PROPOSED PLAN FOR
4825 GLENBROOK ROAD

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

PREPARED BY:

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*Words and acronyms shown in **bold** lettering are defined in the Acronyms and Abbreviations section and/or the Glossary of Terms attached to this plan.*

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*This Proposed Plan was prepared to satisfy Section 117 (a) of the Comprehensive Environmental Response, Compensation and Liability Act (**CERCLA**). This Proposed Plan explains the history of the 4825 Glenbrook Road, NW site, as well as the type and extent of Chemical Warfare Materiel (**CWM**), Agent Breakdown Products (**ABP**s), Munitions and Explosive of Concern (**MEC**) and Hazardous and Toxic Waste (**HTW**)-impacted soil found at the site. The U.S. Army Corps of Engineers (**USACE**) performs, and has been performing, its response activities throughout the Spring Valley Formerly Used Defense Site (SVFUDS) to include 4825 Glenbrook Road, NW in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9601 et seq. and its implementing regulations, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. part 300.*

This Proposed Plan is based on historical information, site characterization, analytical data and determination of potential risk to human health, which is contained in the Remedial Investigation Report for 4825 Glenbrook Road, NW (USACE July 29, 2011) (RI Report), and the conclusions and recommendations presented in that report, plus the alternatives prepared and analyzed in the Feasibility Study for 4825 Glenbrook Road, NW (USACE September 21, 2011) and the conclusions and recommendation presented in that report. To date, the CERCLA response action at 4825 Glenbrook Road, NW has been a "removal action," which has included investigation activities, along with limited-scope cleanup activities. Pursuant to CERCLA, USACE is transitioning from a "removal action" to a "remedial action" for the 4825 Glenbrook Road, NW site. Ultimately, this process will result in a Decision Document (the latter document is executed after the FS, a Proposed Plan, and a public comment period).

*The primary purpose of this Proposed Plan is to summarize the five remedial alternatives evaluated for the 4825 Glenbrook Road, NW and to identify the alternative preferred by the U.S. Army Corps of Engineers, Baltimore District. Consistent with Section 117(a) of CERCLA, USACE, the District Department of the Environment (**DDOE**), and Region 3 of the U.S. Environmental Protection Agency (**USEPA**) encourage the public to participate in the discussion of remedial alternatives for the site at 4825 Glenbrook Road, NW. Public comment is invited on all of the alternatives identified in this **Proposed Plan**. Information on how to participate in this decision-making process is presented at the end of this plan. *Words and acronyms shown in **bold** lettering are defined in the Acronyms and Abbreviations section and/or the Glossary of Terms attached to this plan.*

1.0 Introduction and Purpose

USACE, in consultation with **DDOE** and **USEPA,** is proposing a remedy to address the threat to the health of potential future human receptors created by the presence Chemical Warfare Materiel (**CWM**), Agent Breakdown Products (**ABPs**), Munitions and Explosive of Concern (**MEC**), and Hazardous and

Toxic Waste (**HTW**)-impacted soil found at 4825 Glenbrook Road, NW. Furthermore, with regard to **CWM** and conventional munitions that are recovered from the site, the remedial alternatives would also adopt and incorporate by reference the selected removal actions from USACE's February 2010 Action Memorandum.[1] The selected action for Recovered Chemical Warfare Materiel (**RCWM)** in the action memo is on-site demilitarization using the Explosive Destruction System (EDS) at the Spring Valley federal property. The selected action for conventional munitions is on-site demilitarization using Contained Destruction Technologies at the Spring Valley federal property.

During World War I, the U.S. Government established the American University Experiment Station (**AUES**) to research the testing, production, development and effects of noxious gases, CWM, antidotes and protective masks. Mustard (**H**) and lewisite (**L**) agents, adamsite, irritants and smokes were among the chemicals researched and tested. The Spring Valley Formerly Used Defense Site (**SVFUDS**) includes property occupied by the former **AUES** between 1917-1920, as well as an area adjacent to the **AUES**, named Camp Leach, which was established and used for staging, training, and billeting troops during World War I. Figure 1-1 shows the **SVFUDS** boundary (all figures are presented in Appendix A). **SVFUDS** consists of approximately 661 acres in the Northwest section of Washington, D.C. Today, the Spring Valley neighborhood encompasses approximately 1,600 private homes, including several embassies, as well as the American University (**AU**) and Wesley Seminary. **USACE** is in the process of investigating and cleaning up contamination resulting from the **AUES** operations. The 4825 Glenbrook Road, NW property has been the subject of various investigations since broken glassware was encountered during development of the lot in 1992.

This Proposed Plan includes:

- Background information on the 4825 Glenbrook Road, NW property developed during previous investigations (Section 2)
- A summary of risks (Section 3)
- Scope and role of the remedial action (Section 4)
- A discussion of feasible remedial methods and alternatives (Sections 5 and 6)
- The rationale for recommending the preferred alternative (Section 7)
- Opportunities for public participation (Section 8), and
- A list of acronyms and abbreviations, a glossary of terms, and an Appendix of Figures.

This Proposed Plan summarizes information that can be found in greater detail in the Remedial Investigation (**RI**) and Feasibility Study (**FS**) reports for 4825 Glenbrook Road, NW, as well as, other documents available to the public in the designated document repositories. The location of the document repositories and information on how to participate in the decision-making process is included at the end of this Proposed Plan. **USACE** will finalize the remedy selection for 4825

[1] *Action Memorandum, Disposal of Discarded Military Munitions (DMM), including Recovered Chemical Warfare Materiel (RCWM), Conventional DMM, and Material Documented as an Explosive Hazard (MDEH), Spring Valley Formerly Used Defense Site, Washington, D.C (USACE February 2010).*

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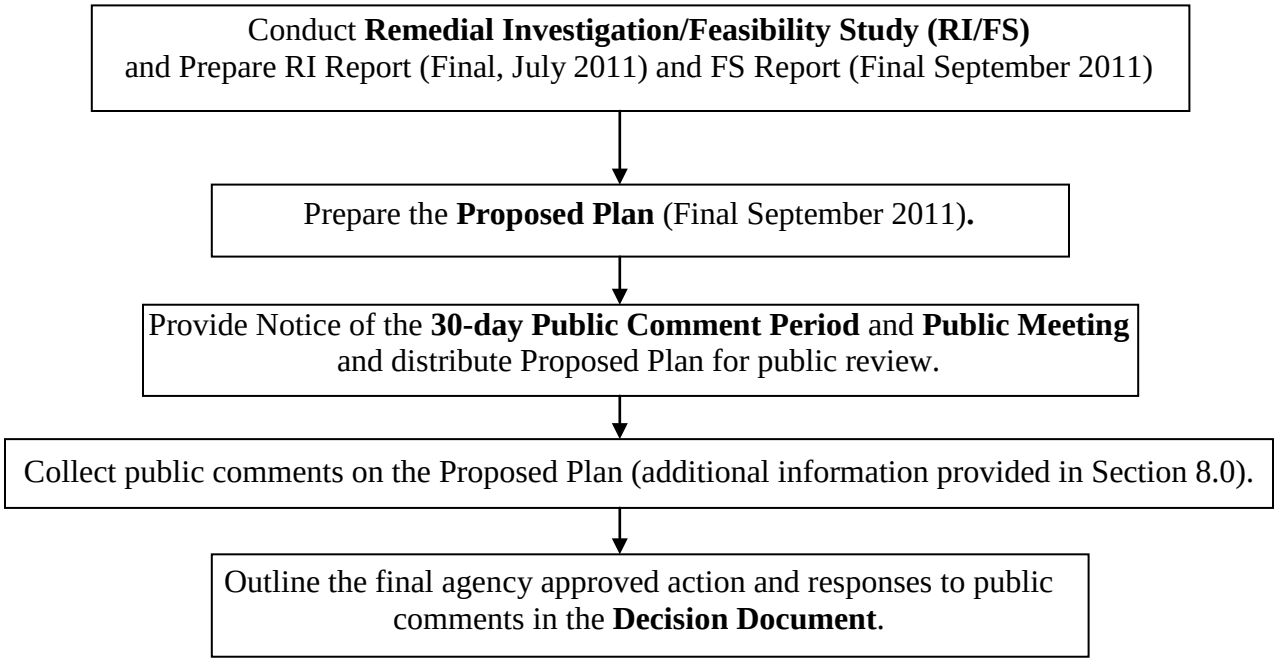
Glenbrook Road, NW in a Decision Document (**DD**) after evaluating comments received from the public and consulting with **DDOE** and **USEPA.**



2.0 Site Background

2.1 Site Location

The 4825 Glenbrook Road, NW site is located in the south central portion of the **SVFUDS** within the Spring Valley residential community, 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 (**AU**). The site is a private residential parcel of approximately 0.4 acres. A Site Plan depicting the property layout is included as Figure 1-2. 4825 Glenbrook Road, NW is located in a low-density residential area (three to four dwelling units per acre) west of American University campus. The residence of the Republic of South Korea Ambassador, 4801 Glenbrook Road, NW, is adjacent to the south and the **AU** president's house, 4835 Glenbrook Road, NW is adjacent to the north. Residential homes are also located to the west across Glenbrook Road.

2.2 Site History

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 development on chemical warfare materiel (**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.

The possible **Chemicals of Potential Concern (COPCs)** in the soil were established during the historical sampling activities. Based on historical records and investigative results, AUES waste was disposed at 4825 Glenbrook Road, NW. The soil samples were analyzed for the following compound classes:

- Mustard (**H**), lewisite (**L**), and **ABPs** (thiodiglycol, oxathiane, and dithiane)
- Explosives
- Volatile Organic Compounds (**VOCs**)
- Semi-Volatile Organic Compounds (**SVOCs**)
- Metals
- Total Cyanide
- Fluoride
- Iodine
- Perchlorate

USACE has performed numerous investigations at the site. A description of the intrusive investigations performed at 4825 Glenbrook Road, NW includes mobilization, intrusive investigation, disposal, site restoration and demobilization. Figure 1-3 illustrates the historical sampling and investigations performed at the site. These investigation activities were performed in accordance with the site-specific work plans (SSWPs) for each of the investigations listed below.

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

During the most recent (2007-2009) high probability and low probability investigations at Burial Pit 3 , eighty-four closed cavity items were recovered including 75mm projectiles, 2-inch and 3-inch pipes with end caps, 4.7-inch projectiles and intact glassware. Analytical results for 11 test pit characterizations 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 the samples.

An additional 41 low probability test pits were completely investigated; only one test pit contained suspect **AUES**-related glassware at 6 feet (ft) below ground surface (**bgs**). Seven planned low probability test pits were not completed. All arsenic impacted soil exceeding the 20 milligrams/kilograms (mg/kg) Spring Valley remediation level for arsenic was removed except for a small area in the driveway adjacent to 4835 Glenbrook Road, NW and a small area near the back porch.

High Probability Test Pits 120, 134 and 138 were investigated from November 2009 – April 2010. Among the closed and open

cavity items which include glass bottles, glass vials, glass test tubes, glass jars, metal bottles, and 75mm projectiles that were uncovered during the excavation, 26 items were identified as **CWM**, two items were identified as **MEC** (one closed cavity 75mm projectile and one 75 mm unfuzed, unfired shrapnel round), three items were identified as **MD** (two open cavity 75mm projectiles and one 75mm unfuzed with hexagonal plug), and the remaining items were identified as suspected AUES-related non-munitions scrap. **Agent/ABPs** were detected in intact containers and soil uncovered in the vicinity of the excavation. Other industrial chemicals such as chloroacetophenone, diphenylchloroarsine, and arsenic trichloride (**$AsCl_3$**), were also detected in the intact containers. The intact containers were destroyed by Edgewood Chemical Biological Command (**ECBC**) located in Edgewood, Md., after analysis was performed. **Agent/ABPs** impacted soil excavated during the investigation was placed in drums and properly disposed. Metals detected in **agent/ABPs**-cleared grab samples that exceeded the accepted comparison levels included aluminum, arsenic, iron, magnesium and thallium. Sample results show that soil exceeding the accepted comparison levels still remains in this area. The investigation was ceased due to detection of arsenic trichloride (**$AsCl_3$**) in a vapor and solid sample. Analysis of the ability of the existing safety control measures to adequately contain and filter the unanticipated chemical was needed as arsenic trichloride had not previously been found in the Spring Valley Formerly Used Defense Site. In order to perform the safety analysis, the property was rendered safe by backfilling and awaits further investigation/removal.

Remobilization is anticipated following completion of the Decision Document for the 4825 Glenbrook Road, NW property. The analysis of the ability of the existing safety control measures to adequately contain and filter the unanticipated chemical was completed and the results of the analysis indicate that the existing Chemical Agent Filtration System (**CAFS**) is capable of handling arsenic trichloride

Additional information on the history of the AUES operations is provided in the *Remedial Investigation (**RI**) Report* (USACE, 1995), the *Remedial Investigation Report for 4825 Glenbrook Road* (USACE 2011) (**RI** Report) and the *Feasibility Study for 4825 Glenbrook Road* (**FS** Report) (USACE 2011).

3.0 Summary of Site Risks

A variety of risk assessments were performed as a part of the RI for 4825 Glenbrook Road, NW to evaluate the presence of **CWM, ABPs, MEC,** and **HTW** impacted soil and risks that could occur to members of the general public if 4825 Glenbrook Road, NW were used in its current condition.

3.1 Human Health Risk Assessment

A Human Health Risk Assessment (**HHRA**) was performed by **USACE** to estimate the potential risks/hazards to current and future receptors from site-related contamination in the soil at the 4825 Glenbrook Road, NW property. The type and magnitude of

exposures to **Chemicals of Potential Concern** (**COPCs**) at the site were estimated; potential exposure pathways, receptors, and exposure scenarios were identified and potential exposure was quantified.

The objective of the **HHRA** was to conduct a site-specific quantitative risk assessment for human receptors at 4825 Glenbrook Road, NW. All previously collected data was evaluated by **USACE** following guidance from **USEPA** (USEPA, 1992a) to determine whether it was acceptable for use in a risk assessment. Data considered acceptable were used to identify and screen COPCs. For the receptors present at the site, the risk assessment estimated the magnitude of assumed exposure to **COPCs** and identified potential exposure pathways. This information, in conjunction with toxicity information for the **COPCs**, helped **USACE** determine whether potential risks to human health associated with exposure to chemicals in the soil remaining at 4825 Glenbrook Road, NW are acceptable.

The human health risk assessment estimates the "baseline risk," which is an estimate of the likelihood of health problems occurring if no cleanup action is taken at a site. The steps used to analyze these risks consist of a four-step process:

(l) data evaluation
(2) exposure assessment
(3) toxicity assessment
(4) risk characterization

In the data evaluation step, relevant site data are compiled to characterize the Chemicals of Potential Concern (**COPCs**). During the exposure assessment step, actual or potential **COPCs** release pathways are analyzed, potentially exposed human populations and exposure pathways are identified, **COPCs** concentrations at potential points of human exposure are determined, and **COPCs** intakes are estimated. In the toxicity assessment step, qualitative and quantitative toxicity data for each **COPCs** are identified. Next, the likelihood and magnitude of adverse health risks are estimated in the risk characterization step. Potential receptors at the site include outdoor workers, future residents and future recreational green space users. The exposure pathways evaluated for all receptors include incidental soil ingestion, dermal contact with soil and inhalation of particulates. In addition, the ingestion of homegrown vegetables and inhalation of volatile compounds in indoor air were evaluated for residents.

The carcinogenic risks estimated individually for future adult residents, child residents, child recreational green space users, and outdoor workers, are within the **USEPA** acceptable risk range of 1×10^{-6} and 1×10^{-4}. This was found to be true regardless of depth interval (i.e., 0-2 vs. 0-12 ft bgs, or 0-0.5 ft **bgs** for child recreational green space users) to which the potential future receptors were assumed to be exposed, or the assumed exposure scenario [i.e., Reasonable Maximum Exposure (**RME**) or Central Tendency (**CT**)].[2] This indicates that assumed future exposures to Chemicals of Potential Concern (**COPCs**) at the property are unlikely to result in unacceptable carcinogenic risks for the receptors evaluated. However, the cumulative cancer risk estimate of 2×10^{-4} for residents (combined adult and child exposure periods) exposed to arsenic in mixed soil (0-12 ft

[2] CT refers to individuals who have average or typical intake of environmental media. RME refers to people who are at the high end of the exposure distribution (approximately the 95th percentile).

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bgs) for the Reasonable Maximum Exposure (**RME**) scenario exceeds 1 x 10^{-4}. Elevated arsenic concentrations were identified in two areas of the driveway and the test pit 138 location. These elevated arsenic concentrations (in test pit 138 and in the driveway) were driving the overall risk to the residential receptor above the acceptable risk threshold.

Additional risk evaluations were performed to determine the impact on remaining risks when these elevated arsenic areas are removed. The 0-12 ft exposure point concentrations were recalculated by removing the three highest arsenic samples located in the driveway and in test pit 138. The exposure point concentrations for the **RME** and Central Tendency (**CT**) scenarios were 7 mg/kg and 6.2 mg/kg, respectively, which are approximately 8.7 times and 3.5 times lower than Exposure Point Concentration (**EPCs**) used in risk assessment for the 0-12 ft depth interval. Both recalculated EPCs are below the Spring Valley site-specific background level of 12.6 mg/kg for arsenic. Therefore, the cancer risk and hazard level for a resident are expected to be acceptable after removing the elevated arsenic concentrations.

The **Hazard Index** (**HI**) estimated for adult residents, child recreational green space users, and outdoor workers potentially exposed to surface soil (i.e., 0-0.5 ft or 0-2 ft bgs) or mixed soil (0-12 ft bgs) in the future was below the **HI** benchmark of 1 for noncarcinogenic effects [under both the **RME** and **CT** scenarios]. Thus, unacceptable hazards to these future receptors at the property are not expected from assumed exposures to **COPCs** in soil. However, the **HI** estimated for potential future child residents exposed to mixed soil (0-12 ft bgs) at the property exceeds the benchmark of 1 under the **RME** scenario, due to arsenic. This indicates that the assumed exposures to arsenic in mixed soils at the property could result in adverse noncarcinogenic health effects for this receptor. Removal of the arsenic-contaminated soil as described above would similarly reduce the noncarcinogenic **HI** to an acceptable level.

The remaining carcinogenic and non-carcinogenic risks, both due to arsenic, are summarized as follows:

- Combined carcinogenic risk to residents (adult and child) exposed to mixed soil exceeds 1 x 10^{-4}
- Non-carcinogenic HI for child resident (RME) exposed to mixed soil exceeds 1

Mustard (**H**) and Agent Breakdown Products (**ABPs**) were not selected as the COPCs in the Human Health Risk Assessment (**HHRA**) because they were not detected in any of the in-place soil samples; therefore they were not evaluated in the **HHRA**. However, Lewisite (**L**) was selected as a COPC because it was detected in two of the in-place soil samples (near TP 138) at concentrations exceeding the residential screening level, and was quantitatively evaluated in the **HHRA**. The **HHRA** concluded that the **HI** from lewisite (**L**) is less than 1, and therefore, noncarcinogenic health effects are not expected from this potential exposure. **USACE** did not complete the test pits 120 and 134 investigations due to discovery of arsenic

trichloride. Therefore, it is not known whether **agent/ABP** contaminated soil extends beyond the boundaries of the excavation footprint. The **HHRA** concludes that based on finding 25 **CWM** items, 2 **MEC** items, 2 **MD** items, and **AUES**-related glassware during the test pits 120 and 134 investigations, there is a likelihood of encountering **MEC**, containerized **CWM**, **ABPs** and **HTW**-contaminated soil in the uninvestigated areas of test pits 120 and 134.

Groundwater will be investigated and addressed as a separate project as part of the site-wide documentation.

3.2 Munitions and Explosives of Concern Hazard Assessment (MEC HA)

A MEC Hazard Assessment (MEC HA) was performed for 4825 Glenbrook Road. A **MEC HA** evaluates the risk of injury or death from explosive hazards present. Hazard Levels range from 1 to 4, with a Hazard Level of 1 indicating the highest potential explosive hazard conditions and 4 indicating the lowest potential explosives hazard conditions.

Hazards Level Scoring Ranking Table

Hazard Level	Maximum MEC HA Score	Minimum MEC HA Score	Associated Relative Explosive Hazard
1	1,000	840	Highest potential explosive conditions
2	835	725	High potential explosive conditions
3	720	530	Moderate potential explosive conditions
4	525	125	Low potential explosive conditions

Source: MEC HA interim guidance (USEPA 2008)

The qualitative baseline evaluation of potential **MEC** hazards was conducted using the **USEPA MEC HA** method (USEPA, 2008). Historical and field investigation data was used to determine the appropriate inputs and assumptions for the **MEC HA**. Additionally, though the contents of all burial pits identified at the site to date have been removed, for the purposes of the **MEC HA** it was assumed that one or more burial pits potentially remain at 4825 Glenbrook Road, NW. 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). All scenarios evaluated for the **MEC HA** are specific to the **MEC HA** analysis process and are not to be confused with the remedial alternatives discussed later in Sections 5 and 6. The Munitions Response Site (**MRS**) at 4825 Glenbrook Road, NW 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. 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 a Munitions Response Site with "moderate potential explosive hazard conditions." Three remedial scenarios were evaluated in the **MEC HA**: 1) Subsurface Clearance, Future Residential Use; 2) Subsurface Clearance, Land Use Controls (**LUCs**), Future Recreational Use; and 3) No Subsurface Clearance, **LUCs**. The first two **MEC HA** remedial scenarios analyzed reduced the **MEC HA** scores to 355 (Residential Use) and 360 (Recreational Use), respectively, both reducing the site to a Hazard Level 4 (low potential explosive hazard conditions). The final remedial scenario analyzed, which does not include subsurface clearance, would lower the **MEC HA** score to 565, but the Hazard Level of 3 would not be reduced. Again, these remedial scenarios are specific to the evaluation of **MEC** hazards at the 4825 Glenbrook Road, NW site only. These remedial scenarios are not the proposed remedial alternatives for the site.

3.3 Chemical Warfare Materiel (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 conceptual site model (**CSM**) assumed that burial pits could be located by excavating a series of test pits strategically located throughout the property. The investigation results show that **CWM** was found in test pit 138 near the back porch, and test pit 134 near the front door. Both locations are surrounding the house. Burial Pit 3 was also located beside the house. Based on all of the past investigations at the site, there are indications that the developer of the property partially disturbed the original burial pit(s). The materials in portions of Burial Pit 3, were neatly stacked, while the materials surrounding the house appear scattered, indicating that the latter materials were moved during the development of the property.

Mustard, lewisite, and **ABPs** were detected in the vicinity of test pit 138, which is located near the back porch. Mustard, lewisite and **ABPs** were also detected in test pits 120 and 134, with the latter test pits located near the front door of the house. Agent impacted soil detected in the vicinity of test pit 138 was removed and disposed of at an incineration facility. Test pit 138 was cleared of containerized **agent/ABP** and no agent or **ABPs** were detected in the sidewall and floor soil confirmation samples for test pit 138. However, the excavation of test pits 120 and 134 was not cleared of **MEC**, **CWM** containers and **agent/ABPs** impacted soil. Furthermore, no soil confirmation samples were collected, as work on this excavation was halted when arsenic trichloride was discovered in **AUES**-related glassware during the excavation. Therefore, it is unknown whether containerized **CWM** and **agent/ABP** impacted soil extend beyond the boundaries of the excavation containing test pits 120 and 134. Potential risk of encountering **MEC**, containerized **CWM**, **ABPs** and agent/hazardous toxic waste (**HTW**) contaminated soil remains in the uninvestigated area of TPs 120 and 134.

The widespread distribution of contaminants, especially **AUES**-related glassware, suggests that there is the potential for containerized **CWM** and **MEC** to be present outside the specific test pit excavations and contaminated soil grids that were removed.

During the sewer line restoration work completed in January 2011, an intact closed-cavity **AUES** glass flask with a dirt or cork plug, containing a small quantity of brown solids was uncovered in an area adjacent to a previously excavated area in 2001. Lewisite was detected in the solid sample collected from the flask. This discovery further indicates that potential risk exists in uninvestigated areas at the property even though test pits were successfully investigated throughout the property.

3.4 Summary of Risk Assessments

Based on the sampling results and future human health risk associated with 4825 Glenbrook Road, NW USACE has determined active measures are necessary to protect public health or welfare from actual or potential releases of hazardous substances, pollutants or contaminants into the environment. Specifically, there are unacceptable risks for plausible future human receptors due to exposure to **CWM**, arsenic in soils, and **MEC** at 4825 Glenbrook Road, NW. Thus a response action is proposed for the site. Remedial Action Objectives (**RAOs**) were developed by USACE and will be discussed in Section 4.0.

4.0 Scope and Role of the Remedial Action

The proposed response action is expected to meet the **Remedial Action Objective** (**RAOs**) and to be the final CERCLA response action under the FUDS program for the 4825 Glenbrook Road, NW site. The remainder of the SVFUDS site, including potential groundwater issues, will be covered under the site wide documentation.

Combining the **COPCs**, the affected media, the exposure pathways, and the remediation goals, the Remedial Action Objectives for the 4825 Glenbrook Road, NW property include:

- Prevent direct contact with soil having non-carcinogenic hazard index exceeding 1
- Prevent direct contact with soil having a cancer risk in excess of 1 x 10^{-4}
- Reduce **MEC** hazard to a low potential for explosive hazard conditions (Level 4)
- Reduce potential to encounter containerized **CWM** and **AUES**-related items

General response actions are actions that must be taken to satisfy the remedial action objectives for the site. These are developed for each medium of interest and include containment, treatment, excavation or other actions. Volumes or areas of media are identified for which the general response actions might be applicable. The actions consider the requirements for protectiveness, as identified in the remedial action objectives and the chemical and physical characterization of the site.

The areas of the 4825 Glenbrook Road, NW property that require a remedial action are presented in the **RI** Report. However, based on the history of investigations and findings at the site, the relatively small site footprint, and the uncertainty associated with remaining **MEC** and **AUES**-related items, it is recommended that the soil contamination rationale for determining excavation depths be supplemented by administrative and practical considerations. The original

conceptual site model was based on historical information and photographic interpretation. Based on the original conceptual site model, **USACE** assumed that the 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. **USACE** believes materials were distributed across the site based upon the findings in portions of Burial Pit 3. The munitions discovered in these pits were neatly stacked and the materials surrounding the house appeared scattered, indicating that they were moved during development of the property. Consequently, there is a high potential for **MEC/CWM** and **AUES**-related items to be located in areas not completely excavated to bedrock or competent saprolite.

Based on the results of the investigation, **USACE** recommends that areas where there is a high probability that debris may be encountered (i.e., near and, possibly under, the foundation of the house and slightly beyond the backyard retaining wall) be excavated to the depth of bedrock or competent saprolite.

Saprolite is thoroughly decomposed rock formed by in-place chemical weathering. It retains characteristics (such as cross-stratification) that were present in the original rock from which it formed, thus providing a strong indication that man-made activities have not impacted the layer. For this reason saprolite has been used during previous **SVFUDS** investigations to represent the limits of past intrusive activities. For this project, competent saprolite is defined as saprolite that cannot be excavated by hand tools, but can be excavated by powered equipment. Excavation depth calculation conservatively assumes a one-foot layer of competent saprolite overlying the bedrock, even though thicker layers of saprolite have been found at 4825 Glenbrook Road, NW.

Digging to bedrock or competent saprolite will result in an over-excavation of the soil relative to the cleanup goals based on soil contamination alone. However, the proposed excavation depth would also accomplish the goals of removing **AUES**-related items that could contain **CWM** and removing potential **MEC** to achieve a **MEC** Hazard Level 4 (low potential for explosive hazard conditions).

5.0 Summary of Remedial Alternatives

This section presents a summary of the remedial action alternatives developed for 4825 Glenbrook Road, NW to meet the **RAOs**. A detailed analysis, conducted in accordance with **USEPA**'s guidance for conducting an **RI/FS** under **CERCLA**, as presented in the FS, is also included below.

Defined alternatives are evaluated against the short and long-term aspects of three broad criteria: effectiveness, implementability, and cost. Remaining alternatives are evaluated against **USEPA's** nine criteria to address **CERCLA** requirements (see Section 6). The purpose of the screening evaluation at this stage is to reduce the number of alternatives that will

undergo the more thorough and detailed analysis in the next section (Section 6.0), and is therefore, a broader, more general screening.

For the **SVFUDS**, multiple Engineering Evaluation/Cost Analysis (**EE/CAs)** were conducted, each relevant to the 4825 Glenbrook Road, NW situation. The **EE/CAs** presented comprehensive screenings of remedial technologies to address soil contamination. The first **EE/CA** focused on arsenic contaminated soil for Operable Unit 3 (**OU-3**) (USACE 2000). The second **EE/CA** effort, addressing **OU**-4 and **OU**-5, was an **SVFUDS** site-wide analysis of technologies to address arsenic in soil (**USACE** 2003). Both **EE/CAs** concluded that excavation and off-site disposal was the preferred technology to address soil contamination in the **SVFUDS**.

To address those items that can be expected to be encountered in the excavated soil at the property (including **MEC, CWM**, and **AUES**-related items), excavation and off-site disposal would involve excavating soils in areas identified as requiring removal. Soil and **MEC, CWM**, and **AUES**-related items (if present), would be segregated and then transported to an appropriate off-site disposal facility, following characterization in accordance with specific procedures that would be detailed in the Remedial Design/Remedial Action Work Plan.

Excavated soil will be disposed of, consistent with the National Contingency Plan (**NCP**), 40 CFR § 300.440, in a treatment, storage, or disposal facility permitted to receive such material. If the excavated soils are characterized as hazardous for purposes of the Resource Conservation and Recovery Act (**RCRA**), the soils would have to be stabilized by a **RCRA** Subtitle C hazardous waste treatment facility and then deposited in a landfill. If the soils are not characterized as "**RCRA** hazardous," the soil can be disposed of directly into a municipal landfill. Note that the extensive previous experience at the **SVFUDS** suggests that the vast majority of the soil would be characterized as non-hazardous.

Excavated soils characterized as containing **CWM** would go to an incineration facility, with the ash ultimately placed in a **RCRA** Subtitle C landfill.

Aqueous investigation-derived waste, primarily water from equipment or personnel decontamination, will similarly be characterized as **RCRA** hazardous or non-hazardous, and disposed of accordingly.

Munitions Debris (**MD**) from the **SVFUDS** has historically been incinerated prior to landfill disposal. More recently, **MD** has been disposed at a metal smelter facility. All non-munitions, non-**AUES** related scrap items will be disposed in a nonhazardous waste landfill.

MEC, Discarded Military Munitions (**DMM**), including Recovered Chemical Warfare Materiel (**RCWM**), Conventional Discarded Military Munitions and Material Documented as an Explosive Hazard (**MDEH**) recovered during the remedial action will be disposed of in accordance

with **USACE**'s February 2010 *Action Memorandum, Disposal of Discarded Military Munitions (**DMM**), including Recovered Chemical Warfare Materiel (**RCWM**), Conventional **DMM**, and Material Documented as an Explosive Hazard (**MDEH**), Spring Valley Formerly Used Defense Site, Washington, D.C* (hereinafter, "February 2010 Action Memorandum"). The selected removal action for **RCWM** in the action memorandum is on-site demilitarization using the Explosive Destruction System (EDS) at the Spring Valley federal property. The selected removal action for conventional **DMM/MDEH** is on-Site demilitarization using Contained Destruction Technologies at the Spring Valley federal property.

The remedial alternatives were screened against the following broad criteria which are defined as follows:

Effectiveness

This criterion is evaluated with respect to effectiveness in protecting human health and the environment, and providing reduction in toxicity, mobility and volume. The short-term components (construction and implementation period) and long-term components (effective period after the remedial action is complete) are also evaluated.

Implementability

This criterion is evaluated as a measure of both the technical and administrative feasibility of constructing, operating and maintaining a remedial alternative. Technical feasibility is the ability to construct, reliably operate and maintain (as required) an alternative, while administrative feasibility refers to the ability to obtain approvals from regulatory agencies, and the availability of required goods and services.

Cost

The cost of each alternative is also evaluated. For the broad screening, it was not necessary to define the cost with the same level of detail or accuracy required for the detailed analysis (Section 6.0). Prior estimates, sound engineering judgment, and most importantly, real-world site cost experience, are sufficient to help evaluate one alternative against another. **USACE**'s Remedial Action Cost Engineering and Requirements software (RACER™), version 10.4, was used as necessary to supplement these costs.

Five remedial alternatives have been identified for the 4825 Glenbrook Road, NW property:

- Alternative 1: No Further Action
- Alternative 2: Land Use Controls (**LUCs**)
- Alternative 3: Cleanup to residential standards without removing the house; restricted future use (**LUCs**)
- Alternative 4: Remove the house and cleanup to recreational standards; restricted future use (**LUCs**)
- Alternative 5: Remove the house and cleanup to residential standards; unrestricted future use of the property

Note that for Alternatives 3, 4 and 5, as described above, cleanup is defined to be through excavation and off-site disposal of soil as previously discussed above. These remedial alternatives also incorporate/include the selected disposal actions from the February 2010 action memorandum with regard to **MEC, DMM, RCWM**, Conventional **DMM**, and **MDEH**.

A summary discussion of each alternative, with estimated cost and construction timeframe, is included below. Of note, throughout the discussions, "soil" is used to encompass "soil and soil-like material" that can be excavated, handled, and/or transported and disposed as soil, **MEC, CWM**, and **AUES**-related items. Additional detail can be found in the **FS.**

Alternative 1: No Further Action

The National Contingency Plan (**NCP**) requires that a no further action alternative be developed for an FS. The no further action alternative would involve leaving the property in its current condition. This alternative provides a comparative baseline against which other alternatives can be evaluated. Under this alternative, no remedial action will be taken, and any identified contaminants are left "as is," without the implementation of any containment, removal, treatment, or other protective actions. This alternative would leave any **MEC, CWM**, or **AUES**-related items potentially present, in place, without further investigation or removal. This alternative does not provide for the monitoring of soil, additional investigation for or removal of **MEC, CWM**, and **AUES**-related items, and does not provide for any active or passive land use controls to reduce the potential for exposure (e.g., physical barriers, deed restrictions).

Alternative 2: Land Use Controls (LUCs)

The "**LUCs**" alternative would include limiting access to all or portions of the property and would call for environmental covenants, among other controls. Access could be limited in a variety of ways. The success of access limitations would depend on what portions of the property they involve and the effectiveness of their implementation including the cooperation of the regulators, the government, stakeholders, and the current and future property owners.

Options for limiting access include fencing specific areas (e.g., areas known to contain soil contaminations, areas suspected to contain explosive or **CWM** hazards); covering the areas with concrete or brick (e.g., restricting the areas' use as a patio or sitting area); or planting the areas with groundcover plants that do not require routine maintenance. With regard to contaminated soil, these options would prevent physical contact with contaminated soil and reduce or eliminate runoff from contaminated surface soil, thereby reducing the potential spread of contamination. With regard to Munitions and Explosives of Concern (**MEC**), this option would also limit potential encounters with any **MEC** present by preventing people from digging to depths where **MEC** may be encountered.

The **LUCs** alternative would also include the development of environmental covenants to legally bind the current and future property owners to the appropriate access and use restrictions. The environmental covenants would include prohibition of

routine landscaping activities in these areas. Finally, **USACE** would develop a **LUC** plan, which would include a delineation of enforcement and maintenance responsibilities, in coordination with the property owner and local agencies.

Periodic reviews (commonly referred to as "5-year reviews") would be part of this alternative. These generally are required by **CERCLA** when hazardous substances remain on site above levels which permit unrestricted use and unlimited exposure (UU/UE). Periodic reviews provide an opportunity to evaluate the implementation and performance of a remedy to determine whether it remains protective of human health and the environment. The objective is to ensure that USACE is aware of and responds to new information or data that affects the selected response action. A periodic review plan would be prepared describing periodic site visits and stakeholder interviews to determine whether or not the level of risk should be changed. If the level of risk should change, the recommended response alternative would be reviewed to determine if it is still applicable.

Alternative 3: Clean up to Residential Standards without Removing the House; Restricted Future Use (LUCs)
Estimated Cost: $8.5 million
Estimated Construction Timeframe: 29 weeks

Alternative 3 entails cleaning up the property to residential standards to eliminate unacceptable risk to human health and the environment, without removing the house. **LUCs** to prevent contact with the soils beneath the house would limit any subsurface intrusive activities associated with the soil, including excavations in or around the foundation or through the basement slab. These **LUCs** would prevent physical contact with the contaminated soil beneath the house and would also include the development of environmental covenants to legally bind the current and future property owner to the appropriate access and use restrictions.

This alternative would include the excavation of potentially contaminated soil and **MEC, CWM**, and **AUES**-related items from locations around the house, including patios and stairs and hardscapes, up to the building foundation. Shoring and stabilization techniques would be required to ensure the structural integrity of the house, as well as neighboring border fences, retaining walls, etc., when excavating close to those structures. With this alternative, the property would be available for residential use.

In theory, to meet residential standards only and to eliminate unacceptable risk to human health and the environment, only the areas of arsenic-contaminated soil would need to be removed. Additionally, any munitions or **AUES**-related items encountered would be removed, with any debris field encountered fully excavated. As mentioned previously, all **MEC** will be inspected to determine its explosive or **CWM** safety status and disposed of in accordance with the February 2010 action memorandum.

It is proposed that the excavation depth be controlled by the depth of bedrock or competent saprolite, rather than just soil contamination. Although there will be an over-excavation of soil relative to cleanup goals based on soil contamination alone, the proposed excavation depth would also accomplish the goals of removing any **MEC**, **CWM**, and **AUES**-related items and achieving a **MEC** Hazard Level 4 (low potential for explosive hazard conditions). The **MEC HA** evaluated a similar scenario for the property and recommended subsurface MEC clearance to a minimum depth of 12 ft **bgs** throughout the property, a depth assumed to be sufficient to address any remaining burial pits or trenches that could be present at the 4825 Glenbrook Road, NW property. Excavating to bedrock or competent saprolite will exceed that recommended depth (where bedrock is deeper than 12 ft **bgs**). Following excavation, the property would be backfilled to approximate original contour, achieving a residential standard for the soil.

Periodic reviews would also be part of this alternative to ensure that **USACE** is aware of and responds to new information or data that affects the selected response action. A periodic review plan would be prepared describing periodic site visits and stakeholder interviews to determine whether or not the level of risk should be changed. If the level of risk should change, the recommended response alternative would be reviewed to determine whether it should be altered.

Alternative 4: Remove the House and Cleanup to Recreational Standards; Restricted Future Use (LUCs)

Estimated Cost: $12.5 million
Estimated Construction Timeframe: 37 weeks

Alternative 4 entails removing the house at 4825 Glenbrook Road, NW and cleaning up the property to a recreational standard, appropriate for use as a non-residential property (one potential usage, among others, would be a green space). This alternative would incorporate **LUCs** and allow restricted future use of the property.

Implementation of this alternative would include removing the house completely, including the building foundation; excavating contaminated soil and soil containing **MEC, CWM**, and **AUES**-related items from the entire property to a depth determined by the recreational standard, and removing the remaining arsenic hot spots. Using backfill, the property would be landscaped and utilized as a non-residential property (one potential usage, among others, would be a green space). However, in accordance with the conclusions of the **HHRA**, there is no potential risk for recreational receptors. Further, **USACE** used the **MEC HA** to evaluate a similar scenario, recommending subsurface **MEC** clearance to a minimum depth of 3 ft **bgs** throughout the property a depth assumed to be sufficient to address remaining **MEC** down to the recreational standard depth. Therefore, for this alternative, it is proposed that soil be removed to a depth of 4 ft **bgs**.

Conservatively accounting for **MEC** and frost heave conditions, a 4 foot depth would also be sufficient to address most utility repair needs. However, as shown on Figure 4, there are known utilities that are greater than 4 ft **bgs**; the utility corridors would be excavated to the depths shown on the figure. (Note that unless indicated on the figure, utilities are either shallower than 4 ft or have already been cleared through the previous investigations). There are also two remaining areas of soil with arsenic exceeding the 20 mg/kg remediation level that are greater than 4 ft **bgs**; under this alternative, these arsenic soil areas would also be excavated to the depths shown on the figure.

After the remedial action, **LUCs** would be implemented to limit all intrusive activities at the remediated property to no deeper than 4 ft **bgs** (with the exception of utility repair workers). Under this alternative, activities at the property would be limited to non-residential activities (one potential usage, among others, would be a green space) and landscape maintenance (e.g., groundskeeping, etc.). With these particular **LUCs** in effect, fencing would not be necessary.

A periodic review would also be part of this alternative to ensure that USACE is aware of and responds to new information or data that affects the selected response action. A periodic review plan would be prepared describing periodic site visits and stakeholder interviews to determine whether or not the level of risk should be changed. If the level of risk should change, the recommended response alternative would be reviewed to determine if it is still applicable.

Alternative 5: Remove the House and Cleanup to Residential Standards; Unrestricted Future Use
Estimated Cost $13.5 million
Estimated Construction Timeframe: 42 weeks

Alternative 5 entails removing the house at 4825 Glenbrook Road, NW and cleaning up the property to residential standards, and to eliminate unacceptable risk to human health and the environment. Following excavation, the property would be backfilled and landscaped, resulting in a sloped, grassy lot suitable for future residential use.

Implementation of this alternative would include removing the house completely, including the building foundation, and excavating contaminated soil and soil containing **MEC, CWM**, and **AUES**-related items from the entire property. Shoring and stabilization techniques would be required to ensure structural integrity of neighboring border fences, retaining walls, etc., when excavating close to those structures. The property would become a grassy lot, ultimately suitable for full residential use.

In theory, to meet residential standards, only the areas of arsenic-contaminated soil described would need to be removed. Additionally, any munitions or **AUES**-related items encountered would be removed, and any debris field encountered would be fully excavated. All **MEC** will be inspected to determine its explosive or

CWM safety status and disposed of per applicable policy and regulations.

However, as described in Alternative 3, excavation depth will be to bedrock or competent saprolite rather than just to the depth of the soil contamination. Although there will be an over-excavation of soil relative to cleanup goals based on soil contamination alone, the proposed excavation depth would also accomplish the goals of removing any **MEC, CWM**, or **AUES**-related items, and achieving a **MEC** Hazard Level 4 (low potential for explosive hazard conditions). Under this alternative no **LUCs** would be needed.

6.0 Evaluation of Alternatives

The five remedial alternatives were screened against the three broad criteria of effectiveness, implementability and cost. Alternative 1 - No Action, and Alternative 2 – Land Use Controls, did not pass the broad criteria screening and were not retained for further evaluation. The remaining three remedial alternatives were examined in a detailed analysis that was intended to allow decision makers to select the most appropriate remedial action.

During the detailed analysis, each alternative was assessed against the evaluation criteria described to the right. The results compare the alternatives and identify the key tradeoffs among them. This approach was designed to provide decision makers with sufficient information to adequately compare the alternatives, select the appropriate remedy for the site, and demonstrate satisfaction of the **CERCLA** remedy selection requirements.

Nine evaluation criteria have been developed by the **USEPA** to address **CERCLA** requirements and technical and policy considerations that have proven to be important for selecting among remedial alternatives. These criteria serve as the basis for analyzing proposed remedial alternatives to determine the most appropriate alternatives to address remediation. The nine criteria are divided into three categories: threshold, balancing and modifying.

SUMMARY OF EVALUATION CRITERIA

Threshold criteria:
Overall Protectiveness of Human Health and the Environment- alternative must eliminate, reduce, or control threats to public health and the environment.

Compliance with ARARs- alternative must meet Federal and State environmental statutes, regulations, and other requirements that pertain to the site, or a waiver must be justified.

Primary balancing criteria:
Long-term Effectiveness and Permanence- considers the ability of an alternative to maintain protection of human health and the environment over time.

Reduction in Toxicity, Mobility, or Volume through Treatment- evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

Implementability-considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

Short-Term Effectiveness- considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.

Cost- includes the estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of plus or minus 50 percent.

Modifying criteria:
State/Support Agency Acceptance- considers the acceptance of the state or support agency of the preferred alternative.

Community Acceptance- considers the acceptance of the community of the preferred alternative.

*Words and acronyms shown in **bold** lettering are defined in the Acronyms and Abbreviations section and/or the Glossary of Terms attached to this plan.*

Threshold Criteria

Overall Protection of Human Health and the Environment

The most important evaluation is against the threshold criteria, as these must be met. All three alternatives were considered protective of human health and the environment. However, Alternative 5 was the most protective of human health and the environment, because soil and potential **MEC, CWM,** and **AUES**-related items down to bedrock or competent saprolite would be removed.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) and To be considered (TBC) Guidance

Alternatives 3, 4, and 5 would meet **ARARs**, which will be discussed in the final decision document. The **ARARs** were also discussed in detail in the Feasibility Study.

Primary Balancing Criteria

Long-Term Effectiveness and Permanence

With regard to the balancing criteria, Alternative 3 and Alternative 4 were only moderately effective in the long term as residual risk could remain in the soils remaining beneath the house. Alternative 5 was the most effective in the long term as it is a permanent remedy that leaves the least amount of residual risk at the site.

Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

All three alternatives were ranked as moderately favorable with regard to reducing toxicity, mobility and volume of contaminants because excavation and off-site disposal (assuming landfill disposal) does not treat the soil contaminants, but transfers them to a proper landfill (note that **MEC, CWM**, and **AUES**-related items would not be landfilled, but instead would be destroyed in accordance with the February 2010 action memorandum). As assessed by reduction of toxicity, mobility and volume of contaminants at the property, Alternative 5 is the most favorable because soil and potential **MEC, CWM**, and **AUES**-related items are removed to bedrock or competent saprolite.

Short-Term Effectiveness

All three alternatives were ranked favorably with regard to short-term effectiveness as protection of workers and the community, using standard good engineering practice, has been previously achieved for excavation and disposal at this property.

Implementability

Alternative 3 was moderately favorable for the implementability criterion because significant shoring would be required as the excavation nears the house foundation, presenting challenges to the technical feasibility sub-criterion. The administrative feasibility sub-criterion is also moderately favorable in that it will require extensive coordination with the property owner,

regulatory agencies and surrounding community members. Alternatives 4 and 5 were ranked as favorable overall for the implementability criterion because technical feasibility and availability of materials and services are well established for excavation and disposal in the **SVFUDS**; however, Alternative 4 was only moderately favorable for the sub-criterion of administrative feasibility because of the coordination requirements with the property owner and supporting agencies to obtain approval as greenspace or a neighborhood park. With regard to the implementability of **LUCs** and/or negotiating access terms for the real estate, the difficulty level for Alternatives 3, 4 and 5 are relatively equivalent to each other.

Cost

Costs generally are a function of volume of soil to be removed and the procedure required to perform the excavation, i.e., low or high-probability. Excavation under high-probability protocols is more costly than working under low–probability conditions. While all three alternatives include both low and high-probability excavation, Alternative 5 is the most costly of the three alternatives based on the total volume of removal, including soils and house removal. Alternative 3 was the least costly, differing from Alternative 5 in the cost of house removal and excavation of soil beneath the house; Alternative 3 would require excavation of approximately one-half the high-probability soil volume compared to Alternative 5. Alternative 4 falls between the other two alternatives with regard to cost, but is relatively close to Alternative 5 in cost because the high-probability soil volume to be excavated under Alternative 4 is just slightly less than for Alternative 5.

Modifying Criteria

State/Support Agency Acceptance

DDOE is the State agency and **USEPA** Region III is the Federal regulatory agency. **DDOE** and the **USEPA**'s comments will be formally evaluated after the regulatory comment period for this Proposed Plan. Therefore, these modifying criteria have not been included in this analysis, but will be included following review and input from those parties.

Community Acceptance

Community acceptance cannot be fully assessed until comments are processed following the public review period on the **RI/FS** Reports and the Proposed Plan. Community acceptance of the preferred alternative will be evaluated based on comments received during the public comment period. Comments will be considered and addressed in the Responsiveness Summary, which will be part of the Decision Document (**DD**) that presents the selected remedial alternative for approval by the Department of the Army.

7.0 Summary of Preferred Alternative

Alternative 5, Removing the House and Cleaning up to Residential Standards with Unrestricted Future Use, is the recommended remedial action alternative. While it is the most expensive alternative, it was ranked as favorable in five out of six of the nine criteria that were

ranked (not including the two modifying criteria and cost criterion). The other two alternatives carried over for the detailed analysis have fewer criteria ranked as favorable. Only Alternative 5 was ranked as favorable for the critical long-term effectiveness criterion that leaves the least amount of residual risk at the site. It is protective of human health and the environment, highly implementable, addresses community concerns by removing hazardous materials from the site and allows for unrestricted use of the property for a future urban resident. Alternative 5 provides the best long term solution for the property by minimizing potential for future risk at the site. Figure 3 illustrates the excavation boundaries for Alternative 5.

Area A represents the backyard, 10 feet behind the current retaining wall, representing a realistic practical extent of possible redistribution of burial pit contents during property development. The area depicted represents a 10 foot wide zone of excavation from the retaining wall to the back of the property. Additionally, the depth of excavation will be 2 feet below the retaining wall footers and/or to competent saprolite or bedrock. The delineation of Area A takes into account the estimated area of disturbance by the developer to re-route the sanitary sewer line behind the backyard retaining wall. Based on the depth of the sanitary sewer line, which is 6 feet, and the location of the sanitary sewer line which is approximately 2 feet east of the retaining wall, plus the assumption of an excavation approach using benching and sloping, the potentially disturbed area is approximately 9 feet behind the retaining wall. Additional excavation may be warranted if debris is encountered in Area A. In that case, any debris fields would be cleared in accordance with the procedures outlined in the Remedial Design/Remedial Action Work Plan (to be prepared) until no additional debris is encountered, at which point the excavation of the area would be considered complete.

Area B represents the flat of the driveway. Area C includes the area worked as Burial Pit 3 and its associated extensions, and based on the extensive work performed previously, no further action is proposed there. Area D is the flat terrain between the retaining wall and the house, while Area F is the front yard down to Glenbrook Road. Area E represents the house and the soil beneath, with the removal of the house (if determined to be necessary) as a low-probability operation while the excavation of the foundation and the soil beneath would be done under high-probability protocols.

Costs for Alternative 5 are estimated at $13,500,000. The estimated time to complete the cleanup, assuming no funding constraints, is approximately 42 weeks. Of note, the time to complete this (or any) alternative is dependent on USACE funding, which is appropriated annually from Congress. If the project can be completed sooner, overall costs are likely to be less. Conversely, if the schedule is extended, overall costs are likely to increase. A more detailed schedule and cost estimate will be developed as a part of the remedial design phase of the action.

The preferred alternative (Alternative 5) provides a reasonable balance among the alternatives identified in the FS. It is protective of human health and the environment, highly implementable, addresses community concern by removing materials from the site and allows for unrestricted use of the property for a future urban resident.

Summary of Detailed Analysis of Remaining Alternatives

	Screening Criterion	Alternative 3: Cleanup to Residential Standards Without Removing the House; LUCs	Alternative 4: Remove the House and Cleanup to Recreational Standards; LUCs	Alternative 5: Remove the House and Cleanup to Residential Standards; Unrestricted Use
Threshold	Overall Protection of Human Health and Environment	●	●	●
	Compliance with ARARs	●	●	●
Balancing	Long-Term Effectiveness	◑	◑	●
	Reduction of Toxicity, Mobility and Volume Through Treatment[1]	◑	◑	◑
	Short-Term Effectiveness	●	●	●
	Implementability	◑	●	●
	Technical Feasibility	◑	●	●
	Administrative Feasibility	◑	◑	●
	Availability of Materials and Services	●	●	●
	Cost[2]	**$6.5-$8.5 million**	**$10.5-$12.5 million**	**$11.5-$13.5 million**
Modifying[3]	Regulator Acceptance	TBD	TBD	TBD
	Community Acceptance	TBD	TBD	TBD
	Recommended			●

● Favorable ('YES' for threshold criteria)

◑ Moderately Favorable

◯ Not Favorable ('NO' for threshold criteria)

1 – While excavation and landfill disposal reduce toxicity, mobility, and volume at the property, the statutory preference is permanent reduction through treatment; therefore, this criterion is not assessed as 'Favorable', even where excavation goes to bedrock or competent saprolite.

2 - Costs are detailed in Appendix B.

3 – The Modifying criteria of regulator and community acceptance are 'To Be Determined' following review and input from these parties.

*Words and acronyms shown in **bold** lettering are defined in the Acronyms and Abbreviations section and/or the Glossary of Terms attached to this plan.*

8.0 Community Role in Selection Process

USACE provides information regarding the cleanup of the 4825 Glenbrook Road, NW site to the public and nearby residents and workers through dedicated community outreach staff working side-by-side with project personnel. Collectively, the USACE Spring Valley project team responds to community inquiries daily and through a 24-hour telephone answering service, as well as meets with concerned and impacted residents on a regular basis. The team provides monthly project updates via e-mail, distribution lists, mails quarterly newsletters to all addresses within the project area and the interested public at large, and when warranted, the project team sends unscheduled updates, newsletters and press releases to a diverse list of stakeholders. Since 2001, the project team has supported the Spring Valley Restoration Advisory Board (**RAB**) meetings (10 per year), as well as small group briefings and public meetings to discuss significant milestones and issues of concern. These meetings are well advertised in local papers, local electronic community bulletin boards, and through mailed newsletters and postcards sent by the **USACE** Public Affairs Office. The Administrative Record for the site, the **USACE** website and a local information repository at the neighborhood library provide easy access to historical and current documents on the project progress. Through all these outreach mechanisms, **USACE** encourages public input to ensure that the remedy selected for 4825 Glenbrook Road, NW meets the needs of the impacted community, in addition to being an effective technical solution to the problem.

Although **Alternative 5, Removing the House and Cleaning up to Residential Standards with Unrestricted Future Use, is the recommended remedial action alternative, USACE** specifically invites comments from the community and other interested parties not only on the preferred alternative, but also on the acceptability of all the alternatives identified in the Feasibility Study (**FS**). Public comments that support an alternative other than the preferred action, or that suggest effectiveness or efficiency improvements to a presented alternative, will be given appropriate consideration in the final selection process. Therefore, **USACE** strongly encourages public comments concerning all the alternatives presented in the 4825 Glenbrook Road, NW Proposed Plan. The dates for the public comment period, the date, location, and time of the public meeting, and the variety of ways to access copies of the Proposed Plan and supporting documents are provided in the box on the next page.

At the public meeting, the results of the Remedial Investigation and the Feasibility Study will be discussed along with a summary of the preferred remedy. Attendees may bring written comments to officially submit or provide oral comments to the meeting recorder in the area reserved for this purpose. Written comments may also be mailed to the **USACE** address below throughout the public comment period. Comments will be summarized and responses provided in the responsiveness summary section of the Decision Document (**DD**). The **DD** will be USACE's official record of the final remedy selection or 4825 Glenbrook Road, NW, that will be submitted for approval by the Department of the Army.

PUBLIC COMMENT PERIOD
October 3, 2011 – November 12, 2011

PUBLIC MEETING
To be held on Wednesday, October 26, 2011, from 6:30 - 8 p.m., at the
D.C. Public Library, Tenley-Friendship Library Branch, 4450 Wisconsin Ave. N.W. Washington, DC 20016

OPEN HOUSE
To be held on Wednesday, October 26, 2011, from 4 - 5 p.m. and 8 – 9 pm, at the D.C. Public Library, Tenley-Friendship Library Branch, 4450 Wisconsin Ave. N.W. Washington, DC 20016

ADMINISTRATIVE RECORD FILE / DOCUMENT REPOSITORIES:

1. Administrative Record:
   U.S. Army Corps of Engineers,
   Baltimore District (10200-C)
   10 South Howard Street
   Baltimore, MD 21201
   Attn: Spring Valley Outreach Team
   410-962-0157

2. Information Repository:
   D.C. Public Library, Reference Desk
   Tenley-Friendship Library Branch
   4450 Wisconsin Ave. N.W.
   Washington, DC 20016
   202-727-1488

3. View the Proposed Plan and supporting documents online at:
http://www.nab.usace.army.mil/Projects/Spring%20Valley/index.html

Or request a copy from the community outreach team at **410-962-0157.**

FOR FURTHER INFORMATION CONTACT:
Brenda Barber, Project Manager
U.S. Army Corps of Engineers, Baltimore District (10040-B)
10 South Howard Street
Baltimore, MD 21201
(410) 962-0030
Brenda.m.barber@usace.army.mil

*Words and acronyms shown in **bold** lettering are defined in the Acronyms and Abbreviations section and/or the Glossary of Terms attached to this plan.*

ACRONYMS and ABBREVIATIONS

ARARS	Applicable or Relevant and Appropriate Requirements
AsCl3	Arsenic Trichloride
ABP	Agent Breakdown Product
AU	American University
AUES	American University Experiment Station
Bgs	Below Ground Surface
USACE	U.S. Army Corps of Engineers, Baltimore District
CA	Chemical Agent
CAFS	Chemical Agent Filtration System
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	Contaminant of Potential Concern
CWM	Chemical Warfare Materiel
CT	Central Tendency
CSM	Conceptual Site Model
DA	Department of the Army
DDOE	District Department of the Environment
DMM	Discarded Military Munitions
DoD	Department of Defense
ECS	Engineering Control Structure
EE/CA	Engineering Evaluation/Cost Analysis
EPC	Exposure Point Concentration
Ft	Feet
FUDS	Formerly Used Defense Site
H	Mustard
HTW	Hazardous and Toxic Waste
HHRA	Human Health Risk Assessment
L	Lewisite
LUC	Land Use Control
MDEH	Material Documented as an Explosive Hazard
MEC	Munitions and Explosives of Concern
MEC HA	MEC Hazard Assessment
MRS	Munitions Response Site
OU	Operable Unit
Partners	Spring Valley Partners
RAB	Restoration Advisory Board
RCWM	Recovered Chemical Warfare Materiel
RAO	Remedial Action Objective
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RCRA	Resource Conservation and Recovery Act
SVFUDS	Spring Valley Formerly Used Defense Site
SVOC	Semivolatile Organic compound
TAL	Target Analyte List

*Words and acronyms shown in **bold** lettering are defined in the Acronyms and Abbreviations section and/or the Glossary of Terms attached to this plan.*

USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compound

GLOSSARY OF TERMS

Agent Breakdown Product (ABPs): Those chemicals resulting from partial decomposition or chemical breakdown of chemical agents. For SVFUDS, these include:
o Dithiane, oxathiane, and thiodiglycol, which are ABPs of mustard.
o Chlorovinylarsenous oxide (CVAO) and chlorovinylarsenous acid (CVAA), which are ABPs of lewisite.

Administrative Record: A collection of documents containing all the information and reports generated during the entire phase of investigation and cleanup at a site, which are used to make a decision on the selection of a response action under CERCLA. This file is to be available for public review and a copy maintained near the site at the Tenley-Friendship Library.

Applicable or Relevant and Appropriate Requirements (ARARs):

Pursuant to the NCP, 40 C.F.R. § 300.5, a regulation may qualify as an ARAR if it meets the definition of being either "applicable" or "relevant and appropriate." Each of these components is discussed below.

"Applicable" requirements means those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable.

"Relevant and appropriate" requirements means those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal environmental or state facility siting laws that, while not applicable to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a site, address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the particular site. Only those state standards that are promulgated, are identified by a state in a timely manner, and are more stringent than federal requirements may be relevant and appropriate. Pursuant to the NCP, the term "State" includes the District of Columbia (DC). 40 C.F.R. § 300.5.

Chemicals of Potential Concern (COPCs): Chemicals identified through the risk assessment process as the primary chemicals that may cause unacceptable human health and/or ecological risk.

GLOSSARY OF TERMS
(Continued)

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A Federal law passed in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA) that concerns hazardous substances.

Chemical Warfare Materiel: Chemical munitions and/or chemical agent in an other than munitions configuration

Decision Document (DD): A public document that describes the cleanup action or remedy selected for a site, the basis for the choice of that remedy, and responds to public comments. The DD is based on information and technical analysis generated during the RI/FS.

Disposal Pits: Areas within impact areas and/or buffer zones where munitions that were fired and scrap material have been collected and buried.

Discarded Military Munitions (DMM): Military munitions that have been abandoned without proper disposal or removed from storage in a military magazine or other storage area for the purpose of disposal. The term does not include unexploded ordnance, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of, consistent with applicable environmental laws and regulations. (10 U.S.C. 2710(e)(2))

Explosive Safety Risk: The probability for a MEC item to detonate and potentially cause harm to people, property, the environment, or operational capability and readiness as a result of human activities. An explosive safety risk exists if a person can come into contact with a MEC item and act upon it to cause detonation. The potential for an explosive safety risk depends on the presence of three critical elements: a source (presence of MEC), a receptor or person, and interaction between the source and receptor (such as picking up the item or disturbing the item by plowing). There is no explosive safety risk if any one element is missing.

Exposure Pathway: Describes the course a chemical or physical agent takes from the source to the exposed individual. Elements of the exposure pathway are: (1) the source of the released chemical or physical agent; (2) the contaminated medium (e.g., soil); (3) a point of contact with the contaminated medium; and (4) an exposure route (e.g., ingestion, inhalation) at a contact point.

Feasibility Study (FS): The FS serves as the mechanism for the development, screening, and detailed evaluation of alternative remedial actions.

Hazardous and Toxic Waste: A term in general use by the U.S. Army Corps of Engineers; it refers to any waste in the environment that could pose a hazard to human health or the environment. Often there are federal or state regulations that will address this waste, but not always.

GLOSSARY OF TERMS
(Continued)

Land Use Controls (LUCs): Physical, legal, or administrative mechanisms that restrict the use of, or limit access to, real property, to prevent or reduce risks to human health and the environment.

Material Documented as an Explosive Hazard (MDEH): Material potentially presenting and explosive hazard that cannot be documented as safe, that has been assessed and documented as to the maximum explosive hazards that the material is known or suspected to present, and for which the chain of custody has been established and maintained.

Munitions Debris (MD): Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization or disposal.

Munitions and Explosives of Concern (MEC): This term distinguishes specific categories of military munitions that may pose unique explosive safety risks, including:

- UXO,
- DMM, or
- Munitions constituents.

Proposed Plan: The purpose of the proposed plan is to supplement the RI/FS and provide the public with a reasonable opportunity to comment on the preferred alternative for remedial action, as well as alternative plans under consideration, and to participate in the selection of remedial action at a site.

Recovered Chemical Warfare Materiel (RCWM): CWM used for its intended purpose or previously disposed of as waste, which has been discovered during a CWM response or by chance (e.g., accidental discovery by a member of the public), that DoD has either secured in place or placed under DoD control, normally in a DDESB-approved storage location or interim holding facility, pending final disposition.

Remedial Action:
Those actions consistent with permanent remedy taken instead of or in addition to removal actions in the event of a release or threatened release of a hazardous substance into the environment, to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health, welfare or the environment.

Remedial Action Objective (RAO): Objectives established for remedial actions to guide the development of alternatives and focus the comparison of acceptable remedial action alternatives, if warranted. RAOs also assist in clarifying the goal of minimizing risk and achieving an acceptable level of protection for human health and the environment.

GLOSSARY OF TERMS
(Continued)

Remedial Investigation (RI): A study of a site that provides information supporting the evaluation for the need for a remedy and/or selection of a remedy for a site where hazardous substances have been disposed of. The RI identifies the nature and extent of contamination at the facility.

Removal Action: The cleanup or removal of released hazardous substances from the environment. Such actions may be taken in the event of the threat of release of hazardous substances into the environment, as these actions may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances, the disposal of removed material. Taking other actions may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release.

Restoration Advisory Board (RAB):
A Restoration Advisory Board (RAB) is a forum for the discussion and exchange of information between the affected community, representatives of the Department of Defense (DoD), regulators, state, local governments, and tribal governments. RABs provide an opportunity for stakeholders to have a voice and actively participate in the review of technical documents, to review restoration progress, and to provide individual advice to decision makers regarding restoration activities at FUDS Properties and Projects.

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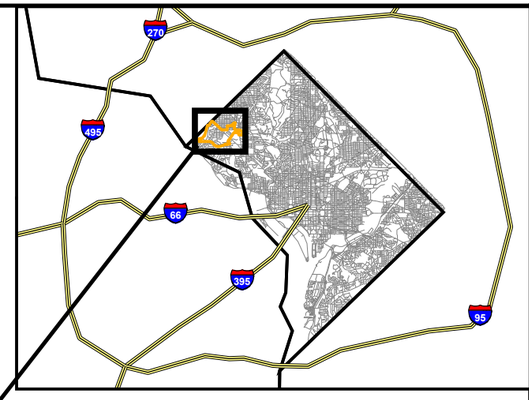
APPENDIX A

LIST OF FIGURES

Figure 1-1
Spring Valley FUDS Location and Operable Units

Spring Valley
Washington, D.C.



Westmoreland Circle

Federal Property

Federal Property Storage Area

Dalecarlia Parkway

Loughboro Road

Van Ness Street

Nebraska Avenue

4825 Glenbrook Rd.

4801 Glenbrook Rd.

Legend

- Buildings
- Road
- Federal Property
- Federal Property Storage Area

Operable Unit
- OU-2
- OU-3
- 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).

1,200 600 0 1,200 Feet

Scale:	
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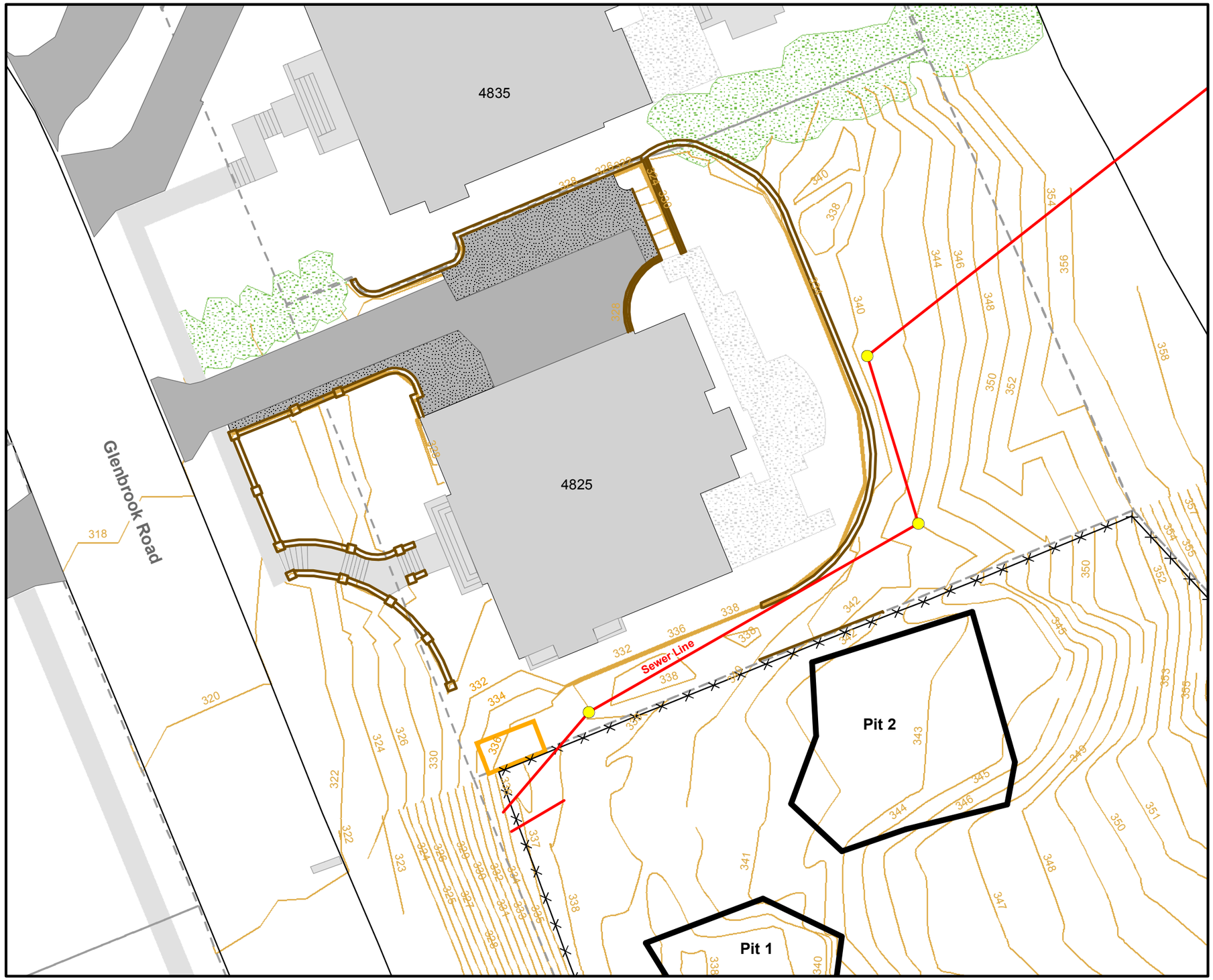
File:	20030825 SV FUDS Location & Operable Units_11x17.mxd
Date:	10/15/2009
Figure Number:	1-1
Page Number:	1-9

N W E S

PARSONS

Figure 1-2
Site Map
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
- Manhole
- Sewer Line
- Elevation Contours

0 10 20 40 Feet

1 inch = 20 feet

Scale:	1:360
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File:	20051221_4825 Glenbrook Rd Site Layout-11x17.mxd
Date:	5/1/2007
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Page Number:	1-10

PARSONS

Figure 1-3
Historical Sampling
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).

0 10 20 40 Feet

1 inch = 20 feet

Scale:	1:240
Created By:	Parsons
File:	20101004 4825 Glenbrook Historic Soil Sampling.mxd
Date:	10/4/2010
Figure Number:	1-3
Page Number:	1-11

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Low-Probability
High-Probability

4835

A

B

C (NO FURTHER ACTION)

D

E

4825

F

Kreeger Music Roadway

4825 Glenbrook Road Property Line

Glenbrook Road

Pit 2

Pit 1

	Area (ft^2)	Depth (ft)	Calculated Soil Volume (yd^3)
Area A	1,109 ft^2	7 ft	**288 (yd^3)**
Area B	2,786 ft^2	5 ft	**516 (yd^3)**
Area C	No Further Action		
Area D	2,202 ft^2	4 ft	**326 (yd^3)**
Area E	3,260 ft^2	5 ft	**604 (yd^3)**
Area F	2,478 ft^2	5 ft	**459 (yd^3)**
		TOTAL	**2,193 (yd^3)**

Response Action Areas at 4825 Glenbrook Road

Spring Valley FUDS
Washington, DC

Legend

- Property Boundaries
- Buildings
- 20' Grid
- Pit 2 (POI-24R)
- Sewer Line

Arsenic Soil

- Arsenic Grid to be Excavated
- Arsenic Grid Previously Removed [6'] (2009)
- Arsenic Grid Previously Removed [5'] (2009)

Note: Arsenic Grids Previously Removed that were excavated to 4' deep or less are labeled accordingly.

Soil Excavation

- Excavation Depth [3.5'] (2009)
- Excavation Depth [4'] (2010)
- Excavation Depth [5'] (2010)
- Excavation Depth [6'] (2010)
- Excavation Depth [6.5'] (2009)

0 10 20 40 Feet

1 inch = 20 feet

N

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Date: July 2011