cause and reanalyze all associated samples.
	Analytical Duplicate	One every 10 samples (minimum one per trial burn).	RPD ≤10%	Flag the data.

Parameter	Quality Control Check	Frequency	Acceptance Criteria	Corrective Action [3]
Viscosity (Liquid Wastes Only)	Calibration Check Sample	Before sample analysis begins, analyze one calibration check standard per batch of up to 20 samples, for each viscometer used in the batch.	Percent difference ≤1%.	Correct the problem. Obtain an acceptable result before beginning sample analysis.
	Analytical Duplicate	One every 10 samples (minimum one per trial burn). Duplicate samples should be performed using different, but same size viscometers, if available.	RPD ≤10%	Flag the data.
Ash	Laboratory Method Blank (LMB)	Every 20 samples or once per sample batch.	The result must be less than the RL. Exception: If all sample results are greater than 10x the blank concentration or less than the RL, do not reanalyze.	Return all of the samples to the muffle furnace and re-fire them. Re-weigh after cooling.
	Laboratory Control Sample (LCS)	Every 20 samples or once per sample batch.	90-110% recovery	Re-fire all associated samples and reanalyze if recovery exceeds upper limit. If recovery is less than lower limit, terminate analysis and reanalyze all associated samples.
	Laboratory Control Sample Duplicate	Every 20 samples or once per sample batch.	RPD ≤ 10 %	Re-fire all associated samples and reanalyze. If RPD value continues to exceed 10%, reanalyze all related samples.
	Laboratory Duplicate	Every 10 samples, once per sample batch. Once for each trial burn project.	RPD ≤ 10 % of mean value.	Flag data.

Parameter	Quality Control Check	Frequency	Acceptance Criteria	Corrective Action [3]
Total Chlorine	Method Blank	One per sample preparation batch of up to 20 samples.	The result should be less than or equal to the RL. Sample results greater than 20x the blank concentration or samples for which the contaminant is < RL do not require reprep.	Reprep and reanalyze samples.
	Laboratory Control Sample (LCS)	One per sample preparation batch of up to 20 samples.	80-120% Recovery	Reprep and/or reanalyze all samples associated with the LCS.
	Laboratory Duplicate	One per sample preparation batch of up to 10 samples. (Minimum one duplicate per trial burn)	RPD ≤ 10%	Flag the data if RPD > 10%.
	Matrix Spike	One per sample preparation batch of up to 20 samples. For trial burn samples, one per trial burn.	80-120% Recovery	Flag the data if % Recovery is outside QC acceptance limits
	Matrix Spike Duplicate	One per sample preparation batch of up to 20 samples. For trial burn samples, one per trial burn.	RPD ≤ 10%	Flag the data if RPD > 10%.
Moisture – Percent Water for Liquids	Laboratory Control Sample (LCS)	One per sample preparation batch of up to 20 samples. For CfPT samples, one per CfPT.	95-105% Recovery	Flag data
	Laboratory Control Sample Duplicate (LCSD)	One per sample preparation batch of up to 20 samples. For CfPT samples, one per CfPT.	RPD ≤ 5%	Flag data
	Analytical Duplicate	One per sample preparation batch of up to 20 samples. For CfPT samples, one per CfPT.	RPD ≤10% for % water > 1%	Flag data
Moisture – Solids	Analytical Duplicate	One per sample preparation batch of up to 20 samples. For CfPT samples, one per CfPT.	RPD ≤ 25% or ≤ 4% Absolute for samples having < 18.0% moisture	Flag data

[1] Analysis to be performed by Eurofins TestAmerica Knoxville.

[2] All specifications are laboratory specifications.

[3] All corrective action will be noted on laboratory reports, and discussed in the QA/QC section of the final report.

10. Data Reduction, Validation, and Reporting

Details of data reduction, validation, and reporting are discussed in this section.

10.1 Calculations

The following sections detail the calculations which will be performed for data presentation.

The stack gas concentration of the parameters tested will be reported as the average of three test runs to document compliance. Stack gas concentration for a parameter may include analytical results for multiple components. For the determination of stack gas concentration measured in an individual sample, or run, for those sampling systems as applicable (other than SW-846 Method 0023A), the following convention will be used to sum the results of multiple analyses:

- In cases where all analytical results are hits (i.e., not “non-detects”), all analytical results will be summed.
- In cases where all analytical results are “non-detects,” all method detection limits will be summed, and the summed result reported as a maximum (“<”).
- In cases where one or more analytical results are hits, and one or more analytical results are “non-detects,” the hits and the “non-detects” will be summed and reported as a maximum (“<”).

Results for dioxins/furans will be converted to 2,3,7,8-tetrachlorodibenzo-dioxin toxicity equivalents (TEQ). Note that Section §1208(b)(1)(iii) of the HWC MACT states that non-detects of dioxins/furans can be assumed to be at zero concentrations.

In those circumstances where a constituent is not detected in a waste feed (i.e., is not analyzed above the method detection limit), the concentration of that parameter will be treated as zero "0" in subsequent calculations.

10.1.1 Stack Gas Mass Emission Rate Calculations

Mass emission rates (MERs) will be calculated for the following stack gas components:

- HCl and Cl_2;
- Metals;
- PCBs;
- and
- Chromium VI.

The MERs, in pounds per hour, will be calculated as follows:

$$\text{MER} = \left(\frac{60}{454 \times 1{,}000{,}000}\right)\left(\frac{M_n \times Q_{sd}}{V_d}\right)$$

Where:

M_n = Mass of compound collected (µg);

Q_{sd} = Dry volumetric flowrate at standard conditions (dscfm);

V_d = Dry gas volume sampled at standard conditions (dscf);

60 = Conversion from hours to minutes;

454 = Conversion of grams to pounds; and

1,000,000 = conversion of µg to grams.

10.1.2 Constituent Feedrate Calculations

The concentrations of metals, ash, PCBs and chlorine will be determined in the waste feed streams in each test period. The total mass feedrates of metals and chlorine during each test period will be calculated from concentrations in the waste streams, and the feedrates of the waste streams recorded by the facility. The feedrate of ash to the afterburner will be calculated from the ash concentrations in the waste streams fed to the SCC, and the feedrates of the waste streams recorded by the facility.

10.1.3 Correction to 7% Oxygen

The emission limits of the HWC MACT are expressed in concentrations "corrected to 7% oxygen". Stack gas concentrations for dioxins and furans will be corrected to 7% oxygen using the concentration of oxygen measured by EPA Method 3A during the stack sampling for dioxins/furans. This correction is done according to the following equation:

$$P_c = P_m \left(\frac{13.9}{20.9 - \text{Oxygen}}\right)$$

Where:

P_c = Pollutant concentration corrected to 7% oxygen;

P_m = Pollutant concentration in the stack gas; and

Oxygen = Concentration of oxygen in the stack gas (in percent).

10.1.4 Stack Gas Volumetric Flowrate

The stack gas volumetric flowrate will be determined during all isokinetic sampling and calculated as described in EPA Reference Method 2.

Stack Gas Velocity Calculation

The velocity of the stack gases based on EPA Reference Method 2 will be calculated as:

$$v_s = K_p \times C_p \times \sqrt{\frac{\Delta P_{avg} \times T_s}{P_s \times M_s}}$$

Where:

V_S = Velocity of the stack gas (ft/sec);

ΔP = Root mean square average differential pressure measured by Type S pitot (in. H2O);

T_s = Average gas temperature in duct (R);

P_s = Absolute duct pressure (in. Hg);

M_w = Wet gas molecular weight (lb/lb-mole); and

C_p = Type-S pitot correction factor (normally 0.84).

Gas Volumetric Flowrate Calculation--Actual Conditions

The volumetric flowrate of the stack gas based on EPA Reference Method 2 will be calculated as:

$$Q_{ac} = 60\,(V_s)(A)$$

Where:

Q_{ac} = Actual volumetric flowrate (acfm);

V_s = Velocity of the stack gas (ft/sec);

A = Cross-sectional area of the stack (ft^2); and

60 = Conversion from second to minutes.

Gas Volumetric Flowrate Calculation--Dry Standard Conditions

The volumetric flowrate of the stack gas at dry standard conditions based on EPA Reference Method 2 will be calculated as:

$$Q_{sd} = (1 - B_w)(Q_{ac})\left(\frac{528}{T_s}\right)\left(\frac{P_s}{29.92}\right)$$

Where:

Q_{sd} = Dry volumetric flowrate at standard conditions (dscfm);

Q_{ac} = Actual volumetric flowrate (acfm);

B_w = Moisture fraction;

528 = Standard temperature (oR);

T_s = Average gas temperature in stack (oR);

29.92 = Standard pressure (in. Hg); and

P_s = Absolute stack pressure (in. Hg).

10.2 Data Validation

All measurement data will be validated based upon the following:

- Representative process conditions during sampling;
- Acceptable sample collection and testing procedures;
- Consistency with expected and/or other results; and
- Adherence to prescribed QC procedures.

This will be accomplished by making a critical, comparative data review. For example, upon the completion of a SW-846 Method 0023A sampling run, the data will be calculated, and the percent isokinetics determined. The results of all runs will be compared with each other for internal consistency. The laboratory personnel for analytical QA/QC will review the results from the analysis, and then the results (in analytical terms) converted into gas concentrations. These results are compared within the testing effort for reproducibility and consistency with engineering principles. Any suspect data will be flagged and identified with respect to the nature of the problem with validity.

10.3 Chain-of-Custody Documentation

Chain-of-custody procedures will be followed for the transfer of field samples to the laboratory. When samples are transported, they will be accompanied by a sample tracking and custody form indicating:

- Every sample shipped (by identifier);
- Sample preservation requirements;
- Analysis and preparation procedures required;
- Special requirements [e.g., matrix spikes/matrix spike duplicate (MS/MSD)];
- Sample packaging; and
- Signature of individual relinquishing sample custody.

Upon receipt by the laboratory, the following will be recorded on the sample tracking and custody form or an attachment to the form:

- Condition of samples received;
- Temperature of samples upon receipt;
- Any discrepancy between information on form and sample labels; and
- Signature of person receiving samples.

Following inspection and completion of chain-of-custody documentation, the samples will be moved to a restricted access storage area prior to analysis.

10.4 Reporting

The results of the CfPT/RCRA Periodic Test will be evaluated for completeness and representativeness and will include all collected data. The report will be submitted – a single report for the est - within 90 days after completion of the test. Data and results interpretation will be presented as necessary in the reports. A detailed case narrative will be provided in the final reports for each analysis.

A Notification of Compliance (NOC) will be filed within 90 days of completion of the Test. The NOC and the report will be submitted to TCEQ. Any data collected during the Test that is used to document compliance or establish OPLs is qualified, those qualified data will be presented and discussed in the Test Report and NOC.

11. Assessment of Precision, Accuracy, and Completeness

The QC analyses to be conducted during the testing program are designed to provide a quantitative assessment of the measurement system data. The two aspects of data quality that are of primary concern are precision and accuracy. Accuracy reflects the degree to which the measured value represents the actual or "true" value for a given parameter and includes elements of both bias and precision. Precision is a measure of the variability associated with the measurement system. The completeness of the data will be evaluated based upon the number of valid sample results compared with the number planned.

11.1 Precision

Precision is defined by EPA as "a measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions." For this project, precision estimates will be based on conditions that encompass as many components of variability as are feasible, which includes variability in the sample matrix itself, as well as imprecision in sample collection, preparation, and analysis. Precision data will be reported for matrix spike duplicates and analytical duplicate samples.

Selected surrogates will be spiked into samples analyzed by GC/MS. Precision for these analyses will be expressed as the percent coefficient of variation (CV) for surrogate spike recoveries. Percent CV (also known as relative standard deviation (RSD)) is calculated as follows:

$$\%\text{CV} = \frac{\text{Standard Deviation}}{\text{Mean}} \times 100$$

11.2 Accuracy

Accuracy, according to EPA's definition is "the degree of agreement of a measurement (or an average of measurements of the same thing), X, with an accepted reference or true value, T." Accuracy includes components of both bias (systematic error) and imprecision (random error). Bias may be estimated from the average of a set of individual accuracy measurements.

For this project, accuracy objectives are expressed in terms of individual measurements. Individual measurements will be compared with the objectives presented in Section 3.0 of this QAPjP. In the final analysis, the average accuracy (i.e., bias) calculated as percent recovery, will be reported and used to assess the impact on project objectives. Percent recovery is calculated as follows:

$$\%\text{ Recovery} = \frac{\text{Measured Value}}{\text{Reference Value}} \times 100$$

In the case of matrix spiked samples, measured value in the above equation represents the difference between the spiked sample measurement result and the unspiked sample results. The reference value represents the amount of spike added to the sample.

Consistent with reporting conventions for continuous monitor performance specifications, accuracy will be expressed in terms of percent error, which is directly related to the percent recovery calculation. Percent error is calculated as follows:

$$\%\text{ Error} = \frac{\text{Measured Value}}{\text{Reference Value}} \times 100$$

It follows that percent recovery and percent error are related by:

$$\%\text{ Error}=\%\text{ Recovery}-100$$

11.3 Completeness

Completeness is a measure of the extent to which the database resulting from a measurement effort fulfills objectives for the amount of data required. For this program, completeness will be defined primarily in terms of the number of valid sample results collected compared with the number planned.

12. Audit Procedures, Corrective Action and QA Reporting

This section describes planned general corrective action procedures to be taken in response to identified problems and QA reporting.

12.1 Audit Procedures

Eurofins TestAmerica Laboratories in Knoxville, TN will be performing the analyses for the Test, and will perform the quality control analyses, and the analysis of any audit samples. The U.S. EPA has instituted an audit program, the SSAP (Stationary Source Audit Program), in which the owner firm or test contractor purchases audit samples from laboratories approved by, and accredited by, the EPA to provide the audit samples. The EPA restructured program requires that two accredited providers be available, and available audit samples must be listed on the EPA Emission Measurement Center website 60 days before audits are required. To date, the EPA has approved two vendors to provide audit samples as an Accredited Audit Sample Provider for metals and hydrogen chloride, but not for dioxins/furans.

The following audit sample is applicable to the CfPT of Veolia's incinerator. Audit samples are not mandated by TCEQ for the RCRA Periodic Test.

- Dioxins and Furans

If audit samples for dioxins and furans are available prior to the Test, audit samples will be acquired. The acquired audit samples would be taken to Veolia Port Arthur and would be onsite during the conduct of the Test. The audit samples would be transported to Eurofins TestAmerica – Knoxville with samples collected during the test. Any audit samples would be analyzed by Eurofins TestAmerica – Knoxville along with the samples from the test.

12.2 Corrective Action

During the course of the test program, it will be the responsibility of the field task leader and the sampling team members to see that all measurement procedures are followed as specified and that measurement data meet the prescribed acceptance criteria. In the event a problem arises, prompt action will be taken to correct the problem. Corrective action may also be initiated by the QA Coordinator or team members.

The laboratory supervisors will initiate corrective action if analytical performance (as determined by sample matrix-independent QC checks) does not meet method specifications. Since these QC checks generally occur before analysis of any samples, little or no effect would be expected on project data quality. If there was an impact expected on actual project data, the project director and QA/QC coordinator would be contacted and the problem resolved. If matrix-specific QC checks indicate that the measurement data will not meet the quality assurance objectives, the project director will be notified immediately. The project manager, laboratory analytical coordinator, and project QA/QC coordinator will then meet and resolve the issue.

The impact of measurement bias or matrix effects on the project objectives (and any endeavors to mitigate these problems) will be assessed and reported in the report.

12.3 Quality Assurance Reporting

Effective management of a field sampling and analytical effort requires timely assessment and review of field activities. This will require effective interaction and feedback between the field team leader, the Project Manager, and the QA Coordinator.

The project final report will include a separate QA/QC section that will address QA/QC aspects of the project. The QA/QC section will address the results of all QA/QC activities specified in the QAPjP and in the sampling and analytical methods, and will compare those results with the data quality objectives (DQOs) stated in Section 3.0 of this QAPjP. The effect of any DQOs (or other QA/QC activities) not achieved will be discussed in detail. The effect of these on the data and conclusions will also be discussed in detail. Any incidents or requirements for corrective action will be documented and discussed.

Appendix A

SOP for Liquid and Sludge Waste Sampling

SAMPLING INSTRUCTIONS
Liquid and Sludge Waste Feeds

1.0 BACKGROUND

These instructions are for sampling the Liquid and Sludge Waste Feeds.

The referenced sampling method is Method S004 in EPA's "Sampling and Analysis Methods for Hazardous Waste Incineration".

2.0 SAFETY

The liquid and sludge waste feeds are hazardous. Personal protection equipment (PPE) for this location consists of a hard hat, goggles, steel-toed boots, respirator, Tyvek suit, and appropriate gloves.

3.0 SUPPLIES: TO BE STORED AT THE SAMPLING AREA FOR EACH RUN

1 – Pre-cleaned 125-mL wide-mouth amber glass bottle
1 – Pre-cleaned 1-gallon wide-mouth glass jar
1 – Data sheet
1 – Clipboard
2 – Black ballpoint pens
1 – Sample tray
1 – Watch/Timer
1 – Heavy plastic sheeting (10')
1 – Absorbent towels (roll)
1 – 5-gallon bucket

4.0 SAMPLING PREPARATIONS

1. Obtain supplies.
2. Transport sampling materials to sample location.
3. Check sampling location to ensure that the data sheet, sampling location and sample containers are correctly marked, and labels for the samples. All data sheet and sample containers will be labeled by the sampler.
4. Spread plastic sheeting under the sample tap and the immediate work area with absorbent pads along the edge.
5. Place sample tray near the sample tap on the plastic sheeting.
6. Place the 5-gallon plastic bucket under the sample tap.
7. Mark the 125-mL bottle for about 100-mL.
8. Organize the sampling location and verify that you have the proper tools and documentation paperwork.
9. Legibly record sampler's name and date on the data sheet.

5.0 SAMPLING PROCEDURE

When directed by project coordinator, do the following activities at 30-minute intervals until directed to stop sampling.

1. Locate the sample tap and verify that the sample tap valve is placed in the "off" position.
2. Locate the flow control valve and verify that it is in the "on" position.

3. Verify that the 5-gallon bucket is under the sample tap, and then open the sample tap until a full stream of liquid is flowing into the bucket to flush the sample line. The stream should not be so fast as to be uncontrollable nor so slow as to not flush the sample line. Fill the 50-mL bottle and dump the collected liquid in the 5-gallon bucket.
4. Collect about 100-mL into the 125-mL bottle, shut off the sample valve, and pour the contents into the 1-gallon jar.
5. Record sample time and test run number on data sheet.
6. Cap the 1-gallon jar. It is important that the time the jar is open to the atmosphere be kept to a minimum.
7. Place the 125-mL bottle in sample tray and wait for the next sample period.

(NOTE: If at any time during the sampling event you observe changes in the stream, contact the project coordinator immediately. Examples of changes in the streams are loss of flow, color changes of the material being collected, plugging of the sample lines, etc.)

6.0 COMPLETION OF SAMPLING, CLEAN-UP, SAMPLE CUSTODY

At the end of the sampling period, upon direction, perform the following activities.

1. Verify that the data sheet has been completed.
2. Verify that the 1-gallon jar is capped.
3. Locate the valve that controls flow to the sample tap and place in the “off” position.
4. Open the sample tap valve and drain the line into the 5-gallon bucket, then close the valve.
5. Carefully transport the 5-gallon bucket containing the waste liquid to designated disposal drum and transfer the contents.
6. Return the bucket to the sampling location.
7. Clean up the sample location by folding the plastic sheeting as to contain any spilled material and absorbent pads, and dispose appropriately.
8. Remove all disposable PPE and dispose appropriately.
9. Return the 1-gallon bottle and the data sheets to the sample accumulation area.

Appendix B

Resumes

Don Icard
Veolia North America

Process Technology Manager

YEARS OF EXPERIENCE
With Veolia: 25
With Other Firms: 17

EDUCATION
Bachelor of Science (BSc), Chemical Engineering, Louisiana State University

EXPERIENCE SUMMARY
Don has worked as an engineer for 32 years including 25 years in the hazardous waste industry.
He has coordinated and overseen dozens of Comprehensive and Confirmatory / RCRA Periodic test campaigns.

Laura Faletto

West Air Practice Department Manager, Associate Vice President

YEARS OF EXPERIENCE
With AECOM: 11
With Other Firms: 15

EDUCATION
Bachelor of Science (BSc), Chemical Engineering, Missouri University of Science and Technology, 1998

LICENSES / REGISTRATIONS / CERTIFICATIONS / TRAINING
Certified Hazardous Materials Manager, Institute of Hazardous Materials Management
AECOM Project Manager Certification

EXPERIENCE SUMMARY
Laura has over two decades of experience in environmental compliance, air permitting, and environmental awareness training. She has a substantial background covering a wide variety of environmental topics and experience performing consultant services and working in both the utility and private industry sectors. Laura has provided comprehensive environmental assistance to industrial and manufacturing clients with the ability to manage regulatory compliance issues ranging from air and water permitting to training development and delivery. She has assisted in preparing air, RCRA, Title V, and injection well permit applications, comprehensive and confirmatory test plans, QAPPs and preparation of Toxic Release Inventories and Tier II report forms under EPCRA Section 313 and Section 312.

Laura has extensive experience assisting cement kilns and hazardous waste incinerators. She has prepared operation and maintenance plans, monitoring plans, and startup, shutdown, and malfunction plans for industrial facilities required to comply with MACT regulations. Laura is proficient in completing toxic release inventories, annual emission reports (including greenhouse gases), and emission calculations. In addition, she performs environmental, safety, and hazardous materials training for industrial facilities. Laura has compiled industry-wide emissions databases and a report summarizing the state of multi-pathway risk assessments for the cement manufacturing industry. She also has experience with environmental compliance auditing, training, and regulatory applicability determinations.

Confidential Copper Manufacturing Client, Environmental Assistance, Various Locations.
Project included ongoing environmental compliance support for multiple manufacturing facilities in two states. Direct several staff and provide technical support to track, compile, and deliver annual hazardous waste reports, Tier II reports, TRI reports, and quarterly wastewater reports. Monitor activity on several tasks with simultaneous deadlines and fulfilled client's expectation to remain within budget. Maintain positive relationship with the long-term industrial client.

Veolia Technical Solutions, CPT, CfPT, Project Manager, Texas and Illinois.
Over the past 10 years, led projects to plan and execute various stack testing programs as required by air permits to comply with HWC MACT and RCRA regulations. As project manager, responsible for scope, schedule and budget matters; make sure technical review of deliverables completed and quality procedures followed, document team members have required safety/security training, communication with client and regulatory compliance agency.

Confidential Hazardous Waste Incinerator, Project Manager.
AECOM measurements staff designed and implemented a stack testing program that was able to detect emissions of PFAS and utilize new EPA collection and analysis methods. PFAS testing in water and soil samples is somewhat mature, but measurements in air samples is a new field with few testing firms or laboratories with experience. As project manager, provide overall management direction to the assigned team, manage the project budget, subcontractor selection and oversight, and oversee the quality of AECOM's deliverables.

Confidential Electric Utility Client, Air Permitting/NEPA Data Information Volume Support, Illinois.
Client plans to modify existing equipment to create the first of its kind large-scale oxy-combustion coal-fired unit that will include carbon capture and sequestration. Compile air permit application to modify an electrical generating facility and new CO2 sequestration site. Facility air permit application included demonstrating facility emissions did not trigger prevention of significant deterioration requirements. Use data from design documents to dozens of data packages containing technical information about the project to support US Department of Energy's environmental impact study.

Confidential Petroleum Refining Client, Site Compliance, Illinois.
Write and deliver mandatory training to fulfill the RCRA generator requirements, specifically for less than 90-day hazardous waste storage areas for two separate sites. Write the spill prevention, control, and countermeasures plan for both project sites and provide training to

site personnel.

Confidential Carbon Fiber Manufacturing Client, Environmental Issues Compliance, Missouri.
Project included assessment of all aspects of physical facility and operational methods that could impact hazardous waste management compliance. Provide technical review of revised facility documentation and procedures including required regulatory reporting, inventory of wastes, waste inspection program, and waste management program and training.

Confidential Clean Energy Provider Client, Environmental Critical Impact Analysis, Oklahoma.
Client constructs and operates power plants to produce electricity from renewable resources. Research potential federal, state and local regulatory requirements that may impact the citing and building of a new wind farm. Locate and coordinate experts in various investigation areas including biology, geology, archeology, community relations, permitting and GIS within AECOM and guide research and analysis efforts. Discuss concerns with client and develop mitigation strategies. Oversee the review and compilation of the final analysis report.

Confidential Plastics Manufacturing Client, Air Permit, Air Testing, Reporting, Water Compliance, Illinois.
Prepared manufacturer Title V renewal application and met with state permit writer to develop strategy to update format of submittal. Performed historical review and wrote summary of permitting of each equipment unit at the facility. Respond to several CAA 114 information requests focusing on emissions compliance. Review previous air testing protocols, develop a redesigned test protocol at the request of the regional EPA office, perform subcontractor selection and test oversight. Assist with oversight of confirmatory source testing. Prepared TRI, Tier II, hazardous waste, and Title V certification reports. Assessed all aspects of physical facility and operational methods that could impact water quality. Investigate relationship between industrial chemical use, material storage, industrial water and stormwater. Create action list and spill prevention, control, and countermeasures plan. Determine applicability of discharge permit requirements and created stormwater pollution prevention plan, and discharge permit application package.

Confidential Hydrogen Producing Client, Title V Air Permit, Illinois.
Prepare manufacturer Title V renewal application including preparation of emission calculations, regulatory applicability determination. Meet with client to develop strategy to draft and submit required regulatory notifications. Perform applicability determination for a modification to Title V air permit and prepare submittal package. Continue support for client and respond to agency comments or requests for additional information.

Confidential Client, Coal Combustion Residual Closure Plans & Fugitive Dust Control Plans, Various Locations.
Generate closure and post closure plans based on closure designs in response to the 2015 USEPA CCR rule. Maintain open communication and deliver project progress reports and budgetary information to corporate client. Coordinate project using employees from several offices to conduct site visits at various client sites, generate reports of findings and recommendations for CCR dust mitigation and create site specific plans in response to the 2015 USEPA CCR rule.

Essroc Cement, RCRA Permit Renewal Application, Indiana.
Prepare RCRA permit renewal application package for a hazardous-waste burning cement kiln. Address and incorporate changes in facility’s operation and equipment since the previous permit application submittal. Respond to agency questions on the permit application. Perform regulatory applicability review and commented on draft permit issued by the state agency. Negotiate with state and federal regulatory agencies to obtain advantageous conditions for client.

Essroc Cement, PSD Applicability Determination, Indiana.
Develop report discussing applicability of federal PSD regulations for a modification of a cement kiln and debottlenecking of the supporting material handling equipment.

Anheuser-Busch Companies, Inc. InBev, Environmental Compliance Audit, Florida & Missouri.
Perform in-depth environmental compliance audit at a beverage container manufacturing facility as part of an audit team consisting of consultants and client representatives. Responsibility areas for audit include wastewater discharge, stormwater, spill control and Emergency Planning and Community Right-to-Know. Inspect operating records and physically reviewed facility operations to access compliance with existing permits, federal, local, and internal requirements. Interviewed local facility personnel to verify required records and reports were present. Present recommendations to client based on observations.

Church & Dwight Co. Inc., Environmental Compliance Audit, New Jersey and Missouri.
Conduct a multi-media audit of a detergent manufacturing facility. Investigate air emissions and controls, wastewater, stormwater, hazardous waste, oil storage, and facility management systems to evaluate compliance with federal, state, and local environmental regulations. Present recommendations to client in written report based on observations and knowledge of applicable regulatory requirements.

Wayne Washburn

Air Quality Senior Scientist

Years of experience
35

Years with AECOM
31+

Education
Bachelor of Science

Registrations/Certifications
QSTI

Mr. Washburn has thirty-five (35) years experience in environmental science specializing in air emissions measurements for regulatory compliance, process optimizations, and internal environmental assessments. He has traveled the world to provide his expertise and experience to clients in the Continental United States, Alaska, Canada, the Caribbean, and Greenland.

Professional history

Technical Specialties

- Professional Oversite – Qualified Source Testing Individual (QSTI)
- Senior Project Manager – Continuous Emissions Monitoring Systems (CEMS)
- Field Oversite and Execution of CEMS Related Projects
- CEMS Procurement and Initial Certifications
- CEMS Evaluations and Factory Acceptance Test (FAT) Oversight
- CEMS QA/QC and Monitoring Protocols
- Source Emissions Testing Broad Spectrum Experience
- Third Party Observer and Consultant for Emissions Testing
- Chemical Analyses

Professional Oversite – QSTI Certification

Mr. Washburn has passed comprehensive examinations and satisfied experience requirements in accordance with the guidelines issued by the Source Evaluation Society (SES) Qualified Source Testing Individual (QSTI) Review Board for “Manual Gas Volume Measurements and Isokinetic Particulate Sampling Methods” (Group 1) as well as “Gaseous Pollutants Instrumental Sampling Methods” (Group 3) with signed 5-year certificates for each maintained since 2015 and currently valid through March 25, 2026. As such, he meets all the requirements set forth by US EPA for holding a certificate of accreditation for the relevant test methods issued by a recognized national accreditation body in order to oversee field testing required by Part 75 regulations (40 CFR 75, Appendix A, Section 6.1.2). He has successfully provided QSTI oversite for many projects in Part 75 CEMS certification and source emissions testing and is fully aware of the requirements of oversite for such projects.

Project Manager

Mr. Washburn served as a Senior Project Manager in the Air Measurements Group, with 35 years of scientific measurement experience with AECOM and others, specializing in a broad range of test methods, especially in instrumental analysis of air pollutants from stationary sources. He has successfully managed many projects in engineering studies, CEMS certifications, and source emissions testing and is fully aware of the requirements of managing such projects.

Field Team Leader

Mr. Washburn serves as field team leader and senior scientist on air measurements projects. He directs the field staff and coordinates with customer and regulatory representatives. Mr. Washburn provides a high level of quality control oversight in the field, and quickly resolves regulatory and process issues in the field while defending the client's best interests.

Source Emissions Testing

Mr. Washburn performs source emissions testing on diverse types of sources, including industrial process exhausts, boilers, gas turbines, thermal oxidizers, air ventilation systems, scrubber systems, kilns, ovens, containment enclosures, and other point sources of numerous varieties. He is familiar with US EPA, BIF, CARB, NIOSH, NCASI, OSHA, and other regulatory methods of source testing including individual requirements within various states.

Chemical Analyses

As the extraction lab supervisor, Mr. Washburn has been responsible for scheduling work, writing/interpreting extraction standard operating procedures, training technicians in extraction methods, maintaining QC log of extractions, and conducting performance reviews of extraction techniques. He is familiar with gas chromatography, UV/VIS spectroscopy, IR spectroscopy, various meters (pH, etc.) and balances (meter), GPC operation, soxhlet and continuous extraction methods, and sonication.

As an extraction lab technician, Mr. Washburn performed soil, water, and filter sample extractions for pesticide/ PCBs, herbicides, semi-volatiles (PNAs), EPTOX, TCLP, petroleum compounds, phenols, PAHs, and other compounds.

Selected project experience

Lutz, Daily, and Brain, CEMS Procurement Consulting, Fremont, Nebraska

Design of Air Quality Monitoring Systems

Teamed with Lutz, Daily and Brain, LLC (LD&B) to assist the Fremont Department of Utilities (FDU) to procure, install, and certify a Continuous Emissions Monitoring System (CEMS) for detecting mercury (Hg) stack emissions from its coal fired power plant in Fremont, Nebraska.

ENSR/AECOM's role was to assist LD&B with the following tasks in performing this overall program for FDU.

- Task I - Hg CEMS Bid Specification Development
- Task II - Technical Evaluation of Material Bids
- Task III - Monitoring Plan/Quality Assurance Plan Update
- Task IV - Factory Acceptance Test
- Task V – Startup and Certification
- Task VI - General Assistance, including:
    - Project Management
    - Vendor Surveillance
    - Regulatory Assistance

AES Somerset, LLC, CEMS Procurement Consulting, Somerset, New York

Design of Air Quality Monitoring Systems

Assist the AES Somerset, LLC to procure, install, and certify a Continuous Emissions Monitoring System (CEMS) for detecting mercury (Hg) stack emissions from its coal fired power plant in Somerset, New York.

ENSR/AECOM's role was to assist AES with the following tasks in performing this overall program.

- Task I - Hg CEMS Bid Specification Development
- Task II - Technical Evaluation of Material Bids
- Task III - Monitoring Plan/Quality Assurance Plan Update
- Task IV - Factory Acceptance Test
- Task V – Startup and Certification
- Task VI - General Assistance, including:
    - Project Management, Vendor Surveillance, Regulatory Assistance

AES Puerto Rico, L.P., Guayama, PR

Served as the project onsite QSTI for the initial emissions evaluation and subsequent emissions compliance testing of the two coal-fired boiler stacks for MATS compliance. Emissions of PM, HCl/Cl_2, and Hg were tested while firing coal at full load. In addition, concurrent testing of NO_x, SO_2, CO, O_2, CO_2, and exhaust gas flow rate was performed and used for the annual certification of the two exhaust-stack CEMS under EPA Part 60, Part 75, and the MATS Rule.

Progress Energy, North Carolina, Georgia, Florida

Provided on-site project management for the initial emissions compliance testing of the newly installed gas-fired turbines at numerous Progress Energy sites, as well as initial certifications of associated continuous emissions monitoring systems. Measured parameters included NOx, CO, O_2, CO_2, THC, speciated VOC, NH_3, formaldehyde, and exhaust gas flow rate.

AES Somerset Station, Barker, NY

Served as the project manager for an extensive study of SO_3 emissions conducted on behalf of Babcock & Wilcox at AES' Somerset Station. Emissions were tested at fourteen points along the exhaust train of the 675 MW coal-fired boiler to determine the contribution of various exhaust train components to the formation of SO_3 emissions and the subsequent "blue haze" in the exhaust plume. Comparative data for EPA Method 8 versus the "CONSOL" method were obtained.

Trigen Energy Corporation, Solvay, NY

Served as the project manager for the initial emissions evaluation and subsequent emissions compliance testing of the coal-fired boiler stack for MACT compliance. Emissions of HCl, Cl_2, and Hg were tested while firing coal and a combination fuel consisting of coal and paper waste. In addition, concurrent testing of NO_X, SO_2, CO, O_2, CO_2, and exhaust gas flow rate was performed and used for the annual certification of the exhaust stack CEMS under EPA Part 75 and the NO_X Budget Program.

NRECA Cooperative Research Network (CRN)

Conducted an evaluation survey for CRN of the commercially available Mercury CEMS meeting the requirements of EPA’s CAMR rule. This involved preparing user and vendor survey questionnaires, followed by phone interviews. Also included was a literature search including EPA’s demonstration programs and Environmental Technology Verification (ETV) reports. Evaluated the advantages and disadvantages of sorbent tube monitoring systems versus full-blown Mercury CEMS as well as cost analysis over a three-year period based upon vendor quoted system costs, maintenance estimates and expendables.

Schenectady International, Rotterdam Junction, NY

Installed a temporary CEMS for measurement of inlet/outlet concentrations of total hydrocarbons (THC) from a temporary carbon adsorption unit (CAU) serving a process emissions control system in response to an emergency installation request. CEMS operated for several weeks to comply with The State of New York regulations for capture and removal efficiency.

Various Clients

Developed and operated ENSR/AECOM's proprietary computer software data acquisition program for field instrumental measurements tasks as well as data reduction and report writing programs designed to comply with EPA Methods 3A, 6C, 7E, 10, 20, and 25A. Repaired, calibrated, and field maintained instrumental analytical sampling equipment. Also developed additional specialized sampling equipment for the measurement of specific components under difficult conditions such as ultra-high moisture, extremely low emission concentrations, et cetera.

Various Clients

Working knowledge of automated CEMS and pollution monitors, including: KVB systems, Thermo Electron systems, Rosemount systems, Lear Siegler systems, Westinghouse, Horiba, Western Research, Fuji, Ratfisch, Servomex, Thermox, California Analytical, Ultraflow, VIG, Anarad, JUM, United Science, and Siemens monitors.

Various Clients

Extensive knowledge and application of EPA 40 CFR 60, Appendix A, Reference Method test procedures (1-25), as well as 40 CFR 60, Appendix B, Performance Specification Tests (1-6), for process exhausts and CEMS evaluations, respectively. Conducted numerous 40 CFR 60, Appendix F CEMS audits (RATA, CGA, and Opacity). Familiar with CEMS regulations and requirements under Part 75 (Acid Rain and NO_X Budget Program) and Part 266 (BIF). Prepared EDR data packages for the certification tests (RTs 610-616) portion of quarterly submittals using EPA's MDC software.

PERSONNEL RESUME

COURTNEY
ADKINS
Project Manager Supervisor

QUALIFICATIONS SUMMARY

Ms. Adkins has worked in the environmental industry since 2007 and is currently the Project Manager Supervisor specializing in Source Air and Specialty Projects. Ms. Adkins holds a Bachelor of Science degree in Biology from Lincoln Memorial University. She coordinates and manages complex projects through all phases of laboratory operations. She maintains communications with clients and serves as a liaison between clients and laboratory operations. Her experience also includes sample receipt, log-in, confirming and verifying analytical test parameters, reviewing reports and invoicing. Ms. Adkins also has several years of experience in the extraction of routine and non-routine sample matrices using EPA approved methods.

PROFESSIONAL EXPERIENCE

SENIOR PROJECT MANAGER / MANAGER OF PROJECT MANGEMENT | *Eurofins Knoxville – 2023 to Present*

In addition to specialty project management, oversight of the local Project Managers, Project Management Assistants, and Sample Receiving Staff. Works with the specialty sales team on proposals and business development plans.

PROJECT MANAGER | *Eurofins Knoxville – 2017 to 2023*

Oversight of specialty projects from development to report and invoice generation. Worked with clients to review quality assurance project plans and data review checklists. Served as a client advocate to ensure that the laboratory met the analytical needs of the client as well as scheduled sampling media delivery and sample courier services. Participated in on-site client visits as well as on-site sample collection and project management.

PROJECT MANAGEMENT ASSISTANT | *2010 to 2017*

Worked under the guidance of a senior project manager to generate detailed cost estimates, review sample logins, place sampling media and bottle orders. Served as a point of contact for clients. Acted as a back-up for the senior project manager. Served as a back-up for sample receipt and login. Maintained face-to face client contact by participating in on-site client visits and meetings.

CHEMIST, SPECIALTY ORGANICS EXTRACTION LABORATORY | *2007 to 2010*

Performed extractions, preparations, and clean-ups of dioxins/furans and PCBs from a variety of raw sample matrices. Prepared source air sampling media for field collection.

EDUCATION

- B.S. Biology, Lincoln Memorial University – Harrogate, TN (2007)

PROFESSIONIAL AFFILIATIONS

- Source Evaluation Society Member
- Air and Waste Management Association Member

PUBLICATIONS

- Patti B. Bales, William C. Anderson, Courtney M. Adkins "The Sampling and Analysis Strategy for the Characterization of Selected Perfluorinated Alkyl Substances (PFAS) in Stack Gas" Annual Conference of the Pacific Northwest International Section (PNWIS) of the Air and Waste Management Association (AWMA), Butte, MO (October 2019)
- I.C. MacGregor, A. Frank, B.A. Seay, J.T. Eastep, G.A. Fenton, J.R. Thorn, M. Schumitz, D.M. Schumitz, D. Heiss, S.S. Buehler, M.W. McCauley, K. Abrams, K. Dasu, P.M. Meeter, W. Fritz, L. Kammer, W.C. Anderson, C. Adkins, and K. Begin, "PFAS Mass Balance and Emission Factors at a Wastewater Treatment Plant and Collocated Sewage Sludge Incinerator" presented at the 12th International Conference on Remediation of Chlorinated and Recalcitrant Compounds (May 2022)

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COURTNEY
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PROFESSIONAL EXPERIENCE

SENIOR PROJECT MANAGER / MANAGER OF PROJECT MANGEMENT | *Eurofins Knoxville – 2023 to Present*

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PROJECT MANAGER | *Eurofins Knoxville – 2017 to 2023*

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PERSONNEL RESUME

ANNA
BARLOZHETSKAYA
Quality Assurance Manager

QUALIFICATIONS SUMMARY

Ms. Barlozhetskaya has worked in the environmental laboratory testing industry since 2007. She serves as the Quality Assurance Manager for Knoxville and is responsible for the development and management of the laboratory's quality assurance program. Her experience is in the operation of Gas Chromatograph/Mass Spectrum in order to quantify volatile contaminants in various organic and inorganic matrixes. Anna takes great pride and care that her work, and those under her supervision, complies with EPA regulations, Quality Assurance programs and Standard Operating procedures. Anna is very proactive. Over years she has cross-trained and helped in different analytical groups as the work load shifted. She is skilled with working under pressure and performing multiple tasks at once. She is also highly motivated and committed to delivering high quality testing and analysis.

PROFESSIONAL EXPERIENCE

QUALITY ASSURANCE MANAGER | *Eurofins Knoxville – 2024 to Present*

Responsible for assuring and improving quality within facility operations. Specific duties include:

- Recommending resolutions for ongoing or recurrent nonconformances within the laboratory.
- Supervising and providing guidance to laboratory QA staff.
- Suspending processing when quality requirements are not met.
- Performing QA assessments of the laboratory.
- Coordinating audit activities at the laboratory.
- Providing timely responses to audit findings and performance evaluation sample deficiencies through cooperative effort with facility operations representatives.
- Closing findings of QA audits.
- Providing training for the laboratory on issues pertaining to the QA program.
- Assisting in preparation of and approving Quality Assurance Project Plans.
- Maintaining certification and accreditation programs.
- Maintaining controlled quality documents.
- Preparing monthly quality reports to management.

GC/MS VOLATILES AND AIR GROUP LEADER | *Eurofins Knoxville – 2018 to Present*

Primary responsibilities include supervising the production activities of the VOA analyses, along with TO14A & TO15 analyses. Responsible for maintenance of sensitive laboratory equipment and assets. Frequently manages a large backlog with short turnaround times. Responsible for the analyses of routine and non-routine GC/MS techniques. Also responsible for the review of analytical data and training new personnel. Has the knowledge of all duties within the group.

ANALYTICAL CHEMIST | *2007 to 2018*

Directly involved in preparation of the environmental samples according to scientific and EPA methodology in compliance with regulatory agencies. Fully proficient and certified in Fixed Gas, Helium, TO14A, TO15 and VOST air analysis. In addition to analysis of soil, waste and water by method 8260B. Other responsibilities include receipt of samples, followed by their screening and preparation for analysis. Cleaning, maintenance and calibration of the mass spectrometers and auto-samplers. Preparation of standards for initial calibration as well as daily calibration to ensure compliant data. Critical interpretation of the data, followed by its primary and secondary level review. Upload of the data into laboratory reporting system to generate data packages for delivery to the clients. Also involved in TO canister maintenance, cleaning, and their preparation for client use, along with other related sampling equipment. Frequently fills large air canister orders on short notice yet timely matter.

EDUCATION

- B.A. Biology – Maryville College, Maryville, TN (2007)
    - Minor in Chemistry and International studies

Scott Neal
Superior Spiking Industries

Project and Operations Manager

EXPERIENCE SUMMARY

Scott has worked for nearly two decades as project manager and now operations manager providing spiking services to the hazardous waste industry. He has served clients which own and operate RCRA, TSCA, and/or HWC MACT regulated combustion units and/or MACT regulated HAP containing vent stream combustion units, and Commercial HW management companies which own and operate RCRA, TSCA, and HWC MACT regulated HWC Units. He has coordinated and overseen dozens of Comprehensive and Confirmatory / RCRA Periodic test campaigns providing materials, tools, qualified labor and expertise to meet spiking requirements.

Phaneendra Uppalapati

Air Quality Engineer/Project Manager

Key skills
Emission Source Testing
Air Quality Permitting
Industrial Hygiene Sampling
Pollution Control Assessment
Compliance Audits
Air Emission Inventory Development

Education
MS, Chemical Engineering, Cleveland State University, 2006
BS, Chemical Engineering, JNT University, 2002

Years of experience
18.5 total | 16 with AECOM

Language skills
English

Training
40-hr OSHA 1910.120 HAZWOPER

Certifications
Qualified Source Testing Individual
Safety Trained Supervisor

Phaneendra has 18 years of experience in air emissions monitoring and environmental permitting. He is an air quality engineer with experience in environmental regulations and ambient monitoring.

Professional history

Phaneendra's experience includes ambient air quality measurements, data reduction, quality assurance and quality control. He is also experienced in PSD, NSR, and Title V permit applications, BACT, RACT analyses and MACT compliance.

Selected project experience

University of Massachusetts Medical School, Annual Emissions Compliance Testing Services, Worcester, MA. Managing annual emissions compliance testing services as part of the ongoing support program since 2015. Conducted annual compliance testing on the four utility boilers along with annual RATA service on the cogeneration combustion turbine. As part of the compliance testing three 1-hour test runs for each of the four boilers on each of two fuels, No. 6 fuel oil and natural gas was performed to comply with the NOx Reasonable Available Control Technology (RACT) program to comply with the requirements set forth under 310 CMR 7.19 of the Massachusetts Department of Environmental Protection (MassDEP) guidelines. For the annual RATA on the CEMS for NOx, CO, and ammonia (NH3) associated with the combustion turbine. The purpose of this emissions test program on the turbine is to ensure that the CEMS complies with the US EPA performance specifications and quality assurance requirements of 40 CFR Part 60 as detailed in Section 60.13 as well as Appendices B and F.

Massachusetts Department of Transportation (MassDOT), Continuous Emission Measurements and System (CEMS) Support, Boston, MA. Provided support with operations and on ongoing maintenance of the MassDOT CEMS systems. Supported technical staff and project manager in responding to requests from MassDOT with CEMS upgrades, equipment maintenance, installation of new shelters and others equipment associated with installed CEMS.

BNSF Railroad, Tunnel Air Quality Measurement programs for the Flathead and Cascade Railroad Tunnels, WA and MT. Supported project manager and project team with the evaluation study of air quality with the long tunnel cargo and passenger train engine transit. Supported staff with the installation of measurement analyzer for SO2, NO2, Particulates, CO, temperature and air flow parameters.

Southeastern Pennsylvania Transportation Authority (SEPTA) Roberts Complex, Multiple Source Testing Support, Philadelphia, PA. Provided: support with multiple source testing projects. Developed test protocols for conducting performance emissions testing on their boilers to determine emissions for nitrogen oxides (NOx) and carbon monoxide (CO) while firing No. 2 fuel oil and natural gas. Reviewed the test report for the initial performance testing of the Combined Heat and Power (CHP) Generator Units G-01 and G-02. Compliance testing was conducted to determine the concentration and emission factors of NOx, CO, non-methane, non-ethane hydrocarbons (NMNEHC), formaldehyde (H2CO) and ammonia (NH3).

U.S. Navy Ship Systems Engineering Station, Alternate Fuels Testing, Philadelphia, PA. As part of Navy's going green campaign, managed alternate fuels testing on their Rolls Royce Allison gas turbine. Testing involved sampling for NOx, CO and voes on different test sequences evaluation emissions based on fuel composition.

United States Navy, Foundry and Propeller Center, Compliance Testing, Philadelphia, PA. Provided support with compliance testing at the Navy Foundry facility with testing on their Rotoclone Dust Collector, Foundry Sand System, Pangborn Blasting Unit, Foundry Sand Conveying Operations and Metal Grinding and Sawing Operations.

Testing activities involved sampling for Filterable PM and Condensable PM.

U.S. Air Force, Air Emissions Inventory, Multiple Locations. Conducted site visits to different air force stations and bases and collected emission source inventory. Developed and updated Air Emissions Inventory (AEI) for stationary and mobile sources in Air Pollution Information Management System (APIMS).

Cape Cod Air Force Station, Site Visit, MA. Conducted site visit to collector inventory data for developing air emissions inventoy for source associated with air emissions.

United Airlines, Compliance Audit, Boston, MA. Conducted regulatory compliance audit on non-road stationary and mobile combustion equipment as part of a merger. Audit included inspection of onsite mobile, stationary and emergency ground support equipment, identifying existing compliance records, and provide guidance in determined emissions and compliance path.

National Institute of Health, Turbine Core Change Performance Testing, Bethesda, MD. Provided support with performance guarantee testing on their Siemens SGT-600 Combustion Turbine. Emissions testing was conducted on the turbine while operating at multiple load conditions while measuring for NOx, CO, VOC and filterable/condensable PM.

AES Puerto Rico, Inc., MATS Performance Test, Guayama, PR. Provided support on multiple projects for the MATS Performance test program. Involving testing for Initial Performance test, Continuous Performance test and Quarterly Testing. Testing was primarily to evaluate the performance of two coal-fired boilers for PM, HCl, Hg, NOx, SO2, CO, 02, CO2 and stack gas flow rate.

CertainTeed, Compliance Emissions Testing, Norwood MA. Completed compliance testing on multiple units at CertainTeed to quantify particulate emissions. Responsibilities include source sampling employing EPA methods 1-5, OTM27 and OTM 28 and developing technical report.

Bostik, Inc., VOE Compliance Testing, Middleton, MA, Performed a regulatory-mandated emissions compliance test program. The testing program involved determination of destruction efficiency of volatile organic compounds from the Film Adhesive Coating Line. Testing involved sampling for voes at the two inlets and one outlet of the RTO and at the inlet and outlet of the process line boiler, data was evaluated to determine the destruction efficiency.

Norlite LLC., MACT Comprehensive Performance Test, Cohoes, NY. Managed MACT CPT and Pre CPT on Kilns 1 and 2 at this facility. Comprehensive sampling and analysis was conducted to re-certify compliance with applicable MACT Subpart EEE performance standards while conducting sampling at three sets of operating conditions.

Scepter, Inc., Emissions Performance Testing, Seneca Falls, NY. Managed multiple projects at this facility by providing support with performance testing on their Rotary Aluminum Furnaces. Testing was conducted to meet the requirements of the NESHAP Subpart RRR to determine the emission rates of polychlorinated dibenzo-o-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs), as 2, 3, 7, 8-tetrachlorinated dibenzo-p-dioxin (2, 3, 7, 8-TCDD) toxicity equivalent (TEQ), referred to in this report as dioxins/furans TEQ. This testing program was also conducted to demonstrate compliance with the PM/PM10, HCl and NH3 emissions.

PSEG BEC, Compliance Testing, Bethlehem, NY. Field Team Member of compliance test program responsible for the set-up and sampling for voe, TSP, PM10, and Sulfuric Acid Mist. The major objective of the project was to estimate emissions rate of these compounds from the source units. Prepared final compliance test report and submitted to NYSDEC.

WestRock Company, Dublin Mill Emission Evaluation, East Dublin, GA, Managed and provided support on this projects with emission evaluation on the power boiler while operating at various test scenarios while operating the boiler at different feed rates. Filterable Particulate Matter, HCl, Mercury, CO and SO2 emissions were evaluated.