



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 8**

1595 Wynkoop Street  
DENVER, CO 80202-1129  
Phone 800-227-8917  
<http://www.epa.gov/region08>

**MAR 28 2008**

Ref: 8EPR-F

Thomas A. Turner, Chief  
Environmental Office, SJMTE-CS-EO  
1 Tooele Army Depot, Building 8  
Tooele, Utah 84074-5003

RE: Second Five-Year Review Report for the Tooele Army Depot, Tooele, Utah, March 2008

Dear Mr. Turner:

The United States Environmental Protection Agency (EPA) has reviewed the March 2007, Five Year Review Report for the Tooele Army Depot, Tooele, Utah, and has determined that it follows EPA guidance and that the Department of Defense (DoD) has met all National Contingency Plan (NCP) requirements for conducting a five-year review at the Tooele Army Depot facility.

EPA believes that the cleanup actions that have been taken at the Tooele Army Depot are generally protective of human health and the environment, and that all immediate threats have been or are being adequately addressed. EPA concurs with DoD's Protectiveness Statements in Chapter XI of the Five-Year Review.

EPA supports and concurs with DoD's recommendations and follow-up actions as outlined in Chapter X of the Five-Year Review. Specifically:

- (1) The Army will continue with the alternate measures evaluation and the current plan to provide a revised corrective measure for SWMU 2 within the CMS for SWMU 58.
- (2) The Army will monitor the status of potential future pump and treatment system re-start, and install corrosion protection systems as appropriate.
- (3) The Army will monitor the status of potential future pump and treatment system re-start, and affect repairs when appropriate.
- (4) The Army will in the report for the NOT, provide evaluation of the statistical

methods and provide recommendations for any follow-on application of statistical methods in the event this type of boundary monitoring will continue.

- (5) The Army will in the SWMU 58 CMS, incorporate institutional controls over groundwater use into the corrective measures for all groundwater plumes.
- (6) The Army will develop a program to evaluate each well/piezometer for its value for sampling or water level measurement and identify wells/piezometers for abandonment.
- (7) The Army will proceed with optimization of the monitoring program after the SWMU 58 CMS is completed.
- (8) The Army will develop a recommendation regarding the issue of no sentry monitoring well beyond well D-17 that shows non-detect levels in the SWMU 58 CMS and final remedy selection recommendation.
- (9) Prepare ESDs for OUs 5 and 7 to document the change from "No further action" to "Institutional Controls".

EPA appreciates the responsive and cooperative style in which DoD has managed the CERCLA and BRAC programs at the Tooele Army Depot. Assuming that resources are maintained at adequate levels and work continues on schedule for the remaining remedial/corrective actions. EPA does not foresee any major threats to DOD's ability to maintain adequately protective remedies during the next five years.

Should you have any questions, please contact Jim Kiefer at (303) 312-6907.

Sincerely,



Terry L. Anderson,  
Director  
Federal Facilities Program

cc: Larry McFarland, TEAD  
Rik Ombach, UDEQ



**TOOELE  
ARMY  
DEPOT**

**FINAL**

**FIVE YEAR REVIEW REPORT  
TOOELE ARMY DEPOT  
TOOELE, UTAH**

**Prepared for:**

**TOOELE ARMY DEPOT  
Tooele, Utah**

**Prepared by:**

**U.S. Army Corps of Engineers  
Sacramento District  
Sacramento, California 95814**

**March 2008**

**Five Year Review Report**

**Second Five Year Review  
for  
Tooele Army Depot  
Tooele, Utah**

**September 2007**

**Prepared by:**

**U.S Army Corps of Engineers  
Sacramento District  
CESPK-ED-GE  
1325 J. Street  
Sacramento, California 95814**

Prepared By:

Approved By:

\_\_\_\_\_  
Date  
Doug Mackenzie  
U. S. Army Corps of Engineers  
Environmental Engineer

*Thomas A. Turner* 3/27/08  
\_\_\_\_\_  
Date  
Thomas A. Turner  
Tooele Army Depot  
Chief, Environmental Office

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## Acronyms and Abbreviations

2,4-DNT	2,4-dinitrotoluene
AED	Ammunition Equipment Directorate
bgs	Below Ground Surface
BRAC	Base Realignment and Closure
CCR	Covenants, Conditions, and Restrictions
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMS	Corrective Measures Study
cm/sec	Centimeters Per Second
CAO	Corrective Action Objectives
CAMU	Corrective Action Management Unit
COC	Contaminant of Concern
DD	Decision Document
DDD	Dichloro-diphenyl-dichloroethane
DDE	Dichloro-diphenyl-dichloroethylene
DDT	Dichloro-diphenyl-trichloroethylene
DERR	Division of Environmental Response and Remediation
DSHW	Division of Solid and Hazardous Waste
DOD	Department of Defense
DRMO	Defense Reutilization and Marketing Office
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FFA	Federal Facilities Agreement
FS	Feasibility Study
ft/day	Feet Per Day
ft/yr.	Feet Per Year
in/yr.	Inches Per Year
IRA	Interim Removal Action
IRP	Installation Restoration Program
IWL	Industrial Waste Lagoon
LTM	Long-term Monitoring
MCL	Maximum Contaminant Level

## Acronyms and Abbreviations (cont.)

NPL	National Priorities List
NRC	Nuclear Regulatory Commission
O&M	Operations and Monitoring
OU	Operable Unit
PAHs	Polycyclic aromatic hydrocarbons
PCB	Polychlorinated Biphenyls
PCE	Tetrachloroethylene
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SWMU	Solid Waste Management Unit
TCA	Trichloroethane
TCE	Trichloroethylene
TEAD	Tooele Army Depot
TNT	Trinitotoluene
TPHC	Total Petroleum Hydrocarbons
TSCA	Toxic Substance Control Act
UAC	Utah Administrative Code
UDEQ	Utah Department of Environmental Quality
USACE	U.S. Army Corps of Engineers
VOCs	Volatile Organic Compounds

## Five Year Review Summary

SITE IDENTIFICATION			
<b>Site Name:</b> Tooele Army Depot			
<b>EPA ID:</b> UT3213820894			
<b>Region:</b> 8	<b>State:</b> Utah	<b>City/County:</b> Tooele/Tooele	
SITE STATUS			
<b>NPL Status:</b> <input checked="" type="checkbox"/> Final    Deleted    Other (Specify)			
<b>Remediation Status:</b> (choose all that apply) : <input checked="" type="checkbox"/> Under Construction <input checked="" type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete			
<b>Multiple OUs?</b> <input checked="" type="checkbox"/> Yes    No		<b>Construction Completion Date:</b>	
<b>Has site been put into reuse?</b> Yes    No <input checked="" type="checkbox"/> Other (specify) Partial Reuse on BRAC Parcels			
REVIEW STATUS			
<b>Reviewing Agency:</b> <input checked="" type="checkbox"/> EPA <input checked="" type="checkbox"/> State    Tribe <input checked="" type="checkbox"/> Other Federal Agency (Specify) U. S. Army Corps of Engineers			
<b>Author Name:</b> Doug Mackenzie			
<b>Author Title:</b> Environmental Engineer		<b>Author Affiliation:</b> U.S. Army Corps of Engineers	
<b>Review Period:</b> April 2007 through September 2007			
<b>Date(s) of Site Inspection:</b> June 4-5, 2007			
<b>Type of Review:</b> <input checked="" type="checkbox"/> Statutory Policy    Post SARA    Pre-SARA    NPL - Removal Only Non - NPL Remedial Action Site    NPL State/Tribe-lead Regional Discretion			
<b>Review Number:</b> 1(first) <input checked="" type="checkbox"/> 2(second)    3(third)    Other (specify)			
<b>Triggering Action:</b> Actual RA Onsite Construction at OU # ____    Actual RA Start at OU # <u>7 and 10</u> Construction Completion <input checked="" type="checkbox"/> Previous Five Year Review Other (specify) _____			
<b>Triggering Action Date:</b> September, 2002			
<b>Due Date (five years after triggering action date):</b> September, 2007			

## Five Year Review Summary cont'd

### ISSUES

1. The pump and treat system is not likely to reduce VOC concentrations to the groundwater protection standard specified in the Permit in all wells within the plume.
2. Several groundwater injection wells will need corrosion protection installed if they are to be operated again.
3. If the groundwater treatment system is to be operated full time again, major repairs/replacement of system components may be necessary due to age and obsolescence.
4. The State has expressed concern over the methodology employed in statistical trend analysis for monitoring the plume boundary.
5. There is no formal institutional control over use of groundwater in the SWMU 2 plume during the time that groundwater protection standards are exceeded.
6. There are many monitoring wells at TEAD that are no longer used for groundwater sampling, but still require maintenance.
7. The groundwater monitoring program currently includes approximately 100 wells. As the SWMU 58 investigations and the SWMU 2 re-evaluation are completed, there will be an opportunity to optimize the program.
8. There is no sentry monitoring well in the GWMA interim remedy beyond well D-17 that shows non-detect levels.
9. There is no modification to the RODs for OUs 5 and 7 to account for the changes in remedy at Sites 5 and 17.

### RECOMMENDATIONS AND FOLLOW-ON ACTIONS

1. Continue with the alternate measures evaluation and the current plan to provide a revised corrective measure for the SWMU 2 within the CMS for SWMU 58.
2. Monitor the status of potential future system re-start, and install corrosion protection systems as appropriate.
3. Monitor the status of potential future system re-start, and affect repairs when appropriate.
4. In the report for the NOT, provide evaluation of the statistical methods and provide recommendations for any follow-on application of statistical methods in the event this type of boundary monitoring will continue.
5. In the SWMU 58 CMS, incorporate institutional control over groundwater use into the corrective measures for all groundwater plumes.
6. Develop a program to evaluate each well/piezometer for its value for sampling or water level measurement. Identify candidates for abandonment.
7. Proceed with optimization of the monitoring program after the SWMU 58 CMS is completed.
8. Develop a recommendation regarding this issue in the SWMU 58 CMS, where the final remedy selection is recommended.
9. Prepare ESDs for OUs 5 and 7 to document the change from "No further action" to "Institutional controls".

## Five Year Review Summary cont'd

### PROTECTIVENESS STATEMENTS

*Soil Remedies:* The soil remedies at Tooele Army Depot are protective. Active remediation has been completed on contaminated soils as necessary to protect current and future industrial workers and construction workers, as well as ecological receptors. Institutional controls to prevent residential development have been enacted where risks to hypothetical future residents are greater than  $10^{-6}$  or hazard index is greater than one. The active remediation activities included excavation and disposal, soil stabilization, and capping. These activities all successfully met the remedial action objectives. A site management program has been implemented which has successfully managed the institutional controls.

*Groundwater Remedies:* The groundwater remedies are protective in the short term. The SWMU 2 groundwater pump-and-treat system has operated from 1993 to 2004, and the TCE plume did not expand during that time. The plume also has not perceptibly expanded during the subsequent non-operation test. The TEAD environmental office has communicated with the offsite property owners and the installation public works department to prevent residential use of contaminated groundwater in the SWMU 2 plume. The SWMU 58 Groundwater Management Area has implemented an interim formal institutional control over groundwater use in the off-post Northeast Boundary Plume. The groundwater remedy for SWMU 2 is not protective over the long term. The existing pump-and-treat system does not appear to be capable of restoring groundwater to the groundwater protection standard. There is no formal institutional control on the SWMU 2 plume to ensure contaminated groundwater is not used for residential purposes in the long term.

# Tooele Army Depot First Five-Year Review Report

## I. Introduction

The U. S. Army Corps of Engineers, on behalf of the Tooele Army Depot (TEAD) Environmental Office has conducted the second five-year review of remedial actions implemented at the TEAD, Tooele, Utah. This review was conducted from April 2007 through August 2007. This report documents the results of the review. The U.S. Environmental Protection Agency, Region VIII and the State of Utah, Department of Environmental Quality, Division of Environmental Response and Remediation participated in the development of this report as reviewers.

The purpose of this five-year review is to determine whether the remedies selected at TEAD are protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify deficiencies found during the review, if any, and identify recommendations or corrective action that may be taken to address them.

This review is required by statute. TEAD must implement five-year reviews consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121(c) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) Part 300.430(f)(4)(ii).

CERCLA Section 121(c) and the NCP Part 300.430(f)(4)(ii), require a review of remedial actions at all sites that do not allow unlimited use and unrestricted exposure no less often than every five years. The NCP states: "If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after initiation of the selected remedial action." The objective of the review is to determine whether the selected remedy remains protective of human health and the environment. Specifically, the reviews are intended to: (1) confirm that the remedy as specified in the ROD/Decision Document (DD) and/or remedial design remains effective in protecting human health and the environment (the remedy is operating as designed, institutional controls remain in place, etc.); and (2) evaluate whether the original cleanup levels remain protective.

This is the second five-year review for the TEAD. The triggering action for this review is the completion of the first five-year review in September 2002. As hazardous substances, pollutants, or contaminants will remain at several sites above levels that allow for unrestricted use and unlimited exposure, additional five-year reviews will be required in the future.

Table 1 of this document identifies the Operable Units (OUs) addressed under the Federal Facilities Agreement (FFA) at TEAD as well as the sites contained in each OU.

This review addresses the Resource Conservation and Recovery Act (RCRA) sites that are covered under the FFA and a Post Closure and Corrective Action Permit issued by the State of Utah, Department of Environmental Quality, Division of Solid and Hazardous Waste. Table 2 of this document identifies the sites covered under this permit. All sites on TEAD were designated a

sequential “SWMU number”, whether they were to be managed under CERCLA or RCRA. Henceforth in this document , the term “SWMU” will be used to refer to all sites.

**Table 1  
Federal Facilities Agreement (FFA) Operable Units**

<b>Operable Unit</b>	<b>SWMU</b>	<b>Description</b>
1		Not assigned in FFA – See Note Below this Table
2		Not assigned in FFA – See Note Below this Table
3		Not assigned in FFA – See Note Below this Table
4	31	Former Transformer Boxing Area
	32	PCB Spill Site
5	17	Former Transformer Storage Area
	33	PCB Storage Building
6	9	Drummed Radioactive Waste Area
	18	Radioactive Waste Storage Building
7	5	Pole Transformer PCB Spill
8	6	Old Burn Area
	8	Small Arms Firing Range
	13	Tire Disposal Area
	22	Building 1303 Washout Pond
	36	Old Burn Staging Area
9	7	Chemical Range
	23	Bomb and Shell Reconditioning Building
	35	Wastewater Spreading Area
	40	AED Test Range
10	41	Box Elder Wash Drum Site
11		Not assigned in FFA – See Note Below this Table
12		Not assigned in FFA – See Note Below this Table
13		Not assigned in FFA – See Note Below this Table
14		Not assigned in FFA – See Note Below this Table

Note: OU 1 through OU 3 and OU 11 through OU 14 were not officially designated in the FFA; however, for record keeping and tracking purposes in CERCLIS, OU 1, 2, 3, 11, 12, 13 are used for RCRA Corrective Actions. The Groundwater Main Plume RCRA Corrective Action is tracked as OU 1. The Known Release RCRA Corrective Actions are tracked as OU 2 and OU 12. The Suspected Release, Group A RCRA Corrective Action is tracked as OU 3. The Suspected Release, Group B RCRA Corrective Action is tracked as OU 13. The Suspected Release, Group C RCRA Corrective Action is tracked as OU 14. The Groundwater North Eastern Boundary Plume RCRA Corrective Action is tracked as OU 11. The RCRA Corrective Actions are summarized in Table 2.

**Table 2**  
**RCRA Corrective Action Solid Waste Management Units**

<b>SWMU</b>	<b>Group</b>	<b>Site Description</b>
1	A	Open Burning / Open Detonation Area
2	Known Releases	Industrial Waste Lagoon (IWL)
3	Known Releases	X-Ray Lagoon
4	B	Sandblast Areas (Bldgs 600, 615, 617)
10	Known Releases	TNT Washout Facility
11	Known Releases	Laundry Effluent Ponds
12	Known Releases	Pesticide Disposal Area
14	--	Sewage Lagoons
15	Known Releases	Sanitary Landfill
19	B	AED Demilitarization Test Facility
20	A	AED Deactivation Furnace Site
21	A	Ammunition Deactivation Furnace Building
24	Known Releases	Battery Pit
25	Known Releases	Battery Shop (Bldg 1252)
26	B	Defense Reutilization and Marketing Office (DRMO) Storage Yard
27	--	RCRA Container Storage Facility
28	--	90-Day Drum Storage Area
29	B	Drum Storage Area
30	Known Releases	Old Industrial Waste Lagoon (OIWL)
34	A	Pesticide Handling and Storage Facility
37	A	Contaminated Waste Processor
38	--	Industrial Wastewater Treatment Plant (IWTP)
39	--	Solvent Recovery Facility
42	A	Bomb Washout Building (Bldg 539)
43	--	Container Storage for P999 Wastes
44	--	Tank Storage of TCE
45	A	Storm water Holding Pond
46	B	Used Oil Dumpsters
47	--	Boiler Blowdown
48	A	Old Dispensary
49	C	Storm Water/Industrial Wastewater Piping System
50	C	Compressor Condensate Drains
51	C	Chromic Acid/Alodine Drying Beds
52	C	Drain Field and Disposal Trenches
53	--	PCB Storage and Spill Sites
54	C	Sandblast Areas (Bldgs 604, 611, and 637)
55	C	Battery Shop (Bldg 618)
56	C	Gravel Pit Disposal Area
57	C	Skeet Range
58	--	Industrial Area Groundwater Sources

## II. Site Chronology

Table 3 is a chronology of events that have occurred since the inception of the TEAD Installation Restoration Program.

**Table 3**  
**Site Chronology**

<b>Date</b>	<b>Event</b>
Dec 1979	Environmental Assessment of Tooele Army Depot (USATHAMA)
Jun 1982	Installation Environmental Assessment (IPEC)
1982	Exploratory Environmental Contamination Assessment (ERTEC)
1982	Environmental Photographic Interpretation (USEPA)
1982-1985	Investigation of the Open Burning/Open Detonation Area (AEHA)
May 1983	Analysis of Existing Facilities/Environmental Assessment (TEAD)
Jan 1985	Monitoring Activity and Waste Disposal Review and Evaluation (CH2MH)
Mar 1985	Environmental Balance Study (DA)
Mar 1985	Performance Evaluation of Remedial Response Activities at Uncontrolled Hazardous Waste Sites (CMD)
1985	Interim Groundwater Quality Assessment (WC)
Nov 1985	Analytical/Environmental Assessment (TEAD)
Jan 1986	IWL - Groundwater Quality Assessment, Corrective Action Plan, and Record of Decision (JMM)
Mar 1986	Engineering Report for Closure of the IWL (JMM)
Jul 1986	Addendum to Environmental Photographic Interpretation (USEPA)
Aug 1987	RCRA Facility Assessment (NUS)
May 1988	Groundwater Quality Assessment Engineering Report (JMM)
Dec 1988	Preliminary Assessment/Site Investigation (EA/EST)
Dec 1989	Discharges to the IWL stopped and the lagoon closed.
Dec 1990	Remedial Investigation (RFW)
Feb 1991	Groundwater Quality Assessment (ESE)
Sep 1991	Federal Facilities Agreement
Nov 1991	RCRA RFI Phase I for Known Releases (ASI)
Apr 1992	Preliminary Baseline Risk Assessment (SECD)
1993	Construction Complete, SWMU 2 Corrective Action
Sep 1993	Groundwater extraction commences
Dec 1993	RCRA RFI Phase I for Suspected Releases (MW)
Feb 1994	Remedial Investigation for Operable Units 4-10 (RUST)
Mar 1994	Feasibility Study for OUs 5, 6, 7, and 10 (RUST)
Sep 1994	Record of Decision for Operable Units 5,6,7, and 10 (RUST)
Nov 1995	Remedial Design for SWMUs 5 and 41 (JACOBS)
Apr 1996	RCRA Phase II RFI for Known Releases (RUST)
May 1996	Site Close-out Report for SWMUs 5 and 41 (USACE)
Jun 1996	RCRA Phase II for Group "B" Suspected Releases (SAIC)
Sep 1996	RCRA Phase II RFI for Group "A" Suspected Releases (RUST)
Nov 1996	Phase II Remedial Investigation for OUs 4, 8, and 9 (RUST)
Apr 1998	RCRA Facility Investigation for Group "C" Suspected Releases (SAIC)

<b>Date</b>	<b>Event</b>
Dec 1999	Feasibility Study for OUs 4 and 8 (DM)
Dec 1999	Proposed Plan for OUs 4 and 8 (DM)
Sep 2000	Record of Decision for OUs 4 and 8 (DM)
Oct 2000	Corrective Measures Study for Group "B" Suspected Releases (DM)
December 2000	Oil/Water Separator Removal, Building 679
February 2001	Decision Document Suspected Releases Group B
April 2001	Corrective Measures Study Suspected Releases Group A
June 2001	Decision Document Suspected Releases Group C
June 2001	Decision Document Suspected Releases Group A
July 2001	Corrective Measures Study Suspected Releases Group C
July- Dec. 2001	Soil Vapor Extraction Pilot Test, Building 679
March 2002	SWMU 58 Phase 1 RFI Report, On-Post Sources
April 2002	Decision Document Known Releases
Fall/Winter 2002	Construction Complete SWMUs 46, 49, 52C, 54, 57
January 2003	Record of Decision OU4
March 2003	Corrective Measures Study, SWMU 12/15
May 2003	Construction Complete SWMU 52D
May 2003	Groundwater Alternate Measures Work Plan
August 2003	SWMU 58 Phase II RFI Report Addendum, Northeast Boundary Off_Post Groundwater
October 2003	Groundwater Treatment Non-Operation Test Proposal
October 2003	Construction Complete SWMUs 11,25
December 2003	SWMU 58 Phase II RFI Work Plan
March 2004	Record of Decision OU8
March 2004	Groundwater Management Area Plan, Northeast Boundary Plume
June 2004	Construction Complete, SWMUs 20,21,34
August 2004	Groundwater Treatment Non-Operation Test Begins
December 2004	Construction Complete SWMU 8 in OU8
January 2005	Final Construction Activity (well abandonment) at SWMU 3
July 2005	Construction Complete SWMU 42
October 2005	Construction Complete SWMU 12/15
June 2007	Corrective Measures Study Revision, SWMU 56

### **III. Background**

#### **Tooele Army Depot Location**

TEAD is located in the Tooele Valley in Tooele County, Utah, and approximately 30 miles southwest of Salt Lake City (Figure 1). TEAD is immediately west of the City of Tooele with a population of approximately 28,000 in 2004. The installation currently covers 23,473 acres. Originally it included an additional 1,700 acres, which were transferred to the Redevelopment Agency of Tooele City in December 1998 under the Base Realignment and Closure (BRAC) Early Transfer Authority with contamination remaining in place. Conditions and restrictions have been placed on the property, limiting the use of the property until such time that the required remedial actions have been completed.

The valley is bounded to the south by the Stockton Bar and South Mountain, to the north by Grantsville and the Great Salt Lake, to the east by Tooele and the Oquirrh Mountains, and to the west by the Stansbury Mountains.

The area surrounding TEAD is largely undeveloped, with the exception of Tooele City, Grantsville (population 8,800 in 2006) located northwest of TEAD, and Stockton (population 400 in 2000) located south of the installation. TEAD is bounded by cultivation, and rangeland grazing to the west; rangeland grazing, a gravel pit operation, and the Tooele County Landfill to the south; rangeland grazing and Tooele City to the east; and rangeland grazing, a concrete/asphalt batch-plant, and a closed Tooele County Municipal Landfill to the north. Also located to the north of the installation, but not directly adjacent to the boundary is a recreation complex and fairgrounds owned by Tooele County.

### **History, Present Mission, and Future Use of TEAD**

Construction of the TEAD facilities began in 1942 and was completed in 1943. Known originally as the Tooele Ordnance Depot (TOD), it functioned as a storage depot for World War II supplies, ammunition and combat vehicles. During the construction of TOD, the U.S. Department of Defense (DOD) also ordered construction of a storage depot for Chemical Corps toxins on 19,355 acres of land 20 miles south of Tooele in Rush Valley. It was named Deseret Chemical Warfare Depot.

By the end of World War II, the depot had 902 munitions igloos, almost 100 of which were constructed of reinforced concrete and covered with 2 feet of earth and gravel, for storing high explosives; 12 above-ground magazines for the storage of small arms ammunition; 31 warehouses, each with a capacity ranging from 200 to 500 carloads; a \$1 million tank repair shop; plus artillery and automotive equipment repair shops.

The administrative area included a hospital, prisoner-of-war camp, 29 barracks for troops, and a 4,080-unit Lanham Housing Project called TOD Park with a shopping center, post office, and elementary school.

The first mission assigned to the depot on Dec. 8, 1942, was to store vehicles, small arms, and fire control equipment for export. Other mission functions included overhauling and modifying tanks and tracked vehicles, plus their armaments. In general, the Tooele Ordnance Depot was a backup depot for the Stockton Ordnance Depot and Benicia Arsenal, both in California. In July 1943, TOD was assigned as a reserve storage depot for tank and combat vehicle tools and equipment. To complete the mission of rebuilding the vehicles and artillery pieces, DOD ordered that a maintenance shop be established.

The Ordnance Department also authorized the depot to rebuild, modify, and reclaim 75-millimeter howitzer motor carriages and artillery pieces, including anti-aircraft artillery up to 155 mm. Between May and September 1944, the Maintenance Section overhauled 325 light tanks and fifty 75-mm howitzer carriages. The depot later expanded its functions to include the repair of optical instruments (telescopes, height finders, aiming circles, and binoculars) and the reclamation and salvage of useless or obsolete weapons, ammunition, and vehicles.

This assignment of additional workload and the consequent expansion of the work force required further construction. The main entrance and underpass were completed and dedicated on July 14, 1943. New structures included a \$110,000 base hospital, a 100,000-gallon water tank, and a

coal yard. By the end of the war, an average of more than \$800,000 per year was being spent on the repair of buildings.

During the post-Korean Conflict period, TOD was assigned an additional mission. In 1954, DOD established the Office of the Ordnance Ammunition Command, National Field Service. The mission of this division was enlarged in 1956 to include the design, standardization, and manufacture of all ammunition designing equipment to maintain, renovate, modify, perform surveillance of, and demilitarize all types of ammunition.

In 1955, Deseret Chemical Warfare Depot was renamed Deseret Depot Activity and assigned to the TOD; in 1961, the Deseret Depot Activity was assimilated by TOD and designated as the South Area. In 1962, the installation's general supply mission was enlarged to provide distribution for several western states, Alaska, and the Pacific Islands. In the same year, the name was changed to Tooele Army Depot (TEAD) to reflect the broad technical role being performed.

Since 1962, the depot has faced fluctuations in both mission and employee levels. By 1967, with the United States increasing its combat role in Vietnam, TEAD's civilian work force had surpassed the all-time Korean War high of 5,313 employees and was involved in around-the-clock work schedules. After the Vietnam War, manpower levels dropped and the missions changed. In 1994, TEAD employed 1,736 civilians and 13 military personnel.

In August 1973, Umatilla Depot Activity, located in northeastern Oregon, was assigned under the command of TEAD. Umatilla's mission was to store conventional ammunition, destroy conventional munitions that the Army was taking out of its inventory, a process known as "demilitarization," and to store toxic chemicals. Fort Wingate Army Depot Activity was assigned to TEAD in 1975. Located near Gallup, New Mexico, the installation had the mission of storing and demilitarizing conventional ammunition. Also in 1975, TEAD assumed command of Navajo Army Depot Activity near Flagstaff, Arizona, and Pueblo Army Depot Activity in Colorado. Navajo Army Depot Activity was decommissioned in 1993 and is now under the command of the Arizona National Guard as Camp Navajo. In 1993, TEAD assumed command of Sacramento Army Depot, whose mission was similar to that of Pueblo Army Depot.

In 1994, modernization was a key component of the TEAD mission. Equipment and systems were updated and computers were extensively integrated into inventory management, work scheduling, and record keeping. Environmental concerns and efficiency goals resulted in the construction of the Consolidated Maintenance Facility (CMF), which began in July 1989. The CMF was officially opened in October 1992. The facility was used by TEAD to consolidate and improve the efficiency of maintenance work, while eliminating liquid industrial waste discharge.

The 1993 BRAC Commission recommended that TEAD be realigned and its maintenance missions be transferred to Red River Army Depot, Texas, and other installations. Congress accepted the recommendation, which said that TEAD would eliminate its troop support, maintenance, and distribution missions. The realignment of the maintenance and supply missions was completed in 1995.

Since the 1993 BRAC decision to reduce and realign TEAD's mission, the Army successfully completed an Early Transfer of the excess property under Section 334 of the FY 97 Defense Authorization Act to the Redevelopment Agency of Tooele. On January 19, 1999, the U.S. Army presented a ceremonial deed to Tooele City commemorating the transfer of 1,700 acres and 258 buildings. Then in September 1999, TEAD's mission of Defense Non-Tactical Generator and Rail Center command and control transferred to another Command in Warren, Michigan.

Tooele Army Depot currently retains only the conventional ammunition storage, maintenance and demilitarization mission. The chemical munitions storage and demilitarization mission (South Area/Deseret) was realigned in 1996 with the U. S. Army Chemical Materials Agency (CMA), and is known as Deseret Chemical Depot.

The Army headquarters element of TEAD is U.S. Army Joint Munitions Command (JMC), located in Rock Island, Illinois. The major command of OSC is the U.S. Army Materiel Command (AMC), which is the major Army command responsible for ensuring the weapon, equipment, and logistics readiness of the Army, Army Reserve, and National Guard.

### **SWMU Locations**

There are fifty-seven SWMUs being addressed under the TEAD Installation Restoration Program. Seventeen of these SWMUs are being addressed under a Federal Facilities Agreement (FFA) that was signed in September 1991. The remaining forty SWMUs are being addressed under a RCRA Corrective Action Permit which was issued by the State of Utah, Department of Environmental Quality in January 1991. Figures 2, 3, and 4 of this review identify the general location of the 17 SWMUs covered under the FFA. The locations of SWMUs being addressed under the RCRA Corrective Action Permit are shown on Figure 5.

### **Physical Characteristics**

TEAD is located at approximately 4,700 feet above mean sea level (msl) in the Great Salt Lake Basin, a large interior drainage basin within the Basin and Range physiographic province. This province is characterized by large fault blocks that trend approximately north-south and form a series of interior basins bounded by fault-block mountain ranges. The Tooele Valley is bounded by the north-trending Stansbury and Oquirrh Mountains, which rise from the valley floor at elevations from 5,000 to more than 10,000 feet msl. The topography of the valley floor is shaped by coalescing alluvial fans formed by debris washed from the adjacent mountains. The valley floor consists of Lake Bonneville sediments of Tertiary and Quaternary age. In ascending order, the basin fill consists of a sequence of moderately consolidated sand, gravel, silt and clay overlain by deposits of unconsolidated sand, gravel, silt, and clay. Depth to bedrock varies from 0 (surface outcrops in the northeastern corner of the facility and along the southern boundary of the installation) to more than 2000 feet in the south-central portion of the installation. A depth-to-bedrock contour map is provided on Figure 3-3 in Attachment 5.

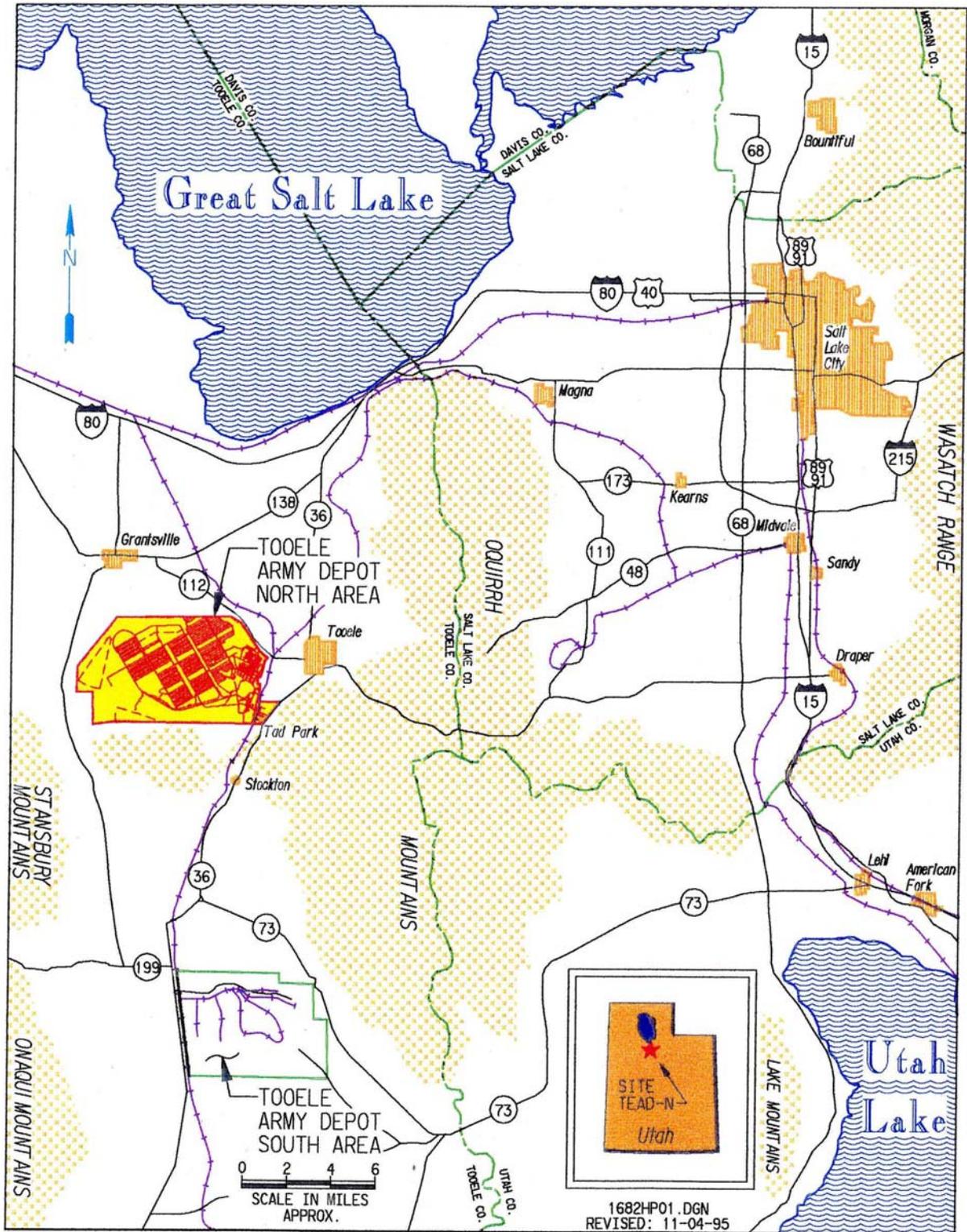
### **Topography**

TEAD is characterized by flat land to gently rolling hills intersected by a series of shallow gullies that drain the installation. The average topographic gradient in the north is 70 feet per mile (ft/mi.). The gradient increased to approximately 150 ft/mi. at the southern boundary.

### **Climate**

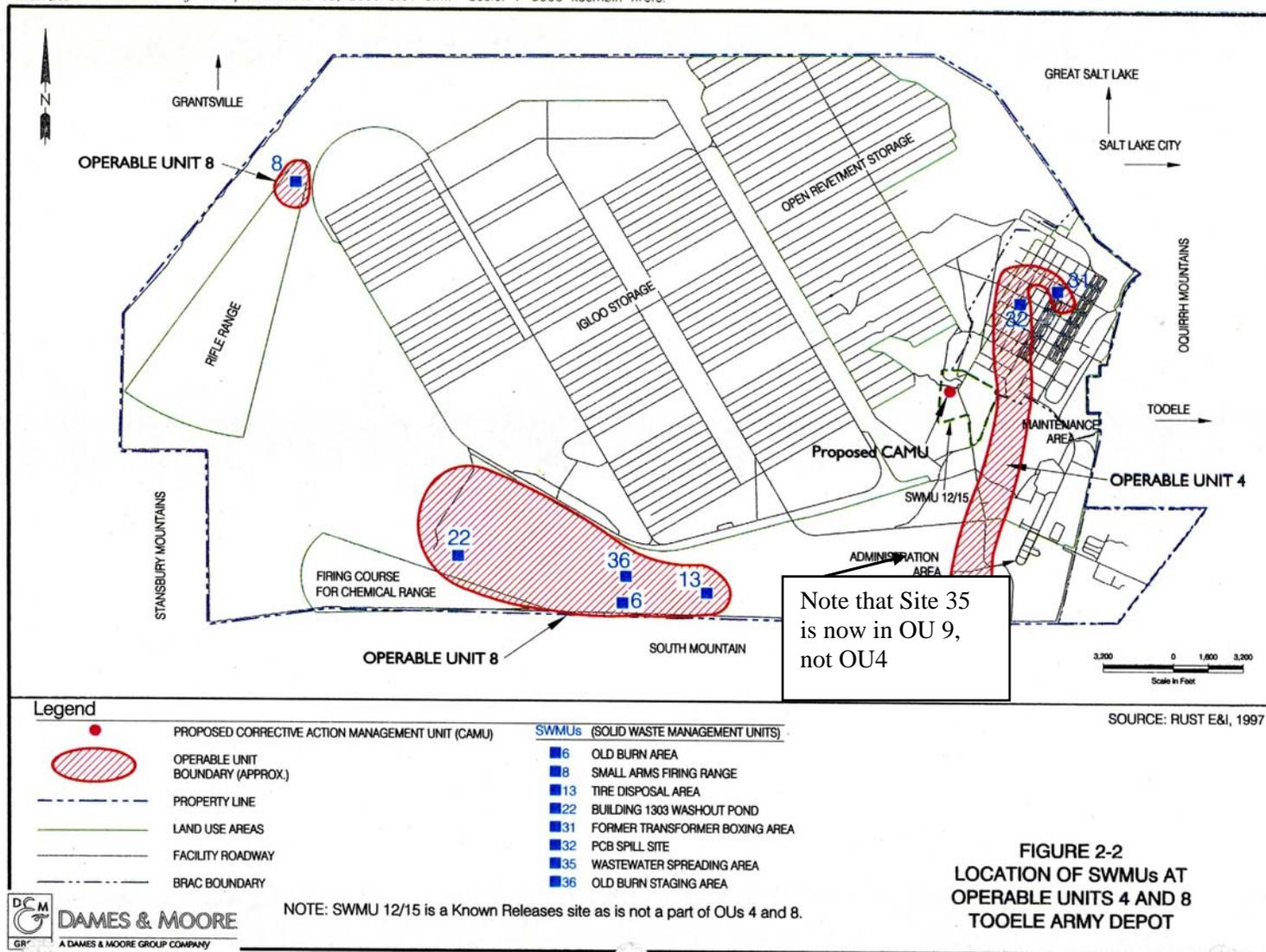
The climate in the Tooele Valley ranges from arid to semiarid at the flats near the Great Salt Lake and in the surrounding mountains. Average annual precipitation is approximately 17 inches in Tooele and 11 inches in Grantsville. Precipitation increases to approximately 40 inches per year (in/yr.) in the mountains. The area is characterized by hot dry summers and cold winters, with a normal mean annual air temperature of 51 degrees Fahrenheit. The prevailing wind is from the north-northwest.

**Figure 1**  
**Site Location Map**

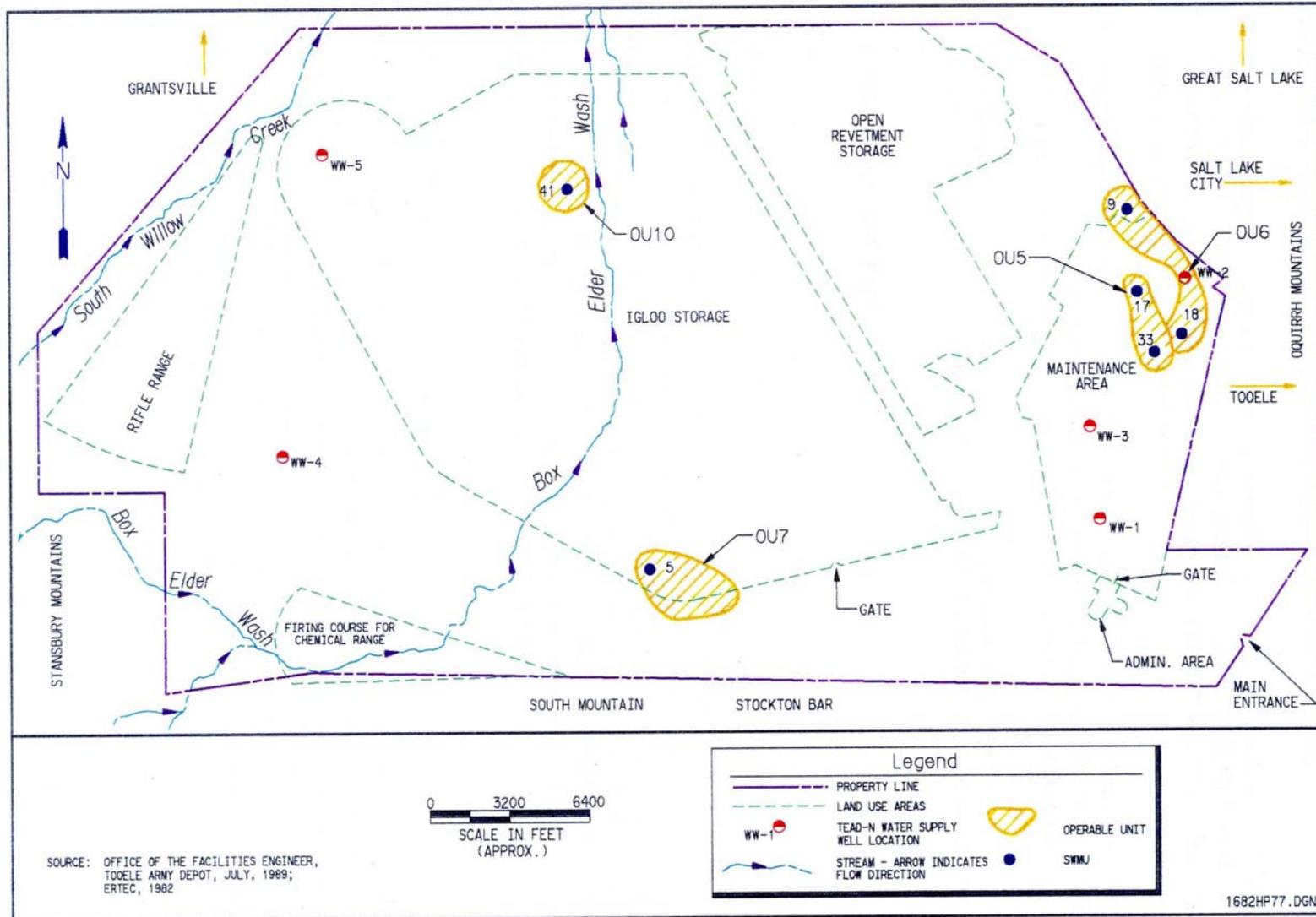


*Figure 1-1. Location Map of Tooele Army Depot-North Area and Vicinity*

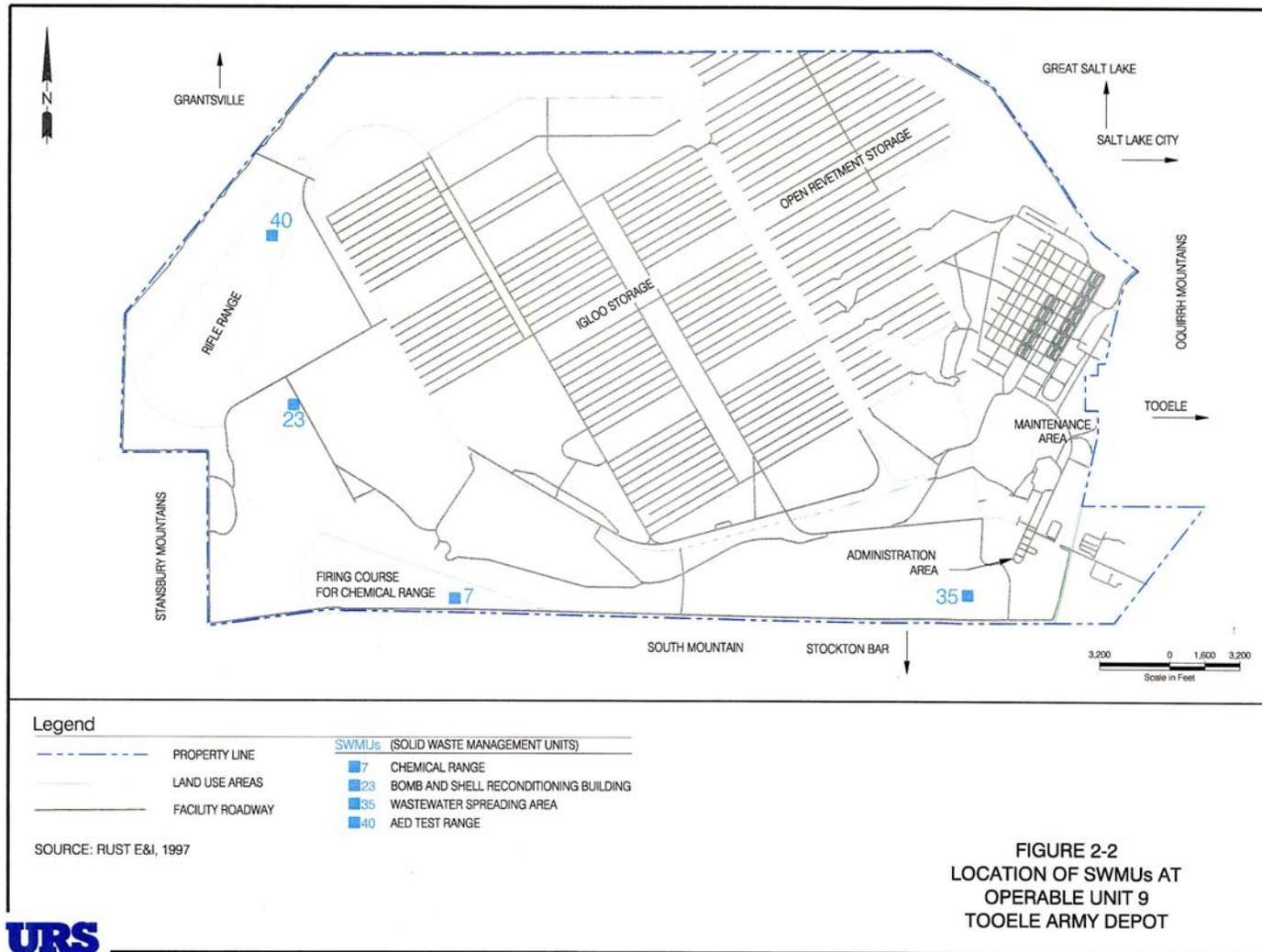
**Figure 2**  
**Operable Units 4 and 8 Locations**



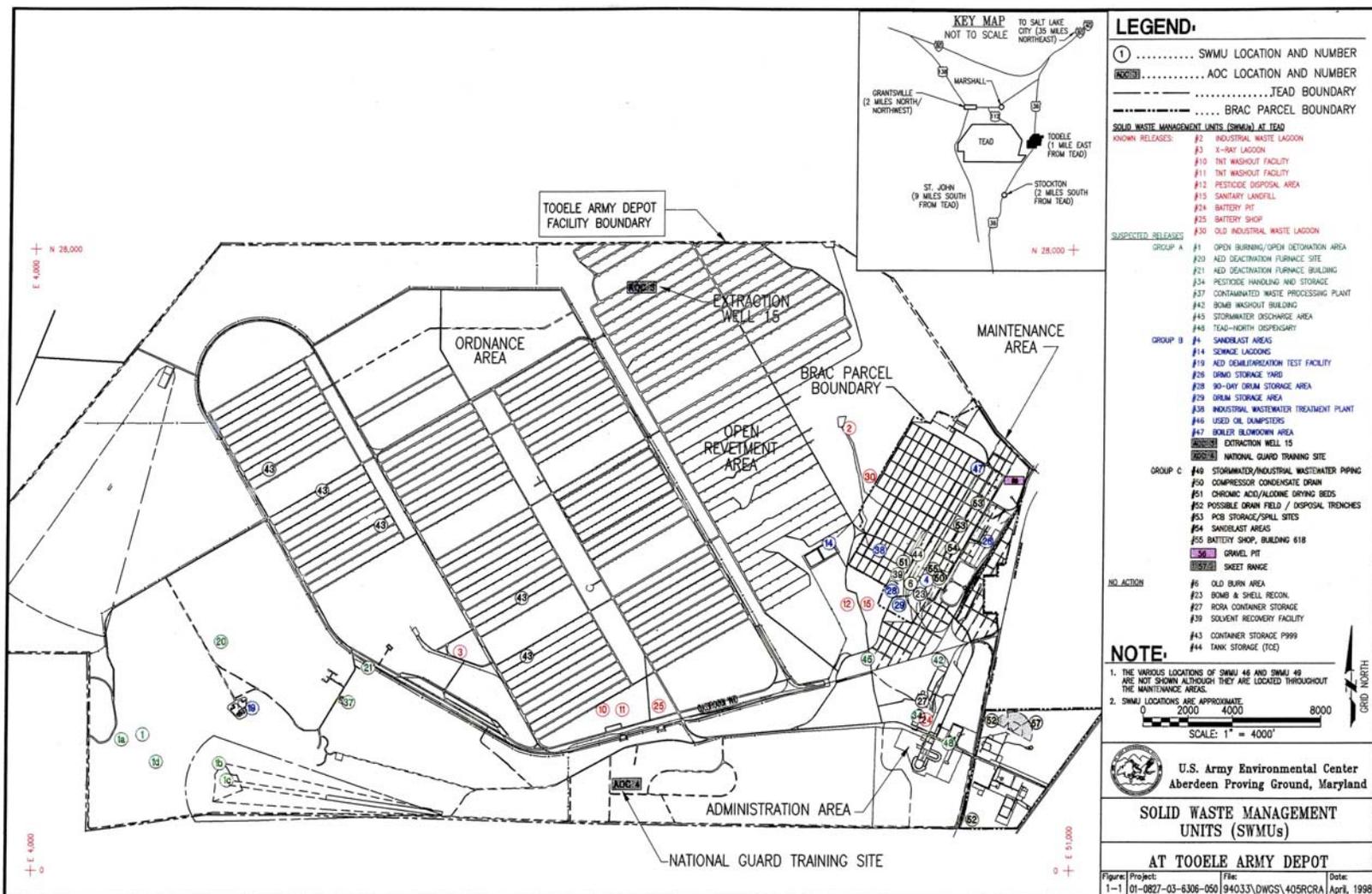
**Figure 3**  
**Operable Units 5, 6, 7, and 10 Locations**



**Figure 4**  
**Operable Unit 9 Location**



**Figure 5**  
**RCRA Corrective Action Solid Waste Management Units**



## **Soil Characteristics**

Soil that develops in semiarid climates is generally deep, well drained, moderately permeable, and alkaline. The hydraulic conductivity of the TEAD area soil ranges from  $1 \times 10^{-2}$  to  $1 \times 10^{-4}$  centimeters per second (cm/sec) [James M. Montgomery (JMM), 1992]. Because of the low precipitation and soil conditions, vegetative cover is somewhat sparse, which contribute to natural erosion of soil in the area.

## **Groundwater**

Tooele Army Depot is located within Tooele Valley, an intermountain valley within the Basin and Range Physiographic Province. This region is characterized by relatively young faulting caused by tensional tectonic forces which overprint the folding and faulting of earlier compressional episodes. The valley fill sediments are composed of alluvial fan and lacustrine deposits. In some areas the alluvial fan materials have been re-worked by Ancient Lake Bonneville and deposited as extensive clay/silt beds and as gravel bars.

Ground surface and the groundwater table both slope generally to the north. The steeper slope of the ground surface results in shallowing of the water table to the north. Depth to groundwater varies from nearly 700 feet in the southwestern corner of the depot to over 400 feet at the eastern edge of the depot, and to less than 300 feet at the northern boundary. The horizontal hydraulic conductivity of the alluvial aquifer is approximately 200 feet per day (ft/day), and the vertical hydraulic conductivity ranges from less than 1 to about 10 ft/d. Calculated groundwater velocities range from 4 to greater than 9800 feet per year (ft/yr.). The great depth to groundwater makes it unlikely that less mobile contaminants will reach groundwater. However, this also greatly increases the expense of investigating and remediating groundwater in northeastern part of the Depot where more mobile solvent contamination has reached the water table.

In Tooele Valley, groundwater recharge comes primarily from infiltration that occurs in the surrounding mountains. Over most of the valley, there is very little recharge to groundwater from vertical infiltration of precipitation. However, in areas such as the former Industrial Area of TEAD, where denudation has reduced evapotranspiration and man-made structures have concentrated precipitation, some infiltration to groundwater does occur. This is evidenced by the fact that solvent contamination does travel from the ground surface down to the water table.

The geology of the depot is highly complex. The ill defined interaction of alluvial fan and lacustrine environments has caused complexity in the sediments; and tectonics events further complicate the picture. Although marine sedimentary bedrock underlies much of the valley at depths of several thousand feet, outcrops and shallower bedrock are seen locally, on and near the Depot. Water flows from the mountains toward the Great Salt Lake in a generally north direction. In the area of the old Industrial Area, groundwater flows generally northwest, but geologic features causes diversion of flow to a more northerly direction near the bedrock outcrop and associated faults. Some significant variations of the flow directions are caused by the complex hydrogeology.

Two significant solvent contaminated groundwater plumes originate in the old Industrial Area. The Main Plume originates at several locations in the western part of the Industrial Area and flows northwest to the northern boundary of TEAD. The Northeast Boundary Plume originates near Building 679 in the eastern part of the industrial area and flows northwest also. The two plumes co-mingle at the eastern edge of the Main Plume and the western edge of the Northeast Boundary. Contaminated water from this co-mingled area and the Northeast Boundary plume are diverted by the

high bedrock and associated faults to a more northerly direction near the northeast boundary of the depot. This contaminated water flows off the depot and under private property.

The Tooele Army Depot Groundwater Flow and Contaminant Transport Model (2007) details the effects of the complex hydrogeology on the movement of contaminated groundwater.

### **Surface Water**

Surface water at TEAD consists entirely of storm water drainage. Box Elder Wash and South Willow Creek traverse the installation from the southwest boundary to the north, but are diverted for irrigation purposes prior to entering the installation. Flow is present during excessive snow melt.

### **Site History and Use**

#### ***CERCLA Sites***

*OU 4, SWMU 31, Former Transformer Boxing Area* - The Former Transformer Boxing Area was used for the temporary storage of transformers from 1979 to 1980. The area in which the transformers were stored is a flat, gravel covered area measuring 625 feet x 300 feet. No leaks or spills of PCBs in the area were documented during the short-term storage of transformers in this area.

*OU 4, SWMU 32, PCB Spill Site* - At this SWMU a reported release of approximately 1,000 gallons of PCB contaminated oil occurred in October 1980. The soil was reportedly excavated to a depth of 8 to 10 feet. Approximately 440 (55 gallon) drums of soil and 18 drums of contaminated oil were removed from the SWMU.

*OU 5, SWMU 17, Former Transformer Storage Area* - The Former Transformer Storage Area was used in the past to store electrical transformers and other switch gear, which may have contained PCBs. This SWMU is located on property that has been transferred to private ownership under the BRAC Act.

*OU 5, SWMU 33, PCB Storage Building* - The PCB Storage Building was identified in the past as building 659, and was a TSCA regulated facility for the storage of transformers containing PCB contaminated oil. The storage area within building 659 was approximately 180 feet x 250 feet. The area had sealed cement floors and an 8 inch high perimeter concrete curb and diversion structures at each entrance for containment of spills. This SWMU is located on property that has been transferred to private ownership under the BRAC Act.

*OU 6, SWMU 09, Drummed Radioactive Waste Area* - The Drummed Radioactive Waste Area consisted of a concrete pad and a nearby field area that was reportedly used in the past for temporary storage of drummed low-level radioactive waste such as luminous dials and gauges. This SWMU is located on property that has been transferred to private ownership under the BRAC Act.

*OU 6, SWMU 18, Radioactive Waste Storage Building* - The Radioactive Waste Storage Building was located in a section of Building 659 adjacent to SWMU 33. The facility began operations in 1975 and was regulated by the NRC. The facility was used to store items such as radiation detection meters, compasses, sights, range finders, and luminous compounds. This SWMU is located on property that has been transferred to private ownership under the BRAC Act.

*OU 7, SWMU 05, Pole Transformer PCB Spill Site* - The Pole Transformer PCB Spill Site resulted when, in 1976, a fire occurred in a pole mounted electrical transformer. During the fire, the

transformer leaked PCB containing oil to the surrounding soils. At the time of the release, the oil containing soils were excavated in an area adjacent to the pole. The excavation measured approximately 5 feet long x 5 feet wide and 3 feet deep. Eleven 55 gallon drums of soil were collected and removed from the SWMU. The excavated area was not backfilled at the time the cleanup occurred.

*OU 8, SWMU 06, Old Burn Area* -The Old Burn Area was used for testing of munitions and for burning boxes and wooden crates on the ground surface and in shallow trenches. These activities were discontinued in the 1970's. The trenches still contain metal debris and spent or destroyed munitions. The trenches have been filled, graded and revegetated.

*OU 8, SWMU 08, Small Arms Firing Range* - The Small Arms Firing Range was used for weapons training by the National Guard, Army Reserve, Navy and TEAD military and security personnel. The range contained 20 firing stations, with targets located at 25, 50, 100, and 300 meters. Bermed areas just in front and behind the targets were used to stop the fired rounds.

*OU 8, SWMU 13, Tire Disposal Area* -The Tire Disposal Area is an 11 acre pit located in the southern portion of TEAD. It was used for the disposal of vehicle tires from 1965 to 1993. The tires were removed from the SWMU in 1993. Mr. Larry McFarland, TEAD Site Restoration Program Manager, indicated that the tires were delivered to a variety of recycle or re-use sources. No detailed records were kept.

*OU 8, SWMU 22, Building 1303 Washout Ponds* - The Building 1303 Washout Pond was a shallow depression located in the southwestern portion of TEAD. This SWMU received wash water from Building 1303, where high-explosive bombs and projectiles were dismantled and shell casing were washed for reuse or disposal. The wash water drained from the building into an unlined ditch and flowed to the ponding area.

*OU 8, SWMU 36, Old Burn Staging Area* - The Old Burn Staging Area is a small pit located immediately north of the Old Burn Area (SWMU 6). The area was used to temporarily store material on its way to the Old Burn Area for disposal or testing.

*OU 9, SWMU 07, Chemical Range* - The Chemical Range covered approximately 550 acres running along the southern installation boundary. At the eastern point of the range was the firing point, with the bullet stop located approximately 4,800 feet to the west. A building foundation and several debris disposal trenches are all that remain at the SWMU. Chemical and pyrotechnic type munitions, excluding chemical agent filled munitions were tested and disposed of at this SWMU. Munitions testing and disposal included such items as flares, smoke grenades, smoke pots, incendiary devices and riot control gases.

*OU 9, SWMU 23, Bomb and Shell Reconditioning Building* - Operations in Building 1345 began in the late 1950's and have consisted of external work on large munitions, primarily sandblasting and painting. Wastewater, which is currently comprised of boiler blow down water, has flowed from the facility into two open ditches to the north of the building.

*OU 9, SWMU 35, Wastewater Spreading Area* - At the Wastewater Spreading Area, runoff and wastewater from a former housing area, now part of the TEAD horse stable complex, was discharged through two culverts into two unlined ditches. The ditches discharged to a relatively flat spreading area.

*OU 9, SWMU 40, AED Test Range* -The AED Test Range is located in the northwestern portion of the installation and has been used in the past for the testing of munitions, bombs, and rocket motors. This SWMU consists of several bermed revetments, a drop tower and a deactivation furnace, of which only the foundation remains. The deactivation furnace was used to test conveyor spacing in relationship to the design of such systems. Fragments of propellant, UXO and spent munitions have been found on the surface through-out the SWMU.

*OU 10, SWMU 41, Box Elder Drum Site* - The Box Elder Drum Site consisted of 21 drums that were dumped off the edge of the Box Elder Wash into the lower bank and bottom of the wash. The drums were located in an approximately 200 foot long stretch of the wash. According to USACE Project Manager, Mr. Paul Feldman, the drums contained a black tar-like substance resembling roofing tar. Analytical data indicated the presence of benzene, phenanthrenes, unidentified aliphatic and polycyclic hydrocarbons, barium, and mercury. Most of the drums were partially covered by soil or vegetation. The soil cover appeared to have resulted from sedimentation during periods of surface water flow and from caving of the steep wash banks. Again, according to Mr. Feldman, the final disposition of the drums was incineration at a state-permitted hazardous waste incinerator in Aptus.

### ***RCRA Solid Waste Management Units***

*Group A, SWMU 1, Open Burning/Open Detonation Area* - The Open Burning/Open Detonation Area is located in the southwest corner of the installation. The area consists of four sub-units, the Open Detonation/Cluster Bomb Area; the Propellant Burn Pad; the Trash Burn Pits; and the Propellant Burn Pans. The Propellant Burn Pans and the Open Detonation/Cluster Bomb Area are currently active RCRA permitted treatment facilities. The Trash Burn Pits and Propellant Burn Pad are located adjacent to the active treatment facilities. The Trash Burn Pits consist of approximately 20 pits located within a 45 acre area that was used to burn range and ammo waste. The Propellant Burn Pad consisted of a 100 foot x 300 foot clear area where propellants were burned in open trenches. Projectile casings were also flashed in this area. Use of the Burn Pad and Pits occurred from 1959 to 1977.

*Group A, SWMU 20, AED Deactivation Furnace Site* - The AED Deactivation Furnace is located in the southwest portion of the installation. This SWMU has been active since approximately 1970. Included at the SWMU are a deactivation furnace, a flash furnace (installed in 1976) and an air pollution abatement system (installed in 1976). Contamination of the SWMU resulted from approximately 6 years of use without the pollution abatement system.

*Group A, SWMU 21, Ammunition Deactivation Furnace*- The Ammunition Deactivation Furnace occupies approximately 1 acre in the southwestern portion of the installation. The furnace is utilized for demilitarization of small arms. The facility was constructed about 1955. Air pollution control equipment was installed on the furnace around 1975. The furnace is currently operating under a RCRA Part B permit. Contamination of the SWMU resulted from approximately 20 years of use without air pollution controls.

*Group A, SWMU 34, Pesticide Handling and Storage Facility* - The Pesticide Handling and Storage Area located at building 518 in the Tooele Army Depot administration area. This facility has been used since 1942 to store and prepare herbicides and pesticides.

*Group A, SWMU 37, Contaminated Waste Processor* - The Contaminated Waste Processor was used up until 1985 for flashing scrap metal and incinerating wooden crates, dunnage, and other ammunition shipping components.

*Group A, SWMU 42, Bomb Washout Facility (Bldg 539)* - Building 539 was used from 1942 to the early 1960's to demilitarize small arms. Wastewater generated in the facility was discharged to an open ditch which led to an unlined holding pond approximately 600 feet northwest of the facility.

*Group A, SWMU 45, Stormwater Holding Pond* - The Stormwater Discharge Area consists of an area at the outfall of the administration area stormwater collection system. The SWMU covers approximately 2 acres and includes a unlined ponding area, discharge pipe, and portions of a wash floodplain down-gradient of the ponding area.

*Group A, SWMU 48, Old Dispensary* - The Old Dispensary was located approximately 300 feet northwest of the present Tooele Army Depot Health Clinic. The facility was constructed in 1945 and originally served as an administration building. It was later converted to a hospital containing operating rooms, sterilization room, x-ray facilities, and a dental office. Wastewater and ~~x-ray~~ waste streams from developing x-rays were discharged to the sanitary sewer system. The facility was demolished in the mid-1980's and replaced with the current facility.

*Group B, SWMU 4, Sandblast Areas* - This SWMU consists of three sandblast areas located in Buildings 615, 617, and 600 where metal processing operations including sandblasting, painting, and stripping were conducted. Wastes produced included used sandblast media (steel grit, ground walnut shells, or glass beads) and paint stripping solutions. Sandblast medias were recycled and reused until they lost their effectiveness. The spent material was collected in hoppers for 90 day temporary storage prior to removal and off-site disposal. According to the RFI report, paint stripping solutions included phosphoric acid, hydrochloric acid, and sodium peroxide. The RFI report also mentions spent solvents used for degreasing, but specific solvents were not identified. Waste products were also produced in the paint booths. This SWMU is located on property that has been transferred to private ownership under the early transfer provisions of the BRAC Act.

*Group B, SWMU 19, AED Demilitarization Test Facility* - The AED Demilitarization Test Facility is located southwest of the ammunition storage area in a remote undeveloped portion of the installation. The facility was constructed in 1973 and is composed of several small buildings, sheds and a series of protective revetments behind which tests are conducted. Operations conducted at this SWMU include experimental or function testing of new design demilitarization equipment. Live ammunition and propellants are commonly used as part of these test operations.

*Group B, SWMU 26, DRMO Storage Yard* - The DRMO Storage Yard is a 60 acre salvage yard located in the eastern section of the industrial area. The SWMU is flat and mostly unpaved with fencing around the perimeter. Several storage buildings occupy portions of the SWMU. This SWMU was used for the temporary storage of surplus materials. Storage times varied according to material types from a few months to several years. Although not a major function of the DRMO, small quantities of hazardous materials and wastes were temporarily stored at the DRMO. Based on aerial photographs, the SWMU became an active storage yard sometime between 1953 and 1959. This SWMU is located on property that has been transferred to private ownership under the BRAC Act.

*Group B, SWMU 29, Drum Storage Area* - SWMU 29 consists of two areas located near the southern end of the Maintenance Area. The two areas are separated by the Maintenance and Supply Road. The southern area, also known as the old lumber yard, is a fenced 25-acre expanse of gravel and broken asphalt surface with a single warehouse. Historical aerial photographs show that the southern part of SWMU 29 has been used for the storage of drums, cylinders, tanker trucks, and lumber. The northern area is a triangular-shaped, sparsely vegetated open area of approximately five acres. A 1953 aerial photograph shows drums stored in this area. Photographs from 1959 and 1966

indicate that the drums were removed and that the area was unoccupied. This SWMU is located on property that has been transferred to private ownership under the BRAC Act.

*Group B, SWMU 46, Used Oil Dumpsters* - Used oil dumpsters are present at a number of locations within the administrative area of the installation, as well as the old industrial area that was transferred under the BRAC action. Used oil from vehicle maintenance operations in these buildings was stored in dumpsters outside of each facility. The used oil was routinely pumped from the dumpsters for offsite disposal by an oil recycling contractor.

*Group C, SWMU 49, Stormwater/Industrial Wastewater Piping System* - Prior to the construction of the Industrial Waste Water Treatment Plant (IWTP) in 1998, the storm water sewer system was used for both storm water and industrial waste water drainage. The piping system discharged into a series of ditches and lagoons (SWMU 30 and 2). These ditches and lagoons have been identified as a major source of groundwater contamination underlying a portion of the installation. This SWMU is located on property that has been transferred to private ownership under the BRAC Act.

*Group C, SWMU 50, Compressor Condensate Drains* - Compressor condensate at Buildings 619 and 613 was discharged from the compressor room to a partially buried 55 gallon drum with a perforated base to dissipate the effluent. The drains are located in a small area approximately 15 feet square. Upon discovery, the drains were closed and removed. This SWMU is located on property that has been transferred to private ownership under the BRAC Act.

*Group C, SWMU 51, Chromic Acid/Alodine Drying Beds* - The Chromic Acid/Alodine Drying Beds were located southeast of the former Consolidated Maintenance Facility, now owned and operated by Detroit Diesel. Real property records indicate that this SWMU was used as a drying bed for the disposal of chromic acid and alodine wastes generated during the 1970's. The drying beds consist of two concrete pads covering a total area of approximately 30 by 30 feet. The two pads are bermed such that liquid could be contained. This SWMU is located on property that has been transferred to private ownership under the early transfer provisions of the BRAC Act.

*Group C, SWMU 52, Drain Field and Disposal Trenches* - As part of the BRAC restoration program, an aerial photographic site analysis was conducted that identified a Drain Field, Spreading Area, and Stable Area in the Property's Administration Area. It is speculated that the Drain field was associated with a septic system, however, no documentation or additional information is available concerning the purpose of this drain field. The drain field and spreading area are located in the northwest corner of the Administration Area. Remnants of possible leach lines remain, running in a westerly direction. An additional line has been observed in aerial photographs, that appears to be originating from off the installation property. In addition to the drain field and spreading area, additional investigations were conducted in an adjacent stable area due to the suspected use of pesticides.

*Group C, SWMU 54, Sandblast Areas* - This SWMU consists of three sandblast areas located at Buildings 604, 611, and 637 where metal processing operations including sandblasting, painting, and stripping were conducted. Wastes produced included used sandblast media (steel grit, ground walnut shells, or glass beads) and paint stripping solutions. Sandblast medias were recycled and reused until they lost their effectiveness. The spent material was collected in hoppers for 90-day temporary storage prior to removal and off-site disposal. Paint stripping solutions included phosphoric acid, hydrochloric acid, and sodium hydroxide. Waste products were also produced in the paint booths. This SWMU is located on property that has been transferred to private ownership under the BRAC Act.

*Group C, SWMU 55, Battery Shop (Bldg 618)* - Building 618 was reportedly used by Tooele Army Depot as a battery shop, vehicle maintenance shop, and metal plating facility. Real property records that have been reviewed confirm that the building had previously been used as a battery shop. Floor drains from this facility appear to have discharged to a sump located on the east side of the facility. At the time that the sump was discovered, the building had been remodeled and the floor drains closed. This SWMU is located on property that has been transferred to private ownership under the BRAC Act.

*Group C, SWMU 56, Gravel Pit* - This SWMU consists of an area where burned materials were discarded or possibly burned on site. The SWMU consists of two areas approximately 20 feet long and 10 feet wide. Test pits excavated in these areas indicated that the burned materials had been placed in trenches and covered with soil. This SWMU is located on property that has been transferred to private ownership under the BRAC Act.

*Group C, SWMU 57, Skeet Range* - This Skeet Range was an active facility prior to the transfer of ownership under the BRAC Act. The range was located in the installation administration area, and was used for recreational purposes. Lead shot and clay pigeon fragments were scattered about the range.

*Known Releases, SWMU 2, Industrial Waste Lagoon* - Between 1965 and 1988, the Industrial Waste Lagoon received wastewater containing high levels of solvents and heavy metals from the old Tooele Army Depot industrial area. Over 140,000 gallons per day on average of industrial wastewater and storm water were discharged to the lagoon during operation. Specific documentation of releases to the lagoon was not found during this review. There is documentation in the RCRA Facility Assessment reports and other site evaluation reports of solvents used in facilities that discharged to the lagoon. A wide variety of solvents were used over time, including 1,1,1-TCA, TCE, and PCE. The Lagoon consisted of a lagoon (200 feet x 400 feet) and four unlined ditches originating at the industrial area which connected to one ditch which extended approximately 1.5 miles to the lagoon. In 1989 the IWL system was shut down and contaminated soil from the lagoon and ditches was remediated. A groundwater pump and treat system was constructed and began operation in 1993 to contain and treat the contaminated groundwater plume. That system consists of 16 extraction wells, 13 injection wells, and a treatment system with 1000 gpm design capacity. The treatment removes VOCs from the groundwater by air stripping.

*Known Releases, SWMU 3, X-Ray Lagoon* - Spent photographic developer and fixer solutions from Building 1223 were discharged to the X-Ray lagoon between 1974 and 1990. These waste streams resulted from the periodic inspection of conventional ammunition. The lagoon was lined, and approximately 75 feet x 35 feet.

*Known Releases, SWMU 10, TNT Washout Facility* - The TNT Washout Facility includes a series of eight ponds that were used from 1948 to 1986 to collect wastewater from a bomb demilitarization facility. Rinse water containing explosives was released to the ponds and allowed to infiltrate and evaporate.

*Known Releases, SWMU 11, Laundry Effluent Pond* - The Laundry Effluent Pond is located adjacent to the TNT Washout Facility. The laundry pond accepted laundry wastewater from approximately 1950 until 1990, and boiler blow down water until 1995.

*Known Releases, SWMU 12/15, Pesticide Disposal Area/Sanitary Landfill* - This SWMU is approximately 140 acres located in and around an arroyo. Use of this area as a landfill began in 1942.

Up until the mid-1980s, access to the landfill was uncontrolled. A wide variety of wastes, including hazardous waste have been disposed of at this SWMU. The SWMU was closed in the early 1990s.

*Known Releases, SWMU 24, Battery Pit (Bldg 507)* – From 1965 to 1980, electrolyte from lead acid batteries was released into the battery pit located adjacent to Building 507. Lime was routinely placed in the pit to neutralize the acid.

*Known Releases, SWMU 25, Battery Shop (Bldg 1252)* – Historic use of Building 1252 has included the re-charging of forklift batteries. Wastewater from the facility was historically discharged into a spreading area located to the east of the facility.

*Known Releases, SWMU 30, Old Industrial Waste Lagoon* - The Old Industrial Waste Lagoon is a 42 acre site located to the west of the old Tooele Army Depot Industrial Area. The SWMU consists of seven ponding areas, referred to as lagoons, and nine unlined collection ditches. The Old Industrial Waste Lagoon collected wastewater from the Tooele Army Depot Industrial Area from 1945 through 1965, at which time the Industrial Waste Lagoon (SWMU 02) was constructed. This SWMU is partially located on property that has been transferred to private ownership under the BRAC Act.

*SWMU 58, Industrial Area Groundwater Sources* - This SWMU consists of VOC source areas within the old Tooele Army Depot Industrial Area that may be contributing to groundwater contamination as well as a groundwater plume originating in the northeast portion of the industrial area, with its extent underlying a portion of the installation, as well as a significant area beyond the northeast boundary. This SWMU is currently being addressed under a RCRA Facility Investigation.

**Status at Last Five-Year Review**

In the first Five-Year Review, several SWMUs had no further action decisions, or remedies complete, indicating that there is no active remedy in place. Five CERCLA sites were in this status and they are listed in Table 4. Sixteen RCRA SWMUs were in this status, and they are listed in Table 5. The remedy selection and implementation were discussed in detail in the first review, and are not discussed further in this review.

**Table 4  
CERCLA Operable Unit Sites Closed at First Five-Year Review**

<b>SWMU</b>	<b>Description</b>	<b>Operable Unit (CERCLA)</b>	<b>Selected Remedy</b>	<b>Site Status – Ongoing Activities</b>
41	Box Elder Wash Drum Site	10	Removal and disposal of drums and stained soils.	NFA
32	PCB Spill Site	4	No Further Remedial Action Planned	NFA
33	PCB Storage Building	5	No Further Remedial Action Planned (Under CERCLA) Closed under TSCA	Closure under TSCA occurred in 1997.
9	Drummed Radioactive Waste Area	6	No Further Remedial Action Planned	NFA
18	Radioactive Waste Storage Building	6	No Further Remedial Action Planned under CERCLA. Closed under NRC	NFA

**Table 5  
RCRA Corrective Action SWMUs Closed at First Five-Year Review**

<b>SWMU</b>	<b>Description</b>	<b>Corrective Action Group (RCRA)</b>	<b>Selected Remedy</b>	<b>SWMU Status – Ongoing Activities</b>
1	Main Demolition Area	A	None	Currently operational under RCRA Part B Permit. RCRA closure under that framework when operations cease.
1d		A	None	Currently operational under RCRA Part B Permit. RCRA closure under that framework when operations cease.
14	Sewage Lagoons		No action necessary based on RFI results	NFA
16	Not Used			
24	Battery Pit	Known Releases	No action necessary based on RFI results	Excavation, backfill and asphalt cover performed after RFI. Site closure report May 1996
27	RCRA Container Storage Facility		No action necessary based on RFI results	This SWMU is currently used as a permitted Hazardous Waste storage facility.
28	90-Day Drum Storage Area		No action necessary based on RFI results	NFA
38	Industrial Wastewater Treatment Plant (IWTP)		No action necessary based on RFI results	NFA
39	Solvent Recovery Facility		No action necessary based on RFI results	NFA
43	Container Storage for P999 Wastes		No action necessary based on RFI results	NFA
44	Tank Storage of TCE		No action necessary based on RFI results	NFA
47	Boiler Blowdown		No action necessary based on RFI results	NFA
52A	Possible Drain Field	C	No action necessary based on RFI results	NFA
53	PCB Storage and Spill Sites		No action necessary based on RFI results	NFA
55	Battery Shop (Bldg 618)	C	No action necessary based on RFI results	NFA

## **V. Federal Facilities Agreement (FFA)/CERCLA Remedial Actions**

### **Remedy Selection**

Records of Decision (RODs) for TEAD were signed in September 1994 for OUs 5, 6, 7, and 10. The ROD for OU 4 was signed in January 2003. The ROD for OU 8 was signed in March 2004. A ROD for OU9 is drafted, and is in public review at the time of this Five-Year Review. Many of the OU SWMUs presented risks that were within the acceptable cancer risk range, below a hazard index of 1.0, and had estimated blood-lead levels less than EPA standards. Under Utah Corrective Action Cleanup Standards Policy, Rule 315-101 (the Risk Rule), any SWMU with a potential residential risk greater than  $1 \times 10^{-6}$  or a hazard index (HI) greater than 1, must have site management in place as a minimum corrective action. This State RCRA requirement is incorporated into the RODs as an ARAR. As a result, several of the OU SWMUs have institutional controls as the selected remedy. Specifically, land use controls have been established to prohibit residential construction at those SWMUs. Selected remedies for all OU SWMUs still open as of the last Five-Year Review are presented in Table 6.

**Table 6**  
**Remedy Selection for CERCLA Operable Unit Sites**

<b>SWMU</b>	<b>Description</b>	<b>Operable Unit (CERCLA)</b>	<b>Selected Remedy</b>	<b>Basis for Selection</b>
31	Former Transformer Boxing Area	4	Institutional control	Risk to future residents due to PAHs. No unacceptable risk to Depot workers. No risk of a magnitude to require active remediation.
17	Former Transformer Storage Area	5	Land Use Controls (as recommended in previous 5-year review).	Initially, "No Further Remedial Action Planned" as conditions at the SWMU met the standard for PCB contamination in EPA Guidance on Remedial Actions for Superfund Sites with PCB Contamination. However, it was identified in the first Five-Year Review that the SWMU did not meet the requirements for risk based closure under Utah Administrative Code (UAC) 315-101, as the risk exceeded $1 \times 10^{-6}$ on a residential basis. Land use control is now the selected remedy.
5	Pole Transformer PCB Spill	7	Excavate, backfill, cap with soil and gravel layers. Land use controls.	Protection of public health and the environment from exposure to contamination by PCBs. In addition the selected remedy is intended to protect cattle and wildlife from exposure to contaminated soil. In the last Five-Year Review it was found that the SWMU did not meet the requirements for risk based closure under Utah Administrative Code (UAC) 315-101(the Risk Rule), as the risk exceeded $1 \times 10^{-6}$ on a residential basis. Land Use Control was added to the remedy after the first review.
6	Old Burn Area	8	Excavation and stabilization of lead contaminated soil. Excavation and offsite disposal of explosive contaminated soil. Land use controls.	Risks to future construction workers and future residents due to Arsenic, Lead, and 2,4-DNT.
8	Small Arms Firing Range	8	Excavation and stabilization of lead contaminated soil. Land use controls.	Elevated predicted blood lead levels and potential adverse ecological effects required active remediation. Residual risks to hypothetical residents at the SWMU require land use control.

<b>SWMU</b>	<b>Description</b>	<b>Operable Unit (CERCLA)</b>	<b>Selected Remedy</b>	<b>Basis for Selection</b>
13	Tire Disposal Area	8	Land use controls	Risk to future residents due to chloromethane. No unacceptable risk to Depot workers. No risk of a magnitude to require active remediation.
22	Building 1303 Washout Pond	8	Excavation, re-seeding, Land use Controls	Risk assessment re-calculated after site excavation. Risk to future residents due to TNT and RDX. No unacceptable risk to Depot workers. No risk of a magnitude to require further active remediation.
36	Old Burn Staging Area	8	Land use controls	No carcinogenic COPCs at the SWMU. No unacceptable hazard to Depot workers. HI greater than 1.0 for hypothetical residents due to lead.
7	Chemical Range	9	Land use controls to prevent residential use. ROD pending	Risk to future residents due to metals, particularly beryllium. No unacceptable risk to Depot workers. No risk of a magnitude to require active remediation.
23	Bomb and Shell Reconditioning Building	9	Excavation and off-post disposal. Land use restrictions to prevent residential use. ROD pending	PCB and PAH are COCs. Active remediation required due to PCB above allowable levels under TSCA.
35	Wastewater Spreading Area	9	Land use controls to prevent residential use. ROD pending	Risk to future residents due to DBHC and Chlordane. No unacceptable risk to Depot workers. No risk of a magnitude to require active remediation.
40	AED Test Range	9	Land use controls to prevent residential use. ROD pending	Risk to future residents due to RDX and 2,4-DNT. No unacceptable risk to Depot workers. No risk of a magnitude to require active remediation.

## **Remedy Implementation**

Remedies have been implemented as specified in the RODs for OUs 5, 6, 7, and 10 prior to the last Five-Year Review. In addition, Remedial Design Plans for Implementation of Institutional Controls have been prepared as a result of recommendations in the first Five-Year Review for SWMUs 5 and 17 in OUs 7 and 5 respectively. In the past five years, remedies for OUs 4 and 8 have been implemented, with the exception of SWMU 6 in OU8, which has been partially implemented.

### ***Land Use Controls***

Land Use Controls are codified in two documents. On the BRAC parcel, the transfer deed includes CCRs which limit the use of the industrial area to industrial use only. The Tooele Army Depot Master Land Use Plan provides appropriate limitations on site use for the SWMUs within current Depot boundaries. For all the CERCLA OU SWMUs, the Remedial Design Plans for Implementation of Institutional Controls include requirements to inspect the SWMUs annually in the fall and report on land use condition.

### ***Active Remediation***

The remedy for SWMU 6 included excavation and off-site disposal of explosives contaminated soil, and excavation and stabilization of lead contaminated soil followed by placement of the stabilized soil into a Corrective Action Management Unit (CAMU). The explosive contaminated areas were successfully remediated in December 2004. Excavation in the lead contaminated areas revealed a high content of debris, which rendered the stabilization process as designed impracticable. The stabilization process was re-evaluated, and a revised process was approved in January 2007. Stabilization is still the remedy, and no significant changes to the remedy have been implemented that would require an ESD. The new process was field tested in Fall 2007, and will be used to complete the remedial action in Spring/Summer 2008.

The remedy for SWMU 8 included excavation and stabilization of lead contaminated soil followed by placement of the stabilized soil into a Corrective Action Management Unit (CAMU). The remedies for SWMUs 6 and 8 were scheduled to occur concurrently. The excavation and stabilization of soil at SWMU 8 did not experience the difficulties of SWMU 6, and was successfully completed in December 2004. A construction completion report has been prepared and is currently in review at EPA and Utah Department of Environmental Quality (UDEQ).

The proposed remedy for SWMU 23 includes excavation and off-site disposal of PAH and PCB contaminated soil. Field work is tentatively planned for Spring/Summer 2008. This field work however, cannot be implemented until the ROD is finalized. The ROD is currently under final revision. A public meeting for OU9 was held in July 2007.

**System Operations**

Of the remedies in place at the time of this review, no operations and maintenance has been required with the exception of annual inspections to ensure that the soil and gravel cover at OU 7, SWMU 5 has not been compromised, the CAMU is in good condition, and that land use remains industrial at all SWMUs where required.

**Annual Operations and Maintenance Costs**

At the time of this review, no remedial actions are in place that required program funding for operations and maintenance of the remedy. Annual site inspections are performed by Army staff at a minimal cost. Ten SWMUs are inspected once per year and a report is generated. Estimated staff labor cost is

**Table 7  
CERCLA Operable Unit SWMUs  
Site Maintenance Inspection Costs**

<b>Dates</b>	<b>O&amp;M Cost Rounded to nearest \$100</b>
FY 2002	\$2,400
FY 2003	\$2,400
FY 2004	\$2,400
FY 2005	\$2,400
FY 2006	\$2,400

**Progress Since the Last Review**

***Status of Issues and Recommendations***

The first review found one issue affecting two sites among the CERCLA operable units. All remedies in place at that time were found to be protective. The issue was that Site 17 in OU5 and Site 5 in OU7 had no further action as the selected remedy in the RODs; but these sites did not meet the State Risk Rule, thus the remedy selection for these sites did not satisfy the ARAR. The first review recommended that institutional control to prevent residential site use be implemented as the selected remedy. The institutional controls have been implemented. Explanations of Significant Difference (ESDs) have not yet been completed to document the changes.

***Progress Toward Additional Site Remedies***

Feasibility Study (FS)/ Proposed Plan (PP)

In July 2006, TEAD completed a Feasibility Study (FS) on OU9 (URS, 2006). In June 2007, the proposed plan was completed.

Record of Decision (ROD)

The final ROD for Operable Units 4 and 8 (DM, 2000) was initially published in June 2000. ROD signatures occurred in January 2003 for OU4 and March 2004 for OU8. The ROD for OU9 is currently under final revision.

### Remedial Action

In the past five years, all selected remedies for OUs 4 and 8 have been initiated. Institutional controls are ongoing at all SWMUs in these OUs. Active remediation at SWMU 6 is partially complete. A pilot test of a modified soil/debris separation process will occur in Fall/2007/winter/2008. Full-scale treatment is anticipated in Spring 2008. Construction is substantially complete for remedial action at SWMU 8.

## **V. RCRA Post Closure and Corrective Action**

RCRA Corrective Action at TEAD is executed in accordance with a Post Closure Monitoring and Corrective Action Permit (“the permit”). The regulatory authority is the Utah Department of Environmental Quality, Division of Solid and Hazardous Waste (DSHW). Solid Waste Management Units (SWMUs) covered by this permit are being addressed under two groups, Known Release SWMUs and Suspected Release SWMUs. Within the Suspected Release SWMUs, three sub-groups have been established. These groups are identified as Groups A, B, and C. These groups were established primarily due to the time of discovery of each unit and for the purpose of executing contracts. The groupings do not relate to affected media, contaminant types, or sources. In addition to the grouped SWMUs, SWMU 58, The Industrial Area Groundwater Sources and Northeast Boundary Plume, is being addressed separately.

The permit contains general and site-specific requirements for implementation of the corrective action program, from identification of new SWMUs through site investigation and corrective action. Detailed requirements are in the permit for long term groundwater monitoring, post closure care for the industrial waste lagoon, and operation and maintenance of the groundwater treatment system. The permit is periodically modified to incorporate new developments in the program. In recent years, updates have been performed approximately annually.

### Remedy Selection

Since the last Five-Year Review, Corrective Measures Studies and Decision Documents have been completed for all RCRA corrective action SWMUs, with the exception of SWMU 58. For SWMU 58, field work for the RFI has recently been completed, and the RFI report is in development. The dates of the Decision Documents are:

Group A	June 2001
Group B	February 2001
Group C	June 2001
Known Releases	April 2002
Known Releases (SWMU 12/15)	March 2003

Table 8 provides a summary of all the selected remedies and the basis of selection. Many of the corrective action SWMUs presented risks that were within the acceptable cancer risk range, below a hazard index of 1.0, and had estimated blood-lead levels less than EPA standards. Under Utah Corrective Action Cleanup Standards Policy, Rule 315-101 (the Risk Rule), any SWMU with a potential residential risk greater than  $1 \times 10^{-6}$  or a HI greater than 1, must have site management in place as a minimum corrective action. As a result, several of the SWMUs have deed restrictions/land

use controls as the selected remedy. Specifically, those controls have been established to prohibit residential construction at those SWMUs. Note that these sites have no contaminants of concern for the reasonable future industrial receptor.

**Table 8**  
**Remedy Selection for RCRA Corrective Action SWMUs**

<b>SWMU</b>	<b>Description</b>	<b>Corrective Action Group (RCRA)</b>	<b>Selected Remedy</b>	<b>Basis of Remedy Selection</b>
1b	Burn Pad	A	Land use restrictions to prevent residential use. Signage warning of potential UXO, UXO clearance before any intrusive Depot activities.	Risks to hypothetical residents due to explosives, dioxins/furans/ metals. No unacceptable risk to Depot workers due to chemical contamination. No risks of a magnitude requiring active remediation. Ordnance encountered during investigation.
1c	Trash burn Pits	A	Land use restrictions to prevent residential use. Signage warning of potential UXO, UXO clearance before any Depot activities.	Risks to hypothetical residents due to RDX, beryllium, and lead. No unacceptable risk to Depot workers due to chemical contamination. No risks of a magnitude requiring active remediation. Ordnance encountered during investigation.
2	Industrial Waste Lagoon (IWL)	Known Releases	Excavate soils in trenches and dispose to lagoon. RCRA cap over lagoon. Extraction, treatment, and re-injection of treated groundwater.	Groundwater is contaminated at levels of VOCs above drinking water standard. Excavation of trenches and capping the lagoon is protective to receptors at surface.
3	X-Ray Lagoon	Known Releases	Monitor groundwater, abandon unused wells, land use restrictions to prevent residential use.	Risks to hypothetical residents. No unacceptable risks to depot workers or construction workers. Elevated levels of metals in groundwater thought to be a result of stainless steel well screen corrosion.
4	Sandblast Areas (Bldgs 600, 615, 617)	B	Deed restrictions to prevent residential use	Risks to hypothetical residents due to PAH, cadmium, chromium, and lead. No unacceptable risks to Depot workers or construction workers.
10	TNT Washout Facility	Known Releases	Excavation, composting, backfilling, and groundwater monitoring, land use restriction	Risks to hypothetical residents, Depot workers, and construction workers due to TNT and RDX. Potentially unacceptable ecological risk. Site related explosives, metals, and SVOCs found in soil. Site related explosives found in

<b>SWMU</b>	<b>Description</b>	<b>Corrective Action Group (RCRA)</b>	<b>Selected Remedy</b>	<b>Basis of Remedy Selection</b>
				groundwater.
11	Laundry Effluent Pond	Known Releases	Excavation and off-post disposal, and land use restrictions to prevent residential use	Risks to hypothetical residents due to arsenic, antimony, lead, and SVOCs. No unacceptable risks to depot workers or construction workers. Estimated blood lead levels for hypothetical residents and depot personnel exceed CDC criteria.
12/15	Pesticide Disposal Area/ Sanitary Landfill	Known Releases	Consolidation of surface debris, soil cover, Land use restriction, cover inspection and maintenance.	Risks to hypothetical residents. Non-cancer risk to construction worker. Potential ecological risk. Metals, VOCs, SVOCs, explosives, and pesticides detected in groundwater. Only VOCs consistent in groundwater.
19	AED Demilitarization Test Facility	B	Land use restrictions to prevent residential use	Risks to hypothetical residents due to lead, RDX, and TNT. No unacceptable risks to depot workers or construction workers.
20	AED Deactivation Furnace Site	A	Asphalt cover and land use restrictions to prevent residential Use	Risks to hypothetical residents due to antimony and lead. No risks to depot workers or construction workers. Estimated blood lead levels to residential child greater than CDC targets.
21	Ammunition Deactivation Furnace Building	A	Asphalt cover and land use restrictions to prevent residential Use	Risks to hypothetical residents, depot workers, and construction workers. COCs are antimony, arsenic, beryllium, cadmium, lead, dioxins/furans. Estimated blood lead levels exceed CDC criteria for all receptors. Four metals determined to pose unacceptable risk. Potentially unacceptable ecological risk.
25	Battery Shop (Bldg 1252)	Known Releases	Excavation and off-post disposal, and land use restrictions to prevent residential use	Risks to hypothetical residents and depot workers due to arsenic, lead, thallium.
26	Defense Reutilization and Marketing Office (DRMO) Storage yard	B	Deed Restrictions to prevent residential use	Risks to hypothetical residents due to PAH. No unacceptable risks to depot workers or construction workers. Estimated blood lead levels in child resident exceed CDC criteria.
29	Drum Storage Area	B	Deed restrictions to prevent residential use	Risks to hypothetical residents due to PAHs. No

<b>SWMU</b>	<b>Description</b>	<b>Corrective Action Group (RCRA)</b>	<b>Selected Remedy</b>	<b>Basis of Remedy Selection</b>
				unacceptable risks to depot workers or construction workers.
30	Old Industrial Waste Lagoon	Known Releases	No Action	Risks to hypothetical residents. No unacceptable risks to depot workers or construction workers. Risk driven by single detection of arsenic at the maximum of the background range.
34	Pesticide Handling and Storage Facility	A	Excavation and off-site treatment/disposal and land use restrictions to prevent residential use	Risks to hypothetical residents due to arsenic, chlordane, DDE, DDT, heptachlor. No unacceptable risks to depot workers or construction workers. "Hotspots" of pesticide contamination exceeded CAOs by an order of magnitude.
37	Contaminated Waste Processor	A	Land use restrictions to prevent residential Use	Risks to hypothetical residents due to PAHs and dioxins/furans. No unacceptable risks to depot workers or construction workers.
42	Bomb Washout Building (Bldg 539)	A	Soil cover, fencing, and land use restrictions to prevent residential use	Risks to hypothetical residents, depot workers, and construction workers due to antimony, arsenic, lead, beryllium, thallium, 2,4-DNT, dioxins/furans. Estimated blood lead levels exceed CDC criteria for all receptors. Potentially unacceptable ecological risk. Lead and antimony posed the unacceptable risks.
45	Storm Water Holding Pond	A	Land use restrictions to prevent residential use	Risks to hypothetical residents due to metals, SVOCs, VOCs in surface water. No unacceptable risks to depot workers or construction workers. Estimated blood lead levels for child resident exceed CDC criteria.
46	Used Oil Dumpsters	B	Excavation and off-post disposal at Buildings 522, 602, 619, 611. Deed restriction at 611 to prevent residential use.	No risks identified for any receptor. Total petroleum hydrocarbon detected at levels above State screening level of 10,000 ug/g.
48	Old Dispensary	A	Land use restrictions to prevent residential Use	Risks to hypothetical residents due to metals, pesticides, SVOCs. No unacceptable risks to depot workers or construction workers.
49	Storm	C	Excavation and off-post disposal at G Avenue outfall,	Nine sub-areas in the SWMU. All of the sub-

<b>SWMU</b>	<b>Description</b>	<b>Corrective Action Group (RCRA)</b>	<b>Selected Remedy</b>	<b>Basis of Remedy Selection</b>
	Water/Industrial Waste Water Piping System		and deed restrictions at all locations (except Building 609) to prevent residential use. No action at Building 609.	areas posed risk to hypothetical residents, but no risk to construction workers or depot workers. At the Building 609 area, risk was driven by levels of thallium within site background. At the G outfall, PAHs exceeded CAOs in 5 of 6 samples.
50	Compressor Condensate Drains	C	Deed restrictions to prevent residential use	Risks to hypothetical residents due to arsenic. No unacceptable risks to depot workers or construction workers.
51	Chromic Acid/Alodine Drying Beds	C	Deed restrictions to prevent residential use	Risks to hypothetical residents due to benzo(b)fluoranthene. No unacceptable risks to depot workers or construction workers.
52B	Disposal Trenches	C	Deed restrictions to prevent residential use	Risks to hypothetical residents due to metals. No unacceptable risks to depot workers or construction workers.
52C	Charcoal Material Area	C	Excavation and off-post disposal of charcoal material and surface soil.	Risks to realistic potential residents. No unacceptable risks to depot workers or construction workers. Risk due to benzo(a)anthracene associated with the charcoal material.
52D	Horse Stable Area	C	Excavation and off-post disposal of shallow soil	Risks to realistic potential residents due to chlordane. No unacceptable risks to depot workers or construction workers.
54	Sandblast Areas (Bldgs 604, 611, and 637)	C	Excavation, off-post treatment/disposal at Building 611. No action at Building 604. Deed restrictions to prevent residential use at Buildings 611 and 637.	Risks to hypothetical residents at all 3 locations. At 604 location, risks driven by single detections of beryllium and thallium within background range. At 611 location, elevated estimated blood lead levels for all receptors. At 637 location, no risks to depot workers or construction workers.
56	Gravel Pit Disposal Area	C	Excavation and off-post treatment/disposal	Risks to potential residents and depot workers due to lead and thallium. Estimated blood lead levels exceed CDC criteria for resident child and construction workers.

SWMU	Description	Corrective Action Group (RCRA)	Selected Remedy	Basis of Remedy Selection
57	Skeet Range	C	Excavation and off-post treatment/disposal	Risks to realistic potential residents, depot workers, and construction workers due to lead, arsenic, antimony, and PAH. Estimated blood levels for resident child, depot worker, and construction workers all exceed CDC criteria.
58	Industrial Area Groundwater Sources and Northeast Boundary Plume		Not yet selected	RFI not completed at this time.

## **Remedy Implementation**

### ***General***

In the past five years, corrective measures have been implemented for several SWMUs. In addition, the groundwater program has evolved considerably. The VOC contaminated groundwater is now being addressed in a comprehensive Depot-wide manner. At the time of the first Five-Year Review, the program included the Main Plume (SWMU 2), the Northeast Boundary Plume (SWMU 58), and the Landfill Plume (SWMU 12/15). As these plumes are connected at most of their extent, it is not practical to study them separately; and their ultimate corrective actions must be consistent.

A web-based database, which was in development during the first review, has been completed, which provides access to most of the geological, hydrogeological, and chemical data acquired at the Depot. The database has functions for automated data review, queries, and a variety of outputs. Data processing and data review have been greatly facilitated by the database.

### ***Implemented Corrective Actions***

Table 9 lists the corrective actions that have been implemented since the last five-year review. Corrective actions were implemented at 27 SWMUs, with 12 SWMUs requiring site management only, 9 SWMUs requiring excavation and disposal, and 6 SWMUs requiring other actions.

Site Management was employed at SWMUs where it is the only corrective action as well as at most of the SWMUs where active remediation was employed. Clean closure was attempted only at SWMUs where a residential scenario was considered reasonable in the future, or where additional cost for reaching clean closure was considered acceptable. Land Use Controls were implemented in two documents. On the BRAC parcel, the transfer deed includes covenants, conditions, and restrictions, (CCRs) which limit the use of the industrial area to industrial use only. The term “deed restrictions” has been used for the BRAC Parcel SWMUs. The Tooele Army Depot Master Plan provides appropriate limitations on site use for the SWMUs within current Depot boundaries. The term “Land Use Restrictions” was used for SWMUs remaining on Army controlled property. While each SWMU requires its own Site Management Plan, the Depot has standardized its site management procedures to facilitate consistent scheduling and reporting. All the RCRA SWMUs are inspected semi-annually in the Spring and Fall, with a report in the Fall. The SWMUs are inspected for land use, condition of fencing, condition of caps, erosion, as appropriate.

In Table 9, corrective action completion dates for active remediation SWMUs represent the date of demobilization of the construction activity. At two of those SWMUs, Corrective Measures Completion Reports have not yet been approved. At 19 SWMUs, site management plans are pending. Due to the high level of activity over the past five years, management of document review schedules became an issue. The Army and regulators developed a document review priority list that is frequently updated to manage the issue. Higher priority is given to documents necessary to continue contracted field efforts for site investigation and cleanup. High priority is also given to documents necessary to continue progress toward decision documents. Site management is being performed where required regardless of whether a plan is in place or not. Attachment 2 contains a table of document completion status for each of the SWMUs. That table is maintained as an attachment to the Permit.

**Table 9**  
**RCRA Corrective Measures SWMUs - Implemented Actions**  
(Chronological Order of Completion)

<b>SWMU</b>	<b>Description</b>	<b>Corrective Action Group (RCRA)</b>	<b>Selected Remedy</b>	<b>Corrective Action Comp Date (YYYY/MM)</b>	<b>SWMU Status – Ongoing Activities</b>
2	Industrial Waste Lagoon (IWL)	Known Releases	Excavate soils in trenches and dispose to lagoon. RCRA cap over lagoon. Extraction, treatment, and re-injection of contaminated groundwater.	1989  1993	Alternative measures study begun in 2004. Groundwater pump-and-treat has been non-operational since Aug. 2004. Effect on TCE plume as a result of non-operation is being monitored. To date there is minimal evidence to suggest plume expansion. The groundwater action is being revisited in the SWMU 58 Corrective Measures Study, which will result in a Depot-wide approach to groundwater plume corrective action. An inspection and maintenance program is in place for the cap.
4	Sandblast Areas (Bldgs 600, 615, 617)	B	Deed restrictions to prevent residential use	2001/02	SWMU inspected twice per year for appropriate land use. Site management plan completed.
19	AED Demilitarization Test Facility	B	Land use restrictions to prevent residential use	2001/02	SWMU inspected twice per year for appropriate land use. Site management plan pending.
26	Defense Reutilization and Marketing Office (DRMO) Storage yard	B	Deed Restrictions to prevent residential use	2001/02	SWMU inspected twice per year for appropriate land use. Site management plan approved.
29	Drum Storage Area	B	Deed Restrictions to prevent residential use	2001/02	SWMU inspected twice per year for appropriate land use. Site management plan approved.
1b	Burn Pad	A	Land use restrictions to prevent residential use	2001/06	SWMU inspected twice per year for appropriate land use. Site management plan pending.
1c	Trash burn Pits	A	Land use restrictions to prevent residential use	2001/06	SWMU inspected twice per year for appropriate land use. Site management plan pending.
37	Contaminated Waste Processor	A	Land Use Restrictions to prevent residential Use	2001/06	SWMU inspected twice per year for appropriate land use. Site management plan approved.
45	Storm Water Holding Pond	A	Land Use Restrictions to prevent residential Use	2001/06	SWMU inspected twice per year for appropriate land use. Site management plan pending.
48	Old Dispensary	A	Land Use Restrictions to prevent residential Use	2001/06	SWMU inspected twice per year for appropriate land use. Site management plan pending.

<b>SWMU</b>	<b>Description</b>	<b>Corrective Action Group (RCRA)</b>	<b>Selected Remedy</b>	<b>Corrective Action Comp Date (YYYY/MM)</b>	<b>SWMU Status – Ongoing Activities</b>
50	Compressor Condensate Drains	C	Deed restrictions to prevent residential use	2001/06	SWMU inspected twice per year for appropriate land use. Site management plan pending.
51	Chromic Acid/Alodine Drying Beds	C	Deed restrictions to prevent residential use	2001/06	SWMU inspected twice per year for appropriate land use. Site management plan pending.
52B	Disposal Trenches	C	Deed restrictions to prevent residential use	2001/06	SWMU inspected twice per year for appropriate land use. Site management plan pending.
30	Old Industrial Waste Lagoon	Known Releases	No Action	2002/04	
46	Used Oil Dumpsters	B	Excavation and off-post disposal at Buildings 522, 602, 619,611. Deed restriction at Building 611 to prevent residential use.	2003/07	Construction complete October 2002. SWMU (at Building 611) inspected twice per year for appropriate land use. Site management plan pending.
52C	Charcoal Material Area	C	Excavation and off-post disposal	2003/12	Construction complete October 2002. SWMU closed
57	Skeet Range	C	Excavation and off-post treatment/disposal	2003/12	Construction complete October 2002. SWMU closed
49	Storm Water/Industrial Waste Water Piping System	C	Excavation and off-post disposal at G Avenue outfall, and Deed restrictions at all locations (except Building 609) to prevent residential use. No action at Building 609.	2004/08	Construction complete November 2002. SWMU inspected twice per year for appropriate land use. Site management plan pending. Wastewater lines throughout the industrial area.
3	X-Ray Lagoon	Known Releases	Monitor groundwater, abandon unused wells, land use restrictions to prevent residential use.	2005/01	Chromium concentrations in groundwater samples found to be a result of well screen corrosion. Wells have been abandoned. One PVC well left in place for water level measurements. SWMU now requires only land use restrictions.
12/15	Pesticide Disposal Area/ Sanitary	Known Releases	Consolidation of surface debris, soil cover, Land	2005/10	Construction complete October 2005. Construction completion report approved December 2006.

<b>SWMU</b>	<b>Description</b>	<b>Corrective Action Group (RCRA)</b>	<b>Selected Remedy</b>	<b>Corrective Action Comp Date (YYYY/MM)</b>	<b>SWMU Status – Ongoing Activities</b>
	Landfill		use restriction, cover inspection and maintenance.		Ongoing site inspections to evaluate erosion of soil cover, security fence, vegetative cover.
54	Sandblast Areas (Bldgs 604, 611, and 637)	C	Excavation, off-post treatment/disposal at Building 611. No action at Building 604. Deed restrictions to prevent residential use at 611 and 637.	2006/01	Construction complete December 2002. SWMU (at 611 and 637) inspected twice per year for appropriate land use. Site management plan pending.
52D	Horse Stable Area	C	Excavation and off-post disposal	2006/12	Construction complete May 2003. SWMU is closed
34	Pesticide Handling and Storage Facility	A	Excavation and off-site treatment/disposal and land use restrictions to prevent residential use	2006/12	Construction complete June 2004. SWMU inspected twice per year for appropriate land use. Site management plan pending.
42	Bomb Washout Building (Bldg 539)	A	Soil cover, fencing, and land use restrictions to prevent residential use	2006/12	Construction complete July 2005. SWMU inspected twice per year for appropriate land use. Site management plan pending.
20	AED Deactivation Furnace Site	A	Asphalt cover and land use restrictions to prevent residential Use	2007/01	Construction complete June 2004. SWMU inspected twice per year for appropriate land use. Site management plan pending.
21	Ammunition Deactivation Furnace Building	A	Asphalt cover and land use restrictions to prevent residential Use	2007/03	Construction complete June 2004. SWMU inspected twice per year for appropriate land use. Site management plan pending.
25	Battery Shop (Bldg 1252)	Known Releases	Excavation and off-post disposal, and land use restrictions to prevent residential use	2007/04	Construction complete October 2003. SWMU inspected twice per year for appropriate land use. Site management plan pending.
11	Laundry Effluent Pond	Known Releases	Excavation and off-post disposal, and land use restrictions to prevent residential use	Report approval pending	Construction complete October 2003. SWMU inspected twice per year for appropriate land use. Site management plan pending.

### ***Pending Corrective Actions***

Implementation of corrective action at SWMU 10, TNT Washout Facility, has begun; with a treatability study for the composting of contaminated soil performed in 2007. Costs for composting amendments had gone up considerably since the CMS was completed. A new amendment was identified that would complete the composting within the previously established budget, and the 2007 treatability study has demonstrated on a field scale that the new amendment will be successful. Construction of full-scale composting facilities began in June 2007. Composting of contaminated soil is expected to begin in October 2007.

Excavation of contaminated soil at SWMU 56, Gravel Pit Disposal Area, was initially begun in 2002. Munitions were found, which was not expected. In addition, it was found that the contamination was significantly more extensive than estimated. Additional site investigations have been performed, which resulted in a revised Corrective Measures Study (June 2007).

### ***SWMU 2 Re-Evaluation***

Groundwater and extraction and treatment began in 1993. In 2003 a process to re-evaluate the effectiveness of the extraction and treatment system (the system) was begun. The Permit requires that the system contain the plume, and that it must operate until the concentrations of the contaminants of concern are reduced to their respective groundwater Protection Standards. During the past five years, and after review of nearly ten years of operation data, the project team observed that while the plume was contained, and concentrations had declined somewhat in some areas of the plume, the aerial extent of the plume had not changed, and that the groundwater protection standard was not likely to ever be met by the existing groundwater extraction and treatment system. In addition, it was questioned as to how much groundwater extraction, if any, was still necessary to achieve containment.

A “Work Plan for Implementation of Alternate Measures” was completed May 2003. The plan included the following tasks:

- Comprehensive review of geologic, hydrogeologic, chemistry, and system operation data
- Perform a system “Non-Operation Test”
- Evaluate alternative plume management strategies

The comprehensive data review is in progress at the time of this review. The evaluation of alternative plume management strategy is being re-directed into the SWMU 58 CMS process. When the SWMU 58 CMS is completed, it will include the revised plan for SWMU 2 plume management. Changes will be managed/documented through the Corrective Action Permit.

A companion document, “Non-Operation Test Proposal”, was finalized in October 2003. The non-operation test (NOT) basically involved shutting down the groundwater extraction and treatment system for three years and evaluating rebound of static water levels and contaminant concentrations. The NOT proposal included procedures for phased system shutdown, static water level monitoring, interim system maintenance, and plume boundary well monitoring and statistical trend analysis. The system began a phased shut-down in June 2004, and complete shutdown occurred in August 2004. The duration of the NOT has nearly ended, and the trend analysis of the selected plume boundary wells has shown no changes that would justify immediate system re-start. A report of findings is

planned which will recommend procedures for follow-on monitoring, maintenance, and operation of the system. In the short term, the system will remain in the non-operation status.

### ***Groundwater Modeling***

A groundwater flow model was required by the permit since its inception, with annual updates an ongoing requirement. The flow model was developed and is updated by the USACE Hydrologic Engineering Center. Its purpose was to provide a tool to optimize plume capture and contaminant removal by adjusting flows at the extraction wells and injection wells. As the Northeast Boundary Plume was discovered, additional sources found in the industrial area, and more wells have been added, the model's complexity has increased. In addition, its purpose has expanded to be used as a predictive tool, with contaminant transport modeling having been added. The fate and transport component of the model is performed by a consultant. The model has expanded from a 8,515 acre area to 25,123 acres; and from 3 layers initially, to 9 layers. The model contains four characteristic "zones": north alluvium, south alluvium, bedrock, and fault zones. The fault zones have been added to the model within the last five years in response to seemingly anomalous water level readings at new monitoring wells in the northeast area. Fault zones were created in the model encasing the bedrock block and extending beyond. Geophysical investigations have verified presence of some faults.

The State DSHW has expressed concern that the model is not being used to predict plume expansion far enough into the future. The Army is currently modeling expansion five years into the future. The Army is reluctant to predict further until uncertainties in the model are better understood. A sensitivity analysis and uncertainty analysis is currently being performed to address that issue.

### **Operations, Maintenance, and Monitoring**

In 2004, the existing operation maintenance, and monitoring contract expired, and the Army contracted with a different contractor to assume the continuing work. The scope of this contract includes all active operations, maintenance, and monitoring requirements as specified in the Post Closure Monitoring and Corrective Action Permit. More specifically, the scope includes O&M of the SWMU 2 groundwater extraction and treatment system, inspection of the SWMU 2 industrial waste lagoon and ditches, and groundwater monitoring for the entire Depot groundwater monitoring program. The contract scope does not include groundwater modeling or passive site management at other SWMUs, or groundwater modeling.

The permit requirements for the SWMU 2 groundwater system include:

- Operation of the groundwater treatment system until the groundwater protection standard is met in all wells. The standard mostly reflects MCLs for each contaminant.
- Maintenance of all treatment system and monitoring system components.
- Quarterly sampling of treatment system influent and effluent, and all extraction wells.
- Semi-annual sampling of a network of monitoring wells.
- Semi-annual reports of O&M activities, sampling results, and system effectiveness evaluation.

Since startup, the groundwater treatment system has treated over 29 billion gallons of contaminated groundwater. Before shutdown, the system operated at a rate of approximately 6000

gallons per minute. While operational, the treatment system continued to remove contaminants from the groundwater to non-detect levels.

Corrosion of the extraction and injection wells had been observed toward the end of the first review period. During the current review period, most of the extraction wells and one injection well have had cathodic corrosion protection systems installed. Extraction well 09 is severely corroded to the extent that more extensive repair is necessary. Due to high cost and the non-operation status of the system, repair of EW 09 is postponed, pending determination of future need. Only one injection well has had corrosion protection installed. That single well has enough capacity to accept the intermittent flows generated during non-operation status. Other injection wells will need corrosion protection installed if additional injection flow is required in the future.

Beginning with the Fall 2002 semi-annual groundwater sampling event, the purge-and-bail method of sample collection was replaced by the passive diffusion bag (PDB) method. A Fall 1999 study demonstrated that the PDB method would produce similar results. In the Fall 2002 event, multiple PDBs were installed at varying depths in each well in order to determine optimal depth placement. In general, little stratification within well screen intervals was observed. Optimal depth placement for each well was determined by the highest detection in the Fall 2002 event. The change in sample collection methodology reduced the time of the field effort per event from over two months to 22 days, which includes 14 days waiting for the PDBs to equilibrate in the wells. Issues and costs associated with purge water management and disposal were nearly eliminated. Prior to the change, the contractor had little time to prepare the semi-annual reports within schedule, due to the time required to collect the samples, perform analysis, and validate the data. The PDB methodology currently provides a 2.5 month time from PDB placement to data available for use in the database.

During the review period, the groundwater monitoring program increased from 55 wells to approximately 100 wells. The groundwater monitoring program includes groundwater sampling associated with all SWMUs. The increase in number of wells is largely due to the wells installed as part of the SWMU 58 RFI, all of which have been added to the program as they have been installed. The number of wells associated with the ongoing SWMU 2 system monitoring has not been reduced due to requirements of the NOT. Optimization of the groundwater monitoring program should be considered when the groundwater remedy is finalized.

There are approximately 244 monitoring wells or piezometers available on the depot or are associated with the off-post portions of the TCE plumes. Many of these wells have not been used for collection of groundwater samples for a significant length of time, for various reasons. Static water levels are measured in nearly all of the wells/piezometers twice per year. All these wells must be inspected and maintained to ensure that they do not fall into disrepair and become conduits for transport of contaminants to groundwater. An evaluation of the wells should be performed to determine each well's value to the ongoing monitoring program. Wells providing limited value should be considered for proper abandonment.

In June 2004 phased shut-down of the system began with six of the fifteen functional extraction wells. Those six wells are screened in the bedrock. Static water levels were measured continuously in those and several surrounding monitoring wells using transducers and data loggers. In August, 45 days later the remaining nine wells (screened in alluvium) were shut down, and similar continuous water level monitoring was performed. The water level rebound data has been useful in subsequent groundwater model calibration.

During the NOT, the system O&M requirements include routine stand-by inspection and maintenance and periodic system exercise events. Every three months, half of the extraction wells are

pumped at minimum flow (approximately 100 gpm each) for four days, and then shut down. The pumped wells are alternated each event, resulting in each extraction well being exercised once every six months. The treatment plant is operated for all of the quarterly events. For the first two years of the NOT, the treatment plant continued to operate in re-circulation mode due to concerns about scale and slime drying in the stripper towers and forming blockage. The issue was evaluated, and it was determined that such an occurrence was unlikely. In October 2006, the treatment plant was completely shut down; to be operated only for the well exercise events.

The NOT monitoring plan includes more frequent sampling at six monitoring wells located near the plume boundary. Wells B-16, B-34, B-35, B-37, B-40, and B-62 are sampled quarterly. Statistical trend analysis is performed to identify potential plume expansion. To date, one well has recently exceeded a statistical control limit, but review of the concentration data and the response data of the other five wells indicates there is no immediate need for system re-starts. Attachment 8 includes charts with the results of the statistical trend analysis. The plume boundary monitoring and analysis will continue pending recommendations from the NOT report.

The activities associated with the site maintenance program are performed entirely by Army personnel. Twenty four RCRA SWMUs are inspected twice per year, and a report is generated once per year.

**Annual Operations and Maintenance Costs**

During this review period, operations and maintenance costs incurred were those associated with the Industrial Waste Lagoon, SWMU 2 Groundwater Treatment System, the groundwater monitoring program, and the site maintenance program. The SWMU 2 O&M, site maintenance, and the groundwater monitoring are performed by contract, and the site maintenance for all other SWMUs is performed by Army staff. Table 10 lists the annual costs for Contract O&M costs. Table 11 lists estimated Army staff labor cost for RCRA site maintenance inspections and reporting.

**Table 10  
Industrial Waste Lagoon  
Annual Operations and Maintenance Costs**

<b>Dates</b>	<b>O&amp;M Cost Rounded to nearest \$1000</b>
FY 2002	\$1,171
FY 2003	\$1,644
FY 2004	\$1,793
FY 2005	\$654
FY 2006	\$768
FY 2007 (9 months)	\$320

**Table 11**  
**RCRA Corrective Action SWMUs**  
**Site Maintenance Inspection Costs**

Dates	O&M Cost
FY 2002	\$5,600
FY 2003	\$5,600
FY 2004	\$5,600
FY 2005	\$5,600
FY 2006	\$5,600

The operation, maintenance and monitoring cost is elevated in FY 2003 through FY 2004. This is due primarily to replacement of several extraction well pumps and motors and installation of cathodic corrosion control systems at all of the extraction wells. Toward the end of FY 2004, a change in O&M contractors occurred, for which transition costs were incurred. In addition, the non-operation test began in June 2004. During the initial 90 days of the shutdown, an intensive water level monitoring program was performed.

**Progress Since the Last Review**

***Status of Issues and Recommendations***

One issue was identified for Corrective Action SWMUs in the first review. A new plume of VOC contaminated groundwater had been discovered, and additional VOC sources had been discovered in the Industrial Area within the BRAC Parcel. No remedies were in place to address these discoveries, hence there was no protectiveness statement regarding any remedy for this issue. Since the first review, this issue is being addressed in the SWMU 58 RFI as elaborated below.

***Progress Toward Additional Site Remedies***

During this review period Corrective Measures Studies and Decision Documents have been completed for all Corrective action SWMUs except SWMU 58. Corrective actions have been implemented at 27 SWMUs as described previously. Two SWMUs, 10 and 56, have selected remedies that are not yet completed.

**SWMU 58 RCRA Facility Investigation (RFI)**

Since the last review, TEAD finalized the SWMU 58 Phase I RFI Report, and has completed field work for the Phase II RFI. SWMU 58 includes VOC groundwater contamination sources up-gradient of SWMU 2, and the Northeast Boundary VOC groundwater plume. In addition, the SWMU 58 RFI/CMS process is being used as the vehicle to provide a comprehensive, unified evaluation and solution to the Depot-wide VOC contaminated groundwater problem.

The Phase I investigation included:

- Geophysical survey in the DRMO area
- Passive soil gas survey, 937 points in industrial area and DRMO
- Active soil gas sampling, 24 locations in industrial area and DRMO
- Vertical soil gas sampling wells, 5 wells with 10 depths each, in the industrial area

- Groundwater monitoring wells, 11 wells in and around the industrial area, 10 wells off-post

Identification of several VOC sources in the industrial area was achieved, with some confirmed as probable sources of groundwater contamination. A VOC source (an oil/water separator) was found adjacent to Building 679 that had not been identified in RCRA Facility Assessments. It is now considered to be a major source of the Northeast Boundary Plume. Partial delineation of the off-post portion of the Northeast Boundary Plume was achieved. Geology in the vicinity of the bedrock, and north and east of the bedrock was found to be quite complex, with anisotropies making prediction of VOC migration difficult. Several methods of geophysics have been applied to the area in separate efforts to aid interpretations. Several faults have been identified or hypothesized and incorporated into the conceptual site model as well as the numerical groundwater flow and contaminant transport model.

The work plan for the Phase II RFI was finalized December 2003. It mapped out a three-stage field effort, with a data review and work plan addendum to follow each of the first two stages. All three stages of field work have been completed as of this review. Additional components of work were also identified which were not dependent on the staging. Those components are also completed. The components of the investigation were:

- Stage 1: Shallow soil vapor and soil sampling to further delineate potential sources identified in Phase 1.
- Stage 2: Drill up to 25 vertical profile borings with rotosonic drilling. Continuously core the borings and collect up to 8 soil vapor samples at select intervals. Locations based on information from Stage 1. On-site analysis of soil vapor samples allows decision to convert the borings to permanent vertical profile soil vapor wells if appropriate.
- Stage 3: Install additional Vertical profile vapor wells as appropriate based on stage 2 results. Also install additional groundwater monitoring wells.
- Collect weather data. Barometric pressure, temperature, precipitation for the duration of field work.
- Soil moisture monitoring. Install a system of probes to measure moisture infiltration rate and depth.
- Vadose zone transport modeling.
- Pneumatic logging at site of Building 679 SVE pilot test. Determine quantity and depth of soil vapor contamination remaining at the site after the 6 month pilot test.
- Sub-slab soil vapor sampling at Building 615. Task identified after initial work plan.
- Risk assessment.

Ultimately, 156 shallow soil gas locations were sampled, 24 vertical profile borings were drilled and sampled, and 19 permanent vertical profile soil gas wells were installed. As the field work progressed, some of the soil vapor wells were installed outside the industrial area in the landfill (SWMU 12/15) and by the Industrial Waste Lagoon (SWMU 2). This field work contributes to the understanding of the Depot-wide VOC groundwater contamination, as those SWMUs did not have available vadose zone vertical profile data. This data will enable evaluation of those SWMUs with similar data sets as those gathered in the industrial area, thus providing a comparable approach.

#### Removal Actions and Interim Actions

Three interim actions were identified and implemented as a result of findings during the implementation of the SWMU 58 RFI.

*Building 679 Oil/Water Separator Removal:* The passive soil gas survey performed during the Phase 1 RFI identified an unexpected source area. A site visit revealed a previously un-identified in-ground concrete structure resembling an oil/water separator with a steel plate cover. Residual liquids and sludge were sampled, with very high detections of TCE. With approval of DSHW, a work plan for removal of the structure was prepared. The removal activity was completed in December 2000. As part of the RFI, a groundwater monitoring well (C-33) was installed in the immediate vicinity of the Oil/water separator. That monitoring well consistently shows the highest TCE concentrations on the former Depot. In addition, a vertical profile soil vapor monitoring well with ten sampling depths was installed close to the oil/water separator. The vertical profile results also confirmed the site as a source of groundwater contamination.

*Soil Vapor Extraction Pilot Test:* Upon the discovery that the Building 679 oil/water separator was a major source of groundwater contamination, soil vapor extraction was considered for an interim removal action. A six-month pilot test was designed to include two extraction wells located adjacent to each other, one screened at 48-168 feet, and the other screened at 210 to 330 feet. Four monitoring clusters with three probes of varying depths were installed at varying distances from the extraction wells to augment the vertical profile well previously installed. The test was performed July-December 2001. The TCE removal rate declined significantly during the operation, though the final rate was still significant. An estimated total of 3820 pounds of TCE were removed during the six month operation.

*SWMU 58 Groundwater Management Area:* As the SWMU 58 RFI progressed, and the off-post groundwater plume became better understood, concern grew about protectiveness to off-post receptors. A Groundwater Management Area (GWMA) Plan was developed as an interim corrective measure to mitigate potential risks pending completion of the Corrective Measures Study. This plan was finalized March 2004. The plan includes the following components:

- Calibration and additional predictive simulations on the groundwater flow and contaminant transport model for 3 and 5 year scenarios.
- Risk evaluation identifying potential pathways and receptors and risk-based concentrations.
- A groundwater monitoring plan to include sentry well monitoring and statistical trend monitoring for temporal changes.
- A decision matrix for evaluating monitoring data and a contingency plan to address monitoring results above criteria for acceptance.

An area was identified bounded by five monitoring wells showing, or expected to show after installation, non-detect levels of VOCs. There is only one water supply well within the GWMA that being the industrial water well (on Bolinder property) where the northeast boundary contamination problem was first identified. In addition, TEAD in cooperation with the State Division of Water Rights and Tooele County Board of Health has implemented groundwater use restrictions. The Division of Water Rights has incorporated the GWMA into their Groundwater Management Program, and the County has a Memorandum of Agreement with the Army under which they monitor and control well construction.

If any of the five sentry wells exceed the risk based concentration of TCE (5 ug/L), DSHW will be notified, and further evaluation of the data will be performed to develop changes to the GWMA Plan as appropriate. If any private water supply wells are impacted at concentrations above 5 ug/L, TEAD will provide an alternate water supply.

## **VI. Five Year Review Process**

### **Administrative Process**

The TEAD second five year review was conducted and written by:

- Doug Mackenzie, Environmental Engineer, U. S. Army Corps of Engineers
- Brad Call, Environmental Engineer, U. S. Army Corps of Engineers
- Cory Koger, Toxicologist, U. S. Army Corps of Engineers
- Carl Cole, Geologist, U. S. Army Corps of Engineers

The second five year review report has been reviewed by:

- Jim Kiefer, USEPA Region 8, Remedial Project Manager
- Helge Gabert, State of Utah, Department of Environmental Quality, Division of Solid and Hazardous Waste, Remedial Project Manager
- Rik Ombach, State of Utah, Department of Environmental Quality, Division of Environmental Response and Remediation, Remedial Project Manager

The five year review consisted of the following activities: A review of relevant documents and data (see attachment 1), a site inspection, and interviews. In addition, a notice of the completion of the review will be placed in the local newspaper making this report available for public review. Copies of the report will be maintained in public repositories and at TEAD as part of the administrative record.

### **Site Inspections**

A site inspection was performed on June 4-5, 2007 by Brad Call, Carl Cole, and Cory Koger of the U. S. Army Corps of Engineers. A trip report was prepared and is provided as Attachment 3 to this review. Table 12 provides a summary. The review team was able to visit 40 SWMUs; and Mr. Larry McFarland, TEAD Environmental Restoration Program Manager, was able to provide information for the balance of the SWMUs from his most recent site visits.

**Table 12**  
**Site Inspection Summary**  
(Ordered by OU or corrective action group)

SWMU	Description	Operable Unit (CERCLA)	Corrective Action Group (RCRA)	Selected Remedy	Site Condition
14	Sewage Lagoons			No action necessary based on RFI results	NA
16	Not Used				NA
27	RCRA Container Storage Facility			No action necessary based on RFI results	NA
28	90-Day Drum Storage Area			No action necessary based on RFI results	NA
38	Industrial Wastewater Treatment Plant (IWTP)			No action necessary based on RFI results	NA
39	Solvent Recovery Facility			No action necessary based on RFI results	NA
43	Container Storage for P999 Wastes			No action necessary based on RFI results	NA
44	Tank Storage of TCE			No action necessary based on RFI results	NA
47	Boiler Blowdown			No action necessary based on RFI results	NA
53	PCB Storage and Spill Sites			No action necessary based on RFI results	NA
58	Industrial Area Groundwater Sources and Northeast Boundary Plume			Not yet selected	NA
1	Main Demolition Area		A	None	NA

SWMU	Description	Operable Unit (CERCLA)	Corrective Action Group (RCRA)	Selected Remedy	Site Condition
1b	Burn Pad		A	Land use restrictions to prevent residential use	Project team inspected. SWMU located on depot, within an area controlled by a manned gate. In addition, a secondary gate is controlled by ammunition demilitarization personnel. No unauthorized use observed.
1c	Trash burn Pits		A	Land use restrictions to prevent residential use	Project team inspected. SWMU located on depot, within an area controlled by a manned gate. In addition, a secondary gate is controlled by ammunition demilitarization personnel. No unauthorized use observed.
1d	Propellant Burn pits		A	None	NA
20	AED Deactivation Furnace Site		A	Asphalt cover and land use restrictions to prevent residential use	Project team inspected. Located on the active Depot, within an area with access controlled through a manned guard gate. Asphalt cover in good condition. SWMU is fenced and signed. No unauthorized use observed.
21	Ammunition Deactivation Furnace Building		A	Asphalt cover and land use restrictions to prevent residential use	Project team inspected. Located on the active Depot, within an area with access controlled through a manned guard gate. Asphalt cover in good condition. SWMU is fenced and signed. No unauthorized use observed.
34	Pesticide Handling and Storage Facility		A	Excavation and off-site treatment/disposal and land use restrictions to prevent residential use	Project team inspected. Located on the active Depot, within an area with access controlled through a manned guard gate. SWMU is fenced and signed. No unauthorized use observed. Access through fence around SWMU controlled by TEAD public works personnel.
37	Contaminated Waste Processor		A	Land Use Restrictions to prevent residential Use	Project team inspected. Located on the active Depot, within an area with access controlled through a manned guard gate. SWMU is fenced and signed. No unauthorized use observed.
42	Bomb Washout Building (Bldg 539)		A	Soil cover, fencing, and land use restrictions to prevent residential use	Project team inspected. Located on the active Depot, within an area with access controlled through a manned guard gate. Sparse vegetation on soil cover, with no evidence of erosion. SWMU is fenced and signed. No unauthorized use observed.
45	Storm Water Holding Pond		A	Land Use Restrictions to prevent residential Use	Project team inspected. Located on the active Depot, within an area with access controlled through a manned guard gate. No unauthorized use observed.

SWMU	Description	Operable Unit (CERCLA)	Corrective Action Group (RCRA)	Selected Remedy	Site Condition
48	Old Dispensary		A	Land Use Restrictions to prevent residential Use	Project team inspected. Located on the active Depot, within an area with access controlled through a manned guard gate. SWMU is fenced. No unauthorized use observed.
4	Sandblast Areas (Bldgs 600, 615, 617)		B	Deed restrictions to prevent residential use	Mr. McFarland inspected. Located on transferred property. Building 600 currently used by developer for storage. Building 615 is currently being used by an industrial tenant..... No violations of deed restriction observed.
19	AED Demilitarization Test Facility		B	Land use restrictions to prevent residential use	Project team inspected. Located on the active Depot, within an area with access controlled through a manned guard gate. SWMU is fenced and signed. No unauthorized use observed.
26	Defense Reutilization and Marketing Office (DRMO) Storage yard		B	Deed Restrictions to prevent residential use	Project team inspected. Located on transferred property. SWMU used by four tenants. Activities include storage of salvaged mining and mill equipment, an automobile wrecking yard, and storage of privately owned antique military equipment. No unauthorized use observed.
29	Drum Storage Area		B	Deed Restrictions to prevent residential use	Project team inspected. Located on transferred property in the industrial area. SWMU is fenced. No unauthorized use observed.
46	Used Oil Dumpsters		B	Excavation and off-post disposal at Buildings 522, 602, 619,611. Deed restriction at 611 to prevent residential use.	Project team inspected. Located on transferred property in the industrial area. No unauthorized use observed.
49	Storm Water/Industrial Waste Water Piping System		C	Excavation and off-post disposal at G Avenue outfall, and Deed restrictions at all locations (except Building 609) to prevent residential use. No action at Building 609.	Project team inspected. Located on transferred property in the industrial area. No unauthorized use observed at all areas.

SWMU	Description	Operable Unit (CERCLA)	Corrective Action Group (RCRA)	Selected Remedy	Site Condition
50	Compressor Condensate Drains		C	Deed restrictions to prevent residential use	Project team inspected. Located on transferred property in the industrial area. No unauthorized use observed.
51	Chromic Acid/Alodine Drying Beds		C	Deed restrictions to prevent residential use	Project team inspected. Located on transferred property in the industrial area. SWMU is fenced. No unauthorized use observed.
52A	Possible Drain Field		C	No Action Recommended in RFI	NA
52B	Disposal Trenches		C	Deed restrictions to prevent residential use	Project team inspected. Located on transferred property in the industrial area. No unauthorized use observed.
52C	Charcoal Material Area		C	Excavation and off-post disposal	Project team inspected. Previously located on transferred property in the old TEAD administrative area. This property has since been re-acquired by the Army. The SWMU has been remediated to un-restricted use. Nothing observed to indicate the remedy has been compromised.
52D	Horse Stable Area		C	Excavation and off-post disposal	Project team inspected. Located on transferred property in the old TEAD administrative area. The SWMU has been remediated to un-restricted use. Nothing observed to indicate the remedy has been compromised.
54	Sandblast Areas (Bldgs 604, 611, and 637)		C	Excavation, off-post treatment/disposal at Building 611. No action at Building 604. Deed restrictions to prevent residential use at 611 and 637.	Project team inspected. Located on transferred property in the industrial area. No unauthorized use observed.at the 611 and 637 sites.
55	Battery Shop (Bldg 618)		C	No action determined in RFI.	NA
56	Gravel Pit Disposal Area		C	Excavation and off-post treatment and disposal, and deed restriction.	Project team inspected. Located on transferred property in the industrial area. The original decision document included excavation to residential standard due to anticipated extent of excavation being similar to that for a reasonable future industrial use. Extent of contamination was found to be much greater than

SWMU	Description	Operable Unit (CERCLA)	Corrective Action Group (RCRA)	Selected Remedy	Site Condition
					anticipated, resulting in a CMS revision to include excavation to industrial standard and deed restriction. SWMU is currently fenced, and signs are posted. Work Plans for final field effort in development.
57	Skeet Range		C	Excavation and off-post treatment/disposal	Project team inspected. Previously located on transferred property in the old TEAD administrative area. The property has since been re-acquired. The SWMU has been remediated to un-restricted use. Nothing observed to indicate the remedy has been compromised.
2	Industrial Waste Lagoon (IWL)		Known Releases	Excavate soils in trenches and dispose to lagoon. RCRA cap over lagoon. Extraction, treatment, and re-injection of contaminated groundwater.	Project team inspected. Located on active Depot. The lagoon is fenced and signs are posted. The treatment plant staff performs required inspections of the lagoon and ditches. The lagoon cap has remained in good condition. Earlier this year the inspections revealed an eroded area around a culvert beside one of the capped ditches, exposing the edge of the membrane. Repairs were made. The groundwater treatment plant was not operational during the site visit due to the Non-Operation Test. Many components of the system showing signs of age. Transfer pumps are worn and no longer manufactured. If/when plant goes back on line, considerable repair/replacement cost may be necessary.
3	X-Ray Lagoon		Known Releases	Monitor groundwater, abandon unused wells, land use restrictions to prevent residential use.	Project team inspected. Located on active Depot. Access to the area controlled through a manned guard gate. The SWMU is fenced and a sign is posted. No unauthorized use observed.
10	TNT Washout Facility		Known Releases	Excavation, composting, backfilling, and groundwater monitoring	Project team inspected. Located on active Depot. Access to the area controlled through a manned guard gate. Active remediation is not yet completed. A pilot test was underway during the site visit. The SWMU is fenced.
11	Laundry Effluent Pond		Known Releases	Excavation and off-post disposal, and land use restrictions to prevent residential use	Project team inspected. Located on active Depot. Access to the area controlled through a manned guard gate. No unauthorized use observed.

SWMU	Description	Operable Unit (CERCLA)	Corrective Action Group (RCRA)	Selected Remedy	Site Condition
12/15	Pesticide Disposal Area/ Sanitary Landfill		Known Releases	Consolidation of surface debris, soil cover, Land use restriction, cover inspection and maintenance.	Project team inspected. Located on active Depot. Access to the area controlled through a manned guard gate. In addition, the SWMU itself is fenced, and access is controlled by the Depot Environmental Management Office. The SWMU is fenced and signs are posted. No unauthorized use observed. The covered areas have moderate vegetative cover and show little evidence of erosion. The CAMU is intact and has signs posted. Vegetation on the CAMU is sparse.
24	Battery Pit		Known Releases	No action determined in RFI	NA
25	Battery Shop (Bldg 1252)		Known Releases	Excavation and off-post disposal, and land use restrictions to prevent residential use	Mr. McFarland inspected. Located on active Depot. Access to the area controlled through a manned guard gate. The SWMU is fenced and a sign is posted. No unauthorized use observed.
30	Old Industrial Waste Lagoon		Known Releases	No Action	NA
41	Box Elder Wash Drum Site	10		Removal and disposal of drums and stained soils.	Project team inspected. Located on active Depot, within an area controlled by a manned guard gate. A sign is present. No development of the site observed.
31	Former Transformer Boxing Area	4		Institutional control	Project team inspected. Located on transferred property, restricted to industrial use. No evidence of unauthorized use.
32	PCB Spill Site	4		No Further Remedial Action Planned	Project team inspected. Located on transferred property, potential construction of a retail distribution center. No evidence of unauthorized use.
17	Former Transformer Storage Area	5		Land Use Controls (as recommended in previous 5-year review).	Mr. McFarland inspected. Located on transferred property, restricted to industrial use. No evidence of unauthorized use.
33	PCB Storage Building	5		No Further Remedial Action Planned (Under CERCLA) Closed under TSCA	NA

SWMU	Description	Operable Unit (CERCLA)	Corrective Action Group (RCRA)	Selected Remedy	Site Condition
9	Drummed Radioactive Waste Area	6		No Further Remedial Action Planned	NA
18	Radioactive Waste Storage Building	6		No Further Remedial Action Planned under CERCLA. Closed under NRC	NA
5	Pole Transformer PCB Spill	7		Excavate, backfill, cap with soil and gravel layers. Land use controls.	Project team inspected. Located on active Depot, and access is controlled by a manned gate. No unauthorized use, and soil and gravel cover remains in good condition.
6	Old Burn Area	8		Excavation and stabilization of lead contaminated soil. Excavation and offsite disposal of explosive contaminated soil. Land use controls.	Project team inspected. Located on active Depot, within an area controlled by a manned guard gate. A warning sign is present. At the SWMU. No unauthorized use observed.
8	Small Arms Firing Range	8		Excavation and stabilization of lead contaminated soil. Land use controls.	Mr. McFarland inspected. SWMU on active Depot and is now included in a range area with limited access. No unauthorized use observed.
13	Tire Disposal Area	8		Land use controls	Project team inspected. Located on active Depot, within an area controlled by a manned guard gate. No unauthorized use observed.
22	Building 1303 Washout Pond	8		Land use Controls	Project team inspected. Located on active Depot, within an area controlled by a manned guard gate. A warning sign is present. At the SWMU. No unauthorized use observed.
36	Old Burn Staging Area	8		Land use controls	Project team inspected. Located on active Depot, within an area controlled by a manned guard gate. A warning sign is present. At the SWMU. No unauthorized use observed.
7	Chemical Range	9		Land use controls to prevent residential	Project team inspected. Located on active Depot, within an area controlled by a manned guard gate. The SWMU is fenced. No

SWMU	Description	Operable Unit (CERCLA)	Corrective Action Group (RCRA)	Selected Remedy	Site Condition
				use. ROD pending	unauthorized use observed.
23	Bomb and Shell Reconditioning Building	9		Excavation and off-post disposal. Land use restrictions to prevent residential use. ROD pending	Project team inspected. Located on active Depot, within an area controlled by a manned guard gate. Remedy not yet complete.
35	Wastewater Spreading Area	9		Land use controls to prevent residential use. ROD pending	Project team inspected. No evidence of unauthorized use. Located on active Depot, and access to area limited by fencing. Current use is for cattle grazing. In the future, the proposed UNEV Pipeline will cross SWMU.
40	AED Test Range	9		Land use controls to prevent residential use. ROD pending	Mr. McFarland inspected. SWMU on active Depot and is now included in a range area with limited access. No unauthorized use observed.

NA – Not applicable.

**Interviews**

Interviews were conducted by Brad Call and Cory Koger of the USACE. Interview record forms are provided in Attachment 4. The people interviewed are listed below.

**Table 13  
Listing of Interviews**

<b>Name</b>	<b>Title</b>	<b>Affiliation</b>
Larry McFarland	Environmental Protection Specialist	Tooele Army Depot
David Imlay	O&M Supervisor	MWH (Groundwater treatment system operation)
Helge Gabert	Hydrogeologist/RPM	Utah DEQ-DSHW
Rik Ombach	Environmental Scientist/RPM	Utah DEQ- DERR
James Kiefer	RPM	USEPA
Harry Shinton	RAB Member	Tooele County Sheriff's ofc.
Jeff Combs	Environmental Health Director	County Health Department
Jessie Sablan	Project Manager	Utah Industrial Depot

Issues and concerns identified in the interviews include:

- The pump and treat system is not likely to reduce concentrations to the groundwater protection standard specified in the Permit.
- Ongoing pilot scale composting testing at SWMU 10 had not yet identified the optimum amendment to achieve cleanup goals in desired timeframe. *At subsequent completion of the pilot test, an amendment was identified that successfully achieved cleanup goal within an acceptable time-frame, though that time-frame was longer than initially desired.*
- Several groundwater injection wells will need corrosion protection installed if they are to be operated again.
- Property rights issues have become significant in the off-post portion of the Northeast Boundary Plume. Acquisition of access agreements and easements has become more difficult, as property development in the area has increased. This may have implications on the (yet to be) selected remedy.
- If the groundwater treatment system is to be operated full time again, major repairs/replacement of system components may be necessary due to age and obsolescence.
- Several groundwater treatment system operation documents were lost during transition of contractors. *This item has been remedied since the interview.*
- In addition to the property rights issue, the Northeast Boundary Plume may affect construction of the mid-valley highway, and citizens have inquired about the potential of well-head treatment for groundwater use. *At this time, it is not certain whether the Mid-Valley Highway will be constructed, and location and timing are also uncertain.*
- The State has expressed concern over the methodology employed in statistical trend analysis for monitoring the plume boundary. The NOT plan has the “ambient” data set held static through the duration of the NOT evaluation; but the specific method, as outlined in the text (Gibbons, 1994), has the “ambient” data set shifting periodically during the evaluation period.
- The results of the ongoing EPA study for TCE toxicity may dramatically affect the groundwater corrective action, particularly in the off-post area.

- Concern has been expressed about the open burn/open detonation activities at TEAD. *While this is a legitimate concern, this ongoing operation is outside the scope of the five-year review, and should be addressed separately.*
- The site groundwater remedy is of primary concern to the regulatory community. The non-operation of the existing system is being monitored closely, and the outcome of the SWMU 58 RFI/CMS is of major significance.
- The impact of emerging contaminants, such as perchlorate and 1,4-Dioxane. *TEAD has performed a review of munitions operations and materials used. No substances containing perchlorate were noted. Routine sampling of water supply wells at TEAD have been analyzed for perchlorate, with wells near munitions operations showing no detections (personal communication with L. McFarland August 2007). A select number of wells have been sampled annually for 1,4-Dioxane beginning Fall 2003.*
- Concern from the public about lack of groundwater treatment during the NOT. The impression was that the Depot would restore the aquifer to pre-DOD condition.
- Concern from the public over the time it takes to perform remedial actions.

Comments from several of those parties interviewed suggest that communication and dissemination of information are strong points of the TEAD environmental restoration program. Regulators and community are satisfied that they are well informed. There is also general input that remedies have been completed in a satisfactory manner.

### **Document and Data Review**

Reports and data generated through June 2007 were reviewed as part of the second Five-Year Review of Tooele Army Depot. A list of these documents and references is included in this report as Attachment 1.

The number of SWMUs and the varying status of each presented a significant organizational challenge during the data evaluation in this review. An initial review of all the CMS', Decision Documents, Proposed Plans, and RODs was performed to determine what remedies were selected for each SWMU and relevant dates, with review of additional documents for SWMUs where further evaluations were pending. During this initial review, a master site status table was prepared in a manner that would allow sorting on the various fields. It is provided in Attachment 5. This table was of significant value to focus review of the activities that have occurred this review period. It was found that the review could be best focused by evaluating by remedial action as opposed to site-by-site. There are a small number of actions that have been applied widely over several SWMUs, with similar results.

### ***Remedial Action Objectives (RAOs) Review***

A number of documents were reviewed to determine how RAOs were set at all SWMUs across the Depot. Toxicity values, numerical standards, methodologies, and assumed pathways used at that time were compared to current values and conditions to develop conclusions regarding potential changes to protectiveness. A memorandum was prepared detailing this analysis, and is provided in Attachment 10. Table 14 provides a summary of changes in toxicity values. Most of the changes involve new toxicity values for inhalation exposure where none existed earlier, and most of the inhalation toxicity values are extrapolated from the oral values. None of those changes would result in significant adjustment to the RAO. Table 15 presents the groundwater protection standards

**Table 14**  
**Comparison of 2001 and Current Toxicity Values**

Chemical	Ingestion Exposure				Inhalation Exposure				Comment
	RfDo mg/kg/day		SFo (mg/kg/day) <sup>-1</sup>		RfDi mg/kg/day		SFi (mg/kg/day) <sup>-1</sup>		
	TEAD	Current #	TEAD	Current#	TEAD	Current #	TEAD	Current#	
Antimony	4E-4	4E-4	-	-	-	-	-	-	
Arsenic	3E-4	3E-4	1.5	1.5	-	-	15	15	
Benzo(a)anthracene	3E-2	-	0.73	0.73 (n)	-	-	-	0.73 (n)	Based on benzo(a)pyrene.
Benzo(a)pyrene	3E-2	-	7.3	7.3 (n)	-	-	-	7.3	
Delta-Benzohexachloride	-	-	1.8	1.8	-	-	1.8	1.8	
Benzo(b)fluoranthene	3E-2	-	0.73	0.73 (n)	-	-	-	0.73 (n)	Based on benzo(a)pyrene.
Benzo(k)fluoranthene	3E-2	-	7.3E-2	7.3E-2 (n)	-	-	-	7.3E-2 (n)	Based on benzo(a)pyrene.
Beryllium	5E-3	2E-3	4.3	-	-	5.7E-6	-	8.4	
Cadmium	1E-3	5E-4	-	-	-	-	-	6.3	
Chlordane	5E-4	5E-4	0.35	0.35	2.5E-4	2E-4	0.35	0.35	
Chromium (total)	1	-	-	-	-	-	-	42	
Chromium VI	5E-3 (i)	3E-3	-	-	-	2.2E-6	41	2.9E+2	
Chrysene	-	-	7.3E-3	7.3E-3 (n)	-	-	-	7.3E-3 (n)	Based on benzo(a)pyrene.
4,4-DDT	5E-4 (i)	5E-4	0.34	0.34	-	5E-4	0.34	0.34	
4,4-DDE	-	-	0.34	0.34	-	-	-	0.34	

Table 1 Continued

Chemical	Ingestion Exposure				Inhalation exposure				Comment
	RfDo mg/kg/day		SFo (mg/kg/day) <sup>-1</sup>		RfDi mg/kg/day		SFi (mg/kg/day) <sup>-1</sup>		
	TEAD	Region IX#	TEAD	Region IX#	TEAD	Region IX#	TEAD	Region IX#	
Dibenzo(a,h)anthracene	3E-2	-	7.3	7.3 (n)	-	-	-	7.3 (n)	Based on benzo(a)pyrene.
Dieldrin	5E-5	5E-5	16	16	-	5E-5	16	16	
2,4-Dinitrotoluene	2E-3	2E-3	-	-	1.7E-3	2E-3	-	-	
Heptachlor	5E-4	5E-4	4.5	4.5	-	5E-4	4.5	4.6	
Indeno[1,2,3-c,d]pyrene	3E-2	-	0.73	0.73 (n)	-	-	-	0.73 (n)	Based on benzo(a)pyrene.
Lead	-	-	-	-	-	-	-	-	Lead is evaluated separately using the California EPA leadsread model.
RDX	3E-3	3E-3	1.1E-1	1.1E-1	3E-3	3E-3	1.1E-1	1.1E-1	
Thallium	8E-5	6.6E-5	-	-	-	-	-	-	
Xylenes	2.0	0.2	-	-	-	2.9E-2	-	-	
Zinc	0.3	0.3	-	-	-	-	-	-	

# Current toxicity values obtained from USEPA Integrated Risk Information System (IRIS) unless otherwise indicated

n National Center for Environmental Assessment (NCEA, <http://cfpub.epa.gov/ncea/>)

**Table 15  
Chemical Specific Standards for SWMU 2 Groundwater**

<b>Contaminant</b>	<b>Media</b>	<b>Current Cleanup Levels<sup>1</sup></b>	<b>Current Standard (USEPA MCL)</b>
Benzene	groundwater	5.0 ug/l	5.0 ug/l
Carbon Tetrachloride	groundwater	5.0 ug/l	5.0 ug/l
Chloroethane	groundwater	1.3 ug/l	None
Chloroform	groundwater	100 ug/l	None
1,1-Dichloroethane	groundwater	170 ug/l	None
1,2-Dichloroethane	groundwater	5.0 ug/l	5.0 ug/l
1,1-Dichloroethene	groundwater	7.0 ug/l	7.0 ug/l
1,2-Dichloroethene	groundwater	1.0 ug/l	cis-1,2-Dichloroethene (70 ug/l) trans-1,2-Dichloroethene (100 ug/l)
1,2-Dichloropropane	groundwater	5.0 ug/l	5.0 ug/l
Ethylbenzene	groundwater	700 ug/l	700 ug/l
Methylene Chloride	groundwater	5.0 ug/l	5.0 ug/l
Tetrachloroethene	groundwater	1.0 ug/l	5 ug/l
1,1,1-Trichloroethane	groundwater	200 ug/l	200 ug/l
Trichloroethene	groundwater	5.0 ug/l	5.0 ug/l
Toluene	groundwater	1000 ug/l	1000 ug/l
Xylenes	groundwater	10000 ug/l	10000 ug/l

MCL= Maximum Contaminant Level

<sup>1</sup> Table V-2, Tooele Army Depot Post Closure Permit, 2005

that are the RAO for groundwater remediation. These standards are equal to, or less than the current MCL for each contaminant. The groundwater protection standards have not changed since inception.

Exposure pathways across all SWMUs have mostly remained as they were when the RAOs were established. The SWMUs are all industrial use or open space. It is noted that two SWMUs on transferred property (SWMUs 52C and 57) were remediated to residential standard due to a

reasonable potential for residential development. Since that time, the Army has re-acquired that property, and residential use is now less likely.

***Active Soil Remediation SWMUs***

There are 21 SWMUs that have soil remedies requiring construction. Fourteen of those SWMUs had construction completed during this review period. Three SWMUs were completed before this review period, and the remaining four SWMUs have not yet been completed. Tables 16 and 17 provide the status of the active soil remediation SWMUs under CERCLA and RCRA respectively. Fifteen SWMUs had excavation and off-post disposal as the selected remedy. Two SWMUs had a simple asphalt cover as the selected remedy. Finally, four SWMUs involved on-site treatment and/or consolidation of contaminated material, with a cover.

**Table 16**  
**CERCLA Operable Unit SWMUs with Active Soil Remediation**

<b>SWMU</b>	<b>Description</b>	<b>Operable Unit (CERCLA)</b>	<b>Selected Remedy</b>	<b>Remedial Action Comp Date (YYYY/MM)</b>	<b>Site Status – Ongoing Activities</b>
5	Pole Transformer PCB Spill	7	Excavate, backfill, cap with soil and gravel layers. Land use controls.	1996/05 (close-out report)	SWMU inspected once per year to verify that cover is not compromised. The land use control was added post-ROD as a recommendation in the first five year review.
6	Old Burn Area	8	Excavation and stabilization of lead contaminated soil followed by onsite management in CAMU. Excavation and offsite disposal of explosive contaminated soil. Land use controls.	Construction pending	Partial completion for explosives soil completed in Dec. 2004. Stabilization process found to be impracticable for lead contaminated soil due to excessive debris. Stabilization portion re-evaluated. Revised approach approved Jan. 2007. Implement treatability study for new process Summer 2007
8	Small Arms Firing Range	8	Excavation and stabilization of lead contaminated soil, followed by onsite management in CAMU. Land use controls.	Construction Completion Report approval pending	Draft-final completion report to regulators Nov. 2005. SWMU inspected once per year for appropriate land use.
23	Bomb and Shell Reconditioning Building	9	Excavation and off-post disposal. Land use restrictions to prevent residential use. ROD pending	Construction pending	Field activities scheduled summer/fall 2007
41	Box Elder Wash Drum Site	10	Removal and disposal of drums and stained soils.	1996/05 (close-out report)	Closed before first Five Year Review.

**Table 17**  
**RCRA Corrective Action SWMUs with Active Soil Remediation**

<b>SWMU</b>	<b>Description</b>	<b>Corrective Action Group (RCRA)</b>	<b>Selected Remedy</b>	<b>Remedial Action Comp Date (YYYY/MM)</b>	<b>Site Status – Ongoing Activities</b>
12/15	Pesticide Disposal Area/ Sanitary Landfill	Known Releases	Consolidation of surface debris, soil cover, Land use restriction, cover inspection and maintenance.	2006/12	Construction complete October 2005. Ongoing site inspections to evaluate erosion of soil cover, security fence, vegetative cover.
2	Industrial Waste Lagoon (IWL)	Known Releases	Excavate soils in trenches and dispose to lagoon. RCRA cap over lagoon. Extraction, treatment, and re-injection of contaminated groundwater.	1993	Alternative measures study begun in 2004. Groundwater pump-and-treat has been non-operational since Aug. 2004. Effect on TCE plume as a result of non-operation is being monitored. To date there is minimal evidence to suggest plume expansion. The groundwater action is being revisited in the SWMU 58 Corrective Measures Study, which will result in a Depot-wide approach to groundwater plume corrective action. An inspection and maintenance program is in place for the cap.
10	TNT Washout Facility	Known Releases	Excavation, composting, backfilling, and groundwater monitoring	Construction pending	Final WP approved Nov. 2006. Treatability study underway. Field work scheduled Spring 2007
11	Laundry Effluent Pond	Known Releases	Excavation and off-post disposal, and land use restrictions to prevent residential use	Report approval pending	Construction complete October 2003. SWMU inspected twice per year for appropriate land use. Site management plan pending.
20	AED Deactivation Furnace Site	A	Asphalt cover and land use restrictions to prevent residential Use	2007/01	Construction complete June 2004. SWMU inspected twice per year for appropriate land use. Site management plan pending.
21	Ammunition Deactivation Furnace Building	A	Asphalt cover and land use restrictions to prevent residential Use	2007/03	Construction complete June 2004. SWMU inspected twice per year for appropriate land use. Site management plan pending.
25	Battery Shop (Bldg 1252)	Known Releases	Excavation and off-post disposal, and land use restrictions to prevent residential use	2007/04	Construction complete October 2003. SWMU inspected twice per year for appropriate land use. Site management plan pending.
34	Pesticide Handling and Storage Facility	A	Excavation and off-site treatment/disposal and land use restrictions to prevent residential use	2006/12	Construction complete June 2004. SWMU inspected twice per year for appropriate land use. Site management plan pending.
42	Bomb Washout Building (Bldg 539)	A	Excavation and consolidation of contaminated soil, soil cover, fencing, and land use restrictions to prevent residential use	2006/12	Construction complete July 2005. SWMU inspected twice per year for appropriate land use. Site management plan pending.
46	Used Oil Dumpsters	B	Excavation and off-post disposal at Buildings 522, 602, 619,611. Deed restriction at 611 to prevent residential use.	2003/07	Construction complete October 2002. SWMU (at 611) inspected twice per year for appropriate land use. Site management plan pending.
49	Storm Water/Industrial Waste	C	Excavation and off-post disposal at G	2004/08	Construction complete November 2002.

<b>SWMU</b>	<b>Description</b>	<b>Corrective Action Group (RCRA)</b>	<b>Selected Remedy</b>	<b>Remedial Action Comp Date (YYYY/MM)</b>	<b>Site Status – Ongoing Activities</b>
	Water Piping System		Avenue outfall, and Deed restrictions at all locations (except Building 609) to prevent residential use. No action at Building 609.		SWMU inspected twice per year for appropriate land use. Site management plan pending. Wastewater lines throughout the industrial area.
52C	Charcoal Material Area	C	Excavation and off-post disposal	2003/12	Construction complete October 2002. SWMU closed
52D	Horse Stable Area	C	Excavation and off-post disposal	2006/12	Construction complete May 2003. SWMU is closed
54	Sandblast Areas (Bldgs 604, 611, and 637)	C	Excavation, off-post treatment/disposal at Building 611. No action at Building 604. Deed restrictions to prevent residential use at 611 and 637.	2006/01	Construction complete December 2002. SWMU (at 611 and 637) inspected twice per year for appropriate land use. Site management plan pending.
56	Gravel Pit Disposal Area	C	Excavation and off-post treatment/disposal, Deed restriction to prevent residential use.	Construction pending	Revised CMS completed June 2007
57	Skeet Range	C	Excavation and off-post treatment/disposal	2003/12	Construction complete October 2002. SWMU closed

Review of construction completion documents for SWMUs completed in this review period indicates that these SWMUs have all met their corrective action or remedial action objectives. Two additional SWMUs have field activities completed, with draft completion documents indicating the goals have been met, with regulator acceptance pending.

***Institutional Control SWMUs***

Institutional control alone was the selected remedy/corrective measure at 20 SWMUs. Those SWMUs and their respective operable units or corrective measures groups are listed in Table 18. In addition, 16 more SWMUs have institutional control as the final component of a selected remedy that includes active remediation. Those SWMUs are included in Tables 16 and 17.

**Table 18  
SWMUs with Institutional Control as the Sole Remedy**

<b>SWMU</b>	<b>Description</b>	<b>Operable Unit (CERCLA)</b>	<b>Corrective Action Group (RCRA)</b>
1b	Burn Pad		A
1c	Trash burn Pits		A
37	Contaminated Waste Processor		A
45	Storm Water Holding Pond		A
48	Old Dispensary		A
4	Sandblast Areas (Bldgs 600, 615, 617)		B
19	AED Demilitarization Test Facility		B
26	Defense Reutilization and Marketing Office (DRMO) Storage yard		B
29	Drum Storage Area		B
50	Compressor Condensate Drains		C
51	Chromic Acid/Alodine Drying Beds		C
52B	Disposal Trenches		C
31	Former Transformer Boxing Area	4	
17	Former Transformer Storage Area	5	
13	Tire Disposal Area	8	
22	Building 1303 Washout Pond	8	
36	Old Burn Staging Area	8	
7	Chemical Range	9	
35	Wastewater Spreading Area	9	
40	AED Test Range	9	

Each CERCLA site is required to have a Remedial Design Plan for Implementation of Institutional Controls, and each RCRA SWMU is required to have a Site Management Plan. While each of the SWMUs has its own plan, all plans follow a consistent, Depot-wide process. The TEAD Master Site Usage Plan and the BRAC Parcel CCRs are periodically reviewed to ensure that the land use restrictions are up to date. Site inspections are conducted annually for the CERCLA sites and semi-annually for the RCRA SWMUs, on routine schedules. The SWMUs are inspected for appropriate land

use and condition of other exposure control features such as fencing and covers. A report for IC management status of the CERCLA sites is prepared annually and is due to the State DERR and USEPA on October 15<sup>th</sup> of each year. A report for site management status of all the RCRA SWMUs is prepared semi-annually and is due to the State DSHW and USEPA on April 15<sup>th</sup> and October 15<sup>th</sup> of each year. To date, TEAD has not experienced any significant site management problems. Regulatory agencies have expressed satisfaction with the site management program, and believe that it has been effective. The history of the site inspection process shows very little change in site conditions over time. A reduction of inspection frequency for the RCRA SWMUs from semi-annual to annual would not likely diminish its effectiveness.

### ***Groundwater Actions***

#### **SWMU 3 X-Ray Lagoon**

The SWMU 3 X-Ray Lagoon corrective measures required groundwater monitoring and land use control. The groundwater problem was due to elevated levels of chromium, which were not believed to be associated with the site activity. It was suspected that the chromium came from corrosion of stainless steel well screens. There were stainless steel well screens and PVC well screens in site wells, and there appeared to be a correlation between chromium concentrations and well screen material.

A detailed analysis of the site groundwater data was performed in 2004. The analysis provided multiple lines of evidence including the following:

- Statistical and graphical well-to-well comparisons of chromium concentration
- Direct comparison of side-by-side wells of identical depth, but different screen material
- Physical appearance of samples
- Testing of precipitate in samples

Ultimately, the evidence supported the hypothesis, and abandonment of the monitoring wells was approved. Abandonment was accomplished in fall 2005. One PVC-screened well was maintained for ongoing static water level measurement.

#### **SWMU 2 Groundwater Extraction and Treatment**

The groundwater component of the SWMU 2 corrective measures includes extraction of contaminated groundwater to provide capture of the plume, treatment of the groundwater to specified groundwater protection standards, and injection of the treated water into the aquifer. The system is required to operate until the aquifer achieves the groundwater protection standard. Section V.C.4 of the permit specifies a post-closure care period of 30 years from January 1991, but it also states that operation shall continue if the standard is not met within that time. Section V.B.1.c of the permit allows for TEAD to submit an alternate concentration limit (ACL) petition if it is determined that attainment of the groundwater protection standard is not possible; or if by risk assessment, it can be demonstrated that higher concentrations can be protective.

Neither the permit nor other documents related to the remedy selection allude to what is done for protectiveness before the protection standard is met through groundwater extraction and treatment. There is no formal requirement for institutional control over use of groundwater. Most of the SWMU 2 plume is within the Depot boundary. The Depot is not extracting groundwater from within the plume for any domestic or industrial use. There is a very small area off-post in the vicinity of monitoring well B-40 that has had persistent concentrations of TCE slightly above 5 ug/L. TEAD has communicated with the property owner, Tooele County, to keep them informed of the groundwater quality status. The County has refrained from using groundwater in that area for anything other than livestock watering.

Progress of the groundwater remediation activity is reported in semi-annual reports. The semi-annual reports contain results and discussion of the groundwater monitoring, and a report on the status of the operation and maintenance of the groundwater treatment system. The permit requires draft submittal of these reports to the State April 15 and October 15 each year. In addition to the reports, the TEAD database is a source for all the historic data for all the wells. Operation and maintenance status reports are provided by the contractor monthly.

Several figures from the most recent semi-annual report are provided in Attachment 6. When interpreting these figures it must be noted that the groundwater extraction wells are located in the left half of the site layout. This area is the “Main Plume”, which is the plume that the SWMU 2 groundwater corrective measure was designed to address. The Northeast Boundary Plume is the lobe to the right, and it is not believed to be affected by the treatment system. All of the wells off-post in the northeast area, and most of the wells in the industrial area at the upgradient part of the plume, did not exist when the SWMU 2 treatment system was designed and built. The figures include:

- Map showing monitoring wells and site features.
- Static head contour map of the “shallow” groundwater.
- Bedrock contour map
- TCE concentration isopleths map
- Carbon tetrachloride concentration isopleths map
- Map with posted concentrations of “other” contaminants.

The static head map demonstrates the complex groundwater flow regime at TEAD. Steep head gradients are observed that correspond to the bedrock interface and to faults. When this figure is compared to the TCE concentration figure, it is noteworthy that the Northeast Boundary Plume’s north end trends in a direction approximately parallel to the static head lines in the same area, instead of perpendicular as would normally be expected. In addition, the static head lines that run parallel to the east boundary of the Depot would lead one to believe that the plume should be much more extensive in the east-northeast direction, which is not the case. A significant amount of study has been directed toward identifying features of anisotropy to gain a better understanding of groundwater flow and TCE transport. The SWMU 58 RFI, to be complete early 2008, will contain a full discussion of this work.

TCE is the predominant contaminant in the groundwater at TEAD as can be seen by comparing the three contaminant concentration maps. The TCE concentrations drive the decisions made with respect to groundwater corrective action. Carbon tetrachloride (CTC) is the second most prevalent contaminant, and the extent of CTC contamination is within that of the TCE. While decisions are currently driven by the extent of TCE contamination, the CTC plume is still noteworthy, due to the toxicity of CTC, and care must be taken not to overlook it in the long term.

Of the remaining contaminants, PCE and more recently 1,4-dioxane, are the only contaminants to consistently show concentrations greater than 10 ug/L in any wells. PCE has been persistent in three monitoring wells near the industrial area and the IWL ditches. The highest value in the Fall 2006 event was 49 ug/L. In spring 2003, limited sampling for 1,4-dioxane was begun at the request of the State, due to concern about this emerging contaminant. It was found at low levels, mostly in the industrial area near source areas. There is a correlation with location of 1,4-dioxane and 1,1,1-TCA. The highest concentration in the Fall 2006 event was 12 ug/L. The extent of 1,4-dioxane is well within the boundaries of the TCE plume.

Attachment 7 provides several charts generated from the TEAD database showing TCE concentration versus time in selected wells. Static water levels are also provided on the charts. Wells that

might be within influence of the extraction system were reviewed. Noteworthy dates to consider when reviewing these charts are: December 1989 when discharges to the IWL were stopped, September 1993 when the groundwater treatment system was started, and August 2004 when the groundwater treatment system was shut down for the non-operation test. Some qualitative observations include:

- Figures for wells B-17, B-19, B-34, B-35, B-37, and B-40 represent wells at the north Depot boundary. Some wells near the north boundary showed increasing concentrations before treatment system startup, with reduction after startup, followed by stable concentrations for the remaining time. Some wells actually show increasing trend after system startup. Most of these wells show little effect of the system shutdown in August 2004. Well B-19 shows a rise in concentration in 2006. This well is located very close to extraction well E-11, and the recent rise in concentration is likely a localized effect of the extraction well being shut down. Well B-34 has a slight upward trend which has proved to be statistically significant. Well B-40 has shown a gentle downward trend since 2000. The consistency of concentrations around 5 ug/L in all these wells for a long period of time after treatment system startup in 2003 reflects containment, but no reduction in the size of the plume.
- Figures for wells B-12 and B-62 represent wells located in the northern alluvium, upgradient of the Depot boundary.
- Figures for wells B-05, B-07, and B-09 represent wells completed in the bedrock. The water level changes are noteworthy at startup (Sep. 1993) and shutdown (Aug. 2004) of the treatment system. This water level “signal” is distinct for all the bedrock wells. The TCE concentration trends vary among these three wells. The treatment system operation appears to have varied effects on TCE concentration within the bedrock.
- Figures for wells B-05, B-21, and B-56 represent wells near the lagoon. Wells B-05 and B-56 show no effect of the treatment system on TCE concentration. At B-21, located at the upgradient end of the lagoon may be showing a slight downward trend since system startup, but that has continued down during the NOT.
- The figure for the treatment system influent, representing a composite of all extraction wells, shows a significant decrease over the first two years followed by a lengthy period of concentrations varying above and below 25ug/L. After the NOT shutdown, the results represent a different situation. In each quarter, half of the wells are pumped at minimal (100gpm) flow for four days, and are sampled at that time. The half of the wells that are operated are alternated each quarter. One group of wells has a composite concentration of 5-9 ug/L, and the other group of wells has a composite concentration of 18-22 ug/L.

A comprehensive qualitative review of all wells in the network indicates a wide variety of trends, reflecting the complexity of the SWMU hydrogeology. TCE concentration trends do not all decrease after start of groundwater pumping, rather many appear unaffected, and several actually increased. Qualitative review of trends after NOT shutdown show increases, decreases, and no effect. The mixed trends resulting from NOT shutdown may represent the shifting of groundwater flow path to its natural state. It is difficult to identify clear patterns among the trends in this review.

During the NOT, six wells near the north boundary are sampled at a greater frequency (quarterly) and concentration trends in those wells are evaluated by the combined Shewart/CUSUM control chart statistical method. The Shewart component of the analysis provides indication of abrupt changes in concentration, while the CUSUM analysis provides indication of gradual changes. Attachment 8 contains a summary of the methodology as presented in the NOT proposal, as well as results of the analysis for each of the six wells. In the NOT proposal, the analysis was designed to compare the post shutdown data to an ambient data set of eight values immediately prior to shutdown. For each well there is a chart for the concentration versus time and a control chart of the statistical analysis results. Five of the six wells have maintained trends within the statistical control limits. One well (B-34) has exceeded the control

limit. The NOT proposal requires that immediate steps be taken in response, beginning with confirmation sampling and review of other pertinent data. If confirmation is received, the proper strategy for restarting all or portions of the system will be evaluated by the project team in coordination with UDEQ. A review of the concentration versus time trend chart for that well, and comparison to the other five wells has led the Army to the conclusion that while the control limit exceedance at that well bears watching, the actual increase in concentration is small, and does not warrant immediate system re-start. A more comprehensive review of data after the shutdown will be provided in the NOT Report, and recommendations regarding well restart can be made at that time.

The State has expressed concern about the way the statistical method has been used. The method, as described in text (Gibbons, 1994) requires that the ambient data set be revised periodically to include more recent data. TEAD has kept the ambient data set static per the NOT proposal, with the intent that the method would evaluate increases relative to the pre-shutdown condition. TEAD has suggested that with the NOT ending in August 2007, the issue should be fully examined in the NOT evaluation report; with recommendations made for appropriate adjustments to the statistical trend analysis process.

#### SWMU 58 Groundwater Management Area (GWMA Interim Measure)

This issue is currently the primary regulatory concern at TEAD. The large off-post portion of the Northeast Boundary Plume is seen to pose the most significant impact to the community. This interim measure is in place to assure protectiveness in the period of time before the CMS and Decision Document are completed for SWMU 58. At present, the available data provide no indication that the plume is expanding at a perceptible rate.

The GWMA Plan includes a boundary monitoring and statistical trend analysis program similar to that of the NOT. At the time the plan was developed, the six monitoring wells to be used for the evaluation were not all installed. To date, all six wells are now in place, but only three of the planned six wells have a large enough data set to perform the analysis. Acquisition of rights of entry and easements has been difficult, and has impacted the well installation schedule. Attachment 9 includes the results of the Shewart/CUSUM analysis for the GWMA wells. At present, none of the three wells shows exceedance of the control limits.

All sentry wells that were intended to define the GWMA boundary have been installed. It was anticipated that those wells would have no detections of TCE. Monitoring well D-17 however has shown detections below MCL. These detections do not require action in accordance with the GWMA plan, but the State has expressed concern that the plume is not bounded by a non-detect well in that area.

Two conditions of the statistical analysis are that the data set be normally distributed and the data must be independent. In the last year the distribution of the data and its independence were revisited. While the data for the GWMA wells were found to be normally distributed, independence may be questionable. Pumping data from well development indicates that wells D-3 and D-5, and to a lesser extent, D-7 have very low specific capacity. Well D-3 could not maintain flow for any significant time. Estimates of groundwater velocity indicate that little water passes by the well (estimated at 3 ft./90 days) during the current 3 month sampling interval. A reduced sampling frequency is suggested.

#### Community Involvement

Restoration Advisory Board (RAB) meetings are held three times per year. The public is invited, and notices are published in the local newspaper, the Tooele Register-Bulletin. The meetings are generally held at the offices of the County Health Department in Tooele. Public attendance has generally been sparse. Attachment 11 is a copy of the latest RAB meeting minutes, including the attendance list.

Two community members who attend the RAB meetings with some frequency were interviewed as part of this review. In addition, a notice of the completion of the review will be placed in the local newspaper making this report available for public review. Copies of the report will be maintained in public repositories and at TEAD as part of the administrative record.

## VIII. Technical Assessment

The assessments of protectiveness are presented separately for each CERCLA operable unit. For the RCRA SWMUs, separate assessments are presented for five corrective measures categories:

- Institutional Control
- Excavation and disposal
- Excavation, onsite treatment/consolidation and capping
- SWMU 2 groundwater extraction and treatment
- Northeast Groundwater Management Area

The assessment is focused on answering three questions, to result in a protectiveness statement for the implemented remedy:

- **Question A:** Are the remedies functioning as intended by the decision documents?
- **Question B:** Are the assumptions used at the time of remedy selection still valid?
- **Question C:** Has any other information come to light that could call into question the protectiveness of the remedies?

While all SWMUs on TEAD have been discussed to some extent in this review, these assessments are performed only on those SWMUs where a remedy, or interim remedy, has been selected and begun, and contamination remains on site that prevents un-restricted use.

### Operable Unit 4

#### *Question A Are the remedies functioning as intended by the decision documents?*

One SWMU in OU4, contains PAHs at concentrations above those that would allow unrestricted use. That SWMU is SWMU 31, Former Transformer Boxing Area. The selected remedy is institutional control. The SWMU is part of the Depot-wide site management program, which is functioning well. All SWMUs in CERCLA OUs which require institutional control are inspected annually, and a report is provided on a set schedule. No residential development of SWMU 31 has occurred. The corrective action objective has been met.

#### *Question B Are the assumptions used at the time of remedy selection still valid?*

#### Changes in standards, newly promulgated standards, and TBCs

The selected remedy was driven by the State Risk Rule (UAC R315-101). There is no risk to industrial workers or construction workers, the reasonable future use receptors; but there is a risk greater than  $10^{-6}$  to the hypothetical resident. This requirement has not changed. There are no new relevant standards.

#### Changes in exposure pathways

There is no change in exposure pathway, as SWMU 31 remains in industrial use only, and the condition of the site has not changed.

### Changes in toxicity

There have been new slope factors for the inhalation pathway for PAHs where there were none before. This is not believed to affect protectiveness because the ingestion pathway poses the more significant risk. In addition, the remedy was not selected for the current or reasonable future receptors, rather it was selected for the hypothetical resident. No COCs were identified at this site because risks to the current and reasonable future receptors were within the acceptable range.

### Changes in risk assessment methods

No standardized risk assessment methods for evaluating PAHs have changed that could affect the protectiveness of the remedy.

*Question C Has any other information come to light that could call into question the protectiveness of the remedies?*

The SWMU condition remains as it was when the remedy was selected. No acts of nature have changed the SWMU, and no new ecological issues have arisen.

## **Operable Unit 5**

*Question A Are the remedies functioning as intended by the decision documents?*

One SWMU in OU5, contains PCB at concentrations above those that would allow unrestricted use. That SWMU is SWMU 17, Former Transformer Storage Area. The selected remedy is institutional control. The SWMU is part of the Depot-wide site management program, which is functioning well. All SWMUs in CERCLA OUs which require institutional control are inspected annually, and a report is provided on a set schedule. No residential development of SWMU 17 has occurred. The corrective action objective has been met.

*Question B Are the assumptions used at the time of remedy selection still valid?*

### Changes in standards, newly promulgated standards, and TBCs

The selected remedy was driven by the State Risk Rule (UAC R315-101). There is no risk to industrial workers or construction workers, the reasonable future use receptors; but there is a risk greater than  $10^{-6}$  to the hypothetical resident. This requirement has not changed. There are no new relevant standards.

### Changes in exposure pathways

There is no change in exposure pathway, as SWMU 17 remains in industrial use only. The physical condition of the site has not changed.

### Changes in toxicity

The remedy was not selected for the current or reasonable future receptors, rather it was selected for the hypothetical resident. No COCs were identified at this site because risks to the current and reasonable future receptors were within the acceptable range.

#### Changes in risk assessment methods

No standardized risk assessment methods have changed that could affect the protectiveness of the remedy.

*Question C Has any other information come to light that could call into question the protectiveness of the remedies?*

The site condition remains as it was when the remedy was selected. No acts of nature have changed the site, and no new ecological issues have arisen.

#### **Operable Unit 6**

No CERCLA remedial actions are required for the two SWMUs in OU6

#### **Operable Unit 7**

*Question A Are the remedies functioning as intended by the decision documents?*

The only SWMU in OU7, contains PCB and dioxins/furans at concentrations above those that would allow unrestricted use. That SWMU is SWMU 5, Pole Transformer PCB Spill. The selected remedy is filling and covering the excavation with gravel and soil and institutional control. The SWMU is part of the Depot-wide site management program, which is functioning well. All SWMUs in CERCLA OUs which require institutional control are inspected annually, and a report is provided on a set schedule. No residential development of SWMU 5 has occurred. The remedial action objective has been met.

*Question B Are the assumptions used at the time of remedy selection still valid?*

#### Changes in standards, newly promulgated standards, and TBCs

The selected remedy was driven by the State Risk Rule (UAC R315-101). There is no risk to industrial workers or construction workers, the reasonable future use receptors; but there is a risk greater than  $10^{-6}$  to the hypothetical resident. This requirement has not changed. There are no new relevant standards.

#### Changes in exposure pathways

There is no change in exposure pathway, as SWMU 5 remains in industrial use only. The physical condition of the site has not changed.

#### Changes in toxicity

The remedy was not selected for the current or reasonable future receptors, rather it was selected for the hypothetical resident. No COCs were identified at this site because risks to the current and reasonable future receptors were within the acceptable range.

### Changes in risk assessment methods

No standardized risk assessment methods have changed that could affect the protectiveness of the remedy.

*Question C Has any other information come to light that could call into question the protectiveness of the remedies?*

The site condition remains as it was when the remedy was selected. No acts of nature have changed the site, and no new ecological issues have arisen.

### **Operable Unit 8**

*Question A Are the remedies functioning as intended by the decision documents?*

Five SWMUs in OU8, contain contaminants at concentrations above those that would allow unrestricted use. Four of the SWMUs have completed remedies in place. The five SWMUs are:

- SWMU 6, Old Burn Area
- SWMU 8, Small Arms Firing Range
- SWMU 13, Tire Disposal Area
- SWMU 22, Building 1303 Washout Pond
- SWMU 36, Old Burn Staging Area

The selected remedies for all five SWMUs include institutional control. For SWMUs 13, 22, and 36, IC is the only component of the remedy. The SWMU is part of the Depot-wide site management program, which is functioning well. All SWMUs in CERCLA OUs which require institutional control are inspected annually, and a report is provided on a set schedule. The SWMUs are all within the current Depot boundary and no residential development of those SWMUs has occurred.

The selected remedy for SWMU 8 includes excavation of lead contaminated soil, stabilization of the soil, and placement of the soil in a CAMU. Excavation of soil on-site achieved the specified corrective action goals. Results of performance samples collected from the stabilized soil indicate attainment of the treatment goal. The CAMU is in good condition. The soil cover is intact, though vegetation is still sparse. Significant erosion has not been observed. It is noted that while the construction is physically complete, the Corrective Measures Completion Report is still in regulatory review; and thus the remedy is not formally in place at this time.

The selected remedy for SWMU 6 includes excavation and offsite disposal of explosives contaminated soil, excavation of lead contaminated soil, stabilization of the soil, and placement of the soil in a CAMU. Excavation and disposal of the explosives contaminated soil has been completed to the specifications of the plan. A revision to the soil treatment process for lead contaminated soil has been necessary due to high debris content of the lead contaminated soil. The remedy is expected to be effective when the new process is implemented.

*Question B Are the assumptions used at the time of remedy selection still valid?*

### Changes in standards, newly promulgated standards, and TBCs

The selected remedy for SWMUs 13, 22, and 36 was driven by the State Risk Rule (UAC R315-101). There is no risk to industrial workers or construction workers, the reasonable future use receptors; but there is a risk greater than  $10^{-6}$  to the hypothetical resident. This requirement has not changed. There are no new relevant standards.

SWMUs 6 and 8 required active remedies to address explosives and lead. Cleanup criteria were risk based, and no standards have been changed or added that would alter the cleanup criteria. ARARs related to management of the construction activities for SWMU 8 were met, and are no longer relevant. Those same ARARs will still be applicable to the SWMU 6 construction activity.

#### Changes in exposure pathways

There is no change in exposure pathway, as all five SWMUs remain in industrial use only. The physical condition of the sites has not significantly changed.

#### Changes in toxicity

For SWMUs 13, 22, and 36, the remedy was not selected for the current or reasonable future receptors, rather it was selected for the hypothetical resident. No COCs were identified at these sites because risks to the current and reasonable future receptors were within the acceptable range. For SWMUs 6 and 8, the California Leadsread Model was used to determine cleanup goals, and the toxicity criterion used is still relevant and appropriate.

#### Changes in risk assessment methods

No standardized risk assessment methods have changed that could affect the protectiveness of the remedy. Changes in the evaluation methodology for vapor intrusion are not applicable, as VOCs were not a contaminant of concern at any of the five SWMUs in OU8.

#### Expected Progress Toward Meeting RAOs

RAOs have been met at SWMUs 8, 13, 22, and 36. The remedy planned for SWMU 6 is similar to that of SWMU 8, except for the altered debris separation process. If the debris separation process is successful, the remedy is expected to be as successful as the remedy for SWMU 8.

*Question C Has any other information come to light that could call into question the protectiveness of the remedies?*

The SWMUs in OU8 continue to be in open space or industrial areas of the active Depot. No acts of nature have changed the SWMUs. No new ecological issues have arisen.

#### **Operable Unit 9**

The OU9 ROD is currently under final revision. Three of the four SWMUs in the OU have ICs as the selected remedy. One SWMU has excavation and off-site disposal followed by IC as the selected remedy. Many other SWMUs on TEAD have had the same remedies successfully implemented, and the remedies will be implemented at OU9 in the same manner as at those other SWMUs. At this time it is reasonable to believe that a similar level of success will be achieved.

## **RCRA Corrective Measures – Site Management**

*Question A Are the remedies functioning as intended by the decision documents?*

Covenants, Conditions, and Restrictions placed on SWMUs within the boundaries of property that has been transferred to the Tooele City Redevelopment Agency have been properly implemented. All actions undertaken by the commercial developer within the restricted parcels are coordinated with the Army and State of Utah prior to implementation. The restrictions placed on SWMUs within the active Depot have also been properly implemented in the TEAD Master Site Use Plan. Actions undertaken by TEAD Public Works are coordinated through the TEAD Environmental Management Office. There has been no evidence of inappropriate site activity.

Ongoing inspections have identified failures in fencing and site cover systems as necessary. Fences and site cover systems are maintained in good condition.

No indicators of potential remedy failure were noted during this review. Costs and maintenance activities have been low.

*Question B Are the assumptions used at the time of remedy selection still valid?*

### **Changes in standards, newly promulgated standards, and TBCs**

The application of institutional control in the form of land use restriction was driven by the State Risk Rule (UAC R315-101). This requirement has not changed. There is no risk to industrial workers or construction workers, the reasonable future use receptors; but there is a risk greater than  $10^{-6}$  to the hypothetical resident. There are no new relevant standards.

Institutional controls are generally applied to SWMUs at TEAD when conditions at the sites are within the acceptable industrial risk range, or the sites have been actively remediated to achieve conditions in the acceptable industrial risk range.

### **Changes in exposure pathways**

There is no change in exposure pathway. The site management program has ensured that all industrial sites have remained in industrial use.

### **Changes in toxicity**

The remedy was not selected for the current or reasonable future receptors, rather it was selected for the hypothetical resident. At sites where institutional control was the sole corrective action, no COCs were identified because risks to the current and reasonable future receptors were within the acceptable range. At sites where COCs were identified for current or reasonable future receptors, active remediation was performed to reduce COC concentrations on site to within the acceptable risk range. There are no changes in toxicity factors affecting the protectiveness of this corrective action.

### **Changes in risk assessment methods**

No standardized risk assessment methods have changed that could affect the protectiveness of the institutional controls where they have been established. Changes in the evaluation methodology for vapor intrusion are generally not applicable, as VOCs were not a contaminant of concern at the sites with institutional controls as a remedy component, with the exception of SWMU 12/15. At that SWMU, the

land use control requires that any potential construction be coordinated through the Depot Environmental Management. Evaluation for potential soil vapor would be necessary before construction could occur.

*Question C Has any other information come to light that could call into question the protectiveness of the remedies?*

There have been some repair actions and industrial construction projects performed at or near some SWMUs, but general site use has remained industrial or open space. No acts of Nature have changed any sites. No new ecological issues have arisen. Potential future construction of the Mid-Valley Highway could impact some SWMUs, but that does not involve residential use. Potential risks to construction workers will be evaluated as part of the site management procedure. Planning for the highway project at this time is not developed to a point where actual impacts are known.

### **RCRA Corrective Measures – Excavation and Disposal**

*Question A Are the remedies functioning as intended by the decision documents?*

All soil excavation activities have successfully removed soil contaminated at levels above corrective action objectives. Thus, the excavation and disposal remedy has functioned as intended. Three SWMUs (52C, 52D, and 57), have been excavated to meet a residential use goal. Seven SWMUs meet an industrial use standard, and will continue to be monitored under the site management program, as planned. Corrective action objectives have been met at all excavation and disposal sites.

*Question B Are the assumptions used at the time of remedy selection still valid?*

### **Changes in standards, newly promulgated standards, and TBCs**

Corrective action objectives for excavation were derived from risk calculations. Action specific ARARs related to construction activities were all met and are no longer relevant. No new standards have been promulgated that would affect the protectiveness of the corrective action.

### **Changes in exposure pathways**

All seven sites remediated to the acceptable risk range for industrial use have remained industrial. Sites 52C and 57 were remediated to acceptable residential risk levels because they were located on transferred property that was slated for residential development. Since that time, the Army has re-acquired a section of the transferred property that includes those SWMUs, resulting in the residential scenario becoming unlikely. SWMU 52D was remediated to acceptable residential risk levels, and there is still reasonable potential for residential use.

### **Changes in toxicity**

Twelve changes in toxicity values for contaminants of concern were noted in this review. The majority of the changes involved toxicity values being established for the inhalation exposure where none had existed before. With those changes, the ingestion exposure still poses the greater risk. Two changes in reference doses for the ingestion exposure are minor, and do not negatively alter calculated risk.

### **Changes in risk assessment methods**

No standardized risk assessment methods have changed that could affect the protectiveness of the remedy. Changes in the evaluation methodology for vapor intrusion are not applicable, as VOCs were not a contaminant of concern at the sites with excavation and disposal as the selected remedy.

*Question C Has any other information come to light that could call into question the protectiveness of the remedies?*

No new information has come to light to negatively affect the protectiveness of the soil excavation and disposal activities. No acts of nature have changed the sites. No new ecological concerns have arisen.

### **RCRA Corrective Measures – Soil Excavation/Consolidation and Capping**

*Question A Are the remedies functioning as intended by the decision documents?*

Asphalt caps are in place and in good condition at SWMU 20 and 21. The caps are effectively protecting receptors from contaminated soil. At the SWMU 12/15 landfill, soil covers are still in place, with no erosion damage. Vegetation has taken hold. Access to the landfill area remains under control of the Environmental Management Office and Depot Security. At SWMU 42, contaminated soil excavation was completed to meet corrective action goals, and the cap was constructed to specifications in the work plan and approved variances. The cap and the fencing around the soil impoundment remain in good condition. The cap over the SWMU 2 Industrial Waste Lagoon and ditches is in good condition. The inspection program for the cap at one time identified an area of erosion at the edge of one of the ditches, and a repair was accomplished. All these remedies are functioning as intended.

*Question B Are the assumptions used at the time of remedy selection still valid?*

#### **Changes in standards, newly promulgated standards, and TBCs**

Corrective action objectives for excavation, consolidation, and capping were derived from risk calculations. Action specific ARARs related to construction activities were all met and are no longer relevant. No new standards have been promulgated that would affect the protectiveness of the corrective action.

#### **Changes in exposure pathways**

There is no change in exposure pathway. The site management program has ensured that all industrial sites have remained in industrial use.

#### **Changes in toxicity**

Twelve changes in toxicity values for contaminants of concern were noted in this review. The majority of the changes involved toxicity values being established for the inhalation exposure where none had existed before. With those changes, the ingestion exposure still poses the greater risk. Two changes in reference doses for the ingestion exposure are minor, and do not negatively alter calculated risk.

#### **Changes in risk assessment methods**

No standardized risk assessment methods have changed that could affect the protectiveness of the remedy. Changes in the evaluation methodology for vapor intrusion will not affect the protectiveness of

the remedy at SWMU 12/15, where VOCs are a COC, because the site management procedures require coordination with TEAD Environmental Management before any construction activity may occur.

*Question C Has any other information come to light that could call into question the protectiveness of the remedies?*

No new information has come to light to affect the protectiveness of the remedies. No acts of Nature have changed the sites. No new ecological concerns have arisen.

### **RCRA Corrective Measures – SWMU 10, TNT Washout Facility**

*Question A Are the remedies functioning as intended by the decision documents?*

This corrective measure is not yet complete. A field pilot test has been completed that demonstrated successful biodegradation of explosives to corrective action goals. The full-scale implementation of the remedy is expected to successfully meet the CAOs.

*Question B Are the assumptions used at the time of remedy selection still valid?*

#### Changes in standards, newly promulgated standards, and TBCs

The corrective action objectives are risk based. There are no changes to action specific standards that are applicable during construction.

#### Changes in exposure pathways

There is no change in exposure pathway, as SWMU 10 remains in industrial use only.

#### Changes in toxicity

There were no changes in toxicity for the COCs at this SWMU.

#### Changes in risk assessment methods

No standardized risk assessment methods have changed that could affect the protectiveness of the remedy.

#### Expected Progress Toward Meeting CAOs

Construction of the full scale treatment pad is anticipated in Fall 2007, with composting operations anticipated in Spring 2008. Based on results of the field pilot test, the CAOs are expected to be met.

*Question C Has any other information come to light that could call into question the protectiveness of the remedies?*

No additional information has come to light. No acts of nature have changed the site. No ecological issues have arisen.

## **RCRA Corrective Measures – SWMU 2 Groundwater Extraction and Treatment**

*Question A Are the remedies functioning as intended by the decision documents?*

The SWMU 2 groundwater plume appears to have been contained during groundwater extraction system operation; however, the objective to reduce groundwater concentrations to the groundwater protection standard specified in the permit is not likely to be met with the system in place. The extent of the plume has not changed in 10 years of operation. It has been found that there are source areas that may be continuing to contribute to the plume, that are not directly captured by the system. The remedy is currently undergoing a re-evaluation process as described in this review. The system has been shut down to determine whether the plume remains stable in absence of pumping. After three years of non-operation, there is little evidence to indicate plume growth.

*Question B Are the assumptions used at the time of remedy selection still valid?*

### Changes in standards, newly promulgated standards, and TBCs

The groundwater protection standards that are specified in the Permit have not changed, and are not expected to change in the near future. An ongoing EPA study of the toxicity of TCE may eventually result in a change of the groundwater protection standard.

### Changes in exposure pathways

There has been no change in exposure pathway. Groundwater is not being extracted for beneficial use within the SWMU 2 plume. To ensure long term protectiveness, formal implementation of groundwater use restriction is recommended.

### Changes in toxicity

To date, there have been no changes in toxicity factors for the COCs in the SWMU 2 groundwater. As mentioned previously, the EPA study of the toxicity of TCE may yield a change of the TCE toxicity.

### Changes in risk assessment methods

No standardized risk assessment methods have changed that could affect the protectiveness of the remedy. Changes in the evaluation methodology for vapor intrusion will not affect the protectiveness of the SWMU 2 groundwater remedy because depth to groundwater is significantly greater than 100 feet.

### Expected Progress Toward Meeting CAOs

As discussed previously, the groundwater treatment system has not made significant progress toward meeting the groundwater protection standard. The SWMU 58 Corrective Measures Study will propose a groundwater remedy for SWMUs 2 and 58 together. The proposed remedy will likely include a different approach at SWMU 2, which could potentially include changes to the system, source control measures, and changes to the CAOs.

*Question C Has any other information come to light that could call into question the protectiveness of the remedies?*

At the time of remedy selection, the IWL and ditches were considered the source of the plume. Since that time, additional sources have been identified up-gradient of the IWL and ditches which may be contributing to the SWMU 2 plume and compromising the effectiveness of aquifer cleanup.

### **RCRA Interim Corrective Measures – SWMU 58 Groundwater Management Area**

*Question A Are the remedies functioning as intended by the decision documents?*

The GWMA monitoring network does not yet have enough data at three of the planned monitoring points, but the rest of the monitoring points provide evidence that the plume is not advancing toward the GWMA boundary. Five of the six sentry wells continue to show no detections of TCE. The sixth well continues to show detections below MCL, with no apparent upward trend. The intent of this interim measure is met.

*Question B Are the assumptions used at the time of remedy selection still valid?*

#### Changes in standards, newly promulgated standards, and TBCs

The groundwater protection standards that are specified in the Permit have not changed, and are not expected to change in the near future. An ongoing EPA study of the toxicity of TCE may eventually result in a change of the groundwater protection standard.

#### Changes in exposure pathways

There has been no change in exposure pathway. Groundwater is being extracted for industrial use only at the Bolinder property in the SWMU 58 plume. No other groundwater extraction is occurring within the GWMA.

#### Changes in toxicity

To date, there have been no changes in toxicity factors for the COCs in the SWMU582 groundwater. As mentioned previously, the EPA study of the toxicity of TCE may yield a change of the TCE toxicity.

#### Changes in risk assessment methods

No standardized risk assessment methods have changed that could affect the protectiveness of the remedy. Changes in the evaluation methodology for vapor intrusion will not affect the protectiveness of the SWMU 58 groundwater remedy because depth to groundwater is significantly greater than 100 feet.

*Question C Has any other information come to light that could call into question the protectiveness of the remedies?*

No new information has come to light to affect the protectiveness of this interim measure..

## IX. Issues

Issues in the TEAD restoration program that have been identified in this five year review are identified in Table 17. This list of issues is limited to those associated with implemented remedies or interim remedies.

**Table 17  
Issues Identified in the Second Five-Year Review**

Issue	Affects Protectiveness? (Y/N)	
	Short Term	Long Term
1. The pump and treat system is not likely to reduce VOC concentrations to the groundwater protection standard specified in the Permit in all wells within the plume.	N	Y
2. Several groundwater injection wells will need corrosion protection installed if they are to be operated again.	N	N
3. If the groundwater treatment system is to be operated full time again, major repairs/replacement of system components may be necessary due to age and obsolescence.	N	N
4. The State has expressed concern over the methodology employed in statistical trend analysis for monitoring the plume boundary.	N	N
5. There is no formal institutional control over use of groundwater in the SWMU 2 plume during the time that groundwater protection standards are exceeded.	N	Y
6. There are many monitoring wells at TEAD that are no longer used for groundwater sampling, but still require maintenance.	N	N
7. The groundwater monitoring program currently includes approximately 100 wells. As the SWMU 58 investigations and the SWMU 2 re-evaluation are completed, there will be an opportunity to optimize the program.	N	N
8. There is no sentry monitoring well in the GWMA interim remedy beyond well D-17 that shows non-detect levels.	N	N
9. There is no modification to the RODs for OUs 5 and 7 to account for the changes in remedy at Sites 5 and 17.	N	N

Issues one and five call into question the long term protectiveness of the SWMU 2 groundwater remedy. The selected remedy requires that the pump and treat system be designed to contain the plume and reduce VOC concentrations to the groundwater protection standard (GPS). The system was expected to operate until the standard was met. The selected remedy for SWMU 2 does not specify any measure such as institutional control to prevent exposure to contaminated groundwater during the time from remedy startup to GPS attainment. There is no exposure in the short term, because no one is extracting contaminated groundwater for residential use, and TEAD has communicated with the property owner to recommend not using the groundwater in the affected area. In the longer term, protectiveness is questionable; as the existing system was intended to provide aquifer restoration, but appears to be incapable of meeting that objective. Long term protectiveness could be provided by implementing formal institutional controls.

Issue eight is the only issue related to the interim corrective action for SWMU 58. The GWMA includes formal institutional controls which prevents the use of groundwater for domestic purposes. SWMU 58 (NEB plume GMA) has no selected remedy yet.

Issues two and three involve repair or replacement of major pump and treat system components. When, or if the system is re-started, these tasks will be necessary; and significant funding must be obtained to accomplish them.

Item four is identified as an issue because the ultimate groundwater remedy that will be selected in the SWMU 58 CMS will likely include a plume boundary monitoring component similar to that which is being performed at the SWMU 2 plume boundary and the SWMU 58 plume boundary. State DSHW concerns about the boundary trend analysis must be addressed in the design of any new plume boundary monitoring process. This issue is not identified as a protectiveness issue, as details of performing the analysis are being reviewed and will be appropriately adjusted before the final remedy selection (for SWMU 2 and 58 groundwater) is finalized. The SWMU 2 plume has not been advancing at a perceptible rate, so protectiveness is not affected in the meantime.

Items six and seven are related to management of the monitoring well network. Many monitoring wells and piezometers are in place that have served their initial purpose, and now are no longer being sampled. All the wells must be kept secure maintained in good repair. Wells not kept secure may become conduits for contamination to the groundwater. Most of the wells are gauged twice each year for static water level, but some of them can potentially be eliminated without adversely effecting hydrogeologic evaluations. At present, the number of monitoring wells being sampled is appropriate to support the SWMU 2 Non-operation test and the SWMU 58 RFI; but in the future, after the groundwater remedy is selected, the number of wells can likely be reduced to a less costly amount.

The issue regarding monitoring well D-17 is not identified as a protectiveness issue. The well has had consistent detections at concentrations below the MCL, which is the standard being used to define protectiveness. The State DSHW has concern that the public will not perceive protectiveness without knowing where non-detect is found beyond well D-17.

**X. Recommendations and Follow-up Actions**

**Table 18  
Issues and Recommendations**

Issue	Recommendation	Party Responsible	Oversight Agency	Milestone
1	Continue with the alternate measures evaluation and the current plan to provide a revised corrective measure for the SWMU 2 within the CMS for SWMU 58.	TEAD	DSHW/EPA	December 2008
2	Monitor the status of potential future system re-start, and install corrosion protection systems as appropriate.	TEAD	DSHW/EPA	Dependent on CMS
3	Monitor the status of potential future system re-start, and affect repairs when appropriate.	TEAD	DSHW/EPA	Dependent on CMS
4	In the report for the NOT, provide evaluation of the statistical methods and provide recommendations for any follow-on application of statistical methods in the event this type of boundary monitoring will continue.	TEAD	DSHW/EPA	Spring 2008
5	In the SWMU 58 CMS, incorporate institutional control over groundwater use into the corrective measures for all groundwater plumes.	TEAD	DSHW/EPA	December 2008
6	Develop a program to evaluate each well/piezometer for its value for sampling or water level measurement. Identify candidates for abandonment.	TEAD	DSHW/EPA	Fall 2008
7	Proceed with optimization of the monitoring program after the SWMU 58 CMS is completed.	TEAD	DSHW/EPA	Fall 2009
8	Develop a recommendation regarding this issue in the SWMU 58 CMS, where the final remedy selection is recommended.	TEAD	DSHW/EPA	December 2008
9	Prepare ESDs for OUs 5 and 7 to document the change from “No further action” to “Institutional controls”.	TEAD	EPA	December 2008

## **XI. Protectiveness Statements**

### **Operable Unit 4**

*This operable unit includes SWMU 31*

The remedy for OU4 is protective. Exposure pathways that could result in unacceptable risks are being controlled through land use restrictions.

### **Operable Unit 5**

*This operable unit includes SWMU 17*

The remedy for OU5 is protective. Exposure pathways that could result in unacceptable risks are being controlled through land use restrictions.

### **Operable Unit 7**

*This operable unit includes SWMU 5*

The remedy for OU7 is protective. Exposure pathways that could result in unacceptable risks are being controlled through land use restrictions.

### **Operable Unit 8**

*This operable unit includes SWMUs 6, 8, 13, 22, and 36*

The remedy for SWMUs 8, 13, 22, and 36 in OU8 is protective. Exposure pathways to soils at SWMU 8 that could result in unacceptable exposure to depot workers and construction workers has been eliminated by removal and treatment of the soil. All remaining exposure pathways at the OU 8 SWMUs could result in unacceptable risks to hypothetical residents, and are being controlled through land use restrictions.

The remedy for SWMU 6 is expected to be protective. Exposure pathways to soils that could result in unacceptable exposure to depot workers and construction workers will be eliminated by removal and treatment of the soil by removal and treatment of contaminated soil.

### **Land Use Controls RCRA Corrective Measures**

*Land use controls are applied at SWMUs 1b, 1c, 3, 4, 11, 19, 20, 21, 25, 26, 29, 34, 37, 42, 45, 46, 48, 49, 50, 51, 52b, 54*

The Land Use Controls corrective measure is protective. Exposure pathways that could result in unacceptable risks are being controlled. The land use controls are codified in appropriate documents, and a site maintenance program is in place to ensure long term protectiveness.

### **Excavation and Disposal RCRA Corrective Measures**

*This Corrective measure applied at SWMUs 11, 25, 34, 46, 49, 52c, 52d, 54, 57*

The contaminated soil excavation and disposal corrective measure is protective. The corrective action goal has been met at all SWMUs where the measure has been performed. Exposure pathways to receptors during reasonable property use have been eliminated.

#### **Asphalt Cap RCRA Corrective Measures**

*This corrective measure applied at SWMUs 20 and 21*

The asphalt cap corrective measure is protective. Exposure pathways to receptors during reasonable property use have been eliminated. Regular inspections and maintenance ensure long term protectiveness of the caps.

#### **Soil and Debris Consolidation and Capping RCRA Corrective Measures**

*This corrective measure is applied at SWMUs 2, 12/15, 42*

The corrective measures are protective. Exposure pathways to receptors during reasonable property use have been eliminated. Soil or debris removal has met corrective action goals, and the contaminated soil is effectively enclosed under caps. Regular inspections and maintenance ensure long term protectiveness of the caps.

#### **SWMU 2 Groundwater RCRA Corrective Measure**

The corrective measure is protective in the short term. The contaminated groundwater is not spreading, and informal control is in place on use of groundwater. The corrective measure is not protective over the long term. Long term protectiveness was to be achieved by reducing contaminant concentrations in the aquifer to groundwater protection standards, but it has been determined that the corrective measure will be unable to achieve those standards. A re-evaluation of the corrective measure is underway to develop a new groundwater corrective measure approach. In addition, institutional control over groundwater use should be formalized to ensure long term protectiveness.

#### **SMWU 58 Groundwater Management Area Interim RCRA Corrective Measure**

This interim corrective measure is protective in the short term. Exposure pathways that could result in unacceptable risks are being controlled. Contaminated groundwater is not expanding beyond the GWMA, and no receptors are using groundwater within the GWMA for domestic purposes. Long term protectiveness is not at issue, as this is an interim corrective measure.

#### **Depot-Wide Protectiveness Statements**

*Soil Remedies:* The soil remedies at Tooele Army Depot are protective. Active remediation has been completed on contaminated soils as necessary to protect current and future industrial workers and construction workers, as well as ecological receptors. Institutional controls to prevent residential development have been enacted where risks to hypothetical future residents are greater than  $10^{-6}$  or hazard index is greater than one. The active remediation activities included excavation and disposal, soil stabilization, and capping. These activities all successfully met the remedial action objectives. A site management program has been implemented which has successfully managed the institutional controls.

*Groundwater Remedies:* The groundwater remedies are protective in the short term. The SWMU 2 groundwater pump-and-treat system has operated from 1993 to 2004, and the TCE plume did not expand

during that time. The plume also has not perceptibly expanded during the subsequent non-operation test. Institutional control of an informal nature has prevented residential use of contaminated groundwater in the SWMU 2 plume. The SWMU 58 Groundwater Management Area has implemented an interim formal institutional control over groundwater use in the off-post Northeast Boundary Plume. The groundwater remedy for SWMU 2 is not protective over the long term. The existing pump-and-treat system does not appear to be capable of restoring groundwater to the groundwater protection standard. There is no formal institutional control on the SWMU 2 plume to ensure contaminated groundwater is not used for residential purposes in the long term.

## **XII. Next Review**

This is a statutory site that requires ongoing five year reviews. The next review will be conducted within five years of the completion of this five year review report. The completion date is the date of the signature shown on the signature cover attached to the front of this document.

## **ATTACHMENT 1**

### **REFERENCES**

## References

- (AEEC, 2005) *Final Source Removal Project Completion Report, Oil/Water Separator, Building 679 Tooele Army Depot, Tooele, Utah*. AEEC, May 2005.
- (Dames and Moore, 1999) *Revised Final Proposed Plan, Operable Units 4 and 8, Tooele Army Depot, Tooele, Utah*. Dames and Moore, December 1999.
- (Dames and Moore, 2000a) *Final Records of Decision for Operable Units 4 and 8 at Tooele Army Depot, Tooele, Utah*, June 2000
- (Dames and Moore, 2000b) *Final Corrective Measures Study Report, Group B Suspected Release SWMUs, Tooele Army Depot, Tooele, Utah*, Dames and Moore, October 2000
- (Dames and Moore, 2000c) *Final Decision Document, Group B Suspected Release SWMUs, Tooele Army Depot, Tooele, Utah*, Dames and Moore, October 2000
- (Dames and Moore, 2001a) *Final Corrective Measures Study Report, Group A Suspected Release SWMUs. Tooele Army Depot, Tooele, Utah*, Dames and Moore, April 2001
- (Dames and Moore, 2001b) *Final Decision Document, Group A Suspected Release SWMUs, Tooele Army Depot, Tooele, Utah*, Dames and Moore, April 2001
- (Dames and Moore, 2001c) *Final Corrective Measures Study Report, Group C Suspected Release SWMUs, Tooele Army Depot, Tooele, Utah*, Dames and Moore, April 2001
- (Dames and Moore, 2001d) *Final Decision Document, Group C suspected Release SWMUs, Tooele Army Depot, Tooele, Utah*, Dames and Moore, April 2001
- (Dames and Moore, 2001e) *Final Corrective Measures Study Report, Known Release SWMUs 3, 11, 25, and 33, Tooele Army Depot, Tooele, Utah*, Dames and Moore, December 2001
- (Dames and Moore, 2001f) *Final Decision Document, Known Release SWMUs 3, 11, 25, and 33, Tooele Army Depot, Tooele, Utah*, Dames and Moore, December 2001
- DSHW, 2001. *Administrative Rules for Cleanup Action and Risk-Based Closure Standards*. Utah Department of Environmental Quality. R315-101, Utah Administrative Code.
- DSHW, 2007. *Tooele Army Depot (TEAD), Post Closure Permit*, Utah Department of Environmental Quality, Latest Revision 2007
- (ECC, 2005) *Draft-Final Completion Report, Corrective Measures Implementation at Solid Waste Management Unit 8, Small Arms Firing Range, Tooele Army Depot, Tooele, Utah*, ECC, November 2005.
- (ECC, 2006) *Draft-Final Interim Remedial Action Completion Report, Corrective Measures Implementation at Solid Waste Management Unit (SWMU) 6, Old Burn Area, Tooele Army Depot, Tooele, Utah*, ECC, January 2006.

(GeoTrans/HEC, 2007) *Tooele Army Depot Groundwater Flow and Contaminant Transport Model (2007)*, Tooele, Utah, GeoTrans Inc. and U.S. Army Corps of Engineers Hydrologic Engineering Center, July 2007.

(Kleinfelder, 2002) *Final Phase I RCRA Facility Investigation Report for SWMU 58, On-Post Sources and Groundwater Contamination, Tooele Army Depot, Tooele, Utah*, Kleinfelder, March 2002.

(Kleinfelder, 2004) *Final Site Closure Work Plan and Groundwater Closure Report, X-Ray Lagoon, SWMU 3, Tooele Army Depot, Tooele, Utah*, Kleinfelder, September 2004

(MWH, 2003) *Final Corrective Measures Completion Report for the Charcoal Material Area (SWMU 52C), Tooele Army Depot, Tooele, Utah*, August 2003.

(MWH, 2003) *SWMU 2/Industrial Waste Lagoon System Non-Operation Test Monitoring and Installation-Wide Groundwater Monitoring Plans, Tooele Army Depot, Tooele, Utah*, June 2004.

(MWH, 2004) *Final Corrective Measures Completion Report for the Skeet Range (SWMU 57), Tooele Army Depot, Tooele, Utah*, September 2003.

(MWH, 2006) *Final Corrective Measures Implementation Plan for the TNT Washout Facility (SWMU 10), Tooele Army Depot, Tooele, Utah*, May 2006.

(MWH, 2006) *Final Corrective Measures Completion Report for the Bomb Washout Building (SWMU 42), Tooele Army Depot, Tooele, Utah*, December 2006.

(MWH, 2007) *Final SWMU 2/Industrial Waste Lagoon Groundwater Treatment Plant Operation and Maintenance Semi-Annual Report, Tooele Army Depot, Tooele, Utah*, March 2007.

(MWH, 2007) *Final Site Management Plan, SWMU 42, Bomb Washout Building, Tooele Army Depot, Tooele, Utah*, June 2007.

(North Wind, 2003a) *Corrective Measures Completion Report for the Corrective Measures Implementation at Solid Waste Management Unit 46, Used Oil Dumpsters, Tooele Army Depot, Tooele, Utah*, North Wind Inc., February 2003.

(North Wind, 2003b) *Addendum to the Corrective Measures Completion Report for the Corrective Measures Implementation at Solid Waste Management Unit 46, Used Oil Dumpsters*, North Wind Inc., July 2003.

(North Wind, 2003c) *Corrective Measures Completion Report for the Corrective Measures Implementation at Solid Waste Management Unit 54, Building 611 Sandblast Area, Tooele Army Depot, Tooele, Utah*, North Wind Inc., December 2003.

(North Wind, 2006) *Corrective Measures Completion Report for the SWMU 12/15 Sanitary Waste Landfill and Pesticide Disposal Area, Tooele Army Depot, Tooele, Utah*, North Wind Inc., December 2006.

(North Wind, 2007) Evaluation of Stabilization/Solidification Technologies for Solid Waste Management Unit 6, *Tooele Army Depot, Tooele, Utah*, North Wind Inc., March 2007.

(Parsons, 2003) *Final Addendum to Phase I RCRA Facility Investigation Report for SWMU-58, Tooele Army Depot, Tooele, Utah*, Parsons, August 2003.

(Parsons, 2003) *Final RCRA Facility Investigation SWMU-58 Work Plan, Tooele Army Depot, Tooele, Utah*, Parsons, December 2003.

(Parsons, 2004) *Final Groundwater Management Area Plan, Northeast Boundary Plume, Tooele Army Depot, Tooele, Utah*, Parsons, March 2004.

(Parsons, 2004) *Phase II RCRA Facility Investigation SWMU-58, Work Plan, Sampling and Analysis Plan Addendum 1 Tooele Army Depot, Tooele, Utah*, Parsons, September 2004.

(Parsons, 2005) *Final SWMU-58 Supplemental Risk Assessment from Exposure to Volatile Organic Compounds in Shallow Subsurface Soils, Tooele Army Depot, Tooele, Utah*, Parsons, November 2005.

(Parsons, 2006) *Phase II RCRA Facility Investigation SWMU-58, Work Plan, Sampling and Analysis Plan Addendum 2 Tooele Army Depot, Tooele, Utah*, Parsons, January 2006.

Rust E&I, 1999. *Tooele Army Depot Revised Final Site-Wide Ecological Risk Assessment, Tooele Army Depot, Tooele, Utah*. Rust Environmental and Infrastructure. May 1999

(SCA, 2002) *SVE Pilot Test Project Final Report, Tooele Army Depot, Tooele, Utah*, SCA Environmental, November 2002

(USACE, 2004a) *Site Management Plan, SWMU 37, Contaminated Waste Processing Plant, Tooele Army Depot, Tooele, Utah*, U. S. Army Corps of Engineers, March 2004.

(USACE, 2004a) *Final Corrective Measures Completion Report, SWMU 49 – Stormwater/Industrial Wastewater Piping, G-Avenue Outfall, Tooele Army Depot, Tooele, Utah*, U. S. Army Corps of Engineers, August 2004.

(USACE, 2007a) *Final Semi-Annual Groundwater Quality Report and Voluntary SWMU Sampling, Fall 2006, Tooele Army Depot, Tooele, Utah*, U. S. Army Corps of Engineers, April 2007.

(USACE, 2007a) *Final Corrective Measures Completion Report, SWMU 21 – , Tooele Army Depot, Tooele, Utah*, U. S. Army Corps of Engineers, May 2007.

(USACE, 2007b) *Final Corrective Measures Completion Report, SWMU 20 – AED Deactivation Furnace Site, Tooele Army Depot, Tooele, Utah*, U. S. Army Corps of Engineers, January 2007.

(USACE, 2007c) *Final Corrective Measures Completion Report, SWMU 34 – Pesticide Handling and Storage Area, Tooele Army Depot, Tooele, Utah*, U. S. Army Corps of Engineers, January 2007.

(USACE, 2007d) *Final Corrective Measures Completion Report, SWMU 52D – Horse Stable Area, Tooele Army Depot, Tooele, Utah*, U. S. Army Corps of Engineers, January 2007.

(USACE, 2007a) *Draft-Final Corrective Measures Completion Report, SWMU 11 – Laundry Effluent Pond and Waste Pile Areas , Tooele Army Depot, Tooele, Utah*, U. S. Army Corps of Engineers, May 2007.

(USACE, 2007e) *Final Corrective Measures Completion Report, SWMU 21 – Deactivation Furnace Building Site, Tooele Army Depot, Tooele, Utah*, U. S. Army Corps of Engineers, May 2007.

(USACE, 2007a) *Final Corrective Measures Completion Report, SWMU 25 – Former Battery Shop , Tooele Army Depot, Tooele, Utah*, U. S. Army Corps of Engineers, May 2007.

(USACE, 2007a) *Final Corrective Measures Study – Revision, SWMU 56, Gravel Pit,, Tooele Army Depot, Tooele, Utah*, U. S. Army Corps of Engineers, June 2007.

USAEC, US Army Environmental Center, 1994. *Tooele Army Depot North Record of Decision for Operable Units 5,6,7, and 10, Tooele Army Depot, Tooele, Utah*. September 1994.

URS, 2001a. *Corrective Measures Study Work Plan, Group A Suspected Releases SWMUs, Tooele Army Depot, Tooele, Utah*. Second Revised Final, URS, April 2001.

URS, 2001b. *Corrective Measures Study Work Plan, Group C Suspected Releases SWMUs, Tooele Army Depot, Tooele, Utah*. Second Revised Final, URS, July 2001.

URS, 2001c. *Final Decision Document, Group C Suspected Releases SWMUs, Tooele Army Depot, Tooele Utah*. URS, July 2001.

URS, 2001d. *Final Corrective Measures Study Report, Known Releases SWMUs 3, 11, 25, and 30, Tooele Army Depot, Tooele Utah*. URS, December 2001.

(URS, 2003) *Final System Non-Operation Test Proposal, Alternative Measures Industrial Waste Lagoon, Tooele Army Depot, Tooele Utah*. URS, October 2003.

URS, 2006. *Draft Final Proposed Plan, Operable Unit 9, Tooele Army Depot, Tooele, Utah*. URS, August 2006.



**ATTACHMENT 2**  
**DOCUMENT STATUS TABLE**

Table VII-2. SWMU/Phase Milestones

SWM U	Grp	RCRIS CA Code		SWMU Description	CA050	CA100	CA150	CA200	CA300	CA350	CA400	CA500	CA550	n/a	CA600	CA650	CA999	
		RFA Complete	RFI Imposed		RFI WP Approved	RFI Approved	RFI Approved	CMS WP Approved	CMS Approved	CMI Imposed	CMI WP Approved	CMI(C) Complete	CMI(O) Start	IRA Imposed	IRA Complete	SMP Approved	NFA	
1	A	Open Burn/Open Detonation Area	7-Jan-91	15-Jul-94	6-Oct-97													6-Oct-97
20	A	AED Deactivation Furnace Site	7-Jan-91	15-Jul-94	6-Oct-97													
21	A	Ammo Deactivation Furnace Site	7-Jan-91	15-Jul-94	6-Oct-97													
34	A	Pesticide Handling and Storage Area	7-Jan-91	15-Jul-94	6-Oct-97													
37	A	Contaminated Waste Processor	7-Jan-91	15-Jul-94	6-Oct-97													
42	A	Bomb Washout Facility, Building 539	7-Jan-91	15-Jul-94	6-Oct-97													
45	A	Storm water Holding Pond	7-Jan-91	15-Jul-94	6-Oct-97													
48	A	Old Dispensary	7-Jan-91	15-Jul-94	6-Oct-97													
1b	A	Propellant Burn Pad	7-Jan-91	15-Jul-94	6-Oct-97													
1c	A	Trash Burn Pits	7-Jan-91	15-Jul-94	6-Oct-97													
1d	A	Propellant Burn Pans	7-Jan-91	15-Jul-94	6-Oct-97													
4	B	Sandblast Areas	7-Jan-91	15-Jul-94	6-Oct-97													6-Oct-97
14	B	Sewage Lagoons	7-Jan-91	15-Jul-94	6-Oct-97													6-Oct-97
19	B	AED Demilitarization Test Facility	7-Jan-91	15-Jul-94	6-Oct-97													
26	B	DRMO Storage Yard	7-Jan-91	15-Jul-94	6-Oct-97													
28	B	90 Day Drum Storage Area	7-Jan-91	15-Jul-94	6-Oct-97													
29	B	Drum Storage Areas	7-Jan-91	15-Jul-94	6-Oct-97													
38	B	Indust Wastewater Treatment Facility	7-Jan-91	15-Jul-94	6-Oct-97													
46	B	Used Oil Dumpsters	7-Jan-91	15-Jul-94	6-Oct-97													
47	B	Boiler Blowdown	7-Jan-91	15-Jul-94	6-Oct-97													
49	C	Storm/Industrial Wastewater System	1994	14-Feb-96	8-May-98	1994	14-Feb-96	8-May-98	8-Dec-00	28-Jun-01	28-Jun-01	23-Apr-02	5-Aug-04					
50	C	Compressor Condensate Drains	1994	14-Feb-96	8-May-98	1994	14-Feb-96	8-May-98	8-Dec-00	28-Jun-01	28-Jun-01							
51	C	Chromic Acid/Aldine Drying Beds	1994	14-Feb-96	8-May-98	1994	14-Feb-96	8-May-98	8-Dec-00	28-Jun-01	28-Jun-01							
53	C	PCB Storage and Spill Sites	1994	14-Feb-96	8-May-98	1994	14-Feb-96	8-May-98	8-Dec-00	28-Jun-01	28-Jun-01							8-May-98
54	C	Sandblast Areas	1994	14-Feb-96	8-May-98	1994	14-Feb-96	8-May-98	8-Dec-00	28-Jun-01	28-Jun-01							
55	C	Battery Shop, Building 618	1994	14-Feb-96	8-May-98	1994	14-Feb-96	8-May-98	8-Dec-00	28-Jun-01	28-Jun-01							8-May-98
56	C	Gravel Pit	1994	14-Feb-96	8-May-98	1994	14-Feb-96	8-May-98	8-Dec-00	28-Jun-01	28-Jun-01							
57	C	Skeet Range	1994	14-Feb-96	8-May-98	1994	14-Feb-96	8-May-98	8-Dec-00	28-Jun-01	28-Jun-01							
52a	C	Drain Field	1994	14-Feb-96	8-May-98	1994	14-Feb-96	8-May-98	8-Dec-00	28-Jun-01	28-Jun-01							
52b	C	Disposal Trenches	1994	14-Feb-96	8-May-98	1994	14-Feb-96	8-May-98	8-Dec-00	28-Jun-01	28-Jun-01							
52c	C	Charcoal Spreading Area	1994	14-Feb-96	8-May-98	1994	14-Feb-96	8-May-98	8-Dec-00	28-Jun-01	28-Jun-01							
52d	C	Horse Stable Area	1994	14-Feb-96	8-May-98	1994	14-Feb-96	8-May-98	8-Dec-00	28-Jun-01	28-Jun-01							
2	KR	Industrial Waste Lagoon	7-Jan-91	1997	1998	13-Jun-00								1993(C)				
10	KR	TNT Washout Facility	7-Jan-91	1994	10-May-96	13-Jun-00												
12	KR	Pesticide Disposal Area	7-Jan-91	1994	10-May-96	13-Jun-00												
15	KR	Sanitary Landfill	7-Jan-91	1994	10-May-96	13-Jun-00												
24	KR	Battery Pit, Building 507	7-Jan-91	1994	10-May-96	13-Jun-00												
3	KR-1	X-Ray Lagoon	7-Jan-91	1994	10-May-96	13-Jun-00												
11	KR-1	Laundry Effluent Ponds	7-Jan-91	1994	10-May-96	13-Jun-00												
25	KR-1	Battery Shop, Building 1252	7-Jan-91	1994	10-May-96	13-Jun-00												

RCRIS CA Code		CA050	CA100	CA150	CA200	CA300	CA350	CA400	CA500	CA550	n/a	CA600	CA650	CA999			
SWM U	Grp	SWMU Description	RFA Complete	RFI Imposed	RFI WP Approved	RFI Approved	CMS WP Approved	CMS Approved	CMI Imposed	CMI WP Approved	CMI(C) Complete	CMI(O) Start	IRA Imposed	IRA Complete	SMP Approved	NFA	
30	KR-1	Old Industrial Waste Lagoon	18-Dec-87	7-Jan-91	1994	10-May-96	13-Jun-00	29-Apr-02								29-Apr-02	1994
27	SR	RCRA Container Storage	18-Dec-87	7-Jan-91	1993	1994											1994
39	SR	Solvent Recovery Facility	18-Dec-87	7-Jan-91	1993	1994											1994
43	SR	Container Storage, P999	18-Dec-87	7-Jan-91	1993	1994											1994
44	SR	Tank Storage TCE	18-Dec-87	7-Jan-91	1993	1994											1994
58	D	Industrial Area Groundwater Sources	1998	1-Apr-98	15-Mar-99(D) 8-Jan-04(E) 22-Sep-04(J)	3-Apr-03(B) 27-Oct-03(K)							18-Feb-04(F) 24-Feb-05 (I)				

Phase Not Required

- (A) Removal and Relocation of Landfill Debris from the Utah Industrial Depot
- (B) Phase I RCRA Facility Investigation of On-site Sources and Groundwater
- (C) Main TCE Plume Groundwater Pump-and-Treat System
- (D) Phase I RCRA Facility Investigation
- (E) Phase II RCRA Facility Investigation
- (F) Groundwater Management Area
- (G) Site Closure Workplan
- (H) Well Abandonment Workplan
- (I) Bldg 679 Oil/Water Separator Removal
- (J) Addendum to Phase II RFI Workplan
- (K) Addendum to Phase I RCRA Facility Investigation, Off-site Ground Water Contamination

**ATTACHMENT 3**  
**SITE INSPECTION**

## Site Inspection Checklist

I. SITE INFORMATION			
<b>Site name:</b> Tooele Army Depot	<b>Date of inspection:</b> xxxxxxxx		
<b>Location and Region:</b> Tooele, UT	<b>EPA ID:</b> UT3213820894		
<b>Agency, office, or company leading the five-year review:</b> Army	<b>Weather/temperature:</b> xxxxxxxxxxxx		
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input checked="" type="checkbox"/> Landfill cover/containment  <input checked="" type="checkbox"/> Access controls  <input checked="" type="checkbox"/> Institutional controls  <input checked="" type="checkbox"/> Groundwater pump and treatment                  Surface water collection and treatment                  Other _____                  _____               </td> <td style="width: 50%; vertical-align: top;">                 Monitored natural attenuation  <input checked="" type="checkbox"/> Groundwater containment                  Vertical barrier walls               </td> </tr> </table>		<input checked="" type="checkbox"/> Landfill cover/containment <input checked="" type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment Surface water collection and treatment Other _____ _____	Monitored natural attenuation <input checked="" type="checkbox"/> Groundwater containment Vertical barrier walls
<input checked="" type="checkbox"/> Landfill cover/containment <input checked="" type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment Surface water collection and treatment Other _____ _____	Monitored natural attenuation <input checked="" type="checkbox"/> Groundwater containment Vertical barrier walls		
<b>Attachments:</b> Inspection team (B. Call, C. Koger, C. Cole ) Site map attached			
II. INTERVIEWS (Check all that apply)			
1. <b>O&amp;M site manager</b> <u>Mike Gronseth (MWH)</u> <u>Project Manager</u> <u>xxxxxx</u> <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <u>at site</u> at office by phone      Phone no. xxxxxxxxxxxx Problems, suggestions; Report attached <u>see interview record</u> _____ _____			
2. <b>O&amp;M staff</b> _____      _____      _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed at site at office by phone      Phone no. Problems, suggestions; _____ _____ _____			



<b>III. ON-SITE DOCUMENTS &amp; RECORDS VERIFIED</b> (Check all that apply)				
1.	<b>O&amp;M Documents</b> <input type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input type="checkbox"/> Maintenance logs Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	N/A N/A N/A
2.	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	N/A N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks: OSHA 8-hr certificate present _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	N/A
4.	<b>Permits and Service Agreements</b> Air discharge permit Effluent discharge Waste disposal, POTW Other permits _____ Remarks: Only required treated water discharge requirements per the Sacramento Regional County Sanitation District. Discharge water samples are regularly collected, analyzed, and reported. The permit# GRW011 is effective from December 31, 2004 to December 31, 2007.	Readily available Readily available Readily available Readily available	Up to date Up to date Up to date Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A N/A <input type="checkbox"/> N/A
5.	<b>Gas Generation Records</b> Remarks _____	Readily available	Up to date	<input type="checkbox"/> N/A
6.	<b>Settlement Monument Records</b> Remarks _____	Readily available	Up to date	<input type="checkbox"/> N/A
7.	<b>Groundwater Monitoring Records</b> Remark: Included in reports and logs. _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	N/A
8.	<b>Leachate Extraction Records</b> Remarks _____	Readily available	Up to date	<input type="checkbox"/> N/A
9.	<b>Discharge Compliance Records</b> Air Water (effluent) Remarks _____	Readily available <input type="checkbox"/> Readily available	Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A N/A
10.	<b>Daily Access/Security Logs</b> Remarks: _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	N/A

**IV. O&M COSTS**

1. **O&M Organization**  
 State in-house Contractor for State  
 PRP in-house Contractor for PRP  
 Federal Facility in-house \_ Contractor for Federal Facility  
 Other \_\_\_\_\_

2. **O&M Cost Records**  
 \_ Readily available \_ Up to date  
 \_ Funding mechanism/agreement in place  
 Original O&M cost estimate included in respective ROD

Total annual cost by year for review period

For FY02 \$xxxxxxx  
 Date Total cost

For FY03 \$xxxxxxx  
 Date Total cost

For FY04 \$xxxxxxx  
 Date Total cost

For FY05 \$xxxxxxx  
 Date Total cost

For FY06 \$xxxxxxx  
 Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**  
 Describe costs and reasons: \_\_\_\_\_  
 \_\_\_\_\_

**V. ACCESS AND INSTITUTIONAL CONTROLS** X Applicable N/A

**A. Fencing**

1. **Fencing** X Location shown on site maps X Gates secured N/A  
 Remarks: Fencing intact and in good condition.  
 \_\_\_\_\_  
 \_\_\_\_\_

**B. Other Access Restrictions**

1. **Signs and other security measures** X Location shown on site map N/A  
 Remarks: Treatment plant and shop building were identified, all wells and vaults were secured.  
 \_\_\_\_\_  
 \_\_\_\_\_

<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs properly implemented	<input type="checkbox"/> Yes	No	N/A
	Site conditions imply ICs being fully enforced	<input type="checkbox"/> Yes	No	N/A
	Type of monitoring :Deeds, Self-reporting			
	Frequency Property transfer _____			
	Responsible party/agency _____			
	Reporting is up-to-date	<input type="checkbox"/> Yes	No	N/A
	Reports are verified by the lead agency	<input type="checkbox"/> Yes	No	N/A
	Specific requirements in deed or decision documents have been met	<input type="checkbox"/> Yes	No	N/A
	Violations have been reported	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	N/A
	Other problems or suggestions: Continue to monitor land use controls			
	_____			
	_____			
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	ICs are inadequate	N/A
	Remarks: Land use controls are recorded with deeds for restricted use as appropriate for impacted parcels. _____			
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	Location shown on site map	<input type="checkbox"/> No vandalism evident	
	Remarks: No vandalism was reported. _____			
	_____			
2.	<b>Land use changes on site</b>	N/A		
	Remarks: _____			
	_____			
3.	<b>Land use changes off site</b>	N/A		
	Remarks: _____			
	_____			
<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A. Roads</b>				
	<input type="checkbox"/> Applicable			N/A
1.	Roads damaged	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate	N/A
	Remarks _____			
	_____			

<b>B. Other Site Conditions</b>		
Remarks:  There will be more development. Offsite use appears to be a combination of industrial/commercial combined with increasing residential.  _____  _____  _____		
<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable    N/A		
<b>A. Landfill Surface</b>		
1.	<b>Settlement</b> Areal extent _____ Depth _____ Remarks Covered with star thistle. No erosion, disturbances or other problems observed. _____ _____	Location shown on site map <input type="checkbox"/> Settlement not evident _____
2.	<b>Cracks</b> Lengths _____    Widths _____    Depths _____ Remarks _____ _____	Location shown on site map <input type="checkbox"/> Cracking not evident _____
3.	<b>Erosion</b> Areal extent _____ Depth _____ Remarks _____ _____	Location shown on site map <input type="checkbox"/> Erosion not evident _____
4.	<b>Holes</b> Areal extent _____ Depth _____ Remarks _____ _____	Location shown on site map <input type="checkbox"/> Holes not evident _____
5.	<b>Vegetative Cove</b> <input type="checkbox"/> Star thistle/weeds <input type="checkbox"/> Cover properly established <input type="checkbox"/> No signs of stress No Trees/Shrubs (indicate size and locations on a diagram) Remarks _____ _____	
6.	<b>Alternative Cover (armored rock, concrete, etc.)</b> N/A Remarks _____ _____	
7.	<b>Bulges</b> Areal extent _____ Height _____ Remarks _____ _____	Location shown on site map <input checked="" type="checkbox"/> Bulges not evident _____

8.	<b>Wet Areas/Water Damage</b>	_ Wet areas/water damage not evident	
	Wet areas	Location shown on site map	Areal extent _____
	Ponding	Location shown on site map	Areal extent _____
	Seeps	Location shown on site map	Areal extent _____
	Soft subgrade	Location shown on site map	Areal extent _____
	Remarks _____		
9.	<b>Slope Instability</b>	Slides	Location shown on site map    _ No evidence of slope instability
	Areal extent _____		
	Remarks _____		
<b>B. Benches</b> Applicable                      N/A			
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)			
1.	<b>Flows Bypass Bench</b>	Location shown on site map	N/A or okay
	Remarks _____		
2.	<b>Bench Breached</b>	Location shown on site map	N/A or okay
	Remarks _____		
3.	<b>Bench Overtopped</b>	Location shown on site map	N/A or okay
	Remarks _____		
<b>C. Letdown Channels</b> Applicable                      X N/A			
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)			
1.	<b>Settlement</b>	Location shown on site map	No evidence of settlement
	Areal extent _____	Depth _____	
	Remarks _____		
2.	<b>Material Degradation</b>	Location shown on site map	No evidence of degradation
	Material type _____	Areal extent _____	
	Remarks _____		
3.	<b>Erosion</b>	Location shown on site map	No evidence of erosion
	Areal extent _____	Depth _____	
	Remarks _____		

4.	<b>Undercutting</b>	Location shown on site map	No evidence of undercutting
	Areal extent _____	Depth _____	
	Remarks _____		
5.	<b>Obstructions</b>	Type _____	No obstructions
	Location shown on site map	Areal extent _____	
	Size _____		
	Remarks _____		
6.	<b>Excessive Vegetative Growth</b>	Type _____	
	No evidence of excessive growth		
	Vegetation in channels does not obstruct flow		
	Location shown on site map	Areal extent _____	
	Remarks _____		
<b>D. Cover Penetrations</b> Applicable    X N/A			
1.	<b>Gas Vents</b>	Active    Passive	
	Properly secured/locked	Functioning	Routinely sampled    Good condition
	Evidence of leakage at penetration		Needs Maintenance
	N/A		
	Remarks _____		
2.	<b>Gas Monitoring Probes</b>		
	Properly secured/locked	Functioning	Routinely sampled    Good condition
	Evidence of leakage at penetration		Needs Maintenance    N/A
	Remarks _____		
3.	<b>Monitoring Wells</b> (within surface area of landfill)		
	Properly secured/locked	Functioning	Routinely sampled    Good condition
	Evidence of leakage at penetration		Needs Maintenance    N/A
	Remarks _____		
4.	<b>Leachate Extraction Wells</b>		
	Properly secured/locked	Functioning	Routinely sampled    Good condition
	Evidence of leakage at penetration		Needs Maintenance    N/A
	Remarks _____		
5.	<b>Settlement Monuments</b>	Located	Routinely surveyed    N/A
	Remarks _____		

<b>E. Gas Collection and Treatment</b>		Applicable	X	N/A
1.	<b>Gas Treatment Facilities</b> Flaring                      Thermal destruction                      Collection for reuse Good condition      Needs Maintenance Remarks _____ _____			
2.	<b>Gas Collection Wells, Manifolds and Piping</b> Good condition      Needs Maintenance Remarks _____ _____			
3.	<b>Gas Monitoring Facilities</b> ( <i>e.g.</i> , gas monitoring of adjacent homes or buildings) Good condition      Needs Maintenance                      N/A Remarks _____ _____			
<b>F. Cover Drainage Layer</b>		Applicable	X	N/A
1.	<b>Outlet Pipes Inspected</b> Remarks _____ _____	Functioning		N/A
2.	<b>Outlet Rock Inspected</b> Remarks _____ _____	Functioning		N/A
<b>G. Detention/Sedimentation Ponds</b>		Applicable	_	N/A
1.	<b>Siltation</b> Areal extent _____                      Depth _____                      N/A Siltation not evident Remarks _____ _____			
2.	<b>Erosion</b> Areal extent _____                      Depth _____ Erosion not evident Remarks _____ _____			
3.	<b>Outlet Works</b> Remarks _____ _____	Functioning		N/A
4.	<b>Dam</b> Remarks _____ _____	Functioning		N/A

<b>H. Retaining Walls</b>		Applicable	_ N/A
1.	<b>Deformations</b> Horizontal displacement_____ Vertical displacement_____ Rotational displacement_____ Remarks_____	Location shown on site map	Deformation not evident
2.	<b>Degradation</b> Remarks_____	Location shown on site map	Degradation not evident
<b>I. Perimeter Ditches/Off-Site Discharge</b>		Applicable	_ N/A
1.	<b>Siltation</b> Areal extent_____ Depth_____ Remarks_____	Location shown on site map	Siltation not evident
2.	<b>Vegetative Growth</b> Vegetation does not impede flow Areal extent_____ Type_____ Remarks_____	Location shown on site map	N/A
3.	<b>Erosion</b> Areal extent_____ Depth_____ Remarks_____	Location shown on site map	Erosion not evident
4.	<b>Discharge Structure</b> Remarks_____	Functioning	N/A
<b>VIII. VERTICAL BARRIER WALLS</b>		Applicable	X N/A
1.	<b>Settlement</b> Areal extent_____ Depth_____ Remarks_____	Location shown on site map	Settlement not evident
2.	<b>Performance Monitoring</b> Type of monitoring_____ Performance not monitored Frequency_____ Evidence of breaching Head differential_____ Remarks_____		

<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b>		Applicable	N/A
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b>		Applicable	N/A
1.	<b>Pumps, Wellhead Plumbing, and Electrical</b> Good condition      All required wells properly operation      Needs Maintenance      N/A Remarks _____ _____		
2.	<b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> Good condition      Needs Maintenance Remarks _____ _____		
3.	<b>Spare Parts and Equipment</b> Readily available      Good condition      Requires upgrade      Needs to be provided Remarks _____ _____		
<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		Applicable	N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> Good condition      Needs Maintenance Remarks _____ _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> Good condition      Needs Maintenance Remarks _____ _____		
3.	<b>Spare Parts and Equipment</b> Readily available      Good condition      Requires upgrade      Needs to be provided Remarks _____ _____		

<b>C. Treatment System</b>		X Applicable	N/A
1.	<b>Treatment Train</b> (Check components that apply) Metals removal                      Oil/water separation                      Bioremediation Air stripping                              Carbon adsorbers Filters _____ Additive (e.g., chelation agent, flocculent) _____ Others: UV/peroxide oxidation system (not utilized due to low levels) _____ X Good condition                              Needs Maintenance X Sampling ports properly marked and functional X Sampling/maintenance log displayed and up to date X Equipment properly identified X Quantity of groundwater treated annually: plant average is xxxxxx gpm with xx% uptime Quantity of surface water treated annually NA _____ Remarks: Site is undergoing the Non-Operational Test at this time. _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) N/A                              X Good condition                              Needs Maintenance Remarks _____ _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> N/A                              X Good condition                              X Proper secondary containment                              Needs Maintenance Remarks _____ _____		
4.	<b>Discharge Structure and Appurtenances</b> N/A                              X Good condition                              Needs Maintenance Remarks _____ _____		
5.	<b>Treatment Building(s)</b> N/A                              X Good condition                              Needs repair Remarks _____ _____		
6.	<b>Monitoring Wells</b> (pump and treatment remedy) X Properly secured/locked    X Functioning    X Routinely sampled                      X Good condition All required wells located                      Needs Maintenance                      N/A Remarks: _____ _____		
<b>D. Monitoring Data</b>			
1.	Monitoring Data X Is routinely submitted on time                              X Is of acceptable quality		
2.	Monitoring data suggests: X Groundwater plume is effectively contained    _ Contaminant concentrations are declining		

<b>D. Monitored Natural Attenuation</b> X N/A			
1.	<b>Monitoring Wells</b> (natural attenuation remedy)		
	Properly secured/locked	Functioning	Routinely sampled
	All required wells located	Needs Maintenance	Good condition
	Remarks _____		N/A
<b>X. OTHER REMEDIES</b>			
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction. Note that there are no other remedies.			
<b>XI. OVERALL OBSERVATIONS</b>			
<b>A. Implementation of the Remedy</b>			
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). _____			
<b>B. Adequacy of O&amp;M</b>			
Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy. The O&M activities appear to be appropriate in maintaining the treatment systems and monitoring network. As long as the groundwater treatment system is maintained, the selected remedy is functioning as intended. _____			

**C. Early Indicators of Potential Remedy Problems**

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

**D. Opportunities for Optimization**

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

## MEMORANDUM FOR FILE

SUBJECT: Trip Report, Site Inspection Conducted for the Tooele Army Depot Five-Year Review.

1. Cory Koger, Carl Cole, and Brad Call conducted the subject site inspection on June 4 and 5, 2007. Mr. Cole's duty station is at the depot, while Mr. Koger and Mr. Call flew in from Sacramento.
2. The team first met with and interviewed Larry McFarland who is the Tooele Army Depot Environmental Protection Specialist. Mr. McFarland manages the depot's environmental restoration program and has been in this position since 1996. The interview of Mr. McFarland is included as an attachment to be included in the Five-Year Review report (see attached).
3. During our discussion with Mr. McFarland he indicated that the depot has established an intranet system which contains a map with a remedy summary for each Solid Waste Management Unit (SWMU). He recommended that Doug Mackenzie review this system during his next visit to the depot. Mr. Cole may have access to the system as well. The system also includes electronic versions of many environmental restoration reports.
4. The remaining part of June 4 was used to visit a number of SWMUs. It was not possible to visit SWMUs 8 and 40 because they are now included in a range area with restricted access. Mr. McFarland indicated that he has visited these sites recently and that there was no evidence of activities that would compromise the remedy or any violations of the institutional controls.
5. Institutional controls in most instances are land use restrictions (no residential).
6. The June 4 site visits included:  
  
SWMU 23, Bomb and Shell Reconditioning Building. Building 1345. Excavation and off-post disposal is planned for this site. One picture was taken, facing southwest.



SWMU 20, AED Deactivation Furnace Site. The asphalt cover is in place and no evidence of major cracks or unauthorized use. There is a sign and fence in place. One picture was taken, facing south.



SWMU 19, AED Demilitarization Test Facility. Institutional controls are the remedy for this site and there was no evidence of unauthorized use. There is both a fence and sign at this site. One picture was taken, facing south.



SWMU 1, Main Demolition Area. This is an active site with warning signs and a fence. No remedy will be established as long as this site is active. No evidence of unauthorized use was noted. Given the sensitive nature of this area no pictures were taken.

SWMU 22, Building 1303 Washout Pond. Mr. Cole noted that the remedy included excavation, off site disposal, backfill and reseeded. Institutional controls are also established for this site and there was no evidence of unauthorized use. There is a sign at this site. One picture was taken, facing southwest.



SWMU 7, Chemical Range. The interim removal action involved trenching and removal of metal scrap. Institutional controls are the remedy for this site and there was no evidence of unauthorized use. There is a fence at this site. One picture was taken, facing southwest.



SWMU 36, Old Burn Staging Area. Institutional controls are the remedy for this site and there was no evidence of unauthorized use. A sign is present. One picture was taken, facing west.



SWMU 6, Old Burn Area. A sign is present. An interim removal action was conducted for explosive contaminated soil. Excavation, soil stabilization, off-site disposal, and fencing is planned for this site. No evidence of unauthorized use was noted. One picture was taken facing west.



SWMU 37, Contaminated Waste Processor. Institutional controls are the remedy for this site and there was no evidence of unauthorized use. There is both a fence and sign at this site. No picture was taken.

SWMU 21, Ammunition Deactivation Furnace Building. Building 1320. The remedy for this site includes placement of an asphalt cap and establishment of institutional controls. The asphalt appears to be in good shape. There was no evidence of unauthorized use. There is both a fence and sign at this site. One picture was taken, facing south.



SWMU 41, Box Elder Wash Drum Site. The remedy included removal of drums and stained soil. There is a sign at this site. No evidence of unauthorized use was noted. One picture was taken, facing northeast.



SWMU 5, Pole Transformer PCB Spill. The remedy for this site included excavating contaminated soil, backfilling, placing a cap consisting of soil and gravel. There is a sign at this site. No evidence of unauthorized use was noted. One picture was taken, facing west.



SWMU 3, X-Ray Lagoon. Bldg 1224. Institutional controls are the remedy for this site and there was no evidence of unauthorized use. There is both a fence and sign at this site. One picture was taken, facing north. A depot worker contacted security when she saw us taking the picture. Mr. Cole was in possession of the necessary permit.



SWMU 10, TNT Washout Facility. Excavation, composting, backfilling, and groundwater monitoring are planned for this site. A fence encloses the lagoons. No evidence of unauthorized use was noted. Two pictures were taken, one of the lagoons (facing northwest, SWMU 10a), and one of the composting operation (facing northeast, SWMU 10b).





SWMU 11, Laundry Effluent Ponds. Excavation and off-post disposal of the lagoon and debris piles. Institutional controls were established. No evidence of unauthorized use was noted. Two pictures were taken, one of the southern lagoon area (facing west, SWMU 11a) and one of the northern lagoon area (facing west, SWMU 11b). The northern lagoon area may be the sewage lagoon that is not included in this SWMU.





SWMU 13, Tire Disposal Area. The tires were dug-up and removed. Institutional controls were established. No evidence of unauthorized use was noted. One picture was taken, facing east.



SWMU 57, Skeet Range. The remedy consisted of excavation and off-site disposal. The site is closed with no need for institutional controls. One picture was taken, facing northeast.



SWMU 52C, Charcoal Material Area. The remedy consisted of excavation and off-site disposal. The site is closed with no need for institutional controls. One picture was taken, facing northwest. SWMU 52A, Possible Drain Field. No action was recommended for this site contained within SWMU 52C. No remedy in place.



SWMU 52D, Horse Stable Area. The remedy consisted of excavation and off-site disposal. The site is closed with no need for institutional controls. One picture was taken, facing west.



SWMU 52B, Disposal Trenches. Institutional controls were established for this site and there was no evidence of unauthorized use. One picture was taken, facing southeast.



SWMU 34, Pesticide Handling and Storage Facility. Bldg 518. The remedy consisted of excavation and off-site treatment/disposal. Institutional controls were established and there was no evidence of unauthorized use. There is both a fence and sign. One picture was taken, facing southeast.



SWMU 42, Bomb Washout Building (Bldg 539). The remedy included excavation and placement in lagoon area, a soil cover, fencing, and institutional controls. Both a fence and sign were present. There was no evidence of unauthorized use. A sparse covering of vegetation was noted on the soil cover. There was no evidence of erosion. Two pictures were taken, one a wide shot of the area (facing northwest, SWMU 42a) and one close-up of the lagoon (facing northwest, SWMU 42b).





SWMU 24, Battery Pit. The summary table indicated that no action was necessary at this site. However Mr. Cole mentioned that soil was excavated and disposed off site, and then the asphalt was patched. The site is located at the southeast corner of the Engineering Equipment Repair Shop. One picture was taken facing northwest.



SWMU 48, Old Dispensary. Institutional controls are the remedy for this site and there was no evidence of unauthorized use. There is a fence at this site. One picture was taken, facing north.



SWMU 45, Storm Water Holding Pond. Institutional controls are the remedy for this site and there was no evidence of unauthorized use. One picture was taken, facing northeast.



SWMU 12/15, Pesticide Disposal Area/Sanitary Landfill. The remedy for this site included consolidation of surface debris, a soil cover, and institutional controls. There was no evidence of unauthorized use. There is a fence. A moderate covering of vegetation was noted on the soil cover areas. There was very little evidence of erosion. The CAMU was intact and two signs were noted at each end. The vegetation cover on the CAMU was sparser than that on the soil cover areas. Three pictures were taken, one showing the central area (facing east, SWMU 12/15a), one showing the northern area (facing northeast, SWMU 12/15b), and one showing the CAMU (facing west, CAMU).





7. On June 5 the team interviewed Dave Imlay, the water treatment plant operator. He works for MWH. During the non-operational test he is the only employee needed at the plant. Now that the plant is no longer operated his primary focus is on maintenance and repair. Mr. Imlay described the condition of the plant as needing repair; however this is expected given the age of the equipment. He also explained that the transfer from the previous contractor did not go as smoothly as it might have done. As a result, some of the plant operational and maintenance records are no longer readily available. These need to be reassembled at the plant if it is to be put back into normal operation. He recommended that certain features be upgraded if the system is made operational again. The most serious maintenance issues involve corrosion of the injection wells and the worn-out nature of the plant water pumps, which are no longer made (therefore repair parts are problematical). He provided the following O&M cost information:

- FY02 - \$816,540 total
- FY03 - \$617,321 total
- FY04 - \$53,311 total (much reduced operation)
- FY05 – \$53,311 total
- FY06 – \$53,311 total
- injection well pipe repairs - \$72,427, cathodic protection for well I-7 - \$31,072, in plant pump repairs - \$25,000. He stated that these costs were all included in the above figures but I question this.

Additional information is available in the attached interview report (see attached).

8. The June 5 site visits included:

SWMU 2, Industrial Waste Lagoon. The remedy at the lagoon involved consolidating contaminated soil from inflow channels, and installation of a RCRA cap and fence. A pump and treat system was installed to address contaminated groundwater. The pump and treat system is shut down while the “non-operational” test is conducted. The entire

site is surrounded by fences and signs are present. There is no evidence of unauthorized use. Two pictures were taken, one showing the IWL (facing southwest, SWMU 2a) and one of the treatment plant and surrounding area (facing northwest, SWMU 2b).



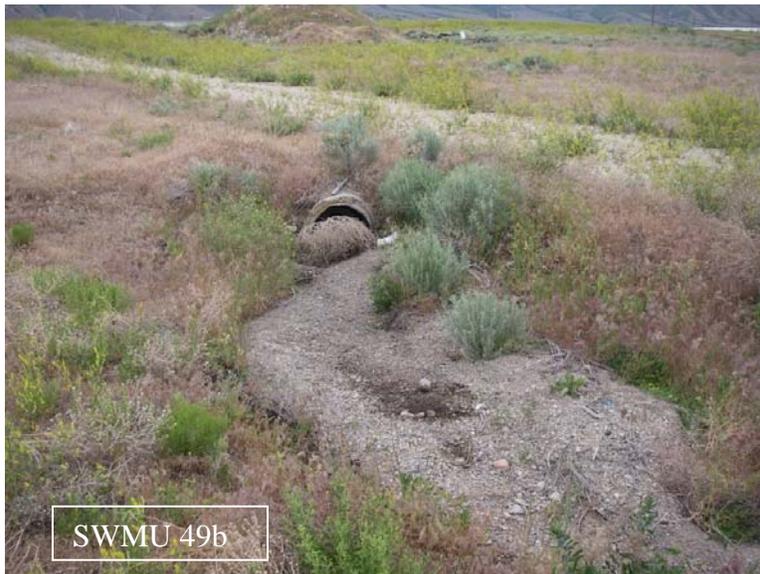
SWMU 30, Old Industrial Waste Lagoon. The summary table indicated that no action was necessary at this site for the basins and spreading areas. The ditches were excavated and backfilled, material consolidated into one ditch, and clay capped. Research the possibility that institutional controls may have been established. There was no evidence of unauthorized use. One picture was taken facing northwest.



SWMU 32, PCB Spill Site. There may have been a soil removal conducted. The ROD indicates that no further action is necessary. Mr. McFarland confirmed that institutional controls will be implemented as recommended in the first Five-Year Review. One picture was taken, facing northeast.



SWMU 49, Storm Water/Industrial Waste Water Piping System. The remedy included excavation and off-post disposal at G Avenue and ICs at all locations (except Bldg 609). No evidence of unauthorized use. Two pictures were taken, one broad view of the area (looking east, SWMU 49a) and one looking southeast at the culvert (SWMU 49b).



SWMU 31, Former Transformer Boxing Area. Institutional controls were the remedy for this site and there was no evidence of unauthorized use. Area is north of building 670. One picture was taken, facing northeast.



SWMU 26, Defense Reutilization and Marketing Office (DRMO) Storage yard. Institutional controls were the remedy for this site and there was no evidence of unauthorized use. Three pictures were taken, one facing southeast (SWMU 26a), one facing northeast (SWMU 26b) and one facing southwest (SWMU 26c).





SWMU 56, Gravel Pit Disposal Area. There is both a fence and sign. Excavation and off-post disposal is planned for this site. An addendum was prepared requesting a change from residential clean-up goals to industrial. This change was requested because the volume of contaminated soil was much larger than originally anticipated. There has been an interim removal action at this site. One picture was taken, facing northwest.



SWMU 46, Used Oil Dumpsters. Buildings 522, 602, 619, and 611. The remedy was excavation and off-site disposal for all but Building 611. Institutional controls established for this last building and there is no evidence of unauthorized use. One picture was taken, facing north.



SWMU 50, Compressor Condensate Drains. Institutional controls were the remedy for this site and there was no evidence of unauthorized use. One picture was taken at Building 603, facing southeast.



SWMU 54, Sandblast Areas (Bldg 604, 611, and 637). The remedy included excavation and off-site disposal at Building 611. There was no action at Building 604. Institutional controls were established for Buildings 611 and 637 and there was no evidence of unauthorized use. One picture was taken at Building 611, facing south.



SWMU 47, Boiler Blowdown. A sign is present. No action was necessary at this site. One picture was taken on the northwest side of building 610, facing south.



SWMU 51, Chromic Acid/Alodine Drying Beds. A fence is present. Institutional controls were the remedy for this site and there was no evidence of unauthorized use. One picture was taken, facing northwest.



SWMU 29, Drum Storage Area. Building 576. A fence is present. Institutional controls were the remedy for this site and there was no evidence of unauthorized use. One picture was taken facing south.



SWMU 35, Wastewater Spreading Area. Institutional controls were the remedy for this site and there was no evidence of unauthorized use. One picture was taken facing south.



9. Final interview with Mr. McFarland. Prior to departing, the team met with Mr. McFarland to clarify a number of issues. The following sites have been recently visited by Mr. McFarland and no issues were noted:

- SWMU 9, Drum Radioactive Waste Area
- SWMU 14, Sewage Lagoons
- SWMU 17, Former Transformer Storage Area
- SWMU 18, Radioactive Waste Storage Building
- SWMU 25, Battery Shop
- SWMU 27, RCRA Container Storage Facility (Bldg 528)

SWMU 28, 90-Day Drum Storage Area  
SWMU 33, PCB Storage Bldg  
SWMU 38, Industrial Wastewater Treatment Plant (IWTP)  
SWMU 39, Solvent Recovery Facility  
SWMU 43, Container Storage for P999 Wastes  
SWMU 44, Tank Storage of TCE (Bldg 620)  
SWMU 53, PCB Storage and Spill Sites  
SWMU 55, Battery Shop (Building 618)

Mr. McFarland confirmed that the SWMU 5 remedy has been changed to add an institutional control, as recommended in the first Five-Year Review. The Chemical Range (SWMU 7) is part of OU9. The SWMU 17 remedy now includes institutional controls, following the last Five-Year Review. He confirmed that excavation and off-post disposal is planned for SWMU 23, this is the only OU9 site with remedial action, the others have only institutional controls. SWMU 27, RCRA Container Storage Facility is currently used for a permitted hazardous waste storage facility. SWMU 33 was closed under TOSCA. Mr. McFarland provided the team with copies of the remedial design plans for institutional controls for OU4, Site 31, OU5, Site 17, OU7, Site 5, and OU8.

10. I can be reached at 916.557.6649.

Bradley A. Call, P.E.  
Senior Environmental Engineer  
Environmental Engineering Section

**ATTACHMENT 4**  
**INTERVIEW FORMS**

## INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

<u>Larry McFarland</u> Name	<u>Environmental Protection Specialist</u> Title/Position	<u>Tooele Army Depot</u> Organization	<u>June 4, 2007</u> Date
<u>Dave Imlay</u> Name	<u>O&amp;M Supervisor</u> Title/Position	<u>MWH</u> Organization	<u>June 5, 2007</u> Date
<u>Helge Gabert</u> Name	<u>Hydrogeologist/RPM</u> Title/Position	<u>Utah DEQ</u> Organization	<u>June 11, 2007</u> Date
<u>Rik Ombach</u> Name	<u>Environmental Scientist/RPM.</u> Title/Position	<u>Utah DEQ</u> Organization	<u>June 12, 2007</u> Date
<u>James Kiefer</u> Name	<u>RPM</u> Title/Position	<u>US EPA</u> Organization	<u>June 12, 2007</u> Date
<u>Harry Shinton</u> Name	<u>RAB Member</u> Title/Position	<u>RAB</u> Organization	<u>June 14, 2007</u> Date
<u>Jeff Combs</u> Name	<u>Environmental Health Director</u> Title/Position	<u>County Health Dept</u> Organization	<u>June 25, 2007</u> Date
<u>Jessie Sablan</u> Name	<u>Project Manager</u> Title/Position	<u>Utah Industrial Development</u> Organization	<u>June 25, 2007</u> Date

## INTERVIEW RECORD

<b>Site Name:</b> Tooele Army Depot		<b>EPA ID No.:</b> UT3213820894	
<b>Subject:</b> 5-yr review		<b>Time:</b> 0700	<b>Date:</b> Jun 4, 07
<b>Type:</b> Telephone <u>Visit</u> Other		Incoming      Outgoing	
<b>Location of Visit:</b> Tooele Army Depot			

### Contact Made By:

<b>Name:</b> Brad Call	<b>Title:</b> Sr. Environmental. Engineer	<b>Organization:</b> USACE
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### Individual Contacted:

<b>Name:</b> Larry McFarland	<b>Title:</b> Envir Protection Specialist	<b>Organization:</b> Tooele Army Depot
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<b>Telephone No:</b> (435) 833-3235	<b>Street Address:</b> Attn: SMATE-CS-EO, Bldg 8 <b>City, State, Zip:</b> Tooele Army Depot, UT 84074
<b>Fax No:</b> NA	
<b>E-Mail Address:</b> mcfarlal@emh2.tooele.army.mil	

### Summary Of Conversation

Mr. McFarland has been managing the environmental restoration of Tooele Army Depot since 1996. He was the principal author of the previous Five-Year Review and is very familiar with the overall program. There are a total of 57 Solid Waste Management Units (SWMUs) in both the RCRA and CERCLA programs at the depot. Many have records of decisions in place, but major decisions have yet to be made regarding groundwater contamination (SWMU 2 and 58).

The only off-depot impacts involve contaminated groundwater. The on-depot contaminated groundwater remedy involves a pump and treat system that has been put into a non-operational status to evaluate the overall effectiveness and to better understand contaminant transport. He is not aware of any community concerns regarding ongoing restoration activities at the depot. Given the high level of security at the site there is generally no problems with vandalism, however he did remember an incident years ago when aluminum injection well covers were stolen prior to installation of locking mechanisms and fences. There have been no changes in land use or zoning. Many of the sites involve the use of institutional controls, and a comprehensive plan is in place to ensure compliance. He feels that overall that all the remedies are working as intended. Mr. McFarland indicated that the evaluation of the SWMU 2 non-operation test data suggests that the pump and treat system may not be effectively treating the contamination. Ongoing pilot-scale composting testing at SWMU 10 has not yet identified the optimum amendment to achieve the required degree of explosive contaminant degradation in the desired time interval.

Mr. McFarland was asked for his general response to the three questions used to determine if a remedy is protective:

Question A. Are the remedies functioning as intended? Answer: Yes.

Question B. Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the site at the time of remedy selection still valid? Answer: Yes.

Question C. Has any other information come to light that could call into question the protectiveness of the remedies? Answer: No.

continued on the next page

Interview with Mr. Larry McFarland, continued.

Mr. McFarland has not noted any unexpected and significant changes to O&M costs at any of the remedies. The SWMU 2 O&M costs are much reduced, however this is expected given that the system is in a caretaker status during completion of the non-operational test. Ongoing maintenance at SWMU 2 has identified corrosion of the injection wells. Cathodic protection has already been installed on the extraction wells. Some of the injection well piping is also scheduled for replacement.

He indicated that there have been no changes to State of Utah MCLs in the past five years and he is not aware of any changes to exposure routes, chemical toxicity, or ARARs. The State and the depot have periodically discussed several chemicals often identified as “emerging contaminants.” None of the emerging contaminants have been found at concentrations that would alter earlier evaluations and decisions. Mr. McFarland noted that he had worked with the State to change the SWMU 56 clean-up levels to an industrial scenario (consistent with the land use) instead of residential, because it would be very costly to achieve the lower standard.

Investigations and evaluation is ongoing for off-depot groundwater contamination (part of SWMU 58). One significant issue that has emerged is in regards to property rights. Property development is occurring in the area overlying the groundwater contamination and this has complicated the acquisition of easements and rights of entry that are necessary for the installation of monitoring wells. This may have implications for the yet to be determined off-depot remedy.

When looking at the overall project he feels the team is moving in the correct direction and has made significant progress. Mr. McFarland believes that the emphasis in the coming years will be reaching agreement regarding the groundwater remedy, both on and off-post. Results received to date on the SWMU 2 non-operational test suggest that groundwater pump and treat systems will be of limited effectiveness and other solutions will have to be considered.

## INTERVIEW RECORD

<b>Site Name:</b> Tooele Army Depot		<b>EPA ID No.:</b> UT3213820894	
<b>Subject:</b> 5-yr review		<b>Time:</b> 0730	<b>Date:</b> June 5, 07
<b>Type:</b> Telephone <u>Visit</u> Other		Incoming    Outgoing	
<b>Location of Visit:</b> Tooele Army Depot			
<b>Contact Made By:</b>			
<b>Name:</b> Brad Call	<b>Title:</b> Sr. Environmental Engineer	<b>Organization:</b> USACE	
<b>Individual Contacted:</b>			
<b>Name:</b> Dave Imlay	<b>Title:</b> O&M Supervisor	<b>Organization:</b> MWH	
<b>Telephone No:</b> (801) 557-3501 (cell)		<b>Street Address:</b> 10619 South Jordan Gateway, St 100	
<b>Fax No:</b> NA		<b>City, State, Zip:</b> Salt Lake City, UT 84095	
<b>E-Mail Address:</b> david.j.imlay@mwhglobal.com			
<b>Summary Of Conversation</b>			
<p>Mr. Imlay, the O&amp;M Supervisor, is the operator of the SWMU 2 water treatment plant. MWH received the contract for this work approximately 3 years ago. The plant is currently not operated and is in caretaker status. The Army has been conducting a non-operational test of the SWMU 2 remedy for approximately 3 years. Initially the plant was operated periodically, but this stopped last year. As a result, Mr. Imlay is the only worker at the plant.</p> <p>Mr. Imlay inspects the plant, wells, piping, controls, and related items. He documents those items needing maintenance and works with Tooele Army Depot to prioritize the repair work. The system is now approximately 15 years old. Despite the ongoing maintenance, many components of the overall system will require repair, replacement, or upgrading if a decision is made to resume pump and treat operations. For example, the water pumps in the plant are worn-out and are no longer produced. Therefore each repair requires expensive custom fabrication. The VFDs are also getting old and need replacement. Some valves have become non-operational over the years and will have to be replaced. The air stripper media have also reached the end of their useful life.</p> <p>The transition between MWH and the previous plant operator was not as trouble free as desired. As a result, a number of plant operation procedural documents will have to be replaced. He is currently writing the plant drain plan. Mr. Imlay also noted that the plant is essentially run manually, and the addition of some degree of remote control will greatly facilitate effective operation of the plant.</p> <p>There have been no security problems or vandalism. Grazing cattle may occasionally cause minor damage to equipment. The electrical supply lines sporadically fail and Mr. Imlay indicates that there are also voltage fluctuations. Birds have caused power line short circuits (on the power poles) which also disrupts the power supply.</p> <p>Approximately five years ago corrosion problems were noted in the extraction wells. Cathodic protection has been installed. Recently corrosion problems were also found in the injection wells and they will require repair and protection if they are to be returned to service.</p>			

## INTERVIEW RECORD

<b>Site Name:</b> Tooele Army Depot	<b>EPA ID No.:</b> UT3213820894	
<b>Subject:</b> 5-yr review	<b>Time:</b> 1500	<b>Date:</b> Jun 11, 07
<b>Type:</b> <u>Telephone</u> Visit       Other	Incoming     Outgoing	
<b>Location of Visit:</b>		

### Contact Made By:

<b>Name:</b> Brad Call	<b>Title:</b> Sr. Environmental Engineer	<b>Organization:</b> USACE
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### Individual Contacted:

<b>Name:</b> Helge Gabert	<b>Title:</b> Hydrogeologist/RPM	<b>Organization:</b> Utah DEQ
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<b>Telephone No:</b> (801) 538-6001	<b>Street Address:</b> 288 North, 1460 West
<b>Fax No:</b> NA	
<b>E-Mail Address:</b> HGABERT@utah.gov	
<b>City, State, Zip:</b> Salt Lake City, UT 84114	

### Summary Of Conversation

Mr. Gabert is a hydrogeologist and oversees the RCRA sites as a member of the Utah Department of Environmental Quality. He has been involved with the project since 1995. Overall he feels that the environmental restoration project is going well and Tooele Army Depot is making a good effort. Mr. Gabert indicates that the project has affected the surrounding community. The North East Boundary groundwater plume has impacted the Bolinger wells. This resulted in a law suit. In addition there have been access issues for installing groundwater wells off depot. The North East Boundary groundwater plume may also impact the construction of the mid-valley highway. Community concerns have largely involved the groundwater impacted by the North East Boundary plume. Landowners would like to use the groundwater and have posed hypothetical questions regarding well head treatment. There have also been concerns regarding open burning/open detonation of ordnance. Mr. Gabert is not aware of any vandalism or trespassing. He feels well informed about the site's activities and progress, Mr. McFarland does a good job of keeping him informed of all events. The RAB meetings have been a good forum to keep the lines of communication open.

Mr. Gabert indicated that the site is generally well managed. One recent problem that has arisen involves the failure to update a database used to compute the statistics for the Non-Operational Test results. Apparently the most recent results were compared to the old data pool. It is not clear at this point what to do about this oversight. He is not aware of any changes to land use or zoning. One change that he recalls involves SWMU 56. The Army asked to change from residential cleanup goals to industrial goals. The institutional controls are all under control of the Army who is doing a good job of overseeing them.

Mr. Gabert feels that in general the remedies are performing well. Most of the SWMUs were addressed with dig-and-haul. It is too early to tell if the SWMU 10 compositing approach will work. The cap and fence at SWMU 2 (IWL) seems to be performing well. The on post groundwater contamination appears to be stable even without active pumping. No remedy has yet been established for the North East Boundary plume, but it also appears to be either stable or slowly expanding. This plume has not yet threatened Erda or Grantsville. He is not aware of any changes to clean-up levels or ARARs. He is monitoring the progress of the EPA TCE study. This study could result in a 10 fold decrease in the MCL, and this would have an impact on the operations at the depot and for sites located above the North East Boundary plume.

## INTERVIEW RECORD

<b>Site Name:</b> Tooele Army Depot		<b>EPA ID No.:</b> UT3213820894	
<b>Subject:</b> 5-yr review		<b>Time:</b> 1400	<b>Date:</b> Jun 12, 07
<b>Type:</b> <u>Telephone</u> Visit        Other <b>Location of Visit:</b>		Incoming	Outgoing
<b>Contact Made By:</b>			
<b>Name:</b> Brad Call	<b>Title:</b> Sr. Environmental Engineer	<b>Organization:</b> USACE	
<b>Individual Contacted:</b>			
<b>Name:</b> Rik Ombach	<b>Title:</b> Envir Scientist/RPM	<b>Organization:</b> Utah DEQ	
<b>Telephone No:</b> (801) 536-4164 <b>Fax No:</b> NA <b>E-Mail Address:</b> rombach@utah.gov		<b>Street Address:</b> 168 North, 1950 West <b>City, State, Zip:</b> Salt Lake City, UT 84114	
<b>Summary Of Conversation</b>			
<p>Mr. Ombach is an environmental scientist and oversees the CERCLA sites as a member of the Utah Department of Environmental Quality. He has been involved with the project since 1999. Overall he feels pretty good about the progress at Tooele Army Depot. The work has been going rather slowly, but that is the nature of this type of site. He is not aware of any adverse effects to the surrounding community. In addition he is not aware of any community concerns regarding the clean-up operations. The CERCLA sites are quite neutral in regards to their impacts on the community. No vandalism has occurred and he is not aware of any emergency responses from local authorities. He feels well informed about the program activities. Tooele Army Depot does a good job of communication despite the diverse nature of the program. Mr. Ombach does not have any recommendations regarding the site's operations. He is not aware of any changes in land use, zoning, clean-up levels, or ARARs that might cause a reevaluation of any of the remedies.</p>			

## INTERVIEW RECORD

<b>Site Name:</b> Tooele Army Depot		<b>EPA ID No.:</b> UT3213820894	
<b>Subject:</b> 5-yr review		<b>Time:</b>	<b>Date:</b>
<b>Type:</b> <u>Telephone</u> Visit       Other		Incoming     Outgoing	
<b>Location of Visit:</b>			
<b>Contact Made By:</b>			
<b>Name:</b> Cory Koger		<b>Title:</b> Toxicologist	<b>Organization:</b> USACE
<b>Individual Contacted:</b>			
<b>Name:</b> James Kiefer		<b>Title:</b> Remedial Project Manager	<b>Organization:</b> US EPA
<b>Telephone No:</b> (303) 312-6907		<b>Street Address:</b>	
<b>Fax No:</b>		<b>City, State, Zip:</b>	
<b>E-Mail Address:</b>			
<b>Summary Of Conversation</b>			
<p>Mr. James Kiefer is with the United States Environmental Protection Agency, Region 8. Mr. Kiefer has been the Regional Project Manager for Tooele Army Depot (TEAD) since 2000, and has been involved in the BRAC property since 1994. Mr. Kiefer was involved in the last 5-year review at TEAD.</p> <p>In general, Mr. Kiefer feels that the overall remediation is going pretty well regarding site soils, but the groundwater remediation, for both the main and northeast boundary plumes, is the greatest concern. He feels that the community is generally positive regarding the depot and that the public is well informed regarding current and future activities. To his knowledge, the northeast boundary plume is impacting the community due to property development and real estate issues. Mr. Kiefer also stated that open burn/open detonation may be a future concern for the surrounding community. He feels these concerns are shared by the community of Tooele.</p> <p>Mr. Kiefer is unaware of any vandalism or emergency responses related to remedial activities. He feels he is well informed through the RAB and via conference calls with Larry McFarland, and has a good working relationship with the Depot and surrounding community.</p> <p>Mr. Kiefer expressed concern over the direction of groundwater remediation, especially the pump-and-treat system shutdown, and is awaiting recommendations in the SWMU 58 RCRA corrective measures study. Other concerns are changes to the toxicity criterion for trichloroethylene, and the impact emerging contaminants (e.g. perchlorate, 1,4-dioxane) might have on future activities.</p>			

## INTERVIEW RECORD

<b>Site Name:</b> Tooele Army Depot	<b>EPA ID No.:</b> UT3213820894	
<b>Subject:</b> 5-yr review	<b>Time:</b>	<b>Date:</b> Jun 14, 07
<b>Type:</b> <u>Telephone</u> Visit      Other	Incoming      Outgoing	
<b>Location of Visit:</b>		

### Contact Made By:

<b>Name:</b> Cory Koger	<b>Title:</b> Toxicologist	<b>Organization:</b> USACE
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### Individual Contacted:

<b>Name:</b> Harry Shinton	<b>Title:</b> RAB Member	<b>Organization:</b> RAB
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<b>Telephone No:</b> 435-882-5600	<b>Street Address:</b> <b>City, State, Zip:</b>
<b>Fax No:</b>	
<b>E-Mail Address:</b>	

### Summary Of Conversation

Mr. Harry Shinton works for the Tooele County Sheriff's Hazmat office. He has elected to serve on the Tooele Army Depot Restoration Advisory Board (RAB) as a member of the public. Mr. Shinton also serves on the RAB for Dugway Proving Ground and Deseret Chemical Depot.

In general, Mr. Shinton felt that he was well informed about remedial activities at TEAD, and that the community is also kept informed since the media are members of the RAB. As a resident, he feels that the community is generally positive regarding the depot and that remedial activities "are not news anymore". He is unaware of any vandalism or emergency responses in relation to remedial actions at TEAD. Mr. Shinton expressed concerns regarding impacts from site activities to the surrounding community, including:

Lack of remedial measures currently in place after groundwater treatment system shut-down. His impression is that the Depot would remediate the aquifer pre-DoD condition. He feels a remedy should be in place.

Impacts to the surrounding community because the depot is on a 4-10 work schedule and is closed every Friday. This could impact work progress from local businesses involved with remedial actions.

Offsite impacts due to aquifer contamination, such as cattle watering or installation of wells.

Mr. Shinton expressed concern over the time it takes to perform remedial actions when compared to other RABs of which he is a member.

## INTERVIEW RECORD

<b>Site Name:</b> Tooele Army Depot	<b>EPA ID No.:</b> UT3213820894	
<b>Subject:</b> 5-yr review	<b>Time:</b>	<b>Date:</b> Jun 25, 07
<b>Type:</b> <u>Telephone</u> Visit      Other	<b>Location of Visit:</b> Incoming      Outgoing	

### Contact Made By:

<b>Name:</b> Cory Koger	<b>Title:</b> Toxicologist	<b>Organization:</b> USACE
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### Individual Contacted:

<b>Name:</b> Jeff Coombs	<b>Title:</b> Environmental Health Director	<b>Organization:</b> Tooele County Health Department
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<b>Telephone No.:</b> (435) 843-2340	<b>Street Address:</b> <b>City, State, Zip:</b>
<b>Fax No.:</b>	
<b>E-Mail Address:</b>	

### Summary Of Conversation

Mr. Jeff Coombs is the Environmental Health Director for the Tooele County Health Department. Mr. Coombs is a member of the Tooele Army Depot (TEAD) RAB.

Mr. Coombs feels that the remedial program at TEAD is comprehensive in varying stages, and that everything that has been addressed thus far has been done well. He stated the only impact to the surrounding community is by the trichloroethylene contamination in groundwater.

Mr. Coombs is unaware of any vandalism or community concerns regarding the site operation or administration. He feels he is well informed through the RAB and has a good working relationship with the Depot and surrounding community. Any questions he has had have been answered quickly by Depot personnel.

Mr. Coombs thinks the Depot is doing a good job and had no suggestions for changes to the program.

## INTERVIEW RECORD

<b>Site Name:</b> Tooele Army Depot	<b>EPA ID No.:</b> UT3213820894	
<b>Subject:</b> 5-yr review	<b>Time:</b>	<b>Date:</b> Jun 25, 07
<b>Type:</b> <u>Telephone</u> Visit     Other	Incoming     Outgoing	
<b>Location of Visit:</b>		

### Contact Made By:

<b>Name:</b> Cory Koger	<b>Title:</b> Toxicologist	<b>Organization:</b> USACE
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### Individual Contacted:

<b>Name:</b> Jesse Sablan	<b>Title:</b> Project Manager	<b>Organization:</b> Utah Industrial Depot
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<b>Telephone No:</b> (435) 843-4500	<b>Street Address:</b>
<b>Fax No:</b>	
<b>E-Mail Address:</b>	
<b>City, State, Zip:</b>	

### Summary Of Conversation

Mr. Jesse Sablan is the Project Manager for the Utah Industrial Depot (UID). Mr. Sablan has been involved with UID since 1999. He is a member of the Tooele Army Depot (TEAD) RAB.

In general, Mr. Sablan feels that he is well informed and has been invited and included in the RAB meetings. He has a positive view of the project and feels the surrounding community has the same view. He stated there were some concerns raised early on about the direction of remedial activities, but that the only issue currently is the groundwater treatment of trichloroethylene.

Mr. Sablan stated that some vandalism of buildings by trespassers has occurred on UID property, but is unaware of other incidents. He feels he is well informed through the RAB and has a good working relationship with the Depot and surrounding community. Any questions he has had have been answered quickly by Depot personnel.

Mr. Sablan is happy with the progress and suggests keeping the lines of communication between the Depot and the community open.

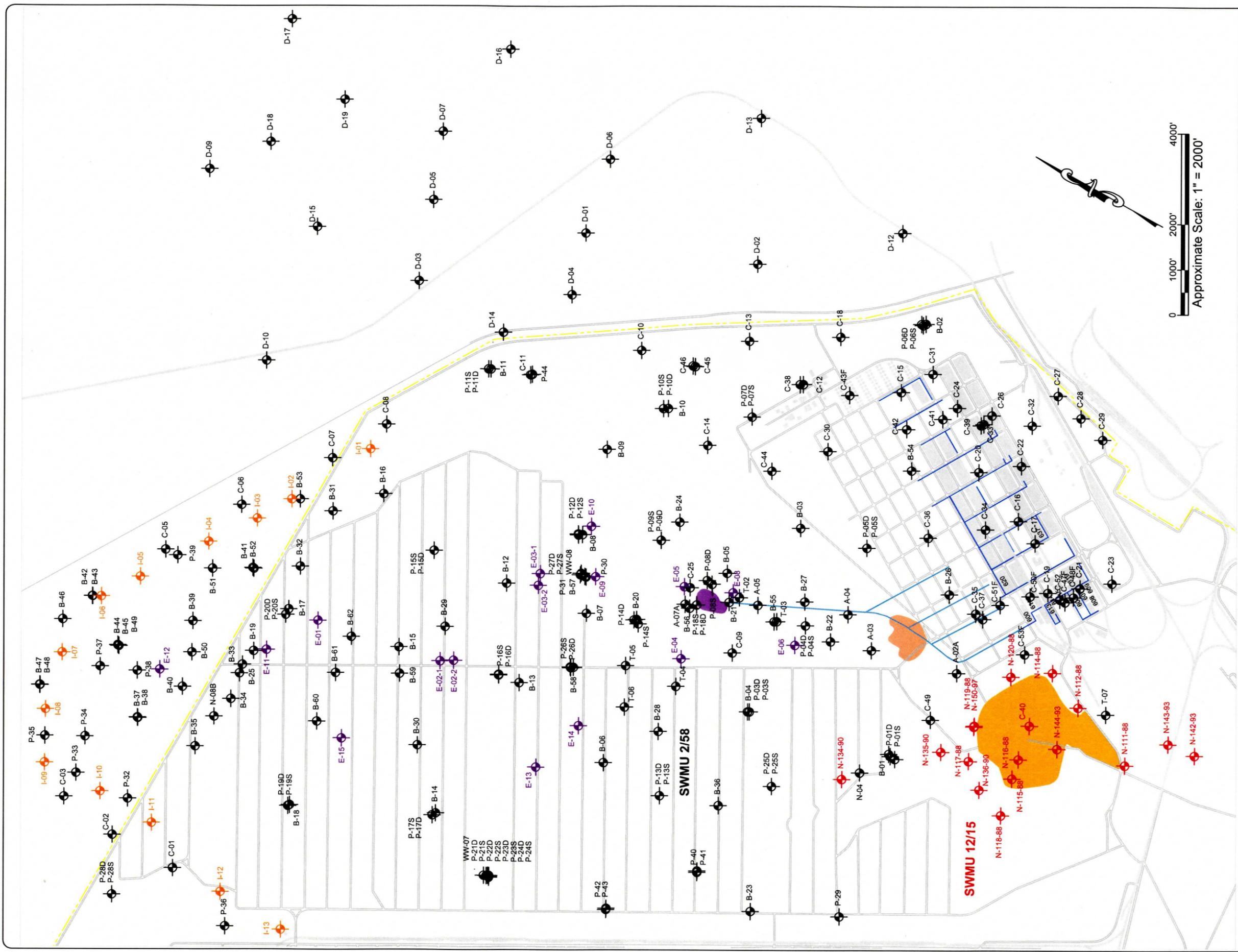
**ATTACHMENT 5**  
**MASTER SITE TABLE**

SWMU	Description	Building(s)	Operable Unit (CERCLA)	Corrective Action Group (RCRA)	Selected Remedy	Remedial Action Comp Date (YYYY/MM)	Site Status – Ongoing Activities – Defining document(s)
12/15	Pesticide Disposal Area/ Sanitary Landfill			Known Releases	COV - Consolidation of surface debris, soil cover, Land use restriction, cover inspection and maintenance.	2006/12	Construction complete October 2005. Ongoing site inspections to evaluate erosion of soil cover, security fence, vegetative cover.
1b	Burn Pad			A	IC - Land use restrictions to prevent residential use	2001/06	Site inspected twice per year for appropriate land use. Site management plan pending.
1c	Trash burn Pits			A	IC - Land use restrictions to prevent residential use	2001/06	Site inspected twice per year for appropriate land use. Site management plan pending.
1	Main Demolition Area			A	None		Currently operational under RCRA Part B Permit. RCRA closure under that framework when operations cease.
1d	Propellant Burn pits			A	None		Currently operational under RCRA Part B Permit. RCRA closure under that framework when operations cease.
2	Industrial Waste Lagoon (IWL)			Known Releases	EX - Excavate soils in trenches and dispose to lagoon. RCRA cap over lagoon. Extraction, treatment, and re-injection of contaminated groundwater.	1993	Alternative measures study begun in 2004. Groundwater pump-and-treat has been non-operational since Aug. 2004. Effect on TCE plume as a result of non-operation is being monitored. To date there is minimal evidence to suggest plume expansion. The groundwater action is being revisited in the SWMU 58 Corrective Measures Study, which will result in a Depot-wide approach to groundwater plume corrective action. An inspection and maintenance program is in place for the cap.
3	X-Ray Lagoon			Known Releases	M - Monitor groundwater, abandon unused wells, land use restrictions to prevent residential use.	2005/01	Chromium concentrations in groundwater samples found to be a result of well screen corrosion. Wells have been abandoned. One PVC well left in place for water level measurements. Site now requires only land use restrictions.
4	Sandblast Areas (Bldgs 600, 615, 617)	600, 615, 617, 617a		B	IC - Deed restrictions to prevent residential use	2001/02	Site inspected twice per year for appropriate land use. Site management plan completed.
5	Pole Transformer PCB Spill	Pole 184	7		EX - Excavate, backfill, cap with soil and gravel layers. Land use controls.	1996/05 (close-out report)	Site inspected once per year to verify that cover is not compromised. The land use control was added post-ROD as a recommendation in the first five year review.
6	Old Burn Area		8		EX - Excavation and stabilization of lead contaminated soil followed by onsite management in CAMU. Excavation and offsite disposal of explosive contaminated soil. Land use controls.	Construction pending	Partial completion for explosives soil completed in Dec. 2004. Stabilization process found to be impracticable for lead contaminated soil due to excessive debris. Stabilization portion re-evaluated. Revised approach approved Jan. 2007. Implement treatability study for new process Summer 2007
7	Chemical Range		9		IC - Land use controls to prevent residential use. ROD pending		An interim action included trenching, a soil scrape, and removal of UXO. Site inspected once per year for appropriate land use.
8	Small Arms Firing Range		8		EX - Excavation and stabilization of lead contaminated soil, followed by onsite management in CAMU. Land use controls.	Report approval pending	Construction complete December 2004. Site inspected once per year for appropriate land use.
9	Drummed Radioactive Waste Area		6		No Further Remedial Action Planned	1994/09	
10	TNT Washout Facility			Known Releases	EX - Excavation, composting, backfilling, and groundwater monitoring	Construction pending	Final WP approved Nov. 2006. Treatability study underway. Field work scheduled Spring 2007
11	Laundry Effluent Pond			Known Releases	EX - Excavation and off-post disposal, and land use restrictions to prevent residential use	2003/10	Army to submit D-F CMCR to regulators Spring 2007 Site inspected twice per year for appropriate land use. Site management plan pending.
13	Tire Disposal Area		8		IC - Land use controls	2004/03	The tires had been removed from this site prior to remedy selection. Site inspected once per year for appropriate land use.
14	Sewage Lagoons				No action necessary based on RFI results.		
16	Not Used						
17	Former Transformer Storage Area	Open storage lot 675B	5		IC - Land Use Controls (as recommended in previous 5-year review).	1994/09	Site inspected twice per year for appropriate land use. Site management plan pending.
18	Radioactive Waste Storage Building	659S listed as the north end	6		No Further Remedial Action Planned under CERCLA. Closed under NRC	1994/09	To be closed under NRC authority.
19	AED Demilitarization Test Facility			B	IC - Land use restrictions to prevent residential use	2001/02	Site inspected twice per year for appropriate land use. Site management plan pending.
20	AED Deactivation Furnace Site			A	COC - Asphalt cover and land use restrictions to prevent residential Use	2007/01	Site cover complete June 2004. Site inspected twice per year for appropriate land use. Site management plan pending.

SWMU	Description	Building(s)	Operable Unit (CERCLA)	Corrective Action Group (RCRA)	Selected Remedy	Remedial Action Comp Date (YYYY/MM)	Site Status – Ongoing Activities – Defining document(s)
21	Ammunition Deactivation Furnace Building	1320		A	COV - Asphalt cover and land use restrictions to prevent residential Use	2007/03	Asphalt cover complete June 2004. Site inspected twice per year for appropriate land use. Site management plan pending.
22	Building 1303 Washout Pond	1303	8		IC - Land use Controls	2004/03	Excavation of explosives stained soil performed before remedy selection. Site inspected once per year for appropriate land use.
23	Bomb and Shell Reconditioning Building	1345	9		EX - Excavation and off-post disposal. Land use restrictions to prevent residential use. ROD pending	Construction pending	Field activities scheduled summer/fall 2007
24	Battery Pit	Engineering Equipment and Repair Shop (507)		Known Releases	No action necessary based on RFI results.		A removal was performed after initial investigation. Documented in a May 1996 Report.
25	Battery Shop (Bldg 1252)	1252		Known Releases	EX - Excavation and off-post disposal, and land use restrictions to prevent residential use	2007/04	Construction complete October 3003. Site inspected twice per year for appropriate land use. Site management plan pending.
26	Defense Reutilization and Marketing Office (DRMO) Storage yard			B	IC - Deed Restrictions to prevent residential use	2001/02	Site inspected twice per year for appropriate land use. Site management plan approved.
27	RCRA Container Storage Facility	528			No action necessary based on RFI results.		This site is currently used as a permitted Hazardous Waste storage facility.
28	90-Day Drum Storage Area				No action necessary based on RFI results.		
29	Drum Storage Area	Near 576		B	IC - Deed Restrictions to prevent residential use	2001/02	Site inspected twice per year for appropriate land use. Site management plan approved.
30	Old Industrial Waste Lagoon			Known Releases	No Action	2002/04	
31	Former Transformer Boxing Area	North of 670	4		IC - Institutional control	2003/01	Site inspected once per year for appropriate land use.
32	PCB Spill Site	Open storage lot 665D	4		No Further Remedial Action Planned	2003/01	Soil removal performed in spill response. Characterization for residual performed in RFI.
33	PCB Storage Building	659	5		No Further Remedial Action Planned (Under CERCLA) Closed under TSCA	1994/09	Closure under TSCA occurred in 1997.
34	Pesticide Handling and Storage Facility	502, 518, 532, 529		A	EX - Excavation and off-site treatment/disposal and land use restrictions to prevent residential use	2006/12	Construction complete June 2004. Site inspected twice per year for appropriate land use. Site management plan pending.
35	Wastewater Spreading Area		9		IC - Land use controls to prevent residential use. ROD pending		Site inspected once per year for appropriate land use.
36	Old Burn Staging Area		8		IC - Land use controls	2004/03	Site inspected once per year for appropriate land use.
37	Contaminated Waste Processor			A	IC - Land Use Restrictions to prevent residential Use	2001/06	Site inspected twice per year for appropriate land use. Site management plan approved.
38	Industrial Wastewater Treatment Plant (IWTP)				No action necessary based on RFI results.		
39	Solvent Recovery Facility	600C			No action necessary based on RFI results.		
40	AED Test Range		9		IC - Land use controls to prevent residential use. ROD pending		Site inspected once per year for appropriate land use.
41	Box Elder Wash Drum Site		10		M - Removal and disposal of drums and stained soils.	1996/05 (close-out report)	
42	Bomb Washout Building (Bldg 539)	539		A	EX - Excavation and consolidation of contaminated soil, soil cover, fencing, and land use restrictions to prevent residential use	2006/12	Construction complete July 2005. Site inspected twice per year for appropriate land use. Site management plan pending.
43	Container Storage for P999 Wastes	Igloos B1002, C117, G308, G1005, K202			No action necessary based on RFI results.		
44	Tank Storage of TCE	620			No action necessary based on RFI results.		
45	Storm Water Holding Pond			A	IC - Land Use Restrictions to prevent residential Use	2001/06	Site inspected twice per year for appropriate land use. Site management plan pending.
46	Used Oil Dumpsters	522, 602, 611, 619		B	EX - Excavation and off-post disposal at Buildings 522, 602, 619,611. Deed restriction at 611 to prevent residential use.	2003/07	Construction complete October 2002. Site (at 611) inspected twice per year for appropriate land use. Site management plan pending.
47	Boiler Blowdown	610, 691			No action necessary based on RFI results.		
48	Old Dispensary	400		A	IC - Land Use Restrictions to prevent residential Use	2001/06	Site inspected twice per year for appropriate land use. Site management plan pending.
49	Storm Water/Industrial Waste Water Piping System			C	EX - Excavation and off-post disposal at G Avenue outfall, and Deed restrictions at all locations (except Building 609) to prevent residential use. No action at Building 609.	2004/08	Construction complete November 2002. Site inspected twice per year for appropriate land use. Site management plan pending. Wastewater lines throughout the industrial area.

SWMU	Description	Building(s)	Operable Unit (CERCLA)	Corrective Action Group (RCRA)	Selected Remedy	Remedial Action Comp Date (YYYY/MM)	Site Status – Ongoing Activities – Defining document(s)
50	Compressor Condensate Drains	603, 613, 619		C	IC - Deed restrictions to prevent residential use	2001/06	Site inspected twice per year for appropriate land use. Site management plan pending.
51	Chromic Acid/Alodine Drying Beds	Facility 623		C	IC - Deed restrictions to prevent residential use	2001/06	Site inspected twice per year for appropriate land use. Site management plan pending.
52C	Charcoal Material Area			C	EX - Excavation and off-post disposal of charcoal material and surface soil.	2003/12	Construction complete October 2002. Site closed
52D	Horse Stable Area			C	EX - Excavation and off-post disposal	2006/12	Construction complete May 2003. Site is closed
52B	Disposal Trenches			C	IC - Deed restrictions to prevent residential use	2001/06	Site inspected twice per year for appropriate land use. Site management plan complete.
52A	Possible Drain Field			C	No action necessary based on RFI results.		
53	PCB Storage and Spill Sites	659, 679			No action necessary based on RFI results.		
54	Sandblast Areas (Bldgs 604, 611, and 637)	604, 611, 637		C	EX - Excavation, off-post treatment/disposal at Building 611. No action at Building 604. Deed restrictions to prevent residential use at 611 and 637.	2006/01	Construction complete December 2002. Site (at 611 and 637) inspected twice per year for appropriate land use. Site management plan pending.
55	Battery Shop (Bldg 618)	618		C	No action necessary based on RFI results.		
56	Gravel Pit Disposal Area			C	EX - Excavation and off-post treatment/disposal, Deed restriction to prevent residential use.	Construction pending	Revised CMS completed June 2007
57	Skeet Range			C	EX - Excavation and off-post treatment/disposal	2003/12	Construction complete October 2002. Site closed
58	Industrial Area Groundwater Sources and Northeast Boundary Plume				Not yet selected		Draft Phase II RFI Report due to the Army Fall 2007.

**ATTACHMENT 6**  
**SEMI-ANNUAL REPORT FIGURES**



### LEGEND

- DEPOT PROPERTY BOUNDARY LINE
- INDUSTRIAL WASTE LAGOON\*
- OLD INDUSTRIAL WASTE LAGOON\*
- SANITARY LANDFILL
- MONITORING WELL LOCATION FOR SWMU 12/15
- MONITORING WELL LOCATION AND PIEZOMETER FOR SWMU 2/58
- EXTRACTION WELL LOCATION
- INJECTION WELL LOCATION
- STORMWATER/INDUSTRIAL WASTEWATER PIPING\*
- UNLINED DITCHES

\*LOCATIONS ARE APPROXIMATE, BASED ON RUST, 1996

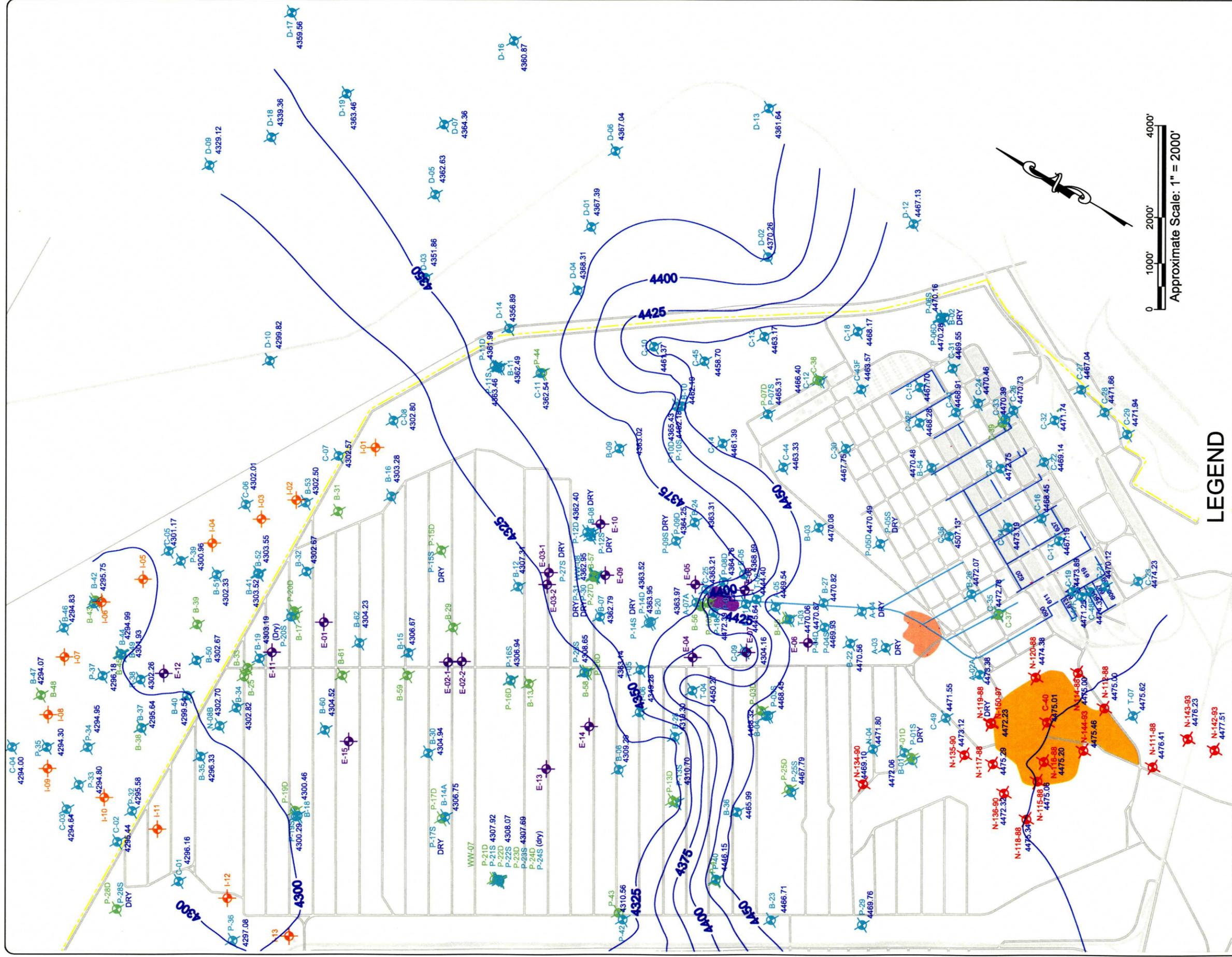


U.S. Army Corps of Engineers  
Sacramento District  
Date: 03/15/2007 Edited by: V. Brown, USACOE  
Project Number

SWMU 2/58 AND 12/15  
GROUNDWATER RESTORATION PROGRAM  
WELLS AND PIEZOMETERS - FALL 2006  
TOOLEE ARMY DEPOT  
TOOLEE, UTAH

SLC44296.dwg

FIGURE  
**3-1**



**LEGEND**

- 4390.23 SHALLOW GROUNDWATER ELEVATION (FEET MSL)
- 4390.23\* GROUNDWATER ELEVATIONS NOT USED FOR CONTOURING DUE TO PERCHED WATER TABLE OR QUESTIONABLE MEASUREMENTS
- NM NOT MEASURED OR NO MEASUREMENT
- 4390— HATCHED CONTOUR INDICATE A DEPRESSION SHALLOW WELL GROUNDWATER ELEVATION WAS USED FOR CONTOURING
- SHALLOW MONITORING WELL LOCATION FOR SWMU 12/15
- SHALLOW MONITORING WELL LOCATION FOR SWMU 2/58
- DEEP MONITORING WELL LOCATION FOR SWMU 2/58
- EXTRACTION WELLS
- INJECTION WELLS

NOTE: BASED UPON GROUNDWATER MEASUREMENTS COLLECTED OCTOBER 2006 (SEE TABLE 1-2)

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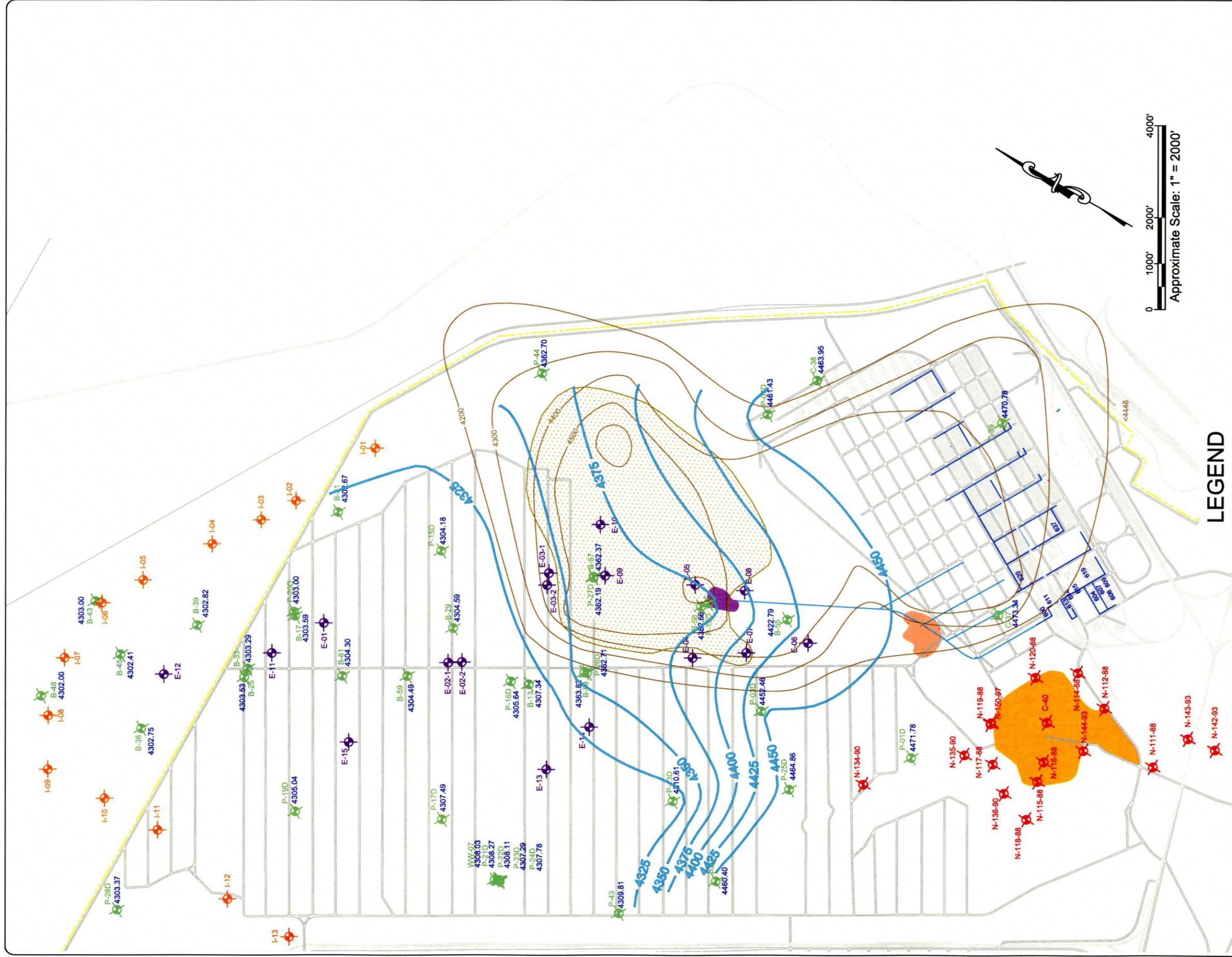


**U.S. ARMY CORP OF ENGINEERS**  
**SACRAMENTO DISTRICT**

Date: 04/09/2007 Edited by V. Brown  
 Project Number

SWMU 2/58 SHALLOW GROUNDWATER ELEVATION CONTOURS - FALL 2006  
 TOOELE ARMY DEPOT  
 TOOELE, UTAH

FIGURE  
**3-2**



### LEGEND

-  SHADED AREA INTERFACE OF BEDROCK AND TOP OF WATER TABLE
-  DEPOT PROPERTY BOUNDARY LINE
-  4390.23 DEEP GROUNDWATER ELEVATION (FEET MSL)
-  4300 BEDROCK ELEVATION CONTOUR
-  4390 DEEP GROUNDWATER ELEVATION CONTOUR
-  SHALLOW MONITORING WELL LOCATION FOR SWMU 12/15
-  DEEP MONITORING WELL LOCATION FOR SWMU 2/58
-  EXTRACTION WELLS
-  INJECTION WELLS

NOTE: BASED UPON GROUNDWATER MEASUREMENTS COLLECTED OCTOBER 2006 (SEE TABLE 1-2)

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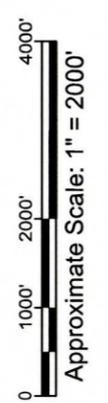
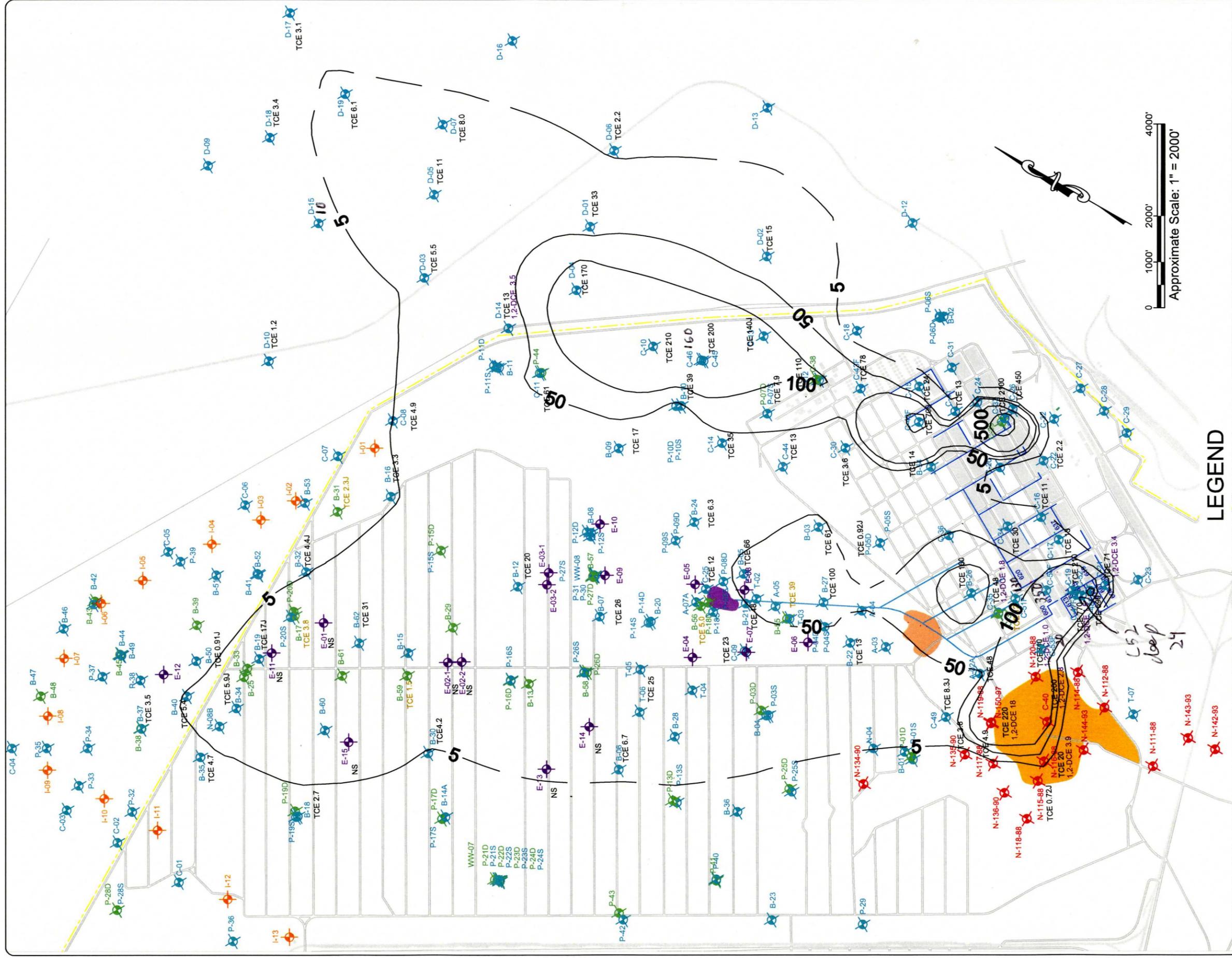


**U.S. ARMY CORP OF ENGINEERS**  
**SACRAMENTO DISTRICT**

Date: 04/09/2007 Edited by V. Brown  
 Project Number

SWMU 2/58 BEDROCK AND DEEP GROUNDWATER  
 ELEVATION CONTOURS - FALL 2006  
 TOOELE ARMY DEPOT  
 TOOELE, UTAH

FIGURE  
**3-3**



**LEGEND**

- SHALLOW MONITORING WELL LOCATION FOR SWMU 12/15
- SHALLOW MONITORING WELL LOCATION FOR SWMU 2/58
- DEEP MONITORING WELL LOCATION FOR SWMU 2/58
- EXTRACTION WELLS
- INJECTION WELLS
- TCE 7.6 SHALLOW TCE CONCENTRATIONS
- TCE 7.6 DEEP TCE CONCENTRATIONS
- 1,2-DCE 2 1,2-DCE CONCENTRATIONS
- SHALLOW TCE ISOCONCENTRATION CONTOURS ARE IN MICROGRAMS PER LITER (ug/L) (DASHED WHERE INFERRED)
- 5

DEPOT PROPERTY BOUNDARY LINE

NOTE: BASED UPON ANALYTICAL RESULTS OF SAMPLES COLLECTED OCTOBER 2006  
NO VINYL CHLORIDE DETECTED FOR FALL 2006

TCE = TRICHLOROETHENE  
1,2-DCE = 1,2-DICHLOROETHENE (TOTAL)

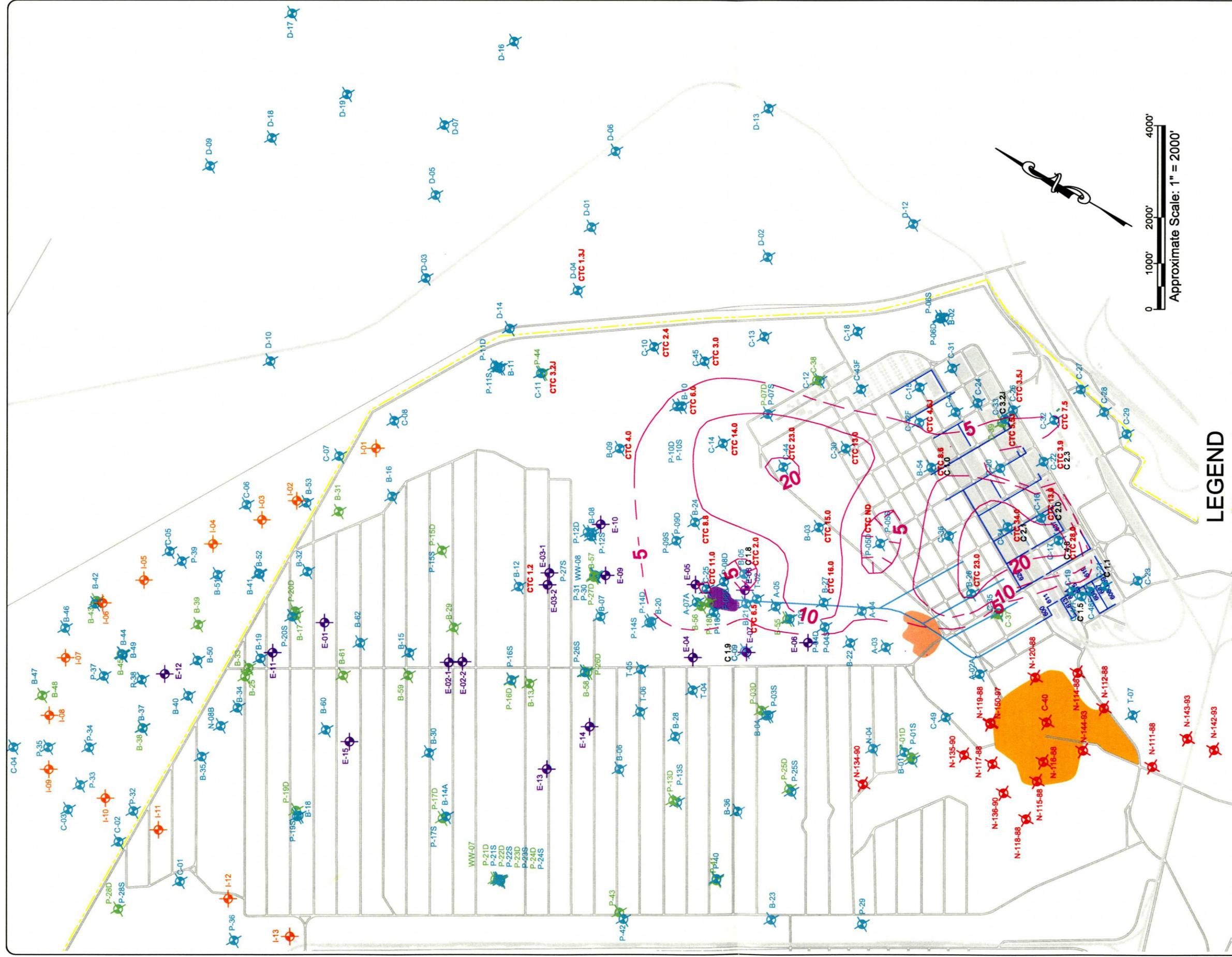
**U.S. ARMY CORP OF ENGINEERS**  
**SACRAMENTO DISTRICT**  
Date: 7/26/2007 Edited by V. Brown  
Project Number

SWMU 2/58 AND 12/15 - FALL 2006 TCE AND BREAKDOWN PRODUCTS IN SHALLOW GROUNDWATER TOOELE ARMY DEPOT, UTAH

FIGURE

**DRAFT**

SLC4d281.dwg



**LEGEND**

- DEPOT PROPERTY BOUNDARY LINE
- CTC 2.6 CARBON TETRACHLORIDE (CTC) CONCENTRATIONS in ug/L
- C 9.0 CHLOROFORM (C) CONCENTRATIONS in ug/L
- SHALLOW MONITORING WELL LOCATION FOR SWMU 12/15
- SHALLOW MONITORING WELL LOCATION FOR SWMU 2/58
- DEEP MONITORING WELL LOCATION FOR SWMU 2/58
- EXTRACTION WELLS
- INJECTION WELLS
- CARBON TETRACHLORIDE (CTC) ISOCONCENTRATION CONTOURS
- ARE IN MICROGRAMS PER LITER (ug/L). DASHED WHERE APPROXIMATE

NOTE: BASED UPON ANALYTICAL RESULTS FOR SAMPLES COLLECTED OCTOBER 2006  
 THE ONLY METHYLENE CHLORIDE FOR FALL 2006 EVENT WAS DETECTED IN P-05D  
 AT 1.5J ug/L

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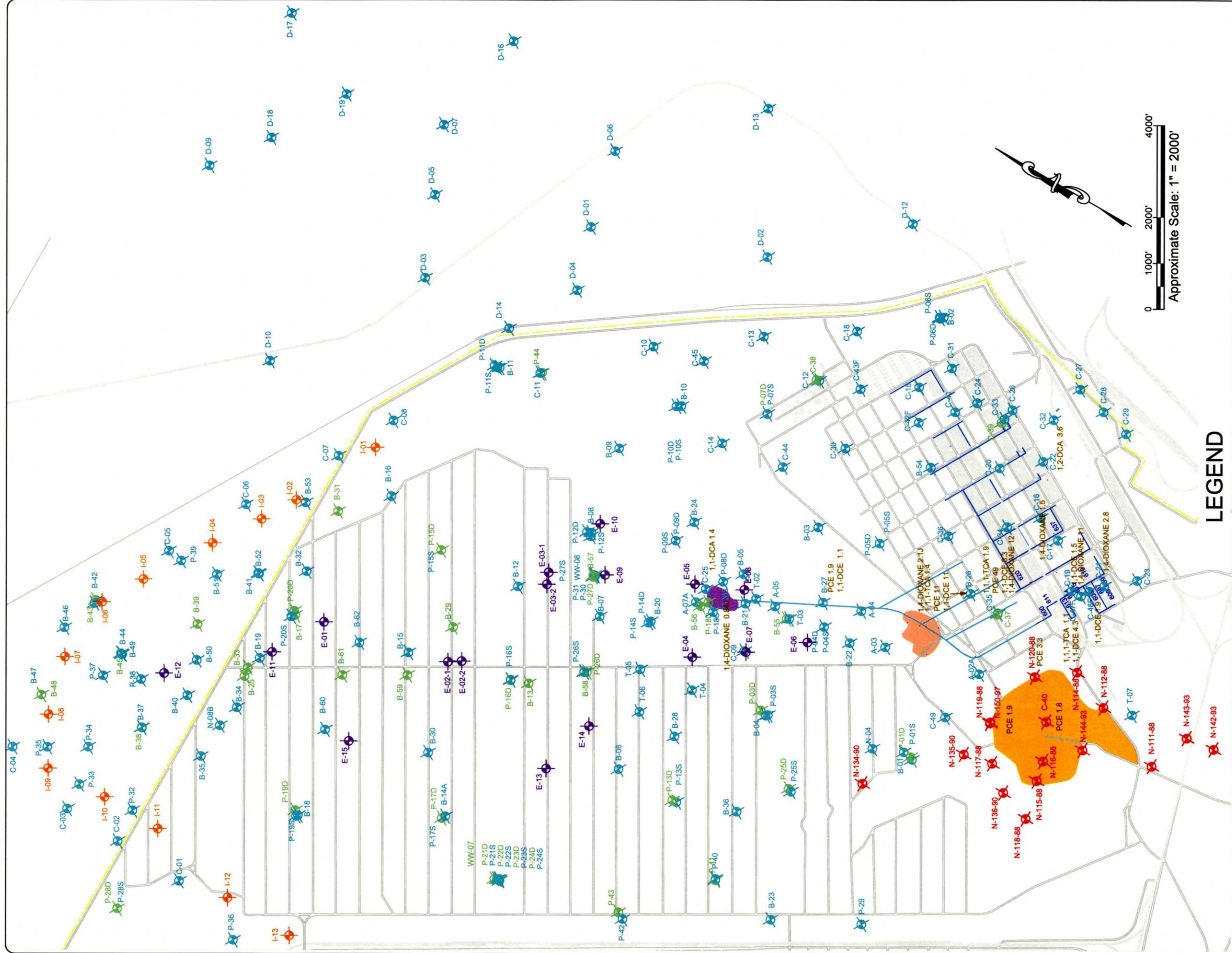


**U.S. ARMY CORP OF ENGINEERS  
 SACRAMENTO DISTRICT**

Date: 04/09/2007 Edited by V. Brown  
 Project Number

FIGURE

**3-6**



0 1000' 2000' 4000'  
 Approximate Scale: 1" = 2000'

### LEGEND

- SHALLOW MONITORING WELL LOCATION FOR SWMU 12/15
- SHALLOW MONITORING WELL LOCATION FOR SWMU 2/58
- DEEP MONITORING WELL LOCATION FOR SWMU 2/58
- EXTRACTION WELLS
- INJECTION WELLS
- DEPOT PROPERTY BOUNDARY LINE

- PCE = TETRACHLOROETHENE
- 1,1,1-TCA = 1,1,1 - TRICHLOROETHANE
- 1,1-DCE = 1,1 - DICHLOROETHENE
- 1,1-DCA = 1,1 - DICHLOROETHANE
- 1,2-DCA = 1,2 - DICHLOROETHANE
- 1,4 DIOXANE

NOTE: BASED UPON ANALYTICAL RESULTS FROM SAMPLES COLLECTED OCTOBER 2006  
 COMPOUND CONCENTRATION IN MICROGRAMS PER LITER (ug/L) SHOWN NEXT TO WELL

SLC4d281.dwg



**U.S. ARMY CORP OF ENGINEERS**  
 SACRAMENTO DISTRICT

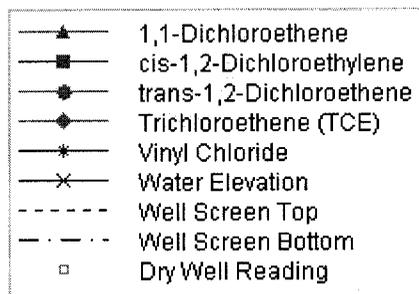
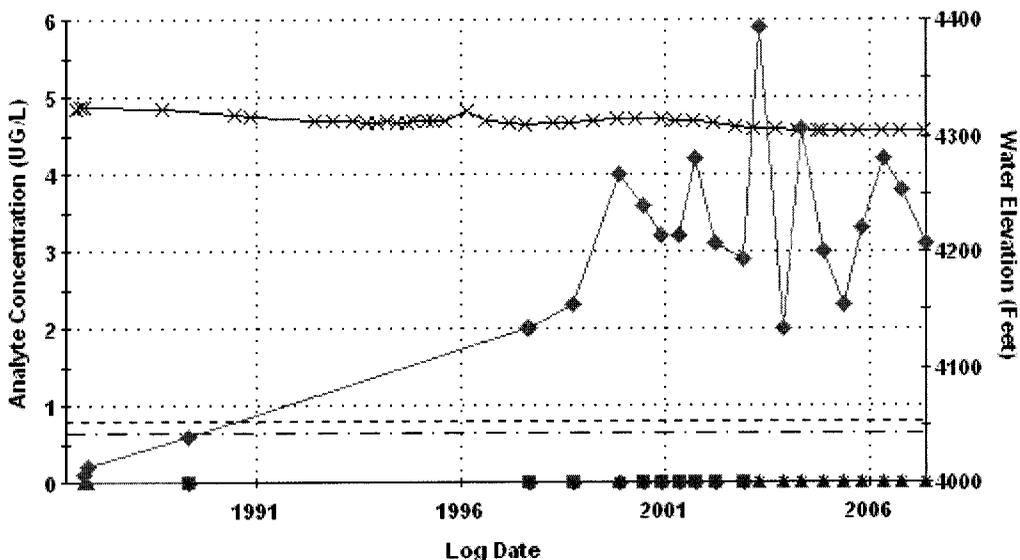
Date: 04/09/2007 Edited by V. Brown  
 Project Number

SWMU 2/58  
 ADDITIONAL VOCs DETECTED IN SHALLOW  
 GROUNDWATER - FALL 2006  
 TOOELE ARMY DEPOT, TOOELE, UTAH

FIGURE  
**3-7**

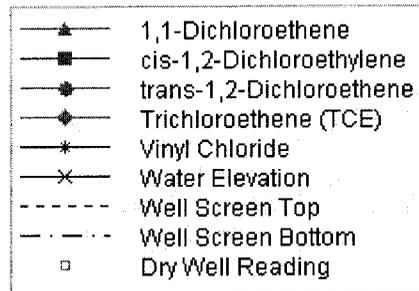
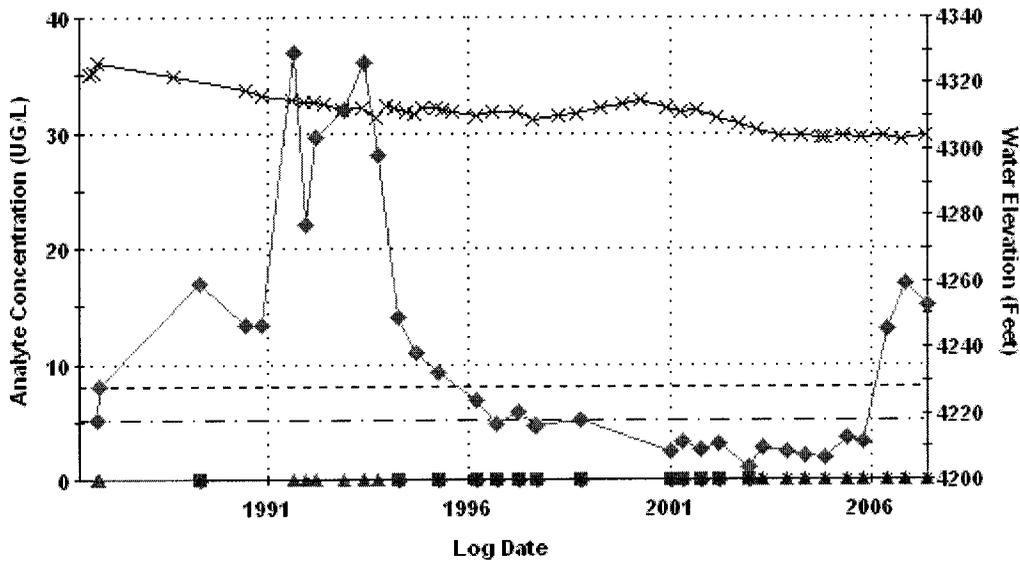
**ATTACHMENT 7**  
**TCE TREND CHARTS**

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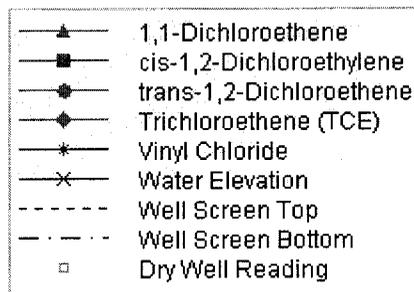
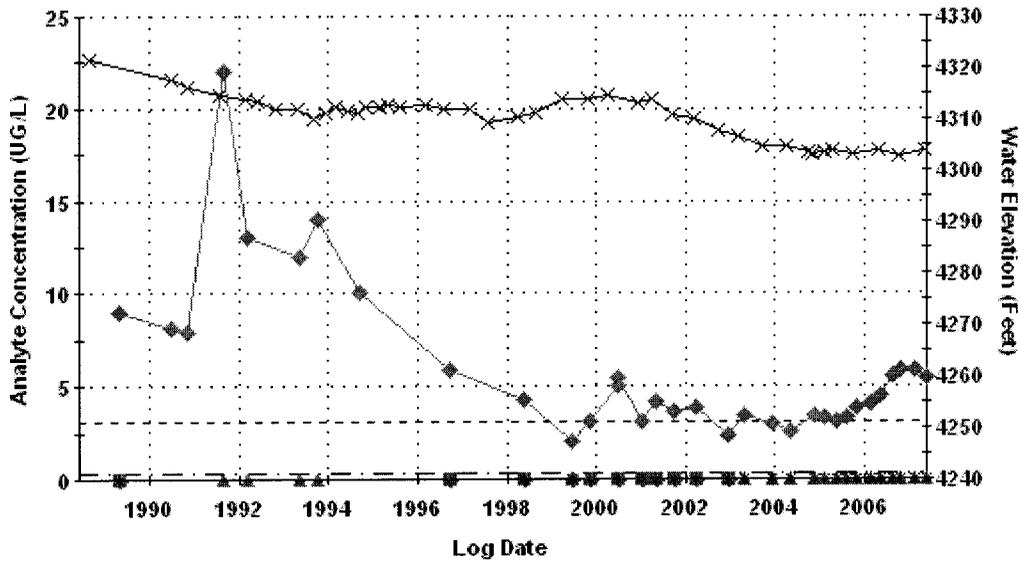
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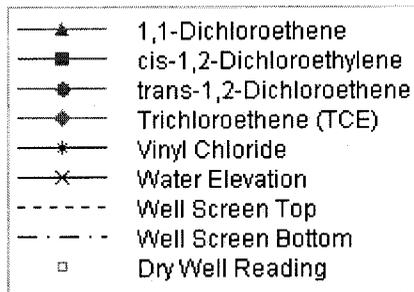
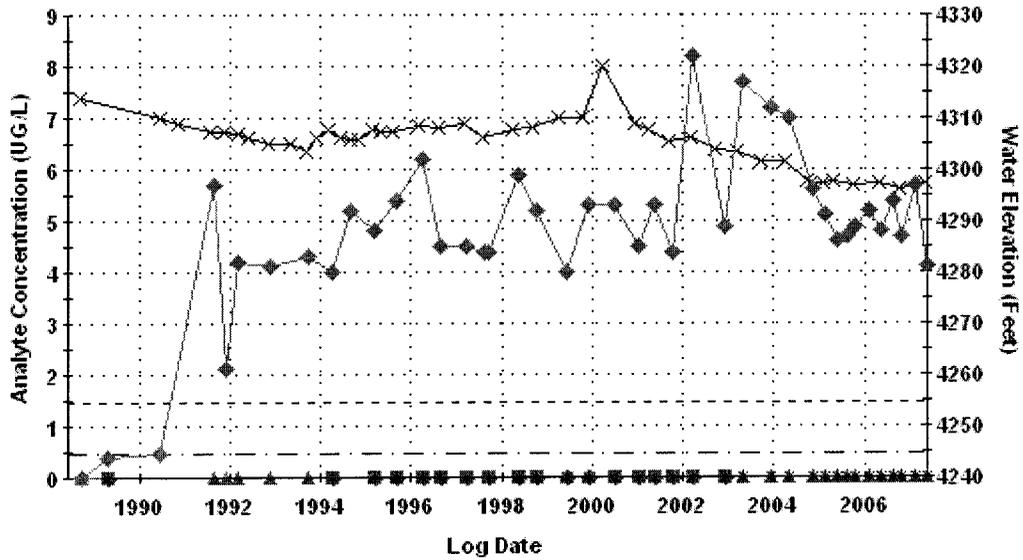
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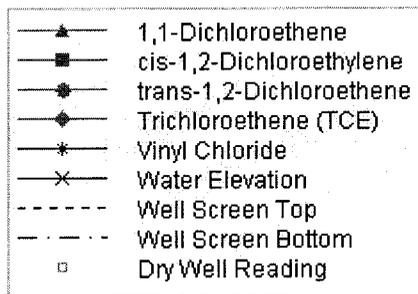
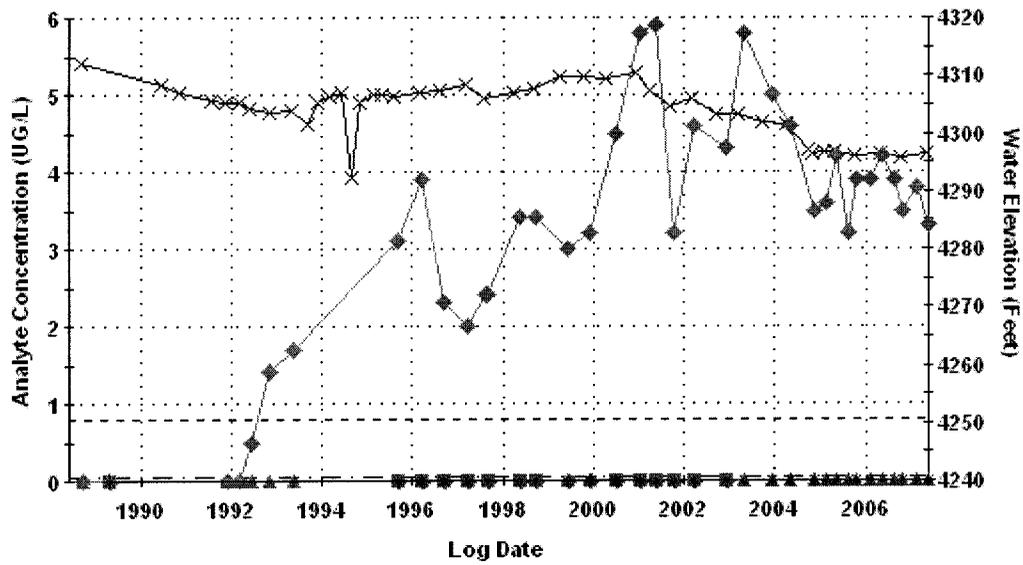
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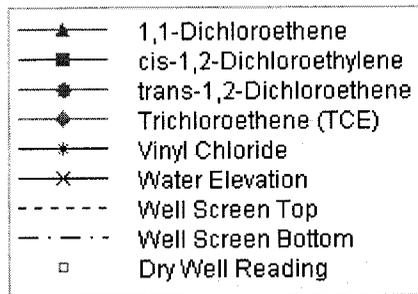
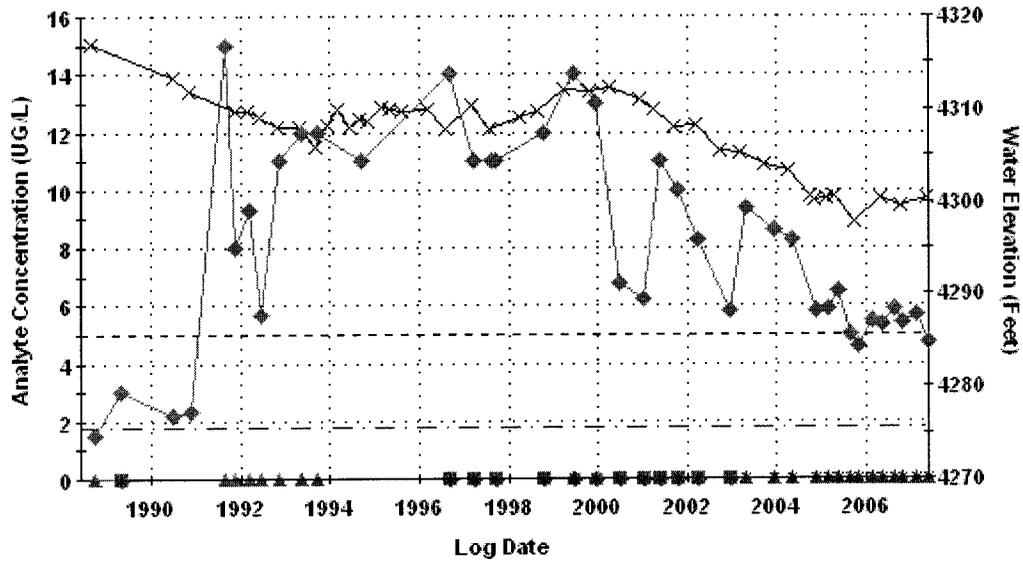
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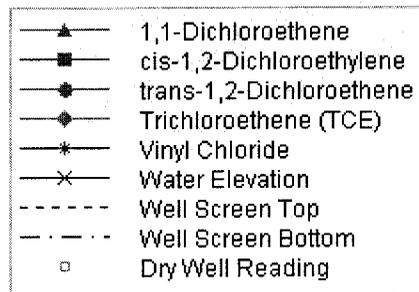
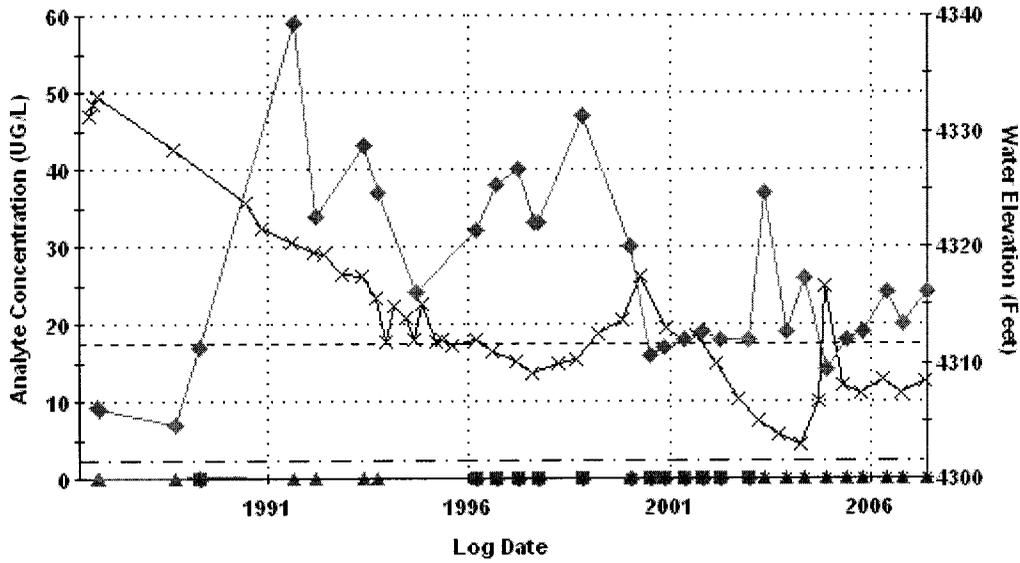
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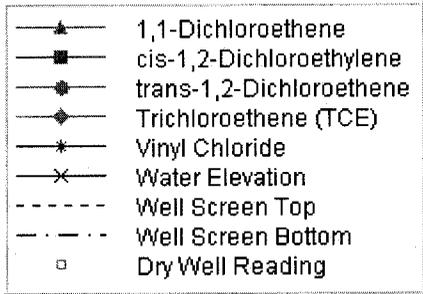
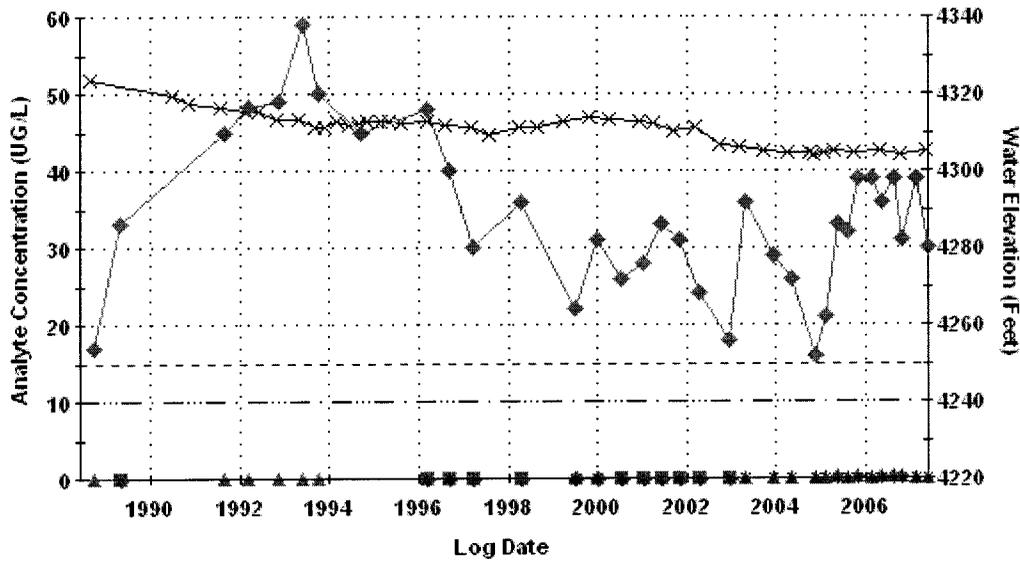
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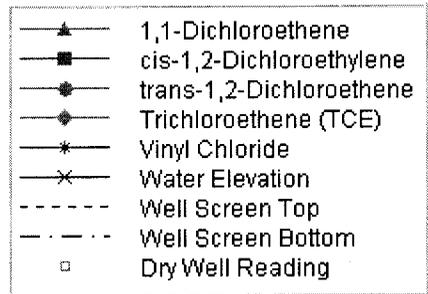
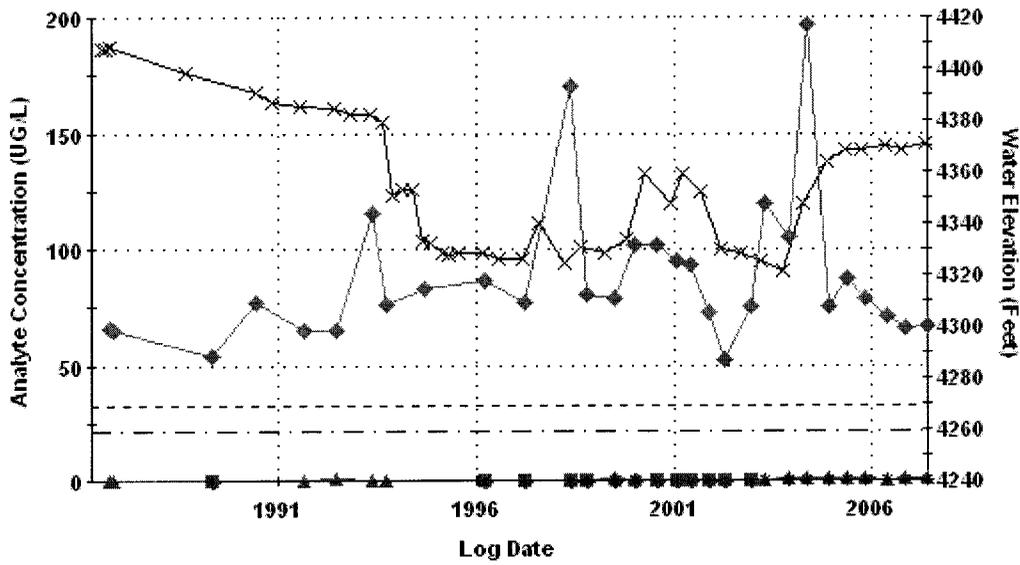
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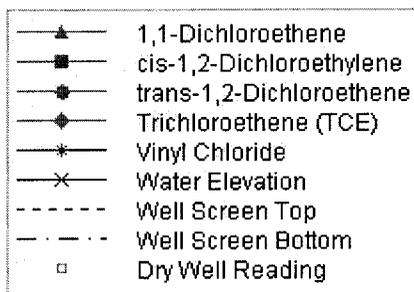
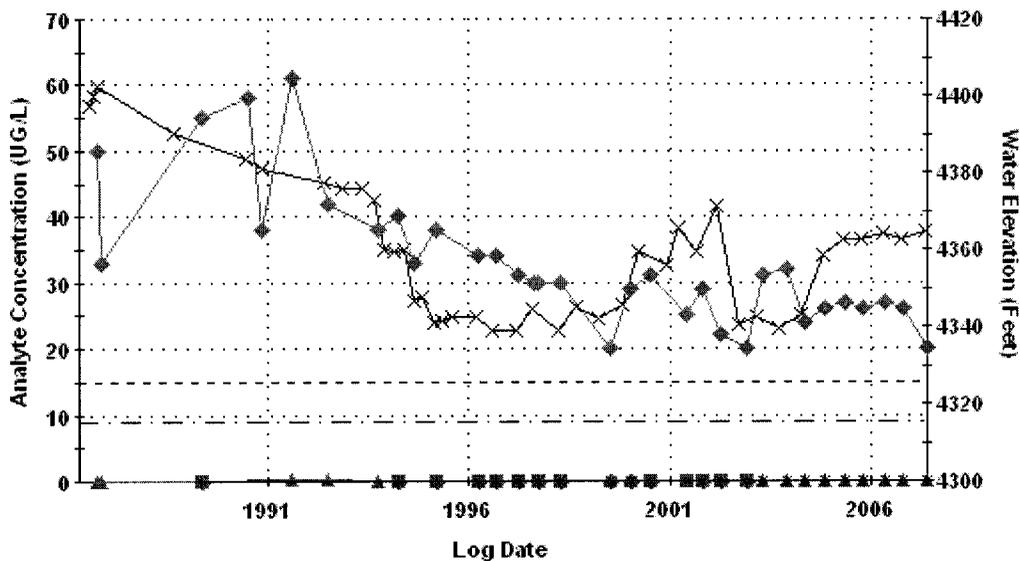
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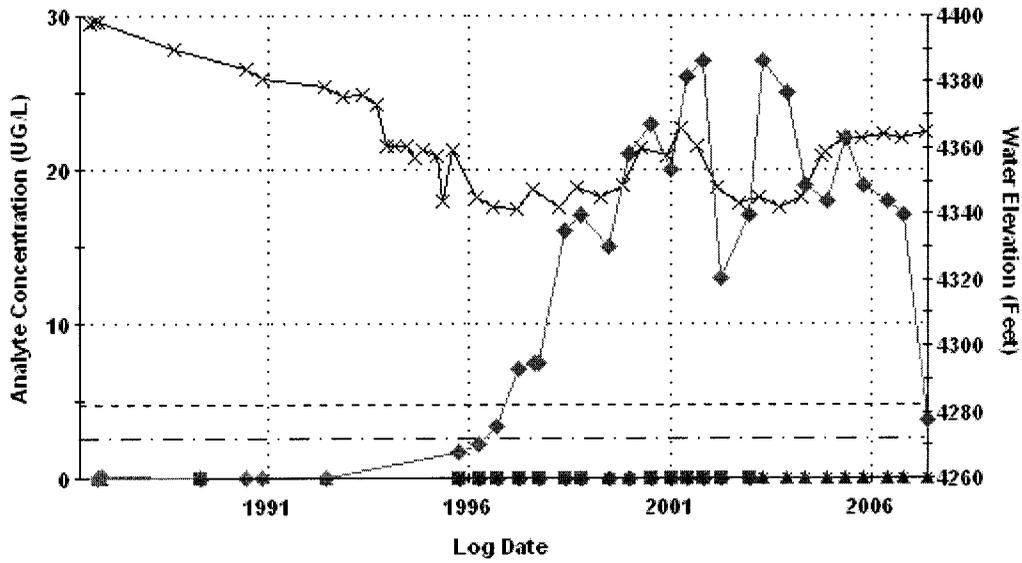
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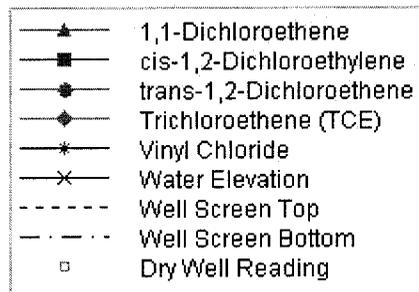
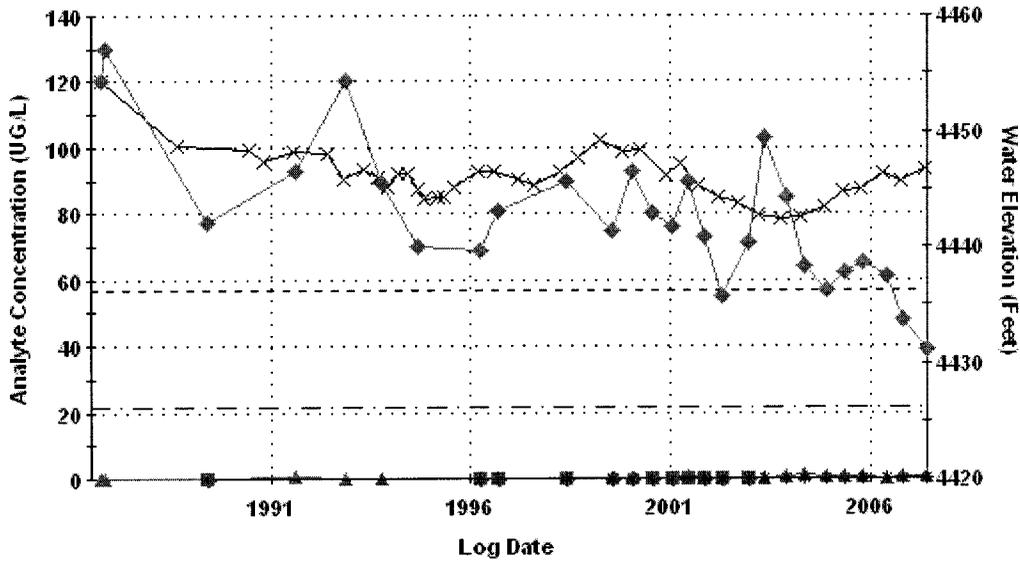
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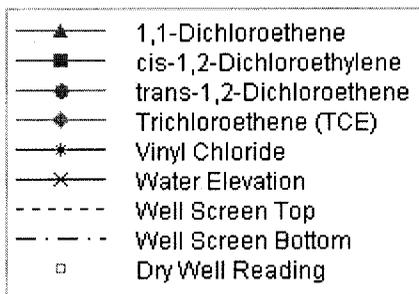
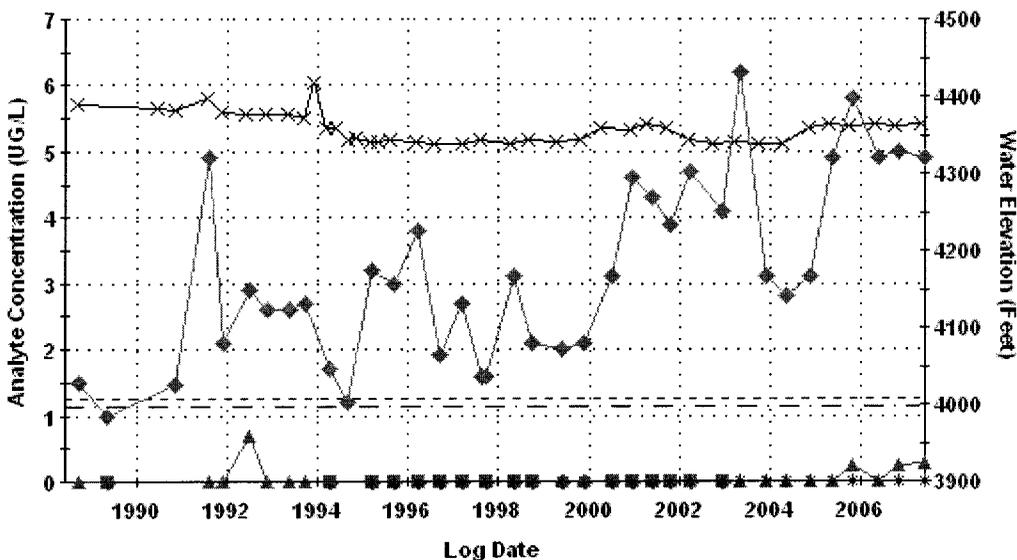
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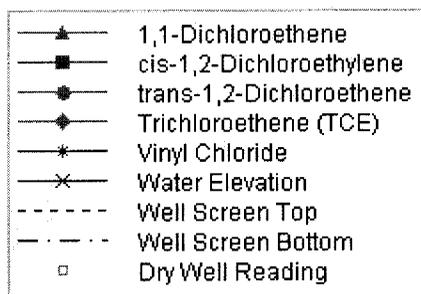
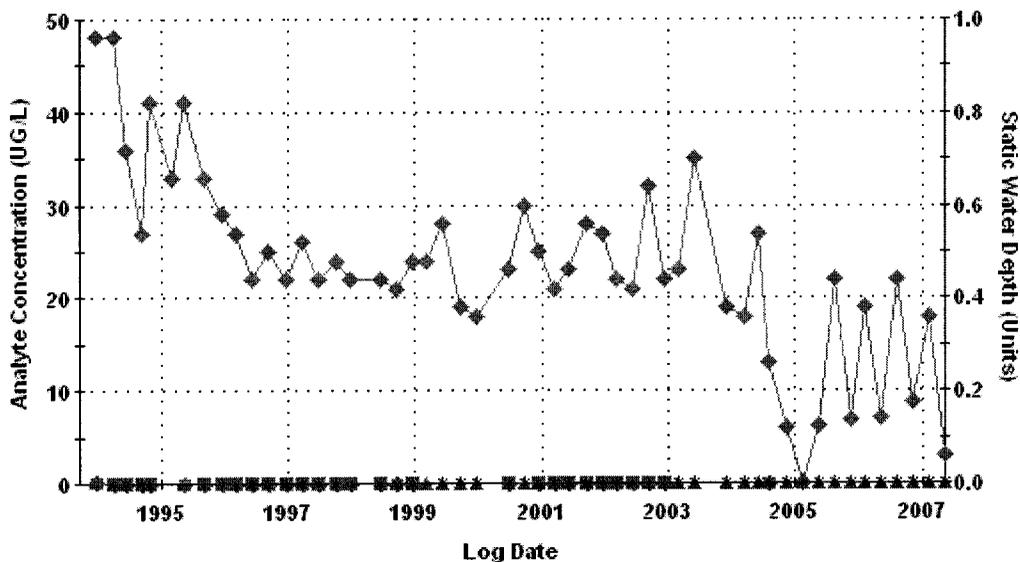
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### TCE Breakdown Products Location B-56, Tooele Army Depot



Date Generated: 20 Aug 2007

### TCE Breakdown Products Location INF, Tooele Army Depot



Date Generated: 18 Aug 2007

# **Attachment 8**

**SWMU 2 North Boundary Monitoring**

**Statistical Analysis**

## APPENDIX B: CONTROL CHART ANALYSIS

### B.1 OBJECTIVE

The objective of statistical groundwater detection monitoring during the test is the timely detection of potential groundwater degradation due to downgradient migration of the TCE plume, while simultaneously minimizing the probability of falsely concluding that groundwater has been degraded when it has not. Using recent data, threshold limits for TCE are established for wells B-31, B-37, E-12, and C-08 so that any future change in groundwater chemistry downgradient of the plume can be detected. Future analytical measurements that cause the threshold to be crossed are taken to indicate downgradient movement of the plume, requiring the reinitiation of measures to control plume migration.

### B.2 DESCRIPTION

The detection monitoring program is based on intrawell comparisons, in which monitoring measurements of a chemical constituent are compared to the history of measurements within a well, rather than by comparing measurements between wells. Intrawell comparisons are useful when there is a clear difference between groundwater chemistry upgradient and downgradient of a specified spatial boundary, in this case the 5 µg/L isoconcentration surface for TCE. The current (for purposes of discussion, spring 2002) position of the surface at the leading edge of the plume is similar to its position in 1993, before the start of groundwater treatment at TEAD. Fluctuations in the position of the surface can be ascribed to the combined effects of natural variability, random measurement error, and the set of measurements used to infer the character of the isoconcentration surface. Upgradient of the boundary, groundwater is contaminated by TCE; downgradient, groundwater is assumed to be free of TCE contamination.

The approach selected for analysis of the detection monitoring data obtained during the test period is the Shewart-CUSUM control chart method, originally developed for statistical quality control of manufacturing processes (Bowker and Lieberman, 1972), and widely applied to groundwater monitoring at landfills (Gibbons, 1994). There are two components to this approach. The Shewart methodology focuses solely on the current monitoring value of a monitored groundwater constituent (in this case, TCE) and its relation to historic background levels of the constituent; it is sensitive to large and sudden changes, but less sensitive to slow, trending changes in

concentration. The CUSUM methodology incorporates information from previous measurements, and is sensitive to small, gradual changes relative to background concentrations. Referenced documents American Society for Testing and Materials (ASTM) PS 64-96, USEPA (1994), Gibbons (1994), and Gilbert (1987) describe the approach in detail.

### B.3 METHODOLOGY

Each well is considered independently of the others. Background (or historical) levels are computed for TCE in the well. Background in a well is taken as the mean TCE concentration in the well, computed from the eight most recent sampling events prior to the start of the shutdown test. The eight background samples are assumed to be independent and Gaussian with fixed mean and variance. Independence is assumed to be met by using background data collected no more frequently than quarterly. The Gaussian assumption will be checked using the Shapiro-Wilk, D'Agostino, and Kolmogorov-Smirnov hypothesis tests (Conover, 1999; Hintze, 2001; Gilbert, 1987); if necessary, the background data will be transformed (e.g., using logarithms) to satisfy the Gaussian assumption.

The background level of TCE in each well is summarized by the sample mean  $\bar{x}$  and the sample standard deviation  $s$ , computed from background measurements for the analyte using the usual expressions for  $\bar{x}$  and  $s$  (see, for example, Gibbons, 1994). Note that  $\bar{x}$  and  $s$  for TCE are expected to vary from well to well.

Each new TCE measurement in a well is compared to threshold limits for the well to assess whether the leading edge of the plume has advanced downgradient. The procedure is as follows:

- Denote the new TCE measurement taken at time  $t_i$  by  $x_i$  ( $i = 1$  corresponds to the first sampling round after the start of the shutdown test; subsequent detection monitoring samples are taken quarterly).
- Compute the standardized value  $z_i = (x_i - \bar{x})/s$ .
- At each time  $t_i$ , compute the cumulative sum  $S_i = \max[0, (z_i - 1) + S_{i-1}]$ .
- Plot both  $z_i$  and  $S_i$  versus  $t_i$ , constructing the Shewart-CUSUM control chart.

An "out of control" concentration is indicated if, for the first time, either  $z_i$  is greater than 4.5 or  $S_i$  is greater than 5.0. The thresholds  $z_i$  equal to 4.5 and  $S_i$  equal to 5.0 are, respectively, the Shewart and CUSUM thresholds.

The protocol for landfills calls for confirmation sampling in the event an analyte is determined to be out of control (EPA, 1992; Gibbons, 1994). If TCE is assessed to be out of control in a well, immediate measures will be taken to reassert hydraulic control of the plume (see Section 4).

The procedure described above uses the normalized TCE concentration  $z$ . It is possible, however, to express the threshold for TCE in a well in terms of the original concentration by application of the formulas:

$$SCL = \bar{x} + 4.5s \text{ and } CCL = \bar{x} + 5s$$

Here,  $SCL$  denotes the Shewart control limit and  $CCL$  denotes the CUSUM control limit. Similarly, the  $S_i$  can be expressed in terms of concentration by calculating  $S_i' = \bar{x} + s S_i$ .

A hypothetical example using well B-37 illustrates the Shewart-CUSUM procedure. Table B-1 lists the eight most recent TCE measurements available in the TEAD internet database for B-37.

The sample mean for these data ( $\bar{x}$ ) is 4.3 and the sample standard deviation ( $s$ ) is 1.1. A hypothesis of normality cannot be rejected at the 90 percent significance level using any of the Shapiro-Wilk, Anderson-Darling, Kolmogorov-Smirnov, or D'Agostino tests.

Table B-1  
Eight Most Recent TCE Measurements in B-37

Well ID	Sample Date	Measured TCE Concentration ( $\mu\text{g/L}$ )
B-37	7-Jun-99	3.0
B-37	29-Nov-99	3.2
B-37	26-Jun-00	4.5
B-37	3-Jan-01	5.8
B-37	16-May-01	5.9
B-37	4-Oct-01	3.2
B-37	27-Mar-02	4.6
B-37	10-Dec-02	4.3

The sample statistics  $\bar{x}$  and  $s$  were used to perform two probabilistic experiments, the first to illustrate the case where downgradient migration of the plume does not occur during the shutdown test, the second to illustrate the case where migration does occur. Table B-2 lists simulated

measured TCE concentrations for quarterly samples assuming that the shutdown test began immediately after the fall 2002 sampling event. The simulated TCE concentrations are independent Gaussian random variables selected from a larger population generated to have mean (i.e., the true mean  $\mu$ ) 4.3 and standard deviation ( $\sigma$ ) 1.1. Thus the simulated concentrations are independent random variables from the same distribution as the background samples and represent the case where plume migration does not occur. Table B-2 also lists the computed values  $z_i$ ,  $z_{i-1}$ , and  $S_i$ . The quantities  $z_i$  and  $S_i$  are plotted in Figure B-1(a). Note that  $z_i$  never exceeds 0.8, and that  $S_i$  never differs from 0. All future measurements are in control, and no plume movement is detected.

Table B-2  
Hypothetical Shewart CUSUM Calculations, No Detected TCE Increase

Hypothetical Sampling Event	Sampling Period, $i$	Simulated TCE Concentration ( $\mu\text{g/L}$ )	$z_i$	$z_{i-1}$	$S_i$
Winter 2002	1	2.4	-1.6	-2.6	0
Spring 2003	2	3.5	-0.7	-1.7	0.0
Summer 2003	3	2.3	-1.7	-2.7	0.0
Fall 2003	4	5.0	0.6	-0.4	0.0
Winter 2003	5	5.1	0.7	-0.3	0.0
Spring 2004	6	3.5	-0.7	-1.7	0.0
Summer 2004	7	5.3	0.8	-0.2	0.0
Fall 2004	8	4.3	0.0	-1.0	0.0

As a counter example, Table B-3 lists the simulated measured TCE concentrations for the hypothetical case in which the leading edge of the plume advances downgradient. In this case, a pattern of systematically increasing TCE concentration was simulated by first generating an independent Gaussian random variable as above, and then adding to it the quantity  $is/2$ , where  $i$  is the sampling period and  $s$  is the sample standard deviation computed from background. This addition effectively transforms the results so that they no longer conform to the sample distribution. The Shewart-CUSUM calculations are shown in Table B-3, and the results plotted in Figure B-1(b). In this example, the Spring 2004 sample is out of control because  $z_i$  equals 4.8 and exceeds the Shewart threshold of 4.5. Note the immediate response to an unusually high concentration with respect to background. In addition, note that although the normalized concentration  $z_i$  decreases after the fifth

sampling event following the start of shutdown,  $S_i$  continues to increase and stays beyond the threshold of  $S_i$  equals 5.0 after the sixth sampling event.

Table B-3  
Hypothetical Shewart CUSUM Calculations, Detected TCE Increase

Hypothetical Sampling Event	Sampling Period, i	Simulated TCE Concentration ( $\mu\text{g/L}$ )	$z_i$	$z_{i-1}$	$S_i$
Winter 2002	1	4.9	0.6	-0.4	0
Spring 2003	2	5.7	1.2	0.2	0.2
Summer 2003	3	6.0	1.4	0.4	0.7
Fall 2003	4	3.9	-0.4	-1.4	0.0
Winter 2003	5	9.8	4.8	3.8	3.8
Spring 2004	6	8.1	3.3	2.3	6.1
Summer 2004	7	7.5	2.8	1.8	8.0
Fall 2004	8	10.6	5.5	4.5	12.5

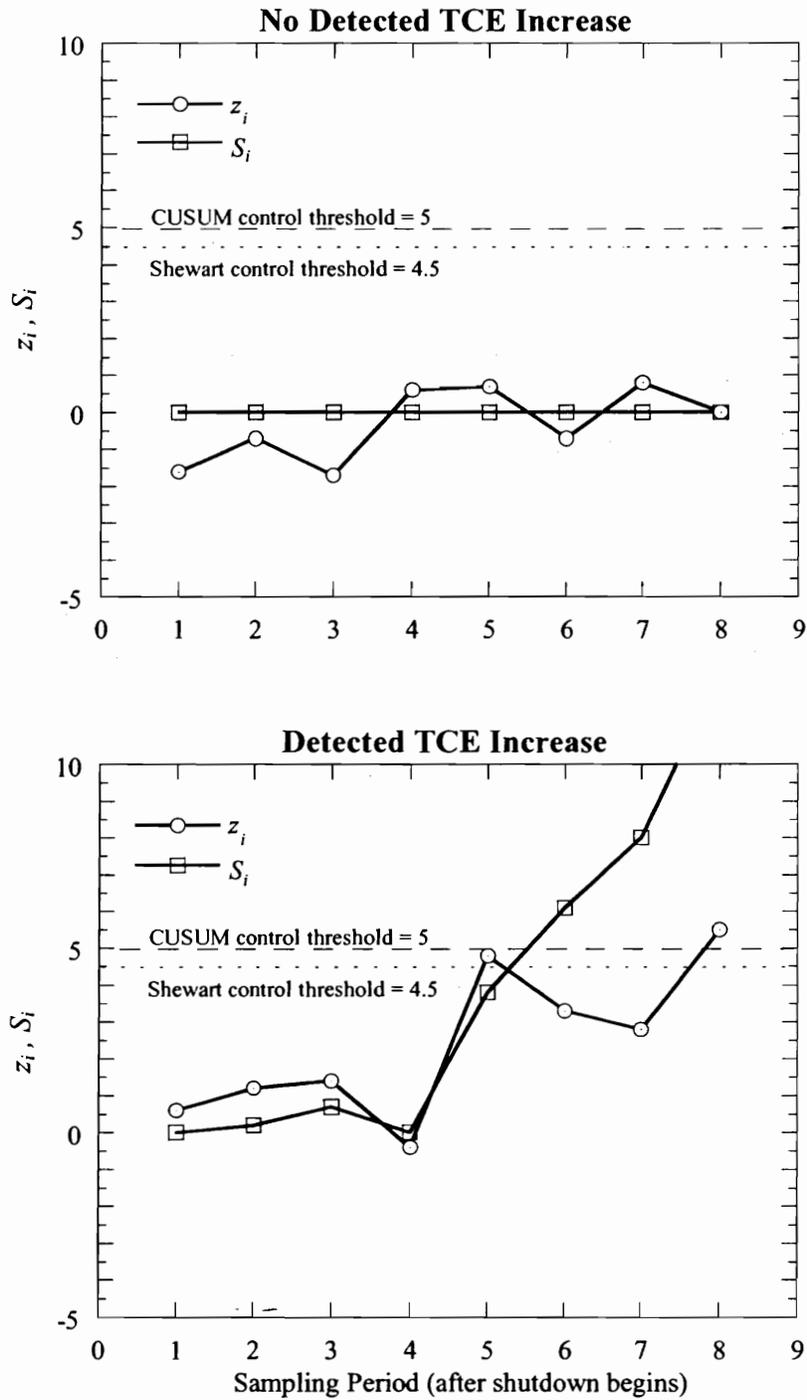
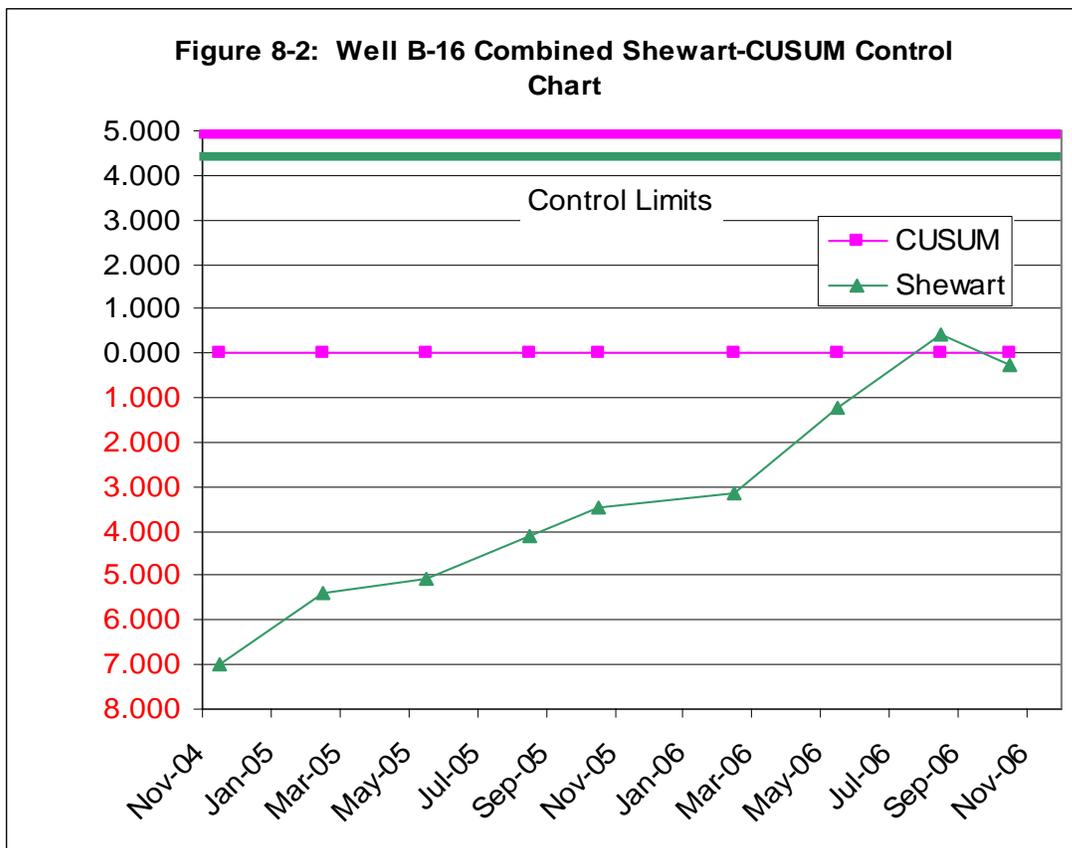
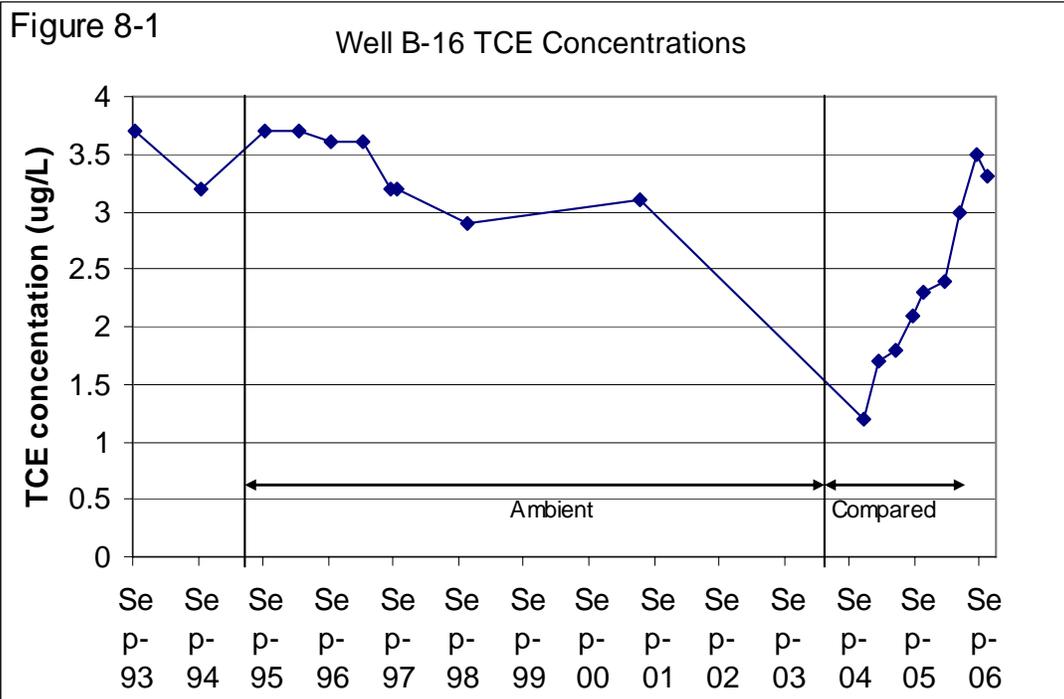
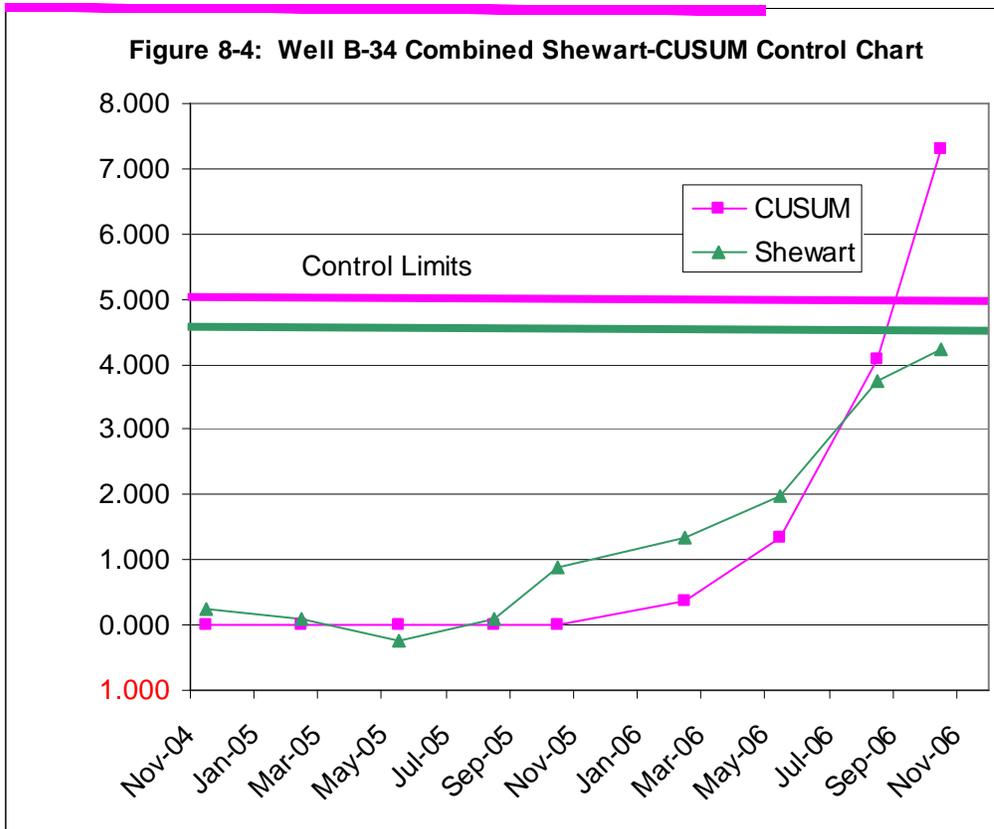
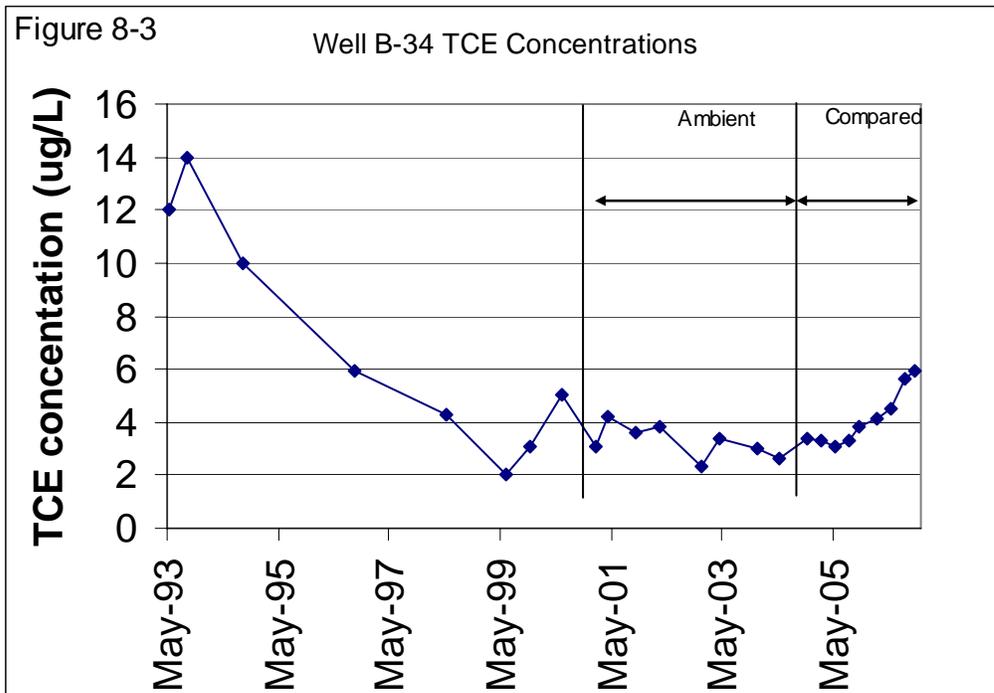


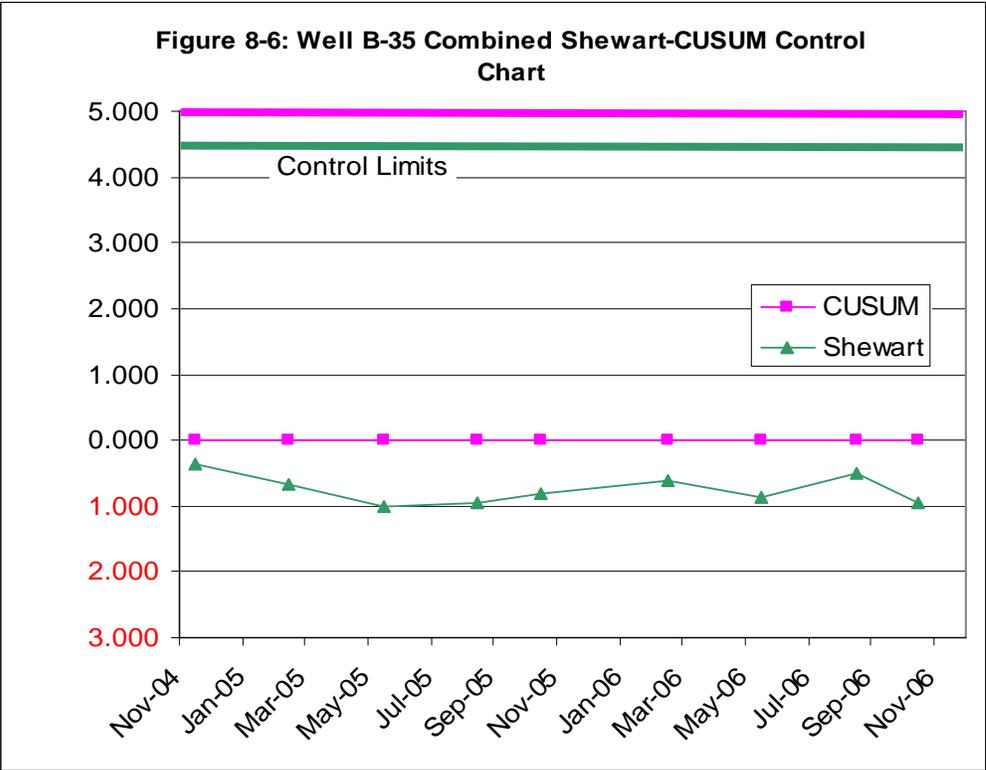
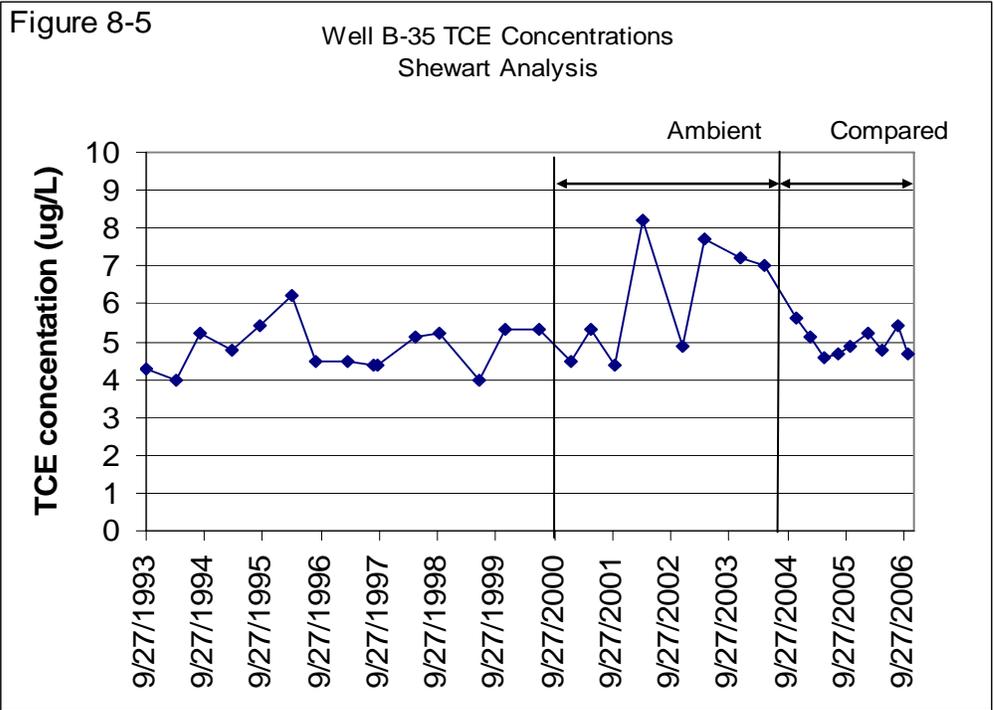
Figure B-1. Hypothetical examples illustrating Shewart CUSUM control charts for (a) the case of no plume movement, and (b) plume movement.

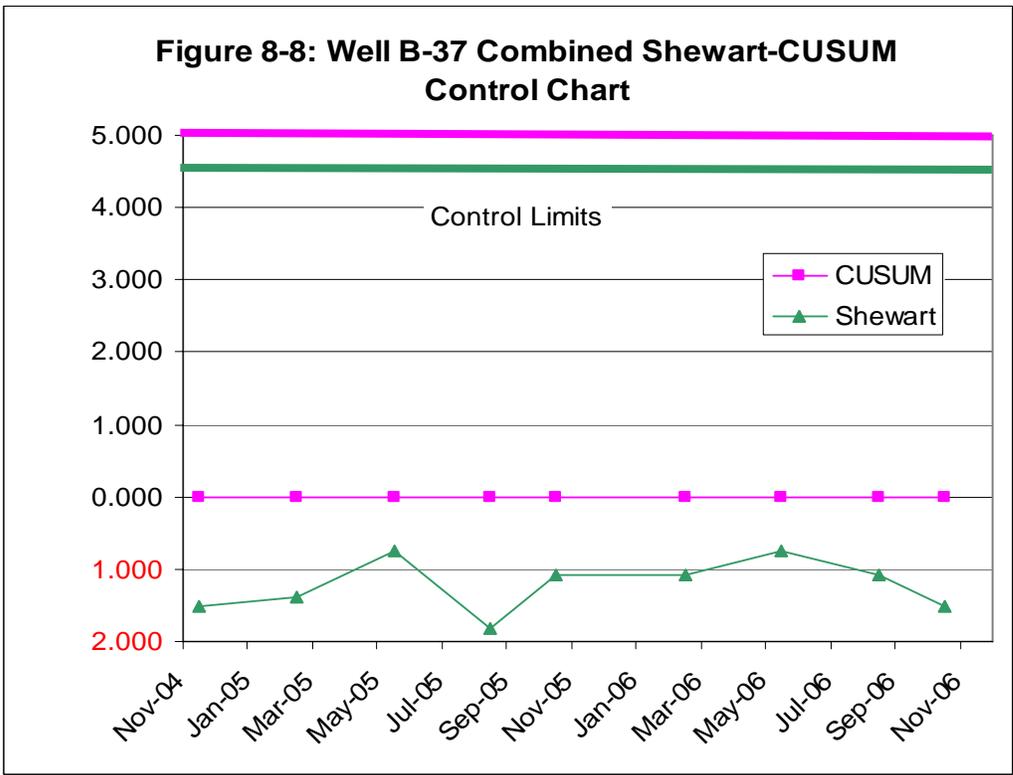
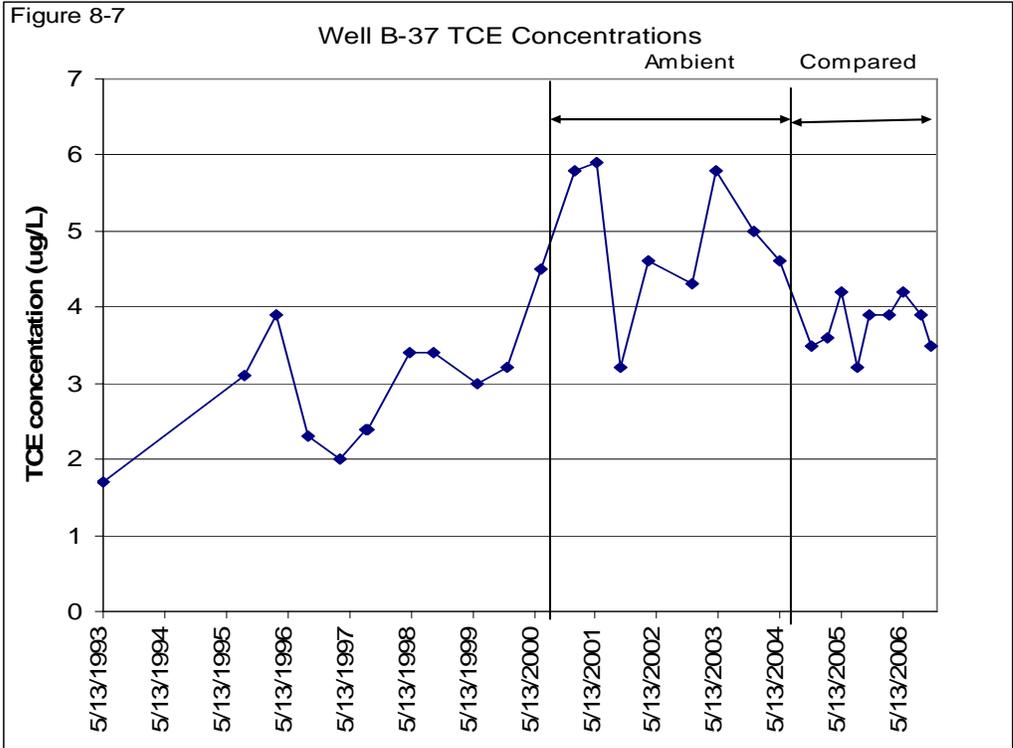
## REFERENCES

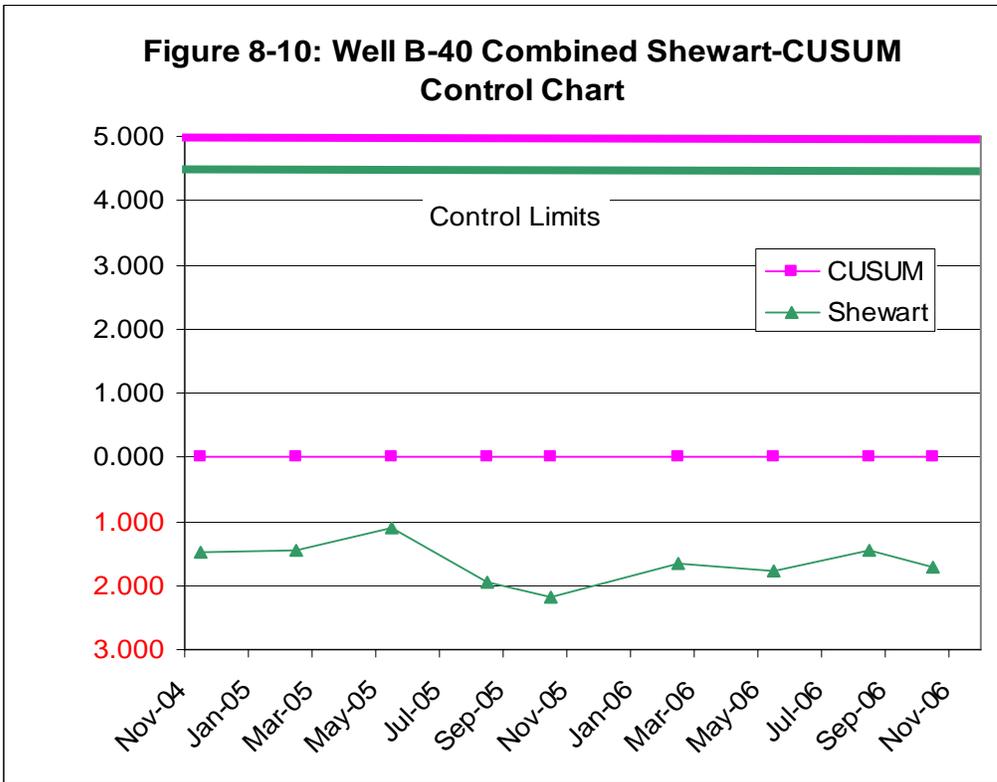
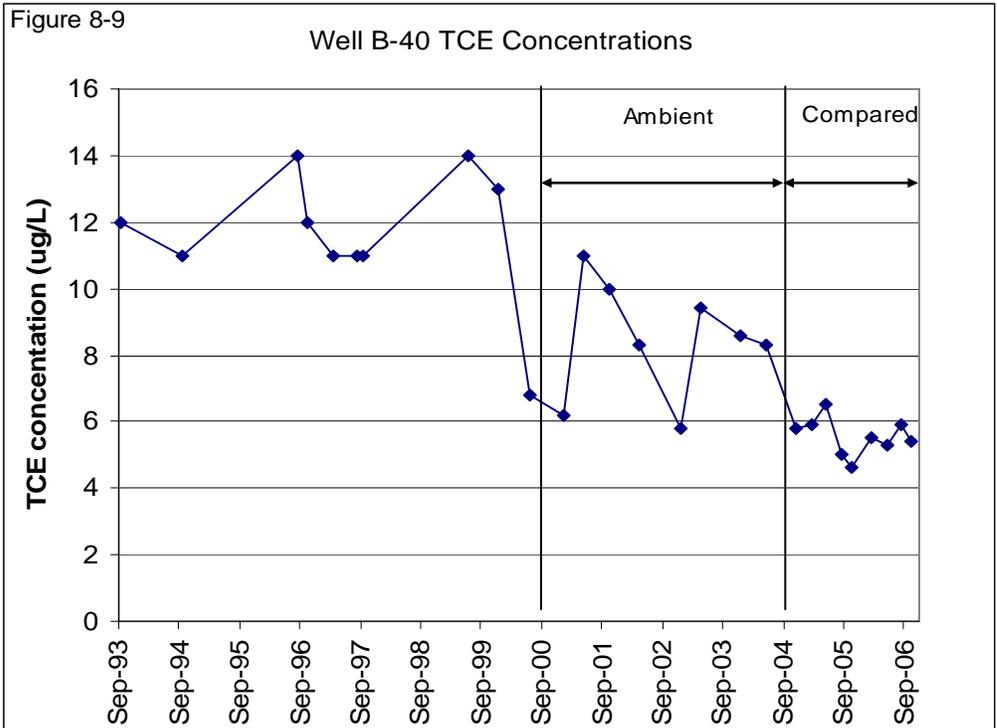
- ASTM PS 64-96, 1996. Provisional Standard Guide for Developing Appropriate Statistical Approaches for Ground-Water Detection Monitoring Programs.
- Bowker, A. H., and G. J. Lieberman, 1972. *Engineering Statistics, Second Edition*, Prentice Hall, Englewood Cliffs, NJ.
- Conover, W. J., 1999. *Practical Non-Parametric Statistics, Third Edition*, John Wiley and Sons, New York.
- Gibbons, R. D., 1994. *Statistical Methods for Groundwater Monitoring*, John Wiley and Sons, New York
- Gilbert, R. O., 1987. *Statistical Methods for Environmental Pollution Monitoring*, John Wiley and Sons, New York.
- Hintze, J. L., 2001. *NCSS User's Guide, Volume I*, Number Cruncher Statistical Systems, Kaysville, UT.
- USEPA, 1992. *Addendum to Interim Final Guidance Document, Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities*, July 1992.

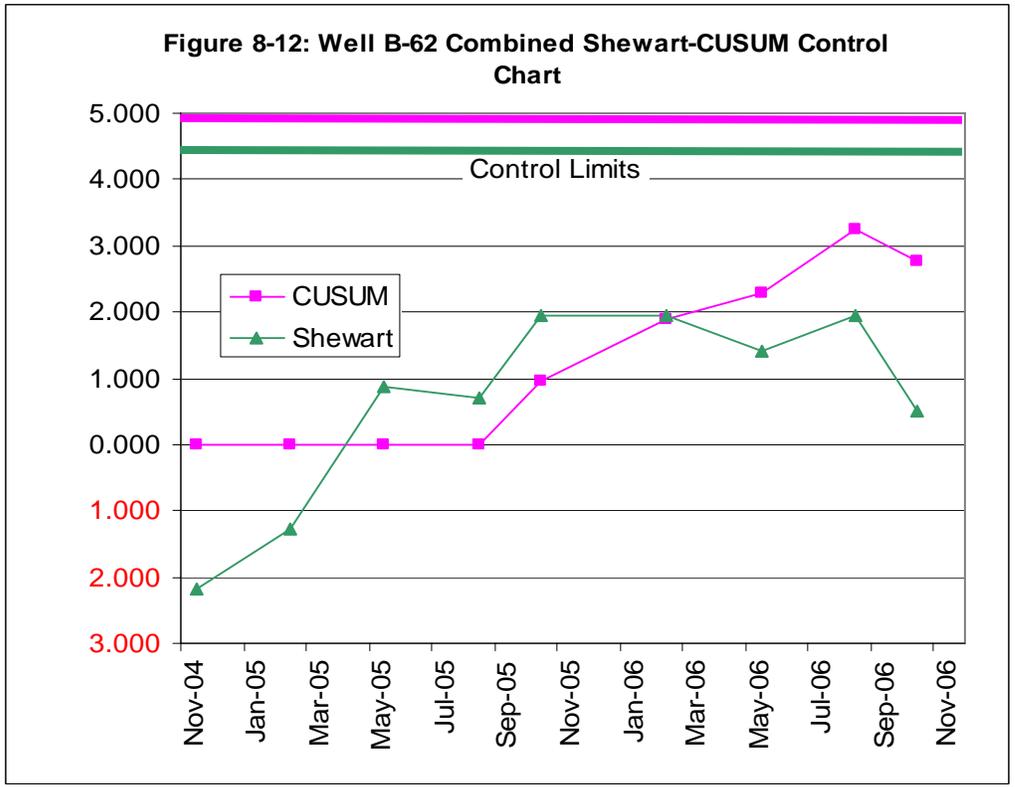
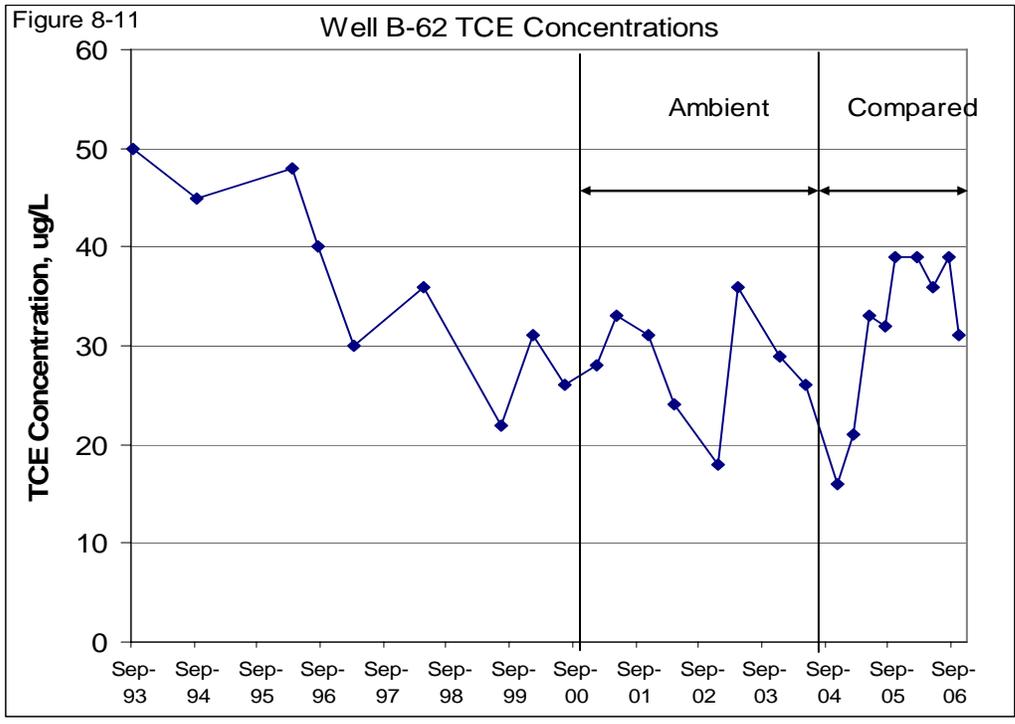








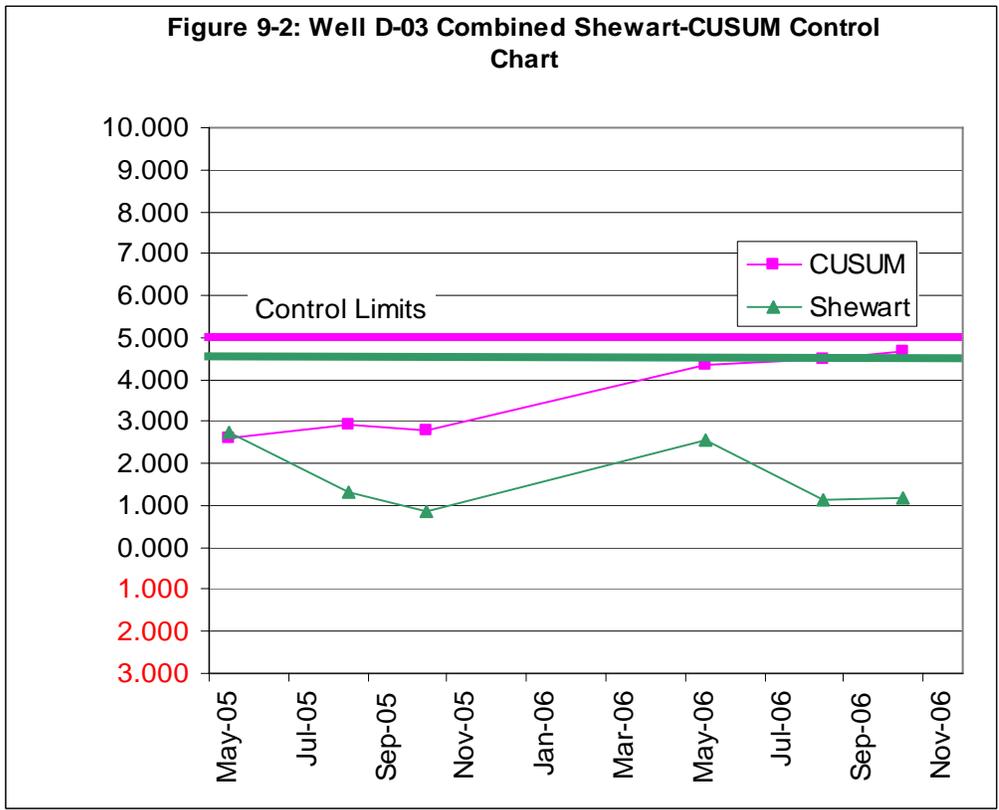
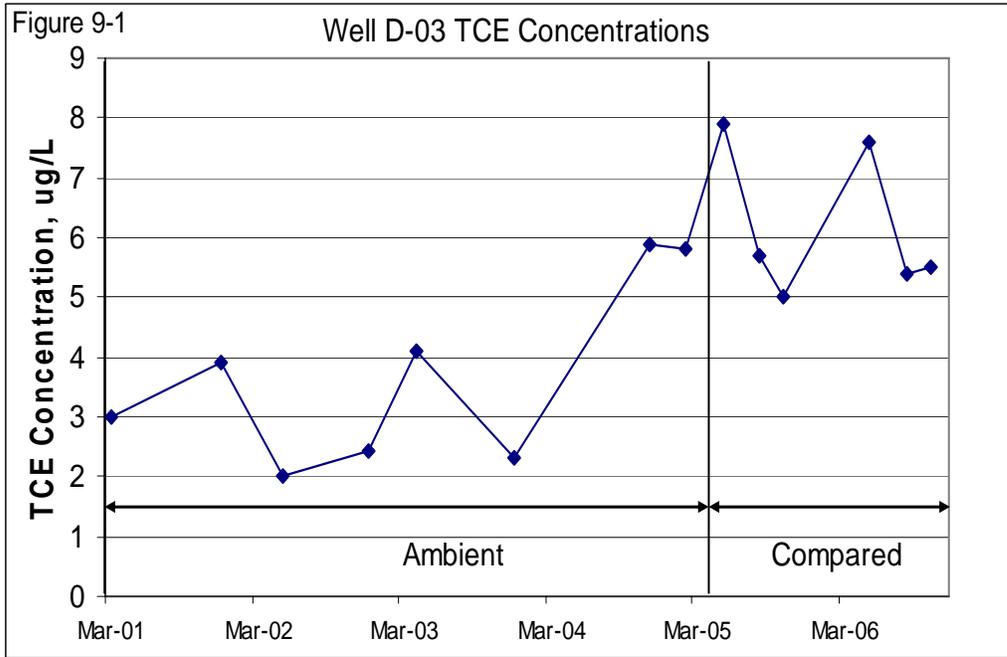


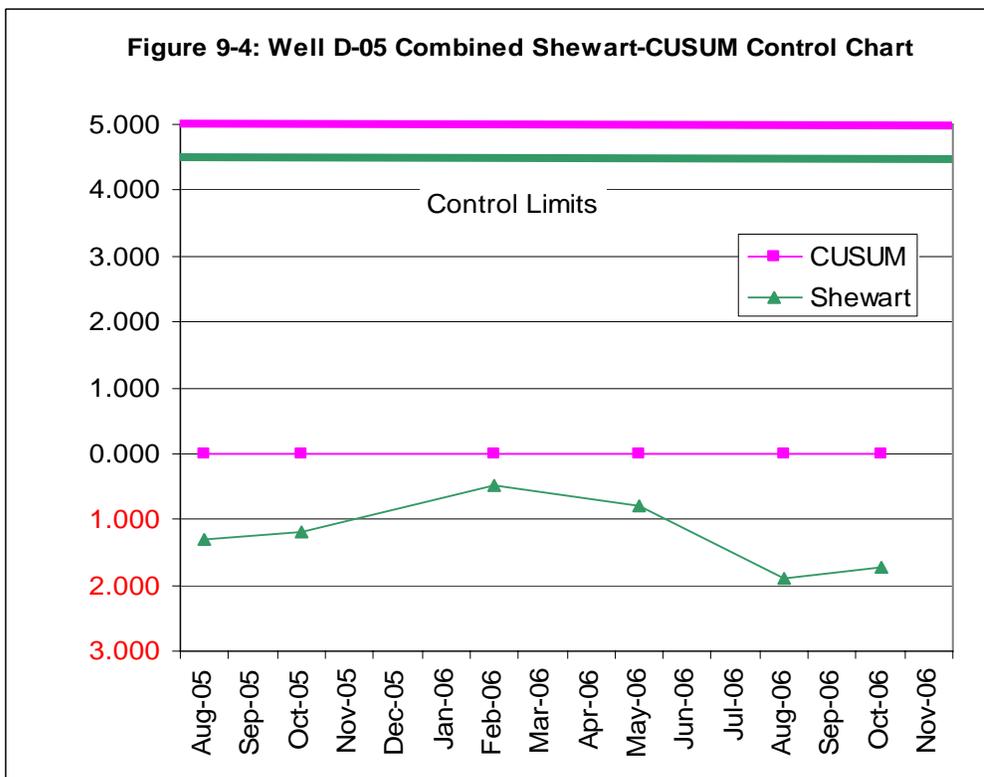
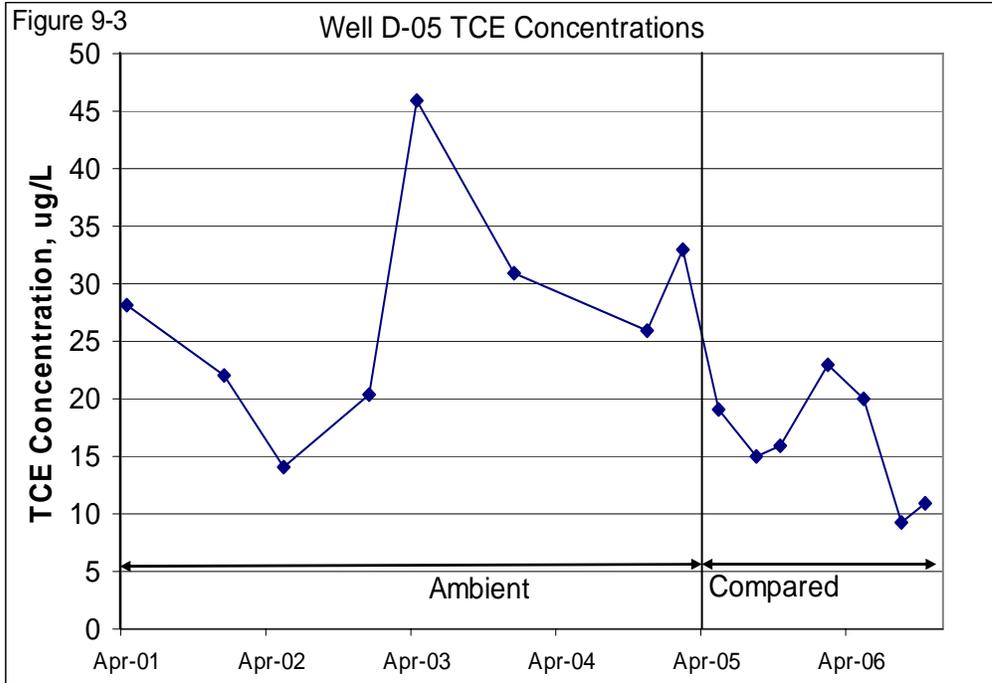


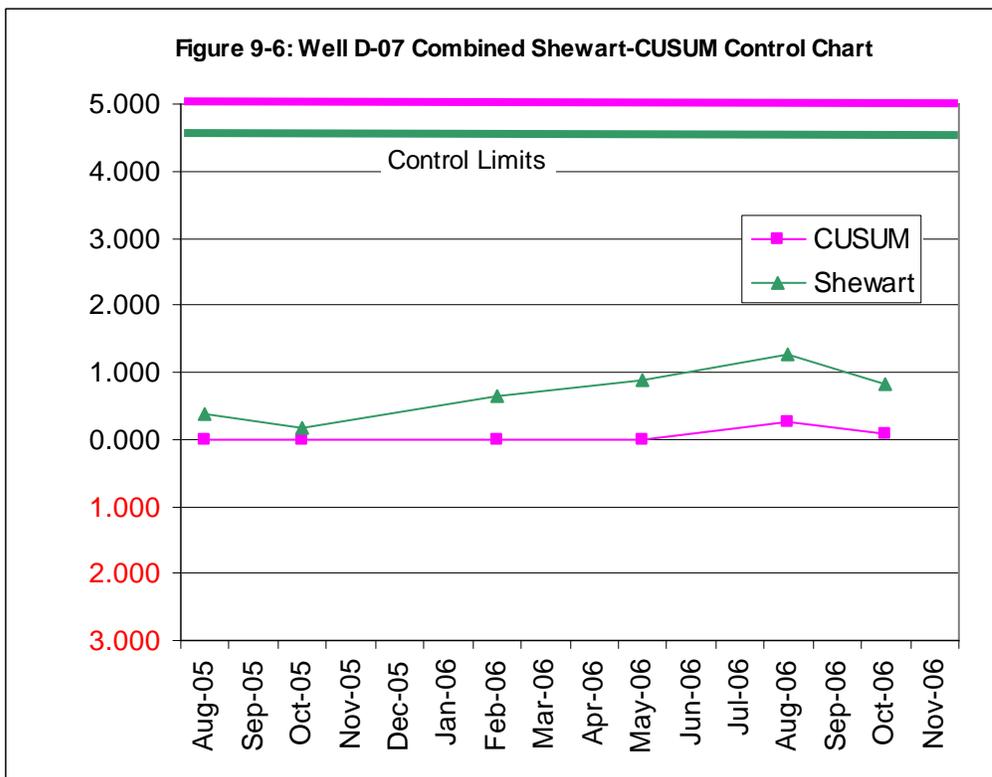
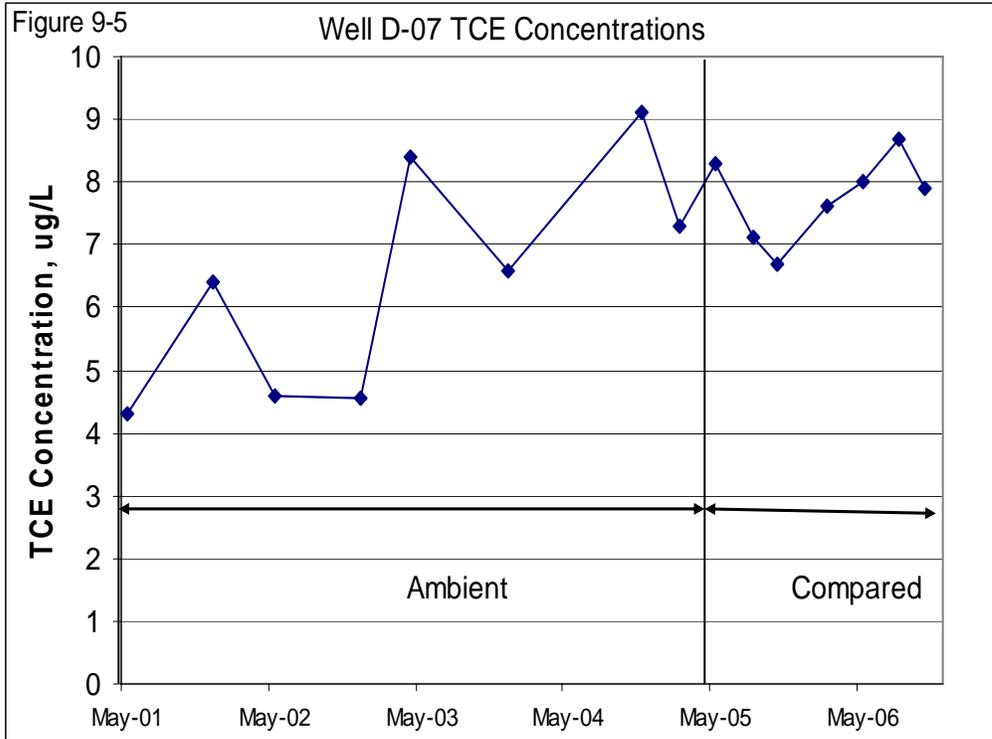
# **Attachment 9**

Northeast Boundary Monitoring

Statistical Analysis Charts







**ATTACHMENT 10**  
**EXPOSURE ASSUMPTIONS EVALUATION**

**PROTECTIVENESS DETERMINATION FOR  
TOOELE ARMY DEPOT  
Prepared by Cory Koger, Sacramento District  
August 9, 2007**

This section addresses Question B of the statement of service, “Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives (RAOs) used at the time of the remedy selection still valid?”

## **HUMAN HEALTH**

### Changes in Toxicity

The calculation of corrective action objectives (CAOs) methods and results for Tooele Army Depot (TEAD) are detailed in a number of documents (URS 2001a, URS, 2001b, URS 2006). Directly comparing toxicity values used to calculate the corrective action objectives, then (time of remedy) and now is an efficient method through which to screen for changes in the level of protectiveness. Table 1 (attached) provides a direct comparison between the historic toxicity values and current values available. The chemicals listed are compiled from a variety of reports that indicate contaminants of concern (CoCs) for specific sites. Only those compounds identified as COCs based on the current or reasonable receptor were evaluated. For most sites where institutional controls were the remedial alternative, there are no COCs for the current industrial receptor, but rather for a residential receptor. Of twenty-five distinct chemicals listed, toxicity values have been revised or newly developed for twelve. The revised or newly developed values are shaded on the attached Table 1. The lead was derived separately using the California Department of Toxic Substances Control (DTSC) leadsread or “Pbsread” model (CalEPA, 1996), and the toxicity criterion used is still relevant and appropriate. Note that in some cases the values used in the risk assessment are more protective than the current toxicity values. However, most of the differences deal with the inhalation route of exposure. Given that ingestion is a more significant exposure pathway for most toxicants, the compounds not previously evaluated for the inhalation route likely will not change the protectiveness of the remedies in place.

### Changes in Standards and To Be Considered

The information provided on Table 2 (attached) is pertinent to the remediation objectives stated in for the groundwater treatment system at SWMU 2. The system is currently in non-operation status, but the criteria are still valid. Table 2 provides the list of chemicals and the groundwater cleanup levels as they were established by the post-closure permit (2005). Also provided on Table 2 are the current maximum contaminant levels (MCLs) for each groundwater compound of concern.

As shown in Table 2, all of the current cleanup levels are equal to or more stringent than the promulgated MCLs, and therefore there is no change in the level of protectiveness.

### Changes in Risk Assessment Methods

There are no significant changes to risk assessment methodology or exposure assumptions outlined in the various risk assessments for individual sites that indicated a change in the level of protectiveness. The exposure parameters used to develop the corrective action objectives were standard default EPA values, with the exception of ingestion rate for construction workers. A value of 480 mg/day was used for the construction worker incidental soil ingestion rate, which is the high intake estimate as opposed to a conservative mean value. The exposure assumptions are valid and appropriate. The methodology for evaluating the vapor intrusion pathway has become more rigorous, but this does not affect the protectiveness of remedies implemented to date. At most of the sites VOCs are not COCs. The exceptions are SWMUs 12/15 and 2. At those SWMUs, there are no structures over source areas, institutional controls prevent future structures, and VOC contaminated groundwater is greater than 100 feet below ground surface.

#### Changes in Exposure

The land use is expected to remain industrial for most location. However, solid waste management units (SWMUs) 52b, 52d and 57 were clean closed since a reasonable future residential receptor was assumed. In the last five years, the Army reacquired those sites, and the residential scenario is now less likely. During the site visit, no changes in land use or zoning were found. It is important to highlight the potential for human exposures off site via residential and or agricultural use of contaminated groundwater without institutional controls prohibiting access to plume regions that extend beyond the site. An active network of monitoring wells and a groundwater management plan are already in place at TEAD.

#### Significant Finding

The information on human health in this memo indicates that the standards meet today's standards of protectiveness. The protectiveness of the selected remedies is considered adequate.

### **ENVIRONMENTAL HEALTH (ECOLOGICAL ASSESSMENT)**

#### Changes in Toxicity and Standards

The ecological risk assessment method and results for the Tooele Army Depot site are detailed in, Tooele Army Depot Revised Final Site-Wide Ecological Risk Assessment (Rust E&I, 1999). Unlike human health toxicity criteria issued by regulatory agencies, there are no generally accepted toxicity criteria or standards for ecological receptors. The toxicity criteria are usually agreed upon values. As such, the criteria used at the time the ecological risk assessment was conducted are still valid.

#### Changes in Risk Assessment Methods

The guidance documents referenced and the methodology used to assess ecological risk at the Tooele Army Depot are still relevant and appropriate.

### Changes in Exposure

The land use is expected to remain industrial. The disturbed arid habitat surrounding or within the investigated areas has not been expanded, nor have any restoration activities occurred that would provide more or different habitat. The criteria used to select receptors potentially exposed to site constituents are still valid. No changes in exposure or receptors are apparent.

### Significant Finding

The information on environmental health in this memo indicates that the standards meet today's standards of protectiveness. The selected remedy is protective of ecological health.

**TABLE 1:** Direct comparison between the 2001 toxicity values and current toxicity values  
The non-carcinogens' reference dose values for oral (RfDo) and inhalation (RfDi) pathways of exposure and the oral and inhalation cancer potency factors (SFo and SFi, respectively) are listed. The potentially significant changes are shaded.

Chemical	Ingestion Exposure				Inhalation Exposure				Comment
	RfDo mg/kg/day		SFo (mg/kg/day) <sup>-1</sup>		RfDi mg/kg/day		SFi (mg/kg/day) <sup>-1</sup>		
	TEAD	Current #	TEAD	Current#	TEAD	Current #	TEAD	Current#	
Antimony	4E-4	4E-4	-	-	-	-	-	-	
Arsenic	3E-4	3E-4	1.5	1.5	-	-	15	15	
Benzo(a)anthracene	3E-2	-	0.73	0.73 (n)	-	-	-	0.73 (n)	Based on benzo(a)pyrene.
Benzo(a)pyrene	3E-2	-	7.3	7.3 (n)	-	-	-	7.3	
Delta-Benzohexachloride	-	-	1.8	1.8	-	-	1.8	1.8	
Benzo(b)fluoranthene	3E-2	-	0.73	0.73 (n)	-	-	-	0.73 (n)	Based on benzo(a)pyrene.
Benzo(k)fluoranthene	3E-2	-	7.3E-2	7.3E-2 (n)	-	-	-	7.3E-2 (n)	Based on benzo(a)pyrene.
Beryllium	5E-3	2E-3	4.3	-	-	5.7E-6	-	8.4	
Cadmium	1E-3	5E-4	-	-	-	-	-	6.3	
Chlordane	5E-4	5E-4	0.35	0.35	2.5E-4	2E-4	0.35	0.35	
Chromium (total)	1	-	-	-	-	-	-	42	
Chromium VI	5E-3 (i)	3E-3	-	-	-	2.2E-6	41	2.9E+2	
Chrysene	-	-	7.3E-3	7.3E-3 (n)	-	-	-	7.3E-3 (n)	Based on benzo(a)pyrene.
4,4-DDT	5E-4 (i)	5E-4	0.34	0.34	-	5E-4	0.34	0.34	
4,4-DDE	-	-	0.34	0.34	-	-	-	0.34	

TABLE 1 Continued

Chemical	Ingestion Exposure				Inhalation exposure				Comment
	RfDo mg/kg/day		SFo (mg/kg/day) <sup>-1</sup>		RfDi mg/kg/day		SFi (mg/kg/day) <sup>-1</sup>		
	TEAD	Region IX#	TEAD	Region IX#	TEAD	Region IX#	TEAD	Region IX#	
Dibenzo(a,h)anthracene	3E-2	-	7.3	7.3 (n)	-	-	-	7.3 (n)	Based on benzo(a)pyrene.
Dieldrin	5E-5	5E-5	16	16	-	5E-5	16	16	
2,4-Dinitrotoluene	2E-3	2E-3	-	-	1.7E-3	2E-3	-	-	
Heptachlor	5E-4	5E-4	4.5	4.5	-	5E-4	4.5	4.6	
Indeno[1,2,3-c,d]pyrene	3E-2	-	0.73	0.73 (n)	-	-	-	0.73 (n)	Based on benzo(a)pyrene.
Lead	-	-	-	-	-	-	-	-	Lead is evaluated separately using the California EPA leadspread model.
RDX	3E-3	3E-3	1.1E-1	1.1E-1	3E-3	3E-3	1.1E-1	1.1E-1	
Thallium	8E-5	6.6E-5	-	-	-	-	-	-	
Xylenes	2.0	0.2	-	-	-	2.9E-2	-	-	
Zinc	0.3	0.3	-	-	-	-	-	-	

# Current toxicity values obtained from USEPA Integrated Risk Information System (IRIS, <http://www.epa.gov/iris/>) unless otherwise indicated

n National Center for Environmental Assessment (NCEA, <http://cfpub.epa.gov/ncea/>)

**Table 2: Chemical Specific Standards for SWMU 2, Groundwater Treatment System.**

Contaminant	Media	Current Cleanup Levels <sup>1</sup>	Current Standard (USEPA MCL)
Benzene	groundwater	5.0 ug/l	5.0 ug/l
Carbon Tetrachloride	groundwater	5.0 ug/l	5.0 ug/l
Chloroethane	groundwater	1.3 ug/l	None
Chloroform	groundwater	100 ug/l	None
1,1-Dichloroethane	groundwater	170 ug/l	None
1,2-Dichloroethane	groundwater	5.0 ug/l	5.0 ug/l
1,1-Dichloroethene	groundwater	7.0 ug/l	7.0 ug/l
1,2-Dichloroethene	groundwater	1.0 ug/l	cis-1,2-Dichloroethene (70 ug/l) trans-1,2-Dichloroethene (100 ug/l)
1,2-Dichloropropane	groundwater	5.0 ug/l	5.0 ug/l
Ethylbenzene	groundwater	700 ug/l	700 ug/l
Methylene Chloride	groundwater	5.0 ug/l	5.0 ug/l
Tetrachloroethene	groundwater	1.0 ug/l	5 ug/l
1,1,1-Trichloroethane	groundwater	200 ug/l	200 ug/l
Trichloroethene	groundwater	5.0 ug/l	5.0 ug/l
Toluene	groundwater	1000 ug/l	1000 ug/l
Xylenes	groundwater	10000 ug/l	10000 ug/l

MCL= Maximum Contaminant Level

<sup>1</sup> Table V-2, Tooele Army Depot Post Closure Permit, 2005

**Applicable or Relevant and Appropriate Requirements (ARARs)**

Applicable or Relevant and Appropriate Requirements (ARARs) are those criteria or requirements agreed upon by the remedial project team. In the case of Tooele Army Depot, the major ARAR is the Utah Risk Rule (UAC R315-101; DSHW, 2001). This rule indicates that active corrective measures are required for clean closure if the cumulative cancer risk is above 1E-6. However, no active remediation is required if the

risk range is between 1E-4 and 1E-6 for an industrial closure. This rule is consistent with current guidance from the USEPA and the State of Utah.

The Toxic Substances Control Act (<http://www.epa.gov/pcb/pubs/laws.html>) also regulates the manufacture, use and disposal of polychlorinated biphenyls (PCBs). The current industrial screening value (25 mg/kg) is the same as that used for remedial activities for Tooele Army Depot.

All ARARs used in the evaluation of remedies at Tooele Army Depot are still appropriate and valid.

#### Documents reviewed in the preparation of this Section

Dames and Moore, 1999. *Revised Final Proposed Plan, Operable Units 4 and 8, Tooele Army Depot, Tooele, Utah*. Dames and Moore, Bethesda, Maryland, December.

DSHW, 2001. *Administrative Rules for Cleanup Action and Risk-Based Closure Standards*. Utah Department of Environmental Quality. R315-101, Utah Administrative Code.

Rust E&I, 1999. *Tooele Army Depot Revised Final Site-Wide Ecological Risk Assessment*. Rust Environmental and Infrastructure. May

USAEC, US Army Environmental Center, 1994. *Tooele Army Depot North Record of Decision for Operable Units 5,6,7, and 10*. September.

URS, 2001a. *Corrective Measures Study Work Plan, Group A Suspected Releases SWMUs, Tooele Army Depot, Tooele, Utah*. Second Revised Final, URS, Bethesda, Maryland, April.

URS, 2001b. *Corrective Measures Study Work Plan, Group C Suspected Releases SWMUs, Tooele Army Depot, Tooele, Utah*. Second Revised Final, URS, Bethesda, Maryland, July.

URS, 2001c. *Final Decision Document, Group C Suspected Releases SWMUs, Tooele Army Depot, Tooele Utah*. URS, Bethesda, Maryland, July.

URS, 2001d. *Final Corrective Measures Study Report, Known Releases SWMUs 3, 11, 25, and 30, Tooele Army Depot, Tooele Utah*. URS, Bethesda, Maryland, December.

URS, 2001e. *Final Decision Document, Known Releases SWMUs 3, 11, 25, and 30, Tooele Army Depot, Tooele, Utah*. URS, Bethesda, Maryland, December.

URS, 2000. *Final Decision Document, Group B Suspected Releases, Tooele Army Depot, Tooele Utah*. URS, Bethesda, Maryland, October.

URS, 2006. *Draft Final Proposed Plan, Operable Unit 9, Tooele Army Depot, Tooele, Utah*. URS, Bethesda, Maryland, August.

**ATTACHMENT 11**  
**RAB MEETING MINUTES**



# TOOELE ARMY DEPOT (TEAD) TECHNICAL REVIEW COMMITTEE (TRC)/ RESTORATION ADVISORY BOARD (RAB)

MEETING MINUTES  
JULY 11, 2007

## ATTENDEES

### **Tooele Army Depot / US Army**

Larry McFarland – Tooele Army Depot  
Tom Turner – Tooele Army Depot  
Brad Wright – US Army Environmental  
Center

### **Federal / State Government**

Jim Kiefer – US EPA – Region 8  
John Dalton – US EPA – Region 8  
Helge Gabert – Utah DEQ – DSHW  
Rik Ombach – Utah DEQ - DERR  
Elise Erler – Utah Trust Lands Administration  
Dave Allison – Utah DEQ

### **US Army Corps of Engineers, Sacramento**

April Fontaine – USACE SPK-PM-H  
Lynn Appell – USACE SPK-ED-PM  
Carl Cole – USACE SPK-ED-GG/TEAD  
Doug Mackenzie – USACE SPK-ED-GE

### **Community Attendees**

Harry Shinton – Tooele County Sheriff,  
HAZMAT  
Tony Crites – Tooele County Emergency  
Management  
Mark Smith – Utah Industrial Depot  
Jesse Sablan – Utah Industrial Depot  
Greg Miller – Miller Motorsports Park

### **Environmental Contractors**

Ross Sollars - AEEC  
Ed Staes – Parsons  
Sarah Gettier – URS  
Rosa Gwinn - URS  
Mickelle Thackeray – EM-Assist, Inc.  
Dave Harris – Concordia Communications  
Carly Brown – Concordia Communications

The **Technical Review Committee/Restoration Advisory Board (TRC/RAB)** meeting was held on Wednesday, July 11th at 9:30 a.m., at the Tooele County Health Department, 151 North Main Street, Tooele, Utah.

1. Larry McFarland, Tooele Army Depot/US Army, called the meeting to order at 9:30 and welcomed participants and attendees. He explained his role as Program Manager and the intent of the meeting which was to provide a basic overview and status update of environmental cleanup projects underway in the Restoration Program at TEAD. Mr. McFarland then reviewed the agenda, provided as **Attachment 1**. He made special note that the presentation on the Operable Unit 9 Proposed Plan will fulfill the requirement for a public meeting, and any comments made will be documented by a court reporter.

## Presentations

2. **SWMU 10 – Composting Update** - April Fontaine, USACE Project Manager

Ms. Fontaine began by giving some background on SWMU 10. The site is comprised of 10,000 cubic yards of soil contaminated with TNT and RDX found in former facility washout ponds.

In 2000, the Corrective Measure selected was excavation and composting of explosives-contaminated soils, which will be left on-site once sampling confirms cleanup objectives have been met.

Ms. Fontaine said that early last year, when they looked to see if the funds allotted for the project were sufficient, it was discovered that the cost of natural compost had increased significantly. There was not enough money in the budget to accomplish the project as planned, so they began to look at alternative types of compost material. Ms. Fontaine said that there were several types of synthetic compost material on the market that would be within the budget restrictions.

A treatability study was performed to determine if the synthetic compost material Daramend ® would be effective at SWMU 10. As part of the study, they simulated full-scale treatment on 6.5 cubic yards of soil that was divided into two treatment cells for an anticipated four weeks of treatment. Although not physically divided, the two treatment cells were treated separately. For details on the 10-day treatability study process, see slide 3 of the presentation.

Ms. Fontaine showed a graph detailing the TNT treatment results (slide 5). She noted that concentrations began between 2,000 to 2,500 milligrams per kilogram (mg/kg), which represented average, if not high, concentrations seen at the site. Ms. Fontaine also noted that TNT is a particulate; although composite samples were collected it was difficult to get a uniform sample, which is why TNT concentrations fluctuated during the study. Treatment goals for TNT were met at nine weeks and although it took longer than expected, it was significant treatment during that time and was a proven success. Ms. Fontaine pointed out that composting is a temperature-dependant process and that the process itself is exothermic; they believe the cold weather in early April may have affected the process and temperatures will be considered as they implement the process site-wide.

On slide 6 Ms. Fontaine showed a graph detailing the RDX treatment results. She noted that concentrations began between 1,000 to 1,200 mg/kg. She said they were puzzled by RDX because there had been no change within six weeks. The Daramend ® supplier conducted tests, including tests on the water used in the study, because they had never seen Daramend ® treat one contaminant and not the other. During this time, RDX concentrations started to drop and treatment goals were met at 11 weeks.

Ms. Fontaine said that Corrective Action Objectives were met at 91 days of treatment which shows that the treatment does work at SWMU 10. She said that even though treatment took longer than expected, there was significant cost savings with the synthetic composting material compared to the natural

material originally planned. A Work Plan Variance will be submitted at the end of July that will document the treatability study and the changes to the work plan. The work in the field is hoped to begin in September. Ms. Fontaine said that as they start full-scale implementation, there are opportunities for efficiencies in the process. She said there are variables they can control, such as the temperature and moisture in the soil.

Ms. Fontaine concluded her presentation by reviewing the Corrective Measures Schedule. See slide 8 for details.

See slide 9 for a list of outstanding documents in order of priority.

Ms. Fontaine asked for questions.

Mr. Helge Gabert, Utah DEQ – As in the pilot study, was sampling done in a systematic fashion? I'm concerned about the end results of RDX and if they were done exactly the same way.

Ms. Fontaine: They followed a systematic sampling approach. It was exactly the same as the day you saw it; they did not vary the process. We wanted to follow a systematic approach so we could have confidence in the results. None of us wanted to get out there and have this not work.

**3. Groundwater Monitoring Program Status – Doug Mackenzie, USACE Technical Team Lead**

Mr. Mackenzie's overview indicated that he would cover a Sampling Events Status, Non-Operation Test (NOT) Monitoring and the Groundwater Management Area (GWMA) Monitoring.

He stated that quarterly sampling took place at 12 boundary wells in February. Semi-annual sampling took place at 80 wells in May and the sampling data will be available in late July.

Mr. Mackenzie discussed the Non-Operation Test (NOT) which includes plume boundary monitoring. Six wells in the north end of the depot were sampled quarterly and evaluated for a trend. There have been ten quarterly sampling events since shutdown in August 2004. The evaluation of the plume movement was done using combined Shewart/CUSUM statistical methods to analyze results.

Mr. Mackenzie then reviewed the statistical analyses. For details and graphs see slides 5-10. He noted that the wells he will be discussing are on the graphic at the end of the presentation handout. He then stated that the Shewart analyses show that none of the six wells have a variance greater than normal pre-shutdown variance. The CUSUM does show one well, (B-

34) with a trend beyond the control limit of 5.0. For details on well B-34 see slides 13-15. As a result of the statistical analysis the action is to continue to monitor the situation. Mr. Mackenzie stated that at this time a re-start of extraction is not yet warranted. He then went on to say that the magnitude of increase showed by well B-34 has been seen before.

Mr. Mackenzie then spoke about the groundwater management area. He reviewed the monitoring that has taken place which includes 16 quarterly sampling events. Evaluation for plume movement was again done by the combined Stewart/CUSUM methods. For details and graphs on the statistical analysis see slides 17-22.

The statistical evaluation was summarized by Mr. Mackenzie and he stated that three wells have enough values to perform the analysis and the remaining three have insufficient data at this time. The ambient data set was shifted to a more current time-frame by two to four events. The independence of the data is questionable at wells D3 and D5 due to low groundwater capacity. The analysis shows that none of the wells have a variance greater than normal pre-shutdown variance.

Mr. Mackenzie stated that the general monitoring program will continue on the same schedule as will the groundwater management area monitoring. The Spring 2007 Semi-annual report is due October 15, 2007. Three years of non-operation ends August 10, 2007. They are currently creating a plan to decide what will happen after August 10<sup>th</sup>. It is proposed that monitoring program continues, pending changes to the north boundary.

In summary, Mr. Mackenzie stated that there is one exceedance of CUSUM at the Main Plume but no active response beyond continued monitoring is proposed. He said there is no exceedance of statistical control limits at the Northeast Boundary Plume. SWMU 58 CMS will propose a groundwater corrective action that will be consistently applied for both plumes.

Mr. Mackenzie concluded his presentation and asked for questions.

Mr. Helge Gabert, Utah DEQ – With regard to well B-34, the CUSUM was done with the assumption that the ambient pool of data was not altered?

Mr. Mackenzie – No, we have scratched our heads and we have not yet come up with a proposal as to how to change it, but we haven't come to specific conclusions.

Ms. Fontaine – We agreed that in the end of the NOT report, we will provide recommendations on how to evaluate the data from here on out, but we're just barely to the end of NOT. The NOT report will contain recommendations for statistical analysis.

Mr. Harry Shinton, Tooele County Sherriff's Department – With regard to SWMU 58, we don't see an improvement with the cleanup system; what is the forecast for treatment?

Mr. Mackenzie – We began the non-operational test (NOT) on the system because the 5 microgram per Liter line hasn't changed over 10 years and we need to determine the true effect of the system on the plume. That was the purpose of the NOT. The results tell us the plume doesn't seem to be going anywhere. We're going to come up with a plan for the long-term. We're not going to be doing what we've been doing for the last 10 years, but there are no specific answers at this time.

Mr. Harry Shinton, Tooele County Sherriff's Department – Our proposed treatment for SWMU 58 may be to "do nothing"?

Mr. McFarland – At this time, no one knows. The treatment system doesn't work; this was why the study was done, to come up with a new remedy that will work. We could do a number of different things such as pump more water, soil vapor extraction at the source, inject something into the source, etc. Now, as far as do nothing, I doubt that. Pump and treat has not worked and no one involved with the project would tell you it ever will work.

Mr. Harry Shinton, Tooele County Sherriff's Department – A couple years ago at the RAB, there was a discussion that the plume was advancing towards Grantsville, then stopped, and then advanced back toward the facility. The discussion at that point was that progress was being made.

Mr. McFarland – This study shows that the thought that the pump-and-treat system was stopping the plume may not be true. Maybe this is as far as the plume will go, even if nothing is actively done to the plume. The system may have looked like it was treating it, but that may not have been happening. The system hasn't been operating for three years and it's not going anywhere, which is why the study was done.

Mr. Harry Shinton, Tooele County Sherriff's Department – What I'm getting at is: doing nothing is not an option? Will the State allow you to do nothing?

Mr. Helge Gabert, Utah DEQ – We are bound by our risk-based rules and administrative codes. Certain things must be in place to ensure we are being protective of human health and the environment. We need to wait until the completion of the RFI Phase II in order to see what remedies make sense under our rules, and they are aware of that. When the system began operation in 1994, it appeared to pull back the plume and that may be the case. The extraction wells were pulling in groundwater with TCE concentrations at 23 ppb, which is almost nothing. It didn't make sense to

spend that much money to control the plume and that's why it was decided to do an RFI for SWMU 58.

**4. SWMU 58 Phase II RFI/CMS Update – Ed Staes, Parsons Project Manager**

Mr. Staes presented a map with an aerial view of SWMU 58 and identified the Northeast Boundary (NEB) Plume and the Industrial area. He discussed the Vadose Zone investigation stages of the Phase II RFI. See slide 4 for descriptions of the stages. He then reviewed the monitoring well stages of the RFI. Installation of seven monitoring wells on the NEB Plume is complete. Installation of eight wells in the Industrial Area following the Stage II Vapor Investigation is complete. Installation of four wells following Stage III Vapor Investigation and two deep wells is complete. He noted that since the last RAB meeting there had been several tasks completed, which included: sampling VSG wells, the rebound test at Building 679 and sub-slab soil gas sampling at Bldg. 615. He noted that all major fieldwork is completed. He then listed the remaining tasks of the Phase II RFI which include: on-going soil moisture monitoring and development of the Phase II Report.

Mr. Staes discussed the Stage III groundwater monitoring wells. He stated that the objectives were to determine the TCE/PCE concentrations at potential source areas (near Buildings 611 and 620). He said they also wanted to determine the vertical distribution of TCE at Bldg. 615 and in the NEB Plume. They are also working to evaluate the changes in TCE concentrations near the landfill, to see if there was a connection between the landfill and the groundwater plume. Since the last meeting, the wells have been developed and sampled, and were also tested for deviation. He explained that well borings can deviate, or move horizontally, as they are installed and it is important to know if this is happened in order to get accurate groundwater levels. He said that the bottom of one well was 30 feet northeast of where its drilling started. They are working on the well reports.

Mr. Staes then reviewed maps of monitoring well locations on slides 10 and 12. Descriptions of the monitoring wells, including depth to groundwater and contaminant concentration, can be found on slides 11 and 13. Correction to the table on slides 11 and 13: concentration value is in parts per billion (ppb), not parts per-million (ppm). Mr. Staes pointed out that well ~~C-51F~~ showed PCE at 240 ppb because it is near Bldg. 620, where PCE was used as a solvent.

Mr. Staes discussed sub-slab soil vapor sampling at Bldg. 615. The purpose of the sampling was to evaluate vapor intrusion pathway risk for workers, evaluate the drains exiting the building as a source for TCE and to determine whether interim actions are needed. Mr. Staes detailed the soil vapor sampling process and passed around an example of the soil vapor

probe that was used during the sampling. He said that the results are not yet back.

Mr. Staes explained the pneulog vapor logging of a well used for soil vapor extraction at Bldg 679. The purpose of the logging is to determine if soil vapor extraction would work as a potential remedy at Bldg. 679. Other objectives are listed on slide 19. A diagram of the pneumatic well logging device and a picture of the sampling mechanism are included on slides 20 and 21. Pneulog results are detailed on the charts on slides 22 and 23. By looking at the charts, he said that most of the air is produced in areas with the shallow slope where soil is permeable; if the slope on the graph is steep or vertical, the soil is not yielding much air and permeability of soil is low. He said the pneulog helps determine the vapor flow through the soil and also allows them to see TCE soil vapor concentrations as a function of depth. He said the pneulog allows you to identify the areas of high concentrations and target the zones where remediation is most applicable. He said the Draft Final SWMU 58 RFI report will be available in November.

**5. Operable Unit 9: Proposed Plan Public Meeting – Sarah Gettier, URS Project Environmental Engineer, P.E.**

Ms. Gettier began her presentation by stating that this meeting fulfills the public meeting requirement and that a court reporter was present to take comments on the Proposed Plan. She asked that anyone making a comment should state their name for the record.

Ms. Gettier began her presentation by explaining that an Operable Unit is a group of sites; Operable Unit 9 (OU 9) sites are listed on slide 2 and shown on the map on slide 3. Slide 4 details the background on OU 9. She explained that the Proposed Plan is a public document that summarizes the Remedial Investigation and Feasibility Study; it also lists the alternatives evaluated for cleanup. She said the Record of Decision is the formal document that lists the recommended alternative.

Ms. Gettier then went over the nine evaluation criteria for each alternative listed on slide 5. Her remaining slides are organized by site, and will include the following information: site summary, site map, alternatives evaluated for cleanup, and the recommendations for the site (including the preferred alternative).

Chemical Range (SWMU 7), slides 7 to 9– Ms. Gettier explained that SWMU 7 was used for the testing of munitions and unexploded ordnance likely remains at the site. Beryllium is the contaminant of concern (COC) and was detected only slightly above the preliminary remediation goal in one sample. In 1997/1998 a formal removal action took place and they removed 80 tons of debris and stained soil from the site. Ms. Gettier said there were two

alternatives evaluated for SWMU 7: No action for a baseline comparison, and institutional controls, such as fencing or signs. The recommended alternative was institutional controls to prohibit residential use of the site.

Bomb Shell and Reconditioning Building (SWMU 23), slides 10 to 12 – SWMU 23 includes several active buildings primarily involved in the reconditioning of large munitions. COCs identified as PAHs and PCBs; The PCB concentration in one soil sample was at a level of 28 ppm, which is above the allowable level of 25 ppm under the Toxic Substances Control Act (TSCA). There were three alternatives evaluated for SWMU 23: No action for a baseline comparison, institutional controls such as fencing and signs, and excavation and off-post treatment and disposal. Ms. Gettier explained that since PCBs were above their allowable levels under TSCA, excavation and off-post treatment and disposal was selected as the recommended alternative for cleanup.

Wastewater Spreading Area (SWMU 35), slides 13 to 15 – SWMU 35 includes an area that collected wastewater from the former residential complex. Pesticides were identified as the COCs. In 2003, 68 tons of soil were removed from an adjacent site (SWMU 52D); during this removal, the soil with high pesticide concentrations were removed. Ms. Gettier said there were two alternatives evaluated at SWMU 35: No action for a baseline comparison, and institutional controls, such as fencing and signs. Ms. Gettier said institutional controls was selected as the recommended alternative at SWMU 35 to prevent residential use.

Ammunition and Engineering Directorate (AED) Test Range (SWMU 40), slide 16 – SWMU 40 was used extensively, which is indicated by unexploded ordnance, metal debris and rocket propellant debris. Explosives were identified as the COCs. The site is surrounded by a perimeter fence installed as a removal action in 2003, because of the potential for unexploded ordnance. Ms. Gettier said there were two alternatives evaluated at SWMU 40: No action for a baseline comparison, and institutional controls. The cost for institutional controls at SWMU 40 is higher than the other SWMUs because the cost of perimeter fence is included. The fencing is already installed at this site, and no additional fencing would be needed. The recommended alternative at SWMU 40 is institutional controls.

Ms. Gettier summarized the Proposed Plan. The preferred alternative at SWMUs 7, 35 and 40 is institutional controls; at SWMU 23, the preferred alternative is excavation and off-post disposal.

Ms. Gettier concluded her presentation and asked for questions. There were none.

6. Larry McFarland called the meeting to a close at 11:30.  
The next meeting is scheduled for Wednesday, November 14, 2007, 9:30 am at the Tooele County Department of Health – Auditorium.