

## 4825 Glenbrook Road N.W. Remedial Investigation Report

### Overview:

The project site is a residential property located at 4825 Glenbrook Road within the Spring Valley Formerly Used Defense Site (FUDS) in Northwest Washington, D.C. During the World War I era, the property was part of a larger area known as the American University Experiment Station, where the U.S. government researched and tested chemical agents, equipment and munitions. American University Experiment Station related waste, including munitions, laboratory glassware and contaminated soil has been recovered and safely removed from the property during investigations from 2000-2002 and then again from 2007-2010. In August 2010, several agencies within the Department of Defense as well as the regulatory partners, the U.S. Environmental Protection Agency and District Department of the Environment, made the decision to separate the 4825 Glenbrook Road N.W. property from the Spring Valley neighborhood site to expedite the cleanup process. This decision was based on the nature and extent of the American University Experiment Station related items found on the property, and the determination that these items were distributed across the property during the construction of the house in the early 1990s. The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) process will guide the selection and implementation of the remaining cleanup activities to achieve closure at the 4825 Glenbrook Road site.

### What is the Remedial Investigation Report?

The *Remedial Investigation Report* is the first of four necessary prerequisite documents for completing the cleanup at sites governed by CERCLA. This Remedial Investigation Report accomplishes four key objectives:

- Summarizes all of the environmental data collected at the site to date;
- Identifies and characterizes environmental contamination resulting from historical activities at American University Experiment Station,



4825 Glenbrook Road N.W. Property

including abandoned munitions and explosives of concern and glassware containing chemical agent;

- Assesses the risk to human health and the environment in the *Human Health Risk Assessment* section; and
- Supports the development and evaluation of cleanup alternatives leading to a *Final Decision Document*, in which the cleanup alternative is selected.

### What do we know about the site?

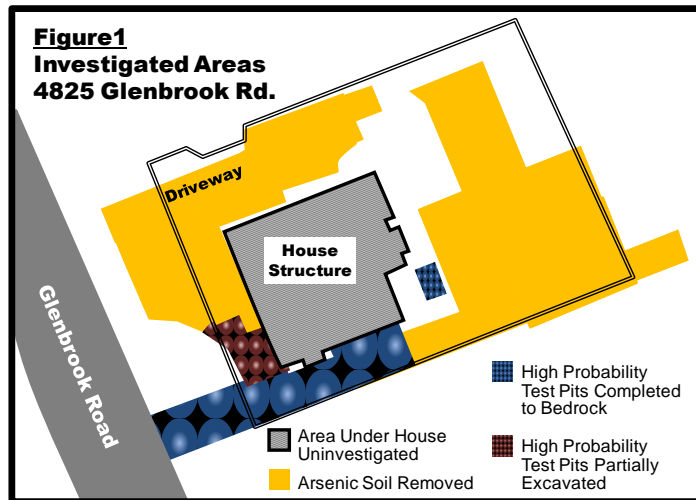
The U.S Army Corps of Engineers (USACE) performed numerous investigations at 4825 Glenbrook Road N.W. from 2000-2002 and 2007-2010. These efforts characterized the site, and included soil removal and the safe recovery of American University Experiment Station related laboratory glassware and buried munitions. Based on these previous investigations, the nature of contamination identified at the property includes:

- Munitions, including munitions containing chemical agent such as mustard;
- American University Experiment Station related laboratory glassware, including glassware containing chemical agent; and

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- Soil contaminated with arsenic, a residual product of the chemical agents tested at the American University Experiment Station.

Figure 1 illustrates the investigations that have been completed at the site to date. It shows the areas where arsenic-contaminated soil was removed and where suspected munitions burial pits were investigated.



**Arsenic Soil Removal:** Soil sampling results at 4825 Glenbrook Road N.W. showed areas with arsenic contamination above 20 parts per million, the limit that requires removal in the Spring Valley FUDS. From 2000-2001, USACE removed and disposed of the arsenic-contaminated soil. In 2009, arsenic-contaminated areas in and around the driveway, that were previously inaccessible due to hardscape, were removed. Areas where arsenic-contaminated soil was removed at the site are indicated in orange. There is still some arsenic impacted soil remaining at the property resulting from accessibility issues due to the presence of hardscape, such as the driveway.

**Buried Munitions Investigations:** From 2001-2002 and again from 2007-2010, USACE conducted subsurface investigations for American University Experiment Station related debris at 4825 Glenbrook Road N.W. The areas indicated in blue were excavated to bedrock from 2009-2010. This involved safely removing munitions items and other American University Experiment Station related items, including laboratory glassware. The bedrock depth ranged from 1.5 -12 feet below the ground surface. All recovered American University Experiment

Station related items were safely and effectively destroyed or disposed of.

### ***What does the Remedial Investigation Report conclude?***

Based on the current site conditions, the report concludes:

- Remaining arsenic detected in the driveway and near the back porch areas pose an unacceptable risk;
  - *Moderate* potential exists for munitions related hazards; and
  - *Low to moderate* potential risk exists for encountering containerized chemical warfare materiel, agent breakdown products and agent contaminated soil throughout the property, including beneath the house, due to the widespread distribution of burial pit contents prior to USACE investigations.

### ***What does the Remedial Investigation Report recommend?***

In conjunction with the CERCLA process, the report recommends cleanup alternatives be developed and evaluated to address the risks identified in the Remedial Investigation Report conclusions:

- Elevated levels of arsenic are present in the soil;
- Existing potential for American University Experiment Station related debris/glassware throughout the property, including beneath the house; and
- Existing potential for munition hazards at the site.

The **Feasibility Study** is the next required step in the CERCLA process and addresses the *Remedial Investigation Report* recommendation.

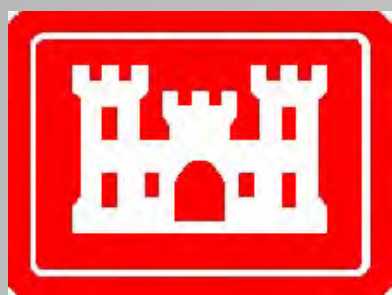
#### ***Where can I learn more?***

The CERCLA related documents for the 4825 Glenbrook Road site are posted on USACE's Spring Valley website (see below). Also posted are additional summary materials discussing the **Overview**, **Feasibility Study**, and **Proposed Plan**. To learn more, call our Community Outreach Office at 410-962-0157.

# REMEDIAL INVESTIGATION REPORT FOR 4825 GLENBROOK ROAD

SPRING VALLEY FORMERLY USED DEFENSE SITE (SVFUDS),  
OPERABLE UNIT 3, WASHINGTON D.C.

CONTRACT NO. W912DY-04-D-0005 DO 0007 AND DACA87-02-D-0005, TO DA01  
FUDS MEC/CWM PROJECT NO. C03DC091801 AND FUDS HTRW PROJECT NO.  
C03DC091802



*Prepared For:*

**U.S. ARMY ENGINEERING AND  
SUPPORT CENTER, HUNTSVILLE**

**U.S. ARMY CORPS OF ENGINEERS,  
BALTIMORE DISTRICT**



*Prepared by:*  
**PARSONS**  
Washington DC

July 29, 2011



# **REMEDIAL INVESTIGATION REPORT - 4825 GLENBROOK ROAD**

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**SPRING VALLEY FORMERLY USED DEFENSE SITE  
WASHINGTON, D.C.**

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FUDS MEC/CWM PROJECT NO. C03DC091801  
AND**

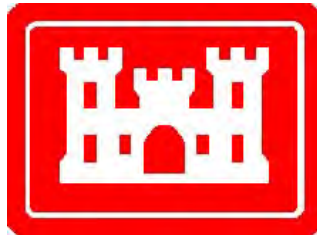
**CONTRACT NO. DACA87-02-D-0005, TO DA01  
FUDS MEC/CWM PROJECT NO. C03DC091801 and  
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**PREPARED FOR:**

**U.S. ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE**

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**U.S. ARMY CORPS OF ENGINEERS, BALTIMORE DISTRICT**



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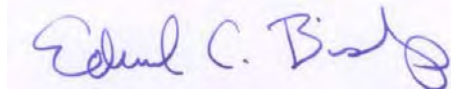
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July 29, 2011

## Preamble

This report summarizes the findings, conclusions, and recommendations of intrusive investigations conducted from 2000 to 2010 at 4825 Glenbrook Road, plus a summary of past investigations at the site from 1992 to 1999. The scope of this work was to perform an Engineering Evaluation/Cost Analysis and Remedial Investigation (RI) of Burial Pit 3 plus all low probability and high probability test pits at 4825 Glenbrook Road. This investigation for munitions and explosives of concern (MEC), chemical warfare materiel (CWM), and hazardous and toxic waste (HTW) was performed under the Defense Environmental Restoration Program/Formerly Used Defense Sites as a Non Time-Critical Removal Action in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act, (CERCLA) Section 104, and the National Contingency Plan, Sections 300.120(d) and 300.400(e).

The objective of this investigation was to characterize the nature and extent of MEC and chemical warfare materiel (CWM) at this property in order to remove and properly dispose of the related material and contamination. In support of this investigation, the site was physically characterized, fate and transport of contaminants was evaluated, and a baseline risk assessment and MEC Hazard Assessment were completed for both chemicals of potential concern and MEC, respectively. Related mobilization and demobilization and site restoration activities were completed in support of this work.

The U.S. Army Corps of Engineers initiated this site characterization work and removal action to ensure that immediate threats to the public and environment from the potential threats of MEC, CWM, and HTW-impacted soil were addressed concurrently. The site characterization activities, as documented herein, are considered to meet the requirements of CERCLA for an RI. The follow-on Feasibility Study will address remaining risks identified as being present at this property.

## Executive Summary

ES.01 Parsons was contracted by the U.S. Army Corps of Engineers (USACE), U.S. Army Engineering and Support Center, Huntsville (USAESCH), to perform a remedial investigation (RI) for the 4825 Glenbrook Road residential property. Currently owned by American University (AU), the property is part of the Spring Valley Formerly Used Defense Site located in northwest Washington, District of Columbia. The RI evaluation at 4825 Glenbrook Road was based on data collected from the past investigations from 1992 to 1999, and the recent investigations from 2000 to 2010 at the site. During the 1999 investigation, the United States Environmental Protection Agency (USEPA) Region III performed soil sampling and a risk assessment. The risk assessment (USEPA, 1999) identified potential “hot spots” of arsenic at 4801 and 4825 Glenbrook Road. The USEPA’s risk assessment concluded the soil of the three properties (4801, 4825, and 4835 Glenbrook Road) may have been impacted by AU activities. To determine the nature and extent of the potential impact, USACE performed a site investigation at these properties. The elevated arsenic concentrations detected at the 4825 Glenbrook Road property as a result of the arsenic sampling in 2000 lead to a series of investigations and removal activities at this property through 2010.

ES.02 During the period 2000 – 2010 the following investigations were performed at 4825 Glenbrook Road in accordance with the site-specific work plans included in Appendix S at the end of this report:

- Arsenic Sampling and Removal (2000-2001)
- Test Pits and Trenches Investigation (2001)
- 4825 Test Pit Investigation (TP 23) – (May 2001 – March 2002)
- Soil Gas and Driveway Boring ABP Soil Sampling (March 2007 – June 2007)
- Burial Pit 3 Investigation and Burial Pit 3 Extensions (October 2007 – March 2009)
- Low Probability Test Pit Investigation (March 2009 – August 2009)
- Arsenic Sampling and Removal in the Driveway (May 2009 – July 2009)
- High Probability Test Pits Investigation (November 2009 – April 2010)
- Geotechnical Soil Boring and Backyard Soil Sampling (August 2010)

ES.03 **Arsenic Sampling and Removal (2000-2001).** Parsons collected arsenic grid surface soil samples (0 to 6 inches below ground surface [bgs]) and six surface samples in the driveway to determine the extent and delineation of arsenic-contaminated soil. From September 2000 to March 2001, arsenic-contaminated soil identified during sampling from 25 grids was excavated under a non-time critical removal action.

ES.04 **Test Pits and Trenches Investigation (2001).** Twenty-three test pits (TPs) and two trenches were investigated in May and June 2001. No significant items were recovered during the investigation of these test pits and trenches, except at TP 23.

ES.05 **4825 Test Pit Investigation (TP 23) – (May 2001 – March 2002).** A Vapor Containment Structure was used as an Engineering Control Structure during the investigation of TP 23 after munitions and explosives of concern (MEC) were discovered. Eighteen

chemical warfare materiel (CWM) items and 406 munitions-related items were recovered. Glassware containing unknown liquids were placed into multiple round containers and transferred to the Edgewood Chemical Biological Center (ECBC) Central Transfer Facility (CTF) at Aberdeen Proving Ground, MD, for screening. Some of the bottles sent to the ECBC CTF were found to contain mustard and lewisite breakdown products. One 75mm projectile was analyzed by Battelle and was found to contain arsine. Battelle disposed of this item and two other items with potentially similar fill. Items also were observed and removed from beneath a retaining wall near the house foundation. Cultural debris and suspected American University Experimental Station (AUES)-related glassware was also encountered during the test pit investigations. Ordnance-related items were destructed during subsequent T-10 or T-30<sup>1</sup> operations or sent to Clean Harbors for destruction. All munitions scrap items were disposed at Onyx Incineration Facility, Port Arthur, TX, after demilitarization. CWM-related items were destroyed in the explosive destruction system (EDS).

**ES.06 Soil Gas and Driveway Boring ABP Soil Sampling (March – June 2007).** The soil gas sampling around the perimeter of the TP 23 with Summa canister and GORE SORBER® samples did not indicate significant concentrations of chemicals resulting from off-gassing and migrating up through the soil column from the contents of TP 23. Soil gas sampling was also performed in the driveway area. The soil gas sampling in the driveway detected two mustard agent breakdown products (ABPs); however, associated soil samples did not confirm ABP presence. Subsequent arsenic removal in Trench 2, which was a 40-foot long trench excavated in the driveway, did not contain suspected AUES-related debris.

**ES.07 Burial Pit 3 Investigation and Burial Pit 3 Extensions (October 2007 – March 2009).** Twenty-two MEC, six CWM and 80 MD items were recovered. These items were identified as 75mm projectiles, 2-inch and 3-inch pipes with end caps, 4.7-inch projectiles, and intact glass container. The 22 MEC items included 75mm projectiles and a 4.7-inch projectile. The CWM included one intact glass vial analyzed by ECBC to contain CWM and was destroyed by ECBC. Five 75mm projectiles were also categorized as CWM and later destroyed in the EDS. A total of eighty MD items were recovered during these investigations. Thirty-seven non-munitions scrap items were recovered. Metals, including aluminum, arsenic, cobalt, iron, magnesium, mercury, and vanadium, were detected at concentrations exceeding the accepted comparison levels<sup>2</sup> in some of the four grab samples, which were collected where AUES-related items were found or stained soil was observed during soil removal. Soil associated with these grab samples was subsequently removed during the Burial Pit 3 excavation. Analytical results for 11 pit characterization and 13 confirmation samples show that metals, including aluminum, arsenic, cobalt, iron, magnesium, manganese, thallium, and vanadium, exceeded the accepted comparison levels in some of these samples. All MEC and MD items were demilitarized and disposed. All non-munitions scrap items were also disposed in a non-hazardous landfill. All contaminated soil associated with the

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<sup>1</sup> T-10 and T-30 are transportable controlled detonation chambers used to demilitarize munitions of explosive concern (MEC) and closed-cavity munitions debris (MD) items.

<sup>2</sup> Accepted comparison levels are the higher of Spring Valley background levels or the USEPA Regional Screening levels (adjusted by 0.1 for non-carcinogens).



characterization/confirmation samples (floor and sidewall samples) exceeding the SV remediation goal for arsenic were removed from the Burial Pit 3 excavation floor and sidewalls. Analytical results from the Burial Pit 3 investigations concluded that ricin was not present at the Burial Pit 3 site and 4825 Glenbrook Road Property.

**ES.08 Low Probability Test Pit Investigation (March – August 2009).** Forty-one low probability test pits were completely investigated. Suspected AUES-related glassware debris was uncovered from one test pit (TP 117) at 6 feet bgs. This debris was headspaced and cleared headspace analysis. Little or no cultural debris were found in the remaining test pits. Seven low probability test pits were not investigated. TP 120 and TP 138 were initially investigated as low probability test pits and were investigated later as high probability test pits due to detections of agent/ABPs.

**ES.09 Arsenic Sampling and Removal in the Driveway (May – July 2009).** Previous arsenic soil sampling performed in 2000 identified arsenic-contaminated soil at three grids and a trench area in the driveway. Arsenic impacted soil exceeding concentrations of Spring Valley remediation level of 20 mg/kg was removed from the driveway except for a small area north of TP 109, adjacent to the 4835 Glenbrook Road retaining wall below 6 feet bgs. The area was backfilled to prevent undermining the retaining wall. Additional engineering design is required to safely excavate this area.

**ES.10 High Probability Test Pits (120, 134 and 138) Investigation (November 2009 – April 2010).** Thirty-seven CWM, two MEC, three MD items and 105 scrap items were recovered during the investigation of TPs 120, 134 and 138. Twenty-six of the 37 suspect CWM items were analyzed and destructed by ECBC. Agent/ABPs and industrial chemicals such as chloroacetophenone, diphenylchloroarsine, and arsenic trichloride ( $AsCl_3$ ) were detected in these containers. Among the CWM items recovered from TP 134, a pressure cylinder and eight scrap items were later decontaminated, cleared for headspace, and incinerated at licensed incineration facilities. Two CWM items from TP 138 also were decontaminated, cleared for headspace, and incinerated at licensed incineration facilities. MEC and MD items recovered were demilitarized and disposed at a metal smelter. Agent/ABPs impacted soil excavated during the investigation was placed in drums and disposed at Veolia Incineration facility in Port Arthur, TX. Metals detected in agent/ABP-cleared grab samples that exceeded the accepted comparison levels included aluminum, thallium, arsenic, iron, and magnesium. Grab sample results show that soil exceeding the SV remedial goal still remain in this area. The investigation was ceased due to detection of  $AsCl_3$  in a vapor and solid samples. The site was rendered safe by backfilling and awaits further remedial action.

**ES.11 Geotechnical Soil Boring (August 2010).** The six geotechnical borings advanced inside the basement of the 4825 Glenbrook Road house encountered saprolite at depths between 8 inches and 14 inches in all borings. Refusal was encountered in two locations (GS-01 and GS-02) near the backyard of the house at depths of 12 inches and 13.5 inches bgs, respectively. Water was encountered in the other four borings (GS-03 through GS-06) at depths between 84.5 inches to 98 inches bgs. Soil encountered beneath the house appeared to be native soil. Neither suspected AUES-related debris nor cultural debris were encountered during the investigation. Analytical results of the six agent cleared soil samples show that no exceedance was detected in GS-01 and GS-02. Metals, including aluminum and vanadium,

were detected at concentrations exceeding the accepted comparison levels in GS-03. The aluminum concentrations exceeded the comparison level in GS-04 through GS-06.

**ES.12 Backyard Soil Sampling (August 2010).** The backyard soil sampling performed for agent/ABP confirmation show that lewisite was detected with J qualifier in two samples (SW-4825GB-MM-2 and SW-4825GB-PP-2) collected at 3 feet bgs near the back porch. The backyard soil sampling consisted of 15 sample locations. Analytical results of two soil samples cleared for agent/ABPs show that metals, including aluminum, manganese, and vanadium, were detected at concentrations exceeding the accepted comparison levels.

**ES.13** Approximately 530 tons of non-hazardous soil excavated during the Burial Pit 3, and approximately 2,326 tons of arsenic-impacted soil (exceeding the Spring Valley remedial action level of 20 mg/kg) and non-hazardous soil excavated during the high probability test pit investigations, were removed from the property and disposed off-site at the King and Queen County Landfill in Plymouth, VA, as non-Resource Conservation and Recovery Act (RCRA) hazardous waste. Approximately 75 tons of agent/ABP impacted waste were removed from the property and disposed off-site at Veolia Incineration facility at Port Arthur, TX. Aqueous investigation-derived waste (IDW) generated from the investigation activities were characterized and disposed at DuPont Chamberworks in Deepwater, NJ.

**ES.14** Table ES.1, at the end of the executive summary, summarizes the CWM and munitions-related items recovered during all previously described investigations at 4825 Glenbrook Road. Based on results of these investigations performed between 1992 and 2010, a Human Health Risk Assessment (HHRA) and a Munitions and Explosives of Concern Hazard Assessment (MEC HA) were performed.

**ES.15 Human Health Risk Assessment.** The HHRA results show the cumulative cancer risk estimates for adult and child residents, child recreational green space users, and outdoor workers exposed to surface soil (*i.e.*, 0-0.5 feet or 0-2 feet bgs) and for outdoor workers exposed to mixed soil (0-12 feet bgs), are all within the USEPA target risk range of  $1 \times 10^{-6}$  to  $1 \times 10^{-4}$ . Thus, unacceptable cancer risks to the receptors at the site are not expected from assumed exposures to chemicals of potential concern (COPC) in soil. However, the cumulative cancer risk estimate of  $2 \times 10^{-4}$  for residents exposed to arsenic in mixed soil exceeds  $1 \times 10^{-4}$ . Elevated arsenic areas were identified in two locations: the driveway and TP 138 location.

**ES.16** The hazard indices (HI) estimated for the following receptors is below the benchmark of 1 under the RME and CT scenarios:

- Adult and child residents exposed to surface soil (0-2 feet bgs),
- Child recreational green space users exposed to surface soil (0-0.5 feet bgs), and
- Outdoor workers exposed to surface soil (0-2 feet bgs) and to mixed soil (0-12 feet bgs)

Thus, unacceptable hazard to the receptors at the site are not expected from assumed exposures to COPCs in soil. However, the HI estimated for residents at the site exceeds the benchmark of 1 for mixed soil (0-12 feet) under the RME scenario for exposure to arsenic.

**ES.17** Mustard agent and ABPs were only detected in the vicinity of high probability test pits (TP 120, TP134, and TP 138). This soil was removed and disposed off-site at the Veolia

incineration facility in Port Arthur, TX. Therefore, mustard agent and ABPs were not selected as COPCs in the HHRA.

ES.18 Lewisite or lewisite breakdown products were also detected and removed in the vicinity of TP 120, TP134, and TP 138. However, lewisite or lewisite breakdown products still remain in soil under the back porch near TP 138. Lewisite was, therefore, selected as a COPC. However, HHRA results determined lewisite concentrations detected in the remaining in-place soil samples do not pose unacceptable risk (*i.e.*, <benchmark level of 1).

ES.19 Investigation of TP 120 and TP 134 was halted when arsenic trichloride was detected. Since TP 120 and TP 134 were not cleared and no soil confirmation samples were collected, there are probable risks associated with exposure to CWM containers, and agent/ABPs impacted soil may still remain at these locations.

ES.20 Both containerized CWM and agent/ABP impacted soil were found in three high probability test pits (TPs 120, 134, and 138) located near the house. Two MEC items were uncovered from TPs 120 and 134 excavations. Six borings were advanced in the basement and although no MEC, CWM containers, agent/ABP impacted soil, and suspected AUES-related debris were encountered in those borings, bedrock was not encountered in the mid to front portions of the house and the spacing of the borings did not eliminate the potential that there may be undiscovered MEC, containerized CWM, AUES-related debris, and agent/ABP impacted soil beneath the building.

ES.21 During the sewer line restoration in 2011, a 75mm projectile and an intact AUES glass flask with a dirt or cork plug containing a small quantity of brown solid were uncovered in an area adjacent to a previously excavated area in 2001. Lewisite was detected in the solid sample collected from the flask. The discovery of these items indicates potential risks remain in uninvestigated areas at the site.

ES.22 **Munitions and Explosives of Concern Hazard Assessment.** The MEC Hazard Assessment (HA) results show that the munitions response site (MRS) at 4825 Glenbrook Road has a total MEC HA score of 615 under the Current Site Conditions (No Residential Use or Subsurface Clearance) scenario, which equates to a Hazard Level of 3. A Hazard Level of 1 indicates the highest potential explosive hazard conditions and a hazard level of 4 indicates low potential explosive hazard conditions. Under the No Action (Residential Use, No Subsurface Clearance) scenario, the MRS has a total MEC HA score of 640, which also equates to a Hazard Level of 3. These hazard levels both indicate an MRS with “moderate potential explosive hazard conditions.” The two remedial scenarios involving subsurface MEC clearance resulted in the greatest reduction from the baseline MEC HA score and Hazard Level. The Subsurface Clearance, Future Residential Use scenario reduced the MEC HA score to 355 and a Hazard Level of 4, while the Subsurface Clearance, Land Use Controls (LUC), Future Recreational Use scenario also reduced the MEC HA score to 360 and a Hazard Level of 4. A Hazard Level of 4 indicates “low potential explosive hazard conditions.” The No Subsurface Clearance, LUCs, Future Recreational Use scenario did reduce the MEC HA score to 565, but not sufficiently to reduce the Hazard Level for the site. It should be noted that the MEC HA was not developed to assess chemical munitions and its results are a qualitative assessment of explosive hazard.

ES.23 **CWM Hazards Assessment.** The conceptual site model (CSM) developed for this site was based on historical information and photographic interpretation. Based on the historical data, the CSM assumed that burial pits could be located. The investigation results show that CWM was found in TP 138 near the back porch, and TP 134 near the front door. Both locations are surrounding the house. Burial pit 3 was also located near the house. Based on all past investigations at the site, it is believed that the developer of the property partially disturbed the original burial pit(s). As such, there is a high potential for CWM to be located throughout the site in areas that have not been investigated/excavated to saprolite/bedrock.

ES.24 **Conclusions.** The investigation results and evaluations concluded the following:

- The site at 4825 Glenbrook Road was impacted by AUES activities.
- Burial Pit 3 was investigated, and MEC, CWM, and AUES-related items, and arsenic-affected soil was removed.
- TP 120 and TP 134 require further remedial action, and seven remaining low probability TPs (135, 136, 139, 140, 143, 144, and 145) remain to be investigated.
- The discovery of  $\text{AsCl}_3$  required work at the site to be placed on hold pending evaluation of the effectiveness of engineering controls to address this contaminant.
- HHRA concluded that arsenic detected in the area north of TP 109 near the 4835 Glenbrook Road retaining wall and in the floor of TP 138 poses unacceptable risk for residents. Remedial action is warranted to mitigate the unacceptable risk and hazard from arsenic in the soil.
- Although mustard (H), lewisite (L), and ABPs were either not detected or the detected concentrations do not pose unacceptable hazards in the remaining samples, the potential for encountering these compounds is high in areas that were not investigated, especially near TPs 120 and 134. Mustard, Lewisite and ABPs are indicators for additional sources of buried contamination on this property. Items previously recovered at the property indicate it is likely that additional containerized CWM, ABPs, and agent /HTW contaminated soil remain in the subsurface.
- The widespread distribution of contaminants, especially AUES associated glassware, provides evidence the burial pit contents were redistributed across the site prior to the current investigations. Therefore, potential for encountering additional AUES-related debris/glassware throughout the property, including beneath the house is highly possible and poses a risk for residents.
- Subsurface Clearance with Future Residential Use and Subsurface Clearance, LUCs, Future Recreational Use scenarios would be the most effective with regard to reducing potential MEC hazards at the 4825 Glenbrook Road property.

ES.25 **Recommendations.** Based on the results and conclusions of these investigations, a Feasibility Study is recommended for 4825 Glenbrook Road to develop alternatives and perform an analysis of those alternatives to mitigate the risk remaining at the site associated with MEC, CWM, ABP and arsenic-contaminated soil identified in the RI.

**Table ES.1 Recovered CWM and Munitions-Related Items Summary at 4825 Glenbrook Road**

<b>Investigation Area</b>	<b>CWM Glassware</b>	<b>CWM Munitions</b>	<b>Total CWM items</b>	<b>MEC</b>	<b>MD</b>	<b>Scrap</b>
TP 23		18	18	73	333	No Record
Burial Pit 3 and East Extension	1	5	6	22	80	37
TP 138	2		2			10
TP 120	5		5			21
TP 134	30		30	2	3	74
Sewer Line	1		1		1	
<b>Total:</b>	<b>39</b>	<b>23</b>	<b>62</b>	<b>97</b>	<b>417</b>	<b>142</b>

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## Acronyms and Abbreviations

ABP	agent breakdown product
ADR	automated data review
APG	Aberdeen Proving Ground
ALSI	Analytical Laboratory Services, Inc.
AMSL	above mean sea level
AsCl <sub>3</sub>	arsenic trichloride
ASTM	American Society for Testing and Materials
ATSDR	Agency for Toxic Substances and Disease Registry
AU	American University
AUES	American University Experiment Station
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CACM	chemical agent contaminated media
CAFS	chemical agent filtration system
CARA	CBRNE analytical remediation activity
CBRNE	chemical biological radiological nuclear and explosives
CENAB	U.S. Army Corps of Engineers, Baltimore District
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
Clark 1	Diphenylchloroarsine
Clark 2	Diphenylcyanoarsine
CN	Chloroacetophenone
COC	contaminant of concern
COPC	contaminant of potential concern
CPJA	Charles P. Johnson and Associates
CRZ	contamination reduction zone
CSM	conceptual site model
CT	central tendency
CTF	Central Transfer Facility
CVAA	chlorovinylarsenous acid
CVAO	chlorovinylarsenous oxide
CWA	chemical warfare agent
CWM	chemical warfare materiel
DA	Department of the Army

DA	Diphenylchloroarsine
DAAMS	depot area air monitoring system
DC	Diphenylcyanoarsine
DDOE	District Department of the Environment
DERP	Defense Environmental Restoration Program
DO	Delivery Order
DoD	Department of Defense
ECBC	Edgewood Chemical Biological Center
ECS	Engineering Control Structure
ECS	Environmental Consulting Services
EDS	Explosive Destruction System
EE/CA	Engineering Evaluation/Cost Analysis
ERT	Earth Resources Technology, Inc
EPIC	Environmental Photographic Interpretation Center
EZ	exclusion zone
FUDS	formerly used defense site
G-858	Geometrics <sup>®</sup> G-858 magnetic gradiometer
GC/MS	Gas Chromatography-Mass Spectrometry
GPL	GPL Laboratories
H	mustard
HA	hazard assessment
HCl	hydrochloric acid
HCN	hydrogen cyanide
H	bis(2-chloroethyl)sulfide
HE	high explosive
HEPA	high efficiency particulate air
HTW	hazardous and toxic waste
IDW	investigation-derived waste
IHF	interim holding facility
L	Lewisite
K <sub>OC</sub>	organic carbon partition coefficient
K <sub>Ow</sub>	octanol-water partitioning coefficient
LUC	land use control
MACS	modular aluminum containment structure
MARB	Materiel Assessment Review Board

MC	Munitions Constituent
MD	munitions debris
MEC	munitions and explosives of concern
mph	miles per hour
MINICAMS	miniature chemical agent monitoring system
MRCs	multiple round containers
MRS	munitions response site
NAD 83	Maryland State Plane Coordinate System
NMR	nuclear magnetic resonance
NTCRA	non-time critical removal action
OSHA	Occupational Safety and Health Administration
OSR	Operation Safe Removal
OU	Operable Unit
PAH	polynuclear aromatic hydrocarbons
Partners	Spring Valley Partners (CENAB, USAESCH, USEPA, and DDOE)
PDS	personnel decontamination station
PHR&A	Patton Harris Rust & Associates
PID	photoionization detector
PINS	portable isotopic neutron spectroscopy
POI	point of interest
PPE	personal protective equipment
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RAD	Removal Action Design
RCRA	Resource Conservation and Recovery Act
RCWM	recovered chemical warfare materiel
RfD	oral reference dose
RfC	inhalation reference concentration
RI	remedial investigation
RME	reasonable maximum exposure
ROE	right of entry
RSL	regional screening level
SAP	sampling and analysis plan

SEDD	staged electronic data deliverable
SF	slope factor
SSHO	site safety and health officer
SSHP	site safety and health plan
SSS	site safety submission
SSWP	site-specific work plan
SWWP	site-wide work plan
STEL	short term exposure limit
SVFUDS	Spring Valley formerly used defense site
SVOC	semivolatile organic compound
SZ	support zone
TAL	target analyte list
TCLP	toxicity characteristic leaching procedure
TP	test pit
TE	technical escort
TIC	tentatively identified compound
TO	task order
URF	unit risk factor
USACE	U.S. Army Corps of Engineers
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
USAESCH	U.S. Army Engineering and Support Center, Huntsville
USCS	Unified Soil Classification System
USEPA	U.S. Environmental Protection Agency
UTL	upper tolerance limit
UXO	unexploded ordnance
V	Volt
VCC	vapor containment cover
VCS	vapor containment structure
VOC	volatile organic compound
XRF	X-Ray fluorescence
ZES	Zimmer Environmental Solutions



## SECTION 1. INTRODUCTION

### 1.1. PROJECT AUTHORIZATION

1.1.0.1 The purpose of this Remedial Investigation Report is to summarize the findings and conclusions of the recent intrusive investigations conducted by the U.S. Army Corps of Engineers (USACE) from 2000 to 2010 and the previous investigations performed from 1992 to 1999, and provide related recommendations. Recent investigation activities include arsenic grid sampling and removal, test pits and trenches investigation, soil gas sampling, Burial Pit 3 and extensions investigations and over-excavation, arsenic-impacted soil removal in the driveway, geotechnical boring and backyard sampling, and low probability and high probability test pit investigations at 4825 Glenbrook Road. The property is located within the Spring Valley Formerly Used Defense Site (SVFUDS) in Washington, D.C. The location of SVFUDS is presented in Figure 1-1, provided at the end of this section. Work required under this Scope of Work falls under the Defense Environmental Restoration Program/Formerly Used Defense Sites (DERP/FUDS), Project No. C03DC091801 and FUDS/Hazardous Toxic and Radioactive Waste (HTRW) Project No. C03DC091802. Work performed between 2000 and 2007 was conducted under Contract No. DACA87-00-D-0038, Delivery Order (DO) No. 0010, with the U.S. Army Engineering and Support Center, Huntsville (USAESCH). The remaining tasks except the Human Health Risk Assessment (HHRA) were performed under a DO of Contract No. W912DY-04-D-0005, DO 0007, for USAESCH. The HHRA was performed under Parsons Contract DACA87-02-D-0005, Task Order (TO) DA01 for USACE Baltimore District (CENAB). All work was performed in compliance with applicable federal, state, and local guidance as required under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA). All activities involving areas potentially contaminated with recovered chemical warfare materiel (CWM) were conducted in full compliance with USAESCH, USACE, Department of the Army (DA), and Department of Defense (DoD) requirements regarding personnel, equipment, and procedures.

1.1.0.2 Parsons completed these investigations under these USAESCH and CENAB contracts. The USACE and CENAB provided overall operations support. Other organizations providing technical input on this project included the U.S. Environmental Protection Agency (USEPA), and the District Department of the Environment (DDOE) (formerly known as the District of Columbia Department of Health). CENAB, USAESCH, USEPA, and DDOE constitute the Spring Valley Partners (Partners). Parsons subcontracted with Zimmer Environmental Solutions (ZES), GPL Laboratories (GPL), Analytical Laboratory Services, Inc. (ALSI), and Charles P. Johnson and Associates (CPJA) for additional site services and sample analysis. Edgewood Chemical Biological Center (ECBC) for air monitoring and CWM analysis and the Chemical Biological Radiological Nuclear and Explosives (CBRNE) Analytical Remediation Activity (CARA) for Technical Escort (TE) of CWM handling, assessment and transport support provided services under contract with USAESCH. Table 1.1 lists the site parties and their responsibilities. Additional Parsons subcontractors are listed in Table 1.1.

**Table 1.1 Agencies/Contractors Performing Work**

<b>Organization</b>	<b>Responsibility</b>
CENAB	Geographic Military District (Project Manager, Site Operations Officer)
USAESCH	Implementing Agency (Technical Manager for RCWM, Safety Specialist)
Product Manager for Non-Stockpile Chemical Materiel	Transport and Disposal of RCWM
CARA	TE for RCWM Handling, Transport, and Assessment
ECBC	Agent/Industrial Chemical Air Monitoring and Analysis of RCWM/agent breakdown products
Parsons	Contractor (Site Manager, Project Safety and Health Officer, and Site Safety Health Officer), Excavation Team, and Landscape Architect
Human Factor Applications Inc.	Parsons Safety observers and personnel for oversight of chemical warfare materiel excavation (2000-2002)
American Waste Service	Site Support and Hazardous and Toxic Waste (HTW) Disposal (2000-2002)
ZES	Site Support and HTW Waste Disposal
CPJA	Surveyor
GPL/ALSI	Analytical Laboratories
Traffic Engineering Services	Traffic Control and Permit Expediting Services
Bloch Consulting Group	Landscape Estimator
Bunker Hill Inc.	Site Restoration and Maintenance
MC Dean	Electrical Contractor
Patton Harris Rust & Associates Environmental Consulting Services	Compaction Service

<b>Organization</b>	<b>Responsibility</b>
Columbia Technology	Geotechnical Soil Borings
Battelle (Aberdeen, MD)	Laboratory and Destruction Services contracted by ECBC (arsine destruction)
Clean Harbors (Norwell, MA)	Destruction Services (munitions debris items destruction)
Onyx Incineration Facility (Port Arthur, TX)	Incineration Facility
King and Queen County Landfill (Little Plymouth, VA)	Non Hazardous Special Waste Landfill
Veolia Port Arthur Incineration Facility (Port Arthur, TX)	Incineration Facility
Veolia Sauget Incineration Facility (Sauget, IL)	Devalve Incineration Facility (pressure cylinder which was devalved)
DuPont Chamberworks Treatment Facility (Dupont, NJ)	Aqueous Waste Disposal Facility

## 1.2. OBJECTIVES AND SCOPE

1.2.0.1 The overall scope of the remedial investigation (RI) at 4825 Glenbrook Road was to investigate the presence of World War I chemical warfare materiel (CWM), CWM precursor chemicals or chemical agent breakdown products (ABP), or related munitions from activities performed from 1918 to 1920 at the U.S. Army American University (AU) Experiment Station (AUES).

1.2.0.2 The objective for an RI is to determine the nature and extent of contamination, and to determine if the contamination poses an unacceptable risk to human health and the environment. The specific objectives of the RI at 4825 Glenbrook Road are as follows:

- Locate and recover all abandoned CWM, CWM precursor chemicals, or ABPs through the investigation efforts;
- Locate and recover all abandoned munitions through the investigation efforts;
- Remove arsenic-contaminated soil via Non-Time Critical Removal Actions (NTCRA);
- Summarize all environmental data collected for the site;
- Identify and characterize environmental contamination resulting from historical activities at AUES;

- Assess the risk to human health and the environment resulting from environmental contamination caused by historical activities at AUES; and
- Prepare an RI report to document and summarize results of the investigation activities and provide data for development of remedial alternatives leading to a Decision Document for the site and subsequent remediation.

Groundwater is being evaluated in the site-wide RI and is not included in this evaluation.

### **1.3. BACKGROUND**

#### **1.3.1. Site Location**

The 4825 Glenbrook Road site is located in the south central portion of the SVFUDS, situated in the northwest section of Washington, D.C. (Figure 1-1). The property is a single family, detached residential dwelling owned by American University. A Site Plan depicting the property layout is included as Figure 1-2.

#### **1.3.2. Site History**

1.3.2.1 During World War I, the U.S. Government established the AUES to investigate the testing, production, and effects of noxious gases, antidotes, and protective masks. The AUES, which was located on the grounds of the current AU, used additional property in the vicinity to conduct this research and also, development of CWM, including mustard (H) and lewisite (L) agents, as well as adamsite, irritants, and smokes. After the war, these activities were transferred to other locations, AUES was demobilized, and the site was returned to the owners. During demobilization, CWM and agents were disposed in on-site pits and trenches. Additional information on the history of the AUES operations is provided in the RI Report (USACE, 1995).

1.3.2.2 During a 1997 review of the 1995 RI (USACE, 1998), it became apparent that the area investigated during the 1995 RI as Point of Interest (POI) No. 24 was not the actual location of POI No. 24 (POI No. 24 was identified as a probable pit through interpretation of a 1918 aerial photograph). POI No. 24 was actually located on the grounds of 4801 Glenbrook Road, not on the AU campus as originally thought. To further evaluate the situation, the USACE performed a geophysical investigation of the grounds at 4801 Glenbrook Road to locate and characterize the potential chemical warfare agent burial pit. It was determined that two geophysical anomalies on the grounds of 4801 Glenbrook Road had the potential characteristics of pits or trenches. The pits (Burial Pits 1 and 2) were excavated and all CWM, ordnance and explosives, and hazardous items were removed for eventual appropriate off-site disposal.

1.3.2.3 To address concerns by the DDOE that the Operation Safe Removal (OSR) FUDS RI did not completely address the potential for contamination within Operable Unit (OU)3 DDOE, the USEPA Region III performed soil sampling and a risk assessment in 1999. The risk assessment (USEPA, 1999a) identified potential “hot spots” of arsenic at 4801 and 4825 Glenbrook Road. Based on the USEPA Region III sampling, historical information, and the USEPA’s risk assessment, it was determined that the soil of three properties (4801, 4825, and 4835 Glenbrook Road) may have been impacted by AUES activities in the vicinity of the two burial pits (Burial Pits 1 and 2) located on the 4801 Glenbrook Road property. Consequently,

the USACE performed an Engineering Evaluation/Cost Analysis (EE/CA) for OU-3 (USACE, 2000a). This EE/CA investigation included extensive sampling to determine the nature and extent of contamination found in the surface and subsurface soil of OU-3. The OU-3 EE/CA and baseline risk assessments for 4801, 4825, and 4835 Glenbrook Road addressed the potential hazard associated with arsenic contamination in the soil. The EE/CA was conducted to evaluate and select the preferred alternative to address arsenic soil contamination. The conclusion of the risk assessment was that there was unacceptable risk with regard to exposure to arsenic in the surface soil. The arsenic-contaminated soil should be excavated and properly disposed. The arsenic-impacted soil was removed in 2001 and a series of investigation activities occurred at these properties through 2010.

### 1.3.3. 4825 Glenbrook Road Previous Investigation Activities (1992 – 1999)

Table 1.2 lists the previous and recent investigation activities performed at this property. Previous investigations across the entire SVFUDS are described in detail in Subchapter 1.8 of the Site-Wide Work Plan (SWWP) (USACE, 2007c). The following describes the previous investigations carried out on the 4825 Glenbrook Road property. Section 2 discusses the current investigations in detail.

**Table 1.2 Timeline of Investigative Activities at 4825 Glenbrook Road**

ACTIVITY	DATE	SECTION
Environmental Management Systems Investigation	1992	1.3.3.1
USACE Soil Sampling	1994	1.3.3.2
USEPA Surface Soil Sampling Event	1994	1.3.3.3
Geophysical Investigation	1999	1.3.3.4
XRF Sampling	4/23/1999	1.3.3.5
USEPA Sampling Event 2 (surface and subsurface)	6/9/1999 to 6/10/1999	1.3.3.6
Previous Investigation Analytical Results	1992-1999	1.3.3.7
Grid Surface Soil Sampling	9/21/2000	2.2.1
Arsenic Soil Excavation (NTCRA)	12/2000 to 3/2001	2.2.2
Test Pit Investigation (property-wide)	5/21/2001 to 6/23/2001	2.3
TP 23 Investigation	5/31/2001 to 3/28/2002	2.3.1
Temporary Backfill of TP 23	5/21/2002 to 5/30/2002	2.3.2
Soil Gas and Driveway Boring ABP Soil Sampling	3/2007 & 6/2007	2.4
Burial Pit 3 Investigation and Burial Pit 3 Extensions Investigations	10/2007 – 3/2009	2.5 & 2.6
Low Probability Test Pit Investigations	3/2009 – 8/2009	2.7
Arsenic Sampling and Removal in Driveway	5/2009 – 7/2009	2.7.2
High Probability Test Pits Investigation	11/2009 – 4/2010	2.8
Geotechnical Borings and Backyard Sampling	8/2010	2.10 & 2.11

### **1.3.3.1. Environmental Management Systems Investigations - 1992**

1.3.3.1.1 In 1992, AU contracted Environmental Management Systems (EMS) to investigate conditions discovered during construction activities in the vicinity of what would become the 4825 and 4835 Glenbrook Road properties. At that time, the properties were under construction and the EMS letter reports from May and June 1992 (EMS, 1992) are not detailed sufficiently to determine the exact locations of the incidents described or the sampling performed. However, as a conservative approach, these data were used in the HHRA. Workers reportedly experienced eye and respiratory irritation during construction activities. A rusted drum, laboratory glassware, and white granular material were reportedly encountered. EMS conducted soil gas probes, hand excavations around the drum, and collected various samples, including the white powder, which they concluded was the herbicide Silvex. The areas investigated were in the vicinity of the current driveway of 4825 Glenbrook Road.

1.3.3.1.2 Transcripts of interviews conducted in November 1993 from the site workers were recently provided to the Agency for Toxic Substances and Disease Registry (ATSDR). These transcripts documented that construction workers reportedly had additional symptoms such as skin rashes, blisters, and skin exfoliation problems. Skin problems included red places or patches, scaling, dryness, itching with scratching until it bleeds, brown spots with water blisters lasting several weeks, and burning of eyes, nostrils, and skin.

### **1.3.3.2. USACE Soil Sampling – 1994**

In support of the 1995 OSR FUDS RI Report (USACE, 1995), it was documented that USACE collected a soil sample (SV-Baker-10) at 2.5 to 4 feet bgs from 4825 Glenbrook Road in March 1994 as part of the Baker Valley POI. The sample was analyzed for agent, ABPs, and total cyanide. No analyzed compounds were detected in the sample. The approximate sample location is illustrated on Figure 1-3. Analytical results of this sample are included in Appendix A (Table A.2) of the HHRA included as Appendix Q of this report. Because the sample is located within the Burial Pit 3 investigation boundary, soil associated with this sample was removed during the Burial Pit 3 investigation activities.

### **1.3.3.3. USEPA Surface Soil Sampling Event - 1994**

As part of the OU-3 investigations, USEPA Region 3 collected soil samples in and around 4801, 4825, and 4835 Glenbrook Road to supplement a risk assessment (USEPA Region 3, 1999). USEPA collected seven surface soil samples (S-1, S-2, S-3, S-4, S-5, S-6, and S-7) at 4825 Glenbrook Road in 1994. The locations of these surface soil samples are illustrated in Figure 1-3. Analytical results of these samples are included in Appendix A (Table A.3) of the HHRA included as Appendix Q of this report. Analytical results show that arsenic concentrations were below the Spring Valley Partners remedial action level of 20 mg/kg developed and approved by the Mayor's Spring Valley Scientific advisory Panel in May 2002 (Scientific Advisory Panel Report dated May 29, 2002) in these samples except for S-6. Soil represented by the S-6 sample and five other samples (S-1 through S-5) was removed during the 2001 arsenic removal activities. The S-7 sample remains at the site and the data were used in the HHRA.

#### **1.3.3.4. Geophysical Investigation –1999**

On 22-24 February 1999, a geophysical investigation was performed at 4825 Glenbrook Road concurrent with the reacquisition of Burial Pits 1 and 2 at the adjacent property, 4801 Glenbrook Road. Results of the investigation are documented in the Geophysical Investigation Report (USACE, 1999a). During the investigation, the subcontractor, Geophex, acquired electromagnetic data using a broadband digital electromagnetic sensor (GEM-3), and total field magnetic data using the Geometrics® G-858 magnetic gradiometer (G-858) cesium-vapor magnetometer, and used ground-penetrating radar to confirm interpretations completed in the field. Analysis of the geophysical data identified two anomalous areas of interest, Anomalies 6 and 7. However, these anomalies were determined not to be representative of pits or trenches. Anomaly 6 was later determined to be a partially buried manhole cover. A test pit and trench were also intrusively investigated in the vicinity of Anomaly 7 with no significant findings in either the test pit or trench.

#### **1.3.3.5. X-Ray Fluorescence Sampling Event - April 1999**

On 23 April 1999, as a part of a larger investigation, Parsons completed X-Ray fluorescence (XRF) arsenic screening on a soil sample collected from a soil boring at the 4825 Glenbrook Road property. The XRF screening identified the area in the soil column that had the highest arsenic signature. The soil sample was collected between 38 and 43 inches bgs. The sample was analyzed for inorganics (metals). Analytical results show the arsenic concentration was below the Spring Valley Partners comparison level. The sample location is illustrated in Figure 1-3. Analytical results of this sample are included in Appendix A (Table A.4) of the HHRA included as Appendix Q of this report.

#### **1.3.3.6. Surface and Subsurface Soil Sampling Event - June 1999**

1.3.3.6.1 On 9 June 1999, USEPA collected six surface soil samples (SS-08, SS-09, SS-10, SS-11, SS-12, and SS-13) and surface and subsurface soil samples from borings SB-01-01, SB-02-01, and SB-03-01. The locations of these samples are illustrated in Figure 1-3. Analytical results of these samples were included and evaluated in the HHRA (see Appendix A (Tables A.3 and A.4) of the HHRA included as Appendix Q of this report).

1.3.3.6.2 Results of the USEPA Region 3 sampling indicate that soil at OU-3 could have been affected by AUES activities in the vicinity of Burial Pits 1 and 2 at 4801 Glenbrook Road. Consequently, the USACE performed an EE/CA for OU-3 (USACE, 2000a). This EE/CA investigation included extensive sampling to determine the nature and extent of contamination found in the surface and subsurface soil of OU-3.

1.3.3.6.3 The OU-3 EE/CA and baseline risk assessments for 4801, 4825, and 4835 Glenbrook Road addressed the potential hazard associated with arsenic contamination in the soil. The EE/CA was conducted to evaluate and select the preferred alternative to address arsenic soil contamination. The conclusion of the risk assessment was that there was unacceptable risk with regard to exposure to arsenic in the surface soil, and the contaminated soil should be excavated and properly disposed.

### **1.3.3.7. Previous Investigation Analytical Results**




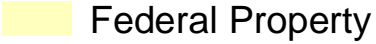




Analytical results from previous investigation activities performed between 1992 and 1999 are included in the Appendix A (Tables A.1, A.2, A.3 and A.4) of the HHRA, which is Appendix Q of this report.



Figure 1-1  
Spring Valley FUDS Location  
and Operable Units

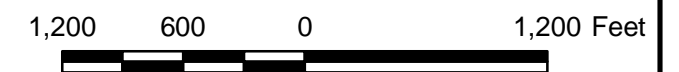
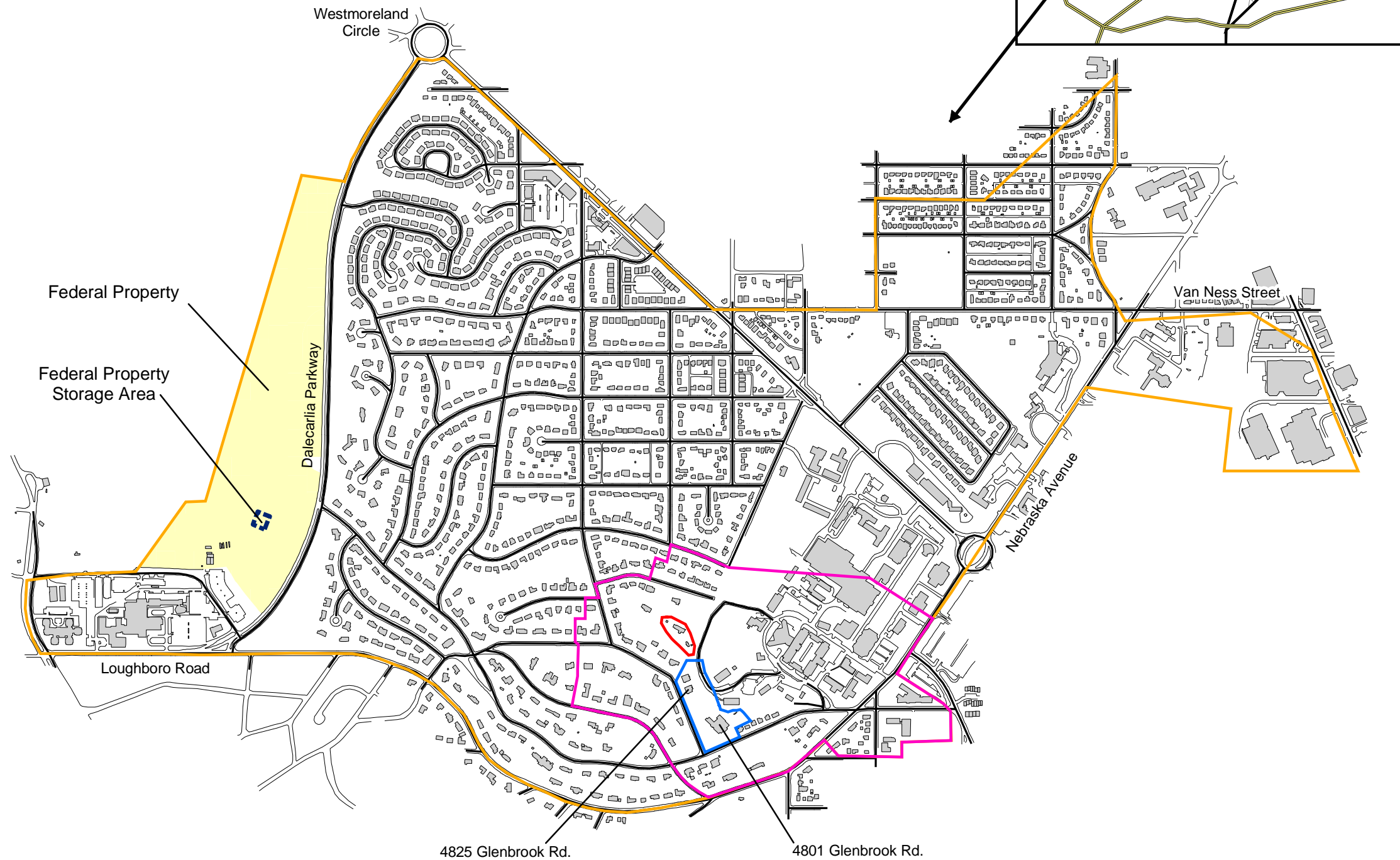
Spring Valley  
Washington, D.C.

**Legend**

 Buildings	<b>Operable Unit</b>
 Road	 OU-2
 Federal Property	 OU-3
 Federal Property Storage Area	 OU-4
	 OU-5

Notes:

1. OU-1 encompasses all of the areas depicted as OU-2, 3, 4, and 5.
2. OU-4 and OU-5 do not include the smaller operable units shown within their boundaries (e.g., OU-4 does not include the areas shown as OU-2 and OU-3).



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Page Number:	1-9



















**PARSONS**



Figure 1-2  
Site Layout at  
4825 Glenbrook Road

Spring Valley  
Washington, D.C.

**Legend**

-  Test Pit 23 (Burial Pit 3)
-  Pits 1 & 2 (POI-24R)
-  Parcels
-  Buildings
-  Driveway
-  Gravel Surface
-  Sidewalk
-  Deck/Porch
-  Dense Shrubbery
-  Property Fence
-  Retaining Wall
-  Elevation Contours
- Utilities**
-  Gas Line
-  Electric Line
-  Water Line
-  Sanitary Sewer Line
-  Sewer Line
-  Manhole



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**PARSONS**

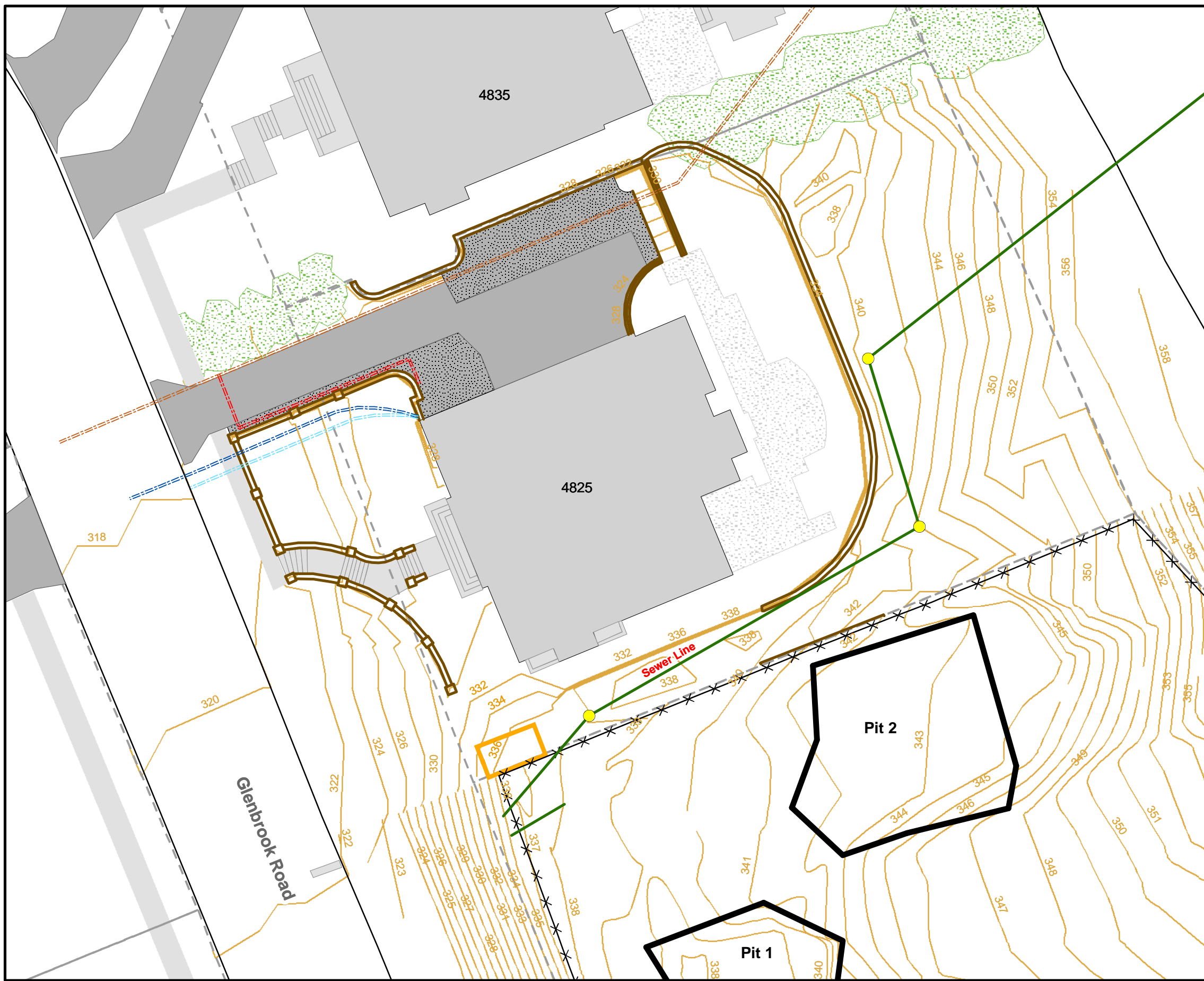


Figure 1-3  
Sampling Locations  
4825 Glenbrook Road

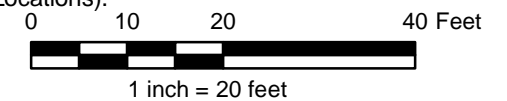
Spring Valley  
Washington, D.C.

**Legend**

- High Probability Test Pits (3 TPs)
- Test Pits Pending Investigation (7 TPs)
- Test Pits Investigated ( 56 TPs outside Pit 3) Plus 7 in Pit 3 and Extension
- Test Pit 23
- Geotechnical Borings (2010) (6 Samples)
- Confirmation Samples-Backyard Investigation of Agent/ABP Contaminated Soil (2010) (15 Samples)
- TP 138 Pit Characterization Samples (2009) (8 Samples)
- Driveway Soil Confirmation Samples (2009) (23 Samples)
- Pit 3 Soil Characterization and Confirmation Sample (2008-09) (22 Samples)
- Grab Sample (2008) (4 Samples)
- Soil Gas Probe Location (2007) (10 Samples)
- Gore Sorber Location (2007) (11 Samples)
- ABP Samples (2007) (6 Samples)
- Arsenic Grid Soil Samples (2000-01) (42 Samples)
- XRF Sample Location (1999) (1 Sample)
- EPA Soil Borings (1999) (3 Samples)
- EPA Surface Samples (1994 and 1999) (13 Samples)
- Baker-10 Soil Sample (1994) (1 Sample)
- Pits 1 and 2 (POI-24R)
- Property Boundaries
- Buildings
- 20' Grid
- Excavated Arsenic Grids (28 Full and Partial Grids)
- Arsenic Grid to be Excavated (1 Partial Grid)
- ECS Footprint

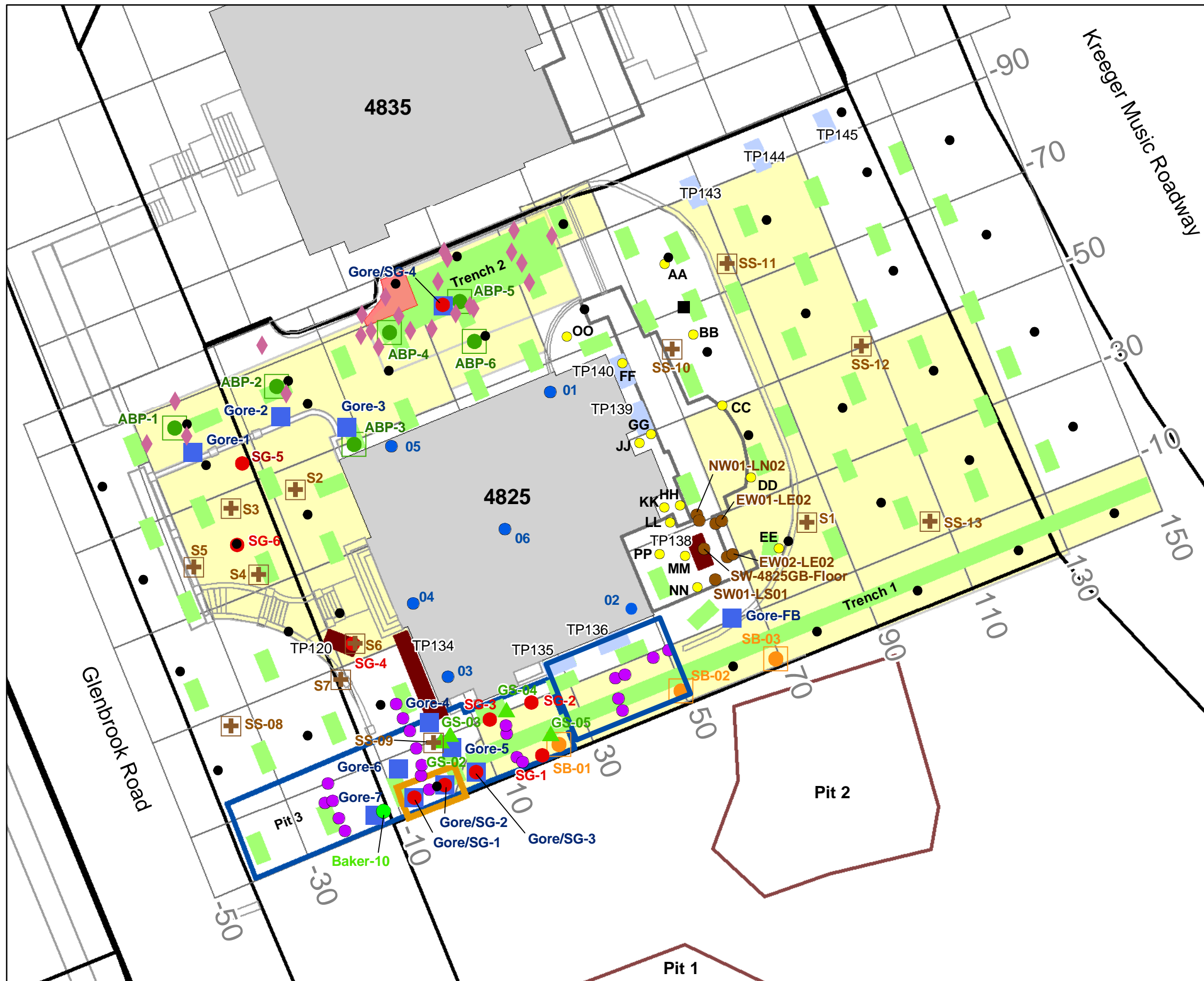
**Notes:**

1.) Additional Sampling Not Shown: 1992 EMS Investigation (Specifics Unavailable). 2000 Quadrant Sampling for HD ABPs (Composited Locations).



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**PARSONS**



## SECTION 2. SITE INVESTIGATION ACTIVITIES (2000 – 2010)

### 2.1. INTRODUCTION

2.1.0.1 This section provides a description of the intrusive investigations performed at 4825 Glenbrook Road, including mobilization, intrusive investigation, disposal, site restoration, and demobilization. These investigation activities were performed in accordance with the Site-Specific Work Plan (SSWP) for each investigation listed below.

- Arsenic Sampling and Removal (2000-2001)
- Test Pits and Trenches Investigation (2001-2002)
- 4825 Test Pit Investigation (TP 23) – (May 2001 – March 2002)
- Soil Gas and Driveway Boring ABP Soil Sampling (March 2007 – June 2007)
- High Probability Burial Pit 3 Investigation and Burial Pit 3 Extensions (October 2007 – March 2009)
- Low Probability Test Pit Investigation (March 2009 – August 2009)
- Arsenic Sampling and Removal in the Driveway (May 2009 – July 2009)
- High Probability Test Pits Investigation (November 2009 – April 2010)
- Geotechnical Soil Boring and Backyard Soil Sampling (August 2010)

2.1.0.2 The findings of these investigation activities are included in this report.

### 2.2. ARSENIC SAMPLING AND REMOVAL (SEPTEMBER 2000 – MARCH 2001)

#### 2.2.1. Grid and Driveway Soil Sampling – September 2000 and January 2001

2.2.1.1 On 21 September 2000, Parsons collected arsenic grid surface soil samples (0 to 6 inches bgs) at 4825 Glenbrook Road to determine the extent and delineation of arsenic-contaminated soil. Samples were collected from 37 20-foot by 20-foot grid squares. The grid sampling locations are illustrated in Figure 1-3. The arsenic analytical results are discussed in Section 4.1.

2.2.1.2 On 23 January 2001, six surface arsenic samples (0 to 6 inches bgs) were collected from the driveway of the 4825 Glenbrook Road property. This sampling was conducted in response to a DDOE request. The driveway surface sample locations are also illustrated in Figure 2-1. Results of the surface soil samples collected are discussed in Section 4.1.

#### 2.2.2. Arsenic Soil Removal - December 2000 and March 2001

2.2.2.1 From December 2000 to March 2001, arsenic-contaminated soil from 25 grids at the 4825 Glenbrook Road property was excavated under the NTCRA Removal Action Design (RAD) (USACE 2000b). These arsenic-contaminated grids were identified to have arsenic concentrations greater than the Spring Valley arsenic remedial action level of 17 mg/kg for 0-2 feet and 41.4 mg/kg for below 2 feet. (Note: The remediation goal was revised to 20 mg/kg regardless of depth by the Scientific Advisory Panel Report (May 29, 2002)).

2.2.2.2 After the initial excavation to a depth of 2 feet, grid confirmation samples were collected at the bottom of each excavation. Seven of the 25 grids required additional

excavation to a depth of 4 feet based on confirmation sampling of the 2-foot grid excavations. Results from the 4-foot grid confirmation samples indicated that further grid excavation was not required. Figure 2-1 shows the areas and depths of where soil was removed from the 4825 Glenbrook Road property.

### **2.3. TEST PITS AND TRENCHES INVESTIGATION (MAY 2001 – MARCH 2002)**

Test pits and trenches investigations conducted at 4825 Glenbrook Road are summarized in the following sub-sections.

#### **2.3.1. Test Pits (1-22) and Trenches (May 2001- July 2001)**

2.3.1.1 The purpose of the test pit and trench excavations is to locate potential burial areas identified by the USEPA Environmental Photographic Interpretation Center (EPIC) review. The test pit locations were selected to provide a 95 percent confidence of locating the burial pits or trenches if they do exist on the property at 4825 Glenbrook Road. The test pit investigation area covered includes the eastern portion of the property and the driveway due to high arsenic soil sampling results. This area includes possible disturbed areas identified by the USEPA EPIC aerial photograph review and areas with elevated arsenic levels in the surface soil. To achieve the 95 percent confidence level, CENAB performed a statistical analysis of possible excavation shapes and grid spacing (Appendix S). The resulting two trenches and 23 test pit locations and spacing are shown in Figure 2-1.

2.3.1.2 On 21 May 2001, a test pit investigation began in the back yard of 4825 Glenbrook Road. Twenty-three test pits and two trenches were excavated at the property in accordance with Addendum 10 to the Site Safety Submission (SSS) (USACE, 1999b). The test pits and trenches were investigated under a tent. Air monitoring during the excavation was performed by the ECBC air monitoring team. There were no detections of the parameters monitored. The excavated soil was placed back into the test pits and trenches.

2.3.1.3 Trench 01 was excavated along the property line between the 4825 and 4801 Glenbrook Road properties to locate potential burial trenches. The length of Trench 01 measured approximately 150 feet and the width was 3 feet. The trench was excavated down to saprolite, except for when a water line was encountered at a depth between 2-4 feet bgs, for which the excavation was halted at the waterline depth.

2.3.1.4 Trench 02 was excavated on the driveway at 4825 Glenbrook Road to investigate the source of the arsenic concentrations determined from the driveway soil boring samples. The length of Trench 02 measured approximately 40 feet and 10 feet wide. The excavation stopped when a drainage pipe was encountered at a depth of 5 feet. Trench 02 was backfilled temporarily with the material that had been removed during the trench operation. Further investigation of Trench 02 occurred during arsenic removal performed in the driveway between May and July 2009.

2.3.1.5 All test pits were excavated to a depth of approximately 6 feet below the historical 1918 ground surface or the maximum depth achievable by equipment. The maximum depth reached during the test pits investigation was 14 feet below the existing ground surface. No significant findings were observed during the excavation of Trenches 01 and 02. Since no significant findings were observed, no sampling was performed during the investigation

activities of test pits 1-22 and the two trenches. Investigation results are discussed in Section 4.2

### **2.3.2. 4825 Test Pit Investigation (TP 23) – May 2001 – March 2002**

2.3.2.1 TP 23 investigation was started on 31 May 2001 in accordance with SSS (USACE, 2001). A Vapor Containment Structure (VCS) was used as an Engineering Control Structure (ECS) during the investigation of TP 23 after a MEC item was discovered. During the investigation of TP 23, a total of 18 CWM-related items and 406 munitions-related items were recovered. All CWM items were placed in the Interim Holding Facility (IHF) at the Federal Property and were subsequently safely demilitarized in the Explosive Destruction System (EDS) in accordance with Annex E to the Site-Wide Chemical Safety Submission (USACE, 2003) or at Battelle APG facility (2.3.1.3).

2.3.2.2 Various types of glassware, artifacts, and general debris also were recovered from TP 23. Some of the glassware contained unknown liquids. These items were placed in multiple round containers (MRC) and transferred to the ECBC Central Transfer Facility (CTF) at Aberdeen Proving Ground, MD for sampling/analysis. Some of the bottles sent to the CTF were found to contain H and L breakdown products.

2.3.2.3 One 75mm projectile was analyzed by Battelle, contracted by ECBC, and was found to contain arsine. Battelle disposed of this item and two other items with potentially similar fill. Items were also observed and removed from beneath a retaining wall near the house foundation during the TP 23 investigation.

2.3.2.4 TP 23 was bisected by the 4801-4825 property line. The northern portion is on the 4825 Glenbrook Road property. The southern portion, on the 4801 Glenbrook Road property, was completely excavated and cleared as part of the initial TP 23 investigation. The TP 23 investigation on the 4801 Glenbrook Road property was cleared in May 2002. Investigation findings are discussed in Section 4.3.

### **2.3.3. Temporary Backfill of Test Pit 23 – May 2002**

Although the southern portion (4801 Glenbrook Road) was excavated and cleared in May 2002, items observed under a retaining wall near the 4825 Glenbrook Road house foundation still remained in the northern portion (4825 Glenbrook Road) of TP 23. The southern portion was separated above-ground from the northern portion by a fence at the property line and below-ground by a wooden retaining wall that provides support for the backfill material placed in the 4801 Glenbrook Road side of TP 23 as part of the closure procedure. The northern portion of TP 23 was temporarily backfilled in March 2002 because of right-of entry (ROE) issues. When the investigation was suspended temporarily, the TP 23 excavation was lined with geotextile cloth and backfilled with sandy material to leave a visible indication of the excavation's extent when the work resumed in March 2007. The remaining portion of TP 23 is referred to as Burial Pit 3 for further investigation.

## **2.4. SOIL GAS AND DRIVEWAY BORING ABP SOIL SAMPLING (MARCH and JUNE 2007)**

2.4.0.1 In March 2007, a soil gas investigation was performed in response to a report of workers affected by the contents of broken glassware when constructing the driveway, and to

assess the remaining contents of TP 23 (USACE, 2009a). Soil gas samples were collected using active soil gas sampling using a summa canister and passive soil gas sampling using GORE SORBER® modules. Three summa canisters (SG-1 through SG-3), four GORE SORBER® samples (Gore 4 through Gore 7), and four co-located summa canister/GORE SORBER® (Gore/SG-1(4')) through Gore/SG-4(2')) were located in TP 23. Summa canister (SG-5), three GORE SORBER® samples (Gore 1 through Gore 3), and co-located sample (Gore/SG-4(2')) were located in Trench 02. Due to the detection of the H ABPs (1,4-oxathiane and 1,4-dithiane) in one co-located sample Gore/SG-4(2') collected within Trench 02 at a depth of 2 feet, six ABP confirmation soil samples (ABP-1 through ABP-6) were collected in the driveway in June 2007. These confirmation samples were negative for ABPs. Sampling locations are illustrated in Figure 1-3. The soil gas and driveway ABP soil sampling results are discussed in Section 4.4.

## **2.5. BURIAL PIT 3 INVESTIGATION (APRIL 2007 – MARCH 2009)**

### **2.5.1. Pre-mobilization Activity**

2.5.1.1 Pre-mobilization activities for the Burial Pit 3 operation included a landscape survey, brush clearing, stump removal, tree removal, and establishing utilities (the required electrical supply).

2.5.1.2 A landscape survey was performed on 2 April 2007 at 4825 Glenbrook Road to survey and document the pre-existing conditions. Trees, shrubs, and hardscape features at this property were assessed and approved for removal (if required) prior to intrusive activities. Additionally, a walkthrough was conducted inside the house to document the condition of the interior of the building. Appendix A includes photos illustrating the landscape features at 4825 Glenbrook Road and the landscape assessment report prior to excavation of Burial Pit 3. Appendix A also includes a photo log documenting the condition of the house (interior) before intrusive investigation began. A copy of the site-specific log book entries is included in Appendix B.

2.5.1.3 Location of Burial Pit 3 was known from previous investigations (TP 23). Five single-item anomalies (Anomalies 11, 22, 44, 52, and 58) identified at the front yard of 4825 Glenbrook Road during the 2006 geophysical investigation for 4801 Glenbrook Road were reacquired geophysically before the investigation and cleared after the investigation as described in Section 3.6 of the SSWP (USACE, 2007d). Anomalies 52, 58, and 44 were located within the footprint of the Burial Pit 3 investigation. Anomalies 11 and 22 were located north of the Burial Pit 3 investigation footprint. A dig sheet is included in Appendix C, which lists the anomalies investigated outside the ECS footprint. Cultural debris and street curb were encountered at these locations. The three anomalies within the ECS (52, 58, and 44) were investigated as part of the Burial Pit 3 investigation and, therefore, no dig sheets were developed for these anomalies.

### **2.5.2. Mobilization and Site Set-Up**

2.5.2.1 Mobilization and site preparation at the 4825 Glenbrook Road property involved brush clearing in the vicinity of the planned excavation site and where vegetation obstructed site facilities (*e.g.*, the Personnel Decontamination Station [PDS]); tree removal; temporary removal of a portion of the fence between 4825 Glenbrook Road and 4801 Glenbrook Road;

installation of a privacy fence; mobilization of equipment and facilities; construction of steps from the front yard to the driveway and extension of the existing steps along the northern boundary in the backyard; and erection of the ECS. The ECS (50 feet long x 16 feet wide) for this investigation was a Modular Aluminum Containment Structure (MACS) with an associated Vapor Containment Cover (VCC).

2.5.2.2 Site preparation activities at 4825 Glenbrook Road started on 14 May 2007. Fill material placed over the original TP 23 excavation was removed to an elevation of approximately 332 feet above mean sea level (AMSL) to install the ECS. This was the approximate elevation of the existing ground surface on the north side of the retaining wall, between the retaining wall and the house. In addition to fill material, some native soil west of the current Burial Pit 3 location was also removed to provide a level surface for the ECS. Native soil/fill at the northeast corner of the PDS location was removed to create a level surface for the PDS. The native soil removed did not contain munitions and explosives of concern (MEC), CWM, or chemical agent contaminated media (CACM). The native soil was removed under low probability excavation protocols with USAESCH oversight. Suitable compactable fill material was added as needed beneath the west end of the planned MACS location and in the drum handling area (Figure 2-2) to provide a stable platform for the ECS and to facilitate drum movement.

2.5.2.3 The fill (and native material) removal process was monitored by an unexploded ordnance (UXO) technician in accordance with low probability excavation protocols and USAESCH safety oversight as described in the SSWP (USACE, 2007d). In addition to the soil, a small portion of the western end of the retaining wall in the area of the ECS was removed until level with the ground surface adjacent to the house at 4825 Glenbrook Road. In conjunction with the grading activities, speed shoring panels were installed to shore-up the wall along the 4825 and 4801 Glenbrook Road property boundary. The shoring eventually formed the east wall and a portion of the south wall of the MACS.

2.5.2.4 Additionally, utility tie-ins for the following list of equipment and their respective electrical power requirements were installed as part of set-up activities:

- Air Monitoring Team Miniature Continuous Air Monitoring System (MINICAMS) trailer and Chemical Agent Filtration System (CAFS) – 480 volt (V), 3-phase, 150 ampere (standalone)
- Two trailers (Command Post and Break Trailer) – 60A each (total 120A)
- PDS and MACS – 30A each (total 60A)
- A six-ton air conditioning unit - 10.5A at 460V, 3-phase

2.5.2.5 Electrical services were supplied from Watkins and Kreeger Halls (American University). The CAFS included a generator back-up supplied by ECBC.

2.5.2.6 Parsons used external water taps at 4825 Glenbrook Road to supply water to the PDS.

2.5.2.7 The facilities used at the site were pre-fabricated or self-contained. Two trailers, storage shed, and two portable toilets were placed within the fenced area and behind 4825 Glenbrook Road on the AU Campus. One trailer was used as the Command Post and Parsons/USAESCH office trailer. The second trailer was used as a break trailer. A pre-



existing storage shed at the site was used to store sampling materials. Stairs were constructed leading from the front yard to the driveway and pre-existing steps along the northern boundary of the backyard were extended to the retaining wall.

2.5.2.8 ECBC provided an office trailer on the 4825 Glenbrook Road property to house the MINICAMS. The 4825 Glenbrook Road garage was used as the redress area. Medical personnel performed pre-work and post-work monitoring of Exclusion Zone (EZ) personnel in the garage area. Two additional portable toilets were placed on the driveway. CARA supplied the PDS, cascade system, and the Medical Monitoring Tent. Parsons supplied the ECS air conditioning system.

2.5.2.9 In addition to the above-referenced facilities, Parsons constructed the ECS for the Burial Pit 3 investigation, which consisted of a MACS covered by a VCC. The MACS was connected to a CAFS with the appropriate airflow as determined by ECBC. Details regarding the configuration and materials for the MACS and VCC were used as described in the ECS evaluation report (USACE, 2006).

2.5.2.10 The 4825 Glenbrook Road property is bounded to the north, south, and east sides by walls and fences. Additional fencing with privacy screen was constructed temporarily at the front of the property along Glenbrook Road to ensure the entire property was enclosed. The fence extended approximately 3 feet into the street for a distance of approximately 20 feet from where the MACS was located. Gates were provided at the fence to provide access to the driveway and the drum handling area.

2.5.2.11 A Maryland-licensed land surveyor located and/or established the following:

- Intrusive excavation location;
- Topography;
- General site and landscape features; and
- Local grid control point(s).

2.5.2.12 All points identified by the surveyor in the field were of second order, class I accuracy, and referenced to the Maryland State Plane Coordinate System (NAD83). Additionally, control points around the site perimeter were established with semi-permanent benchmarks. Data gathered from the survey are included in Appendix G of the SSWP (USACE, 2007d).

2.5.2.13 The EZ for the Burial Pit 3 Investigation was the footprint of the ECS. The Contamination Reduction Zone (CRZ) included the drum handling area and PDS. The Support Zone (SZ) areas were outside of the EZ and CRZ but within the fenced areas of 4825 Glenbrook Road and command post area of the AU Campus.

2.5.2.14 Traffic control measures were also installed, including stationing certified flagmen on Glenbrook Road during the intrusive operations and drum loading activities. An approved District of Columbia traffic control plan was followed for worker and public safety.

2.5.2.15 Site specific training, including scenario training, was conducted between 24 September and 5 October 2007. The USAESCH Table Top meeting was conducted on 9 October 2007 and the pre-operational scenarios were conducted on 11 and 12 October 2007.

The Pre-Operational Survey for Diphenylchloroarsine (DA) was conducted on 16 through 18 October 2007. The intrusive investigation began on 29 October 2007.

2.5.2.16 Air monitoring for Burial Pit 3 and Burial Pit 3 extension investigation included MINICAMS, DAAMS, arsine, hydrogen cyanide (HCN), and photoionization detector (PID) monitoring. There were no detections of the parameters monitored. Sound monitoring was also performed to ensure that the noise level at the property boundary was below the D.C. regulatory requirement. The sound monitoring reports are included in Appendix B as part of the field records. The air monitoring records for arsine are included in Appendix N.

### **2.5.3. Burial Pit 3 – East Extension Investigation**

As part of set-up activities for the investigation of the east extension of Burial Pit 3, the existing ECS at the site was extended by an additional 17 feet to the east and 16 feet wide. The ECS extension was completed on 4 April 2008. Field personnel mobilized on 21 April 2008. East extension intrusive effort began on 28 April 2008 and was completed on 24 July 2008.

### **2.5.4. Burial Pit 3 – South Extension Investigation**

As part of set-up activities for the investigation of the south extension of Burial Pit 3, a new ECS was constructed (34 feet to the south and 16 feet wide of the original ECS). The ECS was completed on 16 October 2008. The south extension investigation began on 20 October 2008 and was completed on 28 October 2008.

### **2.5.5. Burial Pit 3 – East Second Extension Investigation**

As part of set-up activities for the investigation of the east second extension of Burial Pit 3, the east second extension ECS was constructed (24 feet to east and 16 feet wide). Prior to construction of the east second extension, the retaining wall and soil between the retaining wall and 4801 Glenbrook Road was removed between 3 and 28 November 2008 level with 4825 Glenbrook Road so the ECS could sit on level ground. Construction of the east second Extension ECS started on 1 December 2008 and was completed on 19 December 2008. Safety training and ECBC equipment preparation were completed on 9 January 2009. The intrusive investigation started on 12 January 2009 and was completed on 19 March 2009.

## **2.6. HIGH PROBABILITY BURIAL PIT 3 INVESTIGATION (OCTOBER 2007 – MARCH 2009)**

2.6.0.1 In October 2007, the high probability Burial Pit 3 investigation commenced at 4825 Glenbrook Road. The investigation procedures were conducted as per the SWWP (USACE, 2007c) and SSWP (USACE, 2007d). At the beginning of the intrusive investigation of Burial Pit 3, all fill material previously placed by USACE as part of the temporary closure of TP 23 was excavated using low probability procedures. The geotextile fabric barrier placed between the temporary fill and the unexcavated portions of TP 23 acted as a marker for the limits of the previous investigation. Once all the original fill material was removed, excavation continued under an ECS using high probability procedures. Sections A and B were used as a drum staging area and entrance and exit point to the ECS after being excavated and cleared for debris. The remaining area was further subdivided into eight sections (Sections C through J) to

facilitate reference to locations within the MACS. Figure 2-3 shows the grid layout inside the ECS. The intrusive investigation was performed between 29 October 2007 and 10 March 2008.

2.6.0.2 Geophysical data were not available for Burial Pit 3, but dig sheets were used to record the location of items uncovered during the intrusive investigation. Prior to the start of work, the excavation area was overlain with a grid system to facilitate the recording of locations of recovered items and collected samples. As discussed previously, the local grids were based on surveyed points to ensure the data collected could be incorporated into the Parsons GIS database. The grids inside the ECS were labeled A through J as shown in Figure 2-3. Grids A and B were not identified for investigation for any anomalies; therefore, a portion of these grid areas was utilized for drum staging and the remaining area was used as the entrance/exit point to the ECS.

2.6.0.3 The initial excavation under the ECS was performed using a mini-excavator. The excavator was operated by a heavy equipment operator and the excavation was monitored by a UXO Technician II or higher at all times. During excavation activities, each lift of excavated material was inspected by a UXO Technician II or higher for items of interest (potential AUES, ordnance, or CWM items, munitions debris, *etc.*) before the next lift was excavated. Excavations within the ECS were supervised by a USAESCH Safety Specialist and the Parsons Site Safety and Health Officer (SSHO) using closed-circuit video surveillance.

2.6.0.4 Material was removed from the excavation in 6- to 12-inch lifts [using anomaly avoidance](#). A Schonstedt (GA-52Cx magnetic locator) was used by a UXO Technician II monitoring the operation to determine if the excavation was a minimum of 12 inches from any potential item. At this point, mechanical excavation was stopped and the excavation team completed the excavation using hand digging tools. If mechanical excavation became impractical or unsafe during the investigations, the excavation was continued using hand excavation techniques.

2.6.0.5 Potential AUES, ordnance, or CWM items were evaluated initially by Parsons UXO Technicians to determine if the item was acceptable to move or if CARA was required. All potential items were evaluated following the procedures detailed in Subchapter 16.14 of the Site-Wide Site Safety and Health Plan (SSHP) (USACE, 2007b). Potential CWM items were evaluated by the CARA team, packaged in MRCs, and transported to the Federal Property for additional evaluation in accordance with Subchapter 3.8.14 of the SWWP (USACE, 2007c).

2.6.0.6 When excavating inside the ECS, the closest the excavation was allowed to come to any exterior wall was 2 feet. When potential ordnance items were uncovered and brought to ground level, a stand-off distance of 2 feet from the MACS walls was maintained until the item was packaged properly or determined acceptable to move.

2.6.0.7 After inspection, excavated soil was placed directly into drums or stockpiled on geotextile fabric inside the ECS for loading into drums at a later time. Soil was loaded directly into drums if it had been hand-excavated or after inspection by a UXO Technician for items of interest (potential ordnance or CWM items, munitions debris, *etc.*). Drums of soil were staged at the western end of the ECS until such time as the Site Manager and/or Excavation Team leader determined that the drums could be taken outside. The drums were cleaned with a dry brush to get rid of loose soil and debris to prevent contamination from being transported outside the ECS. Once drums were prepared to be moved outside the ECS, the drum handling

truck was brought to the gate outside the drum handling area. The drums were transported and stored temporarily at the Federal Property. With the exception of the fill material excavated at the beginning of the operation, which was assumed to be clean, excavated soil was sampled and disposed in accordance with waste disposal requirements.

2.6.0.8 Burial Pit 3 was excavated until the excavation was cleared. The excavation was considered cleared if: (1) it no longer contained suspect AUES-related items, and (2) the Parsons geologist and USACE equivalent individual determined that the excavation had reached undisturbed soil. Evidence of undisturbed soil was determined based on the presence of saprolite (weathered bedrock), bedrock, or other indications that the soil was native and undisturbed. Additionally, cone penetrometer tests were performed to confirm that excavation reached bedrock. The saprolite depth in the Burial Pit 3 area ranges from 1 feet bgs to 13 feet bgs.

2.6.0.9 Based on results of additional vertical and horizontal delineation samples collected from the Burial Pit 3 area, HTW over-excavation was performed to remove the high arsenic concentration detected in the floor and sidewall pit characterization samples of Burial Pit 3 (USACE, 2008f).

2.6.0.10 Once Burial Pit 3 excavation was complete, additional investigation was warranted based on new targets extending to the east and south of Burial Pit 3. Sampling was performed once Burial Pit 3 investigations were complete. The intrusive team then prepared to resolve the east extension of Burial Pit 3 before investigating the south extension. The investigation results for Burial Pit 3 are discussed in Section 4.5.

### **2.6.1. East Extension of Burial Pit 3 (April 2008 – July 2008)**

2.6.1.1 After the original 16 foot by 50 foot excavation area was cleared, the excavation was extended to the east along the south wall of the residence. The excavation was extended to the east due to evidence found indicating AUES-related items remained in adjacent soil. An ECS extension was constructed to allow the investigation area to be extended 17 feet by 16 feet toward the east. Approximately 20 additional feet of the retaining wall were removed down to an elevation of approximately 332 feet AMSL to construct the east ECS extension. The east extension investigation area was divided into four sections, K through N, and was excavated between 29 April 2008 and 24 July 2008. Appendix A includes photos of the operation. A copy of the site-specific log book entries is included in Appendix B.

2.6.1.2 Investigation procedures for the east extension were similar to the Burial Pit 3 investigations. The additional ECS area was also overlain with a grid pattern and named sections K through N (east extension) for reference. The investigation results for east extension of Burial Pit 3 are discussed in Section 4.5.

### **2.6.2. South Extension of Burial Pit 3 (October 2008)**

2.6.2.1 The intrusive anomaly investigation at the Burial Pit 3 south extension was performed in accordance with the high probability protocols (USACE, 2007c). Nineteen single-item anomalies and one investigative trench were identified to be investigated. Although the anomalies were located on the 4801 Glenbrook Road property, its proximity to Burial Pit 3 warranted these anomalies to be investigated as part of the High Probability Burial

Pit 3 operations. Geophysical reacquisition of the anomalies was performed prior to construction of the south extension of the ECS to avoid flagged anomaly peaks location. The ECS for the south extension of Burial Pit 3 was approximately 34 feet by 16 feet (Figure 2-2). The geophysical survey results are included in Appendix C.

2.6.2.2 The anomaly locations in the Burial Pit 3 south extension were hand dug to identify and remove anomalies, as appropriate. The field team used a Schonstedt to periodically screen each anomaly excavation to evaluate whether additional excavation was required to resolve the anomaly. After the selected anomalies were intrusively investigated and identified or removed, Parsons conducted excavation quality control (QC). For this investigation, the post-excavation response of the Schonstedt was compared to the pre-excavation Schonstedt responses to verify that the target of interest had been identified or removed. USAESCH also conducted an independent quality assurance (QA) review of the data to confirm that all selected anomalies were identified or removed. After the selected anomalies were resolved based on the Schonstedt data, a trench was excavated mechanically as additional confirmation. The trench was approximately 5 to 10 feet long and 1 to 1.5 feet wide. The trench was excavated to 1 foot into saprolite.

2.6.2.3 After inspection, excavated soil from the anomaly location or the investigative trench was used to backfill the excavated location. A compactor was used as necessary to ensure that all excavated soil was emplaced in the excavation.

### **2.6.3. East Second Extension of Burial Pit 3 (January 2009 – March 2009)**

2.6.3.1 To address anomalies encountered at the east wall of the east extension to the ECS, and to further investigate the 4825 Glenbrook Road house foundation and retaining wall for possible munitions presence, the east second extension investigation was performed. An extension to the ECS was completed to support this phase of the investigation. The original 67 foot long ECS was extended eastward by 24 feet for a total length of 91 feet; the width remained the same at 16 feet. Investigation results for south extension of Burial Pit 3 are discussed in Section 4.5.

2.6.3.2 Investigation procedures for the east second extension were similar to the Burial Pit 3 and east extension investigations. The retaining wall and the soil between the retaining wall and 4801 Glenbrook Road were removed to the same level as the ground surface adjacent to the house at the 4825 Glenbrook Road property for the ECS to be situated on level ground. The additional ECS area also was overlain with a grid pattern and named sections O through R (east second extension) for reference.

### **2.6.4. Sampling for Burial Pit 3 Investigation (October 2007- March 2009)**

Several samples were collected during the investigation of Burial Pit 3 according to the SSWP (USACE, 2008b) and SWWP (USACE, 2007c) and analyzed according to the Sampling and Analysis Plan (SAP) in Appendix E of the SWWP (USACE, 2007c).

#### **2.6.4.1. Pit Characterization Samples**

2.6.4.1.1 Pit characterization samples were collected and analyzed during the Burial Pit 3 and Burial Pit 3 extension investigations (USACE, 2007b). A representative pit characterization sample was collected from the center of the floor for each 20 linear feet of excavation. A floor

sample was collected from the center of each 20-foot by 12-foot section (12 feet is the maximum achievable excavation width inside the MACS). Pit characterization samples also were collected from the midpoint of each outer sidewall (generally one per 20 linear feet), halfway between ground level and the pit floor (on the outer boundary of the proposed excavation area) or near the elevation where suspect AUES-related non-munitions scrap or any container were encountered. If the area being sampled was excavated to a greater depth than an adjacent excavated area, pit characterization samples were collected on the sidewall bordering that adjacent area. These samples were collected from the horizontal/vertical midpoint of the sidewall. Locations of the pit characterization samples are illustrated in Figure 2-3. Based on these sampling data, decisions were made to conduct over excavation, as discussed in Section 4.9.

2.6.4.1.2 ECBC analyzed the pit characterization samples for agent/ABPs and ricin. If agent/ABPs or ricin were not detected in the pit characterization samples but the analysis indicated the presence of HTW compounds, the Spring Valley Partners (consisting of USAESCH, CENAB, and Parsons) discussed and recommended the appropriate action to be implemented.

#### **2.6.4.2. Soil Disposal Characterization Samples**

Soil disposal characterization samples were collected and analyzed during the Burial Pit 3 investigations. In addition to analysis for agent/ABPs, ECBC analyzed disposal characterization samples for ricin. However, based on initial results, the frequency of the ricin sampling was reduced as discussed in the following paragraphs. Following agent/ABP and ricin clearance, soil disposal characterization samples (*i.e.*, “Resource Conservation and Recovery Act [RCRA] samples”) and generator knowledge (or “waste profile”) samples were collected and analyzed to determine the waste profile and disposal facility requirements.

#### **2.6.4.3. Chemical Agent and Ricin Analysis**

During the excavation of Burial Pit 3, one representative composite soil sample was collected for every three drums of excavated soil. These representative samples were composited and then sent for headspace analysis for agent clearance by air monitoring personnel. ECBC analyzed the sample for agent/ABPs and ricin (USACE, 2007b). Initially, the frequency of ricin analysis was matched to that of analysis for agent/ABPs (*i.e.*, one sample for every three drums of excavated soil). However, based on results of the ricin analysis, this frequency was reduced following Partner consensus to this approach. Based on results of the samples indicating negative results for ricin, the Partners reevaluated the situation and reduced the sampling frequency to one sample per day, instead of the composite of every three drums. The daily frequency was in turn reduced to weekly and later discontinued after establishing ricin was not present at the Burial Pit 3 site.

#### **2.6.4.4. RCRA Disposal Samples**

One RCRA soil sample was collected and analyzed for each day of the intrusive investigation. During the excavation of Burial Pit 3, one representative composite soil sample was collected for every three drums of excavated soil. These samples were composited and were retained on site, on ice, or in a refrigerator in a secure location, until a separate aliquot was cleared for the presence of agent/ABPs and ricin as specified above. When the individual composite samples

had been cleared for agent/ABPs and ricin, the samples were further composited into a single sample representing the day's production, and submitted to the HTW laboratory (samples for VOC analysis were not composited). These samples were analyzed for RCRA disposal characterization parameters (USACE, 2007b).

#### **2.6.4.5. Waste Profile Samples**

The purpose of the waste profile samples was to ensure that the disposal facility had sufficient knowledge of potential contaminants not addressed by the RCRA samples. The waste profile disposal samples were generated by compositing the samples from drums generated once suspect AUES-related items were encountered in the excavation and continued for two subsequent days. The Sample Team Leader maintained the holding times of individual samples to collect a composite sample from a range of containers/days to produce a representative sample. The waste profile samples were kept on site, on ice or in a refrigerator in a secure location, until the associated soil was cleared for the presence of agent/ABPs and ricin. Following agent/ABP and ricin clearance, the waste profile samples were shipped to the HTW laboratory for analysis.

#### **2.6.5. Scrap, Aqueous, and Intact Container Samples**

General scrap, intact containers, and investigation-derived waste (IDW) aqueous generated during the investigation were sampled and analyzed and disposed in accordance with waste disposal methods described in Spring Valley Site Wide Work Plan (USACE, 2007c).

#### **2.6.6. Other Samples**

The excavation team initiated additional soil sampling based on field observations such as stained soil or ash, or the presence of leaking containers or scrap. Sampling was performed after obtaining concurrence and approval from the on-site USAESCH Safety Specialist and CENAB Site Operations Officer. These samples were kept on site, on ice, or in a refrigerator in a secure location, until cleared for the presence of agent/ABPs and ricin. When the sample was cleared for agent/ABPs and ricin as specified previously, the sample was shipped to a HTW laboratory for analysis.

#### **2.6.7. Backfill Sampling**

Backfill for use in the Burial Pit 3 excavation and Burial Pit 3 extensions was stockpiled at the Federal Property in September 2007. The material was obtained from a source sampled by Severson Environmental and approved by USACE and the Spring Valley Partners for use at SVFUDS. Approximately 2,000 cubic yards were delivered and staged. A soil sample was taken of the backfill in August 2007 and characterized (*i.e.*, classified in accordance with the American Society for Testing and Materials [ASTM] D 2487 and tested for Atterberg limits [ASTM D 4318], grain-size distribution [ASTM D 422], and compaction characteristics [ASTM 698]). Backfilling activities at Burial Pit 3 were commenced after completion of the south and east second extensions. Sampling results for all samples collected from Burial Pit 3 investigations are presented in Section 4.5.5.

## 2.7. LOW PROBABILITY TEST PIT INVESTIGATIONS (MARCH 2009 – AUGUST 2009)

### 2.7.1. TPs 95 – 133 Investigation (March 2009 – July 2009)

2.7.1.1 Low probability test pit investigations were conducted at 4825 Glenbrook Road between March 2009 and July 2009 in accordance with procedures outlined in the SSWP (USACE, 2008c) and Subchapter 3.8 of the SWWP (USACE, 2007c) as appropriate, including all referenced regulations and procedures. Low probability investigations were completed after the high probability Burial Pit 3 investigation and investigation of Burial Pit 3 extensions were complete. A total of 38 test pit locations were proposed initially to be investigated. Twelve additional test pits were added to the initial list during the test pit investigation (USACE, 2009b). Each test pit was approximately 6 feet long and 3 feet wide. The depth of each test pit was either 1 foot into saprolite or to the maximum reach of the excavation equipment (approximately 12 feet), whichever came first. No TPs were proposed where fill was more than 12 feet deep. The excavation team obtained concurrence from the USAESCH Safety Specialist and the CENAB Site Operations Officer regarding completion of each test pit. During the investigations of these low probability test pits, suspected AUES-related glassware debris was only encountered in TP 117 located adjacent to Burial Pit 3. Detailed information on the TP 117 finding is discussed in Section 4.6.2. A dig sheet was completed for each test pit to record pertinent information, except for the test pits that were investigated under the ECS (TP 105, 108, 112, 118, 121, 127, and 133). The dig sheets are included in Appendix C.

2.7.1.2 The low probability test pit investigation started inside the Burial Pit 3 and east extension ECS where seven test pits (TPs 105, 108, 112, 118, 121, 127, and 133) were located. Prior to the investigation of three test pits near the ECS (TPs 117, 124, and 133), Parsons structural engineer evaluated the impacts to the ECS due to test pit investigation activities. After determining it was safe to excavate these three test pits, a CPJ surveyor marked the center of each test pit. The low probability test pit investigation for test pits outside the ECS commenced in March 2009.

2.7.1.3 Excavation was performed using mechanical equipment (*e.g.*, backhoe or equivalent-sized equipment) operated by a heavy equipment operator. Material was removed from the excavation in 6-12-inch lifts. A UXO Technician II or higher monitored the excavation process at all times. The excavated material was stockpiled temporarily on top of geotextile fabric near the excavation. Each lift of excavated material was inspected by a UXO Technician II or higher for items of interest (*e.g.*, potential AUES items, munitions debris, *etc.*) before the next lift was excavated. The UXO Technician screened the bottom and sidewalls of the test pit with a Schonstedt. The locations of the low probability test pits are illustrated on Figure 2-4.

2.7.1.4 On 13 April 2009, TP 120 investigation was conducted and suspected AUES-related glassware debris was uncovered at approximately 18 inches bgs. A grab sample of discolored soil was collected, and excavation of the test pit continued in the exception mode as specified in Attachment D-1 to the Low Probability SSWP for the 4825/4835 GB Test Pits (USACE, 2008f). The low probability contingency plan as specified in the same SSWP (USACE, 2008a) was initiated because a non munitions-related intact bottle (8.5 inches height x 3 inches diameter) with glass stopper containing an unknown liquid was uncovered at approximately 2



feet bgs. The CARA packaging team inspected the item and placed it in the decontamination bucket. After decontamination, the item was combined with other headspace cleared scrap items for disposal at King and Queens Landfill. The bagged glass debris sample (SW-4825-SCR-004) and the grab soil sample (SW-4825GB-GRAB-01 (TP120)) cleared headspace analysis. After the clearance of low level analysis, the grab sample was submitted to GPL to be analyzed for Spring Valley grab sample parameters. The test pit was lined with geotextile and temporary backfill due to high arsenic concentration detected in the grab sample. The lab report for (SW-4825GB-GRAB-01 (TP120)) can be found in the “Data for TP120 and TP138” folder of Appendix I.

2.7.1.5 The intrusive operation was resumed at TP 120 on 30 July 2009. The field team observed a white powdery substance in the excavation. A grab soil sample (SW-4825GB-GRAB-02 (TP 120)) was collected from soil containing a white powdery substance at approximately 1.5 feet bgs. An intact bottle (3 inches height x 2 inches diameter) with liquid (TE-4825GR-TP120-001) was uncovered near the house at approximately 1.5 feet bgs, which initiated another low probability contingency plan. The CARA packaging team assessed the item and transported it to ECBC for agent/ABP analysis. The grab sample was cleared for headspace and submitted to ECBC for agent/ABP analysis. The sample was not sent to a commercial lab for further analysis because agent/ABPs were detected in the sample by the ECBC. A Summa canister<sup>3</sup> sample was collected on 1 August 2009 due to a lingering odor. Only petroleum-related compounds (benzene, toluene, ethylbenzene, and xylenes (BTEX) and 1,2,4-Trimethylbenzene) were detected in the sample. Investigation of the remaining test pit was suspended until the CWM and CACM-related test pits investigation was completed under high probability protocol. The low probability TP 120 investigation results are presented in Section 4.6.2.2.

2.7.1.6 Air monitoring for this investigation included CWM using MINICAMS, arsine, and volatile organic compound (VOC) monitoring at each test pit excavation; CWM using Depot Area Air Monitoring System (DAAMS) perimeter monitoring; and dust monitoring during excavation of arsenic-contaminated soil. Arsenic and dust sampling also was conducted during the initial arsenic soil removal activities. There were no detections of the parameters monitored.

2.7.1.7 The Spring Valley Partners suspended further investigation of TP 120 until the results of the grab samples were available. Investigation of this test pit resumed under high probability operations in November 2009.

## **2.7.2. Arsenic Soil Removal from Driveway (May 2009 – July 2009)**

2.7.2.1 Previous arsenic soil sampling performed in 2000 identified arsenic-contaminated soil at three grids and a trench area at 4825 Glenbrook Road. These areas were identified based on surface soil samples and/or soil samples collected just below the asphalt driveway (borings were advanced through the driveway). To allow for more efficient excavation and backfill operations, grid floor and sidewall confirmation samples were collected prior to excavation in the initially identified arsenic-contaminated grids so the extent of required excavation could be

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<sup>3</sup> A Summa canister is an evacuated canister used to collect an instantaneous air sample.

determined. The initial grid floor confirmation samples for the grids at 4825 Glenbrook Road were collected at 2 feet bgs. Additional grid floor confirmation samples were collected at these locations at 1-foot minimum intervals to define the vertical extent of excavation required to remove arsenic concentrations greater than the Spring Valley remedial action level of 20 mg/kg. Based on pre-confirmation sampling results, arsenic-impacted soil from seven full or partial grids was excavated concurrently with the investigation of test pits at these grids. Arsenic-contaminated soil was excavated and loaded into hoppers or directly into the loader bucket to facilitate load out of the soil into dump trucks staged in the driveway or on Glenbrook Road at the end of the driveway. UXO Technicians monitored excavation and loading of the soil for the presence of suspect AUES-related material. Arsenic impacted soil exceeding concentrations of Spring Valley remediation level of 20 mg/kg was removed from the driveway except for a small area north of TP 109, adjacent to the 4835 Glenbrook Road retaining wall below 6 feet bgs. The arsenic soil sampling results are discussed in Section 4.6.3.

2.7.2.2 Air monitoring during excavation of these arsenic-contaminated grids included MINICAMS, DAAMS, arsine, and VOC monitoring at the excavation. Dust monitoring was performed based on SSHO assessment. There were no detections of the parameters monitored.

### **2.7.3. TPs 134 – 145 Investigation (July 2009 - August 2009)**

2.7.3.1 After completion of the originally proposed 38 test pits and removal of the Burial Pit 3 ECS structure, investigation of 12 additional test pits (TP 134 through 145) at the house perimeter was planned (USACE, 2009b). Investigation procedures for the additional test pits were similar to the previous test pits effort. Prior to the identification of CWM items and CACM from TP 138, the investigation of TPs 137, 141, and 142 was conducted. For TPs 137, 141, and 142, dig sheets are included in Appendix C and the Investigation Summary is included in Table 4.8.

2.7.3.2 Air monitoring during excavation of these arsenic-contaminated grids included MINICAMS, DAAMS, arsine, and VOC monitoring at each test pit excavation. Dust monitoring was performed based on SSHO assessment. There were no detections of the parameters monitored.

2.7.3.3 On 3 August 2009, low probability test pit investigation of TP 138 started and suspected AUES-related glassware debris was uncovered at approximately 2 feet bgs. The low probability contingency plan was initiated. After the bagged non-munitions scrap sample (SW-4825-SCR-005) was cleared for headspace, intrusive operations resumed at TP 138. Additional suspected AUES-related glassware debris, including an intact glass flask with a substance inside, was uncovered on the northeast corner of the pit at approximately 2.5 to 3 feet bgs, which initiated another low probability contingency plan. TP 138 was covered with plywood and plastic. The bagged flask (SW-4825-SCR-006) and glassware debris (SW-4825-SCR-007) were submitted to ECBC for headspace analysis. The glassware sample was cleared for headspace by DAAMS and sent with other scrap items to the King and Queen Landfill. However, DAAMS confirmed the detection of mustard (H) in the flask sample detected first by MINICAMS. The flask item was packaged and transported by CARA to ECBC for low level analysis. The field team placed soil excavated from TP 138 into drums under Level C operations. Approximately 5.5 tons (total of 31 drums) were transported to the drum storage area at the Federal Property. A composite sample (SW-4825-TP138-(SPOILS)) was collected

to represent soil placed in the 31 drums and submitted for headspace analysis. After clearing headspace, the sample was submitted to ECBC for agent/ABP analysis. The sample was not sent to a commercial lab for toxicity characteristic leaching procedure (TCLP) analysis because agent/ABPs were detected in the sample. Further investigation of TP 138 was conducted under high probability and discussed in Section 2.8.1. The investigation results are discussed in Sections 4.7.1 and 4.7.3 together with the results of the high probability investigation of TP 138 started in November 2009. Investigation of seven remaining test pits, therefore, was suspended until the CWM and CACM-related test pits investigation was completed under high probability protocol. Excavation soil stored in drums was later sent to the Veolia Incineration Facility in Port Arthur, TX for disposal.

## **2.8. HIGH PROBABILITY TEST PIT INVESTIGATION (2009 – 2010)**

### **2.8.1. TP 138 Intrusive Investigation**

2.8.1.1 High probability test pit investigation resumed at TP 138 between 17 November 2009 and 11 December 2009 under Level B operations in accordance with procedures outlined in the SSWP (USACE, 2009c) and SWWP (USACE, 2007c) as appropriate. The layout of the TP 138 investigation is presented in Figure 2-5. The excavation under the ECS was performed using hand tools. A UXO Technician II or higher monitored the excavation process at all times. Excavations within the ECS were supervised by a USAESCH Safety Specialist and the Parsons SSHO using closed-circuit video surveillance. Potential ordnance items and intact containers were evaluated initially by Parsons UXO Technicians to determine whether the item was acceptable to move or if CARA was required for further assessment.

2.8.1.2 TP 138 was excavated to 8 feet wide, 12 feet long, and 3 feet 6 inches deep for agent/ABP impacted soil clearance. After excavation of the agent/ABP impacted soil, the original test pit was investigated to 4 feet 4 inches wide, 6 feet and 8 inches long, and 6.5 feet bgs for debris clearance. Sapolite was encountered at 5.5 feet bgs. Appendix A includes photos of the operation. A copy of the site-specific log book entries is included in Appendix B ('Safety' Folder, file "6-26-09 to 1-27-10.pdf" for the SS log book entries for TP 138).

2.8.1.3 TP 138 was considered to be completely investigated when agent/ABP impacted soil encountered was removed, and the TP area was excavated to 1 foot below sapolite. No AUES-related items remained within the footprint of the excavation area (6 inch confirmation of debris clearance). The Parsons and USACE geologists confirmed that the excavation had reached undisturbed soil.

2.8.1.4 During the investigation, suspected AUES-related glassware debris was found at depths between 24 inches and 27 inches bgs. The uncovered suspected AUES-related glassware debris included broken glass labware and two glass containers. Found in the northeast corner of the pit at approximately 2 feet bgs, the first container (SW-4825GBSCR-001) was an open top flask containing a small amount of white powder residue inside. The other container was a 2-quart green tinted glass bottle with 2 inches of liquid inside and a dirt plug. The item was assessed by CARA packaging team and determined to be a non-munitions scrap item (SW-4825GB-SCR-006). All cleared scrap items were double bagged and later sent for disposal at King and Queen County Landfill. Section 4.7.3.2 includes a discussion of these results.

2.8.1.5 The other seven glassware debris samples (SW-4825GB-SCR-001 through SW-4825GB-SCR-005, SW-4825GB-SCR-007, and SW-4825GB-SCR-008) were double bagged and submitted for headspace analysis. All seven samples were cleared for headspace. SW-4825GB-SCR-001 was further submitted to ECBC for agent/ABPs analysis. This sample was not submitted to the commercial laboratory (ALSI) for additional characterization analysis because agent/ABPs were detected in the white solid sample collected from the container. All cleared scrap items were double bagged and later sent for disposal at King and Queen County Landfill. SW-4825GB-SCR-001 was destroyed by ECBC. Section 4.7.3.2 includes a discussion of these results.

2.8.1.6 After excavation of the original test pit dimension of 3 feet by 6 feet, additional excavation was performed to clear suspected AUES-related debris and remove agent/ABP impacted soil. The west wall of the test pit was restricted to the brick wall along the porch boundary. Seven sidewall samples (SW-4825GB-NW01-LN01(2'), SW-4825GB-NW01-LN02(2'), SW-4825GB-EW01-LE01(2'), SW-4825GB-EW01-LE02(2'), SW-4825GB-EW02-LE01(2'), SW-4825GB-EW02-LE02(2'), and SW-4825GB-SW01-LS01(2')) were collected to delineate the extent of the agent impacted soil. These samples were cleared for headspace and low level analysis. Based on the sidewall sampling results, the area was excavated to 8 feet wide, 12 feet long, and 3.5 feet deep for agent/ABP clearance. The sampling results are discussed in Section 4.7.3.3 of this report. The excavated soil was placed into drums. A total of 108 drums were filled. The final test pit excavation dimension was 4 feet 4 inches wide, 6 feet 8 inches long, and 6 feet 6 inches deep.

2.8.1.7 Air monitoring for this investigation included MINICAMS, DAAMS, arsine, hydrogen cyanide (HCN), and photoionization detector (PID) monitoring. There were no detections of the parameters monitored. Sound monitoring was also performed to ensure that the noise level at the property boundary was below the D.C. regulatory requirement. The sound monitoring reports are included in Appendix B as part of the field records. The air monitoring records for arsine are included in Appendix N.

2.8.1.8 TP 138 was lined with geotextile fabric and backfilled temporarily with approved backfill soil on 18 November 2010. Temporary backfill was necessary due to an elevated arsenic result in the floor sample collected one foot below saprolite in undisturbed soil.

## **2.8.2. Sampling for TP 138 Investigation (2009)**

Sampling was performed during the investigation of TP 138 according to the SSWP (USACE, 2009c) and SWWP (USACE, 2007c) and analyzed according to the SAP in Appendix E of the SWWP (USACE, 2007b).

### **2.8.2.1. Grab and Pit Characterization Samples**

2.8.2.1.1 One grab sample (SW-4825GB-GS01) was collected from the TP 138 investigation. The sample was collected from soil near SW-4825GB-SCR-006 (2-quart green tinted glass bottle) containing 2 inches of liquid and a dirt plug. After the clearance of headspace analysis, the sample was submitted to ECBC for agent/ABP analysis. The sample results are discussed in Section 4.7.3.2.

2.8.2.1.2 Four of the seven sidewall samples (SW-4825GB-NW01-LN01(2'), SW-4825GB-EW01-LE01(2'), SW-4825GB-EW02-LE01(2'), and SW-4825GB-SW01-LS01(2')) were further submitted to ALSI to be analyzed for pit characterization parameters. The additional three sidewall samples (NW01-LN02(2'), EW01-LE02(2'), and EW02-LE02(2')) were collected 1-foot north and west of the sidewall samples (NW01-LN01(2'), EW01-LE02(2'), and EW02-LE02(2')) for backup agent/ABPs confirmation. These three samples were not analyzed because the first samples were cleared for agent/ABPs. A floor pit characterization sample (SW-4825GB-Floor (6.5')) was collected at 6 feet and 6 inches bgs after completion of the test pit investigation. The locations of the pit characterization samples are illustrated in Figure 1-3. The samples results are discussed in Section 4.7.3.3.

### **2.8.2.2. Disposal Soil Samples**

A total of 36 composite soil samples (SW-4825GB-CWM-01 through SW-4825GB-CWM-036) were collected (a composite soil sample was collected for every three drums). The composite soil samples were all cleared for headspace. Of the 36 composite soil samples, 13 samples were cleared for agent/ABPs and composited as two HTW soil samples. The two HTW soil samples were submitted to ALSI for TCLP analysis. The samples results are discussed in Section 4.7.3.4

### **2.8.3. TPs 120 and 134 Intrusive Investigation**

2.8.3.1 The high probability test pit investigation started at TP 120 on 5 January 2010 in accordance with procedures outlined in the SSWP (USACE, 2009c) and SWWP (USACE, 2007c), as appropriate. High probability test pit investigations were also planned to be conducted at TP 134 based on its proximity to the Burial Pit 3 ECS. The layout of TPs 120 and 134 is presented in Figure 2-5. The excavation under the ECS was performed using hand tools. Excavations within the ECS were supervised by USAESCH Safety Specialist and the Parsons SSHO using closed-circuit video surveillance. The area inside the VCS was divided into 5-foot by 5-foot grids vertically labeled A through E and horizontally labeled 1 through 8 to facilitate reference to locations within the VCS. Potential ordnance and intact container items were evaluated initially by Parsons UXO Technicians to determine whether the items were acceptable to move or if CARA was required. CARA evaluated including X-ray or portable isotopic neutron spectroscopy (PINS) analysis for the ordnance recovered and assessed the intact container items. The CARA packaging team packed the intact container items and transported them to ECBC for agent/ABPs analysis (full scan analysis was performed for selected items). Suspected AUES-related debris was submitted as non-munitions scrap samples for headspace analysis. All samples were cleared for headspace except for eight samples (SCR-048, SCR-056, SCR-057, SCR-058, SCR-091, SCR-092, SCR-093, and SCR-094) and one pressure cylinder (SCR-062) that exceeded 1 short-term exposure limit (STEL). These eight items were decontaminated on 31 August 2010 and cleared for headspace on 1 September 2010. The samples results are discussed in Section 4.7.2.3

2.8.3.2 The excavated soil was placed into 55-gallon drums. Approximately 136 tons (total of 750 drums) were filled. All agent impacted excavated soil was sent for disposal at an incineration facility. All non-agent impacted soil was sent to King and Queen County Landfill.

2.8.3.3 Air monitoring for this investigation included MINICAMS, DAAMS, arsine, HCN, and PID monitoring. There were no detections of the parameters monitored. A hydrogen chloride monitor was used after detection of  $\text{AsCl}_3$ . Hydrogen chloride is a reaction product of  $\text{AsCl}_3$  and water. Sound monitoring was also performed to ensure that the noise level at the property boundary was below the D.C. regulatory requirement. The sound monitoring reports are included in Appendix B as part of the field records. The air monitoring records for arsine are included in Appendix N.

#### **2.8.4. Sampling for TPs 120 and 134 Investigations (2010)**

Sampling was performed during the investigation of TP 120 and 134 according to the SSWP (USACE, 2009c) and SWWP (USACE, 2007c) and analyzed according to the SAP in Appendix E of the SWWP (USACE, 2007b). The sample results are discussed in Section 4.7.3

##### **2.8.4.1. Intact Container Samples**

A total of 32 intact containers were packaged by CARA and transported to ECBC for agent/ABP analysis. Twenty of the 32 samples were assessed using a qualitative full scan Gas Chromatography-Mass Spectrometry (GC/MS) analysis to identify unknown compounds in the sample. The full scan analysis was not performed on the other 12 samples because there was insufficient sample size. Section 4.7.3.1 includes a discussion of these results.

##### **2.8.4.2. Grab Samples**

A total of 22 grab samples were collected either due to discolored soil or association with suspected AUES-related intact containers or munitions items. All samples were cleared for headspace except for four grab soil samples (GS-18, 19, 20, and 21). Grab soil samples cleared for headspace were further submitted to ECBC for agent/ABP analysis. Three grab samples (GS-11, 12, and 13) cleared for low levels were submitted to ALSI for a Spring Valley full list of grab sample analysis (VOCs, semi-volatile organic compounds [SVOCs], target analyte list [TAL] metals, explosives, total cyanide, iodine, fluoride, and perchlorate). The rest of the samples were not submitted to ALSI for additional analysis because agent/ABPs were detected in these samples. Section 4.7.3.2 includes a discussion of these results.

##### **2.8.4.3. Disposal Samples**

A total of 250 composite soil samples (SW-4825GB-CWM-037 through SW-4825GB-CWM-286) were collected (a composite soil sample was collected for every three drums). All composite soil samples were cleared for headspace. Of the 250 composite soil samples, 177 samples were cleared for agent/ABPs and composited as 16 HTW soil samples. The 16 HTW soil samples were submitted to ALSI for TCLP analysis. The investigation and sampling results for high probability test pits are presented in Section 4.7.3.4.

## **2.9. DISCOVERY OF ARSENIC TRICHLORIDE**

2.9.0.1 On 29 March 2010, an open clear glass jar (SW-4825GB-TP134-TE-017) with a broken top was uncovered in Grid A-4 inside the vapor containment ECS for TPs 120 and 134 at approximately 6.5 feet bgs. The glass jar (6 inches long and 2.75 inches wide) contained dark oily soil. The jar contained 2 inches of blue green soil on top of a small amount of liquid-material. The jar was smoking when shaken slightly. The CARA packaging team bagged the

item and collected a vapor sample using DAAMS tubes on 30 March 2010. The vapor sample was submitted to ECBC for a full-scan analysis. CARA removed the item from the ECS and transported it to ECBC on 19 April 2010. The full-scan analysis of the vapor sample identified arsenic trichloride ( $\text{AsCl}_3$ ). The analysis of a solid sample collected from the item detected mustard and 1,4-dithane.  $\text{AsCl}_3$  also was identified by the full-scan analysis in the solid sample. The detection of  $\text{AsCl}_3$  resulted in the temporary shut down and demobilization from 4825 Glenbrook Road until ECBC performed an additional study on the CAFS demonstrating that the current ECS and associated CAFS are capable of removing  $\text{AsCl}_3$  to a level protective to the public health. Analytical results are discussed in Section 4.8.1.

## **2.10. GEOTECHNICAL BORINGS**

2.10.0.1 Extensive investigations via excavation of test pits were performed to locate potential burial areas around the residence of 4825 Glenbrook Road. However, areas beneath the house had not been previously investigated. In accordance with the SSWP Amendment 3 (USACE, 2009d), six geotechnical borings inside of the residence were completed to investigate whether potential burial areas or agent/ABP contamination were present in the soil between the saprolite and bottom plane of the house.

2.10.0.2 Six soil borings were completed: four at each corner of the property, one in the center of the basement, and one in the front-center of the house located in the bathroom (Figure 2-6). Hand augering was utilized to excavate boreholes inside the house. Continuous soil samples were collected at 6-inch intervals until saprolite was reached to a point of resistance or the water table was encountered in each boring. Each core's lithology, as well as any other observations, were visually inspected and recorded using the Unified Soil Classification System. A sub slab grab sample was collected at each boring location, and the soil samples were analyzed for the full Spring Valley list (USACE, 2007b), including VOCs, SVOCs, TAL metals, explosives, total cyanide, iodine, fluoride, and perchlorate. The investigation results for the geotechnical borings are presented in Section 4.8.2. The geotechnical boring logs are included in Appendix M of this report.

## **2.11. BACKYARD SAMPLING**

2.11.0.1 During the 2009 TP 138 high probability investigation, bis(2-chloroethyl)sulfide (H) and lewisite (L) agent and ABPs were detected. Soil was excavated from TP 138 and placed into 55-gallon drums. Of 139 drums excavated from the TP 138 area: 24 detected H and both ABPs, three detected L and one ABP, six detected both ABPs, 67 detected one ABP, and 39 cleared for both agent and ABPs. Five pit characterization samples (one floor and four sidewall) were collected in accordance with the work plan for high probability test pits investigation (USACE, 2009c). Although the pit characterization sampling results documented that all agent/ABP impacted soil from TP 138 was removed, these findings raised concerns regarding the presence of agent/ABPs at other locations in the back yard of 4825 Glenbrook Road. The known extent of agent/ABP was limited to TP 138; other areas in the backyard were not known because soil samples were not collected during the previous test pit investigations.

2.11.0.2 As a result of these findings, and in accordance with the SSWP for the Test Pit Investigations at the 4825 and 4835 Glenbrook Road Properties-Amendment 4 (USACE, 2010), sampling was conducted in the back yard of 4825 Glenbrook Road. A total of

15 sample locations were chosen. The locations were either chosen from a 15 feet x 15 feet grid or preferentially chosen to either selectively cover areas in the vicinity of TP 138 or cover a region where the 15 feet x 15 feet grid did not branch (Figure 2-7). Two grab samples were collected at each separate sample location, one between 0-6 inches bgs and one at 3 feet bgs, with the exception of three locations where the back yard had been previously excavated to 4 feet bgs during the 2000-2002 arsenic removal activities. Therefore, one grab sample was collected at 4.5 feet bgs at these three locations (CC, DD and EE in Figure 2-7). After clearing headspace analysis and agent/ABP testing, two selected samples from two separate spaced out sections of the back yard were analyzed for arsenic and 12 other AU-requested metals: aluminum, antimony, barium, cadmium, copper, lead, manganese, mercury, nickel, thallium, vanadium, and zinc. In addition, these cleared samples were analyzed for VOCs, SVOCs, and explosives for future risk evaluation. Analytical results are discussed in Section 4.8.3.

## 2.12. DISPOSAL

2.12.0.1 Non MEC/CWM non-munitions scrap items uncovered during the investigation were containerized to be taken to a non-hazardous landfill at King and Queen County Landfill in VA when investigation activities at the site were complete. Ordnance related items certified as munitions debris (MD) also were containerized and stored at a secure location to be sent to incineration facility for disposition. Munitions-related items also were temporarily stored at the IHF area of the Federal Property to be sent for demilitarization when follow-on intrusive activities at the site were completed.

2.12.0.2 Soil removed from Burial Pit 3 was placed on geotextile fabric to allow UXO Technicians to inspect the soil for items of interest then loaded into 55-gallon drums. Soil removed from high probability investigations were placed into 55-gallon drums. After the drums were filled, sealed, and cleaned, the drums were transported to the IHF. Soil samples were collected for waste characterization. After results for the soil samples were received and reviewed, the soil drums were emptied into roll-offs and sent for disposal at King and Queen County Landfill. Soil removed from arsenic and HTW removal was placed in roll-off boxes. After results of the soil samples were received and reviewed, the roll-offs were transported for disposal at King and Queen County Landfill.

2.12.0.3 CWM impacted soil excavated from TPs 120, 134, and 138 investigations was collected in 55-gallon drums and shipped to Veolia Incineration Facility in Port Arthur, TX.

2.12.0.4 Aqueous IDW, specifically decontamination water, was collected in 55-gallon drums. Samples were collected in accordance with the SAP in Appendix E of the SWWP (USACE, 2007b) to characterize the water for disposal. Agent impacted IDW was shipped to Veolia Incineration Facility in Port Arthur, TX. Non-agent impacted IDW was shipped to the DuPont Treatment Facility in NJ.

2.12.0.5 Personal protective equipment (PPE) from the operations was containerized and characterized according to the soil characterization and disposed off-site accordingly.

2.12.0.6 Other potentially agent/ABP impacted material such as plywood and plastic, *etc.* was shipped to Veolia Incineration Facility along with other agent impacted waste.



## 2.13. SITE RESTORATION

2.13.0.1 Investigation of Burial Pit 3 and east extension was extended farther to the east twice and to the south of the original Burial Pit 3 investigation area. The area was temporarily backfilled in March 2009 after the completion of the investigations of Burial Pit 3 and its extensions and before removal of the ECS. Additional sampling was performed to further delineate the vertical and horizontal extent of the metals exceeding the accepted comparison levels<sup>4</sup>. Based on delineation sampling results, over-excavation was performed in the area. The area was backfilled in August 2009 in accordance with the work plan specifications. Erosion and sediment control measures were applied to the area during backfill and restoration activities.

2.13.0.2 Low probability test pit investigations were performed at the front yard, the back yard, and in the driveway of the property. Arsenic removal was also performed in the driveway. The driveway area was backfilled in July 2009 in accordance with the work plan specifications. The investigated low probability test pits were backfilled to the established specification. Erosion and sediment control measures were applied to the area during backfill and restoration activities.

2.13.0.3 High probability test pit investigations were performed in TPs 138, 120, and 134. TP 138 was investigated and temporarily backfilled in November 2010. TPs 120 and 134 were partially investigated and the area was covered with vapor seal plastic sheets, clay soil, and a plastic cap when arsenic trioxide was discovered in March 2010. The area was secured, and erosion and sediment control measures were applied to the area.

2.13.0.4 The remaining restoration effort will be carried out after all investigations are completed at this property. This effort will be coordinated with USACE and AU.

## 2.14. DEMOBILIZATION ACTIVITIES

2.14.0.1 Demobilization activities were conducted following completion of the south extension, east second extension, low probability test pits, arsenic removal, single-item anomaly, and high probability test pit investigations at this property. After the detection of  $AsCl_3$  in a suspected AUES-related labware, demobilization started in September 2010 at USACE direction. Under the Level B operations inside the VCS with MINICAMS, arsine, and continuous (HCl) monitoring, the entire open excavation floor and sidewall were covered with two 6-mil plastic sheets to form a vapor seal. The plastic lined open excavation was secured and backfilled with clean backfill soil. Equipment was decontaminated. Encapsulation was confirmed successful by monitoring with MINICAMS, arsine, and HCl monitors.

2.14.0.2 Two feet of the entire open-excavation area was backfilled with clay soil (Appendix O) approved for use on other USEPA Region III Superfund sites. The remaining depth of the excavation was backfilled with approved backfill. After achievement of performance specifications for compaction, the excavation area was covered by a 40-mil cap. Personnel decontamination station tent, Level B support equipment, and sound barrier from

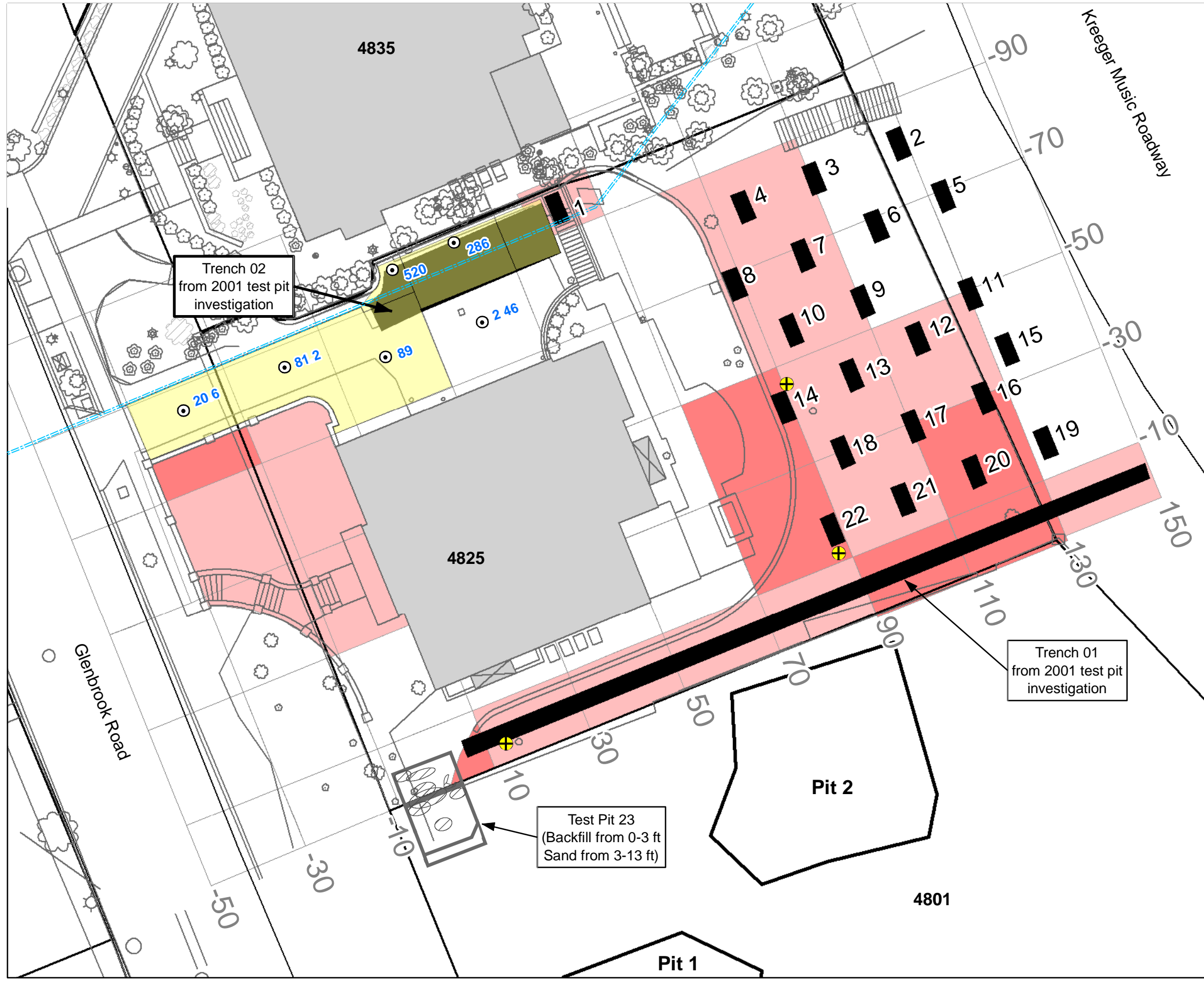
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<sup>4</sup> Accepted comparison levels are the higher of Spring Valley background levels and the USEPA Regional Screening levels (adjusted by 0.1 for non-carcinogens).

chemical filtration system and generator were removed. The VCS was disassembled, and the materials and other equipment were transported to the Federal Property in November 2010. Equipment was removed from the back yard in accordance with a crane lift plan, and all remaining material was removed from the back yard. The perimeter fence was replaced and the excavation area was secured in December 2010.

2.14.0.3 The temporary sewer line installed during the Burial Pit 3 investigations was replaced with a permanent sewer line and manhole in January 2011. The purpose of installing a temporary sewer line was to perform intrusive investigations under the existing sewer lines during Burial Pit 3 and extensions activities. The fence along the 4801 Glenbrook Road property was reconstructed in February 2011. De-energizing the siren, trailer demobilization, and stair removal were also performed in February 2011. The property was prepared for extended inactivity for one to two years. The guard house was removed. A long-term maintenance plan was implemented upon USACE approval of the plan and demobilization was completed on 7 March 2011. The long-term maintenance plan is included in Appendix D.

2.14.0.4 During installation of the permanent sewer line and manhole, an unfuzed intact 75mm projectile was discovered at approximately 3.5 feet bgs. Two small pieces of suspected AUES-related glass debris were also located in the same area where the projectile was found. These items were found approximately 35 feet southeast of TP 138. CARA X-rayed and assessed the 75mm projectile and determined it to be empty. Both the 75mm projectile and AUES-related glassware were cleared for headspace and work resumed shortly thereafter.

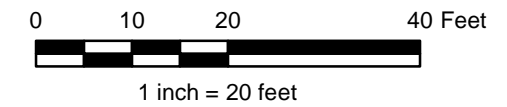


**Figure 2-1**  
**2001 Test Pit Investigations and**  
**Arsenic Removal Locations**  
**4825 Glenbrook Road**

Spring Valley  
 Washington, D.C.

**Legend**

- ⊙ Driveway Borings (Jan 23, 2001)
- 520 Arsenic ppm in boring samples (locations with Arsenic > 20ppm will require removal under separate action)
- ⊕ Manhole
- ▭ Property Boundaries
- ▭ Buildings
- Pits 1 & 2 (POI-24R)
- - - Sanitary Sewer Line
- Test Pits investigated in 2001
- ▭ Test Pit 23 (Burial Pit 3)
- ▨ Areas of Debris/Glassware
- ▭ 20' Grid
- Arsenic Grid to be Removed under a separate action
- Arsenic Grid Previously Removed (2')
- Arsenic Grid Previously Removed (4')



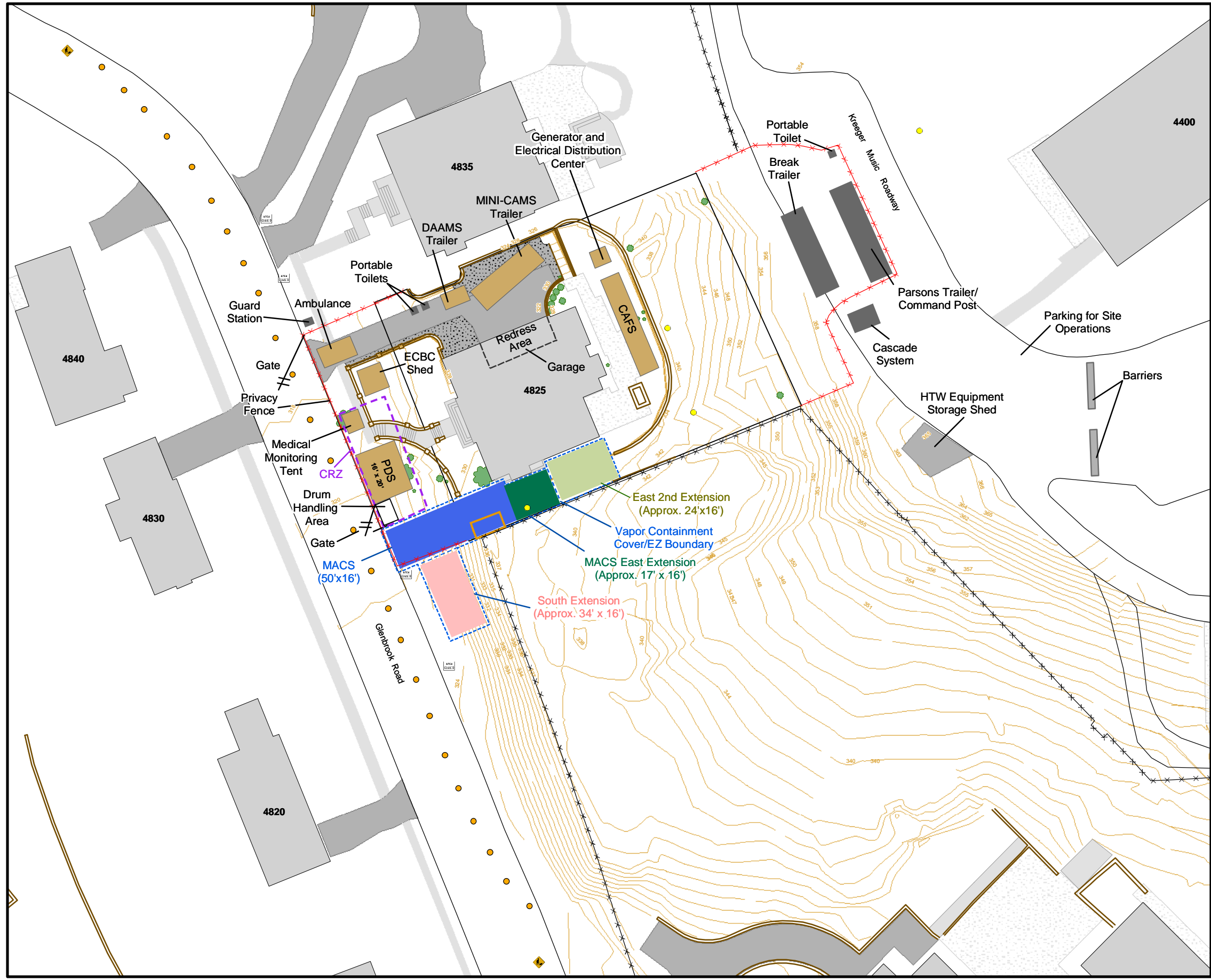
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**PARSONS**



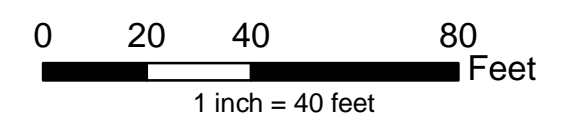
Figure 2-2  
 Site Layout for Burial Pit 3  
 and Extensions  
 4825 Glenbrook Road

Spring Valley  
 Washington, D.C.



**Legend**

- Buildings
- Deck/Porch
- Sidewalk
- Stairs
- Driveway
- Gravel Surface
- Metal Grate
- Trees
- Privacy Fence
- Property Fence
- Elevation Contours
- Manhole
- Test Pit 23 (Burial Pit 3)
- Trailers
- VCC
- ECS and Supporting Structures/Equipment
- MACS East Extension
- Original MACS
- MACS East 2nd Extension
- MACS South Extension
- 36" High Reflective Cones
- Excavation Ahead Sign
- Sidewalk Closed Sign



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**PARSONS**



**Figure 2-3 - 4825 GLENBROOK ROAD PIT 3**  
**PRELIMINARY GRAB SAMPLE, PIT CHARACTERIZATION SAMPLE, and**  
**ADDITIONAL PRE-CONFIRMATION ANALYTICAL DATA**

(dimensions and locations are approximate)

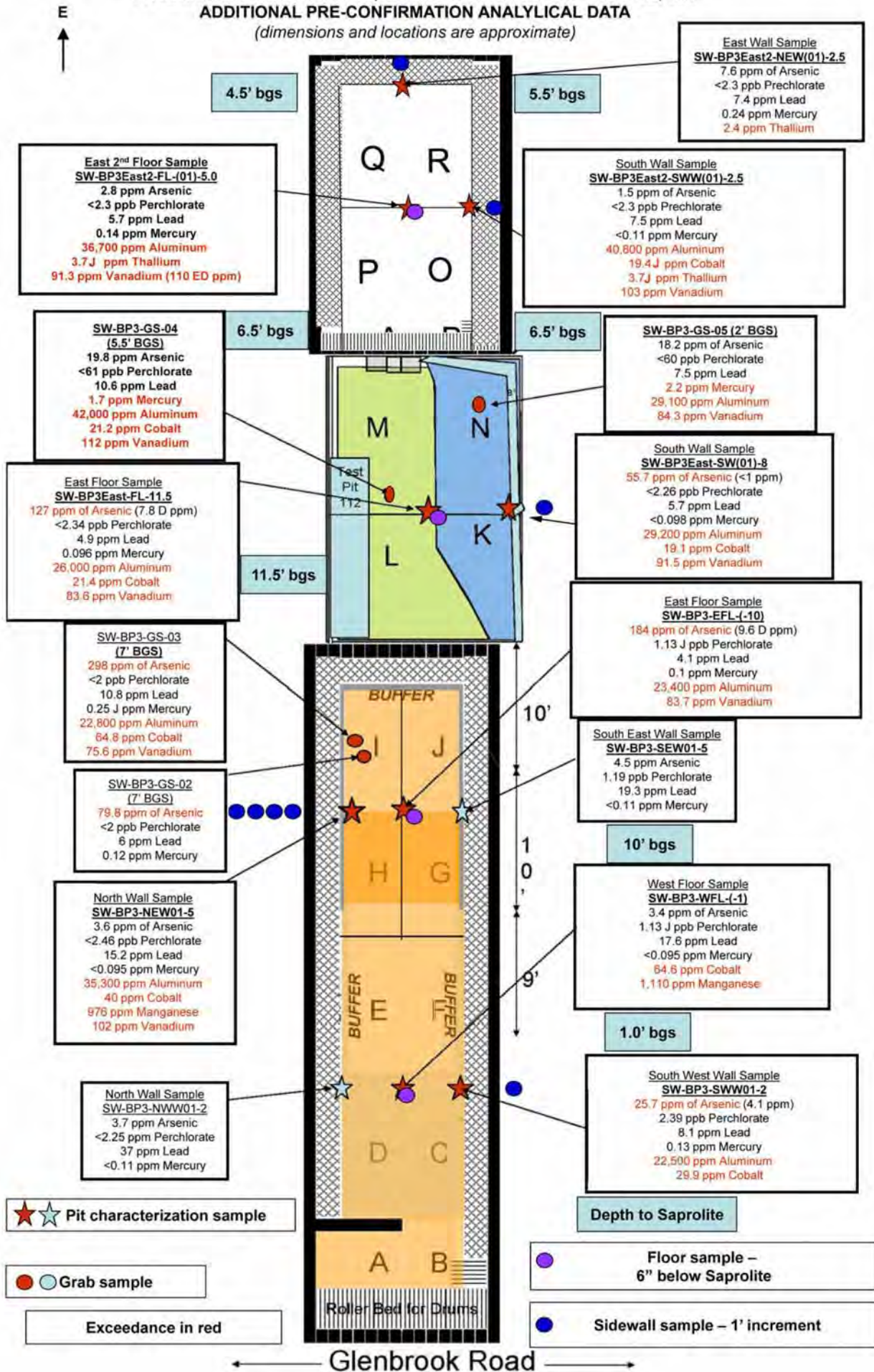
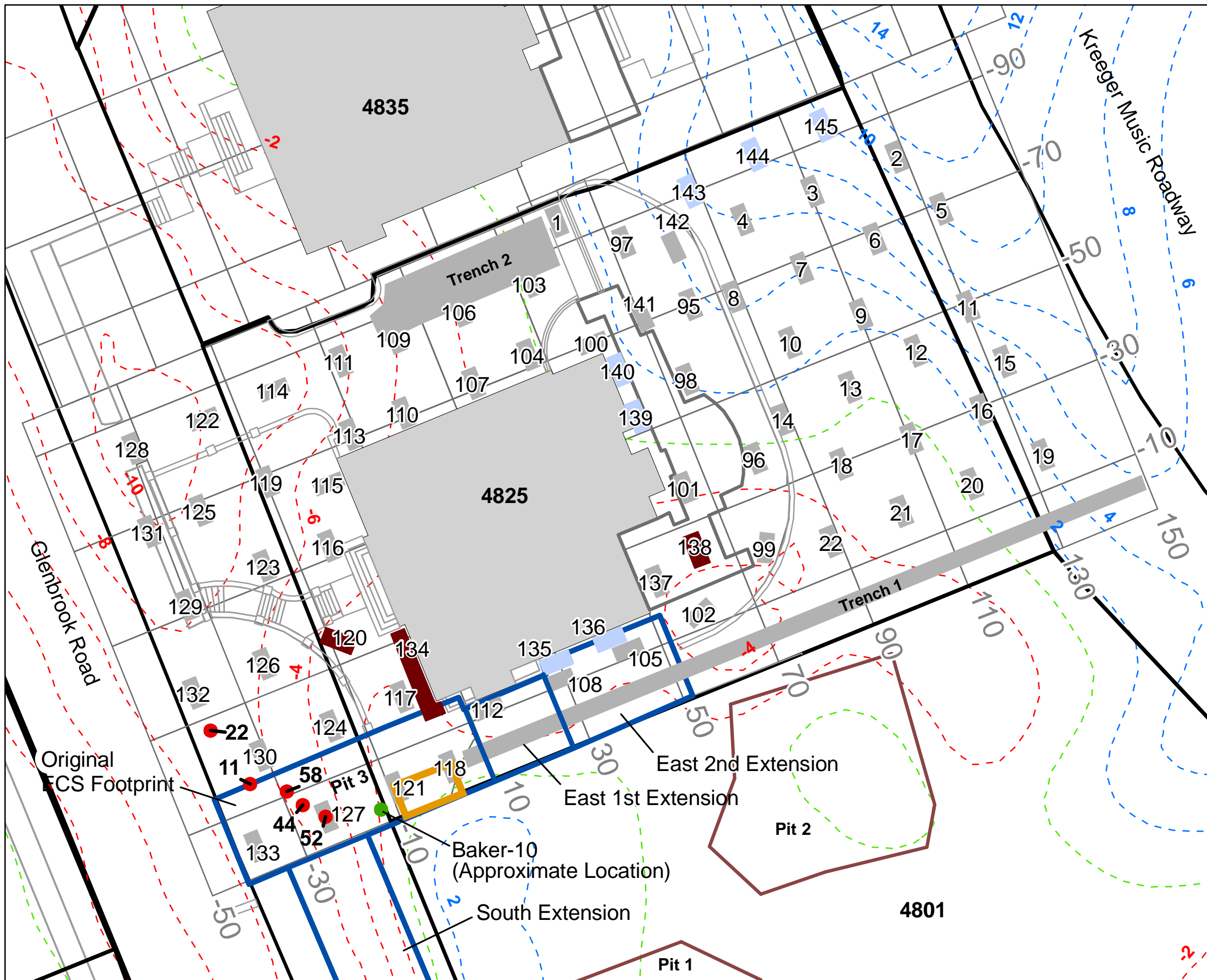


Figure 2-4  
Test Pit and Anomaly Locations  
4825 Glenbrook Road

Spring Valley  
Washington, D.C.

**Legend**

- Anomalies Identified During a 2006 Geophysical Investigation for 4801 Glenbrook Road (5 Anomalies)
- Baker-10 Soil Sample (1994)
- High Probability Test Pits (2 TPs)
- Test Pits Pending Investigation (7 TPs)
- Test Pits/Trenches Investigated with No Significant Finds (68 TPs)
- Test Pit 23
- Pits 1 and 2 (POI-24R)
- Property Boundaries
- Buildings
- 20' Grid
- ECS Footprint
- Cut & Fill (2' Contours)**
- Cut
- Level
- Fill



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

















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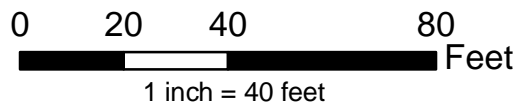


Figure 2-5  
 Site Layout for High Probability  
 Test Pit Investigations  
 4825 Glenbrook Road

Spring Valley  
 Washington, D.C.

**Legend**

-  Buildings
-  Deck/Porch
-  Sidewalk
-  Stairs
-  Driveway
-  Gravel Surface
-  Retaining Wall
-  Privacy Fence
-  Property Fence
-  Elevation Contours
-  High Probability Test Pits
-  Remaining Low Probability Test Pits
-  ECS and Supporting Structures/Equipment
-  ECS and Exclusion Zone
-  Contamination Reduction Zone (CRZ)
-  Excavation Ahead Sign
-  Sidewalk Closed Sign
-  36" High Reflective Cones



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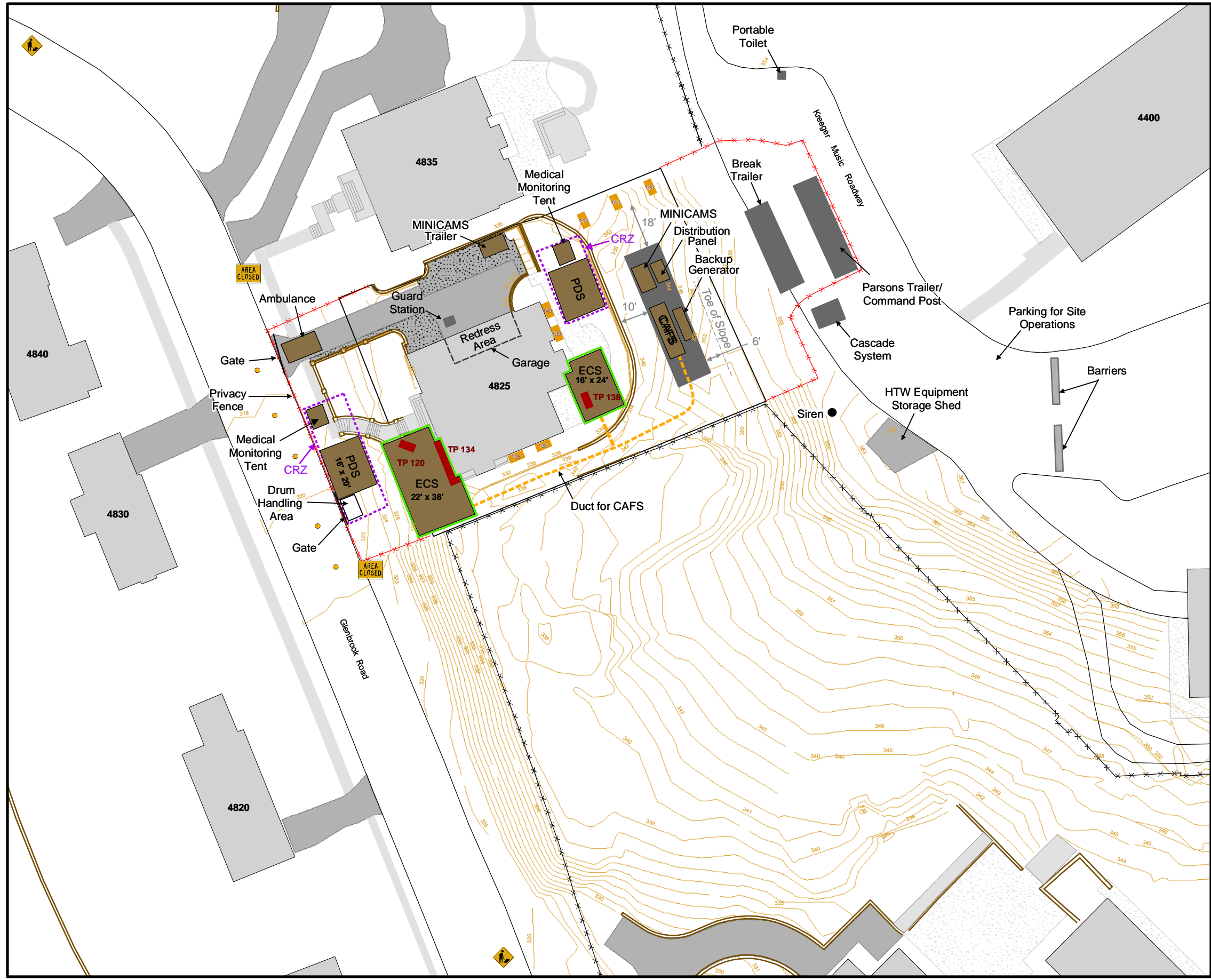


Figure 2-6 Locations of the Six Geotechnical Borings at 4825 Glenbrook Road

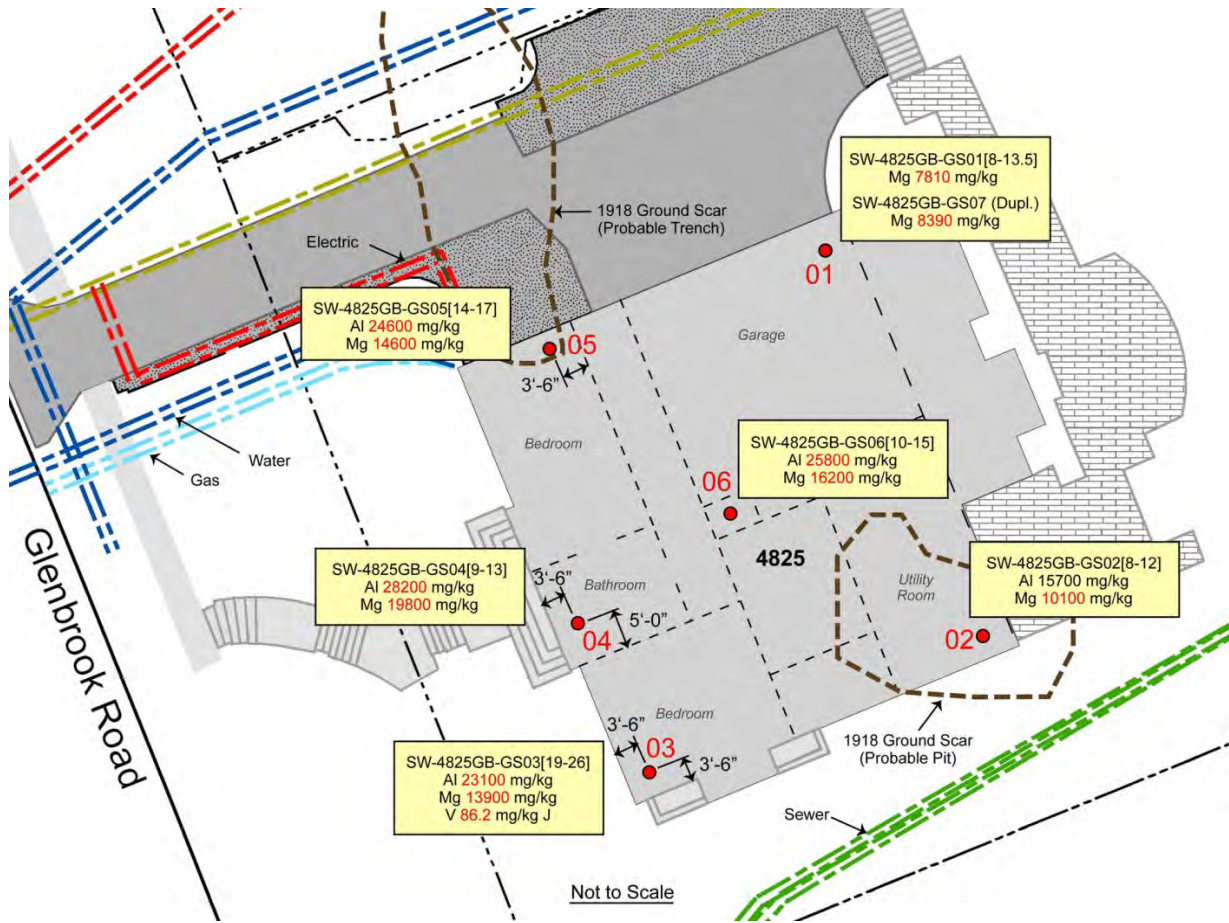
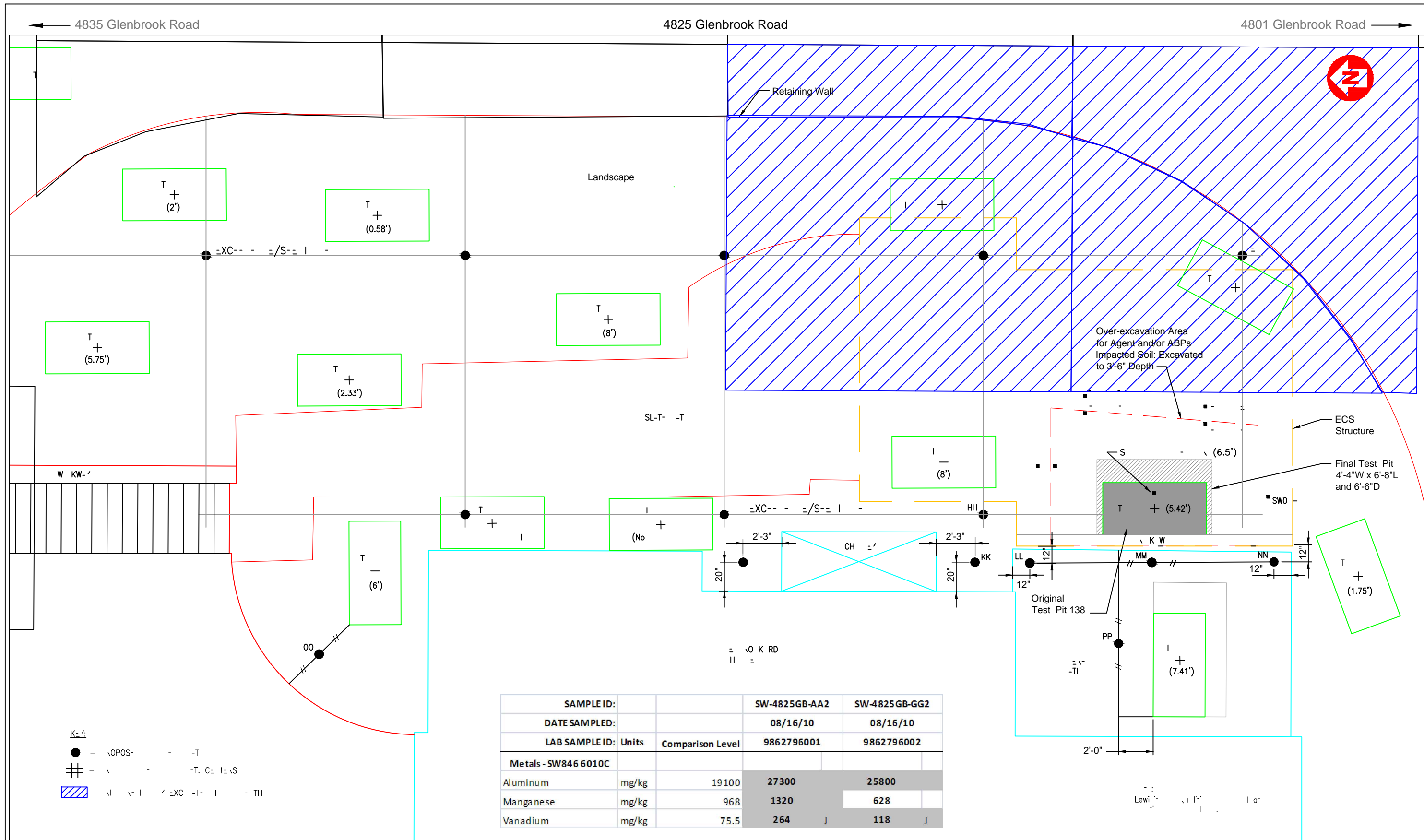
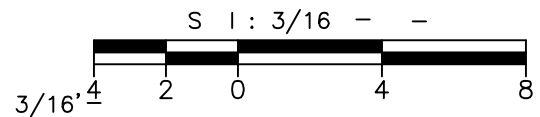




Figure 2-7 Backyard Sampling at 4825 Glenbrook Road



SAMPLE ID:			SW-4825GB-AA2	SW-4825GB-GG2
DATE SAMPLED:			08/16/10	08/16/10
LAB SAMPLE ID:	Units	Comparison Level	9862796001	9862796002
<b>Metals - SW846 6010C</b>				
Aluminum	mg/kg	19100	27300	25800
Manganese	mg/kg	968	1320	628
Vanadium	mg/kg	75.5	264	118



Plan View  
Scale: 1/32" = 1'

## SECTION 3. SITE PHYSICAL CHARACTERIZATION

### 3.1. GEOGRAPHICAL SETTING

#### 3.1.1. Location, Topography, and Cultural Geography

3.1.1.1 4825 Glenbrook Road is located in a low-density residential area (three to four dwelling units per acre) west of the AU campus. The residence of the Ambassador of the Republic of South Korea is adjacent to the south, the AU president's house is adjacent to the north, and the AU campus is adjacent to the east. Residential homes are also located to the west across Glenbrook Road.

3.1.1.2 Elevation at the site is approximately 320 feet in the front yard along the Glenbrook Road site rising to 358 feet in the back yard near the AU campus. The backyard slope is steep in the eastern portion of the property.

3.1.1.3 The 1918 ground scar map (see Figure 2-6) shows a 1918 ground scar (probable pit) located near the back porch and a 1918 ground scar (probable trench) located in the driveway.

### 3.2. METEOROLOGY

#### 3.2.1. Observational Records

Observational records have been kept continuously at locations within the District of Columbia since November 1870. These weather monitoring stations were relocated to Washington National Airport and Dulles International Airport when those airports opened in the 1940s and 1970s, respectively.

#### 3.2.2. Climate

3.2.2.1 The Washington, D.C. area has an average yearly temperature of 54.5°F, and the climate in the area is classified as modified continental. The average length of the growing season is 200 days. Summers are warm and humid, and winters are cold and mild. The coldest average daily temperatures are in late January and early February (upper 20 °F), and the warmest average daily temperatures are in mid-July (upper 80 °F).

3.2.2.2 Normal annual precipitation is approximately 41 inches and is distributed evenly throughout the year. Thunderstorms may occur at any time, but are most frequent during late spring and summer. Storms are most often accompanied by downpours and gusty winds. Tropical storms can bring heavy rain. Hailstorms can occur in the spring. Rainfalls of over 7 inches have occurred during hurricanes. Average snowfall is approximately 20 inches per year. Although a snowfall of 10 inches or more in 24 hours is unusual, several notable snowfalls of more than 25 inches within 24 hours have occurred.

3.2.2.3 Winds are generally light and variable, but thunderstorms can bring gusty winds. Usually, the gusts from windstorms are not severe. The prevailing wind direction is from the northwest. The average wind speed in the Washington, D.C. area is approximately 9 miles per hour (mph). Wind gusts can be expected to peak at approximately 40 mph, but may occasionally reach approximately 60 mph. Tornadoes and tropical storms occur infrequently, but these storms can and have caused damage in the Washington, D.C. area.

### **3.3. SURFACE WATER**

#### **3.3.1. Surface Water Drainage**

3.3.1.1 The site is located in the Potomac Subregion of the mid-Atlantic water resources region. Runoff is highest in March and April due to melting winter snow, rain, reduced evapotranspiration, and saturated soil conditions. Runoff also increases in October and November due to reduced evapotranspiration.

3.3.1.2 The site topography indicates that surface water runoff is channeled into Mill Creek, an intermittent stream. Man-made storm sewers channel runoff toward the west into Little Falls Run. Little Falls Run flows into the Potomac River, located approximately 1.25 miles southwest of the site. The discharge point into Mill Creek is approximately 1 mile downstream of the intake for the District of Columbia water system at Little Falls Dam.

#### **3.3.2. Surface Water Use**

3.3.2.1 Water is supplied to residents in the 4825 Glenbrook Road area through the District of Columbia water supply provided by the USACE Dalecarlia Reservoir. The Dalecarlia Reservoir has two intakes, a primary and a secondary, that channel water from the Potomac River. The primary intake is located at Great Falls, which is approximately 10 miles upstream of the site and supplies the majority of water going into the reservoir. The secondary intake is located at Little Falls, which is approximately 2 miles upstream of the site and supplies only a small portion of the water going into the reservoir.

3.3.2.2 The stream (Mill Creek) is not used as a resource for potable water. The stream is channeled into underground conduits over large portions of its runs. Open stretches of the stream are refuges for urban wildlife and are aesthetically pleasant. This stream is not used for water supply; however, it flows into the Potomac River.

### **3.4. SITE GEOLOGY**

The site is located in the Appalachian Piedmont Physiographic Province (piedmont). Formation of the site bedrock is undifferentiated mafic igneous rock of the piedmont. Schistosity is the major structural feature of the piedmont rocks and saprolite at the site. The undifferentiated mafic rocks have nearly vertical schistosity and foliation. During the site investigation, depth to saprolite at the site ranged from 1 to 13 feet bgs. The shallower saprolite was observed in the front yard and driveway areas and the deeper saprolite was observed in the Burial Pit 3 area.

### **3.5. SOIL**

Soil at the site was either formed in place from the crystalline rocks or moved onto the site as fill for construction of the house. The Urban Land Manor-Glenelg Association is at the site based on U.S. Department of Agriculture soil type map (Smith, 1976). Silt and clay soil were observed during the site investigations and geotechnical soil boring investigation.

### **3.6. SITE HYDROGEOLOGY**

3.6.0.1 Local groundwater flow in the piedmont rocks and saprolite follows the topographic gradient toward the southwest and the Potomac River. The site hydrogeology through

borings/monitoring wells nearby show that the soil profile near the site is silty clay soil overlay saprolite (weathered bedrock), and the bedrock is beneath the saprolite. Saprolite was detected at depths between 1 ft and 13 ft bgs during the site investigations at 4825 Glenbrook Road. The depth to groundwater measured in the nearby well is at approximately 13 ft bgs.

3.6.0.2 Groundwater is not used for public water supply at the site and surrounding area. Municipal water is provided to the area. No private, domestic, or commercial wells were observed at the site and surrounding areas during field activities.

### **3.7. ECOLOGY**

3.7.0.1 The vegetation survey performed at the site in 2007 showed that the plant species at the site include oak, yew, American holly, Barberry, Spreading Juniper, spirea, azalea, and ivy.

3.7.0.2 No large contiguous wooded area is located near the site. Wildlife species found in the vicinity of 4825 Glenbrook Road are typical of those found in most urban-suburban areas. White-tailed deer may be seen in the area. Other mammals found in the Spring Valley area include diurnal mammals such as grey squirrel, raccoon, opossum, eastern chipmunk, field mice, voles, and moles (USACE, 1995).

3.7.0.3 Common birds in the area include those that have adapted to an urban-suburban environment such as the American robin, catbird, mockingbird, Carolina chickadee, Carolina wren, house wren, downy woodpecker, common flicker, European starling, house sparrow, rock dove, mourning dove, and song sparrow. Black and turkey vultures have aerial coverage throughout the city. Migrating birds such as Canadian geese and other waterfowl frequent the area (Smith, 1976).

3.7.0.4 The site and surrounding area are developed and provide little habitat for rare, threatened, and endangered species. The Washington, D.C. Office of Consumer and Regulatory Environmental Regulations has no record of any rare, threatened, or endangered species in the area (USACE, 1995).

3.7.0.5 No surface water body or wetlands are located in the immediate vicinity of the site.

## SECTION 4. NATURE AND EXTENT OF CONTAMINATION

Results from various investigation activities performed from 2000 through 2010 are presented in this section. Investigation activities include the following:

- Arsenic Sampling and Removal (2000-2001);
- Test Pits and Trenches Investigation (2001);
- 4825 Glenbrook Road Test Pit Investigation (TP 23) – (May 2001 – March 2002);
- Soil Gas and Driveway Boring ABP Soil Sampling (March 2007 – June 2007);
- Burial Pit 3 Investigation and Burial Pit 3 Extensions (October 2007 – March 2009);
- Low Probability Test Pit Investigations (March – August 2009);
- Arsenic Sampling and Removal in Driveway (May 2009 – July 2009);
- High Probability Test Pits Investigations (November 2009 – April 2010); and
- Geotechnical Boring and Backyard Sampling (August 2010)

### 4.1. ARSENIC SAMPLING AND REMOVAL (2000-2001)

4.1.0.1 Surface soil sampling results (Table E.1 of Appendix E) of arsenic grids show that the top 2 feet of soil from 25 full or partial grids (Figure 4-1) on the 4825 Glenbrook Road property contained arsenic concentrations exceeding the Spring Valley remedial goal of 17 mg/kg for 0-2 feet. During excavation of these arsenic-contaminated grids, a 75mm projectile and suspect AUES-related debris were encountered. These items were disposed as MD at Onyx Environmental Incinerator and included with other MD and munitions scrap items recovered at this property.

4.1.0.2 Based on results of the surface soil sampling and conclusions presented in the EE/CA, the top 2 feet of soil from these grids were excavated and disposed at King and Queen Landfill to remove the risk associated with arsenic contamination in the surface soil. This work was performed as a NTCRA.

4.1.0.3 Additional subsurface soil samples were collected in grids where arsenic concentrations in the surface soil samples exceeded the Spring Valley remedial goal of 41.4 mg/kg below 2 feet. Seven of the 25 grids required additional excavation to a depth of 4 feet based on confirmation sampling of the 2-foot grid excavation. Three grids with detected arsenic concentrations higher than the remedial goals (17 mg/kg or 41.4 mg/kg) in the driveway were not excavated in 2001. Analytical results resulting from samples removed during the arsenic excavation were not used to quantify risk in the HHRA. Detailed discussions can be found in Appendix Q.

### 4.2. TEST PITS AND TRENCHES INVESTIGATION (2001)

4.2.0.1 Twenty-three test pits and two trenches were investigated in May and June 2001. The test pits and trenches were excavated to a depth of approximately 6 feet below 1918 grade or until 1 foot of virgin soil was reached, wherever possible, to ensure any buried material was encountered. The 150-foot trench along the 4801/4825 Glenbrook Road property boundary and the 40-foot trench in the driveway provided full coverage of these areas. The final excavation depths were determined from the 1918 level as estimated from the cut/fill analysis or until

1 foot of virgin soil was reached, verified in the field by a geologist and noted in the field log book. The cut and fill contours indicating 1918 elevations are included on Figure 2-4.

4.2.0.2 Saprolite depths encountered in the test pits ranged between 2 feet to 10 feet bgs. Table 4.1 lists the test pits investigated and the depth of saprolite encountered at each test pit. Saprolite depth encountered in Trench 1 ranged between 2 to 8 feet bgs at the west and the east end, respectively. The saprolite depth encountered in Trench 2 ranged between 4.5 to 5.5 feet bgs at the west and the east, respectively.

4.2.0.3 With the exception of TP 23 (see discussions in Section 4.3), there were no significant findings at any of the test pits (Table 4.1). Similarly, no significant findings were observed during the excavation of Trenches 01 or 02. Since no significant findings were observed, no sampling of the test pits 1-22 and two trenches was performed during the investigation activities. Field daily reports from these investigations are included in Appendix B of this report.

### **4.3. 4825 GLENBROOK ROAD TP 23 INVESTIGATION (2001-2002)**

4.3.0.1 TP 23 was excavated under a VCS between May 2001 and March 2002. TP 23 was excavated to measure approximately 32 feet by 17 feet by 14 feet in depth. A total of 18 CWM-related items and 406 munitions-related items (Table 4.2) were recovered. Cultural debris and suspect AUES-related glassware was also encountered during the test pit investigations.

4.3.0.2 All CWM-related items recovered were identified as 75mm unfuzed/unfired projectiles. Table 4.3 lists the details of these items. All items were assessed by X-ray and PINS analysis. Materiel Assessment Review Board (MARB) reports determined these items to contain CWM.

4.3.0.3 A total of 406 MEC/MD items were recovered during TP 23 investigations. These items were identified as 383 75mm projectiles, seven burster tubes/push plates, five 3-inch stokes, and 11 cylinder/pipes. All items were assessed, headspaced, and sent for further MARB assessment, if required. Some glassware containing unknown liquids were placed in MRC and transferred to the ECBC CTF at Aberdeen Proving Ground, MD for screening. Some of the bottles sent to the CTF were found to contain H and L breakdown products. One 75mm projectile was analyzed by Battelle and found to contain arsine. Battelle disposed of this item and two other items with potentially similar fill. Items were also observed and removed from beneath a retaining wall near the house foundation.

4.3.0.4 Table 4.3 lists the items recovered and their destruction and disposal. Some items were demilitarized during T-10 operations or sent to Clean Harbors for destruction and disposal. Items demilitarized during the T-10 operations and items certified as munitions scraps were sent to Onyx Environmental Incinerator in Port Arthur, TX for disposal. Items with the positive headspace results were decontaminated. After confirmed negative headspace results, these items were transported to Onyx Environmental Incinerator. CWM-related items were destroyed in the EDS. Appendix F includes the archeological reports of suspect-AUES glassware assessed by the Parsons Archeologist during this investigation

4.3.0.5 Test Pit (TP) 23 was bisected by the 4801-4825 property line. The northern portion was on the 4825 Glenbrook Road property. The southern portion, on the 4801 Glenbrook Road

property, was completely excavated and cleared in May 2002 as part of the initial TP 23 investigation. The northern portion of TP 23 was temporarily backfilled and investigated as part of Burial Pit 3. The investigation results for the north portion of the TP 23 are discussed in Section 4.5, and referred as Burial Pit 3.

#### **4.4. SOIL GAS SAMPLING AND DRIVEWAY ABP SOIL SAMPLING (2007)**

##### **4.4.1. Soil Gas Summa Canister Sampling Results**

4.4.1.1 Summa canister sampling results (Table E.2 of Appendix E) show that numerous VOCs were detected in the soil gas. Using the USEPA Target Shallow Soil Gas screening level (where available), eight VOCs exceeded the screening level in at least one sample. These are 1,2-dichloroethane, 1,3-butadiene, benzene, carbon tetrachloride, chloroform, tetrachloroethene, trichloroethene, and vinyl chloride. Tetrachloroethene exceeded the screening level twice while the other VOCs exceeded the standard once each. Many exceedances were only slightly above the standard.

4.4.1.2 Several VOCs, including benzene, were also detected in the ambient air sample. There was no discernible pattern of detections or exceedances across the site. The summa canisters directly in or around TP 23 did not have more detections or exceedances than other samples, demonstrating a lack of spatial correlation with known areas of impacts. It is likely that the very low detection levels are attributable to common chemicals that can be ubiquitous in an urban environment. The sample with the most individual exceedances was SG/Gore-4 (2'), which was the sample co-located with the GORE SORBER® that contained the low level ABP detections. Six VOCs exceeded their standard in this sample.

##### **4.4.2. Soil Gas GORE SORBER® Sampling Results**

4.4.2.1 The GORE SORBERs® were analyzed for selected VOCs and SVOCs, selected explosives, and selected ABPs. The H ABPs 1,4-dithiane and 1,4-oxathiane, were detected in one sample, Gore/SG-4 (2') (Table E.3 of Appendix E). A screening value for 1,4-oxathiane is not available. 1,4-dithiane has an ambient air USEPA Regional Screening Level (RSL) based concentration, but to use this value, the Gore estimated concentration for the compound must be used. From a detected 1,4-dithiane mass of 2.55 µg, Gore estimated a concentration of 11.21 ppbv. The ambient air RSL, corrected for the attenuation factor, and conservatively adjusted downward by a factor of 10 (as a non-carcinogen), is 75 ppbv. Therefore, the estimated concentration of 1,4-dithiane did not exceed the screening value in this sample. No other ABP or explosive compounds were detected in any of the samples

4.4.2.2 Numerous VOCs/SVOCs were detected. Gore reported combined masses of similar compounds (BTEX, for example). However, counting only individual chemicals, 16 VOCs/SVOCs were detected in the samples. All samples, including the field blank left in the open air for five days (approximate), contained a detection of at least one of these compounds. The BTEX compounds (benzene, toluene, ethylbenzene, and xylenes) were found most frequently (with xylene being the most commonly detected individual component).

#### **4.4.3. Driveway ABP Soil Sampling Results**

4.4.3.1 The H ABPs detected in the GORE SORBER® were not confirmed in any of the driveway area soil samples, including the one (ABP-5 at 2 feet) collected at the same location, Gore/SG-4 (2') (Table E.4 of Appendix E).

4.4.3.2 All the driveway area samples had arsenic detections. A few of those exceeded the remediation goal of 20 mg/kg. Soil associated with these samples was removed. See Section 4.6.3 for additional arsenic removal actions in 2009.

### **4.5. HIGH PROBABILITY BURIAL PIT 3 INVESTIGATION (2007- 2009)**

#### **4.5.1. Burial Pit 3 (October 2007 - March 2008)**

4.5.1.1 Eighty munitions-related items were recovered during the Burial Pit 3 investigation. These items were assessed as 11 MEC, 67 MD, and two as CWM. These items were recovered from grids D, E, H and I between 2 and 9 feet bgs in Burial Pit 3. MEC items recovered from Burial Pit 3 consisted of nine 75mm projectiles, one 6.5-inch pipe and a 4.7-inch round. CARA all 75mm MEC items assessed by PINS after X-ray was inconclusive. The 4.7-inch projectile recovered was assessed by CARA to contain no explosive component while the other item was assessed to contain shrapnel. The 6.5-inch pipe was X-rayed and assessed by PINS to contain wet sand or wet soil. These items that were assessed to contain either liquid or shrapnel were stored temporarily in the high explosive (HE) Bunker at the Federal Property. Figure 4-2 shows the topographical cross-section of the distribution of items recovered at Burial Pit 3.

4.5.1.2 MD items recovered from Burial Pit 3 consisted of 54 75mm projectiles, 11 3-inch pipes and two 4.7-inch projectiles. All munitions-related pipes were recovered from Grid I during the investigation of Burial Pit 3.

4.5.1.3 Two 75mm projectiles were recovered from Grid I during the investigation were assessed as CWM. Items containing CWM were destroyed in the EDS in April 2009. The other munitions-related items were destroyed in January 2011 during the T-30 operations at Spring Valley. Table 4.4, Table 4.5, Table 4.6 and Table 4.7 at the end of this section provides a description of all the MEC, CWM, MD and Scrap items recovered, including the items recovered during subsequent Burial Pit 3 extensions. Appendix A of this report includes selected photographs of these items. MARB reports certifying the contents of the items that required PINS are included in Appendix F.

4.5.1.4 All MD items were disposed at a metal smelter, Demil Metals, located in Glencoe, Illinois. Table 4.6 provides a list of MD items found, current storage locations, and their final dispositions for all Burial Pit 3 and Burial Pit 3 extension investigations.

4.5.1.5 Eighteen non-munitions scrap items (defined as suspected AUES metal and glassware debris recovered during an investigation) were recovered from Burial Pit 3. The items included a piece of asphalt, open pipes (each with one end cap), remnants of a 55-gallon drum, piece of white substance thought to be plaster, glass and rubber stoppers, piece of porcelain, and various pieces of glass. All recovered items were headspaced and cleared. Table 4.7 provides the list of all scrap items found during the Burial Pit 3 and Burial Pit 3 extension investigations.



4.5.1.6 Appendix A of this report includes photographs of these items. Appendix F includes the ECBC daily situation and clearance report (Sitreps) and MARB reports. An archeological assessment of some scrap and one intact container item is also included in Appendix F. The disposal manifests and destruction certificates are included in Appendix H and Appendix P, respectively.

4.5.1.7 After investigation of the original 16 feet by 50 feet excavation area, the excavation was extended to the east along the south wall of the residence, Burial Pit 3-East Extension, and to the south onto the 4801 Glenbrook Road area, Burial Pit 3-South Extension.

#### **4.5.2. East Extension of Burial Pit 3 (April 2008- July 2008)**

4.5.2.1 Twenty-eight items recovered during the east extension of Burial Pit 3 were assessed to include 11 MEC, four CWM, and 13 MD items. These items were recovered in Grids K, L, M, and N in the east extension between 1½ to 6 feet bgs. One of the CWM items recovered was identified as a glass vial containing a white substance. The item was packaged by CARA and sent to ECBC. ECBC analysis determined that the item contained chlorodiphenylarsine (DA or Clark 1, a chemical warfare agent [CWA] respiratory irritant). No further analysis was performed and the item was destroyed by ECBC. The ECBC destruction certificate for this item is included in Appendix P. The remaining three CWM items were 75mm projectiles.

4.5.2.2 Eleven MEC items recovered were assessed to be 75mm projectiles and were assessed by CARA initially by X-ray and then by PINS if an X-ray was inconclusive. Four of these eleven items were assessed to be shrapnel rounds based on X-ray.

4.5.2.3 Thirteen items recovered during the investigation of the east extension of Burial Pit 3 were identified as MD by a qualified UXO Technician or after TE assessment. These MD items were recovered from Grids K, L and M of the east extensions between 1.5 - 5.5 feet bgs. The recovered MD items were identified as 75mm projectiles, stored at the IHF and later demilitarized in the T-30. Table 4.6 lists the items recovered during the investigation of Burial Pit 3 and Burial Pit 3 extensions. Ten non-munitions scrap items were recovered during the east extension investigation. These items were headspaced for H and L. After the items cleared headspace analysis, they were stored in 55-gallon drums and transported for disposal to the King and Queen non-hazardous landfill in Plymouth, VA. Disposal manifests are included in Appendix H.

4.5.2.4 The east extension of Burial Pit 3 was considered to be complete when no AUES-related items remained within the footprint of the excavation area and Parsons and USACE geologist confirmed that the excavation had reached undisturbed soil. Additionally, after completion of the east extension, Parsons geotechnical subcontractor, Patton Harris Rust & Associates (PHR&A), conducted a dynamic cone penetrometer test to confirm that the excavation surface was bedrock/saprolite. Results of this test are included in Appendix G of this report.

#### **4.5.3. South Extension of Burial Pit 3 (October 2008)**

4.5.3.1 The Burial Pit 3 south extension investigation was conducted to investigate 19 previously identified single-item anomalies along the 4801 Glenbrook Road area, located south

of the 4825 Glenbrook Road Burial Pit 3 area (USACE, 2008f). No AUES-related items were recovered during the investigation of these single-item anomalies. All recovered items were certified by UXO Technicians as cultural debris. These items included beverage cans, wire root basket, metal pins, and landscape staples.

4.5.3.2 A trench (11 feet x 11 feet x 6 feet) was excavated that covered anomaly locations GR-3, GR-5, GR-12, GR-38, GR-39, GR-45, and GR-47. Dig sheet summaries for these anomalies are included in Table 4.7. Anomaly locations GR-29 and GR-65 were considered not resolved as the geophysical signal extended outside the ECS structure. These anomalies were resolved in 2009 during the low probability test pit investigations. The remaining anomalies were resolved based on reduction of geophysical signal after intrusive investigation. QC was performed at each of these anomaly locations by the Parsons Geophysicist to confirm a 90 percent reduction in signal. USAESCH also conducted an independent QA review of the data to confirm that all selected anomalies were identified or removed. Dig sheet for the anomalies investigated as part of the south extension are included in Appendix C.

4.5.3.3 Four non-munitions scrap items were recovered during the south extension investigation. These items were headspaced for H and L. After the items cleared headspace analysis, they were stored in 55-gallon drums and transported for disposal to the King and Queen non-hazardous landfill in Plymouth, VA. Disposal manifests are included in Appendix H.

#### **4.5.4. East Second Extension of Burial Pit 3 (January – March 2009)**

The Burial Pit 3 East Second Extension was performed to investigate additional anomalies. During investigation of the East Second Extension, no CWM, MEC, or MD items were recovered; however, five non-munitions scrap items were recovered. All scrap items were cleared for headspace and temporarily stored in 55-gallon drums. The scrap items were disposed at the King and Queen non-hazardous landfill in Plymouth, VA. Disposal manifests are included in Appendix H.

#### **4.5.5. Sampling for Burial Pit 3 Investigations (2007- 2009)**

##### **4.5.5.1. Grab Samples**

4.5.5.1.1 Two grab samples (SW-BP3-GS-02 and SW-BP3-GS-03) were collected on 31 January 2008 associated with a disintegrated 55-gallon steel drum found in grid location I. Figure 4-1 shows the location of the drum recovered during the investigation. Sample SW-BP3-GS-02 was collected from the top and around the drum. After the drum was removed, sample SW-BP3-GS-03 was collected from the bottom of the location and inside the drum. The soil samples were headspaced and cleared for H and L, sent for low-level agent analysis, and after being cleared for agent/ABPs, sent for further analysis.

4.5.5.1.2 The other grab samples were collected during the East Second Extension investigations. Grab sample SW-BP3-GS-04 was collected from Section M, and grab sample SW-BP3-GS-05 was collected from Section N. These samples were headspaced and cleared, sent for low-level agent analysis, and after being cleared for agent/ABPs, sent for further analysis.

4.5.5.1.3 These samples were analyzed for VOCs and associated tentatively identified compounds (TIC), SVOCs, and associated TICs, explosives, and metals. Analytical results of the four grab samples show that metals, including aluminum, arsenic, cobalt, iron, magnesium, mercury, and vanadium, were detected at concentrations exceeding the accepted comparison levels in some of these samples. Soil associated with these grab samples was excavated during the Burial Pit 3 investigation and disposed accordingly. Appendix E (Table E.5) includes the validated data for these samples. The laboratory reports, data validation reports, and staged electronic data deliverable (SEDD)/automated data review (ADR) files are included in Appendices I, J, and K. These grab samples were removed during the investigation and were not used to quantify risk in the HHRA. Detailed discussions can be found in Appendix Q.

#### **4.5.5.2. Pit Characterization Samples**

4.5.5.2.1 Eleven pit characterization samples were collected after completion of the investigation at Burial Pit 3 and the east and east second extensions. All samples collected were cleared for agent and ABPs by ECBC and then sent for further analysis of the SVFUDS comprehensive list in accordance with the SAP of the SWWP (USACE, 2007b). Figure 2-3 shows the locations of the pit characterization samples and the exceedances. Pit characterization samples show exceedances in concentration of metals compared to the accepted comparison values. These metals include aluminum, arsenic, cobalt, iron, magnesium, manganese, thallium, and vanadium.

4.5.5.2.2 Thirteen additional confirmation samples were collected and analyzed for selected metals. Appendix E (Table E.6) includes the validated data for these samples. Among 24 pit characterization and confirmation samples, six soil samples associated with soil removed were not used and 18 samples of soil remaining at the site were used in the HHRA as indicated in Table A.10 of Appendix Q. Table B.1 of Appendix Q summarizes the samples remaining at the site. The laboratory reports, data validation reports, and SEDD/ADR files are included in Appendices I, J, and K. Based on results of the confirmation samples, over-excavation was performed at Burial Pit 3 and Burial Pit 3 extensions. All arsenic impacted soil at concentrations exceeding the remedial action level of 20 mg/kg was removed from the area.

#### **4.5.5.3. Disposal Samples**

4.5.5.3.1 Waste disposal soil samples were collected from soil excavated during the Burial Pit 3 operation and east extensions operations. All samples collected were cleared by ECBC for agent, ABPs, and ricin as explained earlier in this report. The samples were then sent to the HTW laboratory for RCRA analysis. Two waste profile soil samples were collected from soil excavated during the Burial Pit 3 operation and were sent to the HTW laboratory for analysis of specific VOCs, SVOCs, specific explosives, specific metals, and total cyanide. Based on analytical results, approximately 530 tons of non-hazardous soil were disposed at the King and Queen County Landfill in Plymouth, VA. Laboratory reports for the waste disposal soil samples are included in Appendix I. The waste disposal manifests are included in Appendix H.

4.5.5.3.2 A total of 124 55-gallon drums (approximately 5000 gallons) were filled with aqueous IDW (primarily decontamination water) between October 2007 and March 2009. One composite sample was collected from these drums composed of aliquots of water from one of every five drums. The sample was cleared by ECBC for agent (H and L), ABPs (1,4-dithiane

and 1,4 oxathiane), and ricin and then analyzed by the HTW laboratory for RCRA characterization. Aqueous IDW generated during Burial Pit 3 operations through July 2008 met requirements for disposal as non-hazardous material. The waste disposal manifests are included in Appendix H, King and Queen folder, "Manifest 2007 through 2009 red.pdf" file.

4.5.5.3.3 PPE used by site personnel during the operation under the ECS was collected in 55-gallon drums and stored at the Federal Property. PPE disposal was based on the work conditions encountered when it was used (*e.g.*, soil disposal characterization results were used to determine appropriate handling).

#### **4.5.6. Air Monitoring**

There were no confirmed detections of agent or industrial compounds on the MINICAMS during the Burial Pit 3 investigation and Burial Pit 3 extensions investigations. In addition to CWM-related air monitoring, a PID, an arsine meter, and an HCN monitor were used inside the ECS to monitor the excavated soil for VOCs, arsine (SA), and HCN. No sustained detections of VOCs, SA, or HCN were recorded during the investigation of Burial Pit 3 and Burial Pit 3 extension investigations. The air monitoring records for arsine are included in Appendix N. Appendix F includes the air monitoring reports from ECBC.

### **4.6. LOW PROBABILITY TEST PIT INVESTIGATIONS (MARCH –AUGUST 2009)**

#### **4.6.1. Test Pits with No AUES-Related Items**

4.6.1.1 Forty low probability test pit excavations yielded either no debris or cultural debris (Table 4.8). Cultural debris (soda bottle fragment, wires, nail, and aluminum can) was recovered at four test pits (TPs 123, 124, 129, and 130). All excavations were cleared, backfilled, and the debris disposed in accordance with the SSWP (USACE, 2007e). Table 4.8 summarizes the investigation activities for all low probability test pits at 4825 Glenbrook Road. The investigated test pits are illustrated in Figure 2-4. Dig sheets for these excavations are included in Appendix C. TPs 105, 108, 112, 118, 121, 127, and 133 were excavated inside the ECS constructed for Burial Pit 3 and Burial Pit 3 extensions activities. Test pits along the driveway and on the arsenic-contaminated grids were excavated concurrently during arsenic soil excavation activities.

4.6.1.2 One grab soil sample was collected at TP 137 (4825GB-TEST PIT 137-18" BGS) per USEPA request. The sample was collected after removal of bricks and concrete from the porch surface, which was approximately 1 foot deep. The sample cleared headspace analysis performed by ECBC and was then sent for total arsenic analysis. The arsenic was detected at 10.2 mg/kg in this sample. Validated data for this sample are included in Appendix E (Table E.7 of Appendix E). The laboratory reports, data validation reports, and SEDD/ADR files are included in Appendices I, J, and K. This sample was used to quantitatively evaluate the risk (reference to Appendix Q HHRA).

#### **4.6.2. Test Pits with Suspected AUES-Related Items Recovered**

4.6.2.1 During the investigation of TP 117, suspected AUES-glassware was encountered at a depth of 6 feet bgs. The recovered glassware (SW-4825-SCR-001 and SW-4825-SCR-002) was double-bagged and sent for headspace analysis. Both samples cleared headspace analysis

and were categorized as non-munitions scraps. No additional analysis was performed for these scraps. The glassware scrap items were disposed with other scraps with cleared headspace at the King and Queen Landfill. Headspace analysis results are included in Appendix F, Sitreps folder, Low Probability TPs folder.

4.6.2.2 TP 120 was the second test pit where broken glassware and rusted metal items were recovered. During further excavation, discolored soil, more broken glassware, a rusted metal bucket, and glass stoppers were encountered. The broken glassware recovered from the test pit was double-bagged and cleared headspace analysis (SW-4825-SCR-004). No additional analysis was performed for these scraps. The glassware scrap items were disposed with other scraps with cleared headspace at the King and Queen Landfill. One intact glass bottle was also removed. This item was sent for further analysis to ECBC for low level analysis. The low level analytical results show that 1,4-Dithiane (9800 ED  $\mu\text{g}/\text{kg}$ ), and 1,4-Thioxane (1400 D  $\mu\text{g}/\text{kg}$ ) were detected in the liquid of the intact glass container (TE-4825GR-TP120-001), and H (3.4 J  $\mu\text{g}/\text{kg}$ ), L (48 J  $\mu\text{g}/\text{kg}$ ), 1,4-Dithiane (170  $\mu\text{g}/\text{kg}$ ), and 1,4-Thioxane (47 J  $\mu\text{g}/\text{kg}$ ) were detected in the soil sample containing the white powdery substance (SW-4825-GB-GRAB-02 (TP120)). The intact bottle and soil sample were destroyed by ECBC. The ECBC lab reports are included in Appendix I.

4.6.2.3 Grab sample SW-4825GB-GRAB-01(TP120) of the discolored soil was cleared for headspace and sent for further analysis. Trichloroethene and bis(2-Ethylhexyl)phthalate were the only VOC and SVOC detected in this sample. Cyanide, fluoride, and iodine pentafluoride were also detected in the sample. Aluminum, arsenic, magnesium, and thallium exceeded the accepted comparison values. Arsenic was detected at concentration of 4280 mg/kg. The validated analytical result for this sample is included in Appendix E (Table E.8). The laboratory reports, data validation reports, and SEDD/ADR files are included in Appendices I, J, and K. This grab sample was removed during the investigation and was not used to quantify risk in the HHRA. Detailed discussions can be found in Appendix Q.

### **4.6.3. Arsenic Soil Removal from Driveway (May 2009 – July 2009)**

4.6.3.1 Grid pre-confirmation samples were collected to delineate the extent of arsenic contamination in each grid. Analytical results for these samples are included in Appendix E (Table E.7). The laboratory reports, data validation reports, and SEDD/ADR files are included in Appendices I, J, and K.

4.6.3.2 Three grids on the driveway of 4825 Glenbrook Road were identified with arsenic concentrations higher than the SV remedial goal of 20 mg/kg. Concurrent to the investigation of the test pits along the driveway, arsenic-contaminated grids were removed by excavation. All arsenic-impacted soil exceeding concentrations of Spring Valley Partners remediation level of 20 mg/kg was removed except for a small area north of TP 109 near where the 4835 Glenbrook Road retaining wall curves to prevent undermining the retaining wall. The small area north of TP 109 was excavated to 6 feet bgs. Two soil samples containing concentrations exceeding the remediation levels remaining in place (SW-4825GB-(-70,10)-T2-6.0 [596 mg/kg] and SW-4825GB-(-90,10)-T2-SW-N-5.5 [597 mg/kg]) were used in the HHRA. The excavated arsenic areas in the driveway are presented in Figure 4-1. Analytical results resulting from samples removed during the arsenic excavation were not used to quantify risk in the HHRA. Among 51 soil pre-confirmation samples collected in 2009, 19 grids were

excavated and 32 remained. The soil samples from soil not removed were used in the HHRA (See Table A.11 of Appendix Q for samples used for HHRA). Table B.1 of Appendix Q summarizes the samples remaining at the site. Detailed discussions can be found in Appendix Q. All arsenic-contaminated soil was collected in 55-gallon drums/roll-offs and disposed as non-RCRA hazardous waste at King and Queen County Landfill. The TCLP data are included in the CD under the Appendix I, Lab Reports, TP HTW Report folder.

#### **4.7. HIGH PROBABILITY TEST PITS INVESTIGATIONS (NOVEMBER 2009-APRIL 2010)**

Three high probability test pits (TPs 138, 120, and 134) were investigated between November 2009 and April 2010. The intrusive investigation of TP 138 was completed successfully for CWM and suspected AUES-related debris clearance. Investigations of TPs 120 and 134 were not completed due to arsenic trichloride detection in samples collected from an intact container.

##### **4.7.1. TP 138**

4.7.1.1 No munitions-related items were uncovered from TP 138 high probability investigation. Tables 4.9, 4.10 and 4.11 summarize the investigation findings and sampling associated with the investigation.

4.7.1.2 Suspected AUES-related debris items recovered from the high probability test pit investigations were identified as non-munitions scrap. Most of the recovered non-munitions scrap items recovered from TP 138 were identified as glass labware debris (Table 4.9). The non-munitions-related scrap items also included one glass beaker with stopper (SW-4825-SCR-001) that was detected for agent/ABPs; and a glass bottle with dirt plug originally identified as an intact container (SW-4825GR-TP138-TE-001) and later determined by CARA to be a CWM scrap item (SW-4825GB-SCR-006).

##### **4.7.2. TPs 120 and 134**

TPs 120 and 134 were excavated to approximately 15 feet wide, 28 feet long, and 4 feet to 7.5 feet deep. Two MEC items (Table 4.12), 35 CWM items (Table 4.13), three munitions debris (Table 4.14), and 105 suspected AUES-related non-munitions scrap (Table 4.15) were uncovered during the excavation. Agent/ABPs were detected in intact containers and soil in the vicinity of the excavation. Other CWM and industrial chemicals such as chloroacetophenone (CN), Clark 1, phosgene oxime, hexachloroethane, and  $\text{AsCl}_3$  were also detected in some of the intact containers. Appendix A includes photos of the operation. A copy of the site-specific log book entries is included in Appendix B. Tables 4.12 through 4.15 summarize the investigation findings and sampling associated with the investigation.

#### 4.7.2.1. MEC

4.7.2.1.1 No MEC items were recovered at TP 120. Two 75mm projectiles (SVS-10-026 and SVS-10-030) were recovered from TP 134 (Table 4.12). SVS-10-026 was stored in the HE Bunker at the Federal Property and was later destroyed during the T-30 operation in January 2011. SVS-10-030 was stored in the IHF and was later destroyed during the EDS operation in April 2010.

4.7.2.1.2 Appendix A of this report includes photographs of these items. MARB reports certifying the contents of the items that required PINS are included in Appendix F. The destruction certificate for items destroyed in the T-30 operation are included in Appendix P.

#### 4.7.2.2. CWM

Thirty-five CWM items were identified during the TP 120 and 134 investigations (Table 4.13). Five intact glass bottles were uncovered from TP 120 in ECS grid C-6 and B5/B6 at a depth between 3.3-3.5 feet. Figure 4-3 shows the ECS grid layout and the areas where the items were uncovered. The other 30 CWM items were recovered from TP 134 in grids A-4, A-5, A-6, B-4, B-5, and B-6 at depths between 3.5 feet to 7.5 feet bgs. The AUES-related items uncovered in the vicinity of TP 134 include 12 glass bottles, three test tubes, five glass jars, one metal bottle, one pressure cylinder and seven assorted glass debris and one metal debris. The glass and metal debris were bags of glass and metal headspaced as one batch each. The pressure cylinder (SCR-062) and eight scrap items (SCR-048, SCR-056, SCR-057, SCR-058, SCR-091, SCR-092, SCR-093, and SCR-094) exceeded 1 STEL and were classified as CWM. The pressure cylinder and the scrap items were decontaminated with a bleach solution on 31 August 2010. After headspace clearance, the pressure cylinder and the scrap items were placed in drums and stored in the drum storage area. The non-munitions scrap items were disposed at the Veolia Incinerator facility in Port Arthur, TX, and, because it needed to be devalued, the pressure cylinder was disposed at Veolia Incinerator facility in Sauget, IL.

#### 4.7.2.3. Munitions Debris

4.7.2.3.1 Three items recovered during the investigation of TPs 120 and 134 were identified as MD by a qualified UXO Technician. These MD items were recovered from ECS Grids A-2 and A-3 at depths between 4 feet 9 inches and 5 feet 3 inches bgs. The locations of the MD items are presented in Figure 4-4. Detailed information for the MD items is included in Table 4.14.

4.7.2.3.2 These recovered MD items were identified as two 75mm projectiles and one 75mm unfuzed projectile with hexagonal plug. All items were headspaced by ECBC and stored in 55-gallon drums at the Federal Property until disposal at the metal smelter, Demil Metals in Glencoe, IL after completion of the T-30 operation. All MD recovered from the high probability test pit investigation activities was weighed and sent to the Demil Metals smelter during the 2010 demobilization activities.

4.7.2.3.3 Appendix A of this report includes photographs of these items. The disposal manifests and destruction certificates are included in Appendix H and Appendix P, respectively.

#### 4.7.2.4. Scrap Items

4.7.2.4.1 Ninety-five non-munitions scrap items were recovered from TP 120 and 134 (Table 4.15). The non-munitions scrap items recovered from TPs 120 and 134 were identified as assorted glass debris and intact open top glass bottles placed in the decontamination bucket by CARA after its assessments. All recovered scrap items were headspace cleared and placed in drums for storage in the drum storage area.

4.7.2.4.2 Approximately 479.5 pounds of non-munitions scrap (*i.e.*, suspected AUES-related broken glassware and metal debris) were recovered during the high probability test pit investigation. Broken glassware debris included glass stoppers and broken bottle necks, and metal debris included bottles and test tube clamps. The non-munitions scrap items cleared for headspace were disposed with the non-RCRA soil at the King and Queen County Landfill. Appropriate disposal manifests are included in Appendix H. Table 4.15 provides a description of these items. Appendix A includes the photographs of selected non-munitions scrap items recovered during these operations.

#### 4.7.3. Sampling Results

##### 4.7.3.1. Intact Container Samples

4.7.3.1.1 The ECBC analytical results for intact container samples collected from the high probability TPs 120 and 134 investigation show that primary detected compounds are agent (H and L) and ABPs. Intact container SVS-10-022 was identified as a clear glass bottle with glass stopper (6 inches long and 2.5 inches wide); 75 percent full with a bluish liquid. H and 1,4-dithiane were present in this sample at concentrations that saturated the analytical detector for a prolonged period. The container is being managed at the CTF at Aberdeen Proving Ground as mustard of unknown purity.

4.7.3.1.2 The full scan analysis was performed for solid or liquid samples collected from selected intact containers and the analytical reports are included in Appendix L. Some of the full scan analysis performed did not identify any organic compounds or CWM related compounds. Other CWM-related and industrial chemicals identified in the full scan analysis from the intact container samples are listed below:

- Chlorodiphenylarsine (also known as DA or Clark I) - a vomiting agent (Sample ID: SW-4825GB-TP120-TE-001, SW-4825GB-TP134-TE-007, SVS-10-015, SVS-10-025, SVS-10-027, SVS-10-037, SVS-10-038, and SVS-10-039);
- Phosgene oxime (CX) - a chemical nettle agent (Sample ID: SVS-10-013 and SVS-10-027);
- AsCl<sub>3</sub>- vapor and solid samples (Sample ID: SW-4825GBTP134-TE-017)
- Hexachloroethane - used in smoke munitions (Sample ID: SVS-10-027 and SVS-10-035);
- Ethylarsonous dichloride (Sample ID: SVS-10-032); and
- 2-Phenyl-1,3,2-oxathiazolane (Sample ID: SW-4825GB-TP134-TE-007 and SVS-10-040).



#### 4.7.3.2. Grab Samples

4.7.3.2.1 One grab sample (SW-4825GB-GS01), collected from soil near SW-4825GB-SCR-006 (2-quart green tinted glass bottle) containing 2 inches of liquid and a dirt plug, was collected from TP 138. After the clearance of headspace analysis, the sample was submitted to ECBC for agent/ABP analysis. The analytical results show that H and L were not detected, but 1,4-dithiane and 1,4-thioxane were detected. Thiodiglycol was not detected. No additional analysis was performed for this sample. The sample descriptions and ECBC analytical results are summarized in Table E.9 of Appendix E.

4.7.3.2.2 Twenty-two grab soil samples were collected and analyzed during the investigation of high probability TPs 120 and 134 investigations. Results of the headspace analysis by DAAMS of four samples (SW-4825GB-GS18, 19, 20, and 21) indicate the presence of mustard. These samples were double-bagged individually and sealed in a drum. No additional analysis was performed for these samples. Eighteen grab samples cleared for headspace were submitted to ECBC for agent/ABP analysis. H, L, 1,4-dithiane, and/or 1,4-thioxane were detected in 12 samples. Agent/ABPs were not detected in two samples (SW-4825GB-GS-008 and SW-4825GB-GS14). These two samples were associated with a chalky white substance, and a full scan GC/MS analysis was performed. The primary compound identified in the full scan analysis for both samples was CN, a tearing agent. No additional analysis was performed for these 14 samples. The sample descriptions and ECBC analytical results are summarized in Table E.11 of Appendix E.

4.7.3.2.3 Three grab samples (GS-11, GS-12, and GS-13) cleared for agent (H and L) and ABPs (1,4-dithiane and 1,4-oxathiane) by ECBC were shipped to the HTW laboratory ALSI for analysis of VOCs and associated TICs, SVOCs and associated TICs, explosives, and metals. ECBC analytical results are included in Appendix I. ALSI analytical results are summarized in Table E.8 of Appendix E. Table E.8 shows that only metals were detected at concentrations exceeding the accepted comparison levels. Aluminum and thallium (GS-11 and GS-12), arsenic (GS-11 and GS-13), iron (GS-12), and magnesium exceeded the accepted comparison levels. Explosives, iodine, and perchlorate were not detected. VOCs and SVOCs were either not detected or detected at concentrations below the accepted comparison levels. Total cyanide and fluoride were detected at concentrations below the accepted comparison levels. Soil associated with these grab samples was removed during the investigations (reference to Appendix Q HHRA for detailed discussions).

#### 4.7.3.3. Pit Characterization Samples

4.7.3.3.1 Five pit characterization samples were collected after completion of the TP 138 investigation. The locations of the pit characterization samples are illustrated in Figure 4-6. All samples collected were cleared for agent (H and L) and ABPs (1,4-dithiane and 1,4-oxathiane) by ECBC and then sent to the HTW laboratory for analysis of the Spring Valley Partners comprehensive list in accordance with the SAP of the SWWP (USACE, 2007b). Three backup sidewall confirmation samples that were not analyzed for HTW parameters were also clear for agent/ABPs. The ECBC agent/ABP analytical results are included in Appendix I.

4.7.3.3.2 The validated analytical results of the pit characterization samples are summarized in Table E.10 of Appendix E. Table E.10 shows that only metals were detected at concentrations exceeding the accepted comparison levels. Aluminum, cobalt, iron, magnesium,

and vanadium were exceeded in all samples. Manganese was exceeded in two sidewall samples (east and south sidewalls). Aluminum, arsenic (601 mg/kg), cobalt, iron, magnesium, thallium, and vanadium were exceeded in the floor sample (Figure 4-6). Explosives, iodine, and perchlorate were not detected; VOCs and SVOCs were either not detected or detected at concentrations below the accepted comparison levels; and total cyanide and fluoride were detected at concentrations below the accepted comparison levels. These samples were used to quantify the risk in the HHRA (reference to Appendix Q HHRA for detailed discussions).

#### **4.7.3.4. Disposal Samples**

4.7.3.4.1 Two hundred eighty-six waste disposal soil samples were collected from soil excavated during the high probability test pit operations. Thirty-six samples were collected from the TP 138 investigation, of which 23 samples detected agent (H and L) and ABPs (1,4-dithiane and 1,4 oxathiane). Two hundred fifty samples were collected from the TPs 120 and 134 investigations, of which 73 samples detected agent/ABPs. Appendix I includes the laboratory report for these samples.

4.7.3.4.2 Thirteen samples from the TP 138 investigation and 177 samples from the TPs 120 and 134 investigations were cleared by ECBC for agent/ABPs and then sent to the HTW laboratory for RCRA characterization. Two composite TCLP samples were collected from cleared drums during the TP 138 investigation. Sixteen composite TCLP samples were collected from cleared drums during the TPs 120 and 134 investigations. Appendix I (TP HTW Report folder) includes the lab reports for these samples.

4.7.3.4.3 Aqueous IDW, specifically decontamination water, was collected in a total of 159 55-gallon drums (approximately 6500 gallons) between November 2009 and December 2010. Composite samples were collected from these drums composed of aliquots of water from one of every five drums. Water drums were divided into two groups: those suspected of containing agent and those expected to be free of this contamination. Composites of water samples were collected separately from the group of drums generated with agent-impacted soil and from those generated with non-agent impacted soil. Further analysis was not performed for samples that detected agent/ABPs. Samples cleared by ECBC for agent (H and L), ABPs (1,4-dithiane and 1,4 oxathiane), and ricin, were further analyzed by the HTW laboratory for TCLP VOCs, SVOCs; metals; and corrosivity, ignitability, and reactivity. Analytical results show that the detected concentrations are within the RCRA D-list hazardous waste regulatory limits except for one sample (collected on 20 January 2011) that contained arsenic concentrations exceeding the limit. Aqueous IDW from this sample was sent to the DuPont Chamberworks in Deepwater, NJ for disposal. Appendix I (TP HTW Report folder) includes the lab report for these samples.

### **4.8. OTHER SAMPLING RESULTS**

#### **4.8.1. Discovery of Arsenic Trichloride (March 2010)**

4.8.1.1 The full-scan analysis of the vapor sample and the solid sample collected from SW-4825GB-TP134-TE-017 identified  $\text{AsCl}_3$ . The analysis of a solid sample collected from the item also detected H and 1,4-dithiane. Additional analysis was performed on the solid sample per AU request. The sample was tested for CWAs using Nuclear Magnetic Resonance (NMR) and GC/MS. A preliminary NMR analysis of the sample provided no useful information.

Utilizing GC/MS, the samples were screened for CWAs, including associated precursor and degradation products. The GC/MS analysis results indicated the presence of two major peaks (constituted 99.09% of the integrated area) corresponding to  $\text{AsCl}_3$  and arsenic trioxide, respectively, and several minor peaks (constituting 0.91% of the integrated area) corresponding to mainly hexachloroethane, chlorinated aromatics, mustard agent diphenylchloroarsine, octasulfur, and triphenylarsine. The remaining minor peaks detected were consistent with the synthesis of DA. Two polyaromatic impurities also detected in the reaction mixture in small amounts indicated that conversion of the DA to the cyano derivative, diphenylcyanoarsine (DC, or Clark 2), may have been attempted. The presence of the DC, however, could not be confirmed in the sample results. A more detailed discussion and the additional arsenic trichloride analysis results are included in Appendix L.

4.8.1.2 Arsenic wipe samples were collected from the ECS interior wall as part of the demobilization. Although these samples were collected to develop safety measurements for workers who handle ECS panels and CAFS casing during the demobilization activities, they also provided information on arsenic concentrations generated from the investigation as particulates. Three ECS wall samples (two next to CAFS on ECS wall and one near the entrance on ECS wall) were collected by Parsons on 24 September 2010. The highest arsenic concentration was detected in the ECS wall sample near the entrance where less air circulation occurred. There is no Occupational Safety and Health Administration standard for an arsenic wipe sample. The U.S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) (June 2009) uses  $2 \mu\text{g}/100 \text{ cm}^2$  (equal to  $0.2 \text{ mg}/\text{m}^2$ ) as surface wipe screening level. The basis for arsenic surface wipe screening level of  $0.2 \text{ mg}/\text{m}^2$  is the detection limit, which is not a health-based value. Based on the Brookhaven National Laboratory Surface Wipe Sampling Procedure, acceptable surface contamination level for arsenic is  $15 \mu\text{g}/100 \text{ cm}^2$  (equal to  $1.5 \text{ mg}/\text{m}^2$ ) for dust on surface housekeeping. The other acceptable arsenic contamination level cited,  $1.0 \mu\text{g}/100 \text{ cm}^2$  (release criteria), is not applicable since it is below the detection limit of  $2 \mu\text{g}/100 \text{ cm}^2$ . All detected arsenic concentrations in the ECS wall samples were below the Brookhaven National Laboratory Surface Wipe Sampling acceptable surface contamination level of  $1.5 \text{ mg}/\text{m}^2$  for dust on surface housekeeping. Arsenic wipe sampling results are summarized in Appendix E (Table E.14).

4.8.1.3 Seven CAFS samples (Inlet S1, Pre S2, High Efficiency Particulate Air [HEPA], S3 (top left), bottom left, top right, bottom right, and Outlet S7) were collected from various locations from inlet to outlet inside the CAFS casing by ECBC on 8 November 2010. The arsenic wipe sampling results show that the highest arsenic concentrations were detected where the pre-filter was located and arsenic was not detected after the first HEPA filter. Arsenic wipe sampling results are summarized in Appendix E (Table E.14).

4.8.1.4 Bulk identification analysis was performed using NMR and GC/MS for SVS-10-028, which contained a sufficient amount of black oily liquid. NMR and GC/MS analysis results for the liquid sample indicated the presence of aromatic compounds, including primarily benzaldehyde, benzene carboxylic acid, and 2-chlorobenzoic acid. The ECBC laboratory report for the bulk analysis for SVS-10-028 is included in Appendix L. The sample was disposed by the ECBC lab.

4.8.1.5 The investigation activities at TPs 120 and 134 were halted due to the detection and the discovery of  $\text{AsCl}_3$  and uncertainty associated with the protectiveness of the CAFS. The work was halted so USACE could determine the effectiveness of the engineering controls being utilized to ensure worker and public safety.

#### **4.8.2. Geotechnical Borings (August 2010)**

4.8.2.1 Six geotechnical borings were advanced inside the 4825 Glenbrook Road residence to either refusal or upon groundwater being encountered. Soil encountered in the geotechnical borings is described in the geotechnical boring logs, included in Appendix M. Neither suspected AUES-related debris nor cultural debris were encountered during the geotechnical boring effort. Saprolite was encountered at depths between 8 inches and 14 inches in all borings. Refusal was encountered in two locations (GS-01 and GS-02) near the back yard of the house at depths of 12 inches and 13.5 inches bgs, respectively. Instead of refusal, water was encountered in the other four borings (GS-03 through GS-06) at depths between 84.5 inches to 98 inches bgs. Soil encountered beneath the house appeared to be native soil.

4.8.2.2 Soil samples (GS-01 through GS-07) collected from the six geotechnical borings were cleared for headspace and low level agent/ABPs analysis. GS-07 was a duplicate sample collected from GS-01. ALSI analytical results show that no exceedance was detected in GS-01 and GS-02. Metals, including aluminum and vanadium, were detected at concentrations exceeding the accepted comparison levels in GS-03. Aluminum concentrations exceeded the comparison level in GS-04 through GS-06 (Figure 2-6). Other compounds, including VOCs, SVOCs, explosives, remaining metals, total cyanide, fluoride, iodide, and perchlorate, were either not detected or detected at concentrations below the accepted comparison levels. The agent/ABP analytical results are summarized in Appendix E (Table E.12). ALSI analytical results are summarized in Appendix E (Table E.13). These samples were used to quantify the risk in the HHRA (reference to Appendix Q HHRA for detailed discussions).

#### **4.8.3. Backyard Sampling (August 2010)**

4.8.3.1 The agent/ABP analytical results of the 15 locations (27 samples) collected from the back yard show that agent/ABPs were not detected in 13 locations (25 samples). Lewisite was detected with J qualifier in two samples (SW-4825GB-MM-2 and SW-4825GB-PP-2) collected at 3 feet bgs near the back porch. The L impacted soil sampling locations are illustrated in Figure 2-7. The agent/ABP analytical results are summarized in Appendix E (Table E.12).

4.8.3.2 Three randomly selected samples of the 27 samples were collected for further HTW analysis per site-specific work plan (USACE, 2010). Among these three samples, two soil samples (SW-4825GB-AA2 and SW-4825GB-GG2) were cleared for agent/ABPs and submitted to ALSI and analyzed for VOCs, SVOCs, explosives, and 12 AU-requested metals. The third sample, MM2, collected with the intention of submitting to ALSI, but was not submitted as a result of L being detected in the sample MM2. Analytical results show that metals, including aluminum, manganese, and vanadium in SW-4825GB-AA2, and aluminum and vanadium in SW-4825GB-GG2, were detected at concentrations exceeding the accepted comparison levels. Arsenic concentrations in these samples were below the remediation level of 20 mg/kg. Other compounds, including VOCs, SVOCs, explosives, and remaining metals, were either not detected or detected at concentrations below the accepted comparison levels.

ALSI analytical results are summarized in Appendix E (Table E.13). These samples were used to quantify the risk in the HHRA (reference to Appendix Q HHRA for detailed discussions).

#### **4.8.4. Air Monitoring Results (2007-2010)**

4.8.4.1 There were no DAAMS-confirmed detections of agent or industrial compounds on the MINICAMS during Burial Pit 3 and Burial Pit 3 extension investigations, low probability test pit investigations and arsenic removal, and high probability test pit investigations.

4.8.4.2 In addition to CWM-related air monitoring, a PID, an arsine meter, and an HCN monitor were used inside the ECS to monitor the excavated soil for VOCs, arsine, and HCN during the high probability investigations. No sustained detections of VOCs, arsine, or HCN were recorded during the investigations. The air monitoring records are included in Appendix N.

#### **4.8.5. Sewer Line Restoration (2011)**

A 75mm projectile and an intact AUES glass flask with a dirt or cork plug containing a small quantity of brown solids were found in an area adjacent to a previously excavated area in 2001 while constructing a permanent sewer line and manhole. CARA X-rayed and assessed the 75mm projectile and determined it to be empty. Both the 75mm projectile and AUES-related glassware were cleared for headspace and work resumed shortly thereafter. Table 4.17 includes the lists the items found during this effort. The headspace results can be found in the Sewer Line Restoration Work folder located in the Sitreps folder of Appendix F. The 75mm projectile was turned over to the CENAB on January 10, 2011. The hand receipt is included in Appendix P.

#### **4.9. HTW SOIL REMOVED (2007-2010)**

Based on pre-delineation soil sampling results, the Burial Pit 3 area and two east extensions were over-excavated to remove HTW-impacted soil to 1 foot below the saprolite vertically and 1 foot additional horizontally in areas illustrated in Figure 4-5. The pre-delineation soil sampling results are summarized in Appendix E (Table E.5). Approximately 20 tons of HTW soil were excavated from the area to remove arsenic-impacted soil at concentrations exceeding the Spring Valley remedial action level of 20 mg/kg. Appendix I (Pit 3 HTW Lab Reports folder) includes the disposal soil sample results for test pit investigations. The excavated soil was disposed as non-RCRA hazardous waste at King and Queen Landfill in VA.

#### **4.10. BACKFILL AND COMPACTION (2007-2010)**

4.10.0.1 Backfill for use in the Burial Pit 3 and three extensions excavation, arsenic removal, and high probability test pit investigations, was stockpiled at the Federal Property in September 2007. The material was obtained from a source sampled by Severson Environmental and approved by USACE and the Spring Valley Partners for use at SVFUDS. Approximately 2,000 cubic yards were delivered and staged. A soil sample was taken of the backfill in August 2007 and characterized in accordance with the SWWP (USACE, 2007b) (*i.e.*, classified in accordance with ASTM D 2487 and tested for Atterberg limits [ASTM D 4318], grain-size distribution [ASTM D 422], and compaction characteristics [ASTM 698]). The backfill soil results are included in Appendix O.

4.10.0.2 Burial Pit 3 and three extensions excavation, arsenic removal area in the driveway, and test pits completed under the low probability investigations were permanently backfilled with the approved backfill soil to the established compaction standards. The compaction test results are summarized in Appendix O.

#### 4.11. DISPOSAL (2007-2010)

##### 4.11.1. Agent Impacted Soil and Water Disposal

4.11.1.1 During the investigation of TPs 120, 134, and 138, agent/ABP-impacted soil, water and other waste, such as PPE and materials used during the investigation that were potentially impacted by agent/ABPs were generated. Waste profiles were created for this agent/ABP-impacted waste based on the ECBC agent/ABP analytical results. Agent/ABP impacted waste below 1 STEL was shipped as environmental hazardous substance for incineration. Approximately 75 tons of (352 drums and a roll-off box) agent/ABP-impacted waste were transported in six shipments to Veolia Incineration Facility in Port Arthur, TX for disposal. The shipment information is summarized below:

- Load 1 (3 May 2010) – 88 soil drums/total chemical agent (CA) mass: 3.21 g
- Load 2 (3 May 2010) – 88 soil drums/total CA mass: 5.75 g
- Load 3 (3 May 2010) – 50 soil and 38 decontamination water drums/total CA mass: 1.49 g
- Load 4 (10 May 2010) – 88 soil drums/total CA mass: 1.85 g
- Load 5 (25 May 2010) – One roll-off box/total CA mass: 2.93 g (worst case)/0.61 g (estimated)
- Load 6 (1 April 2011) – 3 soil drums, 3 decontamination water drums and 19 other drums including scrap drums and PPE drums/total CA mass: 0.3 g

4.11.1.2 Information on the six agent-impacted waste shipments was submitted to USEPA Regions III and VI; the submitted information is included in Appendix H. The waste disposal manifests are provided in Appendix H.

4.11.1.3 For non-headspace cleared scrap samples detected higher than 1 STEL, decontamination was performed in according with procedures listed in the SWWP Revision 2b (USACE, 2010). This waste was sent to Veolia Incineration Facility in Port Arthur, TX for disposal in April 2011.

##### 4.11.2. Non-Agent Impacted Soil Disposal

4.11.2.1 **Burial Pit 3 and Three Extensions Investigations:** Approximately 530 tons of soil were excavated during the Burial Pit 3 and three extension investigations. Based on the TCLP analytical results, the excavated soil was determined to be non-RCRA hazardous waste and was disposed at Kings and Queen Landfill in VA. The waste disposal manifests are provided in Appendix H.

4.11.2.2 **Arsenic and HTW Soil Removal:** Approximately 750 tons of arsenic-impacted soil were removed from the driveway of 4825 Glenbrook Road. Approximately 20 tons of HTW soil were removed from the Burial Pit 3 area during the over-excavation activities. Based on the TCLP analytical results (Appendix I, TP HTW Lab Reports folder), the excavated

soil was determined to be non-RCRA hazardous waste and was disposed at Kings and Queen Landfill in VA. The waste disposal manifests are provided in Appendix H.

**4.11.2.3 High Probability Test Pits Investigations:** Soil represented by these samples met requirements for disposal as non-hazardous material; this soil (approximately 1556 tons) was disposed at the King and Queen County Landfill in Plymouth, VA. The waste disposal manifests are provided in Appendix H.

#### **4.11.3. Non-Agent Impacted Water Disposal**

The aqueous IDW generated during the high probability test pit investigations through December 2010 met requirements for disposal as non-hazardous/hazardous material at DuPont Chamberworks in Deepwater, NJ. The waste disposal manifests are provided in Appendix H.

#### **4.11.4. PPE and Other Waste Disposal**

PPE used by site personnel during the operation under the ECS was collected in 55-gallon drums and stored at the Federal Property. PPE disposal was based on the work conditions encountered when it was used (*e.g.*, soil disposal characterization results were used to determine appropriate handling).

#### **4.11.5. MEC and MD Items Disposal**

MEC and MD items selected by USACE Huntsville and Parsons safety specialists were destroyed in the T-30 operation. The destruction certificates are included in Appendix P.

#### **4.11.6. Intact Containers and Scrap**

Suspect containers were transferred to ECBC and disposed by ECBC. The scrap items identified as CWM items were disposed at Veolia Incineration Facility in Port Arthur, TX. The munitions-related scrap items cleared for headspace were disposed at a metal smelter (Demil Metal) in Glencoe, Illinois. The glassware scrap items cleared for headspace were disposed as the non-RCRA hazardous special waste at King and Queen County Landfill in Plymouth, VA

### **4.12. SUMMARY OF INVESTIGATION ACTIVITIES (2007-2010)**

#### **4.12.1. Summary of Complete and Incomplete Investigation Activities**

4.12.1.1 Among the various investigation activities proposed for 4825 Glenbrook Road from 2007 through 2010, the following activities were completed:

- High probability Burial Pit 3, east extension, east second extension, and south extension - performed in October 2007 through March 2009;
- Forty-one low probability test pits - performed in March through August 2009;
- Approximately 95 percent of arsenic removal in the driveway was performed in May and July 2009; and
- High probability TP 138 and partial TPs 120 and 134 - performed in November 2009 through April 2010.

4.12.1.2 The following activities were not completed:

- Investigation of the seven low probability test pits (TPs 135, 136, 139, 140, 143, 144, and 145);
- Removal of arsenic-contaminated soil in the driveway area north of TP 109 near the 4835 Glenbrook Road retaining wall and in the floor of TP 138; and
- Delineation and removal of suspect AUES-related debris and agent-impacted soil surrounding high probability TPs 120 and 134.

#### **4.13. DATA SUMMARY**

##### **4.13.1. Soil Data Evaluation**

Data collected by USACE between 2000 through 2010 were validated in accordance with the USEPA data validation guidance listed in the approved QAPP in the Site-Wide Work Plan (USACE, 2007c). Data qualifiers were assigned to the soil analytical data. J qualified data are estimated. U qualified data are non-detected. L qualified data are biased low due to QA/QC parameters. R qualified data are rejected. The data validation reports are included in Appendix J.

##### **4.13.2. Characterization of Chemicals of Potential Concern in Soil**

4.13.2.1 The contaminants of potential concern (COPC) in soil were selected based on the following screening process:

- For non-metals, the maximum detected concentration of a chemical in soil was compared to the USEPA RSL for residential soil screening criteria for soil direct contact determined at a risk level of  $1 \times 10^{-6}$  (for carcinogens) or a hazard quotient level of 0.1 (to account for cumulative effects for non-carcinogens). At this stage, all detections in surface and subsurface soil (to 12 feet in depth) were evaluated together for future use scenarios. This concept derives from the fact that future subsurface activities (e.g., excavation to install a utility line) could bring subsurface soil to the surface. Only chemicals that exceed the RSLs are retained as COPCs.
- In addition to the RSL comparison for metals, the maximum detected concentration of a chemical in soil was compared to the background Upper Tolerance Limit (UTL) as established in the Background Soil Sampling Report for SVFUDS (USACE, 2008c). Metals were eliminated as COPCs for human exposures if the maximum detected concentration is less than the greater of the background UTL or RSL. A comparison to background UTLs to determine which metals are elevated over background is consistent with USEPA (USEPA, 1989, 1992, 2006, , and 2010a,b,c) guidance.
- Essential nutrients were limited from further consideration. Essential nutrients include calcium, sodium, iron, potassium, magnesium, iodine, chloride and phosphorus.
- For the soil to groundwater leaching pathway, the USEPA RSLs for groundwater protection with dilution attenuation factor of 20 (to account for dilution in the aquifer) were used. For soil to groundwater leaching COPCs identified through the screening process, additional evaluation was performed using the SESOIL leaching model in the risk assessment (Appendix Q).
- The screening levels for H and L were taken from a study performed by Oak Ridge National Laboratory (Oak Ridge National Laboratory, 2007), which reflects validation



of values published by USACHPPM (USACHPPM, 1999). The RSL for 1,4-dithiane was used for 1,4-thioxane (USACE, 2008g).

4.13.2.2 The soil analytical results (Table 4.18) collected from the investigation activities remaining in place were compared to Spring Valley Partners direct contact comparison levels to identify COPCs. The comparison results show that agent (L) and metals, including aluminum, arsenic, cobalt, manganese, thallium, and vanadium, are the COPCs in soil for the site. Mustard and mustard ABPs were not identified as COPCs because these compounds were not detected in any of the samples remaining at the site.

4.13.2.3 The soil analytical results (Table 4.19) were also compared to the USEPA RSLs for groundwater protection to identify soil to groundwater leaching COPCs. The comparison results show that two VOCs (chloroform and carbon tetrachloride) and 14 metals (aluminum, antimony, arsenic, cadmium, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, thallium, and vanadium) were the soil COPCs for groundwater protection.

#### **4.13.3. Characterization of Potential MEC Presence**

Test pit locations were selected to provide a 95 percent confidence of locating burial pits or trenches with dimensions of not less than 10 feet by 20 feet. A total of 84 test pits were located at the property. Of these, 75 have been investigated. Of the 162 MEC items recovered, 160 were associated with Burial Pit 3, which was identified from TP 23 and Burial Pit 3 investigations. The other two MEC items were recovered during excavation of adjacent TPs 120/134. While TPs 120/134 and seven other TPs require additional investigation, MEC does not appear to be widely spread across the site.

#### **4.13.4. Characterization of Potential CWM Presence**

A total of 46 confirmed CWM items were discovered to date. Of these, 44 were identified with MEC – 19 in Burial Pit 3 and east extension (100 MEC items) and 25 with TPs 120/134 (two MEC items). Since CWM to date has been associated with MEC, CWM does not appear to be widely spread across the site. However, suspect AUES associated glassware has been found across the site. This glassware has a potential to be associated with CWM.






















#### **4.13.5. Groundwater**

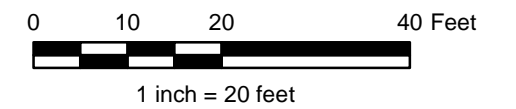
No monitoring well has been installed at the property. Groundwater was encountered in four (GB-03 through GB-06) of the six geotechnical borings advanced during the geotechnical boring sampling at approximately 8 feet bgs. Groundwater samples were not collected from the soil borings. Monitoring wells were installed immediately down-gradient of the property as part of the Spring Valley Partners site-wide groundwater investigation activities. Groundwater associated with the 4825 Glenbrook Road property will be evaluated in the site-wide remedial investigation (RI) and is not evaluated in this document.

Figure 4-1  
Excavated Areas at  
4825 Glenbrook Road

Spring Valley  
Washington, D.C.

**Legend**

-  Buildings
-  Property Boundaries
-  20' Grid
-  Pits 1 and 2 (POI-24R)
-  ECS Footprint - (Burial Pit 3)
-  Arsenic Exceedance to be Further Excavated
- Arsenic Soil**
-  Arsenic Grid Previously Removed [2'] (2000-01)
-  Arsenic Grid Previously Removed [3'] (2009)
-  Arsenic Grid Previously Removed [4'] (2000-01)
-  Arsenic Grid Previously Removed [5'] (2009)
-  Arsenic Grid Previously Removed [6'] (2009)
- Soil Excavation**
-  Excavation Depth [3.5'] (2009)
-  Excavation Depth [4'] (2010)
-  Excavation Depth [5'] (2010)
-  Excavation Depth [6'] (2010)
-  Excavation Depth [6.5'] (2009)
- Test Pit 23**
-  Excavation Depth [13'] (2002)
- Soil Overexcavation**
-  Overexcavation Depth [1.5'] (2009)
-  Overexcavation Depth [4.5'-6.5'] (2009)
-  Overexcavation Depth [10.5'] (2009)
-  Overexcavation Depth [12'] (2009)



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 Date: 10/20/2010  
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**PARSONS**

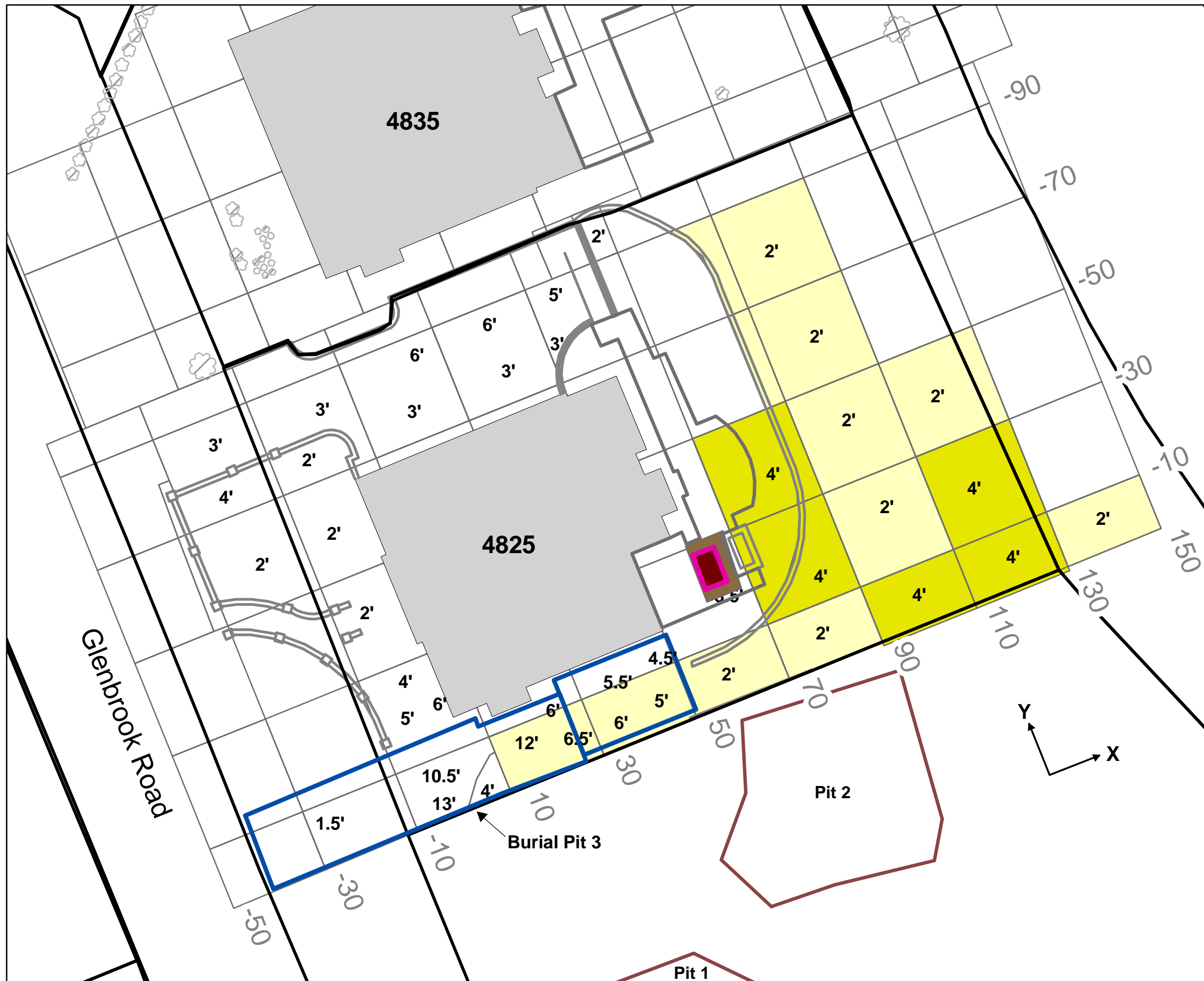


Figure 4-2 Topographical Cross-Section

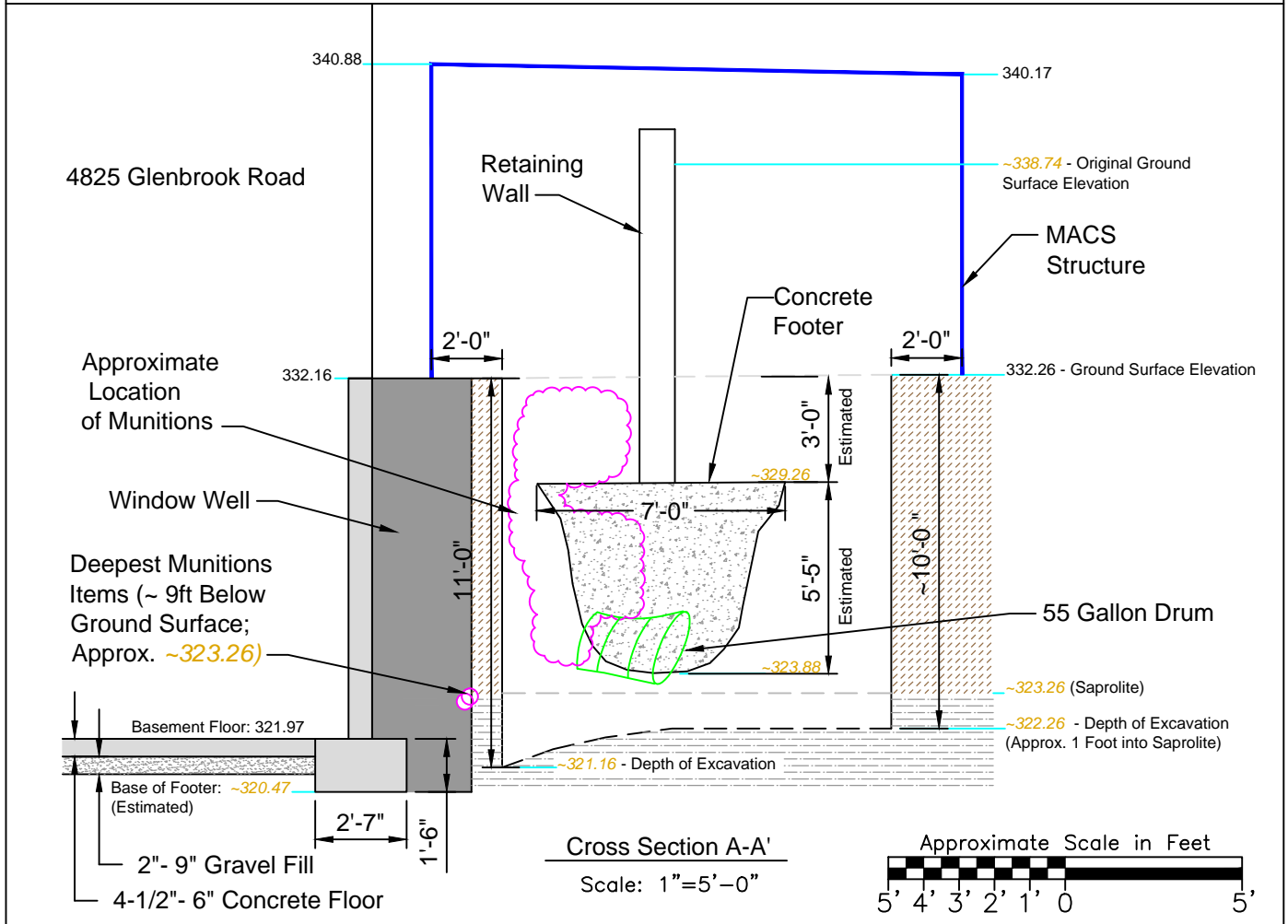
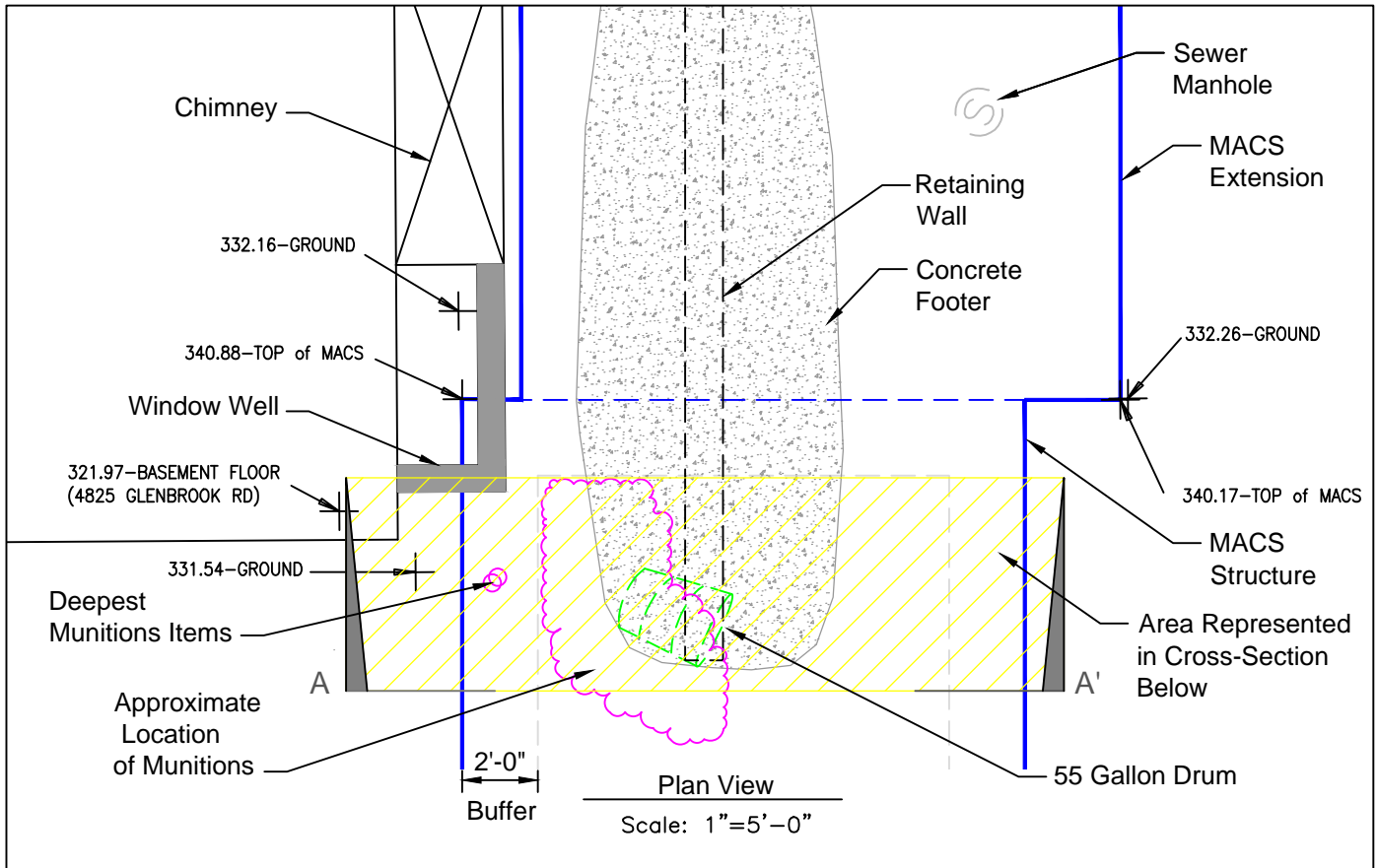
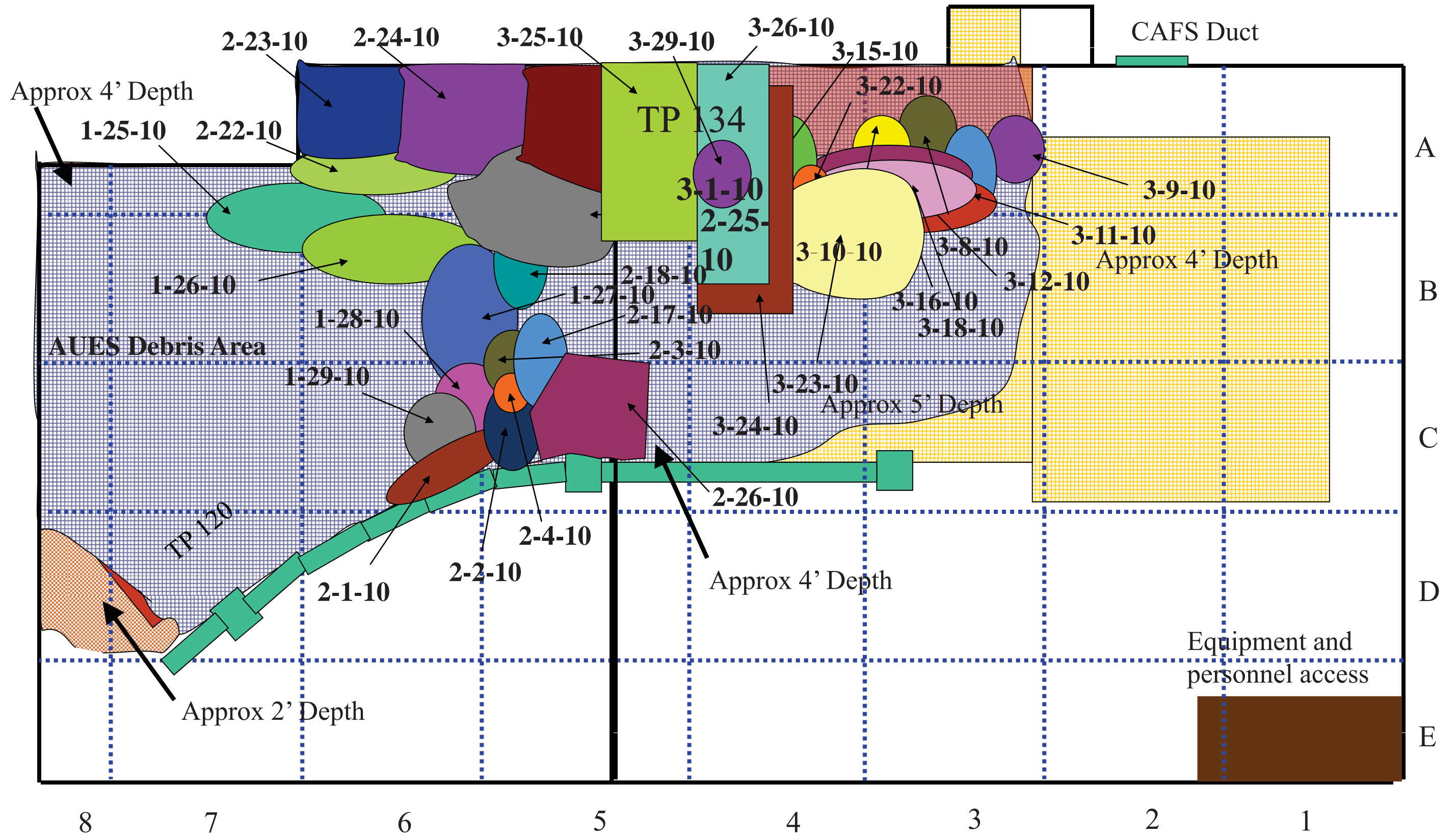
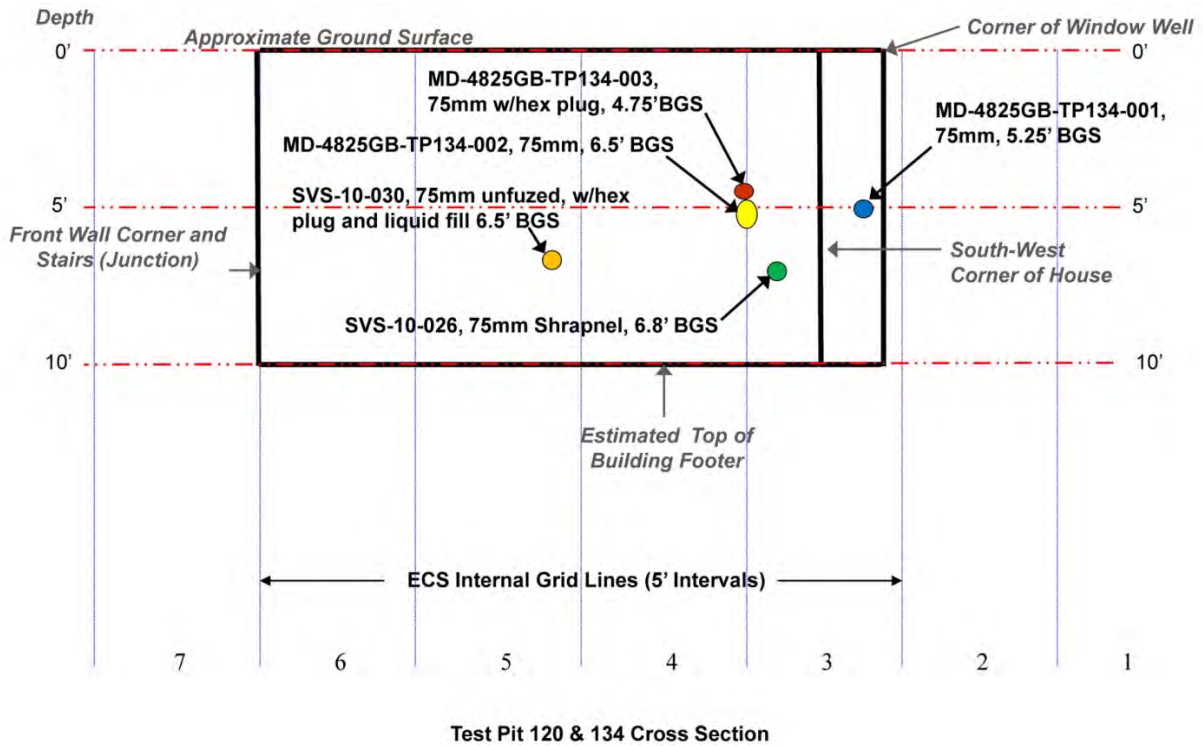


Figure 4-3 ECS Grids and Investigation Progress



TP 120 & 134 Composite as of 4-5-10

**Figure 4-4 Locations of Munitions-Related Items Uncovered During the High Probability TPs 120 and 134 Investigations (Cross-Section)**



**Figure 4-5 4825 GLENBROOK ROAD PIT 3  
OVER-EXCAVATION EXTENT**

(dimensions and locations are approximate)

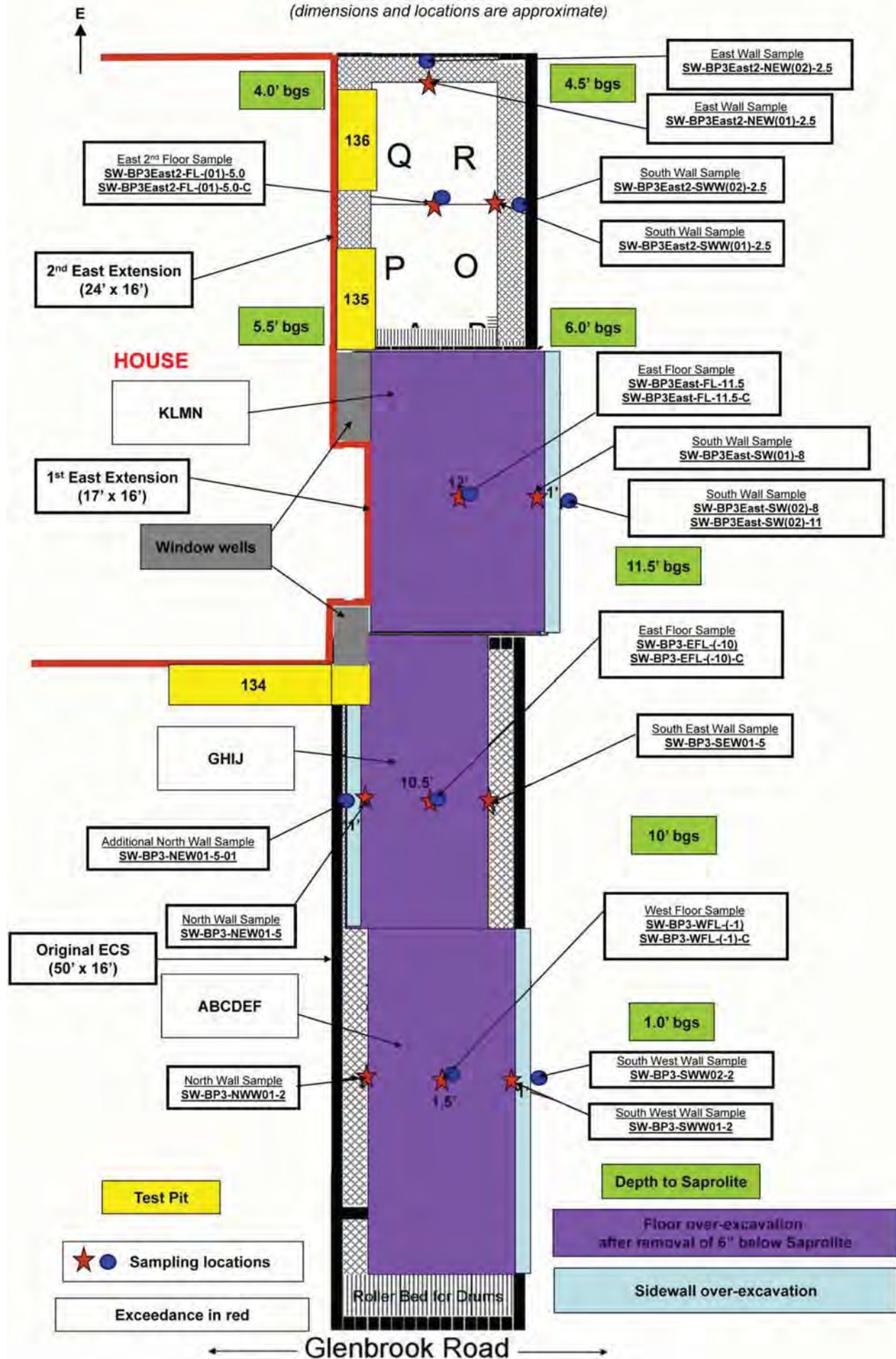
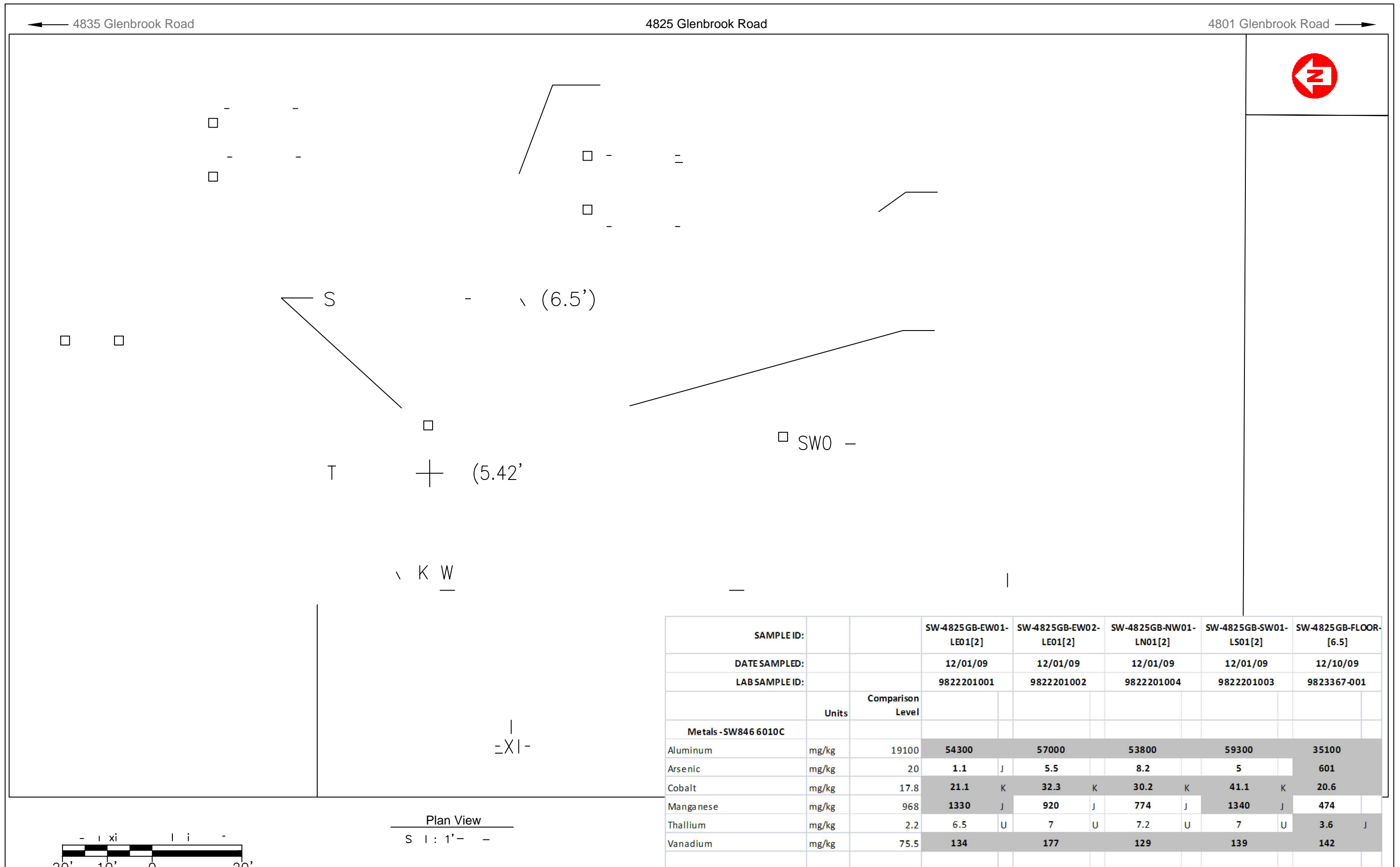


Figure 4-6 Test Pit 138 Sampling Results at 4825 Glenbrook Road



SAMPLE ID:			SW-4825GB-EW01-LE01[2]	SW-4825GB-EW02-LE01[2]	SW-4825GB-NW01-LN01[2]	SW-4825GB-SW01-LS01[2]	SW-4825GB-FLOOR-[6.5]
DATE SAMPLED:			12/01/09	12/01/09	12/01/09	12/01/09	12/10/09
LABSAMPLE ID:			9822201001	9822201002	9822201004	9822201003	9823367-001
	Units	Comparison Level					
<b>Metals - SW846 6010C</b>							
Aluminum	mg/kg	19100	54300	57000	53800	59300	35100
Arsenic	mg/kg	20	1.1 J	5.5	8.2	5	601
Cobalt	mg/kg	17.8	21.1 K	32.3 K	30.2 K	41.1 K	20.6
Manganese	mg/kg	968	1330 J	920 J	774 J	1340 J	474
Thallium	mg/kg	2.2	6.5 U	7 U	7.2 U	7 U	3.6 J
Vanadium	mg/kg	75.5	134	177	129	139	142

Table 4.1  
 Summary of Test Pits 1 to 23 Investigation  
 (2001-2002)

Test Pit	Start Date	End Date	Saprolite Depth (ft)	Bedrock Depth (ft)	Comments
1	6/22/2001	6/22/2001	6		
2	6/18/2001	6/18/2001	10		Encountered Sewer line at 4' (6' below 1918 Grade)
3	5/24/2001	5/24/2001	7		
4	5/24/2001	5/24/2001		5	
5	6/18/2001	6/18/2001	8		Encountered Sewer line at 4' (6' below 1918 Grade)
6	5/24/2001	5/24/2001		0.5	
7	5/24/2001	5/24/2001	8		
8	5/29/2001	5/29/2001	6		
9	5/24/2001	5/24/2001	4		Glass debris recovered
10	5/29/2001	5/29/2001	7		
11	6/19/2001	6/19/2001	6		
12	5/23/2001	5/23/2001	6		
13	5/30/2001	5/30/2001	5.25		
14	5/29/2001	5/29/2001	6.5		
15	6/19/2001	6/19/2001	7.5		
16	6/19/2001	6/19/2001	7		
17	5/23/2001	5/23/2001	5		Encountered water main - TP moved 6' NW
18	5/30/2001	5/30/2001	6		
19	6/20/2001	6/20/2001	5		
20	5/22/2001	5/22/2001	2		
21	5/21/2001	5/21/2001	4		
22	5/30/2001	5/30/2001	7.5		
23	5/31/2001		7		Detailed information listed separately
Trench	Start Date	End Date	Saprolite Depth (ft)	Bedrock Depth (ft)	Comments
Trench 1					
0-10	5/15/2001	5/15/2001	6		
10-20	5/16/2001	5/16/2001	5		
20-30	5/17/2001	5/17/2001	NA		Water line encountered at 2', excavation stopped there
30-40	5/17/2001	5/17/2001	4		
50-60	5/17/2001	5/17/2001	4		
60-70	5/17/2001	5/17/2001	NA		Water line encountered at 4', excavation stopped there
70-80	5/17/2001	5/17/2001	NA		Water line encountered at 4', excavation stopped there
80-90	5/18/2001	5/18/2001	4		
90-100	5/18/2001	5/18/2001	4		
100-110	5/18/2001	5/18/2001	8		
110-120	5/22/2001	5/22/2001	4		
120-130	5/22/2001	5/22/2001	2		
130-140	5/22/2001	5/22/2001	3		
140-150	6/20/2001	6/20/2001	6		
Trench 2					
0-10	7/2/2001	7/2/2001	5		
10-20	7/2/2001	7/2/2001		5	
20-30	7/2/2001	7/2/2001	4.5		
30-40	7/2/2001	7/2/2001	5.5		Water line encountered at 5', excavation stopped there





**TABLE 4.3  
INVENTORY OF MEC ITEMS RECOVERED AT SPRING VALLEY DURING THE  
TEST PIT 23 INVESTIGATION (2001-2002)**

COUNTER	DESCRIPTION	SVS #	SVM #	DATE RECOVERED	DRUM # or LOCATION	PINS DATE	X-RAY DATE	HOTBOX DATE	CLEAR Yes/No	MARB	ADDITIONAL INFORMATION	DEMIL/SCRAP CERTIFICATION	FINAL DISPOSITION
1	75mm projo unfuzed/unfired	SVS-01-070	SVM-02-095	11/15/2001	IHF	11/28/2001	11/27/2001			Yes	Previously in JJ0030S, after Treaty Inspection repacked in JJ196S		CWM
1	75mm projo unfuzed/unfired	SVS-01-075	SVM-02-027	11/16/01	IHF	11/29/01	11/29/2001			Yes	Initial PINS assesment indicates FS/ Verify burster is empty prior to transport(HE)		CWM
1	75mm projo unfuzed/unfired	SVS-01-077	SVM-02-028	11/16/01	IHF	12/06/01	12/5/2001			Yes			CWM
1	75mm projo unfuzed/unfired	SVS-01-108	SVM-02-097	11/29/01	IHF	4/5/02	01/02/2002 Re-X-ray 4/5/02			YES	11lbs 11.25"L 75% Solid Fill Redid data/awaiting MARB		CWM
1	75mm projo unfuzed/unfired	SVS-01-129	SVM-02-093 (02/11/02)	12/05/01	IHF	12/07/01	12/6/2001			Yes	11"L 11lbs/Cl 100%/N 25%/S50%/B50%		CWM
1	75mm projo unfuzed/unfired	SVS-01-134	SVM-02-044	12/05/01	IHF	12/07/01	12/6/2001			Yes	11.5"L 11lbs/liquid/Cl100%/S .05%/B.25%		CWM
1	75mm projo unfuzed/unfired	SVS-01-152	SVM-02-099	12/06/01	IHF	1/14/02	1/10/2002			Yes	11.6lbs 11"L / HE		CWM
1	75mm projo unfuzed/unfired	SVS-01-162	SVM-02-102	12/06/01	IHF	1/10/02	1/9/2002			YES	11.8lbs 11.25"L		CWM
1	75mm projo unfuzed/unfired	SVS-01-165	SVM-02-139	12/06/01	IHF	12/20/01	12/19/2001			Yes	12.4lbs 11.25"L , Cl,100%.B.Si POSSIBLE SMOKE		CWM
1	75mm projo unfuzed/unfired	SVS-01-184	SVM-02-062	12/10/01	IHF	1/08/02	12/17/2001			Yes	DC FILL/Transferred to Battelle for disposal 11 Dec 02		CWM
1	75mm projo unfuzed/unfired	SVS-01-200	SVM-02-107	12/10/01	IHF	01/09/02	1/8/2002			Yes	Liquid Line HD, Mustard; possible smoke or impurity. Cl: S=10.63; Cl: H-0.44. Chlorine 83%, Sulphur 62%, Nitrogen 3%, Silicon 63%		CWM
1	75mm projo unfuzed/unfired	SVS-01-216	SVM-02-068	12/11/01	IHF	1/07/02	12/19/2001			Yes	12lbs 11.5"L. FS SMOKE. Chlorine 100%, Sulphur 25%, Nitrogen 25%, Silicene 50%		CWM

**TABLE 4.3  
INVENTORY OF MEC ITEMS RECOVERED AT SPRING VALLEY DURING THE  
TEST PIT 23 INVESTIGATION (2001-2002)**

COUNTER	DESCRIPTION	SVS #	SVM #	DATE RECOVERED	DRUM # or LOCATION	PINS DATE	X-RAY DATE	HOTBOX DATE	CLEAR Yes/No	MARB	ADDITIONAL INFORMATION	DEMIL/SCRAP CERTIFICATION	FINAL DISPOSITION
1	75mm projo unfuzed/unfired	SVS-01-218	SVM-02-069	12/11/01	IHF	12/18/01	12/17/2001			Yes	12lbs 11.25"L NKE/DC FILL/Transferred to Battelle for disposal 11 dec 02		CWM
1	75mm projo unfuzed/unfired	SVS-01-231	SVM-02-054	12/12/01	IHF	12/12/01	12/12/2001			Yes	11"L 10lbs NKE Silicon 65% / HE		CWM
1	75mm projo unfuzed/unfired	SVS-01-234	SVM-02-071	12/12/01	IHF	12/17/01	12/14/2001			Yes	11.25"L 11lbs, FS SMOKE CL, S		CWM
1	75mm projo unfuzed/unfired	SVS-01-250	SVM-02-077	12/12/01	IHF	12/14/01	12/13/2001			Yes	13 lbs, 11.75" NKE CLORINE 80%, Si		CWM
1	75mm projo unfuzed/unfired	SVS-01-294	SVM-02-090	12/19/01	IHF	1/08/02	1/4/2002			Yes	Liquid, 50% fill		CWM
1	75mm projo unfuzed/unfired	SVS-02-030	SVM-02-122	1/10/2002	IHF	1/17/2002	1/14/2002			YES	DC FILL/Transferred to Battelle for disposal 11 Dec 02		CWM
<b>18</b>	<b>Total CWM Items</b>												
4	(4) Empty 75mm Projectiles unfuzed/unfired	SVS-01-089	NA	11/27/01	HE Bunker	NA	NA	11/28/2001	Yes	No	3 are empty/1 contains a pusher plate	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-185	NA	12/10/01	HE Bunker	NA	12/11/2001	12/12/2001	Yes	No	Empty DAAMS Tubes done	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-02-006	NA	01/08/02	HE Bunker	NA	1/16/2002	1/18/2002	Yes	No	EMPTY, SCRAP	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-02-020	NA	01/09/02	HE Bunker	NA	1/16/2002	1/18/2002	Yes	No	EMPTY	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
4	(4) Empty 75mm Projectiles unfuzed/unfired	SVS-01-100	NA	11/29/01	HE Bunker	NA	NA	11/30/2001	Yes	No	2 are empty/1 w/filler and 1 w/pusher plate	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-124	NA	11/30/01	HE Bunker	12/11/2001	12/10/2001	1/8/2002	Yes Minicams	Yes	8.6lbs 9.75"L/NKE MARB OE Scrap	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm fuze adapter w/burster tube	SVS-01-178	NA	12/07/01	HE Bunker	12/10/2001	12/7/2001	4/10/2002	Yes	Yes	0.3lbs 4.5"L/NKE	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
2	Bursters (2) ea	SVS-01-257	NA	12/12/01	DOT Container HE Bunker	NA	NA	2/13/2002	Yes	No	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-02-003	NA	01/08/02	HE Bunker	NA	1/16/2002	1/18/2002	Yes	No	SCRAP	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator

**TABLE 4.3  
INVENTORY OF MEC ITEMS RECOVERED AT SPRING VALLEY DURING THE  
TEST PIT 23 INVESTIGATION (2001-2002)**

COUNTER	DESCRIPTION	SVS #	SVM #	DATE RECOVERED	DRUM # or LOCATION	PINS DATE	X-RAY DATE	HOTBOX DATE	CLEAR Yes/No	MARB	ADDITIONAL INFORMATION	DEMIL/SCRAP CERTIFICATION	FINAL DISPOSITION
1	1ea Burster/Adapter	SVS-02-011	NA	01/08/02	HE Bunker	NA	NA	NA	NA	No	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
4	(2) ea burster tubes (2) ea pusher plate	SVS-02-049	NA	1/14/2002	HE Bunker	NA	NA	NA	NA	No	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-059	NA	11/15/2001	HE Bunker	12/5/2001	12/5/2001	1/8/2002	Yes	Yes	Shrapnel	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-062	NA	11/15/2001	HE Bunker	12/6/2001	12/5/2001	1/8/2002	Yes	Yes	Shrapnel	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-064	NA	11/15/2001	HE Bunker	12/6/2001	12/5/2001	1/8/2002	Yes	Yes	Shrapnel	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-080	NA	11/16/01	HE Bunker	12/5/2001	12/4/2001	1/8/2002	Yes	Yes	NKE Shrapnel 1/9/02	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-092	NA	11/28/01	HE Bunker	11/30/2001	11/30/2001	1/8/2002	Yes	Yes	14lbs/ NKE/Shrapnel round?	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-093	NA	11/28/01	HE Bunker	12/6/2001	12/5/2001	1/8/2002	Yes	Yes	Minicams	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-094	NA	11/28/01	HE Bunker	12/5/2001	12/5/2001	1/8/2002	Yes	Yes	Shrapnel/NKE	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-096	NA	11/28/01	HE Bunker	12/5/2001	12/5/2001	1/8/2002	Yes	Yes	Shrapnel/NKE	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-123	NA	11/30/01	HE Bunker	12/19/2001	12/18/2001	2/12/2002	Yes	No	NKE Si 60%	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-169	NA	12/06/01	HE Bunker	1/7/2002	12/18/2001	2/11/2002	Yes	Yes	14.2lbs 9.5"L NKE 63% Silicon	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm Projectile unfuzed/unfired	SVS-02-005	NA	01/08/02	HE Bunker	NA	1/16/02	1/17/2002	Yes	No	SHRAPNEL, SCRAP	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-097	NA	11/28/01	HE Bunker	12/06/01	12/5/2001	1/8/2002	Yes	Yes	shrapnel	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-127	NA	12/05/01	HE Bunker	12/07/01	12/6/2001	1/8/2002	Yes	Yes	9"L 13.8lbs/Shrapnel/NKE	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-138	NA	12/05/01	HE Bunker	12/07/01	12/6/2001	1/8/2002	Yes	Yes	9"L 12.4lbs/Shrapnel/NKE	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-149	NA	12/06/01	HE Bunker	12/11/01	12/10/2001	2/12/2002	Yes	Yes	14lbs 9"L/Shrapnel/NKE	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator

**TABLE 4.3  
INVENTORY OF MEC ITEMS RECOVERED AT SPRING VALLEY DURING THE  
TEST PIT 23 INVESTIGATION (2001-2002)**

COUNTER	DESCRIPTION	SVS #	SVM #	DATE RECOVERED	DRUM # or LOCATION	PINS DATE	X-RAY DATE	HOTBOX DATE	CLEAR Yes/No	MARB	ADDITIONAL INFORMATION	DEMIL/SCRAP CERTIFICATION	FINAL DISPOSITION
1	75mm projo unfuzed/unfired	SVS-01-150	NA	12/06/01	HE Bunker	NA	1/10/2002	1/14/2002	Yes	Yes	13.6lbs 10"L	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-183	NA	12/10/01	HE Bunker	12/11/01	12/11/2001	1/8/2002	Yes Minicams	Yes	Shrapnel/NKE	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-286	NA	12/19/01	HE Bunker	NA	12/20/2001	1/4/2002	Yes- DAAMS 1/07/02	No	Shrapnel NO LIQUID Awaiting DAAMS	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-296	NA	12/19/01	HE Bunker	NA	1/4/2002	1/7/2002	Yes- MINICAM 1/07/02	No	Shrapnel, no liquid	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-298	NA	12/19/01	HE Bunker	NA	1/4/2002	1/7/2002	Yes- MINICAM 1/07/02	No	Shrapnel, no liquid	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-300	NA	12/19/01	HE Bunker	NA	1/4/2002	1/7/2002	Yes	No	Shrapnel, no liquid	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm Projectile unfuzed/unfired	SVS-02-016	NA	01/09/02	HE Bunker	NA	1/22/2002	1/23/02 DAAMs	Yes	No	Shrapnel	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm Projectile unfuzed/unfired	SVS-02-018	NA	01/09/02	HE Bunker	1/22/2002	1/22/2002	1/23/2002	Yes	No	Shrapnel	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm Projectile unfuzed/unfired	SVS-02-026	NA	01/10/02	HE Bunker	NA	1/14/2002	1/15/2002	Yes	No	Shrapnel	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm Projectile unfuzed/unfired	SVS-02-027	NA	01/10/02	HE Bunker	NA	1/14/2002	1/15/2002, 1/17/02	Yes	No	Shrapnel	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm Projectile unfuzed/unfired	SVS-02-028	NA	01/10/02	HE Bunker	NA	1/14/2002	1/15/2002, 1/17/02	Yes	No	Shrapnel	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm Projectile unfuzed/unfired	SVS-02-032	NA	1/10/2002	HE Bunker	NA	1/14/2002	1/15/2002	Yes	No	Shrapnel	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm Projectile unfuzed/unfired	SVS-02-039	NA	1/14/2002	HE Bunker	NA	1/22/2002	1/23/2002	Yes	No	Shrapnel	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm Projectile unfuzed/unfired	SVS-02-045	NA	1/14/2002	HE Bunker	NA	1/22/2002	1/23/2002	Yes	No	Shrapnel	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm Projectile unfuzed/unfired	SVS-02-051	NA	1/14/2002	HE Bunker	NA	1/15/2002	1/16/2002	Yes	No	Shrapnel	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm Projectile unfuzed/unfired	SVS-02-052	NA	1/14/2002	HE Bunker	NA	1/15/2002	1/16/2002	Yes	No	Shrapnel	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm Projectile unfuzed/unfired	SVS-02-064	NA	1/15/2002	HE Bunker	NA	1/16/2002	1/17/2002	Yes	No	Shrapnel	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator

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INVENTORY OF MEC ITEMS RECOVERED AT SPRING VALLEY DURING THE  
TEST PIT 23 INVESTIGATION (2001-2002)**

COUNTER	DESCRIPTION	SVS #	SVM #	DATE RECOVERED	DRUM # or LOCATION	PINS DATE	X-RAY DATE	HOTBOX DATE	CLEAR Yes/No	MARB	ADDITIONAL INFORMATION	DEMIL/SCRAP CERTIFICATION	FINAL DISPOSITION
1	75mm projo unfuzed/unfired	SVS-01-109	NA	11/29/01	HE Bunker	12/10/2001	12/10/2001	11/14/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-111	NA	11/29/01	HE Bunker	12/5/2001	12/4/2001	11/15/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm Projectile unfuzed/unfired	SVS-01-125	NA	11/30/01	HE Bunker	NA	1/10/2002	1/14/2002	Yes	No	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-201	NA	12/10/01	HE Bunker	1/8/2002	12/18/2001	2/12/2002	Yes	No	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-213	NA	12/11/01	HE Bunker	1/8/2002	12/17/2001	2/12/2002	Yes	No	9lbs 10.25"L	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-230	NA	12/12/01	HE Bunker	12/13/2001	12/12/2001	2/12/2002	Yes	No	11"L 10lbs NKE Nitrogen B, Si	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-236	NA	12/12/01	HE Bunker	12/14/2001	12/14/2001	2/12/2002	Yes	No	13.25lbs 9"L, NKE B, SI	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-238	NA	12/12/01	HE Bunker	12/17/2001	12/14/2001	2/12/2002	Yes	No	10lbs 11.75"L	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-248	NA	12/12/01	HE Bunker	12/13/2001	12/13/2001	2/12/2002	Yes	No	11 lbs, 9 " NKE, Boron Si	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-252	NA	12/12/01	HE Bunker	12/13/2001	12/13/2001	2/12/2002	Yes	No	12.5 lbs, 9.5 "	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-265	NA	12/17/01	HE Bunker	12/18/2001	12/17/2001	2/12/2002	Yes	No	9" 12 lbs NKE AS, B, Si	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-287	NA	12/19/01	HE Bunker	1/8/2002	12/19/2001	2/13/2002	Yes	No	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-288	NA	12/19/01	HE Bunker	1/4/2002	12/20/2001	2/13/2002	Yes	Yes	5% FILL	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm Projectile unfuzed/unfired	SVS-02-014	NA	01/09/02	HE Bunker	NA	1/22/2002	1/23/2002	Yes	No	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm Projectile unfuzed/unfired	SVS-02-074	NA	1/29/2002	HE Bunker	NA	4/4/2002	4/5/2002	Yes	No	9"L 12.8Lbs	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm Projectile unfuzed/unfired	SVS-02-078	NA	2/25/2002	HE Bunker	NA	4/4/2002	4/4/2002	Yes	No	Shrapnel	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-061	NA	11/15/2001	HE Bunker	12/4/2001	12/3/2001	1/8/2002	Yes	Yes	Phosphorus & some Silicon detected	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator

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INVENTORY OF MEC ITEMS RECOVERED AT SPRING VALLEY DURING THE  
TEST PIT 23 INVESTIGATION (2001-2002)**

COUNTER	DESCRIPTION	SVS #	SVM #	DATE RECOVERED	DRUM # or LOCATION	PINS DATE	X-RAY DATE	HOTBOX DATE	CLEAR Yes/No	MARB	ADDITIONAL INFORMATION	DEMIL/SCRAP CERTIFICATION	FINAL DISPOSITION
1	75mm projo unfuzed/unfired (7.62mm)	SVS-01-130	NA	12/05/01	HE Bunker	12/6/2001	12/6/2001	1/8/2002	Yes	Yes	11 3/8"L 12.6lbs/phosphorus 47%/boron 90%/silicon 60%	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-211	NA	12/11/01	HE Bunker	1/7/2002	12/17/2001	2/12/2002	Yes	No	11.2lbs 12"L. Boron 25%. Silicon 50%. Chlorine 1086- Not agent strength.	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-220	NA	12/11/01	HE Bunker	12/17/2001	12/14/2001	2/12/2002	Yes	No	10.5lbs 11.5"L NKE N, B, Si	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
<b>73</b>	<b>HE Bunker Items</b>												
1	75mm Projo unfuzed/unfired (empty)	SVS-01-046	NA	7/17/2001	#1 DRUM	NA	NA	7/18/2001	Yes	No	NA	Item certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
1	75mm Projo unfuzed/unfired (empty)	SVS-01-047	NA	07/17/01	#1 DRUM	NA	NA	7/18/2001	Yes	No	NA	Item certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
1	75mm Projo unfuzed/unfired (empty)	SVS-01-051	NA	11/14/2001	#1 DRUM	NA	NA	11/16/2001	Yes	No	NA	Item certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
1	75mm Projo unfuzed/unfired (empty)	SVS-01-052	NA	11/14/2001	#1 DRUM	NA	NA	11/16/2001	Yes	No	NA	Item certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
1	75mm Projo unfuzed/unfired (empty)	SVS-01-053	NA	11/14/2001	#1 DRUM	NA	NA	11/16/2001	Yes	No	NA	Item certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-078	NA	11/16/01	#1 DRUM	NA	11/30/2001	12/4/2001	Yes	No	11lbs	Item certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
4	(4) empty 75mm unfuzed/unfired projo's	SVS-01-081	NA	11/16/01	#1 DRUM	NA	NA	11/19/2001	Yes	No		Items certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
4	(4) empty 75mm unfuzed/unfired projo's	SVS-01-083	NA	11/16/01	#1 DRUM	NA	NA	11/19/2001	Yes	No		Items certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
4	(4) empty 75m unfuzed/unfired	SVS-01-089	NA	11/27/01	#1 DRUM	NA	NA	11/28/2001	Yes	No		Items certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
4	(4) empty 75mm unfuzed/unfired	SVS-01-100	NA	11/29/01	#1 DRUM	NA	NA	11/30/2001	Yes	No		Items certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
1	(1) Empty 75mm unfuzed/unfired projo	SVS-01-126	NA	11/30/01	#1 DRUM	NA	NA	11/30/2001	Yes	No		Item certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
4	(4) empty 75mm unfuzed/unfired projo's	SVS-01-148	NA	12/05/01	#1 DRUM	NA	NA	12/6/2001	Yes, DAAMS	No		Items certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
4	(4) empty 75mm unfuzed/unfired projo's	SVS-01-170	NA	12/06/01	#1 DRUM	NA	NA	12/7/2001	Yes, DAAMS	No		Items certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator

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INVENTORY OF MEC ITEMS RECOVERED AT SPRING VALLEY DURING THE  
TEST PIT 23 INVESTIGATION (2001-2002)**

COUNTER	DESCRIPTION	SVS #	SVM #	DATE RECOVERED	DRUM # or LOCATION	PINS DATE	X-RAY DATE	HOTBOX DATE	CLEAR Yes/No	MARB	ADDITIONAL INFORMATION	DEMIL/SCRAP CERTIFICATION	FINAL DISPOSITION
2	75mm projo unfuzed/unfired, 2EA	SVS-01-268	NA	12/17/01	#1 DRUM	NA	NA	12/18/2001	Yes, DAAMS	No		Item certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
2	75mm projo unfuzed/unfired (2)	SVS-01-279	NA	12/18/01	#1 DRUM	NA	NA	12/19/2001	Yes	No		Item certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
2	75mm projo unfuzed/unfired (2)	SVS-01-289	NA	12/19/01	#1 DRUM	NA	NA	12/20/2001	Yes	No		Item certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-301	NA	12/19/01	#1 DRUM	NA	NA	12/20/2001	Yes	No		Item certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
4	4ea Scrap 75mm	SVS-02-012	NA	01/08/02	#1 DRUM	NA	NA	1/10/2002	Yes, DAAMS	No		Items certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
4	4ea Scrap 75mm	SVS-02-022	NA	01/09/02	#1 DRUM	NA	NA	1/10/2002	Yes, DAAMS	No		Items certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
3	3ea 75mm Scrap	SVS-02-035	NA	01/10/02	#1 DRUM	NA	NA	1/15/2002	Yes	No		Items certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
<b>49</b>	<b>Total Drum #1 Items</b>												
1	(1) Empty 75mm unfuzed/unfired projos	SVS-01-159	NA	12/06/01	#2 DRUM	NA	NA	12/7/2001	Yes Decon'd 12/12/01	No	0.16HD to be shipped back to VCS for decon (completed 12/12/01 returned to perf drum).	Item certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
1	(1) Empty 75mm unfuzed/unfired projo	SVS-01-159A	NA	12/06/01	#2 DRUM	NA	NA	12/7/2001	DAAMS NO Decon'd 12/12/01	No	0.16HD to be shipped back to VCS for decon/completed 12/12/01 returned to perf drum	Item certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
1	(1) Empty 75mm unfuzed/unfired projo	SVS-01-193	NA	12/10/01	#2 DRUM	NA	NA	12/11/2001	Yes	No	NA	Item certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
4	(4) empty 75mm unfuzed/unfired projo's	SVS-01-223	NA	12/11/01	#2 DRUM	NA	NA	12/12/2001	Yes	No	NA	Items certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
4	(4) empty 75mm unfuzed/unfired projo's	SVS-01-224	NA	12/11/01	#2 DRUM	NA	NA	12/12/2001	Yes	No	NA	Items certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
4	(4) empty 75mm unfuzed/unfired projo's	SVS-01-235	NA	12/12/01	#2 DRUM	NA	NA	12/12/2001	Yes	No	Empty	Items certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
3	3 ea 75 mm scrap	SVS-01-256	NA	12/12/01	#2 DRUM	NA	NA	12/13/2001	Yes, DAAMS	No	EMPTY	Items certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-260	NA	12/17/01	#2 DRUM	NA	12/17/2001	12/18/2001	Yes	No	11.5" 11 lbs EMPTY	Items certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator



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TEST PIT 23 INVESTIGATION (2001-2002)**

COUNTER	DESCRIPTION	SVS #	SVM #	DATE RECOVERED	DRUM # or LOCATION	PINS DATE	X-RAY DATE	HOTBOX DATE	CLEAR Yes/No	MARB	ADDITIONAL INFORMATION	DEMIL/SCRAP CERTIFICATION	FINAL DISPOSITION
3	3ea 75mm Scrap	SVS-02-034	NA	01/10/02	#2 DRUM	NA	1/14/2002	1/14/2002, 1/23/02	No, after decon, Yes	No	DECON 1/23/02	Items certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
3	3ea 75mm Scrap	SVS-02-036	NA	01/10/02	#2 DRUM	NA	NA	1/15/2002	Yes	No	SCRAP	Items certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
3	3ea 75mm Scrap	SVS-02-047	NA	01/14/02	#2 DRUM	NA	NA	1/17/2002	Yes	No	NA	Items certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
3	3ea 75mm Scrap	SVS-02-048	NA	01/14/02	#2 DRUM	NA	NA	1/15/2002	Yes	No	SCRAP	Items certified as scrap by HFA and sent to incineration	Onyx Environmental Incinerator
<b>31</b>	<b>Total Drum #2 Items</b>												
1	75mm projo unfuzed/unfired	SVS-01-103	NA	11/29/01	#3 DRUM	NA	12/10/2001	12/11/2001	Yes	No	12.6lbs 11.75"L/Empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-105	NA	11/29/01	#3 DRUM	NA	12/10/2001	12/11/2001	Yes, DAAMS	No	10.4lbs 11.75"L/Empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-119	NA	11/30/01	#3 DRUM	NA	12/10/2001	12/11/2001	Yes	No	10.4lbs 11.25"L/Empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-139	NA	12/05/01	#3 DRUM	NA	12/6/2001	12/13/2001	Yes, DAAMS	No	11"L 10.2lbs/empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-142	NA	12/05/01	#3 DRUM	NA	12/6/2001	12/13/2001	Yes, DAAMS	No	12"L 10.4lbs/empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-186	NA	12/10/01	#3 DRUM	NA	12/11/2001	12/12/2001	Yes	No	Empty DAAMS Tubes done	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-188	NA	12/10/01	#3 DRUM	NA		1/15/2002	Yes	No	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-189	NA	12/10/01	#3 DRUM	NA	12/11/2001	12/12/2001	Yes	No	Empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-190	NA	12/10/01	#3 DRUM	NA	12/11/2001	12/12/2001	Yes	No	Empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-191	NA	12/10/01	#3 DRUM	NA	1/9/2002	1/15/2002	Yes	No	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-207	NA	12/11/01	#3 DRUM	NA	12/12/2001	12/13/2001	Yes, DAAMS	No	11.2lbs 11.5"L Empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-208	NA	12/11/01	#3 DRUM	NA	12/12/2001	12/13/2001	Yes	No	10.2Lbs 11.75"L	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-209	NA	12/11/01	#3 DRUM	NA	12/12/2001	12/13/2001	Yes, DAAMS	No	10.8lbs 11.5"L	Item sent to Clean Harbors for destruction	Clean Harbors

**TABLE 4.3  
INVENTORY OF MEC ITEMS RECOVERED AT SPRING VALLEY DURING THE  
TEST PIT 23 INVESTIGATION (2001-2002)**

COUNTER	DESCRIPTION	SVS #	SVM #	DATE RECOVERED	DRUM # or LOCATION	PINS DATE	X-RAY DATE	HOTBOX DATE	CLEAR Yes/No	MARB	ADDITIONAL INFORMATION	DEMIL/SCRAP CERTIFICATION	FINAL DISPOSITION
1	75mm projo unfuzed/unfired	SVS-01-214	NA	12/11/01	#3 DRUM	NA	12/17/2001	12/18/2001	Yes	No	11lbs 11.5"L	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-225	NA	12/12/01	#3 DRUM	NA	12/12/2001	12/13/2001	Yes	No	11.25"L 10.5lbs empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-232	NA	12/12/01	#3 DRUM	NA	12/14/2001	12/17/2001	Yes, DAAMS	No	11.5"L 10lbs	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-233	NA	12/12/01	#3 DRUM	NA	12/14/2001	12/17/2001	Yes, DAAMS	No	11.5"L 10lbs	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-239	NA	12/12/01	#3 DRUM	NA	12/14/2001	12/17/2001	Yes, DAAMS	No	13.25lbs 11.75"L EMPTY	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-240	NA	12/12/01	#3 DRUM	NA	12/17/2001	12/18/2001	Yes	No	12lbs 12.5"L EMPTY	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-247	NA	12/12/01	#3 DRUM	NA	12/13/2001	12/14/2001	Yes	No	10 lbs, 11.5"	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-249	NA	12/12/01	#3 DRUM	NA	12/13/2001	12/14/2001	Yes	No	10 lbs, 11.25 "	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-251	NA	12/12/01	#3 DRUM	NA	12/13/2001	12/14/2001	Yes	No	10.25 lbs, 11.33 "	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-261	NA	12/17/01	#3 DRUM	NA	12/17/2001	12/18/2001	Yes	No	11.5" 11 lbs EMPTY	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-262	NA	12/17/01	#3 DRUM	NA	12/17/2001	12/18/2001	Yes	No	11.5" 10.5 lbs EMPTY	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-264	NA	12/17/01	#3 DRUM	NA	12/17/2001	12/18/2001	Yes	No	11.5" 11.5 lbs EMPTY	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-02-004	NA	01/08/02	#3 DRUM	NA	1/16/2002	1/18/2002	Yes	No	SCRAP	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-02-007	NA	01/08/02	#3 DRUM	NA	1/16/2002	1/18/2002	Yes	No	EMPTY	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-02-009	NA	01/08/02	#3 DRUM	NA	1/16/2002	1/18/2002	Yes	No	EMPTY	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-02-024	NA	01/10/02	#3 DRUM	NA	1/14/2002	1/15/2002, 1/17/02	Yes	No	empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-02-029	NA	01/10/02	#3 DRUM	NA	1/14/2002	1/15/2002	Yes	No	scrap[	Item sent to Clean Harbors for destruction	Clean Harbors

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INVENTORY OF MEC ITEMS RECOVERED AT SPRING VALLEY DURING THE  
TEST PIT 23 INVESTIGATION (2001-2002)**

COUNTER	DESCRIPTION	SVS #	SVM #	DATE RECOVERED	DRUM # or LOCATION	PINS DATE	X-RAY DATE	HOTBOX DATE	CLEAR Yes/No	MARB	ADDITIONAL INFORMATION	DEMIL/SCRAP CERTIFICATION	FINAL DISPOSITION
1	75mm Projo unfuzed/unfired	SVS-02-031	NA	01/10/02	#3 DRUM	NA	1/14/2002	1/15/2002	Yes	No	Empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-02-040	NA	01/14/02	#3 DRUM	NA		1/23/2002	Yes	No	SCRAP	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-02-067	NA	01/17/02	#3 DRUM	NA	1/22/2002	1/23/2002	Yes	No	EMPTY SCRAP	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-02-068	NA	01/17/02	#3 DRUM	NA	1/22/2002	1/23/2002	Yes	No	EMPTY SCRAP	Item sent to Clean Harbors for destruction	Clean Harbors
<b>34</b>	<b>Total Drum #3 Items</b>												
1	75mm projo unfuzed/unfired	SVS-01-106	NA	11/29/01	#4 DRUM	NA	12/19/2001	12/20/2001	Yes	No	9.8lbs 11.5"L	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-107	NA	11/29/01	#4 DRUM	NA	12/19/2001	12/20/2001	Yes	No	10lbs 11.5"L	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-112	NA	11/29/01	#4 DRUM	NA	12/18/2001	12/19/2001	Yes	No	10.2lbs 11"L	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-154	NA	12/06/01	#4 DRUM	NA	1/9/2002	1/14/2002	Yes	No	11lbs 11.5"L	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-163	NA	12/06/01	#4 DRUM	NA	12/18/2001	12/19/2001	Yes	No	11.25lbs 11.25"L	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-168	NA	12/06/01	#4 DRUM	NA	12/18/2001	12/19/2001	Yes	No	8.5lbs 9.5"L	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-172	SVM-02-047	12/07/01	#4 DRUM	12/10/2001	12/7/2001	1/8/2002	Yes	Yes	10.2lbs 11.5"L/NKE, silicon 55%	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-182	NA	12/10/01	#4 DRUM	NA	12/19/2001	12/20/2001	Yes	No	EMPTY	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-192	NA	12/10/01	#4 DRUM	NA	12/18/2001	12/19/2001	No, DAAMS	No	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-194	NA	12/10/01	#4 DRUM	NA	12/18/2001	12/19/2001	Yes	No	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-196	NA	12/10/01	#4 DRUM	NA	12/18/2001	12/19/2001	Yes	No	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-202	NA	12/10/01	#4 DRUM	NA	12/18/2001	12/19/2001	Yes	No	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-204	NA	12/11/01	#4 DRUM	NA	12/19/2001	12/20/2001	Yes	No	9.0lbs 11.5"L	Item sent to Clean Harbors for destruction	Clean Harbors

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TEST PIT 23 INVESTIGATION (2001-2002)**

COUNTER	DESCRIPTION	SVS #	SVM #	DATE RECOVERED	DRUM # or LOCATION	PINS DATE	X-RAY DATE	HOTBOX DATE	CLEAR Yes/No	MARB	ADDITIONAL INFORMATION	DEMIL/SCRAP CERTIFICATION	FINAL DISPOSITION
1	75mm projo unfuzed/unfired	SVS-01-210	NA	12/11/01	#4 DRUM	NA	12/18/2001	12/19/2001	Yes	No	10.5lbs 11.75"L	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-215	NA	12/11/01	#4 DRUM	NA	12/18/2001	12/19/2001	Yes	No	10lbs 11.5"L	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-217	NA	12/11/01	#4 DRUM	NA	12/18/2001	12/19/2001	Yes	No	10.5lbs 11.75"L	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-241	NA	12/12/01	#4 DRUM	NA	12/18/2001	12/19/2001	Yes	No	14lbs 11.75"L EMPTY	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-245	NA	12/12/01	#4 DRUM	NA	12/18/2001	12/19/2001	Yes	No	10lbs 11.75"L	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-269	NA	12/18/01	#4 DRUM	NA	12/18/2001	12/19/2001	Yes	No	10 LBS, 11.5"	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-270	NA	12/18/01	#4 DRUM	NA	12/18/2001	12/19/2001	Yes	No	11 LBS, 11.5 "	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-275	NA	12/18/01	#4 DRUM	NA		1/14/2002	Yes	No	11 LBS, 11.5 "	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-276	NA	12/18/01	#4 DRUM	NA	1/9/2002	1/4/2002	Yes	No	11 LBS, 11.5 "	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-277	NA	12/18/01	#4 DRUM	NA	12/18/2001	12/19/2001	Yes	No	12 LBS, 11.5 "	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-280	NA	12/19/01	#4 DRUM	NA	12/20/2001	1/4/2002	Yes-DAAMS 1/07/02	No	EMPTY	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-285	NA	12/19/01	#4 DRUM	NA	1/4/2002	1/7/2002	Yes-MINICAM 1/07/02	No	EMPTY	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-292	NA	12/19/01	#4 DRUM	NA	12/20/01 & 1/04/02	1/7/2002	Yes-MINICAM 1/07/02	No	EMPTY	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-295	NA	12/19/01	#4 DRUM	NA	12/20/2001	1/4/2002	Yes-DAAMS 1/07/02	No	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-297	NA	12/19/01	#4 DRUM	NA	12/20/2001	1/4/2002	Yes-DAAMS 1/07/02	No	NA	Item sent to Clean Harbors for destruction	Clean Harbors
<b>28</b>	<b>Total Drum #4 Items</b>												
1	75mm projo, unfuzed/unfired	SVS-01-007	NA	06/26/01	#5 DRUM	NA	06/27/01	28JUN01	Yes	No	empty-AHF scrap drum	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-056	NA	11/14/2001	#5 DRUM	NA	11/27/01/Lo st data redo 11/29/01	11/29/2001	Yes, DAAMS	No	empty/10.5lbs	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator

**TABLE 4.3  
INVENTORY OF MEC ITEMS RECOVERED AT SPRING VALLEY DURING THE  
TEST PIT 23 INVESTIGATION (2001-2002)**

COUNTER	DESCRIPTION	SVS #	SVM #	DATE RECOVERED	DRUM # or LOCATION	PINS DATE	X-RAY DATE	HOTBOX DATE	CLEAR Yes/No	MARB	ADDITIONAL INFORMATION	DEMIL/SCRAP CERTIFICATION	FINAL DISPOSITION
1	75mm projo unfuzed/unfired	SVS-01-072	NA	11/16/01	#5 DRUM	NA	11/29/2001	11/30/2001	Yes	No	empty/11lbs	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-073	NA	11/16/01	#5 DRUM	NA	11/29/2001	11/30/2001	Yes	No	empty/10.5lbs	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-074	NA	11/16/01	#5 DRUM	NA	12/3/2001	12/4/2001	Yes	No	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-076	NA	11/16/01	#5 DRUM	NA	11/29/2001	11/30/2001	Yes	No	empty/11lbs	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-079	NA	11/16/01	#5 DRUM	NA	11/29/2001	11/30/2001	Yes	No	empty/10.5lbs	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
4	(4) empty 75mm projo's	SVS-01-082	NA	11/16/01	#5 DRUM	NA		11/19/2001	Yes	No	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-084	NA	11/27/01	#5 DRUM	NA	11/29/2001	11/30/2001	Yes	No	empty	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-085	NA	11/27/01	#5 DRUM	NA	11/29/2001	11/30/2001	Yes	No	empty	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-086	NA	11/27/01	#5 DRUM	NA	11/29/2001	11/30/2001	Yes	No	empty	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-087	NA	11/27/01	#5 DRUM	NA	11/29/2001	11/30/2001	Yes	No	empty	Item demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
4	(4) empty 75mm projo's	SVS-01-088	NA	11/27/01	#5 DRUM	NA		11/28/2001	Yes	No	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-090	NA	11/28/01	#5 DRUM	NA	11/30/2001	11/30/2001	Yes	No	empty	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
3	(3) empty 75mm projo's	SVS-01-110	NA	11/29/01	#5 DRUM	NA		11/30/2001	Minicam No, Daams Yes	No	minicams-L 0.23	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-121	NA	11/30/01	#5 DRUM	NA	12/4/2001	12/4/2001	Yes	No	10.4lbs 11.75"L	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
<b>24</b>	<b>Total Drum #5 Items</b>												
1	75mm projo unfuzed/unfired	SVS-01-057	NA	11/15/01	#6 DRUM	NA	12/5/2001	12/6/2001	Yes	No	EMPTY	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-058	NA	11/15/01	#6 DRUM	NA	12/5/2001	12/6/2001	Yes, DAAMS	No	EMPTY	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-063	NA	11/15/01	#6 DRUM	NA	12/5/2001	12/6/2001	Yes	No	empty	Item sent to Clean Harbors for destruction	Clean Harbors

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TEST PIT 23 INVESTIGATION (2001-2002)**

COUNTER	DESCRIPTION	SVS #	SVM #	DATE RECOVERED	DRUM # or LOCATION	PINS DATE	X-RAY DATE	HOTBOX DATE	CLEAR Yes/No	MARB	ADDITIONAL INFORMATION	DEMIL/SCRAP CERTIFICATION	FINAL DISPOSITION
1	75mm projo unfuzed/unfired	SVS-01-095	NA	11/28/01	#6 DRUM	NA	12/5/2001	12/6/2001	Yes, DAAMS	No	empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-098	NA	11/28/01	#6 DRUM	NA	12/5/2001	12/6/2001	Yes	No	empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-114	NA	11/29/01	#6 DRUM	NA	12/4/2001	12/5/2001	Yes	No	10.6lbs 11"L	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-117	NA	11/30/01	#6 DRUM	NA	12/4/2001	12/5/2001	Yes	No	10.6lbs 11.5"L/DAAMs	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-118	NA	11/30/01	#6 DRUM	NA	12/4/2001	12/5/2001	Yes	No	10.6lbs 11.5"L/DAAMs	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-120	NA	11/30/01	#6 DRUM	NA	12/4/2001	12/5/2001	Yes	No	10.6lbs 11.5"L	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-122	NA	11/30/01	#6 DRUM	NA	12/4/2001	12/5/2001	Yes	No	10.6lbs 11.75"L/DAAMs	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-128	NA	12/05/01	#6 DRUM	NA	12/6/2001	12/10/2001	Yes	No	12"L 10.2lbs/empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-132	NA	12/05/01	#6 DRUM	NA	12/6/2001	12/10/2001	Yes	No	11"L 9.8lbs/empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-135	NA	12/05/01	#6 DRUM	NA	12/6/2001	12/10/2001	Yes	No	11.5"L 9.8lbs/empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	(1) Empty 75mm projo	SVS-01-137	NA	12/05/01	#6 DRUM	NA		12/6/2001	Yes, DAAMS	No	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-140	NA	12/05/01	#6 DRUM	NA	12/6/2001	12/10/2001	Yes	No	11.5"L 10.4lbs/empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-141	NA	12/05/01	#6 DRUM	NA	12/6/2001	12/7/2001	Yes	No	11"L 10.2lbs/empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-143	NA	12/05/01	#6 DRUM	NA	12/6/2001	12/7/2001	Yes	No	11"L 10.2lbs/empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-144	NA	12/05/01	#6 DRUM	NA	12/6/2001	12/7/2001	Yes, DAAMS	No	11"L 10.2lbs/empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-145	NA	12/05/01	#6 DRUM	NA	12/6/2001	12/7/2001	Yes	No	11"L 10.4lbs/empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-146	NA	12/05/01	#6 DRUM	NA	12/6/2001	12/10/2001	Yes	No	11"L 10.4lbs/empty	Item sent to Clean Harbors for destruction	Clean Harbors

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INVENTORY OF MEC ITEMS RECOVERED AT SPRING VALLEY DURING THE  
TEST PIT 23 INVESTIGATION (2001-2002)**

COUNTER	DESCRIPTION	SVS #	SVM #	DATE RECOVERED	DRUM # or LOCATION	PINS DATE	X-RAY DATE	HOTBOX DATE	CLEAR Yes/No	MARB	ADDITIONAL INFORMATION	DEMIL/SCRAP CERTIFICATION	FINAL DISPOSITION
1	75mm projo unfuzed/unfired	SVS-01-147	NA	12/05/01	#6 DRUM	NA	12/6/2001	12/10/2001	Yes	No	11"L 10lbs/empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-156	NA	12/06/01	#6 DRUM	NA	1/9/2002	1/14/2002	Yes	No	12.4lbs 11"L	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-173	NA	12/07/01	#6 DRUM	NA	12/7/2001	12/10/2001	Yes	No	10.8lbs 11.25"L/Empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-174	NA	12/07/01	#6 DRUM	NA	12/7/2001	12/10/2001	Yes	No	11.8lbs 11.5"L/Empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm burster tube	SVS-01-179	NA	12/07/01	#6 DRUM	NA	12/7/2001	12/10/2001	Yes	No	0.8lbs 4.5"L/Empty	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm burster tube	SVS-01-180	NA	12/07/01	#6 DRUM	NA	12/7/2001	12/10/2001	Yes	No	0.8lbs 4.5"L/Empty	Item sent to Clean Harbors for destruction	Clean Harbors
3	(3) empty 75mm projo's	SVS-01-181	NA	12/07/01	#6 DRUM	NA		12/10/2001	Yes	No	2empty and 1solid fill in end	Items sent to Clean Harbors for destruction	Clean Harbors
1	75mm Projo unfuzed/unfired	SVS-02-002	NA	01/08/02	#6 DRUM	NA	1/15/2002	1/16/2002	Yes	No	SCRAP	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm Projo unfuzed/unfired	SVS-02-038	NA	01/14/02	#6 DRUM	NA	1/15/2002	1/16/2002	Yes	No	EMPTY	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm Projo unfuzed/unfired	SVS-02-043	NA	01/14/02	#6 DRUM	NA	1/15/2002	1/15/2002	Yes	No	SCRAP	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm Projo unfuzed/unfired	SVS-02-044	NA	01/14/02	#6 DRUM	NA		1/16/2002	Yes	No	SCRAP	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm Projo unfuzed/unfired	SVS-02-055	NA	01/14/02	#6 DRUM	NA	1/15/2002	1/16/2002	Yes	No	scrap	Item sent to Clean Harbors for destruction	Clean Harbors
<b>34</b>	<b>Total Drum #6 Items</b>												
1	75mm projo unfuzed/unfired	SVS-01-054	SVM-02-015	11/14/01	#7 DRUM	11/28/2001	11/19/2001	1/8/2002	Yes Minicams	Yes	No Key Elements MARB OE Scrap	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-055	SVM-02-016 (MARB 17 Jan 02)	11/14/01	#7 DRUM	11/28/2001 Re PINS 01/09/02	11/27/2001 Re X-Ray 01/08/02	2/13/2002	Yes	Yes	No Key Elements.	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-060	SVM-02-019	11/15/01	#7 DRUM	12/5/2001	12/5/2001	1/8/2002	Yes	Yes	NKE	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-065	SVM-02-023 (MARB 17 Jan 02)	11/15/01	#7 DRUM	11/28/01 Re PINS 01/09/02	11/28/2001 Re X-Ray 1/08/02	2/13/2002	Yes	Yes	Initial PINS assessment indicates FS. 4% Nitrogen	Item sent to Clean Harbors for destruction	Clean Harbors

**TABLE 4.3  
INVENTORY OF MEC ITEMS RECOVERED AT SPRING VALLEY DURING THE  
TEST PIT 23 INVESTIGATION (2001-2002)**

COUNTER	DESCRIPTION	SVS #	SVM #	DATE RECOVERED	DRUM # or LOCATION	PINS DATE	X-RAY DATE	HOTBOX DATE	CLEAR Yes/No	MARB	ADDITIONAL INFORMATION	DEMIL/SCRAP CERTIFICATION	FINAL DISPOSITION
1	75mm projo unfuzed/unfired	SVS-01-067	SVM-02-024	11/15/01	#7 DRUM	11/28/2001	11/27/2001	1/8/2002	Yes Minicams	Yes	No Key Elements MARB OE Scrap	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-068	SVM-02-025	11/15/01	#7 DRUM	11/28/2001	11/27/2001	1/8/2002	Yes Minicams	Yes	No Key Elements MARB OE Scrap	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-069	SVM-02-026	11/15/01	#7 DRUM	11/29/2001	11/27/2001	1/8/2002	Yes	Yes	No Key Elements	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-091	SVM-02-030	11/28/01	#7 DRUM	11/30/2001	11/30/2001	1/8/2002	Yes	Yes	13lbs/PINS=NKE, boron&weak sulfur detected	Item sent to Clean Harbors for destruction	Clean Harbors
1	Cylinder with fitting 18"L x 4"dia	SVS-01-099	SVM-02-036	11/29/01	#7 DRUM	11/29/2001	12/4/2001	1/8/2002	Yes	Yes	No Key Elements (11.9lbs). X-ray redone by MMAS MARB OE Scrap	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-101	SVM-02-037	11/29/01	#7 DRUM	12/11/2001	12/10/2001	1/8/2002	Yes	Yes	10.41lbs 11.5"L/NKE, sulfur 45%,boron 80%, silicon 50% MARB OE Scrap	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-102	SVM-02-055	11/29/01	#7 DRUM	12/11/01 Re PINS 01/09/02	12/10/2001 Re X-Ray 1/8/02	2/13/2002	Yes	Yes	10lbs 11.5"L/NKE/antifreeze and water. REASSESS NKE Nitrogen 50% Boron 25% Silicon 50%	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-104	SVM-02-056	11/29/01	#7 DRUM	12/10/2001	12/10/2001	1/8/2002	Yes	Yes	10.2lbs 11.25"L/NKE, boron 25%	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-113	SVM-02-060	11/29/01	#7 DRUM	1/4/2002	12/19/2001	2/13/2002	Yes	Yes	10lbs6oz 11.25"L	Item sent to Clean Harbors for destruction	Clean Harbors
3	3" stokes (partial)	SVS-01-116	SVM-02-058	11/29/01	#7 DRUM	12/4/2001	12/4/2001	1/8/2002	Yes	Yes	5.6"lbs 7"L/ NKE	Items sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-131	SVM-02-042	12/05/01	#7 DRUM	12/7/2001	12/6/2001	1/8/2002	Yes	Yes	11 3/4"L 10.2lbs/liquid/N25%/S .05%/B.25%	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-133	SVM-02-043	12/05/01	#7 DRUM	12/7/2001	12/6/2001	1/8/2002	Yes	Yes	11.5"L 9.6lbs/NKE	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-136	SVM-02-045	12/05/01	#7 DRUM	12/6/2001	12/6/2001	1/8/2002	Yes	Yes	11.25"L 9.8lbs/NKE	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-160		12/06/01	#7 DRUM			1/9/2002	Yes	No	10.2lbs 11.25"L	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-161	SVM 02-092	12/06/01	#7 DRUM	1/7/2002	12/19/2001	2/13/2002	Yes	Yes	10.4lbs 11.25"L. NKE 63% Silicon	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-175	SVM-02-048	12/07/01	#7 DRUM	12/10/2001	12/7/2001	1/8/2002	Yes	Yes	11lbs 11.5"L/NKE, boron .50% MARB OE Scrap	Item sent to Clean Harbors for destruction	Clean Harbors



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TEST PIT 23 INVESTIGATION (2001-2002)**

COUNTER	DESCRIPTION	SVS #	SVM #	DATE RECOVERED	DRUM # or LOCATION	PINS DATE	X-RAY DATE	HOTBOX DATE	CLEAR Yes/No	MARB	ADDITIONAL INFORMATION	DEMIL/SCRAP CERTIFICATION	FINAL DISPOSITION
1	75mm projo unfuzed/unfired	SVS-01-176	SVM-02-049	12/07/01	#7 DRUM	12/10/2001	12/7/2001	1/8/2002	Yes	Yes	10.6lbs 11.5"L/NKE	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-187	SVM-02-063	12/10/01	#7 DRUM	12/19/2001	12/18/2001	2/13/2002	Yes	Yes	NKE B, Si	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-195	SVM-02-064	12/10/01	#7 DRUM	12/19/2001	12/17/2001	2/11/2002	Yes	Yes	NKE B, Si	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-197	SVM-02-065	12/10/01	#7 DRUM	1/7/2002	12/19/2001	2/11/2002	Yes	Yes	NKE Boron, possible anti-freeze, 60% Silicon	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-198	SVM-02-066	12/10/01	#7 DRUM		12/19/2001	2/11/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-199	SVM-02-059	12/10/01	#7 DRUM	12/19/2001	12/17/2001	2/13/2002	Yes	Yes	NKE B, Si, S	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-206	SVM-02-067	12/11/01	#7 DRUM	12/19/2001	12/14/2001	2/11/2002	Yes	Yes	9lbs 11.5"L NKE,B, Si	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-221	SVM-02-070	12/11/01	#7 DRUM	12/18/2001	12/17/2001	2/13/2002	Yes	Yes	13.5lbs 9.75" L NKE	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-227	SVM-02-051	12/12/01	#7 DRUM	12/12/2001	12/12/2001	1/8/2002	Yes	Yes	11.5"L 10.5lbs NKE SI 50% MARB OE Scrap	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-228	SVM-02-052	12/12/01	#7 DRUM	12/12/2001	12/12/2001	1/8/2002	Yes	Yes	NKE Si 50%	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-229	SVM-02-053	12/12/01	#7 DRUM	12/12/2001	12/12/2001	1/8/2002	Yes	Yes	11" L 10 lbs, NKE Silicon 60%	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-237	SVM-02-072	12/12/01	#7 DRUM	12/17/2001	12/14/2001	2/12/2002	Yes	Yes	10lbs 11.25"L NKE S,B	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-242	SVM-02-073	12/12/01	#7 DRUM	12/17/2001	12/14/2001	2/12/2002	Yes	Yes	10lbs 10.5"l NKE, B, Si	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-243	SVM-02-074	12/12/01	#7 DRUM	1/8/2002	12/14/2001	2/13/2002	Yes	Yes	9.5lbs 11.5"L	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-244	SVM-02-075	12/12/01	#7 DRUM	1/8/2002	12/18/2001	2/13/2002	Yes	Yes	10.5lbs 11.5"L	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-246	SVM-02-076	12/12/01	#7 DRUM	12/14/2001	12/13/2001	2/13/2002	Yes	Yes	11.5 lbs 11.5 "	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-253	SVM-02-078	12/12/01	#7 DRUM	12/14/2001	12/13/2001	2/13/2002	Yes	Yes	11lbs, 11.75 " NKE B, Si	Item sent to Clean Harbors for destruction	Clean Harbors

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INVENTORY OF MEC ITEMS RECOVERED AT SPRING VALLEY DURING THE  
TEST PIT 23 INVESTIGATION (2001-2002)**

COUNTER	DESCRIPTION	SVS #	SVM #	DATE RECOVERED	DRUM # or LOCATION	PINS DATE	X-RAY DATE	HOTBOX DATE	CLEAR Yes/No	MARB	ADDITIONAL INFORMATION	DEMIL/SCRAP CERTIFICATION	FINAL DISPOSITION
1	75mm projo unfuzed/unfired	SVS-01-254	SVM-02-079	12/12/01	#7 DRUM	12/13/2001	12/13/2001	2/13/2002	Yes	Yes	10.5 lbs, 11.75 " NKE P,B,S,Si	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-255	SVM-02-080	12/12/01	#7 DRUM	12/13/2001	12/13/2001	2/14/2002	Yes	Yes	11 lbs, 12" NKE Boron, Si	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-258	SVM-02-081	12/17/01	#7 DRUM	12/19/2001	12/17/2001	2/13/2002	Yes	Yes	NKE, Si	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-259	SVM-02-082	12/17/01	#7 DRUM	12/18/2001	12/17/2001	2/11/2002	Yes	Yes	12.75" 11 lbs NKE N, B	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-263	SVM-02-083	12/17/01	#7 DRUM	1/7/2002	12/18/2001	2/13/2002	Yes	Yes	11.5" 11 lbs. NKE 64% Silicon	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-266	SVM-02-084	12/17/01	#7 DRUM	12/18/2001	12/17/2001	2/13/2002	Yes	Yes	11.5 " 16 lbs	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-267	SVM-02-085	12/17/01	#7 DRUM	1/8/2002	12/17/2001	2/13/2002	Yes	Yes	10.5 " 12 lbs	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-271	SVM-02-086	12/18/01	#7 DRUM	1/7/2002	1/4/2002	2/13/2002	Yes	Yes	14 LBS,11.5 " 80% solid fill.NKE 60% Silicon	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-284	SVM-02-087	12/19/01	#7 DRUM	1/4/2002	12/20/2001	2/13/2002	Yes	Yes	SHRAPNEL.IQUID 20%	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-293	SVM-02-089	12/19/01	#7 DRUM	1/4/2002	1/4/2002	2/12/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-299	SVM-02-091	12/19/01	#7 DRUM	1/7/2002	1/4/2002	2/13/2002	Yes	Yes	Liquid in burster, 15% fill.NKE Boron 25%, Silicon 50%	Item sent to Clean Harbors for destruction	Clean Harbors
1	75mm projo unfuzed/unfired	SVS-01-56A	SVM-02-017	11/15/01	#7 DRUM	11/29/2001	12/4/2001	1/8/2002	Yes	Yes	NKE MARB OE Scrap	Item sent to Clean Harbors for destruction	Clean Harbors
<b>51</b>	<b>Total Drum #7 Items</b>												
1	1ea Empty 75mm projo	SVS-01-066	SVM-02-094	11/15/01	#8 DRUM	11/28/01	11/28/2001	12/03/01 11/30/01	Yes 4/10-02 No	Yes	Decconned 4/10/02	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-01-151	SVM-02-098	12/06/01	#8 DRUM	1/15/02	1/10/2002	4/10/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-01-155	SVM-02-100	12/06/01	#8 DRUM	1/16/02	1/16/2002	4/11/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-01-158	SVM-02-101	12/06/01	#8 DRUM	1/15/02	1/9/2002	4/11/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-01-164	SVM-02-103	12/06/01	#8 DRUM	1/14/02	1/10/2002	4/10/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors

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INVENTORY OF MEC ITEMS RECOVERED AT SPRING VALLEY DURING THE  
TEST PIT 23 INVESTIGATION (2001-2002)**

COUNTER	DESCRIPTION	SVS #	SVM #	DATE RECOVERED	DRUM # or LOCATION	PINS DATE	X-RAY DATE	HOTBOX DATE	CLEAR Yes/No	MARB	ADDITIONAL INFORMATION	DEMIL/SCRAP CERTIFICATION	FINAL DISPOSITION
1	1ea Empty 75mm projo	SVS-01-166	SVM-02-104	12/06/01	#8 DRUM	1/16/02	1/14/2002	4/11/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	Metal Cylinder w/Liquid	SVS-01-171	SVM-02-105	12/07/01	#8 DRUM	12/07/01 12/17/01	12/7/2001	4/10/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-01-203	SVM-02-108	12/11/01	#8 DRUM	1/10/02	12/14/2001	4/10/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1 ea 75mm projo unfuzed/unfired	SVS-01-205	SVM-02-109	12/11/01	#8 DRUM	1/15/02	1/10/2002	4/10/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-01-212	SVM-02-110	12/11/01	#8 DRUM	1/09/02	12/17/2001	4/10/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-01-219	SVM-02-111	12/11/01	#8 DRUM	1/15/02	1/10/2002	4/11/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-01-226	SVM-02-112	12/12/01	#8 DRUM	12/12/01	12/12/2001	4/10/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-01-272	SVM-02-113	12/18/01	#8 DRUM	1/10/02	1/9/2002	4/11/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-01-274	SVM-02-114	12/18/01	#8 DRUM	1/10/02	1/9/2002	4/10/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-01-278	SVM-02-115	12/18/01	#8 DRUM	1/15/02	1/10/2002	4/11/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-01-281	SVM-02-116	12/19/01	#8 DRUM	1/10/02	1/8/2002	4/11/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-01-282	SVM-02-117	12/19/01	#8 DRUM	1/10/02	1/8/2002	4/10/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-02-008	SVM-02-118	01/08/02	#8 DRUM	1/17/02	1/16/2002	4/11/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-02-017	SVM-02-119	01/09/02	#8 DRUM	1/15/02	1/14/2002	4/11/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-02-019	SVM-02-120	01/09/02	#8 DRUM	1/23/02	1/22/2002	4/12/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-02-025	SVM-02-121	01/10/02	#8 DRUM	1/15/02	1/14/2002	4/10/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-02-033	SVM-02-123	01/10/02	#8 DRUM	1/17/02	1/14/2002	4/12/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors

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INVENTORY OF MEC ITEMS RECOVERED AT SPRING VALLEY DURING THE  
TEST PIT 23 INVESTIGATION (2001-2002)**

COUNTER	DESCRIPTION	SVS #	SVM #	DATE RECOVERED	DRUM # or LOCATION	PINS DATE	X-RAY DATE	HOTBOX DATE	CLEAR Yes/No	MARB	ADDITIONAL INFORMATION	DEMIL/SCRAP CERTIFICATION	FINAL DISPOSITION
1	1ea Empty 75mm projo	SVS-02-041	SVM-02-125	01/14/02	#8 DRUM	1/22/02	1/15/2002	4/11/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-02-042	SVM-02-126	01/14/02	#8 DRUM	1/23/02	1/22/2002	4/11/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-02-053	SVM-02-127	01/14/02	#8 DRUM	1/16/02	1/15/2002	4/11/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-02-054	SVM-02-128	01/14/02	#8 DRUM	1/17/02	1/15/2002	4/12/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-02-057	SVM-02-130	01/14/02	#8 DRUM	1/17/02	1/15/2002	4/11/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-02-058	SVM-02-131	01/14/02	#8 DRUM	1/17/02	1/15/2002	4/12/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-02-059	SVM-02-132	01/14/02	#8 DRUM	1/16/02	1/15/2002	4/11/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	Cylinder 8x18 w/liquid 5%	SVS-02-061	SVM-02-133	01/15/02	#8 DRUM	1/15/02	1/15/2002	4/12/1/14/02	Yes No	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	1ea Empty 75mm projo	SVS-02-063	SVM-02-134	01/15/02	#8 DRUM	1/15/02	1/15/2002	4/12/2002	Yes	Yes	NA	Item sent to Clean Harbors for destruction	Clean Harbors
1	Pipe w/End caps	SVS-02-071	NA	01/28/02	#8 DRUM	NA	NA	4/5/2002	Yes	No	NA	Item sent to Clean Harbors for destruction	Clean Harbors
5	3ea 75mm Scrap&2ea pipes	SVS-02-083	NA	03/11/02	#8 DRUM	NA	NA	4/5/2002	Yes	No	NA	Items sent to Clean Harbors for destruction	Clean Harbors
<b>37</b>	<b>Total Drum #8 Items</b>												
1	75mm projo unfuzed/unfired	SVS-02-015	SVM-02-148	01/09/02	#9 DRUM	1/16/02	1/15/2002	11/13/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-02-021	SVM-02-149	01/09/02	#9 DRUM	1/23/02	1/22/2002	11/13/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-02-037	SVM-02-124	01/14/02	#9 DRUM	1/2/02	1/15/2002	11/13/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-02-050	SVM-02-152	01/14/02	#9 DRUM	1/16/02	1/15/2002	11/13/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-005	SVM-01-012	06/26/01	#9 DRUM	7/24/01	6/27/2001	11/14/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-071	SVM-02-096	11/15/01	#9 DRUM	11/28/01	11/27/2001	11/14/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator

**TABLE 4.3  
INVENTORY OF MEC ITEMS RECOVERED AT SPRING VALLEY DURING THE  
TEST PIT 23 INVESTIGATION (2001-2002)**

COUNTER	DESCRIPTION	SVS #	SVM #	DATE RECOVERED	DRUM # or LOCATION	PINS DATE	X-RAY DATE	HOTBOX DATE	CLEAR Yes/No	MARB	ADDITIONAL INFORMATION	DEMIL/SCRAP CERTIFICATION	FINAL DISPOSITION
1	75mm projo unfuzed/unfired	SVS-01-115	SVM-02-136	11/29/01	#9 DRUM	4/9/02	1/9/2002	11/14/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-153	SVM-02-137	12/06/01	#9 DRUM	4/8/02	1/9/02 re-x-ray 4/4/02	11/14/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-157	SVM-02-138	12/06/01	#9 DRUM	1/16/02 repins 4/9/02	1/10/2002	11/14/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-167	SVM-02-140	12/06/01	#9 DRUM	12/20/01 repins 4/8/02	4/4/2002	11/14/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-177	SVM-02-141	12/07/01	#9 DRUM	12/10/01	12/7/2001	11/14/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-222	SVM-02-142	12/11/01	#9 DRUM	12/20/01	12/18/2001	11/15/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-273	SVM-02-143	12/18/01	#9 DRUM	12/19/01	12/18/2001	11/15/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-283	SVM-02-144	12/19/01	#9 DRUM	4/9/02	1/8/2002	11/14/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/fired	SVS-01-291	SVM-02-145	12/19/01	#9 DRUM	12/20/01 repins 4/8/02	12/19/01 re-x-ray 4/4/02	11/14/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-02-072	SVM-02-154	01/29/02	#9 DRUM	4/4/02	4/4/2002	11/15/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-02-073	SVM-02-155	01/29/02	#9 DRUM	4/5/02	4/4/2002	11/14/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-02-079	SVM-02-156	03/11/02	#9 DRUM	4/5/02	4/4/2002	11/14/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-02-080	SVM-02-157	03/11/02	#9 DRUM	4/4/02	4/4/2002	11/14/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-02-081	SVM-02-158	03/11/02	#9 DRUM	4/4/02	4/4/2002	11/14/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-02-082	SVM-02-159	03/11/02	#9 DRUM	4/5/02	4/4/2002	11/14/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-02-001	SVM-02-146	01/08/02	#9 DRUM	1/17/02	1/16/2002	11/14/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SWVS-02-013	SVM-02-147	01/09/02	#9 DRUM	1/22/02	1/22/2002	11/14/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator

**TABLE 4.3  
INVENTORY OF MEC ITEMS RECOVERED AT SPRING VALLEY DURING THE  
TEST PIT 23 INVESTIGATION (2001-2002)**

COUNTER	DESCRIPTION	SVS #	SVM #	DATE RECOVERED	DRUM # or LOCATION	PINS DATE	X-RAY DATE	HOTBOX DATE	CLEAR Yes/No	MARB	ADDITIONAL INFORMATION	DEMIL/SCRAP CERTIFICATION	FINAL DISPOSITION
1	75mm projo unfuzed/unfired	SVS-02-046	SVM-02-151	01/14/02	#9 DRUM	1/16/02	1/15/2002	11/14/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-02-056	SVM-02-159	01/14/02	#9 DRUM	1/16/02	1/15/2002	11/14/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-001	SVM-01-011	06/15/01	#9 DRUM	7/23/01	6/27/2001	11/15/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-006	SVM-01-013	06/26/01	#9 DRUM	7/24/01	6/27/2001	11/15/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
1	75mm projo unfuzed/unfired	SVS-01-008	SVM-01-014	06/26/01	#9 DRUM	7/24/01	6/27/2001	11/15/2002	Yes	Yes	NA	Items demilitarized in T-10 and residue sent to incineration	Onyx Environmental Incinerator
<b>28</b>	<b>Total Drum #9 Items</b>												
6	1 Stokesboom/ (5)empty small arms carts				DRUM # 10			Not Required		No			
5	(5) 75mm unfuzed/unfired/empty	FOX 5 News Scrap**	NA	04/02/02	DRUM # 10	NA	NA	4/5/2002	Yes	No	NA	Items certified as scrap by PPSI and 4 sent to incineration	1-item transferred to USAESCH and 4 sent to Onyx Environmental Incinerator
3	2/75mm & 1/3" stokes Empty	SVS-02-060	NA	01/14/02	DRUM # 10	NA	NA	01/15/02 4/9/02	NO/Yes	No	Decon'd 4/11/02	Items certified as scrap by PPSI and 2 sent to incineration	1-item transferred to USAESCH and 2 sent to Onyx Environmental
3	(3) 75mm unfuzed/unfired/empty	SVS-02-075	NA	01/29/02	DRUM # 10	NA	NA	4/5/02 2/8/02	Yes	No	NA	Items certified as scrap by PPSI	3-items transferred to USAESCH
<b>17</b>	<b>Total Drum #10 Items</b>												

NA Not applicable

\*\* These were Rick Woods items from Dalecarlia and not actually part of TP-23

**Table 4.4  
Summary of MEC Items Recovered During Burial Pit 3 Investigation**

ITEM INFORMATION						Item Description	TE Assessment/Packaging		MARB Review			ECBC Analysis	STORAGE LOCATION / FINAL DISPOSITION	
Item Number	Sample ID	Grid Item Found	Depth (feet bgs)	Final Item Classification	Date Recovered inside ECS	Field Team Assessment / Description	X-Ray Date	Technical Escort Assessment	MARB Assessment - Date	PINS Date	MARB Results	Onsite Headspace Clearance Date/ ECBC Clearance	Temporary Storage Location	Final Disposition
1	SVS-07-013	I	3	MEC	11/20/2007	75mm Closed Cavity	11/27/2007	X-Ray inconclusive. Item needed PINS	75mm closed cavity round. 5% liquid fill, no fuze, unknown energetics 12/05/07	12/4/2007	07MARB12, 5 Dec 07 Moderate Hydrogen; very weak N; possible water - not CWM	3/3/2008	HE Bunker as of 01/23/08	Destroyed in EDS operation on 4/28/10
2	SVS-07-016	I	3	MEC	11/26/2007	75mm Closed Cavity	11/27/2007	X-Ray inconclusive. Item needed PINS	75mm closed cavity round, 5% liquid fill, unfuzed, unknown energetics 12/5/07	12/3/2007	07 MARB12, 5 Dec 07, no key elements (NKE); possible empty, not CWM	3/3/2008	HE Bunker as of 01/23/08	Destroyed in EDS operation on 4/27/10
3	SVS-07-018	I	3	MEC	11/26/2007	75mm Closed Cavity	11/27/2007	X-Ray inconclusive. Item needed PINS	75mm closed cavity round, 20% liquid fill, no fuze, unknown energetics 12/5/07	12/3/2007	07MARB12, 5 Dec 07 strong hydrogen, possible water not CWM	3/3/2008	HE Bunker as of 01/23/08	Destroyed in EDS operation on 4/27/10
4	SVS-07-021	I	3	MEC	11/26/2007	75mm Closed Cavity	11/27/2007	X-Ray inconclusive. Item needed PINS	75mm closed cavity round, 5% liquid fill, no fuze, unknown energetics 12/5/07	12/4/2007	07MARB12, 5 Dec 07 moderate hydrogen; possible water; not CWM	3/3/2008	HE Bunker as of 01/23/08	Destroyed in EDS operation on 4/28/10
5	SVS-07-027	I	3	MEC	11/28/2007	75mm Closed Cavity	11/30/2007	X-Ray inconclusive. Item needed PINS	75mm closed cavity, 5% liquid fill, unfuzed, unknown energetics 12/5/07	12/4/2007	07MARB12, 5 Dec 07 moderate hydrogen; possible water; not CWM	3/3/2008	HE Bunker as of 01/23/08	Destroyed in EDS operation on 4/28/10
6	SVS-07-030	I	4	MEC	11/30/2007	75mm Closed Cavity	12/5/2007	X-Ray inconclusive. Item needed PINS	75mm closed cavity, less than 5% liquid fill, unfuzed, unknown energetics 12/13/07	12/7/2007	07MARB12, 5 Dec 07 moderate hydrogen, possible water, not CWM	1/24/2008	HE bunker as of 1/23/08	Destroyed in EDS operation on 4/29/10
7	SVS-07-031	I	4	MEC	11/30/2007	75mm Closed Cavity	12/5/2007	X-Ray inconclusive. Item needed PINS	75mm closed cavity, less than 5% liquid fill, unfuzed, unknown energetics 12/13/07	12/7/2007	07MARB12, 5 Dec 07 moderate hydrogen, possible water, not CWM	1/24/2008	HE bunker as of 1/23/08	Destroyed in EDS operation on 4/29/10
8	SVS-07-040	I	5	MEC	12/5/2007	75mm Closed Cavity	12/6/2007	X-Ray inconclusive. Item needed PINS	75mm closed cavity, 10% liquid fill, unfuzed, unknown energetics 12/13/07	12/7/2007	07MARB12, 5 Dec 07 moderate hydrogen, possible water, not CWM	1/24/2008 3/5/2008	HE bunker as of 1/23/08	Destroyed in EDS operation on 4/29/10
9	SVS-07-041	I	5	MEC	12/5/2007	75mm Closed Cavity	12/6/2007	X-Ray inconclusive. Item needed PINS	75mm closed cavity, 10% liquid fill, unfuzed, unknown energetics 12/13/07	12/7/2007	07MARB12, 5 Dec 07 moderate hydrogen, possible water, not CWM	1/24/2008 3/5/2008	HE bunker as of 1/23/08	Destroyed in EDS operation on 5/3/10
10	SVS-08-001	I	6	MEC	1/29/2008	6.5" Pipe with end caps Closed Cavity	2/7/2008	Pipe with end caps, closed cavity 6.5" diameter x 16" long X-ray inconclusive. Item needed PINS	Strong hydrogen, strong Si, moderate Ca; Possible wet sand, not CWM 3/06/08 Unknown Energetics	2/27/2008	08MARB02, Strong hydrogen, strong Si, moderate Ca; Possible wet sand, not CWM	4/24/2008	HE Bunker 4/24/08	Destructed during T-30 operation (January 2011)
11	SVS-08-022	I	9	MEC	2/25/2008	4.7" Closed Cavity	2/26/2007	4.7" Closed Cavity Item Assessed by TE as shrapnel round	N/A	N/A	N/A	3/6/2008	HE Bunker as of 3/4/08	Destructed during T-30 operation (January 2011)
<b>Burial Pit 3 - East Extension</b>														
12	SVS-08-023	L	18"	MEC	4/28/2008	75mm Closed Cavity	4/29/2008	75mm closed cavity Unfuzed X-ray shows 5% liquid line. Item was sent for PINS.	Moderate hydrogen; Possible water, not CWM 7/21/08	6/26/2008	Unfuzed, unknown energetics, less than 5% liquid fill, liquid in burster well	NA	MHF	Destroyed in EDS operation on 5/4/10
13	SVS-08-026	L	3	MEC	5/8/2008	75mm Closed Cavity	5/9/2008	Shrapnel Round	N/A	N/A	N/A	5/14/2008	HE Bunker 5/14/08	Destructed during T-30 operation (January 2011)
14	SVS-08-027	L	3.5	MEC	5/8/2008	75mm Closed Cavity	5/13/2008	Shrapnel Round	N/A	N/A	N/A	5/14/2008	HE Bunker 5/14/08	Destructed during T-30 operation (January 2011)
15	SVS-08-028	L	3.5	MEC	5/8/2008	75mm Closed Cavity	5/13/2008	Shrapnel Round	N/A	N/A	N/A	5/14/2008	HE Bunker 5/14/08	Destructed during T-30 operation (January 2011)
16	SVS-08-032	L	4.25	MEC	5/13/2008	75mm Closed Cavity	5/14/2008	Shrapnel Round	N/A	N/A	N/A	5/15/2008	HE Bunker	Destructed during T-30 operation (January 2011)
17	SVS-08-034	L/M	5	MEC	5/19/2008	75mm Closed Cavity	5/20/2008	Assessed by TE. X-ray found item to be a Shrapnel Round	N/A	N/A	N/A	5/21/2008	HE Bunker	Destructed during T-30 operation (January 2011)
18	SVS-08-036	M	5	MEC	5/22/2008	75mm Closed Cavity	5/23/2008	Assessed by TE. X-ray inconclusive. Item was sent for PINS	Moderate hydrogen; Possible water, not CWM 7/21/08	6/27/2008	Unfuzed, unknown energetics, less than 5% liquid fill	N/A	MHF	Destroyed in EDS operation on 5/5/10
19	SVS-08-037	M	5	MEC	5/22/2008	75mm Closed Cavity	5/23/2008	Assessed by TE. X-ray found item to be a Shrapnel Round	N/A	N/A	N/A	5/28/2008	Barrel SVS-BP3-002	Destructed during T-30 operation (January 2011)

**Table 4.4**  
**Summary of MEC Items Recovered During Burial Pit 3 Investigation**

ITEM INFORMATION						Item Description		TE Assessment/Packaging		MARB Review			ECBC Analysis	STORAGE LOCATION / FINAL DISPOSITION	
Item Number	Sample ID	Grid Item Found	Depth (feet bgs)	Final Item Classification	Date Recovered inside ECS	Field Team Assessment / Description	X-Ray Date	Technical Escort Assessment	MARB Assessment - Date	PINS Date	MARB Results	Onsite Headspace Clearance Date/ ECBC Clearance	Temporary Storage Location	Final Disposition	
20	SVS-08-040	L/M	5.5	MEC	5/28/2008	75mm Closed Cavity	5/29/2008	Assessed by TE. X-Ray found item to be solid filled. Item was sent for PINS.	Weak P, moderate hydrogen; possible WP residue, not CWM 7/21/08	6/27/2008	Unfuzed, unknown energetics, 20% solid fill	N/A	MHF	Transported to Aberdeen Proving Ground 8-6-09 by CARA Packaging team	
21	SVS-08-041	L	6	MEC	6/3/2008	75mm Closed Cavity	6/4/2008	Assessed by TE. X-ray found item to be 10% liquid filled. Item was sent for PINS.	Moderate hydrogen; Possible water, not CWM 7/21/08	6/27/2008	Unfuzed, unknown energetics, less than 5% liquid fill	N/A	MHF	Destroyed in EDS operation on 5/5/10	
22	SVS-08-043	L	1	MEC	6/30/2008	75mm Closed Cavity	7/2/2008	Item was sent for PINS.	Moderate hydrogen; Possible water, not CWM 7/21/08	7/10/2008	Unfuzed, unknown energetics, 100%Unknown solid fill	N/A	MHF	Destructed during T-30 operation (January 2011)	

**NOTES:**  
NA- Not Applicable  
IHF - Interim Holding Facility  
MHF- MARB Holding Facility



**Table 4.5  
Summary of CWM Items Recovered During Burial Pit 3 Investigation**

ITEM INFORMATION						Item Description	TE Assessment/Packaging		MARB Review			ECBC Analysis	STORAGE LOCATION / FINAL DISPOSITION	
Item Number	Sample ID	Grid Item Found	Depth (feet bgs)	Final Item Classification	Date Recovered inside ECS	Field Team Assessment / Description	X-Ray Date	Technical Escort Assessment	MARB Assessment - Date	PINS Date	MARB Results	Onsite Headspace Clearance Date/ ECBC Clearance	Temporary Storage Location	Final Disposition
1	SVS-07-008	I	2	RCWM	11/19/2007	75mm Closed Cavity	11/20/2007	X-Ray inconclusive. Item needed PINS.	75mm closed cavity round, 90% liquid filled, no fuze energetics present 12/6/07	12/3/2007	07MARB12, 5 DEC 07 Strong As, moderate hydrogen; probable arsine	N/A	IHF as of 3/4/08	Destroyed in EDS operation on 4/19/10
2	SVS-07-038	I	5	RCWM	12/5/2007	75mm Closed Cavity	12/6/2007	X-Ray inconclusive. Item needed PINS	75mm closed cavity, 40% liquid fill, unfuzed, unknown energetics 12/13/07	12/7/2007	07 MARB12, 5 Dec 07 moderate CI, moderate hydrogen, Weak S, possible H	NA	IHF as of 3/4/08	Destroyed in EDS operation on 4/22/10
<b>Burial Pit 3 - East Extension</b>														
3	SVS-08-025	L	3	RCWM	5/8/2008	75mm Closed Cavity	5/9/2008	Unfuzed, unfired. Item was sent for PINS.	Moderate As, moderate CI, moderate hydrogen; possible Magnetite 7/21/08	6/26/2008	Unfuzed, unknown energetics, 100% liquid fill		MHF	Destroyed in EDS operation on 4/16/10
4	SVS-08-030	L	4.25	RCWM	5/13/2008	75mm Closed Cavity	5/14/2008	80% Liquid Filled. Item was sent for PINS.	Moderate As, moderate hydrogen; possible arsine 7/21/08	6/26/2008	Unfuzed, unknown energetics, 90% liquid fill		MHF	Destroyed in EDS operation on 4/19/10
5	SVS-08-035	L/M	5	RCWM	5/19/2008	75mm Closed Cavity	5/20/2008	Assessed by TE. X-ray found item to be 50% liquid filled. Item was sent for PINS	Strong As, strong hydrogen; possible arsine 7/21/08	6/27/2008	Unfuzed, unknown energetics, 60% liquid Unknown FILL	N/A	MHF	Destroyed in EDS operation on 4/19/10
6	SVS-08-042	N	2	CWM	6/13/2008	5.5" Glass Vial ; Diameter 1.5"	N/A	N/A	N/A	N/A	N/A	On 6/17/2008 item was sent to Edgewood. Intact container contained white substance. Item was packaged by TE. ECBC analysis determined item contained Chlorodiphenylarsine (DA or Clark 1, a CWA respiratory irritant). No further analysis was performed, item was destroyed by ECBC.	N/A	Destroyed by ECBC

**NOTES:**  
NA - Not Applicable  
IHF - Interim Holding Facility  
MHF - MARB Holding Facility

**TABLE 4.6  
SUMMARY OF MUNITIONS DEBRIS ITEMS RECOVERED DURING BURIAL PIT 3 INVESTIGATION**

Item Number (if applicable)	Sample ID (if applicable)	Date Recovered	Grid item found	Depth (feet bgs)	Description	Onsite Headspace Clearance SitRep Date	Disposition (Date)	Remarks
001	SW-BP3-MD-001	11/16/2007	D	2	75mm Open Cavity round	11/19/07	Destructed during T-30 operation (January 2011)	
002	SW-BP3-MD-002	11/16/2007	I	2	75mm Open Cavity round	11/19/07	Destructed during T-30 operation (January 2011)	
003	SW-BP3-MD-003	11/16/2007	H	2	75mm Open Cavity round	11/21/2007 0.58 TWA of L DAAMS -ve false positive, cleared by DAAMS	Destructed during T-30 operation (January 2011)	
004	SW-BP3-MD-004 (earlier labeled as SW-BP3- SCR-007)	11/19/2007	I	2	75mm Open Cavity round	11/29/07	Destructed during T-30 operation (January 2011)	
005	SW-BP3-MD-005 (earlier labeled as SW-BP3- SCR-008)	11/19/2007	I	2	75mm Open Cavity round	11/29/07	Destructed during T-30 operation (January 2011)	
006	SW-BP3-MD-007	11/20/2007	I	3	75mm Open Cavity round	11/30/07	Destructed during T-30 operation (January 2011)	
007	SW-BP3-MD-008	11/20/2007	I	3	75mm Open Cavity round	11/30/07	Destructed during T-30 operation (January 2011)	
008	SW-BP3-MD-009	11/20/2007	I	3	75mm Open Cavity round	11/30/07	Destructed during T-30 operation (January 2011)	
009	SW-BP3-MD-010	11/26/2007	I	3	75mm Open Cavity round	11/29/07	Destructed during T-30 operation (January 2011)	
010	SW-BP3-MD-011	11/26/2007	I	3	75mm Open Cavity round	11/29/07	Destructed during T-30 operation (January 2011)	
011	SW-BP3-MD-012	11/26/2007	I	3	75mm Open Cavity round	11/30/07	Destructed during T-30 operation (January 2011)	
012	SW-BP3-MD-013	11/26/2007	I	3	75mm Open Cavity round	11/29/07	Destructed during T-30 operation (January 2011)	
013	SW-BP3-MD-014	11/28/2007	I	3.5	75mm Open Cavity round	11/30/07	Destructed during T-30 operation (January 2011)	
014	SW-BP3-MD-015	1/29/2008	I	6	75mm Open Cavity round	1/31/2008	Destructed during T-30 operation (January 2011)	
015	SW-BP3-MD-016	1/30/2008	I	6.5	75mm Open Cavity round	2/1/2008	Destructed during T-30 operation (January 2011)	
016	SW-BP3-MD-017	2/12/2008	I	8	75mm Open Cavity round	2/14/2008	Destructed during T-30 operation (January 2011)	
017	SW-BP3-MD-018	2/20/2008	I	8	4.7" Open Cavity round	2/22/2008	Destructed during T-30 operation (January 2011)	Item originally ID as 75mm
018	SVS-07-001	11/7/2007	I	2	75mm Closed Cavity Shrapnel Projectile	11/9/2007	Destructed during T-30 operation (January 2011)	75mm closed cavity round. Item was assessed by TE as a possible low order shrapnel round. Will need to be demiled in T-10. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not Chemical Warfare Material (CWM).
019	SVS-07-002	11/15/2007	D	2	75mm Closed Cavity Shrapnel Projectile	3/6/2008	Destructed during T-30 operation (January 2011)	75mm closed cavity round. Was X-Rayed by TE as a full 75mm shrapnel round. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
020	SVS-07-003	11/15/2007	E	2	75mm Closed Cavity	12/11/2008	Destructed during T-30 operation (January 2011)	75mm closed cavity round. TE determined round was empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
021	SVS-07-004	11/16/2007	E	2	75mm Closed Cavity Shrapnel Projectile	11/29/2007	Destructed during T-30 operation (January 2011)	75mm closed cavity round. Item was X-Rayed by TE as a full 75mm shrapnel round. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
022	SVS-07-005	11/19/2007	I	2	75mm Closed Cavity	12/11/2007	Destructed during T-30 operation (January 2011)	75mm closed cavity round. TE determined round was empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
023	SVS-07-006	11/19/2007	I	2	75mm Closed Cavity	12/11/2007	Destructed during T-30 operation (January 2011)	75mm closed cavity round. TE determined round was empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.

**TABLE 4.6  
SUMMARY OF MUNITIONS DEBRIS ITEMS RECOVERED DURING BURIAL PIT 3 INVESTIGATION**

Item Number (if applicable)	Sample ID (if applicable)	Date Recovered	Grid item found	Depth (feet bgs)	Description	Onsite Headspace Clearance SitRep Date	Disposition (Date)	Remarks
024	SVS-07-007	11/19/2007	I	2	75mm Closed Cavity	12/11/2007	Destructed during T-30 operation (January 2011)	75mm closed cavity round. TE determined round was empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
025	SVS-07-009	11/19/2007	I	2	75mm Closed Cavity	3/3/2008	Destroyed in EDS operation on 4/27/10	X-Ray inconclusive. Item needed PINS.
026	SVS-07-010	11/20/2007	I	3	75mm Closed Cavity	12/11/2007	Destructed during T-30 operation (January 2011)	75mm closed cavity round. TE determined round was empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
027	SVS-07-011	11/20/2007	I	3	75mm Closed Cavity	12/11/2007	Destructed during T-30 operation (January 2011)	75mm closed cavity round, X-Ray showed liquid line. TE determined item to be empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
028	SVS-07-012	11/20/2007	I	3	75mm Closed Cavity	12/11/2007	Destructed during T-30 operation (January 2011)	75mm closed cavity round. TE determined round was empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
029	SVS-07-014	11/26/2007	I	3	3" Pipe with end caps Closed Cavity	12/12/2007	Destructed during T-30 operation (January 2011)	Pipe with end caps -3" diameter x 12" long closed cavity, determined to be empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
030	SVS-07-015	11/26/2007	I	3	3" Pipe with end caps Closed Cavity	12/12/2007	Destructed during T-30 operation (January 2011)	Pipe with end caps - 3" diameter x 12" long closed cavity, determined to be empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
031	SVS-07-017	11/26/2007	I	3	75mm Closed Cavity	12/12/2007	Destructed during T-30 operation (January 2011)	75mm closed cavity round. TE determined round was empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
032	SVS-07-019	11/26/2007	I	3	75mm Closed Cavity	12/12/2007	Destructed during T-30 operation (January 2011)	75mm closed cavity round. TE determined round was empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
033	SVS-07-020	11/26/2007	I	3	75mm Closed Cavity	12/12/2007	Destructed during T-30 operation (January 2011)	75mm closed cavity round. TE determined round was empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
034	SVS-07-022	11/19/2007	I	2	75mm Closed Cavity Shrapnel Projectile	3/6/2008	Destructed during T-30 operation (January 2011)	Was assessed by intrusive team as closed cavity. Item was then assessed by TE as an open cavity 75mm with Shrapnel remnants. Item could not be completely probed. Item was reassigned as BP3-MD-006 See MDTracking Sheet. Memorandum for record 29 Feb 08
035	SVS-07-023	11/28/2007	I	3	3" Pipe with end caps Closed Cavity	12/12/2007	Destructed during T-30 operation (January 2011)	Pipe with end caps - 3" diameter x 12" long closed cavity, determined to be empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
036	SVS-07-024	11/28/2007	I	3	3" Pipe with end caps Closed Cavity	1/24/2008 3/4/08	Destructed during T-30 operation (January 2011)	X-Ray inconclusive. Item needed PINS
037	SVS-07-025	11/28/2007	I	3	3" Pipe with end caps Closed Cavity	12/12/2007	Destructed during T-30 operation (January 2011)	Pipe with end caps, 3" diameter x 12" long closed cavity, determined to be empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
038	SVS-07-026	11/28/2007	I	3	75mm Closed Cavity	12/12/2007	Destructed during T-30 operation (January 2011)	75mm closed cavity, TE assessed the item as empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
039	SVS-07-028	11/30/2007	I	4	2" Pipe with end caps Closed Cavity	11/12/2007	Destructed during T-30 operation (January 2011)	Pipe with end caps - 2" diameter x 12" long closed cavity item determined to be empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
040	SVS-07-029	11/30/2007	I	4	75mm Closed Cavity	11/12/2007	Destructed during T-30 operation (January 2011)	75mm closed cavity round. TE determined round was empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
041	SVS-07-032	11/30/2007	I	4	75mm Closed Cavity	12/11/2007	Destructed during T-30 operation (January 2011)	75mm closed cavity round. TE determined round was empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
042	SVS-07-033	11/30/2007	I	4	75mm Closed Cavity	12/11/2007	Destructed during T-30 operation (January 2011)	75mm closed cavity round. TE determined round was empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
043	SVS-07-034	11/30/2007	I	4	75mm Closed Cavity	11/12/2007	Destructed during T-30 operation (January 2011)	75mm closed cavity round. TE determined round was empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
044	SVS-07-035	12/5/2007	I	5	75mm Closed Cavity	12/11/2007	Destructed during T-30 operation (January 2011)	75mm closed cavity round. TE determined round was empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.

**TABLE 4.6  
SUMMARY OF MUNITIONS DEBRIS ITEMS RECOVERED DURING BURIAL PIT 3 INVESTIGATION**

Item Number (if applicable)	Sample ID (if applicable)	Date Recovered	Grid item found	Depth (feet bgs)	Description	Onsite Headspace Clearance SitRep Date	Disposition (Date)	Remarks
045	SVS-07-036	12/5/2007	I	5	75mm Closed Cavity	12/11/2007	Destructed during T-30 operation (January 2011)	75mm closed cavity round. TE determined round was empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
046	SVS-07-037	12/5/2007	I	5	75mm Closed Cavity	12/11/2007	Destructed during T-30 operation (January 2011)	75mm closed cavity round. TE determined round was empty. Memorandum For Record dated 29 Feb 08 stated that this item has NO EXPLOSIVE component and is not CWM.
047	SVS-07-039	12/5/2007	I	5	75mm Closed Cavity	NA	Destroyed in EDS operation on 5/3/10	X-Ray inconclusive. Item needed PINS
048	SVS-08-002	1/29/2008	I	6	3" Pipe with end caps Closed Cavity	3/4/2008	Destructed during T-30 operation (January 2011)	Pipe with end caps -3"diameter x 12.5" long closed cavity. Appeared to contain no liquid. Memorandum For Record dated 22 April 08 stated this item has NO EXPLOSIVE component and is not CWM
049	SVS-08-003	1/29/2008	I	6	3" Pipe with end caps Closed Cavity	3/6/2008	Destructed during T-30 operation (January 2011)	Pipe with end caps - 3"diameter x 12" long closed cavity. Appeared to contain no liquid. Memorandum For Record dated 22 April 08 stated this item has NO EXPLOSIVE component and is not CWM
050	SVS-08-004	1/29/2008	I	6	3" Pipe with end caps Closed Cavity	3/4/2008	Destructed during T-30 operation (January 2011)	Pipe with end caps - 3"diameter x 13" long closed cavity. Appeared to contain no liquid. Memorandum For Record dated 22 April 08 stated this item has NO EXPLOSIVE component and is not CWM.
051	SVS-08-005	1/29/2008	I	6	75mm Closed Cavity	3/5/2008	Destructed during T-30 operation (January 2011)	75mm closed cavity - Unfuzed & Unfired. Appeared to contain no liquid. Memorandum For Record dated 22 April 08 stated This item was assessed to have NO EXPLOSIVE component and is not CWM.
052	SVS-08-006	1/29/2008	I	6	75mm Closed Cavity	3/4/2008	Destructed during T-30 operation (January 2011)	75mm closed cavity- Unfuzed & Unfired. Appeared to contain no liquid. Memorandum For Record dated 22 April 08 stated this item was assessed to have NO EXPLOSIVE component and is not CWM.
053	SVS-08-007	1/29/2008	I	6	75mm Closed Cavity	3/5/2008	Destructed during T-30 operation (January 2011)	75mm closed cavity Unfuzed & Unfired. Appeared to contain no liquid. Memorandum For Record dated 22 April 08 stated this item has NO EXPLOSIVE component and is not CWM
054	SVS-08-008	1/29/2008	I	6	75mm Closed Cavity	3/5/2008	Destructed during T-30 operation (January 2011)	75mm closed cavity - Unfuzed & Unfired. Appeared to contain no liquid. Memorandum For Record dated 22 April 08 stated this item has NO EXPLOSIVE component and is not CWM.
055	SVS-08-009	1/30/2008	I	6.5	3" Pipe with end caps Closed Cavity	3/4/2008	Destructed during T-30 operation (January 2011)	Pipe with end caps - 3"diameter x 12.5" long closed cavity. Appeared to contain no liquid. Memorandum For Record dated 22 April 08 stated this item has NO EXPLOSIVE component and is not CWM.
056	SVS-08-010	1/30/2008	I	6.5	75mm Closed Cavity	3/4/2008	Destructed during T-30 operation (January 2011)	75mm closed cavity - unfuzed & unfired. Appeared to contain no liquid. Memorandum For Record dated 22 April 08 stated this item has NO EXPLOSIVE component and is not CWM.
057	SVS-08-011	1/30/2008	I	6.5	75mm Closed Cavity	3/4/2008	Destructed during T-30 operation (January 2011)	75mm closed cavity - Unfuzed & Unfired. Appeared to contain no liquid. Memorandum For Record dated 22 April 08 stated this item has NO EXPLOSIVE component and is not CWM.
058	SVS-08-012	1/30/2008	I	6.5	75mm Closed Cavity	3/6/2008	Destructed during T-30 operation (January 2011)	75mm closed cavity - Unfuzed & Unfired. Appeared to contain no liquid. Memorandum For Record dated 22 April 08 stated this item has NO EXPLOSIVE component and is not CWM.
059	SVS-08-013	1/30/2008	I	6.5	75mm Closed Cavity	4/24/2008	Destroyed in EDS operation on 5/3/10	75mm closed cavity - Unfuzed & Unfired. Appeared to contain no liquid. Memorandum For Record dated 22 April 08 stated this item has NO EXPLOSIVE component and is not CWM.
060	SVS-08-014	1/30/2008	I	6.5	75mm Closed Cavity	3/5/2008	Destructed during T-30 operation (January 2011)	75mm closed cavity - Unfuzed & Unfired. Appeared to contain no liquid. Memorandum For Record dated 22 April 08 stated this item has NO EXPLOSIVE component and is not CWM.
061	SVS-08-015	1/30/2008	I	6.5	75mm Closed Cavity	3/5/2008	Destructed during T-30 operation (January 2011)	75mm closed cavity - Unfuzed & Unfired. Appeared to contain no liquid. Memorandum For Record dated 22 April 08 stated this item has NO EXPLOSIVE component and is not CWM.
062	SVS-08-016	1/31/2008	I	7	75mm Closed Cavity	4/24/2008	Destructed during T-30 operation (January 2011)	75mm closed cavity X-ray inconclusive. Item needed PINS
063	SVS-08-017	1/31/2008	I	7	75mm Closed Cavity	3/5/2008	Destructed during T-30 operation (January 2011)	75mm closed cavity - Unfuzed & Unfired. Appeared to contain no liquid. Memorandum For Record dated 22 April 08 stated this item has NO EXPLOSIVE component and is not CWM.
064	SVS-08-018	2/4/2008	I	7	3" Pipe with end caps Closed Cavity	3/5/2008	Destructed during T-30 operation (January 2011)	Pipe with end caps - 3"diameter x 12.5" long closed cavity. Appeared to contain no liquid. Memorandum For Record dated 22 April 08 stated this item has NO EXPLOSIVE component and is not CWM.

**TABLE 4.6  
SUMMARY OF MUNITIONS DEBRIS ITEMS RECOVERED DURING BURIAL PIT 3 INVESTIGATION**

Item Number (if applicable)	Sample ID (if applicable)	Date Recovered	Grid item found	Depth (feet bgs)	Description	Onsite Headspace Clearance SitRep Date	Disposition (Date)	Remarks
065	SVS-08-019	2/4/2008	I	7	75mm Closed Cavity	4/24/2008	Destructed during T-30 operation (January 2011)	75mm closed cavity x-ray inconclusive. Item needed PINS
066	SVS-08-020	2/4/2008	I	7	75mm Closed Cavity	3/6/2008	Destructed during T-30 operation (January 2011)	75mm closed cavity - unfuzed & unfired. Appeared to contain no liquid. Memorandum For Record dated 22 April 08 stated this item has NO EXPLOSIVE component and is not CWM.
067	SVS-08-021	2/25/2008	I	9	4.7" Closed Cavity	3/6/2008	Destructed during T-30 operation (January 2011)	4.7" Closed Cavity. Memorandum For Record dated 22 April 08 stated this item has NO EXPLOSIVE component and is not CWM.
<b>Burial Pit 3 - East Extension</b>								
068	SW-BP3-MD-019	4/28/2008	L	18"	75mm Open Cavity round	4/29/2008	Destructed during T-30 operation (January 2011)	
069	SW-BP3-MD-020	4/28/2008	L	18"	75mm Open Cavity round	4/29/2008	Destructed during T-30 operation (January 2011)	
070	SW-BP3-MD-021	5/13/2008	L	4.25	75mm Open Cavity round	5/14/2008	Destructed during T-30 operation (January 2011)	
071	SW-BP3-MD-022	5/13/2008	L	4.25	75mm Open Cavity round	5/14/2008	Destructed during T-30 operation (January 2011)	
072	SW-BP3-MD-023	5/19/2008	L/M	5.5	75mm Open Cavity round	5/20/2008	Destructed during T-30 operation (January 2011)	
073	SW-BP3-MD-024	5/19/2008	L/M	5.5	75mm Open Cavity round	5/20/2008	Destructed during T-30 operation (January 2011)	
074	SW-BP3-MD-025	5/19/2008	L/M	5.5	75mm Open Cavity round	5/20/2008	Destructed during T-30 operation (January 2011)	
075	SVS-08-024	4/30/089	K	18"	75mm Closed Cavity	5/2/2008	Destructed during T-30 operation (January 2011)	75mm closed cavity Unfuzed X-ray shows item to be empty
076	SVS-08-029	5/8/2008	L	4	75mm Closed Cavity	6/19/2008	Destructed during T-30 operation (January 2011)	75mm closed cavity Unfuzed Unfired. Appeared to contain no liquid. This item was assessed to have NO EXPLOSIVES components and is not CWM (4/22/08)
077	SVS-08-031	5/13/2008	L	4.25	75mm Closed Cavity	5/15/2008	Destructed during T-30 operation (January 2011)	75mm closed cavity. Unfuzed Unfired. Appeared to contain no liquid. This item was assessed to have NO EXPLOSIVES components and is not CWM (4/22/08)
078	SVS-08-033	5/19/2008	L/M	5	75mm Closed Cavity	5/21/2008	Destructed during T-30 operation (January 2011)	Assessed by TE. X-ray found item to be empty
079	SVS-08-038	5/28/2008	L/M	5.5	75mm Closed Cavity	5/29/2008	Destructed during T-30 operation (January 2011)	Assessed by TE. X-Ray found item to be empty
080	SVS-08-039	5/28/2008	L/M	5.5	75mm Closed Cavity	5/29/2008	Destructed during T-30 operation (January 2011)	Assessed by TE. X-Ray found item to be empty.

**TABLE 4.7  
SUMMARY OF SCRAP ITEMS RECOVERED AT BURIAL PIT 3**

Item Number	Sample ID	Grid Item Found	Depth (feet bgs)	Date Recovered	Item Description	Onsite Headspace Clearance SitRep Date	Federal Property Storage Drum ID/ Date	Final Disposition	Manifest# Date	Remarks
001	SW-BP3-SCR-001	I	2	11/7/2007	Glass Stopper	11/8/07	SCR-BP3-001 11/16/07	King and Queen Landfill	8/23/10 031904	
002	SW-BP3-SCR-002	D	2	11/15/2007	Large chunk black tarry substance. ECBC described it as asphalt/rock.	11/16/07	SCR-BP3-001 11/20/07	King and Queen Landfill	8/23/10 031904	
003	SW-BP3-SCR-003	D	2	11/15/2007	Glass Stopper	11/21/07	SCR-BP3-001 11/22/07	King and Queen Landfill	8/23/10 031904	
004	SW-BP3-SCR-004*	I	3	11/26/2007	Glass Fragments	11/30/07	SCR-BP3-001 12/05/07	King and Queen Landfill	8/23/10 031904	
005	SW-BP3-SCR-005*	I	4	11/30/2007	Glass Stopper	12/3/07	SCR-BP3-001 12/05/07	King and Queen Landfill	8/23/10 031904	
006	SW-BP3-SCR-006*	I	5	12/5/2007	Pipe with end cap	12/7/2007	SCR-BP3-001 12/10/07	King and Queen Landfill	8/23/10 031904	
007	SW-BP3-SCR-007*	I	6	1/29/2008	Open cavity pipe w/ one cap	1/30/08	SCR-BP3-001 2/1/08	King and Queen Landfill	8/23/10 031904	
008	SW-BP3-SCR-008*	I	6	1/29/2008	Open cavity pipe w/ one cap	1/30/08	SCR-BP3-001 2/1/08	King and Queen Landfill	8/23/10 031904	
009	SW-BP3-SCR-009*	I	6	1/29/2008	Drum fragments and glass fragments	1/30/08	SCR-BP3-001 2/1/08	King and Queen Landfill	8/23/10 031904	
010	SW-BP3-SCR-010	I	7	2/4/2008	Glass Bottleneck	2/5/08	SCR-BP3-001 2/1/08	King and Queen Landfill	8/23/10 031904	
011	SW-BP3-SCR-011	I	7	2/5/2008	55 gal drum remnants	2/6/08	SCR-BP3-001 2/7/08	King and Queen Landfill	8/23/10 031904	
012	SW-BP3-SCR-012	I	7	2/20/2008	Open cavity pipe w/ one cap	2/22/2008	SCR-BP3-001 2/23/08	King and Queen Landfill	8/23/10 031904	
013	SW-BP3-SCR-013	I	9	2/25/2008	Glass Pieces	2/27/2008	SCR-BP3-001 2/28/08	King and Queen Landfill	8/23/10 031904	
014	SW-BP3-SCR-014	I	9	2/26/2008	55 gal drum remnants - collected over several days	2/27/2008	SCR-BP3-001 2/28/08	King and Queen Landfill	8/23/10 031904	
015	SW-BP3-SCR-015	I	9	2/26/2008	Unknown chunk of white substance possibly plaster	2/27/2008	SCR-BP3-001 2/28/08	King and Queen Landfill	8/23/10 031904	
016	SW-BP3-SCR-016	I	9	2/28/2008	Piece of Porcelain	3/4/2008	SCR-BP3-001 3/5/08	King and Queen Landfill	8/23/10 031904	
017	SW-BP3-SCR-017	I	9	3/3/2008	Empty bottle 2.5" long X 3/8" wide	3/4/2008	SCR-BP3-001 3/5/08	King and Queen Landfill	8/23/10 031904	
018	SW-BP3-SCR-018	Outside ECS Korean side of MACS	3	3/17/2008	Rubber Stopper Found during open air construction for MACS extension	3/18/08	SCR-BP3-001 3/19/08	King and Queen Landfill	8/23/10 031904	

**TABLE 4.7  
SUMMARY OF SCRAP ITEMS RECOVERED AT BURIAL PIT 3**

Item Number	Sample ID	Grid Item Found	Depth (feet bgs)	Date Recovered	Item Description	Onsite Headspace Clearance SitRep Date	Federal Property Storage Drum ID/ Date	Final Disposition	Manifest# Date	Remarks
<b>Burial Pit 3 - East Extension</b>										
019	SW-BP3-SCR-019	J/K	18"	4/28/2008	Jar of white substance - with soil	4/29/08	SCR-BP3-001	King and Queen Landfill	8/23/10 031904	
020	SW-BP3-SCR-020	J/K	18"	4/28/2008	Fragment of Jar of white substance - with soil	4/29/08	SCR-BP3-001	King and Queen Landfill	8/23/10 031904	
021	SW-BP3-SCR-021	J/K	18"	5/9/2008	Glass Fragments collected over several days	5/14/08	SCR-BP3-001	King and Queen Landfill	8/23/10 031904	
022	SW-BP3-SCR-022	K	2	5/19/2008	Glass Container with granular substance	5/19/08	SCR-BP3-001	King and Queen Landfill	8/23/10 031904	
023	SW-BP3-SCR-023	N	2	6/12/2008	Glass Fragments	6/13/08	SCR-BP3-001	King and Queen Landfill	8/23/10 031904	
024	SW-BP3-SCR-024	N	2	6/12/2008	Glass Fragments - Possible AUES related	6/13/08	SCR-BP3-001	King and Queen Landfill	8/23/10 031904	
025	SW-BP3-SCR-025	N	2	6/13/2008	Glass Fragments - Possible AUES related	6/17/08	SCR-BP3-001	King and Queen Landfill	8/23/10 031904	
026	SW-BP3-SCR-026	N	2	6/23/2008	Glass Fragments collected over several days (6/16/08 thru 6/23/08)	7/30/2008	SCR-BP3-001	King and Queen Landfill	8/23/10 031904	
027	SW-BP3-SCR-027	K	0	7/24/2008	manhole lid	7/30/2008	Bagged near SCR-BP3-001	King and Queen Landfill	8/23/10 031904	
028	SW-BP3-SCR-028	K	0	7/24/2008	manhole ring	7/30/2008	Bagged near SCR-BP3-001	King and Queen Landfill	8/23/10 031904	
<b>Burial Pit 3 - South Extension Extension</b>										
029	SW-BP3-SCR-029	K			(15 pc) Glass from		Bagged near SCR-BP3-001	King and Queen Landfill	8/23/10 031905	
	SW-BP3South-SCR-102008	GR-12, 41		10/20/2008	Glass and Metal	10/21/2008	SCR-BP3-001	King and Queen Landfill	8/23/10 031909	
	SW-BP3South-SCR-102108	GR-12, GR-3		10/21/2008	Metal	10/22/2008	SCR-BP3-001	King and Queen Landfill	8/23/10 031909	
	SW-BP3South-SCR-102208	GR-55,GR-63, GR-64, GR-65		10/22/2008	Metal	10/23/2008	SCR-BP3-001	King and Queen Landfill	8/23/10 031909	
<b>Burial Pit 3 - East Second Extension</b>										
030	SW-BP3-SCR-030	Outside ECS during East 2nd construction		11/5/2008	Glass		SCR-BP3-001	King and Queen Landfill	8/23/10 031905	
031	SW-BP3-SCR-031	Outside ECS during East 2nd construction		11/6/2008	Glass	11/18/2008	SCR-BP3-001	King and Queen Landfill	8/23/10 031906	
032	SW-BP3-SCR-032	Outside ECS during East 2nd construction		11/17/2008	Glass Bottleneck with stopper/Glass fragments SCR-030, 031 AND 032 Headspaced as ONE Scrap item - SW-BP3-SCR-032		SCR-BP3-001	King and Queen Landfill	8/23/10 031907	
033	SW-BP3-SCR-033	Outside ECS during East 2nd construction		12/1/2008	Crockery Fragments	12/2/2008	SCR-BP3-001	King and Queen Landfill	8/23/10 031908	
034	SW-BP3-SCR-034	Outside ECS during East 2nd construction		12/2/2008	Crockery Fragments	12/3/2008	SCR-BP3-001	King and Queen Landfill	8/23/10 031909	

\* Reassigned ID. SCR-004 thru SCR-009 will be reused as SCR-004\* thru SCR-009\*

**Table 4.8  
4825 Glenbrook Road Low Probability Test Pits Investigation Summary (2009)**

Test pit ID	EASTING (Center point)	NORTHING (center point)	Located in/adjacent to Arsenic Contaminated Area	Date Excavated	Date Backfilled	Date Complete	Depth to Saprolite (feet bgs)	Final Depth (feet bgs)	Final Dimensions (WxL, feet)	Magnetometer Detections?	Air Monitoring Alarms?	Dig Results	Samples Collected from Test Pit	Sample IDs	Comments	Status	Signed Digsheet	Signed Contingency Plan Initiation
4825-95	1285685.136	461955.405	N	5/18/2009	5/18/2009	5/18/2009	0.58	2.16	3.7 X 3.4	N	N	No cultural debris recovered	N	N/A	N/A	Complete	Y	N
4825-96	1285697.608	461925.2463	N	5/18/2009	5/18/2009	5/18/2009	2	3.3	3.4 X 7.2	N	N	No cultural debris recovered	N	N/A	Pit shifted 3 feet North due to electrical wires	Complete	Y	N
4825-97	1285671.757	461967.4232	N	5/15/2009	5/15/2009	5/15/2009	5.75	7.25	3.1 X 6	N	N	No cultural debris recovered	N	N/A	N/A	Complete	Y	N
4825-98	1285684.229	461940.6658	N	5/15/2009	5/15/2009	5/15/2009	0.7	2	3.25 X 6	N	N	No cultural debris recovered	N	N/A	Pit shifted 1 Foot east to avoid suspected electric line	Complete	Y	N
4825-99	1285699.648	461907.786	N	5/19/2009	5/19/2009	5/19/2009	2	3.25	3.4 X 6.50	N	N	No cultural debris recovered	N	N/A	Pit excavated to 16" where footer to retaining wall was encountered. Pit was shifted 3 feet North and 1 foot West to avoid footer	Complete	Y	N
4825-100	1285665.862	461947.6953	N	5/21/2009	5/21/2009	5/21/2009	6	8	3.5 X 7	N	N	No cultural debris recovered	N	N/A	Pit shifted 1 foot South due to 8" PVC pipe. Pipe was open ended with a 5 gal plastic bucket used a cap.	Complete	Y	N
4825-101	1285683.775	461919.5774	N	5/20/2009	5/20/2009	5/20/2009	8	9.25	4.50 X 6.7	N	N	No cultural debris recovered	N	N/A	N/A	Complete	Y	N
4825-102	1285686.723	461894.8608	N	5/19/2009	5/19/2009	5/19/2009	1.75	3	3.2 X 6.4	N	N	No cultural debris recovered	N	N/A	At 1 foot, PVC pipes were encountered (8" and 1") above drain. Pipes were damaged during excavation and need to be replaced	Complete	Y	N
4825-103	1285653.617	461959.9402	Y	6/10/2009	6/10/2009	6/10/2009	2	3	3 X 6	N	N	No cultural debris recovered	N	N/A	N/A	Complete	Y	N
4825-104	1285653.39	461945.4277	N	6/2/2009	6/2/2009	6/2/2009	0.75	1.75	3.4 X 6.25	N	N	No cultural debris recovered	N	N/A	N/A	Complete	Y	N
4825-105	1285672.891	461887.6046	N	3/12/2009	3/12/2009	3/12/2009	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Test Pit excavated and cleared during high probability investigation	Complete	N/A	N/A
4825-106	1285639.876	461954.2671	Y	6/10/2009	6/10/2009	6/10/2009	2	3	3.X 6	N	N	No cultural debris recovered	N	N/A	N/A	Complete	Y	N
4825-107	1285642.441	461939.7554	Y	6/2/2009	6/2/2009	6/2/2009	0.9	2.5	3.X 6	N	N	No cultural debris recovered	N	N/A	N/A	Complete	Y	N
4825-108	1285659.286	461881.4821	N	3/12/2009	3/12/2009	3/12/2009	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Test Pit excavated and cleared during high probability investigation	Complete	N/A	N/A
4825-109	1285627.132	461948.9454	Y	6/11/2009	6/11/2009	6/11/2009	2	4	3 X 6	N	N	No cultural debris recovered	N	N/A	N/A	Complete	Y	N
4825-110	1285628.774	461933.9289	Y	6/23/2009	6/23/2009	6/23/2009	1.5	3.5	3 X 6	N	N	No cultural debris recovered	N	N/A	Pit was offset 2' North and 1' West to avoid footer	Complete	Y	N
4825-111	1285616.341	461944.3398	Y	6/23/2009	6/23/2009	6/23/2009	1.5	3.5	3 X 6	N	N	No cultural debris recovered	N	N/A	N/A	Complete	Y	N
4825-112	1285645.453	461875.8132	N	3/12/2009	3/12/2009	3/12/2009	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Test Pit excavated and cleared during high probability investigation	Complete	N/A	N/A
4825-113	1285618.254	461929.8608	Y	6/23/2009	6/23/2009	6/23/2009	1.5	3.5	3 X 6	N	N	No cultural debris recovered	N	N/A	N/A	Complete	Y	N
4825-114	1285603.198	461938.7213	Y	6/23/2009	6/23/2009	6/23/2009	1.5	3.5	3 X 6	N	N	No cultural debris recovered	N	N/A	N/A	Complete	Y	N
4825-115	1285614.071	461920.195	N	4/22/2009	4/27/2009	4/22/2009	7.5	9	3 X 6	N	N	No cultural debris recovered	N	N/A	N/A	Complete	Y	N
4825-116	1285614.038	461908.1595	N	4/21/2009	4/27/2009	4/21/2009	7.5	9	3 X 6	N	N	No cultural debris recovered	N	N/A	N/A	Complete	Y	N
4825-117	1285628.219	461878.6002	N	3/24/2009	3/26/2009	3/26/2009	7	8	3.6 X 7	N	N	Glassware at 6'	Y, cleared headspace	SW-4825-SCR-001	Encountered several "HOT" rocks with magnetometer.	Complete	Y	N
4825-118	1285630.03	461949.89	Y	3/12/2009	3/12/2009	3/12/2009	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Test Pit excavated and cleared during high probability investigation	Complete	N/A	N/A
4825-119	1285602.575	461920.8285	N	4/22/2009	4/27/2009	4/22/2009	3.75	4.8	3.5 X 6	N	N	No cultural debris recovered	N	N/A	Pit was shifted 1 foot South due to gas line	Complete	Y	N
4825-121	1285618.25	461929.86	Y	3/12/2009	3/12/2009	3/12/2009	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Test Pit excavated and cleared during high probability investigation	Complete	N/A	N/A
4825-122	1285589.442	461932.9962	Y	6/23/2009	6/23/2009	6/23/2009	1.5	3.5	3 X 6	N	N	No cultural debris recovered	N	N/A	N/A	Complete	Y	N



**Table 4.8  
4825 Glenbrook Road Low Probability Test Pits Investigation Summary (2009)**

Test pit ID	EASTING (Center point)	NORTHING (center point)	Located in/adjacent to Arsenic Contaminated Area	Date Excavated	Date Backfilled	Date Complete	Depth to Saprolite (feet bgs)	Final Depth (feet bgs)	Final Dimensions (WxL, feet)	Magnetometer Detections?	Air Monitoring Alarms?	Dig Results	Samples Collected from Test Pit	Sample IDs	Comments	Status	Signed Digsheet	Signed Contingency Plan Initiation
4825-123	1285601.368	461904.2723	N	4/23/2009	4/24/2009	4/23/2009	2.3	3.8	3 X 6.75	N	N	1 Soda Bottle Fragment Metal Wire	N	N/A	N/A	Complete	Y	N
4825-124	1285614.463	461872.8751	N	3/26/2009	3/26/2009	3/26/2009	4	5	3.4 X 7.8	N	N	Nail - 2 inch	N	N/A	N/A	Complete	Y	N
4825-125	1285588.819	461915.1034	N	4/23/2009	4/23/2009	4/23/2009	4.3	4.3	3.1 X 6.6	N	N	No cultural debris recovered	N	N/A	N/A	Complete	Y	N
4825-126	1285601.33	461885.0428	N	4/17/2009	4/17/2009	4/17/2009	1	2.4	3.3 X 6.7	N	N	No cultural debris recovered	N	N/A	N/A	Complete	Y	N
4825-127	1285613.419	461855.0535	N	3/12/2009	3/12/2009	3/12/2009	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Test Pit excavated and cleared during high probability investigation	Complete	N/A	N/A
4825-128	1285575.686	461927.2712	Y	7/16/2009	7/17/2009	7/16/2009	1.5	3	3 X 6	N	N	No cultural debris recovered	N	N/A	N/A	Complete	Y	N
4825-129	1285586.172	461896.5357	N	4/15/2009	4/15/2009	4/15/2009	.7 to 1.0	2.25	3.5 X 6.2	N	N	12 oz Aluminum Can	N	N/A	Pit adjusted 1 foot South after intrusive effort began due to large rock	Complete	Y	N
4825-130	1285600.707	461867.15	N	3/27/2009	3/27/2009	3/27/2009	2	3	3.3 X 6.3	N	N	Wire - 8 inch Heavy Gauge Wire - 12 inch Heavy Gauge	N	N/A	N/A	Complete	Y	N
4825-131	1285578.796	461910.9543	N	4/16/2009	4/17/2009	4/17/2009	1.8	2.25	3.6 X 7.25	N	N	No cultural debris recovered	N	N/A	Anomaly in footer of retaining wall	Complete	Y	N
4825-132	1285587.574	461879.3178	N	4/15/2009	4/15/2009	4/15/2009	1.1	2.5	3.25 X 6.2	N	N	No cultural debris recovered	N	N/A	Pit adjusted 3 feet East. Section of pit falls on curb of Glenbrook Rd	Complete	Y	N
4825-133	1285599.663	461849.3284	N	3/12/2009	3/12/2009	3/12/2009	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Test Pit excavated and cleared during high probability investigation	Complete	N/A	N/A
4825-137	1285678.259	461901.2242	N	7/31/2009	8/3/2009	8/1/2009	3 to 7.4	8	3.7 X 6.6	N	N	No cultural debris recovered	Y, a grab sample was collected and analyzed for total arsenic per USEPA request during	4825GB- TEST PIT 137- 6"BGS	Pit was rotated 90 degrees for better access.	Complete	Y	N
4825-141	1285675.304	461953.2699	N	8/3/2009	8/4/2010	8/4/2009	2.3	3.8	3 X 6	N	N	No cultural debris recovered	N	N/A	N/A	Complete	Y	N
4825-142	1285681.383	461966.5864	N	8/3/2009	8/4/2010	8/4/2009	2	4.8	3 X 6	N	N	No cultural debris recovered	N	N/A	N/A	Complete	Y	N

Total 41

Note:  
N- no  
Y - yes  
N/A - not applicable

**Table 4.9  
4825 Glenbrook Road Test Pits 138 (High Probability Investigations) CWM**

ITEM INFORMATION								ECBC Analysis	
Item Number	Sample ID	Grid Item Found	Depth (feet bgs)	Date Recovered inside ECS	TE Assessment	Date to Edgewood	ECBC Report Date/ Report #/ Cleared - Y/N		
TP 138									
1	<b>SW-4825-SCR-006</b>	Test Pit 138	2.5' bgs	8/4/2009	Suspect AUES Glass Fragments	8/5/2009	8/5/2009 <b>(HD - 37.659)</b> <b>NO</b>		
2	<b>SW-4825GB-SCR-001</b>	N/E corner	24" to 27"	11/17/2009	Glass beaker w/stopper - Item found in same area as SW-4825-SCR-006 (8/4/09)	11/17/09	11/18/2009 <b>NO</b>		

Table 4.10  
4825 Glenbrook Road Test Pit 138 Scrap Samples

Item Number	Sample ID	Grid Item Found	Depth (feet bgs)	Collection Date	Item Description	Onsite Headspace Clearance Strep Date	Date to Edgewood	Agent/ABP Cleared YES/NO
1	SW-4825-SCR-005	Test Pit 138	2.0' bgs	8/3/2009	Suspect AUES Glass Fragments	8/3/2009	NA	N/A
2	SW-4825-SCR-007	Test Pit 138	3.0' bgs	8/4/2009	Suspect AUES Glass Fragments	8/5/09	N/A	N/A
3	SW-4825GB-SCR-002	Test Pit 138	24" to 27"	11/17/2009	Glass Fragments - scattered throughout test pit	11/18/09	N/A	N/A
4	SW-4825GB-SCR-003	Test Pit 138	24" to 27"	11/17/2009	Glass Fragments - scattered throughout test pit	11/18/09	N/A	N/A
5	SW-4825GB-IDW-Plastic Sheeting-001	Test Pit 138	Ground Surface	11/17/2009	Plastic Sheeting Covering Test Pit - Placed in 55 Gal Drum and Head Spaced	11/18/09	N/A	N/A
6	SW-4825GB-SCR-004	Test Pit 138	24" to 27"	11/18/2009	Glass Fragments - scattered throughout test pit	11/19/09	N/A	N/A
7	SW-4825GB-SCR-005	Test Pit 138	24" to 27"	11/18/2009	Glass Fragments - scattered throughout test pit	11/19/09	N/A	N/A
8	SW-4825GB-TP138-TE-001→ SW-4825GB-SCR-006	East Wall	24"	11/18/2009	Formerly SW-4825GB-TP138-TE-001	Not Headspaced Decon by CARA packaging team	N/A	N/A
9	SW-4825GB-SCR-007	Test Pit 138	24" to 27"	11/20/2009	Glass Fragments - scattered throughout test pit	11/20/09	N/A	N/A
10	SW-4825GB-SCR-008	Test Pit 138	24" to 27"	11/20/2009	Glass Fragments - scattered throughout test pit	11/20/09	N/A	N/A
N/A -	Not Applicable							

**Table 4.11**  
**4825 Glenbrook Road Test Pit 138 (High Probability Investigation) Soil Samples**

Sample ID	DATE GENERATED	Cleared ON SITE		Sent to Edgewood	Edgewood Agent/ABP Clearance			HTW Sample ID
		HD/L	SitRep Date		Batch # Date	QC Date	Cleared	
<b>CWM Drum Samples</b>								
SW-4825GB-CWM-001	11/17/2009	Yes	11/17/2009	11/19/2009	9112001	11/23/2009	NO	N/A
SW-4825GB-CWM-002	11/17/2009	Yes	11/17/2009	11/19/2009	9112001	11/23/2009	NO	N/A
SW-4825GB-CWM-003	11/18/2000	Yes	11/18/2009	11/19/2009	9112001	11/23/2009	NO	N/A
SW-4825GB-CWM-004	11/18/2000	Yes	11/18/2009	11/19/2009	9112001	11/23/2009	NO	N/A
SW-4825GB-CWM-005	11/19/2009	Yes	11/19/2009	11/20/2009	9112002	11/23/2009	NO	N/A
SW-4825GB-CWM-006	11/19/2009	Yes	11/20/2009	11/20/2009	9112002	11/23/2009	NO	N/A
SW-4825GB-CWM-007	11/19/2009	Yes	11/20/2009	11/20/2009	9112002	11/23/2009	NO	N/A
SW-4825GB-CWM-008	11/19/2009	Yes	11/20/2009	11/20/2009	9112002	11/23/2009	NO	N/A
SW-4825GB-CWM-009	11/19/2009	Yes	11/20/2009	11/20/2009	9112002	11/23/2009	NO	N/A
SW-4825GB-CWM-010	11/20/2009	Yes	11/20/2009	11/20/2009	9112002	11/23/2009	NO	N/A
SW-4825GB-CWM-011	11/20/2009	Yes	11/20/2009	11/20/2009	9112002	11/23/2009	NO	N/A
SW-4825GB-CWM-012	11/20/2009	Yes	11/20/2009	12/1/2009	9120101	12/3/2009	NO	N/A
SW-4825GB-CWM-013	12/2/2009	Yes	12/2/2009	12/3/2009	9120403	12/7/2009	YES	SW-4825GB-HTW-121109
SW-4825GB-CWM-014	12/2/2009	Yes	12/2/2009	12/3/2009	9120403	12/7/2009	YES	SW-4825GB-HTW-121109
SW-4825GB-CWM-015	12/2/2009	Yes	12/2/2009	12/3/2009	9120403	12/7/2009	YES	SW-4825GB-HTW-121109
SW-4825GB-CWM-016	12/2/2009	Yes	12/2/2009	12/3/2009	9120403	12/7/2009	YES	SW-4825GB-HTW-121109
SW-4825GB-CWM-017	12/2/2009	Yes	12/2/2009	12/3/2009	9120403	12/7/2009	YES	SW-4825GB-HTW-121109
SW-4825GB-CWM-018	12/3/2009	Yes	12/3/2009	12/4/2009	9120403	12/7/2009	YES	SW-4825GB-HTW-121109
SW-4825GB-CWM-019	12/3/2009	Yes	12/3/2009	12/4/2009	9120403	12/7/2009	YES	SW-4825GB-HTW-121109
SW-4825GB-CWM-020	12/3/2009	Yes	12/4/2009	12/7/2009	9120803	12/10/2009	NO	N/A
SW-4825GB-CWM-021	12/4/2009	Yes	12/4/2009	12/7/2009	9120803	12/10/2009	NO	N/A
SW-4825GB-CWM-022	12/4/2009	Yes	12/4/2009	12/7/2009	9120803	12/10/2009	NO	N/A
SW-4825GB-CWM-023	12/7/2009	Yes	12/7/2009	12/10/2009	9121001	12/15/2009	NO	N/A
SW-4825GB-CWM-024	12/8/2009	Yes	12/8/2009	12/10/2009	9121001	12/15/2009	NO	N/A
SW-4825GB-CWM-025	12/8/2009	Yes	12/7/2009	12/10/2009	9121001	12/15/2009	NO	N/A
SW-4825GB-CWM-026	12/8/2009	Yes	12/8/2009	12/10/2009	9121001	12/15/2009	YES	SW-4825GB-HTW-121509
SW-4825GB-CWM-027	12/8/2009	Yes	12/7/2009	12/10/2009	9121001	12/15/2009	NO	N/A
SW-4825GB-CWM-028	12/8/2009	Yes	12/8/2009	12/10/2009	9121001	12/15/2009	NO	N/A
SW-4825GB-CWM-029	12/9/2009	Yes	12/9/2009	12/10/2009	9121001	12/15/2009	YES	SW-4825GB-HTW-121509
SW-4825GB-CWM-030	12/9/2009	Yes	12/8/2009	12/10/2009	9121001	12/15/2009	YES	SW-4825GB-HTW-121509
SW-4825GB-CWM-031	12/9/2009	Yes	12/9/2009	12/10/2009	9121001	12/15/2009	YES	SW-4825GB-HTW-121509
SW-4825GB-CWM-032	12/9/2009	Yes	12/8/2009	12/10/2009	9121001	12/15/2009	NO	N/A

**Table 4.11**  
**4825 Glenbrook Road Test Pit 138 (High Probability Investigation) Soil Samples**

Sample ID	DATE GENERATED	Cleared ON SITE		Sent to Edgewood	Edgewood Agent/ABP Clearance			HTW Sample ID
		HD/L	SitRep Date		Batch # Date	QC Date	Cleared	
SW-4825GB-CWM-033	12/9/2009	Yes	12/10/2009	12/11/2009	9121102	12/14/2009	YES	SW-4825GB-HTW-121509
SW-4825GB-CWM-034	12/9/2009	Yes	12/10/2009	12/11/2009	9121102	12/14/2009	YES	SW-4825GB-HTW-121509
SW-4825GB-CWM-035	12/10/2009	Yes	12/10/2009	12/11/2009	9121102	12/14/2009	YES	SW-4825GB-HTW-121509
SW-4825GB-CWM-036	12/10/2009	Yes	12/10/2009	12/11/2009	9121102	12/14/2009	YES	SW-4825GB-HTW-121509
SW-4825-TP138-(SPOILS)	8/6/2009	Yes	8/7/09	8/11/2009	9081103	8/12/10	NO	N/A
<b>Grab and Pit Characterization Samples</b>								
SW-4825GB-GS01	11/19/2009	Yes	11/19/09	12/1/2009	9120101	12/3/09	NO	N/A
SW-4825GB-NW01-LN01(2') Pit Characteristic Sample	12/1/2009	Yes	12/1/2009	12/2/2009	9120201	12/7/2009	YES	N/A
SW-4825GB-NW01-LN02(2') Pit Characteristic Sample	12/2/2009	Yes	12/2/2009	12/3/2009	9120403	12/7/2009	YES	N/A
SW-4825GB-EW01-LE01(2') Pit Characteristic Sample	12/1/2009	Yes	12/1/2009	12/2/2009	9120201	12/7/2009	YES	N/A
SW-4825GB-EW01-LE02(2') Pit Characteristic Sample	12/1/2009	Yes	12/1/2009	12/2/2009	9120201	12/7/2009	YES	N/A
SW-4825GB-EW02-LE01(2') Pit Characteristic Sample	12/1/2009	Yes	12/1/2009	12/2/2009	9120201	12/7/2009	YES	N/A
SW-4825GB-EW02-LE02(2') Pit Characteristic Sample	12/2/2009	Yes	12/2/2009	12/3/2009	9120403	12/7/2009	YES	N/A
SW-4825GB-SW01-LS01(2') Pit Characteristic Sample	12/1/2009	Yes	12/1/2009	12/2/2009	9120201	12/7/2009	YES	N/A
SW-4825GB-FLOOR-(6.5') Pit Characteristic Sample	12/11/2009	Yes	12/10/2009	12/11/2009	9121102	12/14/2010	YES	N/A

N/A - Not Applicable

Table 4.12 4825 Glenbrook Road Test Pits 120 and 134 (High Probability Investigations) MEC							
ITEM INFORMATION							ECBC Analysis
Item Number	Sample ID	Grid Item Found	Depth (feet bgs)	Date Recovered inside ECS	TE Assessment	Date to Edgewood	ECBC Report Date/ Report #/ Cleared - Y/N
TP 120							
No MEC Found							
TP 134							
1	SVS-10-026	B-3	6' 8"	3/16/2010	75mm unfused unfired shrapnel round 8.75" (L) X 75mm (W) Scraping of inside cavity of round SVS-10-026 MRC # JJ 534 PB	3/19/2010	3/30/10 10032302 YES
2	SVS-10-030	A-5	6.5	3/24/2010	75mm Closed Cavity unfuzed w/hex plug cannot be probed. X-rayed showed liquid line but no energetics present. PINS assessment results of the liquid line showed chlorine based chemical with unknown energetics.	N/A	N/A

Table 4.13 4825 Glenbrook Road Test Pits 120 and 134 (High Probability Investigations) CWM							
ITEM INFORMATION					ECBC Analysis		
Item Number	Sample ID	Grid Item Found	Depth (feet bgs)	Date Recovered inside ECS	TE Assessment	Date to Edgewood	ECBC Report Date/ Report #/ Cleared - Y/N
<b>TP 120</b>							
1	SVS-10-004	C-6	40"	2/2/2010	Closed cavity item with black residue on shoulder of bottle. Packaged for storage in MRC # JJ 081 PB and will be sent to Edgewood.	2/19/2010	3/15/2010 10030203 <b>N - HD &amp; ABPS</b>
2	SVS-10-006	C-6	40"	2/2/2010	TE assessment came back with an indication of mustard on the ICAM, so item packaged for MRC JJ 081 PB and renamed to SVS-10-006.	2/19/2010	3/15/2010 10030203 <b>N - HD &amp; ABPS</b>
3	SVS-10-007	C-6	40"	2/2/2010	TE assessment found it closed with liquid inside, so item packaged for MRC JJ 081 PB and renamed SVS-10-007.	2/19/2010	3/15/2010 10030203 <b>N - HD &amp; ABPS</b>
4	SVS-10-009	C-6	40"	2/3/2010	4" to neck x 2.5" diameter, clear glass bottle with a deteriorating cork stopper - full with cotton. MRC #JJ238PB	2/19/2010	3/15/2010 10030203 <b>N - HD &amp; ABPS</b>
5	SW-4825GB-TP120-TE-001	B-5/B-6	3.5'	1/28/2010	Open glass bottle with black sticky substance on bottom with small amt of liquid inside. TE will empty liquid in decontamination bucket and transport glass container for headspacing to Fed Property, will be sent to Edgewood for unknown analysis once clear.	1/29/2010	2/4/10 10020203 <b>N</b>
<b>TP 134</b>							
1	SVS-10-001	B-5/B-6	3.5'	1/27/2010	Glass stopper in 2" wide by 4" clear glass bottle. 1/4 full of liquid.	1/29/2010	2/4/10 10020202 <b>N - ABPS</b>
2	SVS-10-002	B-6	4'	1/28/2010	Metal bottle shaped like a Rossi wine bottle with a cap on it, 8" length by 5" wide at the widest part, appears empty inside from handling	2/19/2010	3/15/2010 10030203 <b>N - HD &amp; ABPS</b>
3	SVS-10-010	B-5	4.5'	2/4/2010	Intact clear glass bottle - heat sealed, 4" long X 1.5" wide - 1/2 full, w/clear liquid and brownish powder. Item packaged by TE in MRC	2/19/2010	3/15/2010 10030203 <b>N - HD &amp; ABPS</b>
4	SVS-10-012	B-5	4.5'	2/18/2010	Intact clear glass bottle w/glass stopper - 4.5" long X 1.5" wide - 1/8 full, w/clear liquid MRC # JJ 270 PB Neg. ICAM, Neg. M8 Paper	2/19/2010	3/15/2010 10030203 <b>N - HD, L &amp; ABPS</b>
5	SVS-10-013	B-5	4.5'	2/18/2010	Intact clear glass bottle - w/glass stopper, 8.5" long X 3" wide - 70% clear liquid full MRC # JJ 267 PB Neg. ICAM; Neg M8 Paper	2/19/2010	3/15/2010 10030203 <b>N - HD</b>
6	SVS-10-014	B-5	4.5'	2/18/2010	Intact clear glass bottle - w/deteriorating rubber stopper, 8.5" long X 3.5" wide - brown residue caked near neck full with cotton balls - two pipettes through rubber stopper - no liquid - Total length w/pipette - 10.5" (L) X 4.5" (W) Item placed in DOT Can	2/19/2010	3/15/2010 10030203 <b>N - HD, L &amp; ABPS</b>
7	SVS-10-015	B-4	4.5'	2/18/2010	Intact clear glass test tube, heat sealed on one end - 11.5" (L) X 5/8" (W) - 3" of white crystal powder MRC # JJ 492 PB Neg. ICAM; Neg. M8 Paper	2/19/2010	3/30/10 10032302 <b>N - HD, L &amp; APBS</b>

Table 4.13 4825 Glenbrook Road Test Pits 120 and 134 (High Probability Investigations) CWM							
ITEM INFORMATION					ECBC Analysis		
Item Number	Sample ID	Grid Item Found	Depth (feet bgs)	Date Recovered inside ECS	TE Assessment	Date to Edgewood	ECBC Report Date/ Report #/ Cleared - Y/N
8	SVS-10-016	B-4	4.5'	2/22/2010	Intact clear glass test tube, cork stopper- Glass tube inside glass tube 4.5" (L) X 1/2" (W) - ~1 1/4" of tan/brown solid residue in bottom Small amount of liquid w/solid residue Neg. M8 Paper MRC # JJ 483 PB	2/26/2010	3/18/10 10030402 <b>N - L &amp; APBs</b>
9	SVS-10-022	A-5	4.5'	2/23/2010	Intact clear glass bottle w/glass stopper - 6" (L) X 2.5" (W), 75% full of dark brown Neg. M8, Neg. ICAM MRC # JJ 009 PB	2/26/2010	3/18/10 10030402 <b>N - HD, L &amp; APBs</b>
10	SVS-10-027	B-4	6.5	3/23/2010	Closed glass jar w/glass stopper w/wax seal around neck Item packaged by TE and placed in MCR Neg. ICAM, Neg. M-8 MRC # JJ 460 PB	4/2/2010	5/20/10 10042002 <b>N - ABPs</b>
11	SVS-10-028	B-4	6.5	3/23/2010	Closed glass jar w/ deteriorated cork stopper Contents transferred to 32 oz clear jar Container placed in kill bucket and renamed SW-4825GB-SCR-080 Contents and new jar remain SVS-10-028 Neg. ICAM, Neg. M-8 <u>Thick black molasses type material</u>	4/2/2010	5/20/10 10042002 <b>N - ABP</b>
12	SVS-10-029	A-5	6.5	3/24/2010	Closed glass jar w/cork stopper 3.25"(L) X 2.5"(W) w/cork 2.75"(L) X 2.5"(W) w/o cork ~1/2" of solid yellow orange powder material. TE assessed and opened cork stopper, Neg. on ICAM, no liquid present; replaced stopper and taped shut. Placed in DOT Container.	4/2/2010	5/12/10 10042001 <b>N - HD &amp; ABP</b>
13	SVS-10-031	B-4	6.5	3/26/2010	Sealed glass stopper with white tape inside, clear glass bottle. 3.5" H x 1.5" W, reddish/orange solids inside, little bit of liquid inside. TE assessed and Neg. on ICAM, no liquid came out so put in DOT Container.	4/2/2010	5/20/10 10042002 <b>N - ABP</b>
14	SVS-10-032	B-4	6.5	3/26/2010	Glass stopper in clear glass bottle. 5.5" H x 2" D. Bottom layer of liquid is brownish (.75" thick) and top layer is clear (.75" thick). TE assessed and packaged in MRC # JJ 104 S.	4/2/2010	5/20/10 10042002 <b>N - HD, L, ABPs</b>
15	SVS-10-033	A-4/5	6.5	3/29/2010	Closed clear glass jar w/stopper w/ solid (black) sediment in base 2.5"(L) X 1"(W) Item packaged by TE and placed in DOT can	4/2/2010	5/12/10 10042001 <b>N - HD &amp; ABPs</b>
16	SVS-10-035	A-4	6.5	3/29/2010 4-19-10	Clear glass bottle w/broken glass stopper 3" of dark liquid 7.5" (L) X 3"(W) Item smoking - Will remain in ECS (4-19-10) TE packaging team removes item from ECS	4/19/2010	5/5/10 10042202 <b>HD, L &amp; ABP</b>
17	SVS-10-036	A-4	6.5	3/29/2010	Clear glass test tube w/rubber stopper and solid .5" grayish solid and .75" cloudy green/ blue liquid 5" (L) X .75" (W) Item packaged by TE and placed in MRC # JJ214BP	4/2/2010	5/20/10 10042001 <b>N - ABPs</b>



Table 4.13 4825 Glenbrook Road Test Pits 120 and 134 (High Probability Investigations) CWM							
ITEM INFORMATION					ECBC Analysis		
Item Number	Sample ID	Grid Item Found	Depth (feet bgs)	Date Recovered inside ECS	TE Assessment	Date to Edgewood	ECBC Report Date/ Report #/ Cleared - Y/N
18	SVS-10-037	A-4	7.5	3/31/2010	Clear glass jar w/reddish stopper (some corrosion around stopper) 3" (L) X 1.25" (W) 1/3 full of pink/white solid Item packaged by TE and placed in DOT can	4/2/2010	5/12/10 10042001 <b>N - ABPs</b>
19	SVS-10-038	A-4	7.5	4/1/2010	5.5"(L) X 1.75" (W) Closed clear glass jar w/white stopper Item packaged by TE and placed in MRC # JJ255BP	4/2/2010	5/20/10 10042002 <b>N - Chlorodiphenylarsine</b>
20	SVS-10-039	A-4	7.5	4/1/2010	5.5"(L) X 2.0" (W) Closed clear glass jar w/white stopper Item packaged by TE and placed in MRC # JJ255BP	4/2/2010	5/20/10 10042002 <b>N - Chlorodiphenylarsine</b>
21	SVS-10-040	A-4	7.5	4/1/2010	4.5"(L) X 2.0" (W) Closed clear glass jar w/white stopper Item packaged by TE and placed in MRC # JJ027BP	4/2/2010	5/20/10 10042002 <b>N - ABPs</b>
22	SW-4825GB-SCR-048	A-6	48"	2/23/2010	Assorted glass debris scattered throughout test pit - 9lbs		3/05/2010 Not Cleared by DAAMS Scrap item sealed in 5 gallon DOT drum at Fed. Property Drum Seal # 16830 ----- Deconned and Re-Head spaced 8/31/10 (Cleared by DAAMS)
23	SW-4825GB-SCR-056	B-4	48"	2/25/2010	Assorted glass debris scattered throughout test pit - 10lbs		2/26/2010 Not Cleared by DAAMS ----- Deconned and Re-Head spaced 8/31/10 (Cleared by DAAMS)
24	SW-4825GB-SCR-057	B-4	48"	2/25/2010	Assorted glass debris scattered throughout test pit - 9lbs		2/26/2010 Not Cleared by DAAMS ----- Deconned and Re-Head spaced 8/31/10 (Cleared by DAAMS)
25	SW-4825GB-SCR-058	B-4	48"	2/25/2010	Assorted glass debris scattered throughout test pit - 5lbs		2/26/2010 Not Cleared by DAAMS ----- Deconned and Re-Head spaced 8/31/10 (Cleared by DAAMS)
26	SW-4825GB-SCR-062	A-4	52"	3/1/2010	4.7" Green compressed gas cylinder w/threaded nozzle 13" (L - main body) (18.5" total length ) X 4.7" (W) 4 Green bands - 1"wide Neg. M8, Neg. ICAM MRC # JJ 503 PB X-Ray determined cylinder to be empty - Renamed SW-4825GB-SCR-062 and sent for Head Spacing		3/9/2010 Not Cleared by DAAMS ----- Deconned and Re-Head spaced 8/31/10 (Cleared by DAAMS)

Table 4.13 4825 Glenbrook Road Test Pits 120 and 134 (High Probability Investigations) CWM							
ITEM INFORMATION					ECBC Analysis		
Item Number	Sample ID	Grid Item Found	Depth (feet bgs)	Date Recovered inside ECS	TE Assessment	Date to Edgewood	ECBC Report Date/ Report #/ Cleared - Y/N
27	SW-4825GB-SCR-091	A-5	7-7.5'	4/1/2010	Assorted glass debris scattered throughout A-5 area - (9lbs.)		Not cleared by DAAMS 4/2/2010 ----- Decconned and Re-Head spaced 8/31/10 (Below STEL)
28	SW-4825GB-SCR-092	A-5	7-7.5'	4/1/2010	Assorted glass debris scattered throughout A-5 area - (9lbs,11oz)		Not cleared by DAAMS 4/2/2010 ----- Decconned and Re-Head spaced 8/31/10 (Below STEL)
29	SW-4825GB-SCR-093	A-5	7-7.5'	4/1/2010	Assorted glass debris scattered throughout A-5 area - (7lbs,4oz)		Not cleared by DAAMS 4/2/2010 ----- Decconned and Re-Head spaced 8/31/10 (Below STEL)
30	SW-4825GB-SCR-094	A-5	7-7.5'	4/1/2010	Assorted metal debris scattered throughout TP-134 area - (1lb.)		Not cleared by DAAMS 4/2/2010 ----- Decconned and Re-Head spaced 8/31/10 (Below STEL)

**Table 4.14  
4825 Glenbrook Road Test Pits 120 and 134 (High Probability Investigations) Munition Debris Items**

Item Number	Sample ID	Date Recovered	Grid item found	Depth (feet bgs)	Item Description	Onsite Headspace Clearance Sit Rep Date
TP 120						
No MD Found						
TP 134						
1	MD-4825GB-TP-134-001	3/9/2010	A-2	5'3"	Open Cavity 75mm projectile 75mm Dia. 10.75" (Long)	3/10/10
2	MD-4825GB-TP-134-002	3/10/2010	A-3	5'	Open Cavity 75mm projectile 75mm Dia. 11.75" (Long) 4' from east wall	3/11/10
3	<del>SVS-10-024</del> → MD-4825GB-TP-134-003	3/8/2010	A-3	4'9"	75mm unfused w/hex plug X-Ray determined item to be Empty Renamed to <b>MD-4825GB-TP-134-003</b> and placed in <b>SW-4825GB-MD-001</b> drum at Fed. Property 3/16/10	3/15/10

**Table 4.15  
4825 Glenbrook Road Test Pits 120 and 134 (High Probability Investigations) Scrap**

Item Number	Sample ID	Date Recovered	Depth (feet bgs)	Grid Item Found	Item Description	Onsite Headspace Clearance Sit Rep Date	ECBC Report Date/ Report #/ Cleared - Y/N
<b>TP 120</b>							
1	SW-4825GB-SCR-018	1/28/2010	B-5/B-6	3.5'	Glass Fragments and Glove - scattered throughout Test Pit 120	1/29/2010	
2	SW-4825GB-SCR-019	1/29/2010	B-6	4'	Glass Fragments - scattered throughout Test Pit 120	2/1/2010	
3	SW-4825GB-SCR-020	2/1/2010	B-6	4'	Glass Fragments - scattered throughout Test Pit 120	2/2/2010	
4	SW-4825GB-SCR-021	2/2/2010	B-5	40"	Intact clear glass bottle, open top, 2" wide by 4" long. Black residue on the bottom. TE placed in decontamination bucket and put item in scrap bucket, renamed to SW-4825GB-SCR-021 .	2/4/10	
5	SW-4825GB-SCR-021	2/2/2010	B-5	40"	Intact clear glass bottle, open top, 1.5" wide by 2.5" long with brown/tan small amount of liquid (teaspoon size). TE placed in decontamination bucket, renamed to SW-4825GB-SCR-021.	2/4/10	
6	SW-4825GB-SCR-021	2/2/2010	C-6	40"	Intact clear glass bottle, glass stopper with little hole in stopper, 1" wide by 3" long, 1/4 teaspoon of clear liquid with yellow precipitate solids on the sides. TE placed in decontamination bucket, renamed to SW-4825GB-SCR-021	2/4/10	
7	SW-4825GB-SCR-022	2/3/2010	C-6	45"	Glass Fragments scattered throughout TP 120 - Approx. 3lbs	2/4/10	
8	SW-4825GB-SCR-023	2/3/2010	C-6	45"	Glass Fragments scattered throughout TP 120 - Approx. 4.5lbs	2/4/10	
9	SW-4825GB-SCR-024	2/3/2010	C-6	45"	Glass Fragments scattered throughout TP 120 - Approx. 5 lbs	2/4/10	
10	SW-4825GB-SCR-025	2/3/2010	C-6	45"	Glass Fragments scattered throughout TP 120 - Approx. 15 lbs	2/4/10	
11	SW-4825GB-SCR-026	2/3/2010	C-6	45"	Glass Fragments scattered throughout TP 120 - Approx. 11 lbs	2/4/10	
12	SW-4825GB-SCR-027	2/3/2010	C-6	40"	Clear glass bottle 1/2 full of liquid. TE placed liquid in decontamination bucket and put item in scrap bucket, renamed to SW-4825GB-SCR-027 .	2/4/10	
13	SW-4825GB-SCR-028	2/3/2010	C-6	40"	Intact clear glass bottle, 3" long X 1.5" wide. Cork stopper in neck; black granular substance in bottle. TE assessed cork to actually be soil. Black granular substance assessed to be soil - soil placed in decontamination bucket and glass assigned SW-4825GB-SCR-028	2/4/10	
14	SW-4825GB-SCR-033	2/17/2010	C-5	48"	Clear glass bottle , approx. 1/16 full with clear liquid - 5" long X 2" wide - TE assessed liquid to be water - Liquid poured into decontamination bucket and glass renamed SW-4825GB-	2/22/10	
15	SW-4825GB-SCR-034	2/17/2010	C-5	48"	Clear glass bottle , approx. 1/2" of clear liquid in bottle - 3" long X 1 1/4" wide w/ black residue in bottle TE assessed item w/M8 paper - negative Liquid emptied into decontamination bucket and Item renamed SW-4825GB-SCR-034	2/22/10	

**Table 4.15  
4825 Glenbrook Road Test Pits 120 and 134 (High Probability Investigations) Scrap**

Item Number	Sample ID	Date Recovered	Depth (feet bgs)	Grid Item Found	Item Description	Onsite Headspace Clearance Sit Rep Date	ECBC Report Date/ Report #/ Cleared - Y/N
16	SW-4825GB-SCR-035	2/17/2010	C-5	48"	Clear glass bottle , approx. 1/2" of clear liquid in bottle - 5" long X 1 3/4" wide TE assessed item w/ M8 paper - negative Liquid emptied into decontamination bucket and Item renamed SW-4825GB-SCR-035	2/22/10	
17	SW-4825GB-SCR-060	2/25/2010	B-4	48"	Intact Open Bottle w/"Nitric Acid" in raised letters - 75% full of amber liquid 7"(L) X 3.5"(W) - (08:45) Neg. M8 paper , Neg. ICAM TE determined liquid to be ground water - liquid placed in decontamination bucket Renamed item SW-4825GB-SCR-060	2/26/10	
18	SW-4825GB-SCR-060	2/25/2010	B-4	48"	Intact open bottle 3"(L) X 2.5" (W) - no stopper Brown sediment w/brownish green liquid - 50% full - (09:15) Neg. M8 paper , Neg. ICAM TE assessed liquid to be mud - Liquid placed in decontamination bucket and item rinsed in bleach solution Item placed in SCR-060 bag	2/26/10	
19	SW-4825GB-SCR-060	2/25/2010	B-4	48"	Intact clear glass bottle w/dirt plug in neck -5" (L) X 2" (W) 50% full of bluish green liquid mixed with solid (10:20) Neg. M8 paper , Neg. ICAM TE assessed liquid to be mud - Liquid placed in decontamination bucket and item rinsed in bleach solution Item placed in SCR-060 bag	2/26/10	
20	SW-4825GB-TP120-TE-002	2/2/2010	B-5	40"	Intact clear glass bottle, open top, 2" wide by 4" long. Small amount of white solid on bottom, 1/8 full. TE double bagged it, sent for headspace on 2/2/2010, delivered by TE to ECBC.	2/3/10	
21	SW-4825GB-TP120-TE-006	2/2/2010	C-6	40"	Intact clear glass bottle, open top, 1" wide by 1.75" long with black charcoal on bottom, about 1/4 full. Double bagged for headspacing, TE will transport to ECBC for headspacing.	2/3/10	

**Table 4.15**  
**4825 Glenbrook Road Test Pits 120 and 134 (High Probability Investigations) Scrap**

Item Number	Sample ID	Date Recovered	Depth (feet bgs)	Grid Item Found	Item Description	Onsite Headspace Clearance Sit Rep Date	ECBC Report Date/ Report #/ Cleared - Y/N
<b>TP 134</b>							
1	SW-4825GB-SCR-011	B-6 /B-7	2.5'	1/25/2010	Glass Fragments - scattered throughout Test Pit 134	1/26/2010	
2	SW-4825GB-SCR-012	B-6	4'	1/26/2010	Intact open cavity glass bottle, 2.5" diameter and 6" tall with liquid at bottom	1/27/2010	
3	SW-4825GB-SCR-013	B-6 / B-7	4'	1/26/2010	Glass Fragments - scatter throughout Test Pit 134	1/27/2010	
4	SW-4825GB-SCR-014	B-5/B-6	3.5'	1/26/2010	Glass fragments	1/27/2010	
5	SW-4825GB-SCR-015	B-5/B-7	3.5'	1/27/2010	Intact open cavity glass bottle, 3" diameter and 5" tall with liquid at bottom, neck broken off	1/28/2010	
6	SW-4825GB-SCR-016	B-5/B-7	3.5'	1/27/2010	Metal Fragments - scatter throughout Test Pit 134	1/28/2010	
7	SW-4825GB-SCR-017	B-5/B-7	3.5'	1/27/2010	Glass Fragments - scatter throughout Test Pit 134	1/28/2010	
8	SW-4825GB-SCR-032	C-5	48"	2/17/2010	Assorted glass debris scattered throughout test pit - 12lbs	2/22/10	
9	SW-4825GB-SCR-036	C-5	48"	2/18/2010	Assorted glass debris scattered throughout test pit - 12lbs	2/22/10	
10	SW-4825GB-SCR-037	C-5	48"	2/18/2010	Assorted glass debris scattered throughout test pit - 12lbs	2/22/10	
11	SW-4825GB-SCR-038	C-5	48"	2/18/2010	Assorted glass debris scattered throughout test pit - 4lbs	2/22/10	
12	SW-4825GB-SCR-039	C-5	48"	2/18/2010	Assorted glass debris scattered throughout test pit - 5lbs	2/22/10	
13	SW-4825GB-SCR-040	C-5	48"	2/18/2010	Assorted glass debris scattered throughout test pit - 3lbs	2/22/10	
14	SW-4825GB-SCR-043	B-5	48"	2/22/2010	Assorted glass debris scattered throughout test pit - 9lbs	2/23/10	
15	SW-4825GB-SCR-044	B-5	48"	2/22/2010	Assorted glass debris scattered throughout test pit - 10lbs	2/24/10	
16	SW-4825GB-SCR-045	B-5	48"	2/22/2010	Metal Test Tube Holder - 1.25lbs	2/23/10	
17	SW-4825GB-SCR-046	B-5	48"	2/22/2010	Intact clear glass test tube, GLASS stopper - One side open 3.5" (L) X 1/4" (W) - ~empty Placed in decontamination bucket and renamed SW-4825GB-SCR-046	2/23/10	
18	SW-4825GB-SCR-047	A-5	48"	2/23/2010	Clear glass tube w/glass pipettes - 7" X 2.5", rubber stopper	2/24/10	
19	SW-4825GB-SCR-049	A-6	48"	2/23/2010	Assorted glass debris scattered throughout test pit - 9lbs	2/24/10	
20	SW-4825GB-SCR-050	A-6	48"	2/23/2010	Assorted glass debris scattered throughout test pit - 10lbs	2/24/10	
21	SW-4825GB-SCR-051	A-6	48"	2/23/2010	Assorted metal debris scattered throughout test pit - 5lbs	2/24/10	
22	SW-4825GB-SCR-052	A-6	48"	2/24/2010	Bottle with yellow material - .5lbs	2/25/10	
23	SW-4825GB-SCR-053	A-6	48"	2/24/2010	Assorted glass debris scattered throughout test pit - 6lbs 11oz	2/25/10	
24	SW-4825GB-SCR-054	A-6	48"	2/24/2010	Assorted glass debris scattered throughout test pit - 16lbs	2/25/10	

**Table 4.15  
4825 Glenbrook Road Test Pits 120 and 134 (High Probability Investigations) Scrap**

Item Number	Sample ID	Date Recovered	Depth (feet bgs)	Grid Item Found	Item Description	Onsite Headspace Clearance Sit Rep Date	ECBC Report Date/ Report #/ Cleared - Y/N
25	SW-4825GB-SCR-055	A-6	48"	2/24/2010	Assorted glass debris scattered throughout test pit - 1lbs	2/25/10	
29	SW-4825GB-SCR-059	B-4	48"	2/25/2010	Assorted glass debris scattered throughout test pit - 9lbs	2/26/10	
30	SW-4825GB-SCR-061	A-4	5'	3/1/2010	Assorted glass debris scattered throughout test pit - 5lbs	3/2/10	
31	SW-4825GB-SCR-063	A-3	5'	3/11/2010	Assorted glass debris scattered throughout A-3 Area - 3lbs, 6ozs	3/12/10	
32	SW-4825GB-SCR-064	A-3	5'	3/12/2010	Metal scrap scattered on floor around A--3 area (13:30) 3lbs. 12oz	3/15/10	
33	SW-4825GB-SCR-065	A-3	5'	3/12/2010	Assorted glass debris scattered throughout A-3 area - 9lbs. 8oz	3/15/10	
34	SW-4825GB-SCR-066	A-3	5'	3/12/2010	Assorted glass debris scattered throughout A-3 area - lbs	3/15/10	
35	SW-4825GB-SCR-067	A-3	5'	3/12/2010	Assorted glass debris scattered throughout A-3 area -9 lbs, 4 Oz	3/15/10	
36	SW-4825GB-SCR-069	A-7	7'	3/15/2010	Assorted glass debris scattered throughout A-7 area - 9lbs, 12oz	3/15/10	
37	SW-4825GB-SCR-070	A-7	7'	3/15/2010	Assorted glass debris scattered throughout A-7 area - 9lbs, 10oz	3/16/10	
38	SW-4825GB-SCR-071	A-7	7'	3/15/2010	Assorted glass debris scattered throughout A-7 area - 9lbs, 12oz	3/15/10	
39	SW-4825GB-SCR-072	A-7	7'	3/15/2010	Assorted glass debris scattered throughout A-7 area - 6lbs, 1oz	3/16/10	
40	SW-4825GB-SCR-073	A-7	7'	3/15/2010	Assorted metal debris scattered throughout A-7 area - 7lbs, 5oz	3/15/10	
41	SW-4825GB-SCR-074	A-4	48"	3/15/2010	Intact clear glass bottle - 4.5" (L) X 2" (W) 50% full liquid (10:50) "Sodium Acetate" embossed on outside TE assessed item w/ ICAM and M8 paper - negative Liquid emptied into decontamination bucket and Item renamed SW-4825GB-SCR-074	3/16/10	
42	SW-4825GB-SCR-075	TP-134	7'	3/23/2010	Assorted glass debris scattered throughout TP-134 area - 10lbs, 6oz	3/25/10	
43	SW-4825GB-SCR-076	TP-134	8'	3/23/2010	Assorted glass debris scattered throughout TP-134 area - 7lbs, 4oz	3/25/10	
44	SW-4825GB-SCR-077	TP-134	8'	3/23/2010	Assorted metal debris scattered throughout TP-134 area - 3lbs, 1oz	3/25/10	
45	SW-4825GB-SCR-078	TP-134	8'	3/23/2010	Assorted metal debris scattered throughout TP-134 area - 7lbs, 8oz	3/25/10	
46	SW-4825GB-SCR-080	TP-134	8'	3/24/2010	Decontaminated TE glass items SW-4825GB-TP134-TE-005,006,008,009,010 and container from SVS-10-028	3/25/10	
47	SW-4825GB-SCR-081	TP-134	6'6"	3/29/2010	Decontaminated TE glass items SW-4825GB-TP134-TE-011, 012 and container from TE-014 (1lb, 8oz)	3/30/10	

**Table 4.15  
4825 Glenbrook Road Test Pits 120 and 134 (High Probability Investigations) Scrap**

Item Number	Sample ID	Date Recovered	Depth (feet bgs)	Grid Item Found	Item Description	Onsite Headspace Clearance Sit Rep Date	ECBC Report Date/ Report #/ Cleared - Y/N
48	SW-4825GB-SCR-082	TP-134	6'6"	3/29/2010	Assorted glass debris scattered throughout TP-134 area - (10lbs)	3/30/10	
49	SW-4825GB-SCR-083	TP-134	6'6"	3/29/2010	Assorted glass debris scattered throughout TP-134 area - (9lbs, 7ozs)	3/30/10	
50	SW-4825GB-SCR-084	TP-134	6'6"	3/29/2010	Assorted glass debris scattered throughout TP-134 area - (9lbs, 8ozs)	3/30/10	
51	SW-4825GB-SCR-085	TP-134	6'6"	3/29/2010	Assorted glass debris scattered throughout TP-134 area - (11lbs,)	3/30/10	
52	SW-4825GB-SCR-086	TP-134	6'6"	3/29/2010	Assorted glass debris scattered throughout TP-134 area - (11lbs, 2ozs)	3/30/10	
53	SW-4825GB-SCR-087	TP-134	6'6"	3/29/2010	Assorted glass debris scattered throughout TP-134 area - (9lbs, 2ozs)	3/30/10	
54	SW-4825GB-SCR-088	TP-134	6'6"	3/29/2010	Assorted glass debris scattered throughout TP-134 area - (11lbs, 7ozs)	3/30/10	
55	SW-4825GB-SCR-089	TP-134	6'6"	3/29/2010	Assorted metal debris scattered throughout TP-134 area - (10lbs, 7ozs)	3/30/10	
56	SW-4825GB-SCR-090	TP-134	6'6"	3/29/2010	Decontaminated TE Item SW-4825GB-TP134-TE-016 - Renamed SCR-090	4/2/10	
57	SW-4825GB-SCR-095	A-5	7-7.5'	4/1/2010 Removed from ECS 9/27/10	Decontaminated TE items - TE-018, TE-020, TE-021	9/28/10	
58	SW-4825GB-SCR-096	A-5	7-7.5'	9/27/2010	Metal Debris (Approx 1.5lbs) collected from bucket liner from April Excavations	9/28/10	
59	SVS-10-003	B-6	4'	1/29/2010	4" long x 1.25" wide clear glass bottle with a glass stopper, clear liquid inside about 1/8 full.		2/4/10 10020202 YES
60	SVS-10-011	B-5	4.5'	2/4/2010	Intact clear glass bottle - heat sealed, 10" long X 1.5" wide - 1/2 full, w/clear liquid and brownish powder		3/31/10 10032303 YES
61	SVS-10-018	B-5	4.5'	2/22/2010	Intact clear glass test tube, cork stopper - 5.5" (L) X 2.25" (W) - ~appears full of brown/yellow solid MRC# JJ 547 PB		3/18/10 10030403 YES



**Table 4.15  
4825 Glenbrook Road Test Pits 120 and 134 (High Probability Investigations) Scrap**

Item Number	Sample ID	Date Recovered	Depth (feet bgs)	Grid Item Found	Item Description	Onsite Headspace Clearance Sit Rep Date	ECBC Report Date/ Report #/ Cleared - Y/N
62	SVS-10-019	B-4	4.5'	2/22/2010	Intact copper bottle, 7.5" (L) X 4" (W), appears full Tin or copper stopper MRC# JJ 257 PB		3/31/10 10032303 YES
63	SVS-10-020	B-5	4.5'	2/22/2010	Clear glass bottle w/glass stopper, 4.25" (L) X 2" (W) ~3/8 full of clear liquid MRC # JJ 483 PB		3/18/10 10030402 YES
64	SVS-10-021	A-6	4.5'	2/23/2010	Intact clear glass vial w/plastic cap, 2.75" (L) X .75" (W), .25% full of dark brown material Neg. M8, Neg. ICAM MRC # JJ 009 PB		3/18/10 10030403 YES
65	SVS-10-025	A-3	5'	3/12/2010	Intact Clear glass bottle, heat sealed on one end Appears to be melted red plastic material at base 2.25" (L) X 3/4" (W) MRC # JJ 471 PB		3/31/10 10032303 YES
66	SVS-10-034	A-4	6.5	3/29/2010	Clear glass jar w/stopper 75% full of separated liquid and solid bluish material outside of jar -smoking- 3/4" solid and 5" of yellow liquid 7.5" (L) w/o stopper 11" (L) w/stopper, X 3" (W) Item packaged by TE and placed in MRC # JJ096BP		5/20/10 10042002 YES
67	SW-4825GB-TP134-TE-005	A-4	6',6"	3/22/2010	Clear glass test tube - 9" (L) X 3/4" (W) ~1 teaspoon (1" at top and 1" at base) of white granular substance Scraping of solid collected in (1) 4 OZ JAR for head spacing and low level/unknown analysis Glass deconned in decontamination bucket and sent for headspacing Container combined in scrap bag - SW-4825GB-SCR-080 Item placed in DOT can for transport to ECBC.		5/12/10 10042001 YES
68	SW-4825GB-TP134-TE-006	A-4	6',6"	3/22/2010	Broken clear glass jar - 4.75" (L) X 4" (W) solid crystallized pink/white material that "glistens" "ATL E-Z SEAL" Embossed on side Scraping of solid collected for head spacing and low level/unknown analysis Glass deconned in decontamination bucket and sent for headspacing Solid collected in (1) 4 OZ JAR for head spacing and (1) 32 oz Clear jar for low level/unknown analysis Container combined in scrap bag - SW-4825GB-SCR-080 Item placed in DOT can for transport to ECBC		5/12/10 10042001 YES

**Table 4.15**  
**4825 Glenbrook Road Test Pits 120 and 134 (High Probability Investigations) Scrap**

Item Number	Sample ID	Date Recovered	Depth (feet bgs)	Grid Item Found	Item Description	Onsite Headspace Clearance Sit Rep Date	ECBC Report Date/ Report #/ Cleared - Y/N
69	SW-4825GB-TP134-TE-007	A-4	6',6"	3/23/2010 11:30	Broken clear glass test tube - 5" (L) X 1/2" (W) w/ 1" of solid yellowish material and 3/4" of diluted yellow liquid Item packaged by TE in DOT can for transport to ECBC		5/20/10 10042001 YES
70	SW-4825GB-TP134-TE-013	A-4	6',6"	3/26/2010 9:15:00 AM	Open container clear glass bottle, busted neck. 3.5" W x 7.75 H, filled with a white/blue/green solid and 2.5" liquid on top of solid. TE assessed and found Neg. on ICAM/M-8 paper, cleaned off and photographed, poured liquid out of container into bleach and placed jar with solid remaining in DOT container.		5/10/10 10042201 YES
71	SW-4825GB-TP134-TE-014	B-4	6',6"	3/26/2010 11:30:00 AM	Clear glass bottle with dirt plug in top. 9" H x 3.5" D. Filled with liquid - bottom liquid is yellowish (3" thick) and top liquid is brownish (3" thick). Clear liquid line visible. TE assessed and found B&LOCO on bottom (Bausch & Lomb Company), Neg. on ICAM/M-8 paper, emptied contents into 32 oz. sample jar and stored in MRC # JJ 104 S. The container was decontaminated in bleach and placed in scrap SW-4825GB-SCR-081.		5/20/10 10042002 YES
72	SW-4825GB-TP134-TE-015	A-4	6',6"	3/29/2010 10:25	Open clear glass tube, 5"(L) X .75"(W), 4" of blue/grey colored solid in base and .75" of separated sandy colored solid Neg ICAM TE assessed item to have a stain in the base of vessel Item sealed by TE and placed in DOT can		5/12/10 10042001 YES
73	SW-4825GB-TP134-TE-017	A-4	6',6"	3/29/2010 10:35	Open Clear glass jar - broken top 6"(L) X 2.75"(W) Dark oily soil Jar was smoking 2" of blue green soil on top of small amount of liquid-material reacted by smoking when shaken slightly TE bagged item and will investigate further (4-19-10) TE packaging team removes item from ECS 3/30/10 TE collects vapor sample with DAMMS tubes		5/11/10 10042601  4/9/10 3223 YES
74	SW-4825GB-TP134-TE-019	A-4	7.5'	3/31/2010 13:50	Open clear glass bottle w/dirt plug 4" (L) X 1.5" (W) ~ 90% full Brown/red fiberglass type material TE sealed item with parafilm and placed item in DOT can		5/11/10 10042601 YES

**Table 4.16**  
**4825 Glenbrook Road Test Pits 120 and 134 (High Probability Investigations) Soil Samples**

Sample ID	DATE GENERATED	Cleared ON SITE		Sent to Edgewood	Edgewood Agent/ABP Clearance			HTW Sample ID
		HD/L	SitRep Date		Batch # Date	QC Date	Cleared	
<b>TP 120</b>								
<b>CWM Drum Samples</b>								
SW-4825GB-CWM-160	1/28/2010	Yes	1/28/2010	1/29/2010	10020101	2/2/2010	No	--
SW-4825GB-CWM-161	1/28/2010	Yes	1/28/2010	1/29/2010	10020101	2/2/2010	No	--
SW-4825GB-CWM-162	1/29/2010	Yes	1/29/2010	2/1/2010	10020103	2/2/2010	No	--
SW-4825GB-CWM-163	1/29/2010	Yes	1/29/2010	2/1/2010	10020103	2/2/2010	Yes	SW-4825GB-HTW-022310
SW-4825GB-CWM-164	2/1/2010	Yes	2/1/2010	2/2/2010	10020201	2/4/2010	Yes	SW-4825GB-HTW-022310
SW-4825GB-CWM-165	2/1/2010	Yes	2/1/2010	2/2/2010	10020201	2/4/2010	Yes	SW-4825GB-HTW-022310
SW-4825GB-CWM-166	2/1/2010	Yes	2/1/2010	2/2/2010	10020201	2/4/2010	No	--
SW-4825GB-CWM-167	2/1/2010	Yes	2/1/2010	2/2/2010	10020201	2/4/2010	No	--
SW-4825GB-CWM-168	2/1/2010	Yes	2/2/2010	2/4/2010	10021901	3/2/2010	No	--
SW-4825GB-CWM-169	2/1/2010	Yes	2/2/2010	2/4/2010	10021901	3/2/2010	No	--
SW-4825GB-CWM-170	2/1/2010	Yes	2/2/2010	2/4/2010	10021901	3/2/2010	No	--
SW-4825GB-CWM-171	2/4/2010	Yes	2/2/2010	2/4/2010	10021901	3/2/2010	No	--
SW-4825GB-CWM-172	2/4/2010	Yes	2/4/2010	2/18/2010	10021804	2/22/2010	No	--
SW-4825GB-CWM-173	2/4/2010	Yes	2/4/2010	2/18/2010	10021804	2/22/2010	No	--
SW-4825GB-CWM-174	2/4/2010	Yes	2/4/2010	2/18/2010	10021804	2/22/2010	No	--
SW-4825GB-CWM-175	2/4/2010	Yes	2/4/2010	2/18/2010	10021804	2/22/2010	No	--
SW-4825GB-CWM-196	2/25/2010	Yes	2/25/2010	3/1/2010	10030101	3/4/2010	No	--
SW-4825GB-CWM-197	2/26/2010	Yes	2/26/2010	3/2/2010	10030301	3/6/2010	No	--
SW-4825GB-CWM-198	2/26/2010	Yes	2/26/2010	3/2/2010	10030301	3/6/2010	No	--
SW-4825GB-CWM-199	2/26/2010	Yes	2/26/2010	3/2/2010	10030301	3/6/2010	No	--
SW-4825GB-CWM-200	2/26/2010	Yes	2/26/2010	3/2/2010	10030301	3/6/2010	No	--
<b>Grab Samples</b>								
SW-4825GB-GS06	2/2/2010	Yes	2/2/10	2/4/2010	10022501	3/2/2010	No	N/A
SW-4825GB-GS07	2/3/2010	Yes	2/3/10	2/4/2010	10022501	3/2/2010	No	N/A
SW-4825GB-GS-008	2/18/2010	Yes	2/18/10	2/22/2010	10022501	3/1/2010	No	N/A
<b>TP 134</b>								
<b>CWM Drum Samples</b>								
SW-4825GB-CWM-153	1/25/2010	Yes	1/26/2010	1/28/2010	10012802	2/2/2010	Yes	SW-4825GB-HTW-020210
SW-4825GB-CWM-154	1/25/2010	Yes	1/26/2010	1/28/2010	10012802	2/2/2010	Yes	SW-4825GB-HTW-020210
SW-4825GB-CWM-155	1/25/2010	Yes	1/26/2010	1/28/2010	10012802	2/2/2010	Yes	SW-4825GB-HTW-020210
SW-4825GB-CWM-156	1/25/2010	Yes	1/26/2010	1/28/2010	10012802	2/2/2010	Yes	SW-4825GB-HTW-020210
SW-4825GB-CWM-157	1/26/2010	Yes	1/27/2010	1/28/2010	10012802	2/2/2010	Yes	SW-4825GB-HTW-020210
SW-4825GB-CWM-158	1/26/2010	Yes	1/27/2010	1/28/2010	10012802	2/2/2010	Yes	SW-4825GB-HTW-020210

Table 4.16

## 4825 Glenbrook Road Test Pits 120 and 134 (High Probability Investigations) Soil Samples

Sample ID	DATE GENERATED	Cleared ON SITE		Sent to Edgewood	Edgewood Agent/ABP Clearance			HTW Sample ID
		HD/L	SitRep Date		Batch # Date	QC Date	Cleared	
SW-4825GB-CWM-159	1/26/2010	Yes	1/27/2010	1/28/2010	10012802	2/2/2010	Yes	SW-4825GB-HTW-020210
SW-4825GB-CWM-176	2/17/2010	Yes	2/18/2010	2/22/2010	10022301	3/1/2010	No	--
SW-4825GB-CWM-177	2/17/2010	Yes	2/18/2010	2/22/2010	10022301	3/1/2010	No	--
SW-4825GB-CWM-178	2/17/2010	Yes	2/18/2010	2/22/2010	10022301	3/1/2010	No	--
SW-4825GB-CWM-179	2/19/2010	Yes	2/22/2010	2/22/2010	10022301	3/1/2010	No	--
SW-4825GB-CWM-180	2/19/2010	Yes	2/22/2010	2/22/2010	10022301	3/1/2010	No	--
SW-4825GB-CWM-181	2/19/2010	Yes	2/22/2010	2/22/2010	10022301	3/1/2010	No	--
SW-4825GB-CWM-182	2/19/2010	Yes	2/22/2010	2/22/2010	10022301	3/1/2010	No	--
SW-4825GB-CWM-183	2/19/2010	Yes	2/22/2010	2/22/2010	10022301	3/1/2010	No	--
SW-4825GB-CWM-184	2/19/2010	Yes	2/22/2010	2/22/2010	10022301	3/1/2010	No	--
SW-4825GB-CWM-185	2/19/2010	Yes	2/22/2010	2/22/2010	10022301	3/1/2010	No	--
SW-4825GB-CWM-186	2/19/2010	Yes	2/22/2010	2/22/2010	10022301	3/1/2010	No	--
SW-4825GB-CWM-187	2/19/2010	Yes	2/22/2010	2/22/2010	10022301	3/1/2010	No	--
SW-4825GB-CWM-188	2/19/2010	Yes	2/22/2010	2/22/2010	10022301	3/1/2010	No	--
SW-4825GB-CWM-189	2/22/2010	Yes	2/23/2010	3/1/2010	10030101	3/4/2010	No	--
SW-4825GB-CWM-190	2/22/2010	Yes	2/23/2010	3/1/2010	10030101	3/4/2010	No	--
SW-4825GB-CWM-191	2/24/2010	Yes	2/24/2010	3/1/2010	10030101	3/4/2010	No	--
SW-4825GB-CWM-192	2/24/2010	Yes	2/24/2010	3/1/2010	10030101	3/4/2010	No	--
SW-4825GB-CWM-193	2/24/2010	Yes	2/24/2010	3/1/2010	10030101	3/4/2010	No	--
SW-4825GB-CWM-194	2/24/2010	Yes	2/24/2010	3/1/2010	10030101	3/4/2010	No	--
SW-4825GB-CWM-195	2/24/2010	Yes	2/24/2010	3/1/2010	10030101	3/4/2010	No	--
SW-4825GB-CWM-197	2/26/2010	Yes	2/26/2010	3/2/2010	10030301	3/6/2010	No	--
SW-4825GB-CWM-198	2/26/2010	Yes	2/26/2010	3/2/2010	10030301	3/6/2010	No	--
SW-4825GB-CWM-199	2/26/2010	Yes	2/26/2010	3/2/2010	10030301	3/6/2010	No	--
SW-4825GB-CWM-200	2/26/2010	Yes	2/26/2010	3/2/2010	10030301	3/6/2010	No	--
SW-4825GB-CWM-201	3/1/2010	Yes	3/1/2010	3/2/2010	10030301	3/6/2010	No	--
SW-4825GB-CWM-202	3/1/2010	Yes	3/1/2010	3/2/2010	10030301	3/6/2010	No	--
SW-4825GB-CWM-203	3/1/2010	Yes	3/1/2010	3/2/2010	10030301	3/6/2010	No	--
SW-4825GB-CWM-204	3/1/2010	Yes	3/1/2010	3/2/2010	10030301	3/6/2010	No	--
SW-4825GB-CWM-205	3/1/2010	Yes	3/1/2010	3/2/2010	10030301	3/6/2010	No	--
SW-4825GB-CWM-206	3/2/2010	Yes	3/2/2010	3/5/2010	10030502	3/11/2010	Yes	SW-4825GB-HTW-031110
SW-4825GB-CWM-207	3/2/2010	Yes	3/2/2010	3/5/2010	10030502	3/11/2010	Yes	SW-4825GB-HTW-031110
SW-4825GB-CWM-208	3/2/2010	Yes	3/2/2010	3/5/2010	10030502	3/11/2010	Yes	SW-4825GB-HTW-031110
SW-4825GB-CWM-209	3/2/2010	Yes	3/2/2010	3/5/2010	10030502	3/11/2010	Yes	SW-4825GB-HTW-031110
SW-4825GB-CWM-210	3/2/2010	Yes	3/2/2010	3/5/2010	10030502	3/11/2010	Yes	SW-4825GB-HTW-031110

**Table 4.16**  
**4825 Glenbrook Road Test Pits 120 and 134 (High Probability Investigations) Soil Samples**

Sample ID	DATE GENERATED	Cleared ON SITE		Sent to Edgewood	Edgewood Agent/ABP Clearance			HTW Sample ID
		HD/L	SitRep Date		Batch # Date	QC Date	Cleared	
SW-4825GB-CWM-211	3/2/2010	Yes	3/2/2010	3/5/2010	10030502	3/11/2010	Yes	SW-4825GB-HTW-031110
SW-4825GB-CWM-212	3/2/2010	Yes	3/2/2010	3/5/2010	10030502	3/11/2010	Yes	SW-4825GB-HTW-031110
SW-4825GB-CWM-213	3/2/2010	Yes	3/2/2010	3/5/2010	10030502	3/11/2010	Yes	SW-4825GB-HTW-031110
SW-4825GB-CWM-214	3/2/2010	Yes	3/2/2010	3/5/2010	10030502	3/11/2010	Yes	SW-4825GB-HTW-031110
SW-4825GB-CWM-215	3/2/2010	Yes	3/3/2010	3/5/2010	10030502	3/11/2010	Yes	SW-4825GB-HTW-031110
SW-4825GB-CWM-216	3/2/2010	Yes	3/3/2010	3/5/2010	10030502	3/11/2010	Yes	SW-4825GB-HTW-031110
SW-4825GB-CWM-217	3/3/2010	Yes	3/3/2010	3/5/2010	10030503	3/11/2010	No	--
SW-4825GB-CWM-218	3/3/2010	Yes	3/3/2010	3/5/2010	10030503	3/11/2010	No	--
SW-4825GB-CWM-219	3/3/2010	Yes	3/3/2010	3/5/2010	10030503	3/11/2010	No	--
SW-4825GB-CWM-220	3/3/2010	Yes	3/3/2010	3/5/2010	10030503	3/11/2010	Yes	SW-4825GB-HTW-031210
SW-4825GB-CWM-221	3/3/2010	Yes	3/3/2010	3/5/2010	10030503	3/11/2010	Yes	SW-4825GB-HTW-031210
SW-4825GB-CWM-222	3/3/2010	Yes	3/3/2010	3/5/2010	10030503	3/11/2010	Yes	SW-4825GB-HTW-031210
SW-4825GB-CWM-223	3/3/2010	Yes	3/3/2010	3/5/2010	10030503	3/11/2010	Yes	SW-4825GB-HTW-031210
SW-4825GB-CWM-224	3/3/2010	Yes	3/3/2010	3/5/2010	10030503	3/11/2010	Yes	SW-4825GB-HTW-031210
SW-4825GB-CWM-225	3/3/2010	Yes	3/3/2010	3/5/2010	10030503	3/11/2010	No	--
SW-4825GB-CWM-226	3/3/2010	Yes	3/3/2010	3/5/2010	10030503	3/11/2010	No	--
SW-4825GB-CWM-227	3/3/2010	Yes	3/3/2010	3/5/2010	10030503	3/11/2010	No	--
SW-4825GB-CWM-228	3/3/2010	Yes	3/3/2010	3/5/2010	10030503	3/11/2010	Yes	SW-4825GB-HTW-031210
SW-4825GB-CWM-229	3/3/2010	Yes	3/3/2010	3/5/2010	10030503	3/11/2010	Yes	SW-4825GB-HTW-031210
SW-4825GB-CWM-230	3/5/2010	Yes	3/5/2010	3/8/2010	10030902	3/11/2010	Yes	SW-4825GB-HTW-031210
SW-4825GB-CWM-231	3/5/2010	Yes	3/5/2010	3/8/2010	10030902	3/11/2010	Yes	SW-4825GB-HTW-031210
SW-4825GB-CWM-232	3/5/2010	Yes	3/5/2010	3/8/2010	10030902	3/11/2010	Yes	SW-4825GB-HTW-031210
SW-4825GB-CWM-233	3/5/2010	Yes	3/5/2010	3/8/2010	10030902	3/11/2010	Yes	SW-4825GB-HTW-031210
SW-4825GB-CWM-234	3/5/2010	Yes	3/5/2010	3/8/2010	10030902	3/11/2010	Yes	SW-4825GB-HTW-031210
SW-4825GB-CWM-235	3/5/2010	Yes	3/5/2010	3/8/2010	10030902	3/11/2010	Yes	SW-4825GB-HTW-031210
SW-4825GB-CWM-236	3/5/2010	Yes	3/5/2010	3/8/2010	10030902	3/11/2010	Yes	SW-4825GB-HTW-031210
SW-4825GB-CWM-237	3/5/2010	Yes	3/5/2010	3/8/2010	10030902	3/11/2010	Yes	SW-4825GB-HTW-031210
SW-4825GB-CWM-238	3/5/2010	Yes	3/5/2010	3/8/2010	10030902	3/11/2010	Yes	SW-4825GB-HTW-031210
SW-4825GB-CWM-239	3/5/2010	Yes	3/5/2010	3/8/2010	10030902	3/11/2010	Yes	SW-4825GB-HTW-031210
SW-4825GB-CWM-240	3/8/2010	Yes	3/8/2010	3/8/2010	10030902	3/11/2010	No	--
SW-4825GB-CWM-241	3/8/2010	Yes	3/8/2010	3/8/2010	10030902	3/11/2010	No	--
SW-4825GB-CWM-242	3/9/2010	Yes	3/10/2010	3/11/2010	10031101	3/12/2010	No	--
SW-4825GB-CWM-243	3/9/2010	Yes	3/10/2010	3/11/2010	10031101	3/12/2010	Yes	SW-4825GB-HTW-032210
SW-4825GB-CWM-244	3/10/2010	Yes	3/10/2010	3/11/2010	10031101	3/12/2010	Yes	SW-4825GB-HTW-032210
SW-4825GB-CWM-245	3/10/2010	Yes	3/10/2010	3/11/2010	10031101	3/12/2010	Yes	SW-4825GB-HTW-032210

**Table 4.16**  
**4825 Glenbrook Road Test Pits 120 and 134 (High Probability Investigations) Soil Samples**

Sample ID	DATE GENERATED	Cleared ON SITE		Sent to Edgewood	Edgewood Agent/ABP Clearance			HTW Sample ID
		HD/L	SitRep Date		Batch # Date	QC Date	Cleared	
SW-4825GB-CWM-246	3/10/2010	Yes	3/10/2010	3/11/2010	10031101	3/12/2010	Yes	SW-4825GB-HTW-032210
SW-4825GB-CWM-247	3/10/2010	Yes	3/10/2010	3/11/2010	10031101	3/12/2010	Yes	SW-4825GB-HTW-032210
SW-4825GB-CWM-248	3/10/2010	Yes	3/10/2010	3/11/2010	10031101	3/12/2010	Yes	SW-4825GB-HTW-032210
SW-4825GB-CWM-249	3/10/2010	Yes	3/10/2010	3/11/2010	10031101	3/12/2010	Yes	SW-4825GB-HTW-032210
SW-4825GB-CWM-250	3/10/2010	Yes	3/11/2010	3/16/2010	10031602	3/23/2010	Yes	SW-4825GB-HTW-032510
SW-4825GB-CWM-251	3/10/2010	Yes	3/11/2010	3/16/2010	10031602	3/23/2010	Yes	SW-4825GB-HTW-032510
SW-4825GB-CWM-252	3/10/2010	Yes	3/11/2010	3/16/2010	10031602	3/23/2010	Yes	SW-4825GB-HTW-032510
SW-4825GB-CWM-253	3/11/2010	Yes	3/11/2010	3/16/2010	10031602	3/23/2010	Yes	SW-4825GB-HTW-032510
SW-4825GB-CWM-254	3/11/2010	Yes	3/11/2010	3/16/2010	10031602	3/23/2010	Yes	SW-4825GB-HTW-032510
SW-4825GB-CWM-255	3/11/2010	Yes	3/11/2010	3/16/2010	10031602	3/23/2010	Yes	SW-4825GB-HTW-032510
SW-4825GB-CWM-256	3/11/2010	Yes	3/11/2010	3/16/2010	10031602	3/23/2010	Yes	SW-4825GB-HTW-032510
SW-4825GB-CWM-257	3/11/2010	Yes	3/11/2010	3/16/2010	10031602	3/23/2010	Yes	SW-4825GB-HTW-032510
SW-4825GB-CWM-258	3/11/2010	Yes	3/11/2010	3/16/2010	10031602	3/23/2010	Yes	SW-4825GB-HTW-032510
SW-4825GB-CWM-259	3/11/2010	Yes	3/11/2010	3/16/2010	10031602	3/23/2010	Yes	SW-4825GB-HTW-032510
SW-4825GB-CWM-260	3/11/2010	Yes	3/11/2010	3/16/2010	10031602	3/23/2010	Yes	SW-4825GB-HTW-032510
SW-4825GB-CWM-261	3/11/2010	Yes	3/11/2010	3/16/2010	10031602	3/23/2010	Yes	SW-4825GB-HTW-032510
SW-4825GB-CWM-262	3/11/2010	Yes	3/15/2010	3/16/2010	10031602	3/23/2010	Yes	SW-4825GB-HTW-032510
SW-4825GB-CWM-263	3/11/2010	Yes	3/15/2010	3/16/2010	10031602	3/23/2010	Yes	SW-4825GB-HTW-032510
SW-4825GB-CWM-264	3/11/2010	Yes	3/15/2010	3/16/2010	10031602	3/23/2010	Yes	SW-4825GB-HTW-032510
SW-4825GB-CWM-265	3/12/2010	Yes	3/12/2010	3/16/2010	10031602	3/23/2010	No	--
SW-4825GB-CWM-266	3/12/2010	Yes	3/12/2010	3/16/2010	10031602	3/23/2010	No	--
SW-4825GB-CWM-267	3/15/2010	Yes	3/15/2010	3/16/2010	10031602	3/23/2010	No	--
SW-4825GB-CWM-268	3/15/2010	Yes	3/15/2010	3/16/2010	10031602	3/23/2010	No	--
SW-4825GB-CWM-269	3/15/2010	Yes	3/15/2010	3/16/2010	10031602	3/23/2010	No	--
SW-4825GB-CWM-270	3/18/2010	Yes	3/18/2010	3/22/2010	10032203	3/25/2010	No	--
SW-4825GB-CWM-271	3/18/2010	Yes	3/18/2010	3/22/2010	10032203	3/25/2010	No	--
SW-4825GB-CWM-272	3/18/2010	Yes	3/18/2010	3/22/2010	10032203	3/25/2010	No	--
SW-4825GB-CWM-273	3/18/2010	Yes	3/19/2010	3/22/2010	10032203	3/25/2010	No	--
SW-4825GB-CWM-274	3/18/2010	Yes	3/19/2010	3/22/2010	10032203	3/25/2010	No	--
SW-4825GB-CWM-275	3/18/2010	Yes	3/19/2010	3/22/2010	10032203	3/25/2010	No	--
SW-4825GB-CWM-276	3/22/2010	Yes	3/23/2010	3/30/2010	10033005	3/31/2010	No	--
SW-4825GB-CWM-277	3/23/2010	Yes	3/24/2010	3/30/2010	10033005	3/31/2010	No	--
SW-4825GB-CWM-278	3/23/2010	Yes	3/24/2010	3/30/2010	10033005	3/31/2010	No	--
SW-4825GB-CWM-279	3/23/2010	Yes	3/24/2010	3/30/2010	10033005	3/31/2010	No	--
SW-4825GB-CWM-280	4/2/2010	Yes	4/2/2010	4/6/2010	10040901	4/9/2010	No	--

**Table 4.16**  
**4825 Glenbrook Road Test Pits 120 and 134 (High Probability Investigations) Soil Samples**

Sample ID	DATE GENERATED	Cleared ON SITE		Sent to Edgewood	Edgewood Agent/ABP Clearance			HTW Sample ID
		HD/L	SitRep Date		Batch # Date	QC Date	Cleared	
SW-4825GB-CWM-281	4/2/2010	Yes	4/2/2010	4/6/2010	10040901	4/9/2010	No	--
SW-4825GB-CWM-282	4/2/2010	Yes	4/2/2010	4/6/2010	10040901	4/9/2010	No	--
SW-4825GB-CWM-283	4/2/2010	Yes	4/2/2010	4/6/2010	10040901	4/9/2010	No	--
SW-4825GB-CWM-284	4/2/2010	Yes	4/5/2010	4/6/2010	10040901	4/9/2010	No	--
SW-4825GB-CWM-285	4/2/2010	Yes	4/5/2010	4/6/2010	10040901	4/9/2010	No	--
SW-4825GB-CWM-286	4/5/2010	Yes	8/16/2010	8/25/2010	10082601	8/26/2010	No	--
<b>Grab Samples</b>								
SW-4825GB-GS02	1/26/2010	Yes	1/26/2010	1/28/2010	10012802	2/2/2010	No	N/A
SW-4825GB-GS03	1/26/2010	Yes	1/26/2010	1/28/2010	10012802	2/2/2010	No	N/A
SW-4825GB-GS04	1/27/2010	Yes	1/27/2010	1/28/2010	10012802	2/2/2010	No	N/A
SW-4825GB-GS05	1/27/2010	Yes	1/28/2010	1/29/2010	10012802	2/2/2010	No	N/A
SW-4825GB-GS09	2/25/2010	Yes	3/1/10	3/1/2010	10030101	3/6/2010	No	N/A
SW-4825GB-GS10	3/1/2010	Yes	3/1/10	3/2/2010	10030101	3/6/2010	No	N/A
SW-4825GB-GS11	3/9/2010	Yes	3/10/10	3/11/2010	10031101	3/12/2010	Yes	N/A
SW-4825GB-GS12	3/9/2010	Yes	3/10/10	3/11/2010	10031101	3/12/2010	Yes	N/A
SW-4825GB-GS13	3/10/2010	Yes	3/10/10	3/11/2010	10031101	3/12/2010	Yes	N/A
SW-4825GB-GS14	3/12/2010	Yes	3/12/10	3/22/2010	10032203	3/25/2010	No	N/A
SW-4825GB-GS15	3/16/2010	Yes	3/16/10	3/22/2010	10032203	3/30/2010	No	N/A
SW-4825GB-GS16	3/23/2010	Yes	3/23/10	3/30/2010	10033005	3/31/2010	No	N/A
SW-4825GB-GS17	3/23/2010	Yes	3/23/10	3/30/2010	10033005	3/31/2010	No	N/A
SW-4825GB-GS18	3/23/2010	No	3/25/2010	N/A	N/A	N/A	N/A	N/A
SW-4825GB-GS19	3/26/2010	No	3/26/2010	N/A	N/A	N/A	N/A	N/A
SW-4825GB-GS20	3/26/2010	No	3/26/2010	N/A	N/A	N/A	N/A	N/A
SW-4825GB-GS21	3/31/2010	No	4/1/2010	N/A	N/A	N/A	N/A	N/A
SW-4825GB-GS22	4/5/2010	Yes	8/16/2010	8/25/2010	10082601	8/26/2010	No	N/A

**Table 4.17**  
**4825 Glenbrook Road: Items Recovered during Sewerline Restoration**

<b>Item Number</b>	<b>Sample ID</b>	<b>Grid Item Found</b>	<b>Depth (feet bgs)</b>	<b>Sample Type (MEC/ Glass/ Metal)</b>	<b>Date Recovered</b>	<b>Head Space Cleared</b>	<b>Field Team Assesment / Description</b>	<b>Head Space Cleared</b>
1	<b>SVS-11-001</b>	Approx. 10' East of TP-99	3.5	MD	1/5/2011	Yes	75mm, Intact unfused, unfired	Yes
2	<b>SVS-11-002</b>	Approx. 10' East of TP-99	3.5	CWM Glass	2/4/2011	Yes	Closed cavity intact glass vacuum flask w/cork plug. Item was sent to ECBC on 2/7/11. L was detected (ECBC Batch No. 11020701).	Yes



**Table 4.18**  
**COPC Selection for VOCs, SVOCs, Pesticides, and Ions**  
**4825 Glenbrook Road**  
**Spring Valley, Washington, D.C.**

Chemical	Site										
	Sample Size (-)	Number of NDs (-)	Frequency of Detection (-)	Arithmetic Average of Detected Concentrations (mg/kg)	Range of Detection Limits (mg/kg)	Minimum Detect (mg/kg)	Maximum Detect (mg/kg)	Background UTL <sup>1</sup> (mg/kg)	Residential RSL <sup>2</sup> (mg/kg)	Screening Level <sup>3</sup> (mg/kg)	Maximum Detect Greater Than Screening Level?
<b>VOCs</b>											
1,1,2,2-Tetrachloroethane	26	25	4%	0.002	0.001 - 0.013	0.002	0.002		0.56		No
Acetone	29	14	52%	0.18119	0.002 - 0.012	0.0025	1.27		6,100		No
Carbon Disulfide	27	24	11%	0.00095	0.002 - 0.013	0.00086	0.001		82		No
Carbon Tetrachloride	25	24	4%	0.00087	0.001 - 0.013	0.00087	0.00087		0.61		No
Chlorobenzene	25	22	12%	0.00833	0.001 - 0.013	0.002	0.0158		29		No
Chloroform	25	20	20%	0.00124	0.001 - 0.013	0.0011	0.0013		0.29		No
cis-1,2-Dichloroethene	24	22	8%	0.0034	0.002 - 0.013	0.0023	0.0045		78		No
Methyl t-Butyl Ether	24	22	8%	0.0006	0.002 - 0.013	0.0006	0.0006		43		No
Methylene Chloride	29	5	83%	0.00879	0.002 - 0.013	0.0019	0.074		11		No
Tetrachloroethene	29	25	14%	0.0265	0.001 - 0.013	0.02	0.039		0.55		No
Toluene	28	24	14%	0.0015	0.002 - 0.013	0.001	0.002		500		No
trans-1,2-Dichloroethene	24	23	4%	0.00081	0.002 - 0.013	0.00081	0.00081		15		No
Trichloroethene	26	25	4%	0.001	0.001 - 0.013	0.001	0.001		2.80		No
Xylenes (Total)	29	24	17%	0.00316	0.005 - 0.013	0.00081	0.005		63		No
<b>SVOCs</b>											
4-Nitrophenol	25	24	4%	0.038	0.1 - 1.1	0.038	0.038		NA		NA
Benzaldehyde	24	23	4%	0.22	0.282 - 0.42	0.218	0.218		780	0.218	No
Benzoic acid	14	13	7%	0.56	0.1 - 0.86	0.563	0.563		24000		No
bis(2-Ethylhexyl)phthalate	27	5	81%	0.06	0.1 - 0.38	0.021	0.11		35		No
Di-n-Butylphthalate	27	19	30%	0.06	0.0161 - 0.42	0.0161	0.11		610		No
Diethylphthalate	26	24	8%	0.56	0.1 - 0.42	0.028	1.1		4900		No
Diphenylamine	13	12	8%	0.03	0.105 - 0.123	0.0315	0.0315		150		No
N-Nitrosodiphenylamine	25	24	4%	0.04	0.1 - 0.42	0.0368	0.0368		99		No
Phenyl isocyanate	9	7	22%	0.08	0.37 - 0.42	0.064	0.1		NA		NA
<b>Pesticides</b>											
Chlordane-alpha	1	0	100%	0.00	NA	0.0011	0.0011		1.6		No
4,4,4-DDT	2	1	50%	0.00	0.1 - 0.1	0.0022	0.0022		1.7		No
2,4,5-TP (silvex)	1	0	100%	0.01	NA	0.013	0.013		49		No
<b>Ions</b>											
Cyanide	23	20	13%	0.24	0.15 - 0.5	0.12	0.48		160		No
Fluoride	22	0	100%	5.58	NA	0.96	17		310		No
Iodine Pentafluoride (as Iodate)	12	2	83%	75.40	5.3 - 5.6	19	180		NA		No
Perchlorate	23	17	26%	0.00	0.0021 - 0.00246	0.00113	0.0027		5.5		No
<b>Polycyclic Aromatic Hydrocarbons</b>											
Benzo(a)anthracene	27	26	4%	0.02	0.000398 - 0.42	0.024	0.024	0.36	0.15	0.15	No
Benzo(b)fluoranthene	27	26	4%	0.03	0.000398 - 0.42	0.026	0.026	0.37	1.5	0.15	No
Benzo(k)fluoranthene	26	25	4%	0.02	0.0523 - 0.42	0.021	0.021	0.37	1.5	1.5	No
Chrysene	26	25	4%	0.03	0.0523 - 0.42	0.031	0.031	0.4	15	15	No
Fluoranthene	26	25	4%	0.04	0.0523 - 0.42	0.043	0.043	0.7	230	230	No
Pyrene	27	25	7%	0.03	0.0523 - 0.42	0.02	0.035	0.63	170	170	No

**Table 4.18**  
**COPC Selection for VOCs, SVOCs, Pesticides, and Ions**  
**4825 Glenbrook Road**  
**Spring Valley, Washington, D.C.**

Chemical	Site										
	Sample Size (-)	Number of NDs (-)	Frequency of Detection (-)	Arithmetic Average of Detected Concentrations (mg/kg)	Range of Detection Limits (mg/kg)	Minimum Detect (mg/kg)	Maximum Detect (mg/kg)	Background UTL <sup>1</sup> (mg/kg)	Residential RSL <sup>2</sup> (mg/kg)	Screening Level <sup>3</sup> (mg/kg)	Maximum Detect Greater Than Screening Level?
<b>Metals</b>											
Aluminum	59	0	100%	27250.85	NA	9700	59300	19100	7700	19100	Yes
Antimony	46	36	22%	1.21	1.9 - 32.5	0.3	4.7	5.2	3.1	5.2	No
Arsenic	113	3	97%	22.36	1 - 10	0.38	601	12.6	0.39	12.6	Yes
Barium	53	0	100%	129.35	NA	23.2	277	172	1500	1500	No
Beryllium	28	3	89%	1.76	2.5 - 2.5	0.59	15	1.9	16	16	No
Boron, Total	15	10	33%	10.48	9.4 - 25	8.3	13.7	NA	1600	1600	No
Cadmium	51	26	49%	0.40	0.47 - 5	0.023	2	2.36	7	7	No
Chromium	32	0	100%	74.28	NA	15.5	177	51.3	12000	12000	No
Chromium, hexavalent <sup>4</sup>	1	0	100%	2.60	NA	2.6	2.6	7.33	0.29	7.33	No
Cobalt	33	1	97%	20.51	5 - 5	8.35	53.6	17.8	2.4	17.8	Yes
Copper	52	0	100%	59.28	NA	1.3	250	49.65	310	310	No
Iron	28	0	100%	35226.79	NA	19800	59600	32400	5500	32400	No, essential nutrient
Lead	54	4	93%	11.16	20.5 - 20.5	3.2	100	194	400	400	No
Manganese	56	0	100%	580.27	NA	64.6	2960	968	180	968	Yes
Mercury	53	13	75%	0.13	0.088 - 0.21	0.021	0.52	0.25	0.56	0.56	No
Nickel	53	0	100%	50.10	NA	5.81	135	33.5	150	150	No
Selenium	28	21	25%	2.08	1 - 15.3	0.51	3.3	1.2	39	39	No
Silver	28	17	39%	2.08	0.47 - 4	0.031	8.6	0.87	39	39	No
Strontium	21	0	100%	20.86	NA	3.4	70.5	53	4700	4700	No
Tellurium	22	11	50%	3.07	2.4 - 3	1.7	4.4	5	39.11	39.11	No
Thallium	54	27	50%	3.06	0.35 - 7.2	0.35	12.1	2.2	0.6	2.2	Yes
Tin	26	15	42%	2.84	4.7 - 12	1	5.5	8.4	4700	4700	No
Titanium	21	0	100%	1165.14	NA	307	2140	2690	NA	31000	No
Vanadium	61	0	100%	91.71	NA	18.9	264	75.5	39	75.5	Yes
Zinc	52	0	100%	75.90	NA	28.5	438	158	2300	2300	No
Zirconium	22	0	100%	7.79	NA	0.53	27.3	48.3	NA	48.3	No

**Notes:**

- 1 - All background UTLs are from USACE (2008a)
- 2 - The residential RSLs listed here are the lesser of the cancer-based and non-cancer based November 2010 USEPA Regional Screening Levels (RSL), except for tellurium. Note that non-cancer RSLs were divided by 10 to be protective of an HQ of 0.1. The tellurium PRG is from a toxicological literature review (USACE, 2008b).
- 3 - The greater of the background UTL and the residential PRG
- 4 - calculated background value using 1:6 ratio for Cr VI and Cr III.

**Definitions:**

- COPC - Chemical of Potential Concern
- PRG - Preliminary Remediation goal
- NA - Not Applicable
- ND - Non-detects
- RSL - USEPA (2010) Regional Screening Levels
- UTL - Upper tolerance limit
- Highlighted - Compounds are selected as COPCs

**Table 4.19**  
**COPCs for Groundwater Protection**  
**4825 Glenbrook Road**  
**Spring Valley, Washington, D.C.**

Parameter	Site								Groundwater Protection SSL <sup>1</sup> (mg/kg)	Maximum Detect Greater than Screening Level?	COPCs?
	Sample Size (-)	Number of Non-Detects (-)	Frequency of Detection (-)	Arithmetic Average of Detected Concentrations (mg/kg)	Range of Detection Limits (mg/kg)	Minimum Detect (mg/kg)	Maximum Detect (mg/kg)	Groundwater Protection (mg/kg)			
1,1,2,2-Tetrachloroethane	26	25	4%	0.0020	0.001 - 0.013	0.002	0.002	2.6E-05	Yes	No, not AUES specific	
Acetone	28	13	54%	0.1812	0.002 - 0.012	0.0025	1.27	4.5E+00	No	No	
Carbon Disulfide	27	24	11%	0.0010	0.002 - 0.013	0.00086	0.001	3.1E-01	No	No	
Carbon Tetrachloride	25	24	4%	0.0009	0.001 - 0.013	0.00087	0.00087	1.7E-04	Yes	Yes	
Chlorobenzene	25	22	12%	0.0083	0.001 - 0.013	0.002	0.0158	6.2E-02	No	No	
Chloroform	25	20	20%	0.0012	0.001 - 0.013	0.0011	0.0013	5.3E-05	Yes	Yes	
cis-1,2-Dichloroethene	24	22	8%	0.0034	0.002 - 0.013	0.0023	0.0045	2.1E-02	No	No	
Methyl t-Butyl Ether	24	22	8%	0.0006	0.002 - 0.013	0.0006	0.0006	2.8E-03	No	No	
Methylene Chloride	29	5	83%	0.0088	ND - 0.013	0.0019	0.074	1.2E-03	Yes	No, not AUES specific	
Tetrachloroethene	29	25	14%	0.0265	0.001 - 0.013	0.02	0.039	4.9E-05	Yes	No, not AUES specific	
Toluene	28	24	14%	0.0015	0.002 - 0.013	0.001	0.002	1.6E+00	No	No	
trans-1,2-Dichloroethene	24	23	4%	0.0008	0.002 - 0.013	0.00081	0.00081	3.1E-02	No	No	
Trichloroethene	26	25	4%	0.0010	0.001 - 0.013	0.001	0.001	7.2E-04	Yes	No, not AUES specific	
Xylenes (Total)	29	24	17%	0.0032	0.005 - 0.013	0.00081	0.005	2.0E-01	No	No	
4-Nitrophenol	25	24	4%	0.0380	0.1 - 1.1	0.038	0.038	NA	No	No	
Benzaldehyde	24	23	4%	0.2180	0.282 - 0.42	0.218	0.218	8.1E-01	No	No	
Benzo(a)anthracene	27	26	4%	0.0240	0.000398 - 0.42	0.024	0.024	1.0E-02	Yes	No, not AUES specific	
Benzo(b)fluoranthene	27	26	4%	0.0260	0.000398 - 0.42	0.026	0.026	7.7E-02	No	No	
Benzo(k)fluoranthene	26	25	4%	0.0210	0.0523 - 0.42	0.021	0.021	3.5E-01	No	No	
Benzoic acid	14	13	7%	0.5630	0.1 - 0.86	0.563	0.563	3.4E+01	No	No	
bis(2-Ethylhexyl)phthalate	27	5	81%	0.0599	0.1 - 0.38	0.021	0.11	1.1E+00	No	No	
Chrysene	26	25	4%	0.0310	0.0523 - 0.42	0.031	0.031	1.1E+00	No	No	
Di-n-Butylphthalate	27	19	30%	0.0579	0.1 - 0.42	0.0161	0.11	9.2E+00	No	No	
Diethylphthalate	26	24	8%	0.5640	0.1 - 0.42	0.028	1.1	1.2E+01	No	No	
Diphenylamine	13	12	8%	0.0315	ND - 0.123	0.0315	0.0315	1.7E+00	No	No	
Fluoranthene	26	25	4%	0.0430	0.0523 - 0.42	0.043	0.043	1.6E+02	No	No	
N-Nitrosodiphenylamine	25	24	4%	0.0368	0.1 - 0.42	0.0368	0.0368	7.5E-02	No	No	
Phenyl isocyanate	9	7	22%	0.0820	ND - 0.42	0.064	0.1	NA	No	No	
Pyrene	27	25	7%	0.0275	0.0523 - 0.42	0.02	0.035	1.2E+02	No	No	
Chlordane-alpha	1	0	100%	0.0011	NA	0.0011	0.0011	NA	No	No	
4,4,4-DDT	2	1	50%	0.0022	ND - 0.1	0.0022	0.0022	6.7E-02	No	No	
2,4,5-TP (silvex)	1	0	100%	0.0130	NA	0.013	0.013	1.6E-01	No	No	
Aluminum	61	0	100%	27221.31	NA	9700	59300	5.5E+04	Yes	Yes	
Antimony	47	37	21%	1.21	1.9 - 32.5	0.3	4.7	6.6E-01	Yes	Yes	
Arsenic	113	3	97%	22.37	1 - 10	0.38	601	1.3E-03	Yes	Yes	
Barium	55	0	100%	133.00	NA	23.2	277	3.0E+02	No	No	
Beryllium	31	3	94%	1.72	2.5 - 2.5	0.59	15	5.8E+01	No	No	
Boron, Total	15	10	33%	10.48	9.4 - 25	8.3	13.7	2.3E+01	No	No	
Cadmium	51	26	49%	0.40	0.47 - 5	0.023	2	1.4E+00	Yes	Yes	
Chromium	33	0	100%	76.06	NA	15.5	177	9.9E+07	No	No	

**Table 4.19**  
**COPCs for Groundwater Protection**  
**4825 Glenbrook Road**  
**Spring Valley, Washington, D.C.**

Parameter	Site								Groundwater Protection SSL <sup>1</sup>	Maximum Detect Greater than Screening Level?	COPCs?
	Sample Size (-)	Number of Non-Detects (-)	Frequency of Detection (-)	Arithmetic Average of Detected Concentrations (mg/kg)	Range of Detection Limits (mg/kg)	Minimum Detect (mg/kg)	Maximum Detect (mg/kg)				
Cobalt	36	1	97%	20.26	5 - 5	8.35	53.6	4.9E-01	Yes	Yes	
Copper	54	0	100%	54.25	NA	1.3	250	5.1E+01	Yes	Yes	
Iron	31	0	100%	34401.61	NA	19800	59600	6.4E+02	Yes	No	
Lead	56	4	93%	11.15	20.5 - 20.5	3.2	100	1.4E+01	Yes	Yes	
Manganese	58	0	100%	560.43	NA	64.6	2960	5.7E+01	Yes	Yes	
Mercury	54	13	76%	0.12	0.088 - 0.21	0.021	0.52	3.0E-02	Yes	Yes	
Nickel	55	0	100%	48.62	NA	5.81	135	4.8E+01	Yes	Yes	
Selenium	30	22	27%	2.13	1 - 15.3	0.51	3.3	9.5E-01	Yes	Yes	
Silver	31	18	42%	2.48	0.47 - 4	0.031	8.6	1.6E+00	Yes	Yes	
Strontium	22	0	100%	20.52	NA	3.4	70.5	7.7E+02	No	No	
Tellurium	22	10	55%	3.03	2.4 - 3	1.7	4.4	NA	No	No	
Thallium	55	27	51%	2.97	0.35 - 7.2	0.35	12.1	1.4E-01	Yes	Yes	
Tin	26	15	42%	2.84	4.7 - 12	1	5.5	5.5E+03	No	No	
Titanium	22	0	100%	1183.09	NA	307	2140	NA	No	No	
Vanadium	61	0	100%	88.59	NA	18.9	264	1.8E+02	Yes	Yes	
Zinc	54	0	100%	75.44	NA	28.5	438	6.8E+02	No	No	
Zirconium	22	0	100%	7.52	NA	0.53	27.3	NA	No	No	
Cyanide	25	22	12%	0.24	0.15 - 0.5	0.12	0.48	7.4E+00	No	No	
Fluoride	23	0	100%	5.43	NA	0.96	17	3.3E+02	No	No	
Iodine Pentafluoride	12	2	83%	75.40	ND - 5.6	19	180	NA	No	No	
Perchlorate	23	17	26%	0.00	0.0021 - 0.0024	0.00113	0.0027	NA	No	No	
Hexavalent Chromium	1	0	100%	2.60	NA	2.6	2.6	8.3E-04	Yes	No, not AUES specific	

Definitions:

COPC - Chemical of Potential Concern

NA - Not Applicable

SSL - Soil Screening Level (source: November 2010 USEPA Regional Screening Levels)

shade - Compounds are identified as COPCs.

## SECTION 5. ENVIRONMENTAL FATE AND TRANSPORT OF POTENTIAL CONTAMINANTS

### 5.1. INTRODUCTION

The primary source of potential release of contaminants to the environment at 4825 Glenbrook Road was through past AUES use and testing of CWA, explosives and related laboratory waste, and disposal of CWA and munitions. The contamination source for the site is the burial of CWM, CWM precursors, laboratory waste, MEC, and other debris associated with the demobilization of AUES. Understanding the fate of the various MEC, CWM, and associated contaminants present in or released to the environment is important to evaluate the potential hazards or risk posed by those contaminants to human health and/or the environment. The following paragraphs discuss potential migration processes for, the persistence of, and the potential migration routes of, MEC and the COPCs present at the site.

### 5.2. POTENTIAL ROUTES OF MIGRATION

5.2.0.1 The primary release mechanisms from the source were disposal of CWA containing munitions and conventional munitions and land application of CWA resulting in possible downward infiltration/percolation of rainfall through surface soil or contaminated fugitive dust. Direct release of CWA and industrial chemicals stored in the buried intact containers is a potential release mechanism if the intact containers are broken during intrusive activities. Contaminant infiltration to the subsurface environment can result in groundwater and subsurface soil becoming secondary sources of contamination. Soil in the vadose (unsaturated) and saturated zones can be contaminated by the vertical and horizontal migration of contaminants from surface spills, land application of CWM, or laboratory waste. After migrating through the vadose zone, contaminants can then enter the groundwater where they may undergo hydrolysis, oxidation, reduction, or other processes resulting in the chemical transformation of a contaminant. Contaminants are also attenuated mechanically as they migrate through the subsurface by processes such as dilution, dispersion, diffusion, and absorption. Potential secondary release mechanisms include infiltration and/or percolation of water through contaminated subsurface soil and the discharge of contaminated groundwater to the surface in the form of leachate/seeps. Potential contaminated media can include surficial soil, groundwater, surface water, sediment, or leachate/seeps.

5.2.0.2 Contaminants detected in soil can be transported to a surface water body via surface water runoff into the storm drain located along the Glenbrook Road. The closest surface water body is the Potomac River, approximately 1.25 miles south of the site. Contaminants released to surface water can subsequently be transported downstream on suspended sediment, dissolved in the water column, or transported to the atmosphere. Fugitive dust generation can also transport contaminants to the air; contaminated soil can be tracked from one location to another; plant life may absorb soil contaminants; and wildlife may ingest plants that have assimilated contaminants in leaf and stem tissue. In addition, contaminants can be conveyed by surface water and/or sediments to aquatic life that may be ingested by wildlife.

5.2.0.3 Finally, contaminants can be physically transformed through volatilization, biodegradation, or accumulation in a specific medium. The potential for specific contaminants

to migrate from one medium to another or to be transformed is dependent on the physical and chemical properties of each contaminant.

### 5.3. CONTAMINANT CHARACTERIZATION

5.3.0.1 Possible COPCs in the soil were established during the historical sampling activities. Based on historical records, AUES waste may have been disposed at 4825 Glenbrook Road. The compound classes analyzed for the soil samples are limited to the following:

- H, L, and ABPs (thiodiglycol, oxathiane, and dithiane)
- Explosives
- VOCs
- SVOCs
- Metals
- Total Cyanide
- Fluoride
- Iodine
- Perchlorate

These contaminants were chosen as the best indicators of potential AUES activities. Additional contaminants were evaluated as TICs.

5.3.0.2 Evaluation of the environmental fate and transport of COPCs at 4825 Glenbrook Road was performed to determine the potential for migration in the environment, and the potential for human and environmental exposure. The environmental fate and transport of chemicals are dependent on physical and chemical properties of the compounds, the environmental transformation processes affecting them, and the media through which they migrate. The chemical and physical properties of the COPCs are presented, and the relevance of these properties to environmental fate and transport are discussed. Tables 5.1 and 5.2 summarize relevant properties of the COPCs. The chemical and physical properties of mustard ABPs, and other CWM-related and hazardous industrial compounds identified in the intact containers via full scan analysis at the property were also included in Table 5.2.

5.3.0.3 Water solubility of a substance is a critical property affecting environmental fate. High soluble chemicals can be leached rapidly from soil and are generally mobile in groundwater. The solubility of chemicals not readily soluble in water may be enhanced by the presence of organic solvents (*e.g.*, acetone), which are more soluble in water.

5.3.0.4 Volatilization of a compound depends on its vapor pressure and water solubility. Vapor pressure, a relative measure of the volatility of chemicals in their pure state, varies from approximately 0.001 millimeters of mercury (mm Hg) to 759 mm Hg for estimated equilibrium vapor pressures of dilute contaminants in water. Compounds with Henry's Law Constants greater than  $10^{-3}$  atmospheres – cubic meter per mole ( $\text{atm}\cdot\text{m}^3/\text{mole}$ ) can be expected to volatilize readily from water; those with values ranging from  $10^{-3}$  to  $10^{-5}$   $\text{atm}\cdot\text{m}^3/\text{mole}$  are associated with possibly significant volatilization, while compounds with values less than  $10^{-5}$   $\text{atm}\cdot\text{m}^3/\text{mole}$  will volatilize from water only to a limited extent (Lyman et al., 1982).

5.3.0.5 The octanol-water partitioning coefficient ( $K_{ow}$ ) provides a measure of the extent of chemical partitioning between water and octanol at equilibrium. The greater the  $K_{ow}$ , the more likely a chemical is to partition to octanol than to remain in water. Octanol is used as a surrogate for lipids (fat); therefore,  $K_{ow}$  is used to predict bioconcentration in aquatic organisms.

**Table 5.1**  
**Physical and Chemical Properties of Chemicals of Potential Concern**  
**4825 Glenbrook Road**  
**Washington, D.C.**

COPCs	CAS No.	Molecular Weight	Henry's Law Constants	Density	Diffusivity in Air (Dia)	Diffusivity in Water (Diw)	Organic Carbon Partition Coefficient (Koc)	Water Solubility (S)
			(atm·m <sup>3</sup> /mole)	(g/cm <sup>3</sup> )	(cm <sup>2</sup> /s)	(cm <sup>2</sup> /s)	(L/kg)	(mg/L)
Aluminum	7429-90-5	30.01	NA	2.7	NA	NA	NA	0
Arsenic	7440-38-2	77.95	NA	5.75	NA	NA	NA	0
Cobalt	7440-48-4	58.93	NA	8.86	NA	NA	NA	0
Manganese	7439-96-5	54.94	NA	7.3	NA	NA	NA	0
Thallium	7440-28-0	204.38	NA	11.8	NA	NA	NA	0
Vanadium	NA	50.94	NA	6	NA	NA	NA	0

COPCs - Chemicals of Potential Concern

NA - Not applicable



Table 5.2  
Physical, Chemical, and Environmental Properties of Mustard and Lewisite  
4825 Glenbrook Road  
Washington, D.C.

Agent	CAS No.	Molecular Weight	Physical State	Boiling Point (°C)	Vapor Pressure	Water Solubility (g/L)	Liquid/Vapor Density (g/ml at 25 °C)	Log Octanol-water Partition Coefficient (Kow)	Hydrolysis half-life (h)	Persistence in soil	Henry's Law Constants (H atm <sup>3</sup> /mol)	Diffusivity in Air (Dia) (cm <sup>2</sup> /s)	Diffusivity in Water (Diw) (cm <sup>2</sup> /s)
					(mm Hg at 25 °C)								
Mustard	505-60-2	159.08	Liquid	227.8	0.07 at 20 °C 0.165 <sup>a</sup>	Sparingly soluble in water (<1%)-0.8 <sup>b</sup>	1.27	1.37 <sup>c</sup>	0.08 (acidic); 1 (in salt water); 0.065-0.26 <sup>c</sup>	Several Weeks <sup>c</sup> + 1 year <sup>d</sup>	2.1 x 10 <sup>(-5)</sup> <sup>d</sup>	0.099	8.4 x 10 <sup>-6</sup>
Lewisite	541-25-3	207.32	Liquid	196 (estimated)	0.35 0.58 <sup>a</sup> 0.40 (trans) 1.56 (cis)	0.5 <sup>b</sup>	1.88	NA	"Rapid"	Hydrolyzes rapidly ("instantaneously"); in bulk, polymeric coating of hydrolysis products may form persistent capsules	3.2 x 10 <sup>(-4)</sup> <sup>b</sup>	0.099	9.0 x 10 <sup>-6</sup>
1,4-Dithiane	505-29-3	120.24	Pale yellow powder	199 to 200	0.8	3		0.77	NA	NA	NA	NA	NA
1,4-Oxathiane	107-61-9	136.16	White to off-white		3.9	167		0.6	NA	NA	NA	NA	NA
CN	532-27-4	154.6	White to light yellow powder	244 - 245	0.7	Insoluble	5.3	2.08	NA	NA	NA	NA	NA
Chlorodiphenylarsine	712-48-1	264.6	Colorless crystals	333	0.06	g/100 ml: 0.2 (poor)	0.06	NA	NA	NA	NA	NA	NA
Phosgene oxime	1794-86-1	113.93	Colorless solid or yellowish-brown liquid	128	11.2	70% in water	<3.9	NA	NA	NA	NA	NA	NA
Hexachloroethane	67-72-1	236.7	Colorless crystals with characteristic odor.	NA	53	none	8.2	3.9	NA	NA	NA	NA	NA
AsCl <sub>3</sub>	7784-34-1	181.28	Colorless, oily, fuming liquid, with pungent odor.	130.2°C	1.17	g/100 ml: reaction	6.3	NA	NA	NA	NA	NA	NA

a- Value from MacNaughton and Breer (1994); hydrolysis of D limited by rate of dissolution.

b- According to Rosenblatt et al. (1975), solubility data for Lewisite are meaningless because of very rapid hydrolysis to Lewisite oxide (solid). Please note that Lewisite decomposes prior to boiling.

c- Values from Small (1984); hydrolysis half lives at 20-25 °C; soil persistence for agent applied to soil surface.

d- Value from Rosenblatt et al. (1995); for worst plausible conditions.

NA - Not applicable

5.3.0.6 The bioconcentration factor (BCF) measures the extent of chemical partitioning at equilibrium between biological media (*e.g.*, fish or plant tissue) and external living tissue. The organic carbon partition coefficient ( $K_{oc}$ ) reflects the propensity of a compound to sorb to organic matter found in soil. The normal range of  $K_{oc}$  values is 1 to 107 milliliters per gram, with higher values indicating greater sorption potential. Chemicals that have a strong tendency to sorb to organic matter (*i.e.*, chemicals with a high  $K_{oc}$ ) will move more slowly between environmental compartments than chemicals with a low  $K_{oc}$ .

5.3.0.7 The molecular weight of a chemical is the sum of the atomic weights of its constituent elements. This property is used in calculating exposure via dermal absorption.

## 5.4. CONTAMINANT MIGRATION AND PERSISTENCE

5.4.0.1 Chemicals detected (metals, VOCs, and polynuclear aromatic hydrocarbons [PAH], sulfur mustards and associated H breakdown products, lewisite, and adamsite) or those potentially present based on past site use (explosives) at 4825 Glenbrook Road were classified into several categories according to their similarity in chemical structure and/or physiochemical properties (factors that would influence mobility in the environment). The chemical categories and some of the associated elements/compounds within each category are as follows:

- Agent/ABP/Agent precursors: H, L, oxathiane, dithiane, and thiodiglycol, adamsite, CN, DA, and  $AsCl_3$ .
- Explosive: nitroglycerine, trinitrotoluene, 2,4-dinitrotoluene, 2,6-dinitrotoluene, and nitrobenzene.
- Metals: aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, thallium, vanadium, and zinc.
- PAHs: naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, dibenzo(a,h)anthracene, and benzo(g,h,i)perylene.
- Volatile Aromatic Hydrocarbons: benzene, carbon tetrachloride, chloroform, ethylbenzene, toluene, xylenes, tetrachloroethylene and trichloroethylene.

5.4.0.2 Based on the chemical and physical characteristics of chemicals potentially present at the site (Table 5.1), the following generalizations regarding environmental fate and transport can be made to provide a relative comparison to other chemical categories.

5.4.0.3 The chemical agents (CA) of primary concern at 4825 Glenbrook Road (H, and L) tend to hydrolyze quickly. For example, in the presence of water vapor or high humidity, L will hydrolyze almost immediately to chlorovinylarsenous acid (CVAA), which is toxic but not mobile in the environment. Although L was reported to be detected in soil, L was never definitively found in soil because L is not analyzed directly. The analytical method for L converts the L to CVAA or chlorovinylarsenous oxide (CVAO) that is then analyzed and reported as L. H hydrolyzes in the presence of water vapor but has a longer half-life than L. H agents may also polymerize forming a “shell” over the agent. There are anecdotal reports of long persistence in this form. H agents may also polymerize forming a hardened coating over

the agent, which protects the agent. There are anecdotal reports of persistence of H in this form. H was detected in soil at this property. The hydrolysis products of H are thiodiglycol, oxathiane, and dioxathiane. Adamsite also tends to hydrolyze rapidly and forms diphenylarsenious oxide. The CAs of concern also have relatively low vapor pressures. Consequently, these chemicals will not migrate in the ambient air via volatilization. Because the organosulfurs and L are not readily volatile, have a relatively high  $K_{oc}$ , and have an extremely short half-life, the fate of the chemicals is controlled by the transport of particulates and the presence of water in the atmosphere. The generalizations in this section are provided as a relative comparison to other chemical categories.

5.4.0.4 PAHs and some explosives have a high affinity for organic matter and low water solubility. Water solubility tends to decrease, and affinity for organic material tends to increase with increasing molecular weight. When present in soil, PAHs and some explosives tend to remain bound to the soil particles and dissolve only slowly into groundwater or the overlying water column. Because of the high affinity of organic matter, the physical fate of these chemicals is usually controlled by the transport of particulates. Thus, soil and suspended particulate matter (in air) represent important media for chemical transport. Furthermore, because of their high affinity for organic matter, PAHs are readily bioaccumulated by living organisms, whereas explosives are not as readily bioaccumulated.

5.4.0.5 The metals of potential concern identified at the site are generally immobile under the subsurface conditions. Soil and geological maps show that the site is underlain by "saprolitic" (clay-rich) micaceous soil derived from underlying crystalline rocks. Slightly acid to neutral soil pH and oxidizing conditions are expected for soil at the site.

5.4.0.6 Under such conditions, aluminum should have a solubility of less than a few tenths of a milligram per liter (Hem, 1985). Thallium, and manganese exist as cations and can be adsorbed onto the clay. Manganese also coprecipitates with iron oxyhydroxide species. Vanadium has several oxidation states and forms anionic complexes; these complexes readily precipitate by reaction with iron and other cations. A low solubility is expected for arsenic due to coprecipitation of the arsenate anion with iron species in the soil. These chemical properties result in these metals being immobile.

5.4.0.7 The metal COPCs, including aluminum, arsenic, cobalt, manganese, thallium, and vanadium identified at the site are common elements found naturally in soil and groundwater. The fate and transport of the metal COPCs are discussed as follows:

- **Aluminum:** The mobility of aluminum in the environment is dependent on the solubility of the aluminum compound and the pH of the environmental medium. Soluble compounds will tend to be more mobile in the environment and a lowering of the pH of the soil generally results in an increase in mobility for monomeric forms of aluminum. Consequently, acid rain may mobilize aluminum in the environment (ATSDR, 1999). Aluminum occurs in the environment in several forms, including aluminum chloride, aluminum nitrate, aluminum hydroxide, aluminum chlorohydrate, aluminum lactate, aluminum phosphide, and aluminum sulfate. Aluminum has only one oxidation state (+3), and is not found as a free metal in nature due to its reactivity [ATSDR, 1999]. Aluminum was reported to percolate through soil to groundwater resulting from acid leachate from coal waste (Wangan and Jones, 1984). Adsorption of

aluminum to clay surfaces has been found to decrease the mobility of aluminum in the environment. In water, aluminum concentrations are dependent on the pH of the water: significant concentrations occur only when the pH is less than 5. At a pH greater than 5, aluminum compounds exist primarily in undissolved forms (ATSDR, 1999). In waters with a high humic-derived acid content, aluminum may be present even at a more neutral pH. In surface water, aluminum was detected at concentrations ranging from 0.001 to 2.760 mg/L with a mean concentration of 0.074 mg/L in 456/1577 samples (ATSDR, 1999). Aluminum complexes with phosphate at pH ranges of 5-6 and may be removed from solution. Therefore, aluminum may deplete nutrients in some environments; aluminum may be also used to arrest the aging process of nutrient rich lakes by binding with the overabundant phosphate (Brusewitz, 1984 and Jernelov, 1971). Aluminum salt coagulants have also been used to treat potable water.

- **Arsenic:** Elemental arsenic is extremely persistent in both water and soil. Environmental fate processes may transform one arsenic compound to another; however, arsenic itself is not degraded. Inorganic arsenic tends to adsorb to clay or soil particles. Microorganisms in soil, sediment, and water can reduce and methylate arsenic to yield methyl arsines, which volatilize and enter the atmosphere. These forms then undergo oxidation to become methyl arsonic acids and are ultimately transformed back to inorganic arsenic (Howard, 1990). As discussed in the USEPA Monitored Natural Attenuation of Inorganic Contaminants in Ground Water Volume 2 (USEPA, 2007), in oxidizing environments, the predominant form of arsenic in solution is arsenate,  $\text{HnAsO}_4^{n-3}$ . The arsenate oxyanion may be protonated to various degrees as a function of pH, but it is commonly present as the negatively charged  $\text{H}_2\text{AsO}_4^{1-}$  or  $\text{HAsO}_4^{2-}$  within the pH range of natural waters. However, the neutral ( $\text{H}_3\text{AsO}_4^0$ ) or the fully deprotonated form ( $\text{AsO}_4^{3-}$ ) may exist at acid or alkaline pH extremes that may occur at contaminated sites. The speciation of arsenic may be more complex in reducing environments. In general, arsenite,  $\text{HnAsO}_3^{n-3}$ , is the predominant arsenic species, but mononuclear ( $\text{H}_x\text{AsO}_y\text{S}_z$  ( $3+x-2y-2z$ )) and polynuclear thioarsenic species may also form in sulfate-reducing zones in which iron is depleted. The distribution of various reduced arsenic species under relevant geochemical conditions for an arsenic-contaminated site modeling results suggest that arsenite would predominate under most reducing environments. However, thioarsenic species may become significant in sulfate-reducing zones that are depleted in iron. These conditions may be encountered in organic-rich groundwater derived from contaminated sites. The aqueous concentration of thioarsenic species may remain high in sulfide-dominated systems due to the solubility of orpiment at circumneutral pH. The detection of the species controlling aqueous arsenic speciation in reducing environments may be complicated by the need to employ different sample preservation techniques in the absence or presence of aqueous sulfide.
- **Cobalt:** Cobalt is a gray, hard (although somewhat malleable), magnetic, ductile metal that appears essential to life (playing an important role in animal nutrition), and that exists in two allotropic forms: hexagonal and cubic. The hexagonal form is the more stable, although both can exist at normal ambient temperatures. In addition, both are stable in air and toward water at normal ambient temperatures. Cobalt is readily soluble in dilute nitric acid, and is slowly attacked by hydrochloric acid or cold sulfuric acid.

Compounds and/or complexes of cobalt are not usually volatile. Therefore, the transport of cobalt probably results from particulate matter interactions. Dry and wet deposition accounts for the majority of transport to soil and surface waters. As with most metals, soil and sediments are the final repository for cobalt. Transport of cobalt in soil depends on adsorption/desorption reactions. Cobalt is also retained in soil/sediment by oxides (*e.g.*, iron/manganese oxides) and crystalline materials (*e.g.*, aluminosilicate, geothite). Available data, however, suggest little adsorption of cobalt to organic matter (*e.g.*, humic and/or fulvic matter) in waters. Mobility/transport of cobalt in soil is accelerated with decreasing soil pH. Leaching to groundwater occurs only minimally, and is postulated to be the result of the formation of pseudo-colloidal suspensions and their subsequent migration/leaching to groundwater. Generally, cobalt exhibits greater mobility in soil than does lead, chromium (+2 state), zinc, and nickel, but lesser mobility than cadmium.

- **Manganese:** Environmental fate processes may transform one manganese compound to another; however, manganese itself is not degraded. Elemental manganese and inorganic manganese compounds may exist in air as suspended particulate matter. Such particles are removed from the atmosphere primarily by dry deposition, and, to a lesser extent, by washout. In water, the metal may exist in any of four oxidation states (2+, 3+, 4+, or 7+). Mn(+2) predominates in most waters, and usually combines with carbonate to form a compound of low solubility. In extremely reduced water, poorly soluble sulfides are formed. Manganese is often transported in rivers as suspended sediments. Manganese in water may be significantly bioconcentrated at lower trophic levels. Bioconcentration may not be significant in predatory fish; thus biomagnification may not be significant (Howard, 1990).
- **Thallium:** Elemental thallium is a bluish-white, very soft, inelastic, easily fusible, heavy metal. It will oxidize superficially in air forming a coat of thallium oxide. It will react with nitric and/or sulfuric acids, but only slightly so with hydrochloric acid (Howard, 1990). Thallium exists in either monovalent (thallous) or trivalent (thallic) forms; thallous being much more common. Thallic salts are readily reduced to thallous salts; virtually all are chemically reactive with air and moisture. Volatilization of thallium and its salts is not expected to occur at ambient temperatures and pressures. Elemental thallium is insoluble in water; thallium salts show a moderate to high degree of solubility (*i.e.*, thallium sulfide exhibiting solubility to 200 mg/L; and thallium fluoride exhibiting solubility to 780 g/L) (USEPA, 1980). Therefore, thallium is expected to be relatively mobile in aquatic environments and/or moist-to-wet soil. The health effects of these chemicals is discussed in the toxicity assessment of the HHRA, in Appendix Q.
- **Vanadium:** Releases of vanadium to the atmosphere, water, and land by natural and anthropogenic sources, occur by long-range transportation of particles in both air and water, wet and dry deposition, adsorption, and complexing. Vanadium generally enters the atmosphere as an aerosol. From natural sources, vanadium is probably in the form of mineral particles; it has been suggested that these may frequently be in the less-soluble trivalent form. From man-made sources almost all the vanadium released to the atmosphere is in the form of simple or complex vanadium oxides. One manmade form, vanadium oxide (vanadium bound to oxygen), is most often used by industry in making

steel. Vanadium oxide can be a yellow-orange powder, dark-grey flakes, or yellow crystals. Vanadium is found in many petroleum products. Vanadium occurs naturally in fuel oils and coal. It is also a by-product of petroleum refining. The extraction of vanadium from petroleum ash is a possible future source of the element.

5.4.0.8 VOCs tend to have a low residence time in surface soil environments. These chemicals can be persistent in groundwater. However, there is evidence that non-chlorinated VOCs may degrade rapidly in the vadose zone above groundwater.

## SECTION 6. HUMAN HEALTH RISK ASSESSMENT

### 6.1. INTRODUCTION

6.1.0.1 The risk assessment presented in the following sections evaluates the potential for adverse effects on human receptors associated with each complete exposure pathway. A site-wide screening level ecological risk assessment was performed by Earth Resources Technology, Inc. (ERT) (ERT, 2010). The risk assessment evaluates the potential significance of complete pathways (*i.e.*, whether there is an unacceptable risk). The objectives of this Risk Assessment are to:

- Establish whether any identified COPCs might pose an unacceptable risk to human health; and
- Present documentation to support a plan for a quantitative baseline HHRA if unacceptable risks have been identified in preliminary risk assessment screening steps.

6.1.0.2 COPCs are defined as any chemical contaminants exceeding the preliminary screening levels that have been released at the site as a result of AUES-related activities. Analytes identified as COPCs are retained for analysis in the HHRA in this chapter to determine which, if any, are considered to be contaminants of concern (COC). COCs are defined as those COPCs that are present at sufficient concentrations to present a risk to human health based on results of the HHRA. Any established COCs will be identified for further consideration in Feasibility Study. This subchapter summarizes results of the HHRA. An HHRA report is included in Appendix Q of this report.

### 6.2. INVESTIGATIVE DATA FOR RISK ASSESSMENT

During site investigation activities, several removal actions were performed to remove MEC, MD, CWM, and HTW. The data on contaminants remaining at the site were used to determine the risk from exposure to contaminants in soil at 4825 Glenbrook Road. Analysis of the samples collected during the investigation activities determined that detected concentrations of lewisite, aluminum, arsenic, cobalt, manganese, thallium, and vanadium in the soil exceed their respective preliminary screening values, indicating that these compounds are COPCs. Mustard and ABPs were not selected as COPCs in the risk assessment because they were not detected in any of the in-place soil samples. The project chemist conducted data validation of the analytical data collected during the site investigation activities and found them to be suitable for decision making in this HHRA. Full details of the data used for this HHRA are presented in Appendix Q.

### 6.3. EXPOSURE ASSESSMENT

6.3.0.1 The exposure pathways for human receptors, the affected media, transport mechanisms, exposure routes, and potential receptors at 4825 Glenbrook Road are presented in the Conceptual Site Model shown in Figure 3-1 of Appendix Q. The potential human receptors that may reasonably be anticipated to be present at 4825 Glenbrook Road are as follows:

- **Current Receptors** – The 4825 Glenbrook Road property is a vacant residential property located in between the AU President's house and the residence of the Ambassador of the Republic of South Korea. Future land use at 4825 Glenbrook

Road is expected to be residential. The site is currently fenced to restrict access. Only Parsons and its subcontractors, visit the site to perform weekly inspections, including routine landscaping.

- **Future Receptors** – While vacant, the lot may be returned to residential use in the future. Therefore, a residential exposure scenario was evaluated. Additionally, future receptors could include outdoor (landscaping) workers and construction workers. Conservative exposure assumptions were used for outdoor workers so that risks estimated for outdoor workers are anticipated to be protective of general construction workers. Therefore, construction workers were not evaluated separately. A recreational green space (*i.e.*, park) user was also evaluated because green space is a potential future use (the structure could be demolished and property converted to a community park area). This receptor is assumed to be a child (0 to 6 years of age) who goes to a park for recreational purposes.

6.3.0.2 Complete exposure pathways are required for potential risk to be present. Based on the current and projected land use at 4825 Glenbrook Road, the receptors potentially present include 1) residents, 2) outdoor workers, and 3) green space users. Furthermore, the complete exposure pathways present at 4825 Glenbrook Road are:

- Soil - direct contact pathways
- Inhalation of volatiles
- Incidental soil ingestion
- Dermal contact with soil
- Inhalation of particulates
- Ingestion of home grown vegetables (residents only)
- Soil – groundwater protection
- Leaching to groundwater
- Soil gas
- Inhalation of volatiles in indoor air (residents only)

6.3.0.3 Specific soil exposures evaluated were:

- Residents exposed to the surface (0-2 feet bgs) and mixed soil (0-12 feet bgs).
- Outdoor workers exposed to surface (0-2 feet bgs) and mixed soil (0-12 feet bgs).
- Green space users exposed to surface (0-0.5 feet bgs).

6.3.0.4 Soils - direct contact pathways. For direct contact with soils, none of the identified COPCs (aluminum, arsenic, cobalt, manganese, thallium, vanadium, and lewisite) are classified by USEPA (1991c, 2011a) as volatiles; *i.e.*, have a molecular weight of less than 200 g/mole and a Henry's law constant greater than  $1 \times 10^{-5}$  atm-m<sup>3</sup>/mole. Therefore, inhalation of volatiles in ambient air at the site is an incomplete pathway and was not evaluated further.

6.3.0.5 Soils – groundwater protection. Sixteen COPCs (carbon tetrachloride, chloroform, aluminum, antimony, arsenic, cadmium, cobalt, copper, lead, manganese, mercury, nickel, selenium, silver, thallium, and vanadium) in soil were evaluated using the Seasonal Soil



Compartment (SESOIL) model to determine whether they could leach to, and impact, groundwater.

6.3.0.6 Soil gas. Two COPCs (carbon tetrachloride and chloroform) were identified in soil gas for evaluation of the indoor air pathway. Although the depths where the soil gas samples were collected were excavated, the data was used to evaluate indoor air exposures.

6.3.0.7 No other complete exposure pathways are present at 4825 Glenbrook Road, therefore, potential risks from exposure to COPCs are anticipated from pathways other than those listed above.

#### 6.4. TOXICITY ASSESSMENT

The toxicity assessment weighs available evidence regarding the potential for particular chemicals to cause adverse effects in exposed individuals and to provide, where possible, an estimate of the relationship between the extent of exposure to a chemical and the increased likelihood and/or severity of adverse effects. The types of toxicity values used in risk assessment include oral reference doses (RfD), inhalation reference concentrations (RfC), oral slope factors (SF), and inhalation unit risk factors (URF). SFs and URFs are used to evaluate carcinogenic effects. RfDs and RfCs are used to evaluate non-carcinogenic effects. Arsenic and cobalt are evaluated as both carcinogens and non-carcinogens. Lewisite is a blister agent. Aluminum, manganese, thallium, and vanadium are non-carcinogens. No toxicity values considered appropriate for risk assessment purposes are available for thallium and vanadium due to uncertainties associated with the toxicity studies. Therefore, these two metals were not quantitatively evaluated.

#### 6.5. RISK SUMMARY TO HUMAN RECEPTORS FROM EXPOSURE TO SOIL

6.5.0.1 The cumulative cancer risk estimates for adult and child residents, child recreational green space users, and outdoor workers exposed to surface soil (*i.e.*, 0-0.5 feet or 0-2 feet bgs) and for outdoor workers exposed to mixed soil (0-12 feet bgs) are all within the USEPA target risk range of  $1 \times 10^{-6}$  to  $1 \times 10^{-4}$ . Thus, unacceptable cancer risks to the receptors at the site are not expected from assumed exposures to COPCs in soil. However, the cumulative cancer risk estimate of  $2 \times 10^{-4}$  for residents exposed to arsenic in mixed soil exceeds  $1 \times 10^{-4}$ . Elevated arsenic areas were identified in two locations; *i.e.*, the driveway and TP 138 location (Figure 6-1 of Appendix Q). Further action is warranted for the arsenic in these locations.

6.5.0.2 The hazard indices (HI) estimated for:

- Adult and child residents exposure to surface soil (0-2 feet bgs),
- Child recreational green space users exposure to surface soil (0-0.5 feet bgs), and
- Outdoor workers exposed to surface soil (0-2 feet bgs) to mixed soil (0-12 feet bgs)

are below the benchmark of 1 under the RME and CT scenarios. RME refers to people who are at the high end of the exposure distribution (approximately the 95<sup>th</sup> percentile). The RME scenario is intended to assess exposures that are higher than average, but are still within a realistic range of exposure. CT exposure refers to individuals who have average or typical

intake of environmental media. Thus, unacceptable hazard to the receptors at the site are not expected from assumed exposures to COPCs in soil.

6.5.0.3 The HI estimated for a resident at the site exceeds the benchmark of 1 for mixed soil (0-12 feet) under the RME scenario for exposure to arsenic. As mentioned in paragraph 6.5.0.1, there are two elevated arsenic areas where further action is warranted. These are the driveway area north of TP 109 near the 4835 Glenbrook Road retaining wall and in the floor of TP 138.

6.5.0.4 Additional risk evaluations were performed to determine the impact on remaining risks when these elevated arsenic areas are removed. The evaluation results show the EPC for arsenic in soil decreases to 7.0 mg/kg for the RME and 6.2 mg/kg for the CT, less than the Spring Valley site-specific arsenic background level of 12.6 mg/kg, by removing the these areas.

6.5.0.5 Mustard and ABPs were not selected as the COPCs in the risk assessment because they were not detected in any of the in-place soil samples. Lewisite was detected in two of the in-place soil samples and was, therefore, selected as a COPC. The risk assessment shows that hazards from lewisite are acceptable (*i.e.*, < benchmark level of 1). Although H, L and ABPs were either not detected or the detected concentrations in the in-place samples do not pose unacceptable hazard, they are indicators of additional source of buried contamination on this property. The comparisons levels for these compounds are listed in Table 2-2 of the HHRA report included as Appendix Q.

## 6.6. UNCERTAINTIES EVALUATION

6.6.0.1 Although samples used in this RA were collected over a period of approximately 19 years by differing contractors and for different projects with different objectives, the samples collected by USACE and Parsons from 2000 to 2010 were collected following the approved site-wide Quality Assurance Project Plan (QAPP). The data were validated in accordance with USEPA procedures and are all sufficient to be used to perform a risk assessment. However, it should be noted that analytical laboratories and analytical procedures have changed over the years, which can be expected to introduce some variation into the measurements.

6.6.0.2 Risks were not estimated for vanadium and thallium because no toxicity values considered appropriate for risk assessment are available for these two metals. Thus, the potential hazards from assumed exposures to these metals may have been underestimated. However, since these metals are not assumed to be carcinogenic, the potential cancer risks from assumed exposures to these metals are not likely to have been underestimated. Although some samples are higher than two times the background levels, there is no toxicity data to support removal.

6.6.0.3 H, and its ABPs were not selected as COPCs because they were not detected in any of the in-place soil samples. However, H, L, and ABPs were detected in the vicinities of TP 138 located near the back porch and TPs 120 and 134 located near the front door of the house. H, L, and ABP-impacted soil detected in TP 138 was removed and disposed at an incineration facility during the high probability TP 138 investigations. H, L and ABPs were not detected in the TP 138 sidewall and floor pit characterization samples, which confirmed that agents and ABPs in TP 138 were removed. AUES-related items containing H, L, and ABPs, and H, L, and

ABP-impacted soil were also removed and either destroyed by ECBC or disposed at an incineration facility. However, vertical and horizontal delineations for H, L, and ABPs were not performed due to a work stoppage based on the detection of  $\text{AsCl}_3$  in an AUES-related item and because the protectiveness of the ECS CAFS was in question. Therefore, risk of encountering MEC, containerized CWM, ABPs, and agent/HTW contaminated soil remains.

6.6.0.4 It should be noted that detection of L near TP 138 in the back porch area may actually be its breakdown products CVAO and/or CVAA because L breaks down quickly due to its physical and chemical properties.

6.6.0.5 The ECBC full scan GC/MS analysis for unknown compounds was performed to qualitatively identify the compounds in a sample. Quantitative evaluations for exposure and risk to these compounds, such as CN, DA, and  $\text{AsCl}_3$ , cannot be performed; however, these unknown compounds were all detected in intact containers.

6.6.0.6 Soil gas samples were used for the indoor air evaluation although the soil in which the gas samples were collected was removed during excavation activities. There is also a large degree of uncertainty associated with vapor intrusion modeling. However, the Johnson and Ettinger model (USEPA, 2004) should generally estimate upper bound concentrations of VOCs in indoor air due to subsurface intrusion in one-story houses with basements, as assumed here.

6.6.0.7 The HHRA Conceptual Site Model was based on historical information and photographic interpretation. It was assumed any burial pit(s) could be located and remediated. Throughout the investigations, however, it became clear that during development of the property, contents of the original pit(s) were disturbed and pit contents were distributed across the property as evidenced by the items uncovered during the RI: As examples, a 75mm projectile and an intact container were discovered during the sewer line installation work adjacent to an area that had been excavated during the previous arsenic removal activities in 2001 and contaminated soil and intact containers have been found in the front yard and back yard test pits.

6.6.0.8 Based on these findings and others, the uncertainty is high for finding additional CWM and AUES-related items remain in areas not completely excavated to bedrock or competent saprolite.

## **6.7. POTENTIAL RISK REMAINING IN UNINVESTIGATED AREAS**

6.7.0.1 MEC, CWM including mustard, lewisite, and ABPs, and other industrial compounds, and agents/ABPs impacted soil were removed when uncovered or detected in investigated areas thus eliminating the risk in these areas. However, uninvestigated areas remain.

6.7.0.2 Arsenic has been found across the site and at least two locations containing high arsenic concentration remain. It is probable other areas of high arsenic remain posing an increased risk.

6.7.0.3 TPs 120 and 134 were not cleared of MEC, CWM containers, and agent/ABPs impacted soil, and no soil confirmation samples were collected as work on this excavation was halted when  $\text{AsCl}_3$  was discovered in AUES-related glassware at the bottom of the excavation.

Therefore, it is likely to encounter containerized CWM, ABPs and agent/HTW contaminated soil remain in the uninvestigated area of TPs 120 and 134.

6.7.0.4 Both containerized CWM and agent/ABP-impacted soil were found in three high probability test pits (TPs 120, 134, and 138) located near the house. The CWM and industrial compounds identified in the uncovered intact containers during the high probability TPs 120 and 134 investigations include the following:

- CN - a tearing agent;
- DA - a vomiting agent;
- hexachoroethane - used in smoke munitions; and
- arsenic trichloride - extremely hazardous in case of skin contact (corrosive, irritant)

These toxic or harmful compounds present potential risk to human receptors when encountered via direct contact. However, they were found in intact containers and the potential for human direct contact is limited.

6.7.0.5 Six borings were advanced in the basement. Although no MEC, CWM containers, agent/ABP-impacted soil, or suspected AUES-related debris were encountered in those borings, bedrock was not encountered in the mid to front portions of the house and the spacing of the borings did not eliminate the potential for undiscovered MEC, CWM, AUES-related debris, or agent/ABP-impacted soil beneath the residence. Based on findings uncovered from the TPs 120 and 134, similar AUES-related items are likely to be extended beneath the house.

6.7.0.6 Benzene was detected at concentrations exceeding the screening levels in soil gas samples. The soil associated with these gas samples was subsequently removed. Benzene was not selected as a COPC for indoor air because it was not found in any in-place soil samples. However, benzene may remain in soil in the uninvestigated areas. Benzene is a known human carcinogen where long term exposure can lead to anemia and a compromised immune system (ATSDR, 2007). Potential exposure to benzene in the uninvestigated areas may result in unacceptable risk.

## SECTION 7. MUNITIONS AND EXPLOSIVES OF CONCERN HAZARD ASSESSMENT

7.0.0.1 A MEC hazard assessment (HA) was performed for the 4825 Glenbrook Road property. The purpose of this MEC HA is to qualitatively assess the potential explosive hazards to human receptors associated with complete MEC exposure pathways at the property for both baseline conditions and under several possible remedial response scenarios. It should be noted that the MEC HA does not evaluate hazards from chemical agents.

7.0.0.2 The qualitative baseline evaluation of potential MEC hazards was conducted using the USEPA MEC HA method (USEPA, 2008). Historical and field investigation data were used to determine the appropriate inputs and assumptions for the MEC HA. Additionally, although the contents of all burial pits identified at the site to date have been removed, for the purposes of this MEC HA it is assumed that one or more burial pits potentially remain at 4825 Glenbrook Road. Two baseline condition scenarios were evaluated using the MEC HA method: Current Site Conditions (No Residential Use or Subsurface Clearance) and No Action (Residential Use, No Subsurface Clearance). The munitions response site (MRS) at 4825 Glenbrook Road has a total baseline MEC HA score of 615 under the Current Site Conditions (No Residential Use or Subsurface Clearance) scenario, which equates to a Hazard Level of 3. A Hazard Level of 1 indicates the highest potential explosives hazard conditions and a Hazard Level of 4 indicates low potential explosive hazard conditions. Under the No Action (Residential Use, No Subsurface Clearance) scenario, the MRS has a total baseline MEC HA score of 640, which also equates to a Hazard Level of 3. These hazard levels both indicate an MRS with “moderate potential explosive hazard conditions.

7.0.0.3 The potential hazard mitigation that could be achieved using various remedial responses was also qualitatively evaluated following the established MEC HA process. The three scenarios evaluated were:

1. Subsurface Clearance, Future Residential Use;
2. Subsurface Clearance, Land Use Controls (LUC), Future Recreational Use; and
3. No Subsurface Clearance, LUCs, Future Recreational Use.

7.0.0.4 The two remedial scenarios involving subsurface MEC clearance resulted in the greatest reduction from the baseline MEC HA score and Hazard Level. The Subsurface Clearance, Future Residential Use scenario reduced the MEC HA score to 355 and a Hazard Level of 4, while the Subsurface Clearance, LUCs, Future Recreational Use scenario reduced the MEC HA score to 360 and a Hazard Level of 4. A Hazard Level of 4 indicates “low potential explosive hazard conditions.” The No Subsurface Clearance, LUCs, Future Recreational Use scenario did reduce the MEC HA score to 565, but not sufficiently to reduce the Hazard Level for the site. Based on this result, the Subsurface Clearance with Future Residential Use and Subsurface Clearance, LUCs, Future Recreational Use scenarios would be the most effective with regard to reducing potential MEC hazards at the 4825 Glenbrook Road property. Note that results of this MEC HA do not address or otherwise evaluate potential risks related to chemical agent posed by CWM that might be present at the site, nor should they be interpreted as a quantitative measure of explosives hazards. Also, results of this evaluation should not be used as the sole basis on which to recommend a remedial response.

7.0.0.5 Backgrounds on the method used, description of the inputs and assumptions, and summary of the results for the MEC HA conducted for the 4825 Glenbrook Road property are included in Appendix R.

7.0.0.6 A more detailed discussion of the proposed remedial alternatives will be included in the Feasibility Study report, the scope of which is the evaluation of remedial alternatives.

## SECTION 8. CWM HAZARD ASSESSMENT

8.0.0.1 The investigation activities performed at the site to date, including arsenic grid sampling and removal, low and high probability test pit investigations, and Burial Pit 3 investigations, show that containerized CWM and other toxic industrial compounds and released H, L, and ABPs were detected in the vicinity of TP 138, located near the back porch, and TPs 120 and 134, located near the front door of the house. Agent impacted soil detected in the vicinity of TP 138 was removed and disposed at the Veolia Incineration Facility in Port Arthur, TX. TP 138 was cleared of containerized agent/ABP and no agent or ABPs were detected in the sidewall and floor soil confirmation samples for TP 138. However, excavation of TPs 120 and 134 did not clear CWM and other toxic industrial compounds containers and agent/ABPs-impacted soil, and no soil confirmation samples were collected because work on this excavation was halted when  $\text{AsCl}_3$  was discovered in AUES-related glassware at the bottom of the excavation. Therefore, it is unknown whether containerized CWM and agent/ABP-impacted soil extend beyond the boundaries of the excavation at TPs 120 and 134. Based on finding 25 CWM items, two MEC items, two MD items, and AUES-related glassware during TPs 120 and 134 investigations, it is likely similar containerized CWM, ABPs, and agent/HTW contaminated soil could be encountered in the uninvestigated area of TPs 120 and 134.

8.0.0.2 The widespread distribution of contaminants, especially AUES associated glassware, provides evidence the burial pit contents were redistributed across the site prior to the current investigations. Therefore, there is the potential for containerized CWM and other toxic industrial compounds, and munitions to be present outside the specific disposal pit locations.

8.0.0.3 To identify the potential risk of encountering CWM and other toxic industrial compounds hazards, a qualitative evaluation of potential hazards from CWM and others toxic industrial compounds was performed for the following property use scenarios:

### **8.1. CURRENT SITE CONDITIONS (NO RESIDENTIAL USE, NO SUBSURFACE CLEARANCE)**

Under this scenario, there is the potential for CWM to be present in the subsurface. If the property is fenced and access restricted, then potential for discovery and exposure to buried CWM is minimal and would present a LOW risk to authorized site receptors.

### **8.2. NO FURTHER ACTION (RESIDENTIAL USE, NO SUBSURFACE CLEARANCE)**

If no subsurface clearance is completed and the property is returned to residential use, it is assumed there is significant potential for future intrusive activities at the property that could result in discovery and exposure to CWM, and other toxic industrial compounds, which would present a HIGH risk to site receptors, including residents and construction workers during either gardening or utilities work if a buried container is uncovered and ruptured.

### **8.3. SUBSURFACE CLEARANCE (RESIDENTIAL USE, CLEARANCE AND SOIL REMOVAL TO 12 FEET BELOW GROUND SURFACE)**

For this scenario, remediation would be performed to remove CWM from ground surface down to 12 feet bgs. After subsurface clearance, discovery and exposure to CWM is not likely for any future residential receptor, which would result in a LOW future risk.

### **8.4. SUBSURFACE SOIL REMOVAL, LAND USE CONTROLS – FUTURE RECREATIONAL USE**

For this scenario, remediation would be performed to remove CWM from the subsurface; therefore, discovery and exposure to CWM is not likely for a future recreational user. Consequently, there is a LOW future risk to recreational users.

### **8.5. NO SUBSURFACE SOIL REMOVAL, LAND USE CONTROLS – FUTURE RECREATIONAL USE**

For this scenario, no subsurface clearance would be completed and LUCs restricting use of the property to a recreational use (including digging restriction) would be implemented. If restrictions are placed on property use, then potential for discovery and exposure to buried CWM is minimal resulting in a MODERATE future risk to site receptors, as there is limited ability to prevent digging and there is the potential for munitions items to come to the surface through frost heave and erosion).



## SECTION 9. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

### 9.1. SUMMARY

9.1.0.1 During the period 2000 – 2010 the following investigations were performed at 4825 Glenbrook Road:

- Arsenic Sampling and Removal (2000-2001)
- Test Pits and Trenches Investigation (2001-2002)
- 4825 Test Pit Investigation (TP 23) – (May 2001 – March 2002)
- Soil Gas and Driveway Boring ABP Soil Sampling (March 2007 – June 2007)
- Burial Pit 3 Investigation and Burial Pit 3 Extensions (October 2007 – March 2009)
- Low Probability Test Pit Investigation (March 2009 – August 2009)
- Arsenic Sampling and Removal in the Driveway (May 2009 – July 2009)
- High Probability Test Pits Investigation (November 2009 – April 2010)
- Geotechnical Soil Boring and Backyard Soil Sampling (August 2010)

9.1.0.2 Based on results of these investigations an HHRA and a Munitions and MEC HA were performed.

#### 9.1.1. Investigations

##### 9.1.1.1. Arsenic Sampling and Removal (2000-2001)

Parsons collected arsenic grid surface soil samples (0 to 6 inches bgs) and six subsurface samples in the driveway to determine the extent and delineation of arsenic-contaminated soil. From December 2000 to March 2001, arsenic-contaminated soil identified during sampling from 24 grids was excavated under a NTCRA.

##### 9.1.1.2. Test Pits and Trenches Investigation (2001)

Twenty-three test pits and two trenches were investigated in May and June 2001. No significant items were recovered during the investigation of these test pits and trenches, except at TP 23.

##### 9.1.1.3. 4825 Test Pit Investigation (TP 23) – (May 2001 – March 2002)

A VCS was used as an ECS during the investigation of TP 23 after MEC was discovered. A total of 18 CWM-related items and 406 munitions-related items were recovered. Some of the glassware containing unknown liquids were placed in MRCs and transferred to the ECBC CTF at Aberdeen Proving Ground, MD for screening. Some of the bottles sent to the CTF were found to contain H and L ABPs. One 75mm projectile was analyzed by Battelle and was found to contain arsine. Battelle disposed of this item and two other items with potentially similar fill. Items also were observed and removed from beneath a retaining wall near the house foundation. Cultural debris and suspected AUES-related glassware was also encountered during the test pit investigations. Ordnance-related items were destructed during subsequent T-

10<sup>5</sup> operations or sent to Clean Harbors for destruction and all munitions scrap items were disposed at Onyx Incineration Facility, Port Arthur, TX. CWM-related items were destroyed in the EDS.

#### **9.1.1.4. Soil Gas and Driveway Boring ABP Soil Sampling (March – June 2007)**

Soil gas sampling around the perimeter of the TP 23 showed that neither the Summa canister nor GORE SORBER® samples indicated significant concentrations of chemicals resulting from off-gassing and migrating up through the soil column from the contents of TP 23. The soil gas sampling results in the driveway contained detections of two mustard ABPs; however, associated soil samples did not confirm the ABP detections. Arsenic removal in Trench 2 did not identify any suspected AUES-related debris.

#### **9.1.1.5. Burial Pit 3 Investigation and Burial Pit 3 Extensions (October 2007 – March 2009)**

9.1.1.5.1 One hundred and eight munitions-related and AUES-related items recovered were categorized as 22 MEC, six CWM and 80 MD items. These items were identified as 75mm projectiles, 2-inch and 3-inch pipes with end caps, 4.7-inch projectiles, and intact glass container. Twenty-two MEC items included 75mm projectiles and a 4.7-inch projectile. One intact glass vial recovered from the excavation was analyzed by ECBC to contain CWM and was destroyed by ECBC. Five 75mm projectiles were also categorized as CWM and later destroyed in the EDS. A total of eighty MD items were recovered during these investigations. Thirty-seven non-munitions scrap items were recovered. All MEC and MD items were demilitarized and disposed. All non-munitions scrap items were also disposed in non-hazardous landfill.

9.1.1.5.2 Metals, including aluminum, arsenic, cobalt, iron, magnesium, mercury, and vanadium, were detected at concentrations exceeding the accepted comparison levels in some of the four grab samples. Analytical results for 11 pit characterization and 13 confirmation samples show that metals, including aluminum, arsenic, cobalt, iron, magnesium, manganese, thallium and vanadium, exceeded the accepted comparison levels in some of these samples. The characterization/ confirmation samples exceeding the SV remedial goal still remain at this property.

#### **9.1.1.6. Low Probability Test Pit Investigation (March – August 2009)**

Forty-one low probability test pits were completely investigated. Suspected AUES-related glassware debris was only uncovered from one test pit (TP 117) at 6 feet bgs, which was headspaced and cleared for agent/ABP. A few cultural debris or no cultural debris was found in the rest of the TPs. Seven low probability test pits were not completed.

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<sup>5</sup> T-10 is a transportable controlled detonation chamber (Model T10) used to demilitarize munitions of explosive concern (MEC) and closed-cavity munitions debris (MD) items.

#### **9.1.1.7. Arsenic Sampling and Removal in the Driveway (May – July 2009)**

Arsenic impacted soil exceeding concentrations of Spring Valley remediation level of 20 mg/kg was removed from the driveway except for a small area north of TP 109, adjacent to the 4835 Glenbrook Road retaining wall below 6 feet bgs.

#### **9.1.1.8. High Probability Test Pits Investigation (November 2009 – April 2010)**

9.1.1.8.1 Thirty-seven CWM, two MEC, three MD items and 105 non-munitions scrap items were recovered during the investigation of TPs 120, 134 and 138. Twenty-six of the 37 suspect CWM items were analyzed and destructed by ECBC. Agent/ABPs and industrial chemicals such as chloroacetophenone, diphenylchloroarsine, and arsenic trichloride ( $\text{AsCl}_3$ ), were also detected in these containers. Among the CWM items recovered from TP 134, a pressure cylinder (SCR-062) and eight scrap items (SCR-048, SCR-056, SCR-057, SCR-058, SCR-091, SCR-092, SCR-093, and SCR-094) were later decontaminated, cleared for headspace, and incinerated at licensed incineration facilities. Two CWM items from TP 138 also were decontaminated, cleared for headspace, and incinerated at licensed incineration facilities. MEC and MD items recovered from TP 134 also were demilitarized and disposed at a metal smelter.

9.1.1.8.2 Agent/ABPs impacted soil excavated during the investigation was placed in drums and disposed at Veolia Incineration facility in Port Arthur, TX. Metals detected in agent/ABP-cleared grab samples that exceeded the accepted comparison levels included aluminum, thallium, arsenic, iron, and magnesium. Grab sample results show that soil exceeding the SV remedial goal still remain in this area.

9.1.1.8.3 The investigation was ceased due to detection of  $\text{AsCl}_3$  in a vapor and solid samples. The site was rendered safe by backfilling and awaits further remedial action.

#### **9.1.1.9. Geotechnical Soil Boring and Backyard Soil Sampling (August 2010)**

9.1.1.9.1 The six geotechnical borings advanced inside the basement of the 4825 Glenbrook Road house show that saprolite was encountered at depths ranging between 8 inches and 14 inches in all borings. Refusal was encountered in two locations (GS-01 and GS-02) near the back yard of the house at depths of 12 inches and 13.5 inches bgs, respectively. Water was encountered in the other four borings (GS-03 through GS-06) at depths between 84.5 inches to 98 inches bgs. Soil encountered beneath the house appeared to be native soil. Neither suspected AUES-related debris nor cultural debris were encountered during the investigation. Analytical results of the six agent-cleared soil samples show that no exceedance was detected in GS-01 and GS-02. Metals, including aluminum and vanadium, were detected at concentrations exceeding the accepted comparison levels in GS-03. Aluminum concentrations exceeded the comparison level in GS-04 through GS-06.

9.1.1.9.2 The soil back yard sampling performed for agent/ABP confirmation show that Lewisite was detected with J qualifier in two samples (SW-4825GB-MM-2 and SW-4825GB-PP-2) collected at 3 feet bgs near the back porch. Analytical results of two soil samples cleared for agent/ABPs show that metals, including aluminum, manganese, and vanadium, were detected at concentrations exceeding the accepted comparison levels.

### 9.1.1.10. Investigation Summary

9.1.1.10.1 Approximately 530 tons of non-hazardous soil excavated during the Burial Pit 3, and approximately 2326 tons of arsenic-contaminated soil (exceeding the Spring Valley Partners remedial action level of 20 mg/kg) and non-hazardous soil excavated during the high probability test pit investigations were removed from the property and disposed off-site at the King and Queen County Landfill as non-RCRA hazardous waste. Disposal samples were collected, analyzed for TCLP parameter (Appendix I, Pit 3 HTW Lab Reports folder), and met regulatory limits prior to disposal as non-hazardous soil. Approximately 75 tons of agent/ABP-impacted waste were removed from the property and disposed off-site at Veolia Incineration Facility at Port Arthur, TX. Aqueous IDW generated from the investigation activities were characterized and disposed at DuPont Chamberworks in Deepwater, NJ.

9.1.1.10.2 TPs 120 and 134 require further remedial action, and seven remaining low probability test pits remain to be investigated.

### 9.1.2. Human Health Risk Assessment

9.1.2.1 HHRA results show that the cumulative cancer risk estimates for adult and child residents, child recreational green space users, and outdoor workers exposed to surface soil (*i.e.*, 0-0.5 feet or 0-2 feet bgs) and for outdoor workers exposed to mixed soil (0-12 feet bgs) are all within the USEPA target risk range of  $1 \times 10^{-6}$  to  $1 \times 10^{-4}$ . Thus, unacceptable cancer risks to the receptors at the site are not expected from assumed exposures to COPCs in soil. However, the cumulative cancer risk estimate of  $2 \times 10^{-4}$  for residents exposed to arsenic in mixed soil exceeds  $1 \times 10^{-4}$ . Elevated arsenic areas were identified in two locations: the driveway and TP 138 location. Further action is warranted for the arsenic in these locations.

9.1.2.2 The HI estimated for residents and child recreational green space users exposed to surface soil (*i.e.*, 0-0.5 feet or 0-2 feet bgs), and outdoor workers exposed to surface soil (0-2 feet bgs) or mixed soil (0-12 feet bgs) are below the benchmark of 1 under both the RME and CT exposure scenarios. Thus, unacceptable hazard to the receptors at the site are not expected from assumed exposures to COPCs in soil. However, the HI for residents exposed to mixed soil (0-12 feet) at the site exceeds the benchmark of 1 under the RME exposure scenario due to assumed exposures to arsenic. As mentioned in Section 9.1.2.1, there are two areas with elevated arsenic where further action is warranted.

9.1.2.3 Mustard and ABPs were not selected as the COPCs in the risk assessment because they were not detected in any of the in-place soil samples. However, Lewisite was detected in two of the in-place soil samples and was, therefore, selected as a COPC. The risk assessment shows that hazards from Lewisite are acceptable (*i.e.*, <benchmark level of 1). Although H, L, and ABPs were either not detected or the detected concentrations in the in-place samples do not pose unacceptable hazard, they are indicators of additional source of buried contamination on this property since the investigations of TPs 120 and 134 are not completed. The residential screening levels for these compounds are listed in Table 2-2 of the HHRA report included as Appendix Q.

9.1.2.4 Mustard, Lewisite, and ABPs were detected in the vicinity of TP 138, located near the back porch, and TPs 120 and 134, located near the front door of the house. Agent-impacted soil detected in the vicinity of TP 138 was removed and disposed at an incineration facility. TP

138 was cleared of containerized agent/ABP and no agent or ABPs were detected in the sidewall and floor soil confirmation samples for TP 138. However, the excavation of TPs 120 and 134 was not cleared of MEC, CWM containers, and agent/ABPs-impacted soil, and no soil confirmation samples were collected as work on this excavation was halted when  $\text{AsCl}_3$  was discovered in AUES-related glassware at the bottom of the excavation. Therefore, it is unknown whether agent/ABP-impacted soil and MEC extend beyond the boundaries of the excavation containing TPs 120 and 134. Based on findings from the TPs 120 and 134 investigations, it is likely that containerized CWM, ABPs, and agent/HTW-contaminated soil in the uninvestigated area of TPs 120 and 134 would be encountered. Therefore, remedial action is warranted if unacceptable risk and hazards are identified.

9.1.2.5 Both containerized CWM and agent/ABP-impacted soil were found in three high probability test pits (TPs 120, 134, and 138) located near the house. Two MEC items were uncovered from the TPs 120 and 134 excavation. Six borings were advanced in the basement and, although no MEC, CWM containers, agent/ABP impacted soil, and suspected AUES-related debris were encountered in those borings, bedrock was not encountered in the mid to front portions of the house and the spacing of the borings did not eliminate the potential that there may be undiscovered MEC, containerized CWM, AUES-related debris, and agent/ABP-impacted soil beneath the building. Therefore, remedial action is warranted.

9.1.2.6 During the sewer line restoration in 2011, a 75mm projectile and an intact AUES glass flask with a dirt or cork plug containing a small quantity of brown solids were uncovered in an area adjacent to a previously excavated area in 2001. Lewisite was detected in the solid sample collected from the flask. The discovery of these items indicates that potential risk exists in uninvestigated areas at the site.

9.1.2.7 Due to the uncertainties associated with the HHRA and risk from potential MEC and containerized CWM and toxic industrial compounds remaining in uninvestigated areas, there is risk associated with exposure to these compounds as long as they exist at the site.

### **9.1.3. Munitions and Explosives of Concern Hazard Assessment**

MEC HA results show that the MRS at 4825 Glenbrook Road has a total MEC HA score of 615 under the Current Site Conditions (No Residential Use or Subsurface Clearance) scenario, which equates to a Hazard Level of 3. Under the No Action (Residential Use, No Subsurface Clearance) scenario, the MRS has a total MEC HA score of 640, which also equates to a Hazard Level of 3. A Hazard Level of 1 indicates the highest potential explosives hazard conditions and a Hazard Level of 4 indicates low potential explosive hazard conditions. These hazard levels both indicate an MRS with “moderate potential explosive hazard conditions.” The two remedial scenarios involving subsurface MEC clearance resulted in the greatest reduction from the baseline MEC HA score and Hazard Level. The Subsurface Clearance, Future Residential Use scenario reduced the MEC HA score to 355 and a Hazard Level of 4, while the Subsurface Clearance, LUCs, Future Recreational Use scenario reduced the MEC HA score to 360 and a Hazard Level of 4. A Hazard Level of 4 indicates “low potential explosive hazard conditions.” The No Subsurface Clearance, LUCs, Future Recreational Use scenario did reduce the MEC HA score to 565, but not sufficiently to reduce the Hazard Level for the site. Based on this result, the Subsurface Clearance with Future Residential Use and

Subsurface Clearance, LUCs, Future Recreational Use scenarios would be the most effective with regard to reducing potential MEC hazards at the 4825 Glenbrook Road property.

#### **9.1.4. CWM Hazard Assessment**

The original conceptual site model (CSM) developed for this site was based on historical information and photographic interpretation. Based on the historical data, the CSM assumed that a burial Pit could be located at this property. The investigation results show that CWM were found in TP 138 near the back porch, and TP 134 near the front door. Both locations are surrounding the house. Burial pit 3 was also located near the house. Based on all past investigations at the site, there is evidence the developer of the property partially disturbed the original burial pit(s). As such, there is a high potential for CWM to be located throughout the site in areas that have not been investigated/excavated to saprolite/bedrock.

### **9.2. CONCLUSIONS**

- The site at 4825 Glenbrook Road was impacted by AUES activities.
- Burial Pit 3 was investigated, and MEC, CWM, and AUES-related items, and arsenic-affected soil were removed.
- Two high probability TPs (120 and 134) require further remedial action, and seven low probability TPs (135, 136, 139, 140, 143, 144, and 145) remain to be investigated.
- The discovery of  $\text{AsCl}_3$  required work at the site to be placed on hold pending evaluation of the effectiveness of engineering controls to address that contaminant.
- HHRA concluded that arsenic detected in the area north of TP 109 near the 4835 Glenbrook Road retaining wall and in the floor of TP 138 poses unacceptable risk for residents. Remedial action is warranted to mitigate the unacceptable risk and hazard from arsenic in the soil.
- Although H, L, and ABPs were either not detected or the detected concentrations do not pose unacceptable hazards in the remaining samples, the potential for encountering these compounds is high in areas that were not investigated, especially near TPs 120 and 134. H, L and ABPs are indicators for additional sources of buried contamination on this property. Items previously recovered at the property indicate it is likely that additional containerized CWM, ABPs, and agent /HTW contaminated soil remain in the subsurface.
- The widespread distribution of contaminants, especially AUES associated glassware, provides evidence the burial pit contents were redistributed across the site prior to the current investigations. Therefore, potential for encountering additional AUES-related debris/glassware throughout the property, including beneath the house, is highly possible and poses an unacceptable risk for residents.
- Subsurface Clearance with Future Residential Use and Subsurface Clearance, LUCs, Future Recreational Use scenarios would be the most effective with regard to reducing potential MEC hazards at the 4825 Glenbrook Road property.

### **9.3. RECOMMENDATIONS**

Based on the results and conclusions of these investigations, a Feasibility Study is recommended for 4825 Glenbrook Road to develop alternatives and perform an analysis of

those alternatives to mitigate the risk remaining at the site associated with MEC, CWM, ABP and arsenic-contaminated soil identified in the RI.

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# APPENDIX A

## LANDSCAPE AND INVESTIGATION PHOTOGRAPHS

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**APPENDIX B**  
**FIELD LOG BOOKS**

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## **APPENDIX C**

# **DIG SHEETS AND GEOPHYSICAL SURVEY RESULTS**

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**APPENDIX D**  
**LONG-TERM MAINTENANCE PLAN**

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**APPENDIX E**  
**VALIDATED AND UNVALIDATED DATA SUMMARY TABLES**

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**APPENDIX F**  
**ARCHEOLOGICAL REPORT, SITREP AND MARB REPORTS**

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# APPENDIX G

## CONE PENETROMETER TEST RESULTS

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## **APPENDIX H DISPOSAL RECORDS AND MANIFESTS**

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# APPENDIX I LABORATORY REPORTS

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# APPENDIX J

## DATA VALIDATION REPORTS

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**APPENDIX K**  
**SEDD/ADR FILES**

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**APPENDIX L**  
**ADDITIONAL ARSENIC TRICHLORIDE ANALYSIS**

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# APPENDIX M

## GEOTECHNICAL BORING LOGS

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# APPENDIX N

## AIR MONITORING RECORDS

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## **APPENDIX O**

# **BACKFILL COMPACTION TEST DATA**

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## APPENDIX P DESTRUCTION CERTIFICATES

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# APPENDIX Q

## HUMAN HEALTH RISK ASSESSMENT

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# APPENDIX R MEC HA ANALYSIS

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## **APPENDIX S**

# **SITE-SPECIFIC WORK PLANS**

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