FINAL

SITE-WIDE WORK PLAN
SPRING VALLEY FORMERLY USED DEFENSE SITE

SPRING VALLEY, WASHINGTON, D.C.
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SITE-WIDE WORK PLAN

FOR THE

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

Prepared for:

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and

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ACRONYMS AND ABBREVIATIONS

Acronym	Definition
ABP	Agent Breakdown Product
A/E	architectural/engineering
AEGL	Acute Exposure Guideline Level
AHA	Activity Hazard Analysis
AHF	Assessment Holding Facility
AIDS	Acquired Immune Deficiency Syndrome
AIHA	American Industrial Hygiene Association
AOI	Area of Interest
APG	Aberdeen Proving Ground
APP	Accident Prevention Plan
AR	Army Regulation
ARARs	Applicable, Relevant and Appropriate Requirements
ARB	Anomaly Review Board
ASTM	American Society of Testing and Materials
ATF	Bureau of Alcohol, Tobacco, and Firearms
AU	American University
AUES	American University Experiment Station
BIP	Blow in Place
CA	Chemical Agent
CACM	Chemical Agent Contaminated Material
CADD	Computer Aided Design and Drafting
CAFS	Chemical Agent Filtration System
CASHPAC	Chemical Agent Safety and Health Policy Action Committee
CENAB	U.S. Army Corps of Engineers, Baltimore District
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CG	Phosgene
CGI	Combustible Gas Indicator
CK	Cyanogen Chloride
CPR	Cardiopulmonary resuscitation
CPUs	Chemical Protective Undergarments
CRZ	Contamination Reduction Zone
CSS	Chemical Safety Submission
CTF	Chemical Transfer Facility
CVAA	Chlorovinylarsenous acid
CVAO	Chlorovinylarsenous oxide
DA	Department of the Army
DAAMS	Depot Area Air Monitoring System

ACRONYMS AND ABBREVIATIONS (CONT.)

Acronym	Definition
DDESB	Department of Defense Explosives Safety Board
DC	Diphenylcyanoarsine
DDOE	District of Columbia Department of the Environment
DERP	Defense Environmental Restoration Program
DGM	Digital Geophysical Mapping
DID	Data Item Description
DOD	Department of Defense
DOI	Department of the Interior
DOT	Department of Transportation
DQCR	Daily Quality Control Report
DQO	Data Quality Objective
ECBC	Edgewood Chemical Biological Center
ECBL	Environmental Chemistry Branch Laboratory
ECS	Engineering Control Structure
ECL	Electrochemiluminescence
EE/CA	Engineering Evaluation/Cost Analysis
EM	Engineer Manual
EMT	emergency medical technician
EOD	Explosives ordnance disposal
EPDS	Emergency Personnel Decontamination Station
EPP	Environmental Protection Plan
ERCP	Emergency Response and Contingency Plan
EZ	Exclusion Zone
FFP	Firm-Fixed Price
FGDC	Federal Geographic Data Committee
FUDS	Formerly Used Defense Site
GFCI	Ground fault circuit interrupter
GFE	Government Furnished Equipment
GIS	Geographic Information System
GPO	Geophysical Prove-out
GPR	Ground Penetrating Radar
H	Mustard agent
HAZWOPER	Hazardous Waste Operations and Emergency Response
HE	High explosives
HEPA	High efficiency particulate air
HTW	Hazardous and Toxic Waste
IAW	In Accordance With
IBD	Inhabited Building Distance
IDLH	Immediately Dangerous to Life or Health

ACRONYMS AND ABBREVIATIONS (CONT.)

IDW	Investigation Derived Waste
IHF	Interim Holding Facility
ILD	Intra-line Distance
INEL	Idaho National Engineering Laboratory
L	Lewisite
LAWP	Local Approved Work Plan
LDR	Land Disposal Restriction
MACS	Modular Aluminum Containment Structure
MARB	Munitions Assessment Review Board
MAP	Mobile Analytical Platform
MC	Munitions Constituents
MCE	Maximum Credible Event
MEC	Munitions and Explosives of Concern
MD	Munitions Debris
MGFD	Munition with the Greatest Fragmentation Distance
MHF	MARB Holding Facility
MINICAMS	Miniature Continuous Air Monitoring System
MMAS	Mobile Munitions Assessment System
MM CX	Military Munitions Center of Expertise
MR	Munitions Response
MRC	Multiple Round Container
MRS	Munitions Response Site
MSD	Minimum Separation Distance
MSDS	Material Safety Data Sheet
NCP	National Contingency Plan
NEW	Net Explosive Weight
NFA	No Further Action
NIOSH	National Institute for Occupational Safety and Health
NTCRA	Non-time Critical Removal Action
OE	Ordnance and Explosives
OSHA	Occupational Safety and Health Administration
OSR	Operation Safe Removal
PAED	Public Access Exclusion Distance
PDS	Personnel Decontamination Station
PDT	Project Delivery Team
PEL	Permissible Exposure Limit
PID	photoionization detector
PINs	Portable Isotopic Neutron Spectroscopy
PM	Project Manager
PMNSCM	Product Manager for Non-Stockpile Chemical Materiel
POI	Point of Interest

ACRONYMS AND ABBREVIATIONS (CONT.)

PPE	Personal Protective Equipment
PPP	Public Protection Plan
PS	Chloropicrin
PSHM	Project Safety and Health Manager
PSR	Project Status Report
PTR	Public Traffic Route
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
Q-D	Quantity-Distance
QCM	Quality Control Manager
QCP	Quality Control Plan
QSM	Quality System Manual
RAM	Random Access Memory
RCRA	Resource Conservation and Recovery Act
RCWM	Recovered Chemical Warfare Materiel
RDECOM	Research Development and Engineering Command
RI/FS	Remedial Investigation/Feasibility Study
RMSF	Rocky Mountain Spotted Fever
ROE	Right of Entry
RQ	Reportable Quantity
SA	Arsine
SAP	Sampling and Analysis Plan
SAR	supplied air respirator
SCBA	self-contained breathing apparatus
SDA	Small Disposal Area
SDSFIE	Spatial Data Standard for Facilities, Infrastructure and Environment
SDTS	Spatial Data Transfer Standard
SOP	Standard Operating Procedure
SOW	Statement of Work
SHARP	Safety, Health, and Risk Program
SSHP	Site Safety and Health Plan
SSHO	Site Safety and Health Officer
SSWP	Site-Specific Work Plan
STEL	Short-term Exposure Limit
SUXOS	Senior UXO Supervisor
SVFUDS	Spring Valley Formerly Used Defense Site
SVOCs	Semi-Volatile Organic Compounds
SZ	Support Zone
T&M	Time and Materials
TBC	To Be Considered

ACRONYMS AND ABBREVIATIONS (CONT.)

TBD	To Be Determined
TCLP	Toxicity Characteristic Leaching Procedure
TCRA	Time-critical removal action
TD	Technical Director
TE	U.S. Army 22nd Chemical Battalion (Technical Escort)
TLV	Threshold Limit Value
TPP	Technical Project Planning
TWA	Time-weighted average
UNO	United Nations Organization
USACE	U.S. Army Corps of Engineers
USAESCH	U.S. Army Engineering and Support Center, Huntsville
USATCES	U.S. Army Technical Center for Explosives Safety
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
UTM	Universal Transverse Mercator
UXO	Unexploded Ordnance
UXOQCS	UXO Quality Control Specialist
UXOSO	UXO Safety Officer
VCS	Vapor Containment Structure
VOCs	Volatile Organic Compounds
WBGT	Wet bulb globe temperature
WP	Work Plan
WPL	Worker Population Limit

CHAPTER 1
INTRODUCTION

1.1 PROJECT AUTHORIZATION

1.1.0.1 Under Contract No. W912DY-04-D-0005 Delivery Order 0007, Parsons is serving as the prime contractor to the U.S. Army Engineering and Support Center, Huntsville (USAESCH) for the site-wide intrusive activities at the Spring Valley Formerly Used Defense Site (SVFUDS). This project falls under the Defense Environmental Restoration Program/Formerly Used Defense Sites (DERP/FUDS). The Project Team will consist of Parsons, USAESCH, and U.S. Army Corps of Engineers (USACE), Baltimore District (CENAB) as well as other government and non-government agencies with specific expertise for implementation of specialized components of the field operations. For purposes of this Site-Wide Work Plan (WP) USAESCH and CENAB are referred to jointly as "USACE."

1.1.0.2 This Site-Wide WP applies to site-wide activities related to intrusive investigation within the approximately 668 acres of the SVFUDS. This Site-Wide WP describes in detail the procedures, methods, organization, and resources that Parsons will use to achieve the project objectives described in the Statement of Work (SOW), dated November 1, 2004 (Appendix A). The Site-Wide WP has been prepared consistent with the Data Item Description (DID) MR-001, *Type I Work Plan*, as applicable, and includes additional information necessary to address Recovered Chemical Warfare Materiel (RCWM) investigations. The Site-Wide WP is intended to be an all-inclusive document tailored to address all foreseeable potential investigation actions at various sites throughout the SVFUDS, consequently, this Site-Wide WP may include discussions of procedures and methods that may not apply to a specific site and its associated scope of work. For this reason, a Site-Specific Work Plan (SSWP) will be prepared for each individual site to be addressed at the SVFUDS to augment the Site-Wide WP. These SSWPs will reference the applicable components of the Site-Wide WP but the content will focus on site-specific objectives, information and requirements, procedural decisions, and/or omissions from the site-wide documents. In addition, this Site-Wide WP is a document that will be updated and amended as necessary. A dated summary page listing all revised pages will document the associated changes and will be included with each revision.

1.1.0.3. This Site-Wide WP includes discussions on procedures and methods for conducting investigations at both suspected "RCWM sites" and "non-RCWM sites" at the SVFUDS. A site may be determined to be "non-RCWM" by a USACE probability assessment in accordance with (IAW) the Applicability Memorandum of the *Interim Guidance for Biological Warfare Materiel (BWM) and Non-stockpile Chemical Warfare Materiel (CWM) Response Activities* (Department of the Army Memorandum, September 1997), hereafter referred to as the "Interim Guidance." A probability assessment will be conducted for each planned investigation at the SVFUDS.

1.1.0.4 If the site-specific USACE probability assessment performed IAW the Interim Guidance determines that the probability of encountering munitions and explosives of concern (MEC) and RCWM is "frequent", "likely", or "occasional", then the site will be considered a potential RCWM site and the Interim Guidance will apply. In this case, safety measures such as agent air monitoring and on-site medical support will be required IAW USACE guidance.

1.1.0.5 However, if the site-specific USACE probability assessment determines that the probability of encountering MEC/RCWM is "seldom" or "remotely possible", the Interim Guidance will not apply. In that case, the District Commander or designated representative may assume the risk of proceeding with the investigation as a non-RCWM site. Sites that are determined to be "non-RCWM" in this manner may still have chemical agent present and certain measures (e.g., a contingency plan) will still be implemented to protect workers and the public. In the event that evidence of potential MEC/RCWM is encountered during the investigation of a non-RCWM site, the probability assessment will be revisited by USACE to determine whether the previous findings should be revised.

1.1.0.6 For the purposes of investigations at the SVFUDS, non-RCWM sites are referred to as "low probability" sites, while suspect RCWM sites are referred to as "higher probability" sites. The results of the USACE probability assessment and the nature of the anomalies to be investigated will be stated in the SSWP for each individual project site.

1.1.0.7 This Site-Wide WP describes the methods and procedures to be implemented for investigations of both low probability anomalies and higher probability anomalies at the SVFUDS. In many cases, the methods and procedures required are identical for activities relating to both investigations. However, where the required steps differ between the two types of investigations, the necessary methods and procedures are described separately for the investigation of either low probability anomalies or higher probability anomalies.

1.2 PURPOSE AND SCOPE

1.2.0.1 The objectives of the SVFUDS intrusive investigation are to:

1. Determine if chemical agent (CA), agent breakdown products (ABPs), or SVFUDS-related disposal areas exist in areas identified by the Spring Valley Partners;
2. Remove any MEC/potential RCWM, munitions debris (MD), laboratory wastes, and other debris attributed to past SVFUDS activities;
3. Resolve any anomalies or anomalous areas identified by the Spring Valley Anomaly Review Board (ARB); and
4. Collect data, as appropriate, to characterize investigated areas for the SVFUDS over-arching Remedial Investigation/Feasibility Study (RI/FS).

1.2.0.2 A variety of data will be collected to meet the objectives of the investigation and they will include site visits, field reconnaissance, munitions constituent (MC) sampling (CA and ABPs), geophysical surveys and intrusive investigations, or some combination of these tasks.

1.3 WORK PLAN ORGANIZATION

1.3.0.1 This Site-Wide WP covers the investigation and all associated preparatory activities necessary for intrusive investigation activities at the SVFUDS. The Site-Wide WP is organized to address each of the components of the SOW IAW DID MR-001 (Type I Work Plan) and comprises several sub plans, each discussing a different aspect of the investigations. These plans are summarized below.

- Introduction: Chapter 1 of this Site-Wide WP details the overall scope and objective of the project, presents the organization of the Site-Wide WP document, and presents an overview of the site and its history.
- Technical Management Plan: Chapter 2, the Technical Management Plan, details the organizational structure, lines of authority, and communication of the project team.
- Field Investigation Plan: Chapter 3, the Field Investigation Plan, describes the field methods and procedures planned for the site, and the approach to risk characterization and analysis.
- Quality Control Plan: Chapter 4, the Quality Control (QC) Plan, describes procedures for controlling and measuring the quality of work performed, including the organization, responsibilities, and policies.
- Explosives Management Plan: Chapter 5, Explosives Management Plan, describes details for management of explosives used to destroy MEC items recovered during the project, including acquisition, receipt, storage, transportation, and inventory.
- Explosives Siting Plan: Chapter 6, Explosives Siting Plan, discusses the criteria for planning and siting explosives demolition events that may be required during the project.
- Environmental Protection Plan: Chapter 7, Environmental Protection Plan (EPP), provides general information and lists applicable requirements.
- Property Management Plan: Chapter 8 provides detailed information on the types, quantities, and sources of equipment and materials that will be required to perform field and office operations on this project.
- Interim Holding Facility (IHF) Siting Plan for RCWM Projects: Chapter 9 describes the provisions that will be made and the siting requirements for the storage of RCWM ordnance and containers, and MEC.
- HTW-Contaminated Soil Excavation Plan: Chapter 10 describes procedures for the excavation of HTW arsenic contaminated soil on sites within the SVFUDS.
- Physical Security Plan for RCWM Project Sites: Chapter 11, Physical Security Plan for RCWM Projects is not included in this document for security purposes and will serve as a placeholder chapter only. The Physical Security Plan for RCWM is maintained by CENAB.
- References: Chapter 12 includes a list of references used in the preparation of this Site-Wide WP.

Additional information and plans are attached to this Site-Wide WP as appendices:

- Performance Work Statement: The SOW, dated November 1, 2004, is included as Appendix A to this Site-Wide WP.
- Site Maps: Maps provided in this document are included as Appendix B to this Site-Wide WP.
- Local Points of Contact: Various points of contact are listed in Appendix C to this Site-Wide WP.
- Accident Prevention Plan: The Accident Prevention Plan (APP) is attached as Appendix D of this Site-Wide WP. The APP describes the health and safety procedures, personal protection standards, and environmental health hazards applicable to this project.
- Sampling and Analysis Plan: The Sampling and Analysis Plan (SAP), Appendix E, outlines the anticipated sampling and analysis procedures for the project site. The SAP contains a list of the required analytes and the associated sampling procedures.
- Forms: Relevant forms and templates are provided in Appendix F.
- MSD Calculations: The calculations used to derive the minimum separation distance (MSD) to be employed for project operations are included in Appendix G.
- Résumés: The résumés of key personnel not listed in the Unexploded Ordnance (UXO) database are included in Appendix H.
- Technical Project Planning (TPP): The TPP process for the SVFUDS is implemented through the Spring Valley Partnering process. The Spring Valley Partners is an informal group of stakeholders that meets monthly to discuss and plan the SVFUDS activities. This group predates the formal TPP process therefore; Appendix I (TPP Planning Worksheets) is a placeholder only.
- Air Monitoring and Sampling Plans: The plans utilized for CA and ABP monitoring are provided in Appendix J.
- Product Manager for Non-Stockpile Chemical Materiel (PMNSCM) Plans: The plans for the storage and transportation of RCWM are in Appendix K.
- MEC Transportation Plan: A description procedures used to transport MEC items not transported as potential RCWM is contained in Appendix L.
- Engineering Control Structure Plans: A description of the common engineering controls utilized in the SVFUDS are included in Appendix M.

1.4 PROJECT LOCATION

1.4.0.1 SVFUDS is located in the northwest section of Washington, D.C. (Figure 1-1).

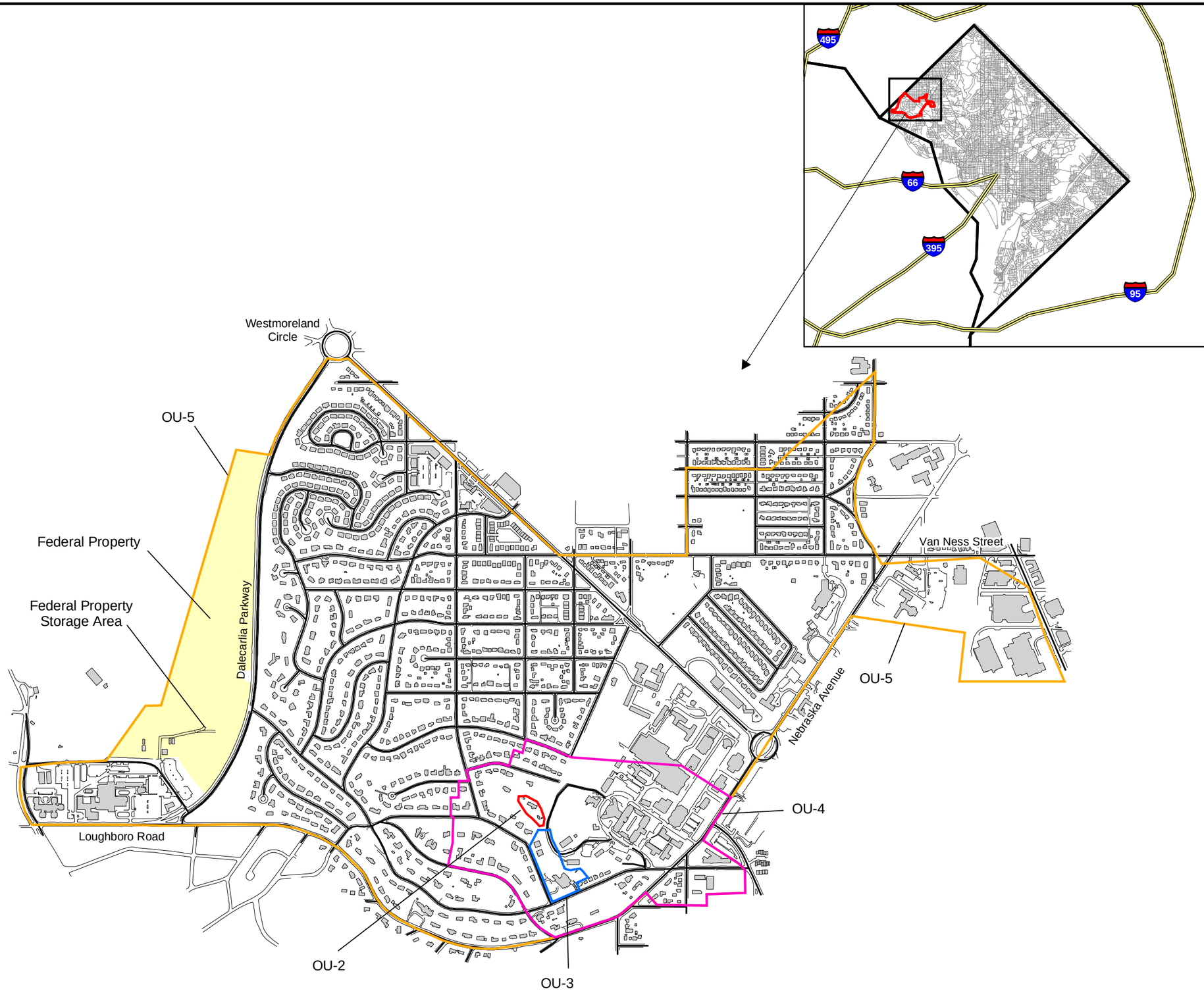

Figure 1-1
Spring Valley FUDS Location and Operable Units

Spring Valley Site-Wide
Washington, DC

Legend

	Operable Unit
Buildings	OU-2
Road	OU-3
Federal Property	OU-4
Federal Property Storage Area	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).

N W E S

1,200 600 0 1,200 Feet

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PARSONS

1.5 SITE DESCRIPTION

1.5.1 Site Location

1.5.1.1 The SVFUDS is located in the Spring Valley neighborhood of northwest Washington, D.C. The 668-acre area currently includes approximately 1,200 private residences, foreign embassies, American University (AU), Wesley Seminary, and numerous commercial properties.

1.5.2 Environmental Setting

1.5.2.1 Rainfall distribution is nearly uniform throughout the year. The Washington, D.C. area has an average yearly temperature of 54.5°F. The climate is classified as modified continental. Winters are cold and mild and summers are warm and humid. The coldest average daily temperatures are in late January and early February (upper 20s °F), and the warmest average daily temperatures are in mid-July (upper 80s °F). The annual precipitation for the area is 39 inches per year.

1.5.2.2 Surface water in the vicinity of Spring Valley consists of intermittent streams that flow generally to the west. The District of Columbia's water supply comes from the Potomac River and is provided by the Washington Aqueduct. The intakes for the Potomac River are located at Great Falls and Little Falls, and water is treated either at the McMillan plant or Dalecarlia plant.

1.5.2.3 The District of Columbia straddles the border of the Northern Atlantic Coastal Plain and the Piedmont aquifer systems. The Coastal Plain is characterized by gently rolling hills and is underlain by a sequence of sand and gravel aquifers with silt and clay confining units throughout. The Piedmont is characterized by more topographic relief than the Coastal Plain region. It is underlain by metamorphic and igneous rock that is overlain by unconsolidated sediments. The aquifer is in the unconsolidated sediments and extends to the bedrock beneath.

1.5.2.4 There are various groundwater aquifer systems associated with the site vicinity. These include terrace gravels and fracture system aquifers associated with the Piedmont formations, saprolite systems, and fill systems. Groundwater may be found in any and all of these aquifers, however, the majority of the groundwater would be expected to be found in the underlying bedrock that comprises the fracture system aquifer. Additionally, there are a number of major fault and fold systems in the site vicinity. Currently, a comprehensive groundwater investigation is underway at the SVFUDS. Groundwater has been encountered at depths ranging from approximately 6 feet to more than 50 feet below ground surface, depending on the well location.

1.5.2.5 Four geological formations, three Piedmont and one Coastal Plain, are apparent in the vicinity of the site. These formations (from west to east) are the Sykesville Formation, the Dalecarlia Intrusive Suite, the Actinolite Schist, and the Coastal Plain Terrace Formation (USGS, 1994). The Sykesville Formation is a sedimentary melange consisting of fragments of metagraywacke, migmatites, amphibolite, and actinolite schist in a quartzofeldspathic matrix. The Dalecarlia Intrusive Suite consists of massive to well-foliated biotite monzogranite and lesser granodiorites. The Actinolite Schist Unit consists of actinolite schist, actinofels, actinolite-chlorite schist and lesser talc-bearing rocks. The Coastal Plain Terrace Gravel consists

of highly weathered, crudely bedded gravel, sand, silt, and clay (Fleming, A. H., Drake, A. A., Jr., McCartan, Lucy, 1994). The Piedmont Formations are igneous or metamorphic in origin. The Coastal Plain Terrace Formation is fluvial in origin (Fleming, A. H., Drake, A. A., Jr., McCartan, Lucy, 1994). Schistosity is the major structural feature of the Piedmont rocks and saprolite in the vicinity of the site-wide area.

1.5.2.6 Four soil associations are present within Spring Valley: the Urban Land-Sassafras Chillum (ULSC), the Urban Land-Manor Glenelg (ULMg), Manor Glenelg (Mg), and Urban Land Brandywine (ULB). The ULMg soil association is a well to moderately well drained soil resulting from the weathering of the basement rocks (schist). The ULSC soil results from the weathering of Coastal deposits. However, typically these soils have been greatly disturbed by construction and landscaping activities. The bedrock consists of a variety of metasedimentary rocks of actinolite schist. Relatively competent saprolite material is encountered at depths that range between 3 to 15 feet below ground surface (bgs). This material appears to be the transition between loose soil material and highly competent bedrock.

1.6 SITE HISTORY

1.6.0.1 RCWM has been found on or in the vicinity of the former World War I era site, historically known as the American University Experiment Station (AUES). 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 was located on the grounds of the current AU and used additional portions of property in the vicinity to conduct this research and development of CWM, including mustard and lewisite agents, adamsite, irritants, and smokes. The areas not used for testing were used to house and train troops (Camp Leach). Immediately after the war these activities were transferred to other locations, and the site was restored and returned to the owners.

1.7 CURRENT AND PROJECTED LAND USE

1.7.0.1 Land use in and around the SVFUDS is primarily low-density residential (three to four dwellings per acre). The campus of AU is considered institutional use. Zoning on site is also predominantly for single-family detached housing except on the AU Campus, which is zoned for apartments. No changes to land use are projected.

1.8 PREVIOUS INVESTIGATIONS

1.8.1 OSR FUDS Remedial Investigation -1993-1995

1.8.1.1 In January 1993, a utility contractor accidentally uncovered buried ordnance at a property in Spring Valley. Following removal of the ordnance, the USACE conducted the Operation Safe Removal (OSR) FUDS Remedial Investigation [OSR FUDS RI (USACE, 1995)] of the entire area within the OSR FUDS boundary. During the investigation, some 53 areas of potential hazards were identified and designated as Points of Interests (POIs). The investigation utilized geophysical technology to identify buried ordnance and soil sampling to identify areas of soil contamination. In June 1995, the USACE determined that no further action was required at

the Spring Valley site, with the exception of a portion of the site known as the Spaulding and Captain Rankin Areas.

1.8.1.2 In June 1994, an Engineering Evaluation/Cost Analysis (EE/CA) was performed for the Spaulding and Captain Rankin Areas (USACE 1996a) to determine the appropriate action for addressing the soil and material contained within the former shell pits and surrounding areas. The shell pits had the potential to contain: intact MEC items; MD; and, intact containers filled with chemical agent and ABPs. Some MD items were encountered, including MD, fragments, and fused components. The only compounds identified that posed an unacceptable risk to human health were lead and arsenic in the soil. During the removal, all material was taken off site for disposal. Mustard was identified in one bunker drain line, however this was most likely the result of an analytical quality assurance anomaly associated with the original analysis. In June 1996, the USACE recommended that no further action be taken at the Spaulding and Captain Rankin Areas.

1.8.2 Burial Pit EE/CA Investigation – 1999-2001

1.8.2.1 During a 1997 review (RI Evaluation Report, USACE, 1998) of the 1995 OSR FUDS RI Report, initiated by the District of Columbia (DC) Department of the Environment (DDOE), the area investigated on the American University campus during the 1995 RI as POI 24 was re-examined and re-positioned to 4801 Glenbrook Road. POI 24 had been identified as a probable pit through interpretation of a 1918 aerial photograph. To further evaluate the situation, the USACE performed a geophysical investigation of the grounds at 4801 Glenbrook Road to locate and characterize the potential burial pit. It was determined that two geophysical anomalies on the grounds of 4801 Glenbrook Road had the potential characteristics of pits or trenches. Nine other anomalies did not have the characteristics of pits or trenches. All eleven anomalies were investigated and resolved. Although the actual location of POI 24 has not yet been determined, future investigations will focus on the 4825 Glenbrook Road property.

1.8.2.2 To perform the investigation of the eleven anomalies, a Site Safety Submission [Site Safety Submission, Spring Valley, Operable Unit 3, Washington, D.C., prepared for USAESCH, by Parsons (USACE 1999b), as changed, amended, and approved by the Department of Defense Explosive Safety Board (DDESB) and the U.S. Army Technical Center for Explosives Safety (USATCES)], was prepared. Investigative work on the two burial pits at 4801 Glenbrook Road began in March 1999 and concluded approximately one year later. The objective of the investigation was to determine the extent and nature of the material contained within the two burial pits. Approximately 299 pieces of ordnance were recovered from these two test pits, 14 of which were identified as chemical munitions, 43 as MEC items, and 242 as MD. In addition to these items, 175 glass bottles were recovered, 77 of which contained acids and other chemicals, as well as 39 cylinders and nine metal drums. Additional compounds detected in soil samples included various volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals (most notably arsenic). The excavation of the pits concluded when the pit characterization soil samples (floor and wall samples) did not detect agent, ABPs, or elevated levels of VOCs, SVOCs, or metals. All recovered material was disposed off site at a facility appropriate for the type of material and level of contamination, as follows: all agent contaminated scrap, or agent contaminated soil was disposed at a licensed industrial waste disposal incinerator; material determined to be hazardous under the Resource Conservation and

Recovery Act (RCRA) guidelines was disposed of at a RCRA subtitle C landfill; material considered RCRA non-hazardous or not contaminated with CA was disposed of in a sanitary landfill.

1.8.2.3 Another burial pit (Test Pit 23), partially on 4801 Glenbrook Road and partially on the adjacent 4825 Glenbrook Road property was investigated in the same manner (Site Safety Submission, Addendum 10, USACE, March 2001). Several hundred MEC items and 11 RCWM-related items were recovered from this pit. The 4801 Glenbrook Road portion was cleared, backfilled, and restored, while the 4825 Glenbrook Road site was temporarily backfilled pending resolution of various administrative issues.

1.8.2.4 Three 75 mm projectiles from Test Pit 23 were characterized by the Munitions Assessment Review Board (MARB) as containing a solid, diphenylcyanoarsine. On December 13, 2002, these projectiles were transported in the multiple round containers (MRCs) to an offsite surety laboratory for drilling and fill analysis (under a PMNSCM contract). Analysis of an off-gas collected during the drilling of one projectile indicated that the fill was arsine. The other two projectiles were not analyzed and were assumed to contain the same filler. The three projectiles were subsequently destroyed using an acid digestion process on March 7, 2003.

1.8.3 Operable Unit 3 EE/CA

1.8.3.1 To address concerns of the DDOE, the U.S. Environmental Protection Agency (USEPA) Region III collected surface soil and subsurface soil samples in and around 4801, 4825, and 4835 Glenbrook Road to supplement their Risk Assessment (USEPA, 1999). It was determined that the soil of these three properties could have been impacted by AUES activities in the vicinity of the two burial pits. Consequently, the USACE performed an EE/CA for the three Operable Unit 3 (OU-3) properties in October 2000. The EE/CA included extensive sampling to determine the nature and extent of contamination found in the surface and subsurface soils of the three OU-3 properties. 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 recommend and justify the appropriate preferred alternative to deal with the arsenic contamination in the soil. The conclusion of the risk assessment was that there was unacceptable risk with regard to exposure to arsenic in the surface soils. A Non-Time Critical Removal Action (NTCRA) was performed to address the arsenic-contaminated soil at 4825 and 4801 Glenbrook Road. The soil removal was conducted from December 2000 to August 2002. The soil at 4835 Glenbrook Road is expected to be addressed in a future removal action.

1.8.4 EE/CA for Arsenic in Soil – Site-Wide (On-going)

1.8.4.1 Based on the findings of the above investigations and the recommendation of DDOE, an expanded area (approximately 91 acres) was further investigated as Operable Unit 4 (OU-4). OU-4 included approximately 80 private residences and significant portions of the current American University (AU). This investigation indicated arsenic concentrations above risk-based concentrations and above normal background levels. In consultation with the USEPA and the DDOE, the USACE then undertook an extensive characterization of the remaining Spring Valley

FUDS, some 577 acres, designated as Operable Unit 5 (OU-5). The soils of both Operable Units were characterized for arsenic and selected CA compounds associated with AUES activities.

1.8.4.2 Within OU-4 and OU-5, all acreage, residential and non-residential, was divided into one-half acre (approximate) exposure areas, or sites, for sampling purposes. Approximately 1,500 sites have been investigated and the soil characterized for arsenic contamination. Of these, approximately 300 sites also had the soil characterized for selected CA constituents representative of past practices at that specific site. The findings indicated that approximately 11% of the sites had arsenic above the screening criteria. Although a small number of samples had detections for possible ABPs, none of the sites contained any of the CA or ABPs at levels above their respective screening criteria.

1.8.4.3 The arsenic soil contamination was addressed through a site-wide EE/CA as documented in the *Engineering Evaluation/Cost Analysis for Arsenic in Soil, Spring Valley Operable Units 4 and 5, Washington, D.C.* (USACE, 2003). This EE/CA recommended removal of arsenic soil that exceeded the screening criteria. The removals, which were based on grid level sampling of the sites, were performed through the NTCRA or Time-Critical Removal Action (TCRA) process described below. Arsenic-contaminated grids are also being addressed in a limited fashion through phytoremediation.

1.8.5 Time Critical Removal Actions

1.8.5.1 Grid sampling conducted in January 2001 as part of the OU-4 and OU-5 investigation identified arsenic contamination in the surface soils at the Child Development Center. This property, located on AU property within the boundaries of OU-4, was formerly used for AUES activities. A TCRA was performed to address contaminated soil at the Child Development Center. The soil removal was completed by November 2001.

1.8.5.2 Grid sampling conducted in March 2001 as part of the OU-4 and OU-5 investigations identified arsenic contamination in the surface soils on other portions of the AU campus. A TCRA was also conducted to address this arsenic-contaminated soil at the AU athletic fields and other AU lots located within OU-4. These areas include grids associated with AU lots 8, 10, 11, 12, 13, 14, and 15; soil borings that were sampled in AU Lots 16, 19, 23 and 24; and the grounds around Kreeger Hall and Watkins Hall. These areas were also formerly used for AUES activities. The soil removal was begun in the summer of 2002.

1.8.5.3 The USACE determined that TCRAs would also be performed at several residential properties. The prioritization of these properties was based on the results of the arsenic testing. An Exposure Point Concentration, derived from the 95 percent Upper Confidence Limit of the grid arsenic data, was used as the primary prioritization strategy. Other factors used to prioritize removals included access agreements and proximity logistics, where otherwise lower priority sites close to high priority sites were also scheduled.

1.8.6 Small Disposal Area – 1999-2001

1.8.6.1 In April 1999, during a USEPA SVFUDS sampling event, a DDOE representative discovered surface debris located on AU property in the vicinity of the site at 4801 Glenbrook

Road. This area, designated as the Small Disposal Area (SDA), was thought to be a burial site potentially associated with AUES-related research and testing activities. An investigation of the SDA was conducted under Addendum 09 to the Site Safety Submission, Spring Valley Operable Unit 3, Washington, D.C. (USACE, October 2000).

1.8.6.2 In January 2001, debris including old used oil filters, glass and lab ware, and other miscellaneous debris was removed from the SDA. No RCWM/MEC-related items were recovered from the SDA during this investigation. Soil contaminated with elevated levels of arsenic, lead, and mercury was encountered. The area was over-excavated to undisturbed rock; characterization samples indicated that no HTW parameters were present above the comparison standards following the over excavation effort. An archaeological review of the items recovered during the excavation concluded that there were likely to have been at least two dumping episodes, and that the manufacturing date ranges of laboratory artifacts are consistent with use during the AUES activities. However, the data did not confirm whether the materials were dumped before or after the closure of the AUES. Soil and debris excavated at the SDA was disposed at off-site disposal facilities. The area was backfilled and closed following the 2001 removal.

1.8.7 Residential Investigations – 2002

1.8.7.1 The investigations at two properties on Sedgwick Street were successfully completed IAW the Site-Wide Chemical Safety Submission (CSS) and the Site-Wide Local Approved Work Plan (LAWP), Annex A, August 2002.

1.8.7.2 Sixteen low-probability anomalies and one higher-probability anomaly were investigated and cleared at the 5054 Sedgwick Street property. Elevated EM-61 readings observed during the higher-probability anomaly investigation were attributed to several pieces of red brick and metal banding found underneath the concrete surface of the property driveway. All higher- and low-probability anomalies were identified as cultural scrap items or false positive instrument readings. Five arsenic-contaminated grids were excavated and confirmation samples were collected. Site restoration was completed on October 3, 2002

1.8.7.3 One higher-probability anomaly was investigated under engineering controls and cleared at the 5058 Sedgwick Street Property. Red bricks and a metal rod were found at the higher-probability anomaly location. Twelve low-probability anomalies were also investigated and cleared at the property. Bricks, metal scraps, nails, and two pieces of munitions debris were among the items found during the low-probability anomaly investigation. It was determined that the munitions debris items were fragments of a 75 mm projectile and were not RCWM-related. All higher- and low-probability anomalies were identified as cultural scrap items or false positive instrument readings. One arsenic-contaminated grid was excavated and confirmation samples were collected. The grid excavation extended into the back yard of the 3700 Fordham Road property. Site restoration was completed on September 24, 2002.

1.8.8 AU Lot 18 Low Probability Anomaly Investigation – 2002-2003

1.8.8.1 In November 2002, the low probability anomaly resolution at the AU Lot 18 area began with the intrusive investigation of 14 low-probability anomalies. During this intrusive

operation, a potential disposal area containing glass, ceramic, metal, stone and concrete was identified. Following the discovery of the potential disposal area, at the request of AU, anomalies in AU Lot 18 were excavated until all the debris associated with the anomalies investigated was removed. Two complete grids (-20,440 and -20,460) and a portion of grid (-40, 460) were cleared for all debris.

1.8.8.2 The OU-4 RI/FS grid sampling identified seven grids with elevated levels (>20 mg/kg) of arsenic in AU Lot 18 that were to be removed as part of the TCRA. During the low probability anomaly investigation, pit characterization sampling indicated that three additional grids contained elevated arsenic concentrations, thus bringing the total of arsenic-contaminated grids identified at AU Lot 18 to ten. Subsequent sampling established clearance depths for these grids.

1.8.8.3 TCRA related arsenic-contaminated soil removal activities took place concurrently with anomaly resolution in the grids in AU Lot 18. Arsenic-contaminated soil and glassware were completely removed from two of the arsenic-contaminated grids identified during the anomaly investigation (-20,440 and -20,460), and arsenic-contaminated soil was completely removed from one of the TCRA grids (40,400). These soil removal activities left a total of seven grids at AU Lot 18 that were identified as containing arsenic at a concentration above 20 mg/kg. This includes six of the original TCRA grids [(60,320), (40,280), (40,300), (40,320), (40,340), and (40,420)] and one of the additional grids identified during the anomaly investigation [(0,460)]. These grids were later excavated during the AU Lot 18 Higher Probability Investigation (see Subchapter 1.8.9).

1.8.8.4 Items found during the low probability investigation of AU Lot 18 included demi-john/carboy fragments, chemical bottles such as stoneware containers, Baker's Analyzed Chemicals bottles, Bausch and Lomb bottles, stoppers, tubes and stirrers. Domestic wares were also identified at AU Lot 18, including dairy bottles and fruit jars. According to an archaeological analysis of the debris performed by Parsons, most of the items uncovered in AU Lot 18 have manufacture dates prior to 1920. The remaining items were manufactured post 1920 and consisted mostly of fruit jars and ceramic plate fragments. The archaeologist concluded that this represented more than one dumping episode since 1848.

1.8.8.5 MD uncovered during the low probability investigation of the AU Lot 18 area consisted of scrap related to 75 mm and Stokes mortar rounds, a Livens projectile, and 4.7-inch projectiles. All MD items were unfuzed, unfired, and empty and were classified as scrap by the USAESCH Safety Specialist. Disposal of these items is discussed in the *Waste Disposal Summary for the June 2003 Shipments* (Parsons, 2003). As a budgetary consideration, based on the number and types of items being found, it was decided to temporarily suspend AU Lot 18 operations in March 2003.

1.8.8.6 In preparation for returning to the site, USAESCH prepared a position paper titled *American University Lot 18, Spring Valley, Washington, D.C.* (USAESCH, August 2003) that recommended that the intrusive investigation at AU Lot 18 be conducted under an approved CSS as a potential RCWM site. Subsequent analysis by Edgewood Chemical Biological Center (ECBC) of an intact bottle recovered from AU Lot 18 found that it contained approximately

6 milliliters of 0.3 percent lewisite solution, supporting the recommendation of the position paper.

1.8.9 AU Lot 18 Higher Probability Investigation – 2004-2006

1.8.9.1 In June 2004, the higher probability investigation commenced at AU Lot 18. This investigation was performed under Annex F to the CSS (USACE, 2004) and was conducted between June 24, 2004 and January 21, 2005. During this period, two complete grids (0,500; and 0,520) and the western half of grid (0,540) were excavated and cleared of debris. Six MD items were recovered from the excavation area related to 75 mm and 3-inch Stokes mortar rounds, a 4.7-inch projectile. Also, a threaded pipe was recovered from the debris but was ultimately determined not to be MD. All MD items recovered were unfuzed, unfired, and empty. In addition, approximately 1,002 pounds of other metal debris was recovered from the excavation area that was not MEC/RCWM-related. Pit characterization samples collected from completed grids (0,520) and (0,540) did not have any constituents detected above the comparison values. The investigation was extending into surrounding grids when work was suspended on January 21, 2005, awaiting the revision of the investigation approach.

1.8.9.2 In June 2005, the higher probability intrusive investigation resumed under Annex G to the CSS (USACE, 2005). Intrusive investigation continued through January 26, 2006. The primary goal of the intrusive investigation was to remove all potentially AUES-related material from the suspect disposal area at AU Lot 18, such as ordnance items, ordnance-related scrap items and intact containers. The objective of the investigation was also to remove all glassware and debris from the suspected disposal area at AU Lot 18; to investigate and resolve the anomaly at 4629 Rockwood Parkway (4629-HNC1) due to it's proximity to the suspected disposal area; and to remove HTW-contaminated soil identified in the immediate vicinity of the suspect disposal area at AU Lot 18. For clearance purposes, each grid was excavated to a depth where either the excavation was clear for glassware and debris or when the excavation had reached bedrock, saprolite, or native soil. Once the soil was considered clear for glassware and debris (i.e., a six-inch lift with no glass containers, debris or identifiable fragments thereof), the excavation was taken 12 inches deeper for confirmation. The sidewalls of each grid were cleared in a similar fashion.

1.8.9.3 During the Annex G investigation, 65 MD items and 16 intact containers were recovered. The MD included an empty 8-inch Livens projectile, empty 4.7-inch rounds, empty 75 mm projectiles, frag from 75 mm projectiles, 3-inch stokes mortars, bomb fragments, a piece of a burster tube, and one incendiary item. Five of the items recovered during the Annex G operation were closed cavity items and included two 75 mm projectiles, two incendiary items, and one 4.7-inch round. The MD was shipped offsite for disposal, while the closed cavity items are onsite pending final disposition. The remaining intact containers consisted of sealed glass bottles. No agent was detected in any of the intact glass containers; ABPs were detected in two intact containers. Approximately 5,115 cubic yards of soil was excavated and disposed off-site. A report for the Annex F and Annex G higher probability investigations at AU Lot 18 is currently being prepared.

1.8.9.4 Pit characterization samples were collected from the sidewalls and floors of the excavated grids once they were cleared for glassware and debris. The results of the Annex F and

Annex G pit characterization samples were evaluated to identify which locations should be included in the HTW over-excavation effort to reduce the residual risk at AU Lot 18 until a formal Human Health Risk Assessment is completed (Final Site Specific Work Plan for HTW Over-excavation Activities at AU Lot 18, May 24, 2006). This evaluation identified arsenic, lead and/or mercury at 21 sample locations at Lot 18 at concentrations exceeding the USEPA Region III Emergency Removal Guidelines as listed in the *Hazard Evaluation Handbook, A Guide to Removal Actions, EPA 903/B-97-006* (USEPA Region 3, 1997). With the exception of three sidewall exceedances closest to the Public Safety Building (where additional debris clearance is required), these locations were selected for excavation as part of this interim measure. The three sidewall samples closest to the Public Safety Building will be addressed in a separate study to be conducted after other tasks near the building are completed (i.e., evaluation of the building stability relative to excavating near the foundation, and debris clearance adjacent to the building). This evaluation also identified vanadium as a significant contributor to the residual risk. Based on this evaluation, additional samples were collected between May 31 and June 9, 2006 to delineate the extent of the HTW over-excavation (Addendum 01, Pre-Excavation Sample Data Report, July 6, 2006). This sampling identified 30 locations for over-excavation. Soil was excavated at these locations between July 10 and August 18, 2006. Approximately 27 pounds of glassware was found during the over-excavation effort; one MD (an empty 75 mm projectile) was recovered from grid (20,520). Approximately 870 cubic yards of non-hazardous soil was excavated during the over-excavation effort and disposed off-site.

1.8.10 Residential Investigations - 2004

1.8.10.1 Low probability anomaly investigations (open air with no engineering controls) were conducted at seven residential properties in March 2004 IAW the *Site-Wide LAWP for the Spring Valley DERP/FUDS Site, Washington, D.C,* March 2004, (Updated July 2005) and *Final Site-Specific Work Plan for Intrusive Investigation of Anomalies at of Seven Properties, Spring Valley, Operable Unit 5, DERP/FUDS Site, Washington, D.C.,* USACE, March 2004.

1.8.10.2 Two anomalous areas containing a total of seven low-probability anomalies were investigated at the 3812 48th Street property and determined not to be related to MEC/RCWM. One arsenic-grid confirmation sample was also collected.

1.8.10.3 Two anomalous areas containing a total of nine low-probability anomalies were investigated at the 3819 48th Street. All of the anomalies were identified as non-MEC/RCWM-related scrap items or false positives caused by interference from landscape or other cultural features present at the site.

1.8.10.4 No intrusive investigations were performed at the 4720 Woodway Lane property. This was because geophysical surveys performed prior to the planned intrusive investigation showed that the anomalies selected for investigation were either no longer present or were considered to be attributed to recent new construction at the property.

1.8.10.5 Four anomalous areas containing a total of ten low-probability anomalies were investigated at the 4800 Woodway Lane property. All of the anomalies were identified as non-MEC/RCWM-related scrap items.

1.8.10.6 Three anomalous areas, including one that contained three low-probability anomalies, were investigated at the 5040 Sedgwick Street property. Two MD items were recovered from this property. These items were identified as a fragment of a Livens projectile and a fragment of a 75 mm projectile. All of the other items recovered from those areas were identified as non-MEC/RCWM-related scrap items. Two soil samples were collected at each of the locations where the MD items were recovered. Neither of the samples contained concentrations above the applicable comparison levels. One arsenic grid confirmation soil sample was also collected.

1.8.10.7 Two anomalous areas that contained a total of five individual low-probability anomalies were investigated at the 5059 Sedgwick Street property. All of the anomalies were identified as non-MEC/RCWM-related scrap items.

1.8.10.8 One anomalous area was investigated at the 5065 Sedgwick Street property. One MD item was identified as a fragment of a Livens projectile. Another item was identified as a non-MEC/RCWM-related scrap item. One soil sample was collected at the location where the MD item was recovered; this sample was analyzed for explosives, ABPs and arsenic and did not contain concentrations above the applicable comparison levels.

1.8.11 Residential Investigations – 2005

1.8.11.1 In July/August 2005 the low probability anomaly investigations were conducted at nine residential properties IAW the *Site-Wide LAWP* (USACE, 2005) and *Final SSWP for Intrusive Investigation of Anomalies at of Nine Properties, Spring Valley, Operable Unit 5, DERP/FUDS Site, Washington, D.C.*, USACE, June 2005.

1.8.11.2 Three anomaly clusters containing 11 low-probability single-item anomalies were investigated at 3641 49th Street. None of the items recovered during the investigation at the property were related to MEC or RCWM. One grid confirmation soil sample was also collected.

1.8.11.3 Ten single-item anomalies were investigated at the 3607 Fordham Road property. Two items found during the intrusive investigation of anomalies were identified to be MD from unidentified ordnance. The results for headspace agent screening on both items were negative.

1.8.11.4 Two anomaly clusters and 61 single item anomalies were investigated at the 4005 52nd property. Thirteen items of MD (six 75 mm, one MK-3 expended fuze, and six unidentified) were recovered. Headspace analysis was performed on the items and the results were negative. One grid confirmation soil sample was also collected.

1.8.11.5 Twenty seven single-item anomalies were investigated at the 4015 52nd Street property. A 4.7-inch illumination projectile recovered was initially identified as a possible MEC item. The U.S. Army 22nd Chemical Battalion (Technical Escort), hereafter referred to as TE, was called to the site and determined the item was unfuzed, unfired, and empty. Six other MD items (one 75 mm fragment, one empty 4.7-inch illumination projectile, and four unidentified) were recovered. Headspace analysis was performed on all of these items and the results were negative. One soil sample was collected where the 4.7-inch illumination projectile was encountered. Following agent clearance using headspace analysis and low-level extraction, the sample was analyzed for ABPs, explosives, metals, VOCs and SVOCs. The soil sample

contained aluminum at a concentration of 28,000mg/kg which is above the applicable comparison level of 25,798mg/kg. Other metals were also detected but at levels below comparison criteria.

1.8.11.6 Two anomaly clusters containing a total of 10 low probability single-item anomalies were investigated at the 4256 Warren Street property. None of the items recovered from the 4256 Warren Street property was identified as being MEC/RCWM-related. A non-intact container (a barrel) was recovered and was initially considered to be a suspect item but, following further analysis, was subsequently assessed to be unrelated to MEC/RCWM. At the recommendation of the intrusive team, and with the concurrence of USACE, a soil sample was collected from the location at which the barrel (non-intact) container was recovered. Following agent clearance using headspace analysis and low-level extraction, the sample was analyzed for ABPs, explosives, metals, VOCs and SVOCs. The sample was found to contain vanadium at a concentration slightly above the applicable comparison level. Other metals were also detected but at levels below comparison criteria.

1.8.11.7 Four anomaly clusters containing a total of 20 single-item low-probability anomalies were investigated at the 4710 Quebec Street property. None of the items recovered during the investigation at the 4710 Quebec Street property were related to MEC or RCWM. During the follow-on arsenic removal by Sevenson, a 3-inch Stokes was found at this property. The USACE identified this item as non-RCWM and directed Parsons to collect a soil sample at the location where the item was found. The sample was analyzed for ABPs, explosives, metals, VOCs and SVOCs, cyanide, and phosphorus. None of the parameters were detected above the comparison values.

1.8.11.8 Six single-item low-probability anomalies were investigated in open air without engineering controls 4801 Quebec Street property. None of the items recovered during the investigation were related to MEC or RCWM.

1.8.11.9 One anomaly trench, one anomaly cluster containing 16 single-item anomalies, and 12 single-item anomalies were investigated at the 4922 Quebec Street property. No MEC/RCWM related items were recovered during the investigation. Investigation of the trench like anomaly (4922-P1) revealed the area contained five metal fence posts cut below grade and spaced at about 5 foot interval along the length of the anomalous area.

1.8.11.10 Sixty-nine single-item anomalies were investigated at the 5011 Sedgwick Street property. Three items recovered from the 5011 Sedgwick Street property were determined to be munitions debris from a 75 mm projectile. Three of the anomalies investigated were unresolved. The remaining 63 single item anomalies investigated were determined to be unrelated to MEC/RCWM. All investigated anomalies with the exception of the three anomalies that were unresolved, were either identified or removed.

1.8.12 Residential Investigations – 2006

1.8.12.1 Five Rockwood Parkway properties (4621, 4625, 4629, 4633 and 4641) were investigated as per the Site-Wide LAWP (USACE, 2006) and the *Final SSWP for Intrusive Investigation of Anomalies at of Four Properties on Rockwood Parkway, Spring Valley,*

Operable Unit 4, DERP/FUDS Site, Washington, D.C., USACE, June 2006 and *Final SSWP for Intrusive Investigation of Anomalies at 4641 Rockwood Parkway, Spring Valley (Revision 3), Operable Unit 4, DERP/FUDS Site, Washington, D.C.*, USACE, February 2006. The investigation at 4641 Rockwood Parkway was conducted in March 2006. The investigations at the four remaining Rockwood Parkway properties were conducted in June and July 2006.

1.8.12.2 A total of 85 single point anomalies and two trenches were investigated at these properties. One AUES-related item, a piece of crockery, was recovered at 4621 Rockwood and headspaced clear for agent. All the remaining items recovered were identified as cultural debris.

1.8.13 American University Bamboo Area Investigation, Kreeger Hall and Public Safety Building Area (Phase 1) - 2006

1.8.13.1 Low probability anomaly investigations were conducted at the AU Bamboo Area IAW the *Site-Wide LAWP* (USACE, 2006) and the *Final SSWP for Intrusive Investigation of Anomalies at American University Bamboo Area, Spring Valley, Operable Unit 4, DERP/FUDS Site, Washington DC*, March 2006. Five anomalous areas, a 10 foot by 10 foot grid, 74 single-item anomalies, and a utility trench east of the AU Public Safety Building were investigated.

1.8.13.2 A total of eight MD and two intact containers were recovered during the AU Bamboo Area investigation. All of these items were headspaced and cleared for agent. A large amount of debris recovered contained broken glassware that appeared to be AUES-related. The glass fragments were also headspaced in batches at the end of each day; all batched were cleared for agent. The remaining items recovered were identified as cultural debris. Grab soil samples, and water and soil disposal characterization samples, were collected at various locations during the course of investigation. One anomaly, BA-512, had an elevated arsenic concentration; additional arsenic soil excavation was conducted at the BA-512 as part of the TCRA.

1.8.13.3 Excavation of glass and debris in the anomalous area AU BA-P6 extended under the concrete patio located at the rear (western side) of the Public Safety Building. The area under the patio was partially excavated for glass and debris. Two intact containers and six of the MD items mentioned above were found under the patio. Additional investigation is planned for removing debris, anomalies and HTW soil at the Public Safety Building Area (PSBA).

1.8.13.4 Additional work was conducted at the PSBA under the *Final SSWP for Structural, Geologic and Geotechnical Investigation at the American University Public Safety Building, Spring Valley, Operable Unit 4, DERP/FUDS Site, Washington DC*, August 2006. The CENAB geotechnical team evaluated the footers of the Public Safety Building at three test pit locations, and also collected borehole samples at each test pit location.

1.8.13.5 Low probability anomaly investigations were conducted at the Kreeger Hall Area in July 2006 IAW with the Site-Wide LAWP (Parsons, 2005) as amended on February 9 and March 27, 2006 and the Final SSWP American University Bamboo Area Addendum 1 – Intrusive Investigation of Kreeger Hall Area Anomalies, Spring Valley, Operable Unit 4, DERP/FUDS Site, Washington DC, June 2006. Two anomalous areas and 17 single-item anomalies were successfully investigated. No MD items or AUES-related items were encountered during the intrusive investigation of the anomalies in the Kreeger Hall Area.

1.9 INITIAL SUMMARY OF RISK FROM RECOVERED CHEMICAL WARFARE MATERIEL AND MUNITIONS AND EXPLOSIVES OF CONCERN

1.9.0.1 RCWM, CA-contaminated media (CACM), and possibly MEC, is known or suspected to be present in the SVFUDS. The majority of the SVFUDS is a public domain, and may constitute an imminent and substantial endangerment to the general public, site personnel and the environment. Access to these items and removal by unauthorized personnel is a concern.

1.9.0.2 Potential RCWM at the SVFUDS includes munitions, bulk containers (e.g., ceramic containers or drums), and laboratory bottles and apparatus. CACM includes soil, water, or debris contaminated with chemical agents. A list of the types of MEC items encountered to date at the SVFUDS is included in Table 1.1. The most common MEC items expected in the SVFUDS include 75 mm Mk II chemical projectiles with explosive bursters and 75 mm shrapnel rounds. As such, the risks and viable mitigation measures vary and will be addressed in the SSWP for the specific site. All site personnel will be given RCWM/UXO recognition training on the type of agent(s) and/or ordnance suspected of being present prior to commencing any field activities. In addition, in the event CACM, RCWM, or MEC is encountered, all site personnel will be instructed to proceed IAW the procedures described in Chapter 3 of this document.

Table 1.1
List of Site-Wide MEC Items and MD Found at the SVFUDS

Item Description/Nomenclature	Comments
75 mm Mk II Chemical projectile	Explosively configured.
75 mm Shrapnel Round	Explosively configured.
3-inch Stokes Mortar Round	None confirmed to be explosively configured.
Livens Projectile	None confirmed to be explosively configured.
4.2-inch Projectile	No energetic fill in recovered rounds. Identified as munitions debris.
4.7-inch Projectile	No energetic fill in recovered rounds. Identified as munitions debris.
4.7-inch Common	No energetic fill in recovered rounds. Identified as munitions debris.

CHAPTER 2
TECHNICAL MANAGEMENT PLAN

2.1 PROJECT OBJECTIVES

2.1.0.1 The primary objectives of this task order are for the Contractor to perform higher probability intrusive investigations in suspected or known SVFUDS burial or disposal areas IAW the approved CSS, and to conduct low probability intrusive investigations in anomalous areas IAW the approved WP in order to fully characterize any RCWM/CACM/MEC hazards that may be present in these areas.

2.2 ORGANIZATION

2.2.0.1 Several organizations are directly involved in the SVFUDS project. TE and ECBC are under the umbrella of U.S. Army Research, Development and Engineering Command (RDECOM).

2.2.0.2 The technical team is shown in Figure 2-1. The roles of these team members are described below.

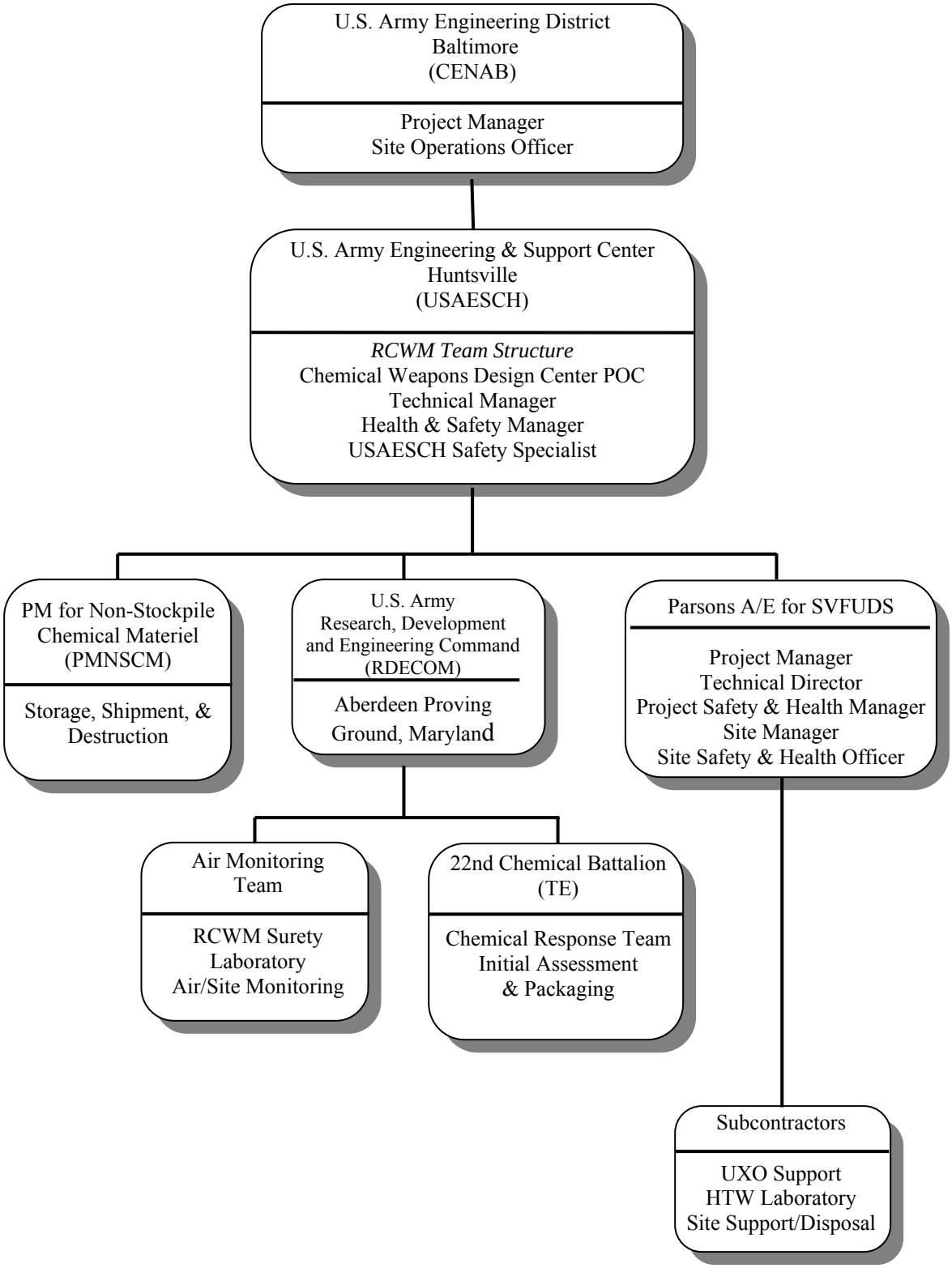
2.2.1 U.S. Army Corps of Engineers, Baltimore District

2.2.1.1 CENAB is the Project Manager (PM) for this project. CENAB responsibilities include review of project plans and documents, obtaining rights-of-entry (ROEs) to properties in the investigation areas, working with the news media and the public, and coordinating with regulatory agencies on issues pertaining to protection of human health and the environment. As the generator of any excavated HTW, CENAB will be responsible for signing waste manifests or required documentation for transportation and disposal of HTW. CENAB will also appoint a Public Affairs Officer to communicate progress and results to the public. CENAB will also appoint a Site Operations Officer who will assist in making decisions during field operations when the CENAB PM is not present.

2.2.2 U.S. Army Engineering and Support Center, Huntsville

2.2.2.1 USAESCH is the implementing agency for execution of this project and provides technical expertise for MEC/RCWM activities. USAESCH responsibilities include procurement of architectural/engineering (A/E) services, direction of the contractor, coordination of document reviews, provision of quality control, and provision of an on-site Safety Specialist.

Figure 2-1
Organization Chart



2.2.3 Product Manager for Non-Stockpile Chemical Materiel

2.2.3.1 PMNSCM is responsible for destroying non-stockpile chemical materiel.

2.2.3.2 With respect to operations at the SVFUDS, PMNSCM is responsible for arranging the interim storage, as well as the on-site disposal or off-site transportation of any RCWM items recovered during the intrusive investigation.

2.2.4 U.S. Army 22nd Chemical Battalion (Technical Escort)

2.2.4.1 TE provides the Department of Defense (DOD) with a worldwide capability of responding to, neutralizing, and interim holding (until final disposal by PMNSCM) of chemical agents, munitions, and other hazardous materials. TE will provide Explosives Ordnance Disposal (EOD) personnel.

2.2.4.2 TE is responsible for:

- Working with contractors to perform the intrusive investigations;
- Packaging of suspect RCWM items
- Transporting RCWM to the IHF containers;
- Responding to emergencies occurring during the on-site transport or storage of RCWM in the IHF;
- Recommending a course of action to USACE in case of an emergency (TE emergency plans are included in the SSHP);
- Assessing potential RCWM items; and
- Maintaining and operating the personnel decontamination station (PDS).

2.2.5 Air Monitoring Team and Contract Surety Laboratory

2.2.5.1 An Air Monitoring Team will be responsible for the development of analytical procedures pertaining to chemical operations. During all higher probability intrusive operations, the air monitoring team will conduct air monitoring for CA in the Exclusion Zone (EZ) and at the site perimeter.

2.2.5.2 Soil, scrap material, or archeological items potentially contaminated with agent will be containerized and heated, and the headspace will be sampled using miniature continuous air monitoring system (MINICAMS) and depot area air monitoring systems (DAAMS) tubes. DAAMS tubes will be analyzed either on site by the air monitoring team Mobile Analytical Platform (MAP), or at the contract surety laboratory at Aberdeen Proving Ground (APG), Maryland.

2.2.5.3 After headspace screening and clearance, samples of any soil and other materials showing evidence of possible contamination will be collected for analysis of CA and ABPs

products. These analyses may be performed either on site using the MAP, or at the contract surety laboratory at APG, Maryland.

2.2.5.4 The Air Monitoring Team and Contract Surety Laboratory for this investigation is ECBC.

2.2.6 Contractor

2.2.6.1 Parsons is the A/E contractor, providing overall site management and coordination during field operations, including sampling, coordination of analytical samples, geophysical anomaly reacquisition, geophysical anomaly clearance, coordination of subcontractors, documentation of site activities, and preparation of engineering reports. Parsons also will supply the Site Safety and Health Officer (SSHO) who will be responsible for ensuring the investigations are conducted safely and IAW with this Site-Wide WP and SSWPs.

2.2.7 Subcontractors

2.2.7.1 Parsons may subcontract the services as described in Subchapter 2.13 to ensure successful completion of the delivery order.

2.3 FEDERAL, STATE, AND LOCAL AGENCIES

2.3.0.1 The USEPA Region 3, USEPA Environmental Photographic Interpretation Center, and DDOE are the regulatory agencies that will provide review and technical support of Site-Wide WP and CSS and the related SSWPs.

2.4 SPRING VALLEY PARTNERING GROUP

2.4.0.1 The TPP process is addressed by the Spring Valley Partners. The Spring Valley Partners comprise representatives of CENAB, USAESCH, USEPA, and DDOE. This group meets monthly to facilitate the planning process.

2.5 ANOMALY REVIEW BOARD

2.5.0.1 The primary purpose of the ARB is to determine if a geophysical anomaly warrants intrusive investigation. The ARB will establish a review process to evaluate anomalies identified during geophysical investigations.

2.5.0.2 The members of the ARB will include Army experts in UXO, UXO detection, and associated UXO health and safety issues. In addition, representatives from regulatory members of the Spring Valley Partners will serve on the ARB.

2.5.0.3 All ARB meetings and decisions will be formally documented and approved by the ARB.

2.6 PROJECT PERSONNEL

2.6.1 Project Team

2.6.1.1 Parsons will employ a highly experienced project team to support this project. Key project personnel have served in their proposed capacity on many other HTW, MC and MEC, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and National Contingency Plan (NCP) related projects. These personnel have performed this work for USACE at FUDS at active and inactive installations.

2.6.2 Project Manager

2.6.2.1 The Parsons PM will be the direct point-of-contact for USACE. The Parsons PM will be responsible for managing all requirements of the project, overseeing the performance of all individuals on the project team, coordinating contract work, and overseeing specific task identification and resolutions. The PM will also schedule field efforts, identify site personnel to accomplish the specific project tasks as defined in this Site-Wide WP, implement project Quality Control (QC) and safety procedures, and direct personnel to achieve successful and timely completion of the project tasks. The PM will promptly implement approved and authorized changes to ongoing work orders, as necessary. The Parsons PM will be assisted by the following key personnel.

2.6.3 Site Manager

2.6.3.1 The Site Manager will manage the successful execution of all field activities, beginning with mobilization. During RCWM/MEC, operations the Site Manager will be a qualified Senior UXO Supervisor (SUXOS). The Site Manager will be responsible for scheduling daily safety meetings, scheduling and coordinating field team activities, and submitting a daily progress report (Appendix F) to the Parsons PM. The Site Manager will have direct oversight of all field activities during the project. The Site Manager will coordinate with the Parsons PM as necessary to take corrective actions to assure that WP and schedule requirements are met. Site Manager duties will also include enforcing compliance with the APP (Appendix D) and general daily field operating procedures.

2.6.3.2 The Site Manager reports to the Project Quality Control Manager (QCM) on quality matters and has responsibility for overall quality of work performed on site.

2.6.4 Project Safety and Health Manager

2.6.4.1 The Project Safety and Health Manager (PSHM) will ensure that procedures developed in the Site-Wide WP and APP are safe and that all safety processes and procedures are implemented in the field. The PSHM will be responsible for safety audits, and the SSHO/UXO Safety Officer (UXOSO) will report to the PSHM concerning non-MEC related safety issues.

2.6.5 Technical Director

2.6.5.1 The Project Technical Director (TD) will provide support to a variety of the work components, including project plans and reports. The TD will review major deliverables and will provide technical input/comment to the Parsons PM. The TD will be available to consult with key USACE and Parsons project personnel on technical issues as they arise.

2.6.6 Project Geophysicist

2.6.6.1 The Project Geophysicist has overall responsibility for the design, implementation and management of geophysical investigations required for the work effort. This individual must have a degree in geophysics, geology, geological engineering, or a closely related field, and have a minimum of five years of directly related experience.

2.6.7 Site Geophysicist

2.6.7.1 The Site Geophysicist is responsible for the day-to-day operations of the site geophysical investigations. This individual also must have a degree in geophysics, geology, geological engineering, or a closely related field.

2.6.8 Geophysical Instrument Operator

2.6.8.1 The Geophysical Instrument Operator is responsible for collecting geophysical data under the direction of the Site Geophysicist.

2.6.9 Project Chemist

2.6.9.1 The Project Chemist will assist in preparation and review of the Site-Wide WP and SAP, support contract laboratory procurement, provide contract laboratory oversight and technical support to the field sampling teams, review analytical results, provide analytical QC, and prepare laboratory data validation reports in compliance with the SOW.

2.6.10 Project QC Manager

2.6.10.1 The Project QCM will provide oversight of all facets of QC for the project IAW the Site-Wide WP, SAP, and other pertinent USACE guidance. The Project QCM will be responsible for overall quality control, including field sampling, geophysics, ordnance disposal and scrap management, review of QC reports, and development and implementation of QC procedures. However, as stated above, laboratory QC will be the direct responsibility of the Project Chemist.

2.6.11 GIS Manager

2.6.11.1 The geographic information system (GIS) Manager will be responsible for establishing a GIS IAW Subchapter 3.7 of this Site-Wide WP. The GIS Manager will also be responsible for collecting, processing and qualifying GIS data obtained during field activities for input into the GIS.

2.6.12 UXO Personnel

2.6.12.1 The specific personnel and responsibilities will be outlined in the SSWP for each site. For operations where the potential exists to encounter potential RCWM or MEC, one UXO Technician III will be designated the UXO QC Specialist (UXOQCS). The UXOQCS reports to the Project QC Manager on quality matters and is the key QC person onsite for RCWM and MEC. The UXO Technician's QC responsibilities are outlined in Chapter 4 of this WP. Similarly, a UXO Technician III will be designated as the SSHO. The SSHO reports to the PSHM for safety-related issues and serves as the field team safety officer, who has the responsibilities as outlined in the APP.

2.7 PROJECT COMMUNICATION AND REPORTING

2.7.1 Record Keeping

2.7.1.1 Aspects of the administration of the contract must be substantiated by permanent records, such as written correspondence, notes, and photographs. It is essential to summarize important non-written communications with notes covering conferences, telephone calls, and discussions, giving the date, location, parties involved, and important issues/topics discussed. Written correspondence is the most deliberate, as well as the most important, of the three general types of contractual communication (i.e., person to person, telephone calls, and written correspondence).

2.7.2 Office Communications and Reporting

2.7.2.1 The Parsons' PM is responsible for issuing the following documents throughout the project:

- Meeting minutes IAW DID MR-045 (due 10 calendar days after a meeting);
- Record of Telephone Conversations IAW DID MR-055 (due with the Project Status Report); and
- Project Status Reports (IAW DID MR-085).

2.7.2.2 A Project Status Report (PSR) will be issued pursuant to the terms of the contract. The PSR will include a summary of the work performed during the reporting period as well as work planned for performance in the upcoming period. The report will summarize results of meetings and telephone conversations that occurred during the reporting period. A request for payment invoice will be provided showing verification of achievement of payment milestones.

2.7.3 Field Communications and Reporting

2.7.3.1 The following actions or communications will be documented as discussed in Chapter 4 of this Site-Wide WP in a written or electronic log maintained by the Parsons Site Manager:

- Each and every occasion that potential RCWM or MEC is encountered;
- When and why work is stopped for safety reasons;
- Health and safety violations;
- Personnel changes and reason for changes; and
- Any deviations from the approved Site-Wide WP, SSWP, SAP or site specific SAP that occur in the field (e.g., number of samples, analysis, or problems encountered).

2.7.3.2 A Daily Progress Report (Appendix F) will be completed by the Parsons Site Manager. The report will include the following:

- Discussion of work progress;
- Individuals contacted or interviewed;
- Problems encountered; and
- Discussion of work completed versus project schedule.

2.7.3.3 Additionally, during sampling activities, Daily Quality Control Reports (DQCRs) will be prepared and submitted with the Daily Progress Report. The DQCR will include, at a minimum, weather information at the time of sampling, field instrument measurements, calibrations, identification of all field and control samples collected, departures from the SAP, any problems encountered, and any Government personnel directives. Distribution of the DQCR is identified within the SAP (Appendix E).

2.8 PROJECT DELIVERABLES

2.8.0.1 Project deliverables will meet the schedule requirements of the project and will be prepared IAW the applicable DID format referenced in the SOW. Deliverables will undergo internal Parsons review prior to submittal to other organizations. The following deliverables will be submitted as specified in the SOW:

- CSS
- Site-Wide WP (this document)
- SAP (included with the WP)
- Site-Specific Annexes to the CSS
- SSWPs
- Anomaly Removal Engineering Reports

2.8.0.2 All documents will be submitted in Draft, Draft Final and Final versions, unless otherwise specified. Other deliverables will include DQCRs (daily during investigation activities) and Sample Data Reports (for environmental samples).

2.9 PROJECT SCHEDULE

2.9.0.1 Project schedules are prepared periodically (typically, once every month) and presented to USACE. The schedule is updated, when necessary. The schedule is based on the time required for Parsons to prepare the draft documents; anticipated review time for the USACE review of the draft; Parsons' response to comments and preparation of the draft final for Partner review; anticipated time for the Partner review; and response to Partner comments; and preparation of the final work plan. Parsons field activities and other related activities (performed by other contractors) are also listed.

2.10 PERIODIC REPORTING

2.10.0.1 Over the course of the project, periodic reports such as daily progress reports and project status report, will be required to document project activities. Parsons will prepare these reports IAW the SOW, the applicable DIDs, and the project schedule.

2.11 COSTING AND BILLING

2.11.0.1 This project delivery order was awarded as a combination of Firm Fixed Price (FFP) and time and materials (T&M) tasks. Parsons will invoice USACE for payment milestones IAW the SOW and subsequent mutually agreed upon milestone payment schedules (typically once every month). Invoices will be submitted at the conclusion of the various milestones upon client acceptance of the milestone(s).

2.12 PROJECT PUBLIC RELATIONS SUPPORT

2.12.0.1 The CENAB PM will be the site-specific coordinator for work on this project and will consult with the USAESCH PM as necessary for public relations issues. The following protocol will be followed during execution of the Site-Wide WP:

- Communications and contacts with the public on this project will be under the direction of CENAB;
- No public information (television, radio, newspaper, web page, etc.) contacts by Parsons are expected on this project; and
- The Parsons project team will direct any media inquiries to CENAB for response.

2.13 SUBCONTRACTOR MANAGEMENT

2.13.1 UXO Subcontractor

2.13.1.1 Parsons will contract with a UXO subcontractor to provide UXO personnel for the field intrusive efforts and for disposal of munitions items. Parsons will manage the UXO Subcontractor by issuing a definitive SOW. The UXO Subcontractor will furnish all labor, tools, equipment, supplies, material, and licenses, and will perform all technical, professional,

supervisory, QC, and other services necessary to complete the SOW IAW the technical specifications, industry standards and schedule requirements set forth in the subcontract. Invoices will be submitted to Parsons according to the agreed payment schedule in the subcontract.

2.13.2 Analytical Laboratory

2.13.2.1 Parsons will solicit bids for laboratory support and select a laboratory to analyze soil (solid) and water (liquid) samples. The laboratory analytical work will performed by a lab in compliance with the DOD QSM (Quality System Manual). Though the selected laboratory will be validated by the USACE , Omaha District this program will expire and the selected laboratory will have to comply with the DOD QSM requirements. Parsons will manage the selected laboratory by issuing a definitive SOW. The selected laboratory will furnish all labor, tools, equipment, supplies, material, and licenses, and perform all technical, professional, supervisory, QC, and other services necessary to complete the SOW IAW the technical specifications, industry standards, and schedule requirements set forth in the subcontract. Invoices will be submitted to Parsons once the required analytical work is complete and all data have been satisfactorily validated.

2.13.3 Other Subcontractors

2.13.3.1 Parsons may also subcontract other services as listed below. Additional services may be subcontracted as required. Subcontractor services will be solicited on a competitive basis IAW the contract requirements.

- Topographical surveying
- Geoprobe Soil Boring
- Site support and disposal
- Air monitoring laboratory
- Security services
- Landscape evaluation
- Courier (for samples)
- Electrical
- Geotechnical
- Janitorial

2.14 MANAGEMENT OF FIELD OPERATIONS

2.14.1 Introduction

2.14.1.1 As this is a site wide document that will be used to address multiple future sites within the SVFUDS not all activities will be performed for all the sites to be investigated. The SSWPs will discuss in detail the sequence of events that will take place.

2.14.2 Technical Project Planning

2.14.2.1 The SVFUDS has a pre-established process through the Spring Valley Partners whereby sites are selected and prioritized for geophysical and/or intrusive investigation. The site-specific objectives are developed through this process.

2.14.3 Probability Assessment

2.14.3.1 If a site is slated for intrusive investigation, CENAB will perform a probability assessment as discussed in Subchapter 1.1. Based on the probability assessment Parsons, USAESCH, and CENAB will decide under what protocols the site will be investigated (i.e., low or higher probability procedures).

2.14.4 Intrusive Investigations

2.14.4.1 Anomalous areas agreed to by the ARB will be reacquired using standard geophysical instruments. Air monitoring will be performed during excavation activities as required using the appropriate procedures described in the APP (Appendix D). The excavation team will perform the initial intrusive investigation. If suspect RCWM or MEC items are found during the excavation, the appropriate Contingency Plan will be initiated (Subchapter 16.13 or 16.14 of the SSHP, which is Attachment 1 to the APP). Initially, the excavation team will evaluate suspect ordnance and RCWM items. If the excavation team determines that it is suspect RCWM, TE personnel will confirm the determination. If the item is suspect RCWM, qualified TE personnel (i.e., TE EOD personnel to package suspect RCWM munitions, and non-EOD personnel TE to package all other suspect RCWM items) will be responsible for packaging it in an MRC and transporting it to the IHF containers in the Federal Property Storage Area for additional evaluation. If the excavation team or TE personnel determines that an item is not suspect RCWM but is MEC, qualified UXO personnel will be responsible for placing these items in suitable containers and having them transported to the Federal Property Storage Area for additional evaluation.

2.14.4.2 If additional items are uncovered indicating a potential burial pit, and a burial pit was not planned for, the excavation will be secured by covering it with plastic. The area around the pit will be surrounded with an appropriate barrier and guarded by security. Excavation activities will continue under additional engineering controls, if necessary.

2.14.4.3 Details regarding the intrusive investigation methods are described in Chapter 3.

2.14.5 HTW Contaminated Soil Removal

2.14.5.1 Coincidental to the intrusive investigations some sites will contain HTW-contaminated soil. This soil may be removed as part of the intrusive investigations or performed as a separate operation within an intrusive site. HTW-contaminated soil removal techniques are described in Chapter 10.

2.14.6 MEC/RCWM Storage

2.14.6.1 The Federal Property Storage Area located at the Federal Property will be used for storing suspect MEC/RCWM recovered from intrusive investigations. The Federal Property Storage Area consists of four structures:

- IHF,
- Assessment Holding Facility (AHF),
- MARB Holding Facility (MHF), and
- Bureau of Alcohol, Tobacco, and Firearms (ATF) Explosives Storage Magazine.

2.14.6.2 In this document, the term "IHF Containers" will refer collectively to the three IHF-type containers, namely the IHF, AHF and MHF. The individual IHF container will be referred to as the "IHF." The siting and occupancy of the Federal Property Storage Areas is described in Chapter 9.

2.14.7 Disposal

2.14.7.1 All items will be properly disposed IAW DOD and federal, state, and local regulations as described in Subchapters 3.8.14, 3.8.15, and 3.9.

2.14.7.2 MEC will be disposed IAW applicable DA and DOD regulations.

2.14.7.3 The PMNSCM will be responsible for providing the IHF to the site, for providing the IHF Plan, and for destruction of RCWM.

2.14.7.4 HTW will be sent to either a RCRA-permitted hazardous waste landfill or a RCRA-permitted incinerator, depending upon the nature and quantity of the HTW material. During intrusive investigations and HTW-contaminated soil removals soil may be determined to be "non-hazardous" based on the results of soil analysis and may be disposed of at non-hazardous waste landfill.

2.14.8 Engineering Report

2.14.8.1 Following completion of a field effort and evaluation of the data collected, an Engineering Report will be prepared to document the completion of the intrusive investigation phase. The information presented in the respective reports will be compiled and assessed as part of a Site-Wide RI/FS.

CHAPTER 3
FIELD INVESTIGATION PLAN

3.1 OVERALL APPROACH TO MUNITIONS RESPONSE ACTIVITIES

3.1.1 Site Characterization Goals

3.1.1.1 The site characterization goal of this investigation is to confirm or refute the presence of MEC and potential RCWM in anomalies and areas of concern identified by the Spring Valley Partners. If MEC or potential RCWM is encountered, it will be removed and disposed of IAW this Site-Wide WP. In addition, any AUES-related contamination identified at sites where this intrusive investigation takes place may also be removed. Items that are potentially related to AUES will include but are not limited to:

- Any item identified as suspect MEC/RCWM or as being related to MEC/RCWM; or
- Any sealed container that cannot be positively identified to be unrelated to AUES (e.g., paint cans, etc. are known to be unrelated to AUES activities); or
- Any unsealed container or identifiable fragment thereof that cannot be positively identified to be unrelated to AUES (e.g., beer bottles, etc. are known to be unrelated to AUES activities); or
- Any other item that is suspected to be agent-related material or that is suspected to contain agent-related material; or
- Any other item that cannot be positively identified as an obvious cultural feature or a post-1918 feature (obvious cultural features or post 1918 features include such items as root ball baskets, poly vinyl chlorinated [PVC] piping, wiring, etc.).

3.1.2 Data Quality Objectives

3.1.2.1 Data Quality Objectives (DQOs) are qualitative and quantitative statements that specify the quality and level of data required to support the decision-making processes for a project.

3.1.2.2 The site-wide goals are preliminary in nature and are refined during the Spring Valley Partnering process for each specific site.

3.1.2.3 Overall project DQOs identified for the general site-wide activities are presented in Tables 3.1a through 3.1e. In addition, secondary DQOs associated with geophysical investigation of potential RCWM/MEC are discussed in Subchapter 3.6.8, and analytical DQOs are presented in the SAP (Appendix E).

Table 3.1a Data Quality Objectives – Digital Geophysical Mapping Spring Valley FUDS, Washington, D.C.

Data Quality Objective	Project Specific Action
1. State the Problem	The site was part of the AUES during World War I. The conceptual site model for the SVFUDS was initially developed by USACE and, in general terms, focuses on encountering hazards from RCWM, MEC, MC, and/or CACM that might remain at the site. Potential receptors include private residents, students, construction workers, and groundskeepers. Potential exposure scenarios with regard to surface and subsurface soil include possible contact with MEC/RCWM items, and possible dermal contact with, direct ingestion of, or inhalation of remaining chemical contaminants.
2. Identify the decision	Determine the locations of single point anomalies and anomalous areas at the SVFUDS that may be representative of single RCWM- or MEC-related items and/or burial pits.
3. Identify inputs to the decision	• Field Notes • Geophysical Data • Quality Control Test Results
4. Define the Boundaries of the Study	The project area is the SVFUDS. Site-specific boundaries will be identified in the SSWP.
5. Develop a Decision Rule	If there are single point anomalies that represent potential single MEC/RCWM items, then the anomaly will be recommended to the ARB for intrusive investigation. In addition, if there are large anomalies that represent possible burial pits or trenches, then these too will be recommended to the ARB for intrusive investigation.
6. Specify Limits on Decision Errors	Decision errors will be minimized by ensuring appropriate instrument function, navigation, positioning, processing, and anomaly selection, combined with an evaluation of detection performance through the analysis of repeated data collection lines. The DQOs listed in section 3.6.8 describe specific metrics that will be used to verify geophysical data quality.
7. Optimize the Design	The design is optimized by concentrating the investigation through historical research on locations identified as most likely to have been impacted and by having all contractor recommended anomalies reviewed by the ARB prior to commencing intrusive work.

Table 3.1b Data Quality Objectives – Reacquisition of Geophysical Anomalies Spring Valley FUDS, Washington, D.C.

Data Quality Objective	Project Specific Action
1. State the Problem	The site was part of the AUES during World War I. The conceptual site model for the SVFUDS was initially developed by USACE and, in general terms, focuses on encountering hazards from RCWM, MEC, MC, and/or CACM that might remain at the site. Potential receptors include private residents, students, construction workers, and groundskeepers. Potential exposure scenarios with regard to surface and subsurface soil include possible contact with MEC/RCWM items, and possible dermal contact with, direct ingestion of, or inhalation of remaining chemical contaminants.
2. Identify the decision	Reacquire the previously identified locations of single point anomalies and anomalous areas that have been selected for intrusive investigation by the SVFUDS ARB.
3. Identify inputs to the decision	The primary information used to determine the quality of anomaly reacquisition will be the locations and characteristics of single point anomalies and anomalous areas, and reacquisition results including peak responses, offsets, field team comments and quality control tests.
4. Define the Boundaries of the Study	The project area is the SVFUDS. Site-specific boundaries and selected anomalies and anomalous areas to be investigated will be identified in the SSWP.
5. Develop a Decision Rule	The reacquisition process will refine the location of intrusive anomaly investigation.
6. Specify Limits on Decision Errors	Decision errors will be minimized by ensuring appropriate instrument function and anomaly positioning, combined with a comparison of the results of initial data collection and reacquisition. The DQOs listed in Section 3.6.8 describe specific metrics that will be used to verify the effectiveness of the reacquisition process.
7. Optimize the Design	The extent of the reacquisition process will be determined by the anomaly selection and review prior to reacquisition.

Table 3.1c Data Quality Objectives – Resolution of Anomalies
Spring Valley FUDS, Washington, D.C.

Data Quality Objective	Project Specific Action
1. State the Problem	The site was part of the AUES during World War I. The conceptual site model for the SVFUDS was initially developed by USACE and, in general terms, focuses on encountering hazards from RCWM, MEC, MC, and/or CACM that might remain at the site. Potential receptors include private residents, students, construction workers, and groundskeepers. Potential exposure scenarios with regard to surface and subsurface soil include possible contact with MEC/RCWM items, and possible dermal contact with, direct ingestion of, or inhalation of remaining chemical contaminants.
2. Identify the decision	Intrusively investigate and resolve single point anomalies and anomalous areas that have been selected by the SVFUDS ARB or Spring Valley Partners as representing areas that may potentially contain MEC/RCWM items.
3. Identify inputs to the decision	The primary information used to determine anomaly resolution will be post-excavation geophysical data, specifically the reduction of geophysical anomaly peak(s). For single point anomalies, the reduction of post-excavation signal response values will be compared to the anomaly reacquisition signal response values. For anomalous areas, one or more anomaly peaks will be selected prior to investigation and the reduction of the post-excavation signal response values of these selected peaks will be used. The agreed percentage reductions for anomaly resolution will be 90% unless otherwise specified in the SSWP. In addition, in case peak reductions cannot be achieved (e.g., where the source is a cultural feature), visual and other data will be collected to determine the anomaly source and facilitate decision making regarding anomaly resolution.
4. Define the Boundaries of the Study	The project area is the SVFUDS. Site-specific boundaries and selected anomalies and anomalous areas to be investigated will be identified in the SSWP.

Table 3.1c Data Quality Objectives – Resolution of Anomalies
Spring Valley FUDS, Washington, D.C.
(continued)

Data Quality Objective	Project Specific Action
5. Develop a Decision Rule	If the post-excavation signal response values for the anomaly or anomalous area selected peak value(s) has/have decreased by an agreed-upon percentage of the initial geophysical mapping and/or anomaly reacquisition signal response values then that anomaly or anomalous area will be considered to be resolved. The agreed percentage reductions for anomaly resolution will be 90% unless otherwise specified in the SSWP. Alternatively, in situations where the required peak reductions cannot be achieved (e.g., where the source is a cultural feature), if sufficient visual and other data can be presented to the USAESCH Project Geophysicist and the SVFUDS ARB to justify resolution of the anomaly or anomalous area, then that anomaly or anomalous area will be considered to be resolved.
6. Specify Limits on Decision Errors	Decision errors will be minimized by ensuring appropriate instrument function, comparing the results of initial data collection and reacquisition, and comparing the results of the intrusive action with the initial and reacquisition responses. The DQOs listed in section 3.6.13 describe specific metrics that will be used to verify the effectiveness of the reacquisition process.
7. Optimize the Design	The design is optimized by concentrating the investigation through historical research on locations identified as most likely to have been impacted. The design is further optimized by using soil lithology in addition to using digital geophysical instruments to confirm that the anomaly has been resolved. Furthermore, all data collected will be submitted to the USAESCH Project Geophysicist and, ultimately, to the SVFUDS ARB for final approval of anomaly resolution.

Table 3.1d Data Quality Objectives – Soil Sampling and Analysis Spring Valley FUDS, Washington, D.C.

Data Quality Objective	Project Specific Action
1. State the Problem	The site was part of the AUES during World War I. The conceptual site model for the SVFUDS was initially developed by USACE and, in general terms, focuses on encountering hazards from RCWM, MEC, MC, and/or CACM that might remain at the site. Potential receptors include private residents, students, construction workers, and groundskeepers. Potential exposure scenarios with regard to surface and subsurface soil include possible contact with MEC/RCWM items, and possible dermal contact with, direct ingestion of, or inhalation of remaining chemical contaminants.
2. Identify the decision	Collect and analyze samples of soil to identify potential contaminants and provide adequate information to facilitate subsequent remedial decisions.
3. Identify inputs to the decision	These details are described in Section 8.4 of the SAP (Appendix E to this WP).
4. Define the Boundaries of the Study	The project area is the SVFUDS. Site-specific boundaries and sampling locations will be identified in the SSWP.
5. Develop a Decision Rule	These details are described in Section 8.4 of the SAP (Appendix E to this WP).
6. Specify Limits on Decision Errors	These details are described in Section 8.4 of the SAP (Appendix E to this WP).
7. Optimize the Design	These details are described in Section 8.4 of the SAP (Appendix E to this WP).

Table 3.1e Data Quality Objectives – Removal of Contaminated Soil Spring Valley FUDS, Washington, D.C.

Data Quality Objective	Project Specific Action
1. State the Problem	The site was part of the AUES during World War I. The conceptual site model for the SVFUDS was initially developed by USACE and, in general terms, focuses on encountering hazards from RCWM, MEC, MC, and/or CACM that might remain at the site. Potential receptors include private residents, students, construction workers, and groundskeepers. Potential exposure scenarios with regard to surface and subsurface soil include possible contact with MEC/RCWM items, and possible dermal contact with, direct ingestion of, or inhalation of remaining chemical contaminants.
2. Identify the decision	Collect and analyze samples of soil to determine whether identified areas of contaminated soil have been removed, if the decision has been made to conduct soil removal.
3. Identify inputs to the decision	These details are described in Section 8.4 of the SAP (Appendix E to this WP).
4. Define the Boundaries of the Study	The project area is the SVFUDS. Site-specific boundaries and sampling locations will be identified in the SSWP.
5. Develop a Decision Rule	If results are greater than specified criteria, then additional sampling or soil removal may be necessary. Criteria will be specified in the SSWP.
6. Specify Limits on Decision Errors	These details are described in Section 8.4 of the SAP (Appendix E to this WP).
7. Optimize the Design	These details are described in Section 8.4 of the SAP (Appendix E to this WP).

3.1.2.4 The overall project goals are to:

- Ensure sites are sufficiently characterized to ensure no immediate hazards remain ; and
- Collect sufficient data to contribute to the RI/FS.

3.1.2.5 For each individual site at the SVFUDS, the Spring Valley Partners will initiate the SVFUDS version of the TPP process to determine the data needs to develop site-specific DQOs.

3.1.3 Data Incorporation into Engineering Reports and RI/FS

3.1.3.1 Raw data from field measurements (including geophysical and intrusive data collection activities) will be recorded and noted in the field notebooks. If the data are to be used in the project reports, they will be reduced and summarized, and the reduction method will be documented in the report. Data reduction and analysis methodologies will be dependent upon the geophysical methods used at the site. All data reduction requirements will meet accepted standards. If requested, unprocessed geophysical data can be provided to USACE in a reasonable time after collection (typically within 36 hours after completion of the day's work).

3.1.3.2 Data review will be performed on both the geophysical surveys and the intrusive investigations. Geophysical data will be validated by reviewing the field notes, geophysical data, reacquisition results, intrusive results, and QC test results to confirm that they meet the applicable DQOs. Analytical data validation will be conducted IAW the SAP (Appendix E).

3.1.3.3 GIS will be used to map site characterization data. Two types of data will be evaluated to support the GIS effort: graphic data contained within the GIS dataset and tabular data contained within a relational database. The GIS effort will involve preparation, analysis, processing, and interpretation of data acquired from the MC sampling and analysis, geophysical survey, and intrusive investigations. All files contributing to the GIS data sets will be backed up prior to editing or manipulation. The GIS coordinator will be responsible for registering and processing all survey and intrusive data collected in the field into the SVFUDS GIS, and also for preparing maps depicting specific attributes for the site.

3.1.4 MEC Exposure Analysis

3.1.4.1 All MEC and potential RCWM will be removed as sites are characterized. No MEC or potential RCWM will remain in anomalies or excavations investigated as part of this effort. Any residual risk remaining within in the SVFUDS will be addressed as part of the Site-Wide RI/FS.

3.1.5 Use of Time Critical Removal Actions

3.1.5.1 The procedures outlined in this Site-Wide WP are for non-time-critical removal actions. In the event that circumstances develop during intrusive investigation activities that justify the need for a time-critical removal action (e.g., significant possibility of explosive hazards resulting in injury or loss of life), procedures will be developed IAW USACE guidance.

3.1.6 Follow-on Activities

3.1.6.1 Parsons will prepare and submit site-specific engineering reports that fully document the fieldwork effort and provide subsequent evaluations and recommendations. These reports will contain a brief description of the site history, previous work conducted, the work conducted under this task order, and the results. The report will also contain the conclusions as to the nature and extent of CA contamination at the site (if applicable), and recommendations for future work at the site if necessary. It is the Government's intent to pursue and to address any CA contamination, which may be present. Each site should be sufficiently characterized to support an overall RI. Site-specific reports will be supported as necessary with accompanying maps, charts, and tables to fully describe and document all work performed and all conclusions and recommendations presented.

3.2 IDENTIFICATION OF AREAS OF CONCERN

3.2.0.1 Areas of concern have been identified as POIs. The first 36 POIs were selected based upon an historical records review, including a 1918 aerial photograph. Based on additional information obtained in an expanded research effort, 17 additional POIs were identified for a total of 53 POIs. Continuing analysis and interpretation of new data and information is the responsibility of the Area of Interest (AOI) Task Force. The AOI Task Force comprises representatives of CENAB, the USEPA, and the DDOE.

3.2.0.2 Once an area is identified, a determination is made as to the type of investigation to be made. Investigations may include test pits performed under this WP, and/or geophysical investigations performed under this and other SVFUDS work plans.

3.2.0.3 After a geophysical investigation identifies anomalies, the ARB will meet to recommend anomalies for intrusive investigation under this WP.

3.3 SITE MOBILIZATION/DEMOBILIZATION AND SUPPORT PLAN

3.3.1 Objective

3.3.1.1 The objective of this subchapter is to describe the logistics of mobilizing personnel, equipment, and facilities to begin the project; and demobilizing personnel, equipment, and facilities upon completion of the project. The scope of the project involves all activities performed within the SVFUDS site-wide intrusive investigation.

3.3.2 Overview

3.3.2.1 The Federal Property (Figure 3-1) will be the primary staging area for all mobilizations. Facilities such as offices and MEC/RCWM storage facilities already exist at the Federal Property. Therefore, minimal mobilization activity is necessary at the Federal Property.

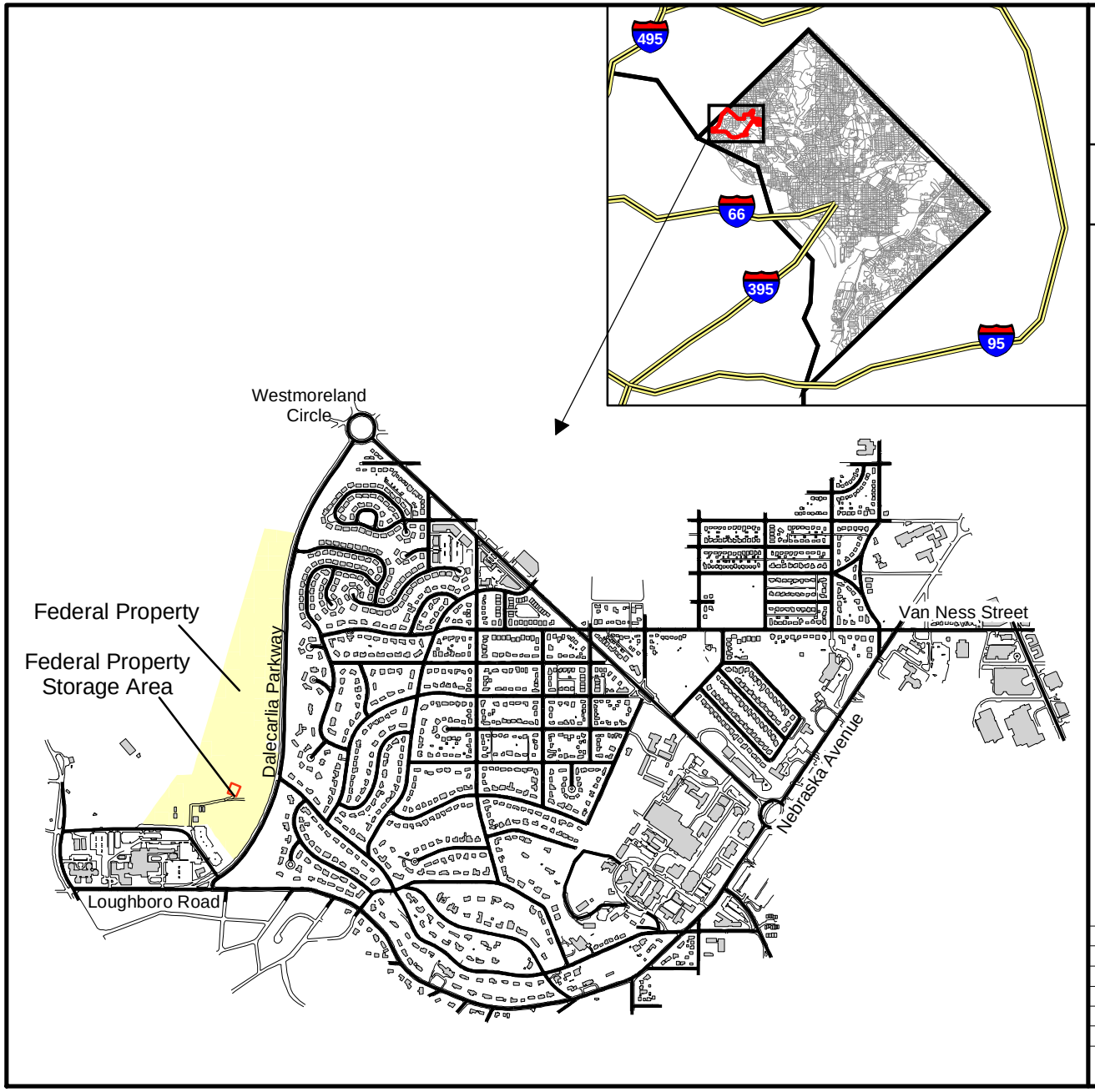


Figure 3-1
Federal Property Location Map

Spring Valley Site-Wide
Washington, DC

Legend

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

N
W E
S

1,500 750 0 1,500 Feet

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3.3.2.2 The Federal Property will be the last location to be demobilized, ensuring the availability of the USACE for public affairs and community relations needs, as well as providing a staging area for the demobilization efforts.

3.3.3 Right-of-Entry

3.3.3.1 ROEs must be obtained on behalf of the Government (and will apply to all representatives, agents, and contractors) to enable project personnel access to private property in order to accomplish the project's objectives. CENAB will obtain the appropriate ROEs to perform the work outlined in this delivery order. CENAB will notify property owners of the field investigation schedule prior to entering the investigation areas. If ROE cannot be obtained, work will be prevented from occurring on the property and the project completion date may need to be extended.

3.3.4 Utility Protection Service

3.3.4.1 Parsons will notify Miss Utility, the utility protection service for the area, at least 48 hours prior to any excavation or intrusive activity. The phone number for Miss Utility is (800) 257-7777. Parsons will also coordinate with property owners to ensure that utilities are not damaged inadvertently.

3.3.5 Federal Property

3.3.5.1 The Federal Property houses the USACE's resident offices and offices for the TE, the CENAB Site Operations Officer/Public Affairs Office, Parsons, the site support and disposal subcontractor, plus the staging area for the mobile laboratories. These facilities are already in place, and therefore, limited mobilization is required. Figure 3-2 shows the Federal Property Layout.

3.3.5.2 The Temporary Storage Area will be used for the storage of containerized soil, scrap, and investigation derived waste (IDW) prior to transport to the approved disposal facilities.

3.3.5.3 <u>Power Supply</u>

3.3.5.3.1 Any additions to the Federal Property Storage Area may require an additional power drop to supply power to the mobile laboratories to supply power to two 200-amp, 3-phase, 230-volt services. Mobile laboratories may be located adjacent to and north of the site trailers. No other modifications are required at the Federal Property. Power at the specific sites will be obtained from generators. Parsons and RDECOM entities will provide generators, as required.

3.3.6 Intrusive Investigation Sites

3.3.6.1 Mobilization at intrusive investigation sites will be sequenced to ensure that all contractors involved minimize impact to residents.

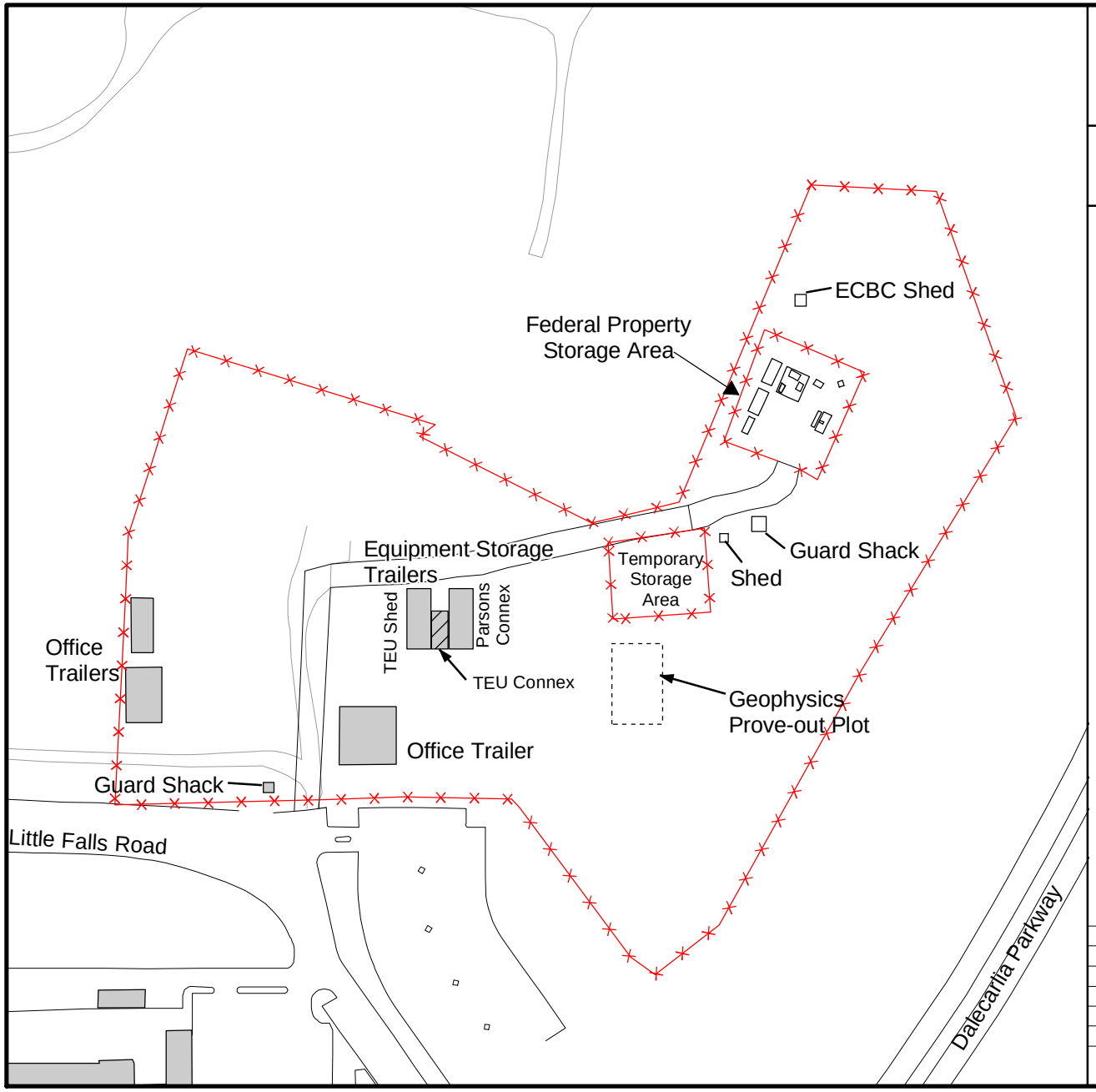

Figure 3-2
Federal Property Layout

Spring Valley Site-Wide
Washington, DC

Legend

- Fence
- Buildings
- Federal Property Storage Area Structures
- Road
- Dirt Road

N
W E
S

150 75 0 150 Feet

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3.3.6.2 Intrusive investigations of low probability anomalies will require minimal equipment at each site. Any vehicles and equipment necessary for site operations will be parked on the same side of the street to minimize impacts to residential roadways.

3.3.6.3 Intrusive investigations of higher probability anomalies typically require more equipment than investigations of low probability anomalies. Figure 3-3 depicts a typical site layout for intrusive investigations of higher probability anomalies. Whenever practical, vehicles and equipment necessary for site operations will be parked on the same side of the street to minimize impacts to residential roadways.

3.3.6.4 Preparation

3.3.6.4.1 Parsons' site support and disposal subcontractor will perform most site preparation activities. Site clearing and construction/privacy fence installation will be performed as needed.

3.3.6.5 Utility Tie-in

3.3.6.5.1 No permanent utility tie-ins are anticipated; only portable equipment will be used. Where necessary, water will be brought in by truck and portable generators will be used to supply power.

3.3.6.6 Facility Construction

3.3.6.6.1 No permanent facilities will be required at intrusive investigation sites. The SSWPs will contain details about the types of facilities required and their layout.

3.3.6.7 Work Area Establishment

3.3.6.7.1 The on-site work area will be established prior to the start of site operations and will be determined on a case-by-case basis.

3.3.6.8 Site Security

3.3.6.8.1 Site security will be the responsibility of CENAB.

3.3.7 Demobilization

3.3.7.1 Intrusive Investigation Sites

3.3.7.1.1 The intrusive investigation sites will be demobilized first with each party involved being responsible for demobilizing their own equipment and facilities. Any rental equipment, unless otherwise needed for the demobilization effort, will be demobilized as soon as possible. Site restoration will be coordinated with the property owners by CENAB.

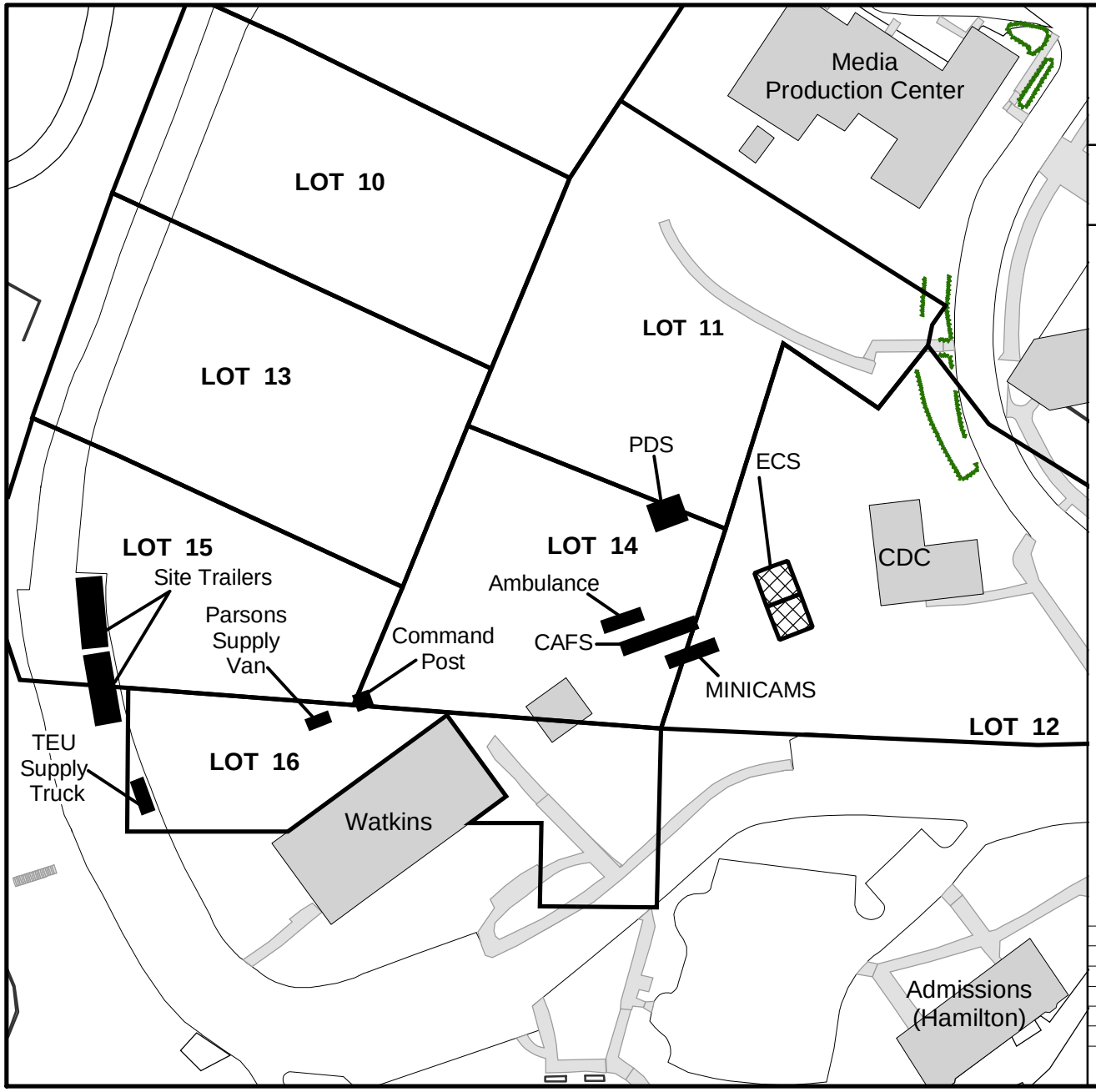

Figure 3-3

Typical Site Layout for Investigation of Higher Probablity Anomalies

Spring Valley Site-Wide
Washington, DC

Legend

- (400,360) & (420,360) Grids
- Lots
- Trailer
- Buildings
- Hedge
- Retaining Wall
- Sidewalk
- Driveway
- Roads

Note: The location of support activities will vary site to site and will be documented in the Site Specific Work Plans.

0 45 90 180 Feet

1 inch equals 90 feet

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3.3.7.2 Federal Property

3.3.7.2.1 The Federal Property will be demobilized only once the site-wide investigation is completed. All rental equipment, unless needed for demobilization efforts, will be demobilized as soon as possible. It is anticipated that the Public Affairs Office trailer will remain on site until all project activities are complete. Restoration of any impacted areas will be the responsibility of CENAB.

3.3.7.3 Post Restoration Survey

3.3.7.3.1 Where intrusive activities have taken place, Parsons' surveying and landscaping subcontractors will conduct post-restoration surveying to determine the impact to properties, to assess any damage caused, and to estimate the costs for repairs. Where necessary, land surveying will also be conducted to establish final topographies.

3.4 BRUSH CLEARING AND DEBRIS REMOVAL PLAN

3.4.1 Introduction

3.4.1.1 This subchapter details the location and method for brush clearing and debris removal, including removal of fences.

3.4.2 Brush Clearing

3.4.2.1 Brush clearing may be required to improve geophysical survey coverage or to facilitate access for intrusive investigation. However, removal of vegetation, specifically those plants, trees, and shrubs that are part of landscaped residential areas, will be kept to a minimum. Efforts will be made wherever practical to tie back branches and limbs to keep them out of the way of field activities in order to minimize the need to destroy or remove vegetation. Brush clearing will be limited to the minimum necessary to carry out investigation activities in vegetated areas. When a ground penetrating radar survey is to be performed in an area, the area will be cleared of brush so as to allow unimpeded access and prevent, to the extent practical, the ground penetrating radar antenna from raising off of the ground surface. This would include removing all shrubs and plants but would not necessitate the removal of grass.

3.4.2.2 Parsons will obtain approval from USACE prior to removing any trees at the SVFUDS. A professional tree service company will be subcontracted to perform any necessary tree removal.

3.4.2.3 Landscape surveys will be conducted at all sites prior to the clearance or removal of any vegetation.

3.4.3 Fence Removal

3.4.3.1 Fence removal will be initiated only if necessary to access areas for the geophysical survey. The fencing material will be salvaged and replaced after all activities are completed that require access in the fenced areas.

3.4.4 Surface Debris

3.4.4.1 A UXO Technician will accompany personnel clearing surface debris. All encountered debris will be disposed of properly according to type. Parsons and the site support and disposal subcontractor will assess material such as car batteries and paint cans and recommend a proper disposal method to be approved by USACE.

3.5 GEOPHYSICAL PROVE-OUT PLAN

3.5.0.1 A geophysical prove-out plan is not required as part of the SOW. Two geophysical instruments, the Geonics EM61-MK2 Metal Detector (EM61-MK2) and the Geometrics G858 gradiometer (G858) (in gradiometer configuration), have already been demonstrated to be the most effective in previous Geophysical Prove-out (GPO) grid surveys and have been accepted by the Spring Valley Partnering Group. The Geophysical Survey Systems, Inc. (GSSI) SIR-3000 Ground Penetrating Radar (GPR), or equivalent has been added to the WP as its previous variant, the SIR-2000, was included in the previous Work Plan developed for the SVFUDS.

3.5.0.2 Prior to acquiring geophysical data or reacquiring anomalies at the SVFUDS the GPO grid will be surveyed, or the seeded items will be reacquired using the same procedures to be used for the actual work to be performed to confirm that the equipment and procedures will achieve the project objectives and meet the DQOs.

3.6 GEOPHYSICAL INVESTIGATION PLAN

3.6.0.1 Geophysical data acquisition or anomaly reacquisition may or may not be a part of a particular investigation. The information contained in this Geophysical Investigation Plan subchapter provides the general details for geophysical investigations to be conducted at the SVFUDS under this SOW. The SSWP will contain the specifics with regard to a particular site's geophysical investigation plan as necessary.

3.6.1 Site Description

3.6.1.1 Geophysical Data Quality Objectives

3.6.1.1.1 In general, the purpose of geophysical mapping will be to determine the locations of anomalies possibly caused by AUES related materials. Some or all of these locations will be intrusively investigated as part of this project. Site-specific objectives will be provided in the SSWP for each site.

3.6.1.2 Specific Area to Be Investigated

3.6.1.2.1 The specific areas to be investigated within the SVFUDS will be documented in the SSWP for each site.

3.6.1.3 Past, Current, and Future Use

3.6.1.3.1 See Subchapter 1.7 of this WP.

3.6.1.4 Anticipated Anomaly Source Type, Composition and Quantity

3.6.1.4.1 Potential anomaly sources include munitions, bulk containers (e.g., ceramic containers or drums), and laboratory bottles and apparatus. The most common munition type encountered is the 75 mm Mk II chemical projectile and 75 mm shrapnel rounds. Additional munition types though less common include 3-inch Stokes Mortars, Livens Projectiles, 4.2-inch projectiles, 4.7-inch projectiles, and 4.7-inch Commons. The items are commonly found in pits and trenches though single items have been found as well.

3.6.1.5 Anticipated Depth

3.6.1.5.1 Anticipated depth will vary due to the potential for items to have been redistributed based on relatively recent land development activities. Anticipated depth of anomaly sources range from 0 to 20 feet based on the depth of burial pits encountered to date.

3.6.1.6 Digital Topographic Maps

3.6.1.6.1 Topographic maps for specific sites will be presented in the respective SSWP.

3.6.1.7 Vegetation

3.6.1.7.1 A description of site specific vegetation conditions will be presented in the respective SSWP.

3.6.1.8 Geologic Conditions

3.6.1.8.1 See Subchapter 1.5.2 of this WP, Environmental Setting.

3.6.1.9 Soil Conditions

3.6.1.9.1 See Subchapter 1.5.2 of this WP, Environmental Setting.

3.6.1.10 Shallow Groundwater

3.6.1.10.1 See Subchapter 1.5.2 of this WP, Environmental Setting.

3.6.1.11 Geophysical Conditions

3.6.1.11.1 The geophysical conditions at the SVFUDS are challenging due to the urban location and long history of development. Cultural features such as buildings, roads, vehicles, fences, landscaping materials, and utilities create localized differences in background responses for both electromagnetic and magnetic techniques. Magnetic background gradients range from +40 to -40 nT/ft, with even greater ranges in close proximity to man-made objects. The background magnetic field intensity is approximately 52,500 nT with a declination of 10.72 degrees west of true north. Static electromagnetic M noise levels are typically within a range of 3 mV, but can increase significantly in the vicinity of power lines present at the site. Other cultural items, such as metallic trash and road bed material containing magnetic rocks cause anomalous responses that are difficult to distinguish from anomalies that could represent

AUES material. These conditions result in many excavations of non-AUES related material and difficulties meeting the required signal response reductions when resolving anomaly excavations at this site.

3.6.1.12 Site Utilities

3.6.1.12.1 As the SVFUDS is predominantly an urban environment site, it is anticipated that a variety of utilities, both buried and overhead, will be encountered. These utilities may include buried water, sanitary and storm sewers, and gas, utilities serving residential properties or American University facilities. The electrical, telephone, and cable utilities may be overhead or buried. The specific residential properties will include the utility laterals that serve the properties, as well as any utility right-of-ways that may pass through respective properties.

3.6.1.12.2 Site utilities may also include underground electric and water utilities serving landscape lighting and sprinkler systems.

3.6.1.12.3 All visible surface features will be located and identified during geophysical surveys. The location of overhead utilities will also be noted and the homeowner(s) will be questioned regarding utilities that might be entering the house. In addition, a utility location survey will be performed prior to any geophysical mapping.

3.6.1.12.4 The locations of utilities will be considered during the selection of anomalies for intrusive investigation and the anomaly resolution process. However, because AUES materials have been found in close proximity to buried utilities in the past, anomalies co-located with known utilities will still be considered for intrusive investigation.

3.6.1.13 Man-Made Feature Affecting Geophysical Investigations

3.6.1.13.1 As the SVFUDS is a dense urban environment, the potential exists for man made features to affect geophysical surveys. The features include but are not limited to:

- Houses or buildings;
- Fences;
- Roads, sidewalks, driveways, walkways, and patios;
- Reinforced concrete structures (i.e., retaining walls and culverts); and
- Landscaping materials (i.e., tree root baskets)

3.6.1.13.2 The SSWP will describe the specific man-made features expected to affect the particular geophysical investigation for that site. All visible surface features will be located and identified during geophysical surveys.

3.6.1.14 Site Specific Dynamic Events Affecting Site Operations

3.6.1.14.1 Dynamic events such as rain, lightning, and solar flares may affect geophysical data collection. Procedures for geophysical survey operations when these events occur are as follows:

3.6.1.14.2 Rain: The effect of rain on geophysical operations is primarily dependent on the instrument being used and the physical site conditions (terrain and vegetation).

- Instrument: Most instruments commercially available are relatively water resistant. Additional measures will be taken by the survey teams (such as covering connections with plastic sheeting) to reduce the possibility of moisture impacting the instrument's electronics. When possible, survey teams will only operate the instruments in the rain under very light rain conditions (drizzling). If the rain persists and the site geophysicist determines that there is a potential for an impact to the data quality, or that moisture could be getting into the instrument, field operations will cease and the project geophysicist will be notified. Operations will continue after the rain has ceased or has reduced to a drizzle.
- Site Conditions: At sites where footing for the operators becomes difficult because of wet terrain or vegetation, operations will cease until the area is deemed safe by the SSHO. The determination to stop work will be made by the SSHO, and the project team will be immediately notified.

3.6.1.14.3 Lightning: Any observed lightning in the area will be considered a safety hazard and field activities will be stopped until all lightning activity has ceased. If any site personnel observe lightning, they will stop work immediately and notify the SSHO. The SSHO will instruct all other site personnel to stop work and equipment will be taken to a safe area. Work will not resume until the UXOSO has given notice that it is safe to do so.

3.6.1.14.4 Solar Flares: Solar flares are sun-generated phenomena which may temporarily generate high-magnitude magnetic noise sufficient to make magnetometers, often gradiometers, and occasionally electromagnetic sensors unusable for the duration of the event. Solar flares are typically readily observable by the instrument operators (throughout the area) as rapidly fluctuating signal readings with no apparent cultural or survey source. The Site Geophysicist will be alert to solar flares and will temporarily cease data collection until static testing shows a cessation of the solar activity. The Site Geophysicist will log the time intervals when solar flare activity is observed to help determine whether any data (for digital geophysics) have been affected. The National Oceanic and Atmospheric Administration maintains a helpful website at http://spaceweather.com.

3.6.1.15 Overall Site Accessibility

3.6.1.15.1 Site access conditions will vary greatly site to site. The respective SSWP will include a discussion of site-specific accessibility issues.

3.6.1.16 Potential Worker Hazards

3.6.1.16.1 Potential worker hazards and corresponding safety measures and procedures are summarized in the APP (Appendix D). Site-Specific hazards will be presented in the SSWPs.

3.6.2 Geophysical Investigation

3.6.2.1 Survey Type

3.6.2.1.1 Fiducial based surveys are to be used for the majority of the sites at the SVFUDS. Should a different method be proposed, it will be discussed in the SSWPs.

3.6.2.2 Equipment

3.6.2.2.1 Three different geophysical instruments are planned for potential use during the geophysical mapping, anomaly reacquisition, and excavation QC tasks: the EM61-MK2; the G-858 and GSSI SIR-3000 GPR. These instruments all land based platforms that will either be hand carried or man-towed.

3.6.2.2.2 Handheld analog/non-Digital Geophysical Mapping (DGM) instruments such as the Schonstedt GA-52Cx magnetic locator and the Fisher 1266-X metal detector may be used for anomaly avoidance and for use in excavations for initial determinations of excavation depths.

3.6.2.2.3 The EM61-MK2 is a high sensitivity four-channel time-domain electromagnetic sensor. The EM61-MK2 generates an EM pulse that triggers eddy currents in the subsurface. The eddy current decay produces a secondary magnetic field that is sensed by one or two receiving coils and recorded by an attached data logger. The EM61-MK2 receives the signal in either one or two receiving coils at two separate heights (45cm and 85cm) above the ground surface and records the signal from the receiver coils over three or four different time windows after the pulse.

3.6.2.2.4 The Geometrics G858 gradiometer utilizes two cesium vapor magnetometer sensors separated by approximately two feet. The total field measurements of each sensor reflect the absolute value of the ambient geomagnetic field. The gradient measurement is obtained by simultaneously obtaining total field measurements for the top and bottom sensors. The vertical gradient can then be computed by subtracting the values from the two sensors (bottom minus top) and dividing by the distance between them.

3.6.2.2.5 The GSSI SIR-3000 GPR generates high frequency (120 to 900MHz) electromagnetic pulses that propagate downwards from the antenna as it is dragged across the surface. As the pulse radiates downward, it may encounter changes in electrical properties at boundaries in the subsurface. At some of these boundaries, a portion of the pulse energy is reflected back towards the surface where it is detected by a receiving antenna. Boundaries where this type of reflection can occur include boundaries between geologic layers, and the interface between soil and buried objects. By measuring the time it takes for the pulse to travel down to the boundary and then back to the surface, an estimate of the boundary layer's depth can be estimated. The GPR signal is very sensitive to the material that it travels through and can be very quickly attenuated by conductive materials. GPR tends to function best in dry, sandy soils. The presence of even minor amounts of certain types of clay can limit the penetration depth of GPR to 1 or 2 feet below the ground surface.

3.6.2.2.6 The Geophysical Prove-Out Report (USACE, December 2000) recommended the EM61 as the most effective instrument for detecting the targets of interest at the SVFUDS. The newer EM61-MK2 has replaced the EM61 and has been successfully used in conjunction with the G-858 at the SVFUDS for several years. These two instruments will be used for geophysical investigations, unless the SSWP identifies that a different instrument would be more effective (e.g., if the targets of interest at a site are expected to be non-metallic, the SSWP may recommend the use of GPR).

3.6.2.3 Procedures

3.6.2.3.1 Geophysical personnel familiar with the geophysical equipment will perform digital geophysical mapping of the survey areas using the procedures described below.

3.6.2.3.2 EM-61-MK2 and G858 Surveys

- The geophysical mapping surveys will be performed using a maximum line separation of 2.5 feet with a maximum data spacing of 0.6-feet along the line.
- Navigation will be performed using local coordinates and fiducial marks indicated at a maximum of every 50 feet in open, flat areas and a maximum of every 25 feet in areas with close or complex terrain, or areas that are close to structures. Geophysical data acquisition will be conducted by teams of at least two people to allow one person to operate the instrument while the second person takes field notes and observes to ensure the data are accurately collected along the intended profile.
- If terrain or vegetation will prevent accurate data collection using the line and fiducial method described above, the line and station technique will be used to collect data. In this type of area, non-metallic tape measures will be laid on the ground along the profile line. The instrument operator will position the sensor at discrete points at a set interval (not to exceed 2 feet) along the profile and collect data with the instrument stationary.
- Repeat data will be collected over a minimum of 3 percent of the survey lines. The actual path that the repeat data are collected over should not deviate by more than one foot from the original survey line(s). Significant anomaly peaks observed in the repeat data profiles are expected to be within one foot of the original survey peaks. The amplitude of these peaks should be within 20 percent of each other.

3.6.2.3.3 GPR Surveys

- GPR surveys may be performed over anomalies detected by other geophysical methods that potentially represent buried pits and trenches.
- The instrument will be set up and checked following the procedures in the instruction manual. The instrument will be checked in an area free from cultural interference and will include an instrument battery check.
- A 120MHz, 200MHz, 400MHz, or 900MHz antenna will be used at the site. A minimum of two antennas will be tested. The selection of antennas to be tested will be made based upon site conditions and in consultation with USACE. USACE will also be consulted on

the final selection of the GPR antennas for the survey, following a test survey over a known utility or buried object.

- GPR surveys will be conducted by laying out a series of parallel and orthogonal lines so that the mapped anomaly is covered. Fiberglass surveying tapes will be stretched out along each line and then the GPR antenna will be dragged across the surface along each line. The operator will initiate GPR data collection by starting the instrument with the controller and then walking the antenna in a straight line toward the opposite edge of the survey area along the stretched out tape. As the center of GPR antenna crosses survey marks, a fiducial marker will be inserted into the data using a manual switch attached to the antenna. These marks will be separated by no more than 10 feet and will be used to correlate events in the GPR record to ground locations. A survey wheel will be used to mark the location along the line.
- To enable 3D-processing of the data, if site conditions are suitable, the GSSI survey wheel will be used to mark the location along the line rather than fiducial marks.

3.6.2.3.4 The following information will be recorded during data acquisition:

- Team members;
- Weather;
- Start time and date;
- File names;
- Equipment serial numbers;
- Battery voltage;
- Grid conditions; and
- Cultural features.

3.6.2.4 Personnel

3.6.2.4.1 See Subchapter 2.6 of this WP, Project Personnel.

3.6.2.5 Production Rates

3.6.2.5.1 Production rates for DGM at the SVFUDS site will vary depending on the type of instrument used, the survey method, and the field conditions. Estimates for production will be provided in the SSWP for each site.

3.6.3 Instrument Standardization

3.6.3.1 Introduction

3.6.3.1.1 Instrument standardization is used to verify that the geophysical instruments and location methods are functioning properly. Instrument standardization checks will be conducted

for geophysical instruments at specified intervals to monitor the instruments for noise, stability, and repeatability as well as collect useful information needed for data processing. Table 3.2 lists the various tests along with the test frequency. The checks may be performed at the Test Plot or at the survey area.

3.6.3.2 Equipment Warm-Up

3.6.3.2.1 The purpose of this test is to minimize sensor drift due to thermal stabilization. Most instruments need a few minutes to warm-up before data collection begins. The manufacturer's instructions will be followed, or if none are given, the data will be observed until they stabilize. Generally, most instruments stabilize within 5 minutes. Instruments that require longer times to stabilize may indicate problems. This procedure should be followed each time the instrument is powered on (i.e., at the start of the day, after breaks, etc.).

Table 3.2 DGM QC Test Frequency

Test Description	Applicable Instruments	Power On	Beginning of Day	End of Day	1st Day of Project for Each Operator	2 Lines per Day
Equipment Warm-Up	All	X				
Record Sensor Positions	All (fixed on some instruments)		X			
Personnel Test	All		X			
Vibration Test (Cable Shake)	All		X			
Static Background and Static Spike	All		X	X		
Azimuthal Test	Magnetometer Only				X	
Height Optimization	All except GPR				X	
6-Line Test	All				X	
Octant Test (Heading Error Test)	Magnetometer Only				X	
Repeat Lines	All					X

3.6.3.3 Record Sensor Positions

3.6.3.3.1 It is important to document the relative positions of the instrument sensors and their height off the ground. For some instruments, the sensor positions are fixed and documentation is not required unless the instrument is known or suspected to be non-standard. For instruments with adjustable sensors, the sensor positions should be recorded at the start of each day. In the case of GPR, the center frequency of the antennas should be recorded; sensor height and position is not applicable.

3.6.3.4 Personnel Test

3.6.3.4.1 For the personnel test, the instrument is set up and turned on at a location where the operator and those working within proximity of the instrument can move close to the sensors. The response of the instrument is monitored for any interfering metal that may be present. Common sources of metal are pens, boots, and belt buckles. In general, the EM61 should remain within 2 mV of background and magnetometers within 3 nT of background. This test is performed at the beginning of each day in an area generally free of anomalies and interference.

3.6.3.5 Vibration Test (Cable Shake)

3.6.3.5.1 This test checks the instrument for cable and connection problems. With the instrument held in a static position and collecting data, shake all cables to test for shorts and connectors to test for bad connections. Cable problems generally require replacing the cable. Connections can sometimes be fixed by cleaning or simply by reconnecting. Data collected while conducting the vibration test should show no spikes or major variations.

3.6.3.6 Static Background and Static Standard Response (Spike) Test

3.6.3.6.1 The purpose of this test is to record the instrument background readings, monitor for drift, identify potential interference, determine the standard test item response and repeatability, and verify the repeatability of geophysical equipment. Baseline static test acceptance criteria will be established at the beginning of the project in an area free of outside interferences. Static background test data will be collected after instrument warm-up for a 3-minute period with no test item near the sensor. After placing a standard test item (i.e., trailer hitch ball) in a consistent location near the sensor, the static response test data will be collected for another 3 minutes. The standard deviation of the data from each of the channels or sensors will be calculated for both the background and static tests. These tests will be performed at least three times at project startup to confirm that test procedures produce repeatable results. The Parsons and USACE project geophysicists will establish criteria for noise levels (standard deviations) and response repeatability based on these initial project startup tests. Daily static tests will be conducted in the same manner and location as the initial test. Any instrument which does not meet the established test criteria will be removed from service until it has either been repaired or the reason for its failure has been determined and corrected.

3.6.3.7 Six Line Test

3.6.3.7.1 At the beginning of the field-mapping program, each instrument operator will log six traverses. The first two traverses record "background" data up and back along a single 50 feet traverse. The next two are a set of traverses (up and back) over a standard item (trailer hitch ball) on the ground at the 25-foot (halfway) mark. The final set of traverses will simulate surveying up and down hills. The operator will first log data traveling at a slow pace (simulating an uphill traverse) and then return at a significantly more rapid pace (simulating a downhill traverse). The positional accuracy of all the resulting impulse spikes should be within one (1) foot of the known item location.

3.6.3.8 Repeat Data

3.6.3.8.1 The repeatability of the geophysical data is monitored by repeating the collection of a line of data. Generally, a line is established at least 10 feet outside the grid parallel to the direction of travel of the grid. A standard item (trailer hitch ball) is placed at the halfway point in an area without anomalies. The line is recorded at the beginning of data collection and at the end. For the EM61-MK2 and G-858, the amplitude of the standard item responses should be within 20% and the location accuracy should be within 20 cm. Any instrument which does not meet the established test criteria will be removed from service until it has either been repaired or the reason for its failure has been determined and corrected.

3.6.3.9 Analog Instrument QC Checks

3.6.3.9.1 Analog geophysical instruments, such as the Schonstedt GA-52Cx, will be checked at the start and end of each day by operating the instrument over two items located at the GPO Test Plot. Items 3 (one 75 mm projectile buried horizontally in a N-S orientation at 24 inches bgs) and 7 (one 75 mm projectile buried horizontally in an E-W orientation at 16 inches bgs) will be used unless different items are identified in the SSWP. The sensitivity of the instruments will be verified by monitoring the audio responses to the buried items and confirming that the items are detected by the system. The Schonstedt GA-52Cx will be operated at the highest sensitivity setting for this test. At the start of each day, each operator will be checked for interfering metallic items by scanning with the instrument. The battery will be checked and the instrument will be shaken to check for loose parts and bad electrical connections. The performance of these tests will be documented in field books or on standard forms.

3.6.4 Data Processing, Corrections, and Analysis

3.6.4.1 Initial Field Processing

3.6.4.1.1 The data collected with the geophysical instruments will be post-processed in the field after downloading using the software provided with each instrument. Initial field-processing for EM and magnetometer surveys will primarily involve ensuring that the survey lines were correctly recorded with respect to their survey direction, distance, and grid coordinates. Post-processing particular to each instrument is described below.

3.6.4.1.2 During the EM61-MK2 and G-858 surveys, the survey lines are traversed over a known distance with data being collected incrementally by time. Data markers are inserted by the operator into the data file at specified distance intervals over the course of the traverse. Post-processing compresses or expands the data collected between each marker to cover the same distance interval because of minor variations in the speed at which the operator walks along the survey line.

3.6.4.1.3 During the GPR surveys, the survey lines are traversed over a known distance with the data being collected incrementally over time. The position is referenced manually with a marker button or using a survey wheel on the antenna. Post-processing compresses or expands the data collected between each marker or increment to account for variations in the speed of the antenna over the ground. Significant segments where the GPR antennas were stationary will be deleted to improve the appearance of the record.

3.6.4.2 Standard Data Analysis

3.6.4.2.1 The data will then be transferred into data processing software (i.e., Geosoft) where geo-referencing to the project coordinate system, leveling (adjusting to a common baseline), gridding, plotting and target analysis will be performed and the locations and magnitudes of the geophysical signals plotted on maps. A raster image will be used to produce an anomaly map that identifies the locations of the anomalies. The data will be processed in the following ways, as needed:

- Extra or erroneous data will be deleted, such as instrument run-ons at the ends of grid lines, data with incorrect values, etc.
- Corrections will be applied for latency, drift, heading error, sensor offset, and diurnal variations.
- EM61-MK2 data recorded with multiple time gates will have an additional channel created that is a combination of those time gates (total channel).
- The analytical signal will be calculated from the G-858 data.

3.6.4.2.2 A Parsons geophysicist will interpret the DGM data. The USAESCH geophysicist will be provided with both the raw and any processed data in digital format on daily basis. A "readme.doc" text file or PDF file will be transmitted with the raw field data file explaining all processing that was performed on the data and detailing any peculiarities identified by geophysical field personnel.

3.6.4.2.3 After post-processing and the data review is complete and the data are backed up on disk and computer, the geophysical data from the surveys will be processed into ASCII space-delimited files. The data will be presented in delineated fields as "X", "Y", and "Z", where "X" and "Y" are the UTM or State Plane Coordinates in Eastings and Northings and "Z1, Z2, …" are the instrument readings.

3.6.4.2.4 The GPR data will be provided in an electronic format with software required to view it, if necessary. Hardcopy records of the GPR data may also be provided if necessary

3.6.4.3 Anomaly Selection and Decision Criteria

3.6.4.3.1 The different datasets (different time gate and total channels for the EM61-MK2 and the vertical gradient, bottom sensor and analytic signal for the G-858) will be evaluated to determine which channel is best for initial anomaly selection with each instrument. Polygons will be delineated around any areas that exhibit the characteristics of burial pits (i.e., broad anomalies or clusters of closely spaced anomalies). Single point anomalies that may represent targets of interest will be identified throughout the rest of the area using the following process:

1. Select initial anomaly set using Geosoft's Blakely peak picking algorithm for one dataset from each instrument;

2. Review closely spaced and/or merging anomaly selections (i.e., <2.5-ft apart) that appear to be caused by the same source item;

3. Compare anomaly selections against field notes to eliminate selections that are collocated with visible metallic cultural items; and

4. Calculate additional anomaly parameters (i.e., power, width, decay constant, magnetic dipole moment, estimated size, etc.); and

5. Anomalous areas will be selected, if appropriate, based on the calculated anomaly parameters and the overall anomaly distribution across the site.

3.6.5 Dig Sheet Development

3.6.5.1 Dig sheets will be produced for each site investigated where anomalies have been identified. The dig sheets will contain the anomaly identification (ID), the location coordinates of the center of the anomaly, the amplitude response of the recording instrument(s), additional calculated parameters, and blank spaces for information gathered during reacquisition and intrusive investigation. An example Anomaly Dig Sheet can be found in Appendix F.

3.6.6 Anomaly Reacquisition

3.6.6.1 Geophysical personnel familiar with the geophysical equipment will refine each anomaly location once the land surveyor has marked the anomaly location based on the dig sheet information generated during the prior digital geophysical mapping surveys. The reacquisition team will then use the EM61-MK2 to reacquire all anomalies and the G-858 to reacquire anomalies originally detected with a magnetic sensor to pinpoint the peak target response(s) associated with the marked anomalies. The flagged location(s) of the anomaly will then be refined based on the peak target response(s). The sensors will be operated at a standard height above ground (40 cm for the EM61-MK2 and 12-inches for the G-858) to ensure consistency between the reacquisition and anomaly resolution results.

3.6.6.2 The reacquisition team will have a copy of the geophysical maps and dig sheets during the anomaly reacquisition process. This will allow them to determine whether or not the

anomaly that they are reacquiring is a single item anomaly or a pit or trench-like anomaly. It will also assist them with marking (painting) overall outline of pit or trench-like anomalies.

3.6.6.3 The site geophysicist will compare the reacquisition peak response and offset with the original survey response and location. If the reacquisition response is more than 20 percent lower than the original survey response or the peak was detected more than 3 feet from the originally selected location the anomaly will be reacquired again. If the reacquisition results are confirmed, then the anomaly will be investigated to determine the cause of the discrepancy.

3.6.6.4 The center of single item anomalies will be pinpointed and marked with a stake, pin flag, and/or paint. Reacquisition of pit or trench-like anomalies will consist of using multiple transects perpendicular to the anomaly feature to verify the location and then painting the ground with the boundary of the anomaly feature.

3.6.6.5 The following information will be recorded by the reacquisition team:

- Offset distance and direction from the original flagged location;
- Peak and background response values;
- Comments indicating whether or not the anomaly was successfully reacquired;
- Team members;
- Start time and date;
- Weather conditions; and
- Equipment serial number.

3.6.6.6 The following quality control steps will be performed for each geophysical instrument used during the anomaly reacquisition:

- Static Background Test; and
- Static Spike Test.

3.6.7 Feedback Process

3.6.7.1 As DGM surveys are conducted on the various sites within the SVFUDS, improvements to the geophysical survey process will be made as they are identified. The results of the reacquisition and intrusive investigation will be used to refine and improve the anomaly selection and locations of subsequent anomalies.

3.6.8 Quality Control

3.6.8.1 Each member of the field team will have the opportunity to comment on the data and procedures used to collect the data. If it appears that a particular geophysical method or instrument is not generating meaningful results, the use of that instrument will be suspended and

the situation will be reviewed by the Project Geophysicist, the Parsons PM, USAESCH Geophysicist, and the USAESCH PM. A decision will then be made as to whether the instrument or method will continue to be used to complete the survey.

3.6.8.2 Geophysical data collected in the field will be reviewed at several stages. The first quality check will be during data collection. The field crews will be able to check the data logger to monitor instrument response and to ensure that data are being collected. The field team will also examine the data during data logger "dumps" when the information is downloaded to the hard drive of a portable computer. Another quality check will occur when the data are preprocessed and formatted for use. Cultural features, geological features and other relevant information will be noted on the field data forms. Another quality check will be performed when the data are loaded into the mapping system.

3.6.8.3 The site geophysicist will review the field notes, geophysical data, QC test results, reacquisition results, and excavation results to ensure that the project DQOs are met. Tables 3.3, 3.4, and 3.5 (or site specific tables included in the SSWP) list the DQOs that are applicable to geophysical data collection, anomaly reacquisition, and anomaly verification, respectively. The project geophysicist will be notified if any of the data fail to meet the DQOs.

3.6.8.4 When a condition adverse to quality is noted, the cause of the condition will be determined and immediate corrective actions will be implemented. Quality improvement measures will also be taken to preclude repetition. All project personnel have the responsibility, as part of their work duties, to promptly identify, solicit approved corrections, and report conditions adverse to quality.

3.6.9 Records Management

3.6.9.1 Paper and digital field records (field data forms, field note copies) will be maintained in the on-site project office. All records will be filed such that they can be found using the date they were created and the team who created them. Pertinent information will be input into the SVFUDS GIS database. Copies of all data will be provided to USAESCH and CENAB for inclusion into the administrative record, when required.

3.6.10 Interim Reporting

3.6.10.1 Parsons will furnish initial and processed data as they become available. All data will be processed into ASCII file format. Each space-separated ASCII file of processed data will contain a header or separate file describing the type of data, area covered in the file, date collected, location, and data column descriptions.

3.6.10.2 Separate geophysical data files will be provided for grid blocks. The data will be presented in delineated fields as x1, y1, x2, y2, and z where x1 and y1 are in UTM, and x2 and y2 are the local Cartesian grid coordinates referenced to the southwest corner of each local grid block (or 0, 0). The z columns will be the instrument readings and the number of columns present will be instrumentation-dependent. The last column will be the time stamp.

Table 3.3 Geophysical Data Acquisition DQOs

Data Quality Objective	Objective	Measurement Method
Instrument Warm-Up	Allow instrument to stabilize before use.	Allow instrument to warm up for at least 5 minutes after turning on.
Vibration Test	Verify that cables and connections are intact and not a source of noise.	Shake cables at the beginning of the day while recording and observing data. Data collected during the vibration test should show no spikes or major variations.
Personnel Test	Verify that the instrument operator is not wearing objects that could increase the noise level or produce false positives during data collection.	Collect data at the beginning of the day while the instrument operator moves close to the sensor. Monitor the response of the instrument to confirm that the movement does not induce significant response increases (i.e., 2mV for EM61-Mk2 channel 3 or 3nT for G-858).
Six Line Test	Verify that data collection methods result in accurate anomaly positions at different data acquisition speeds.	Compare the location of anomaly peaks on the last four lines of the test. They should all be located within one foot of the actual item position.
Background Noise	Verify that geophysical sensor noise levels are consistent with established baseline.	Determine a criterion for the maximum acceptable standard deviation over a three minute static test based on project startup tests. The site geophysicist will review subsequent static background tests to verify that the noise levels are within the acceptable range.
Repeatability	Standard test item responses should be consistent throughout the project.	Determine a criterion for the repeatability of standard test item response based on project startup tests. The site geophysicist will review subsequent static response tests to verify that the responses are within the acceptable range.
Instrument Latency	Apply appropriate latency corrections to geophysical data to compensate for delays in data recording.	Visual examination of anomaly shape for zig-zag or chevron appearances.
Sampling Density	Collect geophysical data along profile lines frequently enough to detect all items of concern.	Calculate average distance between sequential points. Unless otherwise defined in the SSWP the average distance between sequential points should be less than 0.5 feet.

Table 3.3 (Continued) Geophysical Data Acquisition DQOs

Data Quality Objective	Objective	Measurement Method
Field Notes	All lines are listed on field notes with gaps where data was not collected clearly and accurately explained.	Field Notes will be reviewed to ensure all data acquisition lines are listed and notes are clear and understandable.
Repeat Lines	Repeat data should reasonably duplicate the initial data collected over the same profile.	The site geophysicist will review significant anomaly peaks on repeat data collected over the same line to confirm that the peaks are located within 1 foot of each other and the responses are within 20 percent.
Fiducial Accuracy	Accurately insert fiducial marks into geophysical data file during acquisition.	The site or project geophysicist will produce and examine velocity maps for data collected using fiducial positioning. Line segments with velocities that vary significantly from the mean will be investigated to determine a reason for the variation. Anomalies detected along those lines will be checked for possible positioning errors relative to adjacent lines.
Anomaly Selection	Select all anomalies meeting the anomaly selection criteria that are not caused by a known source such as cultural objects.	Visual examination of the survey area for anomalies meeting selection criteria to be established in the SSWP.
Horizontal Accuracy (Acquisition)	All reacquired anomalies lie within 3 feet of the original surface location as marked on the dig sheet.	The site geophysicist will review the offset distances recorded during reacquisition.
False Positives	Zero instances of false positives with large response values from original survey dataset.	The site geophysicist will investigate false positive results for anomalies with a signal to noise ratio of 5 or larger and any anomaly appearing on multiple survey lines in the original survey dataset to determine the cause of the false positive.

Table 3.4 Anomaly Reacquisition DQOs

Data Quality Objective	Objective	Measurement Method
Instrument Warm-Up	Allow instrument to stabilize before use.	Allow instrument to warm up for at least 5 minutes after turning on.
Vibration test	Verify that cables and connections are intact and not a source of noise.	Shake cables at the beginning of the day while recording and observing data. Data collected during the vibration test should show no spikes or major variations.
Background Noise	Verify that geophysical sensor noise levels are consistent with established baseline.	Determine a criterion for the maximum acceptable standard deviation over a three minute static test based on project startup tests. The site geophysicist will review subsequent static background tests to verify that the noise levels are within the acceptable range.
Repeatability	Standard test item responses should be consistent throughout the project.	Determine a criterion for the repeatability of standard test item response based on project startup tests. The site geophysicist will review subsequent static response tests to verify that the responses are within the acceptable range.
Horizontal Accuracy (Acquisition)	All reacquired anomalies lie within 3 foot of the original surface location as marked on the dig sheet.	The site geophysicist will review the offset distances recorded during reacquisition.
Horizontal Accuracy (Reacquisition)	All excavated items lie within 1 foot of their mapped surface location as marked in the field after reacquisition.	The site geophysicist will review the offset distances recorded during intrusive investigation.
Reacquisition Repeatability	The reacquisition response above background should reasonably duplicate the response above background detected during the original survey.	The site geophysicist will compare the reacquisition results with the original survey response values listed on the dig sheet. Any anomaly with reacquisition responses more than 20 percent lower than the original response listed on the dig sheet will be reacquired again and if still more than 20 percent lower will be investigated to determine the cause of the discrepancy.
False Positives	Zero instances of false positives with large response values from original survey dataset.	The site geophysicist will investigate false positive results for anomalies with a signal to noise ratio of 5 or larger and any anomaly appearing on multiple survey lines in the original survey dataset to determine the cause of the false positive.

Table 3.5 Anomaly Resolution DQOs

Data Quality Objective	Objective	Measurement Method
Instrument Warm-Up	Allow instrument to stabilize before use.	Allow instrument to warm up for at least 5 minutes after turning on.
Vibration test	Verify that cables and connections are intact and not a source of noise.	Shake cables at the beginning of the day while recording and observing data. Data collected during the vibration test should show no spikes or major variations.
Background Noise	Verify that geophysical sensor noise levels are consistent with established baseline.	Determine a criterion for the maximum acceptable standard deviation over a three minute static test based on project startup tests. The site geophysicist will review subsequent static background tests to verify that the noise levels are within the acceptable range.
Repeatability	Standard test item responses should be consistent throughout the project.	Determine a criterion for the repeatability of standard test item response based on project startup tests. The site geophysicist will review subsequent static response tests to verify that the responses are within the acceptable range.
False Positives	Zero instances of false positives with large response values from original survey dataset.	The site geophysicist will investigate false positive results for anomalies with a signal to noise ratio of 5 or larger and any anomaly appearing on multiple survey lines in the original survey dataset to determine the cause of the false positive.
Dig Results	Reinvestigate anomalies with dig results that are not consistent with reacquisition results.	The site geophysicist will compare the dig results with the reacquisition results to determine if the items recovered would be reasonably expected to produce the anomalous response detected during reacquisition.
Anomaly Excavation	Remove or identify the source of the geophysical anomalies.	The site geophysicist will compare the response values measured by the reacquisition and anomaly resolution processes to determine if a reduction of 90 percent (or other percentage defined in the SSWP) has been achieved with all sensors used during anomaly resolution. Anomalies which have not been sufficiently reduced and for which a source has not been identified will be reinvestigated or submitted to the ARB for review.

3.6.11 Final Reports and Maps

3.6.11.1 The results of the DGM conducted at the SVFUDS will be presented in the form of color maps and anomaly dig sheets. The maps will include all of the following basic map features:

- Map scales will be in even multiples of the base units presented in the map. Example: for scales based on one inch being equal to X number of feet, the scale should be an even multiple of 12, e.g. 1:120 (or one inch = 120 inches (or 10 feet)) and not 1:150 or 1:200.
- Map sizes will be designed to fit standard printer or plotter sizes. Preferred paper sizes for small maps are letter (8.5" x 11") and tabloid (11" x 17"). For larger maps, the preferred sizes are C1 (24" x 36") or smaller. Each map will be divided into six blocks:
    - Block 1 – Title Block: Each map will have a title block that provides the figure number, title, sub-title (e.g. instrument type and data component) and the location of the information being presented (e.g., site/area name and grid ID). Title block fonts will be large.
    - Block 2 – Map Display Area: As large an area as possible will be reserved for display of information, keeping borders and surrounds as small as possible. Map grid ticks or lines will be visible and labeled using small fonts.
    - Block 3 – Legend: The legend will include all symbols and objects shown on the map. Symbols will conform to either the Civil or Surveying and Mapping subchapters of the Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE). Color scale bars will use a color scheme that ranges from blue to red ("cold to hot") with blue colors representing low or negative values and red representing high values. Background values will be plotted in white or grey.
    - Block 4 – Area Index Map: If multiple sheets are needed to represent the survey area, an index map area will be provided. This area will contain the north arrow and an index map scale.
    - Block 5 – Project Information: This block will contain the client name, project, contractor name (Parsons), map creator and approver, date created, map file name, and scale.
    - Block 6 – Logos: The USACE Castle logo will be provided in the lower right corner of the page along with the words: "U.S. Army Engineering & Support Center, Huntsville."

3.6.12 Geophysical Investigation Performance Goals

3.6.12.1 <u>Geophysical Data Acquisition</u>

3.6.12.1.1 The primary objective of the geophysical investigation is to accurately locate and record locations of geophysical anomalies that represent burial pits, trenches, and buried containers that may contain AUES-related materials. A secondary objective is to accurately

locate and record locations of single items to include 75 mm projectiles, 4.2-inch mortar rounds, and Livens projectiles. The geophysical investigation areas and identified anomalies will be mapped for subsequent evaluation.

3.6.12.1.2 A false positive occurs when an anomaly is detected at a given location, posted on an anomaly dig sheet, and no basis for the anomaly is found upon excavation. The false positive rate will be minimized by accurately documenting the data collection effort in field notes, setting and following appropriate geophysical data collection procedures, and evaluating the results of quality control tests. Specific DQO criteria designed to minimize false positives are described in Table 3.3. The performance goal for the SVFUDS project is to have zero instances of false positive anomalies with large signal to noise ratios from the original survey dataset.

3.6.12.1.3 A false negative is defined for this project as a location where a burial pit/trench or container lies within the detection capability of the geophysical survey instrument but whose location was not selected for intrusive investigation. False negatives can be the result of instrument failure, operator error, or data processing error. The DQOs listed in Table 3.3 are designed to eliminate false negatives. The performance goal with respect to false negatives is to have zero occurrences over the course of the project.

3.6.12.2 Anomaly Reacquisition

3.6.12.2.1 The objectives of anomaly reacquisition are to refine and mark the location of the anomaly peaks and measure the peak and background response values. The DQOs listed in Table 3.4 are designed to verify that the geophysical equipment is functioning properly and the reacquisition procedures are implemented correctly. The anomaly reacquisition performance goal will be to meet these DQOs.

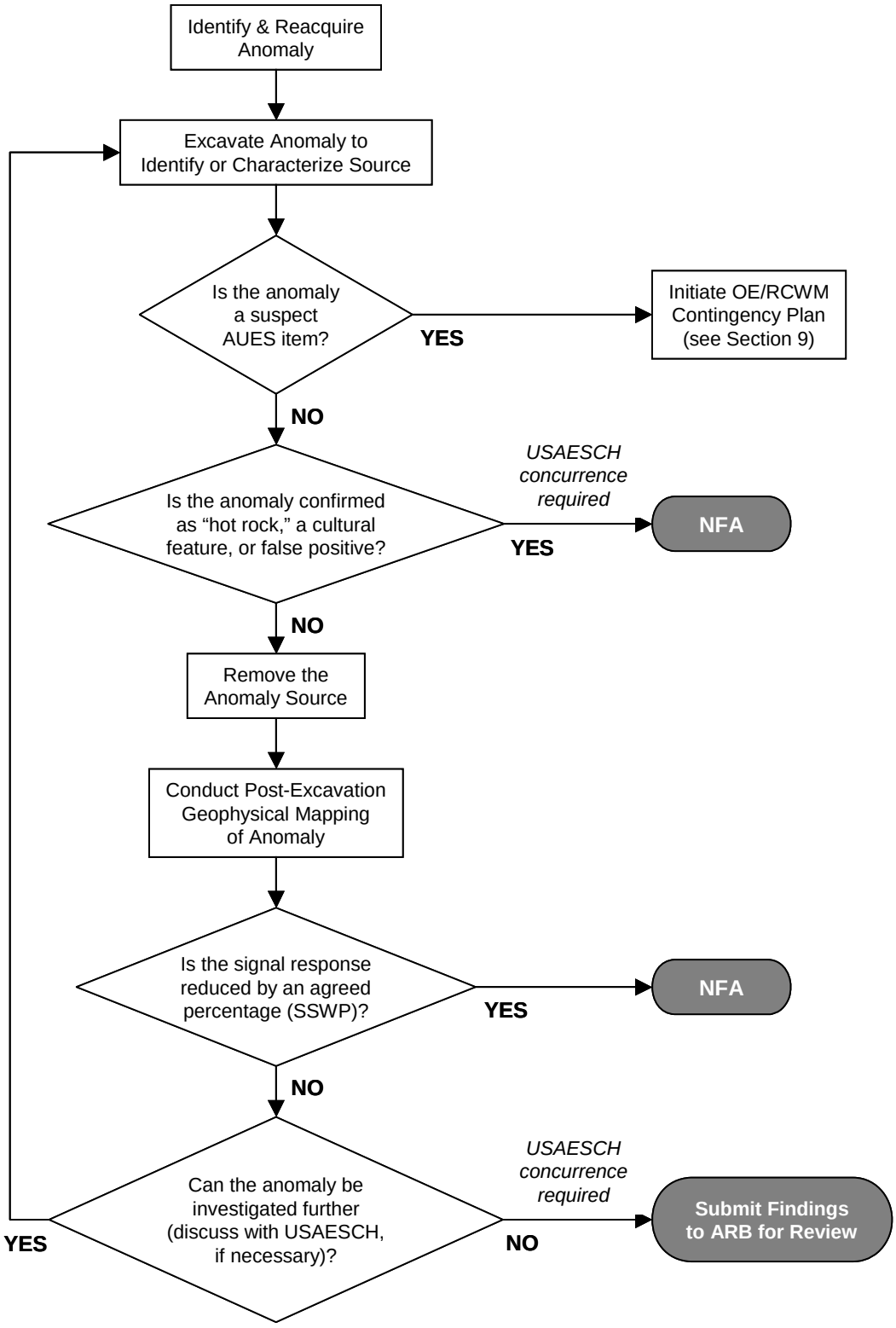
3.6.12.3 Anomaly Resolution

3.6.12.3.1 The objective of anomaly resolution is to ensure that the anomaly has been resolved. The DQOs listed in Table 3.5 are designed to verify that the geophysical equipment is functioning properly, that the source of each anomaly is removed or identified, and the anomaly resolution process is implemented correctly. The anomaly resolution performance goal will be to meet these DQOs.

3.6.13 Anomaly Resolution Procedures

3.6.13.1 Upon completion of the excavation, the excavation will be evaluated to ensure that the anomaly has been resolved. Figure 3-4 summarizes the excavation/anomaly resolution process for geophysical anomalies. The geophysical team assisting with the excavation/anomaly resolution process will have a copy of the geophysical map and the dig sheet during the excavation QC process. This information will assist them in determining where to obtain open hole signal response readings and, if necessary, where to collect digital open hole post-excavation profiles. The resolution process for other excavations is addressed in Paragraph 3.6.13.10.

Figure 3-4
Excavation/Anomaly Resolution Process



3.6.13.2 For single item type anomalies, the geophysical team will record post-excavation peak readings prior to backfilling the excavation. These readings will be determined using the EM61-MK2 for all anomalies and the G-858 for anomalies that were originally detected with a magnetic sensor. The anomaly will be considered resolved if the signal response values have decreased by 90 percent (unless otherwise specified in the SSWP) of the geophysical anomaly reacquisition signal response values for all instruments that detected the anomaly during reacquisition. If a signal reduction other than 90 percent is used for anomaly resolution, the reason will be stated in the SSWP. The sensors will be operated at a standard height above ground (40 cm for the EM61-MK2 and 12-inches for the G-858) to ensure consistency between the reacquisition and anomaly resolution results.

3.6.13.3 If the anomaly is not resolved, the USAESCH Project Geophysicist will be notified. The Parsons Project Geophysicist and Site Manager will discuss recommendations for further excavation investigation and potential reasons for lack of resolution for a given anomaly. If the Project Geophysicist and Site Manager determine that further excavation is not feasible, then the anomaly will be submitted to the ARB for final determination.

3.6.13.4 For pit/trench anomalies, the geophysical team will record several digital post-excavation profiles (referenced to the grid system used during the geophysical mapping) prior to backfilling the excavation. These profiles will be collected with an EM61-MK2 for all pit/trench anomalies and the G-858 for pit/trench anomalies originally detected with a magnetic sensor. The post-excavation peak readings will then be compared with the geophysical anomaly reacquisition signal response values listed on the dig sheet to verify the target of interest has been removed (decreased by 90 percent of the value, unless otherwise specified in the SSWP) from the anomaly location. If a signal reduction other than 90 percent is used for anomaly resolution, the reason will be stated in the SSWP.

3.6.13.5 Under some circumstances, handheld instruments such as the EM61-HH or Schondstedt may be used to guide preliminary decisions concerning pit closure (e.g., when interference from shoring or protective structures prevents use of other geophysical instruments). However, these handheld instruments will never be used to make final determinations concerning anomaly resolution.

3.6.13.6 If the reacquisition or excavation team identifies anomalies as false positives (i.e., signal response for an anomaly could not be reacquired), team will collect a minimum of three digital parallel profiles collected that are centered over the marked anomaly location. These parallel profiles will be referenced to the grid system used during the geophysical mapping, separated by a maximum of 2.5 feet, and will be a minimum length of 10 feet. If a target anomaly identified as a false positive was originally detected using two geophysical techniques, then both techniques will be used to verify the absence of signal response in the area of the marked location. Profiles collected over identified false positives will be reviewed by the Parsons Project Geophysicist.

3.6.13.7 If the post-excavation geophysical response has not been reduced by 90 percent (or other percentage specified in the SSWP) and the source of the anomaly has not been identified as a hot rock or cultural feature, then the intrusive team will perform additional intrusive investigation at the anomaly location. However, if the geophysical response from all instruments

used for anomaly resolution has been reduced by 90 percent (or other percentage specified in the SSWP) from the peak reacquisition response, then no further action (NFA) will be required. Concurrence will be requested from the USAESCH Project Geophysicist for all NFA decisions.

3.6.13.8 The Site Manager will inform the Parsons Project Geophysicist of any cultural or geologic features that are considered to be the source of an anomaly but that cannot be removed (e.g., root baskets, manhole covers, hot rock, etc). In this event, the Parsons Project Geophysicist will develop a way to resolve the anomaly and propose it to the USAESCH Project Geophysicist for concurrence, then details of the feature will be collected as necessary, and further concurrence will be requested from the USAESCH Project Geophysicist for a NFA decision.

3.6.13.9 The Parsons Project Geophysicist will provide additional guidance to the Site Manager and intrusive team prior to further investigation of a specific anomaly. This guidance will include refining the potential investigation locations, remaining signal responses, and potential anomaly sources (i.e., discrete individual targets, "hot rock," or indications of pits or trenches). The USAESCH Project Geophysicist will be notified of any anomalies that are not resolved following the additional investigation. These anomalies may then be submitted to the ARB for final determination, if necessary.

3.6.13.10 In some situations, it may be necessary to resolve an excavation of an area that has not been geophysically mapped (e.g., at sites where there are no magnetic anomalies present or where magnetic interferences prevent accurate geophysical mapping). In these situations, the method(s) to be used for anomaly resolution will be stated in the SSWP. Methods may include factors such as confirming removal of AUES-related items and/or soil lithology. Any determinations concerning soil lithology will be made by the Parsons geologist or equivalent.

3.7 GEOSPATIAL INFORMATION AND ELECTRONIC SUBMITTALS

3.7.0.1 The purpose of this subchapter is to describe the procedures and data formats pertaining to the use of geospatial information and the production of electronic submittals for intrusive investigation at the SVFUDS. Accuracy and methods of location surveys and mapping is also addressed. Parsons will perform all activities related to gathering and maintaining geospatial information IAW DID MR-005-07.

3.7.0.2 Geospatial information will be in Maryland State Plane Coordinate System (NAD83, US survey feet). Geospatial data layers will conform to the GIS created for the SVFUDS. Metadata will be prepared for the core geospatial data layers IAW Federal Geographic Data Committee (FGDC) standards.

3.7.1 Location Survey and Mapping

3.7.1.1 A Maryland licensed land surveyor may locate and/or establish the following:

- Geophysical anomalies identified from the previous geophysical surveys;
- Arsenic contaminated grids, and when applicable co-located anomalies;

- DGM survey grids;
- Intrusive excavation locations not otherwise associated with anomalies;
- Grab sample locations;
- Topography;
- General site and landscape features; and
- Property boundaries.

3.7.1.2 All points identified by the surveyor in the field will be of second order, class I accuracy and referenced to the Maryland State Plane Coordinate System (NAD83).

3.7.1.3 The intended survey locations will be marked with non-metallic pin flags and spray paint. Single point anomalies will be marked with single flags. The boundaries of larger anomalies or excavation locations may be marked as polygons using multiple flags or spray paint (in these cases, the location of one or more peak target responses will also be marked for purposes of anomaly reacquisition). Any offset locations will be marked with information regarding the offset. The area around any markers will be painted with orange marking paint to help locate the survey point. Control around the site perimeter will be made with permanent or semi-permanent benchmarks to maintain control.

3.7.2 Geospatial Information Formats

3.7.2.1 Vector data incorporated into the GIS will be stored in ESRI shapefile or geodatabases formats. These files will be delivered upon completion of the project, along with non-proprietary Spatial Data Transfer Standards (SDTS) format. Examples of vector data sets include physical, cultural, biological and MEC/RCWM related items. Raster GIS data will be used in either TIF or Mr. Sid-compliant formats with accompanying world files (.tfw or .sdw). TIF files will be delivered upon completion of the project with associated world file (.tfw). Examples of raster data sets are aerial photography and scanned topographic maps (DRGs). Tabular data will be stored in either Microsoft Excel or Microsoft Access formats during the course of the project. These file types as well as comma delimited (.csv) text files will be delivered where feasible, upon completion of the project. All ArcGIS map files (.mxd) for plates, figures and drawings used in the Final Report will be included in the electronic deliverable.

3.7.3 Metadata

3.7.3.1 All future metadata will be created IAW FGDC standards that will describe the key information about each geospatial dataset. The metadata will contain information about the data source, its location, where it originated, how it is structured, key attributes, and other miscellaneous items of interest to the project team.

3.7.4 Electronic Submittals

3.7.4.1 All final document files will be submitted to USAESCH in MS Office and Adobe Portable Document Format (PDF).

3.7.4.2 As discussed in Subchapter 3.7.2, all geospatial data sets will be delivered to USAESCH in native ESRI shapefile or geodatabase format, as well as in non-proprietary SDTS format. Metadata will be delivered with the files. Data will be submitted on CD-ROM, or DVD-ROM if accepted by USAESCH.

3.8 INTRUSIVE INVESTIGATION PLAN

3.8.1 General Methodology

3.8.1.1 Intrusive investigations will be performed IAW procedures outlined in the U.S. Army's EP 1110-1-18, *Ordnance and Explosives Response*, and the Occupational Safety and Health Administration (OSHA) requirements for excavations in 29 CFR 1926 Subpart P. The APP contained in Appendix D will be followed at all times, as will procedures outlined in DoD 6055-9-STD, *Ammunition and Explosives Safety Standards*.

3.8.1.2 Site-Specific Plans

3.8.1.2.1 Site-specific plans will identify the details pertinent to each specific anomaly or area as related to this Site-Wide WP. The SSWP will be included as annexes to this Site-Wide WP. SSWPs for higher probability sites will include the following information:

- Site layout;
- The munition with the greatest fragmentation distance (MGFD);
- Maximum Credible Event (MCE) selected for site- specific operations;
- Public Access Exclusion Distance (PAED) for the MCE;
- The EZ distance;
- Site-Specific SSHP and Activity Hazard Analysis; and
- Roster for buildings to be evacuated (if necessary).

3.8.1.2.2 The SSWP will follow the same format as this WP. For low probability sites the SSWP will not need to contain any discussion of MGFD, MCE, or corresponding hazard distance (other than EZ) unless discussed in the contingency plan.

3.8.1.3 Equipment Needs

3.8.1.3.1 Typical equipment needs are presented in Table 3.6.

Table 3.6
Equipment Needs (Typical)

Investigation Under Evacuation	Personnel Decontamination Station (PDS) Excavator Sorting Table/Shaker Table General purpose vehicles Geophysics instruments DAAMS MINICAMS Weather station MRCs	Shovels, etc. Mobile Command Post Ambulance Radios Camera
Investigation Under Engineering Controls	Engineering Control Structure (ECS) Chemical Agent Filtration System (CAFS) Air conditioning (optional) PDS Back hoe/Mini Excavator Sorting Table/Shaker Table General purpose vehicles Geophysics instruments DAAMS	MINICAMS Weather station MRCs Shovels, etc. Ambulance Command post Radios Camera
Low Probability Investigation	Emergency PDS Back hoe/Mini Excavator Sorting Table/Shaker Table General purpose vehicles Geophysics instruments Shovels, etc. Radios	
Federal Property	X-Ray PINs Forklift Soil roll-offs	EPDS Glove box DAAMS MINICAMS

3.8.1.4 Staff

3.8.1.4.1 Typical staff requirements for each operation are summarized below.

3.8.1.4.2 All Field Operations: The following staff will be present during all field operations:

- Site Operations Officer (CENAB)
- Safety Specialist (USAESCH)
- Site Manager (Parsons)
- SSHO (Parsons)
- UXOQCS (Parsons)
- Air Monitoring Team (Higher Probability sites only)
- EOD Team (TE and/or qualified UXO) (**Higher Probability sites only**)
- UXO Team (Parsons)
- RCWM Team (TE) (Higher Probability sites only)
- Two-Person Sampling Team (Parsons)
- Two Medics (Higher Probability sites only)

3.8.1.4.3 Assessments at Federal Property: The following staff will be present during assessment operations at the Federal Property:

- Assessments of Potential RCWM
    - TE Assessment Team
    - Air Monitoring Team
    - Medical Support Team

- Assessments of Low Probability Investigation Debris
    - Air Monitoring Team

- Assessments of MEC
    - SUXOS and UXOSO

- Assessments of HTW
    - Assessment Team (sampling team)

3.8.1.5 Daily Operations

3.8.1.5.1 Daily operations are presented in Table 3.7. A pre-operations checklist is presented in Table 3.8. The SSHO will maintain the file of completed pre-operations checklist.

3.8.1.6 Site Layout (General)

3.8.1.6.1 The general site layout for higher probability investigations is presented in Figure 3-3. For low probability investigations the site layout concerns are typically not as complex given the lesser amount of equipment and site support required. All SSWPs will include a detailed diagram of the site layout regardless of investigation type.

3.8.1.7 QA/QC of Excavation

3.8.1.7.1 Parsons will perform QC of excavations IAW Subchapter 3.6.13.

3.8.1.8 Backfill and Site Restoration

3.8.1.8.1 Backfill operations will be completed by the site support and disposal subcontractor using materials brought in from off-site if MEC or RCWM is removed from the excavation. The backfill soils will be tested as discussed below. If no MEC, RCWM, or HTW contamination is found, the soil removed will be replaced in the excavation by the site support and disposal subcontractor. All MEC/RCWM anomaly investigations will be coordinated with all HTW removal actions to ensure protection of workers, residents, and the environment. Work will also be coordinated such that the impact to individual residents is minimized.

3.8.1.8.2 HTW associated with an anomaly will be removed during the site wide investigations. Site restoration will be coordinated by CENAB.

3.8.1.8.3 The soil and topsoil to be used for backfill will be sampled and analyzed in general accordance with USEPA's December 6, 2001 letter to USACE. Four samples will be collected per 1,000 cubic yards of homogenous backfill from random locations at the surface of each pile. One sample will be a six point composite; the remaining samples will be collected as discrete samples.

3.8.1.8.4 The composite and discrete samples will be analyzed IAW with the SAP in Appendix E. These samples will be analyzed and the data evaluated IAW the Quality Assurance Project Plan (QAPP) in Appendix E.

3.8.1.8.5 Upon completion of all data analyses, the soil and topsoil will be determined to be acceptable or unacceptable as fill material. A copy of the backfill testing results will be provided to USACE including a determination of whether the material is acceptable. Should a source be considered unacceptable, another source will be identified and sampled.

3.8.1.8.6 Once the excavation operation has been completed in a specified area and the results of the confirmation samples from the bottom of the excavation and the sidewalls (where required) indicate that the applicable endpoints have been met, backfill of the excavation will commence.

Table 3.7 Daily Operations

Air Monitoring Team positions monitoring equipment, monitoring lines, and challenges the MINICAMS **(Higher Probability sites only)**. Monitoring personnel will receive tailgate health and safety briefing on site-prior to operations.
All workers and support staff arrive at the Resident Engineer's office (Federal Property) or at the work site.
All personnel receive a daily safety briefing, including the appropriate transportation routes to the Federal Property, by the SSHO.
All team leaders receive a daily operations schedule.
(Higher Probability sites only) All support personnel (security guards, fire, HAZMAT, Medical) receive a daily operations schedule.
(Higher Probability sites only) Security Guards depart to secure Acute Exposure Guideline Level (AEGL)-2 distance perimeter and ensure residents within the AEGL-2 have evacuated (not applicable if engineering controls are used).
(Higher Probability sites only) Air Monitoring Team personnel perform equipment checks prior to beginning intrusive investigations.
Work force departs for work site.
Work force arrives at work site.
(Higher Probability sites only) Medical personnel set up the ambulance for operations, perform pre-work monitoring of personnel that will be entering the EZ.
Work force sets up the equipment in the EZ (air-lines, video, lighting, barricades as required).
The SSHO and Huntsville Safety Specialist will ensure all monitoring equipment (i.e., MINICAMS, Breathing Zone monitors, video) is operational, PDS and Emergency PDS are established.
The SSHO will give a short site-specific safety briefing to the EZ personnel and work will commence IAW the Work Plan and SSHP.
Samples that are obtained during the day's operations will be processed IAW the Work Plan and SSHP.
(Higher Probability sites only) Suspect RCWM items will be packaged in MRCs and transported to the IHF containers at the end of the day (if applicable).
Air Monitoring Team personnel will gather all monitoring media for subsequent processing back at the Federal Property.
(Higher Probability sites only) Medical personnel will perform post-operations monitoring of personnel that worked in the EZ.
All personnel depart for the Federal Property.
(Higher Probability sites only) Road blocks will be removed and residents will be allowed to return to their homes.
The CENAB Site Operations Officer may or may not conduct a daily debrief for the day's operations.
(Higher Probability sites only) Air Monitoring Team personnel will process DAAMS tubes collected during the day.
Soil and IDW containers generated during the day will be placed in the appropriate temporary storage area at the Federal Property, as required (containers may be left on site if it is considered safe to do so).

Table 3.8 Site Daily Pre-Operations Checklist

Item:	**Check off**	**N/A**
Daily Tailgate	☐	☐
Radio Checks	☐	☐
SSHO	☐	☐
Excavation team(s)	☐	☐
Air Monitoring Team (if applicable)	☐	☐
Medics (**Higher Probability sites only**)	☐	☐
USAESCH Safety Specialist	☐	☐
CENAB Site Operations Officer	☐	☐
Security Guard(s) (**Higher Probability sites only**)	☐	☐
PDS (**Higher Probability sites only**)	☐	☐
Site Manager	☐	☐
Sampling Team	☐	☐
PDS Set up (**Higher Probability sites only**)	☐	☐
EPDS Set up	☐	☐
MINICAMS operational (**Higher Probability sites only**)	☐	☐
D2SV results within limits (AEGL-2 distance < _____ meters) (**Higher Probability sites only**)	☐	☐
MRCs on site (Higher Probability sites only)	☐	☐
AEGL-2 distance perimeter secure and residents within AEGL-2 distance evacuated (**Higher Probability sites only**)	☐	☐
Personnel in proper Personal Protective Equipment (PPE)	☐	☐

SSHO's Signature Date/Time

3.8.1.8.7 Backfill material will be purchased and stockpiled at a suitable location. The backfill soil will be classified IAW ASTM D 2487. Backfill material will be tested for Atterberg limits (ASTM D 4318), grain-size distribution (ASTM D 422), and compaction characteristics (ASTM 698) at a frequency of once per 1,000 cubic yards. The soil will be spread in 6-inch compacted lifts. This process will be repeated until the excavation is brought to within 6 inches of final grade.

3.8.1.8.8 Soil will be compacted to 85 percent of maximum dry density (ASTM 698) unless otherwise specified in the SSWP. Density tests will be performed at a frequency of once per 10,000 square feet per lift. A minimum of one density test will be performed on each lift of backfill placed. Field in-place dry density will be determined IAW ASTM D 1556, ASTM D 2167, or ASTM D 2922. If ASTM D 2922 is used, a minimum of one in ten tests will be checked using ASTM D 1556 or ASTM D 2167. Test results from ASTM D 1556 or ASTM D 2167 will govern if there is a discrepancy with the ASTM D 2922 test results.

3.8.1.8.9 Once backfill has been placed to within 6 inches of final grade, the sub-grade soil will be pulverized to a depth of 50mm or 2 inches by tracking with steel-cleated equipment for the bonding of topsoil with the subsoil. The surface will be free of materials that may hinder planting or maintenance operations. Topsoil will then be uniformly spread, graded, and compacted to the original grade, and left free of surface irregularities. Topsoil will not be placed when the sub-grade is frozen, excessively wet, extremely dry, or in a condition otherwise detrimental to seeding, planting, or proper grading.

3.8.1.8.10 After placing backfill and topsoil in the excavations, in previously grassed areas, the area of the excavation will be covered with sod, or seeded with an indigenous grass seed mixture and mulched to deter topsoil erosion.

3.8.2 Accountability and Records Management for MEC and RCWM

3.8.2.1 Individual grid sheets will be maintained and will account for all materials (RCWM/MEC and non-MEC) encountered during the surface and subsurface searches. These grid sheet entries will be made indicating amount, identification, condition, depth, and disposition. A grid sheet entry will be made for non-MEC materials, indicating the general types of materials encountered and pounds per grid.

3.8.2.2 An account of all recovered RCWM/MEC items will be maintained in the project database. Each piece of recovered intact ordnance will be given a unique database ID number, and the item will be tracked from discovery to final disposition. If the item can be moved to the storage location, the item will be recorded in the database until such time as it is destroyed or moved off site. The date of demolition or removal from the site will be recorded. The Site Manager is responsible for the tracking and maintenance of all ordnance recovered during the project.

3.8.2.3 If an item has been sent to the IHF, it will be tracked via the SVS number assigned to it by TE. The first three characters represent the TE tracking number (SVS for Spring Valley sample). The next two characters indicate the year the item was generated. The last set of

characters indicates number of items processed by TE at the assessment facility. The following is an example of the sample designation for an item processed by TE:

SVS-02-007, SVS-02-008, etc.

3.8.2.4 The Parsons Project Manager will be provided with all RDECOM entity reports in a timely manner, including X-Rays for every item assigned a SVS number. The Parsons Project Manager will receive a copy of all MARB reports in a timely manner. These reports will be used for final disposition determination and for inclusion in the any report deliverables. If the MARB determines that an item is for local disposition, then the USAESCH Safety Specialist will notify the Parsons Site Manager. The Parsons Site Manager will note this in the logbook, and daily reports. The Site Manager or UXO qualified (see Subchapter 3.8.3) Parsons designee will be present any time a MEC item is transferred from TE to the Explosives Storage Magazine. The Parsons Site Manager and the USAESCH Safety Specialist will perform weekly inventories of the Explosives Storage Magazine during the duration of the project. At the completion of activities and before final demobilization of the Site Manager and USAESCH Safety Specialist, a final inventory of the Explosives Storage Magazine will be made and provided to the Parsons Project Manager to ensure timely disposition of any MEC items.

3.8.3 Personnel Qualifications

3.8.3.1 UXO teams will consist of qualified personnel accepted by the USACE. Non-UXO qualified personnel will not perform any excavation nor handle potential RCWM/MEC. Non-UXO-qualified equipment operators may perform excavation activities under the direct supervision of UXO-qualified personnel. All project personnel will complete the OSHA 40-hour training course for hazardous waste site workers as required by the specific task. Additional site-specific training, IAW 29 CFR 1910.120, EM 385-1-1 (*USACE Safety and Health Requirements Manual*), ER 385-1-92 (*Safety and Occupational Health Document Requirements for Hazardous, Toxic, and Radioactive Waste and Ordnance and Explosive Waste Activities*), and ER 385-1-95 (*Safety and Health Requirements for Ordnance and Explosives Operations*) will be provided to all personnel upon their initial mobilization. A medical surveillance program will be in place for each member of the field personnel, with the most recent exam for each member having occurred within the last 12 months. Specific team make-up during intrusive operations will be described in the SSWP.

3.8.3.2 The following paragraphs detail individual UXO personnel qualifications.

3.8.3.3 <u>UXO Safety Officer</u>

3.8.3.3.1 The UXOSO will have the ability to identify fusing, necessary precautions, and fuze condition; (*i.e.,* armed, functioned, or armed and functioning); and how this condition can or will affect the munitions payload should other forces be applied.

3.8.3.3.2 The UXOSO will have the ability to recognize munitions/ordnance types and to determine the hazards and make risk assessments. This includes identifying potential fillers, including those in extremely deteriorated condition; *e.g.,* high explosives, fragmentation, white

phosphorous, and CA. The UXOSO must also be able to determine if munitions can be moved before destroying or if the munitions must be blown in place (BIP); fragmentation radius; and, in the case of CA the potential down-wind hazard along with the engineering controls to mitigate risk.

3.8.3.3.3 The UXOSO will have the same minimum prerequisites as the UXO Technician III. In addition, the UXOSO will also have experience in all phases of munition response action activities and applicable safety standards.

3.8.3.4 Senior UXO Supervisor

3.8.3.4.1 The SUXOS will have at least 10 years combined active duty in military EOD and contractor UXO experience, including at least 5 years in supervisory EOD and UXO positions. The SUXOS will also have significant experience in all aspects of munitions response action activities. The individual will be a graduate of military EOD schools of the United States, Canada, Great Britain, Germany, or Australia; or a graduate of a formal training course of instruction, or EOD assistant course as described in DDESB Technical Paper 18.

3.8.3.4.2 As the most senior UXO qualified individual on-site, the SUXOS directly supervises all daily RCWM/MEC activities and as such will be the Site Manager during RCWM/MEC operations. This individual is responsible for the successful performance of field teams, early detection and identification of potential problem areas, and instituting corrective measures. The SUXOS will execute instructions from the Parsons Site Manager; document site conditions; photographically document operations; prepare project reports; and identify efforts to accomplish the SOW. The SUXOS reports to the Parsons Site Manager and PM, though the role of Site Manager may also be performed by the SUXOS.

3.8.3.5 UXO Technician III

3.8.3.5.1 This individual supervises a UXO team. The individual will be a graduate of military EOD schools of the United States, Canada, Great Britain, Germany, or Australia; or a graduate of a formal training course of instruction, or EOD assistant course as described in DDESB Technical Paper 18. This individual will have prior military EOD and/or commercial UXO experience in munitions response actions. The UXO Technician III will have at least 8 years combined active duty experience in military EOD and contractor UXO/MEC positions.

3.8.3.6 UXO Technician II

3.8.3.6.1 The individual will be a graduate of military EOD schools of the United States, Canada, Great Britain, Germany, or Australia; or a graduate of a formal training course of instruction, or EOD assistant course as described in DDESB Technical Paper 18. The UXO Technician II will have prior military EOD experience or 3 years of experience in response munitions response actions plus specific project/explosives safety training if only a graduate of formal training course or EOD assistance course as described in DDESB Technical Paper 18.

3.8.3.7 UXO Technician I

3.8.3.7.1 The UXO Technician I will be a graduate of a formal training course of instruction, or EOD assistant course as described in DDESB Technical Paper 18.

3.8.3.8 UXO Quality Control Specialist

3.8.3.8.1 The individual will be a graduate of military EOD schools of the United States, Canada, Great Britain, Germany, or Australia; or graduate of a formal training course of instruction, or EOD assistant course as described in DDESB Technical Paper 18. This individual will have prior military EOD and/or commercial UXO experience in munitions response actions, and the transportation, handling, and storage of munitions and commercial explosives. The UXO QCS will have at least 8 years combined active duty experience in military EOD and contractor UXO/MEC positions. The role of UXOQCS may also be performed by the UXOSO.

3.8.4 MEC/RCWM/CA Sampling Overview

3.8.4.1 Both higher and low probability intrusive investigations can include anomalous areas identified based on historical evidence, geophysical anomalies, past intrusive work, and areas agreed to by the Spring Valley Partners. The SSWPs will describe the exact locations to be investigated. These areas will be excavated and sampled IAW with Subchapters 3.8.5, 3.8.6, and 3.8.7.

3.8.4.2 Various types of samples will be collected during intrusive excavation activities at the SVFUDS. These may include: surficial soil, subsurface soil, pit characterization soil, soil disposal (excavated soil), aqueous IDW (decontamination water), scrap, and non-agent intact containers. These samples will be analyzed for two general types of compounds: CA, and HTW constituents.

3.8.4.3 For the SVFUDS, CA is limited to mustard and lewisite. ABPs will also be monitored during the site-wide investigations. The mustard agent breakdown products are thiodiglycol, 1,4-dithiane, and 1,4-oxathiane. The lewisite breakdown products are chlorovinylarsenious oxide (CVAO) and chlorovinylarsenious acid (CVAA). At the SVFUDS, ricin is also a potential contaminant of concern. Although not categorized as CA/ABPs, ricin is included with this grouping.

3.8.4.4 CA/ABP samples, including ricin (as required), will be analyzed by the Air Monitoring Team or contract surety laboratory either on site at a laboratory staged at the Federal Property, or transported off site to the contract surety laboratory.

3.8.4.5 HTW constituents, which include disposal parameters, will be specified in the SSWPs. Table 3.1 of the Appendix E SAP indicates the general groups of analytical parameters required to address the SVFUDS Comprehensive list compounds, as well as the disposal parameters. Depending on site-specifics, these could include Volatile Organic Compounds (VOCs), Semivolatile Organic Compounds (SVOCs), and metals, explosives, cyanide, fluoride, and iodine. For the SVFUDS, these samples will primarily be solid (soil) samples. However, for

aqueous samples (e.g., groundwater), the parameters will also include acetic acid, chloracetic acid, bromide, chloride, ethyl alcohol, iodine pentafluoride, picric acid, and perchlorate.

3.8.5 Intrusive Investigation Procedures

3.8.5.1 General

3.8.5.1.1 The following sections describe the intrusive investigation procedures to be used to resolve single point anomalies, anomalous areas, and/or suspected trash/debris areas at the SVFUDS during both low and higher probability investigations.

3.8.5.1.2 At any point during an intrusive investigation, if recovered items, analytical results, or field observations are inconsistent with what is addressed by the Site-Wide WP or SSWP and the related APP/SSHP, work shall cease until the inconsistencies are resolved.

3.8.5.1.3 A dig sheet will be provided for a particular site, address, grid, etc., along with information regarding the relative location of the anomaly or anomalies to be investigated. Following anomaly reacquisition, the UXO contractor will delineate the work zones and proceed with excavation activities.

3.8.5.1.4 Copies of the geophysical maps for the area to be investigated will be furnished to the intrusive investigation team. These will typically be included in the SSWP for the site and will provide information regarding the extent of the anomaly that is being investigated. The dig sheet will provide anomaly amplitude information to the intrusive team to assist them in determining the potential size of the anomaly source.

3.8.5.1.5 For higher probability investigations, the excavation team will perform the initial intrusive investigation either using appropriate engineering controls or under evacuation. The engineering controls will be selected on a site-specific basis. Detailed descriptions of engineering control structures are provided in Appendix M.

3.8.5.1.6 Additional details concerning intrusive investigation procedures for specific sites may be described in the SSWP.

3.8.5.2 Procedures for Single Point Anomalies and Anomalous Areas

3.8.5.2.1 Single point anomalies and/or anomalous areas will be reacquired using the procedures described in Subchapters 3.6.6 and/or 3.7.1. Prior to the start of work, the excavation area will be overlain with a grid system to facilitate the recording of locations of recovered items and collected samples. All excavations will be continually monitored IAW the SSHP found in Attachment 1 of Appendix D of this WP based upon the type of investigation (i.e., low or higher probability).

3.8.5.2.2 All excavation will be performed using either mechanical equipment (i.e., excavator, air-spade, etc.) or hand digging, and will be monitored by a UXO Technician II or higher at all times. The excavation method to be used will be selected based upon site-specific factors. Mechanical equipment will not be used for excavating soil within 12 inches of an anomaly.

3.8.5.2.3 If selected, mechanical excavation will be performed using a backhoe or equivalent-sized equipment, which will be operated by a heavy equipment operator. Material will be removed from the excavation in 6- to 12-inch lifts, until the UXO technician monitoring the operation determines that the excavation is a minimum of 12 inches from the anomaly. At this point, mechanical excavation will be stopped and the intrusive excavation team will complete the excavation using hand digging.

3.8.5.2.4 During excavation activities, each lift of excavated material will be inspected by a UXO Technician II or higher for items of interest (suspect items, munitions debris, etc.) before the next lift is excavated. If suspect MEC/RCWM items are encountered during a low probability investigation, all work will cease and the Low Probability Contingency Plan will be implemented (subchapter 16.13 of the SSHP, found in Attachment 1 of Appendix D of this WP). If suspect MEC/RCWM items are encountered during a higher probability investigation, the Higher Probability Contingency Plan will be implemented (subchapter 16.14 of the SSHP).

3.8.5.2.5 Suspect ordnance items will be evaluated initially by UXO personnel to determine whether the item is acceptable to move or if TE EOD is required. All suspect items will be evaluated using the criteria in Subchapter 16.13 of the SSHP for Low Probability Sites or Subchapter 16.14 of the SSHP for Higher Probability Sites. Qualified UXO personnel will perform applicable procedures, place items in suitable containers, and transport to the storage area on the Federal Property for additional evaluation. Suspect RCWM items will be evaluated by qualified TE personnel, packaged in MRCs, and transported to the Federal Property for additional evaluation IAW Subchapter 3.8.14.

3.8.5.2.6 The size of each excavation will be determined based on the size of the anomaly and the proximity to other anomalies. The Site Manager will decide whether more than one anomaly can be safely investigated using a single excavation. If excavation is required to a depth greater than 4 feet and personnel may be required to enter that excavation, procedures outlined in the shoring plan in the SSHP (Attachment 1 of Appendix D of this WP) will be followed.

3.8.5.2.7 The following information will be collected during the intrusive investigation to assist in ensuring that each anomaly has been adequately resolved:

- The item(s) removed from each excavation will be photographed;
- Written descriptions of the item(s) removed from each excavation will be recorded in the field logbook and on the dig sheet including item type [where known], approximate size, and material (for intact containers the description will include a description of the bottle and bottle cover, and approximate quantity and description of any visible contents);
- The final open excavation will be photographed;
- The physical dimensions of each excavation will be recorded;
- State plane coordinates of trenches will be recorded to assist in comparing the location with the original and reacquisition geophysical data; and

- Where considered appropriate by the field team, soil stratigraphy will be recorded using standardized nomenclature (e.g., Wentworth grain size scale, Munsell color table).

3.8.5.2.8 Once an anomaly has been resolved using the procedures described in Subchapter 3.6.13, any required pit characterization samples will be collected and analyzed IAW the SAP (Appendix E). Collection of pit characterization samples is not required at low probability sites. If no agent/ABPs or ricin (if applicable) are detected in these pit characterization samples, the excavation of that anomaly or anomalous area will be considered to be complete. If soil is found to be free of agent/ABPs and ricin (if applicable), but is identified to contain HTW compounds, it may be removed then or at a later time using the protocols described in Chapter 10 of this WP.

3.8.5.2.9 All soil excavated during the investigation will be sampled IAW this subchapter and disposed of IAW Subchapter 3.9. Typically, the sampling and disposal of excavated soil will not be required during low probability investigations.

3.8.5.2.10 Non-RCWM intact containers, scrap, and IDW will be handled and disposed of IAW Subchapters 3.8.14 and 3.9.

3.8.5.2.11 Upon completion of the excavation, anomaly resolution will be performed as described in Subchapter 3.6.13.

3.8.5.2.12 Once the appropriate anomaly resolution procedures have been completed, soil will be backfilled into the hole and compacted IAW Subchapter 3.8.1.8.

3.8.5.3 Procedures for Suspected Trash/Debris Areas

3.8.5.3.1 Prior to the start of work, the excavation area will be overlain with a grid system to facilitate the recording of locations of recovered items and collected samples. The estimated boundaries of the suspected trash/debris area will be marked using this grid system and this will denote the "minimum limit of excavation." All excavations will be continually monitored IAW the SSHP found in Attachment 1 of Appendix D of this WP based upon the type of investigation (i.e., low or higher probability).

3.8.5.3.2 All excavation will be performed using either mechanical equipment (i.e., excavator, air-spade, etc.) or hand digging, and will be monitored by a UXO Technician II or higher at all times. The excavation method to be used will be selected based upon site-specific factors.

3.8.5.3.3 If selected, mechanical excavation will be performed using a backhoe or equivalent-sized equipment, which will be operated by a heavy equipment operator. Material will be removed from the excavation in 6- to 12-inch lifts.

3.8.5.3.4 For glassware and debris removal, a mechanical soil screening device (e.g., shaker table) may be used to facilitate the sifting and examination of the excavated soil. Each lift of excavated soil will be screened and inspected by members of the excavation team. Intact containers and other suspect glassware or debris will be segregated for further assessment and/or disposal, and excavated soil will be containerized. For intact containers, a description will be

recorded including a description of the bottle and bottle cover, and approximate quantity and description of any visible contents. If suspect MEC/RCWM items are encountered during a low probability investigation, all work will cease and the Low Probability Contingency Plan will be implemented (subchapter 16.13 of the SSHP, found in Attachment 1 of Appendix D of this WP). If suspect MEC/RCWM items are encountered during a higher probability investigation, the Higher Probability Contingency Plan will be implemented (subchapter 16.14 of the SSHP). Other items of interest will be removed from the excavated soil and consolidated for further evaluation, as necessary. Munitions debris and general scrap will be removed from the excavated soil and containerized separately IAW Subchapter 3.9.1. The excavation team will also be responsible for collecting any requisite soil samples for disposal characterization.

3.8.5.3.5 Each of the grids within the minimum limit of excavation will be excavated until they are cleared for AUES-related items as defined in the SSWP. Once grids are cleared for AUES-related items, the excavation walls will be extended a fixed distance (e.g., one foot) for clearance confirmation, and any required pit characterization samples will be collected and analyzed IAW the SAP (Appendix E). Collection of pit characterization samples is not required at low probability sites. If no agent/ABPs or ricin (if applicable) are detected in these pit characterization samples, the CA-related excavation in that grid will be considered to be complete. If soil is found to be free of agent/ABPs and ricin (if applicable), but is identified to contain HTW compounds, it may be removed then or at a later time using the protocols described in Chapter 10 of this WP.

3.8.5.3.6 For clearance purposes, each excavation area will be excavated to a depth where either (a) the excavation is clear of AUES-related items, or (b) when the excavation has reached bedrock, saprolite, or native soil. Once the soil is considered to be clear, the excavation will be taken a fixed distance (e.g., one foot) deeper for confirmation. Assuming that no further AUES-related items are found, pit characterization samples will be collected and, if no agent/ABPs or ricin (if applicable) are detected in the pit characterization samples, the CA-related excavation of the grid floor will cease.

3.8.5.3.7 Once the excavation of the grid floor is complete, grid sidewalls will be cleared for glassware and debris in a similar fashion. Sidewalls at the boundary of the minimum limit of excavation will be excavated in layers until the soil from an excavated layer is clear for glassware and debris. Once the soil is considered to be clear for glassware and debris, the excavation will be taken a fixed distance (e.g., one foot) farther for confirmation. Assuming that no further glassware and debris is found, pit characterization samples will be collected and, if no agent/ABPs or ricin (if applicable) are detected in the pit characterization samples, the CA-related excavation of that sidewall will cease.

3.8.5.3.8 Once the CA-related excavation of the grid is complete, unless immediate removal of any identified HTW contamination is practical, the grid will be lined with a biodegradable liner (e.g., jute mat) and, if necessary, backfilled with clean soil pending pit characterization analysis for HTW compounds. In the event that no further soil needs to be excavated to remove HTW contamination, any present backfill can be left in place and the liner will eventually biodegrade. However, if further excavation is required for HTW-contaminated soil removal, the liner will demark the limits of the previous excavation/backfill to facilitate subsequent excavation activities IAW Chapter 10. Excavation of HTW-contaminated soil (only) will not be

performed using engineering controls or air monitoring for CA, as no chemical agent or ricin hazard exists.

3.8.5.3.9 All soil excavated during the investigation will be sampled IAW this subchapter and disposed of IAW Subchapter 3.9.

3.8.5.3.10 Non-RCWM intact containers, scrap, and IDW will be handled and disposed of IAW Subchapters 3.8.14 and 3.9.

3.8.5.3.11 Upon completion of the excavation, anomaly resolution will be performed as described in Subchapter 3.6.13.

3.8.5.3.12 Once the appropriate anomaly resolution procedures have been completed, soil will be backfilled into the hole and compacted IAW Subchapter 3.8.1.8.

3.8.6 Sampling Procedures at Higher Probability Sites

3.8.6.1 Pit Characterization Sampling

3.8.6.1.1 Pit characterization samples will be collected from the center of the floor of each pit and from the midpoint of each pit outer sidewall, halfway between ground level and the pit floor (on the outer boundary of the proposed excavation area) or near the elevation of scrap or any containers that were encountered. These samples will be collected and analyzed IAW the SAP (Appendix E).

3.8.6.1.2 All pit characterization samples will be split and will be sent to the Contract Surety Laboratory for agent/ABP analysis before being sent for further analysis by the HTW laboratory. In addition, one pit characterization floor sample per pit may also be analyzed for ricin by the Contract Surety Laboratory. The need for ricin analysis will be documented in the SSWP. The split sample for HTW analysis will be kept on site, on ice or in a refrigerator in a secure location, under chain-of-custody protocols, pending the results of the agent/ABP and ricin analysis (if applicable). Soil determined to contain agent/ABPs or ricin will not be sent for further HTW analysis and will be disposed of IAW Subchapter 3.9. Soil determined not to contain agent/ABPs or ricin will be sent to the HTW laboratory to be analyzed IAW the SAP (Appendix E).

3.8.6.1.3 If it is determined that further excavation is required based on the results of the pit characterization sampling for agent/ABPs and/or ricin, over-excavation of the pit will be performed. If further excavation is required at the pit floor, the excavation will proceed one foot deeper, or until bedrock, saprolite or native soil has been reached. If further excavation is required for a sidewall, the excavation will be taken one foot farther.

3.8.6.1.4 Following the over-excavation of the pit, additional pit characterization samples will be collected and the process will be repeated until the pit is determined to be clear for agent/ABPs and/or ricin as applicable, or until saprolite or native soil has been reached.

3.8.6.1.5 If agent/ABPs or ricin are not detected in the pit characterization samples but the analysis indicates the presence of HTW compounds, over excavation of HTW-contaminated soil may be carried out once the ECS (if present) has been moved.

3.8.6.1.6 If required, additional characterization samples may be collected to establish the extent of HTW contamination. These additional samples will only be analyzed for the HTW compounds of concern identified by the original pit characterization samples.

3.8.6.2 Soil Disposal Characterization Samples

3.8.6.2.1 All soil disposal characterization samples will be split and will be sent to the Contract Surety Laboratory for agent/ABP analysis before being sent for further analysis by the HTW laboratory. In addition to analysis for agent/ABPs, a sample may be analyzed for ricin by the Contract Surety Laboratory. The need for ricin analysis will be documented in the SSWP. The split sample for HTW analysis will be kept on site, on ice or in a refrigerator in a secure location, under chain-of-custody protocols, pending the results of the agent/ABP and ricin analysis. Soil determined to contain agent/ABPs or ricin will not be sent for further HTW analysis and will be disposed of IAW Subchapter 3.9.

3.8.6.2.2 Following agent/ABP and ricin clearance (as applicable), soil disposal characterization samples (i.e., "RCRA samples") and generator knowledge (or "waste profile") samples will be collected and analyzed to determine the waste profile and meet the disposal facility requirements during the intrusive investigation.

3.8.6.2.3 RCRA samples will be collected based on the rate of soil excavation, while waste profile samples will be collected according to the location of the excavation. This is explained further below.

3.8.6.2.4 CA and Ricin Analysis

- One representative composite soil sample will be collected at the frequency defined in the SSWP. These representative samples will be composited by collecting grab samples from the soil loaded into containers. Following headspace analysis for agent clearance, this sample will be analyzed for agent/ABPs by Contract Surety Laboratory. In addition to analysis for agent/ABPs, one of the soil disposal samples per week may be analyzed for ricin by Contract Surety Laboratory using the Electrochemiluminescence (ECL) assay method. Ricin analyses may also be conducted on one pit characterization floor sample per grid, and all intact containers and soil characterization grab samples. The need for ricin analysis will be established and described in the SSWP.

3.8.6.2.5 RCRA Disposal Samples

- In general, one RCRA soil sample will be collected for each day of the intrusive investigation IAW the SAP (Appendix E). Actual sample frequency will be specified in the SSWP. This frequency will be dependent upon the excavation production rate. During intrusive operations, composite soil samples will be collected from containers as specified by the Sample Team Leader. The Sample Team Leader will ensure that these composite portions are collected to produce a representative sample from each the containers. These samples will be kept on site, on ice or in a refrigerator in a secure location, until cleared for the presence of agent/ABPs and ricin (if applicable). When the individual composite samples have been cleared for agent/ABPs and ricin (if applicable), they will be further composited into a single sample representing the day's production, and submitted to the HTW Laboratory (samples for VOC analysis will not be composited). These samples will be analyzed for RCRA disposal characterization parameters IAW the SAP (Appendix E).

3.8.6.2.6 Waste Profile Samples

- The purpose of the waste profile samples is to ensure that the disposal facility has sufficient knowledge of potential contaminants not addressed by the RCRA samples Waste profile samples will be collected at frequency specified in the SSWP. The waste profile samples will be analyzed IAW with the SAP (Appendix E). Collection of the composite sample will begin when AUES-related items are encountered in the excavation and will continue for 2 days after that. The Sample Team Leader will collect the composite portions from a range of containers/days to produce a representative sample, while maintaining overall sample holding times. The waste profile samples will be kept on site, on ice or in a refrigerator in a secure location, until the associated soil is cleared for the presence of agent/ABPs and ricin (if applicable). Following agent/ABP and ricin clearance (as applicable), the waste profile sample will be shipped to the HTW laboratory for analysis IAW the SAP (Appendix E).

3.8.6.3 Scrap Sampling

3.8.6.3.1 General scrap recovered during the investigation will be sampled IAW the SAP (Appendix E).

3.8.6.4 Aqueous Samples

3.8.6.4.1 Aqueous IDW generated during the investigation will be sampled and analyzed IAW the SAP (Appendix E). Samples of the water pumped out of an excavation will be collected from the holding containers and analyzed IAW the substantive requirements of the District of Columbia Water and Sewer Authority Temporary Discharge Permit.

3.8.6.5 Intact Container Sampling

3.8.6.5.1 As described in Subchapter 3.8.14, intact containers are any items (bottles, cylinders, lab devices, etc.) that are totally enclosed such that headspace analysis will be an inadequate means of full characterization. Unless otherwise agreed to by the Spring Valley Partners, intact containers will be handled and assessed IAW Subchapter 3.8.14. Non-RCWM intact containers recovered during the investigation will be handled IAW the SAP (Appendix E).

3.8.6.5.2 Suspect containers with solid contents that are not intact (e.g., an unsealed glass bottle assumed to be laboratory ware) or possible AUES-related items may be analyzed if deemed appropriate by the intrusive team. If the contents of the suspect container do not clearly appear to be uncontaminated soil or mud, the intrusive team will recommend that the container be assessed and analyzed. If the USAESCH Safety Specialist and CENAB Site Operations Officer concur with this recommendation, the contents of the container will be sent for headspace analysis. If no agent is detected during the headspace analysis, the container's contents will be transported to the Contract Surety Laboratory for agent/ABP and ricin analysis. If no agent/ABPs or ricin are detected, the container's contents may be further analyzed IAW the SAP (Appendix E).

3.8.6.6 Other Sampling at Higher Probability Sites

3.8.6.6.1 The excavation team may initiate additional soil sampling based on field observations such as stained soil or ash, or the presence of leaking containers or suspect scrap. This sampling will only be performed after obtaining concurrence and approval from the on-site USAESCH Safety Specialist and CENAB Site Operations Officer. Analysis of these samples will be performed for parameters specified in the SAP (Appendix E).

3.8.6.6.2 Additionally, if a consensus member of the Spring Valley Partners requests that a sample be taken, USACE will consider the request. The item or an adequate volume of material to be sampled will be stored appropriately until a decision is made regarding the analysis of the sample. In the case of a disagreement among the Spring Valley Partners, the material will be stored appropriately until the disagreement is resolved. Analysis of the sample collected will be performed for parameters specified in the SAP (Appendix E).

3.8.7 Sampling Procedures at Low Probability Sites

3.8.7.1 Low probability sites typically do not require the same level of analytical coverage as a higher probability site. CA constituents and ricin will not be analyzed at low probability sites. ABPs can be analyzed but, based on site-specific conditions, it may be appropriate to only analyze for a subset of the parameters shown in Table 3.1 of the Appendix E SAP. For example, where stained soil or other field observations indicate sampling is prudent, and concurrence and approval to sample has been obtained from the on-site USAESCH Safety Specialist and CENAB Site Operations Officer, appropriate parameters will be selected from Table 3.1 of the Appendix E SAP. This decision would be based on site history, locational data, previous sampling results in the vicinity, and other information relevant to that specific site. The parameters to be analyzed will be a consensus decision of the Partners, but at a minimum, analysis for arsenic will be performed.

3.8.7.2 Sampling During Low Probability Intrusive Operations in Arsenic Contaminated Grids

3.8.7.2.1 During the excavation of arsenic-contaminated grids, confirmation samples are collected to determine the extent of the arsenic-contaminated soil that requires removal. The procedure for this grid confirmation sampling is described in Chapter 10 and involves collecting grid confirmation samples at the center of the grid floor and at the mid-point of the grid's four walls. The sample(s) taken at the center of the grid floor is/are used to establish the grid clearance depth, while the samples collected at the mid-point of the grid walls are used to establish the lateral extent for grid clearance.

3.8.7.2.2 If the scope of an intrusive investigation does not involve the excavation of arsenic-contaminated grids but occurs within the boundaries of identified arsenic-contaminated grids, the removal of soil during that intrusive investigation might disturb locations where grid confirmation samples would need to be collected during future soil removal activities. Consequently, to preserve sample integrity for the planned arsenic-contaminated soil removal effort, soil sampling will be performed as described in the following paragraphs where intrusive investigation may impact future sampling locations. The results of this sampling may then be used during any subsequent arsenic-contaminated soil removal effort.

3.8.7.2.3 In the event that anomaly excavation takes place within one foot of the center of an arsenic-contaminated grid, or within one foot of the center of a sidewall of an arsenic-contaminated grid, grid confirmation samples will be collected as described in Chapter 10. Note that samples must be collected before intrusive activities encroach on the soil to be sampled.

3.8.7.2.4 If the anomaly excavation occurs within one foot of the center of an arsenic-contaminated grid, samples will be collected in the center of the grid at the appropriate depths to subsequently determine the excavation depth for the future soil removal activities (which will be performed under a separate work plan). If the excavation occurs within one foot of the center of a grid sidewall, samples will be collected at the appropriate depth at the impacted sidewall.

3.8.7.2.5 The appropriate depth for sample collection in the center of an arsenic-contaminated grid is 2 feet and at each foot thereafter (i.e., 2 feet, 3 feet, 4 feet, etc.). The appropriate depth for sample collection in the center of a grid sidewall is at 6 inches, and at 30 inches, and at each foot thereafter (i.e., 6 inches, 30 inches, 42 inches, 54 inches, etc.).

3.8.7.2.6 For example, if the anomaly excavation took place within one foot of the grid center and went down to a depth of one foot, no samples would need to be taken. However, if the excavation went down to a depth of 3½ feet, samples would be collected at depths of both 2 feet and 3 feet. If the excavation was within one foot of the center of a grid sidewall and went down to a depth of 4 feet, then samples would be collected at depths of 6 inches, 30 inches, and 42 inches.

3.8.7.3 Other Sampling at Low Probability Sites

3.8.7.3.1 The field team may initiate additional soil sampling based on field observations, such as strange odors, abnormal soil coloration, and/or the presence of ash or unidentifiable glass fragments. If required, this sampling will be performed IAW the SAP (Appendix E) as

appropriate. Additional sampling will only be performed after obtaining concurrence and approval from USACE. If samples are collected in this manner, Parsons will prepare an Activity Report describing the reason that the samples were collected, the location from which the samples were collected, and the parameters selected for analysis.

3.8.8 Maximum Credible Event and Munition with the Greatest Fragmentation Distance

3.8.8.1 The MCE is selected for higher probability sites based on the maximum release of a chemical agent from a munition, bulk container, or process that could occur as a result of an unintended, unplanned, or accidental incident. The event must be realistic with reasonable probability of occurrence. For site-wide operations at the SVFUDS, USAESCH performed a detailed MCE analysis that identified three possible MCEs for site-wide investigations, based on the record of items discovered at the SVFUDS to date. The identified MCEs are:

- The instantaneous release of mustard agent from an explosively configured 75 mm Mk II chemical projectile, or
- The evaporative release of lewisite from a 5-gallon container, or
- The evaporative release of lewisite from a 1-liter container, or
- The instantaneous release of arsine from a non-explosively configured 75 mm Mk II chemical projectile.

3.8.8.2 The MGFD is selected for higher probability sites based on the ordnance item with the greatest fragmentation distance that can reasonably be expected to be found at the site. Based on the record of items discovered at the SVFUDS to date, the MGFD is a 75 mm Mk II chemical projectile with an explosive burster.

3.8.8.3 The site-specific MCE and associated Acute Exposure Guideline Level (AEGL)-2 distance, and the MGFD if applicable, will be selected by USAESCH for each higher probability site to be investigated. A MGFD may not be selected if ordnance is not expected to be located at the specific site. The results of the selection of MCE and MGFD will be stated in the SSWP prepared for that site.

3.8.9 AEGL-2 Distance, Minimum Separation Distance, and EZ

3.8.9.1 The AEGL-2 distance is the distance beyond which the public will not experience any irreversible or other serious, long-lasting health effects, or an impaired ability to escape associated with a chemical agent release. The AEGL-2 distance is used to delineate site work zones and design contingency plans. A computer model called D2SV, specifically tailored to the SVFUDS, is used to predict the AEGL-2 distance based on the selected MCE, meteorological data, and the nature of the work to be performed. The AEGL-2 distance will be calculated periodically for the specific MCE and weather conditions at each site.

3.8.9.2 The typical MCE-based AEGL-2 distances for atmospheric stability factor D and a wind speed of 1 m/s, under summer conditions (95°F) are shown in Table 3.9. Site-specific

values will be calculated for each site, based upon the selected site-specific MCE. An ECS in conjunction with a CAFS can be used to reduce the AEGL-2 distance to within the ECS.

Table 3.9
MCEs and Associated AEGL-2 Distances

MCE	AEGL-2 Distance
Instantaneous release of 1.35 lbs of H from an explosively configured 75 mm Mk II chemical projectile	73 meters (240 feet)
Evaporative release of L from a 5-gallon container	131 meters (430 feet)
Evaporative release of L from a 1-liter container	29 meters (96 feet)
Instantaneous release of arsine from a non-explosively configured 75 mm Mk II chemical projectile	226 meters (742 feet)

Conditions: Atmospheric Stability Factor D, 1 m/s wind speed, and maximum temperature of 95°F.

Source: AEGL-2 distances were generated by USAESCH and communicated to Parsons March 8, 2007.

3.8.9.3 The fragmentation distance for the MGFD (an explosively configured 75 mm Mk II chemical projectile) is 1,194 feet and the Hazardous Fragment Distance is 200 feet. Per EM 1110-1-4009 (*Ordnance and Explosives Response*), the Hazardous Fragment Distance of 200 feet will be used as the Minimum Separation Distance (MSD) for unintentional detonations during site-wide operations because recovered items are not expected to be UXO.

3.8.9.4 The EZ distance for a site is defined as the greater of the MSD and the MCE-based AEGL-2 distance. The EZ distance used for operations at the SVFUDS will be the greater of either 200 feet or the AEGL-2 distance calculated for the specific operation, and will be stated in the SSWP prepared for that site.

3.8.10 Evacuation

3.8.10.1 Prior to the commencement of intrusive operations, the public will be notified and withdrawn to a point beyond the EZ distance for the specific anomalous area. If evacuation is not feasible, engineering controls will be used during intrusive excavation to reduce the EZ distance. Details concerning the notification and enforcement of the evacuation of residents are included in the CENAB maintained Public Protection Plan (PPP). Site-specific public protection measures will be described in SSWPs.

3.8.10.2 In the unlikely event that engineering controls fail, the CENAB Site Operations Officer will implement public evacuation or shelter-in-place as described in the PPP, depending upon the nature and quantity of the release.

3.8.11 MEC/RCWM Identification

3.8.11.1 In the event that the Low Probability Contingency Plan is initiated because suspect AUES items are encountered during a low probability investigation, subsequent actions taken will be determined according to the nature of the suspect item. This procedure is summarized in Figure D1-16-1 in Subchapter 16.13 of the SSHP (Attachment 1 of Appendix D to this WP).

3.8.11.2 If a suspect RCWM container or MEC item is encountered during a higher probability investigation, the excavation team and/or TE will perform an initial reconnaissance. If during the initial reconnaissance the item is determined to be potential RCWM, the Contingency Plan assessment procedures described in Subchapter 16.14 of the SSHP (Attachment 1 of Appendix D to this WP) will be performed. For the purposes of the Higher Probability Contingency Plan, a suspect RCWM container is defined as either (a) a container with markings denoting chemical agent or RCWM, or (b) an unidentifiable intact container that contains liquid. Note that during an investigation at a higher probability site, any discovered unidentifiable intact container that contains liquid will be assumed to be potential RCWM until determined otherwise.

3.8.11.3 If an item is suspected to be MEC, the UXO team will assess the suspect MEC using their established standard operating procedures (SOPs). Based upon their assessment, procedures described in Subchapter 16.14 of the SSHP (Attachment 1 of Appendix D to this WP) will be implemented as necessary.

3.8.11.4 If it is determined that a suspect container is neither a RCWM container nor a MEC item, it will be categorized as potential HTW and assessed according to the procedures described in Subchapter 3.8.14 of this WP and Subchapter 16.14 of the SSHP (Attachment 1 of Appendix D to this WP).

3.8.12 MEC/RCWM Removal

3.8.12.1 In the event that the Low Probability Contingency Plan is initiated because suspect AUES items are encountered during a low probability investigation, subsequent actions taken will be determined according to the nature of the suspect item as summarized in the Subchapter 16.13 of the SSHP (Attachment 1 of Appendix D to this WP).

3.8.12.2 If suspect MEC/RCWM is encountered during a higher probability investigation, the Higher Probability Contingency Plan will be initiated and the item will be removed IAW Subchapter 16.14 of the SSHP (Attachment 1 of Appendix D to this WP).

3.8.13 MEC/RCWM Storage

3.8.13.1 If an item is a suspect RCWM item it will be stored in the appropriate IHF container. The IHF containers are located at the Federal Property Storage Area. The “IHF containers” include the IHF, the AHF, and the MHF. Personnel will be briefed at the morning safety tailgate meeting on the transportation route from the intrusive investigation site to the IHF containers.

3.8.13.2 If an item is a suspect MEC item and it has been cleared for release to Parsons, it will be stored in the Explosives Storage Magazine at the Federal Property Storage Area. When items

are stored in the Explosives Storage Magazine, the inventory will be reviewed and updated at least weekly or every time an item is added to or removed from the magazine. The Federal Property Storage Area is described further in Chapter 9.

3.8.14 Intact Container Monitoring and Disposal

3.8.14.1 Waste Streams

3.8.14.1.1 Operations at the SVFUDS will potentially generate intact containers from the excavation of geophysical anomalies or pits associated with RCWM items. These intact containers may contain agent/ABP or HTW. Intact containers are any items (bottles, cylinders, lab devices, etc.) that are totally enclosed such that headspace analysis will be an inadequate means of full characterization.

3.8.14.2 Monitoring Methods

3.8.14.2.1 In the Assessment Area, TE will operate a Portable Isotopic Neutron Spectrometer (PINS) instrument to identify the unknown contents of the container(s). This will be performed IAW TE SOPs maintained with the instrument.

3.8.14.2.2 Intact containers that are too small for assessment by the PINS and glass bottles will be sent to the Chemical Transfer Facility (CTF) at Edgewood, Maryland for assessment.

3.8.14.3 Handling Procedures

3.8.14.3.1 If an intact container is encountered, it will be checked for any identifying marks. Markings will be recorded prior to over-packing. Intact small glass containers or ampoules will be assumed to contain mustard or lewisite if no other markings are evident. Figure 3-5 presents the intact container handling/disposal decision process.

3.8.14.3.2 If the intact container is a suspect RCWM item, it will be packed in the appropriate size Department of Transportation (DOT)-approved MRC for subsequent transport by TE to the IHF containers on the Federal Property for closed cavity assessment (refer to Figure 3-6).

3.8.14.3.3 If the intact container is not suspect RCWM (e.g., paint or pesticide container) but is an unknown, it will be overpacked in a DOT-approved polyethylene drum and transported to the Federal Property for sampling. Contents from intact containers will be poured into sample containers listed in Appendix E (for soil sampling procedures) and appropriate handling procedures will be used. If the amount of sample in the intact container is not sufficient for additional HTW sampling, extraction data from the Contract Surety Laboratory will be used.

3.8.14.3.4 Disposal will be based upon the analytical characterization of the container as RCWM, HTW, or non-HTW. Intact containers in overpacks will be stored at the Federal Property pending shipment for disposal.

Figure 3-5 Intact Container Handling/Disposal Overview

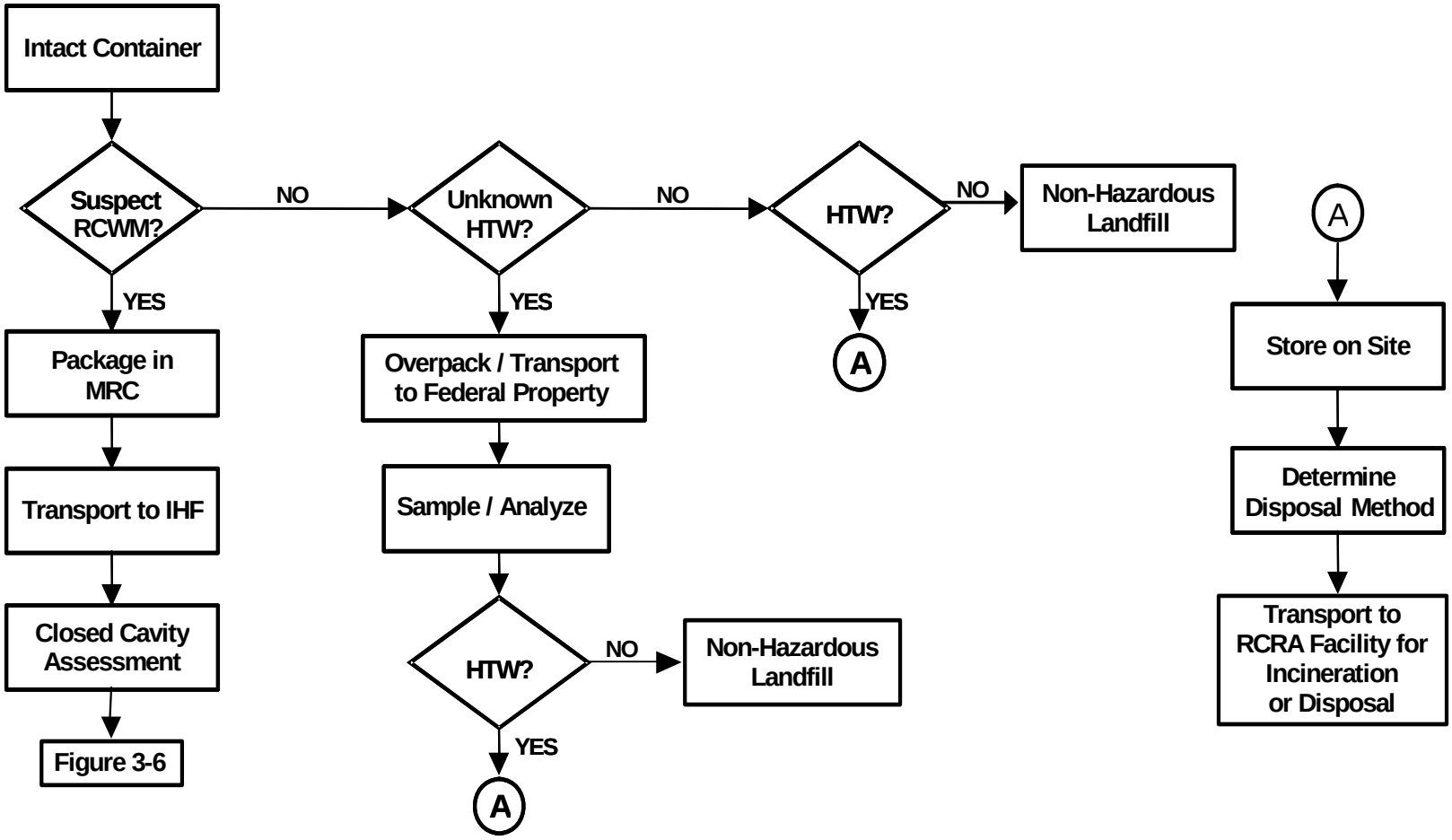
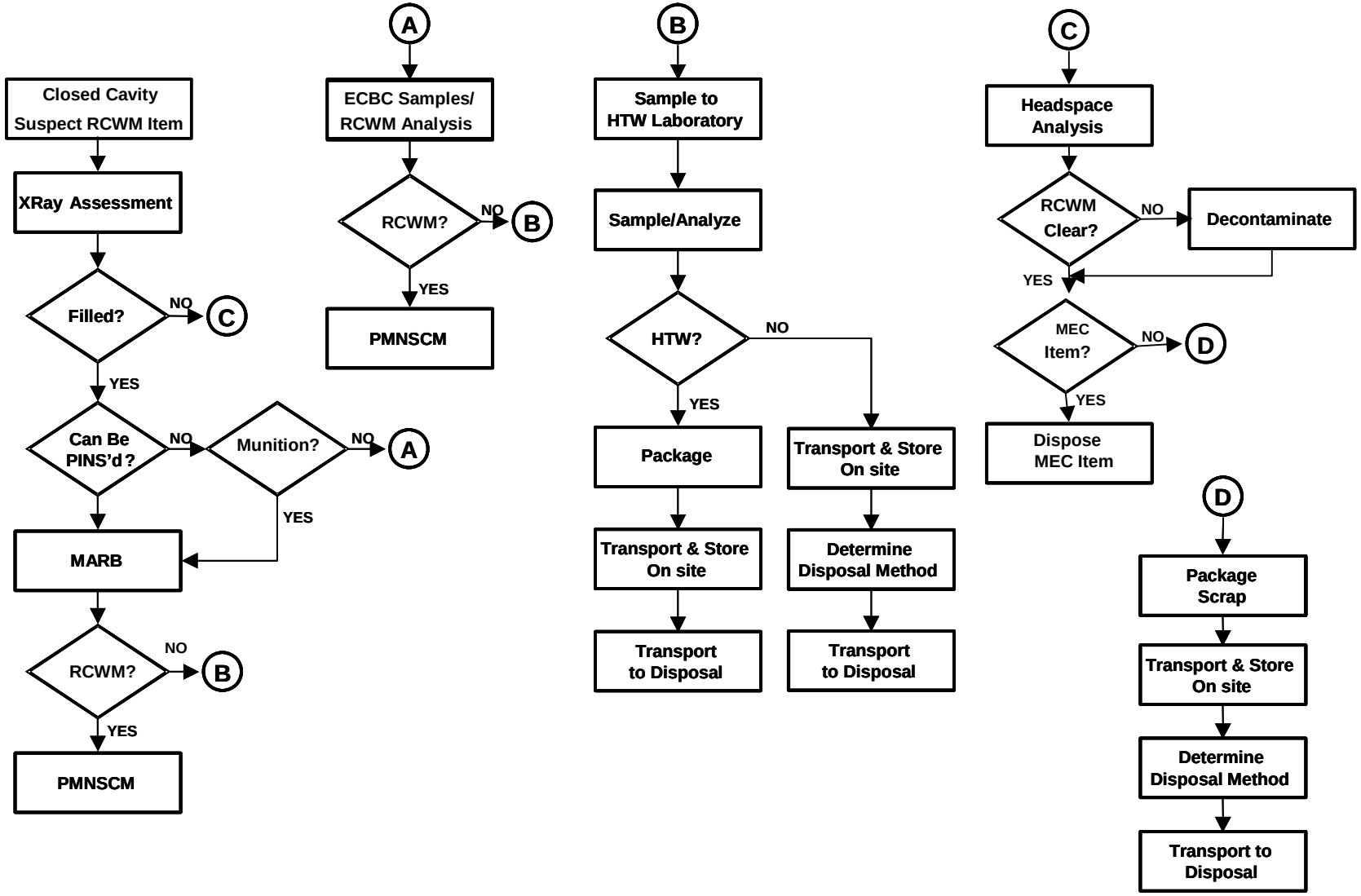


Figure 3-6 Closed Cavity Assessment



3.8.14.4 Closed Cavity Assessment

3.8.14.4.1 The closed cavity assessment process is shown in Figure 3-6. Intact suspect RCWM containers will be initially X-rayed. The X-ray technique can determine if the container is empty or contains filler material. The X-ray SOP is maintained with the instrument.

3.8.14.4.2 If there is sufficient filler material, the container will be assessed using the non-intrusive PINS instrument IAW the TE SOPs. The PINS is specifically calibrated for RCWM agents. The PINS spectrum will be electronically transmitted to Idaho National Engineering Laboratory (INEL) for RCWM identification/confirmation. The results from the INEL will be submitted to the MARB for review and final determination.

3.8.14.4.3 If the item is determined to be RCWM, the container packed in an MRC will be stored in the IHF awaiting final disposition IAW the PMNSCM IHF Plan (Appendix K).

3.8.14.4.4 The PINS requires a minimal quantity of unknown to achieve interpretable results. If there is insufficient quantity (e.g., small bottle) the item will not be assessed via PINS. However, if the item is a suspect RCWM item, contains fill, and is a munition, it will be submitted to the MARB for final determination with disposition determined as above.

3.8.14.4.5 If intrusive sampling is required, the air monitoring team or contract surety laboratory will sample in a glove box filled suspect RCWM items that cannot be assessed via PINS (e.g., insufficient quantity). Samples will be analyzed for mustard and lewisite. If the item is RCWM, it will be repackaged in an MRC, and stored in the IHF awaiting disposition. If the item does not contain RCWM, or the item was assessed via PINS but PINS analysis was negative for CA, a sample will be taken and submitted for HTW analysis by a contract HTW laboratory. A DAAMS tube or MINICAMS will be used to sample the glove box exhaust during sampling operations. If the result is positive for CA but the contents are not RCWM, the Container will undergo headspace analysis and will be decontaminated if necessary (see below) prior to packaging, storage on the Federal Property and final disposal disposition.

3.8.14.4.6 Final disposal will depend upon the characterization as HTW or non-HTW. If the suspect RCWM item is not filled and is not a munition, the item will undergo headspace analysis IAW the air monitoring team's procedures. If the suspect RCWM item is clear for CA, it will be stored at the Federal Property awaiting disposal. If the item is scrap, it will be packaged IAW Subchapter 3.9.1. The drum will be transported to an appropriate disposal facility when it is full, or at the end of the project.

3.8.14.4.7 If a suspect RCWM item is not filled and is not clear for CA, it will be decontaminated and classified as 3X. If it is a suspect MEC item, it will be stored in the magazine at the Federal Property awaiting final disposition. Other 3X scrap will be double bagged and packaged in a 55-gallon polyethylene drum. When the drum is full, or at the end of the project, the drum will be transported to the on-site staging area and stored awaiting disposal disposition as 3X material.

3.8.14.5 Disposal

3.8.14.5.1 RCWM intact containers determined to contain chemical agent will be handled and disposed of IAW the PMNSCM IHF Plan (Appendix K).

3.8.14.5.2 Intact containers that contain HTW constituents as determined by HTW analysis, will be incinerated at a RCRA-permitted facility or transported to a RCRA-permitted landfill, depending upon the nature of the contaminants. The RCRA-permitted incineration facility will be chosen based on best cost and approval from the waste facility. Intact containers that contain non-HTW constituents as determined by HTW analysis will be disposed of in a Class D permitted landfill.

3.8.14.6 On-site Tracking

3.8.14.6.1 The tracking system outlined in Subchapter 3.9.4 will be followed for each waste stream encountered during the intrusive investigation. Every container will be tracked from point of generation to disposal.

3.8.14.7 Transportation

3.8.14.7.1 Upon receipt of analytical data and the waste approval code from the disposal facility, intact containers will be transported IAW Subchapter 3.9.5.

3.8.14.8 Disposal Documentation

3.8.14.8.1 All disposal documentation will be completed IAW Subchapter 3.9.6.

3.8.14.9 Waste Profile Sheet

3.8.14.9.1 Following receipt of analytical characterization data, a Waste Profile Sheet will be prepared for each waste stream for signature by the designated CENAB signatory. A unique Waste Profile Sheet number will be assigned to each Waste Profile Sheet and used throughout the process of both manifesting and transporting the waste stream. Upon approval, a waste approval code will be assigned to each waste stream. An example of a waste profile sheet is provided in Appendix F.

3.8.14.10 Shipping Labels

3.8.14.10.1 All containers will be properly labeled by the Sample Team IAW Subchapter 3.9.7.

3.8.14.11 Manifesting

3.8.14.11.1 The wastes will be manifested by the site support and disposal subcontractor in IAW Subchapter 3.9.8.

3.8.14.12 Weight Slips

3.8.14.12.1 A signed weight slip will be furnished to CENAB and USAESCH indicating the actual weight of the waste shipped to the approved disposal facility.

3.8.14.13 Notification of Waste Shipped

3.8.14.13.1 A Notification of Waste Shipped form, required under the Land Ban Disposal restrictions, will be completed IAW Subchapter 3.9.10.

3.8.14.14 Certificate of Disposal/Destruction

3.8.14.14.1 A receiving manifest indicating acceptance of all materials by the disposal facility will be signed by the disposal facility representative and furnished to CENAB and USAESCH within 10 working days of the materials' receipt. A Certificate of Disposal/Destruction will also be furnished once the disposal action has been completed (these are typically received 2-3 months after the materials are accepted by the disposal facility).

3.8.15 MEC Disposal

3.8.15.1 General Procedure

3.8.15.1.1 If high explosives (HE) are determined to be present during the MEC assessment and the item is acceptable to move, the item will be placed in a suitable transportation container, transported to the Federal Property, and will be placed in the Explosives Storage Magazine until final disposition can be determined.

3.8.15.1.2 The SUXOS and UXO personnel will evaluate conventional MEC items and associated explosive components, previously identified as suspect RCWM, that have been released by TE for disposal. The UXO personnel will accept the conventional MEC item, and then move the item from the IHF containers to the explosive storage magazine for storage, awaiting disposal and disposition.

3.8.15.2 MEC

3.8.15.2.1 When permissible, on-site demilitarization will be conducted using a contained detonation chamber. A SSWP will be prepared to address these operations. Any conventional MEC destroyed on-site will be handled IAW the approved the SSWP.

3.8.15.3 Munitions Debris

3.8.15.3.1 Munitions Debris will be handled IAW with the procedures found in Subchapter 3.9.1.

3.8.16 MEC Disposal Alternatives

3.8.16.1 If onsite demilitarization is not practical demolition operations (non-emergency) will be performed at a permitted RCRA Sub-part X open burn/open detonation facility. The item will

be placed in an approved shipping box and labeled prior to shipment for disposal. Disposal will be coordinated with USAESCH. Items will be shipped IAW the MEC Transportation Plan in Appendix L.

3.8.16.2 Required off-site disposal procedures will be developed by the UXO contractor performing the demolition operations. These plans and SOPs will be maintained at the site where the demolition operations are to take place. The handling and transportation of conventional MEC and associated components are discussed in the SVFUDS MEC Transportation Plan (Appendix L).

3.9 INVESTIGATION DERIVED WASTE PLAN

3.9.0.1 This IDW Plan has been developed for the management of IDW by Parsons during the site-wide investigations. This plan focuses on IDW generated during higher probability investigations. Due to the low probability of encountering AUES related material during the low probability investigations, the only IDW anticipated to be generated during those investigations may be general trash/scrap. This general/trash will be disposed of as non-CA contaminated/non-HTW scrap. If the Low Probability Contingency Plan is initiated, the material generated will be handled IAW with this plan if not specified in the contingency plan. All disposal operations will be conducted IAW this IDW Plan.

3.9.0.2 This subchapter presents the disposal procedures for non-RCWM items. According to the "Interim Guidance" (Department of the Army, 1997), soil and debris contaminated with CA is not considered RCWM. Waste streams requiring disposal could potentially include scrap, soil, decontamination water, PPE, solid waste, and on-site air monitoring laboratory-generated waste, all considered IDW.

3.9.1 Scrap and Munitions Debris

3.9.1.1 Introduction

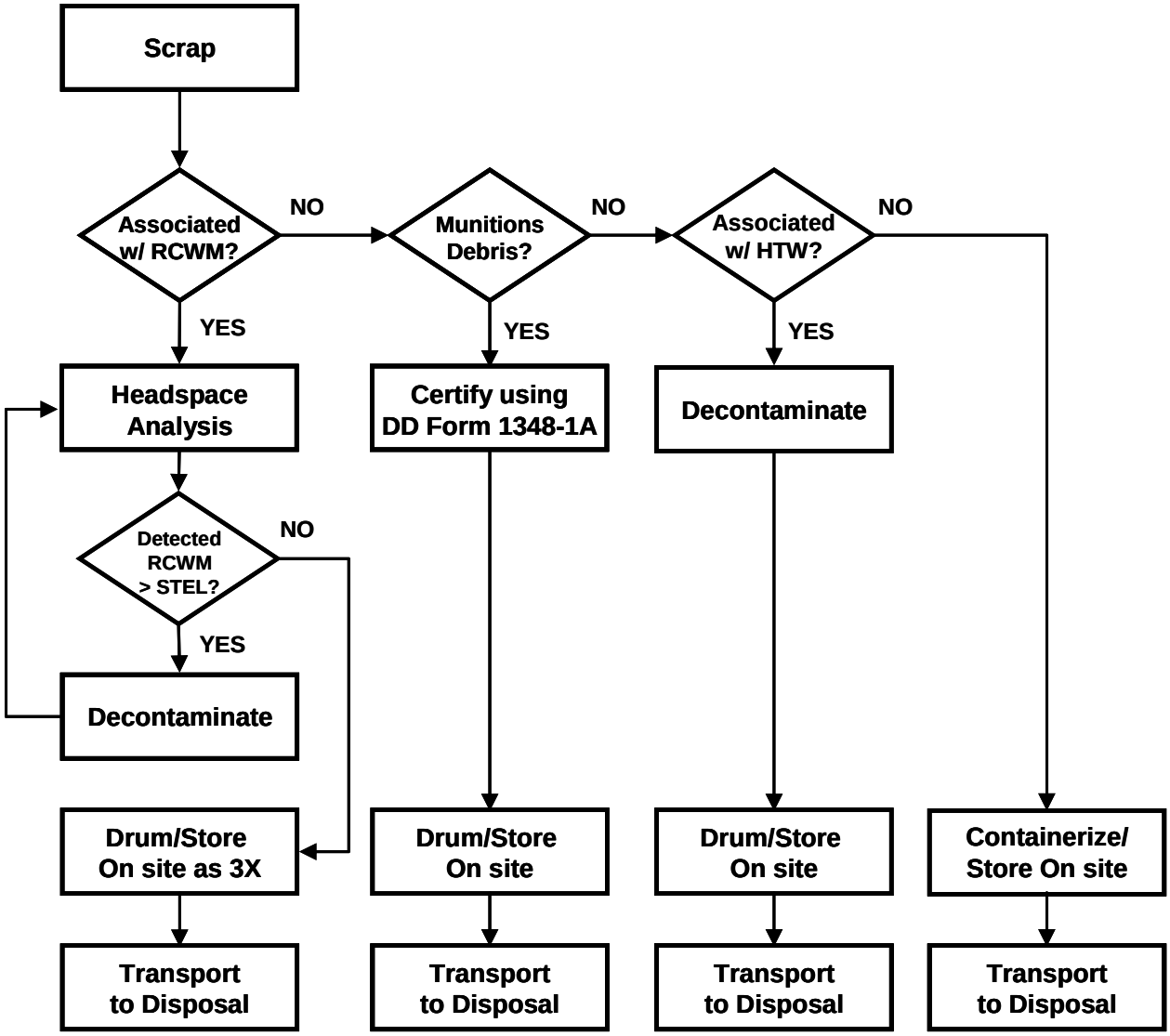
3.9.1.1.1 Scrap recovered from the intrusive activities will consist of suspected CA contaminated scrap, MD, and general metallic scrap and trash. There will be separate locations for the three types of scrap material. These locations will correspond to the hazards associated with the scrap material.

3.9.1.2 Scrap Handling Procedures

3.9.1.2.1 General scrap items will not be assumed to be CA-contaminated. However, if an item is identified as suspect RCWM, a MINICAMS alarm occurs, or other obvious signs of CA contamination are observed, the scrap will be containerized and undergo headspace screening by on-site Air Monitoring Team. General scrap and trash will not require any monitoring if there are no indications of CA contamination. Figure 3-7 presents the scrap handling decision process.

3.9.1.2.2 Items assessed in the field to be RCWM-related scrap metal and debris recovered from excavations will be placed in containers or wrapped in plastic capable of being sealed and

Figure 3-7 Scrap Handling/Disposal



heated. The containers will be heated IAW the procedures outlined in Appendix J, Air Monitoring Plan and the ambient air in the container will be monitored for CA by the on-site air monitoring lab.

3.9.1.2.3 If monitoring reveals the presence of CA vapor above the Short Term Exposure Limit (STEL), the materials will be decontaminated. Metallic items will be allowed to dry after decontamination and rinsing. After the metallic items have dried, they will be headspaced again for CA vapor above the STEL. Once the metallic items have been decontaminated to a level below the STEL, they will be processed as 3X scrap. Porous debris that has been decontaminated will remain in the drum, the drum will be sealed, and the exterior of the drum will be washed with a decontaminating 5% solution of sodium hypochlorite (or other appropriate solution, depending on the CA detected) and rinsed. Decontamination solution and rinse water will be retained in a sump for later disposal. The drum will be labeled as appropriate and prepared for shipment to a disposal facility as per procedures presented in Subchapter 3.9.1.

3.9.1.2.4 Non-RCWM scrap material will be stored in the vicinity of the site equipment staging area in an appropriate container. Non-RCWM scrap material consists of scrap that has no visual suspect RCWM and HTW contamination, that is not in discolored soil, and that, during air monitoring, did not detect CA. Bins of metal or wooden design or poly drums will be used to store scrap metal and MD as required. Non-metallic scrap and trash that is not suspect RCWM will be containerized and stored in a dumpster located in the staging area, or picked up by a local solid waste facility. The final disposition of scrap will be determined on a site-by-site basis.Within or adjacent to the intrusive area, Parsons will establish temporary MD and other scrap collection points. During operations, ordnance scrap and other scrap that is free of explosives will be placed at these collection points. Documentation of the recovered MD will include a description of the scrap, the amount of scrap recovered, and the location where the scrap was discovered. Upon completion of operations, the materials in these temporary collection points will be transferred to the central collection/segregation point at the Federal Property Storage Area. The final disposition of the MD will also be documented.

3.9.1.2.5 Inspection and classification of MEC is a critical aspect of MEC operations and only personnel qualified as a UXO Technician III or above will perform these inspections. UXO Technician II or Technician I personnel may assist in the identification of the items; however, the final identification must be performed by a UXO Technician III or above prior to recovery and removal of the material. As MEC items are encountered, a UXO Technician III will inspect the items and determine: 1) is the item UXO or a munitions component; 2) does the item contain explosives or other dangerous materials; or 3) does the item require TE assessment. Items that the UXO Technician III or higher identifies as being free of explosives and acceptable to move will be relocated within the work grid and segregated by category and type. Segregation categories will include general refuse and MD not requiring further treatment. As materials are collected, the UXO Technician III or higher will further inspect the materials in the segregation area to ensure that the materials have appropriately identified, classified and segregated the materials, and that the items are free of dangerous fillers. At the end of each day's operations or as the individual areas are completed, the UXO Team will upload the segregated materials onto an appropriate vehicle in a manner that maintains the field segregation and transport them to the Federal Property Storage Area.

3.9.1.2.6 At the Federal Property Storage Area, the UXO Technician III and SUXOS will inspect, segregate and containerize the recovered scrap. As the materials are segregated the UXO Technician III will:

- Perform a final inspection of the materials to ensure that they are appropriately categorized, as general refuse or MD;
- Ensure that they are free of explosive and other dangerous materials;
- Separate items requiring further demilitarization; and
- Ensure that the inspected materials are placed in their appropriate storage container.

3.9.1.2.7 Prior to opening the storage containers, the SUXOS will verify that container seals are intact and that the numbers match the last recorded seal numbers. The container seals will be labeled with a unique identification that will start with USACE/Site Name/SV/Parsons/0001 and will continue sequentially for each additional container. Each container will have an identification label that identifies its unique container identification number, its contents, the location where MD was obtained, the name of the contractor, and the names of the SUXOS and USACE Safety Specialist that certified/verified that the contents are free of explosives. When a container becomes full, the SUXOS will have the container weighed and affix a final identification label that includes the previous information plus the weight of the container. During the transfer of materials into the containers, the SUXOS will randomly inspect at least 10% of the materials to ensure that they are appropriately categorized and free of explosives. Upon completion of the transfer, the UXO Technician III and SUXOS will close and seal the storage containers. The UXO Technician III and SUXOS will document the results of these inspections in the Safety and QC logbooks and will maintain a listing of the seal numbers attached to each container.

3.9.1.2.8 The SUXOS is responsible for ensuring that the procedures for segregating, consolidating and inspecting MEC are fully implemented and enforced. To verify that procedures are being followed, the SUXOS will perform random inspections of both the consolidated materials and ongoing field operations. The SUXOS will perform sufficient inspections to facilitate certification that the containerized MD is free of explosive hazards, which is necessary for completion of the Requisition and Turn-in Documentation, DD Form 1348-1A.

3.9.1.2.9 Each container will be kept closed and sealed, except when materials are being loaded into the container or the contents of the container are being inspected. Each container will be closed in a manner that requires that the container seal be broken to gain access to the interior of the container.

3.9.1.2.10 MD must be certified inert prior to disposal off-site. The USAESCH Safety Specialist and SUXOS will inspect and certify that the MD is free of explosives and explosive residues. They will both sign the DD Form 1348-1A as follows:

"We certify that the property listed herein has been inspected by us, and to the best of our knowledge and belief, contains no items of a dangerous nature."

3.9.1.2.11 The above certification statement will appear verbatim on DD Form 1348-1A when the form is being used for MD certification. Both the SUXOS and USAESCH Safety Specialist will sign the DD Form 1348-1A to certify and verify the MD.

3.9.1.2.12 Parsons, in coordination with USAESCH, will arrange for maintaining the chain of custody and final disposition of the certified and verified material. Certified and verified material will only be released to an organization that will:

- Upon receiving the unopened labeled containers, each with its unique identification number and unbroken seal to ensure continued chain of custody, and after reviewing and concurring with all the provided supporting documentation, sign for receiving and agreeing that the sealed containers contain no explosive hazard when received. This will be signed on company letterhead and state that the contents of the sealed containers will not be sold, traded, or otherwise given to another party until the contents have been smelted and are only identifiable by their basic content.
- Send notification and supporting documentation to Parsons that the sealed containers have been smelted and are now only identifiable by their basic content.

3.9.1.2.13 Copies of the final notification and supporting documents, from the receiving agency, will be incorporated into the final project report.

3.9.1.3 Containers

3.9.1.3.1 Burnable poly drums will be used to containerize the scrap.

3.9.1.4 Disposal

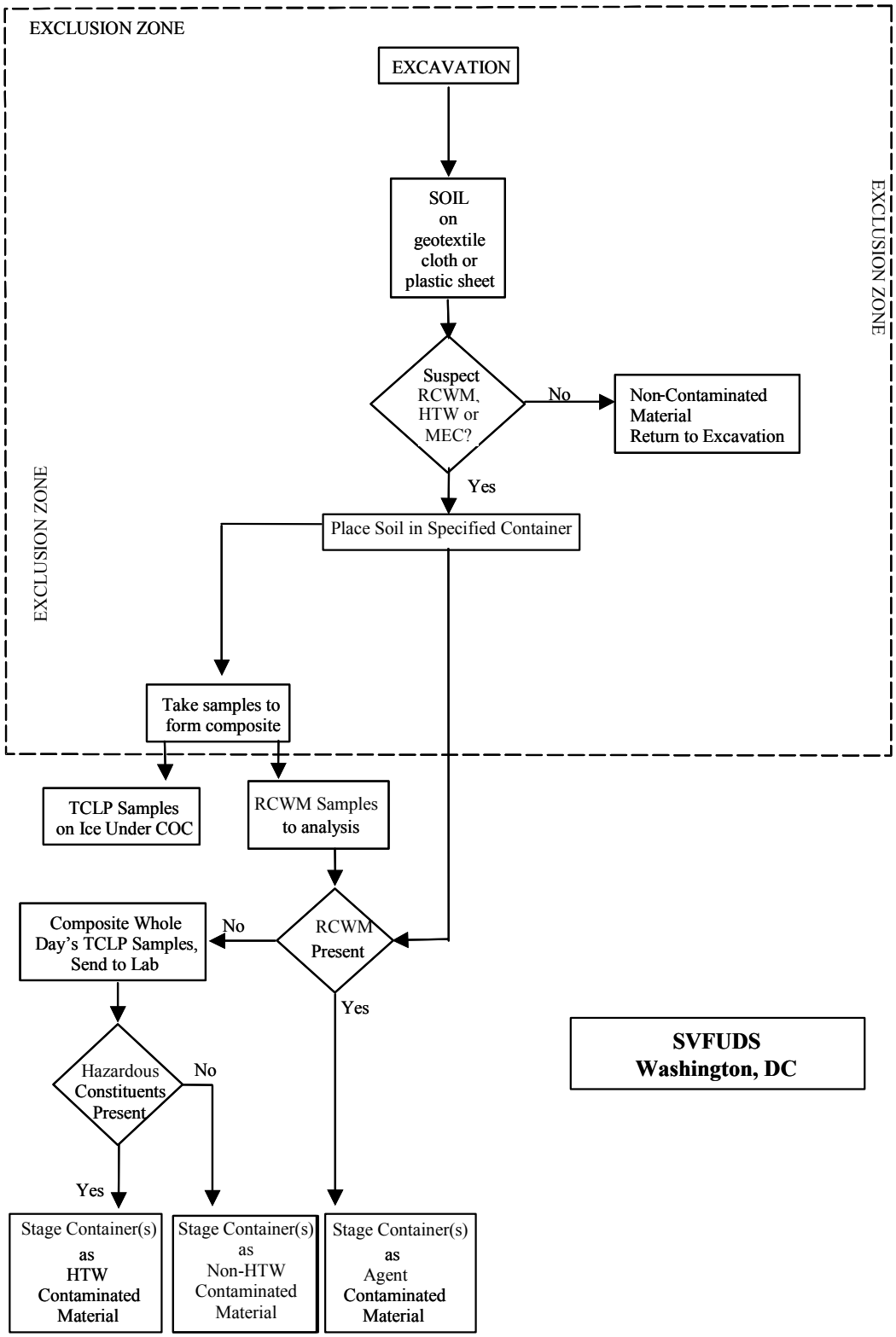
3.9.1.4.1 Once certified free of explosives and other contaminants, recovered scrap metal that is not MD or 3X will be turned over to a local contractor for recycling. Non-metallic scrap and trash will be landfilled at a Subtitle D RCRA permitted solid waste landfill. RCWM scrap will be decontaminated as necessary to be classified as 3X and transported to an approved incinerator for disposal. MD will be transported to a scrap dealer to be smelted. The scrap dealer must provide paperwork that he will not release the scrap prior to smelting.

3.9.2 Soil Monitoring and Disposal

3.9.2.1 On Site and Federal Property Soil Handling

3.9.2.1.1 The decision process for excavated soil is presented in the flow chart in Figure 3-8 and described in the following paragraphs.

Figure 3-8
Soil Handling Decision Process



3.9.2.1.2 The excavation team will excavate to expose suspect anomalies. Excavated soil will be placed on geotextile cloth or plastic sheeting for backfill of the excavation if the anomaly is non-RCWM or MEC. If RCWM or MEC is found at the anomaly location, the soil will be containerized either in burnable 55-gallon polyethylene (poly) drums or other soil containers as detailed in the site-specific plans, and then transported to the Federal Property. As soil is being placed in the specified container, sample aliquots will be collected to form a representative composite sample for disposal characterization. Transport of the containerized soil will be performed by the site support and disposal subcontractor. Because the intrusive investigation sites will vary over the course of the project, the approved transportation route for all materials going from the site to the Federal Property will be included in the SSWPs.

3.9.2.1.3 At the Federal Property, the containers will be staged in a fenced and secure temporary storage area. Precautions will be taken to ensure that all containers are properly tracked and that unnecessary handling of containers is avoided. These procedures are described in greater detail below. Upon receipt of all sample results, the site support and disposal subcontractor will transport the containers to the appropriate disposal facility. Agent positive containers will be shipped to the appropriate disposal facility as soon as possible, regardless of volume. Other containers will be shipped when the shipping containers are full or when that particular waste stream is exhausted. All shipments will be performed in a timely manner to minimize the length of time the containers are held in the temporary storage area.

3.9.2.1.4 The temporary storage area will be located at the Federal Property and will be clearly delineated. Secondary containment will be provided for storage of liquid wastes.

3.9.2.1.5 If the analytical results indicate the soil is non-hazardous or hazardous but does not require incineration, the containers may be transferred to larger disposal containers for transport to the appropriate landfill. This procedure has been accomplished before at the SVFUDS and it provides the least expensive means of proper disposal.

3.9.2.2 <u>Containers</u>

3.9.2.2.1 The SSWPs will describe the type of soil container that will be used by the site support and disposal subcontractor to containerize the excavated soil (e.g., burnable 55-gallon poly drums; dump hoppers, roll-offs; etc.). Care will be taken during loading of soil into the specified container to keep the exterior clean. As necessary, the containers will be further cleaned on the outside before they are transferred to the Federal Property.

3.9.2.2.2 Soil that does not contain RCWM or HTW constituents may be repackaged into larger disposal containers for transport to a properly permitted landfill, and original containers may be reused. In the case of drums or other unlined containers, the drums/containers will be ultimately disposed of at a permitted landfill.

3.9.2.3 <u>Disposal</u>

3.9.2.3.1 Disposal decisions will be based on agent/ABP and disposal characterization sampling results.

3.9.2.3.2 Use of the disposal facilities is contingent upon compliance with the facility-specific requirements for waste acceptance. These requirements may include, at a minimum, complete analytical characterization data and disposal documentation paperwork. It is assumed that the waste will be packaged IAW the disposal facility procedures and that the documentation will be complete. Every attempt has been made to describe the types of wastes that may be encountered at the SVFUDS.

3.9.2.3.3 The presence of contamination in excavated soil will be based on positive detections of agent/ABP as determined by the air monitoring team or the contract surety laboratory, and failure to attain Toxicity Characteristic Leaching Procedure (TCLP) limitations as determined by the HTW laboratory.

3.9.2.3.4 Excavated soil that is determined to contain RCWM (by agent/ABP analysis) will be incinerated at a RCRA-permitted facility. Soil containing HTW (by disposal characterization sample analysis) constituents will be incinerated at a RCRA-permitted facility, or disposed of at an approved RCRA Subtitle C hazardous waste landfill. If soil is found to contain RCWM above the STEL (via soil headspace or extraction analysis) it will decontaminated IAW DA Pam 385-61. Excavated soil that does not contain RCWM or HTW constituents may be returned to the excavation if the anomaly is not AUES-related. If the anomaly is found to be AUES-related, excavated soil containing no RCWM or HTW will be taken to a non-hazardous landfill.

3.9.2.3.5 The RCRA-permitted incineration facility will be chosen based on best cost and approval from the waste facility.

3.9.2.3.6 The RCRA-permitted landfill used for disposal will be chosen based on best cost and approval from the waste facility.

3.9.3 Decontamination Water, PPE, and Air Monitoring Laboratory Waste

3.9.3.1 General

3.9.3.1.1 This plan describes the monitoring and disposal procedures for decontamination water, used PPE/solid waste, and on-site laboratory generated waste. Water will be generated from the decontamination of workers, equipment, scrap, and sample bottleware. PPE will be used IAW the SSHP. The objective of the plan is to clearly present the IDW handling decision process and detail the procedures for documenting proper disposal of the material.

3.9.3.2 Monitoring Methods

3.9.3.2.1 Sampling of the decontamination water will be performed for disposal characterization and is discussed in detail in the SAP (Appendix E). The air monitoring team will perform sampling of the decontamination water for agent/ABP at the MAP, and the Parsons subcontract laboratory will perform sampling for HTW constituents.

3.9.3.2.2 Used PPE, which could contain agent/ABP or HTW residue, will not be sampled, but will be assessed relative to work conditions encountered. If agent/ABP or HTW contamination is detected in the soil, the used PPE associated with that day's work will be

assumed to be contaminated and the material will undergo headspace analysis. If no agent/ABP or HTW contamination is detected in the soil, the PPE will be assumed to be non-contaminated.

3.9.3.2.3 The Air Monitoring Team and Contract Surety on-site laboratory is expected to generate small quantities of several types of waste. These wastes include: spent isopropyl alcohol, spent acetone, spent bleach, sharps (i.e., needles, syringes), spent decontamination water, and used mass selective detector pump oil. These wastes are not expected to be agent-contaminated. Waste profiles will be developed based on generator knowledge and wastes will be packaged and staged for disposition.

3.9.3.3 Handling Procedures

3.9.3.3.1 IDW accumulated at the site will be transported to the Federal Property by the site support and disposal subcontractor following the approved transportation route. Transport of IDW to the disposal facility will also be performed by the site support and disposal subcontractor. Figure 3-9 presents the IDW handling decision process.

3.9.3.3.2 Decontamination water will be generated at different locations. The main areas will be at the PDS and the decon/redress station. These areas, will include decontamination of worker, equipment, and sampling implements. This water will be accumulated in poly drums. Sampling of the decontamination water will be performed by Parsons in the PDS area as described in the SAP (Appendix E).

3.9.3.3.3 Used PPE generated during excavation activities will be containerized in 55-gallon poly drums and segregated per workday. Following the headspace analysis (if applicable as discussed in Subchapter 3.9.3), PPE that exceeds the STEL for mustard or lewisite will be decontaminated by TE in the ECS following the procedures outlined in Subchapter 3.9.1. The drums will remain in the on-site pending analysis for agent/ABP. Once cleared the site support and disposal subcontractor will transport all drums to the Federal Property for temporary storage.

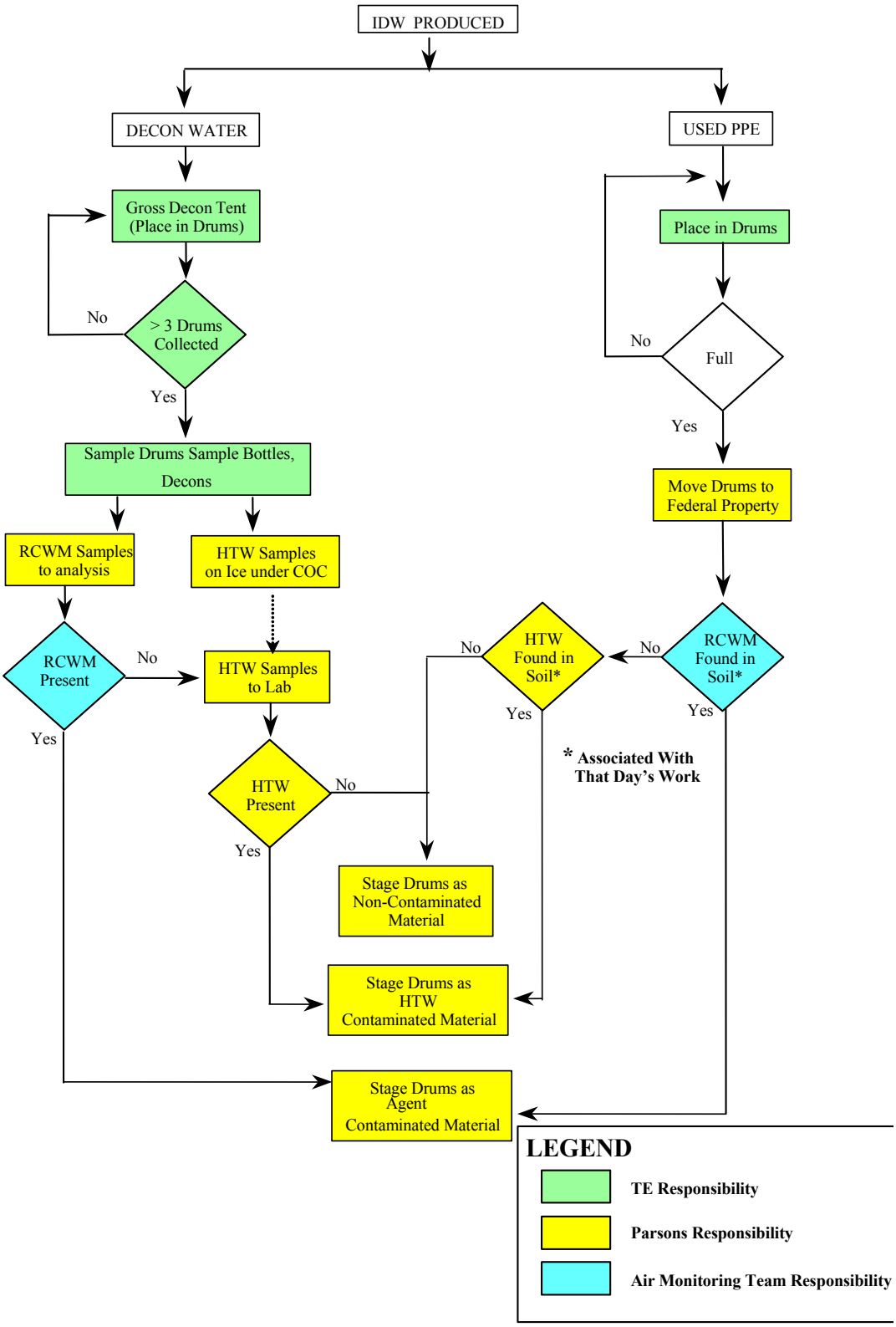
3.9.3.3.4 At the Federal Property, the drums will be staged in the temporary storage area. Drums containing aqueous material (e.g., decontamination water) will be stored in an area with secondary containment. Precautions will be taken to ensure that all drums are properly tracked and that unnecessary handling of drums is avoided.

3.9.3.3.5 From this point, the site support and disposal subcontractor will transport the drums to the appropriate disposal facility. Drums determined to contain hazardous waste will not be stored on site or at the Federal Property for longer than 90 days. Agent positive drums will be transported to the appropriate facility as soon as possible to minimize the length of time they are held in the temporary storage area.

3.9.3.4 Containers

3.9.3.4.1 The site support and disposal subcontractor will utilize burnable 55-gallon poly drums to containerize the decontamination water, used PPE, and Air Monitoring Laboratory waste.

Figure 3-9
Investigative Waste Handling Decision Process



3.9.3.5 Disposal

3.9.3.5.1 Disposal decisions will be based on analytical sampling results.

3.9.3.5.2 The presence of CA contamination in decontamination water will be determined by the air monitoring team. Decontamination water that is determined to contain CA (by CA/ABP analysis) will be incinerated at a RCRA-permitted facility. Decontamination water that fails to attain TCLP limitations, as determined by the HTW laboratory, will also be incinerated. Decontamination water which does not contain RCWM and does not fail to meet TCLP limitations, but which contains decontamination fluids (nitric acid, bleach, etc.), will be processed by an industrial wastewater treatment facility.

3.9.3.5.3 Used PPE which is considered to be RCWM or HTW contaminated, as determined by its association with contaminated soil encountered the same day the PPE was worn, and used PPE which has been decontaminated to ensure that the STEL-C for mustard and lewisite is not exceeded, will be incinerated at a RCRA-permitted facility. Used PPE which is not associated with RCWM or HTW contamination will be landfilled at a Subtitle D RCRA-permitted non-hazardous waste landfill.

3.9.3.5.4 The facilities will be chosen based on best cost and approval from the waste facility.

3.9.4 On-site Tracking

3.9.4.1 The tracking system outlined below will be followed for each waste stream encountered during the intrusive investigation. Every container will be tracked from point of generation to disposal, as follows:

- **Container Number**: Each container drum (or overpack) will be given a unique alphanumeric container number, which will be marked directly on the top and side of each drum. Additionally, the date of generation will be marked on the drum. The first three characters represent the container type (SCR for scrap, ESW for excavated soil waste, IC for intact container, IDW for all other waste). The next four characters indicate the location (i.e., EX for excavation). The last set of characters indicates the number of respective container types generated so far. The following is an example of container designations:
    - SCR-EX22-180, SCR-EX22-181, etc.
    - ESW-EX40-666, ESW-EX40-667, etc.
    - IDW-EX40-240, IDW-EX40-241, etc.
    - IC-EX01-001, IC-EX01-002, etc.

- **Container Form**: Each drum will be associated with a container form which documents the pertinent information about the drum contents, including waste type, generation date, source, associated sample numbers, and storage area location. An example sample container form is presented as Figure 3-10. The Site Manager will maintain the container forms in a binder.
- **Container Log**: The container log is a form that tabulates all information found on the individual container forms. An example container log is presented in Figure 3-11.
- **Storage Area Loading Plan**: The storage area loading plan tracks the exact location of an individual container at the storage area at the Federal Property. An example storage area loading plan is presented as Figure 3-12. This form will be posted at the Federal Property, with an additional copy being maintained by the Parsons Site Manager.

3.9.5 Transportation

3.9.5.1 Upon receipt of analytical data and the waste approval code from the disposal facility, the site support and disposal subcontractor will transport the soil to the appropriate facility. Shipments will be coordinated and scheduled when shipping containers are full (or when a specific waste stream is exhausted). Shipments of agent positive containers in particular will be scheduled so as to minimize the length of time the containers are held in the temporary storage.

3.9.6 Disposal Documentation

3.9.6.1 All disposal documentation will be in full compliance with applicable rules and regulations, including DA 385-61 for "3X" scrap, USEPA requirements, and Department of Transportation (DOT) Hazardous Material Regulations (49 CFR 100-199). CENAB will be listed as the generator of all waste streams and will provide a person responsible for signing all required paperwork. The site manager will maintain copies of all disposal documentation paperwork.

3.9.7 Shipping Labels

3.9.7.1 The site support and disposal subcontractor will properly label all containers IAW DOT and USEPA regulations and restrictions. It is anticipated that wastes will be shipped as hazardous, non-hazardous, or as an Other Regulated Material (for agent contaminated wastes). Figure 3-13 is an example label.

Figure 3-10
Container Form

US Army Corps of Engineers, Baltimore District
SVFUDS
Washington, DC

Parsons

Container No. _____

Date Generated_____

Which Set of Containers (If Applicable) _____

Container Type (circle) Steel Open Top Steel Closed Top Polyethyler Size _____
other (describe) _____

Waste Type (circle) Soil Decon Water Scrap PPE
other (describe) _____

Estimated Weight_____

Source of container contents, location and depth_____

Date Placed In Storage:_____

Storage Location _____

Sample Identifier: _____

Comments: _____

Parsons Sample Team Leader _____

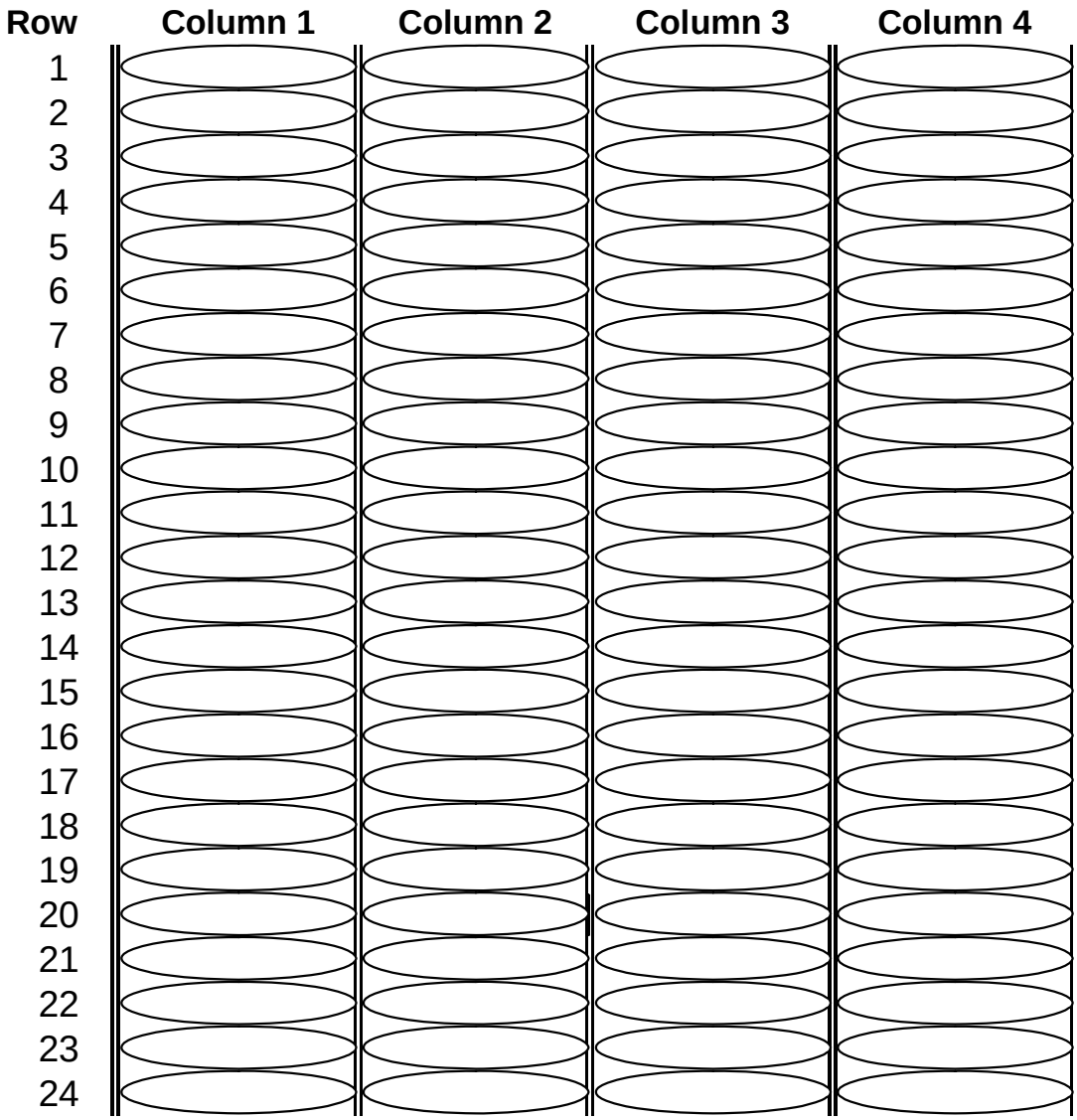
Figure 3-11
Container Log

Container Number	Container Size/Type	Waste Type	Estimated Weight	Date Generated	Associated w/ Sample No(s).	Manifest Number	Date Shipped	Disposal Site	Waste Approval Code

Figure 3-12
Storage Area Loading Plan

US Army Corps Engineers, Baltimore District
SVFUDS

Front of Storage Area



(Example)

Figure 3-13 Shipping Label (Example)

Shipping name	Solids Containing Toxic Liquid, n.o.s. (Mustard)
ID number	UN3243
RQ and notation, if > 100 lbs	None Listed
DOT Label (49 CFR 172.430)	Poison
Consignee's or consignor's name and address	U.S. Army Corps of Engineers, Baltimore District, Baltimore, MD

3.9.7.2 In addition to this label, the following information, at a minimum, will be included on each container:

- Generation date;
- Unique container number;
- Waste approval code; and
- USEPA ID number.

3.9.8 Manifesting

3.9.8.1 The site support and disposal subcontractor will manifest the waste in compliance with all existing rules and regulations. Upon receipt of the waste approval codes, the site support and disposal subcontractor will prepare the manifests for shipment to the disposal facilities. The designated CENAB signatory will sign the manifest.

3.9.9 Weight Slips

3.9.9.1 A signed weight slip will be furnished to CENAB and USAESCH indicating the actual weight of the waste that has been shipped to the approved disposal facility.

3.9.10 Notification of Waste Shipped

3.9.10.1 A Notification of Waste Shipped form, required under the Land Ban Disposal restrictions (the Land Disposal Restriction – LDR form), will be completed by the site support and disposal subcontractor. This form will identify treatment standards required in 40 CFR 268. This form will be prepared as an addendum to the manifest. An example copy of the LDR form has been included in Appendix F.

3.9.11 Certificate of Disposal/Destruction

3.9.11.1 A receiving manifest indicating acceptance of all materials by the disposal facility will be signed by the disposal facility representative and furnished to CENAB and USAESCH within 10 working days of the materials' receipt. A Certificate of Disposal/Destruction will also be furnished once the disposal action has been completed (these are typically received 2-3 months after the materials are accepted by the disposal facility).

3.10 RISK CHARACTERIZATION AND ANALYSIS

3.10.0.1 Risk characterization and analysis will be performed in the SVFUDS Site-Wide RI/FS. Any risk assessment will be conducted IAW USEPA's Risk Assessment Guidance and EM 200-1-4.

3.11 ANALYSIS OF INSTITUTIONAL CONTROLS

3.11.1 Institutional Analysis

3.11.1.1 Site data will be reviewed by USACE and Parsons to determine if an analysis of land use controls is needed for the SVFUDS. If deemed necessary, an institutional analysis will be conducted as part of the RI/FS process. Based on (and if warranted by) the results of that analysis, a recommendation will be made regarding the need for a Land Use Control Implementation Plan to be prepared as a part of the remedial design phase. This analysis will be carried out according to EP 1110-1-24, Establishing and Maintaining Land Use Controls for Munitions Response to Munitions and Explosives of Concern Projects (USACE 2004) and DID MR-100.

3.11.2 Feasibility Study

3.11.2.1 In addition to the evaluation of the applicability and feasibility of land use controls at the site, other response alternatives (control and/or remedial technologies) may warrant evaluation. If so, the FS will be conducted (also incorporating the institutional analysis discussed above) to consider engineering controls, treatment/destruction, and removal alternatives. The specific technology alternatives to be considered will be identified after the initial RI phase. At a minimum, the "no further action" alternative will be evaluated.

3.11.2.2 Results of the initial RI phase will allow identification of the need for an FS and the technology or technologies appropriate for evaluation during the FS step. If needed, an FS will be conducted IAW ER 200-3-1 that will include technology identification and screening, alternatives development (using technologies recommended from the screening step), alternatives screening, and detailed and comparative analyses of the alternatives passing the screening step.

3.12 PREPARATION OF RECURRING REVIEW PLAN

3.12.0.1 A Recurring Review Plan will be prepared as a part of the RI/FS and will be included as an appendix to the RI/FS Report. The decision document will state the requirements for the recurring review, the review cycle, and the proposed funding for the recurring review. The Recurring Review Plan will be prepared IAW EP 75-1-4, *Recurring Reviews on Ordnance and Explosive (OE) Response Actions* (USACE 2003) and DID MR-110.

CHAPTER 4
QUALITY CONTROL PLAN

4.1 GENERAL

4.1.0.1 The purpose of the Quality Control Plan (QCP) is to provide the approach and procedures used to ensure quality throughout the execution of the tasks required by the SOW. The QCP provides organization, responsibilities, policies, and procedures for maintaining the highest possible standards. The QCP applies to all work performed by Parsons and its subcontractors.

4.2 CORPORATE POLICY

4.2.0.1 Parsons recognizes that the USACE is responsible for quality assurance (QA); however, Parsons also has a QA process at the corporate level with the commitment and involvement of its top management. The process provides a permanent and workable system that allows each employee to understand the job performance expected. The Parsons' QA and improvement process ensures that every employee is supported by the actions, procedures, tools, and training required to conduct a job according to the requirements. By promoting teamwork and by focusing attention on the solutions, the quality of work can be increased and assured throughout the project.

4.2.0.2 The Parsons' QA Policy is based on the work and concepts of several recognized authorities on quality management in the United States, especially Mr. Philip Crosby, Dr. W.E. Deming, and Dr. J.M. Juran. These three experts each have different methods of addressing and resolving problems. Parsons has taken unique portions of their concepts and tailored them to corporate work processes. As a result, Parsons has placed a greater emphasis on the actual elements pertaining to work processes, project requirements, and lessons learned from past performances. These concepts have been developed into a systematic and practical approach for improving quality.

4.2.0.3 Generally, Parsons' QA Policy relies on four fundamentals, termed the "absolutes of quality." They answer these questions:

- What is quality? Conformance to Requirements;
- How do we achieve it? Prevention;
- What is our performance standard? Zero Defects; and
- How can we measure quality? Cost of Doing Things Wrong.

4.3 REQUIREMENTS

4.3.0.1 The Parsons QCP has been written to encourage positive communication throughout the Parsons project team. It is also intended to foster clear communication between Parsons, USAESCH, and CENAB. Honest and effective communication among the project team requires that all parties clearly understand the project requirements. This QCP dictates the methods and procedures that will be used during this project, addressing personnel, equipment testing and calibration, QC inspection and audits, and data reduction and reporting. All QC reports and documents will be kept on site and accessible for review upon request. The QCP has been prepared IAW DID MR-005-11.

4.4 RESPONSIBILITIES

4.4.0.1 Above all, project quality is the responsibility of the entire project team. The team's comprehension of this QCP is of primary significance for quality objectives to be accomplished; thus, training and indoctrination of key personnel in the quality objectives will be conducted. The project organization is headed by the Parsons PM; the single focal point for successful accomplishment of all phases of the project. The Parsons PM is given full authority and responsibility for project execution, and the Parsons PM is supported by direct line managers with functions and responsibilities outlined below.

4.4.0.2 The Parsons PM approves the QCP, implements procedures, and has direct responsibility for day-to-day contract management of the project. The PM's responsibilities related to QC include, but are not limited to:

- Implementation of all applicable Parsons policies and procedures;
- Timely submission of all contract deliverables; and
- Analyzing QC failures with the QCM and the appropriate QC person and implementing corrective actions.

4.4.0.3 The QCM interfaces with the PM on all project-related QC matters. The QCM, as a management representative, has the following authorities and responsibilities:

- Ensure that the QCP has been established, maintained, and implemented;
- Establishing guidelines to assist in the development of program, project, site, and task specific QC policies and procedures;
- Initiate, recommend, approve, or provide solutions to the quality problems identified in the QCP during system audits;
- Conducting periodic audits/inspections of the project deliverables and submitting reports to the Parsons Sector Manager with copies to the PM; and
- Reporting the adequacy, status, and effectiveness of ongoing projects to the Parsons Sector Manager.

4.4.0.4 The UXOQCS reports to the QCM on quality matters and has responsibility for overall quality of work performed on-site. Responsibilities of the UXOQCS related to QC include, but are not limited to:

- Develop QC procedures to implement the QCP;
- Verify implementation of corrective actions;
- Initiate actions to identify and prevent the occurrence of nonconformance relating to the services and QCP;
- Authority to stop nonconforming work;
- Ensure that QC procedures are being followed and are appropriate in demonstrating data validity sufficient to meet DQOs;
- Coordinate with District's QA representative for daily activities;
- Recommend actions to be taken in the event of QC failures, both to the PM and the QCM;
- Report non-compliance with QC criteria to the PM and QCM;
- Ensure that MC sampling is conducted IAW the SAP (Appendix E);
- Authority to suspend project activities when a condition adverse to quality is identified and notify the PM and senior personnel when such action is required;
- Conduct daily QC audits and inspections, submitting reports to the PM and the QCM; and
- Report the adequacy, status, and effectiveness of ongoing projects to the QCM.

4.5 INSTRUMENT AND EQUIPMENT TESTING

4.5.0.1 Instruments and equipment used to gather and generate environmental data will be tested with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications. Instruments and equipment required for the SVFUDS intrusive investigation may include a digital geophysical mapping instruments, an analog instrument, digital camera, and cell phones. The QC procedures for the reconnaissance data collection, the survey data collection associated with sampling, and the GIS procedures are discussed below.

4.5.0.2 Testing, calibration, repair, and replacement records will be filed and maintained by the site geophysicist and the UXOQCS. Testing records of the field instrumentation will be filed with the Parsons PM after completion of the project.

4.5.1 Instrument Standardization

4.5.1.1 Geophysical equipment standardization will be performed IAW Subchapter 3.6.3.

4.5.2 Analog Instrument Quality Control

4.5.2.1 An "out of the box" inventory and inspection of the equipment will be performed (for example, batteries including back up, end probe, sensitivity adjustment device, etc.) upon arrival at each site. The analog instrument, such as the Schonstedt, will be checked at the start and end of each day by operating the instrument over a test plot seeded with metallic test items. At the start of each day, each operator will also be checked for interfering metallic items by scanning with the instrument. The battery will be checked and the instrument will be shaken to check for loose parts and bad electrical connections. The performance of these tests will be documented in field books or on standard forms.

4.5.3 Digital Camera Quality Control

4.5.3.1 The digital camera will be checked each day prior to use during the project. The battery level will be checked and, as needed, the batteries recharged, or replaced, as appropriate. Before work begins each morning, team lead will verify that all camera functions are working properly and the available memory space on the camera is sufficient for a complete day of site photography.

4.5.4 Cell Phone Quality Control

4.5.4.1 Each field team will keep a minimum of one cell phone with them at all times for emergency use. The cell phone(s) will be checked each day prior to use during the project. The battery level will be checked and, as needed, the batteries recharged or replaced. In addition, the team will verify that cell phone coverage is adequate at the site. If at any time during the project it is determined that communication by cell phone is not available at any portion of the site, an alternative method of emergency communication will be investigated and organized.

4.5.5 GIS Quality Control Procedures

4.5.5.1 The accuracy of the geographic analysis is equivalent to the accuracy of the underlying data being analyzed. Certain guidelines are necessary to ensure data quality after it has been entered into the system. The QC guidelines presented in this chapter pertain to GIS data loaded into the GIS system.

4.5.5.2 Potential data problems include source data errors, data entry errors that can be corrected, data editing errors that can be corrected, data corruption errors that can be prevented, and user errors that can be anticipated.

4.5.5.3 Geometric Accuracy. After the coordinate information for reconnaissance waypoints are verified, the geometric accuracy of the geographic features will be checked. When this is detected, the source data will be examined and the correct location and place points will be determined in the GIS data set to represent identifiable elements of the feature such as corners or intersections. Original files will be backed up prior to making edits to prevent errors from occurring during the editing process.

4.5.5.4 Geographic Accuracy. One of the strengths of GIS is the accuracy with which geographic phenomena can be mapped. However, this strength can become a weakness if the overall spatial accuracy of the data is not clearly indicated. A statement of the accuracy of the spatial data will be included with documentation of the graphic files. The GIS coverage will be evaluated to determine if the geographic features are graphically correct. If they are not IAW the data dictionary, they will be corrected.

4.5.5.5 Data Loss and File Corruption. There are several programs that manipulate the various files used by the GIS and relational database. Due to hard disk limitations, Random Access Memory (RAM) limitations or human error these programs occasionally crash, and the files being manipulated by these programs are corrupted, among other problems. To prevent data loss, these files will be backed up daily, and stored in a separate physical location from the primary storage device.

4.5.5.6 Schema Quality Control. The database values are the other part of the data structure that requires quality control. The database is generally treated as a single file with unique properties. QC procedures will be developed by the GIS operator to ensure that the data contained therein is accurate and usable. Before editing any database tables, the tables will be unloaded for backing up the schema. Another safeguard is to use a reference file of how data entry is performed.

4.5.5.7 The GIS operator will develop and use a checklist of standard QC steps. For example, another approach to correcting errors is to run a program that edits the ASCII data export file.

4.6 INSTRUMENT/EQUIPMENT MAINTENANCE

4.6.0.1 Instruments, equipment, and other items requiring preventive maintenance will be serviced IAW the manufacturers' specified recommendations and written procedures developed by the operators. The exception will be digital geophysical equipment which, by manufacturer's design, and calibrated at the time of manufacture and should not require field calibration or maintenance. To ensure that equipment is fully capable and will perform IAW the manufacturer's specifications, pre-operational and post-operational checks will be performed. Following these checks, any equipment that is found unsuitable will be immediately removed from service. These checks will provide QC data indicating the proper functionality of the instruments.

4.6.1 Maintenance Procedures

4.6.1.1 Measurement equipment utilized on-site, *i.e.,* magnetometers, monitors, geophysical mapping equipment, etc., will be checked daily for operational reliability. Equipment such as vehicles, backhoe, and chipping/grubbing equipment, will have before-, during-, and after-operation maintenance performed IAW the equipment operating manual. The manufacturers' written maintenance schedules will be followed to minimize the downtime of the measurement system. It will be the operator's responsibility to adhere to these maintenance schedules and to arrange any necessary and prompt service as required. At a minimum, equipment used daily will be cleaned at the end of each workday and kept in good operating condition. Qualified personnel

will perform service to the equipment and instruments. In the absence of any manufacturers' recommended maintenance criteria, the operator will develop a maintenance procedure based on experience and previous use of the equipment.

4.6.1.2 The UXOQCS is specifically responsible for inspecting the equipment and its maintenance records. Records of these checks are maintained in the UXOQCS journals. If equipment field checks indicate that any piece of equipment is not operating correctly, and field repair cannot be made, the equipment is tagged and removed from service. Parsons' PM is notified and a request for replacement equipment is placed immediately. Replacement equipment must meet the same specifications for accuracy and precision as the equipment removed from service.

4.7 INSTRUMENT/EQUIPMENT TROUBLESHOOTING

4.7.0.1 Troubleshooting for the geophysical mapping equipment will rely primarily on the DQOs established by the GPO. Troubleshooting for the remaining equipment will consist of reviewing the guidelines provided in the operator's manual for the analog geophysical equipment, and ensuring batteries are charged, memory sticks have sufficient storage capability remaining, and wireless data transmitters are properly charged prior to beginning field work each day. An inventory of spare parts/or units for all equipment will be maintained for the project. This inventory will include a minimum of at least one extra battery for the geophysical mapping equipment, one analog instrument, digital camera, digital camera memory stick, and one set of applicable rechargeable batteries (and charger, if necessary) for each item. A back-up geophysical instrument will not be kept on site; however, arrangements will be made with an equipment vendor so replacement equipment or any needed spare parts can be delivered to the site by overnight delivery.

4.8 DATA MANAGEMENT

4.8.1 Data Reduction

4.8.1.1 Geophysical data collected in the field will be processed and managed by Parsons geophysical data processors. Processing procedures vary depending on the technology and/or instrument selected for use. Any raw data from field measurements (will be appropriately recorded in field notebooks or computers. Records (field data forms and field note copies) will be maintained onsite in a portable file. All records will be stored such that they can be found using the date they were created, the team who created them and a site identification number. If the data are to be used in the project reports, they will be reduced and summarized, and the reduction method will be documented in the report.

4.8.1.2 Data reduction of the laboratory data from the environmental sampling is discussed in the SAP (Appendix E).

4.8.2 Field Data Storage

4.8.2.1 Tracking data collected in the field will be stored electronically in notebook computers. The files associated with the SVFUDS Data will be backed-up onto CD-ROM weekly.

4.8.3 Data Validation

4.8.3.1 Validation of the laboratory data is discussed in the SAP (Appendix E).

4.9 FIELD OPERATIONS DOCUMENTATION

4.9.1 Daily Field Activity Records

4.9.1.1 All site work field personnel will use either bound logbooks with consecutively numbered pages or electronic note pads. The field logbooks should record the daily activities of field teams, provide sketch maps and locations of MEC and other pertinent items, and note any observations that might affect the quality of data. The field logbooks and site records will be used to record the following:

- Field Log Books: The Site Manager or designate will maintain field logbooks to record site activities and field data. These logbooks will be maintained in a neat and legible manner and provide a historic record of site activities.
- Site Manager Daily Log Book: The Site Manager will maintain a daily journal. This provides a summary of all operations conducted, to include information on weather conditions, problem areas, work plan modifications, injuries, start/stop times, tailgate safety briefs, equipment discrepancies, RCWM/MEC located, training conducted, visitors, and any additional items deemed appropriate.
- MEC and Anomaly Excavation Records: These records will be maintained by the Site Manager or designate and consist of two series of sheets used to record data on the excavation of anomalies and to record data on UXO/MEC items encountered. These data are forwarded through the Site Manager (if not the original recorder) to the UXOQCS and GIS managers, who enter the data into the GIS and update the project database.
- Safety Log Book: The SSHO will maintain this log. It will record all safety matters associated with the specific project, such as safety briefings/meetings (including items covered and attendees), safety training, safety audits, near-misses/accidents/incidents with cause and corrective action taken, weather conditions, and any other matters relating to safety.
- Training Records: The SSHO maintains training records for all site personnel. These records contain training certificates, licenses, and other qualifying data for an individual's duty position.
- Quality Control Log: The UXOQCS maintains this log to record the performance and results of QC checks and audits.

- Visitor's Log: The SSHO maintains this log. All personnel who are not directly involved in the project site activities are identified in this log by name, company, date, time in/out, and a contact phone number. Safety briefings and training for visiting personnel are also recorded in this log.
- Photographic Log: The UXOQCS maintains a photographic log to record all video recording and photographs taken to document work and/or site conditions. Photographic records will be used to supplement information recorded in the daily log and field data collection forms, including photographs of equipment prior to use, typical ordnance items, and the condition of sites prior, during, and after any activity. All digital photographs will be identified using a file name that accurately describes the site, subject of the photograph, and the date the photograph was taken.
- Correspondence Log: The PM maintains a log of all official incoming and outgoing project correspondence. The tracking numbers for the individual correspondence are generated by the onsite contract administrator.
- Phone Log: The Site Manager maintains a log of all outgoing long distance calls, except calls to USAESCH and the Parsons home office. The log includes the date/time, person making the call, and the person or office called.
- Site Maps: The Site Manager and GIS Manager maintain current working maps of the operating areas in the field office throughout execution of this project. These maps are used to document finds and the locations of soil sampling, auguring, drilling, and other soil disturbing activities.

4.9.1.2 The UXOQCS will inspect logs, records, and reports on a weekly basis. These inspections focus on the completeness, accuracy, and legibility of the entries and records. Results of these inspections are forwarded to the Parsons PM.

4.10 NONCONFORMING ITEMS OR ACTIVITIES AND CORRECTIVE ACTIONS

4.10.1 Identification

4.10.1.1 Circumstances that prevent a work process from conforming to the contract requirements will be promptly identified, documented, investigated, and corrected appropriately. All project personnel have the responsibility, as part of their normal work duties, to promptly identify and report conditions adverse to quality. The status of nonconformance reports (NCR) will be maintained in a log, and progress of their resolutions will be documented and reviewed monthly to ensure prompt attention to their conclusion.

4.10.2 Resolution, Corrective Action, and Verification

4.10.2.1 The appropriate level of management is responsible for evaluating the cause of an NCR and will recommend solutions for correcting the deficiency identified. Actions and technical justifications for an action proposed to resolve the corrective action will be reviewed and approved by personnel responsible for the technical aspect of the work. The QC

organization will be responsible for verifying implementation of corrective action, monitoring the effectiveness of preventive action, and reporting any findings to the QCM.

4.10.3 Material and Item Nonconformance

4.10.3.1 The QCM ensures that the following requirements are implemented:

- Items that do not conform to prescribed technical and/or quality requirements are tagged or otherwise identified, documented, and reported as nonconforming. The documentation will include the following information:
    - Identification of the nonconforming activity, material, or item;
    - Identification of the technical and quality requirement(s) with which the activity, material, or item is not in compliance;
    - Identification of the current status of the activity, material or item (i.e., whether the item is on hold or whether its use is conditional);
    - Names and dates of the individuals identifying the nonconformance;
    - Identification of the individual(s) or organization(s) responsible for resolution;
    - Indication of the severity of the nonconformance(s); and
    - Indication regarding the continuance or stoppage of work associated with each nonconforming activity, material, or item.
- Nonconforming materials and items are segregated, when possible, from conforming materials and/or items to the extent necessary to preclude their inadvertent use; and
- The status of nonconforming activities, materials, and items and the progress of their resolution are documented and routinely reviewed to ensure prompt attention to conclusion.

4.10.4 Review and Disposition of Nonconformance

4.10.4.1 The review is conducted by the PM, QCM, and UXOQCS (if applicable) to ensure that:

- The responsibility for review and disposition of nonconformance is defined;
- Nonconforming materials and items are reviewed IAW procedures. Nonconformance can be evaluated according to four criteria:
    - Reworked to meet the original requirements;
    - Accepted with or without repair;
    - Re-graded for alternative applications; and
    - Rejected or scrapped.
- Repaired or reworked materials items are re-inspected; and

- Each document used to identify and correct nonconforming conditions allows for the evaluation and approval of proposed actions by the appropriate authority.

4.10.5 Trend and Root Cause Analysis

4.10.5.1 The trend analysis of QC audits, subcontractor/supplier surveillance reports and nonconformance will include the following information:

- Total number of audit findings and observations, surveillance reports, and NCRs for each area of the QCP;
- A summary of the root causes for the nonconformance consolidated for each area of the QCP; and
- Trends that are developing or that have developed.

4.10.5.2 The PM will perform the trend analysis once every year or as appropriate. QC will verify the implementation of any preventive actions resulting from the trend analysis.

4.10.5.3 The QCM is responsible for evaluating on a semiannual basis (or as appropriate) all NCRs affecting quality and will recommend solutions, as well as steps for verifying their implementation.

4.10.6 Lessons Learned

4.10.6.1 Opportunities to share lessons learned with all of the project team include monthly telecoms to discuss issues and concerns, as well as quarterly internal project review meetings. Additionally, Parsons will compile internal lessons learned and provide a forum for dissemination between project team members and distribute to other applicable Parsons' project locations.

4.11 AUDITS AND SURVEILLANCES

4.11.1 Audit Planning

4.11.1.1 The QCM will perform periodic audits of the project activities and, as required, audits of subcontractors/suppliers in the manner specified in Parsons' corporate procedure Q-021, Quality System Audits and as noted below:

- All areas of the activities being performed (where audits are not planned for certain areas, the audit schedule will include appropriate justification for the course of action);
- The audit schedule will identify office(s), including those in the subcontractor's organization, to be audited; and
- The audit schedule will identify the sequence and dates of audits for a fiscal year.

4.11.1.2 A lead auditor, certified IAW Parsons corporate procedure Q-020, Qualifications of Quality Assurance Auditors, will prepare the audit plan. The plan will be reviewed and approved by the QCM before execution. The audit plan will include the following information:

- Identification of the organization and work areas to be audited;
- Identification of location, times, and dates of duration of the audit;
- Identification of the documents that specify the criteria against which the work will be measured;
- Checklists prepared as a guide during the audit;
- Identification of auditing personnel; and
- Signatures and dates approving the audit.

4.11.1.3 The organization to be audited will be notified of the impending audits at least 15 days in advance.

4.11.2 Audit Execution

4.11.2.1 A pre-audit briefing and a post-audit briefing will be conducted to inform key management personnel or to confirm results of the audit, including concerns and findings. Daily briefings may be conducted, as needed, to inform the audited organizations of the progress of the audit and potential findings or concerns.

4.11.3 Audit Reporting

4.11.3.1 The audit results approved by the lead auditor will include the following information:

- Reference to audit plan;
- Identification of and justification for any differences that occurred between the audit plan and the actual conduct of the audit;
- Synopsis of the audit results;
- Description of nonconformity (identified as findings and observations); and
- Completed audit checklist and documentation (objective evidence) supporting the discovery of the nonconformity.

4.11.3.2 Conditions determined to be in nonconformance with the contract, procedure, or other specified requirements, are identified as findings. Conditions not in nonconformance when first identified, but could lead to nonconformance if left uncorrected, are identified as observations. Formal responses are required for findings only. Corrective action is required for both findings and observations.

4.11.3.3 For internal audits, the lead auditor will issue the audit report to the Parsons PM, QCM, and the responsible Vice President. For audits of suppliers or subcontractors, the Lead Auditor will issue the report to the Parsons PM, and QCM, who will issue the audit report to the audited subcontractors and suppliers.

4.11.4 Review, Approval, and Verification of Recommended Action Response

4.11.4.1 The recommended corrective action proposed by the management of the organization audited in response to the nonconformity will be reviewed and approved by the QCM. Justification for rejection of the response will be documented by the QCM and transmitted to the organization providing the response.

4.11.4.2 Management of the organization being audited will report the implementation of corrective action to close out the audit nonconformity. The lead auditor or the QCM will verify a closeout action at the time of the next scheduled audit.

4.11.4.3 Verification of closeout action will be documented to ensure the satisfactory closure of the audit nonconformity and will be reported to the Parsons PM and to the management of the organization audited, when applicable.

4.12 QUALITY CONTROL REPORTS

4.12.0.1 During the project, the QCM will prepare at least one QC report to discuss:

- The periodic assessment and measurement of data accuracy, precision, and completeness; and
- Significant quality assurance problems and corrective actions taken.

4.12.0.2 In addition, the Parsons PM will receive periodic updates concerning QC associated with the field activities, the GIS process, the laboratory analysis, and the data processing.

4.13 DOCUMENTS AND SUBMITTALS

4.13.1 Process

4.13.1.1 Documents and submittals prepared for the SVFUDS will be the result of a collaborative effort by key personnel dedicated to the project. Qualified individuals from each major discipline represented in the deliverable will compose the applicable portion of the document.

4.13.2 Review

4.13.2.1 All documents and submittals will be reviewed for technical accuracy and editorial merit by qualified peers and/or the appropriate Technical Director(s). The QCM will audit the project files to ensure that final reports and deliverables have gone through peer review.

4.13.3 Document Distribution and Retrieval

4.13.3.1 The most current revisions of documents that prescribe technical, management, and quality requirements are internally and externally distributed to the applicable project personnel. These personnel are responsible for the document's implementation and its verification for implementation.

4.13.3.2 The obsolete documents that prescribe obsolete technical and quality requirements are clearly marked and returned to the Parsons PM upon receipt of any revised document. The recipient must also immediately conduct a page change for all affected documents by inserting the revised document or slip pages in place of the obsolete. The Parsons' PM will maintain a complete list of revisions and will include a summary of the revisions with all document revision submittals.

4.14 PERSONNEL SELECTION

4.14.0.1 Key personnel will be designated by the PM. Those requiring licenses, certification, or other forms of qualifications necessary to perform their work, will be selected and evaluated periodically or on each change of task assignment by program management to ensure that their credentials are current to perform the pre-established job description.

4.14.0.2 Project personnel performing functions that affect quality will receive, prior to assuming duty, indoctrination and training conducted IAW Subchapter 4.15.1. The job description, indoctrination, training, and certification will be maintained in the project files IAW Subchapter 4.9. To ensure quality and consistency throughout the duration of the SVFUDS project, Parsons will maintain a dedicated group of qualified, trained project personnel to conduct the various tasks associated with this project.

4.15 PERSONNEL QUALIFICATIONS AND TRAINING

4.15.1 Training Requirements

4.15.1.1 Personnel and subcontractors assigned to each site to perform activities affecting quality and safety will be trained to the project requirements and to the requirements of the QCP, as well as to the project and safety procedures.

4.15.1.2 The training program will ensure that project personnel:

- Possess adequate knowledge of the processes and procedures needed to conduct assigned tasks;
- Have working knowledge of the tools to be used;
- Possess an understanding of acceptance and rejection criteria for the work process;
- Understand the safety conditions/requirements of the work task;
- Know the consequences of inadequate quality levels;

- Are provided training for continued maintenance of job proficiency; and
- Are aware of the quality improvement and empowerment responsibilities.

4.15.1.3 All visitors will be required to go through a safety training and orientation regarding the general and site-specific hazard requirements.

4.15.1.4 Training records including certifications will be maintained as project records in Document Controls files IAW requirements in this QCP.

4.16 CHEMICAL DATA QUALITY MANAGEMENT PLAN

4.16.1.1 The QCP procedures for the Chemical Data Quality Management Plan are discussed in the SAP (Appendix E).

CHAPTER 5
EXPLOSIVES MANAGEMENT PLAN

5.1 INTRODUCTION

5.1.1 General

5.1.1.1 This plan has been prepared IAW the basic contract, local, state, and federal laws and regulations, ATF P 5400.7(6/90), DOD, and DOT regulations.

5.1.2 Licenses/ Permits

5.1.2.1 Licenses and permits will be obtained IAW CERCLA, Section 104, and in substantial compliance with the NCP, Sections 300.120(d) and 300.400(e). Additionally, the District of Columbia will require that the local authorities (i.e., fire department and police) be notified of the presence and location of storage magazines.

5.1.2.2 Licenses or permits issued under this section or a copy of a license or permit, will be posted and available for inspection on each project site location where explosives materials are purchased, stored, transported, or used.

5.2 ACQUISITION

5.2.1 Description and Estimated Quantities

5.2.1.1 When required, the UXO subcontractor will order the minimum amount of commercial counter charges and initiating explosives required for disposal and demilitarization operations.

5.2.2 Acquisition Source

5.2.2.1 When required, the UXO subcontractor will purchase explosives from a local licensed explosives distributor, who will deliver the demolition material to the site. All explosives used by the UXO personnel will be purchased from commercial sources. The SUXOS will be authorized to request and receive explosives from the explosives distributors.

5.3 INITIAL RECEIPT

5.3.0.1 Shipments of on-call explosives will be by commercial carrier from the explosives supplier. The explosives supplier is responsible for all permits and documentation required by federal, state, and local regulations.

5.3.1 Procedures for Receipt of Explosives

5.3.1.1 On receipt of all explosives the type, quantity, and lot number of each explosive item will be checked against the manifest. The original receipt documents and Explosives Usage Record (Figure 5-1) will be maintained on file by the SUXOS.

5.3.2 Procedures for Reconciling Receipt Documents

5.3.2.1 The SUXOS will reconcile the delivery shipping documentation with the requested amounts ordered and received. Any shortages or overages will be reported to the UXO subcontractor PM, who will contact the explosives distributor and reconcile any differences. In addition, the SUXOS will notify the Parsons Site Manager and PM of any discrepancies.

5.4 STORAGE

5.4.1 Magazine Requirements

5.4.1.1 The explosive storage magazine is an ATF Type II constructed IAW DoD Regulation 6055.9-STD and ATF P 5400.7.

5.4.2 Quantity Distance

5.4.2.1 The type, amount, class, and net explosive weight (NEW) of the worse case explosive hazard to be stored in the explosive storage area is listed in Table 5.1. The required safe separation distance to inhabited buildings is based on this item. All recovered "acceptable to move" MEC items will be stored in a portable Type II class magazine located at the Federal Property.

Table 5.1
Worst Case Criteria for Explosive Items Stored at the Federal Property Explosives Storage Magazine

Description	Class/ Division	NEW	Storage Compatibility Group
75 mm Mk II chemical projectile	1.1D	17.6 lbs	B

Figure 5-1 Explosives Usage Record

Explosives Usage Record *Contract Number:*

Team Number: Date: Project Name:

Team Leader: Work Areas & Grid Numbers:

Explosives Issued Signature Of Team Leader:

Item	Quantity	Lot Number	Checkers Initials

Explosives Expended Signature Of Team Leader

Item	Quantity	Lot Number	Checkers Initials

Explosives Returned Signature Of SUXOS:

Item	Quantity	Lot Number	Checkers Initials

The signatures in each section of this document indicate that the items listed in that section were in fact issued, expended, or returned to storage and that the quantities listed were verified through a physical count.

5.4.3 Physical Security of Storage Facilities

5.4.3.1 Locks

5.4.3.1.1 Each door will be equipped with two padlocks fastened in separate hasps and staples. Padlocks must have at least five tumblers or five blades, and a case-hardened shackle of at least 3/8-inch diameter. Padlocks will be protected with ¼-inch or larger steel hoods that will not cause sawing or lever action on the locks, hasps, and staples. The magazine doors will be equipped with the following locks:

- Padlock, Key Operated, High Security 5 – Pin;
- Padlock, Key Operated, High Security 5 – Blade; or
- HI SHEAR LK1200, High Security Padlock.

5.4.3.2 Hinges and Hasps

5.4.3.2.1 Hinges and hasps will be attached to doors by welding, riveting, or bolting with the nuts on inside of the doors. Hinges and hasps will be installed such that they cannot be removed when the doors are closed and locked.

5.4.3.3 Fencing Protection

5.4.3.3.1 Appropriate fencing (physical security) protection will be installed on all sites IAW AR 190-11. Fence fabric will be of chain link (galvanized, aluminized or plastic coated woven steel) 2-inch square mesh 9-gauge diameter wire, including coating.

- Posts, bracing and other structure members will be located on the inside of the fence fabric. Galvanized steel or aluminized wire-ties equal in gauge to fencing will be used to secure the fence fabric to the posts or other structural members. The minimum height of the fence fabric will be 6 feet without an outrigger.
- The bottom of the fence fabric will extend to within 2 inches of firm ground. Surfaces will be stabilized in areas where loose sand, shifting soils, or surface waters may cause erosion and thereby assist an intruder in penetrating the fenced area. Where surface stability is not possible or is impracticable, concrete curbs, sills or other suitable type anchoring devices, extending below ground level will be utilized.
- The barrier will have a minimum number of vehicular and pedestrian gates, consistent with the operational requirements. These gates will be structurally comparable to the adjacent fence. Gates will have an approved lock and hinge pins and hardware will be welded or otherwise modified to prevent easy removal.

5.4.3.4 Signage/Placards

5.4.3.4.1 ATF and DoD require that all magazines be appropriately posted with content hazard class, fire fighting hazard, and an emergency notification list. Magazines will be

placarded IAW DoD 4145.26M and DA PAM 385-64. Recovered UXO storage magazines will be placarded as "Fire Division Class 1." Demolition material, excluding detonators, will be placarded "Fire Division Class 3." Detonators will be placarded "Fire Division Class 4." If in doubt, label the contents with the next highest hazard. In the event there are two different fire division or hazard class items in the same magazine, use the higher hazard division/class placard.

5.4.3.5 Fire Protection

5.4.3.5.1 Smoking, matches, open flames, spark-producing devices, and firearms will not be permitted inside of or within 50 feet of magazines. Two fire extinguishers, rated at 20 ABC, will be placed on either side of the entrance to the magazine. The land surrounding the magazines will be kept clear of all combustible materials for a distance of at least 25 feet. Combustible materials will not be stored within 50 feet of magazines.

5.4.3.6 Lightning Protection

5.4.3.6.1 IAW DA PAM 385-64, Chapter 6, Paragraph 6.13; Table 6-1 and 6-2 and Chapter 12, Paragraphs 12-5, 12-8, appropriate lightning protection will be installed on all sites used for processing, handling, or storage of explosives, ammunition, explosive ingredients, and other hazardous materials where operations cannot be shut down during electrical storms or in areas with more than five thunderstorm days per year. Specific lightening protection for grounding and straps used on site at IHF is contained in Appendix K PMNSCM.

5.4.3.6.2 Sites that do not need a Lightning Protection System must meet the following requirements, IAW EM 1110-1-4009, Chapter 11.

- The magazine is constructed of metal that is 3/16-inch steel or larger.
- The magazine is grounded as described below.
- The magazine is located at least 7 feet from the nearest fence.

5.4.3.7 Grounding

5.4.3.7.1 Grounding rods will not be less than ¾" in diameter and 10 feet in length. Rods will be copper-clad steel, solid copper, or stainless steel and free of paint or other non-conductive coating. Each facility must have a minimum of two rods; however, more may be used. Rods will be located clear of paved surfaces, walkways and roadways and will be driven into the ground so that the tops are at least 12" below finished grade. In the event of shallow topsoil over bedrock or dense coral, which prevents the burial of rods, use extended-down conductors or buried open plates, as described in Chapter 3 of National Fire Protection Association 780.

5.4.3.7.2 Bonding is used to reduce the possibility of a side flash and to ensure that a lightning current produces no electrical potential differences. For a building 36 feet tall or less, a bonding strap is required for large masses of metal (400 sq. in.) that are located on the exterior (i.e., door), or within the facility.

5.4.3.8 Emergency Notification List

5.4.3.8.1 A list containing the names, telephone numbers, and local addresses of the individuals to be notified in the event of an emergency will be posted on the outside and inside of the magazine door. These individuals should be the same individuals authorized to sign for explosives and are usually the SUXOS and the CENAB Site Operations Officer.

5.5 TRANSPORTATION

5.5.0.1 Transportation of explosives and demolition materials will comply with all federal, state, and local regulations. The Parsons UXO subcontractor will secure permits as required for the transportation of the small quantities of on-call explosives to be used on-site. The most expeditious route will be used when transporting explosives from the delivery vehicle to the detonation location.

5.5.1 Procedures for Transportation from Storage to Disposal Location

5.5.1.1 When transporting explosives on public highways, placarding and inspections will be conducted IAW applicable U.S. Department of Transportation (USDOT) sections of 49 CFR parts 100-199 and Figure 5-2. The UXOSO will provide the team with a transportation route plan in the event public roads will be traveled. Every effort will be made to take a route with the least public exposure. For transportation of demolition material, the UXO subcontractor will comply with the following:

- Initiating explosives, such as blasting caps, will remain separated from other explosives at all times. Blasting caps may be transported in the same vehicle as long as they are in a separate container (designed to transport blasting caps) and secured away from other explosive items.
- Compatibility requirements will be observed.
- Only UXO Technicians III and above (or approved equivalent) may be issued and may transport explosive materials, with the second individual in the vehicle being a minimum of a UXO Technician II (or approved equivalent). The receiving party will sign the receipt documents for accountability.
- Operators transporting explosives will have a valid driver's license.
- Drivers will comply with posted speed limits but will not exceed a safe and reasonable speed for conditions.
- Vehicles transporting explosives off-road will not exceed 25 mph.
- Personnel will not ride in the cargo compartment of a vehicle transporting explosives.

Figure 5-2 Vehicle Inspection Form

EXPLOSIVES VEHICLE INSPECTION, ON-SITE			
This form must be filled out for any vehicle carrying explosives, prior to loading.			
DRIVERS NAME	LICENSE NUMBER		
COMPANY			
TYPE OF VEHICLE	VEHICLE NUMBER		
INSPECTION DATE/TIME	INSPECTOR		
PART INSPECTED	SAT.	UNSAT.	COMMENT
HORN			
STEERING SYSTEM			
WIPERS			
MIRRORS			
FIRE EXTINGUISHERS (10 ABC, 2 EACH)			
REFLECTORS			
EMERGENCY FLASHERS			
LIGHTS			
ELECTRIC WIRING			
FUEL SYSTEM			
EXHAUST SYSTEM			
BRAKE SYSTEM			
SUSPENSION			
CARGO SPACE			
TIRES, WHEELS, RIMS			
TAILGATE			
TARPAULIN			
INSPECTION RESULTS (INSPECTOR INITIAL)			
ACCEPTED:			
REJECTED:			
REMARKS:			
DRIVERS SIGNATURE/DATE	INSPECTORS SIGNATURE/DATE		

5.5.2 Certification

5.5.2.1 The SUXOS and the UXO Technician III team leader performing demolition will sign and date the Explosives Usage Record (Figure 5-1) certifying that the explosives were used for their intended purpose.

5.5.3 Requirements

5.5.3.1 Explosives will be transported in vehicles having a cargo compartment that is separated from the vehicle operator. The load will be braced and, except when in closed cargo compartments, covered with a fire-resistant tarpaulin or in an appropriate shipping container. Minimum vehicle requirements include:

- Vehicles transporting explosives or MEC will be inspected daily using the Explosives Vehicle Inspection form (Figure 5-2);
- Vehicle engines will not be running when loading/unloading explosives;
- Vehicles will be chocked to prevent movement while loading;
- Beds of vehicles will have either a wooden bed liner, dunnage, or sand bags to protect the explosives from contact with the metal bed and fittings; and
- Vehicles transporting explosives will have a first aid kit, two 10 ABC-rated (or higher) fire extinguishers, and a means of communication with the UXOSO.

5.6 RECEIPT PROCEDURES

5.6.0.1 The SUXOS will strictly control access to all explosives. All receipts, issues, turn-ins, and inventories of explosives will be properly documented and verified, through physical count, by the SUXOS and UXOQCS.

5.6.1 Records Management and Accountability

5.6.1.1 All original records of on-call explosives will be forwarded to the UXO Subcontractor's head office for archiving IAW ATF regulations and requirements. Additionally, copies of all on-call explosives records will be maintained on-site by the SUXOS and will be available for inspection by authorized agencies. Explosives items will be tracked by their respective lot number until the item is expended, or transferred to Government control and accountability, or returned to the distributor.

5.6.1.2 Upon receipt of explosives, a magazine data card (Figure 5-3) will be completed for each type of explosives stored at the project site.

5.6.1.3 Whenever a card is completely filled, a new card will be started and the old one retained as part of the official record, and submitted with the final report.

Figure 5-3 Magazine Data Card

Product Code / FSN:		Nomenclature:			Site Name: Address:			
Date Code / Lot Number		Hazard Class	UN or NA	Quantity / Case:				
Date	Bill of Lading / Voucher Number	Received From	Quantity Received	Quantity Issued	Issued To	Current Balance	Initials	
							Issuer	Receiver

5.6.1.4 The SUXOS will be responsible for the initial receipt, control, and issue of all explosives stored on site.

5.6.1.5 The SUXOS will verify that all explosives were destroyed and consumed. The Explosives Usage Record (Figure 5-1) will be completed by the SUXOS and included in the Weekly Reports.

5.6.1.6 No donor explosives will be stored on site. Daily deliveries will be accomplished on an "as needed" basis.

5.6.2 Authorized Individuals

5.6.2.1 The UXO subcontractor is required to provide explosives distributors with documentation of individuals authorized to request and receive explosives. The individuals authorized to receive and issue explosives are the SUXOS, the UXO subcontractor's Technician III (demolition supervisor), or the Parsons UXOQCS. The SUXOS will designate in writing the individual(s) who is/are authorized to transport and use explosives.

5.7 INVENTORY PROCEDURES

5.7.0.1 On-call explosives will be inventoried by the UXOQCS and the SUXOS after receipt on site. Complete inventories will also be conducted after any issues/turn-ins of demolition material.

5.7.1 Physical Inventory Procedures

5.7.1.1 The SUXOS will strictly control access to all explosives. All issues and turn-ins of explosives will be properly documented and verified, through physical count, by a joint inventory by the SUXOS and UXOQCS.

5.7.1.2 The SUXOS will review all requests for on-call explosives and only sufficient types and quantities for the day's operations will be requested and delivered. Issues of explosives will be recorded on the Explosives Usage Record (Figure 5-1), and annotated in the daily journal. This procedure will ensure that the issued explosives are accounted for while they are in the possession of individual users. The end user of explosives will certify on the Explosives Usage Record that the explosives were used for their intended purpose. Entries made on the Explosives Usage Records will be verified through physical count by the UXO Technician III when drawing or turning-in the explosives and verified by the UXOQCS.

5.7.1.3 At the end of each on-call detonation operation, the UXOQCS and the demolition team UXO Technician III will reconcile the entries on the Explosives Usage Record and turn this record over to the SUXOS. The record of ordnance items destroyed with the explosives consumed will be kept in the SUXOS daily log.

5.7.1.4 Entries made on the Explosives Usage Record will be verified through physical count by the demolition team UXO Technician III when drawing or turning in the explosives, and the UXOQCS will verify the record.

5.7.2 Procedures for Reconciling Inventory Discrepancies

5.7.2.1 In the event that a discrepancy is discovered between the inventory and the quantity on hand, then the explosives usage record will be reviewed to ensure that there is no error in the data entry. If the records review does not reconcile the discrepancy, then it will be reported immediately to the USACE Safety Specialist, the USACE Contracting Officer, and UXO subcontractor PM for investigation. In addition, the Parsons Site Manager and PM will be notified immediately. In the event the discrepancy cannot be rectified, it must be reported to ATF.

5.8 REPORTING LOSS OR THEFT OF EXPLOSIVE MATERIALS

5.8.0.1 Loss or theft of explosives will be reported as required in 27 CFR Part 55, Sub part C Paragraph 55.30. ATF Form 5400.5 will be completed, within 24 hours and forwarded to the ATF, with a copy to the contracting officer. The following persons will be notified immediately upon discovery of theft of explosives:

- Site Manager, Site Project Manager and USACE Safety Representative
- USACE Project Manger and Contracting Officer
- Bureau of Alcohol, Tobacco and Firearms (ATF) at 1-800-800-3855
- Project subcontracted UXO firm or supplier of explosives.

5.9 PROCEDURES FOR RETURN TO STORAGE OF EXPLOSIVES NOT EXPENDED

5.9.0.1 For on-call UXO demolition, the UXO Technician III will return any unused explosives to the on-call explosives distributor, and record the returned items on the Explosives Usage Record (Figure 5-1).

5.10 DISPOSAL OF REMAINING EXPLOSIVES

5.10.0.1 As described in Subchapter 5.9, any unused explosives will be returned to the on-call explosives distributor. Returned items will be recorded on the Explosives Usage Record (Figure 5-1).

5.11 ECONOMIC ANALYSIS FOR DIFFERENT ALTERNATIVES

5.11.0.1 The type and quantity of explosives are not known at this time; an economic analysis will be conducted when necessary.

CHAPTER 6
EXPLOSIVES SITING PLAN

6.1 INTRODUCTION

6.1.0.1 This Explosives Siting Plan outlines the procedures to be used during the SVFUDS investigation and describes the explosives safety criteria to be employed during operations. This plan was prepared IAW DID MR-005-04 and all requirements given in the DID are implied in this document.

6.1.0.2 USACE documents used to predict and mitigate blast effects are:

- HNC-ED-CS-96-8, Guide for Selection and Siting of Barricades for Selected Unexploded Ordnance;
- HNC-ED-CS-S-98-1, Methods for Predicting Primary Fragmentation Characteristics of Cased Explosives;
- HNC-ED-CS-S-97-7, Buried Explosion Module;
- HNC-ED-CS-S-00-3, Use of Water for Mitigation of Fragmentation and Blast Effects Due to Detonation of Munitions;
- HNC-ED-CS-S-98-7, Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions;
- HNC-ED-CS-S-99-1, Open Front and Enclosed Barricades;
- DA Pam 385-64, *Ammunition and Explosives Safety Standards*, Chapter 2, Paragraph 2-4 and Chapter 3, Paragraph 3-15 and Figure 3-1;
- DoD 6055.9-STD, DoD Ammunition and Explosives Safety Standards.

6.2 MUNITIONS RESPONSE SITES

6.2.0.1 The Munitions Response Site (MRS) for this project is designated as the SVFUDS. The MSD calculated for this MRS is based on the 75 mm Mk II chemical projectiles formerly used at the site.

6.2.1 Minimum Separation Distance

6.2.1.1 The MSD to protect non-essential personnel during intrusive operations has been calculated to be 200 feet based on the MGFD for the project (Subchapter 3.8.8 and 3.8.9).

6.2.1.2 Should evacuation of personnel be required to meet the separation distances, Parsons will notify the CENAB Site Operations Officer of the need to evacuate personnel and suspend operations in that area until the evacuation has been coordinated/resolved or engineering controls can be put in place.

6.2.1.3 If during the course of the investigation, MEC with a greater fragmentation range than the MGFD is encountered then the distances in DDESB Technical Paper 16 will be used, the Quantity-Distance (Q-D) arc will be adjusted, and an amendment to this Site-Wide WP will be submitted for approval.

6.2.2 Demolition Areas

6.2.2.1 On-site demolition may occur utilizing a controlled detonation chamber. A SSWP and Site-Specific Siting Plan will be prepared and submitted for approval to document the demolition area where a controlled detonation chamber will be used.

6.3 FOOTPRINT AREAS

6.3.0.1 Footprint areas for intrusive and demolition operations will be established prior to beginning operations. The footprint areas will require approval from the USACE Military Munitions Center of Expertise.

6.3.1 Blow-In-Place

6.3.1.1 No blow-in place operations are planned for this site.

6.3.2 Collection Points

6.3.2.1 The Federal Property Storage Area will be utilized as a collection point IAW Chapter 9.

6.3.3 In-Grid Consolidated Shots

6.3.3.1 No In-Grid Consolidated Shots are planned for this site.

6.4 EXPLOSIVES STORAGE MAGAZINES

6.4.0.1 See Chapter 9 for a discussion of the Explosives Storage Magazine siting.

6.5 ENGINEERING CONTROLS

6.5.0.1 In areas where an acceptable fragmentation distance cannot be achieved, Parsons will employ the DDESB-approved engineering controls, such as sandbags, tamping, or barricades (DDESB Technical Paper 15, *Approved Engineering Controls* and HNC-ED-CS-S-98-7, *Use of Sandbags for Mitigation of Fragmentation and Blast Effect Due to Intentional Detonation of*

Munitions) to mitigate fragmentation. If using these controls is determined to be impractical, Parsons will notify the on-site USAESCH Safety Specialist who will notify the USAESCH PM.

CHAPTER 7
ENVIRONMENTAL PROTECTION PLAN

7.1 INTRODUCTION

7.1.0.1 This EPP has been prepared for the SVFUDS site-wide field activities IAW Army Regulation (AR) 200-2. The purpose of the EPP is to establish procedures for avoiding, minimizing, and mitigating potential impacts to environmental and cultural resources near the SVFUDS site-wide project area during field activities. To fulfill the requirements of the EPP, this document describes the following resources and issues and describes procedures and methods to protect and/or mitigate them:

- Threatened and endangered species within the project site;
- Wetlands within the project site;
- Cultural and archaeological resources within the project site;
- Water resources within the project site;
- Coastal zones within the project site;
- Trees and shrubs that will be removed within the project site; and
- Existing waste disposal sites within the project site.

7.2 IDENTIFICATION AND COMPLIANCE WITH PRELIMINARY ARARS

7.2.0.1 Section 121(d)(1) of CERCLA, as amended by the Superfund Amendments and Reauthorization Act, requires that remedial actions must attain a degree of cleanup that assures the safety of human health and protection of the environment. Moreover, all potential Applicable or Relevant and Appropriate Requirements (ARARs) must be outlined. ARARs include federal standards, requirements, criteria, and limitations under state environmental or facility siting regulations that are more stringent than federal standards.

7.2.0.2 Although the requirements of CERCLA Section 121 generally apply as a matter of law only to remedial actions, USACE's policy for response actions is that ARARs will be identified and complied with to the extent practicable. Three factors are applied to determine whether identifying and complying with ARARs is practical in a particular response situation. These factors include:

- The exigencies of the situation;
- The scope of the response action to be taken; and

- The effect of ARAR compliance on the statutory limits for response action duration and cost.

7.2.0.3 ARARs are identified on a general and site-specific basis and involve a two-part analysis: first, a determination is made as to whether a given requirement is applicable; if not applicable, examination is made of whether it is nevertheless both relevant and appropriate. When a requirement is found to be both relevant and appropriate, that requirement must be complied with to the same degree as if it were applicable.

7.2.0.4 Non-promulgated advisories or guidance documents issued by federal or state governments do not have the status of potential ARARs. However, these "to be considered" (TBC) criteria may be used in determining the necessary level of cleanup for human safety and protection of the environment. Table 7.1 lists site-specific ARARs.

7.2.1 Location-Specific ARARs

7.2.1.1 Several location-specific ARARs potentially pertain to the field activities. The ARARs include the protection of historical and archaeological resources and the protection of wildlife and habitat resources. A description of these ARARs is presented in Table 7.1.

7.2.2 Action Specific ARARs

7.2.2.1 Several action-specific ARARs may be applicable to activities performed. The action-specific ARARs are presented in Table 7.1.

7.3 FIELD ACTIVITIES

7.3.0.1 The project scope of work requires the field team to locate and investigate potential AUES burial locations through the use of location survey and mapping, geophysical techniques, and intrusive operations (soil borings and test pits). Field activities at the SVFUDS will include construction of staging and support areas, soil borings, intrusive test pit investigation, and disposal of IDW. These intrusive investigation activities started in August 2002, and related debris removal, brush clearing, and geophysical investigation field activities also began at this time.

7.3.0.2 The scope of the intrusive investigation will impact: residential and non-residential properties in the SVFUDS, an outer portion of AU, and the office trailer complex planning area that has been set up for the project (the Federal Property). The Federal Property is located adjacent to Sibley Memorial Hospital consists an office trailer complex and temporary storage facility for various waste streams.

Table 7.1
Potential ARARs and TBCs, SVFUDS

Standard, Requirement, Criteria, or Limitation	Citation	Description of Requirement	Comment
Action Specific:			
National Environmental Policy Act (NEPA)	40 CFR 1500	NEPA is the basic national charter for the protection of the environment. It establishes policy, sets goals, and provides means for carrying out the policy.	NEPA procedures must insure that information is available to public officials and citizens before decisions are made and before actions are taken.
National Contingency Plan (NCP)	40 CFR 300	Provides the organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants.	
CERCLA cleanup standards	42 U.S.C. 9621	CERCLA cleanup standards.	
Department of Transportation (DOT) – shipping containers	49 CFR 178	Prescribes the manufacturing and testing specifications for packaging and containers used for the transportation of hazardous materials in commerce.	
Exemption to bombs from hazardous waste shipment requirements	DOT-E-7573	Exemption to bombs from hazardous waste shipment requirements.	
Exemption to DOT regulations for chemical or biological agent transportation	PL 91-441 sec. 506 (b)(4)	Exemption to DOT regulations for chemical or biological agent transportation.	
Environmental Protection and Enhancement	AR 200-1, DA PAM 200-1	Requires Army compliance with all environmental statutes and regulations and consultation with federal, state, and local regulatory agencies.	

Table 7.1 (Continued)
Potential ARARs and TBCs, SVFUDS

Standard, Requirement, Criteria, or Limitation	Citation	Description of Requirement	Comment
Action Specific (Cont.):			
Dept. of Army Ammunition and Explosive Safety Standards	AR 385-64, DA PAM 385-64	Requires that safety measures be taken for the handling of explosive ordnance.	Army Regulation that establishes Army standards for the storage, handling, transportation, and disposing of munitions.
DoD Ordnance Safety Standards	DoD 6055.9-STD	Requires that specialized personnel be employed to detect, remove, and dispose of ordnance. This standard also defines the safety precautions and procedures for the detonation or disposal of ordnance.	Establishes DoD ammunition and explosives safety standards.
Military Munitions Rule	40 CFR Part 266, Subpart M	Regulates unused munitions, munitions used for intended purposes, and used or fired munitions.	To be considered.
Location Specific:			
Endangered Species Act	16 U.S.C. §§ 1531-1544 (1991, as amended)	Requires action, including consultation with the Department of the Interior (DOI), to conserve endangered species and critical habitats upon which endangered species depend.	Endangered species may be present on the site. Consultation required.
	50 CFR § 200 (1991)		
	50 CFR § 402 (1991)		
	50 CFR § 10 (1991)	Regulates the taking, possession, transportation, sale, purchase, barter, exportation, and importation of wildlife. Lists wildlife species.	No taking of wildlife will occur under alternatives proposed.
National Ambient Air Standards	40 CFR 50	National Ambient Air Quality Standards.	

Table 7.1 (Continued)
Potential ARARs and TBCs, SVFUDS

Standard, Requirement, Criteria, or Limitation	Citation	Description of Requirement	Comment
Location Specific (Cont.):			
Environmental Protection and Enhancement	AR 200-1, DA PAM 200-1	Requires Army compliance with all environmental statutes and regulations and requires Army consultation with federal, state, and local regulatory agencies.	
Erosion and Sediment Control	21 D.C.M. R. § 502.1 21 D.C.M. R. § 501.4 21 D.C.M. R. § 539	District of Columbia erosion and sediment control requirements during and after completion of all land disturbing activities. District of Columbia Department of Consumer and regulatory Affairs 1987 Standards and Specifications for soil erosion and sediment control. Additional requirements	
Storm Water Management	21 D.C.M. R. § 526.1 21 D.C.M. R. § 528-530	District of Columbia storm water management measures to control and manage run-off during earth moving and land change activity involving more than 5,000 square feet of land. Additional requirements	Applicable Relevant and Appropriate
Fugitive Dust Emissions	21 D.C.M. R. § 605	District of Columbia requirements for taking reasonable precautions to minimize emissions of fugitive dust into outdoor atmosphere.	Applicable
Noise Control	20 D.C.M. R. § 2802.2 20 D.C.M. R. § 2802.3	District of Columbia noise control prescribing a maximum level of 60 decibels for construction activities conducted in residential areas between the hours of 7.00 am and 7.00 pm. Construction noise levels are measured 25 feet from the outermost limit of the site.	

Table 7.1 (Continued)
Potential ARARs and TBCs, SVFUDS

Standard, Requirement, Criteria, or Limitation	Citation	Description of Requirement	Comment
Chemical Specific:			
The Army Chemical Agents Safety Program	AR 385-61, DA PAM 385-61	Minimum safety requirements for handling, processing, transportation, disposal, and decontamination of blister and nerve agents.	
Nuclear and Chemical Weapons and Materiel, Chemical Surety	AR 50-6, DA PAM 50-6	Explanations of procedures and concepts in preparing for, responding to, and recovering from a chemical accident or incident.	
Clean Air Act (CAA)	42 U.S.C. §§ 7401 – 7671q (1991, as amended)	Under this law, USEPA sets limits on how much of a pollutant can be in the air.	
	40 CFR § 61 (1991)	National emissions standards for hazardous air pollutants.	
	40 CFR § 61.223 (1991)	Establishes national primary and secondary ambient air quality standards.	May be applicable or relevant and appropriate if excavation equipment exhaust and fugitive dust contribute significantly to air quality ranking for region.
Water quality standards regulation	40 CFR Part 131 (1992)	Provides chemical-specific numeric criteria for toxic pollutants for states that have not fully complied with the requirements of the Clean Water Act (CWA).	
Transportation of hazardous materials	40 CFR §§ 1801-1819 (1991, as amended)	Establishes requirements (for example, packaging, labeling, and placarding) for the transportation of hazardous materials off-site.	Applicable to transportation off-site.

Table 7.1 (Continued)
Potential ARARs and TBCs, SVFUDS

Standard, Requirement, Criteria, or Limitation	Citation	Description of Requirement	Comment
Chemical Specific (Cont.):			
Hazardous Materials Transportation Act (HMTA) of 1974, amended by the Hazardous Materials Transportation Uniform Safety Act (HMTUSA) of 1990	49 U.S.C. §§ 1801 through 1819 (1991, as amended); regulations promulgated: 49 CFR §§ 100 – 180	Regulation applies to any person who transports or causes to be transported or shipped, a hazardous material. Establishes requirements for transport of hazardous materials.	
Chemical agent standards – U.S. Public Health Service	Federal Register Vol. 53, No. 50, pg. 8504-8507	U.S. Public Health Service chemical agent standards.	
Reportable quantities – hazardous substances	40 CFR 116-117	Reportable quantities for hazardous substances.	
Resource Conservation and Recovery Act	40 CFR 260-280	Regulates treatment, storage, and disposal of hazardous waste.	
District of Columbia Hazardous Waste Management Regulations	20 DMCR 42-43	Regulates treatment, storage, and disposal of hazardous waste within the District of Columbia.	

7.3.1 Flora and Fauna

7.3.1.1 During the Operation Safe Removal Formerly Used Defense Site Remedial Investigation (OSR FUDS RI), research was conducted into the nature and type of fauna and flora found within Washington, D.C. The District of Columbia exhibits a diverse fauna for an area that is principally urban in character. Approximately 35 species of mammals and 175 species of birds occur within the District of Columbia throughout the year. The occurrence of parklands generally determines the relative abundance and location of wildlife (USACE, 1995).

7.3.1.2 Dominant plant species, where native vegetation is found, include red maple, white oak, red oak, chestnut oak, mountain laurel, greenbrier, and poison ivy. Developed and residential areas may include white oak, red oak, red maple, American holly, white cedar, deodar cedar, Norway spruce, in addition to lawn and small ornamental trees and shrubs.

7.3.2 Aquatic Life

7.3.2.1 Primarily, the surface water at the SVFUDS is channeled into two intermittent streams: Mill Creek and East Creek. Additionally, there are several small natural and urbanized stream systems throughout the SVFUDS. The small size and culverted condition of the two streams present in the vicinity of the SVFUDS, and the extensive development of the area, limit the types of aquatic organisms that might be present. The streams may contain frogs, toads, oligochaetes (worms), snails, and assorted aquatic insects. It is unlikely they support a population of native fish (USACE, 1995). Perennial streams and rivers near the project area support catfish, carp, sunfish, and hickory shad during spring migration season (USACE, 1995). Because of its artificial nature, it is also unlikely that the Dalecarlia Reservoir supports a population of native fish. However it may still contain frogs, toads, oligochaetes (worms), snails, and assorted aquatic insects found in the streams.

7.3.3 Water Resources

7.3.3.1 Surface water at the SVFUDS project area is primarily channeled into two intermittent streams, Mill Creek and East Creek. Additionally, there are several small natural and urbanized stream systems throughout the SVFUDS project area. Storm sewers also channel surface runoff, and flow toward the Little Falls Run, to the west. Eventually, all surface water at the SVFUDS project area flows into the Potomac River. Also present at the western border of the SVFUDS is the artificially created Dalecarlia Reservoir.

7.3.3.2 There are various aquifer systems associated with the site vicinity. These include terrace gravels and fracture system aquifers associated with the Piedmont formations, saprolite systems, and fill systems. Groundwater may be found in any and all of these aquifers, however, the majority of the groundwater would be expected to be found in the underlying bedrock that comprises the fracture system aquifer. Additionally, there are a number of major fault and fold systems in the site vicinity. These features, as well as the topography of the site, will affect the general flow of groundwater.

7.3.3.3 The District of Columbia is supplied water by a treated and tested water distribution system. However, it is the DDOE position that all groundwater could potentially be used for

drinking water and therefore, DDOE has requested a groundwater investigation. This investigation is currently underway.

7.3.4 Wetland Resources

7.3.4.1 No wetlands will be impacted by the SVFUDS investigation activities. Narrow bands of forested or scrub-shrub wetlands may be present along stream edges.

7.3.5 Coastal Zones

7.3.5.1 The SVFUDS is not within a coastal zone.

7.3.6 Wildlife

7.3.6.1 Because the SVFUDS project area is developed with few large contiguous wooded areas (except for the fenced Dalecarlia Reservoir), wildlife species found are typical of those found in most urban-suburban areas. Mammals that can be found in and around the area include gray squirrels, raccoons, opossums, eastern chipmunks, field mice, deer, voles and moles (USACE, 1995).

7.3.6.2 Common birds in the area include those that have adapted to an urban-suburban environment such as the American robin, catbird, mocking bird, Carolina chickadee, Carolina wren, downy woodpecker, common flicker, European starling, house sparrow, rock dove, mourning dove, and song sparrow. Black vultures and turkey vultures have aerial coverage throughout the city. Migrating birds such as Canadian geese and other waterfowl frequent the area (USACE, 1995).

7.3.7 Endangered, Threatened, or Special Concern Species

7.3.7.1 Because the SVFUDS project area is mostly developed, it provides very little habitat for rare, threatened, or endangered species. According to the U.S. Fish and Wildlife Service, "Except for occasional transient individuals, no proposed or federally listed endangered or threatened species are known to exist within the Spring Valley site" (U.S. Department of the Interior, 2003).

7.3.8 Cultural and Archaeological Resources

7.3.8.1 All personnel will be briefed by the field manager on proper procedures in case of inadvertent discovery of cultural resources. All site personnel will be informed that it is prohibited to remove any artifacts. Cultural and archaeological artifacts recovered during intrusive investigations will be collected in plastic bags and inspected by an archaeologist.

7.4 MITIGATION PROCEDURES

7.4.0.1 Investigation activities at the site and the Federal Property have been developed to avoid impacts to sensitive resources. For this reason, extensive mitigation is not anticipated.

However, the following general mitigation procedures and engineering controls will be used during all field activities.

7.4.1 All Waste Disposal

7.4.1.1 All waste materials generated during the site-wide investigations will be collected, removed from the site, and properly disposed. These wastes will consist primarily of waste paper, food and beverage containers, and expendables such as uncontaminated building materials.

7.4.2 All Burning Activities

7.4.2.1 Open fires will not be permitted during the performance of this project. Smoking will be restricted to designated smoking areas.

7.4.3 Dust and Emission Control

7.4.3.1 Dust control measures will include best management practices (i.e., watering down) to control dust generation.

7.4.3.2 Consideration of wind direction will be an integral part of daily operations/safety briefings along with other weather conditions. The Parsons PM will ensure that the SSHO obtains daily weather forecasts from the National Weather Service to determine the expected temperature and prevailing winds during site activities. These factors will determine whether additional engineering controls are necessary.

7.4.3.3 During excavation of HTW-contaminated grids, dust monitoring will be carried out IAW with APP (Appendix D).

7.4.3.4 Emissions sources will include vehicles, including automobiles used to travel to the survey sites. All vehicles and equipment will be in good working order and will meet applicable vehicle emissions requirements.

7.4.4 Spill Control and Prevention

7.4.4.1 Secondary containment will be used for liquid IDW operations. If a severe leak of fuel or other fluids, such as hydraulic or transmission fluid, occurs in the field because of a tank puncture or ruptured line, the following procedures will be implemented:

- Promptly berm the site with dirt to prevent the fuel or fluid from spreading along the ground surface.
- Apply oil-absorbing material such as sawdust or kitty litter to the spill. A supply of this material adequate to address the puncture of a full, 25-gallon fuel tank will be always available on-site as part of the team's "possibilities" kit.

- Report the spill to the Site Manager and follow instructions for cleanup. It is anticipated that this will involve digging up and drumming contaminated soil followed by its disposal.

7.4.5 All Storage Areas

7.4.5.1 Storage will be required for solid and liquid IDW. The Parsons site support and disposal subcontractor will use suitable storage containers to store IDW. Only Department DOT-approved shipping containers will be used for waste storage and disposal. IDW will be contained in appropriately sized poly-drums and over-packs. If IDW is determined to be non-hazardous, according to disposal characterization samples, soil or liquid IDW may be bulked into lined roll-offs or tank trailers respectively. All storage areas will have spill kits close at hand. Secondary containment will be used during the filling and storage of liquid IDW.

7.4.6 Manifesting and Transportation of Wastes

7.4.6.1 Wastes that may require transportation include both solid and liquid IDW. Any off site transportation of contaminated soil will be performed IAW USEPA and DOT regulations. Details regarding the manifesting and transportation of IDW can be found in the Subchapter 3.9.

7.4.7 Temporary Facilities

7.4.7.1 Temporary facilities are described in Subchapter 3.3, Mobilization and Demobilization Plan.

7.4.8 Excavation Procedures and Soil/IDW/Scrap Handling and Staging

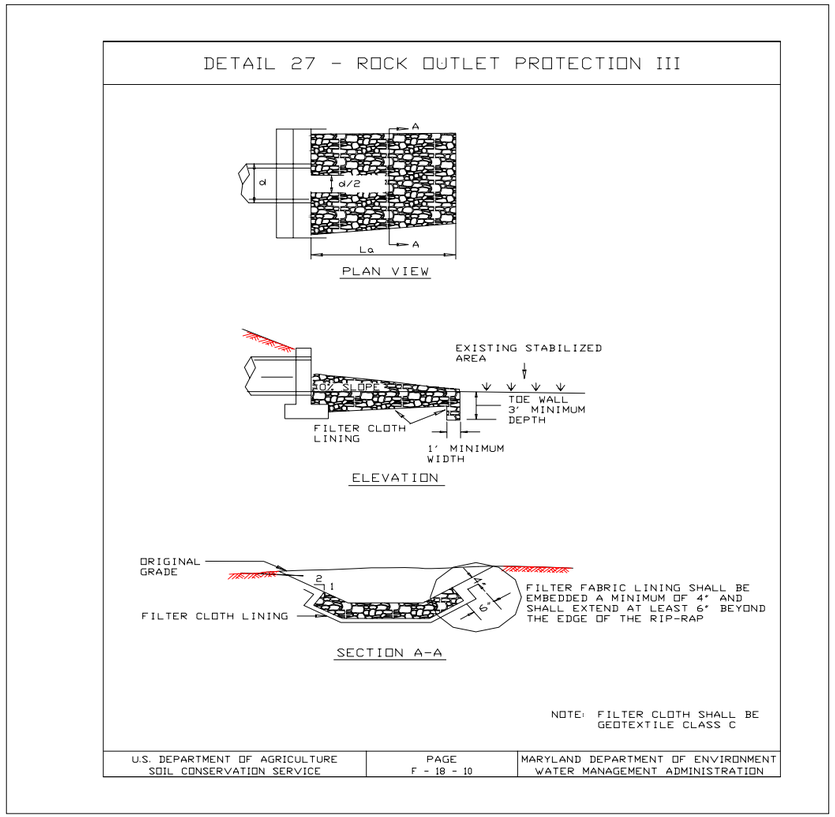
7.4.8.1 Excavation activities may be conducted without any engineering controls. When this occurs, the excavation will be backfilled as soon as possible. Soil excavated from anomalies that are not expected to be MEC-, RCWM-, or HTW-related will be returned to the excavation after the anomaly is identified or removed. Soil excavated from HTW-contaminated grids will be taken off-site for disposal. If the soil characterization results indicate that no hazardous constituents are present, the soil, in some cases, may be transferred to roll-off containers. The use of 55-gallon poly drums and secondary containment will prevent the Federal Property from being environmentally impacted.

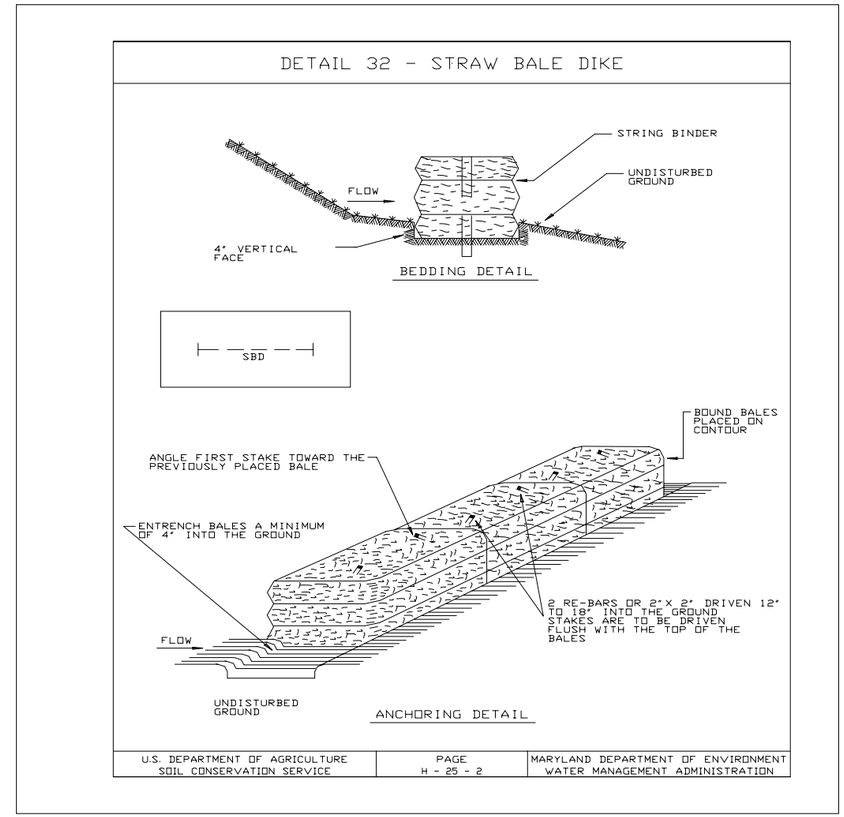
7.4.8.2 Handling of scrap will be consistent with the procedures for soil described above. IDW liquid will be contained in poly drums and staged on ½-inch thick plywood. All filled drums will be stored in secondary containment at the Federal Property.

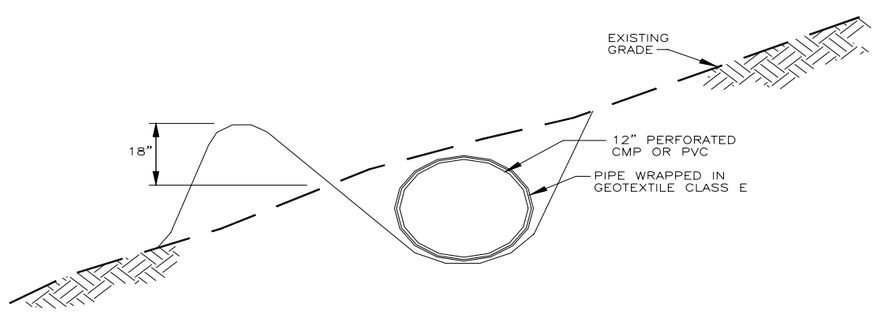
7.4.9 Erosion and Sediment Control

7.4.9.1 The site support and disposal subcontractor will install and maintain erosion and sediment control measures as shown in Figures 7-1 and 7-2. The Parsons Site Manager will inspect erosion-control measures on a daily basis to ensure that the installed measures are in-

Figure 7-1 Erosion and Sediment Control Measures



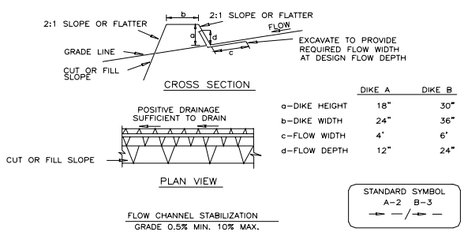




FRENCH DRAIN TRENCH DETAIL

Figure 7-2 Erosion and Sediment Control Measures

DETAIL 1 - EARTH DIKE



	DIKE A	DIKE B
a-DIKE HEIGHT	18"	30"
b-DIKE WIDTH	24"	36"
c-FLOW WIDTH	4'	6'
d-FLOW DEPTH	12"	24"

1. Seed and cover with straw mulch.
2. Seed and cover with Erosion Control Matting or line with sod.
3. 4" - 7" stone or recycled concrete equivalent pressed into the soil 7" minimum

Construction Specifications

1. All temporary earth dikes shall have uninterrupted positive grade to an outlet. Spot elevations may be necessary for grades less than 1%.

2. Runoff diverted from a disturbed area shall be conveyed to a sediment trapping device.

3. Runoff diverted from an undisturbed area shall outlet directly into an undisturbed, stabilized area at a non-erosive velocity.

4. All trees, brush, stumps, obstructions, and other objectional material shall be removed and disposed of so as not to interfere with the proper functioning of the dike.

5. The dike shall be excavated or shaped to line, grade and cross section as required to meet the criteria specified herein and be free of bank projections or other irregularities which will impede normal flow.

6. Fill shall be compacted by earth moving equipment.

7. All earth removed and not needed for construction shall be placed so that it will not interfere with the functioning of the dike.

8. Inspection and maintenance must be provided periodically and after each rain event.

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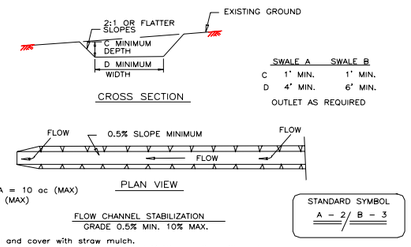
DETAIL 2 - TEMPORARY SWALE



	SWALE A	SWALE B
C	1' MIN.	1' MIN.
D	4' MIN.	6' MIN.

OUTLET AS REQUIRED

DRAINAGE AREA = 10 ac (MAX)
SLOPE = 10% (MAX)

1. Seed and cover with straw mulch.
2. Seed and cover with Erosion Control Matting or line with sod.
3. 4"-7" stone or recycled concrete equivalent pressed into soil in a minimum 7" layer.

Construction Specifications

1. All temporary swales shall have uninterrupted positive grade to an outlet. Spot elevations may be necessary for grades less than 1%.

2. Runoff diverted from a disturbed area shall be conveyed to a sediment trapping device.

3. Runoff diverted from an undisturbed area shall outlet directly into an undisturbed stabilized area at a non-erosive velocity.

4. All trees, brush, stumps, obstructions, and other objectional material shall be removed and disposed of so as not to interfere with the proper functioning of the swale.

5. The swale shall be excavated or shaped to line, grade and cross section as required to meet the criteria specified herein and be free of bank projections or other irregularities which will impede normal flow.

6. Fill, if necessary, shall be compacted by earth moving equipment.

7. All earth removed and not needed for construction shall be placed so that it will not interfere with the functioning of the swale.

8. Inspection and maintenance must be provided periodically and after each rain event.

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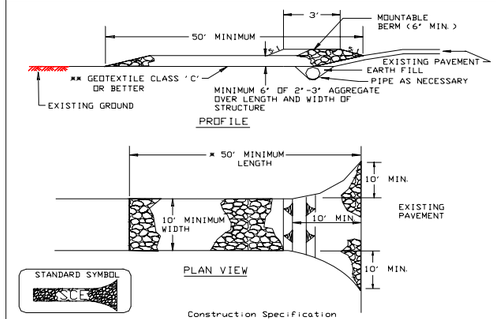
DETAIL 24 - STABILIZED CONSTRUCTION ENTRANCE



Construction Specification

1. Length - minimum of 50' (*30' for single residence lot).

2. Width - 10' minimum, should be flared at the existing road to provide a turning radius.

3. Geotextile fabric (Filter cloth) shall be placed over the existing ground prior to placing stone. **The plan approval authority may not require single family residences to use geotextile.

4. Stone - crushed aggregate (2" to 3") or reclaimed or recycled concrete equivalent shall be placed at least 6" deep over the length and width of the entrance.

5. Surface Water - all surface water flowing to or diverted toward construction entrances shall be piped through the entrance, maintaining positive drainage. Pipe installed through the stabilized construction entrance shall be protected with a mountable berm with 5:1 slopes and a minimum of 6" of stone over the pipe. Pipe has to be sized according to the drainage. When the SCE is located at a high spot and has no drainage to convey a pipe will not be necessary. Pipe should be sized according to the amount of runoff to be conveyed. A 6" minimum will be required.

6. Location - A stabilized construction entrance shall be located at every point where construction traffic enters or leaves a construction site. Vehicles leaving the site must travel over the entire length of the stabilized construction entrance.

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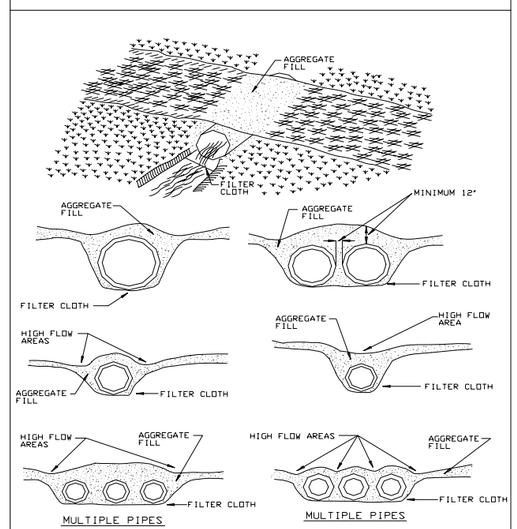
DETAIL 36 - TEMPORARY ACCESS CULVERT



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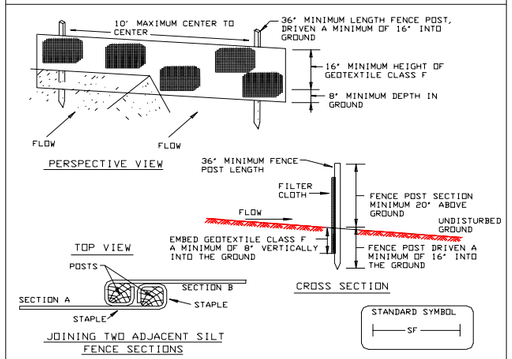
DETAIL 22 - SILT FENCE



Construction Specifications

1. Fence posts shall be a minimum of 36" long driven 16" minimum into the ground. Wood posts shall be 11/2" x 11/2" square (minimum) cut, or 13/4" diameter (minimum) round and shall be of sound quality hardwood. Steel posts will be standard T or U section weighting not less than 1.00 pond per linear foot.

2. Geotextile shall be fastened securely to each fence post with wire ties or staples at top and mid-section and shall meet the following requirements for Geotextile Class F:

Tensile Strength	50 lbs/in (min.)	Test: MSMT 509
Tensile Modulus	20 lbs/in (min.)	Test: MSMT 509
Flow Rate	0.3 gal ft²/ minute (max.)	Test: MSMT 322
Filtering Efficiency	75% (min.)	Test: MSMT 322

3. Where ends of geotextile fabric come together, they shall be overlapped, folded and stapled to prevent sediment bypass.

4. Silt Fence shall be inspected after each rainfall event and maintained when bulges occur or when sediment accumulation reached 50% of the fabric height.

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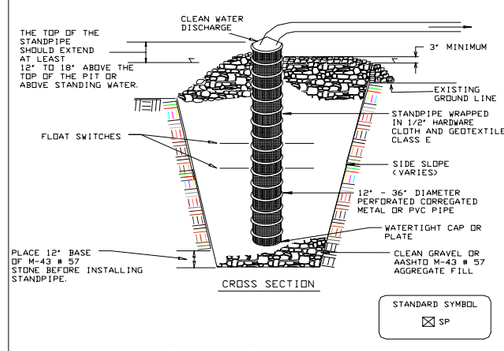
DETAIL 20B - SUMP PIT



Construction Specifications

1. Pit dimensions are variable, with the minimum diameter being 2 times the standpipe diameter.

2. The standpipe should be constructed by perforating a 12" to 24" diameter corrugated or PVC pipe. Then wrapping with 1/2" hardware cloth and Geotextile Class E. The perforations shall be 1/2" x 6" slits or 1" diameter holes.

3. A base of filter material consisting of clean gravel or #57 stone should be placed in the pit to a depth of 12". After installing the standpipe, the pit surrounding the standpipe should then be backfilled with the same filter material.

4. The standpipe should extend 12" to 18" above the lip of the pit or the riser crest elevation (basin dewatering only) and the filter material should extend 3' minimum above the anticipated standing water elevation.

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STABILIZED CONSTRUCTION ENTRANCE

Construction Specification

1. Length - minimum of 50' (*30' for single residence lot).

2. Width - 10' minimum, should be flared at the existing road to provide a turning radius.

3. Geotextile fabric (Filter cloth) shall be placed over the existing ground prior to placing stone. **The plan approval authority may not require single family residences to use geotextile.

4. Stone - crushed aggregate (2" to 3"), or reclaimed or recycled concrete equivalent shall be placed at least 6" deep over the length and width of the entrance.

5. Surface Water - all surface water flowing to or diverted toward construction entrances shall be piped through the entrance, maintaining positive drainage. Pipe installed through the stabilized construction entrance shall be protected with a mountable berm with 5:1 slopes and a minimum of 6" of stone over the pipe. Pipe has to be sized according to the drainage. When the SCE is located at a high spot and has no drainage to convey a pipe will not be necessary. Pipe should be sized according to the amount of runoff to be conveyed. A 6" minimum will be required.

6. Location - A stabilized construction entrance shall be located at every point where construction traffic enters or leaves a construction site. Vehicles leaving the site must travel over the entire length of the stabilized construction entrance.

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TEMPORARY ACCESS CULVERT

Construction Specifications

1. Restrictions - No Construction or removal of a temporary access culvert will be permitted between October 1 through April 30 for Class III and Class IV Trout Waters or between March 1 through June 15 for non-trout waterways.

2. Culvert Strength - All culverts shall be strong enough to support their cross sectional area under maximum expected loads.

3. Culvert Size - The size of the culvert pipe shall be the largest pipe diameter that will fit into the existing channel without major excavation of the waterway channel or without major approach fills. If a channel width exceeds 3 feet, additional pipes may be used until the cross sectional area of the pipes is greater than 60 percent of the cross sectional area of the existing channel. The minimum size culvert that may be used is a 12" diameter pipe. In all cases, the pipe(s) shall be large enough to convey normal stream flows.

4. Culvert Length - The culvert(s) shall extend a minimum of one foot beyond the upstream and downstream toe to the aggregate placed around the culvert. In no case shall the culvert exceed 40 feet in length.
5. Filter Cloth - Filter cloth shall be placed on the streambed and streambanks prior to placement of the pipe culvert(s) and aggregate. The filter cloth shall cover the streambed and extend a minimum six inches and a maximum one foot beyond the end of the culvert and bedding material. Filter cloth reduces settlement and improves crossing stability.

6. Culvert Placement - The invert elevation of the culvert shall be installed on the natural streambed grade to minimize interference with fish migration (free passage of fish).

7. Culvert Protection - The culvert(s) shall be covered with a minimum of one foot of aggregate. If multiple culverts are used they shall be separated by at least 12" of compacted aggregate fill.

8. Stabilization - All areas disturbed during culvert installation shall be stabilized within 14 calendar days of the disturbance in accordance with the Standard for "Critical Area Stabilization With Permanent Seeding."

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place and effective. If it is determined that additional control measures are needed, the Parsons Site Manager will, in consultation with the Parsons PM, direct the site support and disposal subcontractor to install further erosion and sediment controls as required.

7.4.9.2 Fabric silt fencing will be placed along the downslope boundary of the intrusive investigation sites to control erosion and minimize surface water run-off damage. Hay bale dikes will be placed along the raised portions of access roads. The curbs at the road entrances will be maintained and gravel will be placed on top to provide a stable entrance. The curbs and gravel will prevent water from running down access roads. A supply of silt fence, geotextiles and mulch will be maintained on site to be used for additional or modified erosion controls as the mobilization progresses, as well as for ongoing maintenance of existing controls. Erosion control materials will be stockpiled at the Federal Property, but quantities needed for a day's work will be transported around the various site-wide project areas.

7.4.10 Vegetation and Landscape Protection

7.4.10.1 The landscape survey team will be consulted to minimize destruction of landscaping and vegetation, particularly at privately owned residential properties. Prior to conducting any intrusive activities, the landscape survey team will document on videotape all existing landscaping and vegetation. This documentation will be consulted if any plants are destroyed and need to be replaced or the owner reimbursed for the loss.

7.4.10.2 To the extent possible, disturbance to vegetation will be avoided during field activities. Plants and landscape features that do not require removal will be marked with yellow caution tape. Shrubs and small trees in the vicinity of the intrusive activities will be tied back to prevent damage. The location of temporary facilities will be selected to limit impacts to the area and to facilitate easy removal. All trailers used at residential properties will be parked on the street to minimize landscape destruction. Geotextile and plywood may be used on access roads to minimize impact on residential properties. Smaller sized excavation equipment and rubber-tracked skid loaders will be used in residential areas to minimize damage. Potential environmental impacts to the Federal Property will be limited to the existing grass areas.

7.4.10.3 Upon completion of the project, all areas will be restored to their original condition by the USACE or appropriate compensation will be provided to enable the property owner to accomplish site restoration.

7.4.11 Water Resources

Project activities will be performed in a manner to prevent the discharge of pollutants into adjacent waterways within and outside project areas. The use of engineering controls such as berms, dikes, enclosures, and barriers will be employed as needed. The use of such controls to minimize water run-on/run-off and sediment, or siltation migration will be based on heavy precipitation events and observed conditions. All sediment and erosion control measures will be monitored and properly maintained throughout the life of the project. The need for sampling of sediment at the site is not anticipated.

7.4.12 Access Routes

7.4.12.1 Existing roads and access points will be used to the maximum extent possible. However, if access routes are necessary, they will be constructed to prevent run-off, erosion, and contamination migration.

7.4.13 Tree and Shrub Protection and Restoration

7.4.13.1 To the extent possible, the disturbance or destruction of trees or shrubs will be avoided by clearing only those plants necessary to implement this WP. Additional details are in Subchapter 7.4.10.

7.4.14 Control of Water Run-on and Run-off

7.4.14.1 Silt fence and hay bales will be used to control any run-on or run-off during intrusive activities.

7.4.15 Decontamination and Disposal of Equipment

7.4.15.1 Any equipment contaminated by investigation activities will be washed using a 5% bleach solution, followed by a secondary wash using hot, soapy water (a non-phosphate soap, such as Alconox, will be used), and a final rinse with clean water. Any equipment that cannot be decontaminated will be segregated, properly containerized, and disposed of according to its contaminant. Waste decontamination fluids will be containerized and disposed of according to the waste disposal characterization sample results.

7.4.16 Minimizing Areas of Disturbance

7.4.16.1 Procedures for minimizing areas of disturbance are described throughout this EPP and include measures such as driving on roads as much as possible and limiting vehicle trips in unpaved areas.

7.5 PROCEDURES FOR POST-ACTIVITY CLEAN-UP

7.5.0.1 All drummed IDW will be removed from the site daily upon completion of field activities and transported to the Staging Area for HTW-related IDW at the Federal Property Storage Area. It will be held there pending final disposal/disposition. Thus, no post-activity clean up will be required, but post-activity site restoration will be performed as necessary.

7.6 ENVIRONMENTAL DOCUMENTATION UNDER THE NATIONAL ENVIRONMENTAL POLICY ACT

7.6.0.1 This project is an investigation IAW CERCLA as defined in the DERP-FUDS Program Manual (1996). CERCLA is exempt from most environmental compliance requirements, including the NEPA. Therefore, environmental documentation under NEPA is not required.

7.7 AIR MONITORING PLAN

7.7.0.1 Air monitoring during intrusive investigations will be conducted as defined in the SSHP (Attachment 1 of Appendix D).

CHAPTER 8
PROPERTY MANAGEMENT PLAN

8.1 DESCRIPTION

8.1.0.1 This Property Management Plan provides detailed information on the types, quantities, and sources of equipment and materials that will be required to perform field and office operations on this project. Field operations include all activities to be performed to complete the fieldwork. Office operations include all tasks performed in support of project management and the implementation of project work in the field through completion consistent with the requirements of the SOW. The types of equipment recommended, selected, and proposed for this work are those that have been tested and proven in the industry and, therefore, are reliable to use in performing the various activities associated with this project. The quantities proposed are needed to help perform the work in a timely and cost effective manner as dictated by the project schedule.

8.1.1 Field Equipment

8.1.1.1 Geophysical Equipment

8.1.1.1.1 See Chapter 3 of this document for descriptions of the geophysical equipment.

8.1.1.2 Transportation and Construction Equipment

8.1.1.2.1 Various types of transportation and construction equipment will be required during field operations. Vehicles required for on-road service during the project may include standard automobiles, four-wheel drive vehicles, pickup trucks, and ¾-ton and ½-ton trucks. Construction equipment that may be used during the fieldwork to excavate or perform other site related work includes, but is not limited to, skid loaders, backhoes, trackhoes, bulldozers, and cranes.

8.1.1.3 Safety Gear

8.1.1.3.1 The presence of potential RCWM is suspected within the SVFUDS area. Depending on job assignment and mission on-site, the appropriate levels of PPE, including but not limited to, boots, respirators, gloves, and protective clothing, will be used. Personnel assigned to activities outside the EZ will conduct their operations in Level D PPE consisting of standard work clothes with long pants, safety boots (as needed), hard hats (when overhead hazard is present), and safety glasses (as needed). Personnel working away from active field investigations will not be required to wear safety boots or hard hats. In accordance with EM 385-1-1, all site personnel are required to arrive on site with the proper PPE.

8.1.1.4 Equipment for Handling and Disposal of Scrap

8.1.1.4.1 To enable proper handling of scrap encountered or recovered during the intrusive fieldwork, special equipment and materials are required. Drums and containers may be used for temporary storage of munitions debris and other metallic debris, as well as for off-site transportation and disposal.

8.1.1.5 Communication Equipment

8.1.1.5.1 Communications equipment to be used includes hand held two-way radios, cellular phones, and facsimile machines.

8.1.2 Office Equipment

8.1.2.1 The majority of the office equipment to be used on this project is located in Parsons offices throughout the U.S. Most of the equipment (for example, Computer Aided Design and Drafting [CADD] or GIS workstations, computers, printers, plotters, etc.) is owned by Parsons and the charges to the project will be as proposed for this delivery order. However, some items such as field computers, fax machines and printers will be rented or purchased for fieldwork.

8.2 VENDORS AND ASSOCIATED COSTS

8.2.0.1 Parsons may provide some equipment, but most equipment will be obtained from vendors with proven records of furnishing well-maintained, reliable, and updated equipment that can be used to successfully complete the field and office operations. General estimates on the types, quantities, and sources of equipment proposed for the Site-Wide SVFUDS investigation are summarized in Table 8.1.

8.3 PROCUREMENT PROCEDURES

8.3.0.1 Equipment will be procured or purchased for all aspects of project activities during this field effort. An evaluation will be performed whether to rent or purchase needed equipment. When possible, Parsons will price equipment through three different commercial vendors and select the most economical option. The brief nature of this field effort means that renting equipment and supplies is more economical than purchasing equipment. In certain cases involving special maintenance and calibration requirements for an instrument, a sole-source vendor may be used.

8.4 LEASED VEHICLES

8.4.0.1 The leased vehicles will be selected using the comparison of rate quotes from three commercial vendors. The number of vehicles will be determined by one vehicle for approximately four employees working on site. The type of vehicles used on site will be determined by the site's physical conditions, such as terrain, weather conditions, and distances between the living quarters, the site office, and the field work area. Any exceptions will be justified by Parsons and approved by the Contracting Officer.

Table 8.1 List of Equipment

Office/Field Operations	Equipment Type (or equivalent)	No. of Units	Anticipated Source	Status
Communication during fieldwork	Motorola HT-1000 radios	TBD	USACE/ Vendor	Rent
Communication during fieldwork	Cellular phone	TBD	Local Vendor	Rent
Processing and interpretation of field data	Field computer, printer, plotter	1	Parsons / Vendor	Rent/ GFE
Anomaly Excavation/Site Set-up	Backhoe or trackhoe	TBD	Vendor	Lease
ECS Movement	D6 bulldozer or equivalent	TBD	Vendor	Lease
Geophysical Instrument	Schonstedt magnetic locator (GA-52Cx)	12	Vendor	Rent
Geophysical Instrument	Geometrics 858 Cesium Magnetometer	1	Vendor	Rent
Geophysical Instrument	Geonics EM61-MK2	1	Vendor	Rent
Geophysical Instrument	Schonstedt MG-250/ 256 Borehole Magnetic Gradiometer	TBD	Vendor	Rent
Communication during fieldwork	Remote video camera system	1	Parsons	GFE
Transportation of personnel and field equipment	Ford Explorers or equivalent	TBD	Parsons/ Enterprise	Lease
Transportation of personnel and field equipment	Vehicle – passenger car	TBD	Hertz	Rent
Transportation of personnel and field equipment	Vehicle - pickup 4 X 2	TBD	Enterprise/ Ford	Lease
Site office	Office trailers	TBD	Vendor	Rent
Sanitation	Sanitary units (toilets)	TBD	Vendor	Rent
Geophysical survey supplies	Engineers tapes, traffic cones	2 sets	Vendor	Purchase
PPE	Respirators, Interspiro	TBD	Vendor/ Parsons	Rent/Purchase/ maybe GFE
Handling & disposal of MEC	Donor explosives	TBD	Vendor	Purchase

Table 8.1: List of Equipment (cont.)

Office/Field Operations	Equipment Type (or equivalent)	No. of Units	Anticipated Source	Status
Intrusive fieldwork	handtools/equipment	TBD	Vendor	Purchase
Office processing of data and development of maps	GIS workstation	1	Parsons	Own
ECS assembly	Crane, all-terrain forklifts	TBD	Vendor	Rent
Drum movement	Bobcat	TBD	Vendor	Lease
Field electrical power	Generators, 5KW, 10KW	TBD	Vendor	Lease
Office processing of data and development of maps and graphics	CADD/graphics workstation	1	Parsons	Own
Office processing of data and development of maps and graphics	Workstation plotter	1	Parsons	Own
GIS database	Aerial photographs (digital)	1 set	Parsons	Own
Photo documentation of fieldwork	Cameras	1	Parsons	Own
Office communication equipment	Office trailer phone/ answering machine	TBD	Parsons	Purchase
Office communication equipment	Fax machine	TBD	Parson	Purchase

8.5 CONSUMABLE SUPPLIES AND PERSONAL PROPERTY

8.5.0.1 Parsons disclosed accounting practices prescribe that all materials and supplies required for the performance of the contract/task order will be direct charged to that order, and such materials and supplies are not included in the basis for overhead computation. The only exception is limited to home office supplies and equipment such as letterhead, pen/pencils, standard personal computers, office furnishings, etc. Field office supplies are typically direct charged to the project and not included in the overhead computation.

8.6 PROPERTY STORAGE PLAN

8.6.0.1 A storage unit leased to store equipment for the Site-Wide SVFUDS project is located at the Federal Property. Government property (GP) or government furnished equipment (GFE) will be stored at this unit until needed at the sites.

8.6.0.2 All GP should be stored and protected appropriately IAW any special requirements for health and safety or security considerations. Based on the type of work on this contract, additional requirements may are detailed in the IHF Siting Plan.

8.7 ULTIMATE DISPOSAL PLAN

8.7.0.1 Non-consumable items purchased on time and material tasks for the Site-Wide SVFUDS project will be reassigned to other government projects at the end of the investigation, after approval from the Contracting Officer.

8.8 PROPERTY TRACKING

8.8.0.1 An inventory list is maintained by Parsons for the non-consumable items purchased on time and material tasks for the Site-Wide SVFUDS investigation. When applicable, the serial number, model or manufacturer, date purchased, present location of item, cost, current status (functional, need of repair, needs batteries, etc.), and a description of the item are recorded on the inventory list.

8.8.0.2 Inventories would be conducted at least on a quarterly basis, or as requested by the Task Order manager to verify the status of GFE. Table 8.2 is a typical GFE record of inventory log used to track all equipment purchase as part of the SVFUDS investigation.

8.9 LOSS NOTIFICATION

8.9.0.1 For all non-consumable items purchased on the inventory for the Site-Wide SVFUDS project, Parsons will notify USAESCH if the item is lost or stolen, through the contract property manager.

Table 8.2 Record of Inventory

PARSONS GOVERNMENT FURNISHED EQUIPMENT RECORD OF INVENTORY

Contract No. (PIIN) Delivery Order Parsons Project Manager

Contract Type Signature _____ Date Signed _____

Parsons Site Address

City State Zip Code Telephone No.

Item Description (a)	Date Acquired (b)	Manufacturer (c)	Model No (d)	Serial No. (e)	Unit of Issue (f)	QTY (g)	Cost (h)	Cond. Code (i)	GP Tag No. (j)	Responsible Party/ Location (k)	Date transferred (l)	Location of Property (m)

CHAPTER 9
INTERIM HOLDING FACILITY SITING PLAN FOR RCWM PROJECTS

9.1 INTRODUCTION

9.1.0.1 As part of the site-wide intrusive excavations being conducted at the SVFUDS, in Washington, D.C., provisions will be made for the storage of RCWM ordnance and containers, and MEC.

9.1.0.2 This Siting Plan is based on requirements outlined in:

- "DOD Ammunition and Explosives Safety Standards," DOD 6055.9-STD,
- "Toxic Chemical Agent Safety Standards," DA Pam 385-61,
- "Ammunition and Explosives Safety Standards," DA Pam 385-64,
- "Site and General Construction Plan Developer's Guide," USATCESP 385-02,
- DID MR-005-16, "Interim Holding Facility Plan for RCWM Projects", and
- DID MR-005-04, "Explosives Siting Plan".

9.2 FEDERAL PROPERTY STORAGE AREA DESCRIPTION

9.2.1 Location and Layout

9.2.1.1 The Federal Property Storage Area is located on the western boundary of the SVFUDS (Figure 1-1) and is located within a larger area known as the "Federal Property" (Figure 3-2), which is the staging and administrative area used in previous recovery operations at the SVFUDS, and represents a portion of the Washington Aqueduct and Dalecarlia Reservoir Property that is owned by the USACE.

9.2.1.2 The Federal Property is surrounded by a fence and the Federal Property Storage Area is also surrounded by a 6-foot high fence. The Federal Property is bounded by: undeveloped woods to the north; a Sibley Hospital parking lot and Dalecarlia Parkway to the south; Dalecarlia Parkway again to the east; and Little Falls Road, Sibley Hospital, and an undeveloped field to the west.

9.2.1.3 The Federal Property Storage Area contains three structures (Figure 9-1), one of which is the IHF. The other structures include the AHF, the MHF. Also located in the Federal Property Storage Area are the Assessment Structure, and the Explosives Storage Magazine (Figure 9-1).

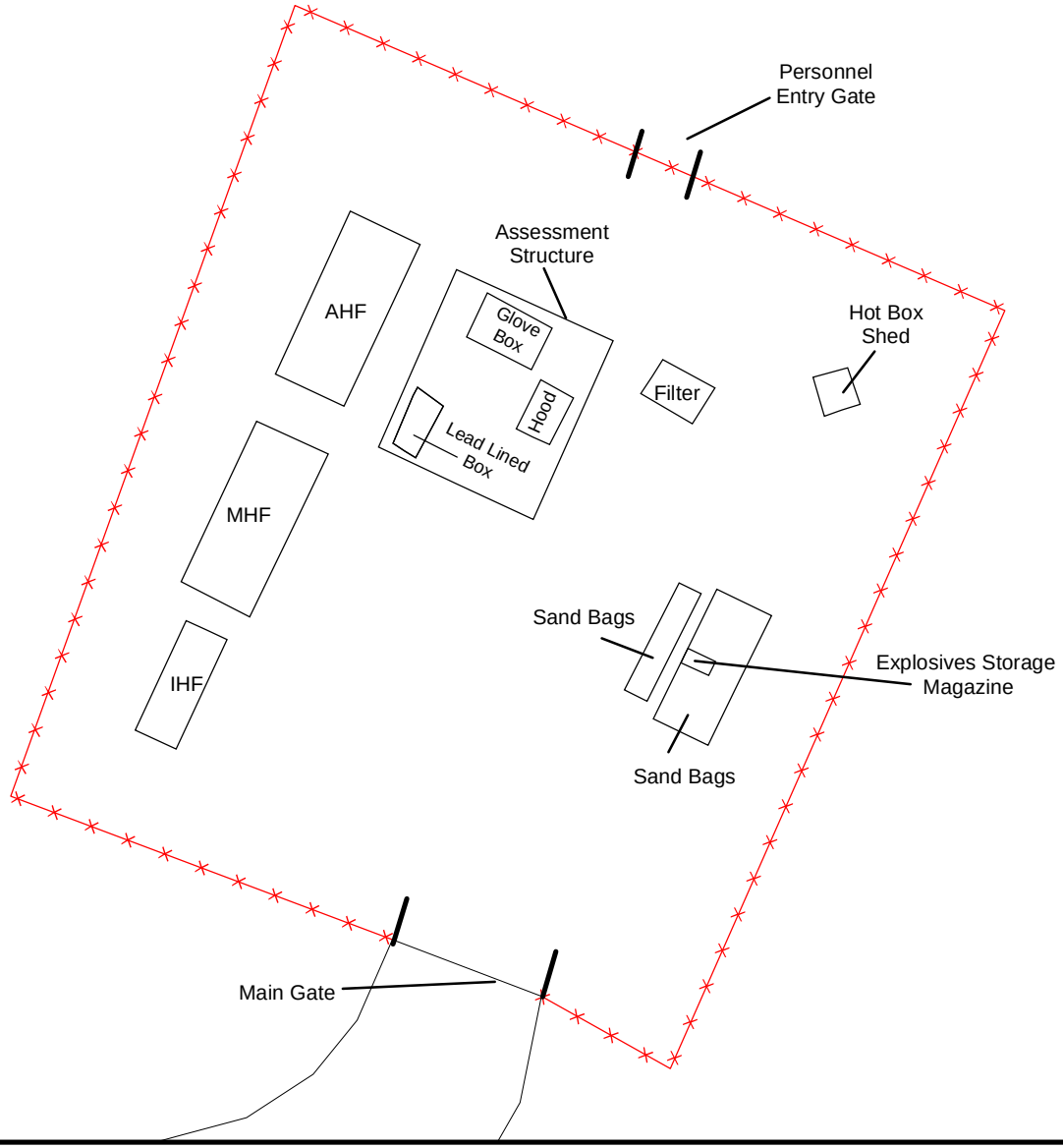

Figure 9-1
Federal Property Storage Area

Spring Valley Site-Wide
Washington, DC

Legend

- Fence
- Buildings
- Federal Property Storage Area Structures
- Road
- Dirt Road

IHF = Interim Holding Facility
AHF = Assessment Holding Facility
MHF = Munitions Assessment Review Board (MARB) Holding Facility

N
W E
S

25 12.5 0 25 Feet

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9.2.1.4 In this document, the term "IHF containers" will be used to refer to the IHF, AHF and MHF. The individual IHF container will be referred to as "IHF."

9.2.2 IHF Container Design and Construction Materials

9.2.2.1 The IHF containers are portable storage buildings designed to store RCWM. These buildings are approximately 24 feet long by 9 feet wide by 8 feet high. The weight and size of these buildings require them to be loaded and unloaded with a 20-ton crane.

9.2.2.2 The buildings are prefabricated, single-story modular units constructed of insulated metal panels and equipped with an integral leak-tight sump beneath the metal floor grating. Two double doors on the front of each unit provide for easy flow-through handling of containers. The facilities are climate-controlled and waterproofed to ensure the integrity of stored materials. Each unit is designed to withstand a Zone 4 seismic load. The facilities conform to generally accepted safety codes and standards, such as the National Fire Protection Association Codes, Uniform Building Codes, etc.

9.2.3 Magazine Design and Construction Materials

9.2.3.1 All retrieved non-RCWM MEC items that are acceptable to move but that may contain energetics will be stored in the Explosives Storage Magazine within the Federal Property Storage Area. This is an ATF portable Type II class magazine that has a professionally installed and inspected grounding protection system, and magazine construction is IAW DOD 6055.9 STD regulations. Each door is equipped with one of the following locks:

- Padlock, Key Operated, High Security 5 – Pin;
- Padlock, Key Operated, High Security 5 – Blade; or
- HI SHEAR LK1200, High Security Padlock.

9.2.3.2 In order to comply with safe distance requirements, a sand-filled barricade has been constructed IAW HNC-ED-CS-S-98-7. Details of this sand-filled barricade are provided in Appendix G.

9.2.3.3 The Explosives Storage Magazine is sited for storage of items with a total NEW not to exceed 17.6 pounds of 1.1D ammunition. Calculations to support this are provided in Appendix G of this plan. Q-D arcs for the Explosives Storage Magazine are discussed in Subchapter 9.4.3.

9.2.3.4 A running inventory of ammunition items stored in the Explosives Storage Magazine is maintained on site, pending disposal, to ensure that the explosives limits (17.6 pounds) are not exceeded.

9.3 FEDERAL PROPERTY STORAGE AREA OPERATIONS

9.3.1 Static Storage

9.3.1.1 The AHF, MHF, IHF, and the Explosives Storage Magazine are the only structures used for static storage.

9.3.1.2 The AHF is used for the storage of RCWM and suspected RCWM items until their disposition is determined or final assessment indicates the items are not RCWM. The AHF may also contain explosively configured non-RCWM rounds (i.e., 75 mm shrapnel rounds) until they are assessed. All items stored in the AHF will be packaged in MRCs.

9.3.1.3 The MHF will be used to store those items whose disposition is pending until the MARB has met, and may contain RCWM, suspected RCWM, and explosively configured non-RCWM filled items (i.e., 75 mm shrapnel rounds). All items stored in the MHF will be packaged in MRCs.

9.3.1.4 The IHF will contain RCWM items pending disposal or transport by the PMNSCM. All items stored in the IHF will be packaged in MRCs.

9.3.1.5 The Explosives Storage Magazine will contain items that have been determined not to contain RCWM, but that are suspected of containing energetics.

9.3.2 Assessment Operations

9.3.2.1 Assessment operations will be performed by TE. These operations will be IAW TE SOPs and Subchapter 3.8.14.

9.3.2.2 TE will use the Mobile Munitions Assessment System (MMAS) to perform X-ray and PINS assessments. The MMAS is a self-contained mobile laboratory with PINS and X-ray equipment.

9.3.2.3 The items to be assessed may be RCWM, suspect RCWM, and/or explosively configured non-RCWM items. Ordinarily, all items will remain inside the MRCs while the assessment activities are being performed. In certain specific cases, the items may be taken outside the MRC with prior approval from USAESCH for further assessment inside the Assessment Structure. Appropriate notification procedures and operational constraints (temperature, wind speed, etc.) will be implemented to meet the hazard distance requirements.

9.3.3 Unpackaging and Placement of Items Inside Explosives Storage Magazine

9.3.3.1 Items that have been found to have no detectable RCWM but that contain energetic material will be unpackaged from the MRCs and placed inside the Explosives Storage Magazine.

9.4 STORAGE AREA HAZARD ANALYSIS

9.4.0.1 This subchapter provides a discussion of the various hazards related to the operations at the Federal Property Storage Area. Discussions are provided on the MCEs, MGFD, and the various distances pertaining to the Federal Property Storage Area.

9.4.1 Expected Contents of IHF Containers

9.4.1.1 The IHF will be used to store items that are determined or suspected to be RCWM. These items will be packaged within MRCs. Some of these items (75 mm projectiles) may have explosive components, such as bursters. Based on this, the only items that may be stored in the IHF containers and that could have explosive components would be ordnance classified under the United Nations Organization (UNO) classification system as Hazard Division 1.2 Subdivision 2 (1.2.2).

9.4.1.2 Based on the worst-case projections for the amount and types of items to be recovered, the NEW of the IHF containers will be less than 0.078 pounds. This NEW is calculated by assuming an MCE of one item detonating in an MRC, with the MRC containing all primary fragments, and Table C9.T7, DoD 6055.9, General Comment (a), which states that the Q-D criteria for HD 1.2.2 items is based on the hazards from primary fragments.

9.4.1.3 The maximum amount of explosives in any one MRC will be 0.078 pounds of tetryl, which is present as a burster. The calculations in Appendix G indicate that no primary fragments will escape the MRC and, therefore, the Inhabited Building Distance (IBD) is established using the K40 distance (for blast IBD) for one round. There is no propagation from one MRC to another, so the maximum NEW to be used for siting each IHF container is 0.078 pounds. That amount will not be exceeded without approval of a change in this siting plan.

9.4.1.4 The types of chemical warfare agents that may be stored in the IHF containers are mustard (H) and lewisite (L).

9.4.2 Maximum Credible Event

9.4.2.1 The MCE is the maximum release of a chemical agent from a munition, bulk container, or process that could occur as a result of an unintended, unplanned, or accidental incident. The event must be realistic with reasonable probability of occurrence.

9.4.2.2 The MCE for operations at the Federal Property Storage Area is the instantaneous release of 0.01 pounds (1 percent of the contents) of mustard from an explosively configured 75 mm Mk II chemical projectile. The Hazard Zone Distance (1% Lethality Distance) associated with this MCE is included in Table 9.1. The 1% Lethality Distance is the distance at which the dosage from a MCE or actual agent release would be 150 mg-min/m^3 for mustard agent. For this MCE, the 1% Lethality Distance is 10 feet. The 1% Lethality Distance is not applicable to the Explosives Storage Magazine because RCWM will not be stored in the magazine.

Table 9.1
RCWM Hazard Zone Distances

Operation/Item/Filler	1% Lethality Distance
Static Storage and Assessment Activities, 75 mm Mk II chemical projectile (1)	3 meters / 10 feet

Note 1 Hazard zone distances are calculated based on a wind speed of 1 m/s, an atmospheric stability factor of D, maximum temperature of 95°F, and instantaneous release of 0.01 lbs of mustard agent.

9.4.3 IHF and Explosives Storage Magazine Hazard Zone Calculations

9.4.3.1 Table 9.2 lists additional hazard zone Q-D arcs. Table 9.3 lists distances of relevant site features from the IHF Containers/Assessment Structure and Explosives Storage Magazine.

9.4.3.2 Figure 9-2 shows the Q-D arcs around the IHF containers and the Assessment Structure. Figure 9-3 shows the Explosives Storage Magazine Q-D arcs. Figures 9-4a and 9-4b show relevant site distance features.

Table 9.2
Additional Hazard Zone Q-D Arcs

Distance Arc	Distances (feet):	
	IHF Containers/ Assessment Structure	Explosives Storage Magazine
IBD	17	220
Public Traffic Route (PTR) Distance	10	132
Intra-line Distance (ILD)	8 (K18)	16 (K9)
1% Lethality Distance (1)	10	NA
PAED (Greater of 1% Lethality Distance or IBD)	17	220
EZ Distance (2)	220 feet	

Note 1 Hazard zone distances are calculated based on a wind speed of 1 meter per second, an atmospheric stability factor of D, maximum temperature of 95 degrees Fahrenheit, and instantaneous release of 0.01 lbs of mustard agent from a MRC.

Note 2 When items are stored in the Federal Property Storage Area, the PAED from the Explosives Storage Magazine will be used as the EZ Distance for the Federal Property Storage Area, as it provides the most conservative distance.

Table 9.3
Distances from IHF Containers/Assessment Structure and Explosives Storage Magazine

Feature or Facility	Distance (feet) from:	
	IHF Containers/ Assessment Structure	Explosives Storage Magazine
Distance to IHF Containers/Assessment Structure	NA	20 [a]
Distance to Explosives Storage Magazine	20 [a]	NA
Sibley Hospital (IBD)	763 [b]	820 [b]
Federal Property Boundary	325 [b]	270 [b]
Sibley Hospital Parking Lot (PTR)	442 [b]	494 [b]
Little Falls Road (PTR)	577 [b]	638 [b]
Dalecarlia Parkway (PTR)	367 [b]	340 [b]
Office Trailers (IBD)	416 [b]	478 [b]
Power distribution lines (adjacent to Office Trailers)	401 [b]	468 [b]

Note a The distance from the Assessment Structure to the Explosives Storage Magazine

Note b These distances are measured from the feature or facility to either the closest IHF container or Assessment Structure, or the Explosives Storage Magazine, as appropriate.

9.4.3.3 Primary Fragmentation Distance

9.4.3.3.1 The MGFD is a 75 mm Mk II chemical projectile with an explosive burster, which has a maximum fragmentation distance of 1,194 feet (364 meters). The rounds will be placed in MRCs that provide a 22 percent safety factor against perforation by fragments and, therefore, the primary fragments will be contained by the MRC (Appendix G). Consequently, all Q-D arcs for the IHF are based on overpressure. Additional information on fragmentation of the MGFD is provided in Appendix G.

9.4.3.4 Inhabited Building Distance

9.4.3.4.1 The IBD for the IHF containers and the Assessment Structure are based on blast overpressure. Based on the K40 distance, the IBDs for the IHF containers and Assessment Structure are 17 feet.

9.4.3.4.2 The IBD for the Explosives Storage Magazine is 220 feet, based on a NEW of 17.6 pounds with a 3 feet sand-filled barricade on all sides.

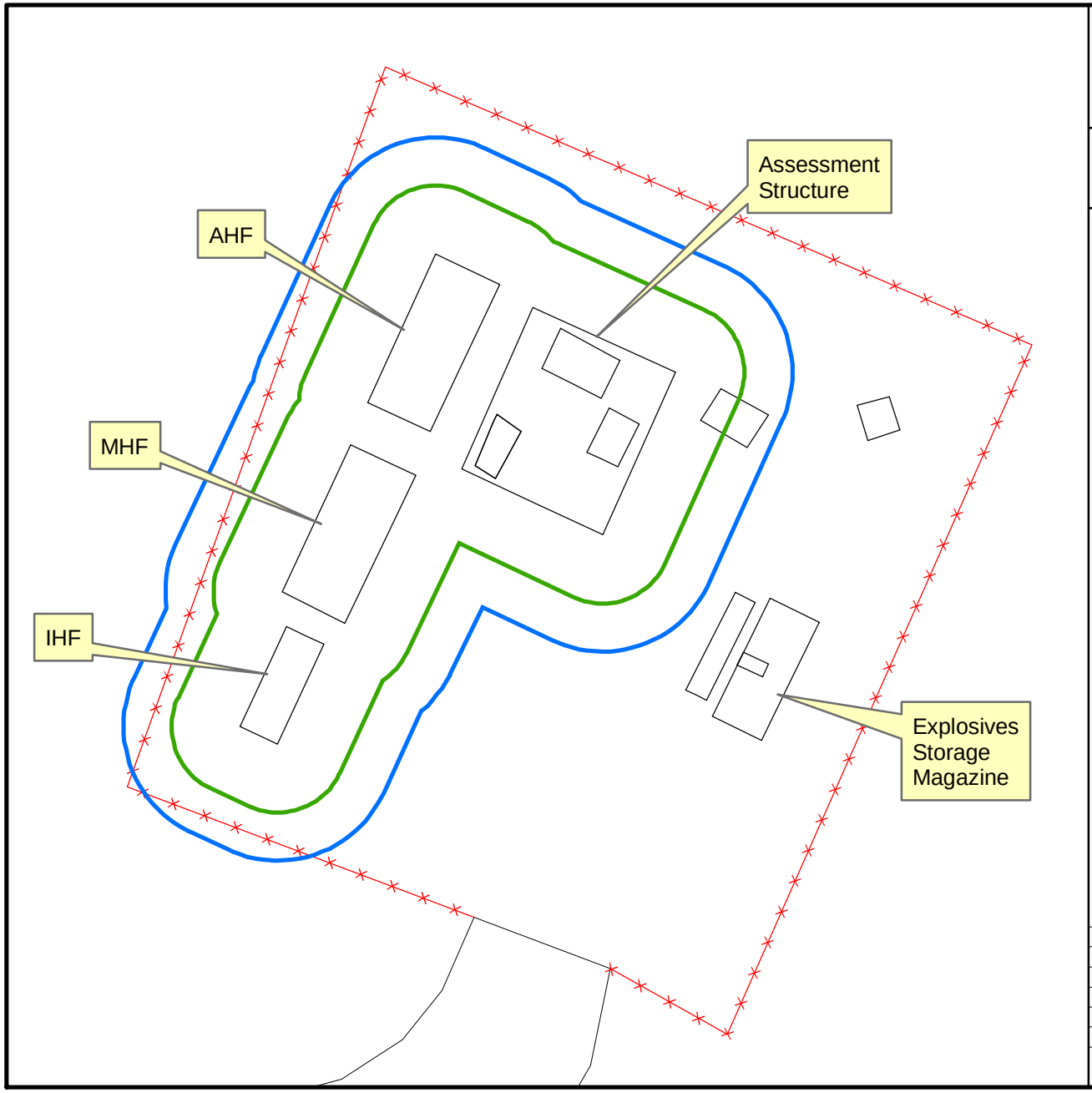

Figure 9-2
Federal Property Storage Area
IHF QD Arcs

Spring Valley Site-Wide
Washington, DC

Legend

IHF Distances

- IBD & PAED (17ft)
- 1% Lethality & PTR (10ft)

- Fence
- Buildings
- Federal Property Storage Area Structures
- Road
- Dirt Road

N
W E
S

20 10 0 20 Feet

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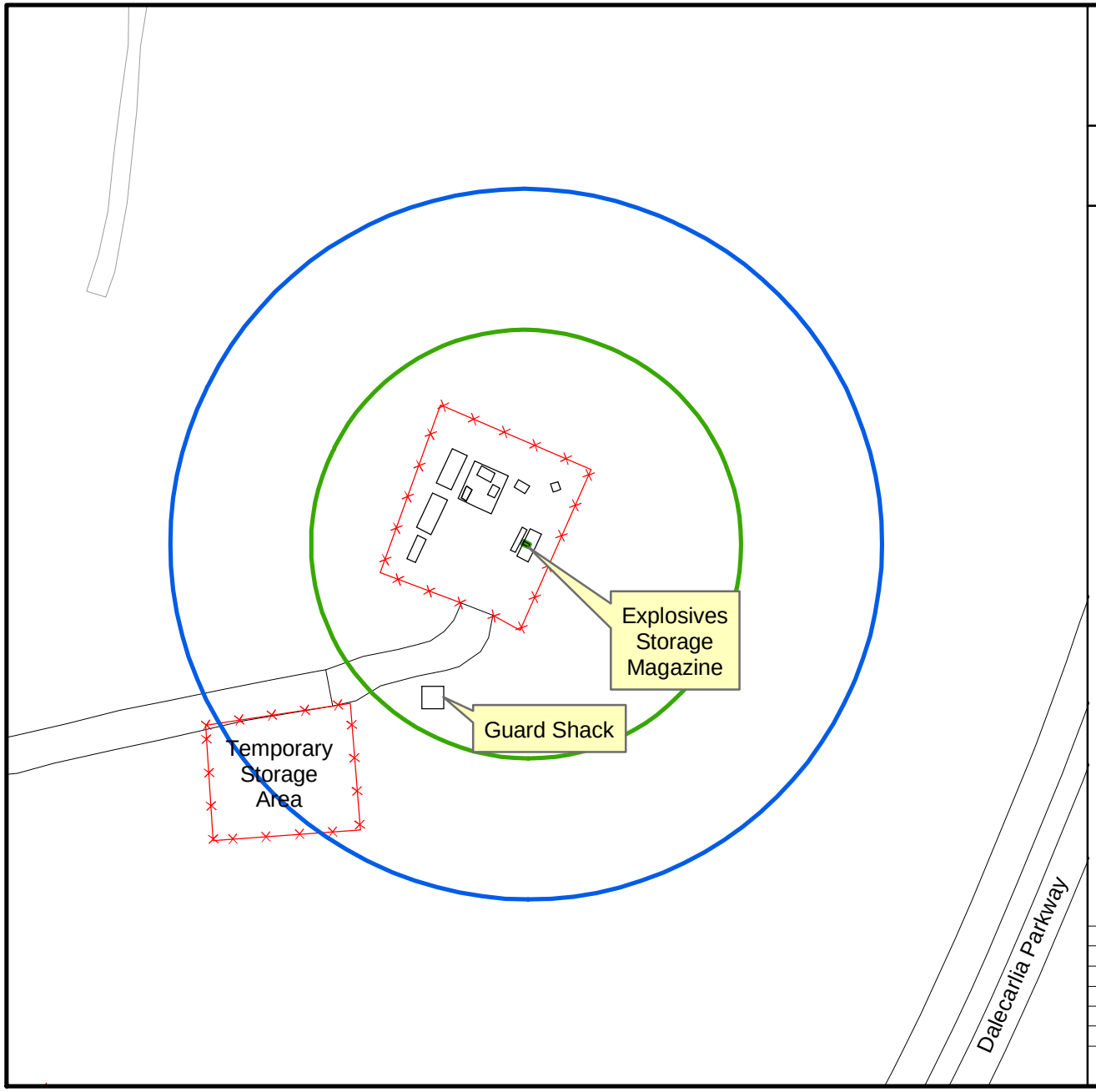

Figure 9-3
Federal Property Storage Area
Explosives Storage Magazine
QD Arcs

Spring Valley Site-Wide
Washington, DC

Legend

- Federal Property Storage Area Structures
- Fence
- Road
- Dirt Road

Magazine Distances

- IBD (220 ft)
- PTR (132 ft)

N W E S

100 50 0 100 Feet

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Figure Number:	9-3
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9.4.3.4.3 The SVFUDS Federal Property office trailers and Sibley Hospital are outside the IBD for the IHF containers, the Assessment Structure and the Explosives Storage Magazine.

9.4.3.5 Public Traffic Routes and Power Distribution

9.4.3.5.1 The Public Traffic Route (PTR) distance for the IHF containers and the Assessment Structure is based on overpressure. Based on the K24 distance, the proposed PTR distance for the IHF containers and the Assessment Structure is 10 feet (Figure 9-2). The closest public traffic route to the IHF containers is Dalecarlia Parkway, which is located at a distance of about 395 feet from the nearest IHF container, and about 367 feet from the Assessment Structure (Figure 9-4a). Access to the Federal Property Storage Area is via the main access to the SVFUDS Federal Property, which is restricted.

9.4.3.5.2 The PTR distance for the Explosives Storage Magazine is 60 percent of the IBD (Appendix G). Therefore, the PTR distance for the Explosives Storage Magazine is 132 feet (Figure 9-3). The closest public traffic route to the Explosives Storage Magazine is Dalecarlia Parkway, which is located at a distance of about 340 feet (Figure 9-4b).

9.4.3.5.3 The closest power transmission lines, distribution lines, or transformer stations to the Federal Property Storage Area are at a distance greater than 500 feet. Only the power supply feed to the Federal Property Storage Area and to the Federal Property office trailers is located on site.

9.4.3.6 Public Access Exclusion Distance

9.4.3.6.1 For the IHF, the Public Access Exclusion Distance (PAED) is taken as the greater of the 1% Lethality Distance or the IBD. Therefore the IBD of 17 feet will be used as the PAED (Figure 9-2), since it is greater than the 1% Lethality Distance of 10 feet.

9.4.3.6.2 Personnel not directly associated with the chemical operations are not to be allowed within the PAED. Personnel who have a means of evacuation, a briefing on evacuation procedures, and access to a warning system (automated, radios, or manual) that would enable them to escape prior to agent exposure may be allowed within the PAED in lieu of absolute exclusion.

9.4.3.7 Exclusion Zone Distance

9.4.3.7.1 The Exclusion Zone Distance for the Federal Property Storage Area will be the IBD measured from the IHF containers since this provides the most conservative distance. The IBD for the IHF containers is 220 feet (Table 9.2), and the public will not be allowed within this radius when items are stored in the IHF containers.

9.4.3.8 Intra-line Distance

9.4.3.8.1 The Intra-line Distance (ILD) is applicable to separation of related operations, facilities, and support facilities within an operating area such as maintenance buildings, change houses, lunchrooms, field offices, laboratories, laundries, and magazines. Based on the NEW

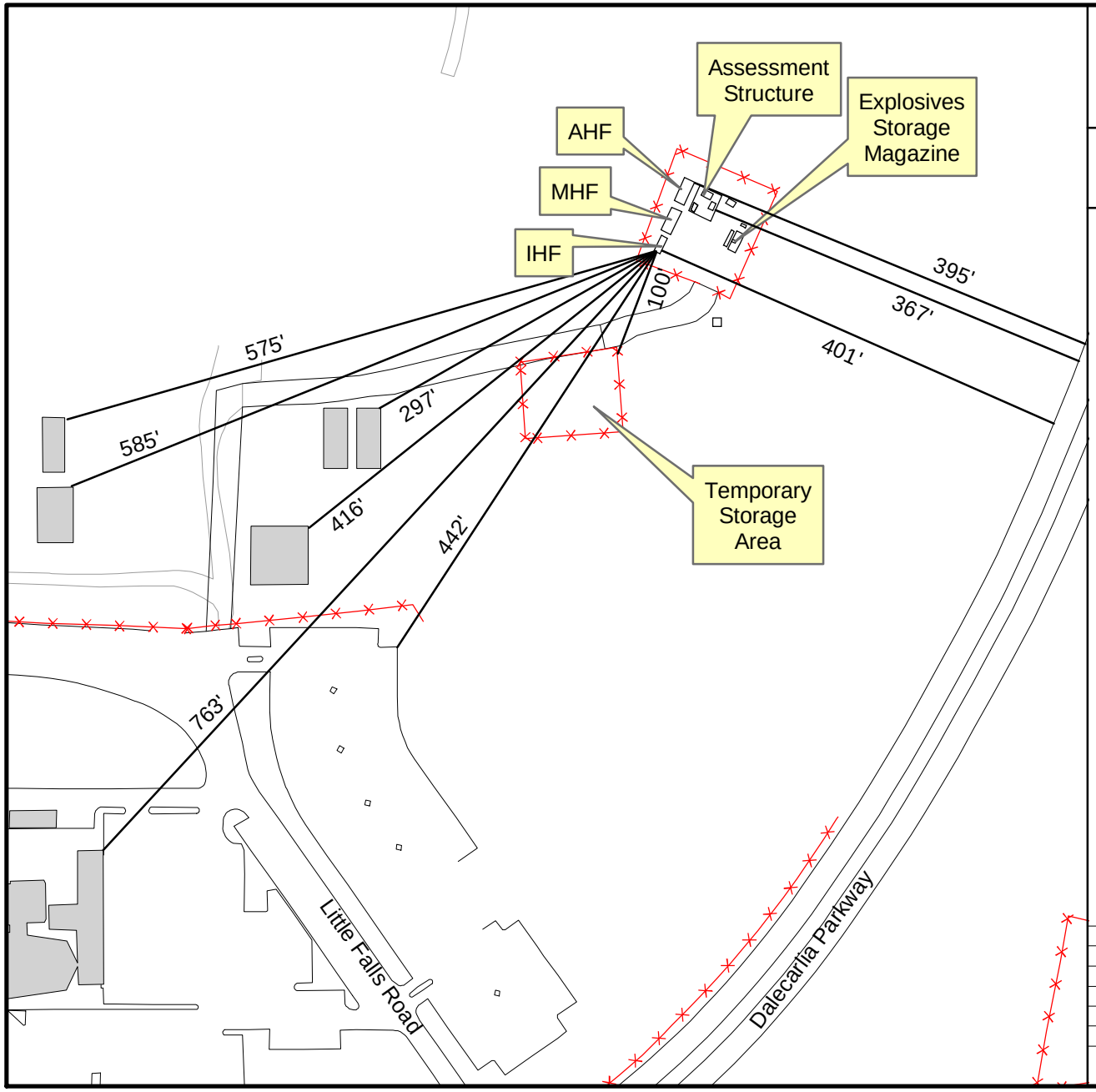

Figure 9-4a

Relevant Site Feature Distances from IHF Containers

Spring Valley Site-Wide
Washington, DC

Legend

- Federal Property Storage Area Structures
- Fence
- Buildings
- Road
- Dirt Road

Note:
All inhabited buidings are located outside the PAED for the IHF containers (43 feet) and the IBD for the Explosives Storage Magazine (220 feet).

N W E S

150 75 0 150 Feet

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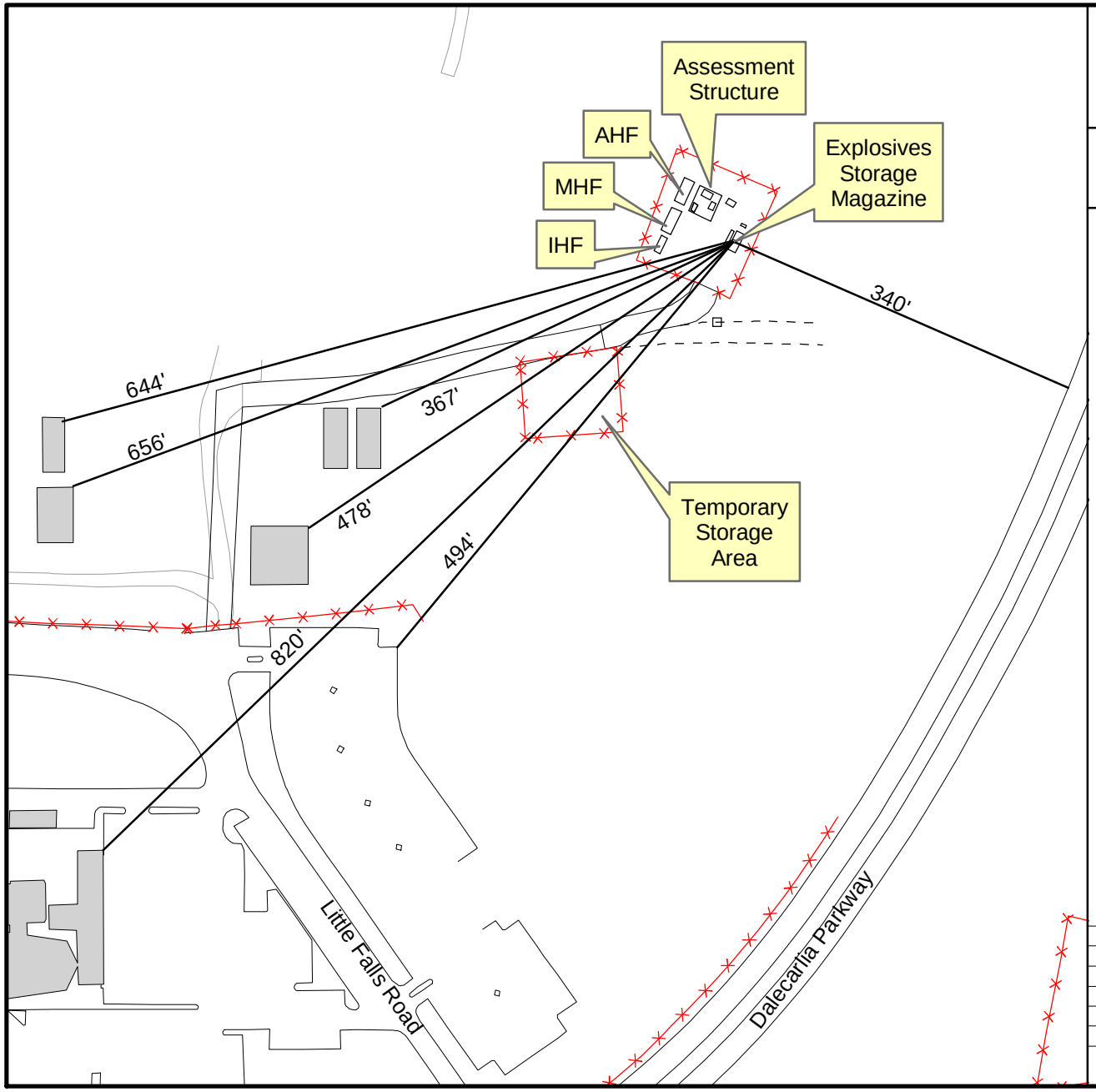

Figure 9-4b
Relevant Site Feature Distances from Explosives Storage Magazine

Spring Valley Site-Wide
Washington, DC

Legend

- Federal Property Storage Area Structures
- Fence
- Buildings
- Road
- Dirt Road

Note:
All inhabited buildings are located outside the PAED for the IHF containers (43 feet) and the IBD for the Explosives Storage Magazine (220 feet).

N
W E
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150 75 0 150 Feet

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and hazard division of the MGFD that could be stored in the facilities and the K18 distance, the ILD for the IHF containers will be 8 feet. The ILD for the Explosives Storage Magazine is 16 feet. The calculations for overpressure (PSI-pounds per square inch) are located in Appendix G.

9.4.3.8.2 The inter-magazine distance between a non-barricaded aboveground magazine (IHF container) and a barricaded magazine (Explosives Storage Magazine) is 16 feet, based on the K6 distance for the Explosives Storage Magazine. The closest IHF container (the MHF) is 50 feet from the magazine. The Assessment Structure is about 20 feet from the magazine (Figure 9-4a).

9.4.3.8.3 All assessment operations at the Federal Property Storage Area, the Assessment Structure, and the respective magazines are located outside the required intra-line distances.

9.4.4 Assessment Activities

9.4.4.1 Assessment of RCWM and MEC items will be performed by TE. During assessment activities, only TE personnel participating in the assessment will be present in the Assessment Structure. The number of TE personnel performing the assessment is listed in Table 9.4. All non-essential personnel will remain outside the PAED during assessment activities.

Table 9.4
Typical Personnel Requirements for Assessment Activities

Assessment Activity	Number of Personnel [1, 2]
MMAS	2
PINS	3
X-ray	3
Packaging/Transfer	4

Note 1 At all times, a minimum of two people will be involved in all activities for safety purposes.

Note 2 Personnel requirements will vary according to site-specific needs.

9.5 IHF USE AND OCCUPANCY

9.5.1 IHF Procedures

9.5.1.1 The IHF containers will be used to store MRCs containing RCWM, suspect RCWM, and other items (e.g., glassware or ceramic containers) potentially containing chemical agents. Only sealed MRCs will be stored in the IHF containers. The placement and monitoring of RCWM in the IHF containers will be handled by Air Monitoring Team. Once RCWM is stored in the IHF containers, air monitoring team personnel wearing the appropriate protective clothing

will conduct first entry monitoring prior to entering the IHF containers. The procedures and requirements for first entry monitoring for CA are described in the Air Monitoring and Sampling Plans (Appendix J). If required, first entry monitoring for arsine will be performed by TE or ECBC using the procedures described in the SAP (Appendix E). Facilities for decontamination, showers, and clothes changing will be provided in the Support Zone.

9.5.2 IHF Uses

9.5.2.1 The first container, the AHF, is used to hold items while they are being assessed. The second container, the MHF, is used to hold items before they go before the MARB. The third container, the IHF, houses potential RCWM items, prior to their disposal on-site or off-site by PMNSCM.

9.5.3 Personnel Entry

9.5.3.1 Personnel in the Federal Property Storage Area will be kept to a minimum when items are stored in the IHF area. When personnel are not working in the IHF area, all IHF containers and the gate in the security fence will be locked. Prior to initiating inspection or moving of MRCs inside the IHF containers, all non-essential personnel will be excluded from the area within the PAED.

9.6 SECURITY

9.6.0.1 The IHF will have the following physical security requirements to reduce potential risks associated with the storage of RCWM at the SVFUDS during the site-wide intrusive investigation. The SVFUDS Operations and Information Security Plan is maintained at the Federal Property at all times.

9.6.1 Guard Force

9.6.1.1 An armed guard, arranged for by CENAB, will be present at the main gate of the Federal Property 24 hours per day, seven days per week when items are placed within the Federal Property Storage Area. In addition, an intrusion detection system is installed at the Federal Property Storage Area. The guard can monitor the status of the intrusion detection system via a screen in the guard shack. If any of the containers are opened or if there is motion inside, an audible alarm sounds and the guard can view the status on the monitor.

9.6.2 Barriers

9.6.2.1 A chain link fence surrounds the Federal Property Storage Area. This fence is constructed of 9-gauge (galvanized steel) wire with 2-inch square mesh. It extends 6 feet high, has a 12-foot clear zone, is constructed IAW commercial practice, and meets the requirements of this specification. For safety purposes, access gates to the Federal Property Storage Area will be left open when workers are within the area. At all other times the gates will be closed and locked. When RCWM is stored in the Federal Property Storage Area, security will be maintained IAW the Physical Security Plan.

9.6.3 Lighting

9.6.3.1 Lights mounted on the outside of the IHF containers provide security lighting.

9.6.4 Signs

9.6.4.1 The fence surrounding the Federal Property Storage Area is posted with signs that indicate that the area is restricted and dangerous, and that unauthorized entry is illegal. These signs are approximately 18 by 24 inches and are legible from a distance of 25 feet. A large sign (approximately 4 by 6 feet) is posted at the gate to the Federal Property Storage Area that reads "Danger - Unauthorized Personnel Keep Out." Similar signs are also posted at other locations on the perimeter fence in sufficient numbers to be seen from any approach. Placards will be placed on the front of the IHF containers to identify the agent or agents being stored inside ("H" for mustard and "L" for lewisite), or "SA" if an arsine round is stored.

9.6.5 Access Control

9.6.5.1 During the receipt and storage of RCWM in the Federal Property Storage Area, access controls described in the Operations and Information Security Plan will be implemented in the vicinity so that direct access to RCWM will be limited to TE.

9.6.6 Locks and Keys

9.6.6.1 The gate to the Federal Property Storage Area, the IHF container doors, and the Explosives Storage Magazine door will be secured with approved high-security locks. TE will maintain control of the keys to the IHF containers while RCWM is stored inside them. The USAESCH Safety Specialist will maintain control of keys to the Federal Property Storage Area and the Explosives Storage Magazine.

9.6.7 Containment

9.6.7.1 RCWM will be packaged in MRCs or overpacks designed to contain both liquid and vapor contents. Secondary containment is provided as part of the IHF design.

9.7 EVACUATION/NOTIFICATION

9.7.0.1 No non-essential personnel or non-project personnel are to be permitted within the PAED unless they are escorted by project personnel. All personnel will be briefed on emergency evacuation procedures as well as emergency signals that indicate a possible release of agent to the environment.

9.7.1 Evacuation in the Event of a Release

9.7.1.1 Upon discovery that chemical agent may have been released from an IHF container, the evacuation procedures will be implemented. These procedures can be found in the CENAB Public Protection Plan.

CHAPTER 10
HTW-CONTAMINATED SOIL EXCAVATION PLAN

10.1 OVERVIEW

10.1.0.1 Excavation of soil contaminated with HTW will be closely coordinated with the anomaly investigations. After the anomaly has been identified and removed, the HTW-contaminated soil associated with the anomaly may also be removed as part of the intrusive investigation. HTW-contaminated soil from grids identified to have arsenic at concentrations above 20 mg/kg may also be removed as part of the intrusive investigation.

10.2 EXCAVATION PROCEDURES

10.2.0.1 Soil will be excavated in grids based on the grid size used to delineate contamination.

10.2.0.2 Each grid will be excavated to an initial minimum depth of 2 feet below ground surface if there is no previous soil boring information. At some locations, this initial excavation depth may be greater than two feet based on the depth of arsenic contamination identified during previous sampling efforts.

10.2.0.3 Grids will be excavated using either hand or mechanical methods as described in the following paragraphs. Excavation procedures for grids that include large trees will be identified after the pre-sampling efforts described in Subchapter 10.3.1 are complete. Excavation procedures for grids centered on historical soil borings will be identified after the pre-sampling efforts described in Subchapter 10.3.2 are complete.

10.2.0.4 Hand excavation will be employed around areas that are not accessible to the prescribed depth with either light or heavy mechanical equipment, such as along utility lines, communication lines, fences, driveways, walls and other structures.

10.2.0.5 Mechanical excavation via heavy equipment will be utilized in open areas of the property to excavate contaminated soils, transport the soil to the disposal piles, maintain the disposal piles, and load waste hauling vehicles. Light equipment will consist of a mini-excavator and a skid steer loader and will be used to supplement the heavy equipment and hand digging excavations. Light equipment will be used in areas where the larger excavators and loaders cannot maneuver or where the weight of the heavy equipment could damage or destroy existing structures.

10.2.0.6 Necessary equipment will be kept on hand during excavation of grids identified as containing utility lines, in the event that an underground line is inadvertently damaged. For example, water from a water pipe may come into contact with arsenic-contaminated soil within the grids and, therefore, potentially become contaminated. If this occurs, water from the pipe

will be diverted from potentially contaminated areas and any water that is potentially contaminated as a result of coming into contact with contaminated soil will be temporarily stored and analyzed IAW D.C. Water and Sewer Authority requirements to determine appropriate disposition procedures.

10.2.0.7 Due to the limited depth of excavations along building foundations, it is not anticipated that the excavations will undermine the footings and foundations of the structures. Therefore, it is not expected that bracing and shoring will be required. However, if the excavations along structures go deeper and require support, the walls will be shored and braced by an angled kick back support method using timbers, lumber, and plywood.

10.2.0.8 A UXO Technician will observe the excavation activities. Although no MEC/RCWM are expected in the excavation areas, a Schonstedt magnetometer will be used prior to excavation. A Schonstedt magnetometer and visual screening will also be used to screen soil removed from the grids to ensure that no MEC/RCWM are inadvertently included in the material to be disposed. If any suspect MEC/RCWM items are encountered during excavation activities, the Low Probability MEC/RCWM Contingency Plan will be implemented (Subchapter 16.13 of the SSHP, which is Attachment 1 to Appendix D of this WP).

10.2.0.9 Contaminated soil will be transported to a disposal pile(s) at a suitable location. This location will be chosen based on vehicle accessibility and its limited impact on traffic. The disposal pile(s) will be placed on geotextile fabric and will also be covered with geotextile fabric or polyethylene sheeting to prevent the wind from spreading the soil. Silt fences or hay bales will be installed around the disposal pile(s) to control run-off from the piles. Once all excavated soil has been loaded from the disposal pile for transportation to the disposal facility, the underlying soil will be excavated to a depth of 6 inches below ground surface and loaded for disposal as well. Once the underlying soil has been excavated, samples will be collected at the base of the excavation at a rate of one sample per 400 square feet of area. The actual number of samples will depend on the aerial extent used for the disposal pile. Subchapter 10.6 of this plan provides further details on the transportation and disposal plans.

10.2.0.10 Loading and disposal of contaminated soil will begin after a sufficient amount is accumulated or at the end of the excavation. Transportation and disposal will continue concurrently with the excavation to ensure that the size of the disposal pile remains manageable. A hydraulic excavator or loader will load soil from the disposal pile to a waste-hauling vehicle. Geotextile fabric will be placed in the loading area to contain any spillage. The loading pad will be swept at the end of each workday.

10.3 CONFIRMATION SAMPLING

10.3.0.1 Confirmation sampling and subsequent analyses for arsenic will be carried out IAW the SAP (Appendix E).

10.3.1 Pre-sampling Procedures for Grids with Large Trees

10.3.1.1 In an effort to preserve existing trees in a grid area, each tree and its roots will be avoided as much as possible. Actual sample locations will be placed within the grid in areas that

are not impacted by the tree or tree roots. If a proposed sample location is obstructed by the tree or a tree root, the sample location will be relocated if possible. More than one confirmation sample will be collected in these grids to better delineate arsenic-contaminated soils. In this way, any necessary soil removal in these grids can be focused to minimize damage to trees and their root systems. Samples will be collected using manual sampling techniques rather than with mechanical equipment.

10.3.1.2 Grid confirmation samples will be collected at distances of 3, 6, and 9 feet from the tree trunk in concentric circles. For example, if a tree is located in the center of a grid, samples will be collected along a line drawn from the center of the tree towards each grid corner at distances of 3, 6, and 9 feet from the exterior of the tree trunk (resulting in 12 samples). If a tree is located in the corner of a grid, samples will be collected along a line drawn from the center of the tree towards the center of the grid at distances of 3, 6, and 9 feet from the tree trunk (resulting in a total of 3 samples). These samples will be collected at a depth of 6 inches below ground surface. The actual number of samples will be determined in consultation with the USACE representative in the field based on actual field conditions in each grid. The results for these samples will be evaluated and presented to the USEPA, DDOE, and other stakeholders as appropriate to determine further action. As recommended by USEPA and agreed to by DDOE, the USEPA emergency removal action level of 43mg/kg arsenic will be considered for these grids to save as many trees as possible. This is a residential risk-based removal guideline applicable to surface soil.

10.3.1.3 Sidewall confirmation samples will be collected from each sidewall that borders a grid identified during previous sampling with an arsenic concentration less than or equal to 20 mg/kg arsenic. The sidewall samples will be collected 6 inches below the surface at the midpoint of the sidewall. The results of these samples will be compared to the remediation endpoint of 20 mg/kg arsenic. If a sidewall sample exceeds the remediation endpoint, another surface sample will be collected five feet away from the sidewall sample. A grid confirmation sample will also be collected in the extended excavation at a depth corresponding to the initial depth of excavation (e.g., 2 feet). If this grid confirmation sample exceeds the remediation endpoint of 20 mg/kg arsenic, USACE will be notified. Additional samples will be collected at a deeper interval in the extended excavation (minimum one foot deeper) until the remediation endpoint is met. Depending on the magnitude of the exceedance, additional soil samples may be collected at increments greater than one foot if directed by USACE. Once the remediation endpoint is met, additional sidewall samples will be collected from the midpoint of each sidewall 6 inches above the final base of the excavation. This process will be repeated until the confirmation sample does not exceed the remediation endpoint. The grid will then be excavated to the depth of the clean sample(s) and immediately backfilled with approved material.

10.3.2 Confirmation Sampling Procedures for Grids Centered on Soil Borings

10.3.2.1 Grids centered on soil boring locations will require the use of a Schonstedt magnetometer during pre-sampling and excavation activities to screen for potential underground features such as utilities. The magnetometer will be used at every 2-foot interval and any underground features detected by the magnetometer will be avoided. Grid confirmation samples will be collected from the center of the grid at the base of the initial excavation depths that are one foot below the depth at which the arsenic exceedance was reported in the respective boring.

In addition to the grid confirmation sample, sidewall samples will be collected from the midpoint of each wall at a depth 1.5 feet above the initial depth of the excavation. This depth will correspond to the depth of the original boring sample that exceeded 20 mg/kg arsenic in previous sampling. These samples will be collected using mechanical equipment (e.g., mini-excavator). Soil excavated while collecting the samples will be placed in the grid area temporarily and will be replaced in the hole following collection of the samples.

10.3.2.2 If a grid confirmation sample from one of these grids exceeds the remediation endpoint of 20 mg/kg arsenic, USACE will be notified. Additional samples will be collected at a deeper interval (minimum one-foot deeper) until the remediation endpoint is met. Depending on the magnitude of the exceedance, however, additional soil samples may be collected at increments greater than one foot if directed by USACE. Once the remediation endpoint is met, sidewall samples will be collected from the midpoint of each sidewall 6 inches above the final base of the excavation.

10.3.2.3 If a sidewall sample exceeds the remediation endpoint, another sample will be collected at the same depth 5 feet away from the sidewall sample. A grid confirmation sample will also be collected at a depth corresponding to the initial depth of excavation, which is 12.5 feet from the original grid confirmation sample (this will be the center of the extended excavation). This process will be repeated until the remediation endpoint is achieved.

10.3.2.4 Once the grid confirmation samples and sidewall samples meet the remediation endpoint, the grid will be excavated to the depth of the clean sample(s) and backfilled.

10.3.3 Confirmation Sampling in the Excavated Grids

10.3.3.1 Soil samples will be collected from the center of the bottom of each 20 by 20 foot grid square prior to or after 2 feet of soil have been removed. The confirmation samples will be compared to the remediation endpoint of 20 mg/kg arsenic.

10.3.3.2 If a grid confirmation sample exceeds the remediation endpoint of 20 mg/kg arsenic, USACE will be notified. Additional soil will be excavated from the grid in minimum one-foot increments until the remediation endpoint is met. Depending on the magnitude of the exceedance, soil may be removed in increments greater than one foot if directed by USACE. Following removal of additional soil, another grid confirmation sample will be collected. This process will be repeated until the confirmation sample does not exceed the remediation endpoint.

10.3.3.3 Soil samples will be collected from each grid sidewall that borders a grid with an arsenic sample result that was less than or equal to 20 mg/kg during previous sampling efforts. The sidewall samples will be collected from the midpoint of the sidewall at a depth of 6 inches below ground surface to correlate with the RI/FS sample depth.

10.3.3.4 If a grid is excavated deeper than 2 feet based on the grid confirmation sample results, an additional sidewall sample will be collected from the midpoint of the sidewall at a depth of 6 inches above the final base of the excavation.

10.3.3.5 If a sidewall sample exceeds the remediation endpoint of 20 mg/kg arsenic, the excavation will be extended laterally for a distance of 5 feet. Three confirmatory sidewall samples will be collected at the midpoint of each sidewall at a depth of 6 inches below ground surface and one confirmatory sample will be collected at the base of the extended excavation.

10.4 BACKFILL AND SITE RESTORATION

10.4.0.1 Backfill and Site Restoration will be performed IAW Subchapter 3.8.1.8.

10.5 SEDIMENT AND EROSION CONTROL

10.5.1 Run-off and Run-on Control

10.5.1.1 Erosion and sediment controls will be implemented prior to soil removal. Silt fences, hay bales, and/or other sediment traps will be installed down gradient of the excavation areas to trap any sediment and prevent run-off from the site into the surrounding areas according to the SSWP.

10.5.1.2 Surface drainage ditches may be utilized to carry water around work areas and prevent run-on.

10.5.1.3 Disposal piles constructed to store excavated soil prior to shipment will be covered with geotextile fabric or polyethylene sheeting when not in use. Silt fences will be placed around the disposal piles and sheet polyethylene and jute mat netting will be used as required to control erosion and run-off.

10.5.2 Dust Control

10.5.2.1 The road system utilized by waste hauling vehicles and any other paved areas that are used during the workday will be monitored for visible surface dust. If necessary, affected areas will be cleaned and swept at the close of every workday to control the migration of fugitive dust emissions from the work site. The disposal soil pile will be covered with geotextile fabric or polyethylene sheeting to prevent the wind from spreading the soil. If excavation and loading activities result in visible dust conditions in the breathing zone (e.g., a dust cloud), dust suppression with water will be instituted. The water will be sprayed from a water truck in a manner that does not create pooling. Air monitoring for dust and arsenic will be conducted downwind of excavation activities. Separate dust monitoring and arsenic sampling devices will be placed downwind of each excavation team. The SSHP (Attachment 1 to Appendix D of this document) describes specific air monitoring procedures.

10.6 TRANSPORTATION AND DISPOSAL PLAN

10.6.1 Soil Transportation

10.6.1.1 Covered dump trucks or roll offs will be used to transport the excavated soil to the designated disposal facilities.

10.6.1.2 It is anticipated that excavated arsenic contaminated soils will be characterized as RCRA non-hazardous waste based upon previous sampling. Non-hazardous waste manifests will be utilized as shipping documents for this non-hazardous waste. Completed copies of the appropriate shipping documents will be provided to the CENAB Project Manager or designee for review and signature.

10.6.1.3 The excavated soil will be loaded into covered, watertight, dump trucks. Dump trucks will be scheduled based upon the quantity of excavated soil in the disposal piles. An excavator will load the soil from the disposal piles into the dump truck. Once the dump truck is loaded, the driver will be provided with the appropriate shipping documents and released for transport to the selected disposal facility.

10.6.2 Waste Disposal

10.6.2.1 Approximately one sample per 1,000 tons of soil excavated will be collected for disposal characterization. The disposal sample will be a composite sample from various locations. Disposal characterization sampling locations will be determined using geographical or projected "work areas." Soil will be collected from 0 to 6 inches depth for the composite sample using stainless steel trowels and bowls. The composite samples will be collected prior to commencing excavation activities in order to obtain disposal facility approvals, and therefore avoid delays in the transportation of excavated soil. Disposal characterization samples will be analyzed for the parameters as described in the SAP (Appendix E).

10.6.2.2 Analytical turnaround times will be expedited for soil disposal characterization samples to minimize delays in obtaining facility waste approvals. It is expected that the soil will be characterized as RCRA non-hazardous waste.

10.6.2.3 The non-hazardous waste will be direct land disposed at a permitted RCRA Subtitle D land disposal facility (sanitary landfill). No treatment or special handling will be required for excavated soil with concentrations of contaminants below the RCRA limits.

10.6.2.4 Wastewater from personnel and equipment decontamination will be generated during the project. Wastewater collected on the decontamination pad will be pumped into 55-gallon polyethylene drums for storage. Once a sufficient number of drums have been generated, a sample will be collected using a disposable bailer and analyzed for the disposal characterization parameters shown in the SAP (Appendix E).

10.6.2.5 It is anticipated that this waste stream will be classified as RCRA non-hazardous waste. Treatment and disposal of the waste stream will be performed at a waste treatment facility permitted and licensed to accept the generated wastewater. If possible, the drummed waste will be stored until a sufficient quantity (approximately 80 drums) has been generated and the wastewater will be pumped into a tanker for bulk shipment to a treatment and disposal facility.

10.6.2.6 One aqueous disposal characterization sample will be collected for every 1,000 gallons to address disposal of decontamination water or other aqueous investigation-derived waste generated during excavation operations.

10.6.2.7 Disposable PPE (e.g., sampling gloves and rubber booties) will be containerized in 55-gallon polyethylene drums staged in the CRZ for storage. PPE will be disposed appropriately based on associated soil sampling results.

CHAPTER 11
PHYSICAL SECURITY PLAN FOR RCWM

11.0.0.1 For security purposes the Physical Security Plan for RCWM for this project is not included in this document. The Physical Security Plan for RCWM is maintained by CENAB.

CHAPTER 12
REFERENCES

29 CFR Sections 1910.

49 CFR Sections 172, 173, and 383.

AR 75-15, Responsibilities and Procedures for Explosive Ordnance Disposal

AR 190-11, Physical Security of Arms, Ammunition, and Explosives

AR 200-2, Environmental Analysis of Army Actions

ATF P 5400.7, ATF-Explosives Laws and Regulations.

DA Pam 385-61, Army Toxic Chemical Agent Safety Program

DA Pam 385-64, Ammunition and Explosives Safety Standards

DDESB Technical Paper 18, Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel

DID MR-001, Type I Work Plan

DID MR-005-04, Explosives Siting Plan

DID MR-005-05, Geophysical Investigation Plan

DID MR-005-07, Geospatial Information and Electronic Submittals

DID MR-005-11, Quality Control Plan

DID MR-045, Report / Minutes, Record of Meeting

DID MR-055, Telephone Conversations / Correspondence Records

DID MR-085, Project Status Report

DID MR-100, Institutional Analysis and Institutional Control Plan

DoD 4145.26M-M, Contractors Safety Manual for Ammunition, Explosives, and related Dangerous Materials

DoD 6055.9-STD, Ammunition and Explosives Safety Standards

EM 200-1-4, Risk Assessment Handbook, Volume II: Environmental Evaluation

EM 385-1-1, USACE Safety and Health Requirements Manual

ER 385-1-92, Safety and Occupational Health Document Requirements for Hazardous, Toxic, and Radioactive Waste and Ordnance and Explosive Waste Activities

EM 1110-1-4009, Engineering and Design - Ordnance and Explosives Response

EP 75-1-4, Recurring Reviews on Ordnance and Explosives (OE) Response Actions

EP 1110-1-18, Engineering and Design - Ordnance and Explosives Response

EP 1110-1-24, Engineering and Design - Establishing and Maintaining Institutional Controls for Ordnance and Explosives (OE) Projects

ER 200-3-1, Environmental Quality - Formerly Used Defense Sites (FUDS) Program Policy

HNC-ED-CS-S-98-7, Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions

FM 9-15, Explosive Ordnance Disposal Service and Unit Operations

Interim Guidance for Biological Warfare Materiel (BWM) and Non-stockpile Chemical Warfare Materiel (CWM) Response Activities (Department of the Army Memorandum, September 1997).

NFPA 780, Standard for the Installation of Lightning Protection Systems, 2004 Edition

Parsons, 2003. Waste Disposal Summary for the June 2003 Shipments.

TM 60 Series, General Explosive Ordnance Disposal Information, Tools and Techniques

TM 60-A-1-1-22, Explosive Ordnance Disposal General Safety Precautions

USACE, 1995. Remedial Investigation Report for the Operation Safe Removal Formerly Used Defense Site, Washington D.C. Prepared for US Army Corps of Engineers, Huntsville Division and Baltimore District. Prepared by Parsons Engineering Science, Inc.

USACE, 1996. Site Safety Submission, Volume I, Work Plan. Spring Valley Operable Unit 3, Washington, D.C. Prepared by Parsons.

USACE, 1997. Remedial Investigation Evaluation Report for the Operation Safe Removal Formerly Used Defense Site, Washington D.C. Prepared for US Army Engineering and Support Center, Huntsville; US Army Corps of Engineers, Baltimore District. Prepared by US Army Engineering and Support Center, Huntsville; US Army Corps of Engineers, Baltimore District; and Parsons Engineering Science, Inc.

USACE, December 1997. Final Remedial Investigation Report, Operation Safe Removal Formerly Used Defense Site Washington, D.C. Prepared by Parsons.

USACE, 1998. Geophysical Investigation Report. Republic of South Ambassador's Residence for the Operation Safe Removal Formerly Used Defense Site, Washington DC Prepared for US Army Engineering and Support Center, Huntsville; US Army Corps of Engineers, Baltimore District. Prepared by Parsons Engineering Science, Inc.

USACE, October 2000. Site Safety Submission Addendum 09. Prepared by Parsons.

USACE, December 2000. Geophysical Prove-Out. Prepared by Parsons.

USACE, August 2002. Revised Final Site-Wide Chemical Safety Submission Site Specific Annex A – 5054 Sedgwick Street. Prepared by Parsons.

USACE, 2003. Engineering Evaluation/ Cost Analysis for Arsenic in Soil. Prepared by Parsons.

USACE, April 2003. Site-Specific Local Approved Work Plan, Spaulding and Captain Rankin Areas. Prepared by Parsons.

USACE, March 2004. Final Site-Specific Work Plan for Intrusive Investigation of Anomalies at of Seven Properties, Spring Valley, Operable Unit 5, DERP/FUDS Site, Washington, D.C. Prepared by Parsons.

USACE, April 2004. Site Wide Chemical Safety Submission, Waste Disposal Summary for June 2003 Shipments. Prepared by Parsons.

USACE, June 2004. Site-Wide Chemical Safety Submission, Site Specific Annex F – American University Lot 18. Prepared by Parsons.

USACE, June 2005 (Revision July 2006). Final Site-Specific Work Plan for Intrusive Investigation of Anomalies at of Nine Properties, Spring Valley, Operable Unit 5, DERP/FUDS Site, Washington, D.C. Prepared by Parsons.

USACE, June 2005. Site-Wide Chemical Safety Submission, Site Specific Annex G – American University Lot 18. Prepared by Parsons.

USACE, December 2005. Site-Wide Local Approved Work Plan, Revision 5B. Prepared by Parsons.

USACE, February 2006. Final SSWP for Intrusive Investigation of Anomalies at 4641 Rockwood Parkway, Spring Valley (Revision 3), Operable Unit 4, DERP/FUDS Site, Washington, D.C. Prepared by Parsons.

USACE, March 2006. Final Site Specific Work Plan for Intrusive Investigation of Anomalies at American University Bamboo Area, Spring Valley, Operable Unit 4, DERP/FUDS Site, Washington D.C. Prepared by Parsons.

USACE, May 2006. Final Site-Specific Local Approved Work Plan, American University Lot 18 HTW Over-Excavation. Prepared by Parsons.

USACE, June 2006. Final Site-Specific Work Plan for Intrusive Investigation of Anomalies at of Four Properties on Rockwood Parkway, Spring Valley, Operable Unit 4, DERP/FUDS Site, Washington, D.C. Prepared by Parsons.

USACE, June 2006. Addendum 1 to Site-Specific Work Plan, American University Bamboo Area Intrusive Investigation of Kreeger Hall Area Anomalies. Prepared by Parsons.

USACE, August 2006. Final Site-Specific Work Plan for Structural, Geologic and Geotechnical Investigation at the American University Public Safety Building, Spring Valley, Operable Unit 4, DERP/FUDS Site, Washington D.C. Prepared by Parsons.

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USEPA, 1997. Emergency Remediation Goal Standards. U.S. EPA Region III.

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Weston, 2000. Background Trip Reports.

APPENDIX A
STATEMENT OF WORK

STATEMENT OF WORK

ENGINEERING EVALUATION/COST ANALYSIS AT THE FORMER AMERICAN UNIVERSITY EXPERIMENT STATION SPRING VALLEY, WASHINGTON D.C.

STATEMENT OF WORK

ENGINEERING EVALUATION/ COST ANALYSIS AT
FORMER AMERICAN UNIVERSITY EXPERIMENT STATION
SPRING VALLEY, WASHINGTON D.C.

1.0 BACKGROUND

The work required under this performance falls under the Defense Environmental Restoration Program/Formerly Used Defense Sites (DERP/FUDS). Munitions of Concern (MEC) is suspected to exist on this property formerly owned by the Department of the Army. Chemical Warfare Materiel (CWM) is suspected to have been buried on or in the vicinity of the former World War I era site, historically known as the American University Experiment Station (AUES). The AUES consists of approximately 661 acres in the northwest section of Washington, DC. The site was used by the U.S. Government for research and testing of chemical agents, equipment and munitions. Today, the Spring Valley neighborhood encompasses approximately 1,200 private homes, including several embassies and foreign properties, as well as the American University and Wesley Seminary. Based on previous work at the site, the likelihood of encountering additional buried CWM is possible.

1.1 GENERAL

Uncontrolled CWM and MEC is a safety hazard and constitutes an imminent and substantial endangerment to the general public, on site personnel and the environment. The work associated with this Non Time-Critical Removal Action (NTCRA) shall be performed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 104, and the National Contingency Plan (NCP), Sections 300.120(d) and 300.400(e). Additionally, the work under this task order will be conducted in compliance with Department of Defense, Department of Army, US Army Corps of Engineers, state and local requirements regarding personnel, equipment, and procedures. 29 CFR 1910.120 shall apply to all actions taken at this site. Work under this task order shall not exceed $10 million.

1.2 ROLE OF GOVERNMENT PROJECT PARTICIPANTS

1.2.1 U.S. Army Engineer District, Baltimore District Office (CENAB) - This office is the Project Manager for work at the former AUES and is responsible for public affairs, real estate rights of entry, leases, utilities, overall coordination of the work, medical support, funding, evacuations, regulatory interface, status of hazardous waste permits, hazardous waste generator for this site.

1.2.2 U.S. Army Engineering and Support Center, Huntsville (USAESCH) - This office is responsible for executing this contract and addressing the chemical warfare materiel (CWM) hazards at the site.

1.2.3 Research, Development and Engineering Command (RDECOM) - This is the parent command for the Edgewood Chemical Biological Center (ECBC). ECBC provides support in air monitoring for agents, establishing and maintaining engineering controls, and laboratory analysis for CWM and agent breakdown products. Analysis for industrial chemicals is the responsibility of the Contractor.

1.2.4 Forces Command (FORSCOM) - This is the parent command for the Guardian Brigade, U.S. Army Technical Escort Unit (TEU). TEU may provide support in excavation and in operation of the personnel decontamination station (PDS). TEU shall conduct assessment and transportation of suspected CWM.

1.2.5 Product Manager, Non-Stockpile Chemical Material (PMNSCM) - PMNSCM is responsible for the storage (i.e. interim holding facility (IHF)), transportation, and disposal of CWM.

1.3 Spring Valley Sites

1.3.1 Various points of interest (POI) have been evaluated and selected POIs are identified to have intrusive work undertaken. The intrusive excavation locations are divided into low probability anomalous sites and high probability anomalous sites.

1.3.1.1 Areas determined to be high probability sites (i.e. suspected Chemical Warfare Materiel (CWM) disposition) shall be intrusively investigated under an approved Chemical Safety Submission. Areas determined to be low probability shall be intrusively investigated in accordance with a locally approved work plan.

2.0 OBJECTIVES

The primary objective of this task order is for the Contractor to perform intrusive investigations into high probability anomalous areas in accordance with the approved CSS and to conduct intrusive investigations into low probability anomalous areas in accordance with the approved work plan in order to fully characterize selected anomalous areas suspected to contain CWM/3X scrap/explosive hazards at AUES. Award of this task order is subject to availability of funds.

3.0 SPECIFIC REQUIREMENTS

The Government will perform QA on all aspects of this task order. Any portion that fails QA will be redone at no cost to the Government. The Government's preliminary Quality Assurance Surveillance Plan (QASP) is attached for the Contractor's information, see Attachment B. The Government's final QASP will be developed based upon the Contractor's Quality Control Plan. The Contractor shall propose payment milestones for the duration of this project. The payment milestones shall be based on government acceptance of deliverables. The Contractor shall submit the appropriate QC documentation with each payment voucher. The Contractor shall submit a letter, following the format provided in Attachment C, indicating milestones accomplished with each payment voucher.

3.1 TASK 1 (FIRM FIXED-PRICE) - PROJECT PREPARATION AND PLANNING

The Contractor is authorized a post award site visit. The objective of this task is for the Contractor to familiarize staff on the specifics of the site and prepare and plan strategies to enable completion of the objective of this Task Order. The Contractor shall notify the USAESCH PM 14 days prior to a planned site visit. The Contractor shall provide a trip report to the PM 7 days after conclusion of the site visit in accordance with DID MR-045.

3.2 TASK 2 (TIME AND MATERIALS) – CWM WORK PLAN (WP)

The Contractor shall initially be required to adhere to the existing Site-Wide Local Approved Work Plan (Revision 5) dated March 2004 prepared for this project site. The Contractor shall keep the WP current incorporating field changes, regulatory changes, directives, and operational changes, as appropriate. The purpose of this task is to address the Contractor's effort in submitting and gaining approval of future editions of the WP IAW DID MR--01. Annexes shall be written and provided for review and approval for each new site to be investigated under this work plan.

3.3 TASK 3 (TIME AND MATERIALS) – CHEMICAL SAFETY SUBMISSION (CSS)

The Contractor shall initially be required to adhere to the existing Site-Wide Chemical Safety Submission dated July 2004 prepared for this project site. The Contractor shall keep the CSS current incorporating field changes, regulatory changes, directives, and operational changes, as appropriate. The purpose of this task is to address the Contractor's effort in submitting and gaining approval of future editions of the CSS IAW DID MR-070. Annexes shall be written and provided for review and approval for each new site to be investigated under the CSS.

3.4 TASK 4 (TIME & MATERIALS) – PREPARATION FOR INTRUSIVE INVESTIGATION

The objective of this task is for the Contractor to perform brush clearing and surface debris removal prior to geophysical survey. Brush clearing will be performed as necessary prior to intrusive operations. A Geophysical prove-out shall be performed prior to the geophysical survey. The Contractor shall geophysically survey remaining lands that have not been previously surveyed under other contracts. The Contractor shall provide geophysical data to the USAESCH for QA.

3.5 TASK 5 - (TIME AND MATERIALS) SITE MOBILIZATION/DEMOBILIZATION AND SUPPORT

3.5.1 The contractor shall perform site setup IAW the approved work plan. Mobilization shall include all equipment, personnel, and facilities to provide a fully functional field execution of the planned activity for the specific property. Once the project has concluded or as determined by the government, the contractor shall be notified regarding the demobilization activities in accordance with the approved work plans. Demobilization shall include all equipment, personnel, and facilities that were utilized on the site to complete the mission.

3.5.2 The contractor shall perform removal of specified trees and brush clearing operations as required. Brush and vegetation will be cut and removed from the site as required to facilitate efficient and safe operations. Fences and other ground features determined to be removed in order to accomplish the mission shall be removed. The contractor shall identify all known cultural feature disturbances (i.e. fences, trees destroyed, etc.).

3.6 TASK 6 - (TIME AND MATERIALS) EVALUATE AND DOCUMENT EXISTING SITE CONDITIONS

The contractor shall perform an evaluation of existing landscaping and site conditions prior to intrusive operations. The contractor shall identify the existing species of plants and trees, diseased or dead flora, number of each species, existing square yards and species of grass, and other site -specific existing landscape documentation. The contractor shall provide photographs and narrated video of each property prior to construction activities and at the conclusion of site activities. The Contractor shall provide drawing to scale depicting existing landscaping.

3.6.1 The contractor shall prepare a cost estimate for the replacement and site restoration to pre existing construction activities. The cost estimate shall be conducted using electronic spreadsheet.

3.6.2 The contractor shall provide a report for each specific property identifying the pre and post construction evaluation, the cost estimate for complete site restoration to pre-existing condition, drawing to scale depicting existing landscaping, and photographs and

narrated video. The report shall be submitted under separate cover to CEHNC and Baltimore District in the number specified by the CO.

3.7 TASK 7 (TIME AND MATERIALS) GEOPHYSICAL MAPPING AND REACQUISITION.

The Contractor shall implement geophysical mapping and evaluation as described in the approved Work Plan and DID MR-005-05.A. All geophysical mapping teams shall be established from personnel who have successfully demonstrated their ability for skill, ability, technique and procedure. The contractor's lead geophysicist for the project shall identify and document the composition of the project geophysical team(s) and document the proven skill, ability, and training of any new member. The lead geophysicist is responsible for the quality and performance of work from each member of the geophysical team. Non UXO metallic scrap shall be collected, documented, and properly disposed of from the geophysical mapping paths or areas. The data from the surface clearance for the geophysical mapping process shall be entered into the GIS database and the final report.

3.7.1 Geophysical Mapping. The contractor's proposal shall include the use of equipment and procedures that will achieve positional accuracies for each data record that do not exceed +/0.75 foot <u>after</u> processing. If the sum of errors for the positioning of data in a given post-processed dataset exceeds +/-0.75 foot and the justification for such is not acceptable to the government, all affected data will be recollected at no cost to the government. If any changes/replacements are made to the geophysical mapping equipment, the equipment shall be tested and reviewed and accepted by the project Geophysicist.

3.7.2 Evaluation. The Contractor's proposal shall identify the roles and functions of the personnel that will be performing data evaluation. The geophysicist(s) shall make a professional determination regarding the identification of target anomalies at the site that meet the established selection criteria. The project geophysicist shall continually compare predicted excavation results with actual results so that the Contractor's geophysical evaluation methodology is constantly refined over the life of the project.

The Contractor shall reacquire all selected geophysical target anomalies identified on the designated properties, and mark them with PVC flags with the unique target ID labeled in indelible waterproof ink on the flag in support of subsequent excavation operations. Immediately after target excavation, the contractor shall re-collect and analyze the geophysical data in the field to verify that the target has been removed during excavation. This data shall be documented and provided in the report. The contractor's proposal shall detail the technical approach(es) that they will be using for anomaly reacquisition. These approaches must take into consideration the sum of errors in positioning and reacquisition methods, and must describe the approaches that will be used to confirm that the selected anomalies in the dig sheets have been reacquired. Any anomalies where the reacquisition is ambiguous or uncertain shall be flagged as such. The Contractor shall provide a total anomaly reacquisition cost based upon the anomalies/acre and a unit cost based on cost per anomaly. Work shall be performed in a manner consistent with the approved Work Plan. The contractor shall perform geophysical QC data collection and on-site analysis after intrusive excavation to validate that the target objective has been removed.

3.8 TASK 8 -(TIME AND MATERIALS) INTRUSIVE INVESTIGATION OF NON-RCWM (i.e. LOW PROBABILITY) ANOMOLIES

The Contractor shall investigate reacquired anomalies by excavating down to the anomalies IAW the approved WP. Actual excavation locations shall be based on the results of the previous geophysical mapping. If RCWM items are found the contractor shall stop work. The subsequent work regarding suspect RCWM shall be conducted as stated in the contingency plan. The contractor shall secure the item and support TEU. TEU shall assess suspect RCWM items. Soils known or suspected of being contaminated shall be placed in containers for characterization, transportation and disposal by the contractor. Soils, materials and Investigative Derived Waste (IDW) identified as contaminated shall be containerized, manifested, transported, and disposed of by the contractor in accordance with local, state and federal laws and regulations and the approved work plans. The contractor shall also be responsible for the backfilling with clean backfill and compaction following intrusive activities.

3.9 TASK 9 (TIME AND MATERIAL) - INTRUSIVE INVESTIGATION OF SUSPECT RCWM ANOMALIES

3.9.1 Pre-Operational Surveys and Exercise. The Contractor shall prepare for, coordinate and support as necessary, and participate in, as required, in pre-operational surveys and exercises consisting of: (1) Table-Top Exercise, (2) Huntsville Survey and (3) DA Safety Pre-Operation Survey.

3.9.2 The contractor shall investigate reacquired anomalies by excavating to the anomalies IAW the approved CSS. Actual excavation locations shall be based on the results of the previous geophysical mapping. If RCWM items are found the contractor shall support TEU in the assessment. TEU shall assess suspect RCWM items. Soils suspected of agent contamination shall be placed in containers for characterization. Soils identified as contaminated with agent shall be containerized by the intrusive team, manifested, transported, and disposed of by the contractor in accordance with local, state and federal laws and regulations and the approved work plans. Soils and other items excavated and identified as not containing chemical agent shall be the responsibility of the contractor, who shall be responsible for the characterization, containerization, manifesting for Hazardous Waste (HW) disposal, transportation, and ultimate disposal of the material as either HW or solid waste. The contractor shall also be responsible for the backfilling with clean backfill and compaction following intrusive activities.

3.9.3 CWM/MEC Accountability. The Contractor shall maintain a detailed accounting of all CWM/MEC items/components encountered. This accounting shall include the amounts of CWM/MEC, the identification and condition, depth located, disposition and location. This accounting shall be a part of an appendix to the Final Report.

3.10 TASK 10 (TIME AND MATERIAL) - SITE RESTORATION.

The Contractor shall perform all site restoration activities required to return all disturbed areas to existing or better conditions. The contractor shall restore cultural features disturbed or destroyed during site activities. Backfilling and site grading shall be

accomplished by the contractor. The contractor shall be responsible for seeding or sodding as required. Fences, side walks, patios, driveways, retaining walls, electrical lines, and other ground features that was determined to be removed in order to accomplish the mission shall be replaced.

3.11 TASK 11 (TIME AND MATERIAL) - ENVIRONMENTAL SAMPLING/ANALYSIS

The contractor shall perform soil and aqueous sampling and analysis. Soil sampling shall be at locations and depths determined in the approved work plan. Samples and analysis shall also be conducted for disposal characterization. The number of samples and analytical methods to be performed shall be as identified in the approved work plan.

3.11.1 The Contractor to shall perform sampling, conducted on a limited basis at the site in accordance with requirements described in DID MR-005-10. The Contractor is to submit and gain approval of an Environmental Sampling and Analysis Plan (SAP), in accordance with DID MR-005-10 and EM 200-1-3. The Contractor shall recommend chemicals of concern for analysis. The accepted SAP shall be inserted in the WP and used to take soil samples at various locations, including field quality control. The location of each sample shall be recorded to within one-foot accuracy.

3.11.2 Any deviations from the accepted SAP shall be documented in the Data Quality Control Report (DQCRs). Any deviations that may affect Data Quality Objectives (DQO's) shall be conveyed to USAESCH personnel [project manager (PM), technical manager (TM), project chemist, etc.] immediately.

3.11.3 Contractor submittals shall be IAW DID MR-005-10 except for the following:

3.11.3.1 Section 1.4 shall be modified as follows:

- Chemistry Data Package.

  The chemistry data package shall be provided to the QA lab and to USAESCH on a quarterly basis.

- Electronic Data Deliverable; G.

All laboratory data for samples analyzed by commercial laboratories shall be submitted in the Staged Electronic Data Deliverable (SEDD) format. Details on the SEDD format are provided in SEDD Version 5.0 (or most recent version) specification located at http://www.epa.gov/superfund/programs/clp/sedd.htm. The EDD shall be provided to USAESCH on a quarterly basis. SEDD Stage 2a is a mandatory submittal. SEDD Stage 2b should be provided if the laboratory is capable.

3.11.3.2 Section 2.8 shall be modified as follows:

- 2.8 ELECTRONIC DATA DELIVERABLE

Chemical data shall also be provided electronically by the Contractor in the SEDD format and as part of the Geographic Information System. The SEDD formatted deliverable will require data parsing for use in the Automated Data Review (ADR) software. Use of the ADR software will also require that the contractor develop a comprehensive library file for all of the methods to be analyzed under this SOW. The library file will accurately reflect all of the analytical quality requirements as documented in the final SAP for this project and will be provided to both USAESCH and the sub-contract lab for use in screening EDD submittals. All electronic data submitted by the contract laboratory is required to be error-free, and in complete agreement with the hardcopy data. Data files are to be delivered both by e-mail and on high density CD accompanying the hardcopy data reports. The disk must be submitted with a transmittal letter from the laboratory that certifies that the file is in agreement with hardcopy data reports and has been found to be free of errors using the latest version of the ADR evaluation software provided to the laboratory. The contract laboratory, at their cost, will correct any errors identified by USAESCH. The Contractor is responsible for the successful electronic transmission of field and laboratory data under this SOW. The Contractor's laboratory is responsible for archiving the electronic raw data and sufficient associated hardcopy data (e.g., sample login sheets

and sample preparation log sheets) to completely reconstruct the analyses that were performed for a period of ten years after completion of this contract.

3.11.3.3 The following software is available upon request to support this task as government furnished software: ADR, Environmental Data Management System (EDMS), SEDD parser, and Forms II Lite. Use of the SEDD parser and ADR software are mandatory, use of EDMS and Forms II Lite are optional.

3.12 TASK 12 (TIME AND MATERIALS) - INVESTIGATIVE DERIVED WASTE (IDW)

The contractor shall dispose of the bulk and/or containerized IDW (i.e. RCWM contaminated media, hazardous waste, and decontamination wastes, etc.) in accordance with the approved work plans. The IDW containers shall be staged, secured, labeled, sampled and analyzed IAW the approved work plan. After receipt of the letter report recommending appropriate disposal actions, the Contracting Officer shall direct the contractor in the disposal of IDW. The contractor shall perform the IDW disposal in a timely manner IAW local, state and federal regulatory requirements.

3.13 TASK 13 (TIME AND MATERIALS) - SURVEYING AND MAPPING.

The contractor shall perform surveying and mapping in accordance with the approved plans.

3.14 TASK 14 (TIME AND MATERIALS) – ENGINEERING CONTROLS.

3.14.1 System Evaluation**.** Based upon the Maximum Credible Event (MCE) and the Most Probable Munition (MPM), the down wind hazard calculations, and the No Significant Effects (NOSE) distance, engineering controls may be required. The contractor shall make recommendations of engineering controls for consideration. The contractor shall design and procure engineering controls based upon constructability, fragmentation containment, feasibility, agent compatibility, decontamination, and release control at a minimum. The engineering controls evaluation shall be documented in a letter report.

3.14.2 Structure and Filtering System. A structure shall be provided by the contractor to control the release of agent and blast fragmentation as required to personnel outside the exclusion zone. The structure shall be capable of containing a release, with capacity for agent filtration. The structure (i.e. tent or building) shall be erected to insure intrusive operations do not result in a release outside the exclusion zone. The structure shall be capable of being decontaminated if a release occurs. The contractor, in conjunction with ECBC, shall identify the design requirements for the agent filtration system and it shall be selected based upon those design requirements. The contractor shall provide, erect, prove out, and move the engineering controls to conduct the mission. The contractor shall assist the government, as required, in the installation, prove out, and operation of the agent filtering system. The filtering system shall be monitored by ECBC to insure that breakthrough has not occurred. The intrusive team shall be responsible for the decontamination of the engineering control, if required. The contractor shall remove the structure once intrusive operations are concluded.

3.15 TASK 15 (TIME AND MATERIAL) - CONVENTIONAL UXO DISPOSITION.

3.15.1 The contractor shall be responsible for the maintenance of the explosives magazine for storage of conventional ordnance items recovered. The contractor shall be responsible for the manifesting, transportation to the disposition location, and disposal of the recovered conventional UXO items in accordance with the approved work plan. If onsite disposal is conducted the contractor shall be responsible for the overall coordination, disposition, and documentation.

3.15.2 The contractor shall, utilizing qualified personnel, perform UXO identification; removal and disposal as specified in the approved work plan. The contractor shall describe how UXO/MEC operations will be planned and implemented utilizing appropriately qualified personnel, equipment and procedures. All UXO/MEC operations

must be performed utilizing qualified UXO personnel, equipment and procedures as defined in CEHNC guidance and procedures.

3.15.3 UXO Destruction. The contractor will be responsible for the destruction of

conventional UXO encountered during site investigations and characterizations utilizing an approved UXO contractor and in accordance with all aspects of the project work plan.

3.15.4 UXO Accountability. The contractor shall maintain a detailed accounting of all UXO items/components demilitarized. This accounting shall include the amounts of UXO, the identification and condition, disposition and location. The accounting system shall also account for all demolition materials utilized to detonate UXO.

3.15.5 UXO Quality Control (QC) Specialist. The individual performing the UXO QC shall not be involved in the performance of other UXO field tasks. UXO QC shall be a separate function and is not envisioned as a full-time position. The UXO QC specialist shall meet the minimum prerequisites of an UXO Supervisor and have the training; knowledge and experience necessary to implement the contractor's QC plan as approved.

3.16 TASK 16 (TIME AND MATERIALS) - PREPARE ENGINEERING REPORT

3.16.1 The Contractor shall prepare and submit an engineering report fully documenting the fieldwork and subsequent evaluations and recommendations made by the contractor for each property site. The future objective is to have each property site summarized into an overall EE/CA Report. Each project site report shall contain a brief description of the site history, briefly describe previous work conducted, the work conducted under this task order, and the results. The report shall also contain the contractor's conclusions as to the nature and extent of findings, RCWM contamination at the site (if applicable) , and recommendations for future work at the site if necessary. It is the Government's intent to pursue and to address any RCWM contamination, which may be present. Each site should be sufficiently characterized to support an overall Engineering Evaluation/Cost Analysis (EE/CA). The textual portions of the report shall be fully supported with accompanying maps, charts, and tables as necessary to fully describe and document all work performed and all conclusions and recommendations presented.

3.16.2 The contractor shall evaluate the risk that the site represents to human health and the environment. The risk evaluated shall consider chronic health effects that could result from chemical warfare constituents.

3.16.3 The objective of this task is for the Contractor to submit and gain approval of a final report in accordance with DID MR-010. In addition to the DID requirements the Contractor shall include all QC documentation in the Final Report. The Contractor is to also include a cover letter signed by an authorized person of the company certifying that the requirements of this Task Order have been met. The Contractor shall include a recurring review plan IAW MR-110 and the Chemical Data Final Report IAW MR-005-10.

3.17 TASK 17 (TIME AND MATERIALS) – MEETINGS AND PUBLIC INVOLVEMENT

The contractor shall provide a minimum of two professionals thoroughly familiar with the project, to attend meetings as required. Provide, in your cost proposal, the cost per meeting. Assume ten (10) two day meetings will be held at or close to Washington DC, and two meetings will be held at Huntsville, AL. The contractor shall be prepared to show overheads or use other presentation techniques to convey plans, findings and recommendations . The Contractor shall provide minutes and record of all meetings per DID MR-045 . The Contractor shall provide a unit cost per meeting for additional meetings.

3.18 TASK 18 (TIME AND MATERIAL) – PROJECT MANAGEMENT

The contractor shall, during the life of the Task Order (TO), manage the TO to accomplish the Statement of Work. All project management associated with this Task Order, with the exception of direct technical oversight of work described in the preceding tasks, shall be accounted for in this task. The objective of this task is for the Contractor to perform project management activities necessary to maintain acceptable project control, to include but not limited to the following:

3.18.1 Schedule. The Contractor shall submit a proposed Project Milestone/Payment Schedule in Primavera for acceptance by USAESCH. The Contractor shall update the schedule in accordance with DID MR-085 Project Status Report. A final schedule shall

be submitted a minimum of 30 days before commencing fieldwork. Changes to the schedule must be accepted by USAESCH.

3.18.2 Telephone Conversations/Correspondence Records. The Contractor shall keep a record of each phone conversation and written correspondence concerning this Task Order in accordance with DID MR-055. A copy of this record shall be attached to the Project Status Report.

3.18.3 Project Status Reports and Work, Data, and Cost Management Plan. The Contractor shall prepare and submit Project Status Reports in accordance with DID MR-085 and including the Work, Data, and Cost Management Plan in accordance with MR-005-08 that outlines the manner in which the contractor intends to accomplish each Task in this SOW. The contractor shall provide a scope or level of effort required for the task, milestones, expected completion dates, and any other planning data the contractor will use to accomplish each task.

3.18.4 Unit Cost. The Contractor shall provide unit cost per month for not-in-the-field Project Management and unit cost per month for in-the-field Project Management.

4.0 SUBMITTALS - GENERAL DIRECTIVES

4.1 COMPUTER FILES. All final text files generated by the Contractor under this contract shall be furnished to the Contract Officer in Microsoft Word 6.0 or higher software. Spreadsheets shall be in Microsoft EXCEL. All final CADD drawings shall be in Microstation 95 or higher. All GIS data shall be in ESRI (Arcview/Arcinfo) format. All MC data shall be IAW DID MR-005-10 and as modified by Paragraph 3.13.3 of this SOW. Each submittal shall contain a compact disk (CD) with electronic files of the submittal contained thereon. CDs shall be appropriately labeled as to its contents and date.

4.2 PDF DELIVERABLES. In addition to the paper and digital copies of submittals, the final version of any and all reports and/or plans shall be submitted, uncompressed, on CD ROM in PDF format along with a linked table of contents, linked tables, linked photographs, linked graphs and linked figures, all of which shall be suitable for viewing

on the Internet. The PDF files shall be created from source documents whenever possible.

4.3 IDENTIFICATION OF RESPONSIBLE PERSONNEL **.** Each submittal shall identify the specific members and title of the Contractor 's and subcontractor staff that had significant input into the report's preparation or review. All final submittals shall be sealed by a registered Professional-In-Charge.

4.4 PUBLIC AFFAIRS. The Contractor shall not publicly disclose any data generated or reviewed under this contract. The Contractor shall refer all requests for information concerning site conditions to the Corps of Engineers Public Affairs Office (Baltimore District) with a copy furnished to the USAESCH Project Manager. Reports and data generated under this contract are the property of the DoD and distribution to any other source by the Contractor, unless authorized by the Contracting Officer, is prohibited.

4.5 SUBMITTALS. The Contractor shall furnish copies of the plans, maps, and reports as identified in Table 1, or as specified in this SOW, to each addressee listed below in the quantities indicated in paragraph 4.6. The Contractor shall submit 1 copy on CD with each hard copy of the Final versions of all submittals (WPs, Reports, Plans, etc) in accordance with section 4.1 & 4.2. For purposes of the SOW all days are considered calendar days.

Table 1. List of Deliverables

	DOCUMENT
1.	Site Visit Report
2.	Draft Work Plan
3.	Draft-final Work Plan
4.	Final Work Plan
5.	Draft Chemical Safety Submission
6.	Draft-final Chemical Safety Submission
7.	Final Chemical Safety Submission
8.	Draft SSFR
9.	Draft-final SSFR

	DOCUMENT
10.	Final SSFR
11.	Project Status Report
12.	Minutes of Meetings
13.	DQCR

4.6 SUBMITTAL QUANTITIES. Provide the number of submittals shown in Table 2 to the addressees given below.

Table 2. Submittal Submission Guidance.

RECEIVING AGENCY	***1.***	***2.***	***3.***	***4.***	***5.***	***6.***	***7.***	***8.***	***9.***	***10.***	***11.***	***12.***	***13.***
A. CENAB	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
B. USAESCH	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
D. Others	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

4.7 ADDRESSES. The following addresses shall be used in mailing submittals as directed by the Contracting Officer:

ADDRESSEE
Commander US Army Engineering and Support Center, Huntsville ATTN: CEHNC-OE-CW-DC, Mr. Allyn Allison 4820 University Square Huntsville, Alabama 35816-1822
HQUSACE (cover letter only) ATTN: CESO-E, Ms. Blanca Roberts 441 G. Street Washington, DC 20314-1000
U.S. Army Engineer District, Baltimore ATTN: CENAB-PP-EE (Craig M. Georg) P.O. Box 1715 Baltimore, MD 21203-1715 (410) 962-6782 craig.m.georg@nab02.usace.army.mil
James Sweeney DC Department of Health 51st N Street, NE 3rd Floor

Washington, DC 20002 (202) 535-2289 james.sweeney@dc.gov
Steven Hirsh US EPA Region III Crystal Gateway 1, Room 101 1235 Jefferson Davis Highway Arlington VA 22202 703 603-0085 hirsh.steven@epa.gov
USATCES ATTN: SMJAC-ESM 1 C Tree Road McAlester, OK 74501-9053
Program Manager for Chemical Demilitarization, Environmental Monitoring ATTN: AMSCM-ECN-ME APG-EA, MD 21010-5401
Program Manager for Chemical Demilitarization, Risk/Surety Management ATTN: AMSCM-ECN-SQ APG-EA, MD 21010-5401
Program Manager for Chemical Demilitarization, Public Affairs ATTN: AMSCM-ECN-P APG-EA, MD 21010-5401
Program Manager for Chemical Demilitarization, Product Manager, Non-Stockpile Chemical Material ATTN: AMSCM-ECN-SO, Mr. John Griesking APG-EA, MD 21010-5401
COMMANDER RDECOM 5232 Fleming Road ATTN: SMCTE-OP Aberdeen Proving Grounds EA, MD 21010-5423
ECBC/Chemical Support Division 5183 Blackhawk Road Bldg E3942 AMSRD-ECB-CB-CP (Mr. John Ditillo) Aberdeen Proving Grounds EA, MD 21010-5423 (410) 436-4679 john.ditillo@sbccom.apgea.army.mil
Commander, Technical Escort Unit (TEU) ATTN: AMSRD-GBT-ADM (Mike Rehmert) 1942 H Street APG, MD 21010-5423 (410) 436-7211 marehmer@sbccom.apgea.army.mil

Note: Addresses may have to be verified by the Contractor.

5.0 REFERENCES

5.1 The Contractor is required to use the latest edition of all references.

5.2 Latest versions of Spring Valley submittals shall be provided as reference documents.

5.5 The DID's are available on the USAESCH Web Page at http://www.hnd.usace.army.mil/oew/dids.asp

Attachment A

Corps of Engineers Contractors MPPEH Inspection, Certification, and Final Disposition Procedures

I. Materials Posing a Potentially Explosives Hazard (MPPEH) – Contractor Responsibilities and Procedures

1. The U.S. Army Corps of Engineers (USACE) contractors executing projects will comply with the following procedures for processing MPPEH for final disposition as munitions debris or range-related debris. The objectives of these procedures are to ensure that an inspection procedure of the exterior and interior surfaces of all recovered MPPEH is in place to ensure these items do not present an explosive hazard and to ensure all target vehicles processed are free of any engine fluids, illuminating dials and other visible liquid hazardous, toxic or radiological waste (HTRW) materials. These USACE contractor responsibilities and procedures will be contained in the project work plan.

   a. Unexploded Ordnance (UXO) Sweep Personnel will only mark suspected items and will not be allowed to perform any assessment of a suspect item to determine its status.

   b. Unexploded Ordnance (UXO) Tech I will only tentatively identify a located item as MPPEH or MEC.

   c. UXO Technician II will:

      (1) Inspect each item as it is recovered and determine the following:

         - Is the item a UXO, Discarded Military Munitions (DMM), or MPPEH?
         - Does the item contain explosives hazards or other dangerous fillers?
         - Does the item require detonation?
         - Does the item require demilitarization (demil) or venting to expose other dangerous fillers?
         - Does the item require draining of engine fluids, illuminating dials and other visible liquid hazardous, toxic or radiological waste (HTRW) materials?

      (2) Segregate items requiring demil or venting procedures from those items ready for certification.

(3) Items found to contain explosives hazards or other dangerous fillers will be processed in accordance with applicable procedures.

d. UXO Technician III will:

(1) Inspect recovered items to determine if free of explosives hazards or other dangerous fillers and engine fluids, illuminating dials and other visible liquid HTRW materials?

(2) Supervise detonation of items found to contain explosive hazards or other dangerous fillers and venting/demil procedures.

(3) Supervise the consolidation of MPPEH for containerization sealing. Munitions Debris and Range-related Debris will be segregated.

e. UXO Quality Control (QC) Specialist will:

(1) Conduct daily audits of the procedures used by UXO teams and individuals for processing MPPEH.

(2) Perform and document random sampling (by pieces, volume or area) of all MPPEH collected from the various teams to ensure no items with explosive hazards, engine fluids, illuminating dials and other visible liquid HTRW materials are identified as munitions debris or range-related debris as required for completion of the Requisition and Turn-in Document, DD Form 1348-1A.

f. UXO Site Safety Officer (UXOSO) will:

(1) Ensure the specific procedures documented in the work plan and responsibilities for processing MPPEH for certification as munitions debris or range-related debris are being followed.

g. Senior UXO Supervisor will:

(1) Be responsible for ensuring work and Quality Control (QC) Plans specify the procedures and responsibilities for processing MPPEH for final disposition as munitions debris or range-related debris.

(2) Ensure a Requisition and Turn-in Document, DD Form 1348-1A is completed for all munitions debris and range-related debris to be transferred for final disposition.

(3) Perform random checks to satisfy that the munitions debris and range -related debris is free from explosive hazards necessary to complete the Form, DD Form 1348-1A.

(4) Certify all munitions debris and range-related debris as free of

explosive hazards. If the material to be turned in contains target vehicles certify the vehicles are free of engine fluids, illuminating dials and other visible liquid HTWR materials.

(5) Be responsible for ensuring that inspected debris is secured in a closed, labeled and sealed container and documented as follows;

- The container will be closed and clearly labeled on the outside with the following information: The first container will be labeled with a unique identification that will start with USACE/Installation Name/Contractor's Name/0001/Seal's unique identification and continue sequentially.

- The container will be closed in such a manner that a seal must be broken in order to open the container. A seal will bear the same unique identification number as the container or the container will be clearly marked with the seal's identification if different from the container.

- A documented description of the container will be provide by the contractor with the following information for each container; contents, weight of container; location where munitions or range-related debris was obtained; name of contractor, names of certifying and verifying individuals; unique container identification; and seal identification, if required (see paragraph I. 1.g. (5)). The contractor in a separate section of the final report will also provide these documents.

II. MPPEH Certification and Verification

1. The contractor will ensure that MPPEH is properly inspected in accordance with the procedures in I. above. Only personnel who are qualified UXO personnel will perform these inspections. The Senior UXO Supervisor will certify and the USACE UXO Safety Specialist will verify that the scrap metal is free of explosive hazards.

2. DD form 1348-1A will be used as certification/verification documentation. All DD 1348-1A must clearly show the typed or printed names of the contractor's Senior UXO Supervisor and the USACE UXO Safety Specialist, organization, signature, and contractor's home office and field office phone number(s) of the persons certifying and verifying the scrap metal.

   a. Local directives and agreements may supplement these procedures. Coordination with the local concerns will identify any desired or requested supplementation to these procedures.

b. In addition to the data elements required and any locally agreed to directives, the DD 1348-1A must clearly indicate the following for scrap metal:

(1) Basic material content (Type of metal; e.g., steel or mixed)

(2) Estimated weight

(3) Unique identification of each of the containers and seals stated as being turned over.

(4) Location where munitions debris or range-related debris was obtained.

(5) Seal identification, if different from the unique identification of the sealed container.

c. The following certification/verification will be entered on each DD 1348-1A for turn over of Munitions debris or range-related debris and will be signed by the Senior UXO Supervisor and the USACE UXO Safety Specialist.

"This certifies that the MPPEH listed has been 100 percent inspected and, to the best of our knowledge and belief, are free of explosives or related material."

If the inspected material contains target vehicles the following statement will be added to the 1348-1A:

"This certifies that the range related debris listed has been 100 percent inspected and to the best of our knowledge and belief are free of engine fluids, illuminating dials, and other visible liquid HTRW materials."

III Maintaining The Chain Of Custody And Final Disposition

1. The contractor, in coordination with the Corps of Engineers, will arrange for maintaining the chain of custody and final disposition of the certified and verified materials. The certified and verified material will only be released to an organization that will:

a. Upon receiving the unopened labeled containers each with its unique identified and unbroken seal ensuring a continued chained of custody, and after reviewing and concurring with all the provided supporting documentation, sign for having received and agreeing with the provided documentation that the sealed containers contained no explosive hazards when received. This will be signed on company letterhead and stating that the contents of these sealed containers will not be sold, traded or otherwise given to another party until the contents have been smelted and are only identifiable by their basic content.

b. Send notification and supporting documentation to the sealed container-generating contractor documenting the seal containers have been smelted and are now only identifiable by their basic content.

c. This document will be incorporated by the contractor into the final report as documentation for supporting the final disposition of munitions debris and range-related debris.

Attachment B

QUALITY ASSURANCE SURVEILLANCE PLAN (QASP)
CWM INTRUSIVE ACTION AT the FORMER AUES
13 September 2004

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1. INTRODUCTION

This Performance-Based Quality Assurance Surveillance Plan (QASP) has been developed pursuant to the requirements of the Performance-Based Statement of Work in Contract No. ***XXXXXX(To be included after award)***. This plan sets forth procedures and guidelines that the USACE will use in evaluating the technical and safety performance of the Contractor. A copy of this plan will be furnished to the Contractor so that the Contractor will be aware of the methods that the Government will employ in evaluating performance on this contract and address any concerns that the Contractor may have prior to initiating work.

2. PURPOSE OF THE QASP

- Confirm that the intrusive actions are conducted utilizing proper procedures and in accordance with the approved work and safety plans;
- Define the roles and responsibilities of participating Government officials;
- Define the types of work to be performed with required end results;
- Document the evaluation methods that will be employed by the Government in assessing the Contractor's performance;
- Provide the Surveillance Activity Checklist and Corrective Action Request (CAR) forms that will be used by the Government in documenting and evaluating the Contractor's performance; and
- Describe the process of performance documentation.

3. ROLES AND RESPONSIBILITIES OF PARTICIPATING GOVERNMENT OFFICIALS

The USACE CWM Design Center Project Manager (DC PM) (Mr. Allyn Allison):

- Provides overall technical guidance to the contractor when necessary or requested for purposes of SOW clarification.
- Reviews vouchers and makes recommendations to the Contracting Officer for payment action based on completion of designated milestones.
- Reports problems or discrepancies to the Contracting Officer as soon as possible.
- Oversees the implementation of the QASP.
- Reviews contractor submittals.
- Schedules and provides labor codes and funding for all surveillance activities with the appropriate USACE Supervisor (UXO Safety Group, Geotechnical Branch, etc.).

- Initiates periodic contractor evaluations in the Past Performance Information Management System (PPIMS).

The USACE Contract Specialist (Mr. Michael Duffy):

- Monitors contract performance.
- Maintains central repository for all QA documents required for payment.
- Issues all acceptance/rejection statements.

The Project Engineer or Technical Manager (Mr. Bruce Whisenant)

- Conducts reviews of contractor submittals for compliance with contract requirements.
- Conducts reviews of contractor submittals for compliance with DOD, DA and USACE explosives and CWM safety requirements.
- Performs Periodic Inspections of contractor compliance with DOD, DA, and USACE explosives and CWM safety requirements and explosives/CWM related procedures described in the work plan.
- Conducts or Supports other surveillance activities as required by the project team.
- Participates in Huntsville surveys.
- Supports all on-site QA activities.
- Develops the final Quality Assurance Report.

The USACE Safety Specialist (as assigned):

- Remains on-site during all field activities.
- Conducts reviews of contractor submittals for compliance with DOD, DA and USACE explosives and CWM safety requirements.
- Performs Periodic Inspections of contractor compliance with DOD, DA, and USACE explosives and CWM safety requirements and explosives/CWM related procedures described in the work plan.
- Conducts or Supports other surveillance activities as required by the project team.
- Participates in Huntsville Surveys as team member and/or on-site team member.all pre-op/table top exercises.
- Supports all on-site QA activities.

The USACE Geophysicist (Mr. Andy Schwartz):

- Reviews contractor's Technical Management Plan, Geophysical Investigation Plan, GPO Plan and Report.
- Performs, or coordinates with USACE team members to perform, Periodic Inspections of contractor's compliance with the Technical Management Plan and Geophysical Investigation Plan.
- Reviews QCP reporting requirements and accepts reported QC measures.
- Performs tasks as specified to support the project’s quality goals (placing and evaluating anomaly selections over blind seed items, randomly selects anomalies for reacquisition and/or excavation, etc.)

The USACE Chemist (Ms. Rebecca Terry):

- Reviews the work plan for compliance with standard protocols for Environmental Sampling and Chemical Analysis.
- Conducts reviews of Environmental Sampling and Chemical Analysis

Data.

- Conducts Periodic Inspections of contractor compliance with environmental sampling requirements of the work plan.
- Reviews contractor Investigative Derived Waste Plan.
- Conducts, or coordinates with USACE Team members to conduct, Periodic Inspections of contractor compliance with the IDW Plan.
- Reviews QCP reporting requirements and accepts reported QC measures.
- Participates in Huntsville surveys and pre-op/table top exercises as required by the PM.

The USACE Industrial Hygienist (Ms. Kellie Williams):

- Reviews contractor submittals for compliance with DOD, DA USACE, and OSHA safety and health requirements.
- Performs unscheduled inspections of on-site activities for compliance with safety and health requirements.
- Participates in Huntsville surveys and facilitates the top exercise.
- Coordinates medical support training and medical support (as required).

4. METHODOLOGIES TO BE USED TO MONITOR THE CONTRACTOR'S PERFORMANCE

Even though the Government will be monitoring the contractor's performance on a continuing basis, the volume of tasks performed by the contractor makes technical inspections of every task and step impractical. Accordingly, USACE will use the Surveillance Activity Checklist (Attachment B.1) as the basis for monitoring the contractor's performance under this contract. The contractor's performance will be evaluated by the Contracting Officer using the performance metrics provided in Attachment B.2.

5. QUALITY ASSURANCE REPORTING FORMS

The primary Form used to document surveillance activities will be the Daily Quality Assurance Report (QAR) provided in Attachment B.3. The QAR will be used by all team members to document surveillance activities conducted. All nonconformances will be documented on a Corrective Action Request (CAR), see Attachment B.4. Non-conformances are documented at the discretion of the person conducting the surveillance activity, but should be fair and reasonable. Each CAR will be annotated as a Critical nonconformance, Major nonconformance, or Minor nonconformance. Definitions and required contractor response times are:

Critical Nonconformance: a nonconformance that is likely to result in hazardous or unsafe conditions for individuals using, maintaining, or depending upon the supplies or services; or is likely to prevent performance of a vital agency mission.
Contractor is provided 24 hours to provide written response to the CAR.

Major Nonconformance: a nonconformance, other than critical, that is likely to result in failure of the supplies or services, or to materially reduce the usability of the supplies or services for their intended purpose.
Contractor is provided 15 calendar days to provide written response to the CAR.

Minor Nonconformance: a nonconformance that is not likely to materially reduce the usability of the supplies or services for their intended purpose, or is a departure from established standards having little bearing on the effective use or operation of the supplies or services.
Contractor is provided up to 15 calendar days to provide written response to the CAR.

Upon completion of field work and acceptance of all final reports, the Project Engineer will document QA activities in a final Quality Assurance Report in accordance with Attachment B.5.

Checklists may be used to support surveillance activities such as the Generic On-Site QA checklist provided in Attachment B.6 or those generated for use during pre-op/table top exercises. These forms, when completed, will document the contractor's compliance with contract requirements and completion of milestone activities. The Contracting Officer will evaluate contractor performance using the definitions (Exceptional, Very Good, Satisfactory, Marginal, Unsatisfactory) contained in the Past Performance Information Management System (PPIMS) and the metrics identified in Attachment B.2.

Completed forms will be consolidated and provided to the Contracting Officer at the end of each month for that month's surveillance activities. A copy of each CAR will be forwarded to the Contracting Officer by COB of the next full workday after it is provided to the contractor. The contractor will be required to correct explosives safety issues immediately. All other CAR's will provide a reasonable suspense date for the contractor to review and take appropriate action, usually 15 calender days. The contractor is required to provide written responses to all CAR's.

Attachment B.1
Surveillance Activity Checklist

Attachment B.2
Performance Metrics

Attachment B.3
Daily Quality Assurance Report

Attachment B.4
Corrective Action Request

Attachment B.5
Final Quality Assurance Report

Attachment B.6
Generic On-site QA Checklist

ATTACHMENT B.1
SURVEILLANCE ACTIVITY CHECKLIST

Contract Requirement	Contract Or Task Order Reference	Method of Surveillance	PPIMS Performance Assessment Record (PAR) Category	Basic Performance Indicator(s) (To be used when completing Contractor Performance Assessment Record (PAR) in PPIMS)	Objective evidence or documentation of surveillance performed	Identify network directory(ies) (and/or file drawers) where all QA documents are kept (e.g. CARs, Form-7 comments, QC reviews, acceptance and/or concurrence communications, etc.)	Dates Accomplished and reviewers
Project Documents/ Submittals							
Draft Work Plan, sub-plans, Reports, and Chemical Safety Submission (CSS)	T.O. SOW para 3.2, 3.3	100% review of submitted document(s). Approval of CO required prior to issuance of NTP.	Quality of Product or Service	Document Reviews	Form 7 comments or DrChecks		
Work Plan							

Contract Requirement	Contract Or Task Order Reference	Method of Surveillance	PPIMS Performance Assessment Record (PAR) Category	Basic Performance Indicator(s) (To be used when completing Contractor Performance Assessment Record (PAR) in PPIMS)	Objective evidence or documentation of surveillance performed	Identify network directory(ies) (and/or file drawers) where all QA documents are kept (e.g. CARs, Form-7 comments, QC reviews, acceptance and/or concurrence communications, etc.)	Dates Accomplished and reviewers
Execution							
Technical Management Plan	Section C, para 4.3.3, and T.O. para 3.2	Periodic Inspection (Monthly)	Quality of Product or Service, and, Management of Key Personnel and Resources	Project Execution, Personnel knowledgeable and effective in their areas of responsibility, and Personnel able to manage resources efficiently	Trip reports, CARs, and/or daily QARs		
Explosives Management Plan	Section C, para 4.3.3 and T.O. para 3.2	Periodic Inspection (Monthly)	Safety, Quality of Product or Service, and, Management of Key Personnel	Accidents and Violations , Project Execution, Personnel	Trip reports, CARs, and/or daily QARs		

Contract Requirement	Contract Or Task Order Reference	Method of Surveillance	PPIMS Performance Assessment Record (PAR) Category	Basic Performance Indicator(s) (To be used when completing Contractor Performance Assessment Record (PAR) in PPIMS)	Objective evidence or documentation of surveillance performed	Identify network directory(ies) (and/or file drawers) where all QA documents are kept (e.g. CARs, Form-7 comments, QC reviews, acceptance and/or concurrence communications, etc.)	Dates Accomplished and reviewers
			and Resources	knowledgeable and effective in their areas of responsibility, and, Personnel able to manage resources efficiently			
Explosives Siting Plan	Section C, para 4.3.3 and T.O. para 3.2	Periodic Inspection (Monthly)	Safety, Quality of Product or Service, and, Management of Key Personnel and Resources	Accidents and Violations, Project Execution, Personnel knowledgeable and effective in their areas of responsibility, and, Personnel	Trip reports, CARs, and/or daily QARs		

Contract Requirement	Contract Or Task Order Reference	Method of Surveillance	PPIMS Performance Assessment Record (PAR) Category	Basic Performance Indicator(s) (To be used when completing Contractor Performance Assessment Record (PAR) in PPIMS)	Objective evidence or documentation of surveillance performed	Identify network directory(ies) (and/or file drawers) where all QA documents are kept (e.g. CARs, Form-7 comments, QC reviews, acceptance and/or concurrence communications, etc.)	Dates Accomplished and reviewers
				able to manage resources efficiently			
Geophysical Investigation Plan	Section C, para 4.3.3 and T.O. para 3.2	Periodic Inspection (Monthly)	Quality of Product or Service Safety, and, Management of Key Personnel and Resources	Project Execution, Personnel knowledgeable and effective in their areas of responsibility, and Personnel able to manage resources efficiently	Trip reports, CARs, and/or daily QARs		

Contract Requirement	Contract Or Task Order Reference	Method of Surveillance	PPIMS Performance Assessment Record (PAR) Category	Basic Performance Indicator(s) (To be used when completing Contractor Performance Assessment Record (PAR) in PPIMS)	Objective evidence or documentation of surveillance performed	Identify network directory(ies) (and/or file drawers) where all QA documents are kept (e.g. CARs, Form-7 comments, QC reviews, acceptance and/or concurrence communications, etc.)	Dates Accomplished and reviewers
Accident Prevention Plan	Section C, para 4.3.3 and T.O. para 3.2	Periodic Inspection (Monthly)	Safety	Accidents and Violations	Trip reports, CARs, QARs, and/or statements of reviewed safety records		
QC Plan Environmental Sampling and Chemical Analyses	Section C, Chapter 2, Sub-section 2.8, Chapter 4, Sub-section 4.5, T.O. para 3.2	Periodic Inspection (during sampling events) 100% review of all DID MR005-10 Section 1.4 submittals except the	Quality of Product or Service	Project execution. Electronic data deliverables will be reviewed with Automated Data Review software.	Trip reports, CARs, QARs, and/or statements of reviewed chemical data		

Contract Requirement	Contract Or Task Order Reference	Method of Surveillance	PPIMS Performance Assessment Record (PAR) Category	Basic Performance Indicator(s) (To be used when completing Contractor Performance Assessment Record (PAR) in PPIMS)	Objective evidence or documentation of surveillance performed	Identify network directory(ies) (and/or file drawers) where all QA documents are kept (e.g. CARs, Form-7 comments, QC reviews, acceptance and/or concurrence communications, etc.)	Dates Accomplished and reviewers
		Chemistry Data Package. 5% review of the Chemistry Data Package					
QC Plan QC reports on GIS	Section C, para 4.3.3 and T.O. para 3.2	Periodic Inspection Reporting examples: Li ne types, symbology, geodatabase integrity (with	Quality of Product or Service	Project Execution	Trip reports, CARs, QARs, and/or statements of reviewed deliverables		

Contract Requirement	Contract Or Task Order Reference	Method of Surveillance	PPIMS Performance Assessment Record (PAR) Category	Basic Performance Indicator(s) (To be used when completing Contractor Performance Assessment Record (PAR) in PPIMS)	Objective evidence or documentation of surveillance performed	Identify network directory(ies) (and/or file drawers) where all QA documents are kept (e.g. CARs, Form-7 comments, QC reviews, acceptance and/or concurrence communications, etc.)	Dates Accomplished and reviewers
		submission of updated GIS files)					
QC Plan QC reports on geodetic surveying	Section C, para 4.3.3 and T.O. para 3.2	100% inspection of QC reports. Reporting examples: Loop closures, re-occupations, reporting coord. systems, , datums, units & delivery of data	Quality of Product or Service	Project Execution	Trip reports, CARs, QARs, and/or statements of reviewed deliverables		

Contract Requirement	Contract Or Task Order Reference	Method of Surveillance	PPIMS Performance Assessment Record (PAR) Category	Basic Performance Indicator(s) (To be used when completing Contractor Performance Assessment Record (PAR) in PPIMS)	Objective evidence or documentation of surveillance performed	Identify network directory(ies) (and/or file drawers) where all QA documents are kept (e.g. CARs, Form-7 comments, QC reviews, acceptance and/or concurrence communications, etc.)	Dates Accomplished and reviewers
		collector files Periodic Inspection (Monthly)					
QC Plan QC reports on geophysical data collection & processing, and anomaly reacquisition	Section C, para 4.3.3 and T.O. para 3.2	100% inspection of QC reports. Reporting examples: noise limits, speed limits, processing SNR compliance, positioning compliance, appropriate data density,	Quality of Product or Service	Project Execution	Trip reports, CARs, QARs, and/or statements of reviewed deliverables		

Contract Requirement	Contract Or Task Order Reference	Method of Surveillance	PPIMS Performance Assessment Record (PAR) Category	Basic Performance Indicator(s) (To be used when completing Contractor Performance Assessment Record (PAR) in PPIMS)	Objective evidence or documentation of surveillance performed	Identify network directory(ies) (and/or file drawers) where all QA documents are kept (e.g. CARs, Form-7 comments, QC reviews, acceptance and/or concurrence communications, etc.)	Dates Accomplished and reviewers
		acceptable data coverage, appropriate instrument selection, adequate field documentation, delivery of complete raw and processed data, QC check sheets, offset compliance with location of recovered					

Contract Requirement	Contract Or Task Order Reference	Method of Surveillance	PPIMS Performance Assessment Record (PAR) Category	Basic Performance Indicator(s) (To be used when completing Contractor Performance Assessment Record (PAR) in PPIMS)	Objective evidence or documentation of surveillance performed	Identify network directory(ies) (and/or file drawers) where all QA documents are kept (e.g. CARs, Form-7 comments, QC reviews, acceptance and/or concurrence communications, etc.)	Dates Accomplished and reviewers
		item and final dig flag, agreement between dig sheets and maps, blind seed item anomaly selection. Periodic Inspection (Monthly)					
QC Plan QC reports on mag and flag and/or mag and dig	Section C, para 4.3.3 and T.O. para 3.2	100% inspection of QC reports. Reporting examples: Daily tests of	Quality of Product or Service	Project Execution	Trip reports, CARs, QARs, and/or statements of reviewed		

Contract Requirement	Contract Or Task Order Reference	Method of Surveillance	PPIMS Performance Assessment Record (PAR) Category	Basic Performance Indicator(s) (To be used when completing Contractor Performance Assessment Record (PAR) in PPIMS)	Objective evidence or documentation of surveillance performed	Identify network directory(ies) (and/or file drawers) where all QA documents are kept (e.g. CARs, Form-7 comments, QC reviews, acceptance and/or concurrence communications, etc.)	Dates Accomplished and reviewers
operations		blind seed item recovery for each team member, or digital mapping results of post-removal areas showing no detected items, Blind seed item recovery. Periodic Inspection (Monthly)			deliverables		

Contract Requirement	Contract Or Task Order Reference	Method of Surveillance	PPIMS Performance Assessment Record (PAR) Category	Basic Performance Indicator(s) (To be used when completing Contractor Performance Assessment Record (PAR) in PPIMS)	Objective evidence or documentation of surveillance performed	Identify network directory(ies) (and/or file drawers) where all QA documents are kept (e.g. CARs, Form-7 comments, QC reviews, acceptance and/or concurrence communications, etc.)	Dates Accomplished and reviewers
QC Plan QC reports on anomaly resolution	Section C, para 4.3.3 and T.O. para 3.2	100% inspection of QC reports. Reporting examples: limits on running average of false positives per sector, limits on distance offsets for recovered items from final marked locations, limits on anomaly	Quality of Product or Service	Project Execution	Trip reports, dated statements of having reviewed deliverables, identify network directory where all CAR and QC reviews/acceptance communications are kept		

Contract Requirement	Contract Or Task Order Reference	Method of Surveillance	PPIMS Performance Assessment Record (PAR) Category	Basic Performance Indicator(s) (To be used when completing Contractor Performance Assessment Record (PAR) in PPIMS)	Objective evidence or documentation of surveillance performed	Identify network directory(ies) (and/or file drawers) where all QA documents are kept (e.g. CARs, Form-7 comments, QC reviews, acceptance and/or concurrence communications, etc.)	Dates Accomplished and reviewers
		amplitude for weight & depth of recovered items, photo records of recovered UXO items. Periodic Inspection (Monthly)					
Environmental Protection Plan	Section C, para 4.3.3 and T.O. para 3.2	Periodic Inspection (Monthly)	Quality of Product or Service, and, Management of Key Personnel and Resources	Project Execution, Personnel knowledgeable and effective in their areas of	Trip reports, CARs, and/or daily QARs		

Contract Requirement	Contract Or Task Order Reference	Method of Surveillance	PPIMS Performance Assessment Record (PAR) Category	Basic Performance Indicator(s) (To be used when completing Contractor Performance Assessment Record (PAR) in PPIMS)	Objective evidence or documentation of surveillance performed	Identify network directory(ies) (and/or file drawers) where all QA documents are kept (e.g. CARs, Form-7 comments, QC reviews, acceptance and/or concurrence communications, etc.)	Dates Accomplished and reviewers
				responsibility, and Personnel able to manage resources efficiently			
Investigative Derived Waste Plan	Section C, para 4.3.3 and T.O. para 3.2	Periodic Inspection (Monthly)	Quality of Product or Service, and, Management of Key Personnel and Resources	Project Execution, Personnel knowledgeable and effective in their areas of responsibility, and Personnel able to manage resources efficiently	Trip reports, CARs, and/or daily Qars		

Contract Requirement	Contract Or Task Order Reference	Method of Surveillance	PPIMS Performance Assessment Record (PAR) Category	Basic Performance Indicator(s) (To be used when completing Contractor Performance Assessment Record (PAR) in PPIMS)	Objective evidence or documentation of surveillance performed	Identify network directory(ies) (and/or file drawers) where all QA documents are kept (e.g. CARs, Form-7 comments, QC reviews, acceptance and/or concurrence communications, etc.)	Dates Accomplished and reviewers
Cost/ Schedule							
Project Management: Cost and Schedule Control/Reporting	Section C, para 2.9 and T.O. para 3.10	100% of weekly status reports reviewed by USAESCH PM.	Schedule and Cost Control	Timely Completion of Tasks, Impacts to Schedule, No Unauthorized Cost Overruns, Monthly Cost Reports, and, Impacts to Cost			
Business Relations							
Level of preparedness		Customer	Quality of Product or	Project	Trip reports, CARs, and/or		

Contract Requirement	Contract Or Task Order Reference	Method of Surveillance	PPIMS Performance Assessment Record (PAR) Category	Basic Performance Indicator(s) (To be used when completing Contractor Performance Assessment Record (PAR) in PPIMS)	Objective evidence or documentation of surveillance performed	Identify network directory(ies) (and/or file drawers) where all QA documents are kept (e.g. CARs, Form-7 comments, QC reviews, acceptance and/or concurrence communications, etc.)	Dates Accomplished and reviewers
for meetings and presentations		Feedback	Service	Execution	daily QARs		
Demeanor and conduct during interactions with the PDT and stakeholders		Customer Feedback	Business Relations	Professional and Ethical Conduct	Meeting minutes, CARs, and/or daily QARs		
Management of Key Personnel							
Project	T.O. para	100%	Management of	Personnel	Trip reports,		

Contract Requirement	Contract Or Task Order Reference	Method of Surveillance	PPIMS Performance Assessment Record (PAR) Category	Basic Performance Indicator(s) (To be used when completing Contractor Performance Assessment Record (PAR) in PPIMS)	Objective evidence or documentation of surveillance performed	Identify network directory(ies) (and/or file drawers) where all QA documents are kept (e.g. CARs, Form-7 comments, QC reviews, acceptance and/or concurrence communications, etc.)	Dates Accomplished and reviewers
Management: personnel	3.10	inspection of personnel training logs & team assignments/ personnel assignments. Look for: Use of personnel stated in proposal and/or work plan. Consistency in personnel assigned to teams or specific	Key Personnel	knowledgeable and effective in their areas of responsibility	dated statements of having reviewed personnel/task assignments		

Contract Requirement	Contract Or Task Order Reference	Method of Surveillance	PPIMS Performance Assessment Record (PAR) Category	Basic Performance Indicator(s) (To be used when completing Contractor Performance Assessment Record (PAR) in PPIMS)	Objective evidence or documentation of surveillance performed	Identify network directory(ies) (and/or file drawers) where all QA documents are kept (e.g. CARs, Form-7 comments, QC reviews, acceptance and/or concurrence communications, etc.)	Dates Accomplished and reviewers
		functions Periodic inspection (with new personnel deployment)					

Attachment B.2

Attachment B.2
QASP Performance Metrics for Performance Assessment Record (PAR)

	Exceptional	Very Good	Satisfactory	Marginal	Unsatisfactory
PAR Category: Quality of Product or Service					
Performance indicator: Document reviews					
Draft Plans and Reports	All contract-milestone documents approved as submitted	One or more documents or subplans were approved as submitted, but exceptions were noted. Resubmissions were not required.	One or more documents or subplans required revisions to be resubmitted for approval prior to proceeding. Resubmission of an entire document or subplan was not required.	One or more documents or subplans required revisions to be resubmitted for approval prior to proceeding. Resubmission of an entire document or subplan was required.	One or more documents or subplans did not comply with contract requirements, or one or more documents or subplans required more than one resubmission of the entire document or subplan prior to its approval.
Performance indicator: Project Execution					
Process Compliance	Zero Corrective Action Requests (CAR)	1-5 CARs for non-critical WP violations (no impact to overall cost and schedule resulting from the non-compliance)	6 or more CARS for non-critical violations (no impact to overall cost and schedule resulting from the non-compliance)	>1 CAR where non-compliance adversely impacted overall cost or schedule	Repeated non-compliance with WP requirements resulted in cost overruns or repeated schedule extensions
Quality Control	Zero QA failures, 80% or more QC measures accepted, zero repetitive QC failures	Zero QA failures, 80% or more QC measures accepted, one or more repetitive QC failure occurred	Zero QA failures, less than 80% of QC measures accepted, or, One or more non-repetitive QA failures occurred	1-3 repetitive QA failures occurred	>3 repetitive QA failures occurred
AR Category: Schedule					
Performance indicator: Timely completion of tasks					
Final Work Plans and Reports, project milestones, T.O. invoices	All document submittals and task order milestones and invoices complete	Project closed out/final invoice approved ahead of schedule	project closed out/final invoice approved on T.O. date	Project closed out/final invoice approved within 30 calendar days after	Project closed out/final invoice approved more than 30 calendar days after T.O. date.

	Exceptional	Very Good	Satisfactory	Marginal	Unsatisfactory
	and approved by T.O date, project closed out/final invoice approved ahead of schedule			T.O. date.	
Monthly status reports accurate			Yes		No
Performance indicator: Impacts to schedule					
Impacts caused by contractor or other causes identified, in writing, in a timely manner to apply acceptable corrective actions.			Yes		No
PAR Category: Cost Control					
Performance indicator: No unauthorized cost overruns					
Unauthorized cost overruns			No		Yes
Total Project Costs	Total contract invoices less than 98% of initial T.O. authorized amount	Total contract invoices greater than 98% but less than 99.99%of initial T.O. authorized amount	Total contract invoices between 99.99% and 100% of initial T.O. authorized amount	Total contract invoices greater than 100% but less than 105% of initial T.O. authorized amount	Total contract invoices greater than or equal to 105% of T.O. authorized amount
Performance indicator: Monthly cost report					
Monthly cost reports accurate			Yes		No
Performance indicator: Impacts to cost					
Impacts caused by contractor or other causes identified, in writing, in a timely manner to apply acceptable corrective actions.			Yes		No

	Exceptional	Very Good	Satisfactory	Marginal	Unsatisfactory
PAR Category: Business Relations					
Performance indicator: Met contractual obligations					
Corrective Actions taken were timely and effective (Refer to CARs issued to contractor)			Yes		No
Performance indicator: Professional and Ethical Conduct					
Meetings and correspondences with Public, project delivery team and other stakeholders	Zero letters of reprimand, grievances, or formal complaints AND one or more unsolicited letters of commendation		Zero letters of reprimand, grievances, or formal complaints	One letter of reprimand, grievance or formal complaint that was resolved through negotiation	More than one letter of reprimand, grievance or formal complaint that were resolved through negotiation OR removal of one or more project personnel as a results of a letter of reprimand, grievance or formal complaint.
Performance indicator: Customer has overall satisfaction with work performed					
Customer survey results for rating period	4.0-5.0	3.0-3.9	2.0-2.9	1.0-1.9	<1.0
Performance indicator: Personnel responsive and cooperative					
Key personnel responsive, and cooperative	Always		Most Times		Almost Never
PAR Category: Management of Key Personnel and Resources					
Performance indicator: Personnel knowledgeable and effective in their areas of responsibility					
Personnel assigned to tasks	All personnel proposed by contractor were assigned to project, some personnel were substituted by higher qualified individuals.		All personnel proposed by contractor were assigned to project, some personnel were substituted by equally qualified individuals.		All personnel proposed by contractor were assigned to project, some personnel were substituted by lesser qualified individuals.
Performance indicator: Personnel able to manage resources efficiently					
Instances when resource management	0	1-2	3-4	5-6	>6

	Exceptional	Very Good	Satisfactory	Marginal	Unsatisfactory
had negative impact on project execution					
PAR Category: Safety					
Performance indicator: Accidents and Violations					
*Number of Class A Accidents, contractor at fault	0				1 or more
*Major safety violations	0		1		>1
*Minor safety violations	1		2-4		>4

*From Section C of Basic contract #W912DY-04-R-0003, Amendment 0001 (may be included but are not limited these)

The following guidelines are provided for issuing ratings that are subjective in nature, these ratings will be supported by the weight of evidence documented during the government's surveillance efforts:

Exceptional: Performance *meets* contractual requirements and *exceeds many* to the Government's benefit. The contractual performance of the element or sub-element being assessed was accomplished with *few minor problems* for which corrective actions taken by the contractor were *highly effective*.

Very Good: Performance *meets* contractual requirements and *exceeds some* to the Government's benefit. The contractual performance of the element or sub-element being assessed was accomplished with *some minor problems* for which corrective actions taken by the contractor were *effective*.

Satisfactory: Performance *meets* contractual requirements. The contractual performance of the element or sub-element contains *some minor problems* for which corrective actions taken by the contractor *appear or were satisfactory*.

Marginal: Performance *does not meet all* contractual requirements. The contractual performance of the element or sub-element being assessed reflects a *serious problem* for which the contractor has *not yet identified corrective actions*. The contractor's proposed actions appear only *marginally effective or were not fully implemented*.

Unsatisfactory: Performance *does not meet most* contractual requirements and *recovery is not likely* in a timely manner. The contractual performance of the element or sub-element contains *serious problems* for which the contractor's corrective actions *appear or were ineffective.*

Attachment B.3

USACE ORDNANCE AND EXPLOSIVE PROJECT
DAILY QUALITY ASSURANCE REPORT

CONTRACT WITH DELIVERY ORDER: DACAXXXXXXXX, Task Order # XX, Contractor

SITE:

DATE: **TELEPHONE NUMBER:**
FAX NUMBER:

WEATHER:

USACE Project Team Member and Title: i.e., Joe Smith UXO Safety Specialist, Jill Jones, USACE Project geophysicist, etc.

GRIDS COMPLETED BY CONTRACTOR:

SURVEILLANCE ACTIVITY or ACTIVITIES:

GRIDS THAT PASSED GOVERNMENT QA:

CORRECTIVE ACTION REQUESTS (CAR) ISSUED and CONTROL NUMBER:

CONTRACTOR KEY PERSONNEL ON-SITE:
GENERAL OBSERVATIONS:

LESSONS LEARNED: None

DISTRIBUTION:
1-CEHNC-OE-CWM-DC (Project Manager)
1-CEHNC-OE-S (FILE)
1-CEHNC-ED (Project Engineer)
1-CEHNC-CT (Contract Specialist)

Attachment B.4

CORRECTIVE ACTION REQUEST	**NO.** *(1,2,3, etc.for the T.O.)*
USACE Representative: Date Issued: Issued to: (*Contractor*) Response Due: (*Based on type of nonconformance*) Contract # and T.O. # Project Name/Location:	
Nonconformance Type (circle one): Critical Major Minor	
Description of Condition Found:	
Apparent Cause:	
(The Contractor will provide the following information to the Contracting Officer and USACE PM by the "Response Due" date above. Please contact the USACE Representative listed above if you have any questions)	
Actual Cause: (Contractor will investigate and determine cause of condition reported above. Actual cause should be stated as specifically as possible)	
Action Taken to Correct Condition: (Corrective Action should address root cause, not the symptom)	
Action Taken to Prevent Recurrence:	
Action Taken to Monitor Effectiveness of Corrective Action: (Generate data as proof. State the monitoring method put in place and who is responsible for reviewing data.)	
Contractor Representative Signature/Title/Date Signed: (Form must be signed before returning)	
(USACE Project Team Use Only) Review of Corrective Action: 1) Has condition improved? ___ Yes ___ No 2) Additional corrective action required? ___ Yes ___ No Comments: Completed form provided to Contracting Officer: (Date)	

Attachment B.5

Final Quality Assurance Report
For
EE/CA (or Removal Action)
At
Former XXXX
Contract Number: 00000000
Task Order: ###

1. Describe QA methods used (or reference where they are documented) and pass/fail criteria.

2. Summarize field QA activities performed and describe any special conditions encountered or special circumstances.

3. Describe any constraints or problems encountered.

4. Summarize data quality assurance activities performed and describe any special conditions encountered or special circumstances.

5. Provide list of all CEHNC 948s issued for QA failures and describe corrective actions taken.

6. List/describe lessons learned.

7. Include a final statement that contract requirements were met regarding quality of services provided.

8. Signature of Project Engineer preparing the report.

9. List supporting data/references and where they are filed.

Attachment B.6
Project Name/Contract No._____

Audit Date (Start):_____ **Audit Date (End):**_____

CHECKPOINTS:

1. Review Scope of Work (DO/TO) & WP	**YES**	**NO**	**N/A**	**COMMENTS**
a. Objectives Clearly Identified				
b. Check for Changes to WP & Up To Date				
c. Proper Depth of Clearance Identified				
d. Proper Target Ordnance Identified				
e. Detection & Target Depth(s) Specified				
f. Exclusion Zone Identified in WP				
2. Documentation Requirements	**YES**	**NO**	**N/A**	**COMMENTS**
a. Notice to Proceed from KO				
b. Approval Letter for Work Plan/SSHP				
c. Approval Letter for UXO Personnel Identified by Name & Position				
d. Approval Letter, FAA (If Required)				
e. Certificate of Grounding, Lightning Protection (if Required)				
f. Explosive Permits/License (If Required)				
g. GFE Transfer Documentation (If Required)				
h. Approval Letter, Public/Personnel Withdraw Distance 1 Frag in 600 sq. ft.				
i. Dig Permits for Utilities (If Required).				
3. CEHNC QA Files Established	**YES**	**NO**	**N/A**	**COMMENTS**
a. Daily/Weekly QA Reports				
b. Approval Letter's (NTP, Personnel & WP/SSHP) for Contractor Operations				
c. Weekly Contractor Reports SUXOS/QC (If Provided)				
d. CEHNC Form 948 Copy 4 (Blue)				
4. Site-Specific Safety & Health Plan (SSHP)	**YES**	**NO**	**N/A**	**COMMENTS**
a. Emergency Notification List Posted & Available				
b. Emergency Routes/Maps Available & Issued to Each Team				
c. Work Task Identified in Hazard Analysis. Approved SSHP				
d. MSDS(s) On-Site. Approved SSHP				
e. Visitors/Safety Briefing Log Current and Updated				
f. All Personnel On-Site in the Proper PPE.				

g. Minimum of Two Personnel On-Site First Aid/CPR Trained, EM 385-1-1, Section 3, Page 19. Paragraph 03.A.02				
h. 16-Unit First Aid Kits or Kits Approved by a Licensed Physician in the Ratio of one for every 25 persons or less. EM 385-1-1, Section 3, Page 19. Paragraph 03.A.03				
5. Technical Management Reference DID OE-005-02.01	YES	**NO**	**N/A**	**COMMENTS**
a. Procedures Established for the Discovery of RCWM				
b. Procedures Developed for Discovery of MEC Which Cannot Be Destroyed in Place				
c. Project Grid Size, Layout, Lane Width(5' or Less) Established				
d. Established Procedures for Chanded Site Conditions				
e. Organizational chart Current and Indicates Assignment, Duties, Responsibilities to Include Geophysical Teams				
f. Procedured for Reporting and Disposition of MPPEH				
g. Procedures Established for Disposal of MEC in Populated/Sensitive Areas				
h. Procedures Established for Managing, reporting, Venting and Disposing of MD and RRD				
i. Additional Task and Procedures being Followed (e.g. PAO, Community Relations, Weekly & Monthly Project Status reports)				
j. Procedured Established for Recording, reporting and implementing Lessons Learned				
k. Limitations Posed and Ability of Detection System(s) Chosen.				
l. Proper use of Geophysical Detections Systems used				
6. Facilities. Reference EM 385-1-1	YES	**NO**	**N/A**	**COMMENTS**
a. Adequate Work Space & Facilities (Restrooms etc.)				
b. Good Housekeeping (No Fire Hazards, Tripping Hazards etc.)				
c. Approved and Suitable Containers for Flammable Toxic or Explosive Materials				
d. Approved/Adequate Explosive Storage Facilities				
e. Fire/Emergency Exits Clear & Unbarred				
f. Personnel Limits Maintained				
g. Site Security Adequate				
h. Toilets. EM 385-1-1, Section 2, page 14, Paragraph 02.B Toilets.				
i. Washing Facilities. EM 385-1-1, Section 2, Page 16. Paragraph 02.C Washing Facilities				
7. Equipment. Reference Approved WP/Manufacture Operators Manual	**Yes**	**NO**	**N/A**	**COMMENTS**
a. Tools Appropriate and Serviceable				
b. Proper Personnel Protective Equipment (PPE) Present, Serviceable & Utilized				
c. Equipment Calibrated (Last cal Date_____ Next cal Date_____)				
d. Survey Equipment Inspected & Serviceable				
e. Heavy Equipment Inspected & Serviceable IAW EM 385-1-1, Section 16				

1. Are Equipped with at Least One Dry Chemical or CO2 Fire Extinguisher - Minimum rating of 5-BC - IAW EM 385-1-1, Section 16.				
f. Two Separate Means of Communications, Radio(s)/Cell Phone, Land Line(s).				
g. Geophysical Equipment On-Hand & Serviceable				
8. Explosive Storage Requirements. Reference EP 1110-1-18	**YES**	**NO**	**N/A**	**COMMENTS**
a. Proper Storage Containers Type 2 Magazines conforming to standards set forth in Section 55.206 of ATFP 5400.7, ATF Explosives Law and Regulations				
b. Placards. Each magazine will display the placards required by DOT regulations in accordance with DOD 6055.9-STD and DA Pam 385-64 for Hazard division of UXO stored in the magazine.				
c. Explosive Compatibility Groups. Segregated into the appropriate hazard divisions criteria listed in Chapter 3, DOD 6055.9-STD.				
d. Physical Security. Contractor shall conduct and document physical security survey, the survey is to determined if fencing or guards are required.				
e. Locks. Shall meet the standards listed in Section 55.208 (a) (4), ATFP 5400.7.				
f. A key control system will be documented in the Work Plan, EP 1110-1-18				
g. Lightning Protection. Magazine constructed of metal that has 3/16 inch steel or longer in accordance with National Fire Protection Association (NFPA) 780.				
h. Lightning Protection. Magazine grounded in accordance with NFPA.				
i. Lightning Protection. Magazine is located at least 6.5 feet from the nearest fence.				
j. Lightning Protection. BRAC, IRP and Active Installation will meet the provisions of DOD 6055.9-STD. Army installations will also meet the provisions of DA Pamphlet 385-64.				
k. Fire Protection. Extinguishers of appropriate size (minimum 10 BC) and type will be located in all explosives storage facilities.				
l. Explosive Limits Maintained, 100 lbs. NEW or less				
m. Waiver. MACOM approval for storage of commercial of explosives on-site (if required).				
9. Explosive Management Plan. Reference Approved WP/49 CFR	ES	**NO**	**N/A**	**COMMENTS**
a. Signature Authority On-Hand				
b. Periodic Inventories Conducted On-Schedule				
c. Accountability Records Maintained				
d. Lost/Stolen Reporting Procedures In Place				
e. Final Disposition Procedures Documented				
f. Key Control/Security				
10. Transportation of UXO. Reference EP 1110-1-18, Chapter 15/49 CFR	**YES**	**NO**	**N/A**	**COMMENTS**
a. Hazardous Waste Manifest (EPA Form 8700-22) (if required)				
b. Hazard Classification of UXO IAW TB 700-2				
c. Training of Transporting UXO IAW 49 CFR, Part 172 & State Applicable State Requirements				
d. Documented Organizational Responsibilities for Transportation of UXO				
e. Approved Transportation Plan				

f. Pre-operational Checks of Vehicles Being Conducted				
g. All Operators Licensed For Vehicle				
h. Fire Fighting & First Aid Equipment On Board				
i. Cargo Properly Segregated/Blocked And Braced and in Proper Container				
j. Proper DOT Placards/Fire Fighting Symbols Used				
11. UXO Operational Plan. Reference Approved WP & EP 1110-1-18	**YES**	**NO**	**N/A**	**COMMENTS**
a. Contractor Following Methodology Defined in WP				
1. SUXO Conducted Physical Check Prior to Sweep Operations				
2. Daily Safety Meeting Conducted by SUXO/SSHO				
b. Geophysical Detection Magnetometer Used				
1. Pre-Operational Checks Performed Prior to Sweep Operations				
2. Operational Condition Annotated in Log Book				
3. UXO Teams				
4. Quality Control				
5. Quality Assurance				
c. Operational Teams Operating IAW WP				
1. UXO Supervisor Conducted Physical Check Prior to Sweep Operation				
2. Pre-Sweep Operational/Safety Brief Conducted				
3. Individual Sweep Lanes/Transects Marked IAW WP				
4. Contacts Marked & Investigated Properly				
5. Results of Sweep Operation Recorded				
6. All UXO, Inert Items & Scrap Examined by at Least Two UXO Personnel				
(a.) AEDA (Range Residue) IAW SOW and Properly Addressed in WP				
7. All UXO's Clearly Marked				
d. QC Operations IAW WP				
e. Non-UXO Scrap Being Collected (as Required)				
f. UXO Scrap Inspected/Vented/Segregated				
g. Geophysical Test Grids Appropriate and IAW SOW				
12. Disposal Operations Planned On-Site IAW the Approved WP and 60A-1-1-31/1-1-22	**YES**	**NO**	**N/A**	**COMMENTS**
a. Disposal Method IAW WP				
b. Adequate Security For Disposal Operation				
c. Disposal Notification List Available				
d. All Necessary Notifications Made				
e. Movement of UXO Items, Or is UXO Consolidation Feasible				

f. Protective Measures/Tamping Being Used/Appropriate for UXO Being Destroyed				
g. Limits of the Exclusion Zone Established and Are All Personnel Aware of Limits				
h. Disposal Procedures				
1. Misfire Procedures Properly Performed (Electric)				
2. Misfire Procedures Properly Performed (Non-Electric)				
13. Location Survey & Mapping Plan. Reference Contract DID's	**YES**	**NO**	**N/A**	**COMMENTS**
a. Professional Land Surveyor				
a. Surveyors Received Safety Briefing				
a. UXO Escort Provided				
b. Grid Stake, Locations Swept With Geophysical Equipment Prior to Driving Stakes				
c. Survey Notes Being Recorded				
14. Quality Control Plan. Reference SOW/DID(s)	**YES**	**NO**	**N/A**	**COMMENTS**
a. QC Operational/Checks Being Conducted IAW WP				
b. QC Grid/Transect Established IAW WP				
c. Results of QC Checks Being Recorded				
d. Pass/Fail Criteria Clearly defined IAW SOW/DID OE-005-05.01				
15. Vegetation Removal Reference WP/SSHP & OSHA Req.	**YES**	**NO**	**N/A**	**COMMENTS**
a. Vegetation Removal & Localized, if Required				
b. Equipment Operated To Prevent Impact With Possible Surface UXO				
c. Cutting Does Not Present Impalement Hazard				
d. UXO Personnel Monitoring Cutting Operation				
e. UXO Discovered Marked/Handled Appropriately				
f. Equipment Being Operated Safely & IAW Equipment Operators Manual/WP				
16. Munition Constituents (MC) Sampling and Analysis Plan, if Required	**YES**	**NO**	**N/A**	**COMMENTS**
a. Key Personnel Identified				
b. Quality Assurance Responsibilities Identified				
c. Procedured for Collection of Samples				
d. Sample Custody				
e. Quality Control Samples				
f. Quality Assurance Samples				
g. Packaging and Shipping Procedures Established				
h. Control Limits and Corrective Actions				
I. Contractors Quality Control Parameters				
j. Field Measurements				

k. Laboratory Quality Assurance Plan				
17. OTHER	**YES**	**NO**	**N/A**	**COMMENTS**

Note: The Contractor can request the excel version of this attachment.

Attachment C

TO: Department of the Army
U.S. Army Engineering and Support Center, Huntsville
Corps of Engineers
4820 University Square
Huntsville, Alabama 35816-1822

Date:_____

Memorandum For Record

Subject: Milestone Approval
Project Name:
Project Location:
Contractor Name:
Contract Number:
Task Order Number:

In accordance with the requirements contained in the Statement of Work for the referenced contract, the undersigned agree that [Contractor Name] has submitted the completed Milestone No._____ Contract Line Item No.: _____, Deliverable: _____ to their satisfaction.

Contractor Signature

_____, Date_____

CEHNC Project Manager/COR Signature

_____, Date_____

Contracting Officer Signature

_____, Date:_____

APPENDIX B
SITE MAPS

APPENDIX B
SITE MAPS

The following Maps can be found in this Appendix:

Figure 1-1	Spring Valley FUDS Location and Operable Units
Figure 3-1	Federal Property Location Map
Figure 3-2	Federal Property Layout
Figure 3-3	Typical Site Layout for Investigation of Higher Probability Anomalies
Figure 9-1	Federal Property Storage Area
Figure 9-2	Federal Storage Area IHF Q-D Arcs
Figure 9-3	Federal Storage Area Explosives Storage Magazine Q-D Arcs
Figure 9-4a	Relevant Site Feature Distances from IHF Containers
Figure 9-4b	Relevant Site Feature Distances from Explosives Storage Magazine

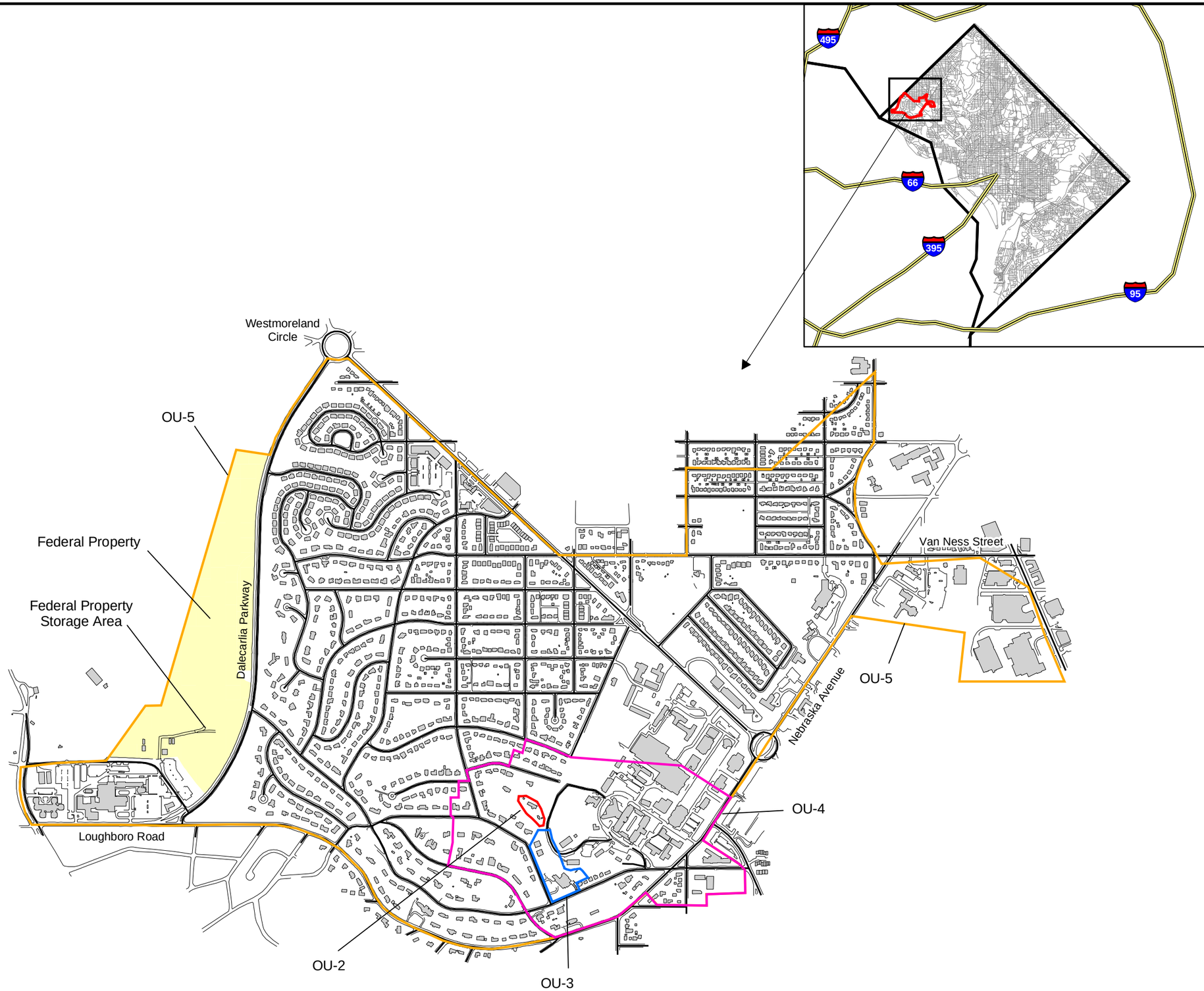

Figure 1-1
Spring Valley FUDS Location and Operable Units

Spring Valley Site-Wide
Washington, DC

Legend

	Operable Unit
Buildings	OU-2
Road	OU-3
Federal Property	OU-4
Federal Property Storage Area	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).

N W E S

1,200 600 0 1,200 Feet

Scale:	
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Page Number:	1-5X

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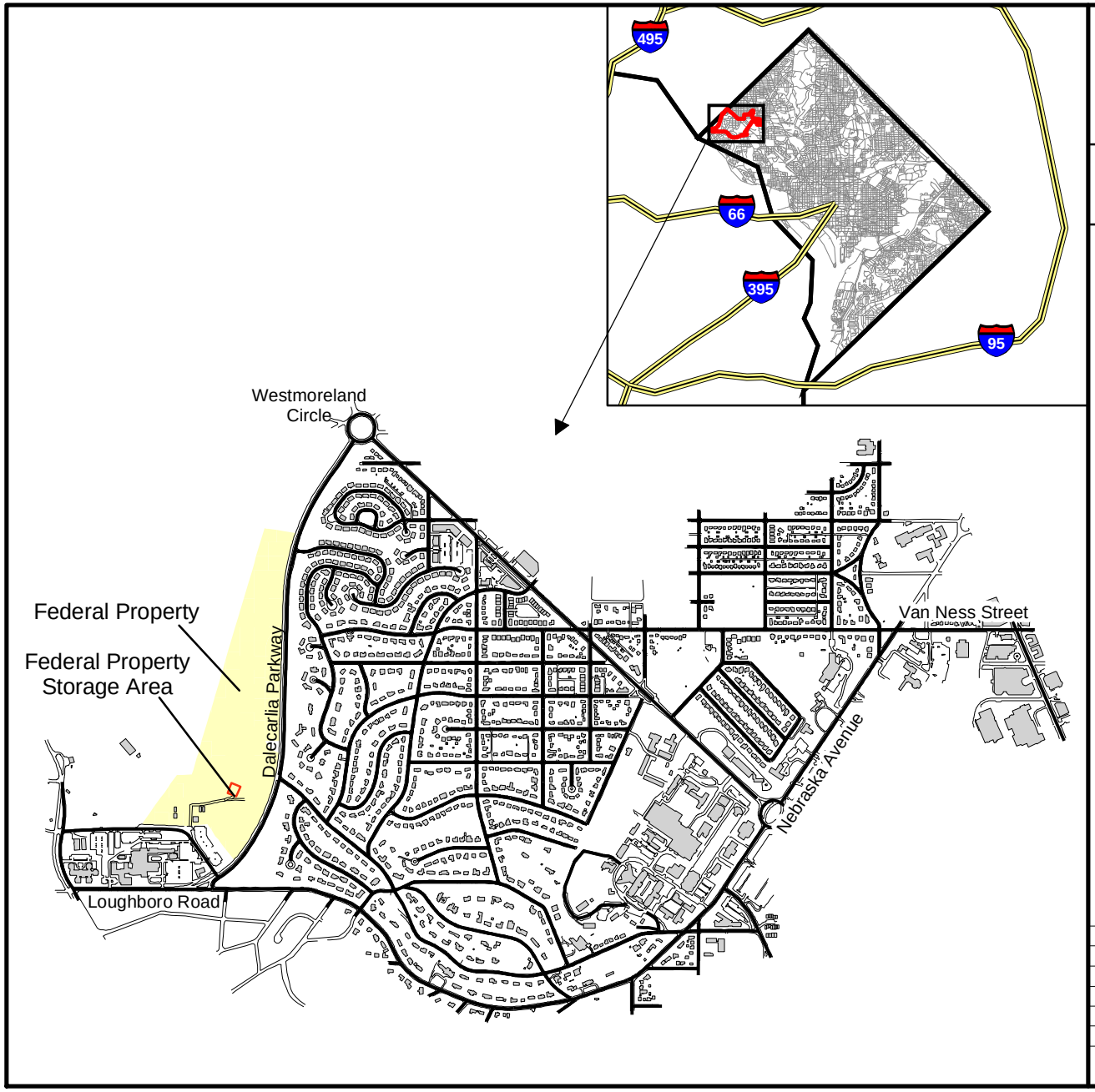

Figure 3-1
Federal Property Location Map

Spring Valley Site-Wide
Washington, DC

Legend

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

N
W E
S

1,500 750 0 1,500 Feet

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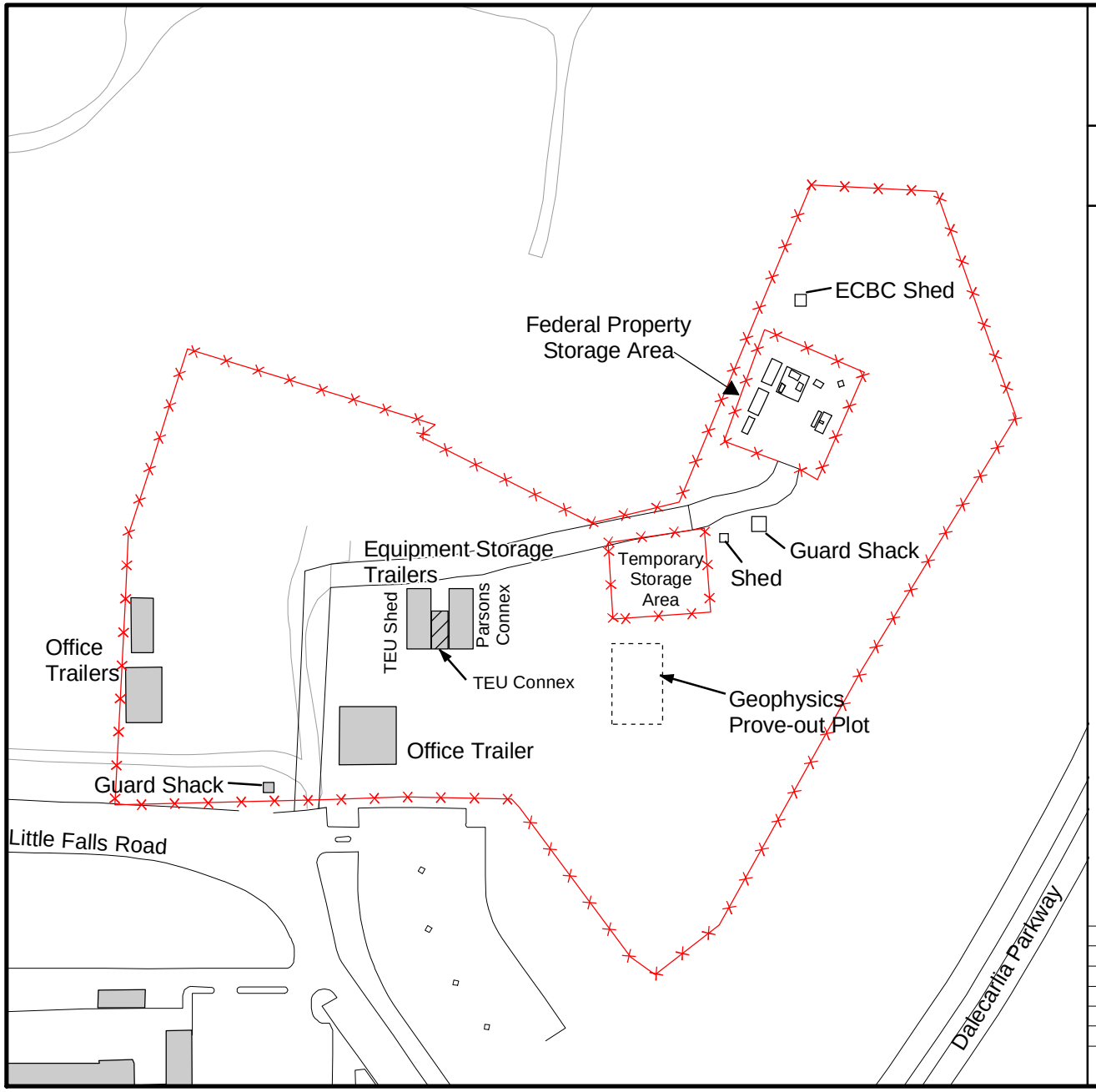

Figure 3-2
Federal Property Layout

Spring Valley Site-Wide
Washington, DC

Legend

- Fence
- Buildings
- Federal Property Storage Area Structures
- Road
- Dirt Road

N
W E
S

150 75 0 150 Feet

Scale:	
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PARSONS

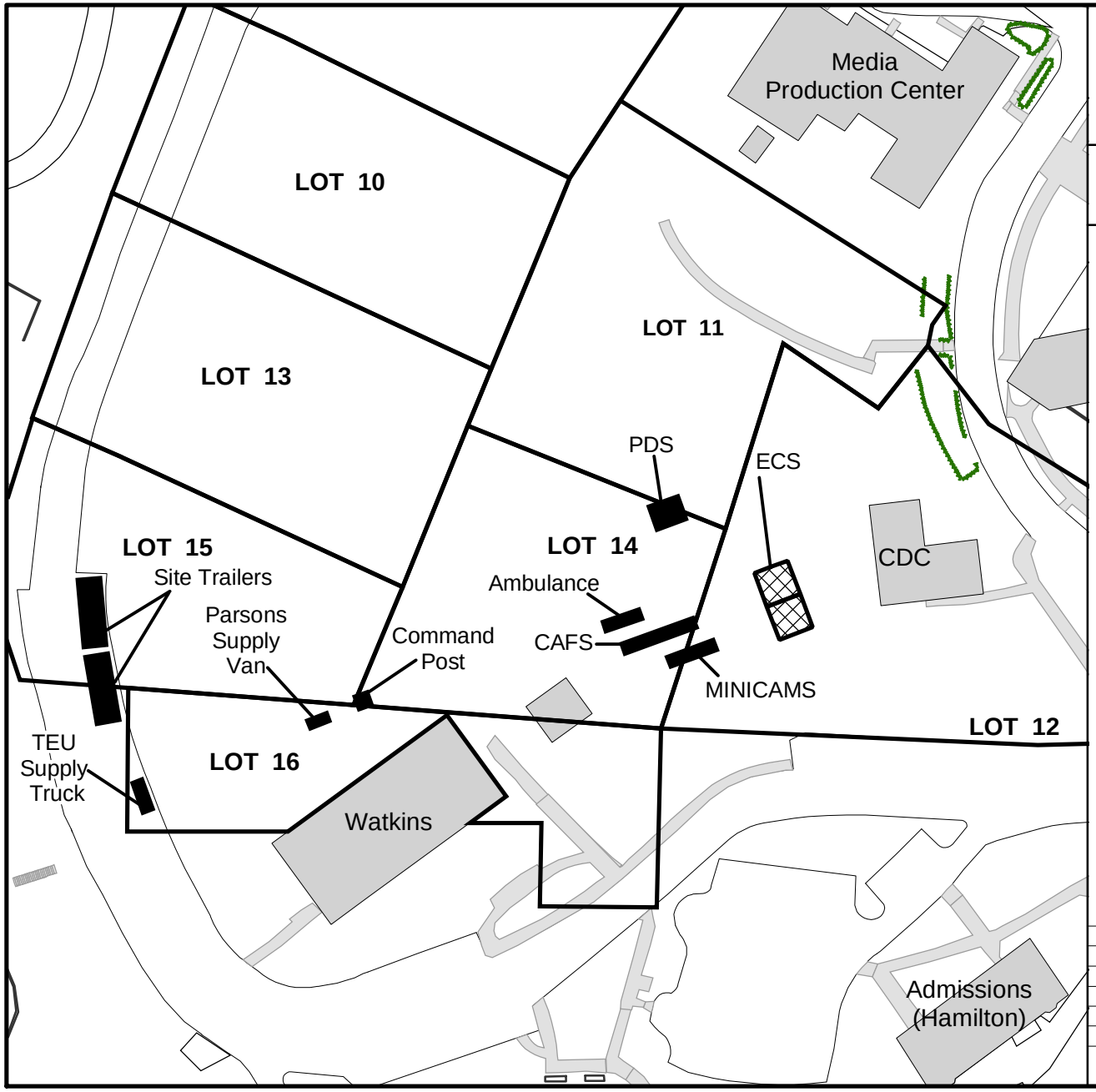

Figure 3-3

Typical Site Layout for Investigation of Higher Probablity Anomalies

Spring Valley Site-Wide
Washington, DC

Legend

- (400,360) & (420,360) Grids
- Lots
- Trailer
- Buildings
- Hedge
- Retaining Wall
- Sidewalk
- Driveway
- Roads

Note: The location of support activities will vary site to site and will be documented in the Site Specific Work Plans.

0 45 90 180 Feet

1 inch equals 90 feet

Scale:	1:1,080
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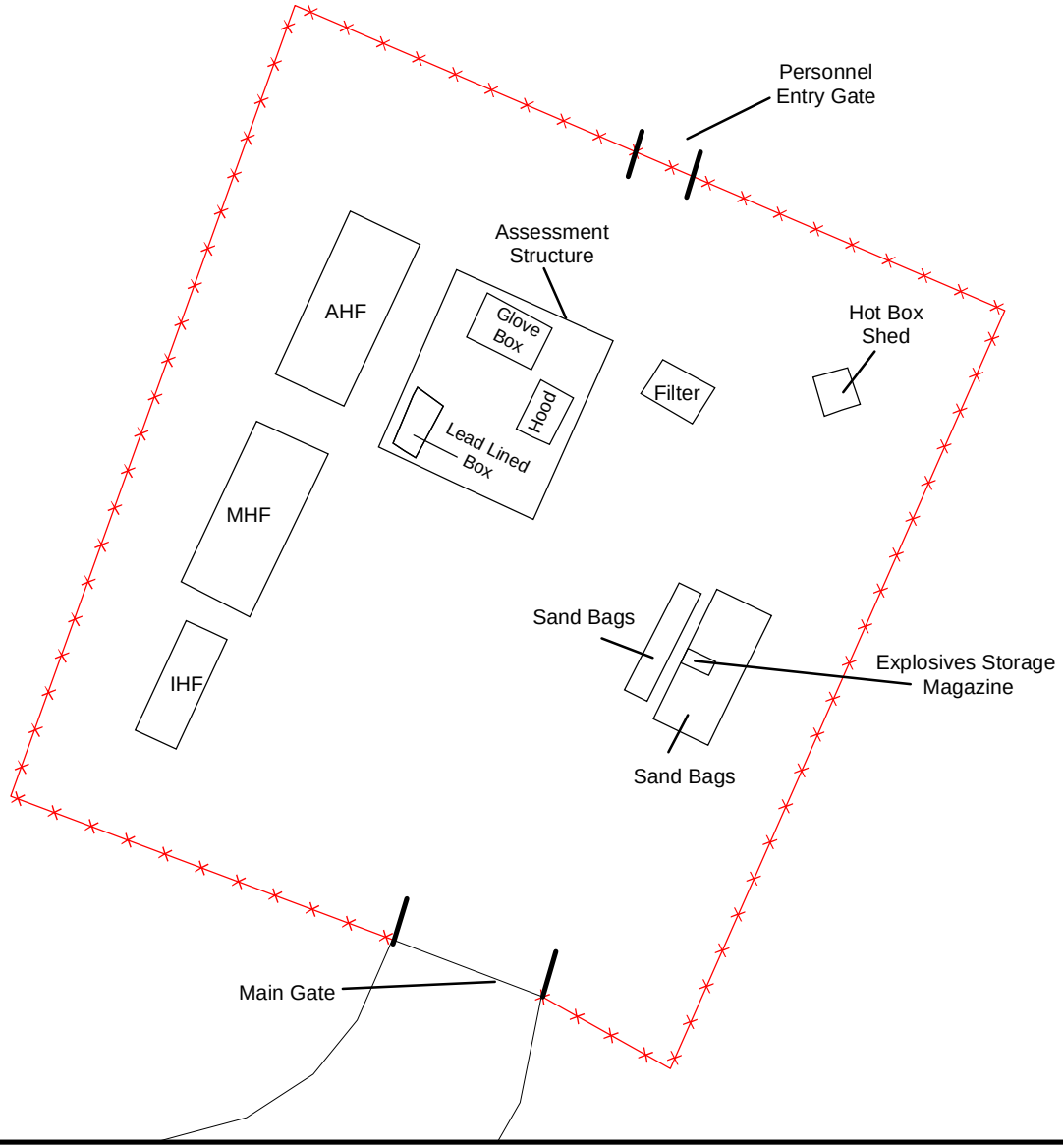

Figure 9-1
Federal Property Storage Area

Spring Valley Site-Wide
Washington, DC

Legend

- Fence
- Buildings
- Federal Property Storage Area Structures
- Road
- Dirt Road

IHF = Interim Holding Facility
AHF = Assessment Holding Facility
MHF = Munitions Assessment Review Board (MARB) Holding Facility

N
W E
S

25 12.5 0 25 Feet

Scale:	1:300
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Page Number:	9-2X

PARSONS

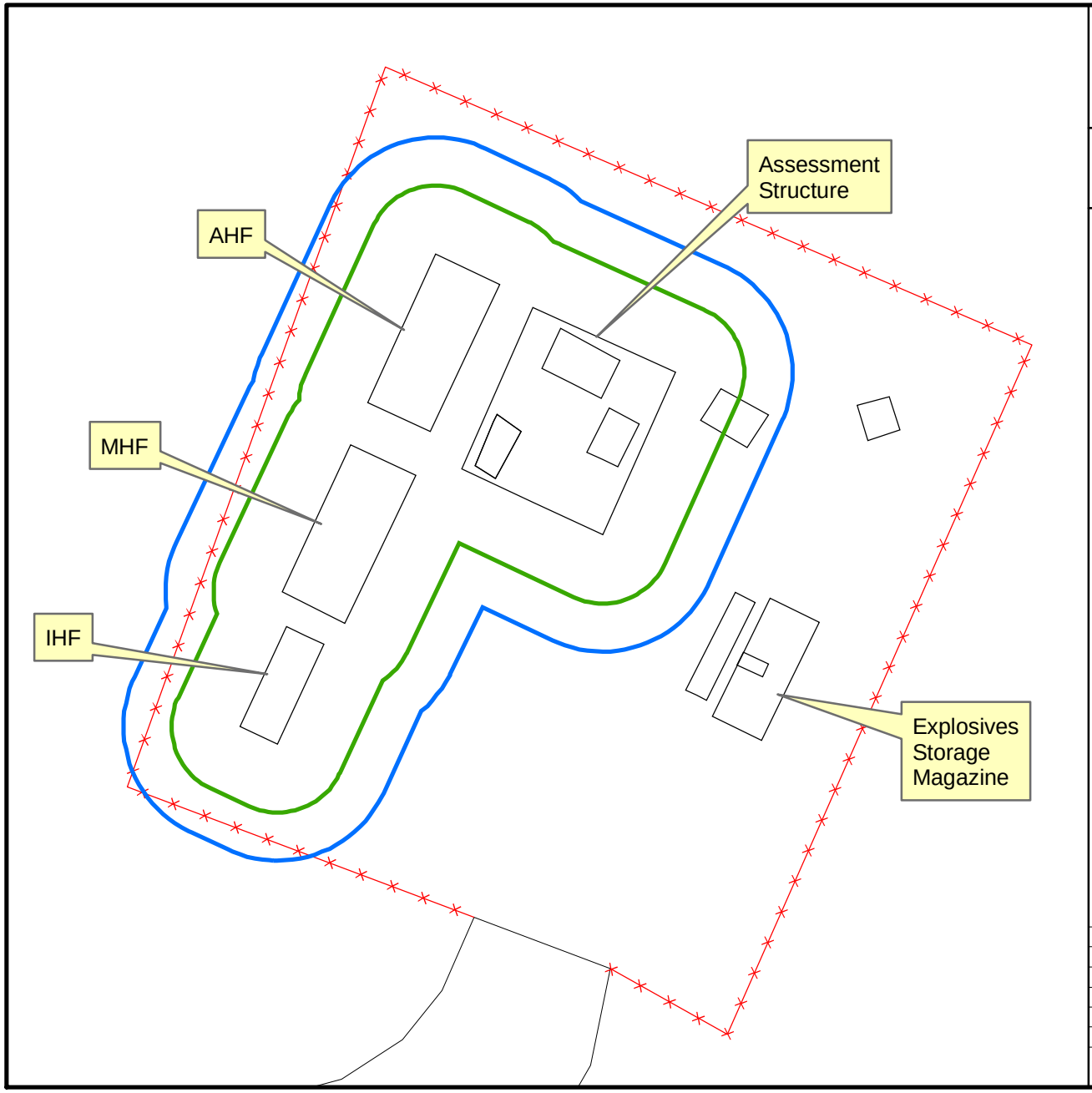

Figure 9-2
Federal Property Storage Area
IHF QD Arcs

Spring Valley Site-Wide
Washington, DC

Legend

IHF Distances

- IBD & PAED (17ft)
- 1% Lethality & PTR (10ft)

- Fence
- Buildings
- Federal Property Storage Area Structures
- Road
- Dirt Road

N
W E
S

20 10 0 20 Feet

Scale:	1:280
Created By:	Parsons
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Date:	09/25/2003
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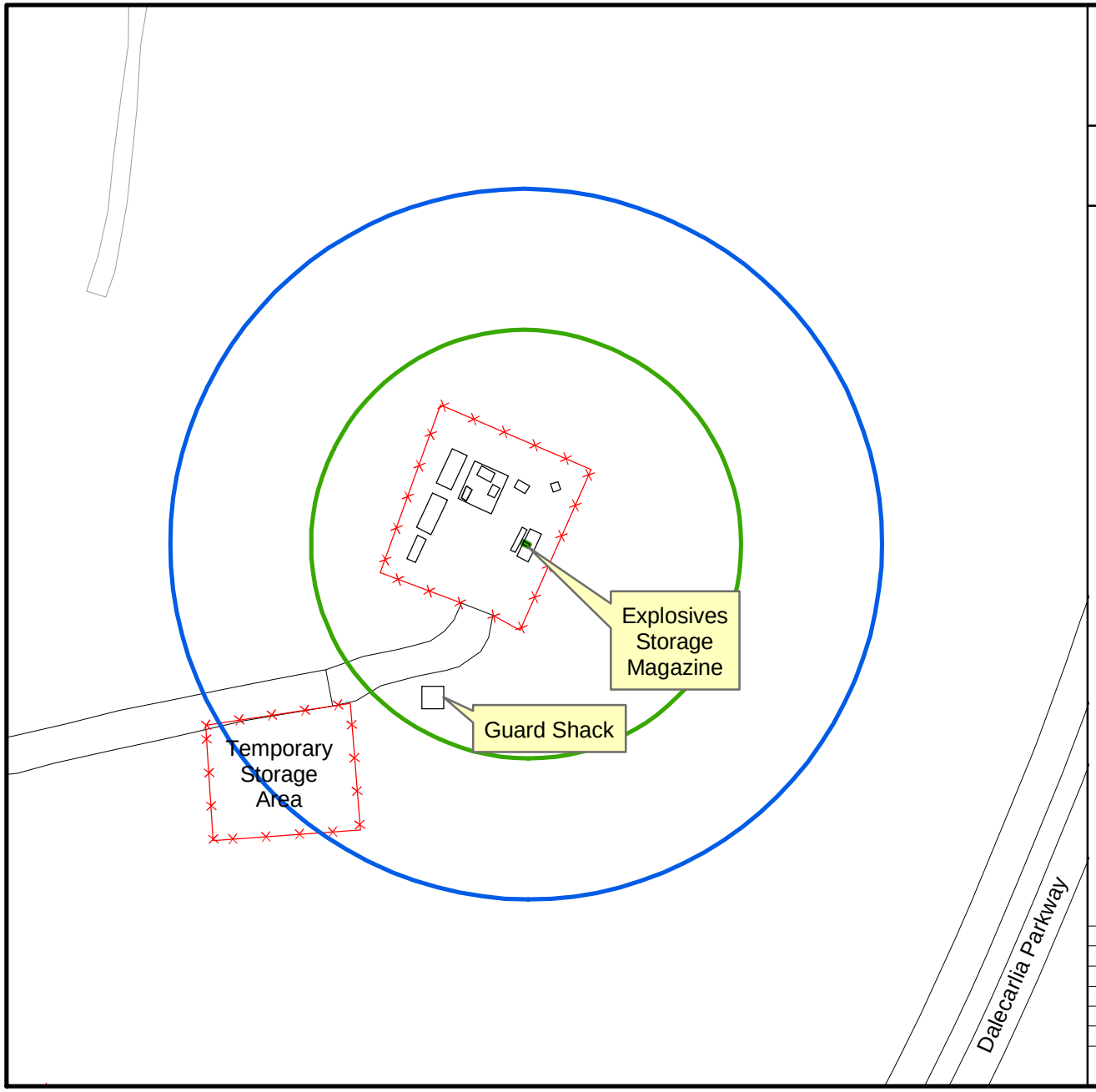

Figure 9-3
Federal Property Storage Area
Explosives Storage Magazine
QD Arcs

Spring Valley Site-Wide
Washington, DC

Legend

- Federal Property Storage Area Structures
- Fence
- Road
- Dirt Road

Magazine Distances

- IBD (220 ft)
- PTR (132 ft)

N W E S

100 50 0 100 Feet

Scale:	1:1,200
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File:	20030925 Federal Property Storage Area ATF Magazine....mxd
Date:	09/25/2003
Figure Number:	9-3
Page Number:	9-9X

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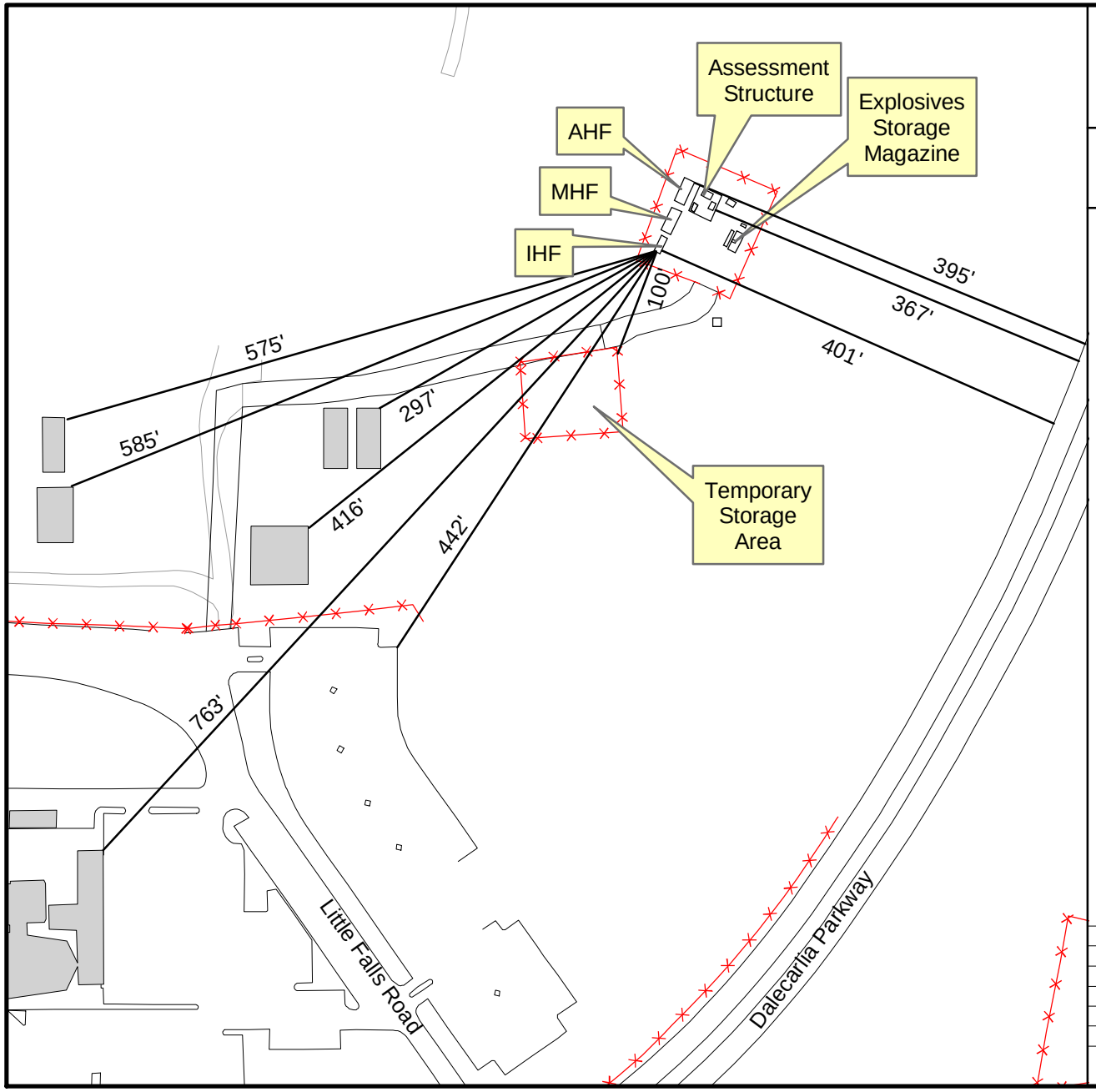

Figure 9-4a

Relevant Site Feature Distances from IHF Containers

Spring Valley Site-Wide
Washington, DC

Legend

- Federal Property Storage Area Structures
- Fence
- Buildings
- Road
- Dirt Road

Note:
All inhabited buidings are located outside the PAED for the IHF containers (43 feet) and the IBD for the Explosives Storage Magazine (220 feet).

N W E S

150 75 0 150 Feet

Scale:	1:1,800
Created By:	Parsons
File:	20030925 IHF Relevant Site Feature Distances IHF ... .mxd
Date:	09/25/2003
Figure Number:	9-4a
Page Number:	9-11X

PARSONS

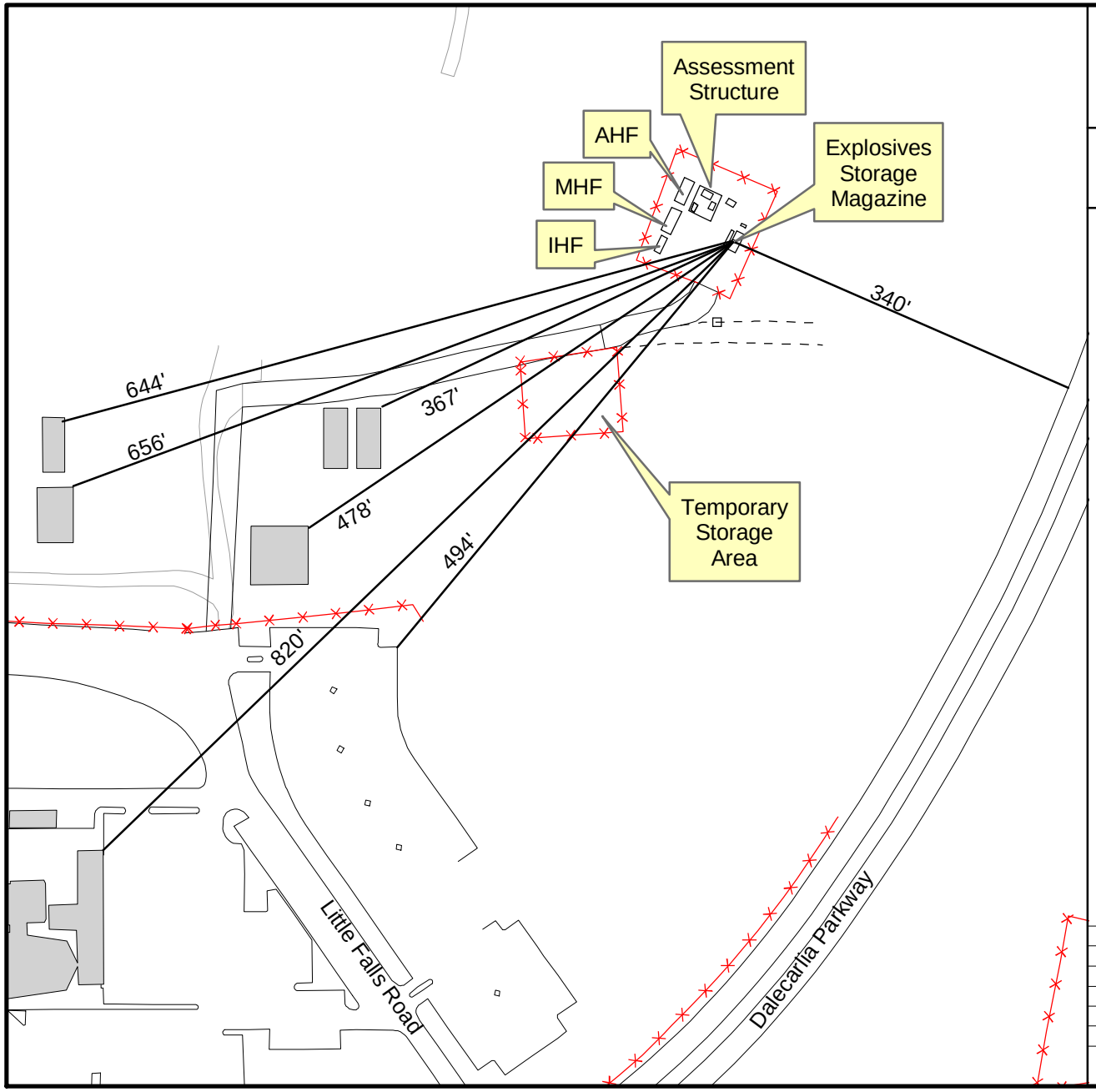

Figure 9-4b
Relevant Site Feature Distances from Explosives Storage Magazine

Spring Valley Site-Wide
Washington, DC

Legend

- Federal Property Storage Area Structures
- Fence
- Buildings
- Road
- Dirt Road

Note:
All inhabited buildings are located outside the PAED for the IHF containers (43 feet) and the IBD for the Explosives Storage Magazine (220 feet).

N
W E
S

150 75 0 150 Feet

Scale:	1:1,800
Created By:	Parsons
File:	20030925 IHF Relevant Site Feature Distances Magazine.mxd
Date:	09/25/2003
Figure Number:	9-4b
Page Number:	9-12X

PARSONS

APPENDIX C
POINTS OF CONTACT

APPENDIX C
POINTS OF CONTACT

These contacts should be posted prominently at the site. The SSWPs will contain the information where to-be-determined (TBD) is noted.

Agency/Contact	Activity	Telephone Number
Police		911
Fire		911
Ambulance		On site/911
Emergency Response (Spills/Releases-Only)	Emergency Response Coordinator for Area	911
Hospital for Non-Trauma/Non-Chemical	Sibley Hospital	202-537-4000
Hospital for Trauma/Chemical	George Washington University Hospital	202-994-3211
National Response Center		800-424-9500
Poison Control Center		800-288-9999

Responsible Person	Telephone Numbers	
	Work	Other
CENAB Site Operations Officer – **Capt. Drew White**	**TBD**	**TBD**
CENAB MMRP Project Manager – **Dan Noble**	410-962-6782	443-676-4235 (cell)
USAESCH Project Manager - **Allyn Allison**	256 895-1121	256 426-5841 (cell)
USAESCH Deputy Project Manager – **Bruce Whisenant**	256 895-1633	256-684-2855 (cell)
USAESCH Safety Specialist – **TBD**	**TBD**	**TBD**
USAESCH Safety Specialist (Alt.) – **TBD**	**TBD**	**TBD**
Parsons Project Manager – **Deepak Bhinge**	703-218-1092	703-609-3963(cell)
Parsons Site Manager – **TBD**	**TBD**	**TBD**
Parsons Project Safety and Health Manager – **Ed Grunwald**	678-969-2394	-
Parsons Site Safety and Health Officer – **TBD**	**TBD**	**TBD**
TE Emergency Contact – **RDECOM Emergency Command Post**	410-436-2148	-
ECBC Emergency Contact - **RDECOM Emergency Command Post**	410-436-2148	-

APPENDIX D
ACCIDENT PREVENTION PLAN

ACCIDENT PREVENTION PLAN

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

Prepared for:

U.S. Army Engineering and Support Center, Huntsville

and

Baltimore District
U.S. Army Corps of Engineers

Prepared by:

PARSONS

10521 Rosehaven Street, Suite 200
Fairfax, Virginia

March 2007

APPROVED BY: ELECTRONIC SIGNATURE

Parsons Project Manager – Deepak Bhinge, P.E.

APPROVED BY: 3/6/07

Project Health and Safety Manager – Ed Grunwald, C.I.H.

APPROVED BY: 3/6/07

Corporate Vice-President – Kenneth Stockwell, P.E.

The views, opinions, and/or findings contained in this document are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentations.

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CHAPTER 1
BACKGROUND INFORMATION

1.1 INTRODUCTION

1.1.0.1 Accident prevention is a key program element to achieve compliance and strive towards our ultimate goal of zero safety incidents. Personnel active in site operations will be thoroughly familiar with the programs and procedures outlined in this Accident Prevention Plan (APP) prior to conducting work at the site.

1.1.0.2 This APP and the attached Site Safety and Health Plan (SSHP) are appended to the Site-Wide Work Plan (WP) that describes the overall methods and procedures to be implemented during field operations at the Spring Valley Formerly Used Defense Site (SVFUDS). Consequently, this APP and SSHP may include discussions of procedures and methods that may not be applicable to a specific site and its associated scope of work. For this reason, a Site-Specific Work Plan (SSWP) will be prepared for each individual site to be addressed at the SVFUDS to augment the Site-Wide WP and APP/SSHP. These SSWPs will reference the applicable components of the Site-Wide WP and APP/SSHP but the content will focus on site-specific objectives, information and requirements, procedural decisions, modifications, and/or omissions from the site-wide documents.

1.2 PROJECT AUTHORIZATION

1.2.0.1 Under Contract No. W912DY-04-D-0005 and Delivery Order 0007, Parsons is serving as the prime contractor to the U.S. Army Engineering and Support Center, Huntsville (USAESCH) for the intrusive investigations and associated activities at the SVFUDS. This project falls under the Defense Environmental Restoration Program/Formerly Used Defense Sites (DERP/FUDS). The Project Team will consist of Parsons, USAESCH, and U.S. Army Corps of Engineers (USACE), Baltimore District (CENAB) as well as other government and non-government agencies with specific expertise for implementation of specialized components of the field operations. For purposes of this APP, USAESCH and CENAB are referred to jointly as "USACE."

1.2.0.2 This APP applies to site-wide activities being conducted within the approximately 667 acres of the SVFUDS. The project will involve an investigation for possible recovered chemical warfare materiel (RCWM), munitions and explosives of concern (MEC), and munitions constituents (MC) to characterize the site and to identify and quantify any associated risk, while adhering to the highest levels of safety for the public and project staff. Primary project activities will include surveying and mapping, geophysical reacquisition, intrusive investigation, sampling, and related activities. The location of the SVFUDS is presented in Figure 1-1 of the Work Plan (WP) to which this APP is appended.

1.3 HAZARDOUS ACTIVITIES ASSOCIATED WITH THE SVFUDS

1.3.0.1 The work at the SVFUDS will involve potentially hazardous activities during the course of operations. Chapter 2 of the SSHP (Attachment 1 to this APP) identifies the hazards associated with the project activities. The Activity Hazard Analyses (AHAs) are presented as Attachment 2 to this APP and detail each activity to be performed during the project and the associated preventative measures for avoiding accidents. Personnel involved with hazardous tasks will be qualified to participate by previous or site-specific training, as applicable.

1.3.0.2 This Site-Wide APP/SSHP includes discussions on procedures and methods for conducting investigations at both suspected "RCWM sites" and "non-RCWM sites" at the SVFUDS. A site may be determined to be "non-RCWM" by a USACE probability assessment in accordance with the Applicability Memorandum of the *Interim Guidance for Biological Warfare Materiel (BWM) and Non-stockpile Chemical Warfare Materiel (CWM) Response Activities* (Department of the Army Memorandum, September 1997), hereafter referred to as the "Interim Guidance." A probability assessment will be performed by USACE for each planned investigation at the SVFUDS.

1.3.0.3 As described in the Site-Wide WP (Section 1.1), sites at the SVFUDS will be determined to be either suspected RCWM sites or non-RCWM sites by these probability assessments. For the purposes of investigations at the SVFUDS, non-RCWM sites are referred to as "low probability" sites, while suspect RCWM sites are referred to as "higher probability" sites. The results of the USACE probability assessment and the nature of the anomalies to be investigated will be stated in the SSWP for each individual project site.

1.3.0.4 It is important to note that sites determined to be "non-RCWM" in this manner may still have chemical agent present and certain measures (e.g., a contingency plan) will still be implemented to protect workers and the public. In the event that evidence of potential MEC/RCWM is encountered during the investigation of a non-RCWM site, the probability assessment will be revisited by USACE to determine whether the previous findings should be revised.

1.3.0.5 This APP and SSHP describes the methods and procedures to be implemented for investigations of both low probability sites and higher probability sites at the SVFUDS. In many cases the methods and procedures required are identical for activities relating to both investigations. However, where the required steps differ between the two types of investigations, the necessary methods and procedures are described separately for the investigation of either low probability sites or higher probability sites. The specific methods and procedures to be used during a given operation will be clarified in the SSWP for each individual project site.

1.3.0.6 The following is a list of potential activities associated with the work being performed at the SVFUDS:

- Mobilization of personnel and equipment to the site.
- Land surveying.

- Brush clearing and debris removal.
- Geophysical anomaly reacquisition.
- Intrusive excavation of anomalies at low probability sites.
- Intrusive excavation of anomalies at higher probability sites.
- Soil packaging.
- Operation of the Personnel Decontamination Station (PDS).
- Emergency rescue.
- Air monitoring.
- Headspace screening of soil and munitions debris.
- Decontamination of items.
- Suspect item assessment.
- Suspect item packaging.
- Drum/Multiple Round Container handling.
- Item transport to Interim Holding Facility.
- Interim Holding Facility entry.
- X-ray analysis/Portable Isotopic Neutron Spectroscopy.
- Excavation backfill.
- Construction, movement, and testing of the Engineering Control Structure (ECS).
- Demobilization of personnel and equipment from the site.

1.4 PARSONS ACCIDENT EXPERIENCE

1.4.0.1 Parsons has a policy of compliance with all governing safety standards and regulations, and a safety performance goal of zero accidents, operational mishaps, and injuries/illnesses. As of January 1, 2007, Parsons' Experience Modification Rate is 0.78.

CHAPTER 2
STATEMENT OF SAFETY AND HEALTH POLICY

2.1 PARSONS CORPORATE SAFETY AND HEALTH POLICY STATEMENT

2.1.0.1 As an industry-leading engineering, construction, and technical services firm, Parsons is firmly committed to maintaining a safe and healthy working environment at all its offices and project facilities. We share the National Safety Council Safety and Health Code of Ethics as the principles guiding our commitment to safety.

1. We will hold safety and health as our highest core value.
2. Executive management will lead the safety improvement process.
3. Safety will be a responsibility shared by everyone in our organization.
4. Safety performance will be a key indicator of our organizational excellence and will be incorporated into our business processes.
5. We will communicate safety performance openly with employees.
6. All employees will be given the knowledge and skills necessary to safely perform their jobs.
7. We will extend our safety efforts beyond the workplace to include transportation, homes, and communities.
8. We will continually strive to improve our safety and health processes.

2.1.0.2 To meet its health and safety objectives, all Parsons employees are expected to act proactively with regard to health and safety issues. This requires the combined efforts of a concerned management, responsible and knowledgeable supervision, and conscientious, well-trained employees.

2.1.0.3 Parsons will take all reasonable action to meet or exceed the applicable occupational health and safety requirements, domestically and internationally, and will continuously monitor and improve operations, procedures, technologies, and programs that are conducive to maintaining a safe and healthy working environment.

2.2 PARSONS SAFETY, HEALTH, AND RISK PROGRAM

2.2.0.1 Parsons has developed a Safety, Health, and Risk Program (SHARP) for the implementation of key safety initiatives on all Parsons' projects. All Parsons Project Managers (PMs) maintain a copy of this document to ensure application and conformance on all projects.

CHAPTER 3
RESPONSIBILITIES AND LINES OF AUTHORITY

3.1 LEVELS OF SAFETY RESPONSIBILITY AT PARSONS

3.1.1 Parsons Corporate Safety Personnel

3.1.1.1 Parsons corporate safety personnel are required to develop, communicate, and oversee Parsons health and safety programs at all Parsons business units. These employees will assist Parsons business unit managers regarding health and safety regulations, reporting requirements, safety training, and other related issues. Corporate safety personnel are responsible for monitoring the effectiveness of Parsons health and safety programs, conduct audits, ensure that all injuries and near misses are fully investigated, and develop Occupational Safety and Health Administration (OSHA) reporting and worker's compensation claim procedures. As part of corporate policy, safety information and statistics will be collected and maintained for all Parsons business units. Parsons corporate safety personnel also keep senior management informed of significant internal and external developments regarding health and safety.

3.1.2 Parsons Management and Supervisory Personnel

3.1.2.1 Supervisors and members of management, at all levels within Parsons, will comply with the Company's Health and Safety Policy and ensure that the applicable health and safety requirements at each domestic and international office and project facility are effectively implemented and monitored at all times. The supervisors and members of management will insure that the policies are effectively integrated with the preparation of proposals, project planning, and project execution. The safety performance of subcontractors will also be monitored in accordance with contract specifications as required by the contract with the client. Safety information and statistics will be reported to Parsons Corporate Safety Manager by personnel serving as supervisors or managers on a consistent and regular basis.

3.1.3 Parsons Employee Responsibility

3.1.3.1 Health and safety is the responsibility of everyone at Parsons. The Parsons employee, to include subcontractors of Parsons, is required to exercise maximum appropriate care and good judgment at all times regarding health and safety, and adhere to safety procedures to prevent accidents and injuries. Any accidents or injuries either suffered by or witnessed by employees will be promptly reported to supervisory personnel. In order to better plan and avoid possible future accidents or injuries, the Parsons employee is required to promptly report any near misses or close calls. The employees are also required to promptly report any unsafe

conditions, equipment, or practices to supervisory personnel in order to ensure a safe working environment.

3.2 LINES OF AUTHORITY REGARDING SAFETY

3.2.0.1 It is important for each employee involved with the project to know and understand the lines of authority. The organizational structure of supervisory personnel for this project is outlined in Figure 2-1 of the WP. All personnel will be informed of this organization structure during the training phase of the project. A copy of Figure 2-1 will be posted at the Command Post in order to provide quick references to anyone needing to report or make suggestions regarding safety issues. The résumés of key safety personnel in the organizational structure are provided in Appendix H of the WP.

CHAPTER 4
SUBCONTRACTORS AND SUPPLIERS

4.0.0.1 Table D.4.1 details the vendors and subcontractors currently anticipated to supply equipment or render services to the personnel working at the SVFUDS. The actual subcontractors and suppliers used may vary from the list in Table D.4.1. All services and vendors will be selected based on government-approved procurement procedures.

4.0.0.2 Each subcontractor is required to abide by all site safety and health regulations. Parsons will work closely with each subcontractor to ensure they are aware of the health and safety regulations that apply to the work site. Personnel arriving on-site to conduct business or provide a service will first attend an initial site-specific safety briefing. If returning to the site, the individual will be required to register and sign in at the office before beginning work. The site-specific safety briefing will inform the individual of the policies and regulations that apply to the subcontractor while on-site. The briefing will also include hazards associated with the individual's area of work, as well as hazards specific to the site. Documentation of the subcontractor's attendance will be generated and the personnel involved will agree to abide by all site regulations.

Table D.4.1
Subcontractors and Suppliers

Subcontractor or Supplier	Service Provided
Total Safety, Inc.	Safety Equipment
Pine Environmental Services, Inc.	Environmental Instrument Rentals
TBD	Site Support and Disposal Contractor
TBD	Sample Analysis Laboratory
TBD	Hazardous Waste Destruction and Disposal
TBD	Survey Subcontractor
Exploration Instruments (EXI)	Geophysical Equipment Rentals
TBD	Electrical Services
Digital One	Computer Rentals
TBD	Security
TBD	Geotechnical Services

CHAPTER 5
TRAINING

5.0.0.1 Training is addressed in Chapter 4 of the SSHP (Attachment 1 to this APP). This chapter is included as a placeholder only.

CHAPTER 6
SAFETY AND HEALTH INSPECTIONS

6.1 RESPONSIBILITY

6.1.0.1 As part of the Parsons SHARP Management, roles and responsibilities for safety audits, inspections and recordkeeping have been established. For each project, the Parsons PM is responsible for ensuring that routine internal safety inspections are performed, for tracking corrective actions to completion, and performing inspections. The Parsons Project Safety and Health Manager (PSHM) is responsible for developing and implementing the project safety and health inspection program contained in this plan as well as conducting inspections.

6.1.0.2 The Site Safety and Health Officer (SSHO) is responsible for conducting safety and health inspections or walkarounds, identifying and reporting deficiencies, and working with the project team to develop corrections. The SSHO will follow-up on any deficiency in a timely manner and halt operations if necessary in order to ensure that individuals are not exposed to an unsafe environment.

6.1.0.3 USAESCH is responsible for leading the Pre-operational Survey (Section 6.4).

6.2 INSPECTIONS

6.2.0.1 Safety and health inspections will be conducted either by the SSHO, the PSHM, or other qualified appointee. Personnel responsible for safety and health inspections will meet the criteria of an OSHA competent person. Safety and health inspections will be conducted at least weekly during field operations or when any of the following events occur:

- The introduction of new substances, procedures, or equipment that presents potential new hazards into the workplace;
- New, previously unidentified hazards are recognized;
- Receipt of complaints of unsafe conditions; or
- In the event of an occupational injury or illness.

6.2.0.2 Safety inspections are conducted by physically walking around the work area(s) and observing conditions for routine and emergency access, evacuation technique, PPE, work practices, site access control, first aid equipment, fire fighting equipment, and sanitation. The inspections may include conversations with workers and supervisors and review of certifications and training documentation.

6.2.0.3 All deficiencies or nonconformances will be documented. If safety hazards exist, it may be necessary to stop work until corrections are in place. Many deficiencies can be corrected immediately by placing barriers, installing signs, changing procedures, etc. The status of each deficiency will be tracked by the SSHO to ensure that a correction is made. If necessary, the SSHO will stop work until the deficiency is corrected. Follow-up reporting on deficiencies will be included on succeeding safety and health inspection documentation until the deficiency is resolved.

6.3 RECORDKEEPING

6.3.0.1 A record of each inspection will be maintained in the project files. The record must include the name of the inspector, unsafe conditions and work practices identified, and actions taken to correct unsafe conditions and work practices. A standard safety inspection form has been developed to assist the inspections and provide documentation of safety and health nonconformances. The Safety Inspection form is located in Appendix F of the WP.

6.4 PRE-OPERATIONAL SURVEY

6.4.0.1 The Pre-Operational Survey, or "Pre-Op," is required by DA Pam 385-61 prior to the startup of any RCWM-related operation. The Pre-Op has been delegated to the Major Army Command level for Spring Valley. The Pre-Op is a two- to three-day exercise that will be conducted on site by representatives of USAESCH and subject matter experts from groups such as the U.S. Army Center for Health Promotion and Preventive Medicine and agencies responsible for executing on-site RCWM activities. The purpose of the Pre-Op is to evaluate the field team's readiness to perform the MEC/agent operations associated with the RCWM project.

6.4.0.2 It is critical to note that the Pre-Op is not a training exercise for the field team and all necessary training must be accomplished prior to the Pre-Op.

6.4.0.3 The Pre-Op is an evaluation and, as such, is subject to failure. The field team will not be permitted to begin intrusive operations until the Pre-Op has been completed to the satisfaction of the review team. Actual intrusive operations will not begin until approved by USAESCH.

6.4.0.4 A Pre-Op is not required for intrusive operations relating to the investigation of low probability anomalies.

CHAPTER 7
SAFETY AND HEALTH EXPECTATIONS, INCENTIVE PROGRAMS, AND COMPLIANCE

7.1 SAFETY GOALS AND OBJECTIVES

7.1.0.1 As stated in the company's Corporate Safety and Health Policy Statement (Section 2 of this APP), Parsons holds safety and health as our highest core value. It is Parsons' objective to maintain a safe working environment and complete every job with zero accidents.

7.2 PARSONS SAFETY AWARD PROGRAM

7.2.0.1 Project management meets on a regular basis to maintain and support an incentive program based on the safety performance of Parsons and subcontractor employees.

7.2.0.2 It has been established that a necessary tie-in to a meaningful safety program is a program that rewards exemplary conduct. To any true professional, the monetary value of an award is transcended by the recognition given. To present a plaque for demonstrating dedication to creating a safe and healthy environment; to dedicate a prime parking space for the use of the individual who has recognized a hazard and has eliminated it or devised a method of managing it; or to let an individual's or group's peers know, in some way, that individual or group has taken an extra step where safety is involved, is the type of award best appreciated by the professional.

7.3 SAFETY VIOLATIONS

7.3.0.1 In the event of a safety violation, the individual (supervisor, manager, employee) or company will be notified of the issue and the situation will be documented. After documentation is completed, the safety violator will be required to submit a written plan of action to correct the problem within two days of notification. Failure to comply will result in disciplinary action against the individual or the individual's company. If the violation is such that work on the site is deemed unsafe, work will be stopped until the problem is corrected and the SSHO inspects the site for safety. Once the corrections are in place and the site has been inspected for compliance, the SSHO will notify the Site Manager when work may resume. Examples of Subcontractor Safety Violation and Noncompliance forms are provided in Appendix F of the WP.

7.3.0.2 Each member of the project team will play a part in keeping operations safe. A brief description of each employee's safety responsibility is listed below:

- Senior management is responsible for leadership and support of the safety program, for its effectiveness and improvement, and for providing all the safe guards necessary to assure a safe working environment.
- Supervisors are responsible for developing proper attitudes towards safety in themselves, and in those they supervise. Supervisors must ensure that all operations are performed with the highest regard for the safety of all personnel involved.
- Employees are responsible for genuine cooperation with all aspects of the safety program, including compliance with all policies and procedures. Employees need to continually practice safety while performing their work duties.

7.3.0.3 Parsons holds the Site Manager, PSHM, SSHO and PM accountable for maintaining project safety and health. All of these persons may be subject to safety inspections by Parsons senior management. These inspections are used to measure safety and health performance and to provide feedback.

CHAPTER 8
ACCIDENT REPORTING

8.1 ACCIDENT REPORTING

8.1.0.1 In the event an accident occurs at the site, the SSHO will investigate the accident after all emergency response actions have been taken. ENG Form 3394 (Appendix F of the WP) will be completed by the SSHO and submitted to the Parsons PSHM. A verbal notification will also be given to the PSHM that the form is being filled out.

8.1.0.2 An accident will be reported immediately to USAESCH if any of the following occur as a result of the accident:

1. Fatality;
2. Injury to three or more persons who are admitted to the hospital;
3. Property damage in the amount of $2,000 or more; or
4. Unfavorable criticism of the Army.

8.1.0.3 For Items 1 and 2, OSHA must also be notified within 8-hours of the accident. If possible, notification should go through the PSHM; however, it may be necessary to make the notification directly in order to meet the deadline.

8.1.0.4 Parsons has an online incident reporting tool for internal reporting. This system can be used to file the initial report and the incident detail report; however, it is necessary to have access to the Parsons PWeb in order to use this tool. The incident reporting tool can be accessed at the following link: https://pweb.parsons.com/PIT/safety/default.htm

8.1.0.5 Other lost-time or OSHA recordable accidents will be formally reported (*i.e.*, using a written report) to USAESCH within several working days. The onsite USAESCH representative will be verbally notified within one day of any accident or injury that may require reporting. An OSHA 300 log of work-related injuries and illnesses will be maintained at the site. A copy of the OSHA 300 log is provided in Appendix F of this WP.

8.2 ACCIDENT INVESTIGATIONS

8.2.0.1 Accident investigations are an important element of Parsons safety program because they provide useful information to prevent similar incidents. Incident investigations identify root causes, system failures, unsafe acts and conditions, and noncompliance with or inadequacy of the

APP. All significant near miss, injury, illness, or major equipment or property damage incidents (including work interruptions) require an investigation.

8.2.0.2 The PM and PSHM must conduct the onsite investigation immediately and prepare an incident investigation report in the event that one is required. The PM is responsible for ensuring that all incidents are reported and investigated in a timely manner and that appropriate corrective actions are identified and implemented. The PSHM will usually lead any investigation with the assistance of the Site Manager and SSHO.

8.2.0.3 The general information collected by the accident investigation includes:

- Location, time, and date;
- Description of the operation being performed at the time of the accident;
- Outline of the sequence of events that led up to the accident;
- All personnel associated with the work task and incident; and
- All eyewitnesses.

8.2.0.4 The investigation team will proceed in the following manner:

1. Identify, secure, and document any evidence, tools, or other materials pertinent to the investigation.
2. Identify and interview all involved employees and eyewitnesses.
3. Provide a private place and time for each individual to prepare a written statement.
4. Prepare and issue a written report.

8.3 EXPOSURE DATA

8.3.0.1 Exposure hours will be reported each month for exposure analysis. Exposure hours are defined as the number of hours worked in the field by Parsons personnel plus the hours worked by subcontractors. Exposure hours are reported internal to Parsons by the PM.

CHAPTER 9
MEDICAL SUPPORT

9.0.0.1 Medical support is addressed in Chapter 7 of the SSHP (Attachment 1 to this APP). This chapter is included as a placeholder only.

CHAPTER 10
PERSONAL PROTECTIVE EQUIPMENT

10.0.0.1 PPE is addressed in Chapter 5 of the SSHP (Attachment 1 to this APP). This chapter is included as a placeholder only.

CHAPTER 11
SITE PLANS

11.0.0.1 Work at the SVFUDS will involve potentially hazardous activities during the course of field operations. In order to prepare for these potential hazards, site plans have been developed and summarized to ensure the prevention of accidents.

11.1 LAYOUT PLAN

11.1.0.1 Details concerning site layout and work zones are described in Chapter 12 of the SSHP (Attachment 1 to this APP).

11.2 EMERGENCY RESPONSE PLAN

11.2.1 Procedures

11.2.1.1 The purpose of the Emergency Response Plan is to define the general procedures to protect human health and the environment both in the event of an accident or emergency during the course of project activities. The Emergency Response and Contingency Plan (ERCP) for the SVFUDS is described in Chapter 16 of the SSHP (Attachment 1 to this APP).

11.2.1.2 The ERCP developed for the SVFUDS complies with 29 CFR 1910.120(1) and addresses the following elements:

- Pre-emergency planning;
- Personnel roles, lines of authority, training, and communications;
- Posted instructions and emergency contacts;
- Emergency recognition and prevention;
- Criteria and procedures for site evacuation;
- Procedures for decontamination and medical treatment;
- Evacuation routes and procedures;
- Emergency alerting and response procedure; and
- Critique of emergency responses and follow-up.

11.2.2 Spill Plan

11.2.2.1 The Spill Plan for the SVFUDS is described in the ERCP located in Chapter 16 of the SSHP (Attachment 1 to this APP).

11.2.3 Firefighting Plan

11.2.3.1 The Firefighting Plan for the SVFUDS is described in the ERCP located in Chapter 16 of the SSHP (Attachment 1 to this APP).

11.2.4 Posting of Emergency Telephone Numbers

11.2.4.1 Emergency telephone numbers for the closest hospitals capable of providing emergency service, Poison Control Center, local Police and Fire Department, and key safety and management personnel from CENAB, USAESCH, the United States Army Technical Escort Unit, Edgewood Chemical Biological Centre, and Parsons will be available to the SSHO and will be posted at the SZ Command Post and in other conspicuous locations at the site. The SSHO will be responsible for keeping the list current and for taking necessary action and contacting the appropriate emergency contacts in the event of an emergency. Emergency contact numbers are provided in Appendix C of the WP.

11.2.5 Wild Land Fire Prevention Plan

11.2.5.1 Project activities at the SVFUDS will not involve prescribed or planned burning of wild lands and, therefore, a wild land fire prevention plan is not required.

11.2.5.2 General fire prevention measures for the site are described in Section 11.28 of this APP.

11.2.6 Man Overboard/Abandon Ship Plan

11.2.6.1 Project activities at the SVFUDS will not involve water craft and, therefore, a man overboard/abandon ship plan is not required.

11.3 HAZARD COMMUNICATION PROGRAM

11.3.0.1 Details on hazard communication training are presented in Chapter 4 of the SSHP (Attachment 1 to this APP).

11.4 RESPIRATORY PROTECTION PROGRAM

11.4.0.1 Details concerning respiratory protection are described in Chapter 5 of the SSHP (Attachment 1 to this APP).

11.5 HEALTH HAZARD CONTROL PROGRAM

11.5.0.1 The health hazard controls for the project are described in Chapter 2 of the SSHP (Attachment 1 to this APP).

11.6 LEAD ABATEMENT PLAN

11.6.0.1 The only potential source of lead at the SVFUDS is in contaminated soil and based on the analytical data collected at the site to date, the highest reported lead concentration detected in soil is 5,980mg/kg. Assuming this as a maximum concentration in soil and using the OSHA action level for lead of 30µg/m³ (0.03mg/m³), then the maximum concentration of dust permissible during SVFUDS operations without needing lead abatement measures would be:

Dust Action Level = (Exposure Limit, mg/m³) × (10^6) / (Soil Concentration, mg/kg)

or

$$\frac{0.03\text{mg/m}^3 \times 10^6\,\text{mg/kg}}{5{,}980\text{mg/kg}} = 5.02\text{mg/m}^3$$

11.6.0.2 During SVFUDS excavation operations that are conducted outside an ECS, dust will be monitored and mitigation measures (i.e., wetting down) will be employed to keep dust levels below 3.0mg/m³. Therefore, the OSHA action level for lead will not be exceeded during activities at the SVFUDS and a lead abatement plan will not be required.

11.6.0.3 Dust monitoring methods are described in Chapter 8 of the SSHP (Attachment 1 to this APP).

11.7 ASBESTOS ABATEMENT PLAN

11.7.0.1 Contact with asbestos-containing materials is not anticipated as part of the operations to be conducted at the SVFUDS. In the unlikely event that asbestos is encountered during field operations, workers will be required to avoid the area of contamination and consult with the SSHO and Site Manager for further instructions.

11.8 ABRASIVE BLASTING

11.8.0.1 Project activities at the SVFUDS will not involve abrasive blasting and, therefore, an abrasive blasting plan is not required.

11.9 CONFINED SPACE ENTRY

11.9.0.1 The confined space entry procedures to be implemented at the SVFUDS are provided in Chapter 18 of the SSHP (Attachment 1 to this APP).

11.10 HAZARDOUS ENERGY CONTROL PLAN

11.10.0.1 The hazardous energy control measures (e.g., lockout and tagout procedures) to be implemented at the SVFUDS are provided in Section 2.2 of the SSHP (Attachment 1 to this APP).

11.11 CRITICAL LIFT PROCEDURES

11.11.0.1 Crane lift operations at the SVFUDS will be conducted in a manner to ensure maximum safety. A critical lift is a non-routine crane lift that requires detail planning and additional or unusual safety precautions. A critical lift plan may be required for some crane lifts for moving equipment or lifting and lowering parts of an ECS at the SVFUDS.

11.12 CONTINGENCY PLAN FOR SEVERE WEATHER

11.12.0.1 Severe weather is defined as high winds, electrical storms, tornadoes, extremely hot weather (> 100°F), or extremely cold weather (< 0°F). In the event that such conditions arise, it is likely that it will be necessary to cease operations and possibly evacuate the site. The SSHO is responsible for monitoring the weather and, should severe weather conditions threaten, the SSHO is responsible for deciding whether site operations should be halted. More information involving severe weather is detailed in Section 2.5 of the SSHP (Attachment 1 to this APP).

11.13 ACCESS AND HAUL ROAD PLAN

11.13.0.1 All roads used at the SVFUDS will be maintained in a safe working condition to reduce potential hazards involving vehicles or heavy equipment. The construction of any new roadways at the SVFUDS will require a plan to be submitted to USAESCH. The submitted plan will address requirements outlined in Section 8.D.1 of EM 385-1-1.

11.14 DEMOLITION PLAN

11.14.0.1 Project activities at the SVFUDS will not involve the demolition of any structures or improvements and, therefore, a structural demolition plan is not required.

11.15 EMERGENCY RESCUE (TUNNELING)

11.15.0.1 Project activities at the SVFUDS will not involve tunneling and, therefore, emergency rescue procedures for tunneling are not required.

11.16 UNDERGROUND CONSTRUCTION FIRE PREVENTION AND PROTECTION PLAN

11.16.0.1 Project activities at the SVFUDS will not involve underground construction and, therefore, an underground construction fire prevention and protection plan is not required.

11.17 COMPRESSED AIR PLAN

11.17.1 Purpose

11.17.1.1 The purpose of this procedure is to outline the minimum requirements for safe handling and use of compressed gas and gas cylinders by Parsons employees at the SVFUDS. This procedure is an overview of the requirements of 29 CFR 1910.101, .169, and .253. It is anticipated that pressurized cylinders will be used to store and supply Grade D breathing air for PPE Level A and B activities. This procedure is intended to provide procedures for safely handling these cylinders and any other pressurized gases used on this project.

11.17.2 Use of Compressed Air or Gases

11.17.2.1 Compressed air or other compressed gases are not to be used to blow dirt, chips, or dust from clothing.

11.17.2.2 The use of compressed air will be controlled, and proper PPE or safeguards used, to protect against the possibility of eye injury to the operator or other persons.

11.17.2.3 Compressed gases will not be used to elevate or otherwise transfer any hazardous substance from one container to another unless the containers are designed to withstand the pressure with a safety factor of at least four.

11.17.3 Compressed Gas Cylinders

11.17.3.1 Cylinders must never be dropped, struck, or permitted to strike each other violently. Carts or racks will be used to move compressed gas cylinders and correct material handling techniques will be exercised when moving cylinders.

11.17.3.2 Valve protection caps will always be kept on cylinders when they are being moved and stored, or until they are ready for use.

11.17.3.3 Cylinder valves will be kept closed except when gas is being used or when the cylinder is connected to a permanent manifold. Valves of empty cylinders will be closed.

11.17.3.4 Cylinders will never be used as rollers or supports, or for any purpose other than carrying gas.

11.17.3.5 Cylinders of compressed gas will be stored in areas where they are protected from external heat sources such as flame impingement, intense radiant heat, electric arc, or high temperature steam lines.

11.17.3.6 Cylinders will be stored in an assigned area, with full and empty cylinders being kept separated. Stored fuel gases and oxygen cylinders will be separated by at least 20 feet, or by a firewall at least five (5) feet high having a fire-resistance rating of at least one-half (½) hour.

11.17.3.7 Oxygen, nitrogen, helium, or freon cylinders will be stored upright or be transported in a horizontal position with the exception of acetylene cylinders, which will always be kept in an upright position in accordance with EM 385-1-1. All horizontally placed cylinders will be secured by chocks or ties to prevent rolling.

11.17.3.8 Cylinders will be secured to a fixed object by chain or equivalent fastening device whenever they are placed in an upright position. The protective cap will not be removed nor will the cylinder valve be opened until the cylinder is secured.

11.17.3.9 The repair of leaks will never be attempted on a pressurized system. If leaks develop, system pressure will be reduced to atmospheric pressure as rapidly as possible, and the SSHO will be immediately notified.

11.17.3.10 Identification of the gas to be used will always be assured before connecting cylinders for use. All cylinders will be clearly labeled regarding their contents in addition to proper color-coding. Color-coding of cylinders will be posted.

11.17.3.11 Compressed gas cylinders in portable service will be conveyed by suitable trucks to which they are securely fastened. All gas cylinders in service will be securely held in substantial racks or otherwise secured to a rigid structure so that they will not fall and will not be knocked over.

11.17.3.12 Gas cylinders moved by hoist will be handled in suitable cradles or boxes.

11.17.3.13 Cylinders will not be placed where they might form part of an electrical circuit.

11.17.3.14 All cylinders used and stored on site will have been hydrostatically tested within the last 5 years and have the date stamped on the cylinder. Any cylinder not having a current hydrostatic test will be rejected.

11.17.3.15 Compressed gas cylinders will be legibly marked for identifying the gas content with either the chemical or the trade name of the gas. Such marking will be by means of stenciling, stamping or labeling, and will not be readily removable. Whenever practical, the marking will be located on the shoulder of the cylinder.

11.17.3.16 Compressed air and oxygen are not interchangeable as gases. Oxygen will NEVER be used for the following:

- As breathing air.
- To purge pipelines, tanks, or any confined area.
- To supply a head-pressure tank.
- To power pneumatic tools.
- In oil preheating burners.
- To start internal combustion engines.

- Ventilation.
- Cleaning clothing.
- In any other way as a substitute for compressed air.

11.17.3.17 Use of a cylinder's contents for purposes other than those intended by the supplier will be prohibited.

11.18 FORMWORK AND SHORING ERECTION AND REMOVAL PLAN

11.18.0.1 Project activities at the SVFUDS will not involve concrete and masonry construction and, therefore, a formwork and shoring erection and removal plan is not required.

11.19 JACKING PLAN (LIFT)

11.19.0.1 Project activities at the SVFUDS will not involve lift-slab operations and, therefore, a jacking plan is not required.

11.20 SAFETY AND HEALTH PLAN

11.20.0.1 The SSHP is included as Attachment 1 to this APP.

11.21 BLASTING PLAN

11.21.0.1 Details specific to explosives operations to be conducted at the SVFUDS are presented in Chapters 5 and 6 of the WP.

11.22 DIVING PLAN

11.22.0.1 Project activities at the SVFUDS will not involve diving operations and, therefore, a diving plan is not required.

11.23 PREVENTION OF ALCOHOL AND DRUG ABUSE

11.23.0.1 Parsons will institute and maintain a program for achieving the objective of drug free workspace. Parsons ensures consistent and uniform application of this policy and, when required interfaces with supervisor and employee to evaluate performance and behavior.

11.23.1 Parsons Corporate Statement of Policy

11.23.1.1 Parsons expects all employees to report to work in a fit condition in order to perform their duties at the utmost levels of safety and efficiency. To that end, Parsons expressly prohibits the unlawful manufacture, distribution, dispensing, possession, use, or sale of a controlled

substance or alcohol on its premises at any time. Employees are prohibited from being at work under the influence of these substances. Parsons will reasonably accommodate the efforts of an employee to obtain medical treatment for substance abuse and to return to employment thereafter. However, no provisions of this policy will contravene the provision of the Employee Personal Conduct Policy or preclude the corporation from terminating an employee in accordance with this policy.

11.23.1.2 Parsons has an obligation to safeguard the privacy rights of all employees; however, it is also committed to provide a healthy and safe work environment for all employees and to take reasonable steps to safeguard the health and safety of others and protect the environment in conducting its business.

11.23.2 Safety and Environmental Provisions

11.23.2.1 In some instances employees may be required to undergo random toxicological tests to ensure their continuing fitness for duty to comply with contract mandated requirements or government regulations, or if performing work at locations where the nature of their duties is such that there is the potential for serious physical injury to themselves, to others, or the general public, or potential for significant damage to property or the environment.

11.23.2.2 Assignment of employees to such job sites will be done on a voluntary basis. Employees who refuse to participate in the random testing program and whose job duties would normally expose them to random testing will be considered for placement in other positions not requiring random testing. Every reasonable effort will be made to accommodate such transfers; however if suitable work for which the employee is qualified is not available, the employee will be subject to termination. A positive test result will lead to immediate removal from the site, in addition to either corrective action in accordance with this policy or the employee's termination in accordance with the Employee Personal Conduct Policy.

11.23.2.3 Searches are another means of protecting the safety of individuals and property at those locations where the nature of the work has the potential for serious injury or damage. Reasonable searches may be conducted of individuals, their personal vehicles, effects, and other areas under the individual's control while at such work sites, or engaged in Parsons business at such sites.

11.23.2.4 Employees will not be detained or searched without their consent. An employee's cooperation in a search at such work sites is a condition of employment. The employee will be required to sign an Acknowledgment and Consent for Random Toxicological Tests and Searches form. Such testing will be performed by the company using qualified contracted agents, or trained employees.

11.23.3 Substance Abuse Testing - Employment Offer

11.23.3.1 No candidate for employment will be subjected to substance abuse testing prior to the receipt of an offer of employment. Offers of employment, regardless of employment category, must contain a contingency regarding satisfactory completion of substance abuse

testing. Failure to submit to or pass an examination will result in immediate disqualification from consideration for placement.

11.23.4 Employee Personal Conduct

11.23.4.1 Employees bear the primary responsibility for their own job performance and for taking any action or undergoing treatment necessary to maintain performance at a satisfactory level.

11.23.4.2 In addition, the Corporation may require an employee to submit to a test for alcohol or illegal drugs, based upon reasonable suspicion that the employee's performance or behavior is being adversely affected by use of such substance(s). Reasonable suspicion will be based upon physical manifestations of impairment, or unsatisfactory behavior or job performance (including on-the-job accident or injury) which causes the supervisor and Human Resources Representative to reasonably believe that alcohol or drug abuse may be a contributing factor. Refusal by an employee to take such a test will be viewed as an admission of such use by the employee.

11.23.5 Confidentiality of Records

11.23.5.1 All information concerning an applicant's or employee's medical condition or test results will be kept strictly confidential, with information released only upon a legitimate need-to-know basis.

11.24 FALL PROTECTION PLAN

11.24.0.1 If workers at the SVFUDS have the potential to become exposed to fall hazards, proper precautions will be implemented to ensure safety. Standard guardrail, catch platforms, temporary floors, and safety nets will be used based on evaluations by the SSHO and PSHM. In addition, full-body harnesses with a shock absorbing lanyard will be worn by any personnel working at risk of falling more than 6 feet. The lanyard will be adjusted to limit free-fall to no more than 6 feet. Lanyards will be secured to strong structural components (breaking strength of 5,000 pounds per attached employee) or lifelines.

11.25 STEEL ERECTION PLAN

11.25.1 Purpose

11.25.1.1 Steel erection activities at the SVFUDS may be required for ECS construction and may include hoisting, laying out, placing, connecting, and rigging structural and panel steel. Many accidents involving collapse can be averted if adequate pre-erection communication and planning occurs. The Steel Erection Plan has been made to ensure safety during the initial stages of this operation, it is essential that an effective steel erection program be instituted for the SVFUDS.

11.25.1.2 The purpose of this plan is to establish the requirements for safe practices involving steel erection.

11.25.2 Planning

11.25.2.1 Access Roads

11.25.2.1.1 Access roads into and through the site will be adequate for safe delivery and movement of:

- Cranes
- Trucks
- Other equipment
- Materials to be erected.

11.25.2.2 Adequate Space

11.25.2.2.1 Adequate space for the safe storage of materials and the safe operation of the erector's equipment, which is:

- Firm
- properly graded
- drained
- Readily accessible to work.

11.25.2.3 Hoisting Operations

11.25.2.3.1 Routes for suspended loads will be pre-planned to ensure that no employee is required to work directly below a suspended load except for:

- Materials being hoisted will be rigged to prevent unintentional displacement;
- Employees engaged in the initial connection of the steel;
- Employees necessary for the hooking or unhooking of the load;
- Hooks with self-closing safety latches or their equivalent will be used to prevent components from slipping out of the hook; and;
- All loads will be rigged by a qualified rigger.

11.25.2.4 Structural Stability

11.25.2.4.1 Structural stability will be maintained at all times during the erection process. The following additional requirements will apply for multistory structures:

- Permanent floors will be installed as the erection of structural members progress;
- A fully planked or decked floor or nets will be maintained within two stories or 30 ft (9.1m), whichever is less, directly under any erection work being performed;
- Stability considerations requiring temporary bracing and guying will be evaluated.

11.25.2.5 Walking/Working Surfaces

11.25.2.5.1 Structural stability will be maintained at all times during the erection process. The following additional requirements will apply in the event that multistory structures are used:

- Walking and working areas will be free of any trip hazards;
- Any metal decking used in work areas will be slip resistant.

11.26 NIGHT OPERATIONS LIGHTING PLAN

11.26.0.1 All field operations at the SVFUDS will be performed during daylight hours (dawn to dusk) and, therefore, a night operations lighting plan is not required.

11.27 SITE SANITATION PLAN

11.27.0.1 Site sanitation measures to be implemented at the SVFUDS are provided in Chapter 13 of the SSHP (Attachment 1 to this APP).

11.28 FIRE PREVENTION PLAN

11.28.1 General

11.28.1.1 Sources

11.28.1.1.1 Although fires and explosions may arise spontaneously, they are more commonly the result of carelessness during the conduct of site activities, such as moving drums, mixing/bulking of site chemicals, and during refueling of heavy or hand held equipment. Other potential causes of explosions and fires include:

- Mixing of incompatible chemicals, which cause reactions that spontaneously ignite due to the production of both flammable vapors and heat.

- Ignition of explosive or flammable chemical gases or vapors by external ignition sources.
- Ignition of materials due to oxygen enrichment.
- Agitation of shock- or friction-sensitive compounds.
- Sudden release of materials under pressure.

11.28.1.2 To ensure adequate fire protection, the SSHO will inspect the site to ensure all flammable and combustible materials are being safely stored in appropriately configured storage areas and containers. The SSHO will also ensure that no flammable/combustible materials are stored near any sources of ignition, and that sources of ignition are removed a safe distance from storage areas. If needed, storage areas will be segregated from the remainder of the site through the use of flagging. Portable fire extinguishers will be located on site.

11.28.1.3 Explosions and fires not only pose the obvious hazards of intense heat, open flames, smoke inhalation, and flying objects, but may also cause the release of toxic chemicals into the environment. Such releases can threaten both personnel on site and members of the general public living or working nearby. Site personnel involved with potentially flammable material or operations will follow the guidelines listed below and EM 385-1-1, Section 9, to prevent fires and explosions:

- Potentially explosive/flammable atmospheres involving gases or vapors will be monitored using a combustible gas indicator.
- Prior to initiation of site activities involving explosive/flammable materials, all potential ignition sources will be removed or extinguished.
- Non-sparking and explosion-proof equipment will be used whenever the potential exists for ignition of flammable/explosive gases/vapors/liquids.
- Dilution or induced ventilation may be used to decrease the airborne concentration of explosive/flammable atmospheres.
- Smoking will be prohibited at, or in the vicinity of, operations which may present a fire hazard, and the area will be conspicuously posted with signs stating “No Smoking or Open Flame within 50 Feet.”
- Flammable and/or combustible liquids must be handled only in approved, properly labeled metal safety cans equipped with flash arrestors and self-closing lids.
- Transfer of flammable liquids from one metal container to another will be done only when the containers are bonded.
- The motors of all equipment being fueled will be shut off during the fueling operations.

- Metal drums used for storing flammable/combustible liquids will be equipped with self-closing safety faucets, vent bung fittings, grounding cables and drip pans, and will be stored outside buildings in an area approved by the SSHO.
- Outdoor flammable/combustible materials storage areas will be: lined and surrounded by a dike of 12 inches in height, and of sufficient volume to contain 110 percent of the stored materials; located 50 feet from buildings; and kept free of weeds, debris, and other combustible materials.

11.28.1.4 In the event of fire, the firefighting procedures will be followed that are described in the ERCP in Chapter 16 of the SSHP (Attachment 1 to this APP).

11.28.2 Fire Extinguishers

11.28.2.1 At minimum, 20lb portable ABC fire extinguishers will be located on site at the PDS, and in the crew break area or warm-up/cooling shelter.

11.28.2.2 The four classes of fire, along with their constituents, are as follows:

Class A	Wood, cloth, paper, rubber, many plastics, and ordinary combustible materials.
Class B	Flammable liquids, gases, and greases.
Class C	Energized electrical equipment.
Class D	Combustible metals such as magnesium, titanium, sodium, and potassium.

11.28.2.3 Examples of proper extinguishing agents are as follows:

Class A Water or ABC Dry Chemical
Class B ABC Dry Chemical
Class C ABC Dry Chemical
Class D Metal-X Dry Chemical (not anticipated and not on-site.)

ATTACHMENT 1
SITE SAFETY AND HEALTH PLAN

SITE SAFETY AND HEALTH PLAN

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

Prepared for:

U.S. Army Engineering and Support Center, Huntsville

and

Baltimore District
U.S. Army Corps of Engineers

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The views, opinions, and/or findings contained in this document are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentations.

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CHAPTER 1
SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

1.0.0.1 The Accident Prevention Plan (APP) and this Site Safety and Health Plan (SSHP) are appended to the Site-Wide Work Plan (WP) that describes the overall methods and procedures to be implemented during the site-wide intrusive field operations at the Spring Valley Formerly Used Defense Site (SVFUDS). Consequently, this SSHP may include discussions of procedures and methods that may not be applicable to a specific site and its associated scope of work. For this reason, a Site-Specific Work Plan (SSWP) will be prepared for each individual site to be addressed at the SVFUDS to augment the Site-Wide WP and APP/SSHP. These SSWPs will reference the applicable components of the Site-Wide WP and APP/SSHP but the content will focus on site-specific objectives, information and requirements, procedural decisions, and/or omissions from the site-wide documents.

1.1 SITE DESCRIPTION

1.1.0.1 A description of the SVFUDS including location, history, previous investigations, topography, and climate is contained in Chapter 1 of the WP.

1.2 CONTAMINATION CHARACTERIZATION

1.2.0.1 Based on historical information and previous investigations at the SVFUDS, the primary munition of concern is an explosively configured 75mm Mk II chemical projectile.

1.2.0.2 The primary chemical hazards at the site are mustard, lewisite, and arsine. Other potential chemical hazards at the SVFUDS include:

- Agent breakdown products (ABPs):
  - Dithiane, oxathiane, and thiodiglycol, which are ABPs of mustard.
  - Chlorovinylarsenous oxide (CVAO) and chlorovinylarsenous acid (CVAA), which are ABPs of lewisite.
- Gasoline and diesel vehicle fuels.
- Decontamination solutions, such as diluted hypochlorite bleach solution, dilute nitric acid, and isopropyl alcohol.
- Arsenic-contaminated soils.
- Other hazardous and toxic waste (HTW) compounds.

CHAPTER 2
HAZARD AND RISK ANALYSIS

2.1 INTRODUCTION

2.1.0.1 Work activities, natural phenomena, and biological hazards may present a risk to the field team on this project. The level of risk is dependent upon the type of work being conducted. This chapter identifies munitions and explosives of concern (MEC), physical, chemical, and biological hazards associated with the tasks scheduled to be performed on this project and outlines the procedures that are to be employed to prevent accidents, injuries, and illness.

2.1.0.2 Personnel working most directly with intrusive anomaly investigations will have the greatest chance of encountering possible MEC and chemical hazards. However, all project personnel and visitors to the site will be expected to be aware of the guidance provided by this document and comply with all applicable safety and health requirements during all activities.

2.1.0.3 Individual hazard analyses have been performed for the tasks associated with the SVFUDS investigation. The potential hazards have been identified; control measures have been outlined; training requirements and personal protective equipment (PPE) requirements have been established; and equipment inspection procedures have been established. The following activities are considered in the Activity Hazard Analyses (AHAs):

- Site mobilization/preparation.
- Property survey and mapping.
- Landscape survey.
- Tree removal.
- Intrusive investigation, low probability sites.
- Intrusive investigation, higher probability sites.
- Drum/multiple round container handling.
- Personnel Decontamination Station (PDS) operation.
- Emergency rescue.
- Air monitoring.
- HTW-contaminated soil removal and packaging.
- Soil sampling.

- Excavation backfill.

2.1.0.4 Attachment 2 to the APP contains AHAs for each of the major tasks identified for the SVFUDS site-wide investigations, including potential hazards, control measures, training requirements, and PPE requirements. These AHAs will be reviewed and updated for each site at the SVFUDS and the site-specific AHAs will be included in the SSWP.

2.1.0.5 If new operations/tasks are introduced, an AHA will be performed by the Project Safety and Health Manager (PSHM). If operations change significantly during the course of this project, the related AHA will be updated to accommodate these changes. Any changes in PPE or operating procedures will be approved by the PSHM before they are implemented, and will be communicated to field team during daily tailgate safety meetings. It will be the responsibility of the Site Safety and Health Officer (SSHO) to ensure that the required controls are being properly implemented.

2.2 CLASSIC SAFETY HAZARDS

2.2.0.1 The classic safety hazards potentially associated with this project are expected to include:

- Slips, trips, and falls;
- Motor vehicle and heavy equipment operation;
- Trenching/excavation safety;
- Confined spaces;
- Electrical energy, lockout/tagout; and
- Pressurized cylinders.

2.2.0.2 Personnel working most directly with the project activities will have the greatest chance of encountering these hazards; however, all personnel on site will have the possibility of encountering them at one time or another. These hazards at the job site and methods to prevent injury resulting from them are described in the following subsections. Additional physical hazards are addressed in Section 2.5.

2.2.1 Slip, Trip, and Fall Hazards

2.2.1.1 Hazard Identification

2.2.1.1.1 Work sites may contain slip, trip, and fall hazards for site workers, such as:

- Holes, pits, or ditches.

- Slippery surfaces.
- Steep grades.
- Uneven grades.
- Sharp objects, such as nails, metal shards, and broken glass.
- Weather conditions, such as snow, that makes surfaces slippery and obscure visibility.

2.2.1.2 Hazard Mitigation/Prevention

2.2.1.2.1 Site personnel will be instructed to look for these potential safety hazards and immediately inform the SSHO, the United States Army Engineering and Support Center, Huntsville (USAESCH) Safety Specialist or the United States Army Corps of Engineers (USACE), Baltimore District (CENAB) Site Operations Officer about any new hazards. If the hazard cannot be immediately removed, action will be taken to warn site workers about the hazard. Slips, trips, and fall hazards will be a daily tailgate safety briefing item. Operations will cease if weather conditions could cause activities to be hazardous.

2.2.2 Motor Vehicles and Heavy Equipment

2.2.2.1 Hazard Identification

2.2.2.1.1 Site tasks such as site preparation, brush clearing, and excavation may require the operation of vehicles and/or heavy equipment and working around these vehicles and equipment may present a hazard. Injuries can result from being hit or run over by a moving vehicle, from vehicles overturning, or from being struck, burned, or otherwise injured by moving parts.

2.2.2.2 Hazard Mitigation/Prevention

2.2.2.2.1 The following precautions will be taken to help prevent injuries and accidents related to motor vehicles and heavy equipment:

- Operations will often occur in residential neighborhoods so special care will be exercised while operating vehicles and heavy equipment because of narrow streets and residential traffic.
- Brakes, hydraulic lines, light signals, fire extinguishers, fluid levels, steering mechanisms, tires, horn, and other safety devices will be inspected and maintained in good working order throughout the duration of field activities. Whenever any machinery or equipment is found to be unsafe, or whenever a deficiency that affects the safe operation of equipment is observed, the equipment will be immediately taken out of service and its use prohibited until unsafe conditions have been corrected.

- All construction motor vehicles will not be operated in reverse gear unless the vehicle has a reverse signal alarm audible above the surrounding noise level, backup warning lights, and the vehicle is backed up only when a spotter signals it is safe to do so.
- Construction and heavy equipment will be provided with necessary safety equipment including seat belts, rollover protection, emergency shut-off during rollover, backup warning lights, and audible alarms.
- Blades and buckets will be lowered to the ground and parking brakes will be set before shutting off any heavy equipment or vehicles.
- Field support vehicles will be equipped with a first-aid kit and appropriate fire extinguisher.
- All operators will provide proof of competency to the SSHO prior to operation of heavy equipment.

2.2.3 Trenching/Excavation Safety

2.2.3.1 Hazard Identification

2.2.3.1.1 When excavations exceed a depth of 4 feet, potential hazards include:

- Cave-ins.
- Items falling into the excavation.
- Personnel falling into the excavation.

2.2.3.2 Hazard Mitigation/Prevention

2.2.3.2.1 If the excavation exceeds 4 feet in depth and will be entered by workers, a modular panel shoring system or sloping/benching will be used. Designs for these systems have been prepared and sealed by a registered professional engineer and will be kept at the site for the duration of the investigation.

2.2.3.3 Additional Mitigations

- A safe means of egress will be provided if the excavation depth is greater than 4 feet.
- Exit locations will be spaced at lateral intervals of less than 25 feet.
- Water Accumulation. The Occupational Safety and Health Administration (OSHA) standard prohibits employees from working in excavations where water has accumulated or is accumulating unless adequate protection has been taken. If

water removal equipment is used to control or prevent water from accumulating, a competent person will monitor the equipment to ensure proper use and operation of the equipment.

- A competent person, as defined by OSHA, will perform daily inspections of excavations for evidence of a potential cave-in. Inspections will also be conducted after every rainstorm.

2.2.3.4 Falls and Equipment

2.2.3.4.1 In addition to cave-in hazards and secondary hazards related to cave-ins, other hazards from which workers must be protected during excavation-related work include exposure to falls, falling loads, and mobile equipment. To protect employees from these hazards, OSHA requires the employer to take the following precautions:

- Keep materials or equipment that might fall or roll into an excavation at least 2 feet from the edge of excavations, or have retaining devices, or both.
- Provide warning systems such as mobile equipment, barricades, hand or mechanical signals, or stop logs, to alert operators of the edge of an excavation. If possible, keep the grade away from the excavation.
- Provide scaling to remove loose rock or soil or install protective barricades and other equivalent protection to protect employees against falling rock, soil or materials.
- Prohibit employees from working on faces of sloped or benched excavations at levels above other employees unless employees at lower levels are adequately protected from the hazard of falling, rolling, or sliding material or equipment.

2.2.4 Confined Space

2.2.4.1 Hazard Identification

2.2.4.1.1 If an excavation is more than 4 feet deep and requires personnel entry, it may present hazards associated with confined spaces. These potential hazards are addressed in Chapter 18 of this SSHP.

2.2.4.2 Hazard Mitigation/Prevention

2.2.4.2.1 The hazard mitigation/prevention measures for confined spaces are addressed in Chapter 18 of this SSHP.

2.2.5 Electrical Energy, Lockout/Tagout

2.2.5.1 Hazard Identification

2.2.5.1.1 It is important to be aware of electrical safety to prevent electrical accidents. Accidents occur when electrical equipment is not properly used and/or installed. Accidents also occur when equipment is not properly isolated, shut down, and/or de-energized (i.e., lockout/tagout procedures are not used).

2.2.5.2 Hazard Mitigation/Prevention

2.2.5.2.1 Electrical Energy

- No electrical work will be performed on an energized circuit.
- Only approved, qualified electricians will be permitted to work on electrical equipment or electrical wiring.
- Proper clearance and grounding procedures will be used. All electrical circuits and equipment will be de-energized and lockout/tagout accomplished before maintenance or repair work is started.
- Single-phase electric hand tools and other single-phase portable electrical equipment will be approved by a recognized testing agency and all exposed non-current-carrying metal parts will be grounded or double-insulated.
- Before each use, portable electrical appliances will be examined for obvious defects in the appliance, cord, and plug. If any deficiency is noted, the appliance will not be used.
- Extension cords will be kept clean, dry, free of kinks, and protected from oil, hot or sharp surfaces, and chemicals. Extension cords used outdoors will be equipped with Ground Fault Circuit Interrupters (GFCI).
- Portable electrical tools not provided with special insulating or grounding protection will not be used at the SVFUDS.
- Portable electrical appliances and equipment with non-current-carrying metal parts exposed to contact by personnel will be grounded by a continuous conductor from the device to a grounded receptacle. The SSHO will resolve any question as to whether a particular appliance is or should be grounded.
- Grounding of receptacles will be accomplished in one of two ways:
    - A built-in ground wire of green color will be attached to the ground pole of the receptacle, or

- The conduit system, if installed in an approved manner, will be relied upon for grounding of a receptacle serving single-phase appliances with ratings up to 230 volts.

- At outside locations all single-phase 15- and 20-ampere receptacle outlets (operating at 230 volts or less) that are not part of the permanent wiring of the building or structure will have GFCI for personnel protection. The GFCI will be located at the power source so that all extension cords and tools are protected.
- The outlet box for portable extension cords for outdoor use will be weatherproof and maintained in good condition.

2.2.5.3 Lockout/Tagout

2.2.5.3.1 Lockout/tagout procedures will be used for all maintenance procedures to ensure the equipment is isolated from all potential hazardous energy sources (electrical and mechanical). These procedures include the following:

- The immediate supervisor with jurisdiction over the equipment and all affected employees will be notified that the energy sources are to be deactivated.
- All sources of power that must be locked out, blocked or released will be identified by the immediate supervisor and the employee who will work on the equipment.
- In order to ensure that the equipment cannot be re-energized while maintenance activities are performed, employees will lockout/blank out all potential energy sources. The employees will be assigned padlocks with their names or identification numbers affixed to the locks. The locks will be individually keyed to prevent another employee from removing the lock inadvertently. If more than one employee is assigned to work on the equipment, a multi-lockout hasp will be used so that all employees working on the equipment can apply their locks and ensure their safety.
- A tagout device will be affixed to all components or systems de-energized to indicate that lockout has occurred.
- After the servicing and/or maintenance are complete and the equipment is ready for normal operations, the area around the machine or equipment will be checked. After all tools have been removed from the machine or equipment, guards have been reinstalled, all lockout or tagout devices will be removed. Finally, the energy-isolating devices will be operated to restore energy to the machine or equipment.

2.2.6 Pressurized Cylinders

2.2.6.1 Hazard Identification

2.2.6.1.1 Compressed air and gas cylinders are associated with the supplied air system for breathing air and analytical instruments. Hazards may arise from leaking cylinders and subsequent gas build up (e.g., hydrogen associated with gas chromatographs) or from the rapid release of compressed gases if a valve is broken off the cylinder. Such an accident can propel the cylinder like a missile.

2.2.6.2 Hazard Mitigation/Prevention

- All cylinders will be stored in a well-ventilated location.
- All cylinders will be secured with substantial fixed or potable racks or hand trucks.
- Cylinder valves will be closed and valve caps in place when cylinders are in storage, in transit, not in use, or empty.
- Cylinders transported by crane, hoist, or derrick, will be securely transported in cradles, nets, or skip pans, and never directly by slings, chains or magnets.
- All cylinders will be labeled as to their contents and all storage areas will be properly placarded.
- Cylinders will be protected from physical damage, electric current, and extremes of temperature. The temperature of the cylinders will not be allowed to exceed 130°F.
- Cylinders will only be filled by qualified persons.
- Smoking will be prohibited wherever cylinders are stored, handled, or used.
- Leaking cylinders will be moved to an isolated location out of doors, the valve will be cracked, and the gas will be allowed to escape slowly. Personnel and ignition sources will be kept away and the cylinder will be tagged "DEFECTIVE."
- All cylinders will be stored (full or empty) in an upright position.
- Cylinders will be marked as to "FULL" or "EMPTY" and segregated.

2.3 EXPLOSIVE ORDNANCE AND EXPLOSIVE HAZARDS

2.3.1 Hazard Identification

2.3.1.1 Owing to the former use of the SVFUDS and based on the results of previous investigations at the site, it is possible that the field team may encounter MEC items that have been fired, disposed of, or abandoned, and that still represent a hazard.

2.3.2 Hazard Mitigation/Prevention

2.3.2.1 All field personnel will be given ordnance recognition training prior to working on the site as discussed in Chapter 4 of this SSHP. The training will be verified by signature on the site training form. Personnel will be instructed to be alert for unexploded ordnance (UXO)/MEC and munitions debris.

2.3.2.2 The following general precautions concerning suspect MEC will be observed at all times:

- Suspect MEC item(s) WILL NOT be touched or moved regardless of the markings or apparent condition.
- Radios or cellular phones WILL NOT be used in the vicinity of suspect MEC items.
- Areas where the ground cannot be seen WILL NOT be traveled across.
- Vehicles WILL NOT be driven into suspected MEC areas; clearly marked lanes will be used.
- Matches, cigarettes, lighters, or other flame-producing devices WILL NOT be carried on to a munitions response site (MRS).
- Color codes WILL NOT be relied upon for positive identification of MEC items or their contents.
- Suspect MEC items will be approached from the side whenever possible; approaching the front or rear areas will be avoided.
- Personnel will always assume that a MEC item contains a live charge until it can be determined otherwise.

2.3.2.3 The following actions will be taken if ordnance is found:

- Personnel who are not UXO-qualified will leave the immediate vicinity. They WILL NOT touch, move, or otherwise disturb the item.
- Personnel should not be misled by markings on the ordnance item stating or indicating that the item is a practice bomb or inert. Even practice bombs may

have explosive charges that are used to mark/spot the point of impact, or the item could be incorrectly marked.

- Immediately upon locating any suspect UXO/MEC, the SSHO and Site Manager will be notified. In turn, the SSHO or Site Manager will notify the Parsons Project Manager (PM), the USAESCH Safety Specialist, and the CENAB Site Operations Officer.
- Operations in the immediate area of the suspect UXO/MEC will be halted and the appropriate Contingency Plan (Section 16) will be implemented.

2.4 CHEMICAL HAZARDS

2.4.1 Hazard Identification

2.4.1.1 Tables D1.2.1a and D1.2.1b list contaminants of concern for both higher probability investigations and low probability investigations at the SVFUDS. The tables list the Threshold Limit Value (TLVs), Permissible Exposure Limit (PELs), Immediately Dangerous to Life or Health (IDLH) value, odor threshold, and health effects for these compounds.

2.4.1.2 The primary contaminants of concern at low probability sites are fuels and decontamination fluids. The latter solutions include nitric acid, bleach solution, and isopropyl alcohol.

2.4.1.3 The primary contaminants of concern at higher probability sites are mustard and lewisite agents and their associated breakdown products, arsine, ricin, fuels, and decontamination fluids. The latter solutions include nitric acid, bleach solution, and isopropyl alcohol.

2.4.1.4 Arsenic-contaminated soil is likely at both low and higher probability sites but exposures will be limited through dust control measures when necessary. Dust concentrations will be continuously monitored and controlled to 3mg/m³. Based on the analytical data collected at the site to date, the highest reported arsenic concentration detected in soil is 2,510mg/kg. Assuming this as a maximum concentration in soil and using the American Conference of Government Industrial Hygienists' TLV® for arsenic of 10µg/m³ (0.01mg/m³), then the maximum concentration of dust permissible during SVFUDS operations would be:

$$\text{Dust Action Level} = (\text{Exposure Limit, mg/m}^3) \times (10^6) / (\text{Soil Concentration, mg/kg})$$

or

$$\frac{0.01\text{mg/m}^3 \times 10^6\,\text{mg/kg}}{2{,}510\text{mg/kg}} = 3.98\text{mg/m}^3$$

Table D1.2.1a
Health Hazard Properties of Contaminants of Concern and Hazardous Materials for Higher Probability Sites (Chemical Agents, Industrial Chemicals, and Agent Breakdown Products)

Compound	PEL	TLV	IDLH	Physical Description/Health Effects/Symptoms
Mustard (H)	0.0004 mg/m^3 (WPL) 0.003 mg/m^3 (STEL)	NA	NA	Blister agent. Yellow, oily liquid. Garlic odor. Reddening of skin or appearance of blisters may occur several hours after exposure. Conjunctivitis, blindness. Carcinogen.
Lewisite (L)	0.003 mg/m^3 (C)	NA	NA	Blister agent. Dark oily liquid with geranium-like odor. Immediate pain on contact. Affects eyes, lungs, & blisters skin. Acts as systemic poison, causing pulmonary edema, diarrhea, restlessness, weakness, subnormal temperature, & low blood pressure. Experimental teratogen.
Arsine (SA)	0.05 ppm	0.05 ppm	3 ppm	Colorless gas with a garlicky or fishy odor. Nonirritating & produces no immediate symptoms. Symptoms of exposure may develop within several hours & include dizziness, nausea, abdominal pain, & difficulty breathing.
Phosgene (CG)	0.1 ppm	0.1 ppm	2 ppm	Colorless liquid or gas with a sweet odor like hay at low concentrations; sharp, pungent odor at high concentrations. Symptoms of exposure include eye irritation; dry burning throat; vomiting; coughing, foamy sputum, shortness of breath, chest pain; bluish or purplish discoloration of skin, & skin burns.
Ricin	NA	NA	NA	White powder or pellet (though soluble in water or weak acid). Toxic if inhaled, ingested, or injected. Symptoms occur 6-8 hours after exposure & include difficulty breathing, fever, cough, nausea, & tightness in chest (if inhaled), & vomiting & diarrhea (if ingested). Exposure to skin or eyes may cause redness & pain.
Chloroform	50 ppm (C)	10 ppm	500 ppm	Clear, colorless liquid with pleasant sweet odor. Central nervous system (CNS) depressant & carcinogen. Irritation of eyes, skin & respiratory tract. CNS effects include headache, drowsiness, dizziness. Ingestion causes severe burning in mouth & throat, chest pain & vomiting. Individuals with existing skin disorders, eye problems, or impaired liver, kidney or respiratory function may be more susceptible to adverse effects.
Cyanogen Chloride (CK)	NA	0.3 ppm (C)	NA	Colorless gas or liquid (below 55°F) with irritating odor. Symptoms of exposure include irritation of eyes and/or upper respiratory system; coughing or delayed pulmonary edema; weakness, headache, giddiness, dizziness, confusion, nausea, or vomiting; heartbeat irregularities. Exposure to liquid may cause skin irritation.
Chloropicrin (PS)	0.1 ppm	0.1 ppm	2 ppm	Colorless to faint-yellow, oily liquid with an intensely irritating odor. Symptoms of exposure include severe irritation of eyes, skin & respiratory passages; lacrimation, nausea, vomiting, colic, diarrhea, bronchitis & pulmonary edema. May also cause vertigo, fatigue & cough. High level exposures followed by burning of nose & throat, coughing, shortness of breath, dizziness, nausea or vomiting, headache, & extreme eye irritation. Skin contact results in immediate burning or stinging pain followed by redness.
Thiodiglycol	NA	NA	NA	Eye, lung, & skin irritation.
1,4 Dithiane	NA	NA	NA	Eye, lung & skin irritation.
1,4-Oxathiane	NA	NA	NA	Unknown.

Notes: NA - Not available or Not applicable. WPL - Worker Population Limit STEL - Short term exposure limit C - Ceiling

Table D1.2.1b
Health Hazard Properties of Contaminants of Concern and Hazardous Materials for Both Low and Higher Probability Sites (Fuels, Decontamination Fluids, and Arsenic)

Compound	PEL	TLV	IDLH	Physical Description/Health Effects/Symptoms
Gasoline (fuel)	300 ppm (TWA); 500 ppm (STEL)	300 ppm (TWA); 500 ppm (STEL)	NA	Light yellow to light red liquid with aromatic odor. Overexposure may cause redness of the eyes, redness and/or swelling if skin is contacted, & headache, nausea, vomiting, dizziness, drowsiness, euphoria, loss of coordination, & disorientation if inhaled.
Diesel (fuel)	NA	100 mg/m^3	NA	Yellow-brown liquid. Symptoms of exposure may include nausea, vomiting, cramping, CNS depression, headache, anesthesia, coma, death, irritation, coughing, gagging, dyspnea, skin & eye irritation & substernal distress.
Nitric Acid (decon solution)	2 ppm	2 ppm (TWA); 4 ppm (STEL)	25 ppm	Clear, colorless liquid with pungent odor. Very corrosive on contact with eyes & skin. Very corrosive when inhaled, causing choking, bronchitis, pneumonitis, breathing difficulty, & irritation of the mucous membranes. Causes burning of the esophagus & mouth, irritation, shock or death if ingested.
5% Sodium Hypochlorite (decon solution)	0.5 ppm (TWA); 1 ppm (STEL) as Chlorine	1 ppm (TWA); 3 ppm (STEL) as Chlorine	NA	Pale yellow liquid with chlorine odor. Excessive inhalation of vapors, mists, or fumes may cause bronchial, coughing, labored breathing, nausea, & pulmonary edema. Skin contact may cause severe irritation with blistering & eczema, especially at higher concentrations.
Isopropyl Alcohol (decon solution)	400 ppm (TWA); 500 ppm (STEL)	200 ppm (TWA); 400 ppm (STEL)	2,000 ppm	Colorless liquid with the odor of rubbing alcohol. Symptoms of exposure may include headache, dry, cracking skin, drowsiness, dizziness, & mild irritation of the eyes, nose, & throat.
Arsenic	0.01 mg As/m^3 (TWA)	0.01 mg As/m^3 (TWA)	5 mg As/m^3	Silver-gray or tin-white, brittle, odorless solid. Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin, [Potential occupational carcinogen].

Notes: NA - Not available or Not applicable. TWA - Time weighted average STEL - Short term exposure limit

2.4.1.5 Therefore, as long as dust concentrations are continuously monitored and controlled to 3mg/m³ or less, arsenic is not a contaminant of concern.

2.4.2 Hazard Mitigation/Prevention

2.4.2.1 The potential hazards from chemical agents and other chemicals of concern will be minimized through the use of proper PPE (Chapter 5 of this SSHP) and appropriate air monitoring (Chapter 8 of this SSHP). Details on hazard communication training are presented in Chapter 4 of this SSHP.

2.5 PHYSICAL HAZARDS

2.5.0.1 The primary physical hazards potentially associated with this project are expected to include:

- Underground utilities;
- Severe weather;
- Lightning;
- Hazardous noise;
- Heat stress; and
- Cold stress.

2.5.0.2 These hazards and mitigation actions are discussed in the following subsections.

2.5.1 Underground Utilities

2.5.1.1 Hazard Identification

2.5.1.1.1 Underground utility lines may be present at the SVFUDS that may pose hazards during the intrusive operations, including both manual and mechanized excavations. The specific hazards include, but are not limited to, utilities such as sewers, telephone, cable, fiber optic, water, fuel, gas, and electrical lines.

2.5.1.2 Hazard Mitigation and Prevention

2.5.1.2.1 The local utility locating hotline (i.e., Miss Utility) will be contacted to identify the locations of buried utilities before subsurface activities are allowed to commence. Prior to commencing any intrusive activities, the Parsons Site Manager will obtain a digging clearance if appropriate, and document phone calls, correspondence, and confirmation numbers. Site personnel will not enter underground utilities. In the event the local utility service cannot access all areas of the site where utilities may be located, geophysical instruments and utility locators will be used to scan for buried utilities.

2.5.2 Severe Weather

2.5.2.1 Hazard Identification

2.5.2.1.1 During the course of field operations, severe weather may be encountered, including thunderstorms, rainstorms, and other unsafe weather conditions (i.e., high winds and tornadoes). Criteria indicating that severe weather conditions may exist include:

- High winds (greater than 40 miles per hour – depending on the tree cover and other site specific conditions),
- Tornado watch or warning in place for an area including the site,
- Visible lightning,
- Extreme temperatures (e.g., greater than 100°F or less than 0°F), or
- Heavy rainfall or ice storms that makes footing treacherous and visibility difficult.
- Muddy or soft ground restricts the movement of rescue teams and emergency vehicles.

2.5.2.2 Hazard Mitigation and Prevention

2.5.2.2.1 In the event of severe weather, it may be necessary to cease operations and evacuate the site. The SSHO will be responsible for being aware of local weather forecasts and monitoring the weather. Should severe weather threaten, the SSHO will be responsible for deciding in conjunction with the CENAB Site Operations Officer and USAESCH Safety Specialist whether site operations should cease.

2.5.2.2.2 In the event that work is suspended, the SSHO will notify personnel who have radios or cellular telephones. These individuals will be responsible for relaying the work suspension to other personnel in their areas. All personnel will render the workplace temporarily closed and move to designated assembly areas for further instruction.

2.5.2.2.3 Once the severe weather hazard has passed, the SSHO will notify personnel that work may resume. The SSHO will monitor weather forecasts and reports of current weather conditions both before and during field activities to determine if severe weather is forecast or is imminent. When medical support is onsite, the medics will monitor the emergency radio for local severe weather conditions.

2.5.3 Lightning

2.5.3.1 Hazard Identification

2.5.3.1.1 Lightning's distance from a given person's position can be estimated by noting the time from its flash to the bang of the associated thunder. For each 5-second count from flash to bang (F-B), lightning is 1 mile away. Thus, an F-B of 10 means that lightning is 2 miles away

and an F-B of 15 means that lightning is 3 miles away, and so on. Because the distance from Strike A to Strike B to Strike C can be 0.5-1.5 miles apart, it is suggested that the lightning safety evacuation plan be implemented at a count of at least 50 (10 miles), or as soon as thunder is heard. Under some weather conditions, thunder will only be heard when the lightning is 3 to 4 miles away.

2.5.3.2 Hazard Mitigation and Prevention

2.5.3.2.1 If a lightning storm is expected or observed, all outdoor site activities will cease and personnel will seek safe shelter. A safe shelter may consist of:

- Fully enclosed metal vehicles with windows up,
- Enclosed buildings, or
- Low ground.

2.5.3.2.2 Unsafe shelter areas include all nearby outdoor metallic objects such as flag poles, fences, high mast light poles, gates, etc. Trees, water, and open fields will be avoided, and personnel will avoid using the telephone.

2.5.3.2.3 Feeling one's hair standing on end and/or hearing "crackling noises" are signs of being in lightning's electric field. Persons experiencing these signs will immediately remove objects containing metal or metal parts (including baseball caps), place their feet together, duck their head, and crouch down with their hands on their knees. A waiting period of at least 30 minutes from the last nearby lightning strike will be observed before resuming activities.

2.5.3.2.4 People who have been struck by lightning do not carry an electrical charge and are safe to handle. Cardiopulmonary resuscitation (CPR) will be performed immediately on victims of a lightning strike by someone qualified to do so. Additionally, emergency help will be sought promptly.

2.5.4 Hazardous Noise

2.5.4.1 Hazard Identification

2.5.4.1.1 Planned activities may involve the use of heavy equipment, such as bobcats and forklifts, and other noise-producing equipment such as the air filtration system. The unprotected exposure of site workers to this noise during activities could result in noise-induced hearing loss.

2.5.4.1.2 A hazardous noise condition exists when communication between individuals separated by three feet requires shouting.

2.5.4.2 Hazard Mitigation/Prevention

2.5.4.2.1 Personnel working at this site will receive an audiogram (hearing test) during their annual physical. The PSHM or SSHO will verify that these requirements have been met for each site worker.

2.5.4.2.2 Hearing protection will be required at any time the noise level reaches 85 decibels (dbA) or greater, or when communication between individuals separated by 3 feet requires shouting. Double protection will be required at any time noise levels exceed 104 dbA. The SSHO will ensure that either earmuffs or disposable foam earplugs are available to, and used by, all personnel near sources of hazardous noise.

2.5.4.2.3 For sites where engineering controls or other equipment generate high levels of continuous or semi-continuous noise, the PSHM or designate will conduct a noise survey to assess noise levels and evaluate whether additional mitigation measures are required.

2.5.5 Heat Stress

2.5.5.1 Hazard Identification

2.5.5.1.1 There is a potential for heat stress and related injuries during intrusive investigation, especially when heavy manual labor-intensive activities are performed with semi-permeable and impermeable PPE. Potential hazards include:

- Heat rash
- Heat cramps
- Fainting
- Heat exhaustion
- Heat stroke

2.5.5.2 Hazard Mitigation/Prevention

- Workers will be trained to recognize the symptoms of heat-related injuries and illnesses.
- Heat-related injury and illness recognition and prevention measures will be emphasized during safety tailgate meetings when the potential for such injuries and illnesses exists.
- Cool beverages will be available on site. Workers will be encouraged to drink fluids.
- The SSHO will monitor workers for signs of heat stress and track Wet Bulb Globe Temperature (WBGT) readings whenever the weather report for the day predicts temperatures of 80°F or greater.

- Heart rate and temperature will be monitored when workers are wearing Level C PPE or above.

2.5.5.3 A more detailed discussion of heat stress symptoms, mitigation, and prevention is provided in Chapter 9 of this SSHP.

2.5.6 Cold Stress

2.5.6.1 Hazard Identification

2.5.6.1.1 There is a potential for cold-related injuries and illnesses. Exposure to low temperatures presents a risk to employee safety and health both through the direct effect of the low temperature on the body and collateral effects such as slipping on ice, decreased dexterity, and reduced dependability of equipment. Specific potential hazards include:

- Frostbite
- Chill blains
- Hypothermia

2.5.6.2 Hazard Mitigation/Prevention

- Workers will be trained to recognize the symptoms of frostbite and hypothermia.
- Cold injuries and illnesses recognition and prevention measures will be emphasized during safety tailgate meetings when the potential for cold injuries and illnesses exists.
- Work will cease under unusually hazardous conditions.
- A heated shelter will be available on site.
- Insulating dry clothes will be available.
- Ambient temperature will be recorded on site.
- Warm beverages will be available on site.

2.5.6.3 A more detailed discussion of cold stress symptoms, mitigation, and prevention is provided in Chapter 9 of this SSHP.

2.6 IONIZING RADIATION

2.6.0.1 There are no known sources of ionizing radiation at the SVFUDS and, therefore, no hazards resulting from ionizing radiation are anticipated to occur.

2.7 BIOLOGICAL HAZARDS

2.7.0.1 Biological hazards may include encounters with mammals, insects, snakes, spiders, ticks, plants, parasites, and pathogens. Potential biological hazards present at the SVFUDS include hazardous plants, insects, and spiders. Additional information about individual biological hazards is presented in the following subsections.

2.7.1 Hazardous Plants

2.7.1.1 Hazard Identification

2.7.1.1.1 Because most of the area is urban residential with associated landscaping, the potential for hazardous plants will mainly be in unimproved areas. Most skin reactions following contact with offending plants are allergic in nature and are characterized by:

- General symptoms of headache and fever;
- Itching;
- Redness; and
- Rash.

2.7.1.1.2 Some of the most common and severe allergic reactions resulting from contact with hazardous plants are caused by poison ivy, poison oak, and poison sumac. Contact with the poisonous sap of these plants produces a severe rash characterized by redness, blisters, swelling, and intense burning and itching. In some cases the victim may develop a high fever and may become very ill. Ordinarily, the rash begins within a few hours after exposure, but it may be delayed for 24 to 48 hours.

2.7.1.1.3 The most distinctive features of poison ivy and poison oak are their leaves, which are composed of three leaflets. In certain seasons, both plants also have greenish-white flowers and berries that grow in clusters. Images of poison ivy, poison oak, and poison sumac are shown in Figure D1-2-1.

2.7.1.2 Hazard Mitigation/Prevention

2.7.1.2.1 Avoiding contact with the plants or their sap is the only effective means of preventing the poisoning. A person experiencing symptoms of hazardous plant poisoning should remove contaminated clothing and wash all exposed areas thoroughly with soap and water. Apply calamine or other poison ivy/oak lotion if the rash is mild. Seek medical advice if a severe reaction occurs, or if there is a known history of previous sensitivity. Thorough washing of skin and clothing after site work or after potential exposure can also reduce severity of irritation.

Figure D1-2-1
Poison Ivy/Poison Oak/Poison Sumac

2.7.2 Ticks/Lyme Disease

2.7.2.1 Hazard Identification

2.7.2.1.1 The Center for Disease Control has noted the increase of Lyme disease and Rocky Mountain Spotted Fever (RMSF), which are caused by bites from infected ticks that live in and near wooded areas, tall grass, and brush. Ticks are small, ranging from the size of a printed comma up to about one quarter inch. They are sometimes difficult to see. The tick season extends from spring through summer. When embedded in the skin, they may look like a freckle.

2.7.2.1.2 Lyme disease has occurred in 43 states, with the heaviest concentrations in the Northeast. It is transmitted by deer ticks and lone star ticks. Female deer ticks are about one quarter inch in size, and are black and brick red in color. Male deer ticks are smaller, and completely black. Lone star ticks are larger and chestnut brown in color. A female deer tick is shown in Figure D1-2-2.

2.7.2.1.3 The first signal of Lyme disease infection may appear in a few days or a few weeks after the tick bite. Typically, a rash starts as a small red rash that sometimes appears as a bulls-eye. Other symptoms include headache, weakness, joint and muscle pain and other flu-like symptoms.

2.7.2.1.4 RMSF has occurred in 36 states, with the heaviest concentrations in Oklahoma, North Carolina, South Carolina, and Virginia. It is caused by Rocky Mountain wood ticks and dog ticks that have become infected with rickettsia. Both are black in color. The first symptoms of RMSF are also flu-like chills, fever, headache, dizziness, fatigue, stiff neck, and bone pain.

2.7.2.1.5 In both cases, if immediately treated by a physician, most individuals recover fully in a short period of time. If not treated, more serious symptoms can occur.

Figure D1-2-2
Female Deer Tick

2.7.2.2 Hazard Mitigation/Prevention

2.7.2.2.1 If you believe a tick has bitten you, or if any of the signs and symptoms noted above appears, contact the SSHO, who will authorize you to visit a physician for an examination and possible treatment.

2.7.2.2.2 Standard field gear (work boots, socks, and light-colored coveralls) provides good protection against tick bites, particularly if the joints are taped. However, even when wearing field gear, the following precautions will be taken when working in areas that might be infested with ticks:

- When in the field, check yourself often for ticks, particularly on your lower legs and areas covered with hair.
- Apply DEET (vapor-active repellent) to any exposed skin surface (except eyes and lips) and apply the permethrin repellent spray to field clothing (Note - allow the permethrin to dry before using the treated clothing).
- When walking in wooded areas, wear a hard hat, and avoid contact with bushes, tall grass, or brush as much as possible.
- If you find a tick, remove it by pulling on it gently with tweezers. Do not squeeze the tick's body. Grasp it where the mouthparts enter the skin and tug gently, but firmly, until it releases its hold on the skin.
- DO NOT use matches, a lit cigarette, nail polish, or any type of chemical to "coax" the tick out.
- Be sure to remove all parts of the tick's body, and disinfect the area with alcohol or a similar antiseptic after removal.

- For several days to several weeks after removal of the tick, look for the signs of the onset of Lyme disease, such as a rash that looks like a bulls-eye or an expanding red circle surrounding a light area, frequently seen with a small welt in the center.
- Also look for the signs of the onset of RMSF, such as inflammation that is visible in the form of a rash comprising many red spots under the skin, which appears 3 to 10 days after the tick bite.

2.7.3 Bees and Other Stinging Insects

2.7.3.1 Hazard Identification

2.7.3.1.1 Contact with stinging insects may result in site personnel experiencing adverse health affects that range from being mildly uncomfortable to life threatening. Therefore, stinging insects present a serious hazard to site personnel, and extreme caution must be exercised whenever site and weather conditions increase the risk of encountering stinging insects. Poisonous insects and insect-like creatures that may be encountered at the SVFUDS include the following:

- Bees (killer bees, honeybees, yellow jackets, bumble bees, wasps, and hornets);
- Scorpions; and
- Fire ants.

2.7.3.2 Hazard Mitigation/Prevention

2.7.3.2.1 Site personnel will comply with the following work practices:

- Personnel with a known hypersensitivity to bee, wasp, or hornet stings will inform the SSHO of this condition prior to performing site activities.
- Personnel with a known hypersensitivity condition will keep emergency medication in their possession.
- All personnel will remain vigilant for the presence of these stinging insects. Discovered nests will be flagged and their position reported to other site personnel.
- If stung, personnel will immediately inform the SSHO in order that they are able to receive appropriate treatment.

2.7.3.2.2 Some of the factors that are related to stinging insects that increase the degree of risk associated with accidental contact are as follows:

- The nests for these insects are frequently found in remote wooded or grassy areas and hidden in cavities.
- The nest can be situated in trees, rocks, bushes, or in the ground, and are usually difficult to see.
- If a site worker accidentally disturbs a nest, the worker may be inflicted with multiple stings, causing extreme pain and swelling which can leave the worker incapacitated and in need of medical attention.
- Some people are hypersensitive to the toxins injected by a sting, and when stung, experience a violent and immediate allergic reaction, resulting in a life-threatening condition known as anaphylactic shock.
- Anaphylactic shock manifests itself very rapidly and is characterized by extreme swelling of the body, eyes, face, mouth, and respiratory passages.
- The hypersensitivity needed to cause anaphylactic shock can, in some people, accumulate over time and exposure, therefore, even if someone has been stung previously, and not experienced allergic reaction, there is no guarantee that they will not have an allergic reaction if they are stung again.

2.7.4 Snakes

2.7.4.1 Hazard Identification

2.7.4.1.1 The only common venomous snake in the vicinity of the SVFUDS is the copperhead, which prefers rocky habitats. Also potentially present are the eastern diamondback and coral snakes. None of these snakes are considered likely to be encountered in residential areas.

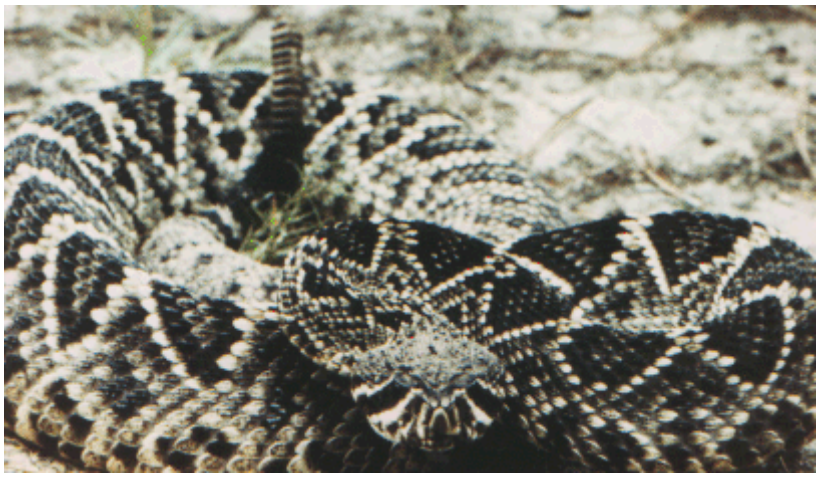
2.7.4.1.2 Illustrations of these snakes are shown in Figures D1-2-3a through D1-2-3c, and descriptions provided below:

- Copperheads (Figure D1-2-3a) are commonly found near water sources in wooded areas. They are generally less than four feet in length and are not particularly aggressive. Coloration ranges from golden brown to tan. These snakes have a banded pattern.

Figure D1-2-3a
Copperhead

- The Eastern Diamondback Rattlesnake (Figure D1-2-3b) is the largest snake native to North America, reaching 6 feet long. It has brown, black, and beige diamond marks on its back. This snake lives in forests near palmetto bushes and makes its home in old animal burrows (holes in the ground). It is a good swimmer and can live near fresh or salt water. The eastern diamondback does NOT always rattle before it strikes.

Figure D1-2-3b
Eastern Diamondback Rattlesnake



- Eastern Coral Snakes (Figure D1-2-3c) are seldom seen and tend to be nocturnal. These snakes are typically small snakes averaging approximately 20 inches in length. Eastern Coral Snakes have rings of red, yellow, and black along the

length of their bodies. Their noses are always black. They do not have long fangs and would have to actually chew on a person in order to inject their venom. Many snakes look like the coral snake. Venomous coral snakes always have red and yellow stripes touching.

Figure D1-2-3c
Eastern Coral Snake

2.7.4.1.3 A bite from a poisonous snake is usually characterized by extreme pain and swelling at the site of the bite; the presence of one or more puncture wounds created by the fangs; and a general skin discoloration. The manifestations of the bite include general weakness; rapid pulse; nausea and vomiting; shortness of breath; dimness of vision; tingling or numbness of the tongue, mouth or scalp; and shock.

2.7.4.1.4 Physical reactions are aggravated by acute fear, anxiety, the amount of venom injected, the speed of absorption of the venom into the victim's circulatory system, the size of the victim, protection provided by clothing (including shoes and gloves), quick anti-venom therapy, and the location of the bite.

2.7.4.2 Hazard Mitigation/Prevention

2.7.4.2.1 The best snakebite mitigation measure is avoidance. The following measures will help in this process:

- Personnel will review the types of poisonous snakes most common to the SVFUDS. This will be reviewed during site-specific safety training. Regardless of type, all snakes will be avoided.
- Personnel will wear long pants and work boots as protection.

- Personnel will be careful where they sit and where they place their hands and feet.
- Personnel will avoid rock piles, stacks of old boards, and brush piles in wooded areas. If it is necessary to move these items, personnel will use a remote means to initially relocate the material. Prior to entering a heavily wooded or brushy area, personnel will look and listen carefully.
- Personnel will never handle "dead" snakes, as they may not be completely dead.
- Personnel will not attempt to capture or kill ANY snakes. According to the Centers for Disease Control and Prevention, most snakebites are the direct result of handling or harassing snakes, which bite as a defensive measure.

2.7.4.2.2 First aid rules that will be followed in the event that someone is bitten by a snake are:

- DO NOT make an incision through the fang marks; this procedure is too hazardous to underlying structures and, at best, removes only 20% of the venom, and will intensify the effect of the venom.
- DO NOT apply suction to the wound since this has a minimal effect in removing venom.
- DO NOT apply a tourniquet since this will concentrate the venom and increase the amount of tissue damage in the immediate area of the wound.
- DO NOT use cold compresses, ice, dry ice, chemical ice packs, spray refrigerants, or other methods of cold therapy.
- If possible, try to get a good look at the snake so it can be identified for proper selection of anti-venom; but do not try to capture or kill it.
- DO NOT allow the victim to run for help, since running increases the heart rate and will increase the spread of the venom throughout the body.
- Keep the victim calm and immobile, and reassure him/her.
- Have the victim hold the affected extremity lower than the body while waiting for medical assistance.
- Do not delay evacuation. Transport the victim to medical attention immediately.

2.7.4.2.3 In addition to the above guidelines, several other factors will be considered by the caregiver in selecting the appropriate actions:

- **Shock:** The victim will be kept in a comfortable, prone position and body temperature will be stabilized.

- **Breathing and heartbeat:** if breathing stops, mouth-to-mouth resuscitation will be administered. If breathing stops and there is no pulse, CPR should be performed by a trained individual.
- **Cleaning the bitten area:** The bitten area may be washed with soap and water and blotted dry with sterile gauze. Dressings and bandages may be applied, but only for a short period of time.
- **Medicine to relieve the pain:** The victim will not be given alcohol, sedatives, or any medicine containing aspirin. Some painkillers may be given after consulting with a doctor or medical personnel for specific medications that may be used.
- **Snakebite kits:** Kits will be kept accessible for all outings in primitive areas or areas known or suspected to be snake infested. All directions will be followed precisely.

2.7.5 Spiders

2.7.5.1 Hazard Identification

2.7.5.1.1 A large variety of spiders may be encountered during site activities. While most spider bites merely cause localized pain, swelling, reddening and in some cases, tissue damage, there are a few spiders that, due to the severity of the physiological affects caused by their venom, are dangerous. The SSHO will brief site personnel as to the identification and avoidance of these dangerous spiders. These species include the black widow and the brown recluse or violin spiders.

2.7.5.1.2 The black widow spider (Figure D1-2-4a) is a coal-black, bulbous spider ¾ to 1½ inches in length, with a bright red hourglass on the under side of the abdomen. The black widow is usually found in dark moist locations, especially under rocks, rotting logs and may even be found in outdoor toilets where they inhabit the underside of the seat. Victims of a black widow bite may exhibit the following signs or symptoms:

- Sensation of pinprick or minor burning at the time of the bite.
- Appearance of small punctures (but sometimes none are visible).
- After 15 to 60 minutes, intense pain is felt at the site of the bite which spreads quickly, and is followed by profuse sweating, rigid abdominal muscles, muscle spasms, breathing difficulty, slurred speech, poor coordination, dilated pupils and generalized swelling of face and extremities.

Figure D1-2-4a
Black Widow Spider

2.7.5.1.3 The brown recluse or violin spider (Figure D1-2-4b) is brownish to tan in color, rather flat, 1/2 to 5/8 inches long. Of the brown recluse spider, there are three varieties found in the United States that present a problem to site personnel. These are the brown recluse, the desert violin, and the Arizona violin. These spiders may be found in a variety of locations including trees, rocks or in dark locations. Victims of a brown recluse or violin spider bite may exhibit the following signs or symptoms:

- Blistering at the site of the bite, followed by a local burning at the site 30 to 60 minutes after the bite.
- Formation of a large, red, swollen, postulating lesion with a bull's-eye appearance.
- Systemic affects may include a generalized rash, joint pain, chills, fever, nausea and vomiting.
- Pain may become severe after 8 hours, with the onset of tissue necrosis.

Figure D1-2-4b
Brown Recluse Spider

2.7.5.2 Hazard Mitigation/Prevention

2.7.5.2.1 The field team will avoid spiders and webs during the course of field activities. An individual who believes he/she has been bitten by a black widow or brown recluse spider will be immediately transported to a hospital. The spider will be collected (if possible) for confirmation of the species. Extreme caution will be used when lifting logs and debris, since spiders are typically found in these areas.

2.7.5.2.2 The best spider bite mitigation measure is avoidance. The following measures will help in this process:

- Personnel will review the types of harmful spiders most common to the SVFUDS. This will be reviewed during site-specific safety training. Regardless of type, all insects will be avoided.
- Personnel will wear pants either tucked into boots or taped to boots and long sleeved shirts as protection.
- Personnel will watch where they sit and where they place their hands and feet.
- Personnel will avoid rock piles, stacks of old boards, and brush piles in wooded areas. If it is necessary to move these items, personnel will use a remote means to initially relocate the material. Prior to entering a heavily wooded or brushy area, personnel will look carefully.
- Personnel will never handle "dead" spiders, as they may not be completely dead.

2.7.5.2.3 First aid treatment if bitten is to attempt to positively identify the spider that bit the individual and take the individual to the hospital immediately for treatment.

2.7.6 Blood-borne Pathogens

2.7.6.1 Hazard Identification

2.7.6.1.1 Blood-borne pathogens enter the human body through punctures, cuts, or abrasions of the skin or mucous membranes. They are not usually transmitted through ingestion (swallowing), through the lungs (breathing), or by contact with whole, healthy skin. However, under the principle of universal precautions, all blood will be considered infectious, and all skin and mucous membranes will be considered to have possible points of entry for pathogens.

2.7.6.1.2 Potential blood-borne pathogen exposures include:

- Contact with contaminated medical equipment or medical waste or sharps.
- Medical emergency response operations, such as administering first aid or CPR.
- Contact with human wastes such as domestic sewage.

- Accidental contact with blood from cuts and scratches incurred during field operations such as brush clearing, excavation, or clearance of munitions debris.

2.7.6.2 Hazard Mitigation/Prevention

2.7.6.2.1 Whenever there is a potential for exposure, personnel will wear the proper PPE (including gloves and masks when appropriate) to prevent exposure to blood-borne pathogens. If exposure to blood-borne pathogens is suspected, the SSHO will be informed and immediate medical attention will be sought.

CHAPTER 3
STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

3.0.0.1 Chapter 2 of the WP provides detail on the project team, qualifications, and responsibilities of the different organizations and staff involved in this project. Figure 2-1 of the WP shows the project organizational structure.

3.0.0.2 The Parsons PM, Site Manager, SSHO, and the PSHM are collectively responsible for formulating and enforcing health and safety requirements and for implementing the APP/SSHP. This section outlines the specific safety responsibilities, accountability, and lines of authority for key Parsons personnel during the course of project activities.

3.0.0.3 All site personnel and subcontractors performing duties or working in areas where there is a potential for exposure to hazardous material will meet the training requirements of OSHA 29 CFR §1910.120 before working on the site.

3.1 PARSONS PROJECT MANAGER

3.1.0.1 The Parsons PM is responsible for all Parsons personnel and Parsons' subcontractors onsite, and designates duties to the on-site personnel.

3.2 PROJECT SAFETY AND HEALTH MANAGER

3.2.0.1 The PSHM is responsible for oversight and direction to ensure full compliance with all health and safety issues at the project site. The PSHM will oversee all aspects of site safety, including the preparation of the APP/SSHP, and any audits of site operations and records to verify OSHA, USACE, and APP/SSHP compliance.

3.2.0.2 The PSHM responsibilities include the following.

- Oversee the development, maintenance, and implementation of the APP/SSHP.
- Visit the project site(s) as needed to audit the effectiveness of the APP/SSHP.
- Remain available for project emergencies.
- Develop modifications to the APP/SSHP as needed.
- Evaluate occupational exposure monitoring data/air-sampling data and adjust the APP/SSHP requirements as necessary.
- Serve as a Quality Control staff member.
- Approve the APP/SSHP by signature.

3.3 SITE SAFETY AND HEALTH OFFICER

3.3.0.1 At a minimum, the SSHO will have completed the 10-hour OSHA Construction safety class within the last three years. The SSHO will also have at least one year of experience implementing safety and occupational health procedures at cleanup operations and have the training and experience to conduct exposure monitoring/air sampling, and select and adjust PPE. A UXO Safety Officer (UXOSO) who meets these qualifications may also serve as the SSHO. The training and experience criteria of the SSHO will be certified by in writing and filed on site.

3.3.0.2 The SSHO will be present during all operations at the SVFUDS, is responsible for implementing the APP/SSHP on site, and has the following additional responsibilities:

- Be present during operations covered by the APP/SSHP.
- Inspect site activities, identify any safety and occupational health deficiencies, and correct any deficiencies found.
- Coordinate changes and modifications to the APP/SSHP with the PSHM, PM, Site Manager, and USACE Contracting Officer.
- Conduct site-specific training and audits.

3.3.0.3 The SSHO has stop work authority is designated as the first responder for medical emergencies or minor injuries and is the on-scene commander in the event of an emergency.

3.3.0.4 The SSHO for each specific site at the SVFUDS will be identified in the SSWP.

CHAPTER 4
TRAINING

4.1 GENERAL

4.1.1 Initial Training

4.1.1.1 Prior to arriving on the site, all personnel will receive training from their employers complying with, but not necessarily limited to, those requirements specified by the USACE in EM 385-1-1 and 29 CFR 1910.120 (Hazardous Waste Operations and Emergency Response, or HAZWOPER), 29 CFR 1910.1200 (Hazard Communication), 29 CFR 1910.1030 (blood-borne pathogens), and 29 CFR 1910.134 (respiratory protection).

4.1.1.2 Copies of certificates of completion for HAZWOPER training (initial 40-hour or refresher course, supervisor training, etc.), medical status, first aid and CPR, and when appropriate UXO, certification for all personnel working on site will be maintained on site by the SSHO. These requirements are summarized in Table D1.4.1.

4.1.1.3 In addition to the initial training above, site-specific training including topics on safe work practices and equipment use (including heavy equipment), PPE, medical surveillance, decontamination, and emergency response will be conducted upon mobilization.

4.1.1.4 Personnel conducting brush clearing, surveying, or other similar non-intrusive activities are not subject to HAZWOPER training requirements under the following conditions:

- No intrusive operations occur while those personnel are on site;
- There is no potential for those personnel to be exposed to hazardous contaminants;
- The personnel receive the daily/visitor's site safety briefing prior to commencing work; and
- A UXO escort is provided for entrance into areas that have not been cleared of potential MEC.

Table D1.4.1
Training Requirements

Training Content	Duration (If specified)	Frequency (If specified)	Personnel Categories				
			Supervisors	Field Teams	Operational Support	Visitors within EZ or CRZ	Other Visitors
HAZWOPER – 29 CFR 1910.120	40-Hours	Once	☑	☑	☑	☑	
HAZWOPER (Refresher) – 29 CFR 1910.120	8-Hours	Annually	☑	☑	☑	☑	
Health and Safety for Supervisors – HAZWOPER, 29 CFR 1910.120	8-Hours	Once	☑				
Supervised Field Experience	3-Days	Once	☑				
Construction Safety Training (to comply with EM 385-1-1 01.A.17.)	10-Hours	Once	☑[1]				
Site-Specific Training (see Section 4.2 for training contents)	-	Once[2]	☑	☑	☑	☑	
Hazard Communication, Hazards of Materials Used/Encountered Emphasis on Chemical Agents & Industrial Chemicals	-	Once[2]	☑	☑	☑	☑	
First Aid and CPR - Equivalent to American Red Cross Training	-	Every 3 years for First Aid; every year for CPR	☑[3]	☑[3]	☑[3]		
Bloodborne Pathogen – 29 CFR 1915.1030: Protective Equipment, Containment and Disposal of Waste	-	Annually	☑	☑			
Visitor Training - Operational Activities & Hazards, Boundaries of Work Area and Entry/Exit, Emergency Site Evacuation & Assembly Points, PPE	-	Per visit					☑
Tailgate Safety Meetings - Potential Hazards & Risks, Encounters with Hazardous Materials to Date, Daily Activities	-	Daily, prior to operations	☑	☑	☑	☑	

Note 1 SSHO is the only person required to have this training.

Note 2 Site-Specific and Hazard Communication training will be updated when there is a significant change in operations or chemical usage.

Note 3 A minimum of 2 trained personnel on site. Any of the personnel categories may have workers trained in First Aid/CPR.

4.1.2 Supervisory Training

4.1.2.1 The SSHO and individuals responsible for supervising personnel engaged in site work will also have at least eight additional hours of specialized training on managing such operations. This specialized training includes the employer's safety and health program and the associated employee training program, PPE program, and health hazard monitoring procedures and techniques. These supervisory personnel will also each have a minimum of three days of field experience under the supervision of a trained, experienced supervisor.

4.1.2.2 In addition, the SSHO will have completed the 10-hour OSHA construction safety class or meet equivalent training requirements specified in EM 385-1-1 Paragraph 01.A.17. This requirement must be met by the SSHO at least once every three years.

4.1.3 Refresher Training

4.1.3.1 All site workers will complete eight hours of refresher training annually on the items covered in the 40-hour initial training program.

4.2 SITE-SPECIFIC TRAINING

4.2.0.1 Site-specific training will be provided for all employees, contractors, and subcontractors who plan to work on site and who have met the requirements of Section 4.1.1. Training will be conducted prior to the job start-up or, for new or replacement personnel, prior to starting work, and as needed thereafter. The PSHM and/or the SSHO will conduct initial site-specific training prior to job start-up to ensure that employees have a thorough understanding of the SSHP, the overall project, standard operating procedures (SOPs), and all of the potential safety hazards at the site. The site-specific training will be conducted as necessary when new employees enter the site. Topics covered in the site-specific health and safety training will include:

- Site history and background.
- Names of employees and their duties.
- Persons responsible for safety and health.
- Employee rights and responsibilities under OSHA.
- Review of the APP/SSHP and AHAs.
- Air monitoring procedures.
- SOPs prepared specifically for various aspects of this project.
- Site control measures.
- Fire prevention measures.
- Emergency response procedures.

- Locations of medical facilities/hospitals.
- Engineering controls, such as dust suppression techniques.
- Medical surveillance program.
- PPE.
- Discussion of action levels for changing site PPE or evacuating the site.
- Heat and/or cold stress prevention, treatment, and monitoring.
- Proper use of heavy equipment and machinery.
- Other physical hazards such as slips, trips, and falls, noise, electrocution, being struck by something, and being caught in or between something.
- Proper lifting techniques.
- Personal cleanliness and restrictions on eating, drinking, and smoking.
- Site-specific UXO training.

4.2.0.2 Employees will also be instructed in the use of the "buddy system," which is a method of organizing work groups so that there is someone that is always available to:

- Provide his or her partner with assistance in an emergency,
- Observe his or her partner for signs of chemical or physical exposure,
- Periodically check the integrity of his or her partner's PPE, and
- Notify the emergency response personnel when an emergency occurs.

4.2.0.3 Any emergency response training during a project will be conducted by qualified instructors. The qualifications are relative to the specific emergency response operation being conducted and are outlined in EM-385-1-1.

4.2.0.4 All employees will be made aware of the project emergency assistance network, the most probable route of evacuation from the site in the event of an emergency, and other emergency procedures included in the project plans. All employees will be briefed on the procedures and hazards specific to the site.

4.2.0.5 At the completion of site-specific training, all employees will be required to sign forms that state they have received site-specific training, and read, understood, agreed with, and will abide by the health and safety procedures outlined in the APP. Appendix F of the WP contains a Plan Acceptance Form and the Site-Specific Training Form.

4.3 TAILGATE SAFETY MEETINGS

4.3.0.1 All personnel who plan to enter the site during investigation activities will attend the daily tailgate safety meeting. This meeting, conducted by the SSHO, will cover specific health and safety issues, site activities for that day, changes in site conditions, topics covered in the initial health and safety meeting as they apply to daily activities, PPE, personnel and equipment decontamination, potential physical hazards, emergency warning signal, rally point, etc. Issues discussed in the daily tailgate meeting will be documented on a form, which will be signed by all the attendees and retained by the SSHO. A sample Tailgate Safety Meeting Form is provided in Appendix F.

4.4 BLOODBORNE PATHOGENS AND CPR/FIRST AID TRAINING

4.4.0.1 Personnel assigned to conduct fieldwork for this project will not conduct first aid or CPR as a primary job function. Rather, selected employees have been trained in CPR and first aid for emergency use only. Acting in the capacity of a designated emergency first aid provider is not mandatory and anyone who is uncomfortable with the possibility of being so designated should notify the SSHO. In accordance with EM 385-1-1, at least two persons currently certified in CPR and first aid will be present on site at all times during site operations.

4.4.0.2 An indoctrination to the bloodborne pathogens standard (29 CFR 1910.1030) will be provided to all employees either during their first aid training, and/or during the initial site health and safety meeting. Hepatitis B and Acquired Immune Deficiency Syndrome (AIDS), among other pathogenic microorganisms, can be contracted during emergency first aid and CPR through contact with blood. Therefore, it is important to recognize the concept of "universal precautions." Universal precautions require one to assume that all blood and bodily fluids contain pathogens and require the use of protective barriers to prevent exposure. Latex gloves and CPR barriers will be available in the first aid supplies stored at each site and should be used prior to attending to a victim's needs. Additionally, washing any body part or surface that has been contaminated with blood is an important part of the universal precautions. The SSHO should be notified of any potential contact with blood or bodily fluids resulting from first aid or CPR administered on the job.

4.4.0.3 A vaccine exists for Hepatitis B. Should employees trained in first aid and CPR desire the vaccine, their employer will arrange to have the employee receive the series of inoculations. The Hepatitis B vaccine can also be effective when administered after exposure to blood containing the Hepatitis B virus, though this method is less efficient than vaccination.

4.5 EMERGENCY RESPONSE TRAINING

4.5.0.1 All employees will be made aware of the project emergency assistance network, the most probable route of evacuation from the site in the event of an emergency, and other emergency procedures included in Chapter 16 of this SSHP.

4.6 HAZARD COMMUNICATION TRAINING

4.6.0.1 In accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200 and CFR 1926.59), copies of all Material Safety Data Sheets (MSDSs) for hazardous chemical materials that are planned for use during site operations or that are present on-site will be available on site from the SSHO. Additionally, a written Hazard Communication Program has been prepared and will be maintained at the site by the SSHO.

4.6.0.2 Hazard communication training in accordance with 29 CFR 1910.1200 and 29 CFR 1926.59, DA Pam 40-173, DA Pam 385-61, and EM 385-1-1 will be presented during the initial training to address site-specific hazards. Training will include, but not be limited to, all hazards or potential hazards associated with site activities, and any hazardous chemical materials brought to or found on site. MSDSs for chemicals potentially present will be maintained on site by the SSHO.

4.7 RECOVERED CHEMICAL WARFARE MATERIEL TRAINING

4.7.0.1 Recovered Chemical Warfare Materiel (RCWM) training will be provided for all on-site personnel in accordance with DA Pam 40-173. Training will be conducted prior to job start-up and as needed thereafter. Topics covered will include:

- Chemical agent exposure routes and potential health effects.
- Methods of detecting a chemical agent release (i.e., monitoring instruments, agent odor, and symptoms of exposure).
- Emergencies and emergency procedures, including: reasons to evacuate and evacuation procedures, proper use of escape breathing apparatus, decontamination, emergency equipment, first aid, hospital routes, emergency contacts, etc.
- Safe work practices (e.g., use of the buddy system, contaminant control procedures, etc.).

4.8 VISITOR TRAINING

4.8.0.1 All visitors to the site will check in with the SSHO and receive a visitor's safety briefing that will include the following:

- Location and description of potential hazards and risks;
- Emergency warning alarms, evacuation procedures, and location of the rally point;
- Chemical and physical hazards found on-site;
- Areas of the site that are closed to visitors;

- Other topics as deemed appropriate.

4.8.0.2 All visitors will be required to sign the Visitor's Log.

4.8.0.3 Site visitors wishing to enter the work area during site operations will be subject to the same documentation and training as specified for site workers.

4.9 UXO TRAINING

4.9.0.1 All UXO personnel and the UXOSO working at the site will have completed Naval Explosive Ordnance Disposal training that details procedures for evaluation and disposal of UXO/MEC. Copies of applicable training certificates will be provided to the SSHO.

4.10 SITE-SPECIFIC TEAM TRAINING

4.10.1 Team Training Activities for Low Probability Sites

4.10.1.1 Prior to initiating intrusive activities at a low probability site, site-specific team training will be conducted under the direction of the SSHO or PSHM. The objective of this training will be to prepare field personnel for the operations to be carried out at that specific site. The training will address the following topics:

- Site layout.
- General site operations.
- Hazard communication.
- Emergency procedures.
- Health and safety measures.

4.10.2 Team Training Activities for Higher Probability Sites

4.10.2.1 Prior to initiating intrusive activities at a higher probability site, site-specific team training will be conducted under the direction of the SSHO or PSHM. The objective of this training will be to prepare field personnel for the operations to be carried out at that specific site. The training will address the following topics:

- Site layout.
- General site operations.
- Hazard communication.
- Emergency procedures.
- Health and safety measures.

- Chemical agent-specific health and safety measures.
- Donning/Doffing of PPE (including 30 minute escape respirators).

4.10.2.2 Team training activities for a higher probability site will be completed prior to the Pre-Operational Survey for that site (see Section 6.4 of the APP to which this SSHP is attached).

4.10.3 Tabletop Exercise for Higher Probability Sites

4.10.3.1 In addition to team training, prior to initiating intrusive activities at a higher probability site, a "tabletop" exercise will also be conducted. The tabletop exercise will be completed prior to the start of any chemical agent project and is a round table discussion of various possible accident and incident scenarios.

4.10.3.2 The tabletop exercise will be conducted by USACE and participants will include all on-site support agencies and any local responders that are supporting the project. The exercise is generally conducted in a conference room environment and typically should last between two to six hours, depending upon the size and complexity of the project.

4.10.3.3 The tabletop exercise is intended to be an open discussion and will be conducted in a non-threatening environment. It will use simulations to conduct drills of the emergency response to different chemical agent accident and incident scenarios in order to evaluate the effectiveness of the planned responses and to identify deficiencies or omissions in the emergency response plan. The tabletop exercise is also used to establish continuity and coordination between the various response agencies involved in the project.

4.10.3.4 The tabletop exercise for a higher probability site will be completed prior to the Pre-Operational Survey (see Section 6.4 of the APP to which this SSHP is attached).

4.11 TRAINING DOCUMENTATION

4.11.0.1 Documentation of training requirements is the responsibility of each employer. Written documentation verifying compliance with 29 CFR 1910.120 (e)(3), (e)(4) (as applicable) and (e)(8) will be submitted to the SSHO prior to entering the site. Types of training documentation include 40-hour HAZWOPER, 8-hour refresher, supervisor training, 10-hour OSHA construction safety, UXO, bloodborne pathogens, HAZCOM, first aid, CPR, current physician's certificate, respiratory protection training and fit testing, and hearing conservation training. Documentation of all workers' current training credentials will be kept on site. Daily tailgate meetings will be documented using a form similar to the sample form presented in Appendix F of the WP.

CHAPTER 5
PERSONAL PROTECTIVE EQUIPMENT

5.1 GENERAL REQUIREMENTS

5.1.0.1 Personnel performing site tasks will wear and use the appropriate level and type of PPE for each individual task in accordance with Table D1.5.1 and as otherwise specified in this plan. This SSHP makes provisions for use of the following levels of PPE in accordance with the hazards and contamination level anticipated for each task or operation: Level D, Modified Level D, Level C, Level B, and Level A. The following sections describe the PPE requirements for activities and locations at the SVFUDS. Task-specific PPE is presented in Table D1.5.1.

5.1.0.2 The SSHO will ensure that:

- Personnel are trained in the proper wearing, donning, and doffing procedures for all PPE used at the site.
- PPE used is properly fitted.

5.1.0.3 Hazard and risk assessment is a continuing process and will be conducted throughout the duration of the project. Changes in specific PPE, levels of PPE, or respiratory protection may be made in accordance with information obtained from actual implementation of site activities and data derived from the Site-Specific Monitoring Plan. As a general rule, levels of PPE and respiratory protection will need to be reassessed if any of the following occur:

- Previously unidentified or unanticipated chemicals, conditions or hazards are encountered.
- Airborne concentrations of known chemicals exceed the action levels specified in Chapter 8 of this SSHP.
- Ambient weather conditions affect the use of assigned PPE.
- A new task is introduced, or a previously assigned and evaluated task is expanded in scope.

5.1.0.4 If work tasks are added to the project after approval of this SSHP, the SSHO will identify and assess the task hazards and relay that information to the PSHM and USAESCH Safety Specialist. The PSHM will prepare an amendment to the SSHP and submit the amendment for approval from USACE or the Department of the Army Safety (DA Safety), as appropriate. The amendment will be added to the SSHP upon approval.

Table D1.5.1
PPE Requirements by Task

TASK	Level of PPE Required [Note 1]				
	Level A	Level B	Level C	Modified Level D	Level D
Low Probability Sites					
All field activities					✓
Higher Probability Sites					
Site Management					✓
Mobilization/Site Preparation					✓
Land Surveying/Geophysical Surveying					✓
Soil Sampling				✓	
Soil Packaging				✓	
Intrusive Excavation, Initial		✓	✓		
Intrusive Excavation, Suspect RCWM	✓	✓	✓		
PDS Operation			✓	✓	
Emergency Rescue (Equal or higher level than worker PPE)	✓	✓	✓	✓	✓
Field Monitoring Outside ECS				✓	
Segregation of RCWM			✓		
Packaging Leakers	✓				
Packaging Non-Leakers			✓		
Monitoring of Scrap Metal and Soil				✓ Note 1	
Decontamination of Scrap Metal			✓		
Disposition of Scrap Metal					✓
Disposition of Investigative Waste					✓
Disposition of Drummed Soil					✓
Excavation Backfill					✓
Project Close-Out/Demobilization					✓

Note 1: Masks will be donned when screening soil or scrap.

5.1.0.5 The SSHO will ensure that PPE and respirator use complies with all applicable OSHA, USACE, and Army regulations. The Level C, Level B, and Level A PPE described in this SSHP is approved for use with lewisite and mustard agent by DA Safety.

5.1.0.6 It is the responsibility of each employee to report to work wearing proper attire and to assemble the necessary PPE prior to donning it. If respiratory protection is to be used, it is the responsibility of employees to report to work clean-shaven to ensure a tight and effective seal with the respirator face piece.

5.2 TASK-SPECIFIC LEVELS OF PPE

5.2.1 Special PPE Considerations

5.2.1.1 The following special considerations will be observed in the selection of PPE:

- Hard hats will be required when working around heavy equipment or when an overhead hazard exists.
- Steel toe/shank boots are not required during surface/subsurface location of UXO unless a serious toe hazard exists, whereupon footwear with a fiber safety toe will be used.
- Safety glasses will be selected that provide site personnel with the best protection from not only physical hazards, such as flying objects, but that also provide adequate splash protection where required.
- The SSHO will continually evaluate site tasks to identify hazards and will provide any PPE necessary to ensure the safety and health of site personnel, regardless of the activity they perform.

5.2.2 Tyvek F Special Considerations

5.2.2.1 When used in any level of PPE, Tyvek F chemical-resistant suits with hoods will be disposed of while processing through the PDS and will not be reused.

5.2.2.2 During intrusive operations, in the event that a worker comes into contact with an object that may result in a tear or abrasion of the Tyvek F material, the worker's buddy will inspect the suit. If there is a tear in the material, if the gray outer coating of the material is abraded away, or if there is any apparent damage to the suit, the affected worker will leave the Exclusion Zone (EZ) and process through the PDS.

5.2.3 Level D PPE

5.2.3.1 Level D PPE is the minimum level of PPE that will be worn by field personnel at the SVFUDS. Level D PPE will not be allowed in areas of the site where atmospheric hazards are known or expected to exist. Level D PPE will also be worn only if the activity in which personnel are engaged does not have the potential for splash, immersion, or any other contact with hazardous substances.

5.2.3.2 Level D PPE will be worn during the site activities as specified in Table D1.5.1 and, at minimum, includes the following:

- Work clothes (i.e., long pants and shirt) or cotton coveralls. Tyvek coveralls may also be worn if handling heavy metal-contaminated soil.
- Leather work boots with safety toe (disposable over boots may also be worn if deemed necessary).
- Safety glasses with side shields or goggles when eye hazards exist.
- Hard hat when working around heavy equipment or when overhead hazard exists.
- Hearing protection when high noise levels are present.
- Leather or canvas work gloves when a scrape or cut hazard exists.
- High visibility vest when working on or adjacent to public roads.
- Chaps and face shield when using chainsaws or other brush-clearing equipment.

5.2.3.3 Unless otherwise specified in the SSWP, Level D PPE is sufficient for all mobilization, site preparation, and demobilization activities at the SVFUDS, and for all field activities carried out at low probability sites at the SVFUDS.

5.2.4 Modified Level D PPE

5.2.4.1 Modified Level D PPE affords protection from casual contact with contaminated soils and materials, but will not be worn when there is a potential for airborne exposure to hazardous substances.

5.2.4.2 Modified Level D PPE will be worn during the site activities as specified in Table D1.5.1 and, at minimum, includes the following:

- Work clothes (i.e., long pants and shirt) or cotton coveralls. Tyvek coveralls may also be worn if handling heavy metal-contaminated soil.
- Approved respirator, civilian National Institute for Occupational Safety and Health (NIOSH)-approved for CBRN agents, or M40 mask – slung, or NIOSH-approved 10-minute escape respirator.
- Leather work boots with safety toe (disposable over boots may also be worn if deemed necessary).
- Safety glasses with side shields or goggles when eye hazards exist.
- Hard hat when working around heavy equipment or when overhead hazard exists.
- Hearing protection when high noise levels are present.

- Nitrile gloves for soil handling, leather or canvas work gloves when a scrape or cut hazard exists.
- High visibility vest when working on or adjacent to public roads.
- Chaps and face shield when using chainsaws or other brush-clearing equipment.

5.2.5 Level C PPE

5.2.5.1 Level C PPE affords protection from casual contact with contaminated soils and materials, but should be worn whenever there is a potential for airborne exposure to hazardous substances.

5.2.5.2 Level C PPE will be worn during the site activities as specified in Table D1.5.1 and, at minimum, includes the following:

- Tyvek F coveralls with hood.
- Approved respirator, civilian NIOSH-approved for CBRN agents, or M40 mask.
- Chemical-resistant, butyl-rubber safety boot covers.
- Inner surgical gloves.
- Outer chemical-resistant, butyl-rubber gloves.
- Hard hat when working around heavy equipment or when overhead hazard exists.
- Hearing protection when high noise levels are present.
- Chemical Protective Undergarments (CPUs), in a mustard agent environment.

5.2.6 Level B PPE

5.2.6.1 Level B PPE offers superior protection against the inhalation of airborne contaminants because it includes supplied air or self-contained breathing apparatus (SCBA) respirators. However, the type of protective suit used with this level of protection is not air tight and skin exposure to hazardous vapors is still possible. Therefore, this level of protection is not acceptable for use when chemical agent presents a serious safety or health threat via dermal contact (i.e., there is the potential for liquid or vapor contact to the skin). However, Level B PPE can be worn under conditions where: 1) the chemical agent and other chemical hazards of concern are not acutely skin-toxic; 2) there is no potential for liquid contact, and vapor levels are being monitored when working with acutely skin-toxic materials; and 3) it is needed to protect site workers from non- chemical agent hazardous wastes.

5.2.6.2 Level B PPE will be worn during the site activities as specified in Table D1.5.1 and, at minimum, includes the following:

- Tyvek F coveralls with hood.

- NIOSH-approved supplied air respirator (SAR)/SCBA.
- Chemical-resistant butyl-rubber safety boots.
- Chemical-resistant rubber boot covers.
- Inner surgical gloves.
- Outer chemical-resistant, butyl-rubber gloves.
- Hard hat when working around heavy equipment or when overhead hazard exists.
- Hearing protection when high noise levels are present.
- CPUs, in a mustard agent environment.

5.2.7 Level A PPE

5.2.7.1 Level A PPE provides the highest available level of protection against both inhalation and skin contact hazardous exposures. The Level A suit is fully encapsulating but, unlike the Level B encapsulating suit, the Level A suit is airtight and must be tested to ensure that hazardous gases and vapors cannot leak into the suit. Because Level A PPE is typically worn in areas where highly toxic and corrosive materials are known to exist, the Level A suit is constructed of materials capable of resisting degradation and permeation by chemical agents or other hazardous substances of concern. To ensure that the Level A suit to be used on site will resist chemical agents and provide adequate protection, Level A suits proposed for site activities have been approved by the Chemical Agent Safety and Health Policy Action Committee (CASHPAC).

5.2.7.2 Because Level A PPE affords the greatest level of protection to dermal hazards, it will be worn in all instances where potential for contact with liquid chemical agent exists, or when the nature and degree of potential exposure are unknown.

5.2.7.3 Level A PPE will be worn during the site activities as specified in Table D1.5.1 and, at minimum, includes the following:

- NIOSH-approved SAR/ SCBA.
- CASHPAC-approved Level A suit.
- Inner surgical gloves.
- Outer butyl-rubber gloves.
- Chemical-resistant butyl-rubber safety boots.
- Chemical-resistant rubber boot covers.
- Two-way radios (worn inside encapsulating suit), each team member.
- Hard hat when working around heavy equipment or when overhead hazard exists.

- Hearing protection when high noise levels are present.
- CPUs, in a mustard agent environment.

5.2.8 PPE Selection Criteria

5.2.8.1 In addition to the task-specific levels of PPE described in Table D1.5.1, the level of PPE will be selected according to the criteria shown in Table D1.5.2:

5.3 RESPIRATORY PROTECTION REQUIREMENTS

5.3.0.1 The respiratory protection requirements included in this section have been designed to comply with applicable Army regulations and the OSHA and USACE regulations found in 29 CFR 1910.134 and EM 385-1-1.

5.3.1 Respirator Selection

5.3.1.1 The PSHM used available site archival and characterization data, and information related to the physical and toxic properties of site contaminants, to select the respiratory protective equipment for each task. Respirators have been assigned for all tasks where there is a potential for employee exposures in excess of the action levels listed in Table D1.5.2.

5.3.1.2 Except for the M-40 respirator worn by military and DOD civilian workers, only NIOSH-approved respirators, cartridges, supplied air systems or SCBAs, or approved combinations of these, will be used on site. At no time will respirators or their components be altered or combined in a manner that is not NIOSH-approved because this may void the NIOSH respirator approval and significantly affect the performance of the respirator.

5.3.2 Respirator Selection Criteria

5.3.2.1 The selection of the proper type of respiratory protection has been and will continue to be based upon the following:

- The type of contaminant(s) expected or known to present a potential for exposure.
- The physical properties, toxicological effects, anticipated exposure concentrations and established exposure limits, and IDLH information for the contaminant.
- The warning properties and initial signs and symptoms of exposure.
- The nature of the operation where exposure may occur.
- The location of the work area in relation to the nearest area having respirable air.
- The period of time for which respiratory protection is needed.
- The characteristics and limitations of the respirator, and/or cartridge.

Table D1.5.2
PPE Ensemble Selection Criteria

Level of Protection	Criteria for Use[1]
Level D	Initial level of protection for work at all low probability sites and all non-intrusive activities outside the EZ at higher probability sites.
Modified Level D	Use Modified Level D for non-intrusive work inside the EZ at higher probability sites unless the upgrade criteria for Level C or B are encountered.
Level C	PPE level for all intrusive operations and other work within the EZ at higher probability sites if: • Air monitoring detects VOCs equal to or above 10ppm but less than 500ppm, or • Suspected RCWM has been encountered, • Air monitoring detects any potential chemical agent; and • Detected compounds are below 1 x STEL for H and L, and CK, if they apply; and • Below 1 x PEL for SA, CG, or PS, if they apply; and • No chemical agent splash hazard exists.
Level B	Upgrade to Level B for personnel working within the EZ at higher probability sites if: • Air monitoring detects VOCs equal to or above 500ppm, or • Suspected RCWM has been encountered; • SA, CG, or PS are detected or indicated equal to or above 1 x PEL; or • Air monitoring indicates detection equal to or above 1 x STEL for H and L, and CK, and • No chemical agent splash hazard exists.
Level A	Upgrade to Level A for personnel performing excavation at higher probability sites when: • Liquids containing chemical agent are in the excavation and there is a splash hazard; or • Air monitoring indicates detection of potential chemical agent equal to or above 10 x STEL[2].

Note 1: Criteria consist of airborne concentrations exceeding the protective factor of the PPE, exceeds the IDLH, or a chemical not effectively removed by the APR is encountered (see Table D1.2.1a and Table D1.8.1).

Note 2: The MINICAMS are not calibrated or certified at these levels.

- The protection factor (PF) and maximum use concentration (MUC) for a given face piece or respirator system.

5.3.3 Special Considerations for Respirator Selection

5.3.3.1 The following special conditions will be considered when selecting the specific type of respiratory equipment to be used for a given task:

- **Verbal Communications.** Talking while wearing a respirator is often difficult and may adversely affect the seal of the face piece. However, clear verbal transmission is often essential while wearing a respirator. For such tasks, radio headsets or throat microphone devices will be used wherever practical.
- **Low-Temperature Environment.** Working in cold temperatures may cause fogging of the respirator lens, leading to a serious visibility and safety problem. Respirators equipped with "nose cups" will normally correct the problem by channeling exhaled air through the exhalation valve without contacting the lens.
- **High-Temperature Environment.** Wearing a respirator in a hot environment creates additional stress on the worker wearing it. Using a respirator that is lightweight and has low breathing resistance, and has a wide lens for good visibility can minimize worker stress.

5.3.4 Task-Specific Respiratory Assignment

5.3.4.1 The SSHO will inform the Excavation Team Leader if site monitoring data indicate the need to upgrade or downgrade the level of respiratory protection for a specific task. Any modifications to the levels of respiratory protection specified in this section will be made in writing, approved by the DA Safety, and issued as an amendment to this SSHP.

5.3.4.2 *SCBA with Level B PPE*: A SCBA, operated in the pressure-demand mode with a full face piece will be worn for conducting tasks where Level B PPE is required, on the conditions that (a) no potential exists for contact with liquid chemical agent and (b) direct reading monitoring is being conducted to determine the vapor concentrations to the IDLH/Airborne Exposure Limit (AEL).

5.3.4.3 *SCBA with Level A PPE*: Level A PPE is designed and selected to provide maximum respiratory and skin protection from exposure to highly toxic materials. Level A PPE with SCBA is also worn for tasks where the nature, degree and duration of exposure is unknown and has yet to be assessed. Therefore, Level A PPE with SCBA has been selected for tasks where it is known that a potential exists for exposure to chemical agent via inhalation or liquid contact. The tasks for which Level A PPE is required are listed in Table D1.5.1.

5.3.4.4 *Supplied Air Systems*: to maximize the amount of time that may be spent inside the EZ, and if other conditions are favorable to its use, a SAR system will be used on site. The SAR

system is NIOSH-approved and will only be used in approved configurations. The SSHO will be responsible for ensuring that the air supply initiates in an area of the site that is free of potential contaminants and is properly maintained. The cascade supply system will supply a minimum of 6 cubic feet of air per minute per worker of certifiable Grade D breathing air. Prior to using the SAR system, and as specified by the system manufacturer, certification of the air will be conducted to ensure it is safe for human use.

5.3.4.5 SCBAs and SARs may be linked to allow the SAR to be the primary air source, while using the SCBA for backup and support. In this case, all connectors and hoses will be inspected and approved for use in the linked configuration. All SARs used in potential IDLH atmospheres will have, as a minimum, a 30-minute escape SCBA connected in line on the person, to be used if the primary source of air fails for any reason.

5.3.4.6 A protective mask or a full-face respirator with high efficiency particulate air (HEPA)/ORGANIC filter will be used with Level C PPE.

5.3.5 Emergency Escape Breathing Apparatus

5.3.5.1 Personnel in Modified Level D PPE will carry on their person (slung) an M-40 protective mask or NIOSH-approved civilian equivalent for CBRN agents (see PPE matrices) or NIOSH-approved escape breathing apparatus.

5.3.6 Respirator Training

5.3.6.1 Training in the use of respiratory protective equipment will be conducted by a competent person. Each individual required to use Level C, Level B, and Level A respiratory protection devices or assigned to the Emergency Response Team will be trained in the use of the required respiratory protection devices and complete the U.S. Army 22nd Chemical Battalion (Technical Escort), hereafter referred to as TE, Respirator Training Form.

5.3.6.2 The respiratory training will be conducted in accordance with the provisions outlined in the TE Respiratory Protection Program. Initially, and every 30 days thereafter, personnel designated to use SCBAs will demonstrate proficiency in donning the SCBA to the TE Supervisor or SSHO. All personnel assigned 30-minute escape SCBAs will be trained in its use by the SSHO prior to entrance into the Contamination Reduction Zone (CRZ).

5.3.7 Respirator Fit-Testing

5.3.7.1 Each member of the field team who is required to use a respirator will be respirator fit-tested at least annually. Negative pressure, air-purifying respirators will be qualitatively fit-tested, using irritant smoke or isoamyl acetate, or quantitatively fit-tested by a competent person prior to on site use. Quantitative fit-testing will be performed on all positive-pressure respirators. Qualitative fit testing will be conducted in accordance with the qualitative fit-testing requirements in 29 CFR 1910.134. Quantitative fit testing will be performed in accordance with

the TE Respiratory Protection Program for military and DoD civilians and 29 CFR 1910.134 for all others.

5.3.7.2 Upon donning the respiratory device or before entering any restricted work area, each respirator wearer will be required to perform a negative- and a positive-pressure test to ensure an airtight seal.

5.3.7.3 Each member of the field team who must wear a respirator will be required to be clean-shaven in the sealing areas of the respirator face piece.

5.4 PPE INSPECTION, MAINTENANCE, CLEANING, AND STORAGE

5.4.1 PPE Inspection

5.4.1.1 All PPE will be inspected prior to use to ensure that it is functional and that its structural integrity has not been compromised. Re-usable PPE (such as safety glasses and hard hats) will also be inspected after each use, prior to storage, and prior to maintenance.

5.4.1.2 If site personnel find that a piece of PPE is defective, it will be reported to the SSHO and the defective article will be repaired or replaced. The procedures listed below will be used during equipment inspection:

- Confirm that the clothing material is correct for the specified task to be performed.
- Visually inspect for imperfect seams, non-uniform coatings, tears, or malfunctioning closures.
- Pressurize gloves and check for pinholes.
- Flex product and check for cracks or other signs of deterioration.
- If previously used, check for signs of chemical attack, such as discoloration, swelling or stiffness.
- Check hardhat for cracks or other evidence of weakness, and check safety glasses for excess lens scratching or cracks.
- During the task, periodically inspect for evidence of chemical attack, closure failure, tears, punctures, and open seams.

5.4.1.3 Any PPE stored and designated as emergency rescue equipment will be inspected at least monthly to ensure that it has not been adversely affected by prolonged storage. Any equipment found to be defective will be replaced immediately. This inspection will be recorded in the appropriate log.

5.4.2 PPE Maintenance, Cleaning, and Storage

5.4.2.1 Maintenance of PPE will be conducted in accordance with the manufacturer's instructions and only be performed by personnel who have received proper instruction in the maintenance of the PPE. Replacement parts will be provided by the manufacturer and at no time will pieces from different brands of PPE be used to "fix" a defective piece of PPE.

5.4.2.2 PPE used inside the EZ will be cleaned in accordance with the site decontamination plan. This cleaning will involve the use of one or more decontamination solutions and a fresh water rinse.

5.4.2.3 All re-usable PPE will be dried, or hung to dry, and stored in a clean environment, free from exposure to chemicals, dust, moisture, sunlight or extreme temperatures. Storage of PPE will include storing in such a way that the natural shape of the PPE is not compromised.

5.5 RESPIRATOR INSPECTION, MAINTENANCE, CLEANING, AND STORAGE

5.5.1 General Requirements

5.5.1.1 All respirators will be inspected prior to use to ensure that they are functional and that their structural integrity has not been compromised. Parts of a respirator that require inspection include the valves, valve covers, nosepiece, straps, eyepiece (for full-face respirators), the face piece and its snaps, cylinders, and canisters.

5.5.1.2 The individual responsible for the cleaning, inspection, maintenance, sanitization, and storage of respirators will be trained by a person competent in the proper methods and procedures. Respirator maintenance, storage, and cleaning will be performed in the decontamination trailer clean room/change room.

5.5.1.3 Each respirator user will store his respirator in a clean and sanitary, sealed plastic bag when not in use, unless the respirator has become contaminated or defective. If a respirator becomes chemically contaminated or malfunctions, it will be replaced with a clean and sanitized respirator and the contaminated/defective respirator will be decontaminated and/or repaired as necessary before reuse. The respirator wearer will then inspect the replacement respirator for proper function and cleanliness.

5.5.2 Escape SCBAs

5.5.2.1 The escape SCBAs will be stored, maintained, and inspected prior to use in the same manner as any other respiratory protective device to ensure its cleanliness and proper working condition. In the event that the mask is used, even if only briefly, it will not be reused until it has been properly decontaminated, sanitized, the air tank refilled, and the unit inspected.

5.5.3 Emergency Respiratory Equipment

5.5.3.1 Any SCBAs designated for emergency response will be inspected at least monthly. This inspection will be documented and will include:

- A determination that the regulator and working devices are functional.
- A check of the air cylinder to ensure that it is fully charged in accordance with the manufacturer's instructions.
- An inspection of all other parts, as specified in Paragraph 5.5.1.1.

CHAPTER 6
MEDICAL SURVEILLANCE

6.0.0.1 Personnel engaged in hazardous waste operations will be enrolled in a medical monitoring program as required by 29 CFR 1910.120(f), 29 CFR 1910.134, and DA Pam 40-173. A letter (signed by a physician) attesting to each individual's fitness for duty will be provided to the SSHO prior to beginning work and will be filed on site.

CHAPTER 7
MEDICAL SUPPORT

7.1 INTRODUCTION

7.1.0.1 The medical support requirements necessary during activities at the SVFUDS depend upon whether operations are being conducted at a low probability site or a higher probability site. The following sections describe the details of these requirements.

7.1.0.2 The primary hospitals for activities at the SVFUDS are Sibley Hospital (illness/injury) and George Washington Hospital (traumatic). All personnel with suspected chemical agent injuries will be transported to George Washington Hospital. CENAB has a Memorandum of Agreement with George Washington Hospital for the facility to treat personnel with chemical agent injuries, as the hospital has physicians specially trained to handle these types of injuries. A map showing the transportation route to these hospitals will be included in the SSWP.

7.2 MEDICAL SUPPORT AT LOW PROBABILITY SITES

7.2.0.1 During investigations at low probability sites, at least two personnel trained in First Aid and CPR will be on site at all times. In the event of a medical emergency, team members will render first aid, while additional medical assistance will be requested by calling 911.

7.3 MEDICAL SUPPORT AT HIGHER PROBABILITY SITES

7.3.0.1 An ambulance staffed with at least two paramedics or emergency medical technicians (EMTs) will be on site at all times while intrusive activities are being conducted at higher probability sites. The ambulance personnel will be trained and current in certification for chemical warfare casualty care.

7.3.0.2 During non-intrusive operations at higher probability sites (e.g., site preparation activities), medical support requirements will be the same as those for investigations at low probability sites (Section 7.2).

CHAPTER 8
EXPOSURE AIR MONITORING AND AIR SAMPLING PROGRAM

8.1 INTRODUCTION

8.1.0.1 The air monitoring methods employed during activities at the SVFUDS depend upon whether intrusive operations are being conducted at a low probability site or a higher probability site. The following sections describe the details of these requirements and procedures. The specific air monitoring and sampling requirements for a site will be described in the SSWP.

8.2 AIR MONITORING AT LOW PROBABILITY SITES

8.2.1 General

8.2.1.1 Air monitoring for dust and arsenic will be conducted during excavation operations taking place in contaminated soil. The purpose of this air monitoring is threefold:

- To determine the airborne concentrations of contaminants being released from on going site activities and to evaluate the need for additional engineering controls during excavations.
- To determine the airborne concentrations of contaminants to which personnel working on the site would be exposed without PPE or other control measures, and to evaluate the adequacy of PPE or other control measures used by site workers.
- To determine the airborne contaminant concentrations leaving the site during intrusive activities and to evaluate/document potential public exposures.

8.2.1.2 Headspace analysis for mustard and lewisite may be required if the Low Probability Contingency Plan is initiated (Section 16.13).

8.2.1.3 Monitoring for volatile organic compounds (VOCs) will be conducted using a photoionization detector (PID) during intrusive operations at all low probability sites.

8.2.2 Air Monitoring Methods for Low Probability Sites

8.2.2.1 Dust and Arsenic

8.2.2.1.1 When excavation activities are being conducted in known arsenic-contaminated soil, at least one direct reading particulate monitor will be placed downwind of the operation. The monitor alarm will be set for a dust concentration of 3mg/m³. Alternatively, the monitor will be

read periodically (approximately every 30 minutes) and the results will be logged. Any reading greater than 3mg/m³ will be reported to the SSHO. This concentration limit will protect workers and the public to below the arsenic TLV® of 0.01mg/m³ for soils containing up to 3,300 mg/kg arsenic.

8.2.2.1.2 Additionally, when excavation activities are being conducted in known arsenic-contaminated soil, total dust will be collected at the construction fence boundary for confirmation sampling. Samples will be collected on pre-weighed 37mm, 5µm pore size, tared PVC filters or matched weight 0.8µm pore size mixed cellulose ester filters at a flow rate of 2.0 liters per minute. During excavation in arsenic-contaminated soil, a minimum of one sample will be collected every day. Samples will be sent to an American Industrial Hygiene Association (AIHA)-accredited lab to be analyzed for total dust and arsenic. Samples will be analyzed in accordance with NIOSH 7300 for arsenic and in accordance with NIOSH 0500 for total particulates.

8.2.2.2 Headspace Analysis

8.2.2.2.1 If required, headspace analysis for mustard and lewisite will be performed by the Air Monitoring Team in accordance with their SOPs.

8.2.2.3 Volatile Organic Compounds

8.2.2.3.1 During all excavation activities at low probability sites, a PID will be used to monitor for VOCs in the breathing zone. If a level of 10 ppm or higher is detected for a duration greater than 10 seconds, all personnel will cease operations and relocate temporarily to a location upwind of the excavation.

8.2.2.3.2 Personnel will wait for a period of 5 minutes to allow potential vapors to dissipate and will then return to the excavation from an upwind direction to take another PID reading in the breathing zone. If readings have subsided to a level below 10 ppm, personnel may continue operations at that location, but will continue to monitor with the PID in accordance with this plan.

8.2.2.3.3 However, if readings are sustained at or above the 10 ppm action level following this 5 minute period, personnel will cease intrusive activities at that location and cover the excavation with plastic sheeting to prevent/reduce further escape of vapors into the atmosphere. Additionally, the excavation location will be secured with tape, cones, etc. to ensure limited access. If approved by the USACE Project Delivery Team (PDT), an air sample will be collected using Summa canisters, which will then be analyzed for VOCs.

8.2.2.3.4 The team will relocate to an area upwind of the excavation if the decision is made to continue work, and an appropriate level of PPE will be determined before work is resumed at the location of concern.

8.3 AIR MONITORING AT HIGHER PROBABILITY SITES

8.3.1 General

8.3.1.1 Air monitoring will be conducted by the Air Monitoring Team during intrusive excavations at higher probability sites. The air monitoring matrix for chemicals of concern is summarized in Table D1.8.1. Specific details concerning analytical methods are presented in the Air Monitoring Team SOPs maintained with the analytical equipment. The purpose of air monitoring is threefold:

- To determine the airborne concentrations of contaminants to which personnel working on the site would be exposed without PPE or other control measures, and to evaluate the adequacy of PPE or other control measures used by site workers.
- To determine the airborne concentrations of contaminants being released from on-going site activities and to evaluate the need for additional engineering controls during intrusive trenching or excavation.
- To determine the airborne concentrations of contaminants leaving the site during intrusive activities and to evaluate/document potential public exposures.

8.3.2 Air Monitoring Methods for Higher Probability Sites

8.3.2.1 Miniature Continuous Air Monitoring System

8.3.2.1.1 During intrusive investigation activities, the Air Monitoring Team will continuously monitor the EZ for the presence of mustard and lewisite in near real-time (approximately 10 minutes from probe inlet to analytical results) using the Miniature Continuous Air Monitoring System (MINICAMS), a capillary column gas chromatograph that uses either a halogen-specific detector or flame photometric detector to identify mustard, lewisite, phosgene, chloropicrin, and cyanogen chloride. The required responses to MINICAMS alarms are described in Section 8.3.4 of this SSHP.

8.3.2.2 Depot Area Air Monitoring System

8.3.2.2.1 Area air monitoring and Worker Population Limit (WPL) monitoring will also be performed for mustard and lewisite using Depot Area Air Monitoring System (DAAMS) tubes. The DAAMS samples will be used to confirm the results of the near real-time monitors and to document conditions over time. The DAAMS tubes will be collected with battery sampling pumps and analyzed by the Air Monitoring Team in accordance with the Air Monitoring Plan in Appendix J. Area air monitoring will not be required when an Engineering Control Structure (ECS) is being used, though WPL monitoring and MINICAMS confirmation will still be performed using DAAMS tubes.

Table D1.8.1
Air Monitoring Matrix for Intrusive Operations at Higher Probability Sites

	MINICAMS (Near Real-Time)	DAAMS (General Area & WPL)	DAAMS (Confirmation)	Electrochemical Detector (Real-Time)	PID (Real-Time)	Summa Canister (Confirmation)	Dust Monitor (Real-time)
Locations	- Intrusive Site (CAFS) - Medical Monitoring Tent - Soil Headspace - IHF Location	- Inside ECS (for WPL monitoring) - Around perimeter (if no ECS)	- Intrusive Site (CAFS, as reqd. for confirmation)	- Intrusive Site - CAFS Exhaust (if using ECS)	- Intrusive Site (inside ECS, or within the EZ in area of excavation if no ECS)	- Intrusive Site (if reqd.)	- Vicinity of excavation (if known arsenic contamination and no ECS)
Sampling Frequency	Continuous On Site [/2] (during intrusive ops)	Up to 8 hours	Up to 12 hours	Continuous	Continuous	When reqd. after PID detect in EZ	Continuous operation (approx. every 30 mins)
Analysis Time	Approx. 10 minutes	30 to 60 minutes	30 to 60 minutes	Immediate	Immediate	24-48 hours	Immediate
No. of People Required	2 MINICAMS operators	1 GC operator & Sample Technician	1 GC operator & Sample Technician	1 person per instrument	1 person per instrument	1 sampler (& laboratory)	1 Operator
Target Compound(s)	Mustard (H) Lewisite (L) Phosgene (CG) Cyanogen Chloride (CK) Chloropicrin (PS)	Mustard (H) Lewisite (L)	Mustard (H) Lewisite (L)	Arsine (SA)	VOCs	VOCs	Dust
Lowest Level of Detection	H: 0.00075 mg/m^3 L: 0.00075 mg/m^3 CG: 0.1 mg/m^3 CK: 0.15 mg/m^3 PS: 0.175 mg/m^3	H[/1]: 0.00008 mg/m^3 L[/1]: 0.00008 mg/m^3	H[/1]: 0.00008 mg/m^3 L[/1]: 0.00008 mg/m^3	20 ppb	1 ppm	n/a	0.01 mg/m^3
USAESCH Safety Specialist Notification (Alarm) Level	H: 0.0012 mg/m^3 L: 0.0012 mg/m^3 CG: 0.28 mg/m^3 CK: 0.42 mg/m^3 PS: 0.49 mg/m^3	H: Any Confirmed Detection L: Any Confirmed Detection	H: Any Confirmed Detection L: Any Confirmed Detection	50 ppb for 10 secs	10 ppm for 60 secs	n/a	3 mg/m^3

Note 1: Detection limit for the DAAMS tubes assumes a 24-liter sample is collected.

Note 2: The MINICAMS collects continuous samples. Soil headspace and IHF samples will be collected when required.

8.3.2.3 Electrochemical Detector

8.3.2.3.1 During intrusive investigation activities, the Excavation Team will continuously monitor the excavation for the presence of arsine using an electrochemical detector. When excavation activities are being conducted inside an ECS, a second electrochemical detector will be installed at the CAFS exhaust. The required responses to electrochemical detector alarms are described in Section 8.3.5 of this SSHP.

8.3.2.4 Photoionization Detector

8.3.2.4.1 When excavation activities are being conducted outside an ECS, the Excavation Team will use a calibrated PID to continuously monitor the excavation for VOCs. The PID will be read periodically and the results logged. If the Excavation Team detects a level of 10 ppm above background for a sustained, 60-second period in the vicinity of the excavation, they will inform the SSHO.

8.3.2.4.2 The SSHO will determine whether work should cease until the source of the elevated reading has been determined. If work is stopped, the immediate area of the suspected source will be mitigated.

8.3.2.4.3 Also, if deemed necessary by the SSHO, a Summa canister sample will be collected at the suspected source of the VOCs. In this case, the Summa canister will be analyzed for the Compendium Method Toxic Organics 15 (TO-15) list of VOCs by an AIHA-accredited lab.

8.3.2.5 Dust and Arsenic

8.3.2.5.1 When excavation activities are being conducted outside an ECS and in known arsenic-contaminated soil, at least one direct reading particulate monitor will be placed downwind of the operation outside the EZ. The monitor alarm will be set for a dust concentration of 3mg/m³. Alternatively, the monitor will be read periodically (approximately every 30 minutes) and the results will be logged. Any reading greater than 3mg/m³ will be reported to the SSHO. This concentration limit will protect workers and the public to below the arsenic TLV® of 0.01mg/m³ for soils containing up to 3,300 mg/kg arsenic.

8.3.2.5.2 Additionally, when excavation activities are being conducted in known arsenic-contaminated soil, total dust will be collected at the construction fence boundary for confirmation sampling. Samples will be collected on pre-weighed 37mm, 5µm pore size, tared PVC filters or matched weight 0.8µm pore size mixed cellulose ester filters at a flow rate of 2.0 liters per minute. During excavation in arsenic-contaminated soil, a minimum of one sample will be collected every day. Samples will be sent to an AIHA-accredited lab to be analyzed for total dust and arsenic. Samples will be analyzed in accordance with NIOSH 7300 for arsenic and in accordance with NIOSH 0500 for total particulates.

8.3.2.6 Combustible Gas Indicator

8.3.2.6.1 When the excavation meets the criteria for a permit-required confined space, or discolored soil is uncovered, the excavation will be continually monitored with a pre-positioned, pre-calibrated combustible gas indicator (CGI) for the presence of potentially explosive atmospheres as a precaution against uncovering a flammable hazardous material.

8.3.2.7 Colorimetric Tubes

8.3.2.7.1 Colorimetric tubes will be used to confirm detections of arsine at the intrusive site. Colorimetric tubes may also be used to confirm MINICAMS detections of Phosgene (CG), Cyanogen Chloride (CK), and Chloropicrin (PS).

8.3.3 Air Monitoring Locations for Higher Probability Sites

8.3.3.1 Air monitoring for chemical agent will be performed within the EZ and at the perimeter of the site. Specific air monitoring locations will be identified and presented on one or more figures included in the SSWP for each site. The general locations are described below.

8.3.3.2 Within EZ (using engineering controls)

8.3.3.2.1 The Air Monitoring Team will perform near-real-time monitoring using MINICAMS at several locations in the Chemical Agent Filtration System (CAFS) to detect mustard and lewisite occurring within the ECS. Typically, these locations will be as follows:

- Before the HEPA filter. This will be the first indication of agent vapors entering the filter bed.
- Between the two charcoal filter beds (if dual bed filtration unit). This will indicate agent breakthrough of the first charcoal filter bed. If agents are detected at this location, public safety protocols will be implemented.
- In the filter exhaust. This will be indicative of chemical agent release to the atmosphere. If agents are detected at this location, public safety protocols will be implemented.

8.3.3.2.2 In addition to near-real-time monitoring during intrusive activities, the MINICAMS units monitoring an ECS will be used to ensure that the environment within the ECS does not exceed the WPL for the chemical agents of concern (STEL-C for mustard and lewisite, and cyanogen chloride) before any personnel enter the ECS in Level D PPE to perform routine, non-intrusive maintenance activities (Section 8.3.5).

8.3.3.2.3 DAAMS tubes will continuously sample the air exhausting from the air filtration system stack. These samples will be analyzed daily regardless of other alarms.

8.3.3.2.4 DAAMS tubes will also be used within the ECS for area background monitoring to the WPL. In conjunction with WPL monitoring, the SSHO, or designate, will maintain

administrative controls to record the amount of time that workers are present in the ECS in Level D PPE (e.g., workers performing routine, non-intrusive maintenance tasks).

8.3.3.2.5 If applicable for the site, the Excavation Team will continuously monitor the excavation for the presence of arsine using an electrochemical detector. If applicable for the site, when excavation activities are being conducted inside an ECS, a second electrochemical detector will be installed at the CAFS exhaust.

8.3.3.2.6 When the excavation meets the criteria for a permit-required confined space, or discolored soil is uncovered without a ringoff, the excavation will be continually monitored with a CGI. The inlet tube for the CGI will be lowered into the excavation and the meter monitored by the Excavation Team attendant.

8.3.3.3 Within EZ (without engineering controls, under evacuation)

8.3.3.3.1 The Air Monitoring Team will perform near-real-time monitoring for mustard and lewisite in close proximity to the excavation and downwind from the excavation.

8.3.3.3.2 If applicable for the site, the Excavation Team will continuously monitor the excavation for the presence of arsine using an electrochemical detector.

8.3.3.3.3 The Excavation Team will use a PID to continuously monitor for VOCs at the excavation.

8.3.3.3.4 When the excavation meets the criteria for a permit-required confined space, or discolored soil is uncovered without a ringoff, the excavation will be continually monitored with a CGI. The inlet tube for the CGI will be lowered into the excavation and the meter monitored by the Excavation Team attendant.

8.3.3.4 Within CRZ (decontamination tent)

8.3.3.5 A MINICAMS will be used for chemical casualty monitoring in the medical monitoring tent, if needed (Section 13.4.3).

8.3.3.6 Site Perimeter

8.3.3.6.1 When excavation activities are being conducted without an ECS, DAAMS tubes will be collected at a minimum of four locations at the CRZ site boundaries and analyzed for mustard and lewisite continuously during intrusive investigation activities.

8.3.3.6.2 When excavation activities are being conducted outside an ECS and in known arsenic-contaminated soil, dust monitoring will be performed at the perimeter of the site.

8.3.4 MINICAMS Alarms/Ringoffs

8.3.4.1 Definitions

8.3.4.1.1 For the purposes of this plan, the following definitions are used:

- An "alarm" is any MINICAMS reading above the alarm set point.
- A "ringoff" is three consecutive alarms at a single MINICAMS monitoring position.
- A "confirmed ring-off" is one or more alarms that have been confirmed by DAAMS tube analysis.

8.3.4.2 Immediate Actions

8.3.4.2.1 If an alarm has occurred with no apparent suspect container present and the excavation team is in the proper level of PPE, they will take immediate action to investigate and mitigate the source, as necessary. If they are not in the appropriate level of PPE, the excavation team will exit the EZ, upgrade PPE depending upon the alarm level, and then reenter the EZ and work towards investigating and mitigating the source as necessary. Mitigation will include activities such as removing the contamination and placing it in a Multiple Round Container (MRC) or plastic drum and/or covering the contamination with plastic sheeting and/or soil. If a ringoff/alarm is not confirmed per Section 8.3.4.3, personnel may re-enter the EZ in the same level of PPE.

8.3.4.3 Alarm/Ringoff Confirmation

8.3.4.3.1 The MINICAMS is a very sensitive instrument and will respond to positive interferences. Consequently, the MINICAMS may produce false alarms. The MINICAMS is set to alarm at 0.0012 mg/m³ for mustard and lewisite, 0.3 mg/m³ for phosgene, and 0.5 mg/m³ for cyanogen chloride and chloropicrin.

8.3.4.3.2 Following an alarm, the standard procedure is to cycle the MINICAMS two additional times. Each of these cycles takes approximately 10 minutes. Three consecutive alarms will be considered to be an indication of agent detection (a "ringoff"). Confirmation of this detection is accomplished using DAAMS tubes, which are sorbent tubes that are analyzed by the Air Monitoring Team in accordance with their SOPs. DAAMS tubes can be collected for analysis whenever deemed appropriate by the USAESCH Safety Specialist, CENAB Site Operations Officer, Site Manager, SSHO, or the Air Monitoring Team. One or more MINICAMS alarms that have been confirmed by DAAMS tube analysis are termed a "confirmed ringoff."

8.3.4.4 Alarm/Ringoff Notification

8.3.4.5 Actions will be taken and notifications will be made in response to alarms and ring-offs as shown in Tables D1.8.2a and D1.8.2b. The USAESCH Safety Specialist and CENAB Site Operations Officer will be responsible for implementing agency and public notification, as necessary.

8.3.4.6 If chemical agent is detected in the air the USAESCH Safety Specialist, the CENAB Site Operations Officer, and the PSHM will be notified immediately. Section 16 contains additional information on communication, notification, and other required actions associated with the detection of airborne chemical agent.

8.3.5 Electrochemical Detector Alarms

8.3.5.1 Definitions

8.3.5.1.1 For the purposes of this plan, the following definitions are used:

- An "alarm" is any electrochemical detector reading above 50 ppb for a sustained period of 10 seconds.
- A "confirmed detection" is an alarm that has been confirmed by collection of a colorimetric tube sample.

8.3.5.2 Immediate Actions

8.3.5.2.1 If an alarm has occurred and the excavation team is in the proper level of PPE, they will take immediate action to investigate and mitigate the source, if possible. If they are not in the appropriate level of PPE, the excavation team will exit the EZ, upgrade PPE as necessary, and then reenter the EZ and work towards investigating and mitigating the source if possible. If an alarm is not subsequently confirmed per Section 8.3.5.3, personnel may re-enter the EZ in the same level of PPE.

8.3.5.3 Alarm Confirmation and Subsequent Actions

8.3.5.3.1 Following an alarm, if or when the Excavation Team is in the proper level of PPE, a member of the Excavation Team will collect an arsine 0.05/a Draeger colorimetric tube to confirm the alarm. If the colorimetric tube indicates the presence of arsine, the detection will be deemed to have been confirmed.

8.3.5.3.2 If activities are taking place within an ECS, following a "confirmed detection" of arsine, the SSHO (or designated representative) will begin to monitor for arsine at the CAFS exhaust using the electrochemical detector located there.

Table D1.8.2a: Monitoring Alarms: Interpretation and Resultant Actions with ECS

Monitoring Location			Response To Alarm	
ECS (Pre-Filter)	**Mid Bed**	**Outside (Exhaust)**	**Interpretation**	**Action**
📢			Possible agent presence	Exit ECS through PDS if workers not in adequate PPE. Check for possible sources, mitigate if obvious source, continue working.
📢📢			Possible agent presence	Pull DAAMS tube at pre-filter, mitigate if obvious source, continue working.
📢📢📢 or 📢📢 & DAAMS			Confirmed agent presence	Confirmed presence, mitigate source. Notify Partners of agent detection. **Note:** Agent is contained within the ECS.
📢📢📢 or 📢📢 & DAAMS	📢		Possible agent breakthrough	Confirmed presence, continue mitigation. **Note:** Agent has **NOT** been released to the environment.
📢📢📢 or 📢📢 & DAAMS	📢📢📢 or 📢📢 & DAAMS		Confirmed agent breakthrough	Implement agency notification and notify residents within AEGL-2 distance to evacuate or shelter-in-place; continue mitigation. **Note:** Agent has **NOT** been released to the environment. There is ample time to evacuate to the AEGL-2 distance.
📢📢📢 or 📢📢 & DAAMS	📢📢📢 or 📢📢 & DAAMS	📢	Probable release to environment	Maintain public evacuation outside AEGL-2 distance and/or shelter-in-place.
📢📢📢 or 📢📢 & DAAMS	📢📢📢 or 📢📢 & DAAMS	📢📢📢 or 📢📢 & DAAMS	Confirmed agent release to environment	Maintain public evacuation outside AEGL-2 distance and/or shelter-in-place.
~~📢~~~~📢~~~~📢~~~~📢~~	~~📢~~~~📢~~~~📢~~~~📢~~	~~📢~~~~📢~~~~📢~~~~📢~~	All Clear	If there has been a confirmed breakthrough, replace charcoal filters and test CAFS prior to resuming operations.

📢 MINICAMS Alarm ~~📢~~ Clear MINICAMS cycle

DAAMS Confirmed DAAMS tube result for H & L (confirmation for CG, CK, & PS is considered to be three consecutive alarms)

Table D1.8.2b: Monitoring Alarms: Interpretation and Resultant Actions without ECS

Monitoring Location	Response To Alarm	
Outside	**Interpretation**	**Action**
📢	Possible agent presence	Exit area through PDS if workers not in adequate PPE. If/when in appropriate PPE, begin investigating source and mitigating as appropriate
📢📢	Possible agent presence	If in appropriate PPE, continue investigating source and mitigating as appropriate. DAAMS tubes may be sampled and replaced based on MINICAMS results as determined by air monitoring personnel.
📢📢📢 or 📢📢 & DAAMS	Confirmed agent presence	If in appropriate PPE, continue investigating source and mitigating as appropriate. Notify Partners of agent detection.
~~📢~~~~📢~~~~📢~~	All Clear	Agent no longer present. Secure site and exit area through the PDS. The SSHO, USAESCH Safety Specialist, and CENAB Site Operations Officer, in consultation with the PDT, will evaluate the situation to determine whether engineering controls are required to continue the investigation. DAAMS tubes may be replaced based on MINICAMS results as determined by air monitoring personnel.

📢 MINICAMS Alarm ~~📢~~ Clear MINICAMS cycle

DAAMS Confirmed DAAMS tube result for H & L (confirmation for CG, CK, & PS is considered to be three consecutive alarms)

Table D1.8.3a: Electrochemical Detector Monitoring Alarms: Interpretation and Resultant Actions with ECS

Monitoring Location		Response To Alarm	
Inside ECS (Dig Site)	**Outside (CAFS Exhaust)**	**Interpretation**	**Action**
✓		Possible arsine presence	Verify adequate worker PPE, check for possible sources, mitigate if obvious source, collect colorimetric tube sample, continue working.
✓ + CT		Confirmed arsine presence	Continue to mitigate source. Notify Partners of arsine detection. **Note:** Arsine is contained within the ECS.
✓ + CT	✓	Confirmed arsine release to environment	Implement agency notification and notify residents within AEGL-2 distance to evacuate or shelter-in-place; continue mitigation.
NFD	NFD	All Clear	Arsine no longer present. If there has been a confirmed breakthrough, replace charcoal filters and test CAFS prior to resuming operations.

Table D1.8.3b: Electrochemical Detector Monitoring Alarms: Interpretation and Resultant Actions without ECS

Monitoring Location	Response To Alarm	
Outside (Dig Site)	**Interpretation**	**Action**
✓	Possible arsine presence	Verify adequate worker PPE, check for possible sources, mitigate if obvious source, collect colorimetric tube sample, continue working.
✓ + CT	Confirmed arsine presence	Continue to mitigate source. Notify Partners of arsine detection. **Note:** Members of public & personnel outside AEGL-2 distance are not at risk.
NFD	All Clear	Arsine no longer present. Secure site and exit area through the PDS. The SSHO, USAESCH Safety Specialist, and CENAB Site Operations Officer, in consultation with PDT, will evaluate the situation to determine whether engineering controls are required to continue the investigation.

✓ Arsine Alarm (i.e., > action level for 10 sec) CT Confirmed colorimetric tube result for arsine. NFD No further detection.

8.3.5.4 Alarm Notification

8.3.5.5 Actions will be taken and notifications will be made in response to electrochemical detector alarms as shown in Tables D1.8.3a and D1.8.3b. The USAESCH Safety Specialist and CENAB Site Operations Officer will be responsible for implementing agency and public notification, as necessary.

8.3.5.6 If arsine is detected in the air, the USAESCH Safety Specialist, the CENAB Site Operations Officer, and the PSHM will be notified immediately.

8.3.6 WPL Monitoring

8.3.6.1 This section describes the necessary steps to be followed with regard to air monitoring at a higher probability site when it is necessary for workers to enter an ECS in modified Level D PPE to perform routine, non-intrusive maintenance activities.

8.3.6.2 Pre-Entry Air Monitoring

8.3.6.2.1 Before personnel in modified Level D PPE are permitted to enter the ECS, the structure will be monitored by the Air Monitoring Team for at least two full MINICAMS cycles to ensure that the chemicals of concern are not present above the detection level. If no chemicals of concern are detected, the SSHO will be notified and the workers in modified Level D PPE may enter the ECS. If chemicals of concern are detected above the alarm level, the SSHO will be notified and the Higher Probability Contingency Plan (Section 16.14) will be initiated.

8.3.6.2.2 Monitoring with the MINICAMS will continue while workers are within the ECS in modified Level D PPE. In the event of a MINICAMS alarm, the personnel in modified Level D PPE will be instructed to leave the ECS via the PDS and the Site Manager and SSHO will initiate responses to the MINICAMS alarm, as described in Section 8.3.4.

8.3.6.3 Worker Population Limit Monitoring

8.3.6.3.1 While personnel in modified Level D PPE are within the ECS, area background monitoring to the WPL will be conducted inside the structure. This will be conducted using two or more DAAMS stations, which will be used to collect air samples while the personnel in modified Level D PPE are inside the ECS.

8.3.6.3.2 The WPL DAAMS stations will be positioned as close as possible to the planned work area and, if multiple crews are working in different locations within the structure, placement of additional stations will be considered. Analysis of the associated DAAMS tubes for mustard and lewisite will be completed by the Air Monitoring Team within 24 hours of sample collection and the results will be reported to the SSHO. WPL monitoring is not required for phosgene, cyanogen chloride, or chloropicrin.

8.3.6.3.3 In the event that DAAMS analysis indicates that the WPL was exceeded while personnel were within the ECS in modified Level D PPE, the potentially affected workers will be

examined by the onsite medical personnel for symptoms of exposure. Additionally, the potential exposure will be documented in their medical file and with the Parsons occupational physician. Finally, in the event of a potential exposure, the Parsons PM and the SSHO will complete a Parsons on-line incident report (see Chapter 8 of the APP to which this SSHP is attached).

8.3.6.4 Administrative Controls

8.3.6.4.1 When personnel in modified Level D PPE are within the ECS, the SSHO or designate will record the duration that each worker spends inside the structure. These records will be kept in the SSHO's file on site for the duration of the project.

8.3.6.4.2 During the daily safety briefings, workers will be instructed that they are required to inform the SSHO prior to any entry into the ECS and that they must receive the SSHO's concurrence before any such entry.

CHAPTER 9
HEAT AND COLD STRESS

9.1 HEAT STRESS

9.1.1 General

9.1.1.1 Sweating does not cool the body unless the sweat is evaporated from the body. The use of some PPE can reduce the body's ability to eliminate large quantities of heat because the evaporation of sweat is decreased. The body's effort to maintain an acceptable temperature may become impaired and this may cause heat stress. Increased body temperature and physical discomfort also promote irritability and a decreased attention to the performance of hazardous tasks. If semi-permeable and impermeable PPE is used at the site, heat stress is a MAJOR HAZARD to involved site workers.

9.1.1.2 Heat stress related problems include heat rash, fainting, heat cramps, heat exhaustion, and heat stroke. Heat rash occurs because sweat is not evaporating, making the skin wet most of the time. Standing erect and immobile allows blood to pool in the lower extremities. As a result, blood does not return to the heart to be pumped back to the brain and fainting may occur. Heat cramps are painful spasms of the muscles as a result of excessive salt loss from profuse sweating. Heat exhaustion occurs because of the large fluid and salt loss from profuse sweating. A person's skin is clammy and moist; and nausea, dizziness, and headaches may occur.

9.1.1.3 Heat stroke occurs when the body's temperature regulatory system has failed. Skin is hot, dry, red, and spotted. These skin color changes may not be readily evident in darker skinned individuals and other signs must be relied upon. The affected person may be mentally confused, delirious, and convulsions may occur. A person exhibiting signs of heat stroke should be removed from the work area to a shaded area immediately. The person should be soaked with water and fanned to promote evaporation. Medical attention must be obtained immediately. EARLY RECOGNITION AND TREATMENT OF HEAT STROKE ARE THE ONLY MEANS OF PREVENTING BRAIN DAMAGE OR DEATH.

9.1.2 Early Symptoms of Heat Stress Related Problems

9.1.2.1 Workers should recognize the early symptoms of heat stress. These symptoms include:

- Decline in task performance,
- Lack of coordination,
- Decline in alertness,

- Unsteady walk,
- Excessive fatigue,
- Muscle cramps, or
- Dizziness.

9.1.3 Engineering Controls

9.1.3.1 For site operations where Level C PPE or higher is required, a cool-down area will be made available on site.

9.1.3.2 WBGT will be tracked continuously by the SSHO when temperatures on site exceed 80°F.

9.1.4 Work/Rest Regimens

9.1.4.1 The management of risk for heat stress exposures centers around the principal of job-specific controls. Controls that will be implemented to reduce the potential for worker heat stress includes: use of acclimated workers, providing adequate replacement fluids, educating workers to recognize the early symptoms of heat stress, use of cooling vests, physiological monitoring, and development of a work/rest regimen that will prevent the onset of heat stress.

9.1.4.2 Work-rest regimens will be implemented in accordance with the limits specified in Table D1.9.1, for Level D and Modified Level D PPE, and Table D1.9.2, for Level C PPE and higher) unless modified as described below.

9.1.4.3 Work schedules may be adjusted in accordance with heat stress monitoring results.

9.1.4.4 If the core body temperature exceeds 38°C (100.4°F) for any team member, then the next lower work-rest regimen will be instituted.

9.1.4.5 If no team member's core body temperature exceeds 37.5°C (99.5°F), then the next higher work-rest regimen may be instituted.

9.1.4.6 The SSHO and site medics will track WBGT readings and compare these to the highest core body temperature for each team. These trend data will used to establish initial work-rest regimens. For example, if PPE is upgraded to Level C (from Modified Level D PPE) and the WBGT is 76°F, the work-rest regimen per Table D1.9.2 is 50%/50%. However, if trend data indicate that personnel have been in Level C PPE at WBGT 76°F and have maintained core body temperatures <37.5°C (99.5°F), then the initial work-rest regimen will be 75%/25%. If the core body temperature exceeds 38°C (100.4°F) for any team member, then the next lower work-rest regimen will be instituted.

Table D1.9.1
Permissible Heat Exposure Threshold Limit Values [°C and (°F) WBGT]
when Level D or Modified Level D PPE is worn

Work-Rest Regimen	Workload		
	Light	Moderate	Heavy
Continuous work	29.5 (85.1)	27.5(82)	26 (77)
75% Work 25% Rest, each hour	30.5 (87)	28.5 (82)	27.5 (78)
50% Work 50% Rest, each hour	31.5 (89)	29.5 (85)	28.5 (82)
25% Work 75% Rest, each hour	32.5 (90)	31 (88)	30.0 (86)

NOTE: The workload category may be established by ranking each job into light, medium, or heavy categories on the basis of type of operation:

Light: (up to 200 kcal/hr or 800 Btu/hr): e.g., sitting or standing to control machines, performing light hand or arm work.

Moderate: (200-350 kcal/hr or 800-1400 Btu/hr): e.g., walking about with moderate lifting and pushing.

Heavy: (350-500 kcal/hr or 1400-2000 Btu/hr): e.g., pick and shovel work.

Table D1.9.2
Permissible Heat Exposure Threshold Limit Values [°C and (°F) WBGT]
when Level C, B, or A PPE are worn

Work-Rest Regimen	Workload		
	Light	Moderate	Heavy
Continuous work	24.5 (76.1)	22.5 (72.5)	21 (69.8)
75% Work 25% Rest, each hour	25.5 (77.9)	23.5 (74.3)	22.5 (72.5)
50% Work 50% Rest, each hour	26.5 (79.7)	24.5 (76.1)	23.5 (74.3)
25% Work 75% Rest, each hour	27.5 (81.5)	26 (78.8)	25 (77)

9.1.4.7 Whenever a new team member begins work on site, that member's entire team will use the appropriate table for establishing the work-rest regimen until the new team member is acclimated.

9.1.4.8 Use of cooling vests by team members may also modify the work-rest regimen or the time of stay for continuous work. In this event, work-rest regimens will be modified as described in Paragraphs 9.1.4.3 through 9.1.4.6.

9.1.5 Prevention of Heat Stress

9.1.5.1 Proper training and preventive measures will aid in averting loss of worker productivity and serious illness. Heat stress prevention is particularly important because once a person suffers from heat stroke or heat exhaustion, that person may be predisposed to additional heat related illnesses. To avoid heat stress, the following steps should be taken:

- Adjust work schedules.
  - Modify work/rest regimens as described above.
  - Mandate work slowdowns as needed.
- Perform work during cooler hours of the day, if possible.
- Provide shelter (air-conditioned, if possible) or shaded areas to protect personnel during rest periods.
- Ensure workers are acclimated to weather conditions and have extensive experience in the selected level of PPE. Workers can be acclimatized by gradually increasing the workload over a period of days.
- Worker heart rate and temperature will be monitored and tracked when workers are wearing Level C PPE or higher.
- Maintain worker's body fluids at normal levels. This is necessary to ensure that the cardiovascular system functions adequately. Daily fluids intake must approximately equal the amount of water lost in sweat, e.g. 8 fluid ounces (0.23 liters) of water must be ingested for approximately every 8 ounces (0.23 kg) of weight loss. The normal thirst mechanism is not sensitive enough to ensure that enough water will be drunk to replace lost sweat. When heavy sweating occurs, encourage the worker to drink more. The following strategies may be useful:
  - Maintain water temperature at 50° to 60°F (10° to 16.6°C).
  - Provide small disposable cups that hold about 4 ounces (0.1 liter).
  - Have workers drink 16 ounces (0.5 liters) of fluid (preferably water or diluted drinks) before beginning work.
  - Urge workers to drink a cup or two every 15 to 20 minutes, or at each monitoring break. A total of 1 to 1.6 gallons (4 to 6 liters) of fluid per day are recommended, but more may be necessary to maintain body weight.

- Train workers to recognize the symptoms of heat-related illnesses.
- Provide potassium supplements (banana or potassium chloride tablets).
- Rotate personnel and alternate job functions.

9.2 COLD-RELATED ILLNESS

9.2.1 General

9.2.1.1 Exposure to low temperatures presents a risk to employee safety and health both through the direct effect of the low temperature on the body and collateral effects such as slipping on ice, decreased dexterity, and reduced dependability of equipment. Work conducted in the winter months can become a hazard for field personnel as a result of cold exposure. All personnel must exercise increased care when working in cold environments to prevent accidents that may result from the cold. The effects of cold exposure include frostbite and hypothermia. Wind increases the impact of cold on a person's body. Systemic cold exposure is referred to as hypothermia. Local cold exposure is generally labeled frostbite. Recognition of the symptoms of cold-related illness will be discussed during the health and safety briefing conducted prior to the onset of site activities.

9.2.1.2 Hypothermia is a life-threatening condition in which the core body temperature falls below 95°F. Hypothermia can occur at temperatures above freezing particularly when the skin or clothing becomes wet. During exposure to cold, maximum shivering occurs when the core temperature falls to 95°F. As hypothermia progresses, depression of the central nervous system becomes increasingly more severe (Table D1.9.3). This accounts for the progressive signs and symptoms ranging from sluggishness and slurred speech to disorientation and eventually unconsciousness.

Table D1.9.3
Progressive Clinical Symptoms of Hypothermia

Core Temperature	Clinical Signs
95°F	Maximum shivering
87°F - 89°F	Consciousness clouded; blood pressure becomes difficult to obtain; pupils dilated
84°F - 86°F	Progressive loss of consciousness; muscular rigidity; respiratory rate decreases
79°F	Victim rarely conscious
70°F - 72°F	Maximum risk of ventricular fibrillation

9.2.1.3 Frostbite is both the general and medical term given to areas of cold injury. Unlike hypothermia, frostbite rarely occurs unless environmental temperatures are less than freezing and usually less than 20°F. Frostbite injuries occur most commonly on the distal parts of the body (nose, earlobes, hands, and feet) that are subject to intense vasoconstriction. The three general categories of frostbite are:

- **Frostnip** - A whitened area of the skin that is slightly burning or painful.
- **Superficial frostbite** - Waxy, white skin with a firm sensation but with some resiliency. Symptomatically feels "warm" to the victim with a notable cessation of pain.
- **Deep frostbite** - Tissue damage deeper than the skin, at times, down to the bone. The skin is cold, numb and hard.

9.2.2 Preventing Cold Exposure

9.2.2.1 In preventing cold stress, the SSHO must consider factors relating to both the worker and the environment. Training, medical screening, establishment of administrative controls, selecting proper work clothing, and wind-chill monitoring all contribute to the prevention of hypothermia and frostbite.

- **Training** - Recognizing the early signs and symptoms of cold stress can help prevent serious injury. Therefore, workers will be trained to recognize the symptoms of hypothermia and frostbite and have appropriate first-aid instruction. When the air temperature is below 50°F, the SSHO will inform workers of the proper clothing requirements and any work practices that are in effect to reduce cold exposure.
- **Administrative Controls** - The SSHO will establish a work/rest schedule based upon worker monitoring. At the first sign of uncontrollable shivering the worker will be rested in a heated shelter. Work will stop when the air temperature reaches 0°F.
- **Clothing** - Workers will be encouraged to layer clothing when air temperature is below 50°F. Clothing that has a high insulation value will be worn under protective garments. Insulated gloves will be worn when the wind chill index is below 32°F.

CHAPTER 10
STANDARD OPERATING PROCEDURES AND WORK PRACTICES

10.1 GENERAL SAFETY

10.1.0.1 The following are considered standard safe work practices:

- Eating, drinking, chewing tobacco, smoking, and carrying matches or lighters are prohibited in a contaminated or potentially contaminated area, or where the possibility for contamination transfer exists.
- Wearing cosmetics and/or contact lenses is not authorized within the EZ.
- Contact with potentially contaminated substances or materials will be avoided. Walking through puddles, pools, mud, or handling soils without protective gloves, etc., will be prohibited. Whenever possible, kneeling on the ground, leaning or sitting on equipment or the ground will be avoided. Monitoring equipment will not be placed on potentially contaminated surfaces (e.g., ground, etc.).
- All field crew members will be alert to all potentially dangerous situations (e.g., the presence of strong, irritating, unusual, or nauseating odors).
- Field crew members will be familiar with the physical characteristics of the site during intrusive investigations, including:
    - Wind direction in relation to nearby buildings.
    - Accessibility to associates, equipment, vehicles, and communication.
    - The EZ location and boundaries.
    - Site access.
    - Nearest water sources.
- Site workers will use PPE as specified in this SSHP during the initial site reconnaissance and follow-on geophysical activities.
- Use of heavy equipment on site (e.g., trucks and bobcats) may be hazardous to site workers. All field crew members will stay clear while heavy equipment is being operated.
- Wearing PPE may result in the impaired ability to operate site equipment. All field crew members will pay specific attention to decreased performance capabilities resulting from wearing PPE, such as poor tactile skills when wearing

certain types of gloves. Prior knowledge of limitations imposed by the use of such equipment will allow the worker to assess the decrease in his or her capability to perform field operations safely.

- Wearing jewelry, such as rings and loose bracelets and necklaces, will be prohibited in order to avoid their entanglement in site machinery.
- Overhead power lines, downed electrical wires, and buried cables may pose a danger of shock or electrocution in the event workers contact or sever them during site operations.
- Buddy system procedures will be enforced during site operations.
- Site personnel will perform only those tasks that they are qualified to perform.
- Site visitors will be escorted by qualified personnel at all times.
- Running and horseplay will be prohibited in all areas of the site.
- The number of personnel in the EZ will be the minimum number necessary to perform work tasks in a safe and efficient manner.

10.2 CHEMICAL AGENT AND ORDNANCE SAFETY

10.2.0.1 The following measures will be observed by personnel working in areas suspected of being contaminated with chemical agent:

- Clothing will be changed at the beginning and end of each work shift. Personal clothing will be removed and replaced with issued clothing. Clothing issued for work on site will be coveralls, T-shirt, underwear, socks, and PPE outer garments.
- A decontamination tent will be used for showering. Showers will be taken as needed (e.g., ringoff, suspected contact with contamination) by all personnel that crossed the Hot Line during intrusive activities at suspect RCWM sites.
- Issued clothing will be laundered by the respective organizations. Personnel are responsible for laundering their personal clothing.
- Open sores or wounds will be evaluated by first aid personnel prior to admittance to the EZ.
- Areas where chemical agent is suspected of being present will be clearly identified to all site personnel. Personnel will be reminded of the possible presence of chemical agent during morning safety meetings.
- The SSHO will designate safe locations (separated from the work areas) where eating, drinking, chewing, and smoking will be allowed.
- Supplies of decontaminating solutions (5% bleach) and emergency flushing devices for personnel decontamination will be located in work areas where intrusive activities are in progress.

- In the event of a ringoff, each worker will be examined for signs of chemical agent exposure before leaving the work site. If signs of possible exposure are detected, the individual will be immediately transported to the George Washington Hospital for further examination.

10.2.0.2 The following measures will be observed by personnel working in areas suspected to contain suspect MEC/UXO:

- UXO will be avoided, and will not be touched, handled, or moved under any circumstances except by UXO Technicians when applicable.
- UXO that have been exposed to fire and detonation will be considered as extremely hazardous.
- Outer or undergarments made of wool, silk, or synthetic textiles such as rayon and nylon will not be worn while working in a UXO-contaminated environment. These materials can generate a sufficient static charge to ignite fuels or initiate explosives. Any UXO technician needing to touch a UXO item will ground themselves prior to touching it.
- Any practice UXO will be assumed to contain a live charge until it can be determined otherwise.
- Unnecessary personnel will not be present in the vicinity of UXO. Personnel exposure time will be limited. Operations will always be based upon minimum exposure consistent with efficient operations.
- Inhalation of and skin contact with smoke, fumes, and vapors associated with any explosives, smoke, or other associated materials will be avoided.
- Color-coding of UXO will not be relied on for positive identification of contents. Munitions having no, incomplete, or improper color-coding have been encountered.
- Land mines will be considered armed until proven otherwise. Be alert to deterioration of mines.

10.2.0.3 Workers at a low probability site who encounter suspect MEC/RCWM will stop work immediately and implement the Low Probability Contingency Plan (Section 16.13).

10.2.0.4 Workers at a higher probability site who encounter suspect MEC/RCWM will implement the Higher Probability Contingency Plan (Section 16.14).

10.2.0.5 The USAESCH Safety Specialist will be notified immediately if suspect MEC/RCWM is encountered. Personnel will evacuate upwind and two UXO technicians will maintain line of site on the item and guard it until relieved by TE personnel.

10.3 ENGINEERING CONTROLS

10.3.0.1 Intrusive investigations at higher probability sites will be performed either by evacuating the public or by performing work using engineering controls. For the purposes of operations at the SVFUDS, engineering controls consist of a containment structure that is exhausted by a CAFS of sufficient size to maintain negative pressure. Air-conditioned or heated air may be supplied to control the temperature within the ECS for worker safety. This system will be continually monitored with the near real-time MINICAMS.

10.3.0.2 The choice of ECS for a particular investigation will depend upon the selected Munition with the Greatest Fragmentation Distance (MGFD) and/or Maximum Credible Event (MCE). Three ECSs that have been used previously at the SVFUDS are the:

- Modular Aluminum Containment Structure (MACS), with aluminum sheeting placed on the outside of the structure to provide additional containment. This ECS will maintain structural integrity in the event of a detonation. The MACS requires a relatively level surface for proper containment. The exact configuration of the MACS will depend upon site-specific conditions. Previous configurations of the MACS at the SVFUDS have been approved to contain either the detonation of the MGFD or an evaporative release resulting from the MCE. The MACS may be used in conjunction with a Vapor Containment Cover (VCC).
- Vapor Containment Structure (VCS). This ECS will maintain structural integrity in the event of a detonation. The VCS requires a minimum site area and a relatively level surface for proper containment.
- Vinyl tent with steel tubing frame (typical). This ECS has been successfully used when there is no possibility for a detonation. This ECS will not contain a detonation but offers easier portability and greater adaptability for uneven surfaces.

10.3.0.3 While the engineering controls are functioning as designed, the boundary of the ECS will be considered to be the EZ for an investigation and will be entered only by persons wearing the appropriate PPE.

10.3.0.4 Prior to starting excavation activities, all ECS doors will be secured, the CAFS will be functional, and air monitoring measures will be in place and operating.

10.3.0.5 Further details concerning the types of ECSs previously approved for use at the SVFUDS are included in Appendix M to the Site-Wide WP.

10.3.0.6 If engineering controls are considered necessary for implementation at a site, the specific details will be described in the SSWP.

10.4 CHEMICAL AGENT FILTRATION SYSTEM

10.4.0.1 If an ECS is used, it will be maintained under negative pressure using a CAFS that is specifically designed to remove chemical agent vapors and particulates. The filter system will be continually monitored using the near real time MINICAMS.

10.4.0.2 The CAFS filter assembly comprises:

- Pre-filters,
- A HEPA filter to remove particulates,
- A charcoal filter bed, and
- An exhaust stack.

10.4.0.3 Any CAFS used will be adequately sized to maintain a negative pressure inside the ECS when the potential exists for encountering chemical agent, as specified in DA Pam 385-61. To maintain the necessary residence time in the filters, the flow rate through the CAFS will not exceed the rated capacity of the filter system.

10.5 VIDEO SURVEILLANCE

10.5.0.1 When circumstances permit it during intrusive investigations at higher probability sites, activities within the ECS will be monitored using video surveillance from the Command Post in the Support Zone (SZ).

CHAPTER 11
PUBLIC SAFETY

11.1 INTRODUCTION

11.1.0.1 The measures used to ensure safety of the public during activities at the SVFUDS depend upon whether intrusive operations are being conducted at a low probability site or a higher probability site. The following sections describe the details of these requirements and procedures.

11.2 PUBLIC SAFETY FOR LOW PROBABILITY SITES

11.2.1 General

11.2.1.1 This activities conducted at low probability site consist of general construction-type activities. The public will be kept out of the construction site area by using construction fencing or other physical means. In the event that unauthorized personnel (e.g., homeowners) inadvertently enter the construction site, work will be stopped immediately. Work will not begin again until the unauthorized person(s) is(are) outside the construction site.

11.2.2 Air Monitoring

11.2.2.1 Continuous, real-time air monitoring for dust will be performed by the Parsons sampling team during contaminated soil removal activities to ensure that the TLV for arsenic will not be exceeded (see Section 8.2.2 of this SSHP). Time weighted average samples will be collected for particulates and analyzed for arsenic during contaminated soil removal activities.

11.2.3 Dust Control

11.2.3.1 Dust mitigation measures (e.g., wetting down) will be implemented any time that site activities result in a visible dust cloud, that the real-time dust monitors indicate a level of greater than 3mg/m³ total dust resulting from site activities, or otherwise at the direction of the Site Manager or SSHO.

11.3 PUBLIC SAFETY FOR HIGHER PROBABILITY SITES

11.3.1 MCE and MGFD

11.3.1.1 The MCE for a site is selected based on the maximum release of a chemical agent from a munition, bulk container, or process that could occur as a result of an unintended,

unplanned, or accidental incident. The event must be realistic with reasonable probability of occurrence. For site-wide operations at the SVFUDS, USAESCH performed a detailed MCE analysis that identified three possible MCEs for site-wide investigations, based on the record of items discovered at SVFUDS to date. The identified MCEs are:

- The instantaneous release of mustard agent from an explosively configured 75mm Mk II chemical projectile, or
- The evaporative release of lewisite from a 5-gallon container, or
- The evaporative release of lewisite from a 1-liter container, or
- The instantaneous release of arsine from a non-explosively configured 75mm MkII chemical projectile.

11.3.1.2 The MGFD for a site is selected based on the ordnance item with the greatest fragmentation distance that can reasonably be expected to be found at the site. Based on the record of items discovered at the SVFUDS to date, the MGFD is a 75mm Mk II chemical projectile with an explosive burster.

11.3.1.3 The site-specific MCE and associated acute exposure guideline level (AEGL)-2 distance, and the MGFD if applicable, will be selected by USAESCH for each higher probability site to be investigated. A MGFD may not be selected if ordnance is not expected to be located at the specific site. The results of the selection of MCE and MGFD will be stated in the SSWP prepared for that site.

11.3.2 AEGL-2 Distance, Minimum Separation Distance, and EZ

11.3.2.1 The AEGL-2 distance is the distance beyond which the public will not experience any irreversible or other serious, long-lasting helath effects, or an impaired ability to escape associated with a chemical agent release. The AEGL-2 distance is used to delineate site work zones and design contingency plans. A computer model called D2SV, specifically tailored to the SVFUDS, is used to predict the AEGL-2 distance based on the selected MCE, meteorological data, and the nature of the work to be performed. The AEGL-2 distance will be calculated daily for the specific MCE and weather conditions at each site.

11.3.2.2 The typical MCE-based AEGL-2 distances for atmospheric stability factor D and a wind speed of 1 m/s, under summer conditions (95°F) are shown in Table D1.11.1. Site-specific values will be calculated for each site, based upon the selected site-specific MCE. An ECS in conjunction with a CAFS can be used to reduce the AEGL-2 distance to within the ECS.

11.3.2.3 The fragmentation distance for the MGFD (an explosively configured 75mm Mk II chemical projectile) is 1,194 feet and the Hazardous Fragment Distance is 200 feet. Per EM 1110-1-4009 (*Ordnance and Explosives Response*), the Hazardous Fragment Distance of 200 feet will be used as the Minimum Separation Distance (MSD) for unintentional detonations during site-wide operations because recovered items are not expected to be UXO.

Table D1.11.1
MCEs and Associated AEGL-2 Distances

MCE	AEGL-2 Distance
Instantaneous release of 1.35 lbs of H from an explosively configured 75mm Mk II chemical projectile	73 meters (240 feet)
Evaporative release of L from a 5-gallon container	131 meters (430 feet)
Evaporative release of L from a 1-liter container	29 meters (96 feet)
Instantaneous release of arsine from a non-explosively configured 75mm Mk II chemical projectile	226 meters (742 feet)

Conditions: Atmospheric Stability Factor D, 1m/s wind speed, and maximum temperature of 95°F.

Source: AEGL-2 distances were generated by USAESCH and communicated to Parsons March 8, 2007.

11.3.2.4 The EZ distance for a site is defined as the greater of the MSD and the MCE-based AEGL-2 distance. The EZ distance used for operations at the SVFUDS will be the greater of either 200 feet or the AEGL-2 distance calculated for the specific operation, and will be stated in the SSWP prepared for that site.

11.3.3 Public Safety Protocols

11.3.3.1 A Public Protection Plan (PPP) has been prepared by CENAB and will be maintained on the site by the CENAB Site Operations Officer. An Evacuation/Shelter-In-Place Plan is included in this PPP.

11.3.3.2 Site Evacuation

11.3.3.2.1 To ensure the safety and the protection of the public, prior to beginning intrusive operations all residents within the EZ distance will be withdrawn to a location outside the EZ distance. The EZ distance will be specified in the SSWP. This EZ distance will be based on either the MGFD or MCE, whichever generates the greatest EZ distance, and the type of engineering controls employed if any. If necessary, roads will be blocked by D.C. Metropolitan Police to prevent unauthorized access inside the EZ. When engineering controls are employed to control site hazards, the EZ distance may be reduced to the boundary of the engineering controls.

11.3.3.3 Intrusive Investigations

11.3.3.3.1 If suspect RCWM, MEC, or an intact container is discovered, it will be packaged in a MRC and transported to the Interim Holding Facility (IHF) containers at the Federal Property Storage Area. The CENAB Site Operations Officer, in consultation with the USAESCH Safety

Specialist, SSHO, Site Manager, and the Spring Valley Partners will decide whether the site will need to be secured and engineering controls established (if not already in place) to complete the investigation or whether the investigation will continue under evacuation.

11.3.3.4 Site Access

11.3.3.4.1 If an excavation at a higher probability site cannot be completed within a single day, the area will be secured and guarded 24 hours per day to prevent unauthorized access until the excavation is completed.

11.3.3.5 Air Monitoring

11.3.3.5.1 Continuous air monitoring for chemical agents will be performed during intrusive operations at higher probability sites and procedures are in place for response in the event of chemical agent detection. These procedures are discussed in Chapter 8 of this SSHP.

CHAPTER 12
SITE CONTROL MEASURES

12.1 WORK ZONES

12.1.0.1 The purpose of establishing work zones and maintaining site control is to minimize potential contamination of workers, protect the public, and prevent unauthorized entry to work areas. Site control involves the physical arrangement of, and controlling access into, established work zones. Additionally, PPE requirements are specified for each work zone. At the SVFUDS, work zones will be established for all activities involving intrusive operations.

12.1.0.2 Zones will be delineated to aid in controlling the flow of personnel and equipment. The establishment of these work zones will help to ensure that personnel are properly protected against the potential hazards present where they are working, that work activities and contamination are confined to the immediate area, and that personnel can be located and evacuated in an emergency.

12.1.0.3 The general work zones designated for the SVFUDS are the EZ, the CRZ, and the SZ and are described in greater detail below. The actual boundaries of the work zones for each site will be specified in each SSWP.

12.2 EXCLUSION ZONE

12.2.0.1 The EZ is the work area where intrusive activities take place and where contamination does or could occur. The EZ boundary will be physically marked by tape or temporary barriers, the ECS (when engineering controls are used), or otherwise well defined by physical and geographic boundaries. All site personnel will be properly trained in controlling and minimizing access to the EZ.

12.2.0.2 Should an unauthorized person enter the EZ, work will be stopped and the unauthorized person will be escorted out of the EZ and to the PDS where he or she will be met by the SSHO, USAESCH Safety Specialist, or Site Manager in the event there is a need for decontamination or medical assistance. Following any unauthorized entry of the EZ, the event will be recorded in the field logbook and site control measures will be reevaluated immediately with regard to preventing future unauthorized intrusions.

12.2.0.3 For low probability sites, the EZ boundary (or hotline) will typically be established using well defined by physical and geographic boundaries. These boundaries should not be outside the visual range of the field team. At minimum, the EZ for low probability sites will be the boundary of the excavation.

12.2.0.4 For higher probability sites, the EZ boundary will be established by the boundaries and entrances to the ECS when engineering controls are used, or by the EZ distance if the investigation is performed under evacuation (Section 11.3.2).

12.2.0.5 The EZ boundary for each site will be defined in the SSWP.

12.3 CONTAMINATION REDUCTION ZONE

12.3.0.1 The CRZ is the transition area between the EZ and the SZ. This zone provides an area to prevent or reduce the transfer of hazardous materials that may have contaminated personnel or equipment leaving the EZ. The organization of the CRZ and control of decontamination operations are described further in Chapter 13 of this SSHP.

12.4 SUPPORT ZONE

12.4.0.1 The SZ is considered to be a clean area and will be located at sufficient distance from intrusive activities to ensure the safety of SZ personnel. The support zone is separated from the CRZ by the contamination control line. Unauthorized access beyond the contamination control line will be prohibited during intrusive operations.

12.4.0.2 The SZ contains the command post and other support supplies. Level D PPE is appropriate apparel within this zone. Contaminated clothing and equipment are not permitted in the SZ. In the event that site activities are being conducted during cold weather, safety equipment susceptible to freezing (such as eye wash and decontamination solutions) will be stored in a heated space.

CHAPTER 13
PERSONAL HYGIENE AND DECONTAMINATION

13.1 INTRODUCTION

13.1.0.1 The personnel decontamination procedures required during activities at the SVFUDS depend upon whether intrusive operations are being conducted at a low probability site or a higher probability site. General sanitation requirements are identical for both types of site. The following sections describe the details of these requirements and procedures.

13.2 GENERAL SANITATION

13.2.0.1 The sanitation provisions specified in Section 2 of EM 385-1-1 will be established and maintained on site as outlined in the following paragraphs.

13.2.0.2 Eating, drinking, smoking, chewing, and application of cosmetics will be restricted to the SZ. However, drinking of replacement fluids will be permitted in designated areas of the CRZ.

13.2.1 Drinking Water

13.2.1.1 Cool, potable drinking water will be provided in sanitary, portable containers at all sites. Where necessary, disposable cups will also be provided and used to drink from the drinking water containers.

13.2.2 Toilets

13.2.2.1 In the event that accessible toilet facilities are not available at a site, one or more chemical toilets will be provided and located in the SZ.

13.2.3 Hand-Washing Facilities

13.2.3.1 Hand-washing facilities or cleaning wipes will be provided in the portable toilet facilities and cleaning wipes will be provided in the crew break area. Field team personnel will wash their hands prior to eating or drinking, and prior to leaving a site.

13.2.4 Designated Smoking Areas

13.2.4.1 Smoking will only be permitted in specific areas designated by the SSHO.

13.3 PERSONNEL DECONTAMINATION AT LOW PROBABILITY SITES

13.3.1 General

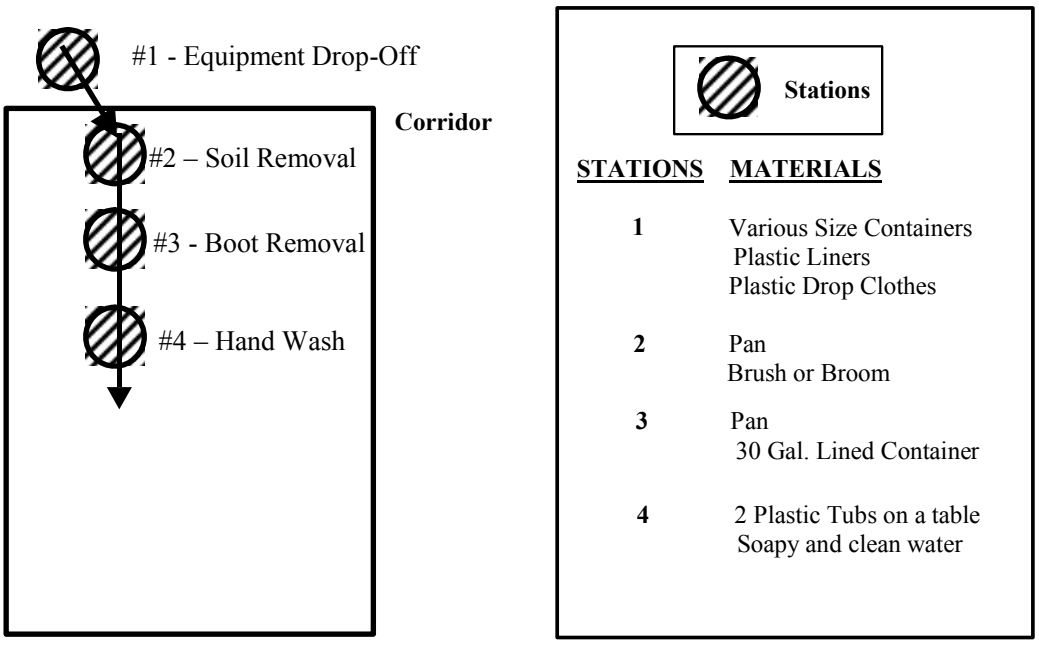
13.3.1.1 The following procedures will be implemented whenever activities at low probability sites involve the potential for contact with hazardous wastes. These and any other site-specific control methods specified by the SSHO will be used to minimize personnel contamination.

13.3.2 Personnel Decontamination Procedures

13.3.2.1 Prior to exiting the CRZ for the SZ, site personnel will brush any loose dirt from boots or over-boots using a handheld broom. They will then remove over-boots and proceed to the hand washing station. A general layout for the PDS to be used at low probability sites is shown in Figure D1-13-1.

13.3.2.2 The SSHO will inspect, and approve for general cleanliness, all personnel prior to the personnel exiting the CRZ for the SZ. In order for personnel to pass inspection they must be in a broom-clean condition, free of loose dirt or stabilized material. All surfaces that have contacted potentially contaminated materials, including soil, will be washed. Approval for personnel exiting the CRZ will be based on visual inspection of all exposed surfaces and, if deemed necessary by the SSHO, the analysis of swipe samples.

Figure D1-13-1
General PDS Layout for Low Probability Sites
(May be adapted based on site conditions)



13.3.3 Emergency Decontamination

13.3.3.1 In the event of personnel contamination with fuel or decontaminating agents (e.g., nitric acid or methanol), personnel will be flushed with copious quantities of water from a garden hose attached to a water truck or building, or using water staged in portable containers.

13.3.3.2 A portable eyewash will be located at the PDS.

13.3.4 Contamination Control

13.3.4.1 This section outlines the measures that will be taken to control contamination and to prevent contamination from leaving the EZ.

13.3.4.2 The decontamination procedures described in the preceding sections will be the primary means of contaminant control. Also, all wastewater generated from decontamination procedures will be collected on site, tested, and disposed of accordingly. In addition to these procedures, measures will be taken to limit the movement of dust and vapors that may be generated within the EZ.

13.4 PERSONNEL DECONTAMINATION AT HIGHER PROBABILITY SITES

13.4.1 General

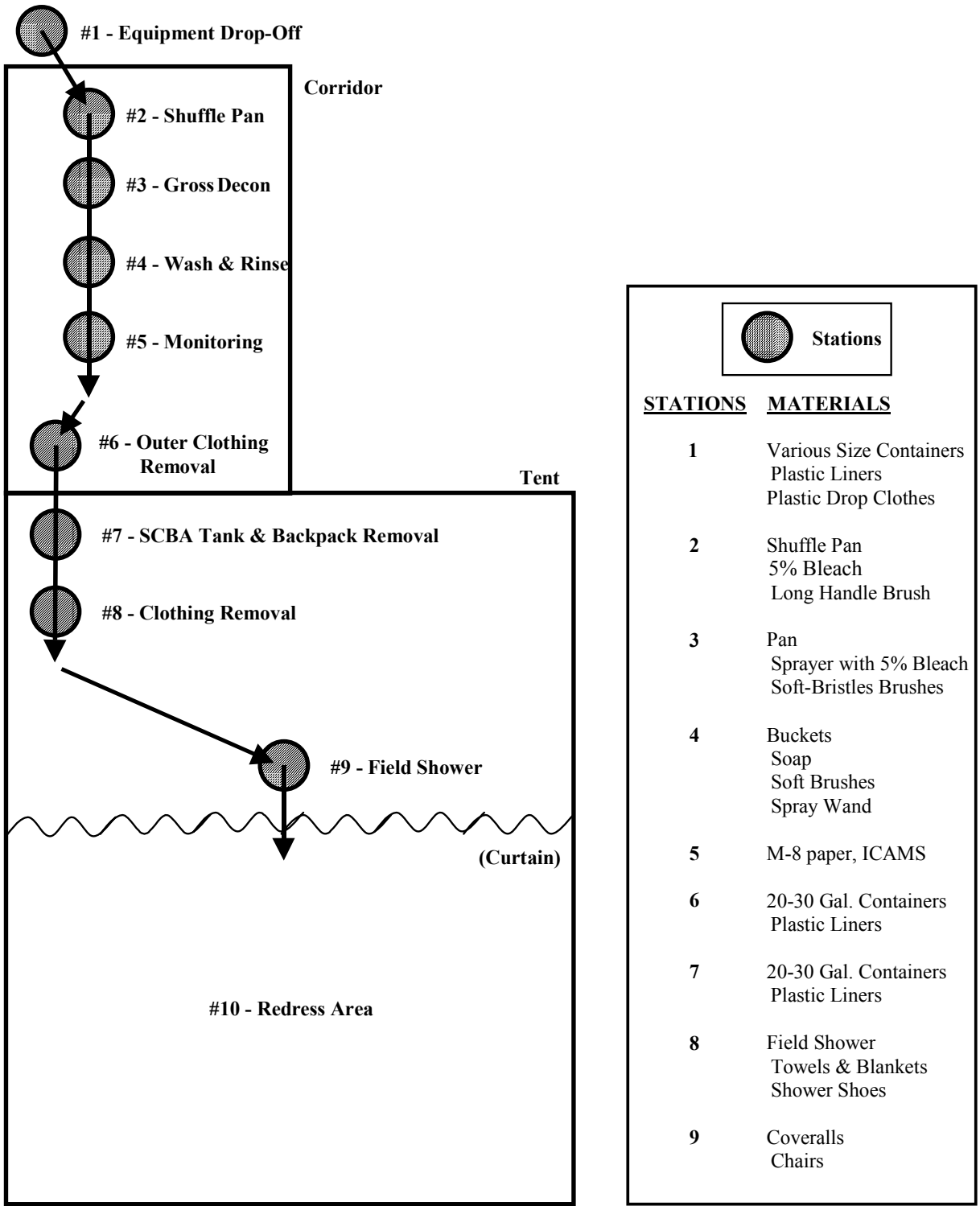
13.4.1.1 The following procedures will be implemented whenever activities at higher probability sites involve the potential for contact with chemical agent or hazardous wastes. These and any other site-specific control methods specified by the SSHO will be used to minimize personnel contamination.

13.4.2 Personnel Decontamination Station

13.4.2.1 A PDS, including an emergency personnel decontamination station (EPDS), will be established to handle decontamination and protective clothing removal, and to prevent EZ personnel from transferring contamination to the SZ. The PDS will be established prior to and used during any site activities involving the potential for personnel to be exposed to the chemical hazards listed in Chapter 2 of this SSHP. The PDS will be located outside the EZ, though the precise PDS location at each specific site will be subject to change based on site-specific conditions.

13.4.2.2 All personnel exiting the EZ will pass through the PDS to ensure removal of contamination. A general PDS layout is shown in Figure D1-13-2. As personnel move through the PDS, PPE will be removed in the order of highest to lowest potential contamination. This “outside-in” removal process should minimize the contamination of inner clothing or the body. The EPDS will be used for the emergency decontamination of personnel who cannot pass through the PDS as a result of injury or illness.

Figure D1-13-2
General PDS Layout for Higher Probability Sites
(May be adapted based on site conditions)



13.4.2.3 Personnel may be required to shower completely (including the washing of hair) before changing into clean clothing prior to exiting the redress area. Personnel will always wash hands, face, and other exposed skin areas immediately after leaving the CRZ for breaks, lunch or at the end of each workday. The shower facility will be a field expedient shower that provides warm water. The shower room will have a deck or mats for walkways and a water capture basin. Captured water will be poured or pumped into a container and sampled by Parsons for chemical agent analysis. The sample results will determine whether the wastewater is to be handled as chemical agent-contaminated wastewater. Towels, washcloths, liquid soap, and shampoo will be provided for personnel. Work clothes worn inside the EZ will be left in the shower/change facility. With the exception of clothing worn for operations in the SZ, company-provided work clothing, shoes, or boots will not be worn off or carried out of the work site. Space will be provided in the clean room for storage of the employee's street clothes along with benches to facilitate changing of clothing.

13.4.2.4 The TE Supervisor is responsible for ensuring that the PDS is set up each day and ready for operation before site personnel enter the EZ. Personnel exiting the ECS will proceed through the specified wash, rinse, and PPE removal steps relevant to the level of protection they are wearing. The requirements for each level of PPE are specified and described in detail in Chapter 5 of this SSHP.

13.4.2.5 The PDS will be large enough to contain the pans/tubs required for Stations 2 through 4 (see Table D1.13.1), and any spillage, splash or overspray that may occur during the use of these stations. The PDS will be constructed of materials that can be readily decontaminated (e.g., plastic covered surfaces). The pans/tubs will be large enough for a person to stand in and will have at least 12-inch high sides. Water/solutions used for decontamination will be poured or pumped into a container and sampled by Parsons for chemical agent. The sample results will determine if the wastewater is to be handled as chemical agent-contaminated wastewater. The PDS will be decontaminated, and the residue collected if site events dictate the need for increased precautions to prevent the contamination of soil and the spread of chemical agent and/or industrial chemical contamination (i.e., action levels are reached for chemical agents). Upon completion of the project, the contents of the containment system will be tested and disposed of accordingly.

13.4.3 Personnel Decontamination Procedures

13.4.3.1 To minimize the potential for contaminant contact and migration, site personnel will decontaminate thoroughly, carefully remove PPE, and follow the decontamination procedures outlined in the following paragraphs. Site personnel following these procedures must remember and understand that improper decontamination can lead not only to personal contamination, but also to contamination of other site personnel, equipment, personal property, and the general public. The procedures listed in Table D1.13.1 represent the minimum requirements for personnel and equipment decontamination. If deemed necessary based on site activities or conditions, revised or additional procedures may be added to this plan by the SSHO. Prior to implementation, additional or revised decontamination procedures will receive approval of the TE Supervisor, or the PSHM and the USAESCH Safety Specialist.

Table D1.13.1
PDS Stations and Associated Decontamination Activities

Station	Associated Activities
1	Equipment Drop: deposit all reusable equipment on the drop cloth inside the ECS prior to entering the PDS. Turn on tank air using proper SCBA starting procedures. Disconnect supplied airline.
2	Shuffle Pan: step into pan and shuffle boots to remove soil from boots.
3	Outer Garment Gross Decontamination (Chemical Suit, Gloves, and Boots): wash all outer garments with 5% bleach decontamination solution. Start at the head and brush or spray down to soles of boots. Scrub boots, including the bottoms, gloves, and any other part of the suit necessary to remove all dirt, mud or other foreign debris.
4	Outer Garment Wash and Rinse (Chemical Suit, Gloves, and Boots): starting at the head and working down, scrub and/or spray entire surface of outer garments, using a brush and hot soapy water. Starting at the head and working down, use clean water to brush off or spray all soap residue from the outer garment.
5	Monitoring: Monitor decontamination effectiveness using the Chemical Agent Monitor (CAM) or M-8 chemical detection paper.
6	Outer Clothing Removal: this consists of the following steps: • Tape Removal. Remove all tape that would restrict the removal of the outer garments and place it in a plastic-lined disposal container. • Boot/Boot Cover Removal (Boot Rack). Remove boots/boot covers and place on boot rack if serviceable; if not place in plastic-lined container. The PDS attendant may assist from the cold side of Hot Line, and will help ensure that personnel do not place unbooted feet back across the Hot Line. A chair or bench and boot jack will be provided at this station to assist in boot/boot cover removal. • Outer Glove Removal. Remove outer gloves and place on table, if serviceable; if not, place in plastic-lined container. Personnel should exercise extreme caution, and make every effort not to touch the inner gloves with the outside of the outer gloves during their removal. • Outer Suit Removal. Remove outer suit and place on table if reusable. The PDS attendant or buddy will assist in removal of the suit in an inside-out fashion, using caution to touch the outer part of the suit with the inner gloves as little as possible. If suit is unserviceable, put into plastic-lined disposal container.
7	SCBA Tank and Backpack Removal: using proper SCBA shut-down procedures, turn off tank air and disconnect the face piece from the supply hose. Remove tank and backpack and place on table. PDS attendant or buddy will assist.
8	Inner clothing removal: remove inner clothing and place in container.
9	Field Shower (as needed): shower entire body, including hair. Exit shower and redress.
10	Redress Area.

13.4.3.2 In the event that a chemical agent casualty is suspected, the casualty will be monitored for H and L for one full MINICAMS cycle before they cross the contamination control line. This monitoring will be performed once the casualty has been processed through the PDS. Once monitoring has confirmed adequate decontamination (i.e., no detections above the AEL), transfer of the suspected casualty to the SZ is permitted in order that they can be treated by medical personnel. In the event of a life-threatening condition, decisions concerning adequate decontamination of the chemical casualty will be at the discretion of the SSHO and on-site medical support personnel.

13.4.4 PDS Attendant Duties

13.4.4.1 The PDS attendants ensure that the PDS is set up and operated in a manner to prevent the contamination of site personnel and equipment, and to eliminate the migration of contamination to clean areas of the site. There will be a minimum of three PDS attendants on duty during intrusive investigation activities at higher probability sites. The PDS attendant duties include:

- On a daily basis, after the safety briefing, prepare and direct assembly of the PDS required for the day's operation.
- Assist EZ personnel as they process through the PDS; assist in tank changes for Levels A and B PPE.
- Receive and put away all equipment passed from the hot side of the Hot Line (i.e., within the EZ) after ensuring items have been cleaned and decontaminated thoroughly.
- After the final person has passed through the PDS, retrieve and store reusable equipment that has been previously decontaminated, including respirators, gloves, boots, and suits.
- At the end of each day, secure the PDS and dispose of all materials as required, including securing of disposal containers and transfer of used decontamination solutions to approved containers.

13.4.4.2 The PDS attendants will wear Level C PPE while processing personnel through the PDS. The PDS attendants will wear modified Level D PPE (with Tyvek F) during cleanup of the PDS after processing personnel.

13.4.5 Daily PDS Shutdown Procedures

13.4.5.1 After assisting EZ personnel after the last work period, the PDS attendants will assist each other in securing the PDS using procedures that allow them to simultaneously decontaminate the PDS as it is secured. To do this, the PDS attendants will secure the PDS at the shuffle pan and work back conducting personal decontamination and PDS security at the same time. This will be accomplished using the following general procedures (refer to Figure D1-13-2):

- First, all reusable equipment will be gathered and removed from the PDS and then transferred to the SZ to be stored.
- Then, wearing appropriate PPE (as specified in Chapter 5 of this SSHP), the Hot Line will be crossed, if applicable and, moving from dirtiest to cleanest, decontamination solutions will be transferred to their respective storage containers.
- Attendants will then proceed down the line removing tape, if applicable, and then secure the tape disposal container.
- At Station 6, attendants will remove all outer clothing and gloves, and secure the outer garment disposal container.
- At Station 7, attendants will remove any respirators.
- Then attendants will move to the inner glove removal station, remove gloves, and secure the associated container.
- At Station 8, attendants will remove remaining clothing, secure the associated container, and proceed to shower and redress.

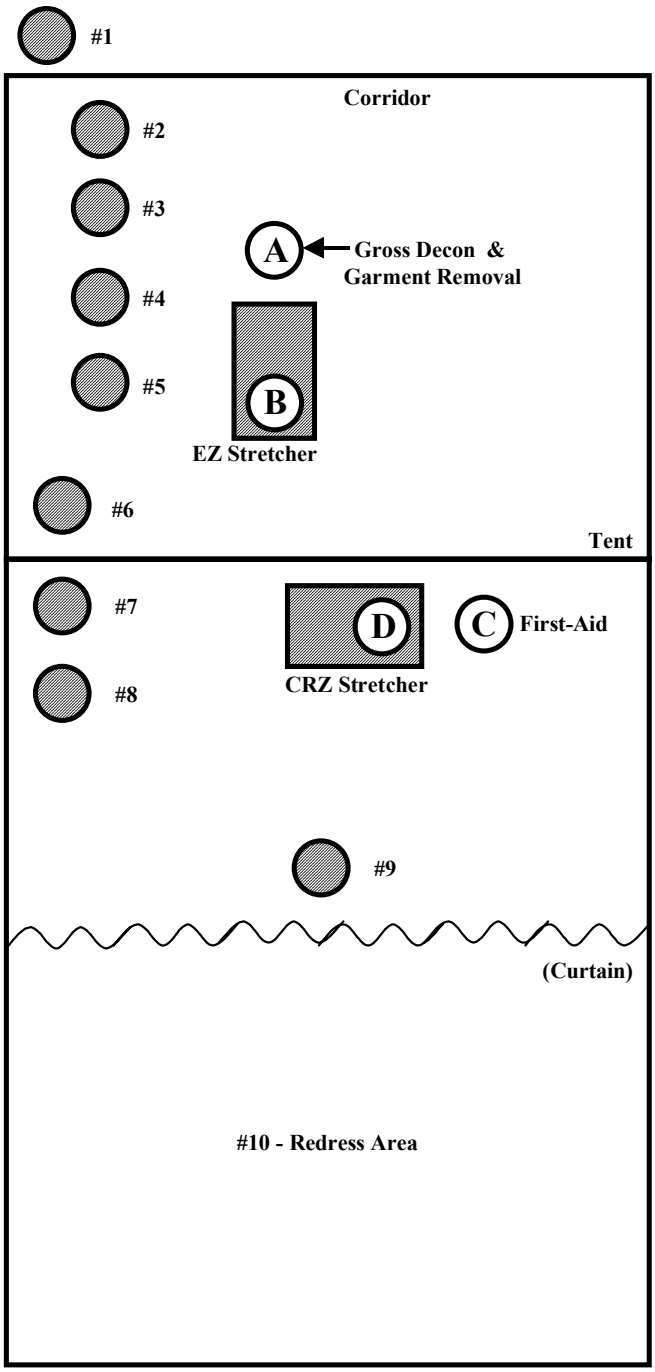
13.4.6 Emergency Decontamination Procedures

13.4.6.1 An EPDS will be set up within the PDS. If an emergency occurs inside the EZ resulting in personal injury or illness that prevents the affected individual from be processed through the PDS, that individual will be processed out of the EZ via the EPDS. The function of the EPDS is to make available all the necessary resources to allow for the combined efforts of first aid and decontamination of personnel.

13.4.6.2 The EPDS will be configured to allow for the rapid decontamination of an injured worker, rapid removal of that worker's PPE, and their subsequent safe transport across the Hot Line. The EPDS will be set up as shown in Figure D1-13-3 and use the following stations and supplies:

- Station A: blunt-nosed scissors for PPE removal. Gross decontamination using the 5% bleach solution of Station 3 and rinse water of Station 4.
- Station B: porous stretcher for EZ side of the Hot Line.
- Station C: drop cloth for location of first aid kit, eye wash kit, burn blanket, bloodborne pathogen universal controls kit, fire extinguisher.
- Station D: stretcher for the PDS side of the Hot Line.

Figure D1-13-3
General PDS Layout for Higher Probability Sites, with EPDS
(May be adapted based on site conditions)



Stations

STATIONS	MATERIALS
1	Various Size Containers Plastic Liners Plastic Drop Clothes
2	Shuffle Pan 5% Bleach Long Handle Brush
3	Pan Sprayer with 5% Bleach Soft-Bristles Brushes
4	Buckets Soap Soft Brushes Spray Wand
5	M-8 paper, ICAM
6	20-30 Gal. Containers Plastic Liners
7	20-30 Gal. Containers Plastic Liners
8	Field Shower Towels & Blankets Shower Shoes
9	Coveralls Chairs

13.4.7 Contamination Control

13.4.7.1 This section outlines the measures that will be taken to control contamination and to prevent contamination from leaving the EZ.

13.4.7.2 The PDS decontamination procedures described above (Table D1.13.1) will be the primary sources of contaminant control. Also all wastewater generated from decontamination procedures will be collected on site, tested, and disposed of accordingly. In addition to these procedures, measures will be taken to limit the movement of dust and vapors that may be generated within the EZ. Water will not be used in excavations to control dust when chemical agent may be present.

13.4.7.3 Uncontaminated standby personnel assigned to assist personnel working in Level C or Level B PPE will, at a minimum, remove outer and inner gloves, respirator and coverall top, and wash hands prior to drinking replacement fluids. Personnel who may have come into contact with contaminated material (based on air monitoring data) will be processed through the PDS before they are allowed to disrobe, eat, or drink.

13.4.7.4 Personnel who may be required to wear respiratory protective equipment, either on a routine or emergency basis, will shave beards or any other facial hair that may interfere with the proper fit of respirators. Any skin abrasions (cuts, bruises, etc.) will be covered with an adhesive bandage and/or adhesive tape before the operator dons protective clothing.

CHAPTER 14
EQUIPMENT DECONTAMINATION

14.1 INTRODUCTION

14.1.0.1 The equipment decontamination procedures required during activities at the SVFUDS depend upon whether intrusive operations are being conducted at a low probability site or a higher probability site. The following sections describe these procedures.

14.2 EQUIPMENT DECONTAMINATION AT LOW PROBABILITY SITES

14.2.1 Introduction

14.2.1.1 The following procedures will be implemented whenever activities at low probability sites involve the potential for contact with hazardous wastes. These and any other site-specific control methods specified by the SSHO will be used to minimize equipment contamination.

14.2.2 Procedures for Handheld Equipment Decontamination

14.2.2.1 If equipment has contacted hazardous waste (based upon soil disposal analyses), it will be decontaminated by brushing off loose soil, washing with soapy water, and rinsing with water. All decontamination fluids will be collected, containerized, tested, and disposed of properly based upon the analytical results.

14.2.3 Procedures for Heavy Equipment and Vehicle Decontamination

14.2.3.1 To minimize the potential for the spread of contamination, individual heavy equipment will remain inside (e.g., excavator) or outside (e.g., loader) the EZ. Such equipment will not transit from the EZ to the SZ through the CRZ without undergoing decontamination.

14.2.3.2 The Site Manager will inspect, and approve for general cleanliness, all heavy equipment prior to the equipment exiting the CRZ for the SZ. In order for a vehicle or piece of heavy equipment to pass inspection it must be in a broom-clean condition, and be free of loose dirt or stabilized material on tailgates, axles, and wheels. All surfaces that have contacted potentially contaminated materials, including soil, will be washed with a pressure washer. Approval for heavy equipment removal from the CRZ will be based on visual inspection of all exposed surfaces and, if needed, the analysis of swipe samples.

14.2.3.3 Personnel assigned to heavy equipment and vehicle decontamination will wear the protective equipment, clothing, and respiratory protection consistent with the levels of PPE worn for the site activities during which the heavy equipment/vehicle became contaminated. Unless a

full-face respirator is worn as part of this requirement, the decontamination personnel will wear a splash shield during the decontamination of heavy equipment/vehicles.

14.3 EQUIPMENT DECONTAMINATION AT HIGHER PROBABILITY SITES

14.3.1 Introduction

14.3.1.1 The following procedures will be implemented whenever activities at higher probability sites involve the potential for contact with chemical agent or hazardous wastes. These and any other site-specific control methods specified by the SSHO will be used to minimize equipment contamination.

14.3.1.2 In the event that monitoring of air and/or soil indicates the presence or release of chemical agent, equipment decontamination will be performed in three stages, using a primary decontamination solution of 5% household bleach followed by a secondary wash using hot, soapy water, and a final rinse with clean water. If an item is identified as potential RCWM by the excavation team and air monitoring indicates no release, TE will recover, package, and transport the item to the IHF. Decontamination will be performed as necessary by the excavation team.

14.3.2 Procedures for Handheld Equipment Decontamination

14.3.2.1 All hand equipment and tools used inside the EZ will be kept inside the EZ until it is demobilized. Hand tools/equipment used on an RCWM site will, at a minimum, receive a three-stage wash/rinse prior to leaving the EZ. The three stages are as follows:

- First stage: wash using a decontamination solution of 5% household bleach.
- Second stage: wash using hot soapy water.
- Third stage: rinse using clean water.

14.3.2.2 All decontamination fluids will be collected in pans. The fluids will be containerized, tested, and disposed of properly based upon the analytical results. After this three-stage wash/rinse cycle and following inspection/approval by the SSHO or USAESCH Safety Specialist, decontaminated hand tools and equipment can be removed from the EZ. If chemical agents were encountered during their use, these tools will be designated as 3X. Further use of these tools on this project will be allowed. Once all work is completed, these tools will be disposed as 3X scrap.

14.3.2.3 Hand tools and equipment with porous surfaces, such as those with wooden or foam covered handles, may allow for the absorption of contamination. If chemical agent contamination is suspected, items of this nature will be kept inside the EZ until they can be tested using headspace analysis (i.e., heated and monitored for chemical agent vapors). These items will be disposed of as potential RCWM or hazardous waste, based upon analytical results.

14.3.2.4 If directed by the USAESCH Safety Specialist, items with potentially absorbed or surface chemical agent contamination will be tested by the Air Monitoring Team once the items have been decontaminated in accordance with the procedure described in Paragraphs 14.3.2.1 and 14.3.2.2. Such items will undergo headspace analysis for traces of chemical agent in accordance with the procedures presented in the Air Monitoring Team's Air Monitoring Plan (Appendix J). Items that show evidence of off-gassing chemical agent will be classified as contaminated and be disposed of in accordance with AR 50-6. Additional testing for contamination from other sources will be performed as necessary following chemical agent decontamination.

14.3.2.5 Whenever possible, equipment that may be contaminated internally or equipment that cannot be washed and rinsed will be encapsulated in plastic prior to being placed inside the EZ. For example, industrial air-monitoring equipment that is not water sealed can be wrapped in plastic (with the exception of the air-sampling inlet). After the air monitor is removed from the EZ, the plastic can be removed, the inlet can be cleaned, and as long as a chemical agent release did not occur during site activities, the monitor can be removed from the CRZ. If a chemical agent release did occur, then any handheld equipment with the potential for internal contamination will be considered chemical agent contaminated and will be double-bagged in plastic and held, pending guidance from USAESCH. This equipment may undergo headspace analysis in accordance with the procedures presented in the Air Monitoring Team's Air Monitoring Plan (Appendix J).

14.3.3 Headspace Procedures

14.3.3.1 All items that are deemed to require headspace analysis will be double-bagged in plastic to prevent transfer of potential contamination outside the EZ. These items will undergo headspace analysis for traces of chemical agent in accordance with the procedures presented in the Air Monitoring Team's Air Monitoring Plan (Appendix J).

14.3.4 Procedures for Heavy Equipment and Vehicle Decontamination

14.3.4.1 To the extent that it is possible, all heavy equipment will remain outside the EZ. In the event that heavy equipment requires decontamination, a decontamination pad will be set up in the vicinity of the PDS.

14.3.4.2 Proper decontamination of equipment is extremely important to ensure that contamination does not spread to uncontaminated portions of the site or to site personnel. To assist in contamination control, seats and flooring in heavy equipment and vehicles used in the EZ will be covered to the extent possible with disposable polyethylene. This layer of protection will be changed as needed to prevent the spread of contamination to surfaces inside the operator area.

14.3.4.3 All equipment requiring maintenance or repair will be staged in the CRZ prior to servicing. The SSHO or USAESCH Safety Specialist will inspect, and approve for general cleanliness, all heavy equipment prior to the equipment exiting the CRZ for the SZ. In order for

a vehicle or piece of heavy equipment to pass inspection, it must be in a broom-clean condition, and free of loose dirt or stabilized material on tailgates, axles, and wheels. All surfaces that have contacted potentially contaminated materials, including soil, will be washed/rinse using the procedures described in Section 14.3.2. Approval for heavy equipment removal from the CRZ will be based on visual inspection of all exposed surfaces and, if deemed necessary by the SSHO or USAESCH Safety Specialist, the analysis of swipe samples.

14.3.4.4 Personnel assigned to heavy equipment and vehicle decontamination will wear the protective equipment, clothing, and respiratory protection consistent with the levels of PPE worn for the site activities during which the heavy equipment/vehicle became contaminated. Unless a full-face respirator is worn as part of this PPE, the decontamination personnel will wear a splash shield during the decontamination of heavy equipment/vehicles.

14.3.4.5 Heavy equipment taken into the EZ will be left in the EZ and will be inspected and decontaminated if a confirmed ringoff or contact with suspected chemical agent occurs. The excavation team will perform gross decontamination (i.e., brush off and removal of any visible contamination) and then move the equipment to the decontamination pad. The equipment will then be pressure washed and scrubbed to remove all gross debris, and then be washed with bleach solution and brushes. Finally, the equipment will be rinsed with water and tested using headspace analysis. If no further contamination is detected, the part(s) of the equipment that might have come into contact with liquid agent will be classified "3X" (e.g., the excavator bucket). If chemical agent is detected, the equipment will be re-cleaned. To perform headspace analysis of heavy equipment, equipment will be placed in an ECS or covered in plastic.

14.3.4.6 Any equipment that is classified as "3X" as a result of contact and subsequent contamination with liquid chemical agents will be handled in accordance with DA Pam 385-61.

14.3.4.7 All solutions collected from the equipment decontamination pad will be containerized, sampled by the field team, and then analyzed by the Air Monitoring Team for chemical agent. The sample results will determine whether the waste is to be handled as chemical agent-contaminated waste.

CHAPTER 15
EMERGENCY EQUIPMENT AND FIRST AID

15.1 FIREFIGHTING EQUIPMENT

15.1.0.1 Firefighting equipment requirements are described in Section 11.2.8.2 of the APP to which this SSHP is appended.

15.2 FIRST AID EQUIPMENT

15.2.1 Equipment for Low Probability Sites

15.2.1.1 A minimum of one first aid kit will be maintained on site by the SSHO. First aid kits used at the site will meet the requirements for Type III, 16-unit kits as described in EM 385-1-1, Paragraph 03.B. First aid kits will be easily accessible to all site workers, protected from the weather, and stored in a manner that keeps the contained items sterile. The location(s) of first aid kits will be clearly marked.

15.2.2 Equipment for Higher Probability Sites

15.2.2.1 First aid kits will be maintained on site by the SSHO at the Command Post, at the PDS, and at the warm-up/cooling shelter. First aid kits used at the site will meet the requirements for Type III, 16-unit kits as described in EM 385-1-1, Paragraph 03.B. First aid kits will be easily accessible to all site workers, protected from the weather, and stored in a manner that keeps the contained items sterile. The location(s) of first aid kits will be clearly marked.

15.2.2.2 Also, during intrusive operations, a fully-equipped ambulance with two trained EMTs will be on standby at the site.

15.3 OTHER EMERGENCY EQUIPMENT

15.3.1 Equipment for Low Probability Sites

15.3.1.1 A minimum of one portable emergency eyewash system will be maintained on site by the SSHO. Emergency eyewash systems used at the site will meet ANSI requirements and have a minimum capacity of one pint. Emergency eyewash systems kept on site will be easily accessible to all site workers.

15.3.2 Equipment for Higher Probability Sites

15.3.2.1 A minimum of two emergency eyewash systems will be maintained on site by the SSHO: one will be available at the warm-up/cooling shelter and one will be available at the PDS. An emergency shower will be maintained at the PDS. Emergency eyewash systems and emergency showers used at the site will meet ANSI requirements.

15.3.2.2 A minimum of two stretchers will be maintained at the emergency PDS.

CHAPTER 16
EMERGENCY RESPONSE AND CONTINGENCY PLAN

16.1 INTRODUCTION

16.1.1 Purpose

16.1.1.1 The purpose of this Emergency Response and Contingency Plan (ERCP) is to define procedures to protect human health and the environment both on and off site in the event of an accident or emergency during the intrusive activities at the SVFUDS.

16.1.2 Elements

16.1.2.1 This ERCP complies with 29 CFR 1910.120(1) and includes the following elements:

- Pre-emergency planning.
- Personnel roles, lines of authority, training, and communications.
- Posted instructions and emergency contact list.
- Emergency recognition and prevention.
- Description of the site topography, layout, and prevailing weather conditions.
- Criteria and procedures for site evacuation.
- Procedures for decontamination and medical treatment.
- Evacuation routes and procedures.
- Emergency alerting and response procedure.
- Critique of emergency responses and follow-up.
- PPE and emergency equipment.

16.1.2.2 This ERCP meets the guidelines given in "Guidance on EPA Oversight of Remedial Designs and Remedial Actions Performed by Potentially Responsible Parties," Appendix B, Contingency Plan (EPA, 1990).

16.1.3 Emergency Identification

16.1.3.1 It is essential that site personnel be prepared in the event of an emergency. Emergencies can take many forms, such as exposure to chemical agents of various types,

illnesses or injuries, chemical exposure, fires, compressed gas leaks, or sudden changes in the weather. The remaining sections of the ERCP outline general emergency and contingency planning procedures to be followed at the SVFUDS. Emergency information and instructions will be posted as appropriate.

16.1.4 Emergency Information Documentation

16.1.4.1 The following forms, provided in Appendix F of the WP, will be completed by all team members to ensure that they have been instructed in the execution of emergency procedures:

- Plan Acceptance Form (acknowledging receipt and review of this APP/SSHP).
- Daily Tailgate Meeting Sign-off (tailgate meetings are conducted by the SSHO for all site personnel).

16.1.4.2 The SSHO will maintain the completed forms on site.

16.2 PRE-EMERGENCY PLANNING

16.2.0.1 Situations requiring emergency response can be minimized by planning and approaching the circumstances in a calm, deliberate manner. The Evacuation/Shelter-in-Place Plan (contained within the CENAB PPP) outlines whom and what means will be used to alert the local community if they are in jeopardy.

16.2.0.3 As conditions dictate, the CENAB Site Operations Officer, USAESCH Safety Specialist, or the SSHO will be the on-site emergency coordinator in case of an accident or incident requiring emergency response. All personnel will be briefed at the morning tailgate safety meetings of the location of the cellular telephones and who has on-site radio communications. This information will also be included in all visitor briefings and in briefings to residents, if the work is occurring at a residential property.

16.2.0.4 A warning system using a series of three (3) long blasts on portable air horns and/or vehicle horns will notify site personnel that an accident or incident has occurred and evacuation is required. Another type of warning signal may be used for emergency notification if deemed appropriate. If another warning signal is to be used, it will be stated in the SSWP. Upon hearing the site evacuation warning, all personnel will immediately clear the site and respond to the rally point. A rally point will be identified for each site-specific investigation. The rally point will be revised based upon prevailing weather conditions and will be identified by the SSHO at the morning tailgate safety briefing. At the rally point, all personnel will be accounted for and interviewed to ensure no one has sustained injuries as a result of the accident or incident.

16.2.0.5 If an emergency response rescue operation is required, no personnel will re-enter the area until the situation has been assessed and it has been determined that resources are on hand to handle the rescue without jeopardizing additional personnel.

16.2.0.2 During investigations at higher probability sites, agencies that may provide emergency response, such as the D.C. Metropolitan Police Department, D.C. Metropolitan Fire Department, and ambulance services, will receive a daily operations schedule. Those agencies will also be involved in pre-emergency planning through their involvement in the tabletop training exercise (Section 4.10.3).

16.3 PERSONNEL ROLES, LINES OF AUTHORITY, AND TRAINING

16.3.0.1 This section describes the various roles, responsibilities, and communication procedures that will be followed by personnel working on this project in the event of an emergency.

16.3.0.2 In the event of an emergency on site, the primary on-site Emergency Coordinator will be the Parsons SSHO or his designee. The on-site Emergency Coordinator will determine the nature of the emergency and take appropriate action.

16.3.0.3 Prior to all field activities, the Parsons SSHO will plan emergency egress routes and discuss them with all personnel who will be conducting fieldwork. Initial planning includes activities such as establishing and testing emergency warning signals and evacuation routes to prevent delays in the event of an emergency.

16.3.0.4 Training requirements for site personnel, including site-specific training and tabletop exercises for higher probability sites, are discussed in Chapter 4 of this SSHP.

16.4 EMERGENCY CONTACT LIST

16.4.0.1 Emergency telephone numbers for the closest hospitals capable of providing emergency service, the Poison Control Center, local police and fire departments, and key safety and management personnel from CENAB, USAESCH, TE, the U.S. Army Edgewood Chemical Biological Center, and Parsons are listed in Appendix C of the WP, in the SSWP for the site, and will also be posted in conspicuous locations on site. The SSHO will be responsible for contacting the listed emergency contacts.

16.5 SITE TOPOGRAPHY, LAYOUT AND PREVAILING WEATHER CONDITIONS

16.5.1 Topography

16.5.1.1 Elevations at the SVFUDS vary from approximately 400 feet North American Vertical Datum (NAVD 88) to approximately 150 feet NAVD 88.

16.5.2 Layout

16.5.2.1 A site-specific layout depicting locations of major equipment, work zones, and AEGL-2 distances (when applicable) will be presented in each SSWP.

16.5.3 Weather Conditions

16.5.3.1 Temperature

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

16.5.3.2 Precipitation

16.5.3.2.1 The average annual precipitation for the Washington, D.C. area 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, and downpours and gusty winds most often accompany these storms. Tropical storms can bring heavy rain. Hailstorms can occur in the spring and single-event 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 in the recent past.

16.5.3.3 Wind

16.5.3.3.1 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 is approximately 9 miles per hour (mph). Wind gusts generally peak at 40 mph but may occasionally reach 60 mph. Tornadoes and tropical storms occur infrequently, but these storms have caused damage in the Washington, D.C. area (NOAA, 1992).

16.6 EMERGENCY RESPONSE PREPAREDNESS

16.6.0.1 The following emergency response preparedness steps will be taken prior to any intrusive investigation activities:

- Personnel will have the proper PPE and will be trained in its correct use.
- The “buddy system” will be enforced. No one will be permitted to enter the EZ alone. Personnel within the EZ will remain in contact with each other at all times.
- During investigations at higher probability sites, an ambulance staffed with EMTs trained in treating chemical agent-related injuries will be on site in the SZ.
- During investigations at higher probability sites, a three-person Emergency Response Team (Chapter 17 of this SSHP) will be suited up and on standby in the redress area of the PDS.

16.7 MEDICAL EMERGENCIES

16.7.1 Treatment of Minor Injuries

16.7.1.1 For minor injuries at lower probability sites, the on site first aid/CPR trained personnel will provide the initial first aid response. If additional/advanced attention is required, an ambulance will be called using 911 or the injured person will be transported by any available site personnel to Sibley Memorial Hospital.

16.7.1.2 For minor injuries at higher probability sites, the on site EMTs or on-site first aid/CPR-trained personnel will provide the initial first aid response. If additional/advanced attention is required, and if the ambulance is on site, the EMTs will attend to the injured party. If recommended by the on site EMTs, the injured person will be transported by any available site personnel to Sibley Memorial Hospital. If additional/advanced attention is required and the ambulance is not on site, , an ambulance will be called using 911 or the injured person will be transported by any available site personnel to Sibley Memorial Hospital.

16.7.2 Treatment of Serious Non-Chemical Agent Injuries

16.7.2.1 For serious injuries at lower probability sites, the first aid/CPR-trained personnel will initiate appropriate emergency first-aid and emergency medical assistance will be summoned using 911.

16.7.2.2 For serious non- chemical agent related injuries at higher probability sites, when on-site EMTs are not present, the first aid/CPR-trained personnel will initiate appropriate emergency first-aid and emergency medical assistance will be summoned using 911. For serious non-RCWM injuries when the EMTs are present, the EMTs will provide emergency treatment to stabilize the injured person, and will then transport the injured person to Sibley Memorial Hospital. Under these circumstances, the first aid/CPR personnel will provide support as requested by the EMTs.

16.7.3 On-Site Treatment of Chemical Agent-Related Injuries

16.7.3.1 As stated in Section 7.3, an ambulance staffed by two trained EMTs will be present on site during any intrusive activities at a higher probability site. In the event of a chemical agent-related injury/exposure, TE personnel will decontaminate the injured/exposed person through the EPDS, and the EMTs will provide emergency treatment and transport the injured/exposed person to George Washington University Hospital.

16.7.4 Off Site Accidents

16.7.4.1 Accidents or incidents occurring off site will be reported to the local authorities. In the event of a transportation accident or incident, personnel will take immediate action to secure the area. Immediate notification of the local authorities will be initiated.

16.7.5 Accident Reporting Requirements

16.7.5.1 Accident reporting requirements are described in Chapter 8 of the APP to which this SSHP is attached.

16.8 CHEMICAL AGENT ALARMS

16.8.1 Alarms and Subsequent Actions

16.8.1.1 The sequence of chemical agent alarms and resultant actions are presented in Section 8.3.4 and in Tables D1.8.2a and D1.8.2b.

16.8.2 Alarm/Ringoff Notification

16.8.2.1 If a ringoff occurs, the SSHO, USAESCH Safety Specialist, CENAB Site Operations Officer, and PSHM will be notified immediately. The Evacuation/Shelter-in-Place Plan (contained within the CENAB PPP) will be activated if appropriate.

16.9 CHEMICAL TREATMENT PROTOCOLS

16.9.0.1 EMT personnel on-site during higher probability operations will maintain chemical treatment protocols for mustard, lewisite, arsine, phosgene, chloropicrin, cyanogen chloride, and ricin in the on-site ambulance. These protocols will include procedures for first aid (initial response), basic treatment (EMT level), and advanced treatment (paramedic level).

16.10 EMERGENCY EVACUATION PLAN

16.10.1 General Evacuation Plan

16.10.1.1 In the case of an operational shutdown as a result of severe weather conditions, or if other hazards exist on-site, the Emergency Coordinator or Site Manager will sound the alarm (three blasts each of five second duration on an air horn or other signal as specified in the SSWP). All personnel in the work area will secure their equipment and proceed to the off-site assembly point, located a safe distance (designated at morning safety meeting) at an upwind location from the site. The Emergency Coordinator or designated alternate will obtain the site entry/exit logs to ensure that all personnel have been safely evacuated. The Site Manager will coordinate with the Emergency Coordinator to determine when it is safe to re-enter the site and resume work.

16.10.1.2 In the general case of a large fire, explosion, or toxic vapor release, a site evacuation will be ordered and the following steps implemented:

- The alarm will be sounded (three blasts each of a five-second duration on an air horn or other signal as specified in the SSWP), appropriate emergency response

agencies will be notified, and USAESCH and Parsons project management personnel will be advised of the situation.

- Downwind impact will be evaluated in order to assist emergency response agencies. All personnel will evacuate in an upwind direction.
- All personnel will assemble in an upwind area when the situation permits, and a head count will be taken.
- The extent of the problem will be determined. If necessary and when conditions do not endanger safety of rescue personnel, the response team will be dispatched in the appropriate PPE to evacuate any missing personnel and to correct the problem.

16.10.2 Evacuation Signals and Routes

16.10.2.1 Two-way radio communication, direct voice communication, or an air-horn (three blasts - each of five seconds duration) will be used to notify employees of the necessity to evacuate an area involved in a release/spill of a hazardous material. Each work location will have a two-way radio. A two-way radio will be kept in the Emergency Coordinator's work location to monitor for emergencies. Total site evacuation will be initiated only by the Emergency Coordinator. However, in their absence, the decision to preserve the health and safety of employees and the public will take precedence.

16.10.2.2 Evacuation routes will be discussed and described during the daily tailgate safety meeting. Periodic drills (before each new phase of work) will be conducted to familiarize each employee with the proper routes and procedures.

16.10.3 Evacuation Procedures

16.10.3.1 In the event that evacuation is necessary, the following actions will be taken:

- The alarm will be activated.
- No further entry of visitors, contractors, or trucks will be permitted to the site. Vehicle and equipment traffic within the site will cease in order to allow the safe exit of personnel and movement of emergency equipment.
- All machinery and equipment will be shut off as long as it is safe to do so.
- All on-site personnel, visitors, and contractors in the Support Zone will assemble at the office trailer, or other designated area, for a head count and wait for further instructions from the Emergency Coordinator.
- Upon completion of the head count, the senior person will provide the information to the Emergency Coordinator.
- Visitors will also be accounted for.

- A final tally of persons will be made by the Emergency Coordinator or his designee. No attempt will be made to find persons not accounted for if the rescue attempt involves endangering the lives of employees.
- Personnel will be assigned by the Emergency Coordinator to be available at the main entrance point to direct and brief emergency responders.
- Re-entry into the site will be made only after clearance has been given by the Emergency Coordinator. At his direction, a signal or other notification will be given for re-entry into the site.
- Drills will be held at the beginning of intrusive fieldwork and at intervals during the intrusive work. Drills will be treated with the same seriousness as an actual emergency.

16.10.3.2 The Evacuation/Shelter-in-Place Plan that describes public evacuation procedures is contained within the CENAB PPP.

16.11 FIREFIGHTING PLAN

16.11.1 Immediate Action

16.11.1.1 Upon detecting a fire/explosion, employees will determine whether the fire is small enough to readily extinguish with immediately available portable extinguishers or water, or if other fire-fighting methods are necessary. Non-essential personnel will be directed away from the area of the fire. If it is judged that a fire is small enough to fight with available extinguishing media, employees will attempt to extinguish the fire provided that:

- They are able to approach the fire from the upwind side, or opposite to the direction of the fire's progress.
- The correct extinguisher is readily available. (Type ABC fire extinguishers will be provided in work areas and on vehicles.)
- No known complicating factors are present, such as the likelihood of rapid spread, imminent risk of explosion, or gross contamination.

16.11.1.2 Personnel leaving a fire/explosion area will account for all employees in that work area as soon as possible. The SSHO or designee will perform a head count for that work area.

16.11.2 Notification

16.11.2.1 The SSHO will be notified as soon as possible of the location, size, and nature of the fire/explosion. As conditions dictate, the SSHO will declare an emergency, initiate the remedial procedures, request assistance from the Metropolitan D.C. Fire Department by dialing 911, and make the necessary telephone notifications to the CENAB Site Operations Officer, USAESCH

Safety Specialist, and USAESCH PM. Outside personnel responding to the fire/explosion may seek assistance from the SSHO with regard to the routing of equipment within the incident site to the most favorable and safe position while minimizing and/or avoiding exposure to any site contaminants.

16.11.3 Rescue

16.11.3.1 If employee(s) are unable to evacuate themselves from a fire/explosion area for any reason, their rescue will be the first priority of responders. The SSHO will determine whether on-site resources are sufficient to proceed or if rescue must be delayed until the D.C. Metropolitan Fire Department responders arrive.

16.11.4 Decontamination

16.11.4.1 At the conclusion of fire fighting activities, the SSHO will:

- Determine, to the extent practical, the nature of the contaminants encountered during the incident.
- If necessary, arrange for the Metropolitan D.C. Fire Department fire response equipment and on-site equipment to be decontaminated, using methods appropriate for the contaminants involved.
- Equipment not easily decontaminated will be labeled and isolated for further action, such as identifying specific contaminants by wipe sampling or awaiting the delivery of specific decontamination media and supplies.

16.12 SPILL PLAN

16.12.1 Chemical Warfare Agents and Chemical Agent-Contaminated Material

16.12.1.1 All suspect or confirmed RCWM and chemical agent is the responsibility of the Product Manager for Non-Stockpile Chemical Materiel/TE. RCWM or chemical agent-contaminated material will be handled in accordance with TE and U.S. Army procedures. The procedures employed by TE will be documented in SOPs required by Army Materiel Command Regulation 700-107.

16.12.2 Chemical Agent Decontamination Solutions

16.12.2.1 TE will provide chemical agent decontamination solutions and will handle spills of these solutions.

16.12.2.2 Chemical agent decontaminants are generally caustic. Personnel handling these solutions will wear safety glasses, a splash apron, and butyl or nitrile gloves. Any clothing that needs to be reused will be thoroughly rinsed with water after being cleaned with decontamination

solutions. Any permeable clothing that becomes wet will be removed. Skin that comes in contact with decontamination solutions will be thoroughly washed with water.

16.12.3 Hazardous Soils/Debris

16.12.3.1 All soil and debris excavated from the SVFUDS will be characterized as clean, RCWM, or hazardous waste, and will be handled as such. Any spills of these materials will be reported to the SSHO, CENAB Site Operations Officer, and USAESCH Safety Specialist. TE/site support and the disposal team/UXO contractor will remediate spills of this nature, as appropriate, under direction of the SSHO.

16.12.4 Spill Response at Low Probability Sites

16.12.4.1 The only hazardous materials present at low probability sites that might present a spill threat are fuels and, to a lesser extent, decontamination fluids. In the event of a spill of one of these materials, the following actions will be taken:

- The SSHO and Site Manager will be notified immediately.
- The leak/spill will be stopped using spill kit located at command post, if this can be accomplished without endangering personnel.
- The spill will be contained, if this can be accomplished without endangering personnel
- The SSHO will sound the alarm to the rally point.
- All nearby drains will be covered/protected.

16.12.5 Spill Response at Higher Probability Sites

16.12.5.1 The following procedures will be implemented in the event of a spill:

16.12.5.2 Isolation:

- Upon observing a spill (or leakage or discharge of the contents of a container) of any size, personnel will immediately don the proper PPE and mitigate the spill as necessary.
- Until determined otherwise, any unidentified spilled material will be assumed to be hazardous and will be contained – see Containment (Section 16.12.5.8) below.
- Sources of ignition within 500 feet of a spill will be extinguished immediately or de-energized (including vehicle engines).
- Employees who have had contact with the spilled materials will report immediately to the decontamination area and undergo decontamination consistent with the extent and nature of the contact.

16.12.5.3 Notification:

- The SSHO, CENAB Site Operations Officer, and USAESCH Safety Specialist will be notified as soon as possible of the location, size, and nature of a spill. Other appropriate notifications will be made in accordance with the emergency contact numbers provided in Appendix C of the WP.
- If conditions dictate, the SSHO may declare an emergency, initiate remediation procedures, request assistance from the D.C. Office of Emergency Management, make the necessary notifications, and initiate a response.
- If assistance from the D.C. Metropolitan Fire Department Hazardous Materials Unit, Spill Response Team is required, the SSHO or CENAB Site Operations Officer will advise them of any special precautions/procedures in effect, and direct them to the location of on-site response supplies and the spill area. A TE escort will direct responders' vehicles over clean fill roads to the extent possible to minimize contamination.

16.12.5.4 Rescue:

- If employees are unable to evacuate themselves from a spill area for any reason, their rescue will be responders' first priority. Responders will wear the appropriate PPE to conduct rescues, as directed by the SSHO or USAESCH Safety Specialist.

16.12.5.5 Assessment/Characterization/Remediation:

- Once employees have left a spill area, initial re-entry to the area will be conducted in the appropriate level of PPE, as directed by the SSHO.

16.12.5.6 Identification:

- An attempt will be made to identify spilled material to the extent possible through container markings, physical properties of the material, and other available evidence.
- When doubt exists as to the material's identity, it will be presumed to be hazardous until proven otherwise.
- Actions will be carried out as though all of the following hazard categories apply, until evidence indicates otherwise: flammable, water reactive, oxidizing, corrosive, and acutely toxic by skin contact or inhalation (material will be presumed to volatilize significantly unless proven otherwise).
- At the direction of the SSHO and if considered necessary, samples of the spilled material will be collected for field testing and subsequent laboratory analysis.

Field tests may include tests of pH, response by various instruments in the headspace of the sample container (colorimetric tubes, ionization device, combustible indicator, meter, etc.), and tests for combustibility and reactivity. Note: Standard procedures for the safe collection and testing of field samples will be followed. If RCWM is suspected of being involved, proper sampling protocols will be followed by TE.

- Available references will be consulted for guidance and toxicity information as the spilled material is identified.

16.12.5.7 Demarcation of Hazardous Spill Areas:

- The area of the spill will be determined and documented, noting area of contamination.
- The quantity of the material spilled will be estimated, and the basis for the estimate will be noted (i.e., remainder in container, direct observation of the spill in progress, etc.).
- The area will be marked with stakes, barrier tape, or other means as appropriate.

16.12.5.8 Containment (these directions for containment also apply if it is suspected that the spill contains chemical warfare agents):

- Prevent Spread of Material
  - Orient containers in an upright position to stop the flow of liquids. Depending on the circumstances, this step may be accomplished as soon as the spill or leak is observed, providing it can be done without personal contact with the material.
  - Use surrounding soil, booms, loose sorbent, sorbent pads, or other materials as appropriate to build a dike or berm around the spilled materials. Choose response materials with minimum potential for incompatibility.
- Suppress Vapors
  - Vapor-suppressing foams may be applied if it has been verified that the spill material is not water-reactive.
  - Sorbent pads with impervious backing may be laid over the spills, provided the potential for incompatibility is taken into consideration.

- Solidify Liquids
  - Apply loose sorbents, pads, or pillows to solidify spilled liquids. Clay and inorganic sorbent should be used on materials not fully identified. Sorbents made from organic materials (such as grain husks) and neutralizers will NOT be applied to materials not fully identified.

16.12.5.9 Cleanup of Hazardous Materials:

- Damaged containers will be placed in drums of compatible construction that contain suitable loose sorbents. Empty drums for this purpose will be maintained on site. Saturated sorbents, soil, spill-control pads, and other spill control material will be collected in compatible drums using non-sparking equipment as appropriate. Contaminated tools and equipment will be collected for subsequent decontamination or disposal.

16.12.5.10 Disposal:

- The appropriate disposal method will depend on the identity of the spilled material. Unidentified material will be stored in a stable, inactive area with secondary containment, pending identification of the material.

16.12.5.11 Restoration:

- Final cleanup of the spill area, which may include post cleanup environmental sampling, will depend on the following:
  - The identity and quantity of the spilled material
  - The physical location of the spill
  - The requirements imposed by regulatory agencies.

16.12.5.12 Air Releases:

- Air monitoring will be conducted by the Air Monitoring Team. The SSHO, in coordination with the Air Monitoring Team, will determine the frequency, duration, and type of air monitoring.

16.12.5.13 Evacuation Routes and Resources (if evacuation is deemed necessary):

- Evacuation notification will be three long blasts on an air horn or vehicle horn or by verbal communication via radio.
- Personnel will keep upwind of smoke, vapors, or spill locations, if possible.

- In the event that emergency site evacuation is necessary, all personnel are to:
  - Escape the emergency situation
  - Decontaminate to the maximum extent practical (personnel will exit through the decontamination corridor, if possible)
  - Assemble at the rally point identified in the morning tailgate meeting.
- If evacuation is not possible via the decontamination corridor, site personnel should remove contaminated clothing once they are in a safe location and leave it near the EZ or in a secure place.
- The SSHO will conduct a head count to ensure all personnel have evacuated safely.

16.13 MEC/RCWM CONTINGENCY PLAN FOR LOW PROBABILITY SITES

16.13.1 Introduction

16.13.1.1 The purpose of this contingency plan is to define the procedures that will be followed in the unlikely event that items potentially related to the American University Experiment Station (AUES) are encountered during non-intrusive activities at the SVFUDS, or during intrusive activities at low probability sites. For purposes of differentiation between this plan and the contingency plan used for higher probability sites, this plan will be referred to as the Low Probability Contingency Plan.

16.13.2 Definitions

16.13.2.1 Items that are potentially related to AUES will be defined as "suspect AUES items" for the purposes of this Low Probability Contingency Plan. These items include but are not limited to:

- Any item identified as suspect MEC/RCWM or as being related to MEC/RCWM; or
- Any sealed container that cannot be positively identified to be unrelated to AUES (e.g., paint cans, etc. are known to be unrelated to AUES activities); or
- Any unsealed container or identifiable fragment thereof that cannot be positively identified to be unrelated to AUES (e.g., beer bottles, etc. are known to be unrelated to AUES activities); or
- Any other item that is suspected to be agent-related material or that is suspected to contain agent-related material; or
- Any other item that cannot be positively identified as an obvious cultural feature or a post-1918 feature (obvious cultural features or post 1918 features include such items as root ball baskets, poly vinyl chlorinated [PVC] piping, wiring, etc.).

16.13.3 Low Probability Contingency Plan Initiation

16.13.3.1 The Low Probability Contingency Plan will be initiated if any suspect AUES items (as defined above) are encountered during site activities, or if personnel at a low probability site exhibit symptoms that may be attributable to a chemical exposure (i.e., respiratory irritation and/or irritation of the eyes or skin).

16.13.3.2 In the event that the Low Probability Contingency Plan is initiated for any reason, intrusive activities will be halted immediately. EXCEPTION: see Paragraphs 16.13.8.2 through 16.13.8.4.

16.13.4 Initiation Procedures for Suspect AUES Items

16.13.4.1 In the event that the Low Probability Contingency Plan is initiated because suspect AUES items are encountered during site activities, subsequent actions taken will be determined according to the nature of the suspect item. This procedure is summarized in Figure D1-16-1 and in Sections 16.13.5 through 16.13.8.

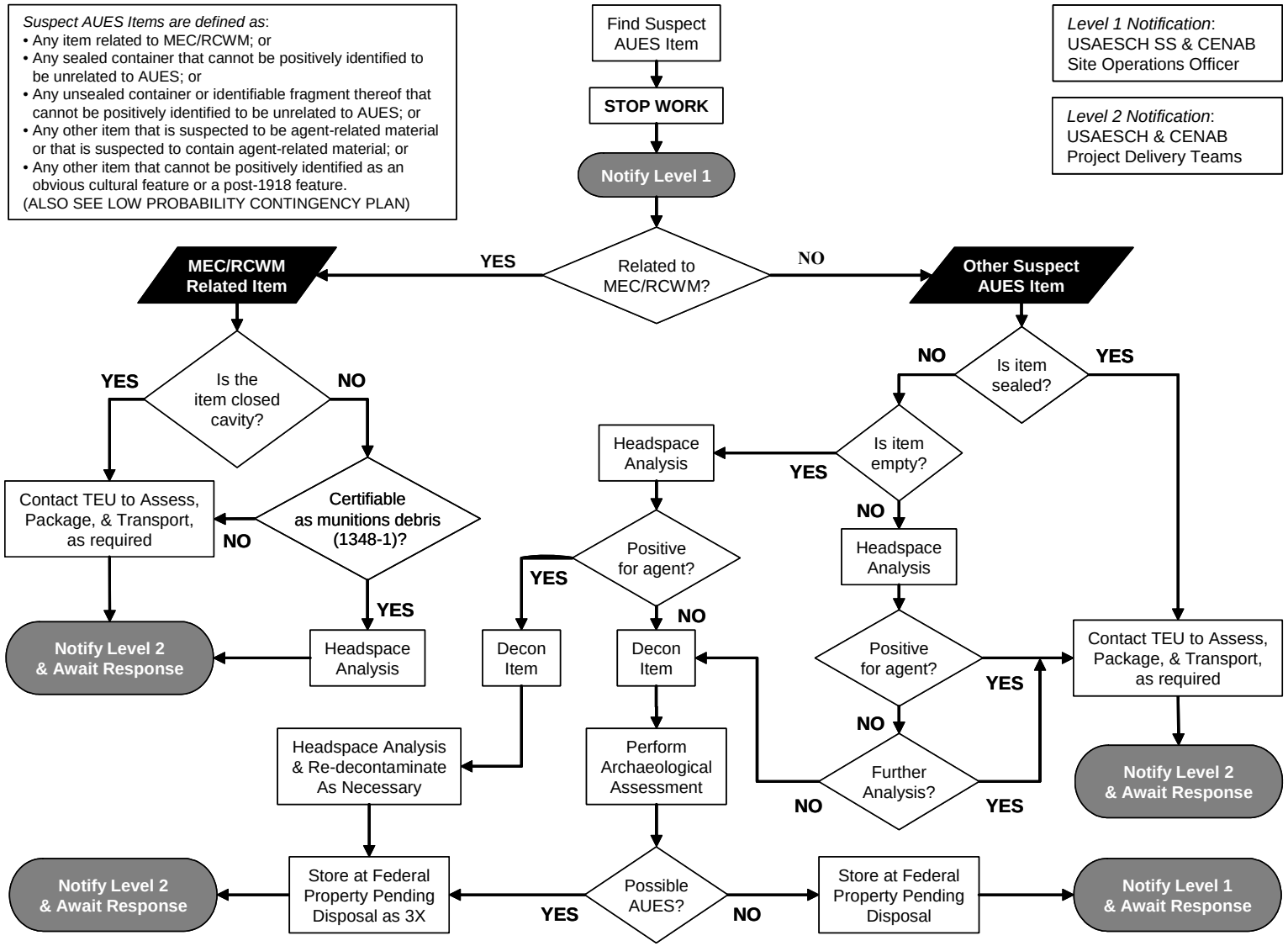
16.13.4.2 After initiation of the Low Probability Contingency Plan and the cessation of intrusive activities, the Site Manager or designate will contact the USAESCH Safety Specialist and CENAB Site Operations Officer and inform them that the Low Probability Contingency Plan has been initiated. The USAESCH Safety Specialist will coordinate further response with USAESCH, TE, and the Air Monitoring Team, as necessary. The CENAB Site Operations Officer will notify other outside agencies, as required. EXCEPTION: see Paragraphs 16.13.8.2 through 16.13.8.4.

16.13.5 Initiation Procedures for MEC/RCWM-Related Items

16.13.5.1 If the suspect item is potentially related to MEC/RCWM, the following step-by-step procedure will be followed:

- If the suspect item requires closed cavity assessment or is not certifiable as munitions debris in accordance with DoD Regulation 4160-21.M, the USAESCH Safety Specialist will contact TE so that the item can be assessed, photographed, packaged, and transported, as appropriate, in accordance with TE SOPs. After TE has been contacted, the USAESCH Safety Specialist and the CENAB Site Operations Officer will contact their respective PDTs to apprise them of the situation.

Figure D1-16-1
Low Probability Contingency Plan Decision Flowchart



- If the suspect item is certifiable as munitions debris in accordance with DoD Regulation 4160-21.M, then the item will be double-bagged in plastic lock bags by personnel wearing Nitrile gloves. The item will be given a tracking number in accordance with Section 16.13.10, and also be photographed unless it is considered unsafe to do so. The item will then be transferred to the Air Monitoring Team for headspace analysis for mustard and lewisite in accordance with their SOPs, and the excavation area will be covered with polyethylene sheeting and anchored at the edges with sandbags pending the analysis results. Once the item has been packaged for transfer, the USAESCH Safety Specialist and the CENAB Site Operations Officer will contact their respective PDTs to apprise them of the situation.
- Intrusive activities will not resume at the site until authorization to continue is received from the USAESCH and CENAB PDTs, via the USAESCH Safety Specialist.

16.13.6 Initiation Procedures for Suspect Sealed Items

16.13.6.1 If the suspect item is sealed, the USAESCH Safety Specialist will contact TE so that the item can be assessed, photographed, packaged, and transported, as appropriate, in accordance with TE SOPs. After TE has been contacted, the USAESCH Safety Specialist and the CENAB Site Operations Officer will contact their respective PDTs to apprise them of the situation.

16.13.6.2 Intrusive activities will not resume at the site until authorization to continue is received from the USAESCH and CENAB PDTs, via the USAESCH Safety Specialist.

16.13.7 Initiation Procedures for Suspect Unsealed Items Containing Liquids or Solids

16.13.7.1 If the suspect item is unsealed and contains a liquid or a solid substance, the following step-by-step procedure will be followed:

- The item will not be moved and the excavation area will be secured and covered with polyethylene sheeting, and anchored at the edges with sandbags.
- The USAESCH Safety Specialist will then contact the Air Monitoring Team to request that they come to the site to perform headspace analysis of the suspect item for mustard and lewisite in accordance with their SOPs.
- If the item is positive for agent, the USAESCH Safety Specialist will contact TE so that the item can be assessed, photographed, packaged and transported, as appropriate, in accordance with TE SOPs. After TE has been contacted, the USAESCH Safety Specialist and the CENAB Site Operations Officer will contact their respective PDTs to apprise them of the situation.
- If the item is not positive for agent, the SSHO will perform a visual assessment of the item to evaluate whether the contents should be recommended for further analysis. Agent-related material may be viscous (oil-like) liquid that is clear,

yellow, brown, black, or milky in appearance, or unidentifiable solid that is white, yellow, green, brown, or black in appearance.

- If the SSHO deems that there is any reason for the contents to undergo further analysis, the USAESCH Safety Specialist will contact TE so that the item can be assessed, photographed, packaged, and transported, as appropriate, in accordance with TE SOPs. After TE has been contacted, the USAESCH Safety Specialist and the CENAB Site Operations Officer will contact their respective PDTs to apprise them of the situation. Intrusive activities will not resume at the site until authorization to continue is received from the USAESCH and CENAB PDTs, via the USAESCH Safety Specialist.
- If the contents of the item clearly appear to be uncontaminated soil, mud, or groundwater, the SSHO will request the USAESCH Safety Specialist's concurrence with this assessment. If the USAESCH Safety Specialist does not concur with the SSHO's assessment, TE will be contacted as described in the previous step. However, if the USAESCH Safety Specialist does concur with the assessment, the item will be photographed, decontaminated in a container of 5% bleach solution, and then double-bagged, labeled (Section 16.13.10), and transferred to the Project Archaeologist for archaeological assessment. The item will be placed into the decontamination solution using tongs or other method to avoid physical contact with the item during decontamination, and the decontamination solution used will be kept segregated until after the results of the archaeological assessment, to allow analysis of the solution if necessary. Following this archaeological assessment, if the item is determined not to be AUES-related, the USAESCH Safety Specialist and the CENAB Site Operations Officer will be informed and may then give permission for intrusive activities to continue at the site. The decontaminated item will be held in a labeled drum at the Federal Property, pending appropriate disposal, and the segregated decontamination solution will be placed in the decontamination water drum.
- If the item is suspected to be AUES-related following this archaeological assessment, the USAESCH Safety Specialist and the CENAB Site Operations Officer will contact their respective PDTs to apprise them of the situation. Intrusive activities will not resume at the site until authorization to continue is received from the USAESCH and CENAB PDTs, via the USAESCH Safety Specialist. The decontaminated item will be held in a labeled drum at the Federal Property, pending disposal as 3X scrap, and the segregated decontamination solution will be kept in a labeled container, pending the decision on whether or not it requires analysis.

16.13.8 Initiation Procedures for Other Suspect AUES Items

16.13.8.1 If the suspect item is neither MEC/RCWM-related nor a sealed item, and it does not contain any liquid or solid substances, the following step-by-step procedure will be followed:

- The item will be photographed and then double-bagged in plastic lock bags by personnel wearing Nitrile gloves. The item will then be transferred to the Air Monitoring Team for headspace analysis for mustard and lewisite in accordance with their SOPs, and the excavation area will be covered with polyethylene sheeting and anchored at the edges with sandbags pending the analysis results.
- If the item is positive for agent, the item will be decontaminated in a container of 5% bleach solution, and then tested again using headspace analysis to confirm decontamination. The item will be placed into the decontamination solution using tongs or other method to avoid physical contact with the item during decontamination. If the item is still positive for agent following this decontamination process, it will be decontaminated again and retested using headspace analysis. This two-step process will be repeated as necessary until decontamination is confirmed. Once the item is decontaminated, it will be double-bagged and labeled in accordance with Section 16.13.10. The USAESCH Safety Specialist and the CENAB Site Operations Officer will contact their respective PDTs to apprise them of the situation and the decontaminated item will be held in a labeled drum at the Federal Property, pending disposal as 3X scrap. Intrusive activities will not resume at the site until authorization to continue is received from the USAESCH and CENAB PDTs, via the USAESCH Safety Specialist.
- If the item is not positive for agent, the item will be decontaminated in a container of 5% bleach solution and then double-bagged, labeled (Section 16.13.10), and transferred to the Project Archaeologist for archaeological assessment. The item will be placed into the decontamination solution using tongs or other method to avoid physical contact with the item during decontamination, and the decontamination solution used will be kept segregated until the results of the archaeological assessment are known, to allow subsequent analysis of the solution if necessary. Following this archaeological assessment, if the item is determined not to be AUES-related, the USAESCH Safety Specialist and the CENAB Site Operations Officer will be informed and may then give permission for intrusive activities to continue at the site. The decontaminated item will be held in a labeled drum at the Federal Property, pending appropriate disposal, and the segregated decontamination solution will be placed in the decontamination water drum.
- If the decontaminated item is suspected to be AUES-related following this archaeological assessment, the USAESCH Safety Specialist and the CENAB Site Operations Officer will contact their respective PDTs to apprise them of the situation. The decontaminated item will be held in a labeled drum at the Federal

Property, pending disposal as 3X scrap, and the segregated decontamination solution will be kept in a labeled container, pending the decision on whether or not it requires analysis. Intrusive activities will not resume at the site until authorization to continue is received from the USAESCH and CENAB PDTs, via the USAESCH Safety Specialist.

16.13.8.2 The above procedure may be modified in the event that multiple suspect items are recovered that are neither MEC/RCWM-related, nor sealed items, and that do not contain any liquid or solid substances (e.g., the team are digging in an area of trash). Under these circumstances, the field team will not be required to stop work and may continue with excavation activities at the low probability site as long as the following conditions have been met:

- The initial suspect item find(s) have been sent for headspace analysis and no agent has been detected.
- The USAESCH and CENAB PDTs have been informed of these finds and have agreed to allow the modification of the procedure.

16.13.8.3 Under these conditions, any suspect items recovered that are neither MEC/RCWM-related, nor sealed items, and that do not contain any liquid or solid substances will be containerized (e.g., placed 55-gallon drum) and sent for headspace analysis at the end of each day. Results of these analyses will be reported to the USAESCH and CENAB PDTs the following morning, via the USAESCH Safety Specialist and the CENAB Site Operations Officer, respectively,. Excavation will halt if agent has been detected.

16.13.8.4 Subsequent to this procedure modification, in the event that any items are recovered that are addressed in Sections 16.13.5, 16.13.6, or 16.13.7 of this Low Probability Contingency Plan, or if the Parsons Site Manager, USAESCH Safety Specialist, or CENAB Site Operations Officer otherwise deem it necessary, further intrusive activities will be halted immediately and the appropriate Contingency Plan procedures will be followed.

16.13.9 Initiation Procedures for Possible Agent Exposure

16.13.9.1 In the event that the Low Probability Contingency Plan is initiated because site personnel exhibit symptoms that may be attributable to a chemical exposure, the following step-by-step procedure will be carried out:

- Personnel will move upwind of the excavation or other potential source of exposure.
- The USAESCH Safety Specialist and CENAB Site Operations Officer will be contacted and informed that the Low Probability Contingency Plan has been initiated. The USAESCH Safety Specialist will coordinate further response with USAESCH, TE, and the Air Monitoring Team, as necessary. The CENAB Site

Operations Officer will notify and coordinate with other outside agencies, as required.

- Potentially exposed personnel may be processed through the EPDS, if signs of exposure are observed on their skin or clothing. Areas of the body suspected to be exposed will be flushed with copious quantities of water. Potentially exposed clothing or PPE will be removed and decontaminated in accordance with the procedures described in Chapter 13 of this SSHP.
- George Washington Hospital will be notified (telephone: 202-934-3211) and, if present, the onsite ambulance will be contacted and used to transport any personnel exhibiting chemical exposure symptoms, or other personnel potentially exposed, to that facility. If no ambulance is on-site, George Washington Hospital will be notified and 911 will be called. At this time, George Washington Hospital will be informed whether the potentially exposed personnel have been processed through the EPDS, though they will be advised that the potentially exposed personnel may require additional decontamination upon arrival at the hospital if decontamination has not been confirmed on site using agent monitoring.
- The excavation area will be covered with polyethylene sheeting and anchored at the edges with sandbags and the USAESCH Safety Specialist will contact the Air Monitoring Team to perform headspace analysis at the excavation. Also, the USAESCH Safety Specialist and the CENAB Site Operations Officer will contact their respective PDTs to apprise them of the situation.
- Intrusive activities will not resume until authorization to continue has been received from the USAESCH and CENAB PDTs, via the USAESCH Safety Specialist.

16.13.10 On-Site Tracking for Low Probability Contingency Plan

16.13.10.1 Every suspect item uncovered that causes the Low Probability Contingency Plan to be triggered will be tracked using unique alphanumeric tracking numbers. General details of the numbering systems to be used are described below, though specific details will be included in each SSWP.

16.13.10.2 The Site Manager will enter descriptions of all suspect items in the Field Log Book (e.g., dimensions, color, material of construction, other notable features). Photographs will be taken of suspect items, as specified in Section 16.13.6. All photographs of suspect items will include a visual scale in order that the dimensions of the item can be estimated using the photograph.

16.13.10.3 On any day that the Low Probability Contingency Plan is initiated, the Site Manager will complete a Contingency Plan Initiation Summary and include it in the Daily Report (Section 4.9 of the WP). Both the Site Manager and the USAESCH Safety Specialist will sign this Contingency Plan Initiation Summary.

16.13.10.4 Items Removed by TE

16.13.10.4.1 If the item has been removed by TE during a low probability intrusive investigation, Parsons will assign a unique alphanumeric tracking number for internal reference and tracking purposes. The first two characters of this number will be "TE" (to denote an item removed by TE). The next set of characters will denote the overall site location (e.g., "4801GR" for 4801 Glenbrook Road). The next four characters will indicate the specific location at which the item was recovered (AN for anomaly number). The last number will be a unique number assigned to each item recovered at that location which is removed by TE.

16.13.10.5 The following is an example of designations for items removed by TE:

TE-4801GR-AN22-010, TE-4801GR-EX22-011, etc.

16.13.10.6 Munitions Debris

16.13.10.6.1 Each item of munitions debris encountered during a low probability intrusive investigation will be given a unique alphanumeric tracking number. The first three characters of this number will be "SCR" (to denote munitions debris). The next set of characters will denote the overall site location (e.g., "4710WL" for 4710 Woodway Lane). The next four characters will indicate the specific location at which the item was recovered (AN for anomaly number). The last number will be a unique number assigned to each munitions debris item recovered at that location.

16.13.10.6.2 The following is an example of munitions debris item designations:

SCR-4710WL-AN22-010, SCR-4710WL-AN22-011, etc.

16.13.10.7 Other Suspect Items

16.13.10.7.1 Other suspect items encountered during low probability, intrusive investigations will be given a unique alphanumeric tracking number, which will be marked on the bag in which the item is placed. Additionally, the date of generation will be marked on the bag. The first two characters of this number will be "SI" (suspect item). The next set of characters will denote the overall site location (e.g., "5058SegS" for 5058 Sedgwick Street). The next four characters will indicate the specific location at which the item was recovered (AN for anomaly number). The last number will be a unique number assigned to each suspect item recovered at that location.

16.13.10.7.2 The following is an example of designations for other suspect items:

SI-5058SegS-AN01-001, SI-5058SegS- AN01-002, etc.

16.13.10.7.3 In the event that the procedures detailed in Paragraphs 16.13.8.2 through 16.13.8.4 are followed, other suspect items will be containerized and tracked by batch using a unique alphanumeric tracking number, which will be marked on the container in which each batch of items is placed. Additionally, the date of generation will be marked on the container. The first two characters of this number will be "SI" (suspect item). The next set of characters will denote the overall site location (e.g., "5058SegS" for 5058 Sedgwick Street). The next four characters will indicate the specific location at which the item was recovered (AN for anomaly number). The next part of the code will be "BATCH" to denote that this tracking number refers to multiple items. The last number will be a unique number assigned to each suspect item recovered at that location.

16.13.10.7.4 The following is an example of designations for other suspect items using the modified procedures:

SI-5058SegS-AN01-BATCH-001, SI-5058SegS- AN01- BATCH-002, etc.

16.14 MEC/RCWM CONTINGENCY PLAN FOR HIGHER PROBABILITY SITES

16.14.1 Introduction

16.14.1.1 This contingency plan defines the procedures that will be followed in the event that suspect MEC/RCWM items are encountered during intrusive activities at higher probability sites in order to ensure the safety and the protection of the public and workers, and to ensure the proper disposal of discovered MEC/RCWM items. For purposes of differentiation between this plan and the contingency plan used for low probability sites, this plan will be referred to as the Higher Probability Contingency Plan.

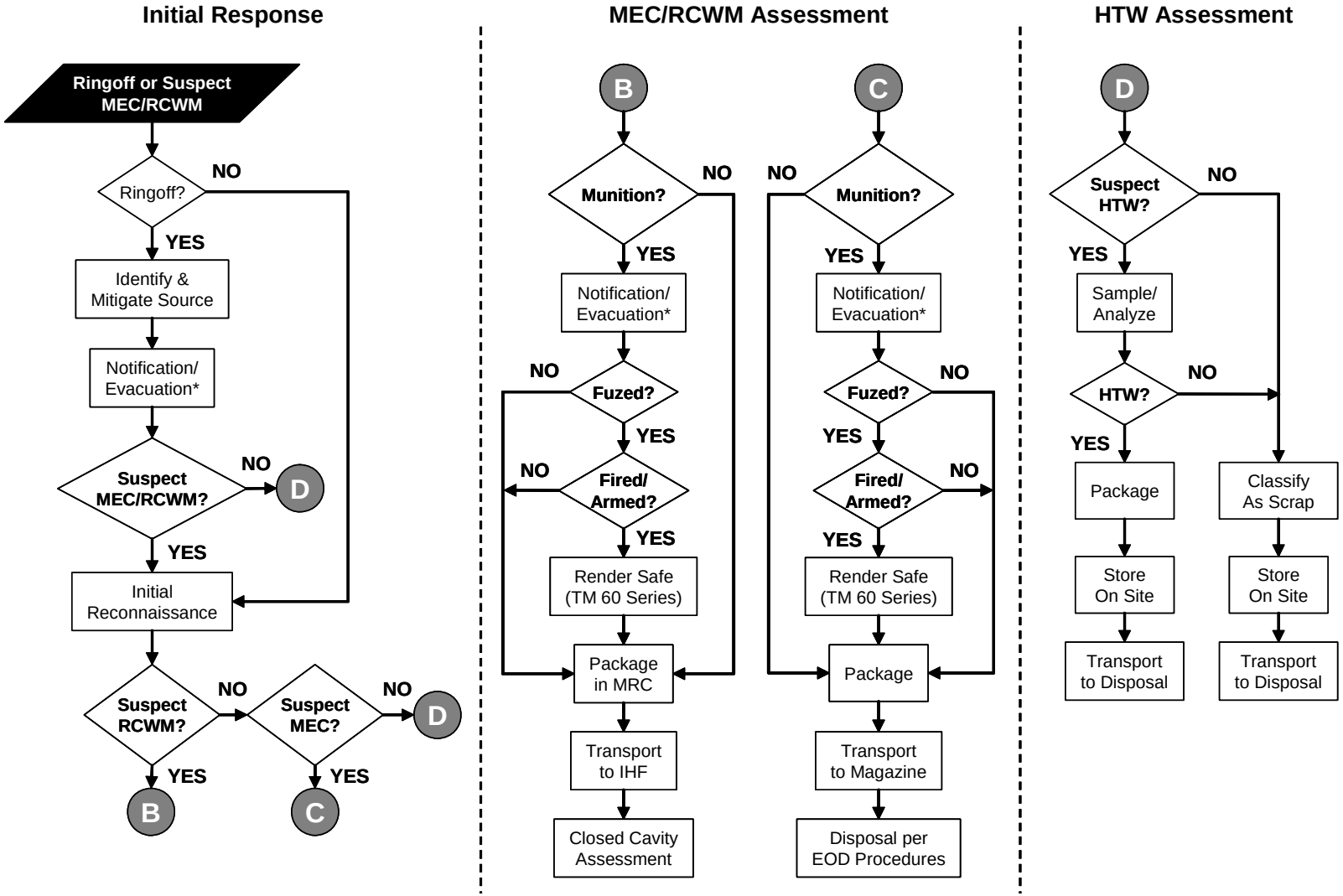
16.14.1.2 Responses to air monitoring alarms/ringoffs are described in Sections 8.3.4 and 8.3.5 of this SSHP.

16.14.2 Initial Response

16.14.2.1 If there is an alarm or a suspect RCWM item is encountered, the excavation team will respond according to the procedures described below and illustrated in Figure D1-16-2.

16.14.2.2 If an air monitoring alarm has occurred with no apparent suspect RCWM container present and the excavation team is in the proper level of PPE, they will take immediate action to investigate and mitigate the source, as necessary. If they are not in the appropriate level of PPE, the excavation team will exit the EZ, upgrade PPE depending upon the alarm level, and then reenter the EZ and work towards investigating and mitigating the source, as necessary. Mitigation procedures will include identifying the source of the alarm, and containerizing the surrounding soil until there are no additional alarms recorded. If, during source mitigation, a suspect RCWM container or MEC item is encountered, the excavation team will perform an initial reconnaissance.

Figure D1-16-2
Higher Probability Contingency Plan Decision Flowchart



* Notification/evacuation is only applicable if the public is not adequately protected by engineering controls or by prior withdrawal

16.14.2.3 Following investigation of possible source of an air monitoring alarm, if suspect chemical agent-related gross liquid contamination is observed, the excavation team will mitigate the source by covering the area with plastic and will then exit the EZ through the PDS. Personnel will then upgrade PPE to an adequate level for dealing with liquid contamination (Chapter 5 of this SSHP) and may then enter the EZ to further mitigate and/or containerize the suspect liquid source.

16.14.2.4 Excavation may continue once the alarm/ringoff has been cleared. However, PPE may be upgraded depending upon the alarm level.

16.14.3 Initial Reconnaissance

16.14.3.1 If a suspect RCWM container or MEC item is encountered, the excavation team and/or TE will perform an initial reconnaissance. For the purposes of this Higher Probability Contingency Plan, a suspect RCWM container is defined as either (a) a container with markings denoting chemical agent or RCWM, or (b) an unidentifiable intact container that contains liquid. Note that, during an investigation at a higher probability site, any discovered unidentifiable intact container that contains liquid will be assumed to be potential RCWM until determined otherwise.

16.14.3.2 If, during the initial reconnaissance, the item is determined to be potential RCWM, the assessment procedures described in Section 16.14.4 will be performed.

16.14.3.3 If an item is suspected to be MEC, the UXO team will assess the suspect MEC using their SOPs. Based upon their assessment, established procedures described in Section 16.14.5 will be implemented, if necessary.

16.14.3.4 If it is determined that a suspect container is neither a RCWM container nor a MEC item, it will be categorized as potential HTW and assessed according to the procedures described in Section 16.14.6.

16.14.4 RCWM Assessment

16.14.4.1 If the item is categorized as potential RCWM, TE will perform an assessment in accordance with their assessment SOPs. This assessment will be performed at the Federal Property under the supervision of the USAESCH Safety Specialist and the SSHO.

NOTE: IN THE EVENT THAT A RCWM ITEM RECOVERED DURING AN INVESTIGATION IS DETERMINED TO BE INCONSISTENT WITH THE MCE STATED IN THE SSWP, WORK WILL CEASE AND THE SITE-SPECIFIC MCE WILL BE REEVALUATED. IF THE MCE IS REVISED TO A GREATER HAZARD, THE AEGL-2 DISTANCE WILL BE RECALCULATED AND THE NEW AEGL-2 DISTANCE WILL BE IN EFFECT FOR THE REMAINDER OF THE INVESTIGATION. THE REVISED MCE AND AEGL-2 DISTANCE WILL BE APPROVED BY USAESCH PRIOR TO IMPLEMENTATION. AN AMENDMENT TO THE CSS OR ANNEX WILL BE PREPARED AND SUBMITTED FOR APPROVAL.

16.14.4.2 If an item is assessed to be a munition, the following steps will be taken.

- The CENAB Site Operations Officer, SSHO, USAESCH Safety Specialist, and Site Manager will be notified immediately. If not previously implemented, the CENAB Site Operations Officer may implement public evacuation or shelter-in-place in accordance with the CENAB PPP if the public is not adequately protected by engineering controls or a prior withdrawal.
- If the item is fuzed and fired/armed, it will be rendered acceptable to move by TE EOD personnel in accordance with TM 60 Series, packaged in a MRC, transported to the IHF containers, and subjected to closed cavity item assessment in accordance with TE assessment procedures (Section 3.8.13 of the WP). The transportation route to the IHF containers will be determined on a site-specific basis and will be included in the SSWP.
- If the item is not acceptable to move, work will stop and appropriate TM 60 series actions, in conjunction with engineering controls, will be selected. These measures will be applied only after review and approval by the on-site USAESCH Safety Specialist (reference TM 60A-1-1-22).
- If the item has not been fired/armed, it will be packaged in a MRC, transported to the IHF containers, and subjected to closed cavity item assessment in accordance with TE assessment procedures (Section 3.8.13 of the WP).

16.14.4.3 If the item is not a munition (i.e., it is an intact container), it will be packaged in a MRC, transported to the IHF containers, and subjected to closed cavity item assessment in accordance with TE assessment procedures (Section 3.8.13 of the WP).

16.14.5 MEC Assessment

16.14.5.1 If the item is not potential RCWM but is a potential MEC item, qualified UXO technicians will perform the assessment.

NOTE: IN THE EVENT THAT A MEC ITEM RECOVERED DURING AN INVESTIGATION IS DETERMINED TO BE INCONSISTENT WITH THE MGFD STATED IN THE SSWP, WORK WILL CEASE AND THE SITE-SPECIFIC MGFD WILL BE REEVALUATED. IF THE MGFD IS REVISED TO A GREATER HAZARD, THE RELATED MSD WILL BE RECALCULATED AND THE NEW MSD WILL BE IN EFFECT FOR THE REMAINDER OF THE INVESTIGATION. THE REVISED MGFD AND MSD WILL BE APPROVED BY USAESCH PRIOR TO IMPLEMENTATION. AN AMENDMENT TO THE CSS OR ANNEX WILL BE PREPARED AND SUBMITTED FOR APPROVAL.

16.14.5.2 If the MEC item is assessed to be a munition, the following steps will be taken:

- The CENAB Site Operations Officer, SSHO, USAESCH Safety Specialist, and Site Manager will be notified immediately. If not previously implemented, the

CENAB Site Operations Officer may implement public evacuation or shelter-in-place in accordance with the CENAB PPP if the public is not adequately protected by engineering controls or a prior withdrawal.

- If the item is fuzed and fired/armed, EOD support shall be requested for further action.
- If the item is not acceptable to move, work will stop and appropriate safety precautions, in conjunction with engineering controls, will be selected. These measures will be applied only after review and approval by the on-site USAESCH Safety Specialist (reference TM 60A-1-1-22).
- If the item has not been fired/armed, it will be packaged by UXO personnel, transported to the magazine at the Federal Property, and disposed of in accordance with applicable guidelines in coordination with USAESCH.

16.14.6 HTW Assessment

16.14.6.1 If the item is not MEC or RCWM but is a potential HTW item, it will undergo HTW assessment at the Federal Property assessment area. The potential HTW item will undergo headspace analysis and liquid or solid samples will be collected from the item by the Sample Team and submitted to the HTW laboratory. If the item itself cannot be sampled, soil samples will be collected from the vicinity in which the item was recovered and these will be analyzed and used to characterize the item.

16.14.6.2 If the item contains HTW components, it will be packaged in a polyethylene drum overpack and stored at the Federal Property with secondary containment until shipped for disposal.

16.14.6.3 All items that are obviously scrap or proven to be scrap will be staged at the Federal Property until shipped for disposal.

16.15 CHEMICAL AGENT OR RELEASE REPORTING

16.15.0.1 A Chemical Event Report, RCS: CSGPO-453 (an example will be kept on site), will be made within three hours of the occurrence of any one of the following (per AR 50-6):

- Any detection of agent outside of a munition body, bulk storage container, or engineering control which is confirmed by other positive detections;
- Discovery of an actual or suspected chemical agent-filled munition or container that may require emergency transportation or disposal;
- Actual or suspected exposure of personnel to an agent above the allowable limits contained in AR 385-61, DA PAM 40-8 or DA PAM 40-173; or

- Any of the above occurrences involving items configured as weapons containing chemical agents or industrial chemicals.

16.15.0.2 If it appears that chemical event reporting may be needed, the USAESCH Safety Specialist will be notified immediately.

16.15.0.3 The Site Manager or SSHO will be prepared to provide the information requested in the Chemical Event Report.

CHAPTER 17
EMERGENCY RESPONSE TEAM

17.1 SITE SAFETY AND HEALTH OFFICER

17.1.0.1 The SSHO has overall responsibility during emergencies. In case of emergency, the SSHO will implement the site emergency response procedures and is specifically responsible for the following:

- Designating the members of the Emergency Response Team.
- Implementing the site ERCP, including ordering site evacuations, coordinating fire fighting efforts, and directing spill control and cleanup.
- Supervising site evacuation and decontamination procedures.
- Contacting emergency services such as the fire department, ambulance and security services, as may be required as requested by the Emergency Response Team.
- Assisting in providing first aid services and medical support or evacuation for injured or exposed personnel.

17.2 EMERGENCY RESPONSE TEAM

17.2.0.1 During investigations at higher probability sites, a three-person Emergency Response Team (Section 16.6) will be suited up and on standby in the redress area of the PDS.

17.2.0.2 Under the direction of the SSHO, the Emergency Response Team will respond in a defensive manner to hazardous substance releases that occur during project activities. In the event that an emergency response is required, the Emergency Response Team will:

- Locate all victims, assess their condition(s), and make an on-scene determination of the resources needed to stabilize and transport them.
- Request emergency response by outside agencies, if required.
- Assess the situation and identify the existing hazards, potential for additional hazards, and need for additional response. Supervisors will ensure that the hazardous condition is stabilized, eliminated, or permanently fixed. If personnel or property are jeopardized, a decision will be made about alerting the local community.

- Remove injured personnel from the EZ. Decontamination, if required, will be accomplished through the EPDS.

17.2.0.3 Response to chemical agent emergencies will be handled by TE (Section 17.3).

17.3 CHEMICAL AGENT EMERGENCY RESPONSE

17.3.0.1 TE will respond to all chemical agent-related emergencies.

17.3.0.2 During intrusive activities at a higher probability site, TE will have a minimum of two medium and two large MRCs, decontamination solutions, and associated supplies and equipment available in preparation for response to potential chemical agent-related emergencies. These supplies will be stored in the TE van in the SZ. Additional MRCs and supplies will be stored in the TE MilVan at the Federal Property.

17.4 ON-SITE PERSONNEL

17.4.0.1 Other on-site personnel will be responsible for reporting emergency situations or conditions immediately to their supervisors, alerting other employees, helping injured personnel, and assisting as directed to mitigate an incident.

CHAPTER 18
CONFINED SPACE ENTRY

18.1 INTRODUCTION

18.1.1 Background

18.1.1.1 Hundreds of fatal accidents occur each year in "confined spaces." The causes of these fatalities include lack of knowledge, improper procedures, and inappropriate equipment for entry and work in confined spaces. The greatest dangers posed by confined spaces are atmospheric hazards and the leading cause of confined space fatalities is asphyxiation.

18.1.2 Classification of Confined Spaces

18.1.2.1 Confined spaces are classified based upon existing or potential hazards. The two classifications of confined spaces are "non-permit confined space" and "permit-required confined space."

18.1.2.2 A non-permit confined space does not contain atmospheric hazards or have the potential to contain any hazard capable of causing death or serious physical harm. Examples of non-permit confined spaces include vented vaults or motor control cabinets. These spaces have either natural or permanent mechanical ventilation to prevent the accumulation of a hazardous atmosphere, and they do not present engulfment or other serious hazards. Since non-permit confined spaces are free of atmospheric or safety hazards, they do not require special entry protocols. However, entry into these areas will comply with applicable OSHA and USACE requirements (i.e. proper illumination, proper ladder use, etc.).

18.1.2.3 A permit-required confined space has one or more of the following characteristics:

- Contains or has the potential to contain a hazardous atmosphere
- Contains a material that has the potential for engulfing a person
- Has an internal configuration such that a person could be trapped by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section
- Contains any other recognized serious safety or health hazard

18.1.2.4 Unless there is a reason to assume that there might be a hazardous atmosphere present, confined spaces during a low probability investigation will typically be assumed to be non-permit spaces.

Unless there is a reason to assume otherwise, confined spaces encountered during a higher probability investigation will typically be assumed to be permit-required spaces.

18.1.3 Hazardous Atmospheres

18.1.3.1 With regard to confined spaces, there are three types of potentially hazardous atmospheres that require special attention and monitoring.

- **Oxygen-Deficient Atmospheres.** An oxygen-deficient atmosphere has less than 19.5 percent available oxygen (O_2). This percentage will be considered the minimum level for safe entry into a confined space without a breathing apparatus. The oxygen level in a confined space can decrease because of the work being done, e.g. welding, cutting, brazing, stirring-up sludge. The oxygen level also can be decreased if displaced by a gas or vapor, such as carbon dioxide or methane. Oxygen deficient atmospheres can cause unconsciousness and death due to asphyxiation.
- **Flammable and Explosive Atmospheres.** For a confined space to have an explosive or flammable atmosphere, three components are necessary: oxygen; a flammable or explosive gas, vapor or dust in the proper mixture; and a source of ignition (fire, hot work).
    - Work in a confined space will be prohibited (except work using intrinsically safe equipment and tools) when air monitoring indicates the presence of flammable vapors greater than 10 percent of the lower explosive limit.
    - An oxygen-enriched atmosphere is an environment with available oxygen above 22 percent. This type of atmosphere will cause flammable materials, such as clothing and hair to burn violently when ignited. Oxygen will not be used to ventilate a confined space since this will produce an oxygen-enriched atmosphere.
- **Toxic Atmospheres.** All substances (liquids, vapors, solid materials, and dusts) should be considered hazardous in a confined space. Toxic substances can come from the following:
    - The product stored or conveyed in a space: Toxic substance can be absorbed into walls and can give off toxic gas when cleanup or removal activities are performed. This is especially true, for example, in storage tanks due to the possible presence of sludges and decomposing material. Toxic gases that may be encountered in this type of confined space include ammonia, carbon monoxide, and hydrogen sulfide. Knowing the material(s) stored in a confined space is therefore crucial when selecting protective measures and air monitoring equipment.

- The work being performed in the space: Examples of work that can cause the creation of toxic substances are welding, cutting, brazing, cleaning, painting, scraping, and sanding.
- The process material in a confined space: Toxic atmospheres can be generated in various processes. For example, cleaning solvents are used in many industries. The vapors from these solvents are very toxic in a confined space.

18.2 ENTRY INTO PERMIT-REQUIRED CONFINED SPACES

18.2.0.1 Entry into a permit-required confined space is not anticipated for work on this project. However, if unanticipated entry into a permit-required confined space becomes necessary, certain equipment and safety procedures will be used. The equipment and safety procedures are described in detail below.

18.2.1 Equipment

18.2.1.1 The following is a list of equipment that will be available for permit-required confined space entry:

- Atmosphere-testing equipment to measure oxygen deficiency, combustible gas, and vapor;
- A positive pressure, self-contained breathing apparatus or a positive pressure air line respirator with an escape SCBA;
- Protective clothing, including rubber boots, gloves, and hard hats, or Level A suit if mustard or lewisite contamination is present;
- Extraction harness;
- Explosion-proof lights, if needed;
- Communications equipment; and
- An extension ladder for entry.

18.2.1.2 Additional equipment or procedures will be evaluated by the PSHM, in consultation with the SSHO, based upon the hazard characteristics of the permit-required confined space.

18.2.2 Atmospheric Testing of Confined Spaces

18.2.2.1 The greatest danger of working in a confined space is a hazardous atmosphere. In order to detect these, atmospheric testing will be performed before any member of the field team enters a permit-required confined space. If possible, initial atmospheric testing of a permit-required confined space will be performed before any ventilation of the space. This type of

initial testing will afford the best opportunity to assess "worst case" conditions and/or identify toxic contaminants, which may be present in low concentrations.

18.2.2.2 Atmospheric testing of confined spaces for the SVFUDS include tests for oxygen content, flammable or explosive atmospheres and perhaps specific toxic contaminants. A combination meter will be used to test for oxygen and explosive vapors and a PID will be used to monitor for toxic industrial chemical contaminants. The PSHM has the sole responsibility for deciding on additional tests for toxic contaminants based upon potential atmospheric hazards. During any atmospheric testing, all levels of the confined space will be tested. Atmospheric testing for oxygen and toxic contaminants will not be required if the entrants are wearing Level B PPE or higher.

18.2.2.3 Personnel working in permit-required confined spaces will be provided with continuous atmospheric monitoring device(s). Monitoring of the atmosphere will be performed according to the Confined Space Permit. Equipment used to monitor the atmosphere will be explosion-proof.

18.2.2.4 Maintenance and calibration records for the air monitoring equipment will be maintained by the SSHO (for industrial chemicals), and by the Air Monitoring Team (for chemical agents and their breakdown products).

18.2.3 Medical, First Aid, and Rescue Provisions

18.2.3.1 General Information

18.2.3.1.1 The list of hospitals, police, fire, and ambulance services, including phone numbers and directions to medical facilities included in this plan will be maintained, with a first- aid kit at the entrance of the permit-required confined space. For entry, there will always be at least one person readily available in the area of the permit-required confined space with up-to-date training in CPR and standard first-aid procedures.

18.2.3.1.2 Standby rescue personnel will be trained, fully-equipped, and ready to effect an immediate rescue. The rescue procedure to be used is:

- First, call for help either by radio or phone, if necessary;
- Next, put on respiratory protection and other necessary equipment before entering the confined space;
- After reaching the victim, assess the injury and the nature of the accident to determine the correct removal procedure; and
- Administer first-aid or breathable air to keep the victim alive until further medical assistance arrives.

18.2.3.2 Employee Information

18.2.3.2.1 The entrance to any permit-required confined space will be posted with a sign. The wording on the sign will include, but not be limited to the following text:

DANGER
CONFINED SPACE
ENTRY BY PERMIT ONLY

18.2.3.3 Specific Work Requirements

18.2.3.3.1 When a specific work practice is performed or specific safety equipment is needed for entry into the permit-required confined space, that information will be added to the warning sign in large letters. For example:

AIR LINE RESPIRATOR REQUIRED FOR ENTRY

18.2.4 General Work Practices

18.2.4.1 The following general work practices will be followed if permit-required confined space work is performed:

- If work is being done in a permit-required confined space, an attendant and stand-by personnel (number to be specified on permit described later) will be present in case of an emergency. Each stand-by person will be assigned appropriate respiratory protection.
- Personnel who are in the permit-required confined space will be provided with atmospheric monitoring device(s) as necessary.
- If a worker begins to feel dizzy or light-headed, he will leave the space immediately. High temperatures and humidity can lead to heat stress or breathing difficulties.
- Hardhats will always be worn in confined spaces. Slick and wet surfaces will probably be encountered in the confined space. Slips and falls can cause injury. Falling objects are also a hazard.
- Hearing protection may be needed. Noise within a space may be amplified because of the acoustic properties of the space, and excessive noise can damage hearing as well as affect communication.
- Explosion-proof lights and intrinsically safe equipment will be used in the permit-required confined space.
- Electrical tools will be equipped with ground fault interrupters and workers will be warned that wet surfaces increase potential for and effect of electrical shock.

18.3 PERMIT-REQUIRED CONFINED SPACE TRAINING

18.3.0.1 Personnel will be made aware of the hazards and procedures associated with confined space entry during the initial site health and safety training. Personnel who may be assigned to work in a permit-required confined space, or in support of those working in a permit-required confined space, will receive the following additional training before entry:

- Roles and responsibilities;
- Emergency entry and exit procedures;
- Emergency rescue;
- Use of applicable respirators;
- Safety equipment including rescue equipment used;
- Fire protection;
- Traffic control procedures;
- Permit requirements;
- Work practices; and
- Communications.

18.3.0.2 Permit-required confined space/rescue and training drills will be conducted before personnel enter the permit-required confined space.

18.4 ENTRY PERMITS

18.4.0.1 Entry into an area defined as a permit-required confined space will be by permit only.

18.4.0.2 A permit is a written authorization and approval that specifies the location and type of work to be done. It certifies that all existing hazards have been evaluated by a qualified person and necessary protective measures have been taken to insure the safety of each employee. For work the SVFUDS, the SSHO, in consultation with the PSHM, will be responsible for identifying, evaluating, and authorizing entry into any permit-required confined space.

18.4.0.3 A completed confined space permit will include the following:

- Hazards that may be encountered;
- Complete isolation checklist, including blanking or disconnecting; electrical lockout; and mechanical lockout;
- Special clothing and equipment, including PPE and clothing; safety harness or lines; and approved tools and electrical equipment;

- Atmospheric testing readings, including oxygen level, flammability or explosive levels, and toxic substance levels;
- Atmospheric monitoring while work is being performed;
- Personnel training;
- Standby persons(s) as named on the permit;
- Authorization signature; and
- Emergency procedures.

18.4.0.4 A typical confined space entry permit that may be used for project activities is shown in Figure D1-18-1.

Figure D1-18-1
Typical Confined Space Entry Permit

Location of work: _____
Description of Work: _____
Entrants: _____
Attendant(s):_____
Entry Supervisor:_____
Rescue Personnel:_____
Entry Date/Time: _____
Outside Contractors: _____

Circle Applicable Items

Isolation Checklist:
- Blanking and/or Disconnecting
- Electrical
- Mechanical
- Other

Hazardous Work:
- Burning
- Welding
- Brazing
- Open Flame
- Other

Hazards Expected:
- Corrosive Materials
- Hot Equipment
- Flammable Materials
- Toxic Materials
- Drains Open
- Cleaning (i.e., chemical or water lance)
- Spark-producing Operations
- Spilled Liquids
- Pressure Systems
- Other

Fire Safety Precautions: _____
_____

Personal Safety: Circle Applicable Items and State Specifics
- Ventilation Requirements _____
- Respirators _____
- Clothing _____
- Heat, Hand, and Foot Protection _____
- Shields _____
- Retrieval Lines and Harness _____
- Lighting _____
- Communications _____
- Employee Qualified _____
- Buddy System _____
- Standby Person _____

Figure D1-18-1 (contd.)
Typical Confined Space Entry Permit

Emergency Egress Procedures _____
Training Sign Off _____
(Supervisor and Qualified Person) _____
Remarks: _____

Atmospheric Gas Tests

	Tests Performed	Location	Reading
Example:	(oxygen)		(19.5%)
	(flammability)		(Less than 10% LEL)
	_____	_____	_____
	_____	_____	_____

Remarks: _____

Calibration performed by:_____
(signature)

Test performed by: _____
(signature)

Time: _____

Authorizations:
Site Safety and Health Officer: _____
Project Safety and Health Officer: _____

Entry and Emergency Procedures Understood:
Standby Person: _____
Rescue: _____
Telephone: _____

Permit Expires: _____

CHAPTER 19
LOGS, REPORTS, AND RECORDKEEPING

19.1 LOGBOOK

19.1.0.1 The SSHO will keep a log recording all of the following aspects related to safety at the site. This information will be maintained in a logbook or personal digital assistant. The log will include at a minimum, but not be limited to:

- Date and recorder of log;
- Training (kickoff training, site-specific training, and other gatherings);
- Issues or problems encountered;
- Tailgate safety briefings (time conducted and by whom);
- Significant site events relating to safety;
- Accidents, incidents, and near misses;
- Stop work events resulting from reasons of safety; and
- Safety audits.

19.2 WEEKLY REPORTS

19.2.0.1 The SSHO will prepare a report each week that is forwarded to the PSHM and USAESCH. This report will describe and summarize the following for the completed week:

- Activities performed and personnel on-site.
- Level of PPE used for site activities.
- Air monitoring results for industrial chemicals (for low probability sites only).
- Air monitoring results for chemical agent and industrial chemicals (for higher probability sites only).
- Training provided (including topics and number of personnel attending).
- On-site visitors.
- Incidents involving safety or health concerns or questions.
- Problems needing resolution.

- Activities planned for the following week.

19.3 RECORDKEEPING

19.3.0.1 The SSHO will establish and maintain a filing system onsite for health and safety records, reports, and other related information such as individual training, medical surveillance, etc. Folders in the health and safety filing system will include:

- Personnel Records: certificates for training (or copies) required by 29 CFR 1910.120, medical examination summary letters or certifications, signed APP/SSHP acceptance forms, monitoring results, etc.
- Air Monitoring Records: calibration details, equipment maintenance, monitoring results, etc.
- Training Records: sign-in sheets for onsite training with topics and dates.
- Visitor Logs: sign-in sheets for site visitors.
- Inspection Reports: reports of daily inspections by the SSHO and others concerning health and safety issues. Copies of reports of periodic safety-related inspections and/or audits by the PSHM, Quality Control Officer, and others.
- WPL Monitoring Records: records documenting the amount of time individual workers are present within the ECS while wearing Level D PPE (for higher probability sites only).
- Accident Prevention: copies of all hazard analyses performed on new tasks or activities, copies of any accident/incident reports and follow-up reports, and any other pertinent correspondence.
- PPE Records: records of periodic inspection, testing, and maintenance performed on PPE.
- Weekly Reports: Copies of weekly safety reports (Section 19.2) forwarded to USAESCH.

ATTACHMENT 2
ACTIVITY HAZARD ANALYSES

ACTIVITY: SITE MOBILIZATION/PREPARATION

Summary: Prior to intrusive operations, mobilization and site preparation activities will be required. These activities include site preparation, installation of erosion and sediment controls, geophysical investigations, removal of vegetation, and erection of an ECS.

Principal Steps	Potential Hazards	Controls
General Mobilization/Preparation Hazards	Biological hazards	SSHO will walk site and identify potentially hazardous areas and these will be identified in the daily tailgate briefing. Site personnel will wear protective clothing to prevent exposure to biological hazards such as poison ivy. Personnel will exercise caution when moving obstacles, items, etc., that could be homes to snakes, spiders, or other animals or insects.
	Cold and heat stress injuries	SSHO will implement heat stress/cold injury control program (when daily temperature is predicted to be greater than 80ºF or less than 40ºF). SSHO will monitor weather conditions and stress symptoms in workers.
	Tripping hazards	SSHO will ensure that workers are aware of potential slippery surfaces and tripping hazards. Personnel will inform site manager or SSHO of any observed potential slip, trip, or fall hazards.
Site preparation	Injury from vehicle and heavy equipment traffic in work area	Personnel will remain out of the crane/bucket swing radius and make sure they have the attention of the equipment operator and that excavator's bucket is lowered to the ground prior to approaching the equipment. A ground guide will be used when backing. All vehicles will have back up alarms. Equipment will be immediately grounded if unauthorized personnel enter the work zone. If there are overhead power lines in the vicinity of the work area, a ground guide will be used to ensure that equipment maintains proper safe distance.
	Injury from hand tool/power tool usage	SSHO and Site Manager will ensure that all tools used on site are in proper working order and are in good condition. Use of hand tools/power tools will be monitored periodically by SSHO. Workers will inform supervisors if tools require repair or replacement and no damaged equipment will be used until repaired or replaced. Workers will ensure other personnel are clear of the swing arc of hand tools. Face shield, leather gloves, and/or chaps will be used as prescribed by the SSHO.

Principal Steps	Potential Hazards	Controls
Geophysical investigation	Manual lifting	Workers will be trained in proper lifting techniques and the potential for injuries due to lifting, to be discussed during site-specific training. No bulky item or items assessed at over 50 lbs will be lifted without assistance or use of a lift assist device (e.g., handcart).
Brush/obstacle removal	Injury from vehicle and heavy equipment traffic in work area	Personnel will remain out of the crane/bucket swing radius and make sure they have the attention of the equipment operator and that the excavator's bucket is lowered to the ground prior to approaching the equipment. A ground guide will be used when backing. All vehicles will have back up alarms. Equipment will be immediately grounded if unauthorized personnel enter the work zone. If there are overhead power lines in the vicinity of the work area, a ground guide will be used to ensure that equipment maintains proper safe distances. Crane and forklift safety protocols will be observed.
	Manual lifting	Workers will be trained in proper lifting techniques and the potential for injuries due to lifting, to be discussed during site-specific training. No bulky item or items assessed at over 50 lbs will be lifted without assistance or use of a lift assist device (e.g., handcart).
	Handling flammable liquid during fueling	Gasoline will be stored in approved flammable liquid containers. Fueling will be carried out in areas free of combustible debris/vegetation. Fueling will not be performed in back of a pick-up truck with a bed liner. All engines will be turned off prior to fueling. Containers will be bonded and grounded during transfer of flammable liquids.
	Noise	SSHO will ensure that hearing protection is worn in hazardous noise areas (where shouting is required for face-to-face communication within three feet).
	Injury from hand tool/power tool usage	SSHO and Site Manager will ensure that all tools used on site are in proper working order and are in good condition. Use of hand tools/power tools will be monitored periodically by SSHO. Workers will inform supervisors if tools require repair or replacement and no damaged equipment will be used until repaired or replaced. Workers will ensure other personnel are clear of the swing arc of hand tools. Face shield, leather gloves, and/or chaps will be used as prescribed by the SSHO.

Principal Steps	Potential Hazards	Controls
Erect and remove security fence/construction fence; Install/remove erosion and sediment controls	Injury from vehicle and heavy equipment traffic in work area	Personnel will remain out of the crane/bucket swing radius and make sure they have the attention of the equipment operator and that the excavator's bucket is lowered to the ground prior to approaching the equipment. A ground guide will be used when backing. All vehicles will have back up alarms. Equipment will be immediately grounded if unauthorized personnel enter the work zone. If there are overhead power lines in the vicinity of the work area, a ground guide will be used to ensure that equipment maintains proper safe distances. Crane and forklift safety protocols will be observed.
	Manual lifting	Workers will be trained in proper lifting techniques and the potential for injuries due to lifting, to be discussed during site-specific training. No bulky item or items assessed at over 50 lbs will be lifted without assistance or use of a lift assist device (e.g., handcart).
	Handling flammable liquid during fueling	Gasoline will be stored in approved flammable liquid containers. Fueling will be carried out in areas free of combustible debris/vegetation. Fueling will not be performed in back of a pick-up truck with a bed liner. All engines will be turned off prior to fueling. Containers will be bonded and grounded during transfer of flammable liquids.
	Noise	SSHO will ensure that hearing protection is worn in hazardous noise areas (where shouting is required for face-to-face communication within three feet).
	Injury from hand tool/power tool usage	SSHO and Site Manager will ensure that all tools used on site are in proper working order and are in good condition. Use of hand tools/power tools will be monitored periodically by SSHO. Workers will inform supervisors if tools require repair or replacement and no damaged equipment will be used until repaired or replaced. Workers will ensure other personnel are clear of the swing arc of hand tools. Face shield, leather gloves, and/or chaps will be used as prescribed by the SSHO.
Position support trailers and equipment	Injury from vehicle and heavy equipment traffic in work area	Personnel will remain out of the crane/bucket swing radius and make sure they have the attention of the equipment operator and that the excavator's bucket is lowered to the ground prior to approaching the equipment. A ground guide will be used when backing. All vehicles will have back up alarms. Equipment will be immediately grounded if unauthorized personnel enter the work zone. If there are overhead power lines in the vicinity of the work area, a ground guide will be used to ensure that equipment maintains proper safe distances. Crane and forklift safety protocols will be observed.

Principal Steps	Potential Hazards	Controls
Position support trailers and equipment (cont.)	Manual lifting	Workers will be trained in proper lifting techniques and the potential for injuries due to lifting, to be discussed during site-specific training. No bulky item or items assessed at over 50 lbs will be lifted without assistance or use of a lift assist device (e.g., handcart).
	Handling flammable liquid during fueling	Gasoline will be stored in approved flammable liquid containers. Fueling will be carried out in areas free of combustible debris/vegetation. Fueling will not be performed in back of a pick-up truck with a bed liner. All engines will be turned off prior to fueling. Containers will be bonded and grounded during transfer of flammable liquids.
	Noise	SSHO will ensure that hearing protection is worn in hazardous noise areas (where shouting is required for face-to-face communication within three feet).
	Injury from hand tool/power tool usage	SSHO and Site Manager will ensure that all tools used on site are in proper working order and are in good condition. Use of hand tools/power tools will be monitored periodically by SSHO. Workers will inform supervisors if tools require repair or replacement and no damaged equipment will be used until repaired or replaced. Workers will ensure other personnel are clear of the swing arc of hand tools. Face shield, leather gloves, and/or chaps will be used as prescribed by the SSHO.
Establish power hook-ups (generator or line)	Injury from hand tool/power tool usage	SSHO and Site Manager will ensure that all tools used on site are in proper working order and are in good condition. Use of hand tools/power tools will be monitored periodically by SSHO. Workers will inform supervisors if tools require repair or replacement and no damaged equipment will be used until repaired or replaced. Workers will ensure other personnel are clear of the swing arc of hand tools. Face shield, leather gloves, and/or chaps will be used as prescribed by the SSHO.
	Electrical hazards	No frayed electrical cords will be permitted on site. GFCI devices will be used on all outdoor circuits. Proper lock-out/tag-out procedures will be used when repairing or installing electrical equipment and only qualified personnel will perform electrical hook-ups.

Principal Steps	Potential Hazards	Controls
Erection of ECS	Injury from vehicle and heavy equipment traffic in work area	Personnel will remain out of the crane/bucket swing radius and make sure they have the attention of the equipment operator and that the excavator's bucket is lowered to the ground prior to approaching the equipment. A ground guide will be used when backing. All vehicles will have back up alarms. Equipment will be immediately grounded if unauthorized personnel enter the work zone. If there are overhead power lines in the vicinity of the work area, a ground guide will be used to ensure that equipment maintains proper safe distances. Crane and forklift safety protocols will be observed.
	Manual lifting	Workers will be trained in proper lifting techniques and the potential for injuries due to lifting, to be discussed during site-specific training. No bulky item or items assessed at over 50 lbs will be lifted without assistance or use of a lift assist device (e.g., handcart).
Erection of ECS (cont.)	Handling flammable liquid during fueling	Gasoline will be stored in approved flammable liquid containers. Fueling will be carried out in areas free of combustible debris/vegetation. Fueling will not be performed in back of a pick-up truck with a bed liner. All engines will be turned off prior to fueling. Containers will be bonded and grounded during transfer of flammable liquids.
	Noise	SSHO will ensure that hearing protection is worn in hazardous noise areas (where shouting is required for face-to-face communication within three feet).
	Injury from hand tool/power tool usage	SSHO and Site Manager will ensure that all tools used on site are in proper working order and are in good condition. Use of hand tools/power tools will be monitored periodically by SSHO. Workers will inform supervisors if tools require repair or replacement and no damaged equipment will be used until repaired or replaced. Workers will ensure other personnel are clear of the swing arc of hand tools. Face shield, leather gloves, and/or chaps will be used as prescribed by the SSHO.

Personal Protective Equipment Requirements:

Level D PPE

Hardhat (as required)

Hearing Protection (as required)

Safety glasses (as required)

Face shield when using chainsaw or brush trimmers

Chaps when using chainsaw

Leather gloves (as required)

Equipment to be used:

Common hand tools

Common power tools (chain saws, brush trimmers)

Vehicles: excavator, front-end loader, crane, forklift, man lift

Inspection Requirements:

The SSHO will inspect the entire work area daily. Workers will inspect all equipment each day prior to use. If, during inspection or during use, equipment fails to function properly, it should be turned in for repair/replacement. All safety guards on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it is repaired/replaced. All construction vehicles in use will be checked at the beginning of each shift to assure that the following parts, equipment, and accessories are in safe operating condition and free of apparent damage that could cause failure while in use: service brakes, including trailer brake connections; parking system (hand brake); emergency stopping system (brakes); tires; horn; steering mechanism; coupling devices; seat belts; operating controls; and safety devices. All defects will be corrected before the vehicle is placed in service. If during inspection or during use, equipment fails to function properly, the equipment will be turned in for repair/ replacement. Cranes will be inspected daily by the operator following the guidelines presented in EM 385-1-1, Appendix H. Documentation of annual crane inspection must be available at the site for review by the SSHO.

Training Requirements:

All on site personnel (except land surveyors and landscape valuation assessors) will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER) and be enrolled in a medical monitoring program with a current occupational physical

with physician's certificate in accordance with 29 CFR 1910.120(f). Additionally, site personnel will receive site-specific and hazard communication training in accordance with Chapter 4 of the SSHP. Heavy equipment and cranes will be operated by designated qualified personnel. Forklift operators must complete training in accordance with 29 CFR 1910.178. A minimum of two people trained in First Aid and CPR will be on site during operations.

Analyzed By: James Salisbury

ELECTRONIC SIGNATURE

Date: March 6, 2007

Approved By: Ed Grunwald, CIH
Project Safety and Health Manager

Date: March 6, 2007

ACTIVITY: PROPERTY SURVEY AND MAPPING

Summary: Prior to intrusive operations, the site may be surveyed and the area(s) to be investigated may be marked out and mapped by a licensed surveying subcontractor.

Principal Steps	Potential Hazards	Controls
General property survey and mapping hazards	Slips, trips, and falls	SSHO will ensure that workers are aware of potential slippery surfaces and tripping hazards. Personnel will inform site manager or SSHO of any observed potential slip, trip, or fall hazards.
	Biological hazards	SSHO will walk site and identify potentially hazardous areas and these will be identified in the daily tailgate briefing. Site personnel will wear protective clothing to prevent exposure to biological hazards such as poison ivy. Personnel will exercise caution when moving obstacles, items, etc., that could be homes to snakes, spiders, or other animals or insects.
	Cold and heat stress injuries	SSHO will implement heat stress/cold injury control program (when daily temperature is predicted to be greater than 80ºF or less than 40ºF). Beverages will be available on site. SSHO will monitor weather conditions and stress symptoms in workers.

Personal Protective Equipment Requirements:

Level D PPE

Equipment to be used:

Surveying Equipment

Inspection Requirements:

The SSHO will inspect the entire work area daily. Workers will inspect all equipment each day prior to use. If, during inspection or during use, equipment fails to function properly, it should be turned in for repair/replacement. All safety guards on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it is repaired/replaced.

Training Requirements:

A minimum of two people trained in First Aid and CPR will be on site during operations. All personnel on site will receive site-specific and hazard communication training in accordance with Chapter 4 of the SSHP.

Analyzed By: James Salisbury

ELECTRONIC SIGNATURE

Date: March 6, 2007

Approved By: Ed Grunwald, CIH
Project Safety and Health Manager

Date: March 6, 2007

ACTIVITY: LANDSCAPE SURVEY

Summary: Prior to and/or following intrusive operations, a landscape surveyor may inspect the investigation area to assess the baseline landscape and/or evaluate whether any impacts have resulted from the investigation.

Principal Steps	Potential Hazards	Controls
General Landscape Survey Hazards	Biological hazards	SSHO will walk site and identify potentially hazardous areas and these will be identified in the daily tailgate briefing. Site personnel will wear protective clothing to prevent exposure to biological hazards such as poison ivy. Personnel will exercise caution when moving obstacles, items, etc., that could be homes to snakes, spiders, or other animals or insects.
	Cold and heat stress injuries	SSHO will implement heat stress/cold injury control program (when daily temperature is predicted to be greater than 80ºF or less than 40ºF). Beverages will be available on site. SSHO will monitor weather conditions and stress symptoms in workers.
	Slips, trips, and falls	SSHO will ensure that workers are aware of potential slippery surfaces and tripping hazards. Personnel will inform site manager or SSHO of any observed potential slip, trip, or fall hazards.

Personal Protective Equipment Requirements:

Level D PPE

Equipment to be used:

Camera

Video Equipment

Inspection Requirements:

The SSHO will inspect the entire work area daily. Workers will inspect all equipment each day prior to use. If, during inspection or during use, equipment fails to function properly, it should be turned in for repair/replacement.

Training Requirements:

A minimum of two people trained in First Aid and CPR will be on site during operations. All personnel on site will receive site-specific and hazard communication training in accordance with Chapter 4 of the SSHP.

Analyzed By: James Salisbury

ELECTRONIC SIGNATURE

Date: March 6, 2007

Approved By: Ed Grunwald, CIH
Project Safety and Health Manager

Date: March 6, 2007

ACTIVITY: TREE REMOVAL

Summary: Depending upon the results of an investigation, there is a remote possibility that tree removal may be required to allow further intrusive investigation. In this event, a subcontractor would be retained to take down and remove trees, as necessary.

Principal Steps	Potential Hazards	Controls
General Tree Removal Hazards	Slips, trips, and falls	SSHO will ensure that workers are aware of potential slippery surfaces and tripping hazards. Personnel will inform site manager or SSHO of any observed potential slip, trip, or fall hazards.
	Biological hazards	SSHO will walk site and identify potentially hazardous areas and these will be identified in the daily tailgate briefing. Site personnel will wear protective clothing to prevent exposure to biological hazards such as poison ivy. Personnel will exercise caution when moving obstacles, items, etc., that could be homes to snakes, spiders, or other animals or insects.
	Cold and heat stress injuries	SSHO will implement heat stress/cold injury control program (when daily temperature is predicted to be greater than 80ºF or less than 40ºF). Beverages will be available on site. SSHO will monitor weather conditions and stress symptoms in workers.
	Injury from vehicle and heavy equipment traffic in work area	Personnel will remain out of the bucket swing radius and make sure they have the attention of the equipment operator and that the excavator's bucket is lowered to the ground prior to approaching the equipment. A ground guide will be used when backing. Equipment will be immediately grounded if unauthorized personnel enter the work zone. If there are overhead power lines in the vicinity of the work area, a ground guide will be used to ensure that equipment maintains proper safe distances.
	Handling flammable liquid during fueling	Gasoline will be stored in approved flammable liquid containers. Fueling will be carried out in areas free of combustible debris/vegetation. Fueling will not be performed in back of a pick-up truck with a bed liner. All engines will be turned off prior to fueling. Containers will be bonded and grounded during transfer of flammable liquids.
	Manual lifting	Workers will be made aware of proper lifting techniques and the potential for injuries due to lifting during morning safety briefings. No bulky item or items assessed at over 50 lbs will be lifted without assistance or use of a lift assist device (e.g., handcart).

Principal Steps	Potential Hazards	Controls
General Tree Removal Hazards (contd.)	Noise	SSHO will ensure that hearing protection is worn in hazardous noise areas (where shouting is required for face-to-face communication within three feet).
	Tree Removal	Ensure personnel wear hard hats and ensure no personnel are in the fall zone of trees. Personnel will wear hearing and eye protection and chaps when operating chainsaws.
	Injury from hand tool usage	SSHO and Site Manager will ensure that all tools used on site are in proper working order and are in good condition. Use of hand tools will be monitored periodically by SSHO. Workers will inform supervisors if tools require repair or replacement and no damaged equipment will be used until repaired or replaced. Workers will ensure other personnel are clear of the swing arc of hand tools. Face shield, leather gloves, and/or chaps will be used as prescribed by the SSHO.

Personal Protective Equipment Requirements:

Level D PPE

Hardhat

Hearing Protection

Safety glasses

Leather gloves

Face shield when using chainsaw or brush trimmers

Chaps when using chainsaw

Equipment to be used:

Common hand tools

Common power tools (chain saws, brush trimmers)

Inspection Requirements:

The SSHO will inspect the entire work area daily. Workers will inspect all equipment each day prior to use. If, during inspection or during use, equipment fails to function properly, it should be turned in for repair/replacement. All safety guards on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it is repaired/replaced.

Training Requirements:

A minimum of two people trained in First Aid and CPR will be on site during operations. All personnel on site will receive site-specific and hazard communication training in accordance with Chapter 4 of the SSHP.

Analyzed By: James Salisbury

ELECTRONIC SIGNATURE

Date: March 6, 2007

Approved By: Ed Grunwald, CIH
Project Safety and Health Manager

Date: March 6, 2007

ACTIVITY: INTRUSIVE INVESTIGATION AT LOW PROBABILITY SITES

Summary: Identified anomalies at low probability sites will be intrusively investigated so that they can be identified or removed. Intrusive investigations will be either performed manually (hand digging) or using mechanical equipment (e.g., mini-excavator, Air-Spade®), as necessary.

Principal Steps	Potential Hazards	Controls
General Low Probability Anomaly Intrusive Investigation Hazards	Slips, trips and falls	SSHO will ensure that workers are aware of potential slippery surfaces and tripping hazards. Personnel will inform site manager or SSHO of any observed potential slip, trip, or fall hazards.
	Biological hazards	SSHO will walk site and identify potentially hazardous areas and these will be identified in the daily tailgate briefing. Site personnel will wear protective clothing to prevent exposure to biological hazards such as poison ivy. Personnel will exercise caution when moving obstacles, items, etc., that could be homes to snakes, spiders, or other animals or insects.
	Cold and Heat Stress Injuries	SSHO will implement heat stress/cold injury control program (when daily temperature is predicted to be greater than 80ºF or less than 40ºF). Beverages will be available on site. SSHO will monitor weather conditions and stress symptoms in workers.
	Injury from vehicle and heavy equipment traffic in work area	Personnel will remain out of the bucket swing radius and make sure they have the attention of the equipment operator and that the excavator's bucket is lowered to the ground prior to approaching the equipment. A ground guide will be used when backing. Equipment will be immediately grounded if unauthorized personnel enter the work zone. If there are overhead power lines in the vicinity of the work area, a ground guide will be used to ensure that equipment maintains proper safe distances.
	Noise	SSHO will ensure that hearing protection is worn in hazardous noise areas (where shouting is required for face-to-face communication within three feet).
Magnetometer clearance	*See general hazards above*	*See general hazards above.*

Principal Steps	Potential Hazards	Controls
Anomaly investigation	Potential of encountering MEC/RCWM	Magnetometer screening for anomalies by spotter. RCWM and UXO training and safety awareness during site-specific training. Written MEC/RCWM contingency plan (Chapter 16 of the SSHP).
	Manual lifting	SSHO will make workers aware of proper lifting techniques and the potential for injuries due to lifting during morning safety briefings. No bulky item or items assessed at over 50 lbs will be lifted without assistance or use of a lift assist device (e.g., handcart).
	Handling flammable liquid during fueling	Gasoline will be stored in approved flammable liquid containers. Fueling will be carried out in areas free of combustible debris/vegetation. Fueling will not be performed in back of a pick-up truck with a bed liner. All engines will be turned off prior to fueling. Containers will be bonded and grounded during transfer of flammable liquids.
	Excavation and trenching	Shoring will be installed or benching/sloping implemented when excavation depth exceeds 4 feet, if workers are required to enter. All water will be pumped from the excavation prior to worker entrance. Excavation will be inspected by the SSHO prior to entrance by workers. Proper ingress and egress will be provided.
	Confined space entry	Confined space entry program will be implemented in concert with excavation and trenching procedures (i.e., if excavation and trenching procedures are implemented, the excavation will be considered to be a confined space). Periodic trench inspections will be performed by SSHO.
	Injury from hand tool usage	SSHO and Site Manager will ensure that all tools used on site are in proper working order and are in good condition. Use of hand tools will be monitored periodically by SSHO. Workers will inform supervisors if tools require repair or replacement and no damaged equipment will be used until repaired or replaced. Workers will ensure other personnel are clear of the swing arc of hand tools. Face shield, leather gloves, and/or chaps will be used as prescribed by the SSHO.
	Injury from Air-Spade®	Air-Spade® operator(s) will be trained to operate the equipment in accordance with the manufacturer's instructions. Operator(s) will wear Tyvek® coveralls, and eye and hearing protection during excavation activities. If deemed necessary by the SSHO based on observation of dust in the breathing zone, operators will wear NIOSH-approved N95 dust filter masks or dust mitigation will be performed. The Air-Spade® SOP will be followed and all safety measures described in the manufacturer's equipment Operating Manuals will be briefed by the SSHO and observed by the field team.

Principal Steps	Potential Hazards	Controls
Anomaly investigation (contd.)	Contact with contaminated soil, air, liquid	All personnel will don the proper PPE commensurate with the chemical hazard. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication per 29 CFR 1910.1200. Material safety data sheets for relevant chemicals will be kept available on site at all times. Continuous air monitoring for VOCs using PID.
Anomaly removal	Potential of encountering MEC/RCWM	Magnetometer screening for anomalies by spotter. RCWM and UXO training and safety awareness during site-specific training. Written MEC/RCWM contingency plan (Chapter 16 of the SSHP).
	Manual lifting	SSHO will make workers aware of proper lifting techniques and the potential for injuries due to lifting during morning safety briefings. No bulky item or items assessed at over 50 lbs will be lifted without assistance or use of a lift assist device (e.g., handcart).
	Handling flammable liquid during fueling	Gasoline will be stored in approved flammable liquid containers. Fueling will be carried out in areas free of combustible debris/vegetation. Fueling will not be performed in back of a pick-up truck with a bed liner. All engines will be turned off prior to fueling. Containers will be bonded and grounded during transfer of flammable liquids.
	Excavation and trenching	Shoring will be installed or benching/sloping implemented when excavation depth exceeds 4 feet if workers are required to enter. All water will be pumped from the excavation prior to worker entrance. Excavation will be inspected by the SSHO prior to entrance by workers. Proper ingress and egress will be provided.
	Confined space entry	Confined space entry program will be implemented in concert with excavation and trenching procedures (i.e., if excavation and trenching procedures are implemented, the excavation will be considered to be a confined space). Periodic trench inspections will be performed by SSHO.
	Injury from hand tool usage	SSHO and Site Manager will ensure that all tools used on site are in proper working order and are in good condition. Use of hand tools will be monitored periodically by SSHO. Workers will inform supervisors if tools require repair or replacement and no damaged equipment will be used until repaired or replaced. Workers will ensure other personnel are clear of the swing arc of hand tools. Face shield, leather gloves, and/or chaps will be used as prescribed by the SSHO.

Principal Steps	Potential Hazards	Controls
Anomaly removal (contd.)	Contact with contaminated soil, air, liquid	All personnel will don the proper PPE commensurate with the chemical hazard. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication per 29 CFR 1910.1200. Material safety data sheets for relevant chemicals will be kept available on site at all times. Continuous air monitoring for VOCs using PID.
Air monitoring	*See general hazards above*	*See general hazards above.*

Personal Protective Equipment Requirements:

Level D PPE

Hardhat (as required)

Hearing Protection (if noise hazards present)

Safety glasses (as required)

Rubber and/or leather gloves (as prescribed above)

Equipment/Materials to be Used:

Excavator

Shoring

Air-Spade®

Trash pumps

Geophysics instruments (magnetometer, gradiometer, etc.)

Hand tools (i.e., shovels, rakes)

Photoionization Detector for VOCs

Inspection Requirements:

Workers will inspect PPE, equipment, hand and power tools daily prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/ replacement. All safety guards on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced. The SSHO will inspect the entire site daily or if site conditions change (e.g., high winds, extended dry periods) to ensure that engineering controls are adequate, and ensure that proper PPE is being worn. The SSHO will inspect or survey excavation at least daily or right after changes in conditions (i.e., heavy rain, large amounts of soil removed). The SSHO will ensure that there is no water in the excavation and that there are no fissures and cracks in the walls, and will also ensure that engineering controls are still appropriate.

Training Requirements:

All on site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). All personnel on site will receive site-specific and hazard communication training in accordance with Chapter 4 of the SSHP. A minimum of two people trained in First Aid and CPR will be on site during operations. Personnel will receive RCWM and UXO safety awareness training during site-specific training. All persons performing UXO operations will be graduates of USAESCH-approved courses and be approved by USAESCH Contracting. All UXO site personnel are current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER) and are enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). All personnel operating heavy equipment will provide proof of competency with the equipment to the SSHO prior to operating the equipment.

Analyzed By: James Salisbury

ELECTRONIC SIGNATURE

Date: March 6, 2007

Approved By: Ed Grunwald, CIH
Project Safety and Health Manager

Date: March 6, 2007

ACTIVITY: INTRUSIVE INVESTIGATION AT HIGHER PROBABILITY SITES

Summary: Soil and materials in investigation area at higher probability site will be excavated. Intrusive investigations will be performed in open air or within an ECS, either manually (hand digging) or using mechanical equipment, as necessary. Excavated material will be sorted by sifting and intact containers and other suspect glassware or debris will be segregated for further assessment. Excavated soil will be transferred into containers. The soil will be sampled as necessary before the containers are sealed.

Principal Steps	Potential Hazards	Controls
General Initial Intrusive Investigation Activities	Chemical Warfare Agents, UXO, and other potentially hazardous laboratory chemicals	SSHO will include RCWM and UXO training and safety awareness training during site-specific health and safety training. This training will be refreshed during tailgate safety briefings. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication. Material safety data sheets for relevant chemicals will be kept available on site at all times. Continuous air monitoring will be performed using the MINICAMS for chemical warfare agents and a PID for HTRW contaminants.
	Cold and Heat Stress Injuries	SSHO will implement heat stress/cold injury control program (when daily temperature is predicted to be greater than 80ºF or less than 40ºF). SSHO will monitor weather conditions and stress symptoms in workers.
	Contact with contaminated soil, air, liquid	All personnel will don the proper PPE in accordance with the PPE matrix. RCWM, UXO, and HTW training and safety awareness during site specific training and refreshed during morning tailgate briefing. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication. Material safety data sheets for relevant chemicals will be kept available on site at all times. Continuous air monitoring.
	Tripping Hazards	SSHO will ensure that workers are aware of potential slippery surfaces and tripping hazards. Personnel will inform site manager or SSHO of any observed potential slip, trip, or fall hazards.
Hand Digging	Confined space entry	Confined space entry program will be implemented in concert with excavation and trenching procedures (i.e., if excavation and trenching procedures are implemented, the excavation will be considered to be a confined space). Periodic trench inspections will be performed by SSHO.

Principal Steps	Potential Hazards	Controls
Hand Digging (contd.)	Excavation and trenching	Shoring will be installed or benching/sloping implemented when excavation exceeds 4 feet, if workers are required to enter. All water will be pumped from the excavation prior to worker entrance. Excavation will be inspected by the SSHO prior to entrance by workers. Proper ingress and egress will be provided.
	Injury from hand tool/power tool usage	SSHO and Site Manager will ensure that all tools used on site are in proper working order and are in good condition. Use of hand tools/power tools will be monitored periodically by SSHO. Workers will inform supervisors if tools require repair or replacement and no damaged equipment will be used until repaired or replaced. Workers will ensure other personnel are clear of the swing arc of hand tools. Face shield, leather gloves, and/or chaps will be used as prescribed by the SSHO.
	Manual lifting	Workers will be trained in proper lifting techniques and the potential for injuries due to lifting, to be discussed during site-specific training. No bulky item or items assessed at over 50 lbs will be lifted without assistance or use of a lift assist device (e.g., handcart).
	Noise	SSHO will ensure that hearing protection is worn in hazardous noise areas (where shouting is required for face-to-face communication within three feet).
Mechanical Excavation	Confined space entry	Confined space entry program will be implemented in concert with excavation and trenching procedures (i.e., if excavation and trenching procedures are implemented, the excavation will be considered to be a confined space). Periodic trench inspections will be performed by SSHO.
	Excavation and trenching	Shoring will be installed or benching/sloping implemented when excavation exceeds 4 feet, if workers are required to enter. All water will be pumped from the excavation prior to worker entrance. Excavation will be inspected by the SSHO prior to entrance by workers. Proper ingress and egress will be provided.
	Handling flammable liquid during fueling	Gasoline will be stored in approved flammable liquid containers. Fueling will be carried out in areas free of combustible debris/vegetation. Fueling will not be performed in back of a pick-up truck with a bed liner. All engines will be turned off prior to fueling. Containers will be bonded and grounded during transfer of flammable liquids.

Principal Steps	Potential Hazards	Controls
Mechanical Excavation (contd.)	Injury from vehicle and heavy equipment traffic in work area	Personnel will remain out of the bucket swing radius and make sure they have the attention of the equipment operator and that the excavator's bucket is lowered to the ground prior to approaching the equipment.
	Inadvertent breakage of intact container	Excavation will proceed with caution in six (6) inch lifts. A dig team member will be positioned to observe the bucket and will halt the excavation if an item is discovered. The Command Post will be contacted for instructions prior to proceeding. If an item is broken, the team will cease excavation, the area will be mitigated/secured, and the excavation team will follow the directions of the Command Post.
	Noise	SSHO will ensure that hearing protection is worn in hazardous noise areas (where shouting is required for face-to-face communication within three feet).
Sifting and Transfer of Soil	Inadvertent breakage of intact container	Spotters will be positioned throughout the process stream to observe and remove intact containers as soon as possible. If an item is broken, the team will cease excavation, the area will be mitigated/secured, and the excavation team will follow the directions of the Command Post
Collect RCWM/HTW samples	Confined space entry	Confined space entry program will be implemented in concert with excavation and trenching procedures (i.e., if excavation and trenching procedures are implemented, the excavation will be considered to be a confined space). Periodic trench inspections will be performed by SSHO.
Segregate suspect items for further assessment by EOD	Confined space entry	Confined space entry program will be implemented in concert with excavation and trenching procedures (i.e., if excavation and trenching procedures are implemented, the excavation will be considered to be a confined space). Periodic trench inspections will be performed by SSHO.
	Glass cuts	Personnel will wear leather work gloves.
	Manual lifting	Workers will be trained in proper lifting techniques and the potential for injuries due to lifting, to be discussed during site-specific training. No bulky item or items assessed at over 50 lbs will be lifted without assistance or use of a lift assist device (e.g., handcart).

Personal Protective Equipment Requirements:

Level B or Level C PPE initially (upgrade in accordance with this plan)

Hardhat (as required)

Face shield (as required)

Hearing Protection (as required)

Rubber gloves with leather outer gloves

Leather gloves (as required)

Equipment/Materials to be Used:

Vehicles: excavator

Sifting table

Hand tools

Shoring (as required)

Multiple Round Containers (MRCs)

Inspection Requirements:

PPE will be inspected in accordance with the manufacturer's instructions by workers daily prior to use. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/replacement. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced. The SSHO will inspect or survey excavation at least daily or right after changes in conditions (i.e., heavy rain, large amounts of soil removed). The SSHO will look for fissures and cracks in the walls and will ensure that engineering controls are still appropriate. During site set-up, any equipment generating noise will be monitored by the SSHO to assess whether hearing protection is required.

Training Requirements:

All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), enrolled in a medical monitoring program, and have a current occupational physical with physician's certificate in accordance with 29 CFR

1910.120(f). Additionally, site personnel will receive site-specific and hazard communication training in accordance with Chapter 4 of the SSHP. Operators will be trained in the safe use of required equipment and in the required PPE. All persons performing UXO operations will be graduates of USAESCH-approved courses and be approved by USAESCH Contracting. Before entering a permit-required confined space, all personnel will show proof of confined space training to the SSHO. All personnel operating heavy equipment will provide proof of competency with the equipment to the SSHO prior to operating the equipment. All personnel required to wear respiratory protection will be fit tested. All documentation will be maintained on site by the SSHO.

Analyzed By: James Salisbury

ELECTRONIC SIGNATURE

Date: March 6, 2007

Approved By: Ed Grunwald, CIH
Project Safety and Health Manager

Date: March 6, 2007

ACTIVITY: DRUM/MRC HANDLING

Summary: Drums of soil or scrap will be transferred outside the EZ/ECS and will then be loaded for transport to Federal Property. MRCs will also be transported to the Federal Property for assessment and subsequent storage at the Interim Holding Facility, pending appropriate disposition.

Principal Steps	Potential Hazards	Controls
General Drum/MRC Handling Activities	Biological hazards	SSHO will walk site and identify potentially hazardous areas and these will be identified in the daily tailgate briefing. Site personnel will wear protective clothing to prevent exposure to biological hazards such as poison ivy. Personnel will exercise caution when moving obstacles, items, etc., that could be homes to snakes, spiders, or other animals or insects.
	Cold and Heat Stress Injuries	SSHO will implement heat stress/cold injury control program (when daily temperature is predicted to be greater than 80ºF or less than 40ºF). SSHO will monitor weather conditions and stress symptoms in workers.
	Manual lifting	Workers will be trained in proper lifting techniques and the potential for injuries due to lifting, to be discussed during site-specific training. No bulky item or items assessed at over 50 lbs will be lifted without assistance or use of a lift assist device (e.g., handcart).
	Noise	SSHO will ensure that hearing protection is worn in hazardous noise areas (where shouting is required for face-to-face communication within three feet).
	Tripping Hazards	SSHO will ensure that workers are aware of potential slippery surfaces and tripping hazards. Personnel will inform site manager or SSHO of any observed potential slip, trip, or fall hazards.
Load/unload drums/MRC to/from transport vehicle	Injury from vehicle and heavy equipment traffic in work area	Personnel will remain out of the crane/bucket swing radius and make sure they have the attention of the equipment operator and that the excavator's bucket is lowered to the ground prior to approaching the equipment. A ground guide will be used when backing. All vehicles will have back up alarms. Equipment will be immediately grounded if unauthorized personnel enter the work zone. If there are overhead power lines in the vicinity of the work area, a ground guide will be used to ensure that equipment maintains proper safe distances.

Principal Steps	Potential Hazards	Controls
Transfer drums/MRC to Federal Property	Injury from vehicle and heavy equipment traffic in work area	Personnel will remain out of the crane/bucket swing radius and make sure they have the attention of the equipment operator and that the excavator's bucket is lowered to the ground prior to approaching the equipment. A ground guide will be used when backing. All vehicles will have back up alarms. Equipment will be immediately grounded if unauthorized personnel enter the work zone. If there are overhead power lines in the vicinity of the work area, a ground guide will be used to ensure that equipment maintains proper safe distances.
First Entry Monitoring of IHF	Chemical Warfare Agents	SSHO will include RCWM and UXO training and safety awareness training during site-specific health and safety training. This training will be refreshed during tailgate safety briefings. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication. Material safety data sheets for relevant chemicals will be kept available on site at all times. First entry air monitoring.
Place MRCs in IHF	Chemical Warfare Agents	SSHO will include RCWM and UXO training and safety awareness training during site-specific health and safety training. This training will be refreshed during tailgate safety briefings. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication. Material safety data sheets for relevant chemicals will be kept available on site at all times. First entry air monitoring.
Refueling transport vehicle(s)	Handling flammable liquid during fueling	Gasoline will be stored in approved flammable liquid containers. Fueling will be carried out in areas free of combustible debris/vegetation. Fueling will not be performed in back of a pick-up truck with a bed liner. All engines will be turned off prior to fueling. Containers will be bonded and grounded during transfer of flammable liquids.

Personal Protective Equipment Requirements:

Level B PPE initially (upgrade in accordance with this plan) for personnel inside the EZ/ECS

Modified Level D PPE for personnel outside the EZ/ECS

Hardhat

Hearing protection (as required)

Safety glasses (as required)

Leather gloves

Equipment to be used:

Vehicles: fork-lift or mini-excavator/loader w/drum handling adapter

Drum dolly

Inspection Requirements:

All PPE will be inspected daily by workers prior to use. All drum handling equipment will be inspected daily prior to use or anytime equipment is reconfigured. If, during inspection or during use, equipment fails to function properly, equipment is to be placed out of service until repaired or replaced. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece will be placed out of service until repaired or replaced.

Training Requirements:

Operators will be trained in the safe use of required equipment and in the required PPE. All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), be enrolled in a medical monitoring program, and have a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). All personnel operating heavy equipment will provide proof of competency with the equipment to the SSHO prior to operating the equipment. Forklift operators must complete training in accordance with 29 CFR 1910.178. Additionally, site personnel will receive site-specific and hazard communication training in accordance with Chapter 4 of the SSHP.

Analyzed By: James Salisbury

ELECTRONIC SIGNATURE

Date: March 6, 2007

Approved By: Ed Grunwald, CIH
Project Safety and Health Manager

Date: March 6, 2007

ACTIVITY: PERSONNEL DECONTAMINATION STATION OPERATION

Summary: Intrusive investigation personnel exiting the EZ/ECS at a higher probability site will be processed through the Personnel Decontamination Station (PDS) to be decontaminated. Equipment used during the excavation will also be decontaminated. PDS personnel will also support rescue personnel, as required.

Principal Steps	Potential Hazards	Controls
General PDS Activities	Cold and Heat Stress Injuries	SSHO will implement heat stress/cold injury control program (when daily temperature is predicted to be greater than 80ºF or less than 40ºF). SSHO will monitor weather conditions and stress symptoms in workers.
	Manual lifting	Workers will be trained in proper lifting techniques and the potential for injuries due to lifting, to be discussed during site-specific training. No bulky item or items assessed at over 50 lbs will be lifted without assistance or use of a lift assist device (e.g., handcart).
	Noise	SSHO will ensure that hearing protection is worn in hazardous noise areas (where shouting is required for face-to-face communication within three feet).
	Tripping Hazards	SSHO will ensure that workers are aware of potential slippery surfaces and tripping hazards. Personnel will inform site manager or SSHO of any observed potential slip, trip, or fall hazards.
Daily PDS set-up (fill pans & connect hoses)	Exposure to bleach solution	All personnel will don the proper PPE commensurate with the potential chemical hazard. Workers will wear face shields if splash hazard exists.
Decontaminate personnel leaving EZ	Chemical Warfare Agents	SSHO will include RCWM and UXO training and safety awareness training during site-specific health and safety training. This training will be refreshed during tailgate safety briefings. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication. Material safety data sheets for relevant chemicals will be kept available on site at all times. Continuous air monitoring of work zone where PDS personnel are working.

Principal Steps	Potential Hazards	Controls
Decontaminate personnel leaving EZ (contd.)	Contact with contaminated soil, air, liquid	All personnel will don the proper PPE in accordance with the PPE matrix. RCWM, UXO, and HTW training and safety awareness during site-specific training and refreshed during morning tailgate briefing. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication. Material safety data sheets for relevant chemicals will be kept available on site at all times. Continuous air monitoring of work zone where PDS personnel are working.
Decontaminate items and equipment brought out of EZ	Chemical Warfare Agents	SSHO will include RCWM and UXO training and safety awareness training during site-specific health and safety training. This training will be refreshed during tailgate safety briefings. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication. Material safety data sheets for relevant chemicals will be kept available on site at all times. Continuous air monitoring of work zone where PDS personnel are working.
	Contact with contaminated soil, air, liquid	All personnel will don the proper PPE in accordance with the PPE matrix. RCWM, UXO, and HTW training and safety awareness during site-specific training and refreshed during morning tailgate briefing. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication. Material safety data sheets for relevant chemicals will be kept available on site at all times. Continuous air monitoring of work zone where PDS personnel are working.
Daily breakdown of PDS	Chemical Warfare Agents	SSHO will include RCWM and UXO training and safety awareness training during site-specific health and safety training. This training will be refreshed during tailgate safety briefings. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication. Material safety data sheets for relevant chemicals will be kept available on site at all times. Continuous air monitoring of work zone where PDS personnel are working.
	Contact with contaminated soil, air, liquid	All personnel will don the proper PPE in accordance with the PPE matrix. RCWM, UXO, and HTW training and safety awareness during site-specific training and refreshed during morning tailgate briefing. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication. Material safety data sheets for relevant chemicals will be kept available on site at all times. Continuous air monitoring of work zone where PDS personnel are working.

Personal Protective Equipment Requirements:

Level C PPE at minimum, during decontamination activities

Two-way radios

Face shield (as required)

Splash protection (as required)

Hearing Protection (as required)

Equipment/Materials to be Used:

Decontamination buckets

Brush

Bleach, dilute solution

Detergent/soap

Water

Inspection Requirements:

Equipment will be inspected by workers daily prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/replacement. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced. The SSHO will ensure prior to daily operations that the PDS is ready for operations.

Training Requirements:

All PDS personnel will be trained in the safe use of required equipment and in the required PPE. All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), enrolled in a medical monitoring program, and have a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additionally,

site personnel will receive site-specific and hazard communication training in accordance with Chapter 4 of the SSHP. All personnel required to wear respiratory protection will be fit tested. All documentation will be maintained on site by the SSHO.

Analyzed By: James Salisbury

ELECTRONIC SIGNATURE

Date: March 6, 2007

Approved By: Ed Grunwald, CIH
Project Safety and Health Manager

Date: March 6, 2007

ACTIVITY: EMERGENCY RESCUE

Summary: In the event that one or more members of the intrusive investigation team are injured during activities within the EZ/ECS at a higher probability site, personnel will enter the EZ/ECS to rescue the injured worker(s).

Principal Steps	Potential Hazards	Controls
General Emergency Rescue Activities	Chemical Warfare Agents	SSHO will include RCWM and UXO training and safety awareness training during site-specific health and safety training. This training will be refreshed during tailgate safety briefings. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication. Material safety data sheets for relevant chemicals will be kept available on site at all times. Continuous air monitoring.
	Cold and Heat Stress Injuries	SSHO will implement heat stress/cold injury control program (when daily temperature is predicted to be greater than 80ºF or less than 40ºF). SSHO will monitor weather conditions and stress symptoms in workers.
	Contact with contaminated soil, air, liquid	All personnel will don the proper PPE in accordance with the PPE matrix. RCWM, UXO, and HTW training and safety awareness during site-specific training and refreshed during morning tailgate briefing. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication. Material safety data sheets for relevant chemicals will be kept available on site at all times. Continuous air monitoring.
	Noise	SSHO will ensure that hearing protection is worn in hazardous noise areas (where shouting is required for face-to-face communication within three feet).
	Tripping Hazards	SSHO will ensure that workers are aware of potential slippery surfaces and tripping hazards. Personnel will inform site manager or SSHO of any observed potential slip, trip, or fall hazards.
Enter EZ/ECS	*See general hazards above*	*See general hazards above.*
Extract personnel & exit EZ/ECS	Biological hazards	SSHO will provide training regarding blood borne pathogens during site-specific training.

Principal Steps	Potential Hazards	Controls
Extract personnel & exit EZ/ECS (contd.)	Confined space entry	Confined space entry program will be implemented in concert with excavation and trenching procedures (i.e., if excavation and trenching procedures are implemented, the excavation will be considered to be a confined space). Periodic trench inspections will be performed by SSHO.
	Manual lifting	Workers will be trained in proper lifting techniques and the potential for injuries due to lifting, to be discussed during site-specific training. No bulky item or items assessed at over 50 lbs will be lifted without assistance or use of a lift assist device (e.g., handcart).

Personal Protective Equipment Requirements:

All levels of PPE: rescue personnel will upgrade to an equal or higher level of protection than the worker(s) requiring rescue

Equipment/Materials to be Used:

Rescue litter

Mechanical retrieval device or pre-positioned equipment suitable for lifting litter

Inspection Requirements:

All rescue equipment will be inspected daily by workers prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, equipment is to be replaced. All safety guards designed on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced.

Training Requirements:

All rescue personnel will be trained in rescue procedures. Rescue teams will practice rescue operations before the start of initial operations. All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), enrolled in a medical monitoring program, and have a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additionally, site personnel will receive site-specific and hazard

communication training in accordance with Chapter 4 of the SSHP. Rescue personnel will be trained in UXO awareness during site-specific training. All personnel will provide proof of competency with the equipment to the SSHO prior to operating. Before entering a permit-required confined space, personnel will show proof of confined space training to the SSHO. All personnel required to wear respiratory protection will be fit tested. All documentation will be maintained on site by the SSHO.

Analyzed By: James Salisbury

ELECTRONIC SIGNATURE

Date: March 6, 2007

Approved By: Ed Grunwald, CIH
Project Safety and Health Manager

Edward Grunwald

Date: March 6, 2007

ACTIVITY: AIR MONITORING

Summary: Air monitoring for chemical agents and industrial chemicals will be conducted during investigations at higher probability sites. Related activities include set-up and calibration of equipment, and operation during site activities.

Principal Steps	Potential Hazards	Controls
General Air Monitoring Activities	Cold and Heat Stress Injuries	SSHO will implement heat stress/cold injury control program (when daily temperature is predicted to be greater than 80ºF or less than 40ºF). SSHO will monitor weather conditions and stress symptoms in workers.
	Tripping Hazards	SSHO will ensure that workers are aware of potential slippery surfaces and tripping hazards. Personnel will inform site manager or SSHO of any observed potential slip, trip, or fall hazards.
Calibrate and set up monitoring equipment	Injury from pressurized cylinders	Pressurized cylinders will be inspected periodically by the air monitoring team. All cylinders will be secured and stored in accordance with the SSHP.
	Manual lifting	Workers will be trained in proper lifting techniques and the potential for injuries due to lifting, to be discussed during site-specific training. No bulky item or items assessed at over 50 lbs will be lifted without assistance or use of a lift assist device (e.g., handcart).
	Noise	SSHO will ensure that hearing protection is worn in hazardous noise areas (where shouting is required for face-to-face communication within three feet).
Monitor EZ with MINICAMS	Injury from pressurized cylinders	Pressurized cylinders will be inspected periodically by the air monitoring team. Cylinders will be stored in accordance with the SSHP.
	Noise	SSHO will ensure that hearing protection is worn in hazardous noise areas (where shouting is required for face-to-face communication within three feet).
Confirmation sampling with DAAMS	Chemical Warfare Agents	SSHO will include RCWM and UXO training and safety awareness training during site-specific health and safety training. This training will be refreshed during tailgate safety briefings. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication. Material safety data sheets for relevant chemicals will be kept available on site at all times. Continuous air monitoring.

Principal Steps	Potential Hazards	Controls
Confirmation sampling with DAAMS (contd.)	Contact with contaminated soil, air, liquid	All personnel will don the proper PPE in accordance with the PPE matrix. RCWM, UXO, and HTW training and safety awareness during site-specific training and refreshed during morning tailgate briefing. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication. Material safety data sheets for relevant chemicals will be kept available on site at all times. Continuous air monitoring.
Break down monitoring equipment	Injury from pressurized cylinders	Pressurized cylinders will be inspected periodically by the air monitoring team. Cylinders will be stored in accordance with the SSHP.
	Manual lifting	Workers will be trained in proper lifting techniques and the potential for injuries due to lifting, to be discussed during site-specific training. No bulky item or items assessed at over 50 lbs will be lifted without assistance or use of a lift assist device (e.g., handcart).
	Noise	SSHO will ensure that hearing protection is worn in hazardous noise areas (where shouting is required for face-to-face communication within three feet).

Personal Protective Equipment Requirements:

Modified Level D PPE

Hearing protection (as required)

Equipment to be Used:

MINICAMS monitoring equipment

DAAMS tubes and portable sampling pumps

PID

Arsine Detector (if applicable for site)

Inspection Requirements:

All air monitoring equipment will be inspected and calibrated daily prior to use by air monitoring team. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/replacement. Cylinders will be inspected daily by air monitoring team to ensure proper placement and storage.

Training Requirements:

All on-site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), be enrolled in a medical monitoring program and have a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additionally, site personnel will receive site-specific and hazard communication training in accordance with Chapter 4 of the SSHP.

Analyzed By: James Salisbury

ELECTRONIC SIGNATURE

Date: March 6, 2007

Approved By: Ed Grunwald, CIH
Project Safety and Health Manager

Date: March 6, 2007

ACTIVITY: HTW-CONTAMINATED SOIL REMOVAL AND PACKAGING

Summary: Following the completion of intrusive investigation activities and RCWM-related soil removal, identified HTW-contaminated soil will be removed and loaded into dump trucks.

Principal Steps	Potential Hazards	Controls
General Soil Removal and Packaging Activities	Biological hazards	SSHO will walk site and identify potentially hazardous areas and these will be identified in the daily tailgate briefing. Site personnel will wear protective clothing to prevent exposure to biological hazards such as poison ivy. Personnel will exercise caution when moving obstacles, items, etc., that could be homes to snakes, spiders, or other animals or insects.
	Cold and Heat Stress Injuries	SSHO will implement heat stress/cold injury control program (when daily temperature is predicted to be greater than 80ºF or less than 40ºF). SSHO will monitor weather conditions and stress symptoms in workers.
	Manual lifting	Workers will be trained in proper lifting techniques and the potential for injuries due to lifting, to be discussed during site-specific training. No bulky item or items assessed at over 50 lbs will be lifted without assistance or use of a lift assist device (e.g., handcart).
	Noise	SSHO will ensure that hearing protection is worn in hazardous noise areas (where shouting is required for face-to-face communication within three feet).
	Tripping Hazards	SSHO will ensure that workers are aware of potential slippery surfaces and tripping hazards. Personnel will inform site manager or SSHO of any observed potential slip, trip, or fall hazards.
Excavation of HTW-contaminated soil	Contact with contaminated soil, air, liquid	All personnel will don the proper PPE in accordance with the PPE matrix. RCWM, UXO, and HTW training and safety awareness during site-specific training and refreshed during morning tailgate briefing. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication. Material safety data sheets for relevant chemicals will be kept available on site at all times. Dust monitoring/mitigation during excavation. Air monitoring using PID if soil contamination is a result of VOCs.

Principal Steps	Potential Hazards	Controls
Excavation of HTW-contaminated soil (contd.)	Confined space entry	Confined space entry program will be implemented in concert with excavation and trenching procedures (i.e., if excavation and trenching procedures are implemented, the excavation will be considered to be a confined space). Periodic trench inspections will be performed by SSHO.
	Excavation and trenching	Shoring will be installed or benching/sloping implemented when excavation exceeds 4 feet, if workers are required to enter. All water will be pumped from the excavation prior to worker entrance. Excavation will be inspected by the SSHO prior to entrance by workers. Proper ingress and egress will be provided.
	Injury from hand tool/power tool usage	SSHO and Site Manager will ensure that all tools used on site are in proper working order and are in good condition. Use of hand tools/power tools will be monitored periodically by SSHO. Workers will inform supervisors if tools require repair or replacement and no damaged equipment will be used until repaired or replaced. Workers will ensure other personnel are clear of the swing arc of hand tools. Face shield, leather gloves, and/or chaps will be used as prescribed by the SSHO.
	Injury from vehicle and heavy equipment traffic in work area	Personnel will remain out of the bucket swing radius and make sure they have the attention of the equipment operator and that the excavator's bucket is lowered to the ground prior to approaching the equipment. A ground guide will be used when backing. All vehicles will have back up alarms. Equipment will be immediately grounded if unauthorized personnel enter the work zone. If there are overhead power lines in the vicinity of the work area, a ground guide will be used to ensure that equipment maintains proper safe distances.
Load/unload excavated soil on to/from transport vehicle	Contact with contaminated soil, air, liquid	All personnel will don the proper PPE in accordance with the PPE matrix. RCWM, UXO, and HTW training and safety awareness during site-specific training and refreshed during morning tailgate briefing. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication. Material safety data sheets for relevant chemicals will be kept available on site at all times. Dust monitoring/mitigation during excavation. Air monitoring using PID if soil contamination is a result of VOCs.

Principal Steps	Potential Hazards	Controls
Load/unload excavated soil on to/from transport vehicle (contd.)	Injury from vehicle and heavy equipment traffic in work area	Personnel will remain out of the bucket swing radius and make sure they have the attention of the equipment operator and that the excavator's bucket is lowered to the ground prior to approaching the equipment. A ground guide will be used when backing. All vehicles will have back up alarms. Equipment will be immediately grounded if unauthorized personnel enter the work zone. If there are overhead power lines in the vicinity of the work area, a ground guide will be used to ensure that equipment maintains proper safe distances.
Transport vehicle fueling	Handling flammable liquid during fueling	Gasoline will be stored in approved flammable liquid containers. Fueling will be carried out in areas free of combustible debris/vegetation. Fueling will not be performed in back of a pick-up truck with a bed liner. All engines will be turned off prior to fueling. Containers will be bonded and grounded during transfer of flammable liquids.

Personal Protective Equipment Requirements:

Modified Level D PPE

Hardhat (as required)

Safety glasses (as required)

Hearing protection (as required)

Rubber gloves with leather outer gloves (as required)

Equipment/Materials to be Used:

Vehicles: excavator, loader, compactor

Hand tools (i.e., shovels, rakes)

Inspection Requirements:

Workers will inspect PPE, equipment, hand and power tools daily prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/

replacement. All safety guards on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced. The SSHO will inspect or survey excavation at least daily or right after changes in conditions (i.e., heavy rain, large amounts of soil removed). The SSHO will ensure that there is no water in the excavation and that there are no fissures and cracks in the walls, and will also ensure that engineering controls are still appropriate.

Training Requirements:

All on site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Additionally, site personnel will receive site-specific and hazard communication training in accordance with Chapter 4 of the SSHP. Operators will be trained in the safe use of required equipment. All personnel operating heavy equipment will provide proof of competency with the equipment to the SSHO prior to operating the equipment.

Analyzed By: James Salisbury

ELECTRONIC SIGNATURE

Date: March 6, 2007

Approved By: Ed Grunwald, CIH
Project Safety and Health Manager

Edward Grunwald

Date: March 6, 2007

ACTIVITY: SOIL SAMPLING AT LOW PROBABILITY SITES

Summary: Samples of soil may be collected while intrusive investigations are being conducted at Low Probability Sites.

Principal Steps	Potential Hazards	Controls
General Soil Sampling Activities	Potential of encountering MEC/RCWM	Magnetometer screening for anomalies by spotter. RCWM and UXO training and safety awareness during site-specific training. Written MEC/RCWM contingency plan (Chapter 16 of the SSHP).
	Slips, trips and falls	SSHO will ensure that workers are aware of potential slippery surfaces and tripping hazards. Personnel will inform site manager or SSHO of any observed potential slip, trip, or fall hazards.
	Biological hazards	SSHO will walk site and identify potentially hazardous areas and these will be identified in the daily tailgate briefing. Site personnel will wear protective clothing to prevent exposure to biological hazards such as poison ivy. Personnel will exercise caution when moving obstacles, items, etc., that could be homes to snakes, spiders, or other animals or insects.
	Cold and Heat Stress Injuries	SSHO will implement heat stress/cold injury control program (when daily temperature is predicted to be greater than 80ºF or less than 40ºF). Beverages will be available on site. SSHO will monitor weather conditions and stress symptoms in workers.
	Injury from vehicle and heavy equipment traffic in work area	Personnel will remain out of the bucket swing radius and make sure they have the attention of the equipment operator and that the excavator's bucket is lowered to the ground prior to approaching the equipment. A ground guide will be used when backing. Equipment will be immediately grounded if unauthorized personnel enter the work zone. If there are overhead power lines in the vicinity of the work area, a ground guide will be used to ensure that equipment maintains proper safe distances.
	Injury from hand tool usage	SSHO and Site Manager will ensure that all tools used on site are in proper working order and are in good condition. Use of hand tools will be monitored periodically by SSHO. Workers will inform supervisors if tools require repair or replacement and no damaged equipment will be used until repaired or replaced. Workers will ensure other personnel are clear of the swing arc of hand tools. Face shield, leather gloves, and/or chaps will be used as prescribed by the SSHO.

Principal Steps	Potential Hazards	Controls
General Soil Sampling Activities (contd.)	Contact with HTW-contaminated soil, air, liquid	All personnel will don the proper PPE commensurate with the chemical hazard. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication per 29 CFR 1910.1200. Material safety data sheets for relevant chemicals will be kept available on site at all times. Continuous air monitoring for VOCs using PID.
HTW Sample Collection	*See general hazards above*	*See general hazards above.*
Decontamination activities	Contact with hazardous chemicals	All personnel will don the proper PPE commensurate with the chemical hazard. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication per 29 CFR 1910.1200. Material safety data sheets for relevant chemicals will be kept available on site at all times.
Mechanical excavation	Confined space entry	Confined space entry program will be implemented in concert with excavation and trenching procedures (i.e., if excavation and trenching procedures are implemented, the excavation will be considered to be a confined space). Periodic trench inspections will be performed by SSHO.
Hand augering	*See general hazards above*	*See general hazards above.*
Air monitoring	*See general hazards above*	*See general hazards above.*

Personal Protective Equipment Requirements:

Level D PPE

Hardhat (as required)

Hearing Protection (if noise hazards present)

Safety glasses

Rubber gloves (with leather outer gloves if deemed necessary by the SSHO)

Equipment/Materials to be Used:

Excavator

Soil sampling equipment

Hand tools (i.e., shovels, rakes)

Photoionization Detector for VOCs.

Inspection Requirements:

Workers will inspect PPE and equipment daily prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/ replacement. All safety guards on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced. The SSHO will inspect the entire site daily or if site conditions change (e.g., high winds, extended dry periods) to ensure that engineering controls are adequate, and ensure that proper PPE is being worn. The SSHO will inspect or survey excavation at least daily or right after changes in conditions (i.e., heavy rain, large amounts of soil removed). The SSHO will ensure that there is no water in the excavation and that there are no fissures and cracks in the walls, and will also ensure that engineering controls are still appropriate.

Training Requirements:

All on site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). All personnel on site will receive site-specific and hazard communication training in accordance with Chapter 4 of the SSHP. A minimum of two people trained in First Aid and CPR will be on site during operations. Operators will be trained in the safe use of required equipment. All persons performing UXO operations will be graduates of USAESCH-approved courses and be approved by USAESCH Contracting. Personnel will receive RCWM and UXO safety awareness training during site-specific training. All personnel operating heavy equipment will provide proof of competency with the equipment to the SSHO prior to operating the equipment.

Analyzed By: James Salisbury

ELECTRONIC SIGNATURE

Date: March 6, 2007

Approved By: Ed Grunwald, CIH
Project Safety and Health Manager

Date: March 6, 2007

ACTIVITY: EXCAVATION BACKFILL

Summary: Following intrusive investigation activities, the excavation will be backfilled using clean soil.

Principal Steps	Potential Hazards	Controls
General Backfill Activities	Biological hazards	SSHO will walk site and identify potentially hazardous areas and these will be identified in the daily tailgate briefing. Site personnel will wear protective clothing to prevent exposure to biological hazards such as poison ivy. Personnel will exercise caution when moving obstacles, items, etc., that could be homes to snakes, spiders, or other animals or insects.
	Cold and Heat Stress Injuries	SSHO will implement heat stress/cold injury control program (when daily temperature is predicted to be greater than 80ºF or less than 40ºF). SSHO will monitor weather conditions and stress symptoms in workers.
	Noise	SSHO will ensure that hearing protection is worn in hazardous noise areas (where shouting is required for face-to-face communication within three feet).
	Tripping Hazards	SSHO will ensure that workers are aware of potential slippery surfaces and tripping hazards. Personnel will inform site manager or SSHO of any observed potential slip, trip, or fall hazards.
Delivery and stockpiling of backfill material	Injury from vehicle and heavy equipment traffic in work area	Personnel will remain out of the bucket swing radius and make sure they have the attention of the equipment operator and that the excavator's bucket is lowered to the ground prior to approaching the equipment. A ground guide will be used when backing. All vehicles will have back up alarms. Equipment will be immediately grounded if unauthorized personnel enter the work zone. If there are overhead power lines in the vicinity of the work area, a ground guide will be used to ensure that equipment maintains proper safe distances.
Mechanical placement of backfill	Excavation and trenching	Shoring will be installed or benching/sloping implemented when excavation exceeds 4 feet, if workers are required to enter. All water will be pumped from the excavation prior to worker entrance. Excavation will be inspected by the SSHO prior to entrance by workers. Proper ingress and egress will be provided.

Principal Steps	Potential Hazards	Controls
Mechanical placement of backfill (contd.)	Injury from vehicle and heavy equipment traffic in work area	Personnel will remain out of the bucket swing radius and make sure they have the attention of the equipment operator and that the excavator's bucket is lowered to the ground prior to approaching the equipment. A ground guide will be used when backing. All vehicles will have back up alarms. Equipment will be immediately grounded if unauthorized personnel enter the work zone. If there are overhead power lines in the vicinity of the work area, a ground guide will be used to ensure that equipment maintains proper safe distances.
Mechanical compaction of backfill	Excavation and trenching	Shoring will be installed or benching/sloping implemented when excavation exceeds 4 feet, if workers are required to enter. All water will be pumped from the excavation prior to worker entrance. Excavation will be inspected by the SSHO prior to entrance by workers. Proper ingress and egress will be provided.
	Injury from vehicle and heavy equipment traffic in work area	Personnel will remain out of the crane/bucket swing radius and make sure they have the attention of the equipment operator and that the excavator's bucket is lowered to the ground prior to approaching the equipment. A ground guide will be used when backing. All vehicles will have back up alarms. Equipment will be immediately grounded if unauthorized personnel enter the work zone. If there are overhead power lines in the vicinity of the work area, a ground guide will be used to ensure that equipment maintains proper safe distances.
	Injury from hand tool/power tool usage	SSHO and Site Manager will ensure that all tools used on site are in proper working order and are in good condition. Use of hand tools/power tools will be monitored periodically by SSHO. Workers will inform supervisors if tools require repair or replacement and no damaged equipment will be used until repaired or replaced. Workers will ensure other personnel are clear of the swing arc of hand tools. Face shield, leather gloves, and/or chaps will be used as prescribed by the SSHO.
Refueling equipment	Handling flammable liquid during fueling	Gasoline will be stored in approved flammable liquid containers. Fueling will be carried out in areas free of combustible debris/vegetation. Fueling will not be performed in back of a pick-up truck with a bed liner. All engines will be turned off prior to fueling. Containers will be bonded and grounded during transfer of flammable liquids.

Personal Protective Equipment Requirements:

Level D PPE

Hardhat (as required)

Hearing protection (as required)

Leather gloves (as required)

Equipment/Materials to be Used:

Vehicles: excavator, loader, compactor

Hand tools (i.e., shovels, rakes)

Inspection Requirements:

Workers will inspect PPE, equipment, hand and power tools daily prior to use in accordance with the manufacturer's instructions. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair/ replacement. All safety guards on equipment will remain in place. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired/replaced. The SSHO will inspect or survey excavation at least daily or right after changes in conditions (i.e., heavy rain, large amounts of soil removed). The SSHO will ensure that there is no water in the excavation and that there are no fissures and cracks in the walls, and will also ensure that engineering controls are still appropriate.

Training Requirements:

All on site personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). Operators will be trained in the safe use of required equipment. All personnel operating heavy equipment will provide proof of competency with the equipment to the SSHO prior to operating the equipment. All personnel on site will receive site-specific and hazard communication training in accordance with Chapter 4 of the SSHP.

Analyzed By: James Salisbury

ELECTRONIC SIGNATURE

Date: March 6, 2007

Approved By: Ed Grunwald, CIH
Project Safety and Health Manager

Date: March 6, 2007

ACTIVITY: IHF ENTRY

Summary: When items are already stored within an IHF container, first entry monitoring will be conducted to confirm that it is safe to enter prior to personnel entering to store a MRC or perform other tasks.

Principal Steps	Potential Hazards	Controls
Set up and operate monitoring equipment	Chemical Warfare Agents, UXO, and other potentially hazardous laboratory chemicals	SSHO will include RCWM and UXO training and safety awareness training during site-specific health and safety training. This training will be refreshed during tailgate safety briefings. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication. Material safety data sheets for relevant chemicals will be kept available on site at all times. Personnel will wear PPE commensurate with chemical hazard. When items are already stored within an IHF container, first entry air monitoring will be performed for chemical warfare agents and arsine, as appropriate.
	Cold and Heat Stress Injuries	SSHO will implement heat stress/cold injury control program (when daily temperature is predicted to be greater than 80ºF or less than 40ºF). SSHO will monitor weather conditions and stress symptoms in workers.
	Electrical Hazards	No frayed electrical cords will be permitted on site. GFCI devices will be used on all outdoor circuits. Proper lock-out/tag-out procedures will be used when repairing or installing electrical equipment.
	Injury from pressurized cylinders	Pressurized cylinders will be inspected periodically by the air monitoring team. All cylinders will be secured and stored in accordance with the SSHP.
	Noise	SSHO will ensure that hearing protection is worn in hazardous noise areas (where shouting is required for face-to-face communication within three feet).
	Vehicle traffic in work area	Operation of vehicles will be conducted in accordance with the SSHP. Personnel will be briefed to remain alert when working around vehicles. Ground guide will be used for the backing of vehicles.

Principal Steps	Potential Hazards	Controls
Working in IHF	Chemical Warfare Agents, UXO, and other potentially hazardous laboratory chemicals	SSHO will include RCWM and UXO training and safety awareness training during site-specific health and safety training. This training will be refreshed during tailgate safety briefings. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication. Material safety data sheets for relevant chemicals will be kept available on site at all times. Personnel will wear PPE commensurate with chemical hazard. When items are already stored within an IHF container, first entry air monitoring will be performed for chemical warfare agents and arsine, as appropriate.
	Cold and Heat Stress Injuries	SSHO will implement heat stress/cold injury control program (when daily temperature is predicted to be greater than 80ºF or less than 40ºF). SSHO will monitor weather conditions and stress symptoms in workers.
	Manual lifting	Workers will be trained in proper lifting techniques and the potential for injuries due to lifting, to be discussed during site-specific training. No bulky item or items assessed at over 50 lbs will be lifted without assistance or use of a lift assist device (e.g., handcart).
	Tripping Hazards	SSHO will ensure that workers are aware of potential slippery surfaces and tripping hazards. Personnel will inform site manager or SSHO of any observed potential slip, trip, or fall hazards.

Personal Protective Equipment Requirements:

Modified Level D PPE initially (upgrade in accordance with this plan)

Equipment to be used:

MINICAMS monitoring equipment

DAAMS tubes

Vehicles

Inspection Requirements:

All air monitoring equipment will be inspected prior to use by air monitoring team and calibrated, when required. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair or replacement. Cylinders will be inspected daily by SSHO and air monitoring team to ensure proper placement and storage. During site set-up, equipment-generating noise will be monitored by the SSHO to determine whether or not hearing protection is required.

Training Requirements:

Air monitoring personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). All personnel on site will receive site-specific and hazard communication training in accordance with Chapter 4 of the SSHP.

Analyzed By: James Salisbury

ELECTRONIC SIGNATURE

Date: March 14, 2007

Approved By: Ed Grunwald, CIH
Project Safety and Health Manager

Edward Grunwald

Date: March 14, 2007

ACTIVITY: X-RAY/PINS ASSESSMENT

Summary: Once a suspect item has been packaged and transported to the Federal Property Storage Area, it may be assessed using X-Ray Analysis and/or Portable Isotopic Neutron Spectroscopy (PINS).

Principal Steps	Potential Hazards	Controls
Assessment of suspect CWM using X-Ray and PINS analysis	Chemical Warfare Agents, UXO, and other potentially hazardous laboratory chemicals	SSHO will include RCWM and UXO training and safety awareness training during site-specific health and safety training. This training will be refreshed during tailgate safety briefings. During site-specific health and safety training, workers will be briefed concerning their rights and responsibilities regarding hazard communication. Material safety data sheets for relevant chemicals will be kept available on site at all times. Personnel will wear PPE commensurate with chemical hazard. When items are already stored within an IHF container, first entry air monitoring will be performed for chemical warfare agents and arsine, as appropriate.
	Cold and Heat Stress Injuries	SSHO will implement heat stress/cold injury control program (when daily temperature is predicted to be greater than 80ºF or less than 40ºF). SSHO will monitor weather conditions and stress symptoms in workers.
	Electrical Hazards	No frayed electrical cords will be permitted on site. GFCI devices will be used on all outdoor circuits. Proper lock-out/tag-out procedures will be used when repairing or installing electrical equipment.
	Exposure to ionizing radiation	Workers will be briefed concerning potential radiation injuries. Area in front of X-ray and/or PINS equipment will be closed to personnel to avoid exposure to radiation.
	Injury from hand tool use	SSHO and Site Manager will ensure that all tools used on site are in proper working order and are in good condition. Use of hand tools will be monitored periodically by SSHO. Workers will inform supervisors if tools require repair or replacement and no damaged equipment will be used until repaired or replaced. Workers will ensure other personnel are clear of the swing arc of hand tools. Face shield, leather gloves, and/or chaps will be used as prescribed by the SSHO.
	Manual lifting	Workers will be trained in proper lifting techniques and the potential for injuries due to lifting, to be discussed during site-specific training. No bulky item or items assessed at over 50 lbs will be lifted without assistance or use of a lift assist device (e.g., handcart).

Principal Steps	Potential Hazards	Controls
Assessment of suspect CWM using X-Ray and PINS analysis (contd.)	Tripping Hazards	SSHO will ensure that workers are aware of potential slippery surfaces and tripping hazards. Personnel will inform site manager or SSHO of any observed potential slip, trip, or fall hazards.

Personal Protective Equipment Requirements:

Modified Level D PPE initially (upgrade in accordance with this plan)

Equipment to be used:

X-Ray equipment

PINS equipment

Common hand tools

Personal radiation dosimeter

Inspection Requirements:

All PPE will be inspected by workers prior to use. Equipment will be inspected prior to use by assessment team and calibrate when required. If during inspection or during use, equipment fails to function properly, equipment is to be turned in for repair or replacement. If any safety device on equipment is missing, that piece of equipment will be placed out of service until it can be repaired or replaced.

Training Requirements:

Personnel performing assessments will be trained and certified to perform PINS and X-Ray operations. Personnel will be current in OSHA training in accordance with 29 CFR 1910.120 (HAZWOPER), and be enrolled in a medical monitoring program with a current occupational physical with physician's certificate in accordance with 29 CFR 1910.120(f). All personnel on site will receive site-specific and hazard communication training in accordance with Chapter 4 of the SSHP.

Analyzed By: James Salisbury

ELECTRONIC SIGNATURE

Date: March 14, 2007

Approved By: Ed Grunwald, CIH
Project Safety and Health Manager

Date: March 14, 2007

ATTACHMENT 3
STANDARD OPERATING PROCEDURES

STANDARD OPERATING PROCEDURE
ROLL-OFF TRUCK, CRANE OPERATION AND SKID LOADER/FORKLIFT OPERATION SAFETY PROTOCOLS

DOT REGULATED VEHICLES/EQUIPMENT

- **Commercial Driving License:** All Parsons and subcontractor personnel operating a U.S. Department of Transportation (DOT)-regulated vehicle must hold a valid commercial driving license (CDL) from their state of residence. Operation of a vehicle without a valid operator's license is prohibited.
- **Air Hose and Couplings:** Periodically check air hoses and couplings and compressor hoses for warn or damaged parts. Do not crimp air hose to disconnect couplings; shut off air at the valve.
- **Backing Up:** Never start or back up equipment or vehicles until you are sure the way is clear. If necessary, have another person guide you safely. Back up alarms, when required, must be working and audible over the surrounding noise.
- **Ear Protection:** Ear plugs or other approved ear protection shall be worn when necessary. Use of ear plugs in cars or trucks on public highways may be against local laws.
- **Fueling and Repair:** No fueling or repair shall be made to equipment while it is in operations. The motor shall be turned off and the bucket, blade, gate or boom shall be lowered to the ground or blocks.
- **Housekeeping:** Operators should keep deckplates, steps, rung and hand rails on equipment free of grease, oil, ice, and mud. The inside of the cabs shall also be kept clean and free of flammable items.
- **Inspections:** Equipment and vehicles shall not be used until known defects or discrepancies are corrected. Inspections shall be made at the start of each shift and defects or discrepancies shall be reported to the supervisor immediately.
- **Jumping:** Jumping on or off equipment is prohibited. When climbing on or off equipment or vehicles, face the unit and use secure hand and foot holds to prevent slips and falls. Always look where you are stepping.
- **Know Your Equipment or Vehicle:** It is your responsibility to be thoroughly familiar with all features and manuals and if you are in doubt as to correct operating techniques or safety features, ask your supervisor at once.

- **Overloading:** Avoid overloading vehicle beds and equipment buckets and beds. Excessive material can damage the unit and falling material can cause serious injury.
- **Power Lines:** When operating trucks, cranes, shovels or other units, always use caution around power lines and maintain a minimum safe clearance of 10 feet or more depending upon the voltage.
- **Riders:** Only authorized persons will be permitted to ride in equipment or vehicles.
- **Securing Loads:** The operator of the vehicle is responsible for ensuring that their load is secure and will not shift during transport.
- **Long Hauls:** On long hauls, binders should be checked periodically (at least during each rest or service stop) to make sure they are still secure and tight.
- **Overhanging and Oversize Loads:** When it is necessary to transport overhanging or oversize loads, the appropriate signs and red flags and red lights will be used. When necessary, use flag cars.
- **Safety Chains:** Safety chains of sufficient size and strength shall be installed on all trailers being towed.
- **Safety Hooks:** Use safety hooks with latches on all winch truck cables.
- **Side Roads and Railroad Tracks**: Stop and look both ways before crossing railroad tracks or before driving onto a highway from a side road.
- **Stopping:** Do not stop vehicles in the middle of the road to talk to occupants in another vehicle. Always pull to the side or off the road to maintain a clear, safe road.
- **Turn Signals:** Always use turn signals, emergency and other signals as appropriate when turning, stopping, passing, or performing other vehicle operations.
- **Vehicle Maintenance:** It is the driver's responsibility to see that his vehicle is in good mechanical condition before and during operation. Special emphasis should be placed on ensuring the brakes, lights, horn, windshield wiper, tires and steering assembly are in good order. Defects must be reported and corrected immediately.

ROLL-OFF TRUCK OPERATION

The following apply to roll-off truck operations:

- The roll-off truck will meet the appropriate manufacturing codes in effect at the time of manufacture. There will be no unauthorized modifications to the equipment.
- The roll-off truck will be inspected before each use.

- Any defects, needed repairs, etc., will cause the roll-off truck to be taken out of service until repaired.
- Only trained and qualified operators will operate the roll-off truck.
- One or more signal people or spotters will help to direct each roll-off truck entering or leaving the site via the access road entrance.
- Roll-off truck drivers will not operate cellular telephones or radios nor will they eat, drink, or smoke while the vehicle is in motion when driving on public roads.
- Roll-off trucks will not be driven at speeds greater than the posted speed limit, with due regard for weather, traffic, intersections, width and character of the roadway, and any other existing condition.
- Roll-off trucks will not be driven on a downgrade with the gears in neutral of the clutch disengaged.
- Roll-off trucks will not be stopped, parked, or left standing on any road, or adjacent thereto, or in any area in a manner as to endanger the vehicle, other vehicles, equipment, or personnel using or passing that road or area.
- Roll-off trucks will not be left unattended until the motor has been shut off, the key removed (unless local regulations prohibit), parking break set, and gear engaged in low, reverse, or park. If stopped on a hill or grade, the front wheels will be turned or hooked into the curb of the wheels securely chocked.

CRANE OPERATION

The following apply to crane operations:

- The crane will meet the appropriate manufacturing codes in effect at the time of manufacture. There will be no unauthorized modifications to the equipment.
- The crane will be inspected before each use.
- Any defects, needed repairs, etc., will cause the crane to be taken out of service until repaired.
- Only trained and qualified operators will operate the crane. Crane operator will be qualified or certified by a source that qualifies crane and derrick operators.
- The crane will be inspected IAW Appendix H of EM 385-1-1.

SKID LOADER/FORKLIFT OPERATION

The following apply to the operation of a skid loader or forklift:

- The skid loader/forklift will meet the appropriate manufacturing codes in effect at the time of manufacture. There will be no unauthorized modifications to the equipment.
- The skid loader/forklift will be inspected before each use.
- Any defects, needed repairs, etc., will cause the skid loader/forklift to be taken out of service until repaired.
- Only trained and qualified operators will operate the skid loader/forklift. Training will meet the requirements of 28CFR 1910.178.
- Riders are not allowed on the skid loader/forklift.
- The engine will be off, the brakes set, controls in neutral and the forklift lowered when the driver is not in the driver's seat.
- Only safely arranged loads will be lifted.
- Loads must be within the rated capacity of the skid loader/forklift.
- The skid loader/forklift will not be fueled while running.
- All skid loader/forklift safety devices will be operable and will not be bypassed.

OE SECTOR
Standing Operating Procedure (SOP)

Severe Weather Operations

PARSONS
5390 Triangle Parkway, Suite 100
Norcross, Georgia 30092

Revision No. 1
February 2005

1.0 PURPOSE

The purpose of this procedure is to provide the minimum requirements and site personnel actions in the event of site evacuation, as a result of severe weather at any Parsons Field operation.

2.0 SCOPE

This SOP applies to all site personnel involved in field operations regardless of affiliation. This SOP is not intended to contain all of the requirements needed to ensure complete compliance, and should be used in conjunction with project plans and applicable Federal, state and local regulations. Consult the documents listed in Section 3.0 of this SOP for additional compliance issues.

3.0 REFERENCES

Applicable sections and paragraphs in the documents listed below will be used as references for the conduct of Severe Weather operations:

- Parsons Corporate Safety and Health Program;
- EP 385-1-95a, CEHNC Basic Safety Concepts and Considerations for OE Operations;
- EM 1110-1-4009, Ordnance and Explosive Response; and
- EM 385-1-1, USACE, Safety and Health Requirements Manual

4.0 RESPONSIBILITIES

4.1 Site Safety and Health Officer (UXOSO)

Upon notification that a severe weather situation exists, the UXOSO will notify site personnel, by radio, cellular phone or sound a horn for 3 five-second blasts. If operations, that might put site personnel at risk, are on going at the time, either the UXOSO or USACE On-Safety Representative will cease all operations and have all teams/crews evacuate to either the site office or the closest "Safe Haven".

The UXOSO will direct site personnel as to the nature of severe weather and to ready site vehicles for evacuation. During this type of emergency site personnel should not be concerned with assigned vehicles. Time permitting, a select number of site personnel will attempt to safely secure mission essential equipment (e.g. Geophysical GPS/Radio Relay Systems, RTK GPS Systems, computers, etc.) and prepare to evacuate the area to the recommended "Safe Haven". The UXOSO will maintain radio communications with all site personnel, necessary support elements and record the events in the site Safety Log.

Upon arrival at the "Safe Haven", the UXOSO will conduct a head count of all site personnel and Site Visitors, using that day's Daily Safety Brief Sign-In Roster and Site Visitors Log.

4.2 Individual/Personnel initially reporting Severe Weather

The individual or personnel initially spotting a severe weather situation (lightning, tornado) will immediately report it to either the UXOSO or USACE On-Safety Representative by the quickest means possible.

4.3 Site Personnel

Upon the notification to evacuate the work site for the designated Rally Point, site personnel will do so in an orderly manner. Vehicle operators will not exceed the posted or site enforced speed limit, unless directed by USACE On-Site Safety Representative; however that speed will not exceed the conditions of the roadway.

4.4 USACE On-Site Safety Representative

Severe weather occurring before normal working hours, the USACE Site Safety Representative will decide whether a work delay is required and notify the UXOSO. The UXOSO will begin a site recall procedure with all site section supervisors, who will in turn notify their personnel.

5.0 GENERAL INFORMATION

The majority of Parsons field operations are conducted at either heavily wooded sites, or sites that consist of large rolling and sloping pastures and grasslands, consisting of clay or loose sand, and some even contain large areas of ravines and drop-offs. As a result of this, even small amounts of rain could cause vehicle entry/exit problems and personnel slipping hazards that may result in damage or injury to site personnel and equipment.

Almost all of the areas are susceptible to severe thunderstorms, with heavy downpours of rain, lightning, hail, strong microburst winds, flash floods and tornadoes. These storms are known to manifest themselves very quickly and leave very little time to react. In the event of severe weather in the area, the UXOSO maintains a portable Severe Weather Alert radio and the Site Manager will have access to the National Weather Advisory system, via the internet or by phone.

5.1 Thunderstorms

Thunderstorms affect relatively small areas when compared with hurricanes and winter storms. Despite their small size, ALL thunderstorms are dangerous. The typical thunderstorm is 1.5 miles in diameter and lasts an average of 30 minutes. In order for a thunderstorm to form it needs three things; Moisture – to form clouds and rain; Unstable Air – warm air that can rise rapidly; and Lift – cold or warm fronts, sea breezes, mountains, or the sun's heat are capable of lifting air to help form thunderstorms.

The life cycle of a thunderstorm constitutes three distinct stages, which are detailed below:

- Developing Stage – Towering cumulus cloud indicates rising air; little if any rain during this stage; and occasional lightning.
- Mature Stage – Most likely time for hail, heavy rain, frequent lightning, strong winds, and tornadoes; storm occasionally has a black or dark green appearance; and lasts an average of 10 – 20 minutes but may last much longer in some cases.

- Dissipating Stage – Rainfall decreases in intensity; can still produce a burst of strong winds; and lightning remains a danger.

5.1.1 How Far Away is the Thunderstorm?

- Count the number of seconds between a flash of lightning and the next clap of thunder.
- Divide the number of seconds by five (5) to determine the distance to the lightning in miles.

5.2 Lightning

Lightning poses the greatest potential threat to site personnel and site operations, due to its unpredictable nature. Lightning results from the buildup and discharge of electrical energy between positively and negatively charged areas. Rising and descending air within a thunderstorm separates these positive and negative charges. Water and ice particles also effect distribution.

A cloud-to-ground lightning strike begins as an invisible channel of electrically charged air moving from the cloud toward the ground. When one channel nears an object on the ground, a powerful surge of electricity from the ground moves upward to the clouds and produces the visible lightning strike.

In accordance with current USACE policies, all operations cease when lightning is observed and the "Flash to Bang Time" is 30 seconds or less (approx 6 miles from site). The safe evacuation of personnel is paramount and equipment is secondary.

Those site personnel in and around the site office will seek shelter inside the building. Site personnel working out in the field will seek shelter inside a site vehicle with the windows rolled up and the doors closed.

Site personnel that are using any electronic equipment with an antenna (i.e. RTK system, G-858 or EM-61, etc.) will cease all operations and seek shelter upon visually seeing lightning at any distance.

5.2.1 30/30 Lightning Safety Rule

Go indoors or seek shelter if, after seeing lightning, you cannot count to 30 before hearing thunder. Stay indoors or under shelter for 30 minutes after hearing the last clap of thunder.

5.2.2 Lightning Safety Rules

- Move to a sturdy building or car. Do not take shelter in small sheds, under isolated trees, or in convertible automobiles. Stay away from tall objects such as towers, fences, telephone poles, and power lines.
- If lightning is occurring and a sturdy shelter is not available, get inside a hard top automobile and keep the windows up. Avoid touching any metal.
- Utility lines and metal pipes can conduct electricity. Unplug appliances, office machines etc. not necessary for obtaining weather information. Avoid using the telephone or any electrical item. Use phones **ONLY** in an emergency.

5.2.3 If Caught Outdoors and No Shelter is Available

- Find a low spot away from trees, fences, and poles. Make sure the place you pick is not subject to flooding.
- If you are in the woods, take shelter under the shorter trees.
- If you feel your skin tingle or your hair stand on end, squat low to the ground on the balls of your feet. Place your hands over your ears and your head between your legs. Make yourself the smallest target possible and minimize your contact with the ground. **DO NOT** lay down.

5.3 Tornadoes

Tornadoes produce extreme high destructive winds and devastation. Tornadoes are generally produced along the leading edges of thunderstorms that form, with little or no warning. Before thunderstorms develop, a change in wind direction and an increase in wind speed with increasing height create an invisible, horizontal spinning effect in the lower atmosphere. Rising air within the thunderstorm updraft tilts the rotating air from horizontal to vertical. An area of rotation, 2 – 6 miles wide, now extends through much of the storm. Most tornadoes form within this area of strong rotation.

Most project sites do not afford adequate tornado "Safe Havens", or adequate "Safe Havens" are so far away that they afford little or no help to those site personnel working in remote site locations (Remote Operations are discussed further in this SOP).

The UXOSO and Site Manager will attempt to locate those "Safe Havens" and brief site personnel of their locations, during the Daily Tailgate Safety Briefing.

5.3.1 When and Where Tornadoes Occur

- Tornadoes can occur any time of the year.
- Tornadoes have occurred in every state, but they are most frequent east of the Rocky Mountains during the spring and summer months.
- In the southern states, peak tornado occurrence is March – May, while peak months in the northern states are during the late spring and summer.
- Tornadoes are most likely to occur between 3 and 9 p.m., but can occur anytime.
- The average tornado moves from southwest to northeast.
- Tornadoes can accompany tropical storms and hurricanes as they move onto land.

5.3.2 Tornado Safety Rules

- In a building, move to a pre-designated shelter, such as a basement.
- If a below ground shelter is not available, move to a small interior room or hallway on the lowest floor and get under a sturdy piece of furniture. Put as many walls as possible between you and the outside.

- Stay away from windows.
- Get out of automobiles.
- Do not try to outrun a tornado in your car; instead, leave it immediately for safe shelter.
- If caught outside or in a vehicle, lie flat in a nearby ditch or depression and cover your head with your hands.
- Be aware of flying debris. Flying debris from tornadoes causes most fatalities and injuries.
- Office trailers, even if tied down, offer little protection from tornadoes. You should leave an office trailer and go to the lowest floor of a sturdy nearby building, or follow the procedures detailed in the 6th bullet above.

5.4 Flash Floods/Floods

Due to the massive amounts of rain that can be dropped from thunderstorms the site may be susceptible to flash floods. Some of the existing roads may be unimproved dirt and are easily turned into mud, creating an unsafe driving environment. Those roadways that are paved also place the vehicle in low-lying areas that may be washed out. Do not attempt to cross any roadway that has become submerged by water.

5.4.1 Flash Flood/Flood Safety Rules

- If you are in a low lying area, at the first sign of rain evacuate to high ground.
- Designate an evacuation route in the event of flooding.
- Avoid walking or driving in flood waters.
- Stay away from high water, storm drains, ditches, ravines, or culverts. If the water is moving swiftly, even water only six (6) inches deep can knock you off your feet.
- If you come upon flood waters, stop, turn around, and go another way.

5.5 Straight-line/High Winds

When this is associated with a passing front generating potential severe weather, the winds can increase in speed rather rapidly. Dust and debris pose an eye hazard. High winds can rip vehicle doors and rear hatches from site personnel's grasp causing damage and injury. Site personnel in the field should select an area or park the vehicle in such a matter that provides a windbreak. If this can not be accomplished, open doors and hatches with care. Vehicles should not be left with doors, hoods or hatches open.

5.5.1 Straight-line/High Winds Safety Rules

- In a building, move to a pre-designated shelter, such as a basement.

- If a below ground shelter is not available, move to a small interior room or hallway on the lowest floor and get under a sturdy piece of furniture. Put as many walls as possible between you and the outside.

- Stay away from windows.

- If caught outside, lie flat in a nearby ditch or depression and cover your head with your hands.

- Be aware of flying debris. Flying debris from tornadoes causes most fatalities and injuries.

- Office trailers, even if tied down, offer little protection from straight-line/high winds. You should leave an office trailer and go to the lowest floor of a sturdy nearby building, or follow the procedures detailed in the 4th bullet above.

- Move to a sturdy building or car. Do not take shelter in small sheds, under isolated trees, or in convertible automobiles.

- If high winds are occurring and a sturdy shelter is not available, get inside a hard top automobile and keep the windows up.

5.6 Hail

Hail can occur in conjunction with a thunderstorm and can cause damage to equipment and injuries to personnel. Hail occurs when strong rising currents of air within a storm, called updrafts, carry water droplets to a height where freezing occurs. These water droplets become frozen and the ice particles grow in size, becoming too heavy to be supported by the updraft, and fall to the ground. Speeds of the falling ice particles, hail, can exceed 100 miles an hour, with size exceeding that of a softball.

5.6.1 Hail safety Rules

- Seek shelter, preferably in a building, or hard-top automobile.

- If in the open seek shelter in a culvert if there is no flooding under a rock outcrop or under trees if there is no lightning associated with the hail storm.

- Exercise caution when driving on hail, it is very slippery, so avoid it if at all possible.

- If driving when a hail storm starts pull under an overpass if possible, if not pull well off the road with your lights on in order that advancing motorists can see you.

OE SECTOR
Standing Operating Procedure (SOP)

Vehicle Operations

PARSONS
5390 Triangle Parkway, Suite 100
Norcross, Georgia 30092

Revision No. 1
February, 2005

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to provide the minimum safety and health requirements and procedures applicable to the operations involving the use of on and off-road motor vehicles.

2.0 SCOPE

This SOP applies to all site personnel, to include contractor and subcontractor personnel, involved in the conduct of operations involving motor vehicles. This SOP is not intended to contain all requirements to ensure regulatory compliance. Consult documents listed in Section 3.0 of this SOP for additional compliance issues.

3.0 REGULATORY REFERENCES

The following Occupational Safety and Health Administration (OSHA) standards and U.S. Army Corps of Engineers (USACE) requirements directly apply to vehicle operations. References used in preparation of the document are listed below:

- Applicable sections of OSHA Construction Industry Standard 29 CFR, Part 1926.601;
- Applicable sections of Department of Transportation 49 CFR, Parts 100-199; and 571
- USCAE Engineer Manual (EM) 385-1-1, Section 18.
-

4.0 RESPONSIBILITIES

4.1 Project Manager

The Project Manager (PM) will be responsible for ensuring the availability of the resources needed to implement this SOP, and shall also ensure that this SOP is incorporated into plans, procedures, and training for sites where vehicular equipment is to be used.

4.2 Site Manager

The Site Manager (SM) will ensure that this SOP is implemented for motor vehicle operations. The SM will also ensure that relevant sections of this SOP are discussed in the tailgate safety briefings, and that information related to its daily implementation is documented in the Site Operations Log.

4.3 UXO Safety Officer

The UXO Safety Officer (UXOSO) will be responsible for ensuring that the safety hazards and mitigation techniques associated with this SOP are discussed during the initial Site Specific Safety Training. The UXOSO will also be responsible for daily inspection of site operations and conditions to ensure their initial, and continued, compliance with this SOP and

other regulatory guidelines. The UXOSO will also compile a monthly total of mileage or hours of usage of all site vehicles, post those totals predominately in the Site Field Office and report them to the Parsons OE Sector Administrative Assistant (See Figure 1).

4.4 Vehicle Operators

All personnel operating a vehicular piece of equipment will posses a valid drivers license, proof of proficiency on the item in question, i.e., certificate of training, and strictly adhere to the procedures stipulated in this SOP.

5.0 PROCEDURES

All personnel, including contractor and subcontractor personnel, involved in motor vehicle operations shall be familiar with the potential safety hazards associated with the operation of vehicular equipment, and with the work practices and mitigation techniques to be used to reduce or eliminate these hazards.

5.1 General Requirements

Motor Vehicle shall mean any vehicle propelled by a self-contained power unit, or equipment designed for use on paved roads. **All-purpose utility vehicle (APUV)** shall mean any four-wheeled or greater, vehicle propelled by a self-contained power unit, designed for off-road use, such as a Gator, or MULE. From this point forward the term vehicle shall constitute both motor vehicle and APU vehicles unless otherwise stated.. Every individual operating a vehicle shall possess a permit (as required by state or federal law) valid for the equipment being operated. No vehicle shall be placed in service until it has been inspected and found to be in a safe operating condition (See Figure 2).

All vehicles shall be inspected and maintained IAW the manufactures recommendations and this SOP. Vehicles being used shall be checked at the beginning of each day to ensure that all parts, equipment, and accessories are in safe operating condition and free of apparent damage that could cause failure while in use. The parts, equipment, and accessories of concern include service brakes, including trailer brake connections; parking system (hand brake); emergency-stopping system (brakes); tires; horn; steering mechanism; coupling devices; seat belts and lap-shoulder restraints; operating controls; and safety devices. These requirements also apply to equipment such as lights, reflectors; windshield wipers, defrosters, fire extinguishers and first aid kits, where such equipment is requjired. Vehicles not meeting safe operating conditions shall be removed from service, repaired or replaced, and re-inspected prior to being placed back in service.

All vehicles operated between sunset and sunrise shall have the following:

- Two headlights, one on each side;
- Directional signal lights, both front rear;
- Rear Brake Lights, one on each side, and
- Rear Back-up Lights, one on each side

All vehicles, except APUV's, trailers or semi-trailers, having a gross weight of 5,000 pounds or less, shall be equipped with service brakes and manually-operated parking brakes. Service and parking brakes shall be adequate to control the movement of, to stop, and to hold the vehicle under all conditions of service. Service brakes on trailers and semi-trailers shall be controlled from the driver's seat of the prime mover.

Braking systems on every vehicle shall be designed as to be in approximate synchronization on all wheels and develop the required braking effort on the rearmost wheels first, unless the vehicle is equipped with an "Anti-lock Braking System" (ABS). The design shall also provide for application of the brakes by the driver of the prime mover. Exceptions to this are vehicles in tow by an approved tow bar hitch.

Every motor vehicle shall be equipped with the following:

- A working speedometer
- A fuel gauge
- An audible warning device (horn)
- A windshield equipped with an adequate powered windshield wiper
- An operable defrosting and defogging system
- Adequate rear view mirror, or mirrors
- Cabs, cab shields, and other protection to protect the driver from hazards of falling or shifting materials/loads
- Non-slip surfaces on steps
- Safety glass in windshields, windows, and doors
- No cracked or broken glass
- All towing devices that are structurally adequate for the weight drawn, and properly mounted
- A power-operated starting device
- One fire extinguisher, rated at 5 BC units (project provided)
- One First Aid Kit and other appropriate first aid equipment (project provided)

All trailers will be equipped as follows:

- A locking device, or double safety system, shall be provided on every fifth wheel mechanism and tow bar arrangement, which will prevent the accidental separation of towed and towing vehicles;
- Every trailer shall be coupled with safety chains or cables to the towing vehicle. Such chain or cable shall prevent the separation of the vehicles in the event of failure of the tow bar;
- While unhooked from the towing vehicle, all trailers shall be equipped with the approved and adequate wheel chocks to prevent roll-back; and
- A manufacturer's attached support leg system at or near the tongue of the trailer to prevent trailer collapse. In event the trailer is not equipped with a support leg system; the use of intact "cinder blocks" may be used. **Note:** Once the "cinder blocks" are observed with cracks or become broken, they will be replaced and not used again as a support leg.

All buses, trucks, and combination of vehicles with a carrying capacity of 12 tons or greater, when operated on public highways, shall be equipped with emergency equipment required by state laws but not less than those listed below:

- One red flag, not less than 12 inches square, and 3 reflective markers, which shall be available for immediate use, in case of emergency stops;
- Two approved wheel chocks for each vehicle, or each unit of a combination of vehicles;
- One fire extinguisher rated at 20 BC units or two 10 BC rated units, being required for flammable cargoes, including explosives and Munitions and Explosives of Concern (MEC);
- Vehicle exhaust control, so as to present no hazard to the operator, passengers, or other personnel; and
- All rubber-tired motor vehicles should be equipped with fenders. However mud flaps may be used in lieu of fenders, whenever motor vehicle equipment is not designed for fenders.

5.2 Safe Operating Rules

No vehicle shall be driven at a speed greater than the posted speed limit, with due regard for weather, traffic, intersections, width, and character of the roadway, type of vehicle, and any other existing conditions. The operator must, at all times, and under all conditions, have the vehicle under such control as to be able to bring it to a complete stop within the clear distance ahead. To accomplish this, the operator shall follow the safe operating rules presented below:

- No vehicle shall be driven on a downgrade with gears in neutral or with clutch disengaged;
- Every vehicle, upon approaching an unguarded railroad crossing or drawbridge, shall sloe down to a speed as to permit stopping before reaching the nearest track or the edge of the bridge, and shall proceed only if the course is clear;
- No vehicle shall be stopped, parked, or left standing on any road, or adjacent thereto, or in any area in such a manner, as to endanger the vehicle, other vehicles, equipment, or personnel using or passing that area;
- No vehicle shall be left unattended until the motor has been shut off, the key removed (unless the WP directs otherwise), the parking brake set, and the gear engaged in park (automatic) or placed in neutral (manual);
- If stopped on a hill or grade, front wheels shall be turned or hooked into the curb or the wheels securely chocked;
- Personnel shall not be permitted to get between a towed and towing vehicle, until the towing vehicle has been placed in park, parking brake set, and engine turned off;
- When backing or maneuvering buses, trucks, or truck/trailer combination not equipped with an audible backing warning device, the operator will use a ground guide. All other vehicle types, when backing or maneuvering, will check the area and sound their horn;
- Operators of vehicles transporting personnel, explosives, or flammable or toxic substances shall stop at railroad crossings or drawbridges, and shall not proceed

until the route is determined to be clear. A stop shall be required at a crossing within a business or residential district that is protected by a watch person, traffic officer, or by a traffic signal giving positive indication to approaching vehicles;

- When a bus, truck, or truck/trailer combination is disabled or parked on the traveled portion of a highway or the shoulder adjacent thereto, red flags shall be displayed during the daytime and reflector, flares, or electric lights at night (An exception may be made in residential or business sections or municipalities);
- The principles of defensive driving shall be practiced at all times;
- Seat belts and lap-shoulder restraints will be installed and worn IAW 49 CFR 571 (DOT);
- If the windshield wipers are in use due to rain, headlights will be activated; and
- During high winds, extreme care is required when opening vehicle doors, hoods and hatches. High winds can rip vehicle doors and rear hatches from a persons grasp causing damage and injury. Site personnel should select an area or park the vehicle in such a manner that provides a windbreak. Vehicles should not be left with doors, hoods or hatches open.

5.3 Transportation of Personnel

The number of passengers in passenger-type vehicles shall not exceed the number of seats with approved seat belts. Trucks used to transport personnel shall be equipped with a seating arrangement that is securely anchored, a rear gate, a guardrail, and steps or ladders for mounting and dismounting. The beds of trucks which are not equipped with the appropriate safety devices, as described in this paragraph, will not be used to transport personnel unless absolutely necessary, and never on a public highway, unless it is an emergency. Additional personnel transportation requirements are listed below:

- All tools and equipment shall be guarded, stowed, and secured when transported with personnel;
- No person will be permitted to ride with arms or legs outside of the truck's body, in a standing position on the body, on running boards, or seated on side fenders, cabs, cab shields, rear of truck, or on the cargo load;
- All motor vehicles transporting personnel during cold or inclement weather shall be enclosed;
- No explosives, flammable materials (except normal fuel supply), or toxic substances shall be transported in the cabs of any vehicle or beds of vehicles being used to transport personnel;
- No vehicle transporting personnel shall be moved until the driver has ascertained that all individuals are seated, belted, the guardrail and rear gate are in place, and doors are closed; and
- Getting on or off any vehicle while in motion is prohibited.

5.4 Fueling

All vehicles shall be shut off during fueling operations, operators and passengers will refrain from using cellular telephones, and no smoking or open flames will be permitted within 50 feet of fueling operations. Care should be taken not to spill fuel, and only that fuel recommended by the vehicle manufacturer shall be used. When fueling from a portable fuel tank system, the vehicle and portable tank will be bonded to each other (Example of this – using

"jumper" cables to connect the tank and vehicle). During fueling, when there is a potential for fuel contact with the skin, especially during cold weather, personnel will wear protective gloves, as specified in the SSHP.

5.5 Loading

Drivers of trucks and similar vehicles shall leave the cab, if the cab of the vehicle being loaded is exposed to danger from suspended or overhead loading operations, unless the cab is adequately protected. No motor vehicle shall be loaded so as to obscure the driver's view ahead or to either side, or to interfere with the safe operation of such vehicle. All vehicles carrying loads which project more than 4 feet beyond the rear of the vehicle shall carry a red light at or near the end of the projection at night, or when atmospheric conditions restrict visibility. During daylight periods, or other non-restricted conditions, a red flag not less than 12 inches square shall be used. The load shall be distributed, checked, tied down, or secured.

5.6 All-Terrain Vehicles

During the operation of all-purpose utility vehicles (APUV's), every operator shall possess a valid state driver's license and have completed, as a minimum, an approved on-site APUV training course prior to operation of the vehicle. See USACE EM 385-1-1, Section 18D for additional information. The operation of APUV's shall be conducted according to the procedures listed below:

- The manufacturer's recommended payload shall not be exceeded at any time;
- Gloves and an approved motorcycle helmet with face shield or goggles shall be worn at all times while operating an APUV;
- APUV's are to be used on off-road terrain and gravel and dirt roads, never on a public road;
- APUV's shall be driven during daylight hours only;
- Only four-wheel, or greater, APUV's shall be used;
- Passengers are prohibited on APUV's, unless they are designed to acommadate additional passengers, i.e., additional seats, and any passenger shall be required to wear a motorcycle helmet with fact shield or goggles; and
- All APUV's shall be equipped with warning signal devices and a horn.

5.7 Maintenance

All vehicles will be maintained IAW the manufacturer's requirements and guidelines. All vehicles will be inspected prior to operation and on a weekly basis for safety and basic operational equipment for deficiencies and parts needing repair. These will be brought to the attention of both the operator's supervisor and the UXOSO. Vehicles requiring repair or manufacturers required maintenance (except of oil changes, lubrication or tire rotation) will be repaired and dead-lined until the repairs are made.

All vehicles will be cleaned weekly and trash will be removed on a daily basis from inside the cab and truck bed. Excessive trash inside the operator's or passenger's compartment is unsafe and a health hazard for others. Excessive build up of mud inside the motor vehicle's wheel wells preclude the operator to observe any vehicle deficiencies and cause unsafe vehicle operations. All motor vehicles at Parsons sites will display a clean and up-kept appearance at all times, regardless of the site's operation, unless otherwise directed by local water restrictions.

5.8 Log Books and Operating Manuals

All motor vehicles will have their Operating Manuals and Log Books, for those vehicles, with the vehicle at all times. The log book will be up-to-date and complete.

ATTACHMENTS

- Figure 1 – Parsons Form D0038.xls (Monthly Mileage Report)
- Figure 2 – Parsons Form (Weekly Vehicle Inspection)
- Figure 3 – Parsons Activity Hazard Analysis (All-Terrain Vehicles)

Weekly Vehicle Inspection Report

Date:	**Vehicle Make:**	**Rental/Lease/Private** *(circle one)*
Lic Plate #:	**Veh VIN#:**	
Starting Mileage for Week:	**Ending Mileage for Week:**	
General Vehicle Inspection		

Check { } with R for repair needed; X for OK; / for adjustment made

1. Windshield { }	**3. Vehicle Interior** { }
2. Vehicle Exterior { }	**4. Leaks** { }

5. Lights:

a. Headlights { }	d. Brake Lights { }
b. Tail lights { }	e. Back-up Lights { }
c. Turn Signals { }	f. Interior Lights { }

6. Brakes { }	**10. Belts** { }
7. Horn { }	**11. Defroster** { }
8. Tires (Tread wear/pressure) { }	**12.Radiator/Hoses** (DON'T check when hot) { }
9. Windshield Wipers/Washer { }	**13. Battery** { }

14. Fluid Levels: (Circle approximate level)

a. Oil	Full	1qt low	Added
b. Coolant:	Full	Need coolant	Added
c. Transmission:	Full	1pt low	Added
d. Fuel:	Full	½ ¼	Empty

Comments/Repairs/Service(s) Needed:

Figure 2

Certification of Task Hazard Assessment

TASK NAME: ALL TERRAIN VEHICLE (ATV)

1.0 PRINCIPAL TASK STEPS

Principal Steps:	**Potential Site Hazards** (See 1.1 list):	**Recommended Controls** (See 1.2 list):
1. Accepted/Inspected at Site	Vehicle Safety	A through D
2. Placed in Operation	A1-2, B1-3, C, D1-2, F, H2-4, J1, K1-3	A through O
3. Vehicle Maintenance	Vehicle Safety	A through D

1.1 Potential Hazards: Items checked are known or anticipated site hazards, or may occur as a result of site operations **(Check Appropriate Box)**

A ( ) Thermal Stress	E( ) Manual Lifting Hazards	J( ) Radiation
A1( ) Heat Stress	F( ) Slip, trip or fall	J1( ) UV
A2( ) Cold Stress	G( ) Chemical Hazards	J2( ) Ionizing
B( ) Biological Hazards	G1( ) Respiratory	K( ) MEC Environment
B1( ) Toxic/Hazardous plants	G2( ) Skin	K1( ) Potential MEC items
B2( ) Hazardous animals/insects	H( ) Vehicle Operations	K2( ) Unplanned Detonation
B3( ) Hanta Virus, when present	H1( ) High Noise (>85 dBA)	K3( ) Near Surface
C( ) Vehicle traffic in work area(s)	H2( ) Overhead Hazards	
D( ) Fire Hazards	H3( ) Pinch Points Hazards	
D1( ) Vegetation (high grass areas)	H4( ) Hot Surfaces	
D2( ) Flammable Liquids		

1.2 Recommended Controls:

A. Observe all MEC safety precautions and use safe work practices, IAW EP 385-1-95a, Basic Safety Concepts for O&E Operations, Jun01 and EM 385-1-1, Safety and Health Requirements Manual.
B. All ATV Equipment will be inspected and tested, in accordance with manufacturer's recommendations and certified in writing by a component person prior to being placed in use, IAW Section 18, EM 385-1-1.
C. All ATV operators will be licensed and trained by a recognized accredited ATV Training Course or in-house resource that is certified as a Trainer by an accredited organization, prior to operations of the vehicle.
D. Wear the appropriate PPE for the task being performed.
E. Use recognized hand and arm signals to communicate between the operators. Cease any operation, when this fails.
F. Maintain safe and appropriate separation distances between ATV, when traveling as a group.
G. ATVs will be used only off road, unless equipped for paved road use by manufacturer.
H. ATVs will only be operated during daylight hours, unless equipped for night use by manufacturer.
I. Only ATVs with four or more wheels may be used.
J. The manufacturer's recommended payload will not be exceeded at any time.
K. Passengers are prohibited on Class I ATVs (Class I ATV – single seat centered over the engine).
L. All ATVs will be equipped with mufflers, spark arrester, tail lights, stop lights and an audible signal device (horn).
M. Use of "ground guides" will be used, when vehicle(s) are not equipped with an audible warning device and/or has an obstructed view. When transporting equipment by trailers, the trailer will be "chocked" with approved devices when unhooked from the transporting vehicle. When attempting to hook onto the trailer, "ground guides" will not place any part of between the trailer and vehicle.
N. Be alert. Mark, avoid, and report any suspect MEC items.
O. Do not handle wildlife. Review characteristics of potential toxic/poisonous plant life known in the area.

2.0 DEGREE OF OVERALL TASK HAZARD: Anticipated degree of hazard, based on the hazards associated with this task.

Chemical Hazard:	**Physical Hazard:**	**Biological Hazard:**
( ) Low ( ) Serious	( ) Low ( ) Serious	( ) Low ( ) Serious
( ) Moderate ( ) Unknown	( ) Moderate ( ) Unknown	( ) Moderate ( ) Unknown

3.0 PROTECTIVE MEASURES: Items checked will be used to control or mitigate the above mentioned hazards

( ) Tailgate Safety Briefing	( ) Engineering Controls	( ) Administrative Controls
( ) Specialized Training	( ) Lockout/Tag Out	( ) Rotate Workers
( ) Proper operations of equipment	( ) Site Control Zones	( ) Limit Exposure Time
( ) Equipment Safety hazards	( ) Communications	( ) Decontamination
( ) Personal protective equipment	( ) Establishing Safe Work Areas	**( )** Wash Hands at break regardless of activity
	( ) Designate Smoking/Break Area	
	( ) Proper use of vehicles	
Other: _____	( ) Proper use of seat belts	Other: _____
	Other: _____	

TASK NAME: ALL TERRAIN VEHICLE (ATV)

4.0 Applicable SOPs/Programs: Site Specific Safety/ Health Plan (SSHP)			
5.0 PPE: PPE has been assigned based on the potential for exposure as identified by this hazard assessment			
Level of Protection	( ) A ( ) B	( ) C ( ) D	( ) Modified
Respiratory Protection	( ) SCBA ( ) Airline Respirator	( ) Full face APR ( ) ½ face APR	( ) Cartridge Type _____ ( ) No respirator needed
Protective Clothing	( ) Fully encapsulated ( ) Tyvek F, with hood	( ) Saranex ( ) Coveralls, Cotton	( ) Work Clothes ( ) Other:
Gloves (specify inner/outer)	( ) Nitrile ( ) Butyl	( ) Neopene ( ) Latex	( ) Leather ( ) Cotton
Head/Face/Eye/Ear Protection	( ) Safety Glasses–ANSIZ87.1 ( ) Ear plugs or muffs	( ) Safety goggles ( ) Wire or Nylon Face Shield	( ) Hard Hat ( ) Other:
Foot/Leg Protection	( ) Work Boots ( ) Steel-toed boots	( ) Steel Toe covers ( ) Snake Leggings	( ) Chemical over boots ( ) Kevlar Leg Chaps
Other Protection	( ) Motor Cycle Helmet w/full face shield or goggles	( ) Hi-Visibility Vests	
5.1 PPE Modifications Required: Elevated PPE posture when dealing with suspected "Hanta Virus" locations.			

6.0 Training Requirements

6.1-UXO personnel are EOD trained and approved by CEHNC-Huntsville
6.2-All Site personnel are OSHA qualified, both 40-hr and current 8-hr Refresher, IAW 29 CFR 1910.120
6.3- All Site personnel operating a vehicle maintain a current state driver's license.
6.4- UXO identification and safety precautions training for all Site Personnel. (Performed by UXOSO)
6.5-ATV operators will provide a copy of their qualifications and competency to the UXOSO, prior to any equipment operation.
6.6-Daily Safety and Operations Briefing. (Performed by UXOSO)
6.7-All Site personnel will attend "Site Specific Training" for safe work practices and hazard protection, IAW SSHP. (Performed by UXOSO).
6.8-Site personnel will be briefed on Material Safety Data Sheets (MSDS) for fuels and oils. (Performed by UXOSO)
6.9-Knowledge of emergency response and notifications IAW SSHP.
6.10-Maintain equipment IAW manufacturer's specifications and operate IAW owner's manual.

7.0 Equipment to be used and Inspection Requirements

Type	**Inspection Frequency (Daily/Weekly/Monthly)**		
Heavy Equipment (checks will be done prior, during and after operation)	Daily by Operator	Weekly as needed	Monthly as needed
First Aid Kits	Daily by Team Leader	Weekly by UXOSO for missing items	Monthly by UXOSO for expired items
Communications Equipment	Daily by Team Leader	Weekly by Team Leader	Monthly, as needed
Communication Checks w/radios (Cellular phones as back-up)	Twice Daily with all site elements. All "operations" will cease until communications have been re-established with at least another site element to relay information		
Fire Extinguishers	Daily by Team	Weekly by UXOSO	Monthly by UXOSO

8.0 Certification: The control methods, PPE and other procedures used in the conduct of this task have been selected as a result of a hazard assessment conducted by the individual identified below:

Printed Name: **Edward Grunwald, C.I.H., Project Safety and Health Officer** **Date: 01/20/05**

OE SECTOR
Standing Operating Procedure (SOP)

Heavy Equipment Operations

PARSONS
5390 Triangle Parkway, Suite 100
Norcross, Georgia 30092

Revision No. 1
February, 2005

1.0 INTRODUCTION

The purpose of this SOP is to provide the minimum procedures and safety and health requirements applicable to the operation of heavy equipment, hereinafter referred to as earth moving machinery (EMM).

2.0 Scope

This standing operating procedure (SOP) contains information specific to the operation of EMM. It will include manuals and publications relevant to operation, lubrication and preventive and scheduled maintenance of the EMM that may be leased, purchased or otherwise employed on the site. It is incumbent upon all designated operators to familiarize themselves with this SOP and to periodically review it an effort to remain current with safe EMM operations.

3.0 REFERENCES

Procedures and information contained in this document were obtained from the below listed references:

- USACE EM 385-1-1, Safety and Health Requirements Manual;
- USACE EP 385-1-95a, Basic Safety Concepts and Considerations for Ordnance and Explosives Operations;
- USACE EP 1110-1-18, Engineering and Design;
- OSHA Regulation 29CFR1926, Subpart P, Appendix A and 29CFR1926.652, Subpart P, Appendix F, Safety and Health Requirements for Construction;
- AR 385-55, Prevention of Motor Vehicle Accidents;
- DA Pam 385-16, System Safety Engineering and Management; and
- Parsons I & T Policies and Procedures for Health and Safety

4.0 EMM Operations

4.1 Team Composition

The minimum team make-up will be:

- One qualified operator, either a UXO Technician or Non-UXO trained individual;
- One ground guide, UXO Technician I or II, (the EMM Safety Observer can fill this role and that of safety Observer if conditions permit); and
- One EMM Safety Observer, UXO Technician III.

4.1.1 Team Leader

An UXO Technician III (Team Leader) will serve as the EMM Team Leader and overall Safety Observer, directing the site personnel and equipment during the operation. Depending on the complexity of the operation, he may also serve as the backup guide. The EMM Team Leader will be trained, as a competent person when required. (See paragraph 6-4, this SOP).

4.1.2 Ground Personnel

Team members working on EMM operations will be qualified through non-the-job training (OJT) and will perform such tasks as magnetometer checks, manual excavation and checks of the excavation for UXO items. When using a UXO Tech I for manual excavation, a UXO Technician III must be present to supervise.

4.1.3 Equipment Operators

All site personnel, regardless of affiliation, who operate EMM equipment, will be qualified through documented formal training, equivalent previous employment experience or OJT. Documentation of this training will be kept on file at the site. The operator, when engaged in EMM operations, will perform daily inspection and maintenance functions (See figure 1), or as directed by the operator's manual for that specific equipment.

4.1.4 Use of Non-UXO Personnel

Use of Non-UXO personnel as operators on UXO sites is authorized. There is no requirement for additional safety barriers or shielding during the operation, IAW USACE EP 385-1-95a. When the operation has come within one foot of the UXO item or anomaly being investigated, unless the operator has been designated essential personnel, the Non-UXO operator must move outside the pre-designated Minimum Safe Distance (MSD), until recalled by the EMM UXO Technician III.

4.2 Equipment Procedures

The hazards associated with heavy equipment involve moving parts and exposure to possible pinch points. Safe operating procedures for each type of equipment or activity must be reviewed and followed. Safety protection, including equipment guards, which must not be removed, shall be provided to mitigate this problem. Site personnel operating or working within close proximity to heavy equipment will wear hard hats, eye protection, steel-toed boots, and hearing protection (as necessary).

Heavy equipment used on the site must meet the requirements of OSHA, DOT, and general industry standards. The operator will be responsible for completing daily written inspections of all heavy equipment and provide copies of the inspection as well as required certifications to the Site Manager (SM). All personnel who operate equipment must use any safety devices, such as seat belts, that the equipment is equipped with during operation. All operators will follow the following heavy equipment operating rules:

- Only personnel trained in the operation of heavy equipment are permitted to operate such equipment;

- Personnel may only operate equipment for which they have received training and certification. Trainees may operate heavy equipment, but only under competent supervision;

- Before operating any heavy equipment, the operator must conduct a pre-operational check of the piece of equipment. Brakes, hydraulic lines, light signals, fire extinguishers, fluid levels, steering, tires, horn, and other safety devices will be checked daily and maintained in good working order throughout the duration of its use. If it is found to be unsafe, the operator must report the condition immediately to the appropriate supervisor, and the piece of equipment placed in an unserviceable status until it has been repaired or replaced.

- The operators of heavy equipment will complete a daily inspection form (See Figure 1).

- All heavy equipment will not be backed up unless the vehicle has a reverse signal alarm audible above the surrounding noise level, backup warning lights, or the vehicle is backed up using a ground guide.

- Heavy equipment will be provided with necessary safety equipment including seat belts, roll-over protection, emergency shut-off during roll-over, backup warning lights, and audible alarms as applicable.

- Blades and buckets will be lowered to the ground and parking brakes will be set before shutting off any heavy equipment.

- Special consideration must be given to the proper functioning of tires, horns, lights, batteries, controllers, lift systems (including forks, chains, cable and limit switches), brakes, and steering mechanisms;

- All heavy equipment must be operated at an authorized safe speed, consistent with conditions, and at a safe distance from other vehicles. Heavy equipment must be under positive control at all times;

- No riders other than the driver are permitted on heavy equipment at any point;

- When heavy equipment is left unattended, loads must be lowered, controls neutralized, power shut off, and brakes set. Wheels should be chocked if the equipment is parked on an incline.

- Backhoe support struts (downriggers) shall be equipped with cleated pads for use in soft sandy soil rather than rubber pads (for hard surfaces).

- When working near a backhoe or excavator, field personnel will maintain sight contact with the operator. Field personnel shall not work within the swing radius of the equipment while the equipment is operating. The swing radius will be defined with traffic cones, barrier tape, or other suitable means, such as inscribing the radius on the soil surface using the backhoe bucket.

- Personnel will not cross the demarcated line without first establishing eye contact with the operator. The operator will cease vehicle operations and remove his hands and feet from the controls and/or turn the equipment off, before allowing personnel access to the area within the swing radius. Operations will resume only after all personnel have left the area within the swing radius.

5.0 Personnel Protective Equipment (PPE)

Modified Level D PPE will be required for personnel engaged in EMM operations. Clothing items will be:

- Coveralls or work clothing as prescribed by APP;
- Work gloves, leather or canvas, as prescribed by APP;
- Safety glasses - as wind conditions and airborne particulate matter dictates;
- Hardhats;
- Highly Visible Safety Vests;
- Work Boots, steel toe - Sturdy and of sufficient height to aid in ankle support;
- Hearing Protection - Will be determined through a Noise Survey (Sound Level Meter) for any EMM equipment brought on site. Until the survey is completed and the degree of attenuation determined, personnel on the EMM team will wear appropriate hearing protection; and
- Dust Masks - as wind conditions and airborne particulate matter dictates.

NOTE: *If the EMM equipment is being used for the clearance in support of other operations, PPE will be IAW that specific matrix (i.e. rat nests - Hanta Virus SOP or CWM projects).*

6.0 General Safety Precautions

6.1.1 Underground Utilities

Utilities companies shall be contacted within established or customary local response times advised of the proposed work and asked to locate underground utilities (sewer, telephone, electric, water, gas or any other utility) prior to start of actual excavation. When these locations cannot be established, the excavation may proceed, provided the EMM operation does so with caution, and only after site personnel, using detection equipment, have made an attempt to locate utilities. While the excavation is opened, and underground utilities exposed, they shall be protected, supported or removed as necessary to safeguard workers.

6.1.2 Exposure to Vehicle Traffic

EMM team members exposed to vehicular traffic shall be provided and wear warning vests or other suitable garment with a highly visible (reflector) material. Traffic direction paddles or saw horse type barricades may also be required to halt or redirect vehicular traffic around the excavation site.

6.1.3 Exposure to Falling Loads

No worker shall be permitted underneath loads handled by lifting or digging equipment. Workers are required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling material.

6.1.4 Equipment Warning Device

All EMM equipment will be equipped with an audile warning system that sounds when the equipment is backing up. EMM equipment needing to be moved adjacent to an excavation or approach the edge, and the operator does not have a clear and direct view of the edge, will institute a warning system, such as barricades, stop logs or arm and hand signals from the safety observer.

6.1.5 Loose Rock or Soil

Workers will be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. All equipment or materials will be placed at least 2 feet (.61m) from the edge of excavations, or by use of retaining devices that are sufficient to prevent the equipment or material from falling or rolling into the excavation. Also scaling the excavation face to remove loose rock or soil and the installation of protective barriers at intervals on the face to stop or contain falling material will be used when appropriate.

6.1.6 Cave-In

Excavations will be protected from cave-ins by adequate protective systems (sloping and benching or shielding and support).

6.1.7 Operation of EMM

EMM will not be operated without a spotter. This includes moving, repositioning, and using the front and rear attachments. Prior to starting an excavation, a safety arc will be etched in the ground with the front or rear boom, fully extended. If operating on a hard surface, the safety arc will be marked on the ground, with bright spray paint. Prior to anyone entering the safety arc, the operator will:

- Swing the boom fully to one side;
- Lower the bucket to the ground;
- Place engine in idle speed; and
- Hold his hands clear of the controls or in the “Hands Up” position.

6.2 UXO Precautions

All EMM operations will adhere to the MSD as described in the site Work Plan. The lateral distances will be maintained when conducting EMM operations on a UXO site. These distances may be reduced or extended by the USACE Site Safety Representative, based on an assessment of site history, size of site, expected UXO, terrain features or other such factors that may apply. The following distances shall apply as applicable:

- 200 feet minimum or the K-50 factor distance (whichever is greater) from non-UXO trained site personnel, unrelated to the operation.
- 200 feet minimum or the K-50 factor distance (whichever is greater) from another EMM operation or other manual intrusive operations.
- All EMM excavations will be conducted offset laterally for the suspected UXO item or anomaly being investigated.
- The EMM will uncover no more than six (6) inches of earth per dig.
- The EMM will not be used to excavate closer than 12 inches from UXO.
- Suspend all operations immediately upon approach of an electrical storm.
- Observe the hazards of electromagnetic radiation (EMR) precautions when working in the vicinity of electrically initiated or susceptible UXO.
- Do not handle any MEC unnecessarily.
- Incorporate appropriate property protective measures for shock and fragmentation when conducting MEC operations.

6.3 Equipment Safety Precautions

All EMM operators will conduct familiarization and OJT with the EMM equipment prior to any excavation operation. All EMM equipment on site will have:

- Roll-Over Protection (ROP) and certificate on file at site.
- Back-up Warning System.
- 5A:BC fire extinguisher.
- Site Radio.
- Operator's Manual and Lubrication Order.

6.4 Training

6.4.1 Competent Person

The EMM Team Leader will serve, as the "Competent Person", for all EMM operations. The Project Health and Safety Officer (PHSO) or the OE Group Certified Industrial Hygienist (CIH) will conduct this training, during the site specific training. This training will be documented and kept on file at the site. Minimum elements of training will include:

- Review of OSHA Regulation for Safety and Health Requirement for Construction/Excavations – *OSHA Regulation 29CFR1926, Subpart P, Appendix A and 29CFR1926.652, Subpart P, Appendix F*, (Annex A of this SOP)

- Proper Shoring and Sloping Techniques
- Soil classification and evaluation at the excavation site.
- Responsibilities of a Competent Person.

Heavy Equipment Inspection Report

Date:	**Vehicle Make:**	**Rental/Lease/Private** *(circle one)*
Lic Plate #:	**Veh VIN#:**	
Starting Mileage/Hours for Week:	**Ending Mileage/Hours for Week:**	

General Vehicle Inspection

Check { } with R for repair needed; X for OK; / for adjustment made

1. Windshield { }	**3. Vehicle Interior** { }
2. Vehicle Exterior { }	**4. Leaks** { }
5. Lights: a. Headlights { } b. Tail lights { } c. Turn Signals { } d. Brake Lights { } e. Back-up Alarm { }	
6. Brakes { }	**10. Belts** { }
7. Horn { }	**11. Defroster** { }
8. Tires/Tracks (Tread wear/pressure) { }	**12.Radiator/Hoses** (DON'T check when hot) { }
9. Windshield Wipers/Washer { }	**13. Battery** { }
14. Fluid Levels: (Circle approximate level) a. Oil Full 1qt low Added_____ b. Coolant: Full Need coolant Added_____ c. Transmission: Full 1pt low Added_____ d. Fuel: Full ½ ¼ Empty	e. Hydraulic Fluid Full 1qt low Added_____ f. Grease Fittings Full Added_____ g. ROPS Certificate Yes No

Comments/Repairs/Service(s) Needed: Next Service @_____hrs

Figure 1

Annex A

Soil Classification for EMM Operations

1.0 Soil Types

The following soil types may be encountered in the course of excavating soil. A knowledge of soil characteristics of the soil types is beneficial to understanding the hazards associated with each.

- **Cemented Soil** – A soil in which a chemical agent, such as calcium carbonate, holds the particles together whereas a hand-size sample cannot be crushed into powder or individual soil particles by finger pressure.

- **Cohesive Soil** – A fine grained soil (clay) or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical side-slopes and is "plastic" when moist. Cohesive soil is hard to break up when dry, and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.

- **Dry Soil** – A soil that does not exhibit visible signs of moisture content.

- **Fissured Soil** – A soil material that has a tendency to break along definite planes of fracture with little resistance or a material that exhibits open cracks, such as "tension cracks", in an exposed surface.

- **Granular Soil** – Means gravel, sand, or silt (coarse grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.

- **Layered System** – Means two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or shale are considered layered.

- **Moist Soil** – Means a condition in which a soil looks and feels damp. Moist cohesive soils can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.

- **Plastic Soil** – means a property of a soil, which allows the soil to be deformed or molded without cracking, or appreciable volume change.

- **Saturated Soil** – Means a soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a penetrometer or sheer vane.

2.0 Soil classification

If personnel are to enter the excavation, the soils of the excavation must be classified to determine the design of the appropriate protective system. Each soil and rock deposit at an excavation site must be classified by a competent person, as either stable rock, Type A, Type B, or Type C soil.

The soil classification results must be made based on the results of at least one visual test (tension cracks or signs that the soil has been previously disturbed) and one manual test (use of pocket penetrometer or shear-vane to measure unconfined compression strength). The definitions of the various soil classifications are presented below.

- **Stable Rock** is natural solid mineral matter that can be excavated with vertical sides and will remain intact while exposed.
- **Type A Soils** are cohesive soils with an unconfined compressive strength of 1.5 tons per square foot (tsf) (144 kPa) or greater. Examples of Type A cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. A soil cannot be classified as Type A if it is fissured; subject to vibration from traffic, pile driving, or similar effects; has previously been disturbed, is part of a sloped, layered system where the layers dip into the excavation on a slope of 4 horizontal to 1 vertical (4H:1V) or greater; or has seeping water.
- **Type B Soils** are cohesive soils with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa). Examples of other Type B soils are: angular gravel; silt; silt loam; previously disturbed soils unless otherwise classified as Type C; soils that meet the unconfined compressive strength or cementation requirements of Type A soils but are fissured or subject to vibration; dry unstable rock; and layered systems sloping into the trench at a slope less than 4H:1V (only if the material would be classified as a Type B soil).
- **Type C Soils** are cohesive soils with an unconfined compressive strength of 0.5 tsf (48 kPa) or less. Other Type C soils include: granular soils such as gravel, sand and loamy sand, submerged soil, soil from which water is freely seeping, and submerged rock that is not stable. Also included in this classification is material in a sloped, layered system where the layers dip into the excavation or have a slope of four horizontal to one vertical (4H:1V) or greater.

Table 1-1
Maximum Allowable Slopes

Soil or Rock Type	**Maximum Allowable Slopes (H:V) for Excavations less than 20 feet in depth**
Stable Rock	Vertical (90 deg.)
Type A	¾:1 (53 deg)
Type B	1:1 (45 deg)
Type C	1 ½:1 (34 deg)

Exception: Simple slope excavations, which are open 24 hours, or less (short term) and 12 feet or less in depth shall have a maximum allowable slope of ½:1.

Annex B

Refresher Examination for EMM Operations

EMM EQUIPMENT REFRESHER EXAM

LOCATION_____

NAME_____DATE_____

ORGANIZATION_____

Circle the correct answer or fill in the blank

1. When performing preventive/pre-operational maintenance on EMM equipment, with out a lubrication chart, where should you look for grease fittings?

a. Behind the wheels.
b. At every pivot point.
c. On the bucket teeth.
d. At a local service station.

2. Before starting to excavate what should you check for?

a. Underground utilities.
b. Overhead utilities.
c. Endangered wildlife habitats and vegetation, as outlined in the Work Plan.
d. All the above.

3. ROPS stands for?

a. Read Operational Standards.
b. Round Off Posts Stops.
c. Roll Over Protection System.
d. Roll Or Push Slowly.

4. According to Corps Safety Concepts how close can you excavate to UXO?

a. 6”.
b. 1’.
c. 1 ½’.
d. 2’.

5. What simple safety rule must be followed to make ROPS effective?

a. Wear gloves.
b. Wear hardhat.
c. Wear seatbelt.
d. Wear pantyhose.

6. The type soil most likely to collapse?

a. A.
b. B.
c. C.
d. D.

7. If the excavation is below 5' deep what precaution must be taken before a man can enter the hole?

a. Get a ladder.
b. Get a harness.
c. Get a tape measure.
d. Sloping or engineer approved shoring.

8. In type "C" soil what is the minimum slope required? (Slope to depth)

a. 1:1
b. 1 ½:1
c. 2:1
d. 3:1

9. What should you as an operator do to protect ground personnel?

a. Mark the maximum arc of the bucket.
b. Remove hands and feet from controls before allowing entry into the arc.
c. Have "eye contact" between operator and assistant.
d. Signal the assistant that it is okay to enter the arc.
e. All of the above.

10. According to the COE Safety Concepts what is the minimum safe separation distance that multiple backhoes can operate from each other?

a. 100'.
b. 200'.
c. Same as intrusive team separation.
d. Both b and c are correct.

11. When the backhoe is delivered who is responsible for loading and unloading.

a. Owner.
b. Renter.
c. Government
d. Home Depot

12. Before accepting delivery you should.

a. Check fluids.
b. Operate all controls then check for leaks.
c. Check all safety equipment.
d. Check for proper routing of hoses.
e. All the above.

13. How many people can ride on the backhoe?

_____.

14. How many people can you lift in the front bucket for tree trimming?

_____.

15. What is the minimum distance you can pile your spoil from the edge of the excavation?

a. 1'
b. 2'
c. 3'

d. 4'

APPENDIX E
SAMPLING AND ANALYSIS PLAN

SAMPLING AND ANALYSIS PLAN

FIELD SAMPLING PLAN
QUALITY ASSURANCE PROJECT PLAN

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

Prepared for:

U.S. Army Engineering and Support Center,
Huntsville

U.S. Army Corps of Engineers,
Baltimore District

Prepared by:
PARSONS
Fairfax, Virginia

March 9, 2007

SPRING VALLEY FORMERLY USED DEFENSE SITE
SAMPLE AND ANALYSIS PLAN

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1 SAMPLING AND ANALYSIS PLAN

1.1 OVERVIEW

1.1.0.1 This section details the Environmental Sampling and Analysis Plan (SAP) for activities at SVFUDS. The plan has been developed in accordance with DID MR-005-10, EM 200-1-3, and the SOW. This document outlines all anticipated sampling and analysis procedures that may be used at SVFUDS. The SAP comprises two parts, the Field Sampling Plan (FSP) and the Quality Assurance Project Plan (QAPP). The FSP is presented as Sections 2 through 7. The QAPP is presented as Sections 8 through 20.

1.1.0.2 As described in the Site-Wide Work Plan (Chapter 1), sites at the SVFUDS will be determined to be either suspected RCWM sites or non-RCWM sites based on the probability assessments. For the purposes of investigations at the SVFUDS, non-RCWM sites are referred to as “low probability” sites, while suspect RCWM sites are referred to as “higher probability” sites. The results of the USACE probability assessment and the nature of the anomalies to be investigated will be stated in the Site-Specific Work Plan (SSWP) for each individual project site.

1.1.0.3 This SAP describes the sampling methods and procedures to be implemented for investigations of both low probability sites and higher probability sites at the SVFUDS. In many cases the sampling methods and procedures required are common to both types of investigations. However, in general, higher probability sites require a higher level of activity (more sampling, more parameters, more rigorous safety protocols, etc.). ***Therefore, unless otherwise specified as a low probability method or procedure, this SAP describes methods and procedures for higher probability activities. Where the required steps for a low probability site differ, those methods and procedures are called out in this SAP***. The specific methods and procedures to be used during a given operation will be designated in the SSWP for each individual project site.

2 FIELD SAMPLING PLAN (FSP)

2.1 PART 1 - FIELD SAMPLING PLAN (FSP)

2.1.0.1 The purpose of the FSP is to provide procedures to conduct field sampling efforts at the SVFUDS during intrusive excavation activities. Field sampling activities will be performed IAW the procedures outlined in this section to ensure that usable data of known quality are generated. The information provided in this section will be supplemented as necessary in the SSWPs.

2.2 PROJECT BACKGROUND

2.2.0.1 The SVFUDS background is presented in the Site-Wide Work Plan, Chapter 1.

2.3 PROJECT ORGANIZATION AND RESPONSIBILITIES

2.3.0.1 The organization and responsibilities for the SVFUDS are described in detail in the Site-Wide Work Plan, Chapter 2.

2.4 PROJECT SCOPE AND OBJECTIVES

2.4.0.1 The SVFUDS project scope and project objectives are described in the Site-Wide Work Plan, Chapters 1 and 2, respectively.

2.5 APPLICABLE REGULATIONS AND STANDARDS

2.5.0.1 Applicable regulations and Standards governing the SVFUDS are presented in the Site-Wide Work Plan, Chapter 7.

2.6 NONMEASUREMENT DATA ACQUISITION

2.6.0.1 Nonmeasurement data acquisition information for the SVFUDS is included in the Site-Wide Work Plan as follows:

- Geological and Hydrogeological (Chapter 1)
- Climate (Chapter 1)
- Threatened and endangered species (Chapter 7)

3 ANALYTICAL PLAN

3.0.0.1 Various types of samples will be collected during intrusive excavation activities at SVFUDS. These may include: surficial soil, subsurface soil, pit characterization soil, soil disposal (excavated soil), aqueous IDW (decontamination water), scrap, and non-agent intact containers. These samples will be analyzed for two general types of compounds: Chemical Agent (CA), and Hazardous and Toxic Waste (HTW) constituents.

3.0.0.2 A Spring Valley Comprehensive list of analytical parameters was specifically developed by the Spring Valley Partners for the SVFUDS. Over a series of meetings, the Partners reviewed all chemicals documented as having been used at the AUES. The list was refined by considering whether analytical methods were available and by using chemical and physical properties to assess whether the chemical could be present under current site conditions. Table 3.1 presents the general analytical methods that will be used on this project, including those required to address the SVFUDS Comprehensive list compounds. These are presented in more detail in the QAPP portions of this SAP (see Tables 1, 2, 3a, and 3b of Attachment A).

3.1 CA/AGENT BREAKDOWN PRODUCTS ANALYSIS

3.1.0.1 For the SVFUDS, CA is limited to mustard and lewisite. Agent Breakdown Products (ABPs) will also be monitored during the site-wide investigations. The mustard breakdown products are thiodiglycol, dithiane, and oxathiane. The lewisite breakdown products are chlorovinylarsenious oxide (CVAO) and chlorovinylarsenious acid (CVAA). At SVFUDS, ricin is also a potential contaminant of concern. Although not categorized as CA/ABP, ricin is included with this grouping.

3.1.0.2 CA/ABP samples, including ricin (as required), will be analyzed by the air monitoring team or contract surety laboratory either on site at a laboratory staged at the Federal Property, or transported off site to either the air monitoring team laboratory at APG, MD, or the contract surety laboratory.

3.1.0.3 Table 3.1 lists the CA/ABP analytical parameters and methods.

3.2 HTW ANALYSIS

3.2.0.1 HTW constituents, which include disposal parameters, will be specified in the SSWPs. Table 3.1 indicates the general groups of analytical parameters required to address the SVFUDS Comprehensive list compounds, as well as the disposal parameters. Depending on site-specifics, these could include Volatile Organic Compounds (VOCs), Semivolatile Organic Compounds (SVOCs), and metals, explosives, cyanide, fluoride, and iodine. For SVFUDS, these samples will primarily be solid (soil) samples. However, for aqueous samples (e.g., groundwater), the parameters will also include acetic acid, chloracetic acid, bromide, chloride, ethyl alcohol, iodine pentafluoride, picric acid, and perchlorate.

3.2.0.2 Disposal characterization parameters will include TCLP volatile organic compounds (VOCs), TCLP semivolatile organic compounds (SVOCs), and TCLP metals, and the RCRA characteristic parameters: corrosivity; ignitability; and reactivity (cyanide and sulfide) as required by disposal facility. HTW analyses will be performed by the HTW laboratory.

3.2.0.3 All of the parameters listed are discussed in greater detail in Section 11 of the QAPP portion of this SAP.

Table 3.1
Analytical Parameters and Methods

	Analysis	Analytical Parameter	Analytical Method
SVFUDS COMPREHENSIVE LIST PARAMETERS	**CA/ABP**	Lewisite (L) CVAO, CVAA	Geomet SOP CDLD SOP 77
		Mustard (H)	Geomet SOP CDLD SOP 77
		Oxathiane	GPL SOP R.3V8
		Dithiane	GPL SOP R.3V8
		Thiodiglycol \[1]	GPL SOP S.2V6
		Ricin	ECL Assay
	HTW Parameters	VOCs \[2]	CLP OLM04.3
		SVOCs	CLP OLM04.3
		Metals	CLP ILM05.3
		Explosives	SW 846 8330
		Cyanide	EPA 335.2
		Fluoride	E300.0
		Iodine	E314.0 Mod
	HTW Parameters (groundwater only)	Acetic acid	GPL SOP L12
		Chloracetic acid	MOD UW22
		Bromide	IC 300
		Chloride	IC 300
		Ethyl alcohol	MOD SW 8015
		Iodine pentafluoride	E314.0 Mod
		Picric acid	GPL SOP S.1
		Perchlorate	IC 314 or DataChem SOP LCMS CL04_REV 2
	Disposal Characterization Parameters	TCLP VOCs	SW-846 1311/8260B
		TCLP SVOCs	SW-846 1311/8270C
		TCLP Metals	SW-846 1311/6010B and
			SW-846 1311/7470A
		Corrosivity	SW-846 9045C
		Ignitability	SW-8461010B (Mod)
		Reactivity (cyanide)	SW-846 Chapter 7
		Reactivity (sulfide)	SW-846 Chapter 7

[1] To prevent false positives from plastics and other household products, thiodiglycol analysis will be conducted only after confirmation of oxathiane and dithiane.

[2] For ***low probability site sampling***, VOCs will be sampled with the Encore device, prep method SW-5035A.

3.3 LOW PROBABILITY SITE INVESTIGATION ANALYSIS

3.3.0.1 Table 3.1 presents the entire suite of analytical parameters required to obtain data for every SVFUDS Comprehensive list compound. In general, this is the analysis required for higher probability site investigations. However, low probability sites typically do not require the same level of analytical coverage.

3.3.0.2 CA constituents and ricin will not be analyzed at low probability sites. ABPs can be, but based on site-specific conditions, it may be appropriate to only analyze for a subset of the Table 3.1 parameters and not the entire list. For example, where stained soil or other field observations indicate sampling is prudent (see Subsection 4.8 of this SAP), and concurrence and approval to sample has been obtained from the on-site USAESCH Safety Specialist and CENAB Site Operations Officer, Table 3.1 can be used as a menu from which to select the appropriate parameters. This decision would be based on site history, locational data, previous sampling results in the vicinity, and other information relevant to that specific site. The parameters to be analyzed will be a consensus decision of the Partners, but at a minimum, analysis for arsenic will be performed.

4 FIELD SAMPLING

4.0.0.1 The following section describes the field sampling procedures for various types of samples, QA/QC sampling procedures, sample designations, sampling equipment decontamination procedures, and surveying procedures.

4.1 PIT CHARACTERIZATION

4.1.1 Sample Collection – Pit Characterization

4.1.1.1 For purposes of characterizing each pit and providing data to make pit closure decisions, individual grab samples will be collected by the excavation team from all four walls and the floor of each excavation pit.

4.1.1.2 All sample locations will have their depth below ground surface (bgs) recorded in feet and inches. Samples will be collected at the horizontal mid-point of the pit wall, or near the elevation of scrap or any containers that were encountered. The pit floor sample will be collected from the center of the floor.

4.1.1.3 Grab soil samples will be collected from each location, and analyzed for HTW parameters by an HTW Laboratory following clearance for CA. The temperature of the HTW sample will also be recorded when analyzed.

4.1.1.4 Pit characterization sampling procedures are provided in Table 4.1.

Table 4.1
Pit Characterization Soil Sampling Procedures

PROCEDURE
1. The sampling team will send a bucket liner to the excavation team containing two 4-ounce and two 8-ounce pre-labeled jars, a trowel, and zipper-lock bags. The sample team will inform the excavation team of the location and depth of the samples. 2. The excavation team will record the sample description (depth, time, date and location) in the field log book or relay this information from inside the EZ to the sample team via hand held radio. 3. The excavation team will remove dirt from the outside of the jars with a dry brush, wipe the exterior of the jars with the decontamination fluid (bleach solution), dry, and place in a zipper-lock bag. 4. If more than one location is to be sampled at one time, the jar lids of each sample will be marked by the excavation team with the proper sample identifier. 5. The excavation team will decontaminate the spoon after each sample is collected. 6. Once the exteriors of the sample jars are decontaminated, they will be passed outside the EZ to the Sample Team. 7. The Sample Team will fill out Chain of Custody forms for the HTW samples. 8. The Sample Team will submit the HTW samples to the HTW laboratory after CA clearance.

4.1.2 QA/QC Sampling – Pit Characterization

4.1.2.1 Several types of field QC samples will be collected for pit characterization soil sampling. Soil QC samples will be collected for every 10 or 20 pit characterization samples, with a minimum of one (1) QC sample from each site. One blind field duplicate (DUP) will be collected per 10 soil field samples and analyzed for CA/ABP and HTW constituents. One sample for every 10 pit characterization samples (at least one from each site) will be collected in triple volume for matrix spike/matrix spike duplicate (MS/MSD) and analyzed for HTW constituents. One equipment blank (EB) will be collected per 20 soil field samples and analyzed for CA/ABP and HTW constituents. One trip blank (TB) will be sent with each shipping container that includes aqueous volatile organic compound (VOC) samples.

4.1.3 Sample Designation – Pit Characterization

4.1.3.1 The site-specific plan will describe a sample nomenclature system designed to track each type, location, and container associated with the sample. The HTW sample collected from each location will have the following alphanumeric code:

- XX-XX#-XX##-(##)

4.1.3.2 The first two characters represent the project (SW for site-wide). The next three characters indicate the location. The next four characters indicate from which wall the sample was collected and how many have been collected (if additional samples are needed from the same wall after further excavation, they will be numbered consecutively). The last set of characters indicates the depth in feet at which the sample was collected. For example, the sample name “SW-PT1-EW01 (05)” would be used for the first sample collected from five feet below ground surface on the east wall of Pit 1. Floor samples will be labeled with "FL" instead of "EW".

4.1.3.3 All QA/QC samples associated with pit characterization samples (except for MS/MSD samples) will be labeled as normal field samples such that the laboratory does not have the knowledge that they are QA/QC samples. The above sample designation codes will be used for the QA/QC samples (except for MS/MSD samples). The logbook will contain an additional set of characters at the end of the sample name described above to identify the type of QA/QC sample (e.g. DUP01, EB01, etc.). The QA/QC samples will be numbered consecutively for a given type for each sampling event. For the MS/MSD samples, the laboratory will be notified appropriately by adding the MS/MSD characters to the sample code (MS01 or MSD02, for example).

4.2 BACKFILL

4.2.1 Backfill Sampling

4.2.1.1 Backfill operations will be completed by the HTW contractor using materials brought in from off site if MEC or RCWM is removed from the excavation. If no MEC or RCWM is found, the soil removed will be replaced in the excavation by the HTW contractor. Site restoration will be coordinated by CENAB.

4.2.1.2 The soil and topsoil to be used for backfill at the SVFUDS will be sampled and analyzed in general accordance with EPA's December 6, 2001 letter to USACE. Four samples will be collected per 1,000 cubic yards of homogenous backfill from random locations at the surface of each pile. One sample will be a six point composite; the remaining samples will be collected as discrete samples.

4.2.1.3 The composite samples will be analyzed for:

- Target compound list (TCL) pesticides (SW-846 Method 8081A);
- TCL PCBs (SW-846 Method 8082A);
- TCL semivolatile organic compounds (SVOCs) (SW-846 8270C); and

Target analyte list (TAL) metals, plus boron and tin (SW-846 Method 7471A for mercury, SW-846 Method 6010B for others).

4.2.1.4 The discrete samples will be analyzed for:

- TCL VOCs (SW-846 Method 8260);
- TCL pesticides (SW-846 Method 8081A);
- TCL PCBs (SW-846 Method 8082A);
- TCL SVOCs (SW-846 8270C); and
- TAL metals, plus boron and tin (SW-846 Method 7471A for mercury, SW-846 Method 6010B for others).

4.2.1.5 Backfill material will be purchased and stockpiled at a suitable location. The backfill soil will be classified in accordance with ASTM D 2487. Backfill material will be tested for Atterberg limits (ASTM D 4318), grain-size distribution (ASTM D 422), and compaction characteristics (ASTM 698) at a frequency of once per 1,000 cubic yards.

4.2.1.6 Soil will be compacted to 85 percent of maximum dry density for cohesive soils or 85 percent of maximum dry density for cohesionless soils (ASTM 698) unless otherwise specified in the SSWP. Density tests will be performed at a frequency of once per 10,000 square feet per lift. A minimum of one density test will be performed on each lift of backfill placed. Field in-place dry density will be determined IAW ASTM D 1556, ASTM D 2167, or ASTM D 2922. If ASTM D 2922 is used, a minimum of one in ten tests will be checked using ASTM D 1556 or ASTM D 2167. Test results from ASTM D 1556 or ASTM D 2167 will govern if there is a discrepancy with the ASTM D 2922 test results.

4.2.2 Sample Designation

4.2.2.1 All backfill and topsoil samples will have the following alphanumeric sample IDs;

- XX-BF01-0912 or XX-TS01-0912

4.2.2.2 The first two characters represent the project (SW for site-wide). The next four characters indicate the type and number of samples collected. The last set of characters indicates the date the samples were collected. For example, the sample name "SW-BF01-

1010" would be used for the first discrete backfill sample collected on October 10, or "SW-BF01(c)-1010" for the first composite backfill sample collected on October 10.

4.2.3 QA/QC Sampling – Backfill

4.2.3.1 One blind field duplicate (DUP) will be collected per 1,000 cubic yards. One sample per 1,000 cubic yards will be collected in triple volume for matrix spike/matrix spike duplicate (MS/MSD). These will analyzed for the composite sample parameters as described above.

4.2.3.2 The QA/QC samples will have the following alphanumeric code:

- XX-BF-MSD##

4.2.3.3 The first two characters represent the site-wide project. The next two characters indicate that it is an investigative waste sample. The last five characters indicate the type of QA/QC sample (e.g. MSD01, MS01, etc.). The QA/QC samples will be numbered consecutively for a given type. As an example, the sample number "SW-BF-MSD01" could be used for the first MSD collected for backfill material for the site-wide operations.

4.3 SCRAP

4.3.1 Sample Collection - Scrap

4.3.1.1 Scrap items (e.g., scrap metal and debris recovered from the excavations) will not be assumed to be CA contaminated. If a MINICAMS alarm ringoff occurs or other signs of CA contamination are observed, the scrap will undergo the headspace analytical screening procedure. As described in greater detail in the (Site-Wide Work Plan, Chapter 3), the scrap will be double-bagged by the excavation team and removed outside of the engineering control. The headspace analysis will be conducted IAW the air monitoring plan in Site-Wide Work Plan, Appendix J.

4.3.1.2 If the headspace results exceed the airborne exposure limits (AEL) for mustard, or lewisite, the scrap will be decontaminated by the excavation team within the engineering control. Scrap pieces too large for the drums will be cut into manageable pieces after decontamination. Specific scrap disposal procedures can be found in Site-Wide Work Plan, Chapter 3.

4.3.2 QA/QC Samples – Scrap

4.3.2.1 No QA/QC sampling is associated with scrap items.

4.3.3 Sample Designation - Scrap

4.3.3.1 The headspace analysis scrap samples will have the following alphanumeric code:

- XX-SCR-##

4.3.3.2 The first two characters represent the project. The next three characters indicate that it is a scrap sample. The last two characters indicate the number of the scrap container. The scrap samples will be numbered consecutively.

4.4 AQUEOUS IDW DISPOSAL CHARACTERIZATION SAMPLES

4.4.1 Sample Collection – Aqueous IDW

4.4.1.1 Aqueous investigative derived waste (IDW) includes gross decontamination water and equipment or scrap decontamination water. This water will be accumulated in 55-gallon drums. One composite sample will be collected by the Sampling Team for every fifty drums of accumulated aqueous IDW and analyzed for disposal characterization. The samples will be collected using disposable PVC bailers supplied by the Sample Team. If separate phase liquids are encountered in the drums (as observed in the bailer), care will be taken to sample each phase to allow for proper disposal characterization. Aqueous IDW sampling procedures are provided in Table 4.2.

Table 4.2
Aqueous IDW Characterization Sampling Procedures

PROCEDURE
1. The sample team will use a disposable PVC bailer to collect a sample from a set of fifty 55-gallon drums of accumulated aqueous IDW. At least one of every five drums will be sampled such that the composite is representative of the IDW. The bailer will be inserted and withdrawn and visually checked for phase separation. If separate phase liquids are evident, each phase will be sampled or the sample will be composited in a new bucket liner.
2. The sample team will fill the six 40-ml glass VOC vials (4 HTW and 2 ABP) first and then fill the remaining bottleware.
3. The sample team will wipe the exterior of the bottleware with the decontamination fluid (bleach solution), and dry.
4. The sample team will affix labels to all the bottleware with the proper sample identifier.
5. The sample team will fill out separate Chain of Custody forms for the CA/ABP sample(s) and the TCLP samples.
6. The sample team will submit the CA/ABP sample to the air monitoring team or contract surety laboratory and hold the TCLP sample on ice, under chain of custody protocols until CA/ABP analyses are complete.
7. If the CA/ABP sample is cleared for the presence of CA/ABP, the TCLP samples will be submitted to the HTW laboratory by the sample team. If CA/ABP is detected, then the TCLP samples will be placed into the appropriate drum to be disposed of as CA/ABP contaminated IDW.

4.4.1.2 The aqueous IDW characterization sample will be divided into two samples: one sample will be analyzed for agent by the air monitoring team or contract surety laboratory and the other sample will be analyzed for disposal characterization parameters by the HTW Laboratory. The disposal sample will be kept on site, on ice, under chain-of-custody protocols, until cleared for the presence of CA/ABP by the air monitoring team or contract surety laboratory. The remaining disposal samples associated with an agent-positive CA/ABP sample will not be sent to the HTW laboratory and will be placed into the appropriate drum to be disposed of as agent contaminated IDW.

4.4.1.3 Disposal characterization data from the agent free samples will be used for the CA/ABP positive IDW samples collected on the same date and closest location. These data will be provided to the disposal facility where the drums containing agent are taken for disposal.

4.4.2 Sample Designation – Aqueous IDW

4.4.2.1 The site-specific plan will describe a sample nomenclature system designed to track each type, location, and container associated with the sample. The agent and disposal characterization composite aqueous IDW samples will have the same alphanumeric code that is descriptive of the specific project, using the following format:

- XX-IW-##-####

4.4.2.2 The first two characters represent the project. The next two characters indicate that it is an investigative waste sample. The next two characters indicate from which set of five drums the sample was collected. The last set of four characters indicates the month and day of sample collection. As an example, the sample number "SW-IW-01-0211" could be used for a IDW sample collected on February 11 during site-wide investigations from the first set of (5) drums generated.

4.4.3 QA/QC Sampling – Aqueous IDW

4.4.3.1 The only QC samples that will be collected for aqueous IDW disposal characterization are MS/MSDs for agent analyses and MS samples for TCLP analyses. These aqueous IDW QC samples will be collected at a frequency of one for every 20 aqueous IDW samples collected.

4.4.3.2 The QA/QC samples will have the following alphanumeric code:

- XX-IW-MSD##

4.4.3.3 The first two characters represent the site-wide project. The next two characters indicate that it is an investigative waste sample. The last five characters indicate the type of QA/QC sample (e.g. MSD01, MS01, etc.). The QA/QC samples will be numbered consecutively for a given type. As an example, the sample number "SW-IW-MSD01" could be used for the first MSD collected for aqueous IDW for the site-wide operations.

4.5 NON-AGENT INTACT CONTAINERS

4.5.1 Sample Collection – Non-Agent Intact Containers

4.5.1.1 Intact containers determined by the PINS technology to be non-agent, but which cannot otherwise be identified, will be sent to the Chemical Transfer Facility at Edgewood, Maryland for assessment. After the assessment, these items will be returned to the Federal Property to be processed for disposal. This is not expected to be a common occurrence. Characterization of these samples will be for disposal purposes (disposal characterization parameters as listed in Table 3.1). However, it is possible that analyses for unknowns may include site-specific HTW parameters.

4.5.2 QA/QC Sampling – Non-Agent Intact Containers

4.5.2.1 No QA/QC sampling is proposed for the non-agent intact container samples.

4.5.3 Sample Designation – Non-Agent Intact Containers

4.5.3.1 The site-specific plan will describe a sample nomenclature system designed to track non-agent intact container samples. The samples will have an alphanumeric code that uses the following format:

- SVS-Year-Sample Number

4.5.3.2 For example, the sample name "SVS-07-001" will be assigned to the first non-agent intact container collected from the SVFUDS in the year 2007.

4.6 SOIL DISPOSAL CHARACTERIZATION SAMPLES

4.6.1 Sample Collection – Soil Disposal

4.6.1.1 Representative composite samples for disposal characterization will be collected from the soil removed from the excavations (specific soil disposal procedures are in the Site-Wide Work Plan, Chapter 3). The number of samples to be collected for disposal characterization will be based on the logistics of the operation, including type and size of any engineering control structures (e.g., VCS, ECS, etc.), estimated rate of soil excavation, scheduled excavation team crew shift changes, and the need to minimize the number of times the pressure seal of any engineering control is broken. The number of samples and collection procedures will be specified by the Sample Team leader. Detailed soil disposal characterization sampling procedures are provided in Table 4.3.

4.6.1.2 All soil disposal characterization samples will be split and will be sent to the ECBC laboratory for CA/ABP analysis before being sent for further analysis by the HTW laboratory. In addition to analysis for CA/ABPs, one of the soil disposal samples may be analyzed for ricin by ECBC. The split sample for HTW analysis will be kept on site, on ice or in a refrigerator in a secure location, under chain-of-custody protocols, pending the results of the CA/ABP and ricin analysis. Soil determined to contain CA/ABPs or ricin will not be sent for further HTW analysis and will be disposed of IAW the Site-Wide Work Plan, Chapter 3.

4.6.1.3 Following CA/ABP and ricin analysis (as applicable), soil disposal characterization ("Resource Conservation and Recovery Act [RCRA] samples") and generator knowledge (or "waste profile") samples will be collected and analyzed to determine the waste profile and meet the disposal facility requirements. RCRA disposal samples will be collected daily, while waste profile samples will be collected according to the location of the excavation.

4.6.2 CA and Ricin Analysis

4.6.2.1 For intrusive operations, a representative composite soil sample will be collected from every roll-off container (or site-specific equivalent) of excavated soil for disposal characterization. Following headspace analysis for CA clearance, this sample will be analyzed for CA/ABPs by ECBC.

4.6.2.2 In addition to analysis for CA/ABPs, one of the soil disposal samples may be analyzed for ricin by ECBC using the Electrochemiluminescence (ECL) assay method. Ricin analyses may also be conducted on pit characterization floor samples, intact containers, and soil characterization grab samples.

4.6.3 RCRA Disposal Samples

4.6.3.1 One RCRA soil sample will be collected for each day of the intrusive investigation. This is dependent upon the excavation production rate, but is expected to equate to one sample for approximately every five to six roll-off containers. These samples will be collected as described below.

4.6.3.2 During intrusive operations, composite soil samples will be collected from each roll-off container (or site-specific equivalent) as specified by the Sample Team Leader. The Sample Team Leader will ensure that these composite portions are collected to produce a representative sample from each roll-off container. These samples will be kept on site, on ice or in a refrigerator in a secure location, until cleared for the presence of CA/ABPs and ricin (if applicable). When the individual composite samples have been cleared for CA/ABPs and ricin (if applicable), they will be further composited into a single sample representing the day's production, and submitted to the HTW Laboratory (samples for VOC analysis will not be composited). These samples will be analyzed for the RCRA disposal characterization parameters shown in Table 3.1.

4.6.4 Waste Profile Samples

4.6.4.1 The purpose of the waste profile samples is to ensure that the disposal facility has sufficient knowledge of potential contaminants not addressed by the RCRA samples discussed above.

4.6.4.2 During intrusive operations, composite soil samples will be collected at locations as specified by the Sample Team Leader. The waste profile samples will be analyzed for the SVFUDS Comprehensive list parameters for soil (not including RCRA/TCLP). Collection of the composite sample will begin when glass or debris is first encountered in the excavation and will continue for 2 days after that. The Sample Team Leader will collect the composite portions from a range of roll-off containers/days to produce a representative sample, while maintaining overall sample holding times. The waste profile samples will be kept on site, on ice or in a refrigerator in a secure location, until the associated soil is cleared for the presence of CA/ABPs and ricin (if applicable). Following CA/ABP and ricin clearance (as applicable), the waste profile sample will be shipped to the HTW laboratory for analysis of the SVFUDS Comprehensive list parameters for soil.

4.6.5 QA/QC Sampling – Soil Disposal Characterization

4.6.5.1 One sample for every 20 of the same matrix (e.g., excavated soil) will be collected in triple volume for the matrix spike/matrix spike duplicate (MS/MSD) and analyzed for CA/ABP. One sample for every 20 of the same matrix (e.g., excavated soil) will be collected in double volume for the MS and analyzed for HTW constituents. No other quality control samples will be collected for soil disposal characterization.

4.6.6 Sample Designation – Soil Disposal Characterization

4.6.6.1 The site-specific plan will describe a sample nomenclature system designed to track each type, location, and container associated with the sample. The CA/ABP composite sample will have an alphanumeric code that is descriptive of the specific project, using the following format:

- XX-XX#-##-####

4.6.6.2 The first two characters represent the project. The next three characters indicate the location. The next two characters indicate from which set of drums the sample was collected. The last four characters indicate the month and day the sample was collected. For example, the sample number "SW-PT1-01-0211" could be used for a sample collected from the first set of drums generated on February 11 for excavation work at Pit 1 for the site-wide investigations.

4.6.6.3 The disposal characterization composite sample will be labeled on top of the jar lid with an alphanumeric code that links it to the associated CA/ABP sample. In the example above, the disposal composite sample could be labeled "PT1-01". This will allow the disposal characterization composite sample to track with the specific set of drums the CA/ABP composite sample is associated with. This is necessary to ensure that a disposal sample associated with a set of drums which was positive for CA/ABP is not submitted to a non-CA/ABP laboratory.

4.6.6.4 Disposal samples that have been identified as non-CA/ABP will be composited into a single sample for submittal to the HTW laboratory. This final disposal sample will have the same sample number as the CA/ABP sample, absent the third set of characters that were used to identify the set of drums. In the example used above, the final disposal characterization sample would have the alphanumeric code "SW-PT1-0211".

4.6.6.5 For QA/QC samples associated with soil disposal characterization samples, an additional set of characters will be added to the end of the sample name described above to indicate the type of QA/QC sample (e.g., MS01, MSD01, etc.). The QA/QC samples will be numbered consecutively for a given type for each sampling event.

Table 4.3
Soil Disposal Characterization Sampling Procedures

SAMPLE COLLECTION PROCEDURE
1. The excavation team will prepare the 5 gallon composite bucket by lining bucket with a new plastic liner (4 to 6 mil).
2. After a 5 gallon soil removal bucket is filled by the excavation team, a spoonful of soil will taken from the soil removal bucket and placed into the lined composite bucket.
3. The excavation team will dump the remaining soil from the soil removal bucket into the 55-gallon drum after the spoonful of soil is removed.
4. The excavation team will continue filling the composite bucket in this manner until three 55-gallon drums have been filled.
5. The excavation team will then homogenize the soil in the composite bucket by mixing the soil with the spoon.
6. After mixing, the excavation team will prepare the CA/ABP sample by filling one 8-ounce glass jar with soil from the composite bucket (Note: the number of jars will increase for split or QA/QC samples).
7. After preparing the CA/ABP sample, the excavation team will prepare the disposal characterization sample by filling one 4-ounce jar with soil from the composite bucket.
8. The excavation team will remove dirt from the outside of the jars with a dry brush, wipe the exterior of the jars with the decontamination fluid (bleach solution), and dry.
9. The excavation team will decontaminate the spoon and remove the plastic liner from the composite bucket and replace it with a new one. The used plastic liner will be placed in the same waste container as used PPE.
10. Once the exteriors of the sample jars are decontaminated, they will be passed outside the EZ to the Sample Team.
11. The Sample Team will affix a label to the 4-ounce CA/ABP jar with the proper sample identifier (this sample will be analyzed by the air monitoring team and contract surety laboratory). The Sample Team will label the lid of the 4-ounce disposal characterization sample jar with the proper sample identifier (this sample will be further composited).
12. The Sample Team will fill out separate Chain of Custody forms for the CA/ABP sample(s) and the disposal sample.
13. The Sample Team will submit the CA/ABP sample to the air monitoring team and contract surety laboratory and hold the disposal sample on ice, under chain of custody protocols until CA/ABP analyses are complete.
(Note: These steps will be repeated until the day's work is complete.)

TCLP COMPOSITE PROCEDURE
1. If the CA/ABP samples are cleared for the presence of CA/ABP, the TCLP samples will be composited by the Sample Team. If CA/ABP is detected in a sample, the associated TCLP sample will be placed into the appropriate drum to be disposed of as CA/ABP contaminated soil. The remaining TCLP samples will be composited as described below. TCLP data from the CA/ABP free samples collected on the same date and closest location will be provided to the disposal facility for the CA/ABP contaminated soil.
2. The Sample Team will composite the TCLP samples by pouring the contents of each 4-ounce jar into one a stainless steel mixing bowl, mixing, and then filling a 4-ounce jar and two 8-ounce jars. The 4-ounce jar and 8-ounce jars will be labeled with the proper TCLP sample identifier. The composite TCLP sample will be submitted to the HTW laboratory for analysis.
3. All used emptied bottleware will be decontaminated in the same manner as sampling equipment.

4.7 HTW-CONTAMINATED SOIL CONFIRMATION SAMPLING

4.7.0.1 Excavation of soil contaminated with HTW will be closely coordinated with the low and higher probability anomaly investigations. After the anomaly has been identified and removed, the HTW-contaminated soil associated with the anomaly may also be removed as part of the intrusive investigation. HTW-contaminated soil from grids identified to have arsenic at concentrations above 20 mg/kg may also be removed as part of the intrusive investigation.

4.7.1 Excavation Procedures

4.7.1.1 Soil will be excavated in grids based on the grid size used to delineate contamination. Each grid will be excavated to an initial minimum depth of 2 feet below ground surface if there is no previous soil boring information. At some locations, this initial excavation depth may be greater than two feet based on the depth of arsenic contamination identified during previous sampling efforts.

4.7.2 Confirmation Sampling

4.7.2.1 Specific soil HTW-contaminated grid confirmation sampling procedures are presented in the Site-Wide Work Plan, Chapter 10.

4.7.3 Sample Designation – Confirmation Sampling

4.7.3.1 Collected grid confirmation samples will use the following site-specific sample designations:

SW-XXXX-(Grid No.)(Location)(Sample No.)(Depth Taken)

4.7.3.2 The first two letters (SW) denote Site Wide operations. The next code identifies the site-specific location. The location for the Grid Confirmation samples will be “EW” for “East Wall,” “SW” for “South Wall,” “NW” for “North Wall,” “WW” for “West Wall,” and “FL” for “Floor.” Sample Numbers will begin with 01 for each site. Sample depths will be denoted in feet (e.g., “5”, “2.5”).

4.8 OTHER SAMPLING

4.8.0.1 The excavation team may initiate additional soil sampling based on field observations such as stained soil, granular soil, powder or ash, or the presence of leaking containers or suspect scrap. This sampling will only be performed after obtaining concurrence and approval from the on-site USAESCH Safety Specialist and CENAB Site Operations Officer. Analysis of the sample collected will be performed for the SVFUDS Comprehensive list for soils (see Table 3.1).

4.8.0.2 Additionally, if a consensus member of the Partners requests that a sample be taken, USACE will consider the request. The item or an adequate volume of material to be sampled will be stored appropriately until a decision is made regarding the analysis of the sample. In the case of a disagreement among the Partners, the material will be stored appropriately until

the disagreement is resolved. Analysis of the sample collected will be performed for the SVFUDS Comprehensive list for soils (see Table 3.1).

4.8.0.3 As discussed in Section 3.0, ***for low probability sites***, analysis may be performed for a subset of the Comprehensive list parameters, based on a consensus decision of the Partners.

4.9 QA/QC SAMPLE COLLECTION PROCEDURES

4.9.0.1 As described in the previous paragraphs, several types of field QC samples may be collected for during intrusive excavation activities. MS/MSD samples and duplicate samples will be collected in the same manner as the original samples. QC samples will be collected as blind samples so that the laboratory does not know the associated original sample. Equipment blanks will be collected by the Sample Team by running HPLC grade water over or through the decontaminated sampling implement into the appropriate sample bottleware.

4.9.0.2 All QA/QC samples will be cleared for the presence of CA/ABP by the air monitoring team and contract surety laboratory prior to submittal to the HTW laboratory.

4.10 SAMPLING EQUIPMENT DECONTAMINATION PROCEDURES

4.10.0.1 All non-dedicated sampling and measurement equipment will be decontaminated as detailed in Table 4.4. Sampling and measurement equipment will be decontaminated before each use and at the end of the day. At no time will decontaminated equipment be placed directly on the ground.

Table 4.4
Sampling Equipment Decontamination Procedures

PROCEDURE
The following procedures will be followed for decontaminating equipment before work at each new sampling location. All rinsate will be collected in rinsate collection pans/buckets:
1. Sampling equipment will be cleaned of all soil and obvious particles and immersed in 5% bleach solution in the PDS by TEU personnel. The cleaned sampling equipment will then be passed on to the sampling team. The sampling team will NOT handle sampling utensils directly from the ECS. 2. The sampling team will place ½-inch baking soda in the bottom of a rinsate collecting bucket. 3. Rinse equipment with laboratory-grade detergent (Alconox) and potable water solution. 4. Rinse equipment with 1 percent (by volume) nitric acid solution. 5. Rinse with isopropyl alcohol. 6. Rinse with HPLC-grade deionized water. 7. Allow to air dry. 8. If equipment is not to be used right away, wrap sample equipment in aluminum foil.

4.11 LOCATION AND SURVEY INFORMATION

4.11.0.1 Sample locations will be surveyed for horizontal and vertical control. Elevations will be tied to benchmarks on site and referenced to the National Geodetic Vertical Datum. Horizontal locations will be tied to the existing on site benchmarks in the Maryland State Plane feet, North American Datum 1927 coordinate system. Horizontal orientation locations will be accurate to ±0.1 feet and vertical orientation elevations accurate to ±0.01 feet. The excavation team will measure all pit characterization sample locations relative to the stakes when the sample is collected.

5 SAMPLE DESIGNATION

5.1 PIT CHARACTERIZATION SAMPLES

5.1.0.1 Sample designation for Pit Characterization samples is discussed in Section 4.1.3.

5.2 BACKFILL SAMPLES

5.2.0.1 Sample designation for backfill samples is discussed in Section 4.2.2.

5.3 SCRAP SAMPLES

5.3.0.1 Sample designation for scrap samples is discussed in Section 4.3.3.

5.4 AQUEOUS IDW DISPOSAL CHARACTERIZATION SAMPLES

5.4.0.1 Sample designation for aqueous IDW disposal characterization samples is discussed in Section 4.4.2.

5.5 NON-AGENT INTACT CONTAINERS

5.5.0.1 Sample designation for non-agent intact containers is discussed in Section 4.5.3.

5.6 SOIL DISPOSAL CHARACTERIZATION SAMPLES

5.6.0.1 Sample designation for soil disposal characterization samples is discussed in Section 4.6.6.

5.7 HTW-CONTAMINATED SOIL CONFIRMATION SAMPLING

5.7.0.1 Sample designation for HTW-contaminated soil confirmation samples is discussed in Section 4.7.3.

6 SAMPLE HANDLING AND SHIPMENT

6.1 BOTTLE TYPES, PRESERVATION, AND HOLDING TIME REQUIREMENTS

6.1.0.1 All samples collected at the site will be placed in an appropriate sample container for preservation and transfer to the designated laboratory. The sample container types, preservatives, and holding time requirements for potential analyses are specified in Tables 11 and 12 of Attachment A of this SAP. Site-specific plans will supplement this information if necessary for the site-specific analytical parameters. All sample containers, including CA/ABP bottleware, will be supplied by the HTW Laboratory. The HTW Laboratory has the responsibility to ensure all sample containers are properly cleaned before shipment. No preservatives are required for the soil or water samples to be collected for this project.

6.2 SHIPMENT

6.2.0.1 HTW samples will be delivered to the HTW laboratory by their designated courier to ensure timely receipt of samples. The Parsons Sample Team Leader will contact the HTW laboratory daily to inform them of anticipated HTW sample shipments.

6.2.0.2 Metal or hard plastic ice chests or containers with similar durability will be used for shipping samples. Each container will be lined with a plastic garbage bag. Styrofoam or bubble wrap will be used to absorb shock and prevent breakage. After packing is complete, the plastic bags lining the cooler will be sealed to prevent leakage. Ice will be packed in sealable plastic bags and placed around the bottleware to maintain a temperature at or below 4°C.

6.2.0.3 The COC and any other documentation will be placed in a waterproof plastic bag and taped to the underside of the container lid. The container will then be secured with custody seals affixed across top and bottom joints. Sample shipping containers will be marked IAW current U.S. Department of Transportation (DOT) and International Air Transport Association (IATA) dangerous goods regulations, as applicable. In addition to labeling each container with complete mailing addresses, each container will be clearly marked with "this end up" arrows, a label on each side of the container indicating the proper "shipping name" of the samples, and a sticker containing the originator’s address.

7 FIELD PROCEDURES

7.0.0.1 For all sampling activities addressed in this section, the excavation team will collect the sample using bottleware supplied and labeled by the Sample Team. All HTW samples will be held on site in a shipping container under full chain of custody protocols until the results of CA/ABP analyses are completed by the air monitoring team or contract surety laboratory.

7.0.0.2 Sample custody procedures will be observed to support the validity of the data. To reduce the chance for error, the number of personnel handling the sample will be minimized. On-site monitoring data will be controlled and entered in permanent log books. Personnel involved in the chain-of-custody and transfer of samples will be trained and indoctrinated on the approved procedures prior to implementation.

7.0.0.3 Sample custody and documentation procedures described in this section will be followed for all project sample collection activities. Proper sample custody procedures include the use of field log books, sample labels, custody seals, and chain-of-custody forms.

7.1 DAILY QUALITY CONTROL REPORTS

7.1.0.1 When sampling activities occur, daily quality control reports (DQCRs) will be prepared daily, dated, and signed by the Site Manager. The DQCR will be included with the Site Manager's Daily Report. These will be sent to the USAESCH PM and the USAESCH Project Chemist. The DQCR will include weather information at the time of sampling, field instrument measurements, calibrations, identification of all field and control samples taken, the status of each sample, departures from the SAP, any problems encountered, and on-site verbal or written instructions authorized from Government personnel. Any deviations that may affect data quality objectives will be conveyed to the USAESCH PM and USAESCH project chemist immediately.

7.2 FIELD LOG BOOKS

7.2.0.1 All parties involved in data collection will be required to document field activities in a log book as described below. Each field log book will receive a serialized number. Field log books will be maintained by the field operations manager and other team members to provide a daily record of significant events, observations, and measurements during the field investigation. All entries will be signed and dated.

7.2.0.2 All information (except formal laboratory chain-of-custody forms) pertinent to field survey and/or sampling activities will be recorded in the log books. The books will be bound with consecutively numbered pages. Entries in the log book will include, at a minimum, the following information:

- Name and title of author, date and time of entry, and physical/environmental conditions during field activity.

- Purpose of sampling activity.
- Location and description of sampling point.
- Name and title of field crew
- Ambient weather conditions.
- Sample media (e.g., pit characterization soil, etc.).
- Sample collection method.
- Number and volume of sample(s) collected.
- Date and time of collection.
- Sample identification number(s).
- Sample distribution (e.g., laboratory).
- Any field measurements made.
- References for all maps and photographs of the sampling site(s). and
- Information pertaining to sample documentation such as:
  - Bottle lot numbers.
  - Dates and method of sample shipments.
  - Chain-of-Custody Form numbers.
  - Unusual incidents, problems, and accidents experienced.

7.2.0.3 All original data recorded in field log books and sample labels will be written with waterproof ink. The bottom of each page of a daily entry will be dated. The last page of a daily entry will be signed and dated. No controlled serialized documents will be destroyed. If an error is made on a controlled document assigned to an individual, that individual will make all corrections simply by crossing a line through the error, initializing the error, and entering the correct information. The erroneous information will not be erased. Any subsequent error discovered on an controlled document will be corrected by the person who made the entry. All subsequent corrections will be initialed and dated.

7.3 SAMPLE LABELS

7.3.0.1 All samples obtained for the SVFUDS project will be placed in the designated sample container for preservation and shipment to the laboratory. Each sample will be identified with a separate identification label which includes the following information:

- Analyses to be performed
- Project: Site Name and Project Code (Project No.)
- Sample description (soil or water, grab or composite)
- Unique sample identification number as specified in Section 5.3
- Preservatives used and any other field preparation of the sample
- Date

- Time (a four-digit number indicating the 24-hour clock time of collection), if not already included in the sample name
- Remarks (such as MINICAMS readings, etc.)
- Sampler's initials

7.4 CUSTODY SEALS

7.4.0.1 When samples are to be shipped to the laboratory they will be placed in shipping containers sealed with custody seals. The shipping container will be secured and a seal provided by the laboratory will be affixed to the latch. Clear tape will be placed over the seals to ensure that seals are not accidentally broken during shipment. A seal broken prior to receipt at the laboratory indicates possible tampering. The laboratory will contact the field operations manager and the sample will not be analyzed if tampering is apparent.

7.5 CHAIN-OF-CUSTODY RECORDS

7.5.0.1 All samples will be accompanied by a Chain-of-Custody form (COC). A COC accompanies the sample from initial sample container selection and preparation at the laboratory, shipment to the field for sample collection and preservation, and return to the laboratory. If samples are divided and sent to different laboratories, a COC will be sent with each sample. Each COC will be uniquely numbered. The remarks column is used to record specific considerations associated with sample acquisition such as sample type, container type, sample preservation methods, and analyses to be performed. When transferring samples, the individual relinquishing and receiving should sign, date, and note the time on the record.

7.5.0.2 The field operations manager will indicate the sample designation/location number in the space provided on the appropriate COC for each sample collected. Two copies of this record will follow the samples to the laboratory. The laboratory maintains one file copy, and the completed original is returned to the project manager as a part of the final analytical report. This record will be used to document sample custody transfer from the sampler, to another team member, to a shipper, or to the laboratory.

8 QUALITY ASSURANCE PROJECT PLAN (QAPP)

8.1 PART 2 – QUALITY ASSURANCE PROJECT PLAN (QAPP)

8.1.0.1 This Quality Assurance Project Plan (QAPP) presents the project objectives, organization, functional activities, and specific quality assurance/quality control (QA/QC) activities associated with the SVFUDS. The QAPP portion of this SAP is presented as Sections 8 thru 20. The purpose of this QAPP is to establish procedures that will ensure project requirements for quality assurance and quality control are met. All referenced tables beginning with this section are presented in Attachment A.

8.1.0.2 Similar to the FSP, this QAAP describes the methods and procedures to be implemented for investigations of both low probability sites and higher probability sites at the SVFUDS. In many cases the methods and procedures required are common to both types of investigations. ***Where the required steps for a low probability site differ, those methods and procedures are called out in this QAPP***. The specific methods and procedures to be used during a given operation will be designated in the SSWP for each individual project site

8.2 INTRODUCTION

8.2.0.1 The overall quality assurance (QA) objective for the project is to develop and implement procedures that will provide data that are of known, documented, and defensible quality. Quality is ensured through appropriate sample collection, preservation and transport methods combined with an evaluation of analytical performance through the analysis of quality control (QC) samples. The data generated will be used to:

- determine the extent of excavation for contaminated soils;
- make appropriate soil and/or water disposal determinations; and
- characterize the contents of intact containers.

8.2.0.2 The project will be conducted in accordance with Contract Laboratory Program (CLP) methodology and criteria for some analytical parameters, and other EPA-approved methods for other parameters (see Section 11). For the SVFUDS, CLP parameters ,non-CLP analyses, and dust samples will be analyzed by the selected HTW laboratory(s). For the purposes of this SAP, analytical procedures and QA parameters are based on information from GPL Laboratories (GPL) and Clayton Group Services.

8.3 DATA QUALITY OBJECTIVES

8.3.0.1 Data quality objectives (DQOs) are qualitative and quantitative statements that define the acceptability of data generated by a study. The data generated by this study must be of sufficient quality to be used to complete the investigation in accordance with USEPA

requirements. The DQOs are used for designing the sampling plan and data collection program for the investigation of the site.

8.4 THE DQO PROCESS

8.4.0.1 There are seven steps to the USEPA's DQO process. Application of the DQO Process assists the site manager's plans to collect data of the right type, quality, and quantity to support defensible site decisions. The *Data Quality Objectives Process for Hazardous Waste Site Investigations (QA/G-4HW)* (USEPA, 2000) provides general, non-mandatory guidance on developing DQOs for environmental data collection operations in support of hazardous waste site investigations. The DQOs for this project were developed using this guidance.

8.4.0.2 The DQO Process is a seven-step iterative planning approach used to prepare plans for environmental data collection activities. It provides a systematic approach for defining the criteria that a data collection design should satisfy, including: when, where, and how to collect samples or measurements; determination of tolerable decision error rates; and the number of samples or measurements that should be collected. DQOs, outputs of the DQO Process, are qualitative and quantitative statements that are developed in the first six steps of the DQO Process. DQOs define the purpose of the data collection effort, clarify what the data should represent to satisfy this purpose, and specify the performance requirements for the quality of information to be obtained from the data. These outputs are then used in the seventh and final step of the DQO Process to develop a data collection design that meets all performance criteria and other design requirements and constraints.

8.4.1 Step 1 The Problem

8.4.1.1 The planning team for this project includes the USACE, USEPA (Region III), and the DDOE. Technical execution of the project plan is carried out by USACE and its contractors. Oversight is provided by both DDOE and USEPA.

8.4.1.2 The conceptual site model (CSM) for the SVFUDS was initially developed by the USACE in the previous Spring Valley reports. In general terms, the CSM focuses on encountering CA or arsenic and other HTW contaminants that may have resulted from AUES operations. Potential receptors include private residents, students, construction workers, and groundskeepers. Potential exposure scenarios with regard to surface and subsurface soil, and bottle contents involve dermal contact, direct ingestion and inhalation of fugitive particulates.

8.4.2 Step 2 Identify the Decision

8.4.2.1 The objectives of the work at SVFUDS are to:

- Determine if chemical agent (CA), agent breakdown products (ABPs), or SVFUDS related disposal areas exist;
- Remove any MEC, MEC-related debris, laboratory wastes, and other debris attributed to past SVFUDS activities;
- Resolve any anomalies or anomalous areas identified by the Spring Valley Anomaly Review Board; and

- Collect data to characterize investigated areas for the SVFUDS over-arching Remedial Investigation/Feasibility Study (RI/FS).

8.4.3 Step 3 Identify the Inputs to the Decision

8.4.3.1 For processing of contaminated solids or liquids, the inputs for the decision are the parameters, analytes, and comparison values presented in Tables 1 through 10 of Attachment A. The parameters to be analyzed include metals, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), explosives, mustard, mustard breakdown products, lewisite breakdown products, total cyanide, fluoride and iodine. Additionally, some aqueous samples may also be analyzed for other parameters including acetic acid, chloroacetic acid, ethyl alcohol, iodine pentafluoride, picric acid and perchlorate. CLP Methods will be used to provide the contaminant concentrations for VOCs, SVOCs, and metals. There are 32 VOC, SVOC, or metal compounds not included in the CLP lists. QA objectives and QC criteria for those are addressed in the applicable tables. Standard EPA-approved methods will be used for the other analyses as applicable (see Section 11 for more detail). In addition to these, ricin may be analyzed using the electrochemiluminescence (ECL) assay method. Attachment B contains additional information on the ricin method.

8.4.3.2 The parameters and comparison values shown in Tables 1, 2, 3a and 3b, Attachment A, constitute the SVFUDS Comprehensive list. They were specifically developed by the Spring Valley Partners for the Spring Valley site. Over a series of meetings, the Partners reviewed all chemicals documented as having been used at the AUES. The list was refined by considering whether analytical methods were available and by using chemical and physical properties to assess whether the chemical could be present under site conditions. The comparison values for soil were similarly developed through the consensus process, while the comparison values for water were largely a function of the sewer permit under which water encountered will be discharged. Table 3.1 in Section 3 presents the summary of the parameters required to address all the chemicals on the SVFUDS Comprehensive list. ***However, as discussed in more detail in Section 3, sampling at low probability sites may not require analysis for all the chemicals on the SVFUDS Comprehensive list.***

8.4.4 Step 4 Define the Boundaries of the Study

8.4.4.1 The spatial boundaries of the SVFUDS are shown in the Site-Wide Work Plan (Chapter 1, Figure 1-1).

8.4.4.2 For proper disposal of the excavated soil and/or water generated, the inputs for the decisions are the concentrations of selected analytes [RCRA Characteristics of Ignitability, Corrosivity, and Reactivity; RCRA Toxicity Characteristic Leaching Procedure (TCLP) Metals, VOC and SVOC Analysis]; and the regulatory limits/landfill acceptance criteria. The regulatory limits are shown in Table 10, Attachment A.

8.4.5 Step 5 Develop Decision Rule

8.4.5.1 The parameters of interest for the surface and subsurface soil are presented in Table 1, Attachment A. The general decision rule for soil excavations is that if the concentration of any of the listed CA, ABPs, or ricin exceeds the comparison value, then further vertical or

lateral excavation is warranted in that grid. If those comparison values are not exceeded, the excavation is considered complete for CA, ABPs, and ricin, and may be backfilled.

8.4.5.2 The general decision rule for HTW constituents is that if the concentration of any HTW analyte listed in Attachment A Table 1 (soil sample) or Table 2 (water sample), exceeds the comparison value, then one of several actions may be taken. These may include: further vertical or lateral excavation; further sampling until the area is below the comparison value for that compound; or performance of risk assessment calculations to evaluate future risk potential if that soil remains in place. For an intact container, the comparison values will be used to determine appropriate disposal.

8.4.6 Step 6 Limits on Decision Error

8.4.6.1 The following are the limits on decision errors with respect to the soil analysis. The baseline condition or null hypothesis would be that following excavation, the remaining soil has lower concentrations of analyzed parameters than does background soil. There are two possible decision errors that could be made based on the environmental data: **Type I** - deciding that a grid is not contaminated when, in fact, it is contaminated; or **Type II** - deciding that the grid is contaminated, when in fact, it is not. In the first case, unacceptable contamination would be left on site. In the second case, unnecessary removal would be performed. The acceptable probability of a Type I decision error is a 5% probability of not excavating further when it is contaminated. The acceptable probability of a Type II decision error is a 20% probability of excavating further when the remedial objective has already been met.

8.4.7 Step 7 Optimize the Design

8.4.7.1 The design of the sampling and analysis plan is being optimized through review by CENAB, USEPA, and DDOE, by limiting the study area to locations identified as most likely to have been impacted, and by sampling for constituents identified as COCs.

8.5 ROLES AND RESPONSIBILITIES

8.5.0.1 All data will be received from the laboratories by the Parsons QA/QC Manager, Mr. David Badio. The QA/QC Manager will review the data with the Parsons Project Manager, Mr. Deepak Bhinge. Only final data from the labs can be released to other stakeholders. Should it become necessary to release data that have not been validated by the QA/QC Manager, this will be done with the data marked as preliminary.

9 QA/QC SAMPLING PROCEDURES

9.1 BOTTLE TYPES, PRESERVATION, AND HOLDING TIME REQUIREMENTS

9.1.0.1 All samples collected at the site will be placed in an appropriate sample container for preservation and transfer to the appropriate laboratories. All sample containers will be supplied by the appropriate laboratories. Each laboratory has the responsibility to ensure that all sample containers are properly cleaned before shipping them to the site. Sample preservation requirements are indicated on Tables 11 and 12 of Attachment A.

9.2 SAMPLE NUMBERING

9.2.0.1 A sample numbering system will be used to identify each sample. The numbering system will be a tracking mechanism to allow retrieval of information about a particular location and to ensure that each sample is uniquely numbered. A listing of sample numbers will be maintained by the field team leader. Each sample number will assume the format described earlier in Section 4 of the FSP.

9.3 SAMPLE LABELS

9.3.0.1 Each sample will be identified with a separate identification label. The label will document:

- Analyses to be performed;
- Sample identification number;
- Preservatives used;
- Date;
- Time (a four-digit number indicating the 24-hour-clock time of collection; for example, 1430 for 2:30 P.M.); and
- Sampler's initials.

9.4 QUALITY CONTROL SAMPLES

9.4.0.1 Four types of field QC samples will be collected during sampling activities for the SVFUDS. They are trip blanks, equipment blanks, field duplicates, and matrix spike/matrix spike duplicates (MS/MSDs). Section 12 describes each of these QC samples and gives the frequency and analytical requirements for each.

9.5 FIELD SAMPLE CUSTODY

9.5.0.1 A sample shall be considered to be in the custody of a person if it is in his or her possession, in his or her sight or secured by that person in an approved location accessible only to authorized personnel.

9.5.0.2 The following procedures will be used to document, establish, and maintain custody of the field samples:

- Sample labels will be completed for each sample using waterproof ink, making sure that the labels are legible and affixed firmly to the sample container.
- All sample-related information will be recorded in the field logbooks.
- The field sample custodian will retain custody of the samples until they are transferred or properly dispatched.

9.6 LABORATORY SAMPLE CUSTODY

9.6.0.1 A chain-of-custody (COC) record accompanies the sample container from the laboratory to the field where the sample is contained, preserved, and then returned to the laboratory. The laboratory's sample custody program meets the criteria listed below.

- The laboratory has designated a sample custodian who is responsible for maintaining sample custody and for maintaining all associated records documenting sample custody.
- Upon receipt of the samples, the custodian checks the original COC documents and compares them with the labeled contents of each sample container for correctness and traceability. The custodian signs the COC record and records the date and time the samples are received. In the event of discrepant documentation, the laboratory immediately contacts the Parsons Project Manager as part of the corrective action process. The sample temperatures will be recorded; if more than 2 degrees Celsius outside of the 4 degree Celsius target, Parsons will be notified.
- A qualitative assessment of each sample container is performed to note any anomalies, such as broken or leaking containers. This assessment will be recorded as part of incoming COC procedures.
- The samples are stored in a secured area at a temperature of approximately 4°C until analyses begin.
- A copy of the COC form accompanies the laboratory report and becomes a permanent part of the project records.

9.7 DOCUMENTATION

9.7.0.1 Field Logbook. The field logbook is the master field investigation document and is a bound book with sequentially numbered pages. Its primary purpose is to contain within one document references to field activities which have occurred at the site on any given day. Any administrative occurrences, conditions, or activities that have affected the field work will also be recorded. All entries into these logbooks will be signed and dated. Entries in the field logbook will include, at a minimum, the following information:

- Sample type and sampling method;
- Location and depth of sample;

- Sample identification number;
- Sample description (e.g., color, odor, clarity);
- Amount of sample; and
- Identification of sampling device and conditions that might affect the representativeness of a sample (e.g., refueling operations).
- Any deviations from established procedures will be documented in the field logbook with the date, time, reason for deviation, and measures to correct the problem identified.
- Decontamination and health and safety procedures shall also be documented in the field logbooks.
- Documentation of field calibration procedures (e.g., field air monitoring equipment).

9.7.0.2 Daily Logs. The site manager will complete a daily log to document the activities that took place each day, including personnel on site, field work completed, samples collected, problems encountered, and significant conversations/decisions that took place.

9.7.0.3 Corrections to Documentation. All documents will be completed in permanent, waterproof ink. None of the field documents are to be destroyed or thrown away, even if they are damaged or contain inaccuracies that require a replacement document. Corrections to the document will be made by crossing out mistakes with a single line and then dating and initialing the correction. The use of correction fluid is not permissible.

9.7.0.4 Final Evidence Files. This project will require the administration of a central project file. All field and laboratory generated data will be kept in this file. Hard copies of all data will be kept in project-designated files. The data records management protocols will provide adequate controls and retention of all materials related to the project. Record control will include receipt from external sources, transmittals, transfer to storage and indication of record status. Record retention will be one year and will include receipt at storage areas, indexing, filing, storage, maintenance, and retrieval. Project filing procedures are described below.

9.7.0.5 Record Control. All incoming materials related to the project including sketches, correspondence, authorizations, and logs will be forwarded to the Project Manager or designated assistant. These documents will be placed in the project file as soon as is practical. If correspondence is needed for reference by project personnel, a copy will be made rather than retaining the original. All records shall be legible and easily identifiable. Examples of the types of records that will be maintained in the project file include:

- Field documents;
- Correspondences:
- Photographs;
- Laboratory data:
- Reports; and

- Procurement agreements and contracts.

9.7.0.6 Outgoing project correspondences and reports will be reviewed and signed by the Project Manager prior to mailing. The office copy of all outgoing documents shall bear distribution information.

10 INSTRUMENT AND EQUIPMENT CALIBRATION

10.1 CALIBRATION PROCEDURES AND FREQUENCY

10.1.0.1 Instruments and equipment used to gather, generate, or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the standard operating procedures. Calibration procedures and frequency for the analytical procedures are summarized in Table 13 of Attachment A, as well as Attachments B and C, and in the standard methods. The calibration procedures will meet or exceed the calibration requirements specified in the respective analytical methods. Calibrations can also be performed at the start and completion of each test run. Calibration standards used as reference standards will be traceable to the NIST, USEPA, or AEC when possible. Calibration, repair, or replacement records will be filed and maintained by the laboratory's personnel performing quality control activities. Calibration records of the assigned laboratory will be filed and maintained at the laboratory location where the work is performed.

10.1.0.2 Calibration of field instruments and equipment will be performed at approved intervals as specified in the standard operating procedures or more frequently as conditions dictate.

11 ANALYTICAL PROCEDURES

11.1 ENVIRONMENTAL AND DISPOSAL ANALYSES

11.1.0.1 All CA (mustard and lewisite) samples and ABP (CVAA/AO, thiodiglycol, dithiane, and oxathiane) samples will be analyzed by ECBC in accordance with their Sample and Analysis Plan presented in Appendix J of the Site-Wide Work Plan. ECBC will perform the ricin analyses, if needed, using the ECL assay quantification.

11.1.0.2 The selected HTW laboratory will perform all grab, pit characterization, waste profile, and disposal analyses.

11.1.0.3 The metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, thallium, silver, sodium, vanadium, and zinc) plus strontium, tin, titanium, tellurium and zirconium, will be analyzed by ICP-AES (CLP Method ILM05.3). Total cyanide will be analyzed by a colorimetric method (EPA 335.2).

11.1.0.4 TCL VOCs and VOC Tentatively Identified Compounds (TICs) will be analyzed by GC/MS (CLP Method OLM04.3, plus selected non-CLP compounds shown in Table 6, Attachment A). The lab will identify up to the 20 largest non-target peaks using CLP procedures. ***For low probability sites, where VOC soil sampling is required, this will be performed with the Encore device, preparation method SW 5035A.***

11.1.0.5 TCL SVOCs and SVOC TICs will be analyzed by GC/MS (CLP Method OLM04.3, plus selected non-CLP compounds shown in Table 7, Attachment A). The lab will identify up to the 20 largest non-target peaks using CLP procedures.

11.1.0.6 Explosives will be analyzed by HPLC (SW-846 8330). GPL will follow its modification to the method to include nitroglycerin as a target analyte. See Table 8, Attachment A.

11.1.0.7 The analytical procedures required for environmental and disposal analyses, solid and aqueous, are listed in Attachment A, Tables 4 and 5, respectively. Non CLP parameters include fluoride, iodine, acetic acid, chloroacetic acid, ethyl alcohol, hydrogen sulfide, iodine pentafluoride picric acid and perchlorate. Disposal analyses will be performed using SW-846 RCRA TCLP methods.

11.2 AIRBORNE DUST

11.2.0.1 Clayton Group Services will perform all analyses for airborne dust. Samples will be collected and analyzed using National Institute for Occupational Safety and Health (NIOSH) approved methods. Clayton Group Services is AIHA accredited for these analyses.

11.2.0.2 Total dust samples will be collected and analyzed for the specific HTW parameters found in exceedance of the comparison values. As required, samples will be analyzed for organics using NIOSH method 5506 for PAHs, and for inorganics using NIOSH method 7300 for metals by ICP. These methods are described in Attachment B.

12 INTERNAL QUALITY CONTROL SAMPLES AND FREQUENCY

12.1 INTERNAL QUALITY CONTROL

12.1.0.1 The overall effectiveness of a QC program depends on field and laboratory activities being conducted in accordance with a program that ensures the precision and accuracy of analyses by detecting errors and preventing recurrences or measuring the degree of error inherent in the activities and procedures. The field QC samples to be used during this project are described in this section. The routine laboratory QC samples to be employed during the project are also discussed. Table 13 and Attachment B summarize the internal QC requirements including the frequency, acceptance criteria, and corrective action for each type of field or laboratory QC sample.

12.2 FIELD QUALITY CONTROL SAMPLES

12.2.0.1 Field QC samples are used to assess the representativeness of the sampling activities. They are designed to determine what effects activities such as sample container cleaning, sample collection, field decontamination, bottling and shipping have on sample integrity and to ensure that samples sent to the laboratory are representative of site conditions. Field QC samples collected in support of this project will include equipment blanks, field duplicates, MS/MSDs, and trip blanks. Each QC sample is briefly described in the following subsections.

12.2.0.2 Equipment blanks will be collected to assess the potential for sample contamination occurring through the sampling equipment. They are also used to monitor the sampling equipment decontamination procedures. Equipment blanks will be collected only if non-disposable sampling equipment is used (i.e., if sampling equipment is reused to collect multiple samples). Equipment blanks will not be collected for aqueous IW samples. Equipment blanks will be collected in sample containers, sealed and handled in the same manner as the associated field samples, and shipped to the laboratory for analysis. One equipment blank will be collected for every 20 environmental soil samples collected, using non-disposable sampling equipment (5 percent).

12.2.0.3 Field duplicate samples will be collected to monitor sample variability and sampling procedures. The collection frequency for field duplicates will be one for every 10 environmental soil samples collected (10 percent). Every attempt will be made to collect duplicates from different soil matrices to represent the range of soil types encountered. Field duplicates will not be collected for Investigation derived Waste (IDW) samples. The field duplicate samples will be analyzed for the same parameters as the associated field sample.

12.2.0.4 MS/MSD samples will be collected to assess the effect of sample matrices on the analytical methods and as a means of determining analytical precision and accuracy. The collection frequency for MS/MSDs will be one for every 10 (10 percent) environmental samples collected per matrix (i.e., surface and subsurface). Every attempt will be made to collect MS/MSDs from different soil matrices to represent the range of soil types encountered.

An MS only will be collected at a frequency of one per 10 aqueous IW samples intended for TCLP analyses. The MS and MSD samples will be analyzed for the same parameters as the associated field samples.

12.2.0.5 Trip blanks will be prepared by the laboratory, transported to the field, kept with the field samples throughout the sampling effort, and returned to the laboratory for analysis. Trip blanks consist of organic-free water and are not opened in the field. One trip blank will be included within every cooler that contains aqueous samples to be analyzed for VOCs. Trip blanks will be analyzed for the same list of VOCs as the associated field samples.

12.3 LABORATORY QUALITY CONTROL CHECKS

12.3.0.1 Laboratory analyses will be conducted in accordance with the appropriate analytical methods. Laboratory QC checks will include calibration standards, reagent or method blanks, surrogate and matrix spikes, matrix spike duplicates, laboratory duplicates, and laboratory control samples. The frequency, acceptance criteria, and corrective action requirements for each laboratory QC check are summarized in Table 13 and Attachment B.

13 DATA REDUCTION, VALIDATION, AND REPORTING

13.1 DATA REDUCTION

13.1.1 Field Data Reduction

13.1.1.1 Any raw data from field measurements or sample collection activities will be appropriately recorded in the field notebooks. If the data are to be used in the project reports, they will be reduced and summarized and the reduction method will be documented in the report.

13.1.2 Laboratory Data Reduction

13.1.2.1 The laboratory will, as a part of the data reduction and validation process, confirm that its documentation is complete, paginated, and legible; qualitative identifications are accurate; calculations are accurate; and results are expressed in the appropriate units. The laboratory will also confirm that data documentation has been approved by the laboratory manager or designee.

13.2 DATA VALIDATION

13.2.0.1 Review of all analytical data will focus on the QA/QC criteria set forth in each analytical method, the QA objectives presented in this plan, and standard USEPA Region III data validation guidelines. The validation will be in accordance with an M3 level, i.e., full CLP per the Region III Modifications to the National Functional Guidelines. Automated data review (ADR) will be incorporated into the data validation process. The laboratories will conduct a systematic data review before submitting the analytical report. Post-laboratory data validation will be performed by the Parsons QA/QC Manager. To resolve any conflicting QC requirements, the following order is specified: this QAPP, Contract Laboratory Program Statement of Work OLM04.3 (for VOCs and SVOCs) and ILM05.3 (for Target Analyte List inorganics), SW 846, EPA 540-R-99-008, EPA 540-R-01-008 and the National Functional Guidelines for Organic and Inorganic Data Review with Region III Modifications (USEPA, 1999 and USEPA, 2002 and all subsequent modifications). TIC data will be evaluated in accordance with CLP protocols and the Region III Modifications to the National Functional Guidelines.

13.2.0.2 ADR will be used to streamline the data validation process, saving time. The ADR process includes generation of a project library which includes the QA/QC requirements and control limits for the project (based on the QAPP and the data validation requirements). This library will be prepared by Parsons and reviewed and approved by the laboratory. The library will cover QC items including LCS, MS/MSD, laboratory and field duplicates (precision), blanks and surrogates. The library will also include the target analytes and their CAS Nos. as they are to appear in the data reports and data validation tables. The project library is developed in the ADR software and once approved will be used by ADR to validate the

laboratory electronic data delivery (EDD). The latest ADR software also includes a Region III validation module which includes Region III modifications to the NFG. Manual validation of the project data will include a Level IV evaluation of those QA/QC items not covered by ADR including calibration, tuning, chromatograms, quantitation reports, etc. It is anticipated that with the time saved by using ADR, 100% manual validation of the remaining data will be achieved.

13.3 DATA MANAGEMENT AND REPORTING

13.3.1 Field Data Management

13.3.1.1 Data generated in the field will be managed by the field team leader who will be responsible for recording and documenting all sampling activities in the field logbook, on sampling records (as appropriate), or on COC forms. These records will be stored in the project files. Additional elements of data management, including sample custody, documentation and recorded control, are contained in Section 2.

13.3.2 Laboratory Data Management

13.3.2.1 A copy of the completed COC records and cooler receipt forms for all shipments of samples will be maintained in the laboratory project file. The laboratory will also archive all logbooks associated with the sample management procedures. These records will be filed accordingly, so they will be easily retrievable in the future, if needed.

13.3.2.2 Sample and QC data will initially be provided as an Excel file in the format used for the SVFUDS and PDF files within the specified turn around time. The Excel and PDF files will be used to make decisions regarding further excavation requirements and will be sent by the laboratory via electronic mail to the Parsons PM. In general, the Excel and PDF files will include:

- the laboratory's identification of each field sample;
- field sample identifications;
- sample collection and sample analysis dates;
- analytes;
- results;
- data qualifiers; and
- concentration units.

13.3.2.2 The data will be imported into an ACCESS database for automated validation. The post validation EDD will include text or a database file format of data including all validation qualifiers. Final ADR deliverables will also be generated.

13.3.2.3 Data Reporting. In order to obtain data for all the SVFUDS Comprehensive list compounds (Tables 1, 2, 3a, and 3b of Attachment A), the full list of compounds from a particular analytical suite will be analyzed, e.g., for TCL VOCs it is the CLP list plus selected

non-CLP volatile compounds (see Table 6 for the specific compounds). For reporting purposes, only those compounds that are SVFUDS Comprehensive list compounds (as determined by the Partners, see paragraph 8.4.3.2) plus any detections of the non-SVFUDS Comprehensive list compounds, will be reported.

13.3.2.4 The HTW analyses will be performed by the selected HTW laboratory. ECBC will follow documentation procedures presented in their Sample Analysis Plan presented in Appendix J of the Site-Wide Work Plan.

13.3.3 Data Reporting Procedures

13.3.3.1 Laboratory Report Requirements

13.3.3.2 For all analyses, at a minimum, the laboratory report will show traceability to the sample analyzed and will contain the following information required for data validation:

1. Case narrative (identifies problems and corrective actions);
2. Copy of signed COC;
3. Cooler receipt forms documenting the date, time of receipt, condition of samples (including preservation) and labels, temperature of the shipping container, and verification of integrity of the custody seals;
4. Laboratory name;
5. Client name;
6. Date of sample collection;
7. Date of sample receipt;
8. Date of sample extraction or preparation;
9. Date of issue;
10. Project name and unique identification number;
11. Field sample name/number;
12. Laboratory sample number;
13. Sample matrix description;
14. Analytical method description and reference citation for all analyses, preparation, cleanup procedures;
15. Preparation, analysis and other batch numbers;
16. Individual parameter;
17. All confirmation data, when performed;
18. Date and time of analysis (first run and subsequent runs);
19. Method reporting limits adjusted for sample-specific factors (i.e., aliquot size, dilution/concentration factors, moisture content;

20. Method detection limits;
21. Concentration units;
22. Any data qualifiers assigned;
23. Percent moisture or percent solids (all soils reported on dry weight basis);
24. Any special conditions;
25. Chromatograms, as needed;
26. Sample aliquot analyzed;
27. Final extract volume;
28. Dilution or concentration factors (if dilutions result in non-detect values for all other analytes which showed detected concentrations in previous analyses, the results of both runs will be reported with the appropriate notations in the narrative);
29. A cross-reference to identify applicable laboratory QC samples with field samples, such as an analytical batch number; and
30. Corresponding QC summary report.
31. For samples requiring reanalysis, the laboratory will report complete results and supporting raw and QA/QC data for both the original run and any reanalyses. Reanalyses will be properly identified.

13.3.3.3 QC data will be recorded on Contract Laboratory Program (CLP) or CLP-equivalent QC summary forms for the appropriate tests and correlated to the analysis results by the laboratory lot control numbers. The QC results are used to prepare control charts for each test and matrix type. QC reports will contain the following items as appropriate:

1. Narratives describing any non-compliant samples,
2. Initial and continuing calibration results,
3. Method blank,
4. Surrogate results,
5. LCS results,
6. MS/MSD results, and
7. Tuning results.
8. Internal standards summary

13.3.3.4 The laboratory is required to indicate the use of Manual Integration (MI) in the case narrative including the reason MI was used and the samples and analytes affected. When MI is used, the lab is also required to submit both the original and manually integrated chromatograms and quantitation reports as part of the data package (with the integrated chromatograms and quantitation reports clearly initialed and dated). During validation the reviewer will evaluate the information provided by the laboratory to determine agreement or disagreement with the reason for the MI or the results of the MI. If there is disagreement, the lab will be contacted to discuss the issue. If the issue cannot be resolved, the reviewer reserves

the right to qualify the affected results and offer explanations in the data validation summary report. All MI should be well documented including the following items:

1. “Before" and "after" chromatographs of each MI event;
2. The reason(s) for the MI;
3. Date and the signature of the analyst who performed the MI; and
4. Date and the signature of the approver.

13.3.3.5 Electronic Deliverable Requirements

13.3.3.5.1 The laboratories also will submit the analytical data for environmental, field, and laboratory QC samples as a pdf file on a CD-ROM. One pdf file will be submitted for each SDG. The electronic data delivery (EDD) shall be submitted in the Staged Electronic Data Deliverable (SEDD) format, version 5.0 (or most recent version). The SEDD formatted deliverable will require data parsing for use in the ADR software, version 8.0. ADR is a tool developed to aid data users in evaluating the quality of analytical chemistry results. The application was designed to perform routine data quality accuracy and precision checks traditionally performed through a manual data review. ADR uses a project specific library as a reference for EDD non-conformance checks and automated data review. The project specific library will be built and maintained by Parsons and the laboratory and will contain all the methods, target analytes, and quality control and validation requirements specified in this QAPP. Parsons will prepare the initial project library. The library will be submitted to the laboratory for review and comments. The laboratory’s comments will be incorporated and the project library finalized. The final project library will be returned to the laboratory for use in generation of the ADR EDDs. The final project library will also be used by Parsons during data validation and included in the final ADR deliverables.

13.3.3.5.2 In general, the EDD submittal will include:

1. The laboratory’s identification of each field sample,
2. Field sample identifications,
3. Analytes,
4. Results,
5. Data qualifiers and validation flags,
6. Concentration units, and
7. Applicable QC data.
8. An error log showing the results of ADR’s EDD compliance screening. The error log will also address all errors or warnings.

13.3.3.5.3 Additionally, the calibration information may be included in the ADR EDD as the laboratory develops the capability to input the data efficiently.

14 PERFORMANCE AND SYSTEM AUDITS

14.0.0.1 The laboratory QA officer will carry out performance and/or systems audits to ensure that data of known and defensible quality are produced during the program.

14.0.0.2 Field. Field performance audits will include an audit by the Parsons Technical Director or qualified designee to ensure that sampling procedures performed by the sampling team are in accordance with the Site-Wide Work Plan, FSP, and QAPP.

14.0.0.3 Laboratory. GPL has National Environmental Laboratory Accreditation Program (NELAP) certification and is accredited to perform work for DoD under Quality Systems Manual, Version 3.0. Clayton Group Services carries AIHA certification. ECBC does not fall under the HTRW MCX validation criteria.

14.0.0.4 Subcontractor Laboratory. In accordance with the QSM, Version 3.0, section 4.5, any subcontractor laboratories (laboratory contracted by the primary laboratory) will similarly be accredited under NELAP for the tests to be performed or will meet applicable statutory and regulatory requirements for performing the tests and submitting the results of tests performed. The subcontractor laboratory will be indicated in the final report and non-NELAP accredited work will be identified.

15 PREVENTIVE MAINTENANCE

15.1 MAINTENANCE PROCEDURES

15.1.0.1 Equipment, instruments, tools, gauges, and other items requiring preventive maintenance will be serviced in accordance with the manufacturer's specified recommendation and written procedures developed by the operators. Written procedures will identify the schedule for servicing critical items to minimize the downtime of the measurement system. It will be the operator's responsibility to adhere to this maintenance schedule and to arrange any necessary service promptly. Service to the equipment instruments, tools, etc., shall be performed by qualified personnel. In the absence of any manufacturer's recommended maintenance criteria, a maintenance procedure will be developed by the operator based upon experience and previous use of the equipment.

15.2 MAINTENANCE RECORDS

15.2.0.1 Logs shall be established to record and control maintenance and service procedures and schedules. All maintenance records will be documented and traceable to the specific equipment, instruments, tools, and gauges. Records produced shall be reviewed, maintained, and filed by the operators at the laboratories and by the data and sample control personnel. The QA/QC Manager can audit these records to verify complete adherence to these procedures.

15.3 EQUIPMENT SPARE PARTS

15.3.0.1 The operator will make a critical spare parts list. These parts will be stored on-site or be immediately available for use in reducing instrument or equipment downtime. In lieu of maintaining an inventory of spare parts, an arrangement for rapid instrument repair or backup instruments shall be made.

15.4 LABORATORY MAINTENANCE

15.4.0.1 Preventive maintenance procedures for each laboratory will be in accordance with the approved laboratory QA plans.

16 ASSESSMENT PROCEDURES FOR DATA ACCEPTABILITY

16.1 PRECISION

16.1.0.1 Precision will be estimated by analyzing field and laboratory duplicate samples. The relative percent difference (RPD) between the analyte levels measured in the duplicate samples will be calculated using the following equation:

$$RPD = \frac{|V_1 - V_2|}{0.5(V_1 + V_2)} x100\%$$

where:

RPD	=	Relative Percent Difference;
V_1, V_2	=	The two values obtained by making analyzing duplicate samples;
$\| V_1 - V_2 \|$	=	The absolute value of the difference between the two resultts; and
$0.5(V_1 + V_2)$	=	The average value of the two results.

16.1.0.2 Requirements for precision are presented in Tables 4 and 5, Attachment A.

16.2 ACCURACY

16.2.0.1 Accuracy will be estimated by calculating the percent recovery (%R) of spiked samples using the equation below:

$$\% R = \frac{C_j - C_o}{C_t} x 100$$

where:

%R	=	Percent Recovery;
C_j	=	Measured concentration in the spiked aliquot;
C_o	=	Measured concentration in the unspiked sample; and
C_t	=	Actual concentration of spike added.

16.2.0.2 Requirements for accuracy are presented in Tables 4 and 5, Attachment A.

16.3 REPRESENTATIVENESS

16.3.0.1 Representativeness is the degree to which a set of data accurately reproduces the characteristics of the population. Analyses performed by the analytical laboratory will follow standard analytical methodologies for data representativeness. Instrument performance checks, initial and continuing calibrations, laboratory blanks, and internal standards are some of the measures evaluated to determine that representativeness has been achieved.

16.3.0.2 The focus of the soil sampling is to bias the effort toward potential soil contamination. Approximate site sampling uniformity will be achieved by selecting sample locations where past military activities occurred. Soil sample representativeness of the sample location itself will be achieved by the quartering technique described previously in the Field Sampling Plan. By following the guidelines in this QAPP, shipping and handling representativeness can be assumed. Equipment rinsate blanks will also provide an assessment of the representativeness of the overall field sampling activities, including decontamination procedures, sample containers, sampling procedures, shipping, and handling

16.4 COMPLETENESS

16.4.0.1 Completeness, including analytical, field, and overall, will be estimated as the percentage of all usable samples/measurements and calculated as follows:

$$\%C = (U/T) \times 100$$

where:

% C = Percent completeness;
U = Number of samples/measurements judged usable; and
T = Total number of samples/measurements.

16.4.0.2 Requirements for analytical completeness are presented in Tables 4 and 5, Attachment A.

16.5 COMPARABILITY

16.5.0.1 Comparability expresses the confidence with which one set of data can be compared with another. Comparability can be related to precision and accuracy, as these quantities are measures of data reliability. All measurement data generated will be expressed in units as defined by the method to allow comparability of data among sampling locations, as applicable. The laboratory will maintain a QA/QC program and perform analyses in accordance with applicable USEPA protocols and other applicable standard methods.

16.5.0.2 The CA screening data generated will be expressed in units as defined by the method (ECBC IOP MT-16 Dec 2003 Rev #9) to allow comparability of data among sampling locations. The field team will perform all procedures according to the guidelines in this SAP to maintain comparability throughout the sampling effort.

17 CORRECTIVE ACTION

17.1 INTRODUCTION

17.1.0.1 The following procedures have been established to assure that conditions adverse to quality such as malfunctions, deficiencies, deviations, and errors are promptly investigated, documented, evaluated, and corrected. Table 13, Attachment A also presents specific corrective actions.

17.2 ADVERSE CONDITIONS AND CORRECTIVE ACTIONS

17.2.0.1 When a significant condition adverse to quality is noted at the site, laboratory, or other subcontractor locations, the cause of the condition will be determined and corrective action taken to preclude repetition. Condition identification, cause, reference documents, and corrective action planned will be documented and reported to the site team leader, project manager, QA/QC manager, and involved subcontractor management. Implementation of corrective actions will be verified by documented follow-up action. All project personnel have the daily responsibility to promptly identify and report any condition adverse to quality, as well as to solicit the approved corrective action.

17.2.0.2 Corrective actions will be initiated at a minimum:

- when sample holding times are exceeded;
- when sample temperatures are outside of acceptable criteria;
- when sample containers are received broken or in unacceptable condition;
- when sample identification is unclear;
- when predetermined acceptance standards are not attained;
- when procedures or data are determined to be faulty;
- when equipment or instrumentation is found faulty;
- when samples and test results are questionably traceable;
- when QA requirements are violated;
- when designated approval have been circumvented;
- as a result of system and performance audits; and/or
- as a result of management assessment.

17.2.0.3 The Parsons QA/QC Manager will be responsible for approving and documenting the corrective actions and ensuring their implementation. Laboratory corrective action procedures are discussed in detail in the laboratory QA plans and standard methods.

18 CHEMICAL DATA QUALITY ASSESSMENT REPORTS

18.0.0.1 During the project, the QA/QC Manager will prepare at least one Chemical Data Quality Assessment Report (CDQAR) to discuss:

- the periodic assessment of measurement data accuracy, precision, and completeness; and
- significant quality assurance problems and corrective actions taken.

18.0.0.2 These reports will be prepared following receipt of the full data packages from the lab. The reports will be provided as attachments to the site-specific reports.

18.0.0.3 In addition, the Project Manager will receive periodic updates concerning QA at the site or the laboratory. The final report prepared upon completion of the project will include a separate data assessment report summarizing data quality information and QC sample results.

19 PROJECT-SPECIFIC QA OBJECTIVES

19.1 FIELD MEASUREMENTS

19.1.0.1 Field measurements will include a survey of the grid corners. The survey will meet a horizontal accuracy of 0.1' and a vertical accuracy of 0.01'.

19.1.0.2 Field measurements will also include real time air monitoring for dust using a MIE PDM-3 Miniram. The Miniram is capable of measuring concentrations of the range of 0.01 to 100 mg/m^3 with a precision of ± 0.02 mg/m^3.

19.1.0.3 Field measurements using a photoionization detector (PID) will be made inside the ECS and potentially outside depending on site circumstances. Attachment C provides the standard operating procedures for PID usage. SUMMA canisters may be used to collect air samples for VOC analysis depending on site circumstances; Attachment D provides the standard operating procedures for using SUMMA canisters.

19.1.0.4 Field measurements using an arsine detector may be made depending on site circumstances. Attachment E provides the Standard Operating Procedures for using the arsine detector. Dräger tubes may be used for arsine confirmation depending on site circumstances; Attachment F provides standard operating procedures for using the Dräger tubes.

19.2 LABORATORY MEASUREMENTS

19.2.0.1 QA objectives for laboratory measurements are expressed in terms of precision, accuracy, completeness, representativeness, comparability, and detection limits. Project-specific objectives are listed in Tables 1 through 13, Attachment A. Evaluation procedures for each of these data quality indicators are discussed throughout this section. These objectives may not be met due to matrix effects unique to the samples; however, for laboratory quality control samples (e.g., method blank, blank spike, laboratory control samples, etc.), these objectives must be met. Matrix effects must be verified through reanalysis of affected samples and reporting both sets of data.

19.2.0.2 Precision is an expression of the agreement between multiple measurements of the same property carried out under similar conditions. Precision thus reflects the reproducibility of the measurement. Precision will be evaluated using the relative percent difference (RPD) of the data for field or laboratory duplicates. The target RPD is applicable to sample and duplicate results > 5X the Contract Required Quantitation Limit (CRQL). For results < 5X CRQL the precision target to be used is the absolute difference between the sample and duplicate result < 2X CRQL. RPD control limits for matrix spikes are presented in Tables 4 and 5; the target RPD for field duplicates is 30% for aqueous samples and 50% for soil samples. For laboratory duplicates, the target RPD is 20%.

19.2.0.3 Accuracy is a measure of the difference between a measured value and the "true" or accepted reference value. Accuracy will be evaluated as percent recovery from matrix, control, and surrogate spike samples. Accuracy criteria are listed in Tables 4 through 10, Attachment A.

19.2.0.4 Samples collected and analyzed must be representative of the population. Representativeness will be achieved by:

- collecting samples from locations fully representing site conditions;
- using appropriate sampling procedures and equipment;
- collecting sufficient amount of properly preserved samples in the appropriate pre-cleaned containers;
- selecting appropriate analytical methods for the parameters of interest; and
- analyzing samples within the holding time specified for the parameter or method.

19.2.0.5 Completeness of the data set generated will be assessed by comparing the number of parameters required with the number of parameters successfully completed and usable. The completeness objective for this project is 95 percent as shown in Tables 4 and 5, Attachment A.

19.2.0.6 The data collection procedures presented in this section are designed to produce comparable data. Standard recognized field and analytical methods will be followed to ensure generation of comparable data. Any deviations from prescribed procedures will be noted with the reported data. Comparability of the data generated and conclusions drawn from them during this project will be assured by:

- conforming to identified Standard Operating Procedures (SOPs) during all field and laboratory activities;
- using identified standard methods for the analytical phase of this project;
- ensuring traceability of all analytical standards or source materials to the National Institute of Standards and Technology (NIST), USEPA, or Army Environmental Center (AEC) Reference Standards (when available); and
- using standard reporting units and reporting formats including the reporting of QC data.

19.2.0.7 Sensitivity will be monitored using detection limits: Contract Required Quantitation Limits (CRQL for CLP methods) and Practical Quantitation Limits (PQL for non CLP methods). Definitions for CRQL, PQL and Method Detection Limits (MDL) are provided below. For purposes of this Project, the CRQL and the PQL are equivalent to the Project Reporting Limits (PRL). All non-detects will be reported at the PRL (with the 'U' qualifier). Sample detections above the MDL but less than the PRL will be reported with the 'J' qualifier. The sample specific PRL will be adjusted for sample amounts, dilution and percent solids as appropriate. The CRQLs and PQLs for the target analytes, for each matrix, are presented in Tables 4 through 10, Attachment A.

- Method Detection Limit. The MDL is the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte. For samples in which an analyte is not detected, the environmental laboratory will report results as not-detected at the MDL (or not-detected at the SDL if dilution was required; see below).
- Contract Required Quantitation Limit. Minimum level of quantitation acceptable under the Contract Laboratory Program (CLP) Statement of Work (SOW). CRQLs are provided for CLP methods only.
- Practical Quantitation Limit. The PQL is used to express the lowest concentration of a substance that can be determined within the accuracy and precision limits established for the method. The PQL is established by the lowest initial calibration standard. The sample specific PQL obtainable for environmental samples is subject to matrix effects, sample size, dilution and moisture content (solid samples).
- Project Reporting Limit. The PRL is the project-specific reporting level. For this project, the CRQLs and PQLs will be used as the PRLs. The environmental laboratory will ensure that their MDLs are no greater than one-third (as possible) the PRLs and will implement corrective action as necessary to ensure that MDLs remain less that the PRLs.

20 REFERENCES

US EPA (1993), Region III Modifications to the National Functional Guidance for Inorganic Data Review.

US EPA (1994), Region III Modifications to the National Functional Guidance for Organic Data Review.

US EPA (1999 and subsequent modifications), Test Methods for Evaluating Solid Waste, Physical/Chemical Methods Integrated Manual (SW 846).

US EPA (2000), Data Quality Objectives Process for Hazardous Waste Site Investigations, (EPA QA/G-4HW, EPA/600/R-00/007).

USACE (2000), Final Work Management Plan Remedial Investigation/Feasibility Study (RI/FS), Operable Unit 4, Spring Valley, Washington DC.

USACE (2000), Revised Final Engineering Evaluation/Cost Analysis: 4801, 4825, and 4835 Glenbrook Road, Operable Unit 3, Spring Valley, Washington, DC.

USACE (2001), Requirements for the Preparation of Sampling and Analysis Plan, (EM 200-1-3).

USACE (2003), Data Item Description MR-005-10, Munitions Constituent Chemical Data Quality Deliverables.

US EPA (2003), Multi-Media, Multi-Concentration Organics Analysis (OLM04.3) Statement of Work (SOW) and associated documents.

US EPA (2004), Multi-Media, Multi-Concentration Inorganics Analysis (ILM05.3) Statement of Work (SOW) and associated documents.

ATTACHMENT A

QAPP TABLES

TABLE A-1 - COMPARISON VALUES
COMPREHENSIVE LIST for SOIL SAMPLING

	A	B	C	D	E	F	G	H	I	J
1				SOIL						
2	COUNTER	COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD	WASTE PROFILE COMPARISON VALUES	CHAR-GRAB-CONFIRM. COMPARISON VALUES		UNITS	COMPARISON VALUE SOURCE	COMMENTS
3		'ECBC ANALYSES'								
4	1	ricin	9009-86-3	Immuno-assay	Positive detect	Positive detect		NA	NA	For quantitative analysis, positive detection is exceedance of the detection limit.
5	1	2-chlorovinylarsenous acid/chlorovinylarsenic oxide (CVAA/CVAO) (Lewisite Breakdown Products)	3088-37-7 (CVAO)	CWM	7,800	7,800		ug/kg	HBESL[1]	Lewisite ABPs, not CWM, but listed as such for categorization ease.
6	1	mustard (crude, pure, distilled, gas forms)	505-60-2	CWM	550	550		ug/kg	HBESL[1]	
7	1	dithiane (1,4)*	505-29-3	GC/MS	780,000	78,000	N	ug/kg	RBC	Mustard ABP
8	1	oxathiane (1,4)*	15980-15-1	GC/MS	780,000	78,000	N	ug/kg	1995 RI Report	Mustard ABP
9	1	thiodiglycol	111-48-8	GC/MS	391,000	39,100	N	ug/kg	1995 RI Report	Mustard ABP
10										
11		METALS								
12	1	Adamsite (DM, phenarsazine chloride)	578-94-9	METAL	20	20		mg/kg	SV Remed. Goal	ONLY TOTAL ARSENIC WILL BE ANALYZED AS AN INDICATOR OF EACH OF THESE ORGANO-ARSENICALS.
13	1	ethylarsine	593-59-3	METAL	20	20		mg/kg	SV Remed. Goal	
14	1	ethyldichloroarsine (CY)	598-14-1	METAL	20	20		mg/kg	SV Remed. Goal	
15	1	methyldichloroarsine	593-89-5	METAL	20	20		mg/kg	SV Remed. Goal	
16	1	phenyldichloroarsine (MA)	696-28-6	METAL	20	20		mg/kg	SV Remed. Goal	
17	1	aluminium	7429-90-5	METAL	78,000	25,798	N	mg/kg	RBC/BG	
18	1	antimony*	7440-36-0	METAL	31	3.1	N	mg/kg	RBC	
19	1	arsenic	7440-38-2	METAL	20	20		mg/kg	SV Remed. Goal	
20	1	barium*	7440-39-3	METAL	16,000	1,600	N	mg/kg	RBC	
21	1	beryllium*	7440-41-7	METAL	160	16	N	mg/kg	RBC	
22	1	cadmium*	7440-43-9	METAL	78	7.8	N	mg/kg	RBC	
23	1	chromium*	16065-83-1	METAL	120,000	12,000	N	mg/kg	RBC	Chromium III RBC used.
24	1	cobalt*	7440-48-4	METAL	1,600	160	N	mg/kg	RBC	
25	1	copper*	7440-50-8	METAL	3,100	310	N	mg/kg	RBC	
26	1	cyanide	57-12-5	IC/METAL	1,600	160	N	mg/kg	RBC	
27	1	lead*	7439-92-1	METAL	400	400		mg/kg	RBC	USEPA recommended residential land use screening level.
28	1	manganese*	7439-96-5	METAL	1,600	1,251	N	mg/kg	RBC/BG	
29	1	mercury*	7439-97-6	METAL	7.8	0.78		mg/kg	RBC[2]	
30	1	mercury methyl	22967-92-6	METAL	7.8	0.78	N	mg/kg	RBC	ONLY TOTAL MERCURY WILL BE ANALYZED AS AN INDICATOR.
31	1	nickel*	7440-02-0	METAL	1,600	160	N	mg/kg	RBC	
32	1	selenium	7782-49-2	METAL	390	39	N	mg/kg	RBC	

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33	1	silver*	7440-22-4	METAL	390	39	N	mg/kg	RBC	
34	1	strontium	7440-24-6	METAL	47,000	4,700	N	mg/kg	RBC	
35	1	tellurium*	13494-80-9	METAL	39.11	39.11		mg/kg	Tox Review[3]	Added as potential degradation product of 2 compounds that were deleted.
36	1	thallium*	7440-28-0	METAL	5.5	1.36	N	mg/kg	RBC/BG	
37	1	tin*	7440-31-5	METAL	47,000	4,700	N	mg/kg	RBC	
38	1	titanium	7440-32-6	METAL	310,000	31,000	N	mg/kg	RBC	
39	1	vanadium*	7440-62-2	METAL	78	66.76	N	mg/kg	RBC/BG	
40	1	zinc	7440-66-6	METAL	23,000	2,300	N	mg/kg	RBC	
41	1	ZIRCONIUM	7440-67-7	METAL	NA	NA		ug/kg	NA[5]	
42										
43		**VOCs + TICs**								
44	1	acrolein (papite)	107-02-8	VOC	39,000	3,900	N	ug/kg	RBC	
45	1	benzene	71-43-2	VOC	12,000	12,000		ug/kg	RBC	
46	1	benzyl bromide (cyclite, lachrymogene)	100-39-0	VOC	156,000	156,000		ug/kg	Surrogate[4]	
47	1	benzyl chloride	100-44-7	VOC	3,800	3,800		ug/kg	RBC	
48	1	BROM ACETALDEHYDE	17157-48-1	VOC	NA	NA		ug/kg	NA[5]	Assume misspelling of bromoacetaldehyde
49	1	carbon tetrachloride	56-23-5	VOC	4,900	4,900		ug/kg	RBC	
50	1	chlorobenzene (chlorobenzol)	108-90-7	VOC	1,600,000	160,000	N	ug/kg	RBC	
51	1	chlorodiethyl sulfide	693-07-2	VOC	NA	NA		ug/kg	NA[5]	
52	1	chloroform	67-66-3	VOC	780,000	78,000	N	ug/kg	RBC	
53	1	chloropicrin (PS, Aquinite)	76-06-2	VOC	NA	NA		ug/kg	NA[5]	
54	1	DIPHENYL ETHER	101-84-8	VOC	NA	NA		ug/kg	NA[5]	
55	1	ETHYLENE	74-85-1	VOC	NA	NA		ug/kg	NA[5]	
56	1	ethylene chloride	107-06-2	VOC	7,000	7,000		ug/kg	RBC	**Synonym of 1,2-DCA**
57	1	toluene	108-88-3	VOC	6,300,000	630,000	N	ug/kg	RBC	
58	1	xylene	1330-20-7	VOC	16,000,000	1,600,000	N	ug/kg	RBC	
59										
60		**SVOCs + TICs**								
61	1	ACETOPHENONE	98-86-2	SVOC	7,800,000	780,000	N	ug/kg	RBC	
62	1	BENZAL CHLORIDE	98-87-3	SVOC	NA	NA		ug/kg	NA[5]	Syn: dichloromethyl benzene
63	1	benzoic acid	65-85-0	SVOC	310,000,000	31,000,000	N	ug/kg	RBC	
64	1	BROMACETOPHENONE	70-11-1	SVOC	NA	NA		ug/kg	NA[5]	Assume misspelling of BROMOACETOPHENONE

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65	1	BROMCHLORACETOPHENONE	536-38-9	SVOC	NA	NA		ug/kg	NA[\5]	Assume 2-Bromo-4'-chloroacetophenone
66	1	BROMDIMETHYL ETHER	13057-17-5	SVOC	NA	NA		ug/kg	NA[\5]	
67	1	DICHLOR-DIMETHYL ETHER	542-88-1	SVOC	NA	NA		ug/kg	NA[\5]	Syn: bis-chloromethyl ether
68	1	dichlorobenzyl bromide	18880-04-1	SVOC TIC	NA	NA		ug/kg	NA[\5]	
69	1	DIMETHYLAMILINE	121-69-7	SVOC	160,000	16,000	N	ug/kg	RBC	Assume misspelling of Dimethylaniline
70	1	DINITROCHLORBENZENE	97-00-7	SVOC	NA	NA		ug/kg	NA[\5]	1 chloro 2,4 dinitrobenzene; may be synonym of Parazol
71	1	DIPHENYL	92-52-4	SVOC	NA	NA		ug/kg	NA[\5]	
72	1	DIPHENYLAMINE	122-39-4	SVOC	2,000,000	200,000	N	ug/kg	RBC	
73	1	ETHYLENE CHLOROHYDRIN	107-07-3	SVOC	NA	NA		ug/kg	NA[\5]	
74	1	GLYCOL-BROMHYDRIN	540-51-2	SVOC	NA	NA		ug/kg	NA[\5]	Syn: ethylene bromohydrin
75	1	hexachloroethane (HC)	67-72-1	SVOC	46,000	7,800		ug/kg	RBC[\6]	
76	1	lead tetraethyl	78-00-2	SVOC TIC	7.8	0.78	N	ug/kg	RBC	
77	1	octochloroethyl sulfide	13905-39-0	SVOC TIC	NA	NA		ug/kg	NA[\5]	
78	1	P-CHLORACETOPHENONE	99-91-2	SVOC	NA	NA		ug/kg	NA[\5]	This is 4-chloroacetophenone
79	1	tetrachlorodinitrobenzene	20098-38-8	SVOC TIC	NA	NA		ug/kg	NA[\5]	
80	1	TOLIDINE	119-93-7	SVOC	NA	NA		ug/kg	NA[\5]	
81	1	triphenylarsine	603-32-7	SVOC TIC	NA	NA		ug/kg	NA[\5]	
82		**EXPLOSIVES**								
83	1	2-amino-4,6-dinitrotoluene (2-Am-DNT)*	35572-78-2	EXP 8330	160,000	16,000	N	ug/kg	RBC[\7]	
84	1	4-amino-2,6-dinitrotoluene (4-Am-DNT)*	19406-51-0	EXP 8330	160,000	16,000	N	ug/kg	RBC[\7]	
85	1	dinitrobenzene (1,3)*	99-65-0	EXP 8330	7,800	780	N	ug/kg	RBC	
86	1	dinitrotoluene (2,4)*	121-14-2	EXP 8330	160,000	16,000	N	ug/kg	RBC	
87	1	dinitrotoluene (2,6)*	606-20-2	EXP 8330	78,000	7,800	N	ug/kg	RBC	
88	1	hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)*	121-82-4	EXP 8330	5,800	5,800		ug/kg	RBC	
89	1	nitrobenzene	98-95-3	EXP 8330	39,000	3,900	N	ug/kg	RBC	
90	1	nitroglycerin*	55-63-0	EXP 8330	7,800	780	N	ug/kg	RBC	
91	1	nitrotoluene (m)*	99-08-1	EXP 8330	1,600,000	160,000	N	ug/kg	RBC	
92	1	nitrotoluene (o)*	88-72-2	EXP 8330	780,000	780,000		ug/kg	RBC	
93	1	nitrotoluene (p)*	99-99-0	EXP 8330	38,000	38,000		ug/kg	RBC	
94	1	octahydro-1,3,5,7-tetranitro-1,3,5,7 tetrazocine (HMX)*	2691-41-0	EXP 8330	3,900,000	390,000	N	ug/kg	RBC	
95	1	tetryl*	479-45-8	EXP 8330	310,000	31,000	N	ug/kg	RBC	
96	1	trinitrobenzene (1,3,5)*	99-35-4	EXP 8330	2,300,000	230,000	N	ug/kg	RBC	
97	1	trinitrotoluene	118-96-7	EXP 8330	39,000	3,900		ug/kg	RBC[\6]	

TABLE A-1 - COMPARISON VALUES
COMPREHENSIVE LIST for SOIL SAMPLING

	A	B	C	D	E	F	G	H	I	J
1				SOIL						
2	COUNTER	COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD	WASTE PROFILE COMPARISON VALUES	CHAR-GRAB-CONFIRM. COMPARISON VALUES		UNITS	COMPARISON VALUE SOURCE	COMMENTS
98		**OTHER**								
99	1	FLUORIDE	16984-48-8	IC (300.0)	NA	NA		ug/kg	NA[5]	
100	1	IODINE (as IODIDE)	7553-56-2	IC	NA	NA		ug/kg	NA[5]	
101										
102	**89**	**TOTAL COMPOUNDS**								
103		* Not on any of the lists, but historically analyzed or has potential to be present.								
104		NA--Not Applicable or Not Available.								
105		RBC--USEPA Risk Based Concentration from **October 2006** tables, Residential Soil concentration, unless otherwise indicated.								
106		N--Non-carcinogen. Applies to characterization/grab/confirmation samples only. This RBC was adjusted down by a factor of 10 to account for cumulative effects.								
107		BG--95th percentile of the background concentration. This was used when it was higher than the RBC.								
108		RBC/BG--Waste Profile Comparison Value is the RBC. Characterization/grab/confirmation Comparison Value is the BG.								
109		ALL CAPS ARE COOK LIST COMPOUNDS (**20 TOTAL**).								
110		[1]--Health Based Environmental Screening Level (residential soil) from US Army Center for Health Promotion and Preventive Medicine								
111		[2]--Based on methyl mercury.								
112		[3]--Based on a review of toxicological literature.								
113		[4]--USEPA derived surrogate for N,N-Dimethyl aniline (121-69-7), RfD = 0.002.								
114		[5]--Not currently available. Detection of this compound would trigger discussion with stakeholders and possibly development of a surrogate comparison value.								
115		[6]--Use non-cancer endpoint because the hazard index at 0.1 is less than the cancer RBC. It has been adjusted downward by a factor of 10.								
116		[7]--RBC for aminodinitrotoluenes.								
117										

TABLE A-2 - COMPARISON VALUES
COMPREHENSIVE LIST for WATER SAMPLING

	A	B	C	D	E	F	G	H
1	COUNTER			WATER				
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD	COMPARISON VALUE[1]	UNITS	COMPARISON VALUE SOURCE	COMMENTS
3		'ECBC ANALYSES'						
4	1	ricin	9009-86-3	Immuno-assay	Positive detect	NA	NA	For quantitative analysis, positive detection is exceedance of the detection limit.
5	1	2-chlorovinylarsenous acid/chlorovinylarsenic oxide (CVAA/CVAO) (Lewisite Breakdown Products)	3088-37-7 (CVAO)	CWM	80	ug/L	FDWS	Lewisite ABPs, not CWM, but listed as such for categorization ease.
6	1	mustard (crude, pure, distilled, gas forms)	505-60-2	CWM	140	ug/L	FDWS	
7	1	dithiane (1,4)*	505-29-3	GC/MS	370	ug/L	RBC	Mustard ABP
8	1	oxathiane (1,4)*	15980-15-1	GC/MS	NA	ug/L	NA[2]	Mustard ABP
9	1	thiodiglycol	111-48-8	GC/MS	NA	ug/L	NA[2]	Mustard ABP
10								
11		METALS						
12	1	Adamsite (DM, phenarsazine chloride)	578-94-9	METAL	230	ug/L	DC WASA	ONLY TOTAL ARSENIC WILL BE ANALYZED AS AN INDICATOR OF EACH OF THESE ORGANO-ARSENICALS.
13	1	ethylarsine	593-59-3	METAL	230	ug/L	DC WASA	
14	1	ethyldichloroarsine (CY)	598-14-1	METAL	230	ug/L	DC WASA	
15	1	methyldichloroarsine	593-89-5	METAL	230	ug/L	DC WASA	
16	1	phenyldichloroarsine (MA)	696-28-6	METAL	230	ug/L	DC WASA	
17	1	aluminium	7429-90-5	METAL	37,000	ug/L	RBC	
18	1	antimony*	7440-36-0	METAL	15	ug/L	RBC	
19	1	arsenic	7440-38-2	METAL	230	ug/L	DC WASA	
20	1	barium*	7440-39-3	METAL	7,300	ug/L	RBC	
21	1	beryllium*	7440-41-7	METAL	73	ug/L	RBC	
22	1	cadmium*	7440-43-9	METAL	200	ug/L	DC WASA	
23	1	chromium*	16065-83-1	METAL	55,000	ug/L	RBC	
24	1	cobalt*	7440-48-4	METAL	730	ug/L	RBC	
25	1	copper*	7440-50-8	METAL	2,300	ug/L	DC WASA	
26	1	cyanide	57-12-5	IC/METAL	560	ug/L	DC WASA	
27	1	lead*	7439-92-1	METAL	1,200	ug/L	DC WASA	
28	1	manganese*	7439-96-5	METAL	730	ug/L	RBC	
29	1	mercury*	7439-97-6	METAL	1	ug/L	DC WASA	
30	1	mercury methyl	22967-92-6	METAL	3.7	ug/L	RBC	ONLY TOTAL MERCURY WILL BE ANALYZED AS AN INDICATOR
31	1	nickel*	7440-02-0	METAL	2,200	ug/L	DC WASA	
32	1	selenium	7782-49-2	METAL	180	ug/L	RBC	
33	1	silver*	7440-22-4	METAL	3,300	ug/L	DC WASA	
34	1	strontium	7440-24-6	METAL	22,000	ug/L	RBC	
35	1	tellurium*	13494-80-9	METAL	70	ug/L	DMHSPE	Added as potential degradation product of 2 compounds that were deleted.

TABLE A-2 - COMPARISON VALUES
COMPREHENSIVE LIST for WATER SAMPLING

	A	B	C	D	E	F	G	H
1	COUNTER			WATER				
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD	COMPARISON VALUE[1]	UNITS	COMPARISON VALUE SOURCE	COMMENTS
36	1	thallium*	7440-28-0	METAL	2.6	ug/L	RBC	
37	1	tin*	7440-31-5	METAL	22,000	ug/L	RBC	
38	1	titanium	7440-32-6	METAL	150,000	ug/L	RBC	
39	1	vanadium*	7440-62-2	METAL	37	ug/L	RBC	
40	1	zinc	7440-66-6	METAL	4,900	ug/L	DC WASA	
41	1	ZIRCONIUM	7440-67-7	METAL	NA		NA[2]	
42								
43		**VOCs + TICs**						
44	1	acrolein (papite)	107-02-8	VOC	10[3]	ug/L	DC WASA	
45	1	allyl alcohol	107-18-6	VOC TIC	10	ug/L	DC WASA	
46	1	benzene	71-43-2	VOC	140	ug/L	DC WASA	
47	1	benzyl bromide (cyclite, lachrymogene)	100-39-0	VOC	10	ug/L	DC WASA	
48	1	benzyl chloride	100-44-7	VOC	10	ug/L	DC WASA	
49	1	benzyl iodide (iodomethyl benzene)	620-05-3	VOC TIC	10	ug/L	DC WASA	
50	1	BRAMACTONE	598-31-2	VOC TIC	10	ug/L	DC WASA	Assume misspelling of bromoacetone
51	1	BROM ACETALDEHYDE	17157-48-1	VOC	10	ug/L	DC WASA	Assume misspelling of bromoacetaldehyde
52	1	bromoacetone (bromo-2-propanone)	598-31-2	VOC TIC	10	ug/L	DC WASA	
53	1	bromoacetonitrile	590-17-0	VOC TIC	10	ug/L	DC WASA	
54	1	bromomethyl ether	4497-29-4	VOC TIC	10	ug/L	DC WASA	
55	1	bromomethylethyl ketone	816-40-0	VOC TIC	10	ug/L	DC WASA	
56	1	carbon bisulfide (carbon disulfide)	75-15-0	VOC	60	ug/L	DC WASA	
57	1	carbon tetrachloride	56-23-5	VOC	30	ug/L	DC WASA	
58	1	chloracetoluene	4209-24-9	VOC TIC	10	ug/L	DC WASA	
59	1	CHLOR ETHYL ACETATE	76-03-9	VOC TIC	10	ug/L	DC WASA	Assume misspelling of chloroethyl acetate
60	1	chlorobenzene (chlorobenzol)	108-90-7	VOC	2,310	ug/L	DC WASA	
61	1	chlorodiethyl sulfide	693-07-2	VOC	10	ug/L	DC WASA	
62	1	chloroform	67-66-3	VOC	410	ug/L	DC WASA	
63	1	chloropicrin (PS, Aquinite)	76-06-2	VOC	10	ug/L	DC WASA	
64	1	crotonaldehyde	4170-30-3	VOC TIC	10	ug/L	DC WASA	
65	1	DIPHENYL ETHER	101-84-8	VOC	10	ug/L	DC WASA	
66	1	ethyl dibromoacetate	617-33-4	VOC TIC	10	ug/L	DC WASA	
67	1	ethyl iodoacetate (SK, KSK)	623-48-3	VOC TIC	10	ug/L	DC WASA	
68	1	ETHYLENE	74-85-1	VOC	10	ug/L	DC WASA	
69	1	ethylene chloride	107-06-2	VOC	280	ug/L	DC WASA	Synonym 1,2-DCA
70	1	ethylene thiocyanate	629-17-4	VOC TIC	10	ug/L	DC WASA	
71	1	isoprene dibromide	18860-95-2	VOC TIC	10	ug/L	DC WASA	
72	1	methyldibromoarsine	676-70-0	VOC TIC	10	ug/L	DC WASA	
73	1	methyldioxyarsine	25400-23-1	VOC TIC	10	ug/L	DC WASA	
74	1	methyltrithiocarbonate	2314-48-9	VOC TIC	10	ug/L	DC WASA	

TABLE A-2 - COMPARISON VALUES
COMPREHENSIVE LIST for WATER SAMPLING

	A	B	C	D	E	F	G	H
1	COUNTER			WATER				
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD	COMPARISON VALUE\1	UNITS	COMPARISON VALUE SOURCE	COMMENTS
75	1	nitrobenzyl bromide	3958-60-9	VOC TIC	10	ug/L	DC WASA	
76	1	nitrochloroacetanilide	17329-87-2	VOC TIC	10	ug/L	DC WASA	
77	1	p-nitrobenzyl cyanide	555-21-5	VOC TIC	10	ug/L	DC WASA	Synonym p-nitrophenylacetonitrile
78	1	SULFUR DIOXIDE	7446-09-5	VOC TIC	10	ug/L	DC WASA	
79	1	TETRACHLOROACETONE	632-21-3	VOC TIC	10	ug/L	DC WASA	1,1,3,3-Tetrachloroacetone
80	1	tetrachloroethyl ether	7166-44-1	VOC TIC	10	ug/L	DC WASA	
81	1	thionyl fluoride	7783-42-8	VOC TIC	10	ug/L	DC WASA	
82	1	toluene	108-88-3	VOC	1,360	ug/L	DC WASA	
83	1	tribromochloroacetone	76841-88-8	VOC TIC	10	ug/L	DC WASA	
84	1	TRIBROMMONOCHLORACETONE	34718-47-3	VOC TIC	10	ug/L	DC WASA	
85	1	trichloroacetone	918-00-3	VOC TIC	10	ug/L	DC WASA	
86	1	trichloroacetonitrile	545-06-2	VOC TIC	10	ug/L	DC WASA	
87	1	xylene	1330-20-7	VOC	10	ug/L	DC WASA	
88		**SVOCs + TICs**						
89	1	ACETOPHENONE	98-86-2	SVOC	10\3	ug/L	DC WASA	
90	1	BENZAL CHLORIDE	98-87-3	SVOC	10	ug/L	DC WASA	Syn: dichloromethyl benzene
91	1	benzoic acid	65-85-0	SVOC	10	ug/L	DC WASA	
92	1	benzoyl thiocynate		SVOC TIC	10	ug/L	DC WASA	
93	1	BROMACETAMIDE	683-57-8	SVOC TIC	10	ug/L	DC WASA	Assume misspelling of bromoacetamide
94	1	BROMACETOPHENONE	70-11-1	SVOC	10	ug/L	DC WASA	Assume misspelling of bromomacetophenone
95	1	BROMCHLORACETOPHENONE	536-38-9	SVOC	10	ug/L	DC WASA	Assume 2-Bromo-4'-chloroacetophenone
96	1	BROMDIMETHYL ETHER	13057-17-5	SVOC	10	ug/L	DC WASA	
97	1	bromobenzyl cyanide (bromobenzylnitrile, CA, Camite)	5798-79-8	SVOC TIC	10	ug/L	DC WASA	
98	1	bromobutylrophenone	4981-64-0	SVOC TIC	10	ug/L	DC WASA	
99	1	CHLORACETANILIDE	539-03-7	SVOC TIC	10	ug/L	DC WASA	Assume misspelling of chloracetanilide
100	1	chloracetoxylene	2623-45-2	SVOC TIC	10	ug/L	DC WASA	
101	1	chloroacetophenone	532-27-4	SVOC TIC	10	ug/L	DC WASA	
102	1	CHLOROACETOTHIENONE	29683-77-0	SVOC TIC	10	ug/L	DC WASA	Assume 2-(2-chloroacetyl)thiophene
103	1	chlorochloracetanilide	3289-75-6	SVOC TIC	10	ug/L	DC WASA	
104	1	chloronitrobenzene	25167-93-5	SVOC TIC	10	ug/L	DC WASA	
105	1	CHLORPROPIO PHENONE	936-59-4	SVOC TIC	10	ug/L	DC WASA	Assume 3-Chloropropiophenone
106	1	DIANISIDINE	119-90-4	SVOC TIC	10	ug/L	DC WASA	
107	1	dibromoethyl selenide	41294-57-9	SVOC TIC	10	ug/L	DC WASA	
108	1	dibromoethyl sulfide	7617-64-3	SVOC TIC	10	ug/L	DC WASA	
109	1	dibromopropyl sulfide	98280-65-0	SVOC TIC	10	ug/L	DC WASA	
110	1	dichloroacetophenone	937-20-2	SVOC TIC	10	ug/L	DC WASA	
111	1	dichlorodimethyl dithioloxalate		SVOC TIC	10	ug/L	DC WASA	
112	1	DICHLOR-DIMETHYL ETHER	542-88-1	SVOC	10	ug/L	DC WASA	Syn: bis-chloromethyl ether
113	1	dichloroethyl selenide	4730-83-0	SVOC TIC	10	ug/L	DC WASA	

TABLE A-2 - COMPARISON VALUES
COMPREHENSIVE LIST for WATER SAMPLING

	A	B	C	D	E	F	G	H
1	COUNTER			WATER				
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD	COMPARISON VALUE[1]	UNITS	COMPARISON VALUE SOURCE	COMMENTS
114	1	dichloroethyl telluride dichloride	32157-00-9	SVOC TIC	10	ug/L	DC WASA	Tellurium analyzed as a degradation product.
115	1	dichlorovinyl selenide		SVOC TIC	10	ug/L	DC WASA	
116	1	diisothiocyanodimethylether	63918-92-3	SVOC TIC	10	ug/L	DC WASA	
117	1	DIMETHYLAMILINE	121-69-7	SVOC	10	ug/L	DC WASA	Assume misspelling of Dimethylaniline
118	1	dinitrobenzyl chloride	610-57-1	SVOC TIC	10	ug/L	DC WASA	
119	1	DINITROCHLORBENZENE	97-00-7	SVOC	10	ug/L	DC WASA	1 chloro 2,4 dinitrobenzene; may be synonym of Parazol
120	1	dinitrodichlorobenzene (parazol)	87453-79-0	SVOC TIC	10	ug/L	DC WASA	
121	1	DIPHENYL	92-52-4	SVOC	10	ug/L	DC WASA	
122	1	DIPHENYLAMINE	122-39-4	SVOC	10	ug/L	DC WASA	
123	1	ETHYLENE CHLOROHYDRIN	107-07-3	SVOC	10	ug/L	DC WASA	
124	1	FLUORSULFONIC ACID	7789-21-1	SVOC TIC	10	ug/L	DC WASA	Assume misspelling of fluorosulphonic acid
125	1	GLYCOL-BROMHYDRIN	540-51-2	SVOC	10	ug/L	DC WASA	Syn: ethylene bromohydrin
126	1	hexachloroethane (HC)	67-72-1	SVOC	93	ug/L	DC WASA	
127	1	hexachloroethyl sulfide	13905-38-9	SVOC TIC	10	ug/L	DC WASA	
128	1	HEXANITRODIPHENYLAMINE	131-73-7	SVOC TIC	10	ug/L	DC WASA	Syn: dipicrylamine
129	1	iodoacetophenone	4636-16-2	SVOC TIC	10	ug/L	DC WASA	
130	1	lead tetramethyl	75-74-1	SVOC TIC	10	ug/L	DC WASA	
131	1	methyl sulfate	75-93-4	SVOC TIC	10	ug/L	DC WASA	
132	1	methylnitrosourethane	615-53-2	SVOC TIC	10	ug/L	DC WASA	
133	1	NITRONAPTHALANCE	27254-36-0	SVOC TIC	10	ug/L	DC WASA	Assume misspelling of nitronaphthalenes
134	1	NITRONCEPTHALENES	86-57-7	SVOC TIC	10	ug/L	DC WASA	Assumed to be 1-nitronaphthalene (those values shown)
135	1	p-bromoacetophenone	99-90-1	SVOC TIC	10	ug/L	DC WASA	
136	1	p-bromochloroacetophenone	4209-02-3	SVOC TIC	10	ug/L	DC WASA	
137	1	PCHLOR CHLORACETOPHENONE	937-20-2	SVOC TIC	10	ug/L	DC WASA	
138	1	P-CHLORACETOPHENONE	99-91-2	SVOC	10	ug/L	DC WASA	This is 4-chloroacetophenone
139	1	P-CHLORBENZYLBRMIDE	622-95-7	SVOC TIC	10	ug/L	DC WASA	Assume misspelling of 4-chlorobenzyl bromide
140	1	P-CHLOR-CHLORACETANILIDE	3289-75-6	SVOC TIC	10	ug/L	DC WASA	
141	1	perchloromethyl carbonate	32315-10-9	SVOC TIC	10	ug/L	DC WASA	
142	1	perchloromethyl sulfide	60565-85-7	SVOC TIC	10	ug/L	DC WASA	
143	1	P-METHOXY-CHLORACETOPHENONE	2196-99-8	SVOC TIC	10	ug/L	DC WASA	
144	1	PORAZOL	6306-39-4	SVOC TIC	10	ug/L	DC WASA	Assume misspelling of parazol
145	1	SULPHONE DICHLOROMINE	80-08-0	SVOC TIC	10	ug/L	DC WASA	Assumed to be SULPHONE CHLORO AMINO (those values shown)
146	1	tetrachlorodinitroethane	67226-85-1	SVOC TIC	10	ug/L	DC WASA	
147	1	THIO CARBANILIDE	102-08-9	SVOC TIC	10	ug/L	DC WASA	
148	1	TOLIDINE	119-93-7	SVOC	10	ug/L	DC WASA	
149	1	TRINITRONAPTHALENE	55810-17-8	SVOC TIC	10	ug/L	DC WASA	Assume misspelling of trinitronaphthalene

TABLE A-2 - COMPARISON VALUES
COMPREHENSIVE LIST for WATER SAMPLING

	A	B	C	D	E	F	G	H
1	COUNTER			WATER				
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD	COMPARISON VALUE\1	UNITS	COMPARISON VALUE SOURCE	COMMENTS
150		**EXPLOSIVES**						
151	1	2-amino-4,6-dinitrotoluene (2-Am-DNT)*	35572-78-2	EXP 8330	73	ug/L	RBC\4	
152	1	4-amino-2,6-dinitrotoluene (4-Am-DNT)*	19406-51-0	EXP 8330	73	ug/L	RBC\4	
153	1	dinitrobenzene (1,3)*	99-65-0	EXP 8330	3.7	ug/L	RBC	
154	1	dinitrotoluene (2,4)*	121-14-2	EXP 8330	7,210	ug/L	DC WASA	
155	1	dinitrotoluene (2,6)*	606-20-2	EXP 8330	37	ug/L	RBC	
156	1	hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)*	121-82-4	EXP 8330	0.61	ug/L	RBC	
157	1	nitrobenzene	98-95-3	EXP 8330	9,410	ug/L	DC WASA	
158	1	nitroglycerin*	55-63-0	EXP 8330	3.7	ug/L	RBC	
159	1	nitrotoluene (m)*	99-08-1	EXP 8330	120	ug/L	RBC	
160	1	nitrotoluene (o)*	88-72-2	EXP 8330	61	ug/L	RBC	
161	1	nitrotoluene (p)*	99-99-0	EXP 8330	0.62	ug/L	RBC	
162	1	octahydro-1,3,5,7-tetranitro-1,3,5,7tetrazocine (HMX)*	2691-41-0	EXP 8330	1,800	ug/L	RBC	
163	1	tetryl*	479-45-8	EXP 8330	150	ug/L	RBC	
164	1	trinitrobenzene (1,3,5)*	99-35-4	EXP 8330	1,100	ug/L	RBC	
165	1	trinitrotoluene	118-96-7	EXP 8330	2.2	ug/L	RBC	
166								
167		**OTHER**						
168	1	ACETIC ACID	64-19-7	Titration	NA	mg/L	NA\2	
169	1	~~bromine~~ **bromide**	7726-95-6	IC	2.0	mg/L	NYSDEC	Analyze as bromide.
170	1	~~chlorine (Red Star, Bertholite)~~ **chloride**	7782-50-5	IC	250	mg/L	SDWR	Analyze as chloride.
171	1	CHLORACETIC ACID	79-11-8	IC (UT03)	73	ug/L	RBC	Assume misspelling of chloroacetic acid
172	1	ETHYL ALCOHOL	64-17-5	GC/FID	NA	mg/L	NA\2	Ethanol
173	1	IODINE	7553-56-2	IC	NA	ug/L	NA\2	
174	1	IODINE PENTAFLUORIDE	7783-66-6	IC	NA	mg/L	NA\2	
175	1	perchlorates*	14797-73-0	IC	26	ug/L	RBC	
176	1	PICRIC ACID	88-89-1	HPLC/UV	NA	ug/L	NA\2	Syn: trinitrophenol
177								
178	**165**	**TOTAL COMPOUNDS**						
179								

TABLE A-2 - COMPARISON VALUES
COMPREHENSIVE LIST for WATER SAMPLING

	A	B	C	D	E	F	G	H
1	COUNTER			WATER				
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD	COMPARISON VALUE[1]	UNITS	COMPARISON VALUE SOURCE	COMMENTS
180		* Not on any of the lists, but historically analyzed or has potential to be present.						
181		NA--Not Applicable or Not Available.						
182		RBC--USEPA Risk Based Concentration from **October 2006** tables, Tap water concentration, unless otherwise indicated.						
183		NYSDEC--New York Dept of Environmental Conservation.						
184		SDWR--Secondary Drinking Water Regulation.						
185		DMHSPE--Dutch Ministry of Housing, Spatial Planning and the Environment.						
186		FDWS--Field Drinking Water Standards (USACHPPM).						
187		[1]--Where available, comparison values are from the DC Water and Sewer Authority (DC WASA) permit limits. Otherwise, groundwater standards are shown.						
188		[2]--Not currently available. Detection of this compound would trigger discussion with stakeholders and possibly development of a surrogate comparison value.						
189		[3]--The DC WASA 10 ug/L standard is a default for non-routine VOCs and SVOCs. That is, **although 10 ug/L is shown for each compound, the summation of all detectable organics,**						
190		**unless a specific standard is shown, CANNOT exceed 10 ug/L.**						
191		[4]--RBC for aminodinitrotoluenes.						
192		ALL CAPS ARE COOK LIST COMPOUNDS (**46 TOTAL**).						
193		**GC/FID--**Gas Chromatography/Flame Ionization Detector						
194		**GC/MS--**Gas Chromatography/Mass Spectrometry						
195		**HPLC/UV--**High Performance Liq Chrom/UV Detector						
196		**IC--**Ion Chromatography						
197								
198								
199								
200								
201								
202								
203								
204								

TABLE A-3a - PARAMETERS
COMPREHENSIVE LIST for INTACT CONTAINER - SOLIDS

	A	B	C	D	F	G	I
1	COUNTER			INTACT CONTAINERS - SOLIDS			
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD		UNITS	COMMENTS
3		'ECBC ANALYSES'					
4	1	ricin	9009-86-3	Immuno-assay		NA	
5	1	2-chlorovinylarsenous acid/chlorovinylarsenic oxide (CVAA/CVAO) (Lewisite Breakdown Products)	3088-37-7 (CVAO)	CWM		ug/kg	Lewisite ABPs, not CWM, but listed as such for categorization ease.
6	1	mustard (crude, pure, distilled, gas forms)	505-60-2	CWM		ug/kg	
7	1	dithiane (1,4)*	505-29-3	GC/MS	N	ug/kg	Mustard ABP
8	1	oxathiane (1,4)*	15980-15-1	GC/MS	N	ug/kg	Mustard ABP
9	1	thiodiglycol	111-48-8	GC/MS	N	ug/kg	Mustard ABP
10							
11		METALS					
12	1	Adamsite (DM, phenarsazine chloride)	578-94-9	METAL		mg/kg	ONLY TOTAL ARSENIC WILL BE ANALYZED AS AN INDICATOR OF EACH OF THESE ORGANO-ARSENICALS.
13	1	ethylarsine	593-59-3	METAL		mg/kg	
14	1	ethyldichloroarsine (CY)	598-14-1	METAL		mg/kg	
15	1	methyldichloroarsine	593-89-5	METAL		mg/kg	
16	1	phenyldichloroarsine (MA)	696-28-6	METAL		mg/kg	
17	1	aluminium	7429-90-5	METAL	N	mg/kg	
18	1	antimony*	7440-36-0	METAL	N	mg/kg	
19	1	arsenic	7440-38-2	METAL		mg/kg	
20	1	barium*	7440-39-3	METAL	N	mg/kg	
21	1	beryllium*	7440-41-7	METAL	N	mg/kg	
22	1	cadmium*	7440-43-9	METAL	N	mg/kg	
23	1	chromium*	16065-83-1	METAL	N	mg/kg	
24	1	cobalt*	7440-48-4	METAL	N	mg/kg	
25	1	copper*	7440-50-8	METAL	N	mg/kg	
26	1	cyanide	57-12-5	IC/METAL	N	mg/kg	
27	1	lead*	7439-92-1	METAL		mg/kg	
28	1	manganese*	7439-96-5	METAL	N	mg/kg	
29	1	mercury*	7439-97-6	METAL		mg/kg	
30	1	mercury methyl	22967-92-6	METAL	N	mg/kg	ONLY TOTAL MERCURY WILL BE ANALYZED AS AN INDICATOR.
31	1	nickel*	7440-02-0	METAL	N	mg/kg	
32	1	selenium	7782-49-2	METAL	N	mg/kg	
33	1	silver*	7440-22-4	METAL	N	mg/kg	
34	1	strontium	7440-24-6	METAL	N	mg/kg	
35	1	tellurium*	13494-80-9	METAL		mg/kg	Added as potential degradation product of 2 compounds that were deleted.

TABLE A-3a - PARAMETERS
COMPREHENSIVE LIST for INTACT CONTAINER - SOLIDS

	A	B	C	D	F	G	I
1	COUNTER			INTACT CONTAINERS - SOLIDS			
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD		UNITS	COMMENTS
36	1	thallium	7440-28-0	METAL	N	mg/kg	
37	1	tin*	7440-31-5	METAL	N	mg/kg	
38	1	titanium*	7440-32-6	METAL	N	mg/kg	
39	1	vanadium*	7440-62-2	METAL	N	mg/kg	
40	1	zinc	7440-66-6	METAL	N	mg/kg	
41	1	ZIRCONIUM	7440-67-7	METAL		mg/kg	
42							
43		**VOCs + TICs**					
44	1	acetonitrile	75-05-8	VOC		ug/kg	
45	1	ACETYLENE	74-86-2	VOC TIC		ug/kg	
46	1	acrolein (papite)	107-02-8	VOC	N	ug/kg	
47	1	allyl alcohol	107-18-6	VOC TIC		ug/kg	
48	1	allyl fluoride	818-92-8	VOC TIC		ug/kg	
49	1	allyl isocyanate	1476-23-9	VOC TIC		ug/kg	
50	1	B-chloroethyl acetate	542-58-5	VOC TIC		ug/kg	
51	1	B-chloroethyl chloroformate	627-11-2	VOC TIC		ug/kg	
52	1	B-chloroethyl methyl sulphide	542-81-4	VOC TIC		ug/kg	
53	1	benzene	71-43-2	VOC		ug/kg	
54	1	benzoyl bromide	618-32-6	VOC TIC		ug/kg	
55	1	benzoyl chloride	98-88-4	VOC TIC		ug/kg	
56	1	benzoyl fluoride	455-32-3	VOC TIC		ug/kg	
57	1	benzyl bromide (cyclite, lachrymogene)	100-39-0	VOC		ug/kg	
58	1	benzyl chloride	100-44-7	VOC		ug/kg	
59	1	benzyl iodide (iodomethyl benzene)	620-05-3	VOC TIC		ug/kg	
60	1	BRAMACTONE	598-31-2	VOC TIC		ug/kg	Assume misspelling of bromoacetone
61	1	BROM ACETALDEHYDE	17157-48-1	VOC		ug/kg	Assume misspelling of bromoacetaldehyde
62	1	bromoacetone (bromo-2-propanone)	598-31-2	VOC TIC	N	ug/kg	
63	1	bromoacetonitrile	590-17-0	VOC TIC		ug/kg	
64	1	bromobenzene (phenyl bromide)	108-86-1	VOC TIC		ug/kg	
65	1	bromomethyl ether	4497-29-4	VOC TIC		ug/kg	
66	1	bromomethylethyl ketone	816-40-0	VOC TIC		ug/kg	
67	1	bromotoluene (benzyl bromide)	100-39-0	VOC TIC		ug/kg	
68	1	BUTANE	106-97-8	GC/FID VOC		ug/kg	
69	1	butyl fluoride	2366-52-1	VOC TIC		ug/kg	

TABLE A-3a - PARAMETERS
COMPREHENSIVE LIST for INTACT CONTAINER - SOLIDS

	A	B	C	D	F	G	I
1	COUNTER			INTACT CONTAINERS - SOLIDS			
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD		UNITS	COMMENTS
70	1	butyl mercaptan / 1-butanethiol	109-79-5	VOC TIC		ug/kg	
71	1	butylarsine (normal)	17753-29-6	VOC TIC		ug/kg	
72	1	carbon bisulfide (carbon disulfide)	75-15-0	VOC	N	ug/kg	
73	1	carbon tetrachloride	56-23-5	VOC		ug/kg	
74	1	carbonyl sulfide	463-58-1	VOC TIC		ug/kg	
75	1	chloracetoluene	4209-24-9	VOC TIC		ug/kg	
76	1	chloroacetone	78-95-5	VOC TIC	N	ug/kg	
77	1	chloroacetonitrile	107-14-2	VOC TIC		ug/kg	
78	1	chlorobenzene (chlorobenzol)	108-90-7	VOC	N	ug/kg	
79	1	chlorodiethyl sulfide	693-07-2	VOC		ug/kg	
80	1	CHLOR ETHYL ACETATE	76-03-9	VOC TIC		ug/kg	Assume misspelling of chloroethyl acetate
81	1	chloroform	67-66-3	VOC	N	ug/kg	
82	1	chloromethyl acetate	625-56-9	VOC TIC		ug/kg	
83	1	chloromethyl butyl ether	2351-69-1	VOC TIC		ug/kg	
84	1	chloromethyl chloroethyl ether	1462-33-5	VOC TIC		ug/kg	
85	1	chloromethyl dichloroethyl ether		VOC TIC		ug/kg	
86	1	chloromethyl ether	107-30-2	VOC TIC		ug/kg	
87	1	chloromethyl ethyl ether	3188-13-4	VOC TIC		ug/kg	
88	1	chloropicrin (PS, Aquinite)	76-06-2	VOC		ug/kg	
89	1	chlorotoluene	25168-05-2	VOC TIC		ug/kg	
90	1	crotonaldehyde	4170-30-3	VOC TIC		ug/kg	
91	1	dichlorodivinyl ether	72533-02-9	VOC TIC		ug/kg	
92	1	dichloroethyl ether/bis(2-chloroethyl)ether	111-44-4	VOC TIC		ug/kg	
93	1	dichloroethyl sulfide	505-60-2	VOC TIC		ug/kg	
94	1	dichloromethyl ether / bis(chloromethyl) ether	542-88-1	VOC TIC		ug/kg	
95	1	dichloromethyl sulfide	3592-44-7	VOC TIC		ug/kg	
96	1	dichloropropyl sulfide	22535-54-2	VOC TIC		ug/kg	
97	1	DIPHENYL ETHER	101-84-8	VOC		ug/kg	
98	1	dithioacetone	1687-47-4	VOC TIC		ug/kg	
99	1	ethyl bromoacetate (US)	105-36-2	VOC TIC	N	ug/kg	
100	1	ethyl chloroacetate	105-39-5	VOC TIC		ug/kg	
101	1	ethyl chloroformate	541-41-3	VOC TIC		ug/kg	
102	1	ethyl dibromoacetate	617-33-4	VOC TIC	N	ug/kg	
103	1	ethyl iodoacetate (SK, KSK)	623-48-3	VOC TIC		ug/kg	

TABLE A-3a - PARAMETERS
COMPREHENSIVE LIST for INTACT CONTAINER - SOLIDS

	A	B	C	D	F	G	I
1	COUNTER			INTACT CONTAINERS - SOLIDS			
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD		UNITS	COMMENTS
104	1	ethyl isocyanide	624-79-3	VOC TIC		ug/kg	
105	1	ethyl isothiocyanate	542-85-8	VOC TIC		ug/kg	
106	1	ethyl mercaptan	75-08-1	VOC TIC		ug/kg	
107	1	ethyl sulfide	352-93-2	VOC TIC		ug/kg	
108	1	ETHYLENE	74-85-1	VOC		ug/kg	
109	1	ethylene chloride	107-06-2	VOC		ug/kg	Synonym 1,2-DCE
110	1	ethylene thiocyanate	629-17-4	VOC TIC		ug/kg	
111	1	ethyleneimine (syn. aziridine)	151-56-4	VOC TIC		ug/kg	
112	1	fluorobenzene	462-06-6	VOC TIC		ug/kg	
113	1	flurormethyl ether	462-51-1	VOC TIC		ug/kg	
114	1	isoprene dibromide	18860-95-2	VOC TIC		ug/kg	
115	1	methyl bromoacetate	96-32-2	VOC TIC		ug/kg	
116	1	methyl chloroacetate	96-34-4	VOC TIC		ug/kg	
117	1	methyl chloroformate	79-22-1	VOC TIC		ug/kg	
118	1	methyl chlorosulfonate	812-01-1	VOC TIC		ug/kg	
119	1	METHYLETHYLETHER	540-67-0	VOC TIC		ug/kg	Syn: ethyl methyl ether
120	1	methyl isothiocyanate	556-61-6	VOC TIC		ug/kg	
121	1	methyl selenide	593-79-3	VOC TIC		ug/kg	
122	1	methyl telluride	593-80-6	VOC TIC		ug/kg	
123	1	methyldibromoarsine	676-70-0	VOC TIC		ug/kg	
124	1	methyldiethyoxyarsine	40515-06-8	VOC TIC		ug/kg	
125	1	methyldioxyarsine	25400-23-1	VOC TIC		ug/kg	
126	1	methylphosphine	593-54-4	VOC TIC		ug/kg	
127	1	methyltrithiocarbonate	2314-48-9	VOC TIC		ug/kg	
128	1	nitrobenzyl bromide	3958-60-9	VOC TIC		ug/kg	
129	1	nitrochloroacetanilide	17329-87-2	VOC TIC		ug/kg	
130	1	nitromethane	75-52-5	VOC TIC		ug/kg	
131	1	PERCHLORMETHYLCHLORFORMATE	503-38-8	VOC TIC		ug/kg	
132	1	perchloromethylmercaptan	409314-70-1	VOC TIC		ug/kg	
133	1	phosphine	7803-51-2	VOC TIC	N	ug/kg	
134	1	phosphorus sulfochloride	3982-91-0	VOC TIC		ug/kg	
135	1	p-nitrobenzyl cyanide	555-21-5	VOC TIC		ug/kg	Synonym p-nitrophenylacetonitrile
136	1	SULFUR DIOXIDE	7446-09-5	VOC TIC		ug/kg	
137	1	TETRACHLOROACETONE	632-21-3	VOC TIC		ug/kg	1,1,3,3-Tetrachloroacetone

TABLE A-3a - PARAMETERS
COMPREHENSIVE LIST for INTACT CONTAINER - SOLIDS

	A	B	C	D	F	G	I
1	COUNTER			INTACT CONTAINERS - SOLIDS			
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD		UNITS	COMMENTS
138	1	tetrachloroethyl ether	7166-44-1	VOC TIC		ug/kg	
139	1	thionyl fluoride	7783-42-8	VOC TIC		ug/kg	
140	1	thiophene	110-02-1	VOC TIC		ug/kg	
141	1	thiophosgene (TP)	463-71-8	VOC TIC		ug/kg	
142	1	toluene	108-88-3	VOC	N	ug/kg	
143	1	tribromochloroacetone	76841-88-8	VOC TIC		ug/kg	
144	1	TRIBROMMONOCHLORACETONE	34718-47-3	VOC TIC		ug/kg	
145	1	trichloroacetone	918-00-3	VOC TIC		ug/kg	
146	1	trichloroacetonitrile	545-06-2	VOC TIC		ug/kg	
147	1	trichlorohydrin	96-18-4	VOC TIC		ug/kg	Synonym 1,2,3-Trichloropropoane
148	1	trichloronitroethylene	4607-81-2	VOC TIC		ug/kg	
149	1	TRIMETHYLAMINE	75-50-3	VOC TIC		ug/kg	
150	1	xylene	1330-20-7	VOC	N	ug/kg	
151		**SVOCs + TICs**					
152	1	ACETOPHENONE	98-86-2	SVOC		ug/kg	
153	1	ACETYL SULFOCYANATE	542-90-5	SVOC TIC		ug/kg	Assumed to be Ethyl sulfocyanate (those values shown)
154	1	BENZAL CHLORIDE	98-87-3	SVOC		ug/kg	Syn: dichloromethyl benzene
155	1	benzoic acid	65-85-0	SVOC	N	ug/kg	
156	1	benzotrichloride	98-07-7	SVOC TIC		ug/kg	
157	1	benzoyl thiocynate		SVOC TIC		ug/kg	
158	1	benzyl fluoride	350-50-5	SVOC TIC		ug/kg	
159	1	BROMACETAMIDE	683-57-8	SVOC TIC		ug/kg	Assume misspelling of bromoacetamide
160	1	BROMACETOPHENONE	70-11-1	SVOC		ug/kg	Assume misspelling of BROMOACETOPHENONE
161	1	bromobenzyl cyanide (bromobenzylnitrile, CA, Camite)	5798-79-8	SVOC TIC		ug/kg	
162	1	bromobutylrophenone	4981-64-0	SVOC TIC		ug/kg	
163	1	BROMCHLORACETOPHENONE	536-38-9	SVOC		ug/kg	Assume 2-Bromo-4'-chloroacetophenone
164	1	BROMDIMETHYL ETHER	13057-17-5	SVOC		ug/kg	
165	1	BROMXYLENE	89-92-9	SVOC TIC		ug/kg	Assume misspelling of bromoxylene
166	1	CHLORACETANILIDE	539-03-7	SVOC TIC		ug/kg	Assume misspelling of chloracetanilide
167	1	chloracetoxylene	2623-45-2	SVOC TIC		ug/kg	
168	1	chloroacetophenone	532-27-4	SVOC TIC		ug/kg	
169	1	chlorochloracetanilide	3289-75-6	SVOC TIC		ug/kg	
170	1	CHLORMETHYLETHYLSULFIDE	1708-73-2	SVOC TIC		ug/kg	
171	1	CHLOROACETOTHIENONE	29683-77-0	SVOC TIC		ug/kg	Assume 2-(2-chloroacetyl)thiophene

TABLE A-3a - PARAMETERS
COMPREHENSIVE LIST for INTACT CONTAINER - SOLIDS

	A	B	C	D	F	G	I
1	COUNTER			INTACT CONTAINERS - SOLIDS			
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD		UNITS	COMMENTS
172	1	chloronitrobenzene	25167-93-5	SVOC TIC		ug/kg	
173	1	CHLORPROPIO PHENONE	936-59-4	SVOC TIC		ug/kg	Assume 3-Chloropropiophenone
174	1	DIANISIDINE	119-90-4	SVOC TIC		ug/kg	
175	1	dibromoethyl selenide	41294-57-9	SVOC TIC		ug/kg	
176	1	dibromoethyl sulfide	7617-64-3	SVOC TIC		ug/kg	
177	1	dibromopropyl sulfide	98280-65-0	SVOC TIC		ug/kg	
178	1	dichloroacetophenone	937-20-2	SVOC TIC		ug/kg	
179	1	dichlorobenzyl bromide	18880-04-1	SVOC TIC		ug/kg	
180	1	dichlorodimethyl dithioloxalate		SVOC TIC		ug/kg	
181	1	DICHLOR-DIMETHYL ETHER	542-88-1	SVOC		ug/kg	Syn: bis-chloromethyl ether
182	1	dichloroethyl chloroformate		SVOC TIC		ug/kg	
183	1	dichloroethyl disulfide	1002-41-1	SVOC TIC		ug/kg	
184	1	dichloroethyl selenide	4730-83-0	SVOC TIC		ug/kg	
185	1	dichloroethyl telluride dichloride	32157-00-9	SVOC TIC		ug/kg	Tellurium analyzed as a degradation product.
186	1	dichlorovinyl selenide		SVOC TIC		ug/kg	
187	1	DIISOAMYLAMINE	544-00-3	SVOC TIC		ug/kg	
188	1	diisothiocyanodimethylether	63918-92-3	SVOC TIC		ug/kg	
189	1	DIMETHYLAMILINE	121-69-7	SVOC		ug/kg	Assume misspelling of Dimethylaniline
190	1	dinitrobenzyl chloride	610-57-1	SVOC TIC		ug/kg	
191	1	DINITROCHLORBENZENE	97-00-7	SVOC		ug/kg	1 chloro 2,4 dinitrobenzene; may be synonym of Parazol
192	1	dinitrodichlorobenzene (parazol)	87453-79-0	SVOC TIC		ug/kg	
193	1	DIPHENYL	92-52-4	SVOC		ug/kg	
194	1	DIPHENYLAMINE	122-39-4	SVOC		ug/kg	
195	1	ethyl chlorosulfonate	625-01-4	SVOC TIC		ug/kg	
196	1	ETHYL CHLORSULPHONIC ACID	625-01-4	SVOC TIC		ug/kg	Assume misspelling of ethyl chlorosulphonic acid
197	1	ethyl fluorosulfonate	371-69-7	SVOC TIC		ug/kg	
198	1	ethyl isocyanoformate		SVOC TIC		ug/kg	
199	1	ethyl trichloroacetate	515-84-4	SVOC TIC		ug/kg	
200	1	ETHYLENE CHLOROHYDRIN	107-07-3	SVOC		ug/kg	
201	1	FLUORSULFONIC ACID	7789-21-1	SVOC TIC		ug/kg	Assume misspelling of fluorosulphonic acid
202	1	GLYCOL-BROMHYDRIN	540-51-2	SVOC		ug/kg	Syn: ethylene bromohydrin
203	1	hexachloroethane (HC)	67-72-1	SVOC		ug/kg	
204	1	hexachloroethyl sulfide	13905-38-9	SVOC TIC		ug/kg	
205	1	HEAMETHYLENE TETRAMINE	100-97-0	SVOC TIC		ug/kg	Assume misspelling of hexamethylene tetramine
206	1	HEXANITRODIPHENYLAMINE	131-73-7	SVOC TIC		ug/kg	Syn: dipicrylamine

TABLE A-3a - PARAMETERS
COMPREHENSIVE LIST for INTACT CONTAINER - SOLIDS

	A	B	C	D	F	G	I
1	COUNTER			INTACT CONTAINERS - SOLIDS			
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD		UNITS	COMMENTS
207	1	iodoacetophenone	4636-16-2	SVOC TIC		ug/kg	
208	1	isothiocyanodimethylether	19900-84-6	SVOC TIC		ug/kg	
209	1	isothiocyanomethyl ethyl ether	59565-12-7	SVOC TIC		ug/kg	
210	1	isothiocyanomethyl isothiocyanoethyl ether		SVOC TIC		ug/kg	
211	1	ISOTHIO METHYL ETHYL ETHER	6427-21-0	SVOC TIC		ug/kg	
212	1	lead tetraethyl	78-00-2	SVOC TIC	N	ug/kg	
213	1	lead tetramethyl	75-74-1	SVOC TIC	N	ug/kg	
214	1	methyl sulfate	75-93-4	SVOC TIC		ug/kg	
215	1	methylnitrosourethane	615-53-2	SVOC TIC		ug/kg	
216	1	MONOCHLORETHYLMETHYLSULFIDE	542-81-4	SVOC TIC		ug/kg	
217	1	MONOCHLORETHYLSULFIDE	693-07-2	SVOC TIC		ug/kg	Syn: 2-chloroethylsulfide
218	1	MONOCHLORMETHYL SULFIDE	2373-51-5	SVOC TIC		ug/kg	
219	1	NITRONAPTHALANCE	27254-36-0	SVOC TIC		ug/kg	Assume misspelling of nitronaphthalenes
220	1	NITRONCEPTHALENES	86-57-7	SVOC TIC		ug/kg	Assumed to be 1-nitronaphthalene (those values shown)
221	1	NITROXYLENE	25168-04-1	SVOC TIC		ug/kg	
222	1	octochloroethyl sulfide	13905-39-0	SVOC TIC		ug/kg	
223	1	ORTHONITROCHLORBENZOL	88-73-3	SVOC TIC		ug/kg	Syn: O-nitrochlorobenzene
224	1	p-bromoacetophenone	99-90-1	SVOC TIC		ug/kg	
225	1	p-bromochloroacetophenone	4209-02-3	SVOC TIC		ug/kg	
226	1	PCHLOR CHLORACETOPHENONE	937-20-2	SVOC TIC		ug/kg	
227	1	P-CHLORACETOPHENONE	99-91-2	SVOC		ug/kg	This is 4-chloroacetophenone
228	1	P-CHLORBENZYLBRMIDE	622-95-7	SVOC TIC		ug/kg	Assume misspelling of 4-chlorobenzyl bromide
229	1	P-CHLOR-CHLORACETANILIDE	3289-75-6	SVOC TIC		ug/kg	
230	1	P-METHOXY-CHLORACETOPHENONE	2196-99-8	SVOC TIC		ug/kg	
231	1	perchloromethyl carbonate	32315-10-9	SVOC TIC		ug/kg	
232	1	perchloromethyl sulfide	60565-85-7	SVOC TIC		ug/kg	
233	1	phenyl chloroacetate	620-73-5	SVOC TIC		ug/kg	
234	1	phenyl isocyanate	103-71-9	SVOC		ug/kg	
235	1	phenyl isocyanide	931-54-5	SVOC TIC		ug/kg	
236	1	phenyl isothiocyanate	103-72-0	SVOC		ug/kg	
237	1	PORANITROCHLORBENZOL	100-00-5	SVOC TIC		ug/kg	Assume misspelling of paranitrochlorobenzol (syn; paranitrochlorobenzene)
238	1	PORAZOL	6306-39-4	SVOC TIC		ug/kg	Assume misspelling of parazol (dinitrodichlorobenzene)
239	1	SULPHONE DICHLOROMINE	80-08-0	SVOC TIC		ug/kg	Assumed to be SULPHONE CHLORO AMINO (those values shown)
240	1	tetrachlorodinitrobenzene	20098-38-8	SVOC TIC		ug/kg	
241	1	tetrachlorodinitroethane	67226-85-1	SVOC TIC		ug/kg	

TABLE A-3a - PARAMETERS
COMPREHENSIVE LIST for INTACT CONTAINER - SOLIDS

	A	B	C	D	F	G	I
1	COUNTER			INTACT CONTAINERS - SOLIDS			
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD		UNITS	COMMENTS
242	1	THIO CARBANILIDE	102-08-9	SVOC TIC		ug/kg	
243	1	THIOPHOSPHORYLCHLORIDE	3982-91-0	SVOC TIC		ug/kg	
244	1	TOLIDINE	119-93-7	SVOC		ug/kg	
245	1	TRINITRONAPTHALENE	55810-17-8	SVOC TIC		ug/kg	Assume misspelling of trinitronaphthalene
246	1	triphenylarsine	603-32-7	SVOC TIC		ug/kg	
247		**EXPLOSIVES**					
248	1	2-amino-4,6-dinitrotoluene (2-Am-DNT)*	35572-78-2	EXP 8330	N	ug/kg	
249	1	4-amino-2,6-dinitrotoluene (4-Am-DNT)*	19406-51-0	EXP 8330	N	ug/kg	
250	1	dinitrobenzene (1,3)*	99-65-0	EXP 8330	N	ug/kg	
251	1	dinitrotoluene (2,4)*	121-14-2	EXP 8330	N	ug/kg	
252	1	dinitrotoluene (2,6)*	606-20-2	EXP 8330	N	ug/kg	
253	1	hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)*	121-82-4	EXP 8330		ug/kg	
254	1	nitrobenzene	98-95-3	EXP 8330	N	ug/kg	
255	1	nitroglycerin*	55-63-0	EXP 8330		ug/kg	
256	1	nitrotoluene (m)*	99-08-1	EXP 8330	N	ug/kg	
257	1	nitrotoluene (o)*	88-72-2	EXP 8330		ug/kg	
258	1	nitrotoluene (p)*	99-99-0	EXP 8330		ug/kg	
259	1	octahydro-1,3,5,7-tetranitro-1,3,5,7tetrazocine (HMX)*	2691-41-0	EXP 8330	N	ug/kg	
260	1	tetryl*	479-45-8	EXP 8330	N	ug/kg	
261	1	trinitrobenzene (1,3,5)*	99-35-4	EXP 8330	N	ug/kg	
262	1	trinitrotoluene	118-96-7	EXP 8330		ug/kg	
263							
264		**OTHER**					
265	1	ACETIC ACID	64-19-7	WC		ug/kg	WC by titration
266	1	CHLORACETIC ACID	79-11-8	IC (UT03)		ug/kg	Assume misspelling of chloroacetic acid
267	1	ETHYL ALCOHOL	64-17-5	GC/FID		ug/kg	Ethanol
268	1	FLUORIDE	16984-48-8	IC (300.0)		ug/kg	
269	1	HYDROGEN SULFIDE	7783-06-4	WC		ug/kg	
270	1	IODINE	7553-56-2	IC		ug/kg	
271	1	IODINE PENTAFLUORIDE	7783-66-6	IC		ug/kg	
272	1	perchlorates*	14797-73-0	IC		ug/kg	Army approval process for sampling involved.
273	1	PICRIC ACID	88-89-1	HPLC/UV		ug/kg	Syn: trinitrophenol
274							
275	**262**	**TOTAL COMPOUNDS**					
276							
277		* Not on any of the lists, but historically analyzed or has potential to be present.					
278		NA--Not Applicable or Not Available.					
279		N--Non-carcinogen.					
280		ALL CAPS ARE COOK LIST COMPOUNDS (67 **TOTAL**).					

TABLE A-3b - PARAMETERS
COMPREHENSIVE LIST for INTACT CONTAINER - LIQUIDS

	A	B	C	D	F	G	I
1	COUNTER			INTACT CONTAINERS - LIQUIDS			
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD		UNITS	COMMENTS
3		**'ECBC ANALYSES'**					
4	1	ricin	9009-86-3	Immuno-assay		NA	
5	1	2-chlorovinylarsenous acid/chlorovinylarsenic oxide (CVAA/CVAO) (Lewisite Breakdown Products)	3088-37-7 (CVAO)	CWM		ug/L	Lewisite ABPs, not CWM, but listed as such for categorization ease.
6	1	mustard (crude, pure, distilled, gas forms)	505-60-2	CWM		ug/L	
7	1	dithiane (1,4)*	505-29-3	GC/MS	N	ug/L	Mustard ABP
8	1	oxathiane (1,4)*	15980-15-1	GC/MS		ug/L	Mustard ABP
9	1	thiodiglycol	111-48-8	GC/MS		ug/L	Mustard ABP
10							
11		**METALS**					
12	1	Adamsite (DM, phenarsazine chloride)	578-94-9	METAL		ug/L	**ONLY TOTAL ARSENIC WILL BE ANALYZED AS AN INDICATOR OF EACH OF THESE ORGANO-ARSENICALS.**
13	1	ethylarsine	593-59-3	METAL		ug/L	
14	1	ethyldichloroarsine (CY)	598-14-1	METAL		ug/L	
15	1	methyldichloroarsine	593-89-5	METAL		ug/L	
16	1	phenyldichloroarsine (MA)	696-28-6	METAL		ug/L	
17	1	aluminium	7429-90-5	METAL	N	ug/L	
18	1	antimony*	7440-36-0	METAL		ug/L	
19	1	arsenic	7440-38-2	METAL		ug/L	
20	1	barium*	7440-39-3	METAL		ug/L	
21	1	beryllium*	7440-41-7	METAL	N	ug/L	
22	1	cadmium*	7440-43-9	METAL		ug/L	
23	1	chromium*	16065-83-1	METAL	N	ug/L	
24	1	cobalt*	7440-48-4	METAL	N	ug/L	
25	1	copper*	7440-50-8	METAL		ug/L	
26	1	cyanide	57-12-5	IC/METAL		ug/L	
27	1	lead*	7439-92-1	METAL		ug/L	
28	1	manganese*	7439-96-5	METAL	N	ug/L	
29	1	mercury*	7439-97-6	METAL		ug/L	
30	1	mercury methyl	22967-92-6	METAL	N	ug/L	**ONLY TOTAL MERCURY WILL BE ANALYZED AS AN INDICATOR**
31	1	nickel*	7440-02-0	METAL	N	ug/L	
32	1	selenium	7782-49-2	METAL		ug/L	
33	1	silver*	7440-22-4	METAL		ug/L	
34	1	strontium	7440-24-6	METAL	N	ug/L	
35	1	tellurium*	13494-80-9	METAL		ug/L	Added as potential degradation product of 2 compounds that were deleted.

TABLE A-3b - PARAMETERS
COMPREHENSIVE LIST for INTACT CONTAINER - LIQUIDS

	A	B	C	D	F	G	I
1	COUNTER			INTACT CONTAINERS - LIQUIDS			
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD		UNITS	COMMENTS
36	1	thallium	7440-28-0	METAL		ug/L	
37	1	tin*	7440-31-5	METAL	N	ug/L	
38	1	titanium*	7440-32-6	METAL	N	ug/L	
39	1	vanadium*	7440-62-2	METAL	N	ug/L	
40	1	zinc	7440-66-6	METAL		ug/L	
41	1	ZIRCONIUM	7440-67-7	Metals		ug/L	
42							
43		**VOCs + TICs**					
44	1	acetonitrile	75-05-8	VOC	N	ug/L	
45	1	ACETYLENE	74-86-2	VOC TIC		ug/L	
46	1	acrolein (papite)	107-02-8	VOC	N	ug/L	
47	1	allyl alcohol	107-18-6	VOC TIC		ug/L	
48	1	allyl fluoride	818-92-8	VOC TIC		ug/L	
49	1	allyl isocyanate	1476-23-9	VOC TIC		ug/L	
50	1	B-chloroethyl acetate	542-58-5	VOC TIC		ug/L	
51	1	B-chloroethyl chloroformate	627-11-2	VOC TIC		ug/L	
52	1	B-chloroethyl methyl sulphide	542-81-4	VOC TIC		ug/L	
53	1	benzene	71-43-2	VOC		ug/L	
54	1	benzoyl bromide	618-32-6	VOC TIC		ug/L	
55	1	benzoyl chloride	98-88-4	VOC TIC		ug/L	
56	1	benzoyl fluoride	455-32-3	VOC TIC		ug/L	
57	1	benzyl bromide (cyclite, lachrymogene)	100-39-0	VOC		ug/L	
58	1	benzyl chloride	100-44-7	VOC		ug/L	
59	1	benzyl iodide (iodomethyl benzene)	620-05-3	VOC TIC		ug/L	
60	1	BRAMACTONE	598-31-2	VOC TIC		ug/L	Assume misspelling of bromoacetone
61	1	BROM ACETALDEHYDE	17157-48-1	VOC		ug/L	Assume misspelling of bromoacetaldehyde
62	1	bromoacetone (bromo-2-propanone)	598-31-2	VOC TIC	N	ug/L	
63	1	bromoacetonitrile	590-17-0	VOC TIC		ug/L	
64	1	bromobenzene (phenyl bromide)	108-86-1	VOC TIC		ug/L	
65	1	bromomethyl ether	4497-29-4	VOC TIC		ug/L	
66	1	bromomethylethyl ketone	816-40-0	VOC TIC		ug/L	
67	1	bromotoluene (benzyl bromide)	100-39-0	VOC TIC		ug/L	
68	1	BUTANE	106-97-8	GC/FID VOC		ug/L	
69	1	butyl fluoride	2366-52-1	VOC TIC		ug/L	

TABLE A-3b - PARAMETERS
COMPREHENSIVE LIST for INTACT CONTAINER - LIQUIDS

	A	B	C	D	F	G	I
1	COUNTER			INTACT CONTAINERS - LIQUIDS			
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD		UNITS	COMMENTS
70	1	butyl mercaptan / 1-butanethiol	109-79-5	VOC TIC		ug/L	
71	1	butylarsine (normal)	17753-29-6	VOC TIC		ug/L	
72	1	carbon bisulfide (carbon disulfide)	75-15-0	VOC	N	ug/L	
73	1	carbon tetrachloride	56-23-5	VOC		ug/L	
74	1	carbonyl sulfide	463-58-1	VOC TIC		ug/L	
75	1	chloracetoluene	4209-24-9	VOC TIC		ug/L	
76	1	chloroacetone	78-95-5	VOC TIC	N	ug/L	
77	1	chloroacetonitrile	107-14-2	VOC TIC		ug/L	
78	1	chlorobenzene (chlorobenzol)	108-90-7	VOC		ug/L	
79	1	chlorodiethyl sulfide	693-07-2	VOC		ug/L	
80	1	CHLOR ETHYL ACETATE	76-03-9	VOC TIC		ug/L	Assume misspelling of chloroethyl acetate
81	1	chloroform	67-66-3	VOC		ug/L	
82	1	chloromethyl acetate	625-56-9	VOC TIC		ug/L	
83	1	chloromethyl butyl ether	2351-69-1	VOC TIC		ug/L	
84	1	chloromethyl chloroethyl ether	1462-33-5	VOC TIC		ug/L	
85	1	chloromethyl dichloroethyl ether		VOC TIC		ug/L	
86	1	chloromethyl ether	107-30-2	VOC TIC		ug/L	
87	1	chloromethyl ethyl ether	3188-13-4	VOC TIC		ug/L	
88	1	chloropicrin (PS, Aquinite)	76-06-2	VOC		ug/L	
89	1	chlorotoluene	25168-05-2	VOC TIC		ug/L	
90	1	crotonaldehyde	4170-30-3	VOC TIC		ug/L	
91	1	dichlorodivinyl ether	72533-02-9	VOC TIC		ug/L	
92	1	dichloroethyl ether/bis(2-chloroethyl)ether	111-44-4	VOC TIC		ug/L	
93	1	dichloroethyl sulfide	505-60-2	VOC TIC		ug/L	
94	1	dichloromethyl ether / bis(chloromethyl) ether	542-88-1	VOC TIC		ug/L	
95	1	dichloromethyl sulfide	3592-44-7	VOC TIC		ug/L	
96	1	dichloropropyl sulfide	22535-54-2	VOC TIC		ug/L	
97	1	DIPHENYL ETHER	101-84-8	VOC		ug/L	
98	1	dithioacetone	1687-47-4	VOC TIC		ug/L	
99	1	ethyl bromoacetate (US)	105-36-2	VOC TIC	N	ug/L	
100	1	ethyl chloroacetate	105-39-5	VOC TIC		ug/L	
101	1	ethyl chloroformate	541-41-3	VOC TIC		ug/L	
102	1	ethyl dibromoacetate	617-33-4	VOC TIC	N	ug/L	
103	1	ethyl iodoacetate (SK, KSK)	623-48-3	VOC TIC		ug/L	

TABLE A-3b - PARAMETERS
COMPREHENSIVE LIST for INTACT CONTAINER - LIQUIDS

	A	B	C	D	F	G	I
1	COUNTER			INTACT CONTAINERS - LIQUIDS			
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD		UNITS	COMMENTS
104	1	ethyl isocyanide	624-79-3	VOC TIC		ug/L	
105	1	ethyl isothiocyanate	542-85-8	VOC TIC		ug/L	
106	1	ethyl mercaptan	75-08-1	VOC TIC		ug/L	
107	1	ethyl sulfide	352-93-2	VOC TIC		ug/L	
108	1	ETHYLENE	74-85-1	VOC		ug/L	
109	1	ethylene chloride	107-06-2	VOC		ug/L	Synonym 1,2-DCE
110	1	ethylene thiocyanate	629-17-4	VOC TIC		ug/L	
111	1	ethyleneimine (syn. aziridine)	151-56-4	VOC TIC		ug/L	
112	1	fluorobenzene	462-06-6	VOC TIC		ug/L	
113	1	flurormethyl ether	462-51-1	VOC TIC		ug/L	
114	1	isoprene dibromide	18860-95-2	VOC TIC		ug/L	
115	1	methyl bromoacetate	96-32-2	VOC TIC		ug/L	
116	1	methyl chloroacetate	96-34-4	VOC TIC		ug/L	
117	1	methyl chloroformate	79-22-1	VOC TIC		ug/L	
118	1	methyl chlorosulfonate	812-01-1	VOC TIC		ug/L	
119	1	METHYLETHYLETHER	540-67-0	VOC TIC		ug/L	Syn: ethyl methyl ether
120	1	methyl isothiocyanate	556-61-6	VOC TIC		ug/L	
121	1	methyl selenide	593-79-3	VOC TIC		ug/L	
122	1	methyl telluride	593-80-6	VOC TIC		ug/L	
123	1	methyldibromoarsine	676-70-0	VOC TIC		ug/L	
124	1	methyldiethyoxyarsine	40515-06-8	VOC TIC		ug/L	
125	1	methyldioxyarsine	25400-23-1	VOC TIC		ug/L	
126	1	methylphosphine	593-54-4	VOC TIC		ug/L	
127	1	methyltrithiocarbonate	2314-48-9	VOC TIC		ug/L	
128	1	nitrobenzyl bromide	3958-60-9	VOC TIC		ug/L	
129	1	nitrochloroacetanilide	17329-87-2	VOC TIC		ug/L	
130	1	nitromethane	75-52-5	VOC TIC		ug/L	
131	1	PERCHLORMETHYLCHLORFORMATE	503-38-8	VOC TIC		ug/L	
132	1	perchloromethylmercaptan	409314-70-1	VOC TIC		ug/L	
133	1	phosphine	7803-51-2	VOC TIC	N	ug/L	
134	1	phosphorus sulfochloride	3982-91-0	VOC TIC		ug/L	
135	1	p-nitrobenzyl cyanide	555-21-5	VOC TIC		ug/L	Synonym p-nitrophenylacetonitrile
136	1	SULFUR DIOXIDE	7446-09-5	VOC TIC		ug/L	
137	1	TETRACHLOROACETONE	632-21-3	VOC TIC		ug/L	1,1,3,3-Tetrachloroacetone

TABLE A-3b - PARAMETERS
COMPREHENSIVE LIST for INTACT CONTAINER - LIQUIDS

	A	B	C	D	F	G	I
1	COUNTER			INTACT CONTAINERS - LIQUIDS			
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD		UNITS	COMMENTS
138	1	tetrachloroethyl ether	7166-44-1	VOC TIC		ug/L	
139	1	thionyl fluoride	7783-42-8	VOC TIC		ug/L	
140	1	thiophene	110-02-1	VOC TIC		ug/L	
141	1	thiophosgene (TP)	463-71-8	VOC TIC		ug/L	
142	1	toluene	108-88-3	VOC		ug/L	
143	1	tribromochloroacetone	76841-88-8	VOC TIC		ug/L	
144	1	TRIBROMMONOCHLORACETONE	34718-47-3	VOC TIC		ug/L	
145	1	trichloroacetone	918-00-3	VOC TIC		ug/L	
146	1	trichloroacetonitrile	545-06-2	VOC TIC		ug/L	
147	1	trichlorohydrin	96-18-4	VOC TIC		ug/L	Synonym 1,2,3-Trichloropropoane
148	1	trichloronitroethylene	4607-81-2	VOC TIC		ug/L	
149	1	TRIMETHYLAMINE	75-50-3	VOC TIC		ug/L	
150	1	xylene	1330-20-7	VOC		ug/L	
151		**SVOCs + TICs**					
152	1	ACETOPHENONE	98-86-2	SVOC		ug/L	
153	1	ACETYL SULFOCYANATE	542-90-5	SVOC TIC		ug/L	Assumed to be Ethyl sulfocyanate (those values shown)
154	1	BENZAL CHLORIDE	98-87-3	SVOC		ug/L	Syn: dichloromethyl benzene
155	1	benzoic acid	65-85-0	SVOC	N	ug/L	
156	1	benzotrichloride	98-07-7	SVOC TIC		ug/L	
157	1	benzoyl thiocynate		SVOC TIC		ug/L	
158	1	benzyl fluoride	350-50-5	SVOC TIC		ug/L	
159	1	BROMACETAMIDE	683-57-8	SVOC TIC		ug/L	Assume misspelling of bromoacetamide
160	1	BROMACETOPHENONE	70-11-1	SVOC		ug/L	Assume misspelling of bromomacetophenone
161	1	bromobenzyl cyanide (bromobenzylnitrile, CA, Camite)	5798-79-8	SVOC TIC		ug/L	
162	1	bromobutylrophenone	4981-64-0	SVOC TIC		ug/L	
163	1	BROMCHLORACETOPHENONE	536-38-9	SVOC		ug/L	Assume 2-Bromo-4'-chloroacetophenone
164	1	BROMDIMETHYL ETHER	13057-17-5	SVOC		ug/L	
165	1	BROMXYLENE	89-92-9	SVOC TIC		ug/L	Assume misspelling of bromoxylene
166	1	CHLORACETANILIDE	539-03-7	SVOC TIC		ug/L	Assume misspelling of chloracetanilide
167	1	chloracetoxylene	2623-45-2	SVOC TIC		ug/L	
168	1	chloroacetophenone	532-27-4	SVOC TIC		ug/L	
169	1	chlorochloracetanilide	3289-75-6	SVOC TIC		ug/L	
170	1	CHLORMETHYLETHYLSULFIDE	1708-73-2	SVOC TIC		ug/L	
171	1	CHLOROACETOTHIENONE	29683-77-0	SVOC TIC		ug/L	Assume 2-(2-chloroacetyl)thiophene

TABLE A-3b - PARAMETERS
COMPREHENSIVE LIST for INTACT CONTAINER - LIQUIDS

	A	B	C	D	F	G	I
1	COUNTER			INTACT CONTAINERS - LIQUIDS			
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD		UNITS	COMMENTS
172	1	chloronitrobenzene	25167-93-5	SVOC TIC		ug/L	
173	1	CHLORPROPIO PHENONE	936-59-4	SVOC TIC		ug/L	Assume 3-Chloropropiophenone
174	1	DIANISIDINE	119-90-4	SVOC TIC		ug/L	
175	1	dibromoethyl selenide	41294-57-9	SVOC TIC		ug/L	
176	1	dibromoethyl sulfide	7617-64-3	SVOC TIC		ug/L	
177	1	dibromopropyl sulfide	98280-65-0	SVOC TIC		ug/L	
178	1	dichloroacetophenone	937-20-2	SVOC TIC		ug/L	
179	1	dichlorobenzyl bromide	18880-04-1	SVOC TIC		ug/L	
180	1	dichlorodimethyl dithioloxalate		SVOC TIC		ug/L	
181	1	DICHLOR-DIMETHYL ETHER	542-88-1	SVOC		ug/L	Syn: bis-chloromethyl ether
182	1	dichloroethyl chloroformate		SVOC TIC		ug/L	
183	1	dichloroethyl disulfide	1002-41-1	SVOC TIC		ug/L	
184	1	dichloroethyl selenide	4730-83-0	SVOC TIC		ug/L	
185	1	dichloroethyl telluride dichloride	32157-00-9	SVOC TIC		ug/L	Tellurium analyzed as a degradation product.
186	1	dichlorovinyl selenide		SVOC TIC		ug/L	
187	1	DIISOAMYLAMINE	544-00-3	SVOC TIC		ug/L	
188	1	diisothiocyanodimethylether	63918-92-3	SVOC TIC		ug/L	
189	1	DIMETHYLAMILINE	121-69-7	SVOC		ug/L	Assume misspelling of Dimethylaniline
190	1	dinitrobenzyl chloride	610-57-1	SVOC TIC		ug/L	
191	1	DINITROCHLORBENZENE	97-00-7	SVOC		ug/L	1 chloro 2,4 dinitrobenzene; may be synonym of Parazol
192	1	dinitrodichlorobenzene (parazol)	87453-79-0	SVOC TIC		ug/L	
193	1	DIPHENYL	92-52-4	SVOC		ug/L	
194	1	DIPHENYLAMINE	122-39-4	SVOC		ug/L	
195	1	ethyl chlorosulfonate	625-01-4	SVOC TIC		ug/L	
196	1	ETHYL CHLORSULPHONIC ACID	625-01-4	SVOC TIC		ug/L	Assume misspelling of ethyl chlorosulphonic acid
197	1	ethyl fluorosulfonate	371-69-7	SVOC TIC		ug/L	
198	1	ethyl isocyanoformate		SVOC TIC		ug/L	
199	1	ethyl trichloroacetate	515-84-4	SVOC TIC		ug/L	
200	1	ETHYLENE CHLOROHYDRIN	107-07-3	SVOC		ug/L	
201	1	FLUORSULFONIC ACID	7789-21-1	SVOC TIC		ug/L	Assume misspelling of fluorosulphonic acid
202	1	GLYCOL-BROMHYDRIN	540-51-2	SVOC		ug/L	Syn: ethylene bromohydrin
203	1	hexachloroethane (HC)	67-72-1	SVOC		ug/L	
204	1	hexachloroethyl sulfide	13905-38-9	SVOC TIC		ug/L	
205	1	HEAMETHYLENE TETRAMINE	100-97-0	SVOC TIC		ug/L	Assume misspelling of hexamethylene tetramine
206	1	HEXANITRODIPHENYLAMINE	131-73-7	SVOC TIC		ug/L	Syn: dipicrylamine

TABLE A-3b - PARAMETERS
COMPREHENSIVE LIST for INTACT CONTAINER - LIQUIDS

	A	B	C	D	F	G	I
1	COUNTER			INTACT CONTAINERS - LIQUIDS			
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD		UNITS	COMMENTS
207	1	iodoacetophenone	4636-16-2	SVOC TIC		ug/L	
208	1	isothiocyanodimethylether	19900-84-6	SVOC TIC		ug/L	
209	1	isothiocyanomethyl ethyl ether	59565-12-7	SVOC TIC		ug/L	
210	1	isothiocyanomethyl isothiocyanoethyl ether		SVOC TIC		ug/L	
211	1	ISOTHIO METHYL ETHYL ETHER	6427-21-0	SVOC TIC		ug/L	
212	1	lead tetraethyl	78-00-2	SVOC TIC	N	ug/L	
213	1	lead tetramethyl	75-74-1	SVOC TIC		ug/L	
214	1	methyl sulfate	75-93-4	SVOC TIC		ug/L	
215	1	methylnitrosourethane	615-53-2	SVOC TIC		ug/L	
216	1	MONOCHLORETHYLMETHYLSULFIDE	542-81-4	SVOC TIC		ug/L	
217	1	MONOCHLORETHYLSULFIDE	693-07-2	SVOC TIC		ug/L	Syn: 2-chloroethylsulfide
218	1	MONOCHLORMETHYL SULFIDE	2373-51-5	SVOC TIC		ug/L	
219	1	NITRONAPTHALANCE	27254-36-0	SVOC TIC		ug/L	Assume misspelling of nitronaphthalenes
220	1	NITRONCEPTHALENES	86-57-7	SVOC TIC		ug/L	Assumed to be 1-nitronaphthalene (those values shown)
221	1	NITROXYLENE	25168-04-1	SVOC TIC		ug/L	
222	1	octochloroethyl sulfide	13905-39-0	SVOC TIC		ug/L	
223	1	ORTHONITROCHLORBENZOL	88-73-3	SVOC TIC		ug/L	Syn: O-nitrochlorobenzene
224	1	p-bromoacetophenone	99-90-1	SVOC TIC		ug/L	
225	1	p-bromochloroacetophenone	4209-02-3	SVOC TIC		ug/L	
226	1	PCHLOR CHLORACETOPHENONE	937-20-2	SVOC TIC		ug/L	
227	1	P-CHLORACETOPHENONE	99-91-2	SVOC		ug/L	This is 4-chloroacetophenone
228	1	P-CHLORBENZYLBRMIDE	622-95-7	SVOC TIC		ug/L	Assume misspelling of 4-chlorobenzyl bromide
229	1	P-CHLOR-CHLORACETANILIDE	3289-75-6	SVOC TIC		ug/L	
230	1	P-METHOXY-CHLORACETOPHENONE	2196-99-8	SVOC TIC		ug/L	
231	1	perchloromethyl carbonate	32315-10-9	SVOC TIC		ug/L	
232	1	perchloromethyl sulfide	60565-85-7	SVOC TIC		ug/L	
233	1	phenyl chloroacetate	620-73-5	SVOC TIC		ug/L	
234	1	phenyl isocyanate	103-71-9	SVOC		ug/L	
235	1	phenyl isocyanide	931-54-5	SVOC TIC		ug/L	
236	1	phenyl isothiocyanate	103-72-0	SVOC		ug/L	
237	1	PORANITROCHLORBENZOL	100-00-5	SVOC TIC		ug/L	Assume misspelling of paranitrochlorobenzol (syn; paranitrochlorobenzene)
238	1	PORAZOL	6306-39-4	SVOC TIC		ug/L	Assume misspelling of parazol (dinitrodichlorobenzene)
239	1	SULPHONE DICHLOROMINE	80-08-0	SVOC TIC		ug/L	Assumed to be SULPHONE CHLORO AMINO (those values shown)
240	1	tetrachlorodinitrobenzene	20098-38-8	SVOC TIC		ug/L	
241	1	tetrachlorodinitroethane	67226-85-1	SVOC TIC		ug/L	

TABLE A-3b - PARAMETERS
COMPREHENSIVE LIST for INTACT CONTAINER - LIQUIDS

	A	B	C	D	F	G	I
1	COUNTER			INTACT CONTAINERS - LIQUIDS			
2		COMPOUND	CAS No.	PARAMETER TYPE OR ANALYTICAL METHOD		UNITS	COMMENTS
242	1	THIO CARBANILIDE	102-08-9	SVOC TIC		ug/L	
243	1	THIOPHOSPHORYLCHLORIDE	3982-91-0	SVOC TIC		ug/L	
244	1	TOLIDINE	119-93-7	SVOC		ug/L	
245	1	TRINITRONAPTHALENE	55810-17-8	SVOC TIC		ug/L	Assume misspelling of trinitronaphthalene
246	1	triphenylarsine	603-32-7	SVOC TIC		ug/L	
247		**EXPLOSIVES**					
248	1	2-amino-4,6-dinitrotoluene (2-Am-DNT)*	35572-78-2	EXP 8330	N	ug/L	
249	1	4-amino-2,6-dinitrotoluene (4-Am-DNT)*	19406-51-0	EXP 8330	N	ug/L	
250	1	dinitrobenzene (1,3)*	99-65-0	EXP 8330	N	ug/L	
251	1	dinitrotoluene (2,4)*	121-14-2	EXP 8330	N	ug/L	
252	1	dinitrotoluene (2,6)*	606-20-2	EXP 8330	N	ug/L	
253	1	hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)*	121-82-4	EXP 8330		ug/L	
254	1	nitrobenzene	98-95-3	EXP 8330	N	ug/L	
255	1	nitroglycerin*	55-63-0	EXP 8330		ug/L	
256	1	nitrotoluene (m)*	99-08-1	EXP 8330	N	ug/L	
257	1	nitrotoluene (o)*	88-72-2	EXP 8330		ug/L	
258	1	nitrotoluene (p)*	99-99-0	EXP 8330		ug/L	
259	1	octahydro-1,3,5,7-tetranitro-1,3,5,7tetrazocine (HMX)*	2691-41-0	EXP 8330	N	ug/L	
260	1	tetryl*	479-45-8	EXP 8330	N	ug/L	
261	1	trinitrobenzene (1,3,5)*	99-35-4	EXP 8330	N	ug/L	
262	1	trinitrotoluene	118-96-7	EXP 8330		ug/L	
264		**OTHER**					
265	1	ACETIC ACID	64-19-7	(Titration)		mg/L	
266	1	~~bromine~~ **bromide**	7726-95-6	IC		mg/L	Analyze as bromide.
267	1	~~chlorine (Red Star, Bertholite)~~ **chloride**	7782-50-5	IC		mg/L	Analyze as chloride.
268	1	CHLORACETIC ACID	79-11-8	IC (UT03)		ug/L	Assume misspelling of chloroacetic acid
269	1	ETHYL ALCOHOL	64-17-5	GC/FID		mg/L	Ethanol
270	1	FLUORIDE	16984-48-8	IC (300.0)		ug/L	
271	1	HYDROGEN SULFIDE	7783-06-4	WC		mg/L	
272	1	IODINE	7553-56-2	IC		ug/L	
273	1	IODINE PENTAFLUORIDE	7783-66-6	IC		mg/L	
274	1	perchlorates*	14797-73-0	IC		ug/L	Army approval process involved.
275	1	phenylhydrazine	100-63-0	Special GC		ug/L	
276	1	phosphorus, white (WP, fumite)	7723-14-0	Special GC	N	ug/L	
277	1	PICRIC ACID	88-89-1	HPLC/UV		ug/L	Syn: trinitrophenol
279	**266**	**TOTAL COMPOUNDS**					
281		* Not on any of the lists, but historically analyzed or has potential to be present.					
282		NA--Not Applicable or Not Available.					
283		N--Non-carcinogen.					
284		ALL CAPS ARE COOK LIST COMPOUNDS (**67 TOTAL**).					

TABLE A-3c
INTACT CONTAINER LIMITED VOLUME LIQUIDS ANALYSIS PLAN

If Sample Volume Received is (approx.)	Proposed Analytical Parameters
< 20 mL	VOCs and Metals
20-40 mL	VOCs, Metals, Cyanide, Bromide and Chloride
40-300 mL	VOCs, Metals, Cyanide, Bromide, Chloride, Explosives, Perchlorate, Phenyl Hydrazine and White Phosphorus[1]
> 300 mL	VOCs, Metals, Cyanide, Bromide, Chloride, Explosives, Perchlorate, Phenyl Hydrazine, SVOCs[2], and White Phosphorus

Please note reporting limits on parameters will vary based on sample volumes.

[1]White Phosphorus will be analyzed if sufficient sample volume is available.

[2]Additional sample volume will be used for SVOC analysis.

TABLE A-3d
LIMITED VOLUME SOLIDS ANALYSIS PLAN

If Sample Volume Received is (approx.)	Proposed Analytical Parameters
< 4 oz. [1]	Metals, Explosives, SVOCs, VOCs on headspace if possible
4 to 8 oz. [1]	Lab should be able to conduct all analyses. Pack one 4 oz jar with no headspace for VOC analysis; put remaining soil in a separate 4 oz jar.
> 8 oz.	Lab should be able to conduct all analyses. Pack two 4 oz jars with no headspace for VOC analysis; put remaining soil in separate 4 oz or 8 oz jars.

Please note reporting limits on parameters will vary based on sample volumes.

[1] Percent solids analysis may not be possible, so data would be reported on a wet basis.

Table A-4
Summary of Quality Assurance Objectives
Solid Samples

Parameter	Analytical Method	Reporting Units	Contract Required Quantitation Limit (CRQL)	Practical Quantitation Limit (PQL)	Precision for Lab Dups (RPD)	Accuracy (% R, Samples and MS/MSD/LCS)	Completeness (%)
Characterization Analyses							
TCL VOCs[2]	CLP OLM04.3	µg/kg	See Table 6	NA	≤30%	See Table 6	95
TCL SVOCs[3]	CLP OLM04.3	µg/kg	See Table 7	NA	≤30%	See Table 7	95
Explosives	SW 846 8330	mg/kg	NA	See Table 8	≤30%	See Table 8	95
TAL Metals[4]	CLP ILM05.3	mg/kg	See Table 9	NA	≤20%	See Table 9	95
Mustard	Geomet CDLD SOP 77	µg/kg	NA	250	≤30%	50-130	95
Dithiane	GPL SOP R.3V8	µg/kg	NA	250	≤30%	50-130	95
Oxathiane	GPL SOP R.3V8	µg/kg	NA	250	≤30%	50-130	95
Thiodiglycol	GPL SOP S.2V6	µg/kg	NA	250	≤30%	20-130	95
CVAA/CVAO	Geomet CDLD SOP 77	µg/kg	NA	250	≤30%	40-130	95
Ricin	ECL Assay	ng/kg	NA	0.1 ng/kg	≤30%	NA	95
Acetic acid	GPL SOP L.12	mg/kg	NA	2	50	75-125	95
Chloroacetic acid	MOD LW18	µg/kg	NA	400	25	37-138	95
Ethyl alcohol	Sw 8015	µg/kg	NA	50	40	65-135	95
Iodine	E314.0 Modified	µg/kg	NA	7.6	15	85-115	95
Iodine pentafluoride	E314.0 Modified	mg/kg	NA	9	15	85-115	95
Picric acid	MOD SW 8330	µg/kg	NA	1000	50	NA	95
Fluoride	E 300.0	µg/kg	NA	0.1	50	90-110	95
Hydrogen Sulfide	MOD 9030B	mg/kg	NA	20	50	NA	95
Butane	SW 8015	µg/kg	NA	24	50	50-150	95
Perchlorate	E314.0	µg/kg	NA	10	15	75-125	95
Perchlorate[5]	DataChem SOP LCMS, CL04_REV 2	µg/kg	NA	2.2	≤20%	80-120	95
Total Cyanide	E335-2	mg/kg	2.5	NA	≤20%	75-125	95

Table A-4 (Continued)
Summary of Quality Assurance Objectives
Solid Samples

Parameter	Analytical Method	Reporting Units	Contract Required Quantitation Limit (CRQL)	Practical Quantitation Limit (PQL)	Precision for Lab Dups (RPD)	Accuracy (% R, Samples and MS/MSD/LCS)	Completeness (%)
Disposal Analyses							
TCLP VOCs	SW-846 1311/8260B	mg/L	NA	See Table 10	≤30%	See Table 10	95
TCLP SVOCs	SW-846 1311/8270C	mg/L	NA	See Table 10	≤30%	See Table 10	95
TCLP Metals	SW-846 1311/6010B and SW-846 1311/7470A	mg/L	NA	See Table 10	≤20%	See Table 10	95
Corrosivity	SW-846 9045C	unitless	NA	0-14	± 0.5	NA	95
Ignitability	SW-846 1010B (Mod)	°C	NA	Room Temp – 100 °C	±5 °C	NA	95
Reactivity (Cyanide)	SW-846 Chapter 7	mg/kg	NA	25	≤20%	±15%	95
Reactivity (Sulfide)	SW-846 Chapter 7	mg/kg	NA	10	≤20%	±15%	95

Note: For low probability sites, not all parameters indicated above for characterization analyses will necessarily be required (see Section 3).
\1 Results will be reported on a dry weight basis
\2 Includes CLP list plus selected site-specific non-CLP compounds that have been categorized as volatiles (see Table 6)
\3 Includes CLP list plus selected site-specific non-CLP compounds that have been categorized as semi-volatiles (see Table 7)
\4 Includes CLP list plus tellurium and zirconium. Boron and tin are added for backfill samples.
\5 Two perchlorate methods shown. Partners will specifiy which is to be used.

mg/kg – milligrams/kilogram
MS/MSD – Matrix Spike/Matrix Spike Duplicate
NA – Not Applicable
% R - Percent Recovery
RPD - Relative Percent Difference (for field duplicates)
SVOCs - Semivolatile Organic Compounds
TAL – Target Analyte List
TCL – Target Compound List
TCLP - Toxicity Characteristic Leaching Procedure
ug/kg – micrograms per kilogram
VOCs – Volatile Organic Compounds

Table A-5
Summary of Quality Assurance Objectives
Aqueous Samples

Parameter	Analytical Method	Reporting Units	Contract Required Quantitation Limit	Practical Quantitation Limit (PQL)	Precision for Lab Dups (RPD)	Accuracy (% R, Samples and MS/MSD/LCS)	Completeness (%)
Characterization and Waste Profile Samples							
TCL VOCs[1]	CLP OLM04.3	µg/L	See Table 6	NA	≤30%	See Table 6	95
TCL SVOCs[2]	CLP OLM04.3	µg/L	See Table 7	NA	≤30%	See Table 7	95
Explosives	SW 846 8330	µg/L	NA	See Table 8	≤30%	See Table 8	95
TAL Inorganics[3]	CLP ILM05.3	mg/L	See Table 9	NA	≤20%	See Table 9	95
Bromide	IC 300	µg/L	NA	50	≤30%	75-125	95
Chloride	IC 300	µg/L	NA	62	≤30%	75-125	95
Perchlorate	IC 314	µg/L	NA	1.99	≤30%	75-125	95
Phenylhydrazine	UV spectroscopy	µg/L	NA	200	≤30%	10-150	95
White Phosphorus	Special GC	µg/L	NA	0.1	≤30%	10-150	95
Mustard	Geomet CDLD SOP 77	µg/L	NA	250	≤30%	50-130	95
Dithiane	GPL SOP R.3V8	µg/L	NA	250	≤30%	50-130	95
Oxathiane	GPL SOP R.3V8	µg/L	NA	250	≤30%	50-130	95
Thiodiglycol	GPL SOP S.2V6	µg/L	NA	250	≤30%	50-130	95
CVAA/CVAO	Geomet CDLD SOP 77	µg/L	NA	250	≤30%	50-130	95
Ricin	ECL Assay	ng/ml	NA	0.1 ng/ml	≤30%	NA	95
Acetic acid	GPL SOP L.12	mg/L	NA	0.05	≤30%	75-125	95
Chloroacetic acid	MOD UW22	µg/L	NA	40	≤25%	37-138	95
Ethyl alcohol	MOD SW 8015	mg/L	NA	5	≤40%	65-135	95
Iodine	E314.0 Modified	µg/L	NA	0.76	≤15%	85-115	95
Iodine pentafluoride	E314.0 Modified	mg/L	NA	0.9	≤15%	85-115	95
Picric acid	GPL SOP S.1	µg/L	NA	2.6	≤30%	67-120	95
Hydrogen Sulfide	SW9030B	mg/L	NA	2	30	NA	95
Fluoride	E300.0	ug/L	NA	0.1	30	90-110	95
Total Cyanide	Colorimetric	mg/L	10	NA	≤20%	80-120	95

Table A-5 (continued)
Summary of Quality Assurance Objectives
Aqueous Samples

Parameter	Analytical Method	Reporting Units	Contract Required Quantitation Limit	Practical Quantitation Limit (PQL)	Precision (RPD)	Accuracy (% R, Samples and MS/MSD/LCS)	Completeness (%)
Disposal Analyses							
TCLP VOCs	SW-846 1311/8260B	mg/L	NA	See Table 10	≤30%	See Table 10	95
TCLP SVOCs	SW-846 1311/8270C	mg/L	NA	See Table 10	≤30%	See Table 10	95
TCLP Metals	SW-846 1311/6010B and SW-846 1311/7470A	mg/L	NA	See Table 10	≤20%	See Table 10	95
Corrosivity	SW-846 9040	unitless	NA	0-14	± 0.5	NA	95
Ignitability	SW-846 1010B (Mod)	°C	NA	Room Temp – 100 °C	± 5 °C	NA	95
Reactivity (Cyanide)	SW-846 Chapter 7	mg/kg	NA	25	≤20%	± 15%	95
Reactivity (Sulfide)	SW-846 Chapter 7	mg/kg	NA	10	≤20%	± 15%	95

\1 Includes CLP list plus selected site-specific non-CLP compounds that have been categorized as volatiles (see Table 6)
\2 Includes CLP list plus selected site-specific non-CLP compounds that have been categorized as semi-volatiles (see Table 7)
\3 Includes CLP list plus tellurium and zirconium

mg/kg – milligrams/kilogram
MS/MSD – Matrix Spike/Matrix Spike Duplicate
NA – Not Applicable
% R - Percent Recovery
RPD - Relative Percent Difference (for field duplicate)
SVOCs - Semivolatile Organic Compounds
TAL – Target Analyte List
TCL – Target Compound List
TCLP - Toxicity Characteristic Leaching Procedure
Ug/kg – micrograms per kilogram
VOCs – Volatile Organic Compounds

Table A-6
Quality Assurance Objectives [1]
Volatile Organic Compounds

Analyte	Contract Required Quantitation Limit [2]		% Recovery (Samples and MS/LCS/MSD) [3,4]		RPD (MS/MSD)[3,4]	
	Solid (µg/kg)	Aqueous (µg/L)	Solid	Aqueous	Solid	Aqueous
Analytes:						
Acetone	10.0	10.0				
Acetonitrile (Non-CLP)			10-150	10-150	50	50
Acrolein (Non-CLP)	10.0	10.0	10-150	10-150	50	50
Benzene	10.0	10.0	66-142	76-127	21	11
Benzyl Bromide (Non-CLP)	10.0	10.0	10-150	10-150	50	50
Benzyl Chloride (Non-CLP)	10.0	10.0	10-150	10-150	50	50
Bromobenzene	10.0	10.0				
Bromodichloromethane	10.0	10.0				
Bromoform	10.0	10.0				
Bromomethane	10.0	10.0				
2-butanone	10.0	10.0				
Carbon Disulfide	10.0	10.0				
Carbon Tetrachloride	10.0	10.0				
Chlorobenzene	10.0	10.0	60-133	75-130	21	13
Chloroethane	10.0	10.0				
Chloroform	10.0	10.0				
Cyclohexane	10.0	10.0				
Chloromethane	10.0	10.0				
Chloropicrin (Non-CLP)	10.0	10.0	10-150	10-150	50	50
Dibromochloromethane	10.0	10.0				
1,2-dibromo-3-chloropropane	10.0	10.0				
l,l-Dichloroethane	10.0	10.0				
1,2-Dichloroethane	10.0	10.0				
1,2-Dichloroethene(ethylene chloride)	10.0	10.0				
l,l-Dichloroethene	10.0	10.0	59-172	61-145	22	14
cis –1,2-Dichloroethene	10.0	10.0				
trans-1,2-Dichloroethene	10.0	10.0				
1,2-Dichloropropane	10.0	10.0				
cis-1,3-Dichloropropene	10.0	10.0				
trans-1,3-Dichloropropene	10.0	10.0				
Diphenyl ether (Non-CLP)	10	10.0	10-200	10-150	50	50
Ethylbenzene	10.0	10.0				
Ethylene (Non-CLP)	10	10.0	10-200	10-150	50	50
2-Hexanone	10.0	10.0				
Isopropylbenzene	10.0	10.0				
Methylene Chloride	10.0	10.0				
Dichlorodifluoromethane	10.0	10.0				
4-Methyl-2-pentanone	10.0	10.0				
Methyl tert-Butyl Ether	10.0	10.0				
1,1,2-Trichloro-1,2,2-trifluroethane	10.0	10.0				

Table A-6 (continued)
Quality Assurance Objectives \1
Volatile Organic Compounds

Analyte	Contract Required Quantitation Limit /2		% Recovery (Samples and MS/LCS/MSD)\3,4		RPD (MS/MSD)\3,4	
	Solid (µg/kg)	Aqueous (µg/L)	Solid	Aqueous	Solid	Aqueous
Methyl Acetate	10.0	10.0				
Styrene	10.0	10.0				
Methylcyclohexane	10.0	10.0				
1,1,2,2-Tetrachloroethane	10.0	10.0				
Tetrachloroethene	10.0	10.0				
Toluene	10.0	10.0	59-139	76-125	13	21
1,2-Dibromoethane	10.0	10.0				
1,2,4-Trichlorobenzene	10.0	10.0				
l,l,l-Trichloroethane	10.0	10.0				
1,1,2-Trichloroethane	10.0	10.0				
Trichloroethene	10.0	10.0	62-137	71-120	24	14
1,2-Dichlorobenzene	10.0	10.0				
1,3-Dichlorobenzene	10.0	10.0				
1,4-Dichlorobenzene	10.0	10.0				
Vinyl Chloride	10.0	10.0				
Xylenes (total)	10.0	10.0				
Trichlorofluoromethane	10.0	10.0				
Surrogates:						
Toluene-d8	NA	NA	84-138	88-110	NA	NA
4-Bromofluorobenzene	NA	NA	59-113	86-115	NA	NA
1,2-Dichloroethane-d4	NA	NA	70-121	76-114	NA	NA

\1 Method OLM04.3; this analyte list reflects the full list of CLP compounds normally reported by GPL, plus those compounds that are also included on the SVFUDS Comprehensive lists.

\2 The Contract Required Quantitation Limit may be adjusted by the laboratory to reflect sample dilution, dry weight, sample volume, or other required analytical adjustments.

\3 The percent recovery acceptance limits shown are required by the CLP program for the CLP target VOCs, for non CLP target analytes the listed limits are based on statistical evaluation of laboratory data and are periodically updated. The laboratory will provide the acceptance limits which are in use at the time of sample analysis if they are different than those listed in this plan.

\4 Only those compounds with % recovery acceptance units shown in this table will be spiked into samples, MS/MSD.

Table A-7
Quality Assurance Objectives [1]
Semivolatile Organic Compounds

Analyte	Contract Required Quantitation Limit [2]		% Recovery (Samples and MS/LCS/MSD) [3,4]		RPD (MS/MSD) [3,4]	
	Solid (µg/kg)	Aqueous (µg/L)	Solid	Aqueous	Solid	Aqueous
Analytes:						
1-Chloro-2,4-dinitrobenzene (Non-CLP)	330.0	10.0	10-150	10-150	50	50
2-Bromo-4'-chloroacetophenone (Non-CLP)	330.0	10.0	10-150	10-150	50	50
4-Chloroacetophenone (Non-CLP)	330.0	10.0	10-150	10-150	50	50
Acenaphthene	330.0	10.0	31-137	46-118	19	31
Acenaphthylene	330.0	10.0				
Acetophenone	330.0	10.0	10-150		50	
Anthracene	330.0	10.0				
Benzal chloride (Non-CLP)	330.0	10.0	10-150	10-150	50	50
Benzo(a)anthracene	330.0	10.0				
Benzo(b)fluroanthene	330.0	10.0				
Benzo(k)fluoranthene	330.0	10.0				
Benzo(ghi)perylene	330.0	10.0				
Benzo(a)pyrene	330.0	10.0				
Benzoic Acid	330.0	10.0				
bis(2-Chloroethoxy)methane	330.0	10.0				
bis(2-Chloroethyl)ether	330.0	10.0				
bis(2-Ethylhexyl)phthalate	330.0	10.0				
Bromoacetophenone (Non-CLP)	330.0	10.0	10-150	10-150	50	50
4-Bromophenyl phenyl ether	330.0	10.0				
Butyl benzyl phthalate	330.0	10.0				
Carbazole	330.0	10.0				
4-Chloroaniline	330.0	10.0				
4-chloro-3-methylphenol	330.0	10.0	26-103	23-97	33	42
2-Chloronaphthalene	330.0	10.0				
2-Chlorophenol	330.0	10.0	25-102	27-123	50	40
4-Chlorophenyl phenyl ether	330.0	10.0				
Chrysene	330.0	10.0				
2-methylphenol	330.0	10.0				
4-Methylphenol	330.0	10.0				
Di-n-butyl phthalate	330.0	10.0				
Di-n-octyl phthalate	330.0	10.0				
Dibenz(a,h)anthracene	330.0	10.0				
Dibenzofuran	330.0	10.0				
Benzaldehyde	330.0	10.0				
Acetophenone	330.0	10.0				
Caprolactam	330.0	10.0				
3,3'-Dichlorobenzidine	330.0	10.0				
2,4-Dichlorophenol	330.0	10.0				
Dimethylaniline (Non-CLP)	330.0	10.0	10-150	10-150	50	50
Diethyl phthalate	330.0	10.0				
2,4-Dimethylphenol	330.0	10.0				
Dimethyl phthalate	330.0	10.0				
4,6-Dinitro-2-methylphenol	830.0	25.0				
2,4-Dinitrophenol	830.0	25.0				
2,4-Dinitrotoluene	330.0	10.0	28-89	24-96	47	38

Table A-7 (continued)
Quality Assurance Objectives \1
Semivolatile Organic Compounds

Analyte		Contract Required Quantitation Limit /2		(Samples and MS/LCS/MSD)\3,4		RPD (MS/MSD) \3,4	
		Solid (µg/kg)	Aqueous (µg/L)	Solid	Aqueous	Solid	Aqueous
2,6-Dinitrotoluene		330.0	10.0				
Diphenylamine (Non-CLP)		330.0	10.0	10-150	10-150	50	50
Ethylene chlorohydrin (Non-CLP)		330.0	10.0	10-150	10-150	50	50
Fluoranthene		330.0	10.0				
Fluorene		330.0	10.0				
Glycol-bromhydrin (Non-CLP)		330.0	10.0	10-150	10-150	50	50
Hexachlorobenzene		330.0	10.0				
Hexachlorobutadiene		330.0	10.0				
Hexachlorocyclopentadiene		330.0	10.0				
Hexachloroethane		330.0	10.0				
Indeno(1,2,3-cd)pyrene		330.0	10.0				
Isophorone		330.0	10.0				
2-Methylnapthalene		330.0	10.0				
Naphthalene		330.0	10.0				
2-Nitroaniline		830.0	25.0				
3-Nitroaniline		830.0	25.0				
4-Nitroaniline		830.0	25.0				
2-Nitrophenol		330.0	10.0				
4-Nitrophenol		830.0	25.0	11-114	10-80	50	50
n-Nitrosodiphenylamine		330.0	10.0				
n-Nitrosodipropylamine		330.0	10.0	41-126	41-116	38	38
2,2'-Oxybis(1-chloropropane)		330.0	10.0				
Pentachlorophenol		830.0	25.0	17-109	9-103	47	50
Phenanthrene		330.0	10.0				
Phenol		330.0	10.0	26-90	12-110	35	42
Phenyl isocyanate (Non-CLP)		330.0	10.0	10-150	10-150	50	50
Phenyl isothiocyanate (Non-CLP)		330.0	10.0	10-150	10-150	50	50
1,1'-Biphenyl		330.0	10.0				
Atrazine		330.0	10.0				
Pyrene		330.0	10.0	35-142	26-127	36	31
Tolidine (Non-CLP)		330.0	10.0	10-150	10-150	50	50
1,2,4-Trichlorobenzene		330.0	10.0				
2,4,5-Trichlorophenol		830.0	25.0				
2,4,6-Trichlorophenol		330.0	10.0				
Surrogates:							
Terphenyl-d14	NA	NA	NA	18-137	33-141	NA	NA
Nitrobenzene-d5	NA	NA	NA	23-120	35-114	NA	NA
2-Fluorobiphenyl	NA	NA	NA	30-115	43-116	NA	NA
Phenol-d5	NA	NA	NA	24-113	10-110	NA	NA
2-Fluorophenol	NA	NA	NA	25-121	21-110	NA	NA
2,4,6-Tribromophenol	NA	NA	NA	19-122	10-123	NA	NA

\1 Method OLM04.3
\2 The Contract Required Quantitation Limit may be adjusted by the laboratory to reflect sample dilution, dry weight, sample volume, or other required analytical adjustments.
\3 The percent recovery acceptance limits shown are determined by the laboratory based on statistical evaluation of laboratory data and are periodically updated. The laboratory will provide the acceptance limits which are in use at the time of sample analysis if they are different than those listed in this plan.
\4 Only those compounds with % recovery acceptance units shown in this table will be spiked into samples, MS/MSD.

Table A-8
Quality Assurance Objectives
Explosives \1

Analyte	Soil Practical Quantitation Limits (ug/kg)	Soil Method Detection Limits (ug/kg)	Aqueous Practical Quantitation Limits (ug/L)	Aqueous Method Detection Limits (ug/L)	Soil (MS/ MSD)	Aqueous (MS/MD)	Soil (LCS)	Aqueous (LCS)
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	342	68	0.65	0.13	76-116	56-139	76-116	56-139
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	325	65	0.58	0.12	70-130	58-133	70-130	58-133
1,3,5-Trinitrobenzene	640	128	0.47	0.09	48-125	50-145	48-125	50-145
1,3-Dinitrobenzene	191	38	0.40	0.08	68-124	60-138	68-124	60-138
Methyl-2,4,6-trinitrophenylnitramine (tetryl)	367	73	0.34	0.07	13-140	41-139	13-140	41-139
Nitrobenzene	280	56	0.62	0.12	90-127	58-153	90-127	58-153
4-Amino-2,6-dinitrotoluene	755	151	0.45	0.09	75-136	58-139	75-136	58-139
2-Amino-4,6-dinitrotoluene	55	18	0.35	0.07	60-119	60-120	60-119	60-120
2,4-Dinitrotoluene	591	118	0.34	0.07	83-123	66-137	83-123	66-137
2,6-Dinitrotoluene	202	40	0.47	0.10	70-131	60-125	70-131	60-125
2-Nitrotoluene (o)	280	56	0.57	0.11	75-133	56-147	75-133	56-147
3-Nitrotoluene(m)	356	71	0.43	0.09	80-135	63-153	80-135	63-153
4-Nitrotoluene (p)	375	75	0.77	0.15	77-130	57-153	77-130	57-153
Nitroglycerine	1510	302	0.813	0.163	68-132	83-121	68-132	83-121
Trinitrotoluene	209	42	0.31	0.062	76-113	65-140	76-113	65-140
PETN (surrogate)	NA	NA	NA	NA	52-123	61-121	NA	NA

\1 Method 8330 (Non-CLP). QC criteria provided by GPL Laboratories.

Table A-9
Quality Assurance Objectives
Target Analyte List Inorganics (TAL)

Analyte	Contract Required Quantitation Limit /1		% Recovery (MS and LCS) \3		RPD (Lab duplicate)	
	Soil (mg/kg)	Aqueous (µg/L)	Soil	Aqueous	Soil	Aqueous
Aluminum	20.0	200.0	75-125	80-120	20	20
Antimony	6.0	10.0	75-125	80-120	20	20
Arsenic	1.0	10.0	75-125	80-120	20	20
Barium	20.0	200.0	75-125	80-120	20	20
Beryllium	0.5	5.0	75-125	80-120	20	20
Boron	3.0	15.0	75-125	80-120	20	20
Cadmium	0.5	5.0	75-125	80-120	20	20
Chromium	1.0	10.0	75-125	80-120	20	20
Cobalt	5.0	50.0	75-125	80-120	20	20
Copper	2.5	25.0	75-125	80-120	20	20
Iron	10.0	100.0	75-125	80-120	20	20
Lead	1.0	10.0	75-125	80-120	20	20
Magnesium	500.0	5000.0	75-125	80-120	20	20
Manganese	1.5	15.0	75-125	80-120	20	20
Mercury	0.1	0.2	75-125	80-120	20	20
Nickel	4.0	40.0	75-125	80-120	20	20
Selenium	3.5	35.0	75-125	80-120	20	20
Silver	1.0	10.0	75-125	80-120	20	20
Strontium\2	1.0	10.0	10-150	80-120	20	20
Tellurium\2	10	50.0	10-150	80-120	20	20
Thallium	2.5	3.0\4	75-125	80-120	20	20
Tin\2	5.0	21.0	10-150	80-120	20	20
Titanium\2	1.0	10.0	10-150	80-120	20	20
Vanadium	5.0	50.0	75-125	80-120	20	20
Zinc	6.0	60.0	75-125	80-120	20	20
Zirconium\2	10.0	100	75-125	80-120	20	20
Cyanide	2.5	10.0	75-125	80-120	20	20

\1 The Contract Required Quantitation Limit may be adjusted to reflect sample dilution, dry weight, sample volume, or other required analytical adjustments.

\2 Non-CLP. These, plus cyanide, are not TAL metals. Note that Boron is analyzed in backfill samples only.

\3 The percent recovery acceptance limits shown are determined by the laboratory based on statistical evaluation of laboratory data and are periodically updated. The laboratory will provide the acceptance limits which are in use at the time of sample analysis if they are different than those listed in this plan.

\4 ICP/MS will be used to achieve this CRQL.

Table A-10
Quality Assurance Objectives
Disposal Parameters

Analyte	Regulatory Limit (mg/L)	Practical Quantitation Limit /1 (mg/L)	Method Detection Limit (mg/L)	% Recovery (Samples and MS) /2	% Recovery (LCS) /2
TCLP Volatiles (SW-846 8260B)					
Analytes:					
Benzene	0.5	0.1	0.01	50-125	88-129
2-Butanone (MEK)	200	0.1	0.01	50-125	N/A
Carbon Tetrachloride	0.5	0.1	0.01	50-125	76-120
Chlorobenzene	100	0.1	0.01	50-125	N/A
Chloroform	6.0	0.1	0.01	50-125	88-124
1,2-Dichloroethane	0.5	0.1	0.01	50-125	88-124
1,1-Dichloroethene	0.7	0.1	0.01	50-125	72-101
Tetrachloroethene	0.7	0.1	0.01	50-125	N/A
Trichloroethene	0.5	0.1	0.01	50-125	74-120
Vinyl chloride	0.2	0.1	0.01	50-125	69-176
Surrogates:					
Toluene-d8	NA	NA	NA	74-128	NA
4-Bromofluorobenzene	NA	NA	NA	81-125	NA
1,2 Dichloroethane-d4	NA	NA	NA	77-133	NA
1,2 Dichlorobenzene d4	NA	NA	NA	76-134	NA
TCLP Semivolatiles (SW-846 8270C)					
Analytes:					
o-cresol (2-methylphenol)	200	0.05	0.004	17-132	36-120
m-cresol (3-methylphenol)\3	200	0.05	0.003	6-127	26-115
p-cresol (4-methylphenol)\3	200	0.05	0.003	6-127	26-115
1,4-dichlorobenzene	7.5	0.05	0.001	25-99	47-86
2,4-dinitrotoluene	0.13	0.05	0.0005	25-163	43-164
Hexachlorobenzene	0.13	0.05	0.0008	28-148	58-129
Hexachlorobutadiene	0.5	0.05	0.002	16-100	36-81
Hexachloroethane	3.0	0.05	0.001	14-117	26-115
Nitrobenzene	2.0	0.05	0.002	24-133	51-121
Pentachlorophenol	100	0.25	0.009	0-150	19-216
Pyridine	5.0	0.05	0.001	0-139	20-149
2,4,5-Trichlorophenol	400	0.05	0.003	25-133	33-134
2,4,6-Trichlorophenol	2.0	0.05	0.004	20-154	38-153
Surrogates:					
Nitrobenzene-d5	NA	NA	NA	48-106	NA
2-Fluorobiphenyl	NA	NA	NA	51-108	NA
Terphenyl-d14	NA	NA	NA	20-165	NA
2-Fluorophenol	NA	NA	NA	19-118	NA
2,4,6-Tribromophenol	NA	NA	NA	38-153	NA
Phenol-d5	NA	NA	NA	24-117	NA

Table A-10 (continued)
Quality Assurance Objectives
Toxicity Characteristic Leaching Procedure

Analyte	Regulatory Limit (mg/L)	Practical Quantitation Limit /1 (mg/L)	Method Detection Limit (mg/L)	% Recovery (Samples and MS/MSD) /2	% Recovery (LCS) /2
TCLP Metals (SW-846 6010B, 7470A)					
Arsenic	5.0	0.01	0.003	75-125	80-120
Barium	100	0.005	0.0006	75-125	80-120
Cadmium	1.0	0.003	0.0004	75-125	80-120
Chromium	5.0	0.005	0.0008	75-125	80-120
Lead	5.0	0.007	0.002	75-125	80-120
Mercury	0.2	0.0005	0.0001	75-125	80-120
Selenium	1.0	0.011	0.002	75-125	80-120
Silver	5.0	0.004	0.0007	75-125	80-120
RCRA Characteristics					
Corrosivity	40CFR 261.21	See Table 4 or 5	See Table 4 or 5	See Table 4 or 5	See Table 4 or 5
Ignitability	40CFR 261.21	See Table 4 or 5	See Table 4 or 5	See Table 4 or 5	See Table 4 or 5
Reactivity (Cyanide)	40CFR 261.23	See Table 4 or 5	See Table 4 or 5	See Table 4 or 5	See Table 4 or 5
Reactivity (Sulfide)	40CFR 261.23	See Table 4 or 5	See Table 4 or 5	See Table 4 or 5	See Table 4 or 5

\1 The Practical Quantitation Limit may be adjusted by the laboratory to reflect sample dilution, dry weight, sample volume, or other required analytical adjustments.
\2 The percent recovery acceptance limits shown are determined by the laboratory based on statistical evaluation of laboratory data and are periodically updated. The laboratory will provide the acceptance limits which are in use at the time of sample analysis if they are different than those listed in this plan.
\3 m- and p-cresol cannot be differentiated.
All QC criteria provided by GPL Laboratories.
Herbicides, pesticides, and PCBs not included.

Table A-11 Sample Containers, Preservation, and Holding Times Solid Samples

Parameter	Sample Container	Preservative	Holding Time
TCL VOCs	2 4-oz glass vials w/Telfon-lined cap	Cool to 4°C	48 hrs*/14 days
TCL SVOCs	2 8-oz glass w/Teflon-lined cap	Cool to 4°C	14/40 days [1]
Explosives	Use SVOC Containers	Cool to 4°C	14/40 days
TAL Metals	1 4-oz glass w/Teflon-lined cap	Cool to 4°C	28 days (Hg); /180 days (others)
Mustard	1 8-oz glass w/Teflon-lined cap	Cool to 4°C	10 days
Dithiane	Use mustard container	Cool to 4°C	10 days
Oxathiane	Use mustard container	Cool to 4°C	10 days
Thiodiglycol	Use mustard container	Cool to 4°C	10 days
CVAA/CVAO	Use mustard container	Cool to 4°C	10 days
Ricin	Use mustard container	Cool to 4°C	7 days
Acetic acid	Use SVOC Container	Cool to 4°C	7 days
Chloroacetic acid	Use SVOC Container	Cool to 4°C	14/40 days
Ethyl alcohol	Use SVOC Container	Cool to 4°C	28 days
Iodine	Use SVOC Container	Cool to 4°C	7 days
Iodine pentafluoride	Use SVOC Container	Cool to 4°C	7 days
Picric acid	Use SVOC Container	Cool to 4°C	14/40 days
Fluoride	Use SVOC Container	Cool to 4°C	28 days
Hydrogen Sulfide	Use SVOC Container	Cool to 4°C	7 days
Butane	Use SVOC Container	Cool to 4°C	14 days
Perchlorate	Use SVOC Container	Cool to 4°C	28 days
Butane	1 4oz glass Jar with Teflon lid	Cool to 4°C	14 days
Disposal Analyses [b]			
TCLP VOCs	1 4-oz glass w/Teflon-lined cap	Cool to 4°C	14/14 days [2]
TCLP SVOCs	1 8-oz glass w/Teflon-lined cap	Cool to 4°C	14/7/40 days [3]
TCLP Metals	Use TCLP SVOCs sample	Cool to 4°C	28/28 days (Hg)[4];/180/180 days (others)[5]
Corrosivity	1 8-oz glass w/Teflon-lined cap	None	28 days
Ignitability	Use corrosivity sample	None	28 days
Reactivity (Cyanide)	Use corrosivity sample	Cool to 4°C	7 days
Reactivity (Sulfide)	Use corrosivity sample	Cool to 4°C	7 days

* 48 hrs only applies to VOCs collected via SW5035A—these will be collected with an Encore device ***(low probability investigations only)***.

[1] 14 days between sample collection and extraction, 40 days between extraction and analysis

[2] 14 days between sample collection and extraction, 14 days between extraction and analysis

[3] 14 days between sample collection and TCLP extraction, 7 days between TCLP extraction and 8270C extraction, 40 days between 8270C extraction and analysis

[4] 28 days between sample collection and extraction, 28 days between extraction and analysis

[5] 180 days between sample collection and extraction, 180 days between extraction and analysis

[a] Two additional sets of samples will be collected for one in every 20 field samples to be used as the MS and MSD.

[b] One additional 4-oz jar and two additional 8-oz jars will be collected for one in every 20 soil disposal samples to be used as the MS.

Table A-12
Sample Containers, Preservation, and Holding Times
Aqueous, Dust, and Air Samples

Parameter	Sample Container	Preservative	Holding Time
TCL VOCs	4 x 40 mL glass VOA vials	Cool to 4°C, zero headspace	7 days
TCL SVOCs	2 x 1000 mL amber glass	Cool to 4°C	7/40 days\5
Explosives	2 x 1000 ml amber glass	Cool to 4°C	7/40 days
TAL Metals	1 x 500 ml glass (or plastic)	Cool to 4°C, HNO^3	28 days (Hg); 180 days (others)
Cyanide	1 500 ml plastic	Cool to 4°C, NaOH	14 days
Bromide	1 100 ml glass plastic	Cool to 4°C	28 days
Chloride	Use bromide	Cool to 4°C	28 days
Perchlorate	Use bromide	Cool to 4°C	28 days
Phenylhydrazine	Use bromide	Cool to 4°C	7/40 days$^{\backslash 5}$
White Phosphorus	TBD	Cool to 4°C	TBD
Mustard	2 x 40 mL glass VOA vials	Cool to 4°C	10 days
Dithiane	Use mustard container	Cool to 4°C	10 days
Oxathiane	Use mustard container	Cool to 4°C	10 days
Thiodiglycol	Use mustard container	Cool to 4°C	10 days
CVAA/CVAO	Use mustard container	Cool to 4°C	10 days
Ricin	Use mustard container	Cool to 4°C	7 days
Acetic acid	1 500 ml polyethylene	Cool to 4°C	7 days
Chloroacetic acid	1 100 ml amber glass	Cool to 4°C	7/40 days
Ethyl alcohol	2 40 ml VOA Vials	Cool to 4°C	28 days
Iodine	1 500 ml polyethylene	Cool to 4°C	7 days
Iodine pentafluoride	1 500 ml polyethylene	Cool to 4°C	7 days
Picric acid	2 1000 ml amber glass	Cool to 4°C	7/40 days
Fluoride	Use Bromide Container	Cool to 4°C	28 days
Hydrogen Sulfide	Use Bromide Container	Cool to 4°C	7 days

Table A-12 (continued)
Sample Containers, Preservation, and Holding Times
Aqueous, Dust, and Air Samples

Parameter	Sample Container	Preservative	Holding Time
Disposal Analyses[b]			
TCLP VOCs	4 x 40 mL glass VOA vials	Cool to 4°C, zero headspace	14/14 days[1]
TCLP SVOCs	2 x 1000 mL amber glass	Cool to 4°C, zero headspace	14/7/40 days [2]
TCLP Metals	500 mL plastic or glass	None	28/28 days (Hg); [3] 180/180 days (others) [4]
Corrosivity	125 mL plastic	None	Analyze immediately upon receipt at lab
Ignitability	500 mL amber glass	None	28 days
Reactivity (cyanide)	500 mL plastic	Cool to 4°C	7 days
Reactivity (sulfide)	Use Reactivity (Cyanide) sample	Cool to 4°C	7 days
Dust (metals)	Mixed Cellulose Ester filter	None	None
Dust (PAHs)	XAD-2 or PTFE Teflon filter	Cool to 4°C	None
Air (VOCs)	1 liter Summa Canister	None	14 days

[1] 14 days between sample collection and extraction, 14 days between extraction and analysis
[2] 14 days between sample collection and TCLP extraction, 7 days between TCLP extraction and 8270C extraction, 40 days between 8270C extraction and analysis
[3] 28 days between sample collection and extraction, 28 days between extraction and analysis
[4] 180 days between sample collection and extraction, 180 days between extraction and analysis
[5] 7days between sample collection and extraction, 40 days between extraction and analysis

[a] Two additional sets of samples will be collected for one in every 20 field samples to be used as the MS and MSD.
[b] One additional set of samples will be collected for one in every 20 aqueous IW disposal samples to be used as the MS.

PTFE – polytetrafluoroethylene.

Table A-13
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
CLP OLM04.3	**TCL Volatiles plus non-CLP and cook list VOCs**	Field QC: Trip Blank	One per Sample Cooler	Target analyte concentration ≤ PQL except for common lab contaminants which shall be ≤ 2xPQL	Check method blank for possible laboratory problem Discuss in Narrative
		Equipment Blank	One per 20 field samples per matrix for VOC analysis if nondisposable sampling equipment is used, not required in association with disposal samples	Analyte concentrations ≤ PQL, except for common lab contaminants which shall be ≤2x PQL	- Check method blank for possible laboratory problem. Document corrective action. - Reanalyze equipment blank - Flag data and discuss in Narrative
		Field Duplicate	One per 10 field samples per matrix for VOC analysis; not required in association with disposal samples	RPD ≤ 30% for aqueous samples, RPD ≤ 50% for solid samples	- Review and discuss in technical report - Flag data where appropriate
		Laboratory QC: BFB tuning check	Every 12 hours	See method	- Check system - Retune as necessary - Document corrective action

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
CLP OLM04.3 (cont.)	**Volatile Organics (cont.)**	Initial Calibration	Prior to analysis of initial project samples and as needed afterward (Calibration standard concentrations of 10,20,50,100 and 200 ug/L)	Relative Response Factor (RRF) for all target VOCs must be ≥0.05, or ≥0.01 for non-CLP compounds Percent Relative Standard Deviation (%RSD) from the initial calibration must be ≤30% (≤40% for non-CLP)	- Check system. - Document corrective action - Repeat as needed to meet criteria prior to analysis of any samples
		Continuing Calibration Check	Once every 12 hours	RRF for target VOCs and surrogates must be ≥0.05, or ≥0.01 for non-CLP compounds Percent Difference (%D) between initial calibration RRF and continuing calibration RRF must be within ≤25% (≤40% for non-CLP)	- Check system. - Document corrective action. - Repeat calibration check. - If still unacceptable, repeat initial calibration and reanalyze affected samples.
		Method Blank	One per batch of ≤20 project samples or every 12 hours	All target VOCs ≤PQL except for common lab contaminants which must be ≤2xPQL	- Reanalyze blank. - If still exceeds criteria, clean work area and reanalyze blank. Do not analyze samples until problem is corrected. Document corrective action. - Reanalyze affected samples.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
CLP OLM04.3 (cont.)	**Volatile Organics (cont.)**	Storage Blank	Once per SDG	All target VOCs ≤PQL	Review associate method blank, if contaminated, follow Method Blank Corrective Action.
		Instrument Blank	Must be analyzed after sample that saturates the instrument to avoid cross contamination	All target VOCs ≤PQL	Decontaminate instrument; reanalyze instrument blank; reanalyze any samples analyzed on contaminated instrument.
		Surrogate Spikes	Every sample (field, standards, QC, blank)	Percent recoveries as shown in Table 6	- Check calculation and instrument performance. - If still unacceptable, reextract and reanalyze. - Discuss in case narrative and flag data if appropriate.
		MS/MSD	One pair per batch of ≤10 project samples (only MS is needed for TCLP samples)	Percent recoveries as shown in Table 6	Discuss in case narrative. If LCS fails, repeat LCS and reanalyze sample.
		LCS	One pair per batch of ≤20 project samples (only MS is needed for TCLP samples)	Percent recoveries as shown in Table 6	Discuss in case narrative. If LCS fails, repeat LCS and reanalyze sample.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
CLP OLM04.3 (cont.)	**Volatile Organics (cont.)**	Internal Standards (ISTD)	Added to all samples, blanks, QC samples	ISTD area counts must be within –50% to +100% compared to the calibration check standard ISTD retention time (RT) must be within ±30 secs of calibration standard	Reanalyze all samples affected by ISTD outliers, report both data sets; discuss in Narrative
CLP OLM04.3	**TCL Semivolatiles Plus non-CLP and cook list SVOCs**	Field QC: Equipment Blank	One per 20 field samples per matrix for SVOC analysis if nondisposable sampling equipment is used; not required in association with disposal samples	Analyte concentrations ≤ PQL, except for common lab contaminants which shall be ≤2x PQL	- Check method blank for possible laboratory problem. Document corrective action. - Reanalyze equipment blank - Flag data and discuss in technical report where appropriate
		Field Duplicate	One per 10 field samples per matrix for SVOC analysis; not required in association with disposal samples	RPD ≤ 30% for aqueous samples, RPD ≤ 50% for solid samples	- Review and discuss in technical report - Flag data where appropriate
		Laboratory QC: DFTPP tuning check	Every 12 hours	See method	- Retune as necessary. - Document corrective action.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
CLP OLM04.3 (cont.)	**Semivolatile Organics (cont.)**	Initial Calibration (linear with 5 points)	Prior to analysis of initial project samples and as needed afterward	RRF must be ≤0.05 for all target SVOCs, or ≥0.01 for non-CLP compounds %RSD for RRFs must be ≤30% for all target SVOCs (≤40% for non-CLP)	- Check system. - Document corrective action. - Repeat as needed to meet criteria prior to analysis of any samples.
		Continuing Calibration Check	Every 12 hours	RRF must be ≥0.05 for all target SVOCs, or ≥0.01 for non-CLP compounds %D must be ≤25% for all target SVOCs (≤40% for non-CLP)	- Check system. - Document corrective action. - Repeat calibration check. - If still unacceptable, repeat initial calibration and reanalyze affected samples.
		Method Blank	One per batch (maximum of 20 field samples per batch) or 1 per day, whichever is more frequent.	≤PQL for all target SVOCs except for common laboratory contaminants which must be ≤2x PQL.	- Reanalyze blank. - If still exceeds criteria, clean work area and reanalyze blank. Do not analyze samples until problem is corrected. Document corrective action. - Reanalyze affected samples.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
CLP OLM04.3 (cont.)	**Semivolatile Organics (cont.)**	Surrogate Spikes	Every sample (field, standards, QC, blank)	Percent recoveries as shown in Table 7	- Check calculation and instrument performance. - If still unacceptable, reextract and reanalyze. - Discuss in case narrative and flag data if appropriate
		MS/MSD	One pair per batch of ≤10 project samples (only MS is needed for TCLP samples)	Percent recoveries as shown in Table 7	- Discuss in case narrative.
		LCS	One pair per batch of ≤20 project samples (only MS is needed for TCLP samples)	Percent recoveries as shown in Table 7	Discuss in case narrative. If LCS fails, repeat LCS and reanalyze sample.
SW-846 8330	**Explosives**	Field QC: Equipment Blank	One per 20 field samples per matrix for pesticides analysis if nondisposable sampling equipment is used; not required in association with disposal samples	Analyte concentrations ≤ PQL	- Check method blank for possible laboratory problem. Document corrective action. - Reanalyze equipment blank - Flag data and discuss in technical report where appropriate

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
SW 8330 (cont.)	**Explosives (cont.)**	Field Duplicate	One per 10 field samples per matrix for analysis; not required in association with disposal samples	RPD ≤ 30% for aqueous samples, RPD ≤ 50% for solid samples,	- Review and discuss in technical report - Flag data where appropriate
		Laboratory QC: Initial Calibration	Prior to analysis of initial project samples and as needed afterward	RSD ≤20% or linear correlation coefficient >0.99 for each target compound	- Check system. - Document corrective action - Repeat as needed to meet criteria prior to analysis of any samples
		Initial Calibration Verification Standard	After initial calibration	% Recovery 85-115%	Correct problem Repeat ICV standard or initial calibration
		Continuing Calibration Check	Every 10 samples and at the end of day	Relative difference or drift ≤15% from initial calibration	- Check system. - Document corrective action. - Repeat calibration check - If still unacceptable, repeat initial calibration and reanalyze affected samples

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
SW 8330 (cont.)	**Explosives (cont.)**	Method Blank	One per batch of ≤20 project samples	Analyte concentrations ≤ ½ PQL	- Reanalyze blank. - If still exceeds criteria, clean work area and reanalyze blank. Do not analyze samples until problem is corrected. Document corrective action. - Reanalyze affected samples.
		Surrogate Spikes	Every sample (field, standards, QC, blank)	Percent recovery as shown in Table 8	- Check calculation and instrument performance. - If still unacceptable, reextract and reanalyze (report both data sets). - Discuss in case narrative
		LCS	One per batch of ≤20 project samples and when MS/MSD falls outside established limits	Percent recovery as shown in Table 8	- Check calibration - Reextract and reanalyze LCS and associated samples - Discuss in case narrative and flag data
		MS/MSD	One pair per batch of ≤10 project samples	Percent recovery as shown in Table 8	- Flag data if LCS is acceptable. - If LCS is unacceptable, re-extract and reanalyze all samples associated with LCS and MS/MSD. - Discuss in case narrative

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
SW 8330 (cont.)	**Explosives (cont.)**	Target Analyte Confirmation	Whenever target analyte is detected and confirmed on 2nd dissimilar column	RPD ≤40%	Discuss in Case Narrative Qualify as appropriate during data validation.
CLP ILM05.3	**Metals (ICP-AES)**	Field QC: Equipment Blank	One per 20 environmental solid samples for arsenic/metals analysis if non-disposable sampling equipment is used; not required in association with disposal samples	≤PQL for all target metals	- Check method blank for possible laboratory problem. Document corrective action. – if method blank is unacceptable, reanalyze equipment unsafe and associated samples – flag data and discuss in case narrative and technical report, as appropriate.
		Field Duplicate	One per 10 field samples per matrix for arsenic/metals analysis; not required in association with disposal samples	RPD ≤ 30% for aqueous and 50% for solids	- Review and discuss in technical report. - Flag data.
		Laboratory QC: Initial Calibration (single point calibration and an instrument blank) ICV	Prior to analysis of each batch of samples After initial calibration	ICP: ±10% of expected value 90-110% or expected value	- Check system. - Document corrective action - Repeat as needed to meet criteria prior to analysis of any samples Check system. Repeat initial calibration

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
CLP ILM05.3 (cont.)	**Metals (ICP-AES) (cont.)**	Continuing Calibration Check	Every 10 samples	ICP: 90-110% or expected value	- Check system. - Document corrective action. - Repeat calibration check - If still unacceptable, repeat initial calibration and reanalyze affected samples
		PQL Check (CRI)	Every 20 project samples and at beginning and end of each analytical run	70-130% of expected value except for Sb, Pb, Tl which is 50-150%	Check system Repeat CRI Repeat calibration
		Initial and continuing calibration blank (ICB & CCB)	10% or every 2 hours during run, minimum of the beginning and end of each run	Concentration of analytes ≤ the PQL	- Check system. - Recalibrate. - Reanalyze affected samples. - Flag data as appropriate.
		Interference check samples (ICP only)	Beginning and end of each analysis run	±20% of true value for analytes present	- Check system - Recalibrate. - Reanalyze preceding samples.
		Preparation Blank	1 per batch (maximum of 20 samples per batch)	If concentration >PQL, lowest concentration in field samples must be 20x the concentration detected in blank.	- Redigest and reanalyze blank and associated samples if sample result is <20x blank result. - Flag data as appropriate..
		MS	One pair per batch of ≤10 project samples (only MS is needed for TCLP samples)	See Control limits in Table 6	- Analyze post digestion spike sample. - Check LCS. - Flag data as appropriate.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
CLP ILM05.3 (cont.)	**Metals (ICP-AES) (cont.)**	Laboratory Duplicate	One per batch of samples	RPD ≤20% (RPD applies to sample and duplicate results >5x the PQL; if sample or duplicate results ≤5x PQL the control limit is the absolute difference between sample and duplicate results must be <PQL	Flag data and discuss in Narrative
		LCS	One per batch of samples	Percent recovery as shown in Table 9	Check system Flag data and discuss in Narrative
		Serial Dilutions	One per batch of ≤20 project samples	ICP: ±10% of original determination	Flag data
		Post digestion spike	When MS outside acceptance range	ICP: Percent recovery 75-125%	Flag the data
CLP ILM05.3	**Metals (Mercury by CVAA)**	Field QC: Equipment Blank	One per 20 environmental solid samples if non-disposable sampling equipment is used (not required with disposal samples).	<PQL	Check method blank for possible laboratory contamination If method blank is contaminated, reanalyze equipment blank and associated samples Discuss in Narrative

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
CLP ILM05.3 (cont.)	**Metals (Mercury by CVAA)- (cont.)**	Field Duplicate	One per 10 field samples per matrix (not required with disposal samples)	RPD ≤30 for aqueous samples and ≤50% for solid samples	No lab action – Blind duplicate Any outliers will be addressed during data validation.
		Laboratory QC: Initial Calibration (one blank and at least 4 calibration standards one of which is at PQL)	Prior to analysis of each batch of samples or daily	Correlation coefficient ≥0.995	Check system Document corrective action Repeat as needed to meet criteria prior to sample analysis
		Initial Calibration Verification (ICV)	After initial calibration	80-120% of expected value	Check system, Repeat ICAL
		Continuing Calibration Check (CCV)	Every 10 samples and at the end of the run	80-120% of expected value	Check system Document corrective action Repeat CCV If still unacceptable, repeat ICAL
		Initial and continuing calibration blanks (ICB & CCB)	At the beginning and end of each day or after every 10 samples	< PQL	Check system Recalibrate Reanalyze associated samples Flag data, discuss in Narrative
		PQL Check (CRI)	Every 20 samples and at beginning and end of day	70-130% or expected value	Check system Repeat CRI Repeat calibration

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
CLP ILM05.3 (cont.)	**Metals (Mercury by CVAA)- (cont.)**	LCS	One per batch of samples	80-120%	Check system Flag data and discuss in Narrative
		MS	One per batch of samples	75-125%	Check system Flag data and discuss in Narrative
		Laboratory Duplicate	One per batch of samples	RPD ≤20% (RPD applies to sample and duplicate results >5x the PQL; if sample or duplicate results ≤5x PQL the control limit is the absolute difference between sample and duplicate results must be <PQL	Flag data and discuss in Narrative
EPA 335.2	**Total Cyanide (Colorimetric Method)**	Field QC: Equipment Blank	One per 20 environmental solid samples if non-disposable sampling equipment is used (not required with disposal samples).	<PQL	Check method blank for possible laboratory contamination If method blank is contaminated, reanalyze equipment blank and associated samples Discuss in Narrative
		Field Duplicate	One per 10 field samples per matrix (not required with disposal samples)	RPD ≤30 for aqueous samples and ≤50% for solid samples	No lab action – Blind duplicate Any outliers will be addressed during data validation.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
EPA 335.2 (cont.)	**Total Cyanide (Colorimetric Method) (cont.)**	Laboratory QC: Initial Calibration (one blank and at least 3 calibration standards one of which is at PQL)	Prior to analysis of each batch of samples or daily	Correlation coefficient ≥0.995	Check system Document corrective action Repeat as needed to meet criteria prior to sample analysis
		Initial Calibration Verification (ICV)	After initial calibration	85-115% of expected value	Check system, Repeat ICAL
		Continuing Calibration Check (CCV)	Every 10 samples and at the end of the run	85-115% of expected value	Check system Document corrective action Repeat CCV If still unacceptable, repeat ICAL
		Initial and continuing calibration blanks (ICB & CCB)	At the beginning and end of each day or after every 10 samples	< PQL	Check system Recalibrate Reanalyze associated samples Flag data, discuss in Narrative
		PQL Check (CRI)	Every 20 samples and at beginning and end of day	70-130% or expected value	Check system Repeat CRI Repeat calibration

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
EPA 335.2 (cont.)	**Total Cyanide (Colorimetric Method) (cont.)**	Preparation Blank	One per analytical batch	< PQL	Redigest and reanalyze blank and associated samples if sample result is ≤ 10X blank result Flag data and discuss in Narrative
		Matrix Spike (MS)	One per batch of 10 samples of similar matrix	See Table 9	Analyze post digestion spike sample Flag data and discuss in Narrative
		Laboratory Duplicate	One per batch of 20 samples	RPD ≤20% (for sample and duplicate values ≥5xPQL; ±PQL if sample and/or dup result <5x PQL	Check data Flag data and discuss in Narrative
SW9030 B	**Hydrogen Sulfide**	Field QC: Equipment Blank	One per 20 environmental solid samples if non-disposable sampling equipment is used (not required with disposal samples).	<PQL	Check method blank for possible laboratory contamination If method blank is contaminated, reanalyze equipment blank and associated samples Discuss in Narrative
		Laboratory QC: Check Standards	One per batch of ≤20 project samples	Dependent on level and matrix.	- Repeat standards check. - If still unacceptable, check system, document corrective action and reprepare and reanalyze affected samples.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
SW 9030B (cont.)	**Hydrogen Sulfide (cont.)**	Method Blank	One per batch of ≤20 project samples	< 5%-10% of the decision limit, 5%-10% of the sample concentration, or 2 x MDL.	- Reanalyze blank. - If still exceeds criteria, clean work area and reanalyze blank. Do not analyze samples until problem is corrected. Document corrective action. - Reanalyze affected samples.
		MS	One per batch of ≤10 project samples	Percent recoveries as shown in Tables 4 and 5.	- Flag data if check standard is acceptable. - If check standard is unacceptable, check system and document corrective action. Do not analyze samples until problem is corrected. Reanalyze all samples associated with the check standard and MS. - Discuss in case narrative.
SW 8015 Modified	**Ethyl Alcohol**	Equipment Blank	One per 20 field samples per matrix if non disposable sampling equipment is used.	Analyte concentrations SPQL, except for common lab contaminants which shall be ≤2xPQL	Check method blank for problem. Document corrective action. Reanalyze equipment blank – Flag data and discuss in narrative.
		Field Duplicate	One per 10 field sample matrix	RDP ≤ 30% for aqueous samples and ≤ 50% for solid samples.	Review and discuss in technical report Flag data where appropriate

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
SW 8015 Modified (cont.)	**Ethyl Alcohol (cont.)**	ICV – Initial Calibration Verification	Prior to the analysis of samples	±15% of the expected value	Check system. Correct problem. Recalibrate system, if necessary. Repeat ICV.
		CCV – Continuing Calibration Verification	After 10 analytical samples and at end of run	±15% of the expected value	Check system. Correct problem. Recalibrate system, if necessary. Reanalyze all samples since last complaint CCV.
		ICB/CCB – Initial and Continuing Calibration Blank	Following ICV and every CCV	All analytes < PQL	Check system. Correct problem. Reanalyze affected samples
		PB – Procedure Blank	1 per batch of samples prepared (maximum of 20 samples per batch)	All analytes < PQL. If not, then the lowest conc. For that analyte in field samples must be › 5x that detected in PB.	Reextract and reanalyze blank and associated sample if sample result is ‹ 5x PB result for a given analyte. Note in narrative.
		LCS – Laboratory Control Sample	1 per batch of samples prepared (maximum of 20 samples per batch)	LCS 65-135% recovery for aqueous or solids	Correct problem. Reextract and reanalyze the samples associated with that LCS.
		MS/MSD	1 per batch of < 10 samples	65-135% recovery and < 30% RPD	Re-extract and re-analyze if less than 10%. Otherwise, note in narrative and flag associated samples.
		Target Analyte Confirmation	Not applicable	Not applicable	Not applicable

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
EPA 314.0 **(see also LCMS method at end of table)**	**Perchlorate**	Equipment Blank	One per 20 field samples per matrix if nondisposable sampling equipment is used	Analyte concentrations ≤ PQL, except for common lab contaminates which shall be ≤ 2xPQL	- Check method blank for possible laboratory problem. Document corrective action. - Reanalyze equipment blank – Flag data and discuss in Narrative
		Field Duplicate	One per 10 field sample matrix	RPD ≤ 50% for solid samples	- Review and discuss in technical report - Flag data where appropriate
		Initial Calibration (a minimum of five points with low point at the reporting limit)	Prior to analysis of initial project samples and as needed	RSD ≤ 20% or linear correlation coefficient > 0.995	Check system Document corrective action Repeat as needed to meet criteria prior to analysis or any samples
		Second Source Initial Calibration Verification	After each new curve.	± 10% of the expected value	Check system. Correct problem. Recalibrate system, if necessary. Repeat ICV.
		ICV – Initial Calibration Verification	Analyzed after the LRB at a concentration prepared at 1ppb	± 25% of the expected value	Check system. Correct problem. Recalibrate system, if necessary. Reanalyze all sample since last compliant CCV.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
EPA 314.0 (cont.)	**Perchlorate (cont.)**	CCV – Continuing Calibration Verification	Bracketing every 10 analytical samples	± 15% of the expected value	Check system. Correct problem. Recalibrate system, if necessary. Reanalyze all sample since last compliant CCV.
		ICB/CCB – Initial and Continuing Calibration Blanks	Following each ICV and CCV	All analytes < ½ the PQL	Check or clean system. Re-analyze all positive samples greater than the MDL since last compliant ICB/CCB.
		Instrument Performance Check	Prior to the analysis of samples	± 10% of the maximum conductivity ((700µS/cm) with the perchlorate recovery at the MRL between 70-130%	Re-calibrate the threshold
		Laboratory Reagent Blank (LRB)	1 per batch of samples (maximum of 20 samples per batch) and for each cleanup procedure	< ½ the reporting limit	Reextract and reanalyze blank and associated sample if sample result is < 5x PB result for a given analyte. Note in narrative.
		LCS-Laboratory Control Sample	1 per batch of samples prepared (maximum of 20 samples per batch)	LCS 75-125% recovery	Correct problem. Reextract and reanalyze the samples associated with that LCS.
		MS/MSD	1 per batch of <10 samples	75-125% recovery and <30% RPD.	Re-extract and re-analyze if less than 10%. Otherwise, note in narrative and flag associated samples.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
EPA 314.0 (cont.)	**Perchlorate (cont.)**	Confirmation	For each positive result above 1ppb.	a) Post spike with at least 75% recovery. b) Analyze using LC/MS by a modified 8321A	
GPL-SOP S-1	**Picric acid**	Equipment Blank	One per 20 field samples per matrix if nondisposable sampling equipment is used.	Analyte concentrations ≤ PQL, except for common lab contaminants which shall be ≤2Xpql	Check method blank for possible laboratory problem. Document corrective action Reanalyze equipment blank – Flag data and discuss in Narrative
		Field Duplicate	One per 10 field sample matrix	RDP ≤ 30% for aqueous samples and ≤ 50% for solid samples	Review and discuss in technical report Flag data where appropriate
		Initial Calibration (a minimum of five points with low point at the reporting limit)	Prior to analysis of initial project samples and as needed	RSD ≤ 20% or linear correlation coefficient > 0.99	Check system Document Corrective action Repeat as needed to meet criteria prior to analysis of any samples
		ICV – Initial Calibration Verification	Prior to the analysis of samples	± 15% of the expected value	Check system. Correct problem. Recalibrate system, if necessary, Repeat ICV.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
GPL SOP S.1 (cont.)	**Picric Acid (cont.)**	CCV – Continuing Calibration Verification	After 10 analytical samples and at end of run	± 15% of the expected value	Check system. Correct problem. Recalibrate system, if necessary. Reanalyze all sample since last compliant CCV.
		ICB/CCB – Initial and Continuing Calibration Blank	Following ICV and every CCV.	All analytes < PQL	Check system. Correct problem. Reanalyze affected samples.
		PB – Procedure Blank	1 per batch of samples prepared (maximum of 20 samples per batch)	All analytes < PQL. If not, then the lowest conc. For that analyte in field samples must be > 5x that detected in PB.	Reextract and reanalyze blank and associated sample if sample result is < 5x PB result for given analyte. Note in narrative.
		Surrogate Spikes	Every sample (field, standards, QC, blank)	See Method	Check calculation and instrument performance. If still unacceptable, reextract and reanalyze (report both data sets). Discuss in case narrative.
		MS/MSD	1 per batch of <10 samples	67-120% and < 20% RPD	Re-extract and re-analyze if less than 10%. Otherwise, note in narrative and flag associated samples.
		Target Analyte Confirmation	Whenever target analyte is detected on a primary column it will be confirmed on 2nd dissimilar column	RPD <40%	Discuss in Case Narrative. Qualify as appropriate during data validation.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
GPL SOP R.3V8	**Dithiane & oxathiane**	Equipment Blank	One per 20 field samples per matrix if nondisposable sampling equipment is used.	Analyte concentrations ≤ PQL, except for common lab contaminants which shall be ≤2Xpql.	Check method blank for possible laboratory problem. Document corrective action. Reanalyze equipment blank – Flag data and discuss in Narrative.
		Field Duplicate	One per 10 field sample matrix	RPD ≤ 50% for solid samples	Review and discuss in technical report Flag data where appropriate
		Initial Calibration (a minimum of five points with low point at the reporting limit)	Prior to analysis of initial project samples and as needed	RSD ≤ 20% or linear correlation coefficient >0.99	Check system. Document corrective action Repeat as needed to meet criteria prior to analysis of any samples
		ICV – Initial Calibration Verification	Prior to the analysis of samples	± 25% of the expected value for each analyte	Check system. Correct problem. Recalibrate system, if necessary, Repeat ICV.
		CCV – Continuing Calibration Verification	After 10 analytical samples and at end of run	± 25% of the expected value for each analyte	Check system. Correct problem. Recalibrate system, if necessary. Reanalyze all sample since last compliant CCV.
		ICB/CCB – Initial and Continuing Calibration Blank	Following ICV and every CCV.	All analytes < PQL	Check system. Correct problem. Reanalyze affected samples.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
GPL SOP R.3V8 (cont.)	**Dithiane & Oxathiane (cont.)**	PB – Procedure Blank	1 per batch of samples prepared (maximum of 20 samples per batch)	All analytes < PQL. If not, then the lowest conc. For that analyte in field samples must be > 5x that detected in PB.	Reextract and reanalyze blank and associated sample if sample result is < 5x PB result for given analyte. Note in narrative.
		LCS-Laboratory Control Sample	1 per batch of samples prepared (maximum of 20 samples per batch)	Solid LCS 70-119 for dithiane and 33-107 for oxathiane	Correct problem. Reextract and reanalyze the samples associated with that LCS.
		Surrogate Spikes 2-Bromothioanisole	Every sample (field, standards, QC, blank)	51-171%	Check calculation and instrument performance. If still unacceptable, reextract and reanalyze (report both data sets). Discuss in case narrative.
		MS/MSD	1 per batch of <10 samples	Solid LCS 70-119 for dithiane and 33-107 for oxathiane 44-136% and < 20% RPD	Re-extract and re-analyze if less than 10%. Otherwise, note in narrative and flag associated samples.
UW22-MOD-W **LW18-MOD-S**	**Chloroacetic Acid**	Equipment Blank	One per 20 field samples per matrix if nondisposable sampling equipment is used.	Analyte concentrations ≤ PQL, except for common lab contaminants which shall be ≤2Xpql.	Check method blank for possible laboratory problem. Document corrective action. Reanalyze equipment blank – Flag data and discuss in Narrative.
		Field Duplicate	One per 10 field sample matrix	RPD ≤ 30% for aqueous samples and ≤ 50% for solid samples	Review and discuss in technical report Flag data where appropriate

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
UW22-MOD-W **LW18-MOD-S (cont.)**	**Chloroacetic Acid (cont.)**	Initial Calibration (a minimum of five points with low point at the reporting limit)	Prior to analysis of initial project samples and as needed	RSD ≤ 20% or linear correlation coefficient >0.995	Check system. Document corrective action Repeat as needed to meet criteria prior to analysis of any samples
		ICV – Initial Calibration Verification	Prior to the analysis of samples	± 15% of the expected value for each analyte	Check system. Correct problem. Recalibrate system, if necessary, Repeat ICV.
		CCV – Continuing Calibration Verification	After 10 analytical samples and at end of run	± 15% of the expected value for each analyte	Check system. Correct problem. Recalibrate system, if necessary. Reanalyze all sample since last compliant CCV.
		ICB/CCB – Initial and Continuing Calibration Blank	Following ICV and every CCV.	All analytes < ½ the PQL	Check or clean system. Re-analyze all positive samples greater than the MDL since last compliant ICB/CCB.
		PB – Procedure Blank	1 per batch of samples prepared (maximum of 20 samples per batch)	All analytes < PQL. If not, then the lowest conc. For that analyte in field samples must be > 5x that detected in PB.	Reextract and reanalyze blank and associated sample if sample result is < 5x PB result for given analyte. Note in narrative.
		LCS-Laboratory Control Sample	1 per batch of samples prepared (maximum of 20 samples per batch)	See Tables 4 and 5	Correct problem. Reextract and reanalyze the samples associated with that LCS.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
UW22-MOD-W **LW18-MOD-S (cont.)**	**Chloroacetic Acid (cont.)**	MS/MSD	1 per batch of <10 samples	37-138% and < 20% RPD for solid and aqueous samples	Re-extract and re-analyze if less than 10%. Otherwise, note in narrative and flag associated samples.
		Target Analyte Confirmation	Whenever target analyte is detected on a primary column it will be confirmed on 2nd dissimilar column	RPD <40%	Discuss in Case Narrative. Qualify as appropriate during data validation.
GPL SOP S.2V6	**Thiodiglycol**	Equipment Blank	One per 20 field samples per matrix if nondisposable sampling equipment is used.	Analyte concentrations ≤ PQL, except for common lab contaminants which shall be ≤2XPQL.	Check method blank for possible laboratory problem. Document corrective action. Reanalyze equipment blank – Flag data and discuss in Narrative.
		Field Duplicate	One per 10 field sample matrix	RPD ≤ 30% for aqueous samples and ≤ 50% for solid samples	Review and discuss in technical report Flag data where appropriate
		Initial Calibration (a minimum of five points with low point at the reporting limit)	Prior to analysis of initial project samples and as needed	RSD ≤ 20% or linear correlation coefficient >0.995	Check system. Document corrective action Repeat as needed to meet criteria prior to analysis of any samples
		ICV – Initial Calibration Verification	Prior to the analysis of samples	± 15% of the expected value for each analyte	Check system. Correct problem. Recalibrate system, if necessary, Repeat ICV.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
GPL SOP S.2V6 (cont.)	**Thiodiglycol (cont.)**	CCV – Continuing Calibration Verification	After 10 analytical samples and at end of run	± 15% of the expected value for each analyte	Check system. Correct problem. Recalibrate system, if necessary. Reanalyze all sample since last compliant CCV.
		ICB/CCB – Initial and Continuing Calibration Blank	Following ICV and every CCV.	All analytes < ½ the reporting limit	Check or clean system. Re-analyze all positive samples greater than the MDL since last compliant ICB/CCB.
		PB – Procedure Blank	1 per batch of samples prepared (maximum of 20 samples per batch)	All analytes < PQL. If not, then the lowest conc. For that analyte in field samples must be > 5x that detected in PB.	Reextract and reanalyze blank and associated sample if sample result is < 5x PB result for given analyte. Note in narrative.
		LCS-Laboratory Control Sample	1 per batch of samples prepared (maximum of 20 samples per batch)	LCS 64-120% recovery	Correct problem. Reextract and reanalyze the samples associated with that LCS.
		MS/MSD	1 per batch of <10 samples	64-120% and < 20% RPD	Re-extract and re-analyze if less than 10%. Otherwise, note in narrative and flag associated samples.
		Target Analyte Confirmation	Whenever target analyte is detected on a primary column it will be confirmed on 2nd dissimilar column	RPD <40%	Discuss in Case Narrative. Qualify as appropriate during data validation.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
E314-0 Modified	**Iodine or Iodine pentafloride**	Equipment Blank	One per 20 field samples per matrix if nondisposable sampling equipment is used.	Analyte concentrations ≤ PQL, except for common lab contaminants which shall be ≤2XPQL.	Check method blank for possible laboratory problem. Document corrective action. Reanalyze equipment blank – Flag data and discuss in Narrative.
		Field Duplicate	One per 10 field sample matrix	RPD ≤ 30% for aqueous samples and ≤ 50% for solid samples	Review and discuss in technical report Flag data where appropriate
		Initial Calibration (a minimum of five points with low point at the reporting limit)	Prior to analysis of initial project samples and as needed	RSD ≤ 20% or linear correlation coefficient >0.995	Check system. Document corrective action Repeat as needed to meet criteria prior to analysis of any samples
		ICV – Initial Calibration Verification	Prior to the analysis of samples	± 15% of the expected value for each analyte	Check system. Correct problem. Recalibrate system, if necessary, Repeat ICV.
		CCV – Continuing Calibration Verification	After 10 analytical samples and at end of run	± 15% of the expected value for each analyte	Check system. Correct problem. Recalibrate system, if necessary. Reanalyze all sample since last compliant CCV.
		ICB/CCB – Initial and Continuing Calibration Blank	Following ICV and every CCV.	All analytes < ½ the reporting limit	Check or clean system. Re-analyze all positive samples greater than the MDL since last compliant ICB/CCB.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
E314-0 Modified (cont.)	**Iodine or Iodine pentafloride (cont.)**	PB – Procedure Blank	1 per batch of samples prepared (maximum of 20 samples per batch)	All analytes < PQL. If not, then the lowest conc. For that analyte in field samples must be > 5x that detected in PB.	Reextract and reanalyze blank and associated sample if sample result is < 5x PB result for given analyte. Note in narrative.
		LCS-Laboratory Control Sample	1 per batch of samples prepared (maximum of 20 samples per batch)	See Tables 4 and 5	Correct problem. Reextract and reanalyze the samples associated with that LCS.
		Laboratory Duplicate	1 per each group of <10 samples	See Tables 4 and 5	If conc. are >10x MDL, and RPD > 20%, flag data and note in narrative.
		MS	1 per batch of <10 samples	See Tables 4 and 5	Re-extract and re-analyze if less than 10%. Otherwise, note in narrative and flag associated samples.
GPL SOP L .12	**Acetic Acid**	Equipment Blank	One per 20 field samples per matrix if nondisposable sampling equipment is used.	Analyte concentrations ≤ PQL, except for common lab contaminants which shall be ≤2XPQL.	Check method blank for possible laboratory problem. Document corrective action. Reanalyze equipment blank – Flag data and discuss in Narrative.
		Field Duplicate	One per 10 field sample matrix	RPD ≤ 30% for aqueous samples and ≤ 50% for solid samples	Review and discuss in technical report Flag data where appropriate

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
GPL SOP L .12 (cont.)	**Acetic Acid (cont.)**	Initial Calibration (a minimum of five points with low point at the reporting limit)	Prior to analysis of initial project samples and as needed	RSD ≤ 20% or linear correlation coefficient >0.995	Check system. Document corrective action Repeat as needed to meet criteria prior to analysis of any samples
		ICV – Initial Calibration Verification	Prior to the analysis of samples	± 25% of the expected value for each analyte	Check system. Correct problem. Recalibrate system, if necessary, Repeat ICV.
		CCV – Continuing Calibration Verification	After 10 analytical samples and at end of run	± 25% of the expected value for each analyte	Check system. Correct problem. Recalibrate system, if necessary. Reanalyze all sample since last compliant CCV.
		ICB/CCB – Initial and Continuing Calibration Blank	Following ICV and every CCV.	All analytes < PQL	Check or clean system. Re-analyze all positive samples greater than the MDL since last compliant ICB/CCB.
		PB – Procedure Blank	1 per batch of samples prepared (maximum of 20 samples per batch)	All analytes < PQL. If not, then the lowest conc. For that analyte in field samples must be > 5x that detected in PB.	Reextract and reanalyze blank and associated sample if sample result is < 5x PB result for given analyte. Note in narrative.
		LCS-Laboratory Control Sample	1 per batch of samples prepared (maximum of 20 samples per batch)	LCS 75-125% recovery	Correct problem. Reextract and reanalyze the samples associated with that LCS.
		Laboratory Duplicate	1 per each group of <10 samples	< 20% RPD.	If conc. Are >10x MDL, and RPD > 20%, flag data and note in narrative.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
GPL SOP L .12 (cont.)	**Acetic Acid (cont.)**	MS	1 per batch of <10 samples	75-125%	Re-extract and re-analyze if less than 10%. Otherwise, note in narrative and flag associated samples.
Immunoassay	**Ricin**	Equipment Blank	Once per 20 field samples	Ricin not present	Reanalyze equipment blank – Flag data and discuss in Narrative
		Field Duplicate	One per 10 field sample matrix	Agreement of positive or not present	Review and discuss in technical report
		Assay Control	Each Test	Appearance of the control line indicates a proper test	Repeat
GEOMET SOP CDLD SOP 77	**CVAA/CVAO**	Equipment Blank	One per 20 field samples per matrix if nondisposable sampling equipment is used.	Analyte concentrations ≤ PQL, except for common lab contaminants which shall be ≤2XPQL.	Check method blank for possible laboratory problem. Document corrective action. Reanalyze equipment blank – Flag data and discuss in Narrative.
		Field Duplicate	One per 10 field sample matrix	RPD ≤ 50% for solid samples	Review and discuss in technical report Flag data where appropriate
		Initial Calibration (a minimum of five points with low point at the reporting limit)	Prior to analysis of initial project samples and as needed	RSD ≤ 25% or correlation coefficient >0.990	Check system. Document corrective action Repeat as needed to meet criteria prior to analysis of any samples

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
GEOMET SOP CDLD SOP 77 (cont.)	**CVAA/CVAO (cont.)**	ICV – Initial Calibration Verification	Prior to the analysis of samples	± 25% of the expected value for each analyte	Check system. Correct problem. Recalibrate system, if necessary, Repeat ICV.
		CCV – Continuing Calibration Verification	After 10 analytical samples and at end of run	± 25% of the expected value for each analyte	Check system. Correct problem. Recalibrate system, if necessary. Reanalyze all sample since last compliant CCV.
		ICB/CCB – Initial and Continuing Calibration Blank	Following ICV and every CCV.	All analytes < PQL	Check or clean system. Re-analyze all positive samples greater than the MDL since last compliant ICB/CCB.
		PB – Procedure Blank	1 per batch of samples prepared (maximum of 20 samples per batch)	All analytes < PQL. If not, then the lowest conc. For that analyte in field samples must be > 5x that detected in PB.	Reextract and reanalyze blank and associated sample if sample result is < 5x PB result for given analyte. Note in narrative.
		LCS-Laboratory Control Sample	1 per batch of samples prepared (maximum of 20 samples per batch)	Solid LCS 50-150% recovery	Correct problem. Reextract and reanalyze the samples associated with that LCS.
		Lab Duplicate or Matrix Spike Duplicate	1 per batch of <20 samples	<30% RPD	If conc. Are >10x MDL, and RPD> 20%, flag data and note in narrative.
		MS/MSD	1 per batch of <10 samples	20-150%	Re-extract and re-analyze if less than 10%. Otherwise, note in narrative and flag associated samples.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
GEOMET SOP CDLD SOP 77 (cont.)	**CVAA/CVAO (cont.)**	Internal Standards (STD)	Not applicable	Not applicable	Not applicable
		Surrogate Spikes	Not applicable	Not applicable	Not applicable
GEOMET SOP CDLD SOP 77	**Mustard**	Equipment Blank	One per 20 field samples per matrix if nondisposable sampling equipment is used.	Analyte concentrations ≤ PQL, except for common lab contaminants which shall be ≤2XPQL.	Check method blank for possible laboratory problem. Document corrective action. Reanalyze equipment blank – Flag data and discuss in Narrative.
		Field Duplicate	One per 10 field sample matrix	RPD ≤ 30% for solid samples	Review and discuss in technical report Flag data where appropriate
		ICV – Initial Calibration Verification	Prior to the analysis of samples	± 25% of the expected value for each analyte	Check system. Correct problem. Recalibrate system, if necessary, Repeat ICV.
		CCV – Continuing Calibration Verification	After 10 analytical samples and at end of run	± 25% of the expected value for each analyte	Check system. Correct problem. Recalibrate system, if necessary. Reanalyze all sample since last compliant CCV.
		ICB/CCB – Initial and Continuing Calibration Blank	Following ICV and every CCV.	All analytes < PQL	Check or clean system. Re-analyze all positive samples greater than the MDL since last compliant ICB/CCB.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
GEOMET SOP CDLD SOP 77 (cont.)	**Mustard (cont.)**	PB – Procedure Blank	1 per batch of samples prepared (maximum of 20 samples per batch)	All analytes < PQL. If not, then the lowest conc. For that analyte in field samples must be > 5x that detected in PB.	Reextract and reanalyze blank and associated sample if sample result is < 5x PB result for given analyte. Note in narrative.
		LCS-Laboratory Control Sample	1 per batch of samples prepared (maximum of 20 samples per batch)	Solid LCS 50-150% recovery	Correct problem. Reextract and reanalyze the samples associated with that LCS.
		Lab Duplicate or Matrix Spike duplicate	1 per each group of <10 samples	< 30% RPD.	If conc. Are >10x MDL, and RPD > 20%, flag data and note in narrative.
		MS/MSD	1 per batch of < 10 samples	50-150%	Re-extract and re-analyze if less than 10%. Otherwise, note in narrative and flag associated samples.
SW-846 9040B/ 9045C	**Corrosivity**	Field QC: This method will only be used for analysis of disposal samples; field QC samples are not required for disposal samples			
		Laboratory QC: Initial Calibration (calibration with pH 4 and pH 10)	Prior to analysis of initial project samples and as needed afterward	Values within 0.05 pH units of the expected value.	- Check system. - Document corrective action. - Repeat as needed to meet criteria prior to analysis of any samples.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
SW-846 9040B/ 9045C	**Corrosivity**	Calibration Verification with pH 7	Once per batch of ≤20 project samples	Values within 0.05 pH units of the expected value	- Check system. - Document corrective action. - Repeat calibration verification.. - If still unacceptable, repeat initial calibration and reanalyze affected samples.
SW-846 Chapter 7	**Reactivity (Cyanide)**	Field QC: This method will only be used for analysis of disposal samples; field QC samples are not required for disposal samples			
		Laboratory QC: Standard Curve (if spectrophotometric determination is used)	Prior to analysis of initial project samples and as needed afterward	Correlation coefficient ≥ 0.995	- Check system. - Document corrective action. - Repeat as needed to meet criteria prior to analysis of any samples.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
SW-846 Chapter 7 (cont.)	**Reactivity (Cyanide) (cont.)**	Check Standards	One per batch of ≤20 project samples	±15% of expected value	- Repeat standards check. - If spectrophotometric determination is being used and standards check is still unacceptable, repeat initial standards curve and reanalyze affected samples. - If titration procedure is being used and standards check is still unacceptable, check system, document corrective action and reprepare and reanalyze affected samples.
		Method Blank	One per batch of ≤20 project samples	< 5%-10% of the decision limit, 5%-10% of the sample concentration, or 2 x MDL.	- Reanalyze blank. - If still exceeds criteria, clean work area and reanalyze blank. Do not analyze samples until problem is corrected. Document corrective action. - Reanalyze affected samples.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
SW-846 Chapter 7 (cont.)	**Reactivity (Cyanide) (cont.)**	MS	One per batch of ≤10 project samples	Percent recoveries as shown in Tables 4 and 5.	- Flag data if check standard is acceptable. - If check standard is unacceptable, check system and document corrective action. Do not analyze samples until problem is corrected. Reanalyze all samples associated with the check standard and MS. - Discuss in case narrative.
SW-846 Chapter 7	**Reactivity (Sulfide)**	Field QC: This method will only be used for analysis of disposal samples; field QC samples are not required for disposal samples			
		Laboratory QC: Standard Curve (if spectrophotometric determination is used)	Prior to analysis of initial project samples and as needed afterward	Correlation coefficient ≥ 0.995	- Check system. - Document corrective action. - Repeat as needed to meet criteria prior to analysis of any samples.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
SW-846 Chapter 7 (cont.)	**Reactivity (Sulfide) (cont.)**	Check Standards	One per batch of ≤20 project samples	±15% of expected value	- Repeat standards check. - If spectrophotometric determination is being used and standards check is still unacceptable, repeat initial standards curve and reanalyze affected samples. - If titration procedure is being used and standards check is still unacceptable, check system, document corrective action and reprepare and reanalyze affected samples.
		Method Blank	One per batch of ≤20 project samples	< 5%-10% of the decision limit, 5%-10% of the sample concentration, or 2 x MDL.	- Reanalyze blank. - If still exceeds criteria, clean work area and reanalyze blank. Do not analyze samples until problem is corrected. Document corrective action. - Reanalyze affected samples.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
SW-846 Chapter 7 (cont.)	**Reactivity (Sulfide) (cont.)**	MS	One per batch of ≤10 project samples	Percent recoveries as shown in Tables 4 and 5.	- Flag data if check standard is acceptable. - If check standard is unacceptable, check system and document corrective action. Do not analyze samples until problem is corrected. Reanalyze all samples associated with the check standard and MS. - Discuss in case narrative.
SW-846 1010	**Ignitability**	Field QC: This method will only be used for analysis of disposal samples	Field QC samples are not required for disposal samples		
		Laboratory QC: Check Standards		Standard should flash between 26oC and 27oC	- Inspect apparatus. - Check standard and document corrective action Repeat test
		Duplicate	One per batch of ≤20 pit characterization samples	+ 5oC	- Inspect apparatus. - Check standard and document corrective action Repeat test
SW 846 1311/8260B	**TCLP Volatiles**	Field QC samples are not required for disposal samples.			

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
SW1311/8260B (cont.)	**TCLP Volatiles (cont.)**	Laboratory QC: BFB tuning check	Every 12 hours	See method	- Check system - Retune as necessary - Document corrective action
		Initial Calibration	Prior to analysis of initial project samples and as needed afterward (Calibration standard concentrations of 10,20,50,100 and 200 ug/L)	Relative Response Factor (RRF) for all target VOCs must be ≥0.05 Percent Relative Standard Deviation (%RSD) from the initial calibration must be ≤30%.	- Check system. - Document corrective action - Repeat as needed to meet criteria prior to analysis of any samples
		Continuing Calibration Check	Once every 12 hours	RRF for target VOCs and surrogates must be ≥0.05 Percent Difference (%D) between initial calibration RRF and continuing calibration RRF must be within ±25%.	- Check system. - Document corrective action. - Repeat calibration check. - If still unacceptable, repeat initial calibration and reanalyze affected samples.
		Method Blank	One per batch of ≤20 project samples or every 12 hours	All target VOCs ≤PQL except for common lab contaminants which must be ≤2xPQL	- Reanalyze blank. - If still exceeds criteria, clean work area and reanalyze blank. Do not analyze samples until problem is corrected. Document corrective action. - Reanalyze affected samples.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
SW1311/8260B (cont.)	**TCLP Volatiles (cont.)**	Surrogate Spikes	Every sample (field, standards, QC, blank)	Percent recoveries as shown in Table 6	- Check calculation and instrument performance. - If still unacceptable, reextract and reanalyze. - Discuss in case narrative and flag data if appropriate.
		MS	One pair per batch of ≤10 project samples (only MS is needed for TCLP samples)	Percent recoveries as shown in Table 6	Discuss in case narrative.
		Internal Standards (ISTD)	Added to all samples, blanks, QC samples	ISTD area counts must be within –50% to +100% compared to the calibration check standard ISTD retention time (RT) must be within ±30 secs of calibration standard	Reanalyze all samples affected by ISTD outliers, report both data sets; discuss in Narrative
SW 846 1311/3510C/ 8270C	**TCLP Semivolatiles**	Field QC samples are not required for disposal samples.			
		Laboratory QC: DFTPP tuning check	Every 12 hours	See method	- Retune as necessary. - Document corrective action.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
SW 846 1311/3510C/ 8270C (cont.)	**TCLP Semivolatiles (cont.)**	Initial Calibration (linear with 5 points)	Prior to analysis of initial project samples and as needed afterward	RRF must be ≤0.05 for all target SVOCs. %RSD for RRFs must be ≤30% for all target SVOCs	- Check system. - Document corrective action. - Repeat as needed to meet criteria prior to analysis of any samples.
		Continuing Calibration Check	Every 12 hours	RRF must be ≥0.05 for all target SVOCs %D must be ±25% for all target SVOCs	- Check system. - Document corrective action. - Repeat calibration check. - If still unacceptable, repeat initial calibration and reanalyze affected samples.
		Method Blank	One per batch (maximum of 20 field samples per batch) or 1 per day, whichever is more frequent.	≤PQL for all target SVOCs except for common laboratory contaminants which must be ≤2x PQL.	- Reanalyze blank. - If still exceeds criteria, clean work area and reanalyze blank. Do not analyze samples until problem is corrected. Document corrective action. - Reanalyze affected samples.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
SW 846 1311/3510C/ 8270C (cont.)	**TCLP Semivolatiles (cont.)**	Surrogate Spikes	Every sample (field, standards, QC, blank)	Percent recoveries as shown in Table 7 (Water)	- Check calculation and instrument performance. - If still unacceptable, reextract and reanalyze. - Discuss in case narrative and flag data if appropriate
		MS	One pair per batch of ≤10 project samples (only MS is needed for TCLP samples)	Percent recoveries as shown in Table 7 (Water)	- Discuss in case narrative.
		Internal Standards (ISTD)	Added to all samples, blanks, QC samples	ISTD area counts must be within –50% to +100% compared to the calibration check standard ISTD retention time (RT) must be within ±30 secs of calibration standard	Reanalyze all samples affected by ISTD outliers, report both data sets; discuss in Narrative
SW 846 1311/ 6010B/7470A	**TCLP METALS**	Field QC samples are not required for disposal samples.			

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
SW 846 1311/ 6010B (cont.)	**TCLP Metals (cont.)**	Laboratory QC: Initial Calibration (single point calibration and an instrument blank) ICV	Prior to analysis of each batch of samples After initial calibration	ICP: ±10% of expected value 90-110% or expected value	- Check system. - Document corrective action - Repeat as needed to meet criteria prior to analysis of any samples Check system. Repeat initial calibration
		Continuing Calibration Check	Every 10 samples	ICP: 90-110% or expected value	- Check system. - Document corrective action. - Repeat calibration check - If still unacceptable, repeat initial calibration and reanalyze affected samples
		Initial and continuing calibration blank (ICB & CCB)	10% or every 2 hours during run, minimum of the beginning and end of each run	Concentration of analytes ≤ the PQL	- Check system. - Recalibrate. - Reanalyze affected samples. - Flag data as appropriate.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
SW 846 1311/ 6010B (cont.)	**TCLP Metals (cont.)**	Interference check samples (ICP only)	Beginning and end of each analysis run	±20% of true value for analytes present	- Check system - Recalibrate. - Reanalyze preceding samples.
		Preparation Blank	1 per batch (maximum of 20 samples per batch)	If concentration >PQL, lowest concentration in field samples must be 20x the concentration detected in blank.	- Redigest and reanalyze blank and associated samples if sample result is <20x blank result. - Flag data as appropriate..
		MS	One pair per batch of ≤10 project samples (only MS is needed for TCLP samples)	See Control limits in Table 10	- Analyze post digestion spike sample. - Check LCS. - Flag data as appropriate.
		Laboratory Duplicate	One per batch of samples	RPD ≤20% (RPD applies to sample and duplicate results >5x the PQL; if sample or duplicate results ≤5x PQL the control limit is the absolute difference between sample and duplicate results must be <PQL	Flag data and discuss in Narrative
		LCS	One per batch of samples	80-120%	Check system Flag data and discuss in Narrative
		Serial Dilutions	One per batch of ≤20 project samples	ICP: ±10% of original determination	Flag data

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
SW 846 1311/ 6010B (cont.)	**TCLP Metals (cont.)**	Post digestion spike	When MS outside acceptance range	ICP: Percent recovery 75-125%	Flag the data
SW 1311/7470A	**TCLP Metals (Mercury by CVAA)**	Field QC samples are not required for disposal samples.			
		Laboratory QC: Initial Calibration (one blank and at least 4 calibration standards one of which is at PQL)	Prior to analysis of each batch of samples or daily	Correlation coefficient ≥0.995	Check system Document corrective action Repeat as needed to meet criteria prior to sample analysis
		Initial Calibration Verification (ICV)	After initial calibration	80-120% of expected value	Check system, Repeat ICAL
		Continuing Calibration Check (CCV)	Every 10 samples and at the end of the run	80-120% of expected value	Check system Document corrective action Repeat CCV If still unacceptable, repeat ICAL
		Initial and continuing calibration blanks (ICB & CCB)	At the beginning and end of each day or after every 10 samples	< PQL	Check system Recalibrate Reanalyze associated samples Flag data, discuss in Narrative

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
SW 1311/7470A (cont.)	**TCLP Metals (Mercury by CVAA) (cont.)**	LCS	One per batch of samples	80-120%	Check system Flag data and discuss in Narrative
		MS	One per batch of samples	75-125%	Check system Flag data and discuss in Narrative
		Laboratory Duplicate	One per batch of samples	RPD ≤20% (RPD applies to sample and duplicate results >5x the PQL; if sample or duplicate results ≤5x PQL the control limit is the absolute difference between sample and duplicate results must be <PQL	Flag data and discuss in Narrative
EPA 300.0	**Chloride, Fluoride and Bromide by Ion Chromatography**	ICV – Initial Calibration Verification	Prior to the analysis of samples	±10% of the expected value for each analyte	Check system. Correct problem. Recalibrate system, if necessary. Repeat ICV.
		CCV – Continuing Calibration Verification	After 10 analytical samples and at end of run	±10% of the expected value for each analyte	Check system. Correct problem. Recalibrate system, if necessary. Reanalyze all sample since last compliant CCV.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
EPA 300.0 (cont.)	**Chloride, Fluoride and Bromide by Ion Chromatography (Cont.)**	ICB/CCB – Initial and Continuing Calibration Blank	Following ICV and every CCV.	All analytes < PQL	Check system. Correct problem. Reanalyze affected samples.
		PB – Procedure Blank	1 per batch of samples prepared (maximum of 20 samples per batch)	All analytes < PQL. If not, then the lowest conc. for that analyte in field samples must be > 10x that detected in PB.	Reextract and reanalyze blank and associated sample if sample result is < 10x PB result for a given analyte. Note in narrative.
		LCS-Laboratory Control Sample	1 per batch of samples prepared (maximum of 20 samples per batch)	Aqueous LCS 80–120% recovery.	Correct problem. Reextract and reanalyze the samples associated with that LCS.
		Duplicate	1 per batch of ≤10 samples	If conc. are ≥10x PQL, than ≤ 20% RPD.	If conc. are ≥10x MDL, and RPD ≥ 20%, flag data and note in narrative.
		MS	1 per batch of ≤10 samples	75-125%	Note in narrative. Flag associated samples.
LCMS_CL04_ REV2	**Perchlorate**	Field Duplicate	One per 10 field sample matrix	RPD ≤ 30% for aqueous samples and ≤ 50% for solid samples	Review and discuss in technical report Flag data where appropriate
		Initial Calibration (a minimum of five points with low point at the reporting limit)	Prior to analysis of initial project samples and as needed	linear correlation coefficient >0.995	Check system. Document corrective action Repeat as needed to meet criteria prior to analysis of any samples

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
LCMS_CL04_ REV2 (cont.)	**Perchlorate (cont.)**	ICV – Initial Calibration Verification	Prior to the analysis of samples	± 15% of the expected value for each analyte	Check system. Correct problem. Recalibrate system, if necessary, Repeat ICV.
		CCV – Continuing Calibration Verification	After 10 analytical samples and at end of run	± 15% of the expected value for each analyte	Check system. Correct problem. Recalibrate system, if necessary. Reanalyze all sample since last compliant CCV.
		ICB/CCB – Initial and Continuing Calibration Blank	Following ICV and every CCV.	All analytes < ½ the reporting limit	Check or clean system. Re-analyze all positive samples greater than the MDL since last compliant ICB/CCB.
		PB – Procedure Blank	1 per batch of samples prepared (maximum of 20 samples per batch)	All analytes < RL. If not, then the lowest conc. For that analyte in field samples must be > 5x that detected in PB.	Reextract and reanalyze blank and associated sample if sample result is < 5x PB result for given analyte. Note in narrative.
		LCS-Laboratory Control Sample	1 per batch of samples prepared (maximum of 20 samples per batch)	80-120% R	Correct problem. Reextract and reanalyze the samples associated with that LCS.
		Laboratory Duplicate	1 per each group of <10 samples	RPD $\leq$ 20%	If conc. are >10x MDL, and RPD > 20%, flag data and note in narrative.
		MS	1 per batch of <10 samples	80-120% R	Re-extract and re-analyze if less than 10%. Otherwise, note in narrative and flag associated samples.

Table A-13 (Continued)
Summary of Internal Quality Control and Corrective Action Requirements

Analytical Method	Parameter	Quality Control Check	Frequency	Acceptable Criteria	Corrective Action
General					
Holding time violation or temperature outside of criteria		Lab report to Parsons QA/QC Manager immediately		See Tables 11 and 12	Specific problem resolved in accordance with guidance in Section 13.2
Broken or mis-labeled sample container		Lab report to Parsons QA/QC Manager immediately			Resolve mis-labeled container based on field logbooks or chain of custody and have lab personnel re-log sample properly. For broken containers, Parsons QA/QC Manager and Project Manager will make resampling decision in consultation with the USACE based on significance of that data point.

ATTACHMENT B

OTHER ANALYTICAL METHODS

RICIN ECL METHOD
DUST (METALS 7300)
DUST (PAHS 5506)

RICIN ECL METHOD

CB Services CBARR Biomonitoring Facility: *STORM* Laboratories		
Title: Preparation and Testing using BioVeris (ECL) Assays for Ricin Analysis		
Procedure # 003 **Version** 1	**Effective:**	**Author:** Isaac Fruchey/Jessica Dang

Purpose: The purpose of this document is to describe the preparation of BioVeris reagents for use in the BioVeris M8 analyzer (BioVeris International Inc., Gaithersburg, MD) to detect ricin toxin in environmental samples (including soil and water). This work is performed in support of the CB Services CBARR *STORM* laboratories for the detection of biological warfare agents. Uncharacterized samples will be screened for chemical agents and radioactivity by appropriate personnel prior to initiation of the procedures. Screening of uncharacterized samples will be performed at BSL-2, which is consistent with CDC guidelines for diagnostic pathogen work (bacterial).

Responsibilities: It is the responsibility of the laboratory supervisor to assure that all personnel performing these procedures have been properly trained in the protocol and have been informed of any hazards associated with this protocol, to include appropriate personal protective equipment. All contractor personnel, government personnel, and visitors entering the BSL-2 laboratory must comply with the following federal laws and US Army regulations:

32 CFR 626	Biological Defense Safety Program, Final Rule, April 1992
32 CFR 627	Biological Defense Safety Program, Final Rule, April 1992
AR 385-69	Biological Defense Safety Program, 31 Dec 93.
DA PAM 385-69	Biological Defense Safety Program, 31 Dec 93.
42 CFR 73	Office of the Inspector General/Possession, Use, and Transfer of Select Agents and Toxins, Interim Final Rule
	Most recent DoD and Army Biosurety guidance

Materials:
BioVeris ECL immunoassay reagents for targets of interest
Sterile phosphate buffered saline + Tween
shallow round-bottom 96 well microtiter plates (Costar cat#3365)
sterile reagent reservoirs
parafilm

Equipment:
1 Matrix Impact pipettor (Matrix Technologies cat#2034)
Pipette aid
Vortex mixer

Procedure:

1. Run QC plate.
2. Remove the BioVeris reagents from the freezer, thaw, and keep cold.
3. Mix contents on vortex mixer at high speed for 30 seconds. Open the vial and place contents into a sterile reagent trough.
4. Prepare Toxin ECL reagent plates by pipetting 50ul of reagent per test well. Prepare ECL toxin negative and positive controls (150ul provided for ECL low and medium positive controls).

Sample Preparation

5. Weigh out 1 gram of dry sample (powder, soil, etc) and place in a 50 ml conical centrifuge tube containing 10 ml of sterile deionized water.
6. Vortex sample for 30 seconds then centrifuge at 2,000 x g for five minutes.
7. Transfer supernatant into a clean 15 ml conical centrifuge tube.
8. Add test material to test wells.
9. Shake plates for 30 min.
10. Stop reaction with appropriate plate wash on Multidrop. **Check number of rows to be filled with buffer.**
9. Read plate in BioVeris M8. Download protocol, click Start, correct number of rows to be read and click Continue to start run. Record run information in M8 Log book.
10. Dispose of remaining reagent in biohazard waste container.

Controls

A. QC plates using manufacturer supplied reagents will be run daily to verify instrument performance. Reagents purchased from the manufacturer are lot tested and validated.
B. Negative controls shall be run in duplicate for each series of tests performed.
C. Positive controls (ricin toxin) shall be run in duplicate for each series of tests performed.

DUST (METALS 7300)

ELEMENTS by ICP 7300

MW: Table 1 CAS: Table 2 RTECS: Table 2

METHOD: 7300, Issue 2 **EVALUATION: PARTIAL** **Issue 1: 15 August 1990**
Issue 2: 15 August 1994

OSHA: Table 2
NIOSH: Table 2
ACGIH: Table 2

PROPERTIES: Table 1

ELEMENTS:

aluminum*	chromium*	lithium*	phosphorus	tellurium	zinc
aresenic	cobalt*	magnesium	platinum*	thallium	zirconium*
beryllium*	copper	manganese*	selenium	titanium	
Cadmium	iron	molybdenum*	silver	vanadium	
calcium	lead* nickel	sodium	yittrium		

*Some compounds of these elements require special sample treatment.

SAMPLING

SAMPLER: FILTER (0.8-µm, cellulose ester membrane)

FLOWRATE: 1 to 4 L/min

VOL-MIN: Table 1
-MAX: Table 1

SHIPMENT: routine

SAMPLE STABILITY: stable

BLANKS: 2 to 10 field blanks per set

ACCURACY

RANGE STUDIED: not studied

BIAS: none identified

OVERALL PRECISION ($\hat{S}$): not evaluated

ACCURACY: not determined

MEASUREMENT

TECHNIQUE: INDUCTIVELY COUPLED ARGON PLASMA, ATOMIC EMISSION SPECTROSCOPY

ANALYTE: elements above

ASHING REAGENTS: conc. HNO_3, 4 mL; and conc. $HClO_4$, 1 mL

CONDITIONS: room temperature, 30 min; 150 °C to near dryness

FINAL SOLUTION: 4% HNO_3, 1% $HClO_4$, 10 mL

WAVELENGTH: depends upon element; Table 3

BACKGROUND CORRECTION: spectral wavelength shift

CALIBRATION: elements in 4% HNO_3, 1% $HClO_4$

RANGE: 2.5 to 1000 µg per sample [1]

ESTIMATED LOD: 1 µg per sample [1]

PRECISION ($\bar{S}$): Table 3

APPLICABILITY: The working range of this method is 0.005 to 2.0 mg/m^3 for each element in a 500-L air sample. This is simultaneous elemental analysis, not compound specific. An alternative microwave digestion procedure is included. Verify that the types of compounds in the samples are soluble with the ashing procedure selected.

INTERFERENCES: Spectral interferences are the primary interferences encountered in ICP-AES analysis. These are minimized by judicious wavelength selection, interelement correction factors and background correction [1,2].

OTHER METHODS: This method replaces P&CAM 351 [2] for trace elements. Flame atomic absorption spectroscopy (e.g., Methods 70XX) is an alternate analytical technique for many of these elements. Graphite furnace AAS (e.g., 7102 for Be, 7105 for Pb) is more sensitive.

REAGENTS:

1. Nitric acid, conc., ultra pure.
2. Perchloric acid, conc., ultra pure.*
3. Ashing acid: 4:1 (v/v) HNO_3:$HClO_4$. Mix 4 volumes conc. HNO_3 with 1 volume conc. $HClO_4$.
4. Calibration stock solutions, 1000 µg/mL. Commercially available, or prepared per instrument manufacturer's recommendation (see step 12).
5. Dilution acid, 4% HNO_3, 1% $HClO_4$. Add 50 mL ashing acid to 600 mL water; dilute to 1 L.
6. Argon.
7. Distilled,deionized water.

* See SPECIAL PRECAUTIONS.

EQUIPMENT:

1. Sampler: cellulose ester membrane filter, 0.8-µm pore size, 37-mm diameter; in cassette filter holder.
2. Personal sampling pump, 1 to 4 L/min, with flexible connecting tubing.
3. Inductively coupled plasma-atomic emission spectrometer, equipped as specified by the manufacturer for analysis of elements of interest.
4. Regulator, two-stage, for argon.
5. Beakers, Phillips, 125-mL, or Griffin, 50-mL, with watchglass covers.**
6. Volumetric flasks, 10- and 100- mL.**
7. Assorted volumetric pipets as needed.**
8. Hotplate, surface temperature 150 °C.

** Clean all glassware with conc. nitric acid and rinse thoroughly in distilled water before use.

SPECIAL PRECAUTIONS: Perform all perchloric acid digestions in a perchloric acid hood.

SAMPLING:

1. Calibrate each personal sampling pump with a representative sampler in line.
2. Sample at an accurately known flow rate between 1 and 4 L/min for a total sample size of 200 to 2000 L (see Table 1) for TWA measurements. Do not exceed a filter loading of approximately 2 mg total dust.

SAMPLE PREPARATION:

3. Open the cassette filter holders and transfer the samples and blanks to clean beakers.
4. Add 5 mL ashing acid. Cover with a watchglass. Let stand 30 min at room temperature.
   NOTE: Start a reagent blank at this step.
5. Heat on hotplate (120 °C) until ca. 0.5 mL remains.
   NOTE 1: Recovery of lead from some paint matrices may require other digestion techniques. See Method 7082 (Lead by Flame AAS) for an alternative hotplate digestion procedure or the Appendix for a microwave digestion procedure [8].
   NOTE 2: Some species of Al, Be, Co, Cr, Li, Mn, Mo, V, and Zr will not be completely solubilized by this procedure. Alternative solubilization techniques for most of these elements can be found elsewhere [2-7]. For example, aqua regia may be needed for Mn [4,9].
6. Add 2 mL ashing acid and repeat step 5. Repeat this step until the solution is clear.
7. Remove watchglass and rinse into the beaker with distilled water.
8. Increase the temperature to 150 °C and take the sample to near dryness (ca. 0.5 mL).
9. Dissolve the residue in 2 to 3 mL dilution acid.
10. Transfer the solutions quantitatively to 10-mL volumetric flasks.
11. Dilute to volume with dilution acid.

CALIBRATION AND QUALITY CONTROL:

12. Calibrate the spectrometer according to the manufacturers recommendations.
    NOTE: Typically, an acid blank and 10 µg/mL multielement working standards are used. The following multielement combinations are chemically compatible in 4% HNO_3/1%

$HClO_4$:

a. Ag, Ca, Co, Mn, Pb, V, Zn;
b. Al, Be, Cd, La, Li, Ni, Tl;
c. As, B, Ba, Mg, Mo, P;
d. Cu, Fe, Na, Pt, Sr, Te, Y;
e. Cr, K, Se, Ti, Zr; and
f. Si, W (distilled water only)

13. Analyze a standard for every ten samples.
14. Check recoveries with at least two spiked media blanks per ten samples.

MEASUREMENT:

15. Set spectrometer to conditions specified by manufacturer.
16. Analyze standards and samples.

NOTE: If the values for the samples are above the range of the standards, dilute the solutions with dilution acid, reanalyze and apply the appropriate dilution factor in the calculations.

CALCULATIONS:

17. Obtain the solution concentrations for the sample, Cs (µg/mL), and the average media blank, Cb (µg/mL), from the instrument.
18. Using the solution volumes of sample, Vs (mL), and media blank, Vb (mL), calculate the concentration, C (mg/m3), of each element in the air volume sampled, V (L):

$$C = \frac{C_s V_s - C_b V_b}{V}, \text{ mg/m}^3.$$

EVALUATION OF METHOD:

Method P&CAM 351 was evaluated in 1981 [1,2]. The precision and recovery data were determined at 2.5 and 1000 µg of each element per sample on spiked filters. The precision and recovery data, instrumental detection limits, sensitivity, and analytical wavelengths are listed in Table 3. The values in Table 3 were determined with a Jarrell-Ash Model 1160 ICP operated according to manufacturer's instructions.

REFERENCES:

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[8] DataChem Laboratories, NIOSH Sequence 7998-J (NIOSH/DPSE, unpublished, April 12, 1994).
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METHOD WRITTEN BY:

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James B. Perkins, David L. Wheeler, and Keith Nicholson, DataChem Labortories, Salt Lake City, UT, prepared the microwave digestion procedure in the Appendix.

TABLE 1. PROPERTIES AND SAMPLING VOLUMES

Element (Symbol)	Properties: Atomic Weight	Properties: MP, °C	Air Volume, L @ OSHA PEL: MIN	Air Volume, L @ OSHA PEL: MAX
Silver (Ag)	107.87	961	250	2000
Aluminum (Al)	26.98	660	5	100
Arsenic (As)	74.92	817	5	2000
Beryllium (Be)	9.01	1278	1250	2000
Calcium (Ca)	40.08	842	5	200
Cadmium (Cd)	112.40	321	13	2000
Cobalt (Co)	58.93	1495	25	2000
Chromium (Cr)	52.00	1890	5	1000
Copper (Cu)	63.54	1083	5	1000
Iron (Fe)	55.85	1535	5	100
Lithium (Li)	6.94	179	100	2000
Magnesium (Mg)	24.31	651	5	67
Manganese (Mn)	54.94	1244	5	200
Molybdenum (Mo)	95.94	651	5	67
Sodium (Na)	22.99	98	13	2000
Nickel (Ni)	58.71	1453	5	1000
Phosphorus (P)	30.97	44	25	2000
Lead (Pb)	207.19	328	50	2000
Platinum (Pt)	195.09	1769	1250	2000
Selenium (Se)	78.96	217	13	2000
Tellurium (Te)	127.60	450	25	2000
Titanium (Ti)	47.90	1675	5	100
Thallium (Tl)	204.37	304	25	2000
Vanadium (V)	50.94	1890	5	2000
Yttrium (Y)	88.91	1495	5	1000
Zinc (Zn)	65.37	419	5	200
Zirconium (Zr)	91.22	1852	5	200

TABLE 2. EXPOSURE LIMITS, CAS #, RTECS

Element (Symbol)	CAS #	RTECS	Exposure Limits, mg/m ^{3} (Ca = carcinogen) OSHA	NIOSH	ACGIH
Silver (Ag)	7440-22-4	VW3500000	0.01 (dust, fume, metal)	0.01 (metal, soluble)	0.1 (metal) 0.01 (soluble)
Aluminum (Al)	7429-90-5	BD0330000	15 (total) 5 (respirable)	5	10 (dust) 5 (fume)
Arsenic (As)	7440-38-2	CG0525000	varies	C 0.002, Ca	0.01, Ca
Beryllium (Be)	7440-41-7	DS1750000	0.002, C 0.005	0.0005, Ca	0.002, Ca
Calcium (Ca)	--	--	varies	varies	varies
Cadmium (Cd)	7440-43-9	EU9800000	0.2, C 0.6 (dust) 0.1, C 0.3 (fume)	lowest feasible, Ca	0.01 (total), Ca 0.002 (respir.), Ca
Cobalt (Co)	7440-48-4	GF8750000	0.1	0.05	0.05 (dust, fume)
Chromium (II) (Cr)	22541-79-3	GB6260000	0.5	0.5	0.5
Chromium (III) (Cr)	16065-83-1	GB6261000	0.5	0.5	0.5
Chromium (VI) (Cr)	18540-29-9	GB6262000	C 0.1	0.001 (dust)	0.05 (soluble) 0.05 (insoluble), Ca
Copper (Cu)	7440-50-8	GL5325000	1 (dust, mists) 0.1 (fume)	1 (dust) 0.1 (fume)	1 (dust, mists) 0.2 (fume)
Iron (Fe)	1309-37-1	NO7400000	10 (dust, fume)	5 (dust, fume)	5 (fume)
Lithium (Li)	--	--	--	--	--
Magnesium (Mg)	1309-48-4	OM3850000	15 (dust) as oxide 5 (respirable)	10 (fume) as oxide	10 (fume) as oxide
Manganese (Mn)	7439-96-5	OO9275000	C 5	1; STEL 3	5 (dust) 1; STEL 3 (fume)
Molybdenum (Mo)	7439-98-7	QA4680000	5 (soluble) 15 (total insoluble) 5 (respirable insol.)	5 (soluble) 10 (insoluble)	5 (soluble) 10 (insoluble)
Nickel (Ni)	7440-02-0	QR5950000	1	0.015, Ca	0.05, Ca
Lead (Pb)	7439-92-1	OF7525000	0.05	<0.1	0.05
Platinum (Pt)	7440-06-4	TP2160000	0.002	1 (metal)	1 (metal)
Selenium (Se)	7782-49-2	VS7700000	0.2	0.2	0.2
Tellurium (Te)	13494-80-9	WY2625000	0.1	0.1	0.1
Titanium (Ti) TiO_2	7440-32-6 13463-67-7	XR1700000 XR2275000	as TiO_2, 15 as TiO_2, 5 (respirable)	lowest feasible, Ca	10
Thallium (Tl)	7440-28-0	XG3425000	0.1 (skin) (soluble)	0.1 (skin) (soluble)	0.1 (skin)
Vanadium (V) V_2O_5	7440-62-2 1314-62-1	YW240000 YW1355000	C 0.5 (respirable) as V_2O_5 C 0.1 (fume) as V_2O_5	C 0.05	0.05 (respir.) as V_2O_5
Yttrium (Y)	7440-65-5	ZG2980000	1	1	1
Zinc (Zn)	1314-13-2	ZH4810000	5 (ZnO fume) 15 (ZnO dust) 5 (ZnO respirable)	5; STEL 10 (ZnO fume) 5; C 15 (ZnO dust)	5; STEL 10 (ZnO fume) 10 (ZnO dust)
Zirconium (Zr)	7440-67-7	ZH7070000	5	5, STEL 10	5, STEL 10

TABLE 3. MEASUREMENT PROCEDURES AND DATA [a]

Element	Wavelength (nm)	Instrumental LOD (ng/mL)	Sensitivity (Intensity/ µg/mL)	Recovery @ 2.5 µg/ filter [b]	Recovery @ 1000 µg/ filter	Precision ($\bar{S}_r$) (N = 3) @ 2.5 µg/ filter	Precision ($\bar{S}_r$) (N = 3) @ 1000 µg/ filter
Ag	328.3	26	0.65	111	91	0.02	0.075
Al	308.2	14	0.23	93	100	0.092	0.023
As	193.7	13	0.57	103	99	0.062	0.026
Be	313.0	1.5	1.29	107	90	0.040	0.034
Ca	315.9	10	0.49	99	95	0.036	0.014
Cd	226.5	1.6	0.83	107	99	0.032	0.020
Co	231.2	7.4	0.38	101	95	0.040	0.005
Cr	205.6	1.3	0.50	98	106	0.053	0.016
Cu	324.8	2.1	0.72	98	99	0.036	0.022
Fe	259.9	3.9	0.13	94	97	0.068	0.016
Li	670.8	2.8	0.48	89	95	0.171	0.043
Mg	279.6	24	0.22	105	106	0.084	0.027
Mn	257.6	0.4	0.74	84	93	0.062	0.035
Mo	281.6	7.0	0.18	94	88	0.023	0.049
Na	589.0	10	0.76	(c)	101	(c)	0.045
Ni	231.6	3.4	0.41	105	97	0.027	0.020
P	214.9	22	0.17	(c)	91	(c)	0.056
Pb	220.4	17	0.42	105	95	0.060	0.011
Pt	203.7	15	0.69	106	91	0.041	0.075
Se	190.6	21	0.28	105	97	0.068	0.049
Sn[d]	190.0	64	0.49	74	67	0.33	0.16
Te	214.3	29	0.41	102	94	0.050	0.063
Ti	334.9	1.2	0.55	96	108	0.051	0.029
Tl	190.9	17	0.22	103	99	0.043	0.017
V	310.2	3.2	0.88	99	94	0.043	0.014
W[d]	207.9	13	2.58	35	23	0.053	0.60
Y	371.0	0.8	2.35	99	100	0.015	0.013
Zn	213.9	0.6	0.60	101	94	0.013	0.013
Zr	339.2	1.9	0.88	75	98	0.049	0.008

(a) Values reported were obtained with a Jarrell-Ash Model 1160 ICP; performance may vary with instrument and should be independently verified.
(b) 2.5 µg/filter corresponds to 5 µg/m ^{3} for a 500-L air sample.
(c) Blank levels too high to make accurate determinations.
(d) Qualitative only because of low recovery.

APPENDIX - MICROWAVE DIGESTION FOR LEAD IN PAINT CHIPS (AND OTHER MATRICES)

This procedure is an alternative to the procedure presented in the Sample Preparation section of this method. It provides a rapid, complete acid digestion prior to analysis by flame atomic absorption (FAA), heated graphite furnace atomic absorption (HGFAA), and inductively coupled plasma spectroscopy (ICP) [10].

Apparatus and Material [11-16]

1. Microwave apparatus requirements:
   a. The microwave unit provides programmable power with a minimum of 574 W and can be programmed to within ± 10 W of the required power.
   b. The microwave unit cavity is corrosion resistant as well as ventilated. All electronics are protected against corrosion for safe operation.
   c. The system requires Teflon PFA digestion vessels (120-mL capacity) capable of withstanding pressures up to 7.5 ± 0.7 atm (110 ± 10 psi) and capable of controlled pressure relief at pressures exceeding 7.5 ± 0.7 atm (110 ± 10 psi).
   d. A rotating turntable is employed to ensure homogeneous distribution of microwave radiation within the unit. The speed of the turntable should be a minimum of 3 rpm.
   e. A safety concern relates to the use of sealed containers without pressure relief valves in the unit. Temperature is the important variable controlling the reaction. Pressure is needed to attain elevated temperatures but must be safely contained [12].
   f. Polymeric volumetric ware in plastic (Teflon or polyethylene), 50- or 100-mL capacity.
   g. Disposable polypropylene filter funnel.
   h. Analytical balance, 300-g capacity, and minimum ± 0.001 g.

Reagents

1. Nitric acid, concentrated, spectroscopy grade.
2. Reagent Water. Reagent water shall be interference free. All references to water in the method refer to reagent water that meets the ASTM Type 2 standard.

Procedure

1. Calibration of Microwave Equipment.
   Calibrate microwave equipment in accordance with manufacturer's instructions. If calibration instructions are not available, see EPA Method 3051 [11].
2. All digestion vessels and volumetric ware must be carefully acid washed and rinsed with reagent water. All digestion vessels should be cleaned by leaching with hot (1:1) nitric acid for a minimum of fifteen minutes, rinsed with reagent water, and dried in a clean environment.
3. Sample Digestion
   a. Tare the Teflon PFA digestion vessel.
   b. Weigh out 0.1 g paint chip sample to the nearest 0.001 g into the tared Teflon PFA sample vessel. With large paint chip samples, measure out a 2 cm^2 piece, weigh to the nearest 0.001 g, and quantitatively transfer it to the vessel.
   c. Add 5.0 ± 0.1 mL concentrated nitric acid to the sample vessel in a fume hood. If a vigorous reaction occurs, allow the reaction to stop before capping the vessel. Cap the vessel and torque the cap to 12 ft-lb (16 N-m) according to the manufacturer's directions. The sample vessel may be connected to an overflow vessel using Teflon PFA connecting tubes. Place the vessels in the microwave carrousel. Connect the overflow vessels to the center well of the unit.
   d. Place the vessels evenly distributed in the turntable of the microwave unit using groups of two, six, or 12 sample vessels. Any vessels containing 5 mL of nitric acid for reagent blank purposes are counted as sample vessels. When fewer than the recommended number of samples are to be digested, i.e., three samples plus one blank, the remaining vessels should be filled with 5 mL of nitric acid to achieve the full complement of vessels. This provides an energy balance since the microwave power absorbed is proportional to the total mass in the cavity [14]. Irradiate each group of samples to achieve a temperature of 180°C in five minutes at a pressure of 50 psi. Continue to irradiate to achieve a temperature of 180°C at 100 psi after 25 minutes. Continue

digestion for five minutes. A sample digestion program for 12 samples is presented in the following table.

PROGRAM VARIABLES FOR PAINT CHIPS SAMPLE DIGESTION WITH NITRIC ACID

Stage	(1)	(2)	(3)
Power	90%	90%	0%
Pressure, psi	50	100	0
Run Time, min	10:00	20:00	05:00
Time @ P, min	05:00	15:00	00:00
Temperature	180°C	180°C	0°C
Fan Speed	100%	100%	100%
Number of Vessels:	12		
Liquid Volume per Vessel:	5 mL		
Sample Weight:	0.1 g		

If the analyst wishes to digest other than two, six, or 12 samples at a time, use different values of power as long as they result in the same time and temperature conditions.

e. At the end of the microwave program, allow the vessels to cool for a minimum of five minutes before removing them from the microwave unit. If a loss of sample is detected (e.g., material in overflow collection vessel, liquid outside liner), determine the reason for the loss (e.g., loss of vessel seal integrity, use of a digestion time longer than 30 minutes, too large a sample, or improper heating conditions). Once the source of the loss has been corrected, prepare a new sample beginning at Section 2. If insufficient material is available for reanalysis, dilute remaining digestate and note that some sample loss may have occurred.

f. Uncap and vent each vessel in a fume hood. Add 20 mL reagent water, then reseal vessels and shake to mix thoroughly. Transfer the sample to an acid-cleaned polyethylene bottle. If the digested sample contains particulates which may clog nebulizers or interfere with injection of the sample into the instrument, allow the sample to settle or filter it:

Settling: Allow the sample to stand until the supernatant is clear (usually, overnight is sufficient). If it does not clear, filter the sample.

Filtering: The filtering apparatus must be thoroughly precleaned and rinsed with dilute nitric acid. Filter the sample through quantitative filter paper into a second acid-cleaned container.

The digestate is now ready for analysis for elements of interest using the appropriate method.

4. Calculations: Report the concentrations based on the actual weight of the original sample.

DUST (PAHS 5506)

ANALYSIS OF POLYNUCLEAR AROMATIC HYDROCARBONS (PNA) BY HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC)

Authorization/Approval:	**Applicability and Revision History:**	
Jeffrey Cooper Manager HPLC — Date 6/4/04	Office Location:	Novi, Michigan
	Effective Date:	R0, May 16, 1997 R1, June 12, 1997 R2, February 5, 2001 R3, June 2004
Robert Lieckfield, Jr., CIH Laboratory Director — Date 6-14-04	Reference Methods:	EPA NIOSH 5506 Issue 2, August 1994
	Media/Matrices	PTFE filter/XAD-2 Sorbent Tube

Distribution: HPLC

1.0 SCOPE AND APPLICATION

1.1 This method is applicable to the measurement of Polynuclear Aromatic Hydrocarbons (PNA) that have been collected in series on a PTFE filter and an XAD-2 sorbent tube. This method may be used to quantitatively determine the concentration of the following analytes:

acenaphthene	acenaphthylene	anthracene
benzo[a]anthracene	benzo[b]fluoranthene	benzo[k]fluoranthene
benzo[ghi]perylene	benzo[a]pyrene	benzo[e]pyrene
chrysene	dibenzo[a,h]anthracene	fluoranthene
fluorene	indeno[1,2,3-cd]pyrene	naphthalene
phenanthrene	pyrene	

1.2 The limit of detection (LOD) is 3 µg.

2.0 SUMMARY OF METHOD

PNAs collected in series on filter/sorbent tube media are desorbed with Acetonitrile and subsequently analyzed by High Performance Liquid Chromatography (HPLC) equipped with fluorescence and UV detectors.

3.0 INTERFERENCES

3.1 Any compound that elutes at the same retention time may interfere.

3.2 Heat, ozone, NO_2, or UV light may cause some degradation of compounds.

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4.0 APPARATUS AND MATERIALS

4.1 High Performance Liquid Chromatograph (Waters, manufacturer) equipped with a UV detector, Fluorescence detector, autosample injector, electronic integrator, and data system.

4.2 Novapak C18, or equivalent.

4.3 Wheaton vials, 2 mL with Teflon-lined crimp caps.

4.4 Syringes, 10 µL, 25 µL, 50 µL, 100 µL, 500 µL, Hamilton (manufacturer).

4.5 Volumetric pipettes, 1.0 mL, 2.0 mL, 10.0 mL.

4.6 Shaker, Eberbach Corporation (manufacturer).

4.7 Disposable syringe, 3.0 mL, Becton/Dickinson (manufacturer).

4.8 Filter tips for disposable syringes, 0.45 µm, Phenomenex (manufacturer).

4.9 Disposable test tubes, 14 mL capacity, with polyethylene fitted caps, Baxter (vendor).

4.10 Filters, PTFE-laminated membrane, 2-µm pore size, 37-mm diameter, Gelman (manufacturer), pre-weighed.

4.11 XAD-2 sorbent tubes, SKC (vendor).

4.12 Volumetric flasks, 10 mL.

4.13 Aluminum foil.

4.14 Forceps.

4.15 Pyrex beakers, 50 mL

5.0 REAGENTS

5.1 Acetonitrile (ACN), HPLC grade, Baxter (vendor).

5.2 Reagent water, Milli-Q system, minimum resistance, 1 megOhm-cm.

5.3 Standards: PNA Mix, 98% A.C.S Reagent, Cerilliant (vendor).

6.0 SAMPLE CONTAINERS, SHARED SAMPLES, AND HOLDING TIMES

6.1 Refer to NIOSH Method 5506 for instructions on sampling techniques.

6.2 Upon arrival at the laboratory, samples are stored in a freezer at -5 °C, protected from light, and are analyzed as soon as possible.

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7.0 HEALTH AND SAFETY

7.1 Refer to the Material Safety Data Sheet (MSDS) for information on the toxicity and potential hazards of solvents/chemicals used during this procedure. MSDSs are located in the filing cabinet in the laboratory copier room.

7.2 PNAs are potential carcinogens. Follow necessary precautions to prevent inhalation or skin absorption of these materials.

8.0 QUALITY CONTROL

8.1 With each batch of samples analyzed, a recovery blank (RB) and two recovery spikes (R1/R2) are analyzed for each media type.

8.2 A recovery blank is a treated filter/tube that is carried through all steps of preparation and analysis along with the samples. The concentration of any analytes detected in the recovery blank must be less than the reporting limit.

8.3 Recovery spikes are treated filters/tubes that are spiked with a known amount of the target compounds, and are carried through all steps of preparation and analysis along with the samples. Recovery spikes should agree to within ± 15% of the spiked amount.

8.4 The client for each media type must submit at least one field blank for every batch of 20 or fewer samples. Field blanks are prepared and analyzed along with the samples.

8.5 A Continuing Calibration Verification Standard (CCV) must be analyzed at a minimum of every 10 samples. The CCV standard should be at a concentration that is mid level on the calibration curve and must be within ± 15%.

9.0 PROCEDURE

9.1 Standard Preparation

- Prepare a stock standard of 10 ppm by diluting the premixed standard
- The calibration curve is made by utilizing the 10 ppm stock and making serial dilutions. The correlation coefficient must be a minimum of 0.995, with each standard concentration less than 10% difference when evaluated against the curve, except the low level standard, which must be ≤ 15%.

9.2 Filter Extraction

- Using forceps, remove filters from the filter cassettes and place each one into a separate clean, test tube.
- Add 2.0 mL of Acetonitrile to each test tube containing a filter, and shake for 30 minutes

9.3 Sorbent Tube Desorption

- Transfer the front glass wool plug and the front sorbent section of each tube into a separate clean labeled 14 mL test tube. Transfer each of the back sorbent sections and the middle glass wool plugs into separate glass test tubes.
- Allow samples to stand for 30 minutes. Swirl occasionally, or place on a shaker.
- Filter all sample extracts through the 0.45 μm syringe filter. Use a clean syringe for each sample.

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9.4 Sample Analysis

Reverse phase HPLC conditions:

• Mobile Phase: Eluent A: H_20, Eluent B: ACN

Gradient

Time (min)	%A	%B
0	60	40
5	60	40
30	0	100
32	0	100
33	60	40
41	60	40

• Flow Rate: 1.5 - 2.2 mL /min
• Detector: UV = 254 nm, 0.1 AUFS
Fluorescence = 340 nm excitation, 425 nm emission
• Injection volume: 30-75 µL
• Run time: 41 minutes

9.5 Analyze the calibration curve, followed by the method blank, recovery spikes, and client samples. The samples are bracketed with continuing calibration verification standards (CCV) at a minimum rate of every 10th injection. This is typically a mid-level calibration standard, and must be within ± 15%

9.6 Data is collected with a software-based integration system. Concentration is quantitated based on peak height or area.

10.0 CALCULATION

10.1 Calculate the recovery of the two spiked samples (R1 and R2).

$$\text{Recovery (R1, R2)} = \frac{\text{Total Amount Recovered}}{\text{Total Amount Spiked}} \times 100\%$$

If the recoveries are not within ± 5% of the true value, any samples with positive results must be recovery corrected using the average recovery of R1 and R2. This is termed the extraction efficiency.

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10.2 The concentration in micrograms per milliliter of PNA present in a sample is determined form the height or area response of the analytes as measured by an electronic integrator. Comparison of sample response with a least squares curve fit for standards allows the analyst to determine the concentration of PNA in µg/mL for the sample. Since the sampel volume is 2 mL, the results in $\mu g/m^3$ of air are expressed by the following equation:

$$\mu g/m^3 = \frac{(\mu g/mL)\ (2\ mL)}{(m^3 \text{ of air sampled})\ (\text{extraction efficiency})}$$

11.0 REAGENT WASTE DISPOSAL

All hazardous materials are disposed of by an approved hazardous waste disposal company, as coordinated by the Hazardous Waste Manager (See Clayton SOP: M-HS-1/N).

12.0 METHOD PERFORMANCE

Laboratory control samples historically achieve 80-100% recovery of spiked analytes.

13.0 RERERENCES

U.S. Department of Health and Human Services. Public Health Service Centers for Disease Control and Prevention. National Institute for Occupational Safety and Health. Division of Physical Sciences and Engineering. August 1994. *NIOSH Manual of Analytical Methods (NMAM)*. 4th ed., ed. P.M. Eller. 3 vols. Cincinnati: NIOSH.

SOP Author: Allen Schinsky	**SOP Reviewer:** Christina M. Balagna 6/4/04 Christina Balagna Date

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ATTACHMENT C

PHOTOIONIZATION METER
STANDARD OPERATING PROCEDURE

ATTACHMENT C

PHOTOIONIZATION DETECTOR

C.1 GUIDELINE

The guideline for operational check, operation, and maintenance of the Photoionization Detector (PID) is outlined below. Operational checks will be performed daily in accordance with the manufacture's instructions. The manufacturer's operation manual should be consulted for detailed instructions concerning the operation of various makes and models of PIDs.

C.1.1 Operational Check (Each Morning)

1. Check to see that the batteries are sufficiently charged.
2. Confirm that the instrument is in the survey mode or read mode.
3. Confirm that the previously entered standard gas value is consistent with the current gas value. Make adjustments as required.
4. Connect the standard calibrations gas bottle.
5. Turn the calibration gas cylinder on.
6. The reading should be close to the actual gas concentration. If not wait a few seconds and then repeat this process until the calibration gas has stabilized to 1-2 ppm with the calibration gas range.
7. Exit the calibration mode, turn off the gas and disconnect the calibration gas cylinder from instrument.

The calibration gas typically used for calibration is isobutylene at a concentration of 100 ppm. The use of this calibration gas will result in a reading of 100 ppm in the calibration mode.

C.1.2 Operations

1. Turn the instrument on. Zero out any background level.
2. Place sensor near the sample or location to be measured.
3. Set alarm at 10 ppm using light and sound modes.

C.1.3 Preventive Maintenance

After daily use of the PID for field investigations, the unit will be inspected and cleaned as necessary. The battery should be recharged daily (if needed) while in continuous use. Spare batteries will be available on site.

ATTACHMENT D

SUMMA CANISTERS
STANDARD OPERATING PROCEDURE

ATTACHMENT D

SUMMA CANISTERS
STANDARD OPERATING PROCEDURE

D.1 GUIDELINES

The guidelines for the operation and maintenance of SUMMA canisters are outlined below.

D.1.1 Operations

1. Remove cap on SUMMA canister.
2. Attach a 1-2' hose with the appropriate connector, to the SUMMA canister.
3. Position end of hose at monitoring sample point or port.
4. Open the valve on the SUMMA canister
5. Allow SUMMA canister to fill. This should take a couple of seconds and would be audible.
6. Close the valve on the SUMMA canister once canister is full.
7. Package SUMMA canister and ship to lab with appropriate label and COC documentation.

D.1.2 Preventive Maintenance

The SUMMA canisters should be stored in a cool, dry place out of direct sunlight (not to exceed 140 degrees F).

ATTACHMENT E

ARSINE DETECTOR
STANDARD OPERATING PROCEDURE

ATTACHMENT E

ARSINE MONITOR
STANDARD OPERATING PROCEDURE

E.1 GUIDELINES

The guidelines for operational check, operation and maintenance of the arsine monitor are outlined below. Operational checks will be performed daily in accordance with the manufacturer's instructions. The manufacturer's operation manual should be consulted for detailed instructions concerning the operation of various makes and models of arsine detectors. The procedures below are based on operation of the PortaSens II arsine monitor, but an equivalent monitor could also be used in which case the manufacturer's operating instructions should be consulted.

E.1.1 Operational Check (each morning)

1. Attach the sampling wand at the sample inlet port (if the wand is not already attached).
2. Turn on the instrument using the soft keys on the front panel.
3. The screen displays self check.
4. After the instrument passes self check, a display of "Self Check Passed" is displayed.
5. Press NEXT button to go through the following screens if changes are needed, or press skip to go to the "SMPL" screen:
    - Programmed full scale range- Press NEXT
    - Caution setpoint- Press NEXT
    - Warning setpoint- Press NEXT
    - Alarm setpoint- Press NEXT
    - Minimum and maximum full scale range- Press NEXT
    - Revision levels of the firmware and the sensor module - Press NEXT

E.1.2 Operations

1. After the operational check is complete and the "SMPL" screen is displayed, place the sensor near the location to be monitored. Screen displays "SMPL" indicating sampling mode.
2. Set alarm at level specified in the Site-Specific Work Plan.

E.1.3 Preventive Maintenance

After daily use of the arsine monitor, the unit will be inspected and cleaned as necessary. The batteries will be replaced or recharged for use the next day. On days when the ambient humidity is high, the sensors may be replaced with spare sensors if needed. The sensor should be sent for re-calibration to the factory every <u>six months</u>.

ATTACHMENT F

DRÄGER TUBES FOR ARSINE CONFIRMATION STANDARD OPERATING PROCEDURE

ATTACHMENT F

DRÄGER TUBES FOR ARSINE CONFIRMATION
STANDARD OPERATING PROCEDURE

F.1 GUIDELINES

The guidelines for the operation and maintenance of dräger tubes for arsine confirmation are outlined below. The arsine dräger tube measures arsine within the range of 0.05 to 3 ppm (parts per million).

F.1.1 Operations

1. The tips of the dräger tube are broken and the tube is inserted at the sampling port of the dräger bellows pump.
2. Air is drawn through the tube by dräger bellow pump (20 strokes drawing approximately 100 ml of ambient air total).
3. After 20 strokes of the pump (approximately 6 minutes) the presence of arsine can be confirmed by the change in color of the chemical reagent present in the tube. The color changes from white to a grey violet color if arsine is present in the air.
4. The arsine dräger tubes are calibrated for reading the concentration of arsine by the length of color change in the tube. If a color change is seen, read the level or concentration of arsine up to the level of color change.

F.1.2 Preventive Maintenance

After use, the tubes should be removed and disposed safely. The dräger pump should be cleaned and properly stored. Dräger tubes are pre-calibrated for two years. The dräger tubes should be stored out of direct sunlight and at a temperature less than 25 °C (77 °F).

APPENDIX F
CONTRACTOR FORMS

1. BLANK FORMS

This section includes copies of all blank forms that will be required for the Site-Wide Chemical Safety Submission. The following forms will be used to collect and record site-specific data. *Additional forms will be added as they become available.*

1. Plan Acceptance, Site Safety and Health;
2. Site Safety Daily Check List for Site-Wide Intrusive Investigation;
3. Training and Documentation log;
4. Violation and Corrective Action Summary;
5. Quality Control Inspection Log;
6. Tailgate H&S Briefing;
7. Daily Safety Checks;
8. Monthly Safety Checks;
9. Safety Inspection Log;
10. Daily Pre-Operations Checklist;
11. Vehicle Inspection (DD Form 626);
12. Daily Quality Control Report;
13. Daily Reports;
14. Air Monitoring Log;
15. Contingency Plan Initiation Summary;
16. Excavation Activity Summary;
17. Geophysical Survey Summary;
18. Anomaly Dig Sheets;
19. Transfer Log;
20. Recovered Item Inventory Log;
21. Scrap Item Certification Form (DD 1348);
22. Drum Log;
23. Sample Tracking Log;
24. Sample Chain-of-Custody;
25. Discharge Log;
26. Portable Radio Sign-out Log;
27. Container Form;
28. Parsons Accident Report;
29. USACE Accident Investigation Report;
30. Material Waste Profile;
31. Waste Notification Sheet;
32. OSHA Form 300
33. Report of Theft or Loss-Explosive Materials
34. Magazine Data Card
35. Explosives Purchase/Receipt /Authorization List

PLAN ACCEPTANCE FORM
PROJECT HEALTH AND SAFETY PLAN

I have read and agree to abide by the contents of the Site Safety and Health Plan for the following project:

SPRING VALLEY OU-3, WASHINGTON, D.C.

Name	Signature	Date

SITE SAFETY DAILY CHECKLIST FOR SITE-WIDE CSS INVESTIGATION

Site Name and Location: Spring Valley		**Date:** _____	
Project: Site-Wide CSS Excavations			
Weather (am)		**Weather (pm)**	
Temp (F°)		**Temp (F°)**	
Wind (mph/dir)		**Wind (mph/dir)**	
Hazard Distance (meters)		**Hazard Distance (meters)**	

DAILY PRE-OPERATIONAL CHECK

Personnel Decontamination Station (PDS) Operational Notes:	☐
Emergency PDS Operational Notes:	☐
Cascade System Operational Notes:	☐
Privacy Fence Gate Unlocked Notes:	☐
DAAMS Stations Operational (Perimeter if app and ECS) Notes:	☐
Personnel Air Monitoring (Monotox and DAAMS) Begun Notes:	☐
Video System Operational Notes:	☐
Ambulance Operational Notes:	☐
Minicams Operational Notes:	☐
Radios Operational Notes:	☐
Confined Space Entry Permit Signed and Posted Notes:	☐
Security Operational Notes:	☐
CENAB Operations Officer (or alternate) Notified Notes:	☐
If all of the above are checked off, **operations can begin inside the ECS**: Time of Entry:	

SPRING VALLEY SITE-WIDE CSS INTRUSIVE INVESTIGATION TRAINING AND DOCUMENTATION CHECKLIST

Name:_____

Status (i.e. Visitor or Site Worker):_____

Training	SSHP Ref.	Required (Yes/No)	Completion Date	Certificate on File (√)	Initials of Employee & Date	Initials of Checker & Date
HAZWOPER 40-Hour	8.1.1.1					
HAZWOPER Supervisors 8-Hour	8.1.2.1					
HAZWOPER 8-Hour Annual Refresher	8.1.3.1					
CPR and First Aid	8.4					
HAZCOM	8.6					
Bloodborne Pathogens	8.4					
Respirator	9.3.6					
Physical Examination (CFR 1910.120)	10.1					
Visitor	8.8					
Site-Specific Training, Including:						
Confined Space Entry Procedures	6.2.6					
CWM	8.7					
Excavation Safety	6.2.5					
Lockout/Tagout Procedures	6.2.8.3					
Pressurized Cylinder Safety	6.2.9					
Emergency Assistance Network & Evacuation Procedures	8.5					
Site-Specific Health & Safety	8.2					

PARSONS

Notice of Subcontractor Violation of Safety and Health Regulations

Date: _____

Contractor Name: _____

Address: _____

_____

_____

Attention: _____

This letter officially notifies you that you have been found to be in violation of the following Safety Regulations:

_____

on (date) _____, by_____.

Confined Space Entry	___	Lockout/Tagout	___	Hot Work	___	Personal Protective Equipment	___
Knowledge of the environment	___	Awareness of warning alarms	___	Evacuation routes	___	Back-up Alarms	___
Assembly locations	___	Fall Protection	___	Scaffolding	___	Environmental/Hazardous Material Storage	___
Trenching	___	Safe Work Practices	___	Security Practices	___		___

Other: _____

_____

_____

This/These violations occurred at the following locations: _____

_____

at the following times_____ and dates _____

The name of the employees was/were _____

under the supervision of_____.

VIOLATION AND CORRECTIVE ACTION SUMMARY

SPRING VALLEY SITE-WIDE CSS INVESTIGATION

HEALTH AND SAFETY VIOLATIONS

CORRECTIVE ACTIONS

Signature: _____ **Date:**_____

Quality Control Inspection Log

Date: Time: Contract Number:
Delivery Order Number: Location:

Type of Inspections: Daily Weekly Special Re-inspection

Location inspected: (List by grid number, coordinates, or description)
Activity inspected: Spring Valley AU lot 18 and Fed property

II. Inspection Requirement	Discrepancies Y / N / NA	Comments
Work plan compliance		
Subsurface Sweep		
Evacuation Technique		
Personal Protection Equipment		
Work Practices		
Site Control / CRZ / EZ		
First Aid Equipment		
Fire Fighting Equipment		
Heavy Equipment		
Personal Decontamination Station		
Site Mobilization/Demobilization		
Air Monitoring Equipment PID / Dust		
Electrical Equipment / Wiring		
Documentation & Files		
Equipment Accountability / Inventory		
Training		
Housekeeping		
Tools & Equipment		
ORS / OE Certification		

Overall Inspection Results: Satisfactory Unsatisfactory

III.
Comments:

- Work stopped due to safety violation: Yes No
- Corrective Measures
- Re-inspection required Yes No

IV. Signatures:
UXO QC_____ Site Manager/Project Manager_____

SAFETY, IT'S EVERYONES RESPONSIBILITY

DAILY SAFETY MEETING ATTENDANCE LOG

CONTRACT NO.

DATE **TIME:** **Temps:**
Conditions: Winds:
SAFETY MEETING TOPICS: Site Activities, weather, site hazards, PPE, contaminants, fuel, dust control, Heavy Equipment, slips, trips, falls, Emergency Procedures, Decontamination

OTHER TOPICS COVERED

Name	Signature	Company

SAFETY, IT'S EVERYONES RESPONSIBILITY

Name	Signature	Company

Site Health and Safety Officer: _____

SITE SPECIFIC TRAINING

TOPICS COVERED:	CHECK OFF
Personnel responsible for health and safety	_____
Site hazards	_____
Health and safety procedures	_____
Safe work practices	_____
Engineering controls	_____
Effects of compounds	_____
Emergency procedures	_____
Decontamination	_____

TEAM MEMBERS IN ATTENDANCE:

_____

_____

_____

_____

_____

_____

_____

_____
Trainer's Signature

SITE SPECIFIC TRAINING
(CONTINUED)
TEAM MEMBERS IN ATTENDANCE (CONTINUED):

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Trainer's Signature

DAILY SAFETY CHECKS

Item	NA √	Yes √	No √	Corrective Action Required/ Date	Corrective Action Implemented/ Date
PHYSICAL HAZARDS					
Are all Fire Extinguishers Charged					
Fire Extinguishers located in the PDS, EPDS, Warm-up Trailer, Bounder, and Heavy Equipment					
Are First Aid Kits Stocked					
Electrical Junction Box Weatherproof and Secure					
Extension Cords/Plugs No Kinks or Frays					
Pressurized Cylinders:, Secure, Valves Closed, Caps On, Labeled,					
Are Lockout/Tagout Procedures Followed Whenever Electrical Systems are Maintained					
Are No Smoking Signs Posted at Flammable/Pressurized Gas Storage Areas					
Hazardous Chemicals Stored Properly					
HEAT/COLD STRESS					
Physiological Monitoring at 72° F					
Personnel Monitored After Leaving EZ					

Signature: _____ Date:_____

DAILY SAFTEY CHECKS (CONT.)

Item	NA √	Yes √	No √	Corrective Action Required/ Date	Corrective Action Implemented /Date
CHEMICAL HAZARD PREVENTION					
PPE Checked Daily					
Treatment Protocols in Ambulance					
Heavy Equipment Visually Inspected prior to leaving CRZ					
EXCAVATION SAFETY					
Miss Utility Contacted (Miss Utility No._____Date Called:_____					
Is Shielding Provided When Excavations Exceed Five Feet in Depth (Note Soil is competent to allow excavating to 5 feet without sheilding)					
Are Safe Excavation Practices Followed (Egress, Exit Spacing, Water Pumping)					
Is Equipment Kept at Least Two Feet From Edge of Excavations					
Is Excavation Declared a Confined Space (> 4 Feet)					
Are Explosive Atmospheres Being Monitored For					

Signature: _____ Date:_____

MONTHLY SAFETY CHECKS

Item	NA √	Yes √	No √	Corrective Action Required/ Date	Corrective Action Implemented/ Date
Emergency Response PPE Inspected					
PPE Tested					

Signature: _____ Date:_____

Safety Inspection Log

Date: Time: Contract Number:
Delivery Order Number: Location:
Weather Conditions:

Type of Inspections: Daily Weekly Special Re-inspection

Location inspected: (List by grid number, coordinates, or description)
Activity inspected: Intrusive operations

II. Inspection Requirement	Satisfactory	Unsatisfactory	N/A
Surface Sweep			
Subsurface Sweep			
Evacuation Technique			
Personal Protection Equipment			
Work Practices			
Site Control			
First Aid Equipment			
Fire Fighting Equipment			
Earth Moving Equipment			
Personal Decontamination Station			
Site Mobilization/Demobilization			

Overall Inspection Results: Satisfactory Unsatisfactory

III. Comments:

- Work stopped due to safety violation: Yes No
- Safety violations noted: None
- Personnel involved: N/A
- Corrective Measures N/A
- Re-inspection required Yes No XXX

IV. Signatures: I acknowledge that I have been briefed on the results of this inspection and will take corrective actions (if necessary).

_____ _____

Site UXO Safety Officer Site Manager/Project Manager

SITE DAILY PRE-OPERATIONS CHECKLIST

Spring Valley

Washington, DC

DATE: _____ **Check off/Time**

Daily Tailgate _____

Radio Checks

a. CEHNC-COE _____

b. TE (Supervisor / PDS / Cascade) _____

c. ECBC (DAAMS/ MiniCams) _____

d. Medics _____

e. Parsons (Site PM, SM, SSHO) _____

f. Down Range Team / Rescue _____

g. SUXOS _____

MEAP Operational (ECBC via Nextel) _____

DAAMS Operational (ECBC): **PUMP START TIME**_____ _____

MINICAMS operational (ECBC): **START TIME**:_____ _____

CLEAR FOR ENTRY: **CLEAR FOR EXIT:**

PDS Set up (TE) _____

EPDS Set up (stretchers in place) (TE) _____

D2PC (Weather Station) Operational (TE) **NOSE** _____ _____

Ambulance on site (SSHO) _____

Generator(s) Preop Checks and prepared for use _____

Air Scrubber/Filtration Preoperational Checks and prepared for use _____

Cascade _____

Low Pressure Monitor _____

PID _____

Arsine Detector _____

Weekly Vehicle Inspection Report

Date:	**Vehicle Make:**	**Rental/Lease/Private** *(circle one)*
Lic Plate #:	**Veh VIN#:**	
Starting Mileage for Week:	**Ending Mileage for Week:**	
General Vehicle Inspection		

Check { } with R for repair needed; X for OK; / for adjustment made

1. Windshield { }	**3. Vehicle Interior** { }
2. Vehicle Exterior { }	**4. Leaks** { }

5. Lights:

a. Headlights { }	d. Brake Lights { }
b. Tail lights { }	e. Back-up Lights { }
c. Turn Signals { }	f. Interior Lights { }

6. Brakes { }	**10. Belts** { }
7. Horn { }	**11. Defroster** { }
8. Tires (Tread wear/pressure) { }	**12.Radiator/Hoses** (DON'T check when hot) { }
9. Windshield Wipers/Washer { }	**13. Battery** { }

14. Fluid Levels: (Circle approximate level)

a. Oil	Full	1qt low	Added
b. Coolant:	Full	Need coolant	Added
c. Transmission:	Full	1pt low	Added
d. Fuel:	Full	½ ¼	Empty

Comments/Repairs/Service(s) Needed:

Figure 2

Certification of Task Hazard Assessment

TASK NAME: ALL TERRAIN VEHICLE (ATV)

1.0 PRINCIPAL TASK STEPS

Principal Steps:	**Potential Site Hazards** (See 1.1 list):	**Recommended Controls** (See 1.2 list):
1. Accepted/Inspected at Site	Vehicle Safety	A through D
2. Placed in Operation	A1-2, B1-3, C, D1-2, F, H2-4, J1, K1-3	A through O
3. Vehicle Maintenance	Vehicle Safety	A through D

1.1 Potential Hazards: Items checked are known or anticipated site hazards, or may occur as a result of site operations **(Check Appropriate Box)**

A ( ) Thermal Stress	E( ) Manual Lifting Hazards	J( ) Radiation
A1( ) Heat Stress	F( ) Slip, trip or fall	J1( ) UV
A2( ) Cold Stress	G( ) Chemical Hazards	J2( ) Ionizing
B( ) Biological Hazards	G1( ) Respiratory	K( ) MEC Environment
B1( ) Toxic/Hazardous plants	G2( ) Skin	K1( ) Potential MEC items
B2( ) Hazardous animals/insects	H( ) Vehicle Operations	K2( ) Unplanned Detonation
B3( ) Hanta Virus, when present	H1( ) High Noise (>85 dBA)	K3( ) Near Surface
C( ) Vehicle traffic in work area(s)	H2( ) Overhead Hazards	
D( ) Fire Hazards	H3( ) Pinch Points Hazards	
D1( ) Vegetation (high grass areas)	H4( ) Hot Surfaces	
D2( ) Flammable Liquids		

1.2 Recommended Controls:

A. Observe all MEC safety precautions and use safe work practices, IAW EP 385-1-95a, Basic Safety Concepts for O&E Operations, Jun01 and EM 385-1-1, Safety and Health Requirements Manual.
B. All ATV Equipment will be inspected and tested, in accordance with manufacturer's recommendations and certified in writing by a component person prior to being placed in use, IAW Section 18, EM 385-1-1.
C. All ATV operators will be licensed and trained by a recognized accredited ATV Training Course or in-house resource that is certified as a Trainer by an accredited organization, prior to operations of the vehicle.
D. Wear the appropriate PPE for the task being performed.
E. Use recognized hand and arm signals to communicate between the operators. Cease any operation, when this fails.
F. Maintain safe and appropriate separation distances between ATV, when traveling as a group.
G. ATVs will be used only off road, unless equipped for paved road use by manufacturer.
H. ATVs will only be operated during daylight hours, unless equipped for night use by manufacturer.
I. Only ATVs with four or more wheels may be used.
J. The manufacturer's recommended payload will not be exceeded at any time.
K. Passengers are prohibited on Class I ATVs (Class I ATV – single seat centered over the engine).
L. All ATVs will be equipped with mufflers, spark arrester, tail lights, stop lights and an audible signal device (horn).
M. Use of "ground guides" will be used, when vehicle(s) are not equipped with an audible warning device and/or has an obstructed view. When transporting equipment by trailers, the trailer will be "chocked" with approved devices when unhooked from the transporting vehicle. When attempting to hook onto the trailer, "ground guides" will not place any part of between the trailer and vehicle.
N. Be alert. Mark, avoid, and report any suspect MEC items.
O. Do not handle wildlife. Review characteristics of potential toxic/poisonous plant life known in the area.

2.0 DEGREE OF OVERALL TASK HAZARD: Anticipated degree of hazard, based on the hazards associated with this task.

Chemical Hazard:	**Physical Hazard:**	**Biological Hazard:**
( ) Low ( ) Serious	( ) Low ( ) Serious	( ) Low ( ) Serious
( ) Moderate ( ) Unknown	( ) Moderate ( ) Unknown	( ) Moderate ( ) Unknown

3.0 PROTECTIVE MEASURES: Items checked will be used to control or mitigate the above mentioned hazards

( ) Tailgate Safety Briefing	( ) Engineering Controls	( ) Administrative Controls
( ) Specialized Training	( ) Lockout/Tag Out	( ) Rotate Workers
( ) Proper operations of equipment	( ) Site Control Zones	( ) Limit Exposure Time
( ) Equipment Safety hazards	( ) Communications	( ) Decontamination
( ) Personal protective equipment	( ) Establishing Safe Work Areas	**( )** Wash Hands at break regardless of activity
	( ) Designate Smoking/Break Area	
	( ) Proper use of vehicles	
Other: _____	( ) Proper use of seat belts	Other: _____
	Other: _____	

TASK NAME: ALL TERRAIN VEHICLE (ATV)

4.0 Applicable SOPs/Programs: Site Specific Safety/ Health Plan (SSHP)			
5.0 PPE: PPE has been assigned based on the potential for exposure as identified by this hazard assessment			
Level of Protection	( ) A ( ) B	( ) C ( ) D	( ) Modified
Respiratory Protection	( ) SCBA ( ) Airline Respirator	( ) Full face APR ( ) ½ face APR	( ) Cartridge Type _____ ( ) No respirator needed
Protective Clothing	( ) Fully encapsulated ( ) Tyvek F, with hood	( ) Saranex ( ) Coveralls, Cotton	( ) Work Clothes ( ) Other:
Gloves (specify inner/outer)	( ) Nitrile ( ) Butyl	( ) Neopene ( ) Latex	( ) Leather ( ) Cotton
Head/Face/Eye/Ear Protection	( ) Safety Glasses–ANSIZ87.1 ( ) Ear plugs or muffs	( ) Safety goggles ( ) Wire or Nylon Face Shield	( ) Hard Hat ( ) Other:
Foot/Leg Protection	( ) Work Boots ( ) Steel-toed boots	( ) Steel Toe covers ( ) Snake Leggings	( ) Chemical over boots ( ) Kevlar Leg Chaps
Other Protection	( ) Motor Cycle Helmet w/full face shield or goggles	( ) Hi-Visibility Vests	
5.1 PPE Modifications Required: Elevated PPE posture when dealing with suspected "Hanta Virus" locations.			

6.0 Training Requirements

6.1-UXO personnel are EOD trained and approved by CEHNC-Huntsville
6.2-All Site personnel are OSHA qualified, both 40-hr and current 8-hr Refresher, IAW 29 CFR 1910.120
6.3- All Site personnel operating a vehicle maintain a current state driver's license.
6.4- UXO identification and safety precautions training for all Site Personnel. (Performed by UXOSO)
6.5-ATV operators will provide a copy of their qualifications and competency to the UXOSO, prior to any equipment operation.
6.6-Daily Safety and Operations Briefing. (Performed by UXOSO)
6.7-All Site personnel will attend "Site Specific Training" for safe work practices and hazard protection, IAW SSHP. (Performed by UXOSO).
6.8-Site personnel will be briefed on Material Safety Data Sheets (MSDS) for fuels and oils. (Performed by UXOSO)
6.9-Knowledge of emergency response and notifications IAW SSHP.
6.10-Maintain equipment IAW manufacturer's specifications and operate IAW owner's manual.

7.0 Equipment to be used and Inspection Requirements

Type	**Inspection Frequency (Daily/Weekly/Monthly)**		
Heavy Equipment (checks will be done prior, during and after operation)	Daily by Operator	Weekly as needed	Monthly as needed
First Aid Kits	Daily by Team Leader	Weekly by UXOSO for missing items	Monthly by UXOSO for expired items
Communications Equipment	Daily by Team Leader	Weekly by Team Leader	Monthly, as needed
Communication Checks w/radios (Cellular phones as back-up)	Twice Daily with all site elements. All "operations" will cease until communications have been re-established with at least another site element to relay information		
Fire Extinguishers	Daily by Team	Weekly by UXOSO	Monthly by UXOSO

8.0 Certification: The control methods, PPE and other procedures used in the conduct of this task have been selected as a result of a hazard assessment conducted by the individual identified below:

Printed Name: **Edward Grunwald, C.I.H., Project Safety and Health Officer** **Date: 01/20/05**

DAILY CONTRACTOR QUALITY CONTROL REPORT - #01

PROJECT: _____

Contract Number:

Delivery Order/Task Order Number:

Project Name:

Project Number:

Site Location:

Date:

Weather:

Personnel at Site:

Activities Conducted: .

Summary:

Items Found: None

Contingency Plan Initiated: (Y/N) N Time: N/A

Air Monitoring: N/A

IDW Generated:

Waste Disposition:

Work Planned : .

Departures from approved SSWP/LAWP:

Problems encountered/resolutions:

Health and Safety Training:

Instructions given by government personnel:

Check all attachments:

_____ Daily QC logs

_____ UXO Safety Log (Weekly)

Signed by: _____

Name (print): _____

Date: _____

Phone Number: _____

Copies sent to: _____

_____

_____

_____

_____

_____

_____

DAILY REPORT
SITEWIDE CSS INVESTIGATION
SPRING VALLEY, WASHINGTON DC

Contract No: W912DY-04-D-005
Delivery Order: DO 0007
Date/Day:
Report No.:
Site Location:

Weather:

Personnel on Site

Parsons	AWS	USAESCH	OTHER
		CENAB	

ACTIVITIES CONDUCTED (include site mobilization/demobilization, brush/tree clearing, geophysical survey, intrusive excavation, contaminated soil excavation, sampling, and restoration activities)

Visitors	Contractors

Problems encountered/resolutions:

Instructions given by government personnel:

Attachments (include as appropriate)		
	Y/N	
Geophysical Summary		
Excavation Summary		
Air Monitoring Summary		*To be included if investigation is using CSS protocols*
Anomaly Dig Sheet		*To be included at least once every week during intrusive investigation*
Sample Chains-of-Custody (COCS)		
Contingency Plan Initiation Summary		
Health and Safety Report		*To be included weekly during field activities*
Property Management Summary		*Include complete property inventory once every month*
Photographs		

Parsons Geophysical Anomaly Resolution

Unique Target ID	Original Survey				Reacquisition Survey					Dig Results			Post-Dig Excavation QC Results									USAESCH Concurrence
	Northing Coord.	Easting Coord.	Size (nT)	Size (mV)	Maximum Amplitude (nT)	Maximum Amplitude (mV)	Offset (ft)	Date	Comment	Excavation Dimension (in feet)	Description	Date	Excavation Hole Cleared?	QC Initials	Date	Agreement between Dig Results & Geophysical Data?	Maximum Amplitude (nT)	Maximum Amplitude (mV)	90% Reduced	Anomaly Identifed or Removed	Comment	

DAILY REPORT
SITEWIDE CSS INVESTIGATION
SPRING VALLEY, WASHINGTON DC

Contract No: W912DY-04-D-0005
Delivery Order: DO 0007
Date/Day:
Report No.:
Site Location:

PROPERTY MANAGEMENT SUMMARY

Property Received or Purchased

List Property (include rental equipment also)	**Received/Purchased From:**	**Comments** (indicate property was inspected and verified)

Property Sent or Damaged

List Property	**Sent back to or damaged/broken/lost**	**Comments** (property transfer form DD1149 or LDD Report completed as appropriate)

Please report all property management issues to Spring Valley Property Manager (INSERT NAME)
Include Property Inventory once every month.

DAILY REPORT
SITE-WIDE CSS INVESTIGATION
SPRING VALLEY, WASHINGTON DC

Contract No: WY912DY-04-D-0005
Delivery Order: DO 0007
Date/Day:
Report No.: 1

AIR MONITORING SUMMARY
FOR EXCAVATION UNDER CSS PROTOCOLS

Air Monitoring Equipment Used DAAMS Tubes, MINICAMS, PIDs, OP-FITR

If detections are reported for an instrument, further details should be noted in the appropriate summary table below.

Were any DAAMS detections reported? **Y/N**

DAAMS Detection Summary

Time	Location	Compound	Result (ng)	Action Taken

Were any MINICAMS ringoffs reported? **Y/N**

Operational MINICAMS Ringoff Summary

Time	Location	Compound	Result (TWA)	Action Taken

Were any PID detections reported in the ECS? **Y/N** *(A PID "detection" is 50ppm or more for a 60-second period)*

NOTE: A PID detection in the ECS triggers subsequent sampling at the CAFS exhaust. The results of this should also be reported in this table.

PID Detection Summary

Time	Location	Result (ppm)	Action Taken

Were there any OP-FTIR detections? **Y/N**

OP-FTIR Detection Summary

Time	Location	Compound	Action Taken

DAILY REPORT
SITE-WIDE CHEMICAL SAFETY SUBMISSION INVESTIGATION
SPRING VALLEY, WASHINGTON DC

Contract No: WY912DY-04-D-0005
Delivery Order: DO 0007
Date/Day:
Report No.: 1

CONTINGENCY PLAN INITIATION SUMMARY
FOR EXCAVATION UNDER CSS PROTOCOLS

Contingency Plan Initiated? Y / N Time?

Reason:

If initiated as result of possible agent detection (e.g., MINICAMS ringoff), was suspect source identified and mitigated?

If initiated as result of recovery of suspect RCWM, what was result of initial reconnaissance?

If initiated as result of recovery of suspect OE, what was result of initial reconnaissance?

Item Tracking

Item Number	Location (list Anomaly or Grid No.)	Headspaced? (Y/N)	Photo IDs	Description (indicate OE/RCWM, sealed or unsealed, glass or ceramic, empty or filled, or other AUES item, or fragments, or scrap)	Final Disposition

Final Resolution:

SITE MANAGER *DATE* *USAESCH SAFETY SPECIALIST* *DATE*

DAILY REPORT
SITE-WIDE CSS INVESTIGATION
SPRING VALLEY, WASHINGTON DC

Contract No: WY912DY-04-D-0005 **EXCAVATION ACTIVITY SUMMARY**
Delivery Order: DO 0007
Date/Day:
Report No.: 1

Excavation Equipment Used:

Excavation Summary

Anomaly ID / Grid ID	Excavation Dimensions in feet	Anomaly Resolved/Grid Cleared (Y/N)	Photo IDs (if applicable)	Excavation in Arsenic Grid (Y/N)	Excavation Comments (include brief descriptions of items found, and approximate size; and approximate quantities of material excavated)

Air Monitoring Conducted? **Y / N** (*Refer to separate Air Monitoring Summary if using CSS protocols*)

Air Monitoring Instruments Used:

List Arsenic Grids cleared:

Waste Summary (include wastes generated and also wastes taken offsite for disposal)

Waste	Source	Amount	Disposition
Soil			
Water			
Scrap			

Scrap glassware found requiring archaeological assessment? **Y / N** *If yes, report details on Daily Report Summary Sheet*

Backfill Used? **Y / N** *If yes, state amount and the excavations at which backfill was used -*

Erosion & Sediment Controls Checked? **Y/N** *If any repairs/modifications were necessary, describe on Daily Report Summary Sheet*

DAILY REPORT
SITE-WIDE CSS INVESTIGATION
SPRING VALLEY, WASHINGTON DC

Contract No: WY912DY-04-D-0005 **GEOPHYSICAL SURVEY ACTIVITY SUMMARY**
Delivery Order: DO 0007
Date/Day:
Report No.: 1
Site Location: Spring Valley, Federal Property

Geophysical Instruments Used:

Field Calibrations Conducted: **Y / N**

Geophysical Mapping Summary

Grid Mapped	Mapping Comments

Geophysical Reacquisition Summary

Anomaly ID Reacquired	Reacquisition Comments

Geophysical Excavation QC Summary

Anomaly ID	Excavation QC Comments (Indicate status of post backfill mapping, Parsons concurrence and USAESCH concurrence)

Example Spring Valley
Geophysical Dig Sheet

Project Name: _____
Geophysical Contractor: Parsons
Project Geophysicist: Greg Van
Field Team: _____
Survey Area ID: _____
Sector: _____ Grid: _____

Project Location: Spring Valley, Washington D.C.
Design Center POC: _____
Site Geophysicist: _____
Date: _____
Coordinate System: NAD 83 Maryland Zone

Scanning Geophysical Equipment Used: EM61 MkII Metal Detector G-858
Reacquisition Geophysical Equipment Used: EM61 MkII Metal Detector G-858

Background Value (mV / nT): _____ _____
Background Value (mV / nT): _____ _____

	Original Survey				Reacquisition Survey				Dig Results												Post-Excavation Results			Post-Dig Geophysical QC							
													Offset				Depth (in/cm)														
Unique Target ID	Northing Coord.	Easting Coord.	Size (nT)	Size (mV)	# of Contacts to dig	Maximum Amplitude (nT)	Maximum Amplitude (mV)	Date	Anomaly type *	Description	# of contacts	Approx. weight (lbs-oz / kg-g)	Distance (ft / m)	Direction (N, NE, etc.)	Orientation of Nose (Azimuth deg) **	Inclination of Nose (deg) **	Top	Center of Mass	Date	Team Leader Initials	Excavation Hole Cleared?	QC Initials	Date	Agreement between Dig Results & Geophysical Data? (G=good, P=poor, U=unacceptable)	Maximum Amplitude (nT)	Maximum Amplitude (mV)	90% Reduction or Reduced	Anomaly Identifed or Removed	Geophysicist QC Initials	Date	Comments

TRANSFER LOG

Date:
Time: ~

SVM	SVS	Date Generated	Description	Sample ID	Cleared HD	Cleared HD-L	Non-CWM	CWM-positive

Item transfered to TEU _____ Date _____

Item transfered to ECBC _____ Date _____

Item transfered to AWS _____ Date _____

Recovered Item Inventory Log
Spring Valley Site-Wide CSS

As of: _____

No.	Date	Grid / Location	Depth	Closed Cavity?		X-rayed?		PINS'd?		MARB'd?		Headspaced?		Initial Discription	Tracking No.	Location.	Certified to be Scrap?		Disposition
			ft	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No				Yes	No	
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
0																			

DD FORM 1348-1A, JUL 91 (EG) ISSUE RELEASE/RECEIPT DOCUMENT

1	2	3	4	5	6	7		23	24	25	26	27	28	29		45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
DOD CEN			RI FROM			M&S		UNIT			QUANTITY					SER	SUPPLEMENTARY ADDRESS					SIG	FUND		DISTRIBUTION			PROJECT			PRI		REQD	DATE		ADV		RI			O/P	COND		MGT									

1. TOTAL PRICE			2. SHIP FROM	3. SHIP TO
UNIT PRICE		DOLLARS	CTS	
DOLLARS	CTS			
			4. MARK FOR	

5. DOC DATE	6. NMFC	7. FRT RATE	8. TYPE CARGO	9. PS

10. QTY. REC'D	11.UP	12. UNIT WEIGHT	13. UNIT CUBE	14. UFC	15. SL

16. FREIGHT CLASSIFICATION NOMENCLATURE

17. ITEM NOMENCLATURE

18. TY CONT	19. NO CONT	20. TOTAL WEIGHT	21. TOTAL CUBE

22. RECEIVED BY	23. DATE RECEIVED

24. DOCUMENT NUMBER & SUFFIX (30-44)

25. NATIONAL STOCK NO. & ADD (8-22)

26. RIC (4-6)
UI (23-24)
QTY (25-29)
CON CODE (71)
DIST (55-56)
UP (74-80)

27. ADDITIONAL DATA

PREVIOUS EDITION MAY BE USED

PerFORM (DLA)

SAMPLE ID/DRUM CLASSIFICATION
SPRING VALLEY SITE WIDE CSS INVESTIGATION

Drum Total:	**0**
Non-OE Metal Scrap Drums:	**0**
OE Scrap Drums:	**0**
Liquid Waste Drums	**0**

Drum ID	Matrix	Date Use Started	Date Use Ended	Date off site	CWM Sample ID	HTW Sample ID	Seal ID	HTW Non Hazardous	Date Off Site for disposal

SUMMARY OF SAMPLES COLLECTED
SITE-WIDE CSS INVESTIGATION
SPRING VALLEY, WASHINGTON DC

Period:

Last Updated: **10-Aug-06**

Tent Location	No	Sample ID	Sample Media	Sample Type	Date Sample Received from ECS	Headspace Clearance Date	Sample Location / Drums Sampled	Date to Edgewood	Date CWM Results Received	Lab sample sent to (GPL):	Date Sent to GPL	Date HTW Results Received	Unvalidated Lab Data Reports to Corps	USACE Comments Received (unvalidated)	EDD Received	Validation Completed	Final Data Tables to Corps	USACE Comments Received (validated)	Notes	GPL Report #

Notes:
(1) Headspace and CWM clearance was conducted on daily composite samples
(2) Water samples were not headspaced in the field, but were sent directly to ECBC for CWM clearance
NA - NOT APPLICABLE

0	PC samples
0	waste profile samples
0	grab samples
0	tank samples
0	HTW samples

PARSONS

10521 Rosehaven Street, Fairfax, VA 22030 * 703-591-7575-voice * 703-591-1305-fax

Project No.	Project Name/Location
744507	Site-Wide Intrusive Investigation, Spring Valley, Washington, DC

Project Manager: Deepak Bhinge

Comments: ***Please expedite,*** and email or fax results to Deepak Bhinge.

Field No.	Sample Collection: Date mmddyy	Sample Collection: Time Military Time	Sample ID	Matrix	No. of Bottles/Items	Sampler	Preservatives and Containers									
							Methods for Analysis							RUSH		
							Mustard	Lewisite						72hr	NORMAL	
1				Scrap	1		X	X								
2				Scrap	1		X	X								
3				Scrap	1		X	X								
4				Scrap	1		X	X								
5				Scrap	1		X	X								
6				Scrap	1		X	X								
7				Scrap	1		X	X								

Relinquished By:	**Date:**	**Time:**
Received By:	**Date:**	**Time:**
Relinquished By:	**Date:**	**Time:**
Received By:	**Date:**	**Time:**

Airbill#
Cooler #:
Laboratory: **ECBC**
Attn: John Ditillo

Laboratory Comments

Sheet ____

BAKER TANK DISCHARGE LOG

As stated in the DCWASA temporary discharge permit, sampling for WQ parameters is required bi-weekly (once every two weeks). DCWASA approval is not required prior to discharge, though they must be informed by Parsons every time a discharge takes place.

EVERY TANK MUST BE CLEARED FOR AGENT/ABPs BEFORE DISCHARGE

* "Cleared for Agent" means no detection of HD, L, ABPs, or ricin by the ECBC lab at APG, Maryland.

Tank No.	Date Filled	Date Sampled	pH	Sample Number	Cleared for Agent*	Sent to HTW Lab	Date Discharged	Vol Discharged (gallons)
1								
2								
3								
4								
5								
6								
7								
8								
							TOTAL	

Portable Radio Sign-Out Log

Bar Code	Name (Print)	Org/Func	Sign
		Casscade	
		PDS	
		Medic	
		Minicam	
		Hunt Safety	
		Parsons Safety	
		Parsons	
		AWS	
		DAAMS	
		Op FTIR	
		Tech Ops	
		ECBC	

Portable Radio Sign-Out Log

Bar Code	Name (Print)	Org/Func	Sign
		Casscade	
		PDS	
		Medic	
		Minicam	
		Hunt Safety	
		Parsons Safety	
		Parsons	
		AWS	
		DAAMS	
		Op FTIR	
		Tech Ops	
		ECBC	

CONTAINER FORM

US Army Corps of Engineers, Baltimore District
Spring Valley Site-Wide Intrusive Investigation
Washington, DC

Parsons
AWES Remediation, Inc.

Container No. _____

Date Generated: _____

Container Type (circle) Steel Open Top Steel Closed Top Polyethylene Size 55 gal.
other (describe): _____

Waste Type (circle) Soil Decon Water Scrap PPE
other (describe): _____

Amount Filled (circle) 1/4 1/2 3/4 Full

Source of container contents, location and depth: _____

Date Placed in Storage: _____

Storage Trailer Number: _____

CWM Sample Identifier: _____ * see description if drum contains PPE

HTW Sample Identifier: _____ * disregard if CWM-positive

Comments: _____

Parsons Representative _____

ACCIDENT REPORT FORM

EMPLOYER

1. Name: _____
2. Mail Address: _____
   (No. and Street) (City or Town) (State and Zip)
3. Location :_____
   (if different from mail address)

INJURED OR ILL EMPLOYEE

4. Name:_____Social Sec. No.:_____
   (first) (middle) (last) Employee No:_____
5. Home Address: _____
   (No. and Street) (City or Town) (State and Zip)
6. Age:_____ 7. Sex: male ( ) female ( )
8. Date of injury or illness: _____ Time of accident:_____
9. Occupation: _____
   (specific job title, not the specific activity employee was performing at time of injury)
10. Department: _____
    (enter name of department in which injured person is employed, even though they may have been temporarily working in another department at the time of injury)

THE ACCIDENT OR OCCUPATIONAL ILLNESS

11. Place of accident of exposure:_____
    (No. and Street) (City or Town) (State and Zip)
12. Project: _____
13. Was place of accident or exposure on employer's premises? Yes ( ) No ( )
14 How did the accident occur? _____
    (describe fully the events that resulted in the injury or occupational illness.

    _____
    Tell what happened and how. Name objects and substances involved. Give details on all factors that led to

    _____
    accident. Use separate sheet for additional space).

15. What was the employee doing when injured? _____
(be specific--was employee using tools or equipment
_____
or handling material?)
_____

16 WITNESS TO ACCIDENT _____
(Name) (Affiliation) (Phone No.)
_____
(Name) (Affiliation) (Phone No.)

17 Name the object or substance that directly injured the employee. _____
(for example, object that struck
_____
employee; the vapor or poison inhaled or swallowed; the chemical or radiation that irritated the skin; or in
_____
cases of strains, hernias, etc., the object the employee was lifting, pulling, etc.)

18. Did the accident result in employee fatality? Yes ( ) No ( )

19. Number of lost days ____/restricted workdays ____ resulting from injury or illness?

OTHER

20. Name and address of physician:_____
(No. and Street) (City or Town) (State and Zip)

21. If hospitalized, name and address:_____
(No. and Street) (City or Town) (State and Zip)

22. Initial diagnosis of injury/occupational illness: _____
Date of report: _____ Prepared by:_____
Official position:_____

23. Treatment rendered: __ first aid __ medical treatment
_____
_____

PARSONS

ACCIDENT REPORT FOLLOW-UP

Employee: _____ Date of injury or illness: _____

ANALYSIS - What caused the accident. Why did it happen:

Primary cause:

_____
_____
_____
_____
_____
_____

Contributing factors:

_____
_____
_____
_____
_____
_____

PREVENTIVE/CORRECTIVE ACTION - State what will be done to prevent re-occurrence.

Immediate action:

_____
_____
_____
_____
_____
_____

Who is responsible _____ Completion date(s): _____

Long-term action:

_____
_____
_____
_____
_____

Who is responsible _____ Completion date(s): _____

Closed by _____

Facility Health and Safety Representative date

FORM HS07-03

(For Safety Staff only)	REPORT NO.	EROC CODE	**UNITED STATES ARMY CORPS OF ENGINEERS ACCIDENT INVESTIGATION REPORT** *(For Use of this Form See Help Menu and USACE Suppl to AR 385-40)*	REQUIREMENT CONTROL SYMBOL: CEEC-S-8(R2)

1. ACCIDENT CLASSIFICATION

PERSONNEL CLASSIFICATION	INJURY/ILLNESS/FATAL	PROPERTY DAMAGE	MOTOR VEHICLE INVOLVED	DIVING
GOVERNMENT ☐ CIVILIAN ☐ MILITARY	☐	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ CONTRACTOR	☐	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ PUBLIC	☐ FATAL ☐ OTHER		☐	

2. PERSONAL DATA

a. Name *(Last, First, MI)*	b. AGE	c. SEX ☐ MALE ☐ FEMALE	d. SOCIAL SECURITY NUMBER	e. GRADE

f. JOB SERIES/TITLE

g. DUTY STATUS AT TIME OF ACCIDENT: ☐ ON DUTY ☐ TDY ☐ OFF DUTY

h. EMPLOYMENT STATUS AT TIME OF ACCIDENT: ☐ ARMY ACTIVE ☐ ARMY RESERVE ☐ VOLUNTEER ☐ PERMANENT ☐ FOREIGN NATIONAL ☐ SEASONAL ☐ TEMPORARY ☐ STUDENT ☐ OTHER *(Specify)* _____

3. GENERAL INFORMATION

a. DATE OF ACCIDENT *(month/day/year)*

b. TIME OF ACCIDENT *(Military time)* hrs

c. EXACT LOCATION OF ACCIDENT

d. CONTRACTOR'S NAME (1) PRIME: (2) SUBCONTRACTOR:

e. CONTRACT NUMBER _____ ☐ CIVIL WORKS ☐ MILITARY ☐ OTHER *(Specify)* _____

f. TYPE OF CONTRACT: ☐ CONSTRUCTION ☐ SERVICE ☐ A/E ☐ DREDGE ☐ OTHER *(Specify)* _____

g. HAZARDOUS/TOXIC WASTE ACTIVITY: ☐ SUPERFUND ☐ DERP ☐ IRP ☐ OTHER *(Specify)* _____

4. CONSTRUCTION ACTIVITIES ONLY *(Fill in line and corresponding code number in box from list - see help menu)*

a. CONSTRUCTION ACTIVITY _____ (CODE) #

b. TYPE OF CONSTRUCTION EQUIPMENT _____ (CODE) #

5. INJURY/ILLNESS INFORMATION *(Include name on line and corresponding code number in box for items e, f & g - see help menu)*

a. SEVERITY OF ILLNESS/INJURY _____ (CODE) #

B. ESTIMATED DAYS LOST

C. ESTIMATED DAYS HOSPITALIZED

D. ESTIMATED DAYS RESTRICTED DUTY

e. BODY PART AFFECTED
PRIMARY _____ (CODE) #
SECONDARY _____ (CODE) #

f. NATURE OF ILLNESS / INJURY _____ (CODE) #

g. TYPE AND SOURCE OF INJURY/ILLNESS
TYPE _____ (CODE) #
SOURCE _____ (CODE) #

6. PUBLIC FATALITY *(Fill in line and correspondence code number in box - see help menu)*

a. ACTIVITY AT TIME OF ACCIDENT _____ (CODE) #

b. PERSONAL FLOATATION DEVICE USED? ☐ YES ☐ NO ☐ N/A

7. MOTOR VEHICLE ACCIDENT

a. TYPE OF VEHICLE: ☐ PICKUP/VAN ☐ AUTOMOBILE ☐ TRUCK ☐ OTHER *(Specify)* _____

b. TYPE OF COLLISION: ☐ SIDE SWIPE ☐ HEAD ON ☐ REAR END ☐ BROADSIDE ☐ ROLL OVER ☐ BACKING ☐ OTHER *(Specify)* _____

c. SEAT BELTS	USED	NOT USED	NOT AVAILABLE
(1) FRONT SEAT			
(2) REAR SEAT			

8. PROPERTY/MATERIAL INVOLVED

a. NAME OF ITEM	B. OWNERSHIP	C. $ AMOUNT OF DAMAGE
(1)		
(2)		
(3)		

9. VESSEL/FLOATING PLANT ACCIDENT *(Fill in line and correspondence code number in box from list - see help menu)*

a. TYPE OF VESSEI/FLOATING PLANT _____ (CODE) #

b. TYPE OF COLLISION/MISHAP _____ (CODE) #

10. ACCIDENT DESCRIPTION *(Use additional paper, if necessary)*

See attached page.

11. CAUSAL FACTOR(S) *(Read Instruction Before Completing)*

a. (Explain YES answers in item 13)	YES	NO
DESIGN: Was design of facility, workplace or equipment a factor?	☐	☐
INSPECTION/MAINTENANCE: Were inspection & maintenance procedures a factor?	☐	☐
PERSON'S PHYSICAL CONDITION: In your opinion, was the physical condition of the person a factor?	☐	☐
OPERATING PROCEDURES: Were operating procedures a factor?	☐	☐
JOB PRACTICES: Were any job safety/health practices not followed when the accident occurred?	☐	☐
HUMAN FACTORS: Did any human factors such as, size or strength of person, etc., contribute to accident?	☐	☐
ENVIRONMENTAL FACTORS: Did heat, cold, dust, sun, glare, etc., contribute to the accident?	☐	☐

a. *(CONTINUED)*	YES	NO
CHEMICAL AND PHYSICAL AGENT FACTORS: Did exposure to chemical agents, such as dust, fumes, mists, vapors or physical agents, such as, noise, radiation, etc., contribute to accident?	☐	☐
OFFICE FACTORS: Did office setting such as, lifting office furniture, carrying, stooping, etc., contribute to the accident?	☐	☐
SUPPORT FACTORS: Were inappropriate tools/resources provided to properly perform the activity/task?	☐	☐
PERSONAL PROTECTIVE EQUIPMENT: Did the improper selection, use or maintenance of personal protective equipment contribute to the accident?	☐	☐
DRUGS/ALCOHOL: In your opinion, was drugs or alcohol a factor to the accident	☐	☐

b. WAS A WRITTEN JOB/ACTIVITY HAZARD ANALYSIS COMPLETED FOR TASK BEING PERFORMED AT TIME OF ACCIDENT?

☐ YES *(If yes, attach a copy.)* ☐ NO

12. TRAINING

a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK?	b. TYPE OF TRAINING.	c. DATE OF MOST RECENT FORMAL TRAINING.
☐ YES ☐ NO	☐ CLASSROOM ☐ ON JOB	(Month) (Day) (Year)

13. FULLY EXPLAIN WHAT ALLOWED OR CAUSED THE ACCIDENT; INCLUDE DIRECT AND INDIRECT CAUSES *(See instruction for definition of direct and indirect causes.) (Use additional paper, if necessary)*

a. DIRECT CAUSE

See attached page.

b. INDIRECT CAUSE(S)

See attached page.

14. ACTION(S) TAKEN, ANTICIPATED OR RECOMMENDED TO ELIMINATE CAUSE(S).

DESCRIBE FULLY:

See attached page.

15. DATES FOR ACTIONS IDENTIFIED IN BLOCK 14.

a. BEGINNING (Month/Day/Year)	b. ANTICIPATED COMPLETION (Month/Day/Year)

c. SIGNATURE AND TITLE OF SUPERVISOR COMPLETING REPORT	d. DATE *(Mo/Da/Yr)*	e. ORGANIZATION IDENTIFIER *(Div, Br, Sect)*	f. OFFICE SYMBOL
CORPS _____ CONTRACTOR _____			

16. MANAGEMENT REVIEW *(1st)*

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE

17. MANAGEMENT REVIEW *(2nd - Chief Operations, Construction, Engineering, etc.)*

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE

18. SAFETY AND OCCUPATIONAL HEALTH OFFICE REVIEW

a. ☐ CONCUR b. ☐ NON CONCUR c. ADDITIONAL ACTIONS/COMMENTS

SIGNATURE	TITLE	DATE

19. COMMAND APPROVAL

COMMENTS

COMMANDER SIGNATURE	DATE

*U.S. GOVERNMENT PRINTING OFFICE: 1993-0-791-757

10. ACCIDENT DESCRIPTION *(Continuation)*

13a. DIRECT CAUSE *(Continuation)*

13b. INDIRECT CAUSES *(Continuation)*

14. ACTION(S) TAKEN, ANTICIPATED, OR RECOMMENDED TO ELIMINATE CAUSE(S) *(Continuation)*

Secure Environmental Treatment
Waste Characterization Profile Form

Section A - Generator Information

Generator (Company name)

USEPA_ID_Number

Site_Location

City, State, Zip

Contact Name
Phone
Fax
E-mail

Submitter (Individual or Company Name)

Billing_Address

City, State, Zip

Mailing_Address

City, State, Zip

Contact

Phone Fax

Section B - General Waste Information

Name_of_Waste

Process_Generating_Waste

Section C - Expected Volume

Expected_Annual_Volume (specify Gallons or Drums)

Expected_per_Shipment_Volume (specify Gallons or Drums)

Section D - Waste Stream Composition

Major Components	Concentration Range (wt% or ppm) Lower	Upper	Typical Units (wt% or ppm)

Section E - EPA Information:

RCRA Hazardous Waste Codes (and/or State Codes)

Section F - Does the Waste Contain?

(Check all that apply, and list approximate concentrations; include units: ppm, wt%, etc.)

Asbestos
Dioxins
Human/Animal_Waste
Mercaptans
PCBs (>50 ppm)
Pesticides/Herbicides
Surfactants
Perfluorooctanoic Acid (PFOA)
Ammonium perfluorooctanoate

Section G - Does the Waste Contain?

(For Organic Recovery ONLY - Check all that apply.)

Acrylates
Aldehydes
Amines
Ethers
Glycols
Nitrocompounds

Section H - Physical Properties

(Check all that apply)
Explosive
Oxidizer
Water_Miscible
Radioactive
Multiple_Liquid_Phases
Infectious
Carcinogen (or suspect)
Emulsion

(Specify)
pH_Range
Odor
Flash_Point
Dissolved Organic Carbon (DOC) (%)
Total Organic Carbon (TOC) (%)
Total Suspended Solids (TSS)(%)
Color/Appearance
Temperature as delivered °F
Reaction_Products with acidic water

Section I - Method of Shipment

(Check all that apply)
Tank Truck
Tank Car
Drum
Barge
Other (please specify)

Section J - Analytical Data

Characteristic Metals	TCLP (ppm)	Total Comp (ppm)
Arsenic		
Barium		
Cadmium		
Chromium		
Lead		
Mercury		
Selenium		
Silver		

Section J - Analytical Data (cont.)

Noncharacteristic Metals	Total Comp (ppm)
Antimony	
Chrome +6	
Cobalt	
Copper	
Iron	
Molybdenum	
Nickel	
Thallium	
Tin	
Titanium	
Vanadium	
Zinc	

Other Components	Total Comp (ppm)
Ammonia	
Cyanides_Soluble	
Cyanides_Total	
Cyanides_Amenable	
Fluoride	
Mercaptans	
PCBs	
Sulfides_Soluble	
Sulfides_Total	
Total_Organic_Halogens	

TC Organics	TCLP (ppm)	Total Comp (ppm)
Benzene		
Carbon_Tetrachloride		
Chlordane		
Chlorobenzene		
Chloroform		
Cresols		
1,4-Dichlorobenzene		
1,2-Dichloroethane		
1,1-Dichloroethylene		
2,4-Dinitrotoluene		
Heptachlor		
Hexachlorobenzene		
Hexachlorobutadiene		
Hexachloroethane		
Methyl_ethyl_ketone		
Nitrobenzene		
Pentachlorophenol		
Pyridine		
Tetrachloroethylene		
Trichloroethylene		
2,4,5-Trichlorophenol		
2,4,6-Trichlorophenol		
Vinyl_chloride		

Section J - Analytical Data (cont.)

Non-TC Organics	Total Comp (ppm)
Acetonitrile	
Acetophenone	
Acrolein	
Acetaldehyde	
Acrylonitrile	
Allyl chloride	
Anthracene	
Benzotrichloride	
Benzyl chloride	
Biphenyl	
Bis(2-chloroethyl)ether (Dichloroethyl ether)	
Bis(2-ethylhexyl)phthalate	
Bis(chloromethyl)ether	
Bromoform	
Butadiene	
Butyl benzyl phthalate	
Carbon disulfide	
Carbonyl sulfide	
Chloramben	
Chloroethane (Ethyl chloride)	
Chloromethyl methyl ether	
Chlorophenol	
Chloroprene (2-chloro-1,3-butadiene)	
Cumene	
Cyclohexadiene	
Diazomethane	
Dibenzofuran	
Dibromo-3-chloropropane	
Dichlorobenzene (ODCB)	
Dichloroethane (Ethylidene dichloride)	
Dichlorophenol	
Dichlorophenoxyacetic acid (2,4- D)	
Dichloropropane (Propylene dichloride)	
Dichloropropene	
Dicyclopentadiene	
Diethyl sulfate	
Dimethyl hydrazine	
Dimethyl sulfate	
Dimethylaniline	
Dimethylcarbamoyl chloride	
Dimethylphenol	
Di-n-butyl phthalate	
Dinitro-o-cresol	
Dinitrophenol	

Dinitrotoluene
Di-n-octyl phthalate
Dioxane (1,4-Diethyleneoxide)
Epichlorohydrin
Epoxybutane
Ethyl acrylate
Ethyl benzene
Ethylene dibromide (Dibromoethane)
Ethylene imine (Aziridine)
Ethylene oxide
Fluorene
Furfuryl alcohol
GE- Diethylene Glycol diethyl ether
GE- Diethylene Glycol dimethyl ether
GE- Ethylene Glycol dimethyl ether
GE- Ethylene Glycol monobutyl ether acetate
GE- Ethylene Glycol monoethyl ether acetate
GE- Ethylene Glycol monomethyl ether acetate
Hexane
Isophorone
Lindane
Methanol
Methyl bromide (Bromomethane)
Methyl chloride (Chloromethane)
Methyl iodide (Iodomethane)
Methyl isobutyl ketone (Hexone)
Methyl isocyanate
Methyl methacrylate
Methyl tert-butyl ether
Methylacetylene
Methylene chloride (Dichloromethane)
Monomethyl aniline
Monomethyl hydrazine
Naphthalene
Nitrophenol
Nitrophenol
Nitropropane
Oxybis butane
Pentachloronitrobenzene (Quintobenzene)
Phenanthrene
Phenol
Phosgene
Propionaldehyde
Propylene oxide
Propylenimine (2-Methyl aziridine)
Pyrene
Styrene
Styrene oxide
Tetrachloroethane

Tetramethyl lead
Toluene
Toluene diisocyanate
Toluidine
Trichlorobenzene
Trichloroethane (Methyl chloroform)
Trichloroethane (Vinyl trichloride)
Triethylamine
Trimethylpentane
Vinyl acetate
Vinyl bromide
Xylenes (isomers and mixtures)

Section K - Additional Waste Information

(Check if "Yes")

1. Is this waste subject to benzene NESHAP controls?
2. Was any portion of the waste (as generated) >10% TOC D001 (ignitable)?
3. Is this waste from an etching or electroplating process?
4. (For nonhazardous wastes only) Was your waste hazardous as generated and rendered nonhazardous by pretreatment?

   (If yes, a Land Disposal Restriction [LDR] form is required with each shipment.)
5. Does your waste contain any Toxics Release Inventory compounds (40 CFR 372.65) at concentrations at or greater than 0.1%?

   (If yes, include compounds in characterization data above.)

6a. Are you part of the Synthetic Organic Chemicals Manufacturing Industry?

(If no, skip to question 7.)

6b. Is this waste stream generated from the manufacture of a product that meets any of the criteria in 40 CFR 63.100(B)?

(If no, skip to question 7; if yes, please specify.)

6c. This wastewater stream contains organic hazardous air pollutants. It must be managed and treated in accordance with the provisions of Subpart G of Part 63, National Emissions Standards for Hazardous Air Pollutants for Source Categories.

6d. This wastewater stream contains organic hazardous air pollutants appearing in 40 CFR 63, Subpart G, Table 9, at levels greater than 1000 ppm.

6e. This wastewater stream is from a new source and contains organic hazardous air pollutants appearing in 40 CFR 63, Subpart G, Table 8, at levels greater than 10 ppm.

6f. This wastewater stream is from a new source and contains organic hazardous air pollutants appearing in 40 CFR 63, Subpart G, Table 9, at levels less than 1000 ppm.

7a. Do you generate a waste material that meets one of the exclusions in 40 CFR 63.680(b)(2)?

(If yes, please specify and skip question 7b.)

7b. Does your waste contain greater than 500 ppm hazardous air pollutants listed in 40 CFR 63 Subpart DD, Table 1?

(If yes, include compounds in characterization data above.)

8. Is this waste stream associated in any way with the U.S. Government Department of Defense Chemical Demilitarization Program?

Any additional comments or remarks:

Fax to DuPont Waste Acceptance Consultant (856) 540-3402

GENERIC CONTRACT

DuPont Generic Preshipment Notification and Hazardous Air Pollutant (HAP) Certification Form For RCRA Hazardous and Nonhazardous Wastewater

Date _____ **OW/DW** _____

Submitter	Generator
Company _____	Company _____
Address _____	Site Location _____
City/State/Zip _____	City/State/Zip _____
Contact_____	Contact_____
Phone_____	Phone_____
	U.S. EPA ID No._____
	SIC Code _____

Specific process Generating wastewater	Is this waste generated	Anticipated volume
_____	☐ From a one-time event?	_____ One-time
_____	☐ By a repetitive process?	_____ Per year
_____		
_____		

RCRA hazardous codes applicable to this waste stream_____

Is this waste subject to Benzene NESHAP controls? ☐ Yes ☐ No

Does the waste contain PCBs? ☐ Yes ☐ No If yes, indicate maximum ppm _____

Is this waste from an etching or electroplating process? ☐ Yes ☐ No

Was any portion of the waste (as generated) > 10% TOC, D001 (Ignitable)? ☐ Yes ☐ No

Waste stream composition

Components	Wt% or PPM
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

pH range _____ **Flash point** _____ **Approx. TSS<** _____ **% Approx. TOC<** _____

DuPont Generic Preshipment Notification and Hazardous Air Pollutant (HAP) Certification Form for RCRA Hazardous and Nonhazardous Wastewater (cont.)

Hazardous Air Pollutant (HAP) Certification

Instructions: Review the list of Hazardous Air Pollutant (HAP) compounds below. For each HAP compound that is or may be present in the waste, place the letter "**Y**" for "Yes" in the box in the column marked "Present" and indicate the maximum concentration of that compound.

If the HAP compound cannot be present in the waste, place the letter "**N**" for "No" in the box in the column marked "**Present**".

The generator must place either a "Y" or "N" in the box for each HAP compound or this form will be rejected.

Once completed and signed, FAX to (856) 540-3402.

HAP Compound	CAS #	Present Y or N	Max. Conc. (ppm)	HAP Compound	CAS #	Present Y or N	Max. Conc. (ppm)
Acetaldehyde	75070			Glycol Ethers (d) (see GE- below)	n/a		
Acetonitrile	75058			GE- Ethylene Glycol monoethyl ether acetate	111159		
Acetophenone	98862			GE- Ethylene Glycol monomethyl ether acetate	110496		
Acrolein	107028			Hexachlorobenzene	118741		
Acrylonitrile	107131			Hexachlorobutadiene	87683		
Allyl chloride	107051			Hexachloroethane	67721		
Benzene	71432			Hexane	100543		
Benzotrichloride	98077			Isophorone	78591		
Benzyl chloride	100447			Lindane	58899		
Biphenyl	92524			Methanol	67561		
Bis(chloromethyl)ether	542881			Methyl bromide (Bromomethane)	74839		
Bromoform	75252			Methyl chloride (Chloromethane)	74873		
1,3-Butadiene	106990			Methyl ethyl ketone (2-Butanone)	78933		
Carbon disulfide	75150			Methyl iodide (Iodomethane)	74884		
Carbon tetrachloride	56235			Methyl isobutyl ketone (Hexone)	108101		
Carbonyl sulfide	43581			Methyl isocyanate	624839		
Chloramben	133904			Methyl methacrylate	80626		
Chlorobenzene	108907			Methyl tert-butyl ether	1634044		
Chloroform	67663			Methylene chloride (Dichloromethane)	75092		
Chloromethyl methyl ether	107302			Naphthalene	91203		
Chloroprene (2-chloro-1,3-butadiene)	126998			Nitrobenzene	98953		
Cumene	98828			2-Nitropropane	79469		
Diazomethane	334883			Pentachloronitrobenzene (Quintobenzene)	82688		
Dibenzofuran	132649			Pentachlorophenol	87865		
1,2-Dibromo-3-chloropropane	96128			Phosgene	75445		
1,4-Dichlorobenzene	106467			Propionaldehyde	123386		
1,2-Dichloroethane (Ethylene dichloride)	107062			Propylene dichloride (1,2-Dichloropropane)	78875		

HAP Compound	CAS #	Present Y or N	Max. Conc. (ppm)	HAP Compound	CAS #	Present Y or N	Max. Conc. (ppm)
Dichloroethyl ether (Bis (2-chloroethyl) ether)	111444			1,2-Propylenimine (2-Methyl aziridine)	75558		
Dichlorophenoxyacetic acid (2,4- D)	94757			Propylene oxide	75569		
1,3-Dichloropropene	542756			Styrene	100425		
Diethyl sulfate	64675			Styrene oxide	96093		
Dimethyl sulfate	77781			1,1,2,2-Tetrachloroethane	79345		
N,N-Dimethylaniline	121697			Tetrachloroethylene (Perchloroethylene)	127184		
Dimethylcarbamoyl chloride	79447			Toluene	108883		
2,4-Dinitrophenol	51285			o-Toluidine	95534		
2,4-Dinitrotoluene	121142			1,2,4-Trichlorobenzene	120821		
1,4-Dioxane (1,4-Diethyleneoxide)	123911			1,1,1-Trichloroethane (Methyl chloroform)	71556		
Epichlorohydrin (1-Chloro-2,3-epoxypropane)	106898			1,1,2-Trichloroethane (Vinyl trichloride)	79005		
1,2-Epoxybutane	106887			Trichloroethylene	79016		
Ethyl acrylate	140885			2,4,5-Trichlorophenol	95954		
Ethyl benzene	100414			2,4,6-Trichlorophenol	88062		
Ethyl chloride (Chloroethane)	75003			Triethylamine	121446		
Ethylene dibromide (Dibromoethane)	106934			2,2,4-Trimethylpentane	540841		
Ethylene imine (Aziridine)	151564			Vinyl acetate	108054		
Ethylene oxide	75218			Vinyl bromide	593602		
Ethylidene dichloride (1,1-Dichloroethane)	75343			Vinyl chloride (chloroethylene)	75014		
Glycol Ethers (d) (see GE- below)	n/a			Vinylidene chloride (1,1-Dichloroethylene)	75354		
GE- Diethylene Glycol diethyl ether	112367			m-Xylene	108383		
GE- Diethylene Glycol dimethyl ether	111966			o-Xylene	95476		
GE- Ethylene Glycol dimethyl ether	110714			p-Xylene	106423		
GE- Ethylene Glycol monobutyl ether acetate	112072			Xylenes (isomers and mixtures)	1330207		

Generator Certification Statement:

I hereby certify that I am authorized to sign this form on behalf of the waste Generator identified, and that I have personally examined and am familiar with the information submitted in this form and all attached pages. The submitted information is true, accurate, and complete and all HAP compounds that may be present in the waste have been identified and maximum concentrations disclosed. I further acknowledge my responsibility to immediately inform DuPont of any changes to this information.

Printed Name (Generator)	Signature	Date

Approved by (DuPont)	Date

OSHA's Form 300 (Rev. 01/2004)

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name _____

City _____ State _____

Identify the person			Describe the case			Classify the case — CHECK ONLY ONE box for each case based on the most serious outcome for that case:				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness:					
								Remained at Work									
(A) Case no.	(B) Employee's name	(C) Job title (*e.g., Welder*)	(D) Date of injury or onset of illness	(E) Where the event occurred (*e.g., Loading dock north end*)	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill (*e.g., Second degree burns on right forearm from acetylene torch*)	Death (G)	Days away from work (H)	Job transfer or restriction (I)	Other recordable cases (J)	Away from work (K)	On job transfer or restriction (L)	(M) Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)
____	_____	_____	___/___ month/day	_____	_____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	_____	_____	___/___ month/day	_____	_____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	_____	_____	___/___ month/day	_____	_____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	_____	_____	___/___ month/day	_____	_____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	_____	_____	___/___ month/day	_____	_____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	_____	_____	___/___ month/day	_____	_____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	_____	_____	___/___ month/day	_____	_____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	_____	_____	___/___ month/day	_____	_____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	_____	_____	___/___ month/day	_____	_____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	_____	_____	___/___ month/day	_____	_____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	_____	_____	___/___ month/day	_____	_____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
____	_____	_____	___/___ month/day	_____	_____	☐	☐	☐	☐	____ days	____ days	☐	☐	☐	☐	☐	☐
					Page totals ➤	____	____	____	____	____	____	Injury (1) ____	Skin disorder (2) ____	Respiratory condition (3) ____	Poisoning (4) ____	Hearing loss (5) ____	All other illnesses (6) ____

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

OSHA's Form 300A (Rev. 01/2004)

Summary of Work-Related Injuries and Illnesses

Year 20__ __

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

All establishments covered by Part 1904 must complete this Summary page, even if no work-related injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete and accurate before completing this summary.

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the Log. If you had no cases, write "0."

Employees, former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR Part 1904.35, in OSHA's recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
_____	_____	_____	_____
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
_____	_____
(K)	(L)

Injury and Illness Types

Total number of . . .
(M)

(1) Injuries _____

(2) Skin disorders _____

(3) Respiratory conditions _____

(4) Poisonings _____

(5) Hearing loss _____

(6) All other illnesses _____

Post this Summary page from February 1 to April 30 of the year following the year covered by the form.

Public reporting burden for this collection of information is estimated to average 50 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment information

Your establishment name _____

Street _____

City _____ State _____ ZIP _____

Industry description (*e.g., Manufacture of motor truck trailers*)

_____

Standard Industrial Classification (SIC), if known (*e.g., 3715*)

___ ___ ___ ___

OR

North American Industrial Classification (NAICS), if known (e.g., 336212)

___ ___ ___ ___ ___ ___

Employment information *(If you don't have these figures, see the Worksheet on the back of this page to estimate.)*

Annual average number of employees _____

Total hours worked by all employees last year _____

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

_____
Company executive — Title

( ) - / /
Phone — Date

Optional

Worksheet to Help You Fill Out the Summary

At the end of the year, OSHA requires you to enter the average number of employees and the total hours worked by your employees on the summary. If you don't have these figures, you can use the information on this page to estimate the numbers you will need to enter on the Summary page at the end of the year.

How to figure the average number of employees who worked for your establishment during the year:

❶ ***Add*** the total number of employees your establishment paid in all pay periods during the year. Include all employees: full-time, part-time, temporary, seasonal, salaried, and hourly.

The number of employees paid in all pay periods = ❶ _____

❷ ***Count*** the number of pay periods your establishment had during the year. Be sure to include any pay periods when you had no employees.

The number of pay periods during the year = ❷ _____

❸ ***Divide*** the number of employees by the number of pay periods.

❶ _____ / ❷ = ❸ _____

❹ ***Round the answer*** to the next highest whole number. Write the rounded number in the blank marked *Annual average number of employees*.

The number rounded = ❹ _____

For example, Acme Construction figured its average employment this way:

For pay period...	Acme paid this number of employees...
1	10
2	0
3	15
4	30
5	40
▼	▼
24	20
25	15
26	+10
	830

Number of employees paid = 830 ❶

Number of pay periods = 26 ❷

830 / 26 = 31.92 ❸

31.92 rounds to 32 ❹

32 is the annual average number of employees

How to figure the total hours worked by all employees:

Include hours worked by salaried, hourly, part-time and seasonal workers, as well as hours worked by other workers subject to day to day supervision by your establishment (e.g., temporary help services workers).

Do not include vacation, sick leave, holidays, or any other non-work time, even if employees were paid for it. If your establishment keeps records of only the hours paid or if you have employees who are not paid by the hour, please estimate the hours that the employees actually worked.

If this number isn't available, you can use this optional worksheet to estimate it.

Optional Worksheet

_____ ***Find*** the number of full-time employees in your establishment for the year.

X _____ ***Multiply*** by the number of work hours for a full-time employee in a year.

_____ This is the number of full-time hours worked.

+ _____ ***Add*** the number of any overtime hours as well as the hours worked by other employees (part-time, temporary, seasonal)

_____ ***Round*** the answer to the next highest whole number. Write the rounded number in the blank marked *Total hours worked by all employees last year.*

U.S. Department of Labor
Occupational Safety and Health Administration

OSHA's Form 301
Injury and Illness Incident Report

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

U.S. Department of Labor
Occupational Safety and Health Administration

Form approved OMB no. 1218-0176

This *Injury and Illness Incident Report* is one of the first forms you must fill out when a recordable work-related injury or illness has occurred. Together with the *Log of Work-Related Injuries and Illnesses* and the accompanying *Summary,* these forms help the employer and OSHA develop a picture of the extent and severity of work-related incidents.

Within 7 calendar days after you receive information that a recordable work-related injury or illness has occurred, you must fill out this form or an equivalent. Some state workers' compensation, insurance, or other reports may be acceptable substitutes. To be considered an equivalent form, any substitute must contain all the information asked for on this form.

According to Public Law 91-596 and 29 CFR 1904, OSHA's recordkeeping rule, you must keep this form on file for 5 years following the year to which it pertains.

If you need additional copies of this form, you may photocopy and use as many as you need.

Completed by _____

Title _____

Phone (_____)_____--_____ **Date** ____/ ____/ ____

Information about the employee

1) **Full name** _____

2) **Street** _____

City _____ **State** _____ **ZIP** _____

3) **Date of birth** _____ / _____ / _____

4) **Date hired** _____ / _____ / _____

5) ❒ **Male**
❒ **Female**

Information about the physician or other health care professional

6) **Name of physician or other health care professional** _____

_____

7) **If treatment was given away from the worksite, where was it given?**

Facility _____

Street _____

City _____ **State** _____ **ZIP** _____

8) **Was employee treated in an emergency room?**
❒ **Yes**
❒ **No**

9) **Was employee hospitalized overnight as an in-patient?**
❒ **Yes**
❒ **No**

Information about the case

10) **Case number from the *Log*** _____ *(Transfer the case number from the Log after you record the case.)*

11) **Date of injury or illness** _____ / _____ / _____

12) **Time employee began work** _____ **AM / PM**

13) **Time of event** _____ **AM / PM** ❒ **Check if time cannot be determined**

14) ***What was the employee doing just before the incident occurred?*** **Describe the activity, as well as the tools, equipment, or material the employee was using. Be specific.** ***Examples:*** **"climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."**

15) ***What happened?*** **Tell us how the injury occurred.** ***Examples:*** **"When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."**

16) ***What was the injury or illness?*** **Tell us the part of the body that was affected and how it was affected; be more specific than "hurt," "pain," or sore."** ***Examples:*** **"strained back"; "chemical burn, hand"; "carpal tunnel syndrome."**

17) ***What object or substance directly harmed the employee?*** ***Examples:*** **"concrete floor"; "chlorine"; "radial arm saw."** ***If this question does not apply to the incident, leave it blank.***

18) ***If the employee died, when did death occur?*** **Date of death** _____ / _____ / _____

Public reporting burden for this collection of information is estimated to average 22 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Persons are not required to respond to the collection of information unless it displays a current valid OMB control number. If you have any comments about this estimate or any other aspects of this data collection, including suggestions for reducing this burden, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

FIGURE 5
ATF FORM 5400.5, REPORT OF THEFT OR LOSS-EXPLOSIVE MATERIALS

Form Approved, OMB No. 1512-0183 (04/30/96)

DEPARTMENT OF THE TREASURY
BUREAU OF ALCOHOL, TOBACCO AND FIREARMS
REPORT OF THEFT OR LOSS-EXPLOSIVE MATERIALS

DATE

Upon discovery of any theft or loss of any of your explosive materials:
-First, call ATF toll free at 1-800-800-3855 (or call ATF collect at 1-800-800-3855 if you are in Alaska, Guam, Hawaii, Puerto Rico or the Virgin Islands) to report the theft or loss;
-Second, call your local law enforcement office to report the theft or loss; and
-Third, complete this form and attach any additional sheets or invoices necessary to provide the required information, and mail to the nearest ATF office listed on the reverse. We suggest you retain a copy of the completed form. Please complete each item as applicable, to the best of your ability.
NOTE: Section 842(k), 18 U.S.C. Chapter 40, states, "It shall be unlawful for any person who has knowledge of the theft or loss of any explosive materials from his stock to fail to report such theft or loss within twenty-four hours of discovery to the Secretary and to appropriate local authorities." Codified at 27 C.F.R. Section 55.30.

1. NAME, ADDRESS AND TELEPHONE NUMBER OF PERSON MAKING REPORT (include corporate or business name, if applicable)

2. Location of theft or loss (if different from item 1)

3. THEFT OR LOSS	DATE	TIME
a. DISCOVERED		
b. OCCURRED (Show approximate if exact is not known)		
c. REPORTED TO ATF BY TELEPHONE		
d. REPORTED TO LOCAL AUTHORITIES		

4. NAME AND ADDRESS OF LOCAL AUTHORITY TO WHOM REPORTED

5. EXPLOSIVE MATERIALS LOST OR STOLEN (Attach invoices or additional sheets, if necessary)

a. MANUFACTURER OR BRAND NAME (Include date and shift code)	b. QUANTITY (Pounds of Explosives, Number of Caps)	C. TYPE AND DESCRIPTION (Dynamite, Blasting Agents, Detonators, etc. Include for each type, size, MS delay or length of leg wire, as applicable)

6. THEFT OR LOSS OCCURRED FROM (Check applicable box)
☐ PERMANENT MAGAZINE ☐ PORTABLE MAGAZINE ☐ TRUCK ☐ WORK SITE ☐ OTHER (Explain)

7. ENTRY TO MAGAZINE MADE THROUGH (Complete if applicable)
☐ DOOR ☐ ROOF ☐ FLOOR ☐ FOUNDATION
☐ WALL ☐ CEILING ☐ VENTS ☐ OTHER (Explain)

8. NUMBER AND TYPE OF LOCKS FORCED (Complete if applicable)

9. OTHER INFORMATION PERTINENT TO THE THEFT OR LOSS

10. SIGNATURE AND TITLE OF PERSON MAKING REPORT

11. FEDERAL EXPLOSIVE LICENSE OR PERMIT IF ANY

FOR ATF USE ONLY

DATE RECEIVED	TIME RECEIVED	UNIQUE IDENTIFIER

ATF F 5400.5 (1-93) PREVIOUS EDITIONS ARE OBSOLETE

SHIPPING PAPER AND EMERGENCY RESPONSE INFORMATION FOR HAZARDOUS MATERIALS

THIS VEHICLE IS TRANSPORTING HAZARDOUS MATERIALS

Date Prepared:	Date of Travel:	Page_____of_____

Proper Shipping Name	Hazard	ID No.	PG	Qty/Units	Weight

Emergency notification. In all cases of accident, incident, breakdown or fire, prompt notification must be given.
FOR EMERGENCY RESPONSE INFORMATION, SEE BACK OF THIS FORM

Remarks:

Certification:
This is to certify that the above named materials are properly classified, described, packaged, marked, and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

Signature of Shipper Representative:	Signature of Vehicle Operator(s):

24-Hour Emergency Assistance Telephone Numbers:	Work Hours Emergency Phone Numbers:

EMERGENCY RESPONSE INFORMATION

Guide Number 46 and 50 from the U.S. Department of Transportation Emergency Response Guide Book P 5800.6 are reproduced hereon. These guides are applicable to Hazard Class 1 Materials (Explosives).
Mark an X in the appropriate box:

☐ **USE GUIDE 46 FOR EXPLOSIVES (1.1), (1.2), (1.3), (1.5), AND (1.6)**

☐ **USE GUIDE 50 FOR EXPLOSIVES (1.4)**

For all other hazardous materials or substances, annotate appropriate Emergency Response Guide Book Guide Number in the block below, and attach a copy of the guide number page or pages.

Guide Numbers:

GUIDE 46 (ERG 93)

POTENTIAL HAZARDS

FIRE OR EXPLOSION:
May explode and throw fragments 1 mile or more if fire reaches cargo.

HEALTH HAZARDS:
Fire May produce irritating or poisonous gases.

EMERGENCY ACTION

If fire reaches cargo, do not fight fire.

If you know or suspect that heavily-encased explosives, such as bombs or artillery projectiles are involved, stop all traffic and begin to evacuate all persons, including emergency responders, from the area in all directions for 5000 feet (1 mile) for rail car or 4000 feet (3/4 mile) for tractor/trailer.

When heavily-encased explosives are not involved, evacuate the area for 2500 feet (½ mile) in all directions.

Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection.

CALL Emergency Response Telephone Number on Shipping paper FIRST. If Shipping Paper NOT AVAILABLE or NO ANSWER, CALL CHEMTREC AT 1-800-424-9300.

FIRE

Cargo Fires: DO NOT FIGHT FIRE WHEN IT REACHES CARGO. Withdraw from area and let fire burn.

Truck and Equipment Fires: Try to prevent fire from reaching the explosive cargo compartment. Flood with water; if no water is available use Halon, dry chemical or earth.

Promptly isolate the scene by removing ALL PERSONS from the vicinity of the incident if there is a fire. First, move people out of line-of-sight of the scene and away from windows. Then, obtain more information and specific guidance from competent authorities listed on the shipping papers.

SPILL OR LEAK

Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch or walk through spilled material.

FIRST AID

Call emergency medical care.
Use first aid treatment according to the nature of the injury.

GUIDE 50 (ERG 93)

POTENTIAL HAZARDS

FIRE OR EXPLOSION:
May explode and throw fragments 1/3 mile or more if fire reaches cargo.

HEALTH HAZARDS:
Fire May produce irritating or poisonous gases.

EMERGENCY ACTION

If fire reaches cargo, do not fight fire.

Stop all traffic and begin to evacuate all persons, including emergency responders, from the area for 1500 feet (1/3 mile) in all directions.

Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection.

CALL Emergency Response Telephone Number on Shipping paper FIRST. If Shipping Paper NOT AVAILABLE or NO ANSWER, CALL CHEMTREC AT 1-800-424-9300.

FIRE

Cargo Fires: DO NOT FIGHT FIRE WHEN IT REACHES CARGO. Withdraw from area and let fire burn.

Truck and Equipment Fires: Try to prevent fire from reaching the explosive cargo compartment. Flood with water; if no water is available use Halon, dry chemical or earth.

Promptly isolate the scene by removing ALL PERSONS from the vicinity of the incident if there is a fire. First, move people out of line-of-sight of the scene and away from windows. Then, obtain more information and specific guidance from competent authorities listed on the shipping papers.

SPILL OR LEAK

Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch or walk through spilled material.

FIRST AID

Call emergency medical care.
Use first aid treatment according to the nature of the injury.

SUPPLEMENTAL INFORMATION

Packages bearing the 1.4S label contain explosive substances or articles that are designed or packaged in such a manner that when involved in a fire, may burn vigorously with localized detonations and projection of fragments; effects are usually confined to immediate vicinity of packages.

If fire threatens cargo area containing packages bearing the 1.4S label, consider initial isolation of at least 50 feet in all directions. Fight fire with normal precaution from a reasonable distance.

MAGAZINE DATA CARD

Product Code / FSN:		Nomenclature:			Site Name: Address:			
Date Code / Lot Number		Hazard Class	UN or NA	Quantity / Case:				
Date	Bill of Lading / Voucher Number	Received From	Quantity Received	Quantity Issued	Issued To	Current Balance	Initials	
							Issuer	Receiver

Explosives Purchase / Receipt / Authorization List

Address and County: (Home Office) Address and County: (Field Office)			
Federal License #:		Expiration Date:	
The following individuals are agents, employees, or representatives of the undersigned, and are authorized to order or acquire explosive materials on behalf of Parsons			
Name and Home Address	Driver's License No.	Soc. Sec. Number	Place of Birth
The undersigned certifies the foregoing information to be true and correct to the best of his knowledge and belief, and that he will communicate any additions or deletions to the foregoing list to Parsons			
OE Sector Manager		Date	

Table 1 - DOD Hazard Classifications for Commercial Explosives
April 17, 2000

DOT EX #	Name	DOD Hazard Classification	Date Class
9806054	Cord, detonating	1.1D	2 Dec 98
9803207	Detonator with fuse assembly	1.1B	12 Jan 99
9709010	Cap, blasting, electric instant in DOT Packaging	1.4B	27 Jan 99
9707051	Cap, blasting, non-electric only when in DOT Package	1.4B	2 Dec 98
9608028	Shaped charge, commercial	1.4D	19 Sep 97
9608031	1 lb booster	1.1D	14 Jan 98
9508033	Fuse lighter, commercial	1.4S	27 Oct 97
9404156	Shock Star MS (shock tube)	1.4S	14 Jan 98
9405290	Shaped charge, commercial	1.4S	10 Mar 99
9409002	Shaped charge, commercial	1.4D	27 Oct 97
9308432	Pentolite booster	1.1D	14 Jan 98
9303285	Austin cast booster	1.1D	14 Jan 98
9303282	Cord detonating, commercial	1.1D	14 Jan 98
9303278	Cap, NE, commercial	1.1B	14 Jan 98
9303277	Detonator (Cap, Elec, comm)	1.4B	04 Apr 00
9207009A	Cord, Detonating	1.4D	04 Apr 00
9202035	Cord, detonating, commercial	1.1D	19 Sep 97
9201092	Fuse, time safety	1.4S	2 Dec 98
9104118	Cap, blasting electric, commercial	1.4B	19 Sep 97
9106259	Exel MS (shock tube)	1.4S	14 Jan 98
8912113	Demo charge, C-4, commercial	1.1D	27 Jan 99
8601111	Shaped charge, commercial	1.4S	10 Mar 99
8611125	Pentex booster	1.1D	14 Jan 98
8511062	Cap, blasting, NE, commercial 1.	4B	27 Oct 97
8311105	Safety fuse, commercial	1.4S	27 Oct 97
8210044	Cord, detonating	1.1D	12 Jan 99

Note: Greg Bayuga CEHNC-OE-S-P (256) 895-1596 maintains all the supporting documentation.

APPENDIX G
MSD CALCULATION SHEETS

US Army Corps of Engineers

FACSIMILE HEADER SHEET

Ordnance and Explosives

U.S. Army Engineering and Support Center, Huntsville
ATTN: CEHNC-OE-CW
4801 University Sq. Suite 20
P.O. Box 1600
Huntsville, AL 35807-4301

Telephone:	**FAX Number: (256) 895-1518**
TO: Deepak Bhinge	**FAX Number:** 703-991-7542
FROM: Wilson Walter	**Telephone:** 256-895-1290
SUBJECT: Explosive Siting - IHF	

Comments:

Dr Cullo - signed copy.

Date: 12 Jan 04	**Time:** 1415

Number of pages, including header page 5.

U. S. ARMY ENGINEERING & SUPPORT CENTER, HUNTSVILLE — CORPS OF ENGINEERS

DESIGN REVIEW COMMENTS

PROJECT: Spring Valley, Site-Wide CSS Amendment 5, Federal Property Storage Area

- ☐ SITE DEV & GEO
- ☐ ENVIR PROT& UTIL
- ☐ ARCHITECTURAL
- ☐ STRUCTURAL
- ☐ MECHANICAL
- ☐ MFG TECHNOLOGY
- ☐ ELECTRICAL
- ☐ INST & CONTROLS
- ☐ SAFETY
- ☒ ADV TECH
- ☐ ESTIMATING
- ☐ SPECIFICATIONS
- ☐ SYSTEMS ENG
- ☐ VALUE ENG
- ☐ OTHER

REVIEW: Final
DATE: 12 January 2004
NAME: Michelle Crull, PhD, PE (256) 895-1653

ITEM	DRAWING NO. OR REFERENCE	COMMENT	MC ACTION
1		All previous comments have been incorporated.	
2		Signed memo is attached.	

ACTION CODES
A - ACCEPTED/CONCUR
D - ACTION DEFERRED
W - WITHDRAWN
N - NON-CONCUR
VE - VE POTENTIAL/VEP ATTACHED

CEHND FORM 7 (Revised)
15 Apr 89

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

FROM : FAX NO. : Jan. 12 2004 02:17PM P2

Explosive Siting of IHF Area
And Explosives Magazine
At Spring Valley Federal Property Storage Area

Quantity-Distances (QD) for Barricaded ATF Magazine - The maximum net explosive weight (NEW) stored in the ATF magazine at the Federal Property Storage Area is 17.6 lbs TNT equivalent. The ATF magazine is barricaded with a minimum of 3 ft thick sandbags. This maximum NEW is based on the tests done for intentional detonations using sandbag mitigation (HNC-ED-CS-S-98-7) where a 155mm M107 (15.4 lbs of Comp B = 17.6 lbs TNT equivalent) was detonated inside a structure made of 3 ft thick sandbags. This 3 ft of sandbags contained all fragments and reduced the overpressure from the detonation. The inhabited building distance (IBD) for 17.6 lbs NEW with a 3 ft thick sandbag barricade on all sides based on these tests is 220 ft. The public traffic route (PTR) distance (60% of IBD) is 132 ft. The intermagazine distance between an unbarricaded aboveground magazine and a barricaded aboveground magazine (K6) is 16 ft.

In accordance with DoD 6055.9-STD, paragraph C2.4.2.1 the maximum permissible overpressure from the ATF magazine to the assessment operations is 3.5 psi. The ATF magazine barricading is based on the tests done for intentional detonations using sandbag mitigation (HNC-ED-CS-S-98-7) where a 155mm M107 (15.4 lbs of Comp B = 17.6 lbs TNT equivalent) was detonated inside a structure made of 3 ft thick sandbags. This 3 ft of sandbags contained all fragments and reduced the overpressure from the detonation. During these tests pressures were recorded at 40 ft, 80 ft, and 100 ft from the detonation. Fitting a curve to this test data (see attached figure), the pressure at 16 ft is 0.145 psi. This is well below the required 3.5 psi requirement. The hotbox is the nearest assessment operation at 16 ft. Therefore, all assessment operations are provided the required protection from the barricaded ATF magazine.

Interim Holding Facility (IHF) Area – The IHF Area include the structures labeled IHF, MHF, and AHF on the diagram. These structures are all bonded together for lightning protection and sited as one storage facility (i.e. a single magazine). Therefore, intermagazine distance does not apply between these structures.

Maximum Credible Event (MCE) for IHF Area - The most probable munition (MPM) at this site is the 75 mm Mk II chemical round. When explosively configured, this round contains 0.078 lbs tetryl (0.083 lbs TNT equivalent) in the burster. No fuzed munitions have been found at Spring Valley to this date.

All items are put into an MRC before being brought to the Federal Property Storage Area and remain in an MRC unless it is confirmed that there is no chemical agent in the item. If the item is confirmed to contain only high explosives (in the burster) with no agent, the item is removed from the MRC and placed in the barricaded ATF magazine.

The design fragment from the 75 mm Mk II chemical munition (0.0214 lbs at 2037 ft/sec) will not penetrate the MRC. The design fragment will be defeated by 0.11 inches of mild steel. The MRC is 0.134 inches of stainless steel (stronger than mild steel). Therefore, there is at least a 22% safety factor against perforation of the MRC by the design fragment of the 75 mm Mk II chemical munition. Additionally, each round will be in an MRC requiring perforation of two MRCs for the design fragment to impact another round. Therefore, there will be no propagation between rounds due to primary fragments. Tests performed August 2003 confirmed that no fragments from an explosively configured 75 mm Mk II chemical munition perforate the MRC when a detonation occurs.

In the holding facilities, each MRC is in a wooden box. In the event of an unintentional detonation, the boxes will mitigate any possible secondary fragments due to the MRC to an extent that propagation is unlikely to occur due to secondary fragments.

Overpressure from the detonation of a 75 mm Mk II chemical munition will not cause propagation of another.

Therefore, the explosive MCE is the burster only for the 75 mm Mk II chemical munition with 0.078 lbs tetryl and the primary fragments are defeated by the MRC. All QD's for the IHF Area are based on overpressure. IBD (K40) is 17 ft, PTR (K24) is 10 ft, and ILD (K18) is 8 ft.

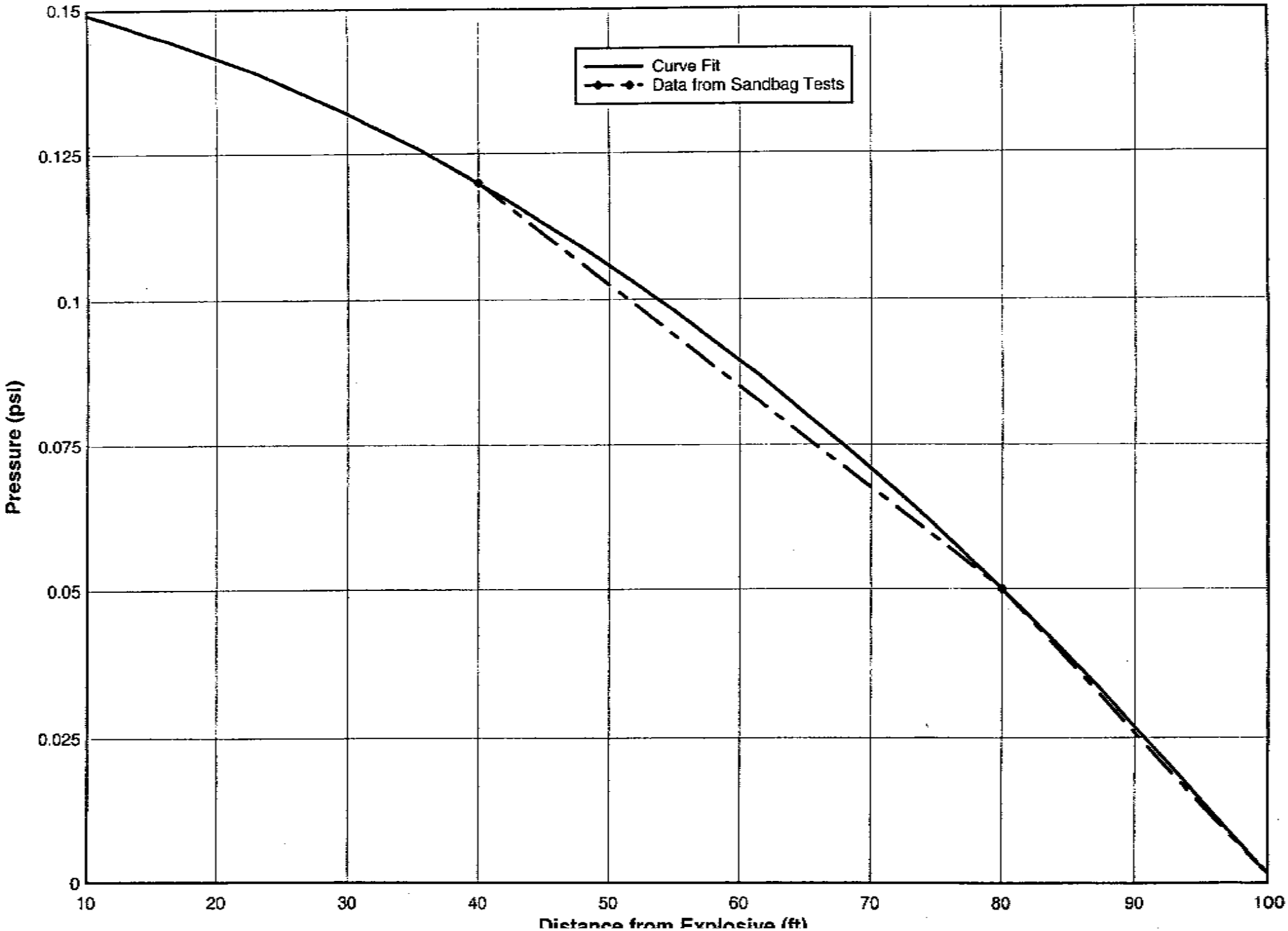
Assessment Tent – Assessment activities are done inside the tent south of the AHF on the drawing. The assessment workstation that is nearest to the AHF is the glove box that is more than 10 ft from the AHF. The assessment workstation that is nearest to the barricaded ATF is the hood which is greater than 30 ft from the barricaded ATF magazine. Therefore, all assessment workstations are outside ILD from all storage areas.

Inhabited Buildings and Public Traffic Routes – There are no inhabited buildings or public traffic routes within the IBD or PTR distances from either the barricaded ATF magazine or the IHF area.

Michelle Crull 1/12/04
Subject Matter Expert
Date: 12 January 2004

Sherene Opachka 1/12/04
QA Reviewer

Pressure Levels for 17.6 lbs NEW Under 36" Sandbags



FRAGMENTATION DATA REVIEW FORM

Category:	Chemical, WP, & In	DODIC:	
Munition:	75 mm MkII (Chemical)	Date Record Created:	7/30/2004
		Last Date Record Updated:	7/30/2004
Primary Database Category:	projectile	Individual Last Updated Record:	Crull
Secondary Database Category:	75 mm	Date Record Retired:	
Tertiary Database Category:	chemical		

Munition Information and Fragmentation Characteristics

Explosive Type:	Tetryl
Explosive Weight (lb):	0.07800
Diameter (in):	2.9528
Max Fragment Weight (lb):	0.078308
Critical Fragment Velocity (fps):	2037

Theoretical Calculated Fragment Range

Range to No More Than 1 Hazardous Fragment/600 Square FeetA (ft):	200
Vertical Range of Maximum Weight Fragment (ft):	873
Horizontal Range of Maximum Weight Fragment (ft):	1194

Overpressure Distances

Inhabited Building Distance (12 psi), K40 Distance:	19
Inhabited Building Distance (09 psi), K50 Distance:	23
Intentional MSD (0065 psi), K328 Distance:	152

Minimum Thickness to Prevent Perforation

4000 psi Concrete (Prevent Spall):	2.03
Mild Steel:	0.31
Hard Steel:	0.26
Aluminum:	0.65
LEXAN:	3.13
Plexi-glass:	1.86
Bullet Resist Glass:	1.47

Required Sandbag Thickness

Max Fragment Weight (lb)SB:	0.078308
Critical Fragment Velocity (fps)SB:	2037
Kinetic Energy 106 (lb-ft2/s2)SB:	0.1625
Required Wall _Roof Sandbag Thickness (in)SB:	NA
Expected Maximum Sandbag Throw Distance (ft)SB:	NA
Minimum Separation Distance (ft)SB:	NA

Water Containment System and Minimum Separation Distance:

Max Fragment Weight (lb)W:	0.078308
Critical Fragment Velocity (fps)W:	2037
Kinetic Energy 106 (lb-ft2/s2)W:	0.1625
Water Containment System:	NA
Minimum Separation Distance (ft)W:	NA

◀ ▶ Print This Form Close Form

APPENDIX H
RÉSUMÉS

DEEPAK BHINGE, P.E.
Project Manager

Experience Summary

Mr. Bhinge is a chemical/environmental engineer with more than 20 years experience in munitions and explosives of concern/recovered chemical warfare materiel (MEC/RCWM), drinking water policy development, and toxic/hazardous wastes management. His expertise includes remedial investigations/feasibility studies (RI/FSs); Resource Conservation and Recovery Act (RCRA) compliance; treatability studies; Proposed Plans and Records of Decision (RODs); pollution prevention action plans; and development of the Best Demonstrated Available Technology (BDAT) standards for soil and debris.

Mr. Bhinge has managed and provided engineering support for the U.S. Army Corps of Engineers (USACE), U.S. Environmental Protection Agency (EPA) Office of Drinking Water and Ground Water, Army Environmental Center (AEC), the EPA Superfund Underground Storage Tanks (UST), and the Alternative Remedial Control Strategy (ARCS) programs. Other technical assignments include the Department of Defense (DOD) Installation Restoration Program (IRP) site field investigations, Department of Energy (DOE) RCRA and FUSRAP programs, and Air Force Wright Laboratories pollution prevention action plans. He was the field manager and member of several field teams for groundwater monitoring well installation, and environmental sampling, including groundwater, surface water, stream sediments, and soils.

Years of Experience:

21 years

Years with Parsons:

5 years

Education

Virginia Tech.: M.S., Civil/Environmental Engineering (1986)

Indian Institute of Technology - Bombay: B.S., Chemical Engineering (1984)

Registered Professional Engineer (Maryland, 1990)
40-Hour Hazardous Waste Health and Safety Training (1987)

Primary Experience

October 2001 to date: Parsons, Fairfax, Virginia – Senior Project Manager

Mr. Bhinge is managing projects totaling about $20 million in budget for the U.S. Army Corps of Engineers to conduct intrusive investigations at Spring Valley, a high profile residential site in Washington, D.C. He is responsible for all the technical and financial aspects of the projects, and coordinating efforts with the Corps. He managed the successful completion and closeout of two residential properties on Sedgwick Street that are among the first to be completed at Spring Valley. Other investigations that have been completed and closed out are at the American University (AU) Intramural Lots, Spaulding Captain Rankin Area (SCRA), seven residential properties, AU Lot 18, AU Bamboo Area and Rockwood Properties. Work plan development for intrusive investigations at Glenbrook Road are planned.

February 2000 to August 2001: Independent Consulting

Business development for IT companies

January 1993 to January 2000: Science Application International Corporation (SAIC), McLean, Virginia – Project Manager

- Developed cost curves for central treatment options, prepared a breakthrough report for viruses in ground water drinking water wells, and conducted a study on coliphage samples in septic tanks for EPA.
- Developed supplemental guidance for determining ground water under the influence of surface water (GWUDI) for an EPA project.
- Managed an Offpost Groundwater Monitoring and Emergency Response Plan for the Anniston Army Depot in Alabama under contract with AEC
- Managed an Environmental Readiness Pilot Study for the Badger Army Ammunition Plant in Baraboo, Wisconsin as part of an AEC contract.
- Developed pollution prevention action plans with the Air Force Wright Laboratories Program.

November 1990 to December 1992: CDM Federal Programs Corporation (CDM), Fairfax, Virginia - Project Manager

- Managed a $600,000 work assignment assisting in the development of BDAT soil standards under the EPA UST contract.
- Field Manager at the FCX site in Washington, North Carolina under the EPA ARCS Region IV Program.
- Lead Feasibility Study Engineer for groundwater remediation for the Westinghouse Savannah River Sanitary Landfill Site in Aiken, South Carolina for DOE, and for the Aberdeen Pesticide Dumps Site in Aberdeen, North Carolina.
- Lead Engineer for preparing the Scoping Document for a model expedited RI/FS for two wood preserving sites in EPA Region VI under the ARCS program.
- Prepared Preliminary Assessment reports for several operating facilities under the Technical Enforcement System (TES) Region II and Region VI.
- Prepared RCRA Part B Renewal Permits for several facilities for the Westinghouse Savannah River Company in Aiken, South Carolina.

August 1987 to October 1990: C.C. Johnson and Malhotra, P.C. (CCJM), Wheaton, Maryland - Environmental Engineer

- Conducted the feasibility studies at the Nascolite Site and the DeRewal Site. Assisted EPA in the preparation of the Proposed Remedial Action Plan (PRAP) for the selected remedy as part of the ROD.
- Field member of remedial investigation teams for the Nascolite site, DeRewal, Smith's Farm site in Louisville, Kentucky, and the Dover Air Force Base site.

September 1986 to July 1987: Century Engineering, Inc., Baltimore, Maryland

Construction Inspector/Engineering Technician with the State Highway Administration, Maryland.

Publications and Patents

Published 13 papers. Two additional publications in progress. Listing available on request.

Granted U.S. Patent No. US 6,874,401B2, Structure and Method for Containing the Detonation of an Explosive. April 5, 2005.

THOMAS J. BACHOVCHIN, P.G.
Sr. Project Manager

Experience Summary

Registered Professional Geologist with comprehensive hazardous materials training and diverse project experience, including UXO investigations. **Project Manager** for RCRA and CERCLA hazardous waste sites. Performed numerous site assessments and acted as principal project manager for major oil corporation client. Responsibilities included design and installation of remediation systems and supervision of site workers. Member of field investigation team for EPA's Region III CERCLA contractor, functioning as Project Manager on CERCLA and RCRA sites.

Years of Experience:

25

Years with Parsons:

17

Education

B.S., Natural Sciences/Geology, June 1980, Pittsburgh University, Johnstown, Pennsylvania

Registrations

Registered Professional Geologist (Pennsylvania No. PG-000431-G)

Special Training

40-hour OSHA Certified for Hazardous Waste Operations and Emergency Response

8-hour OSHA Supervisory Training

Standard First Aid and Adult CPR

Primary Experience

November 1989 - Date. Parsons. Site Investigation and Remediation Group Supervisor. **Senior Geologist**.

- **Project Manager**, Baltimore District (CENAB) – for the Spring Valley former American University Experiment Station, WWI Chemical Munitions Development and Training Facility. Currently completing large-scale Remedial Investigation/ Feasibility Study (RI/FS) for Operable Units 4 and 5. This project involves complex arsenic and CWM sampling (more than 17,000 samples) in an upscale high-visibility neighborhood. Innovative studies, including arsenic Bioavailability, Speciation and Synthetic Precipitate Leaching Procedure (SPLP), were conducted. Many different aspects of the project required technical briefings to the Restoration Advisory Board and the general public. Considerable media scrutiny and publicity were involved. This project was completed under an extremely aggressive short-fuse schedule. Project was lump-sum and was completed on schedule and under budget.

- **Project Manager,** Huntsville District (USAESCH) – for the Spring Valley former American University Experiment Station. Several Delivery Orders including primary writing responsibilities for the approved CWM Safety Submission for the excavation at the Republic of South Korea's Ambassador's Residence Remediation Project, Washington, D.C. Developed work plans to perform work in a CWM contaminated environment. Obtained, reviewed, and selected subcontractors. Both projects involved

considerable interaction with regulatory authorities, including monthly Partnering meetings involving DC Health and the USEPA. Assisted the preparation of a final EE/CA report to be used as the basis of follow-on activities.

- **Project Manager**, USACE CEHND Huntsville District. RI/FS and Predesign for a Former Fire Training Area at the Defense Supply Center – Richmond, NPL site in Virginia. Organized and conducted a large-scale investigation which included: work plan preparation; characterization of a multiple aquifer hydrogeo-logically complex region and installation of monitoring wells; geophysical characterization; multi-media sampling; pump testing and analysis using computer modeling; and submittal of a final focused feasibility report to the U.S. Environmental Protection Agency. Project manager for another delivery order to prepare plans to perform exploratory trenching at a former landfill. The project objective was to investigate geophysical anomalies possibly caused by buried drums or unexploded ordnance (UXO). The project was in support of a focused feasibility report.

- **Project Manager**, Fuel Tank Assessment and Remedial System Design. Managed all phases of, and performed numerous Phase I assessments; installed groundwater recovery and treatment systems; investigated/ assessed explosion-proof requirements for remediation systems constructed at operating service stations; supervised tank excavation and closure; and prepared project and health and safety reports.

- **Project Manager** for a U.S. Army Environmental Center (US AEC) RCRA Facility Investigation project. The project, in excess of $1 million, addressed comprehensive investigations at various Solid Waste Management Units at a government owned-contractor operated military installation supplying solvent and solventless propellant grains and TNT explosives. Planned and executed the field investigation which involved: installation of deep groundwater monitoring wells in complex Karst subsurface terrain; dye tracing studies to determine groundwater movement; statistically based background sampling activities; sampling of rivers, creeks, lagoons and monitoring wells for soil, sediment, aqueous and waste samples; and, a complete structural study of the geology of the site vicinity including production of geological and structural maps. Responsible for completion of the RCRA Facility Investigation report that involved considerable interaction with several regulatory agencies, including the US EPA and the State of Virginia.

- **Project Manager** for the Engineering Evaluation/Cost Analysis (EE/CA) projects involving Unexploded Ordnance. The Kaho'olawe Island Reserve project involved analysis of treatment and disposition alternatives of hazardous waste and ordnance materials for the Naval Facilities Engineering Command. Involved detailed analysis of treatment and disposal alternatives for the recovered materials. Also involved considerable interaction with regulatory authorities, including the USEPA, and preparation of a final EE/CA report to be used as the basis of follow-on activities.

- **Principal Project Manager** for major oil corporation client including all phases of fuel tank assessment and remedial system

design, and performance of numerous Phase I assessments; installation of groundwater recovery and treatment systems; investigation/assessment of explosion-proof requirements for remediation systems constructed at operating service stations; supervision of tank excavation and closure; and preparation of project and health and safety reports. Participated in or coordinated: EPA SITES project at a U.S. Air Force base utilizing solidification and stabilization technologies; EPA SITES project at a U.S. National Laboratory utilizing UV/Oxidation Technologies; major investigation of hydrocarbon plume migration using hydropunch technology at a large fuel storage facility for the state of Virginia and the subsequent monitoring well installation program; contaminated soil excavation monitoring; full-scale hazardous constituent landfill sampling for the state of New York and an NPL site in Virginia; sampling investigation of a former major chemical facility in New Jersey; numerous monitoring well installations, development, and aquifer testing at sites in Maryland, Virginia, and Pennsylvania; and contaminated underground storage tank soil excavation, monitoring, and sampling and completion of closure report for an aviation facility at Washington D.C.'s Reagan National Airport.

Other Experience

January 1986 - October 1989. NUS Corporation, Wayne, Pennsylvania.

- **Project Manager** (1987-1989) for EPA's Region III Preremedial CERCLA Contractor. Directed investigations of sites on CERCLIS for consideration of possible NPL inclusion under the EPA's Field Investigation Team (FIT) contract. Responsible for calculation of a hazardous ranking system (HRS) score to determine the disposition of numerous sites throughout Region III. Organized sampling investigations, supervised six or seven technicians, prepared preliminary toxicological evaluation of laboratory data, wrote final reports, and coordinated the involvement of various state and regulatory agencies.

- **Laboratory Technician** (1986-1987). Performed organic extractions on a wide variety of hazardous samples and learned EPA sampling and analytical methodologies and techniques.

April 1984 - January 1986. Core Laboratories Inc., Houston, Texas. **Analyst II**. Performed analysis of drilled cores for the oil industry, including rig-site preparation and collection of samples; analysis of fluid saturations; determination of probable production for sampled zones; and reports to clients. Completed several technical seminars involving oil geology techniques and practices.

December 1981 - December 1983. Penn-Laurel Associates, Central City, Pennsylvania. **Surface Mine Permitter**. Responsible for operations consultation for the purpose of environmental compliance. Duties included erosion and sedimentation control design and determination of bond monies in excess of $100,000 at certain sites. Performed exploration drilling, water and overburden analysis, and environmental monitoring.

March 1981 - December 1981. Bendix United Geophysical, Somerset, Pennsylvania. **Field Crew Worker**. Field work in seismic oil and gas exploration, involving survey, geophone, and blasting crews.

DAVID Y. BADIO, JR.
Senior Quality Assurance Chemist

Experience Summary

Over twenty years of professional experience in Analytical Chemistry, Data Validation and data management. Working knowledge of a broad range of organic and inorganic methods for analyzing hazardous waste samples of various matrices (i.e.; water, soil, air, etc.) in support of CLP, RCRA, AFCEE, DOD and USACE site investigations. Extensive experience in the performance of field and laboratory audits and the training and supervision of data validation and QA personnel.

Years of Experience:

22

Years with Parsons:

14

Education

B.S., Chemistry, February 1980, University of Liberia, West Africa

M.S., Chemistry (analytical and physical), May 1984, American University, Washington, District of Columbia

Primary Experience

March 1992 - Date Parsons. **Senior Quality Assurance Chemist.** Responsible for QA Management of the EPA Superfund Innovative Technology Evaluation (SITE) Program and various CERCLA, RCRA, AFCEE, DOD and USACOE investigations. Principle activities include: (1) development and implementation of Quality Assurance\Quality Control (QA\QC) Program and Project Plans; (2) performing system and data audits for various field and laboratory projects; (3) automated validation of laboratory data using EPA, AFCEE, DOD, USACE and other standardized and customized guidelines; (4) supervision and training of QA and data validation chemists; (5) preparation of QA data summary reports; and development and administration of computer programs and databases for electronic data management.

Other Experience

Sept. 1988 - October 1992 Environmental Strategies Corporation (ESC), Reston, Virginia. **Senior Chemist/QA Manager.** Responsible for procuring and coordinating laboratory services and providing analytical chemistry and QA/QC technical support for a medium-size environmental consulting firm. Principal activities included: (1) procurement and coordination of domestic and international laboratory services for all four branches of a medium-size environmental consulting company; (2) generation and enforcement of ESC's laboratory services contract and selection of participating contract laboratories; (3) development and implementation of QA/QC programs, generated company's generic quality assurance plan; participated in the review of sampling and work plans; (4) review and validation of all laboratory data using EPA or ECRA guidelines; and (5) interpretation of data and general QA support, including development of data quality objectives, field, laboratory and data audits, and selection of appropriate analytical and QA/QC protocols.

October 1987 - Dec. 1988 ICF Technology, Fairfax, Virginia. **Senior Organic Analytical Chemist.** Responsible for providing technical and scientific support on organic issues to the Analytical Operations Branch at EPA headquarters. Principle activities included: (1)

providing support for the development, improvement and revision of methods and protocols for organic analysis, including screening methods and protocols, to improve detection limits; (2) assisting AOB staff in communicating with EPA Regional Superfund program staff and translating their analytical needs into organic analytical services; (3) researching and recommending methods for use in the CLP's special analytical services contracts; (4) developing standard operating procedures and assisting AOB project officers in revising technical sampling and QA and project plans and IFBs for use by CLP laboratories.

Dec. 1985 - Dec. 1987 Versar Inc., ESM Operations, Columbia, Maryland. **QA/QC Coordinator.** Responsible for the design, implementation and enforcement of the QA/QC program for an environmental laboratory. Principle activities included: (1) monitoring laboratory activities to determine conformance with authorized quality assurance policies; (2) implementing appropriate statistical procedures, including quality control charts, for the effective evaluation of laboratory results. This included monitoring the laboratory's QA objectives; (3) administering interlaboratory QA efforts, such as EPA, state and local QA programs, which included coordination of the analysis of split and other quality control samples by other area laboratories; (4) reviewing data from completed organic and inorganic analyses to determine compliance with EPA, ESM and other quality control protocols; (5) preparing QA summaries for all client reports.

Dec. 1983 - Dec. 1985 Viar and Company, Alexandria, Virginia. **Quality Assurance Chemist.** Reviewed analytical and quality assurance data generated from the laboratory analysis of environmental samples in support of EPA's CLP program.

Publications

"Column Capacity Variation in Silica-based Single Column Ion Chromatography," Analytical Chemistry 56(14): 2990-2994, 1984 (coauthor J. E. Girard).

"Single Column Ion Chromatography; Column Capacity and Eluent Composition," M.S. thesis, American University, 1984.

EDWARD L. GRUNWALD, C.I.H.
Industrial Hygiene/Construction Safety Specialist

Experience Summary

Extensive experience in the development and management of safety and quality assurance programs. Project Manager for several industrial hygiene investigations.

Years of Experience

25

Years with Parsons

20

Education

MS, Public Health (Toxicology Specialization), 1982, University of Massachusetts, Amherst, Massachusetts

BS, Bacteriology, 1978, Ohio Wesleyan University, Delaware, Ohio

Experience Record

Corporate Health and Safety Manager (1996-2002). Responsible for the development, standardization, and implementation of health, safety, and training programs throughout Parsons Infrastructure and Technology (Parsons I&T). Authored the Parsons I&T Health and Safety Policies and Procedures Manual, the Health and Safety Training Manual for Hazardous Waste Operations, the Construction Safety Training Manual, the Laboratory Safety Training Manual, and the Health and Safety Training Manual for Supervisors.

Specific duties include:

- Revise, as needed, the Parsons I&T Health and Safety Manual to comply with new regulations or policies.
- Develop and implement safety training programs for employees.
- Manage the occupational medical monitoring program.
- Perform audits of Parsons I&T facilities and projects to verify compliance with established policies, procedures, and plans.
- Investigate accidents and incidents and develop corrective actions.
- Establish procedures to evaluate the safety programs of subcontractors prior to hiring.
- Supervise facility health and safety representatives.
- Publish monthly safety newsletter to notify personnel of new OSHA regulations or corporate requirements.
- Develop health and safety plans for projects.

Construction Safety Manager, Hurlburt Field, Florida (2006-Present). The scope of work under this contract is to perform repairs and upgrades to eight buildings at Hurlburt Field, Florida. A major component of the work involved the fabrication and installation of sixteen 20 x 63 foot hanger doors at Eason Hanger before start of hurricane season (June 1st). My responsibilities involve:

- Developing a Project Health and Safety Program
- Reviewing subcontractor safety submittals
- Providing workforce safety training (project orientation and task specific safety trainings [ie crane safety, fall protection, lockout/tagout, mobile scaffold safety, etc)

- Conducting inspections to verify compliance with safety requirements
- Developing and updating AHAs
- Reviewing incident reports and developing corrective actions

Program Health and Safety Manager, Fulton County, Georgia (2001-Present). Program Health and Safety Manager of a joint venture that is providing Program and Construction Management (PCM) services for Fulton County's Water Services Division. Responsibilities include:

- Develop contract safety specifications for Fulton County
- Review contractor and subcontractor safety submittals for compliance with bid specifications and OSHA requirements
- Interact with Fulton County Loss Control Division
- Manage contractor and subcontractor OCIP enrollment
- Interface with OCIP insurance carrier and broker
- Develop Health and Safety program for joint venture team
- Perform inspections to verify that contractors and subcontractors are following contract specifications and applicable federal, state, and local safety requirements
- Develop & Implement training programs for Joint Venture personnel (project orientation, 10-hr OSHA constructions safety, Permit-Required confined Space entry training, electrical safety, CPR/First aid, OCIP enrollment and reporting, etc)

The Parsons PM Team has received safety awards and commendations from:

1) Georgia Department of Labor- Award of Safety excellence; "in recognition for outstanding workplace safety" (2004)

2) Fulton County Board of Commissioners- August 18, 2004 was proclaimed Parsons PM Team day. The Fulton County Commissioners praised Parsons safety record in the performance of difficult and high risk tasks (714 days without an injury)

3) Parsons Water & Infrastructure Group- Project safety award (2005)

4) National Safety Council- Perfect Record Award (2006)

Program Health and Safety Manager, U.S. Army Defense Environmental Restoration Program OE/CWM and HTW Assessments (1996-present). Provide health and safety program management of multidisciplinary workforce that includes 200 Parsons employees from 20 offices and over 30 subcontractors. Specific responsibilities entailed: reviewing and approving project safety and health plans for over 30 OE/HTW sites and 6 CWM sites, developing and implementing site-specific training programs for OE/CWM workers; performing audits of OE/CWM/HTW operations and developing corrective action programs when findings were discovered, assisting field teams prepare for DA safety audits (CWM sites); reviewing near miss and accident reports (3394 form) and developing measures to prevent recurrences, periodically meeting with Parsons OE safety personnel to review the OE/CWM program and assess where improvements can be made, and interfacing with USAESCH safety personnel (involves providing monthly safety reports, periodically developing safety guidance manuals and "White Papers," and meetings with COE safety and health personnel).

Project Manager (2001) Hired by Delta Airlines to investigate a potential hydrocarbon leak from

its fuel farm located at Atlanta Hartsfield Airport. Field tasks involved the:

- Collection of 6 soil borings to evaluate subsurface contamination;
- Installation of 6 ground water monitoring wells and collection of ground water samples; and
- Entry into the Flint River culvert to collect surface water samples to evaluate petroleum infiltration.

The Flint River sampling event was a permit confined space operation that involved entry into the 18-foot wide, 2-mile long culvert that runs under the airport. Eight surface water samples were collected and analyzed for petroleum hydrocarbons. Elevated petroleum hydrocarbon levels were not detected in down-stream samples.

Project Manager (1999-2001). Contracted by Public Works Department of Atlanta, Georgia to provide operations and maintenance employees at five wastewater treatment plants with hazard communication training. The course was designed to provide plant employees with information on the hazards associated with the chemicals in their workplace and the protective measures they can implement when handling these chemicals. Training involved both "hands-on" exercises and multi-media lectures (involving slides, VHS tapes and overheads) to enhance the retention of information. The training received excellent reviews from Public Works personnel.

Construction Safety Manager (1999-2005). Retained to provide construction safety services on a 10 mile $137 million dollar sewer interceptor tunnel project in Cobb County, Georgia. The workforce consisted of 100 workers from 3 different contractors operating 3 shifts per day. Responsibilities involved:

- Reviewing subcontractor safety plans and procedures
- Performing audits to verify contractor compliance with contract specifications and procedures
- Conducting crystalline silica worker exposure monitoring to verify compliance with OSHA/MSHA requirements
- Developing and implementing safety training programs (respiratory protection, explosives use and handing, controls to reduce silica exposure, emergency response and rescue, etc)

Technical Manager (1997-2000). Retained by BellSouth to: 1) Identify and classify confined spaces located on BellSouth properties and 2) develop a confine space database that provides safety information for each space. To date, over 1,400 confined spaces at 500 BellSouth facilities have been identified. Approximately, a third of these spaces have been classified as a permit-required confined space indicating that the space contains a safety or health hazard.

The confined space database provides hazard and logistic information on each space (space classification, atmospheric measurements, types of safety hazards inside space, location of space on property, space ID number, interior dimensions of the space, and proper entry procedures). When employees or contractors anticipate entry into a permit-required confined space they are required to call BellSouth's Facilities Management Department prior to entry. The Facilities Management Department accesses the database and informs the entrants of the specific hazards associated with the space and the proper procedures to use for entry. This process ensures that workers are informed of the hazards so entry is performed safely.

Project Manager (1998). Retained by the Paulding Country Public Works Department to

provide construction safety training. Training topics included:

- Excavation and trenching safety
- Electrical safety
- Personal protective equipment
- Heavy equipment safety
- Fall protection
- OSHA overview

The Director of Public Works praised the training program and recommended it to the County Department of Transportation.

Project Manager (1997) Contracted by insurance company to perform indoor air investigations at 3 homes where there were homeowner complaints. These investigations entailed:

- Interviewing homeowners
- Reviewing architectural drawings
- Performing visual survey of homes
- Conducting moisture testing of walls, floors, and ceiling
- Performing fungal sampling
- Performing volatile organic sampling

At two homes, visible mold was present on basement walls. (The insurance company later remediated the mold and constructed french drains along the perimeter of these homes.) At the third home petroleum hydrocarbons were detected in the basement (a gas station was located adjacent to the home).

Project Manager (1996 - 1997). Retained by the Metropolitan Atlanta Rapid Transit Authority (MART7A) to oversee lead paint abatement operations inside 23 box girders on the MARTA rail-lines. Responsibilities included:

- Review abatement contractor's submittals for compliance with project specifications.
- Oversee field operations. Document deviations from specifications.
- Perform OSHA compliance sampling to evaluate workers' exposure to lead dust.
- Conduct ambient air monitoring to evaluate lead dust emissions during abatement operations.
- Perform wipe sampling to ascertain the presence of residual lead on the surfaces of the box girders after abatement.
- Verify proper disposal of lead waste.

Task Manager (1996). Provided air monitoring services for a petroleum pipeline company. The purpose of the monitoring was to identify and quantify the concentrations of petroleum hydrocarbons vapors inside a cave system located adjacent to a diesel fuel spill site. Quarterly air samples were collected from 31 caves and vents in an effort to determine the exposure potential of recreational spelunkers. Sample results were compared to occupational exposure limits (OSHA PELs and ACGIH TLVs)-- the levels considered safe by the Tennessee Environmental Protection Division.

Technical Manager (1994-1995). Designed exposure monitoring study for Johnson Controls. The national contract with Johnson Controls involved the assessment of employee exposure to the refrigerant 2,2-dichloro-1,1,1-trifluoroethane during scheduled and emergency repair of chiller units. Additionally, the study evaluated mechanical room ventilation systems for adherence to American Society of Heating Refrigeration and Air Conditioning Engineers (ASHRAE) Standards.

Task Manager (1994). Conducted indoor air quality (IAQ) assessment of a Metropolitan

Atlanta Rapid Transit Authority office building. The assessment involved:

- Development and distribution of employee questionnaire and the evaluation of data for clusters;
- Visual walkthrough of areas identified as having a high incidence of occupant complaints;
- Inspection of HVAC system and review of maintenance procedures; and
- Collection and evaluation of mold and volatile organic samples.

From collected data, recommendations were made to eliminate employee IAQ complaints.

Task Manager (1994). Conducted 40-hour hazardous waste operations safety training for Mobil Oil employees.

Project Manager (1993). Responsible for the design and implementation of an industrial hygiene air survey for a petroleum pipeline company in Georgia. The study investigated employee exposure to lead and zinc oxide fumes associated with arc welding and oxyacetylene cutting during the construction of a drum storage facility.

Project Manager (1993). Managed several asbestos abatement projects for Metropolitan Atlanta Rapid Transit Authority (MARTA). Responsibilities included:

- Bulk sampling to confirm asbestos containing materials.
- Review abatement contractors qualifications and develop removal specifications.
- Perform oversight of abatement activities
- Conduct background, work area, clearance and OSHA compliance air sampling.

Project Manager (1992). Developed and performed occupational health and training for construction service and engineering personnel employed by MARTA.

Project Manager (1991 - 1992). Responsible for evaluating health and safety risk and recommending measures to control employee exposure at an automotive manufacturing facility located in Georgia.

Task Manager (1991). Developed and provided construction safety training for design and construction service personnel contracted by the Chinese Petroleum Company to manage the building of the Kaohsiung refinery's wastewater treatment system.

Project Quality Assurance Manager (1985-1990). Two industrial site investigations and contamination assessment projects and two remedial investigation and feasibility study (RI/FS) IRP projects for the U.S. Air Force. Responsibilities included the development of quality assurance project plans, the auditing of field and laboratory procedures, issuance of audit findings, and validation of laboratory and field data.

Toxicologist (1985 - 1990). Authored public health risk evaluations for several multi-site RI/FS projects.

1983 - 1985. NUS Corporation, Atlanta, Georgia. **Regional Safety Manager** (1983 - 1985). Worked as a member of multidisciplinary field investigation team (FIT) under contract with the U.S. Environmental Protection Agency (USEPA). Duties as a safety officer included the instruction of USEPA, FIT, and State Emergency Response Personnel in hazardous waste operations. Topics of the training included the following areas: protective clothing, respiratory protection, air monitoring instrumentation/OSHA regulations, site control, and site characterization. Developed

the Health and Safety Standard Operating Procedures for the USEPA Region IV FIT.

As a **Quality Assurance Manager** (1983 - 1985) for the Region IV FIT, developed quality assurance/control standard operating procedures. Performed audits on several RI/FS projects to insure compliance with USEPAs, NEICs, and FITs quality assurance procedures. Coauthored the Quality Assurance Manual for Remedial Response Activities at Uncontrolled Hazardous Substance Facilities, Zone 1. Selected topics from this manual include: the development and control of work plans, document control, remedial design control, data acquisition, field data collection, subcontractor quality assurance requirements, identification and control of laboratory samples, auditing, etc. These procedures were adopted by USEPA and Zone 1 FIT.

Project Manager (1983 - 1985). Site investigations at eight Superfund sites, under contract with USEPA Region IV. The activities performed at these CERCLA sites included the installation of monitoring wells and the sampling of soils, sediments, groundwater, and surface waters. One site involved the excavation, sampling, and removal of drums containing corrosive materials (mineral acids). The level of protection utilized by personnel for this included the use of fully encapsulating suits and self-contained breathing apparatuses. Ranked all sites utilizing the Hazardous Ranking System (HRS).

Professional Affiliations

Certified Industrial Hygienist, Comprehensive Practice, No. 5133

Society of Occupational and Environmental Health

American Board of Industrial Hygienists

American Academy of Industrial Hygienists (Diplomat)

American Industrial Hygiene Association

Georgia Local Section- American Industrial Hygiene Association (Officer)

Hazardous Waste Action Coalition, Health and Safety Subcommittee (Member)

Georgia AIHA Government Affairs Committee (Officer)

Papers and Publications

Crystalline Silica Exposure, Chattahoochee Tunnel Case Study-Presented at Georgia Local Section AIHA Fall 2001 meeting

"Exploding Trailer Incident Investigation," presented at American Industrial Hygiene Conference and Exposition, May 1995.

"Safety Considerations of Underground Storage Tank Investigations," presentation to the Arizona Society of Safety Engineers, 1985.

"Health and Safety Considerations for Hazardous Waste Operations," presented at the USEPA Region IV sponsored Symposium on the Progress of Regional and State Superfund Programs, July 1984.

"Protection by Ascorbate Against Acetylphenylhydrazine Induced Heinz Body Formation in Normal Human and Sheep Erythrocytes," *The Journal of Environmental Science and Health*, Volume 6, pp. 897-902, 1982.

"Ozone-Induced Decrease of Erythrocyte Survival in Adult Rabbits," *Advances in Modern Environmental Toxicology*, Volume 5, 1982.

""The Salmonella/Mammilian-Microsome Mutagenicity Test," presented before the Honor Society of Ohio Wesleyan University, June 1978.

CRAIG MURRAY
GEOPHYSICIST

EXPERIENCE SUMMARY

Mr. Murray has a broad range of near-surface geophysical experience with special expertise applying magnetic and electromagnetic methods for locating unexploded ordnance (UXO). After using seismic and ground penetrating radar while achieving his Masters degree at Cornell University, Mr. Murray spent 4 ½ years working with magnetic, electromagnetic, seismic, GPR, resistivity, borehole, and gravity data to solve a variety of environmental and engineering problems. Since joining Parsons in 2001, he has focused on applying magnetic and electromagnetic techniques for locating UXO at former military bases.

YEARS OF EXPERIENCE:

11

YEARS WITH PARSONS:

5

EDUCATION

B.S., Physics, 1995, Cornell University

M.E., Geological Sciences, 1996, Cornell University

REGISTRATIONS

California Registered Geophysicist (Number 1047)

EXPERIENCE

Huntsville CONUS/OCONUS Military Munitions Response Program, Denver, CO. **Program Geophysicist (2005-Present)**

- Planned geophysical field investigations of sites contaminated with military munitions.
- Provided management support and acted as technical lead for military munitions response geophysical work at multiple MMR sites.
- Researched and implemented innovative technology used to increase productivity, lower costs and improve quality.

Former Fort Ord Military Munitions Response Program (MMRP), Monterey County, CA. **Project Geophysicist. (2003-2005)**

- Managed geophysical department.
- Planned geophysical field investigations of sites contaminated with military munitions.
- Reviewed after-action reports for completed munitions responses.
- Provided management and technical support for munitions response remedial investigation/feasibility study (MR RI/FS).
- Developed and implemented site characterization approach using geophysical transect sampling.
- Researched and implemented innovative technology used to increase productivity and lower costs.
- Chaired the Fort Ord Project safety committee.

Former Fort Ord Military Munitions Response Program (MMRP), Monterey County, CA. Q**uality Control Geophysicist. (2001-2003)**

- Prepared sampling and analysis plan (SAP), time-critical removal action (TCRA) memoranda, and other critical documents.
- Analyzed and reported data collected for ordnance detection and discrimination study (ODDS).
- Implemented document and deliverable quality control process.
- Implemented geophysical data management system.
- Oversaw quality of geophysical data collection and processing for munitions responses.

Geophex, Ltd., Raleigh, NC. **Field Geophysicist**. **(1996-2001)**

- Managed $1,000 to $200,000 geophysical projects.
- Conducted research and development tests with the GEM-2 and GEM-3 sensors to improve their capabilities for detection and discrimination of unexploded ordnance (UXO).
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APPENDIX I
TECHNICAL PROJECT PLANNING WORK SHEETS

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TECHNICAL PROJECT PLANNING WORK SHEETS

The SVFUDS has a pre-established process that pre-dates the implementation of the TPP process. TPP is implemented through the Spring Valley Partnering process. This Appendix is a placeholder only.

APPENDIX J
AIR MONITORING AND SAMPLING PLANS

APPENDIX J

AIR MONITORING PLAN (PART A)
AND
SAMPLING ANALYSIS PLAN (PART B)

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

Prepared for:

U.S. Army Engineering and Support Center, Huntsville

and

Baltimore District
U.S. Army Corps of Engineers

Prepared by:

Edgewood Chemical Biological Center

EDGEWOOD CHEMICAL BIOLOGICAL CENTER

CHEMICAL APPLICATIONS DIVISION

MONITORING BRANCH

CHEMICAL WARFARE MATERIEL (CWM) AIR MONITORING PLAN FOR SITE-WIDE SITE SAFETY SUBMISSION Spring Valley, Washington D.C.

March 2007
Version 4.1

U.S. ARMY RESEARCH, DEVELOPMENT AND ENGINEERING COMMAND

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1.0 INTRODUCTION

This document presents a monitoring plan for the U.S. Army Engineering and Support Center – Huntsville (USAESCH) remediation efforts at Spring Valley, Washington, D.C.

1.1 PURPOSE

The purpose of this plan is to illustrate the strategy used by USAESCH to monitor the airborne concentrations of chemical warfare materiel (CWM) during remediation operations at the Spring Valley Site.

1.2 SCOPE

This plan establishes the policies, objectives, procedures, and responsibilities for the execution of a monitoring program at the Spring Valley Site. This plan describes the rationale for monitoring strategies for perimeter and general area air monitoring and choice of monitoring equipment. This monitoring plan applies to all facilities and operations within the Spring Valley Site involving air sampling and screening of soils containing suspected CWM.

1.3 OBJECTIVES

The objectives of this plan are:

A. To illustrate the monitoring method used for each RCWM operation performed at the Spring Valley Site.

B. To assure that workers and public safety and health are maintained by providing adequate environmental monitoring as specified in AR 385-61.

2.0 RESPONSIBILITIES

The U.S. Army Research, Development and Engineering Command (RDECOM) will

Collect and retain all CWM-related air monitoring data generated during this project.

Provide guidance on monitoring operations conducted on-site.

Conduct on-site analysis and confirmation for air samples and headspace samples collected from soil, scrap, PPE and bulk item samples. Aqueous and screened soil samples requiring low level CWM determination shall be sent to ECBC laboratory in Edgewood, MD for extraction and analysis.
Provide equipment and trained and certified personnel to operate MINICAMS and maintain certification data as part of the Monitoring Branch 40-year database.

Provide trained and certified personnel to set up, calibrate monitoring equipment, and collect monitoring samples for work space and historical monitoring stations.

Perform air-monitoring procedures as outlined in the Corps of Engineers Scope of Work, and consistent with RDECOM monitoring capabilities.

3.0 MONITORING.

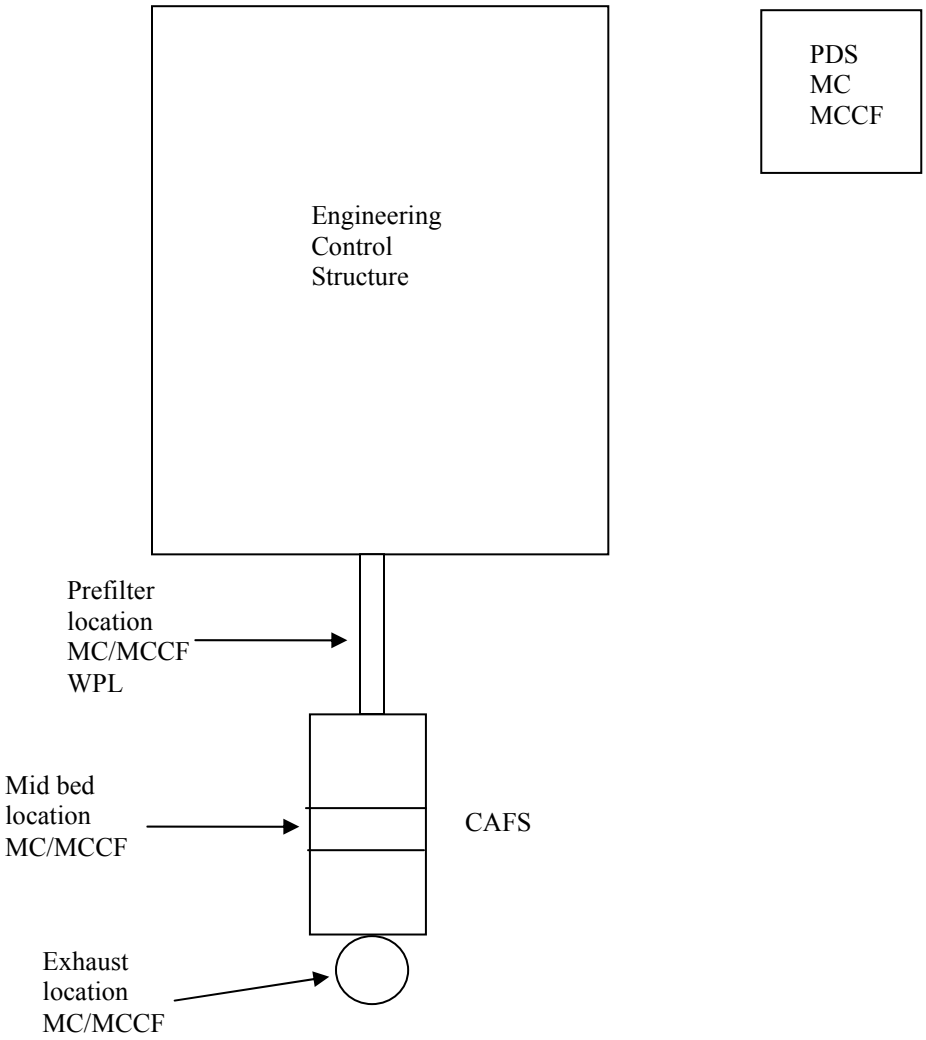
The intent of air monitoring is to indicate to workers when a hazardous atmosphere is present and to maintain a record of worker exposure to airborne CWM, thus ensuring the safety of the operators, the environment, and the surrounding communities. The choice of monitoring equipment is based on the type of monitoring to be performed and the types of agent involved. The location of monitors or sample ports is based on the operation, the airflow in the area, and the location of the source of agents. A general site layout of the sample locations during operations conducted under an Engineering Control Structure (ECS) is detailed in Figure 1. Figure 2 depicts the site layout of sampling locations during open air operations.

Table 1 Chemicals of Interest for Spring Valley

Chemical Name	Abbreviation	**CAS Number**	**Airborne Exposure Limit**	
			WPL (mg/m^3)	**STEL (mg/m^3)**
Bis(2-chloroethyl)sulfide	Mustard, H, HS, HD	505-60-2	0.0004	0.003
2-Chlorovinylarsonous dichloride	Lewisite, L	541-25-3	N/A	0.003
Carbonic dichloride	Phosgene, CG	75-44-5	N/A	0.40 [a] (0.1 ppm)
Cyanogen Chloride	CK	506-77-4	N/A	0.75[a] (0.3 ppm)
Trichloronitromethane	Chloropicrin, (PS)	76-06-2	N/A	0.7 [a] (0.1 ppm)

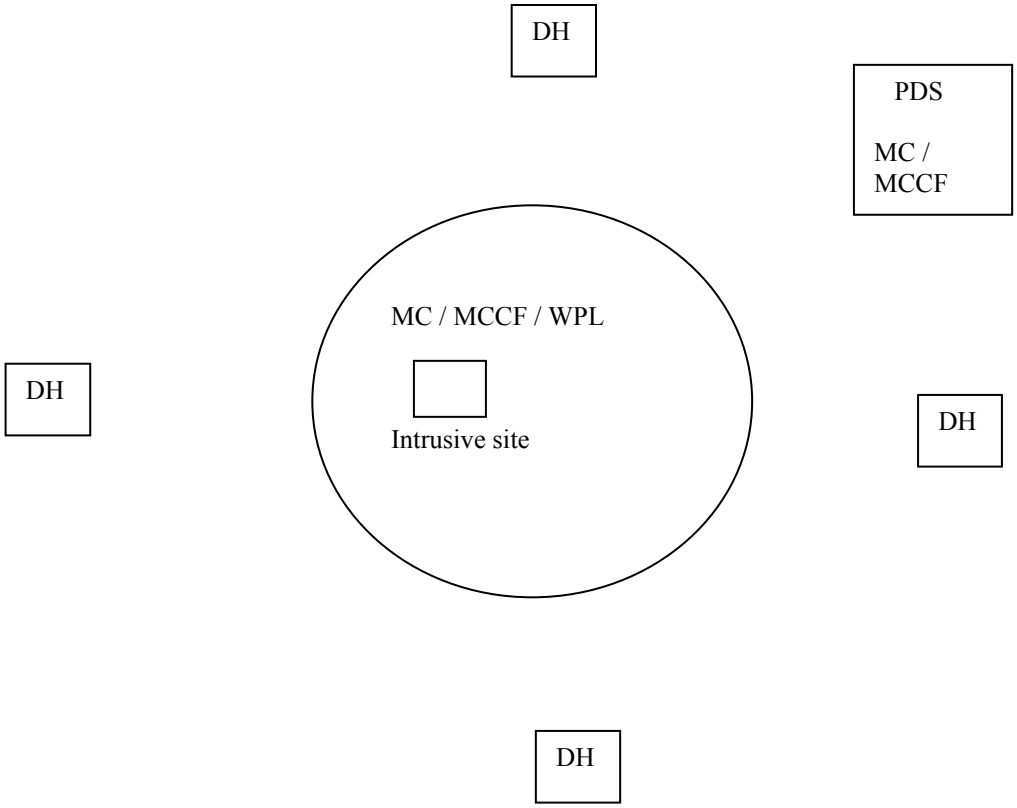
[a] Permissible Exposure Limit (PEL)

Figure 1 – Monitoring Configuration for Intrusive Operations within an Engineering Control Structure



Key:
MC – MINICAMS
MCCF – DAAMS confirmation
WPL – DAAMS

Figure 2 – Monitoring Configuration for Open Air Digs



Key:
MC – MINICAMS
MCCF – DAAMS confirmation
WPL – DAAMS
DH – Historical DAAMS

3.1 TERMS, DEFINITIONS, AND MONITORING SYSTEM DESCRIPTIONS.

3.1.1 Airborne Exposure Limits (AELs).

An airborne exposure limit is a general term that describes the maximum allowable air concentrations for occupational and general population exposure to chemical warfare material. Airborne exposure limits (AELs) for chemical warfare agents are contained in AR 385-61. The U.S. Army has published revised AELs in the Implementation Guidance Policy for Revised Airborne Exposures Limits for GB, GA, GD, GF, VX, H, HD, and HT. The U.S. Army Chemical Materials Agency has published AELs for Lewisite and some industrial compounds in the Chemical Materials Agency Monitoring Concept Plan.

3.1.2 Worker Population Limit (WPL).

The WPL is the maximum allowable 8 hour time-weighted average concentration that an unmasked worker could be exposed to for an 8 hour workday, 40 hours per week, for 30 years without adverse effect. There is no health significance from a single or short-term exposure of this concentration. Low level monitoring using either a near real time monitor or an historical monitor is conducted if workers are unmasked. If CWM is detected above the WPL, ECBC will implement its WPL Excursion Plan. The Excursion Plan will ensure that corrective actions are taken to prevent continuous exposure above the WPL.

3.1.3 Short Term Exposure Limit (STEL).

The STEL is the maximum concentration to which unprotected chemical workers may be exposed for up to 15 minutes. Near real time monitoring is conducted at the STEL in areas where CWM may be present.

3.1.4 Immediately Dangerous to Life and Health (IDLH).

A condition posing an immediate threat to life or health regardless of PPE use, including situations where concentrations of contaminants (including military toxic chemical agents) require self-contained, full face piece, positive pressure supplied air respirators. This condition represents the maximum concentration from which, in the event of respirator failure, the wearer could escape without the respirator and without experiencing any escape impairing or irreversible health effects. For the purpose of the military toxic chemical agent program, IDLH includes atmospheres where oxygen content by volume is less than 19.5 percent.

3.1.5 3X (XXX).

XXX indicates that the item has been surface decontaminated by approved procedures, bagged or contained, and that appropriate tests or monitoring have verified that vapor concentrations above the STEL limits for the specific agent(s) do not exist. The ECBC Monitoring Branch utilizes a headspace procedure for determining XXX; see section 3.3.5 for the specific procedure. The term XXX does not apply to a decontaminated liquid, detoxified liquid, soil, or a gas. Some items may be released from Government control if appropriate monitoring is performed and all Federal, State and local provisions have been met.

3.1.6 Depot Area Air Monitoring System (DAAMS).

The DAAMS is a portable air-sampling unit, which is designed to draw a controlled volume of air through a glass tube filled with a solid sorbent collection material (for example Tenax TA). As the air is passed through the solid sorbent tube, agent is collected on the sorbent bed. After sampling for the predetermined period of time and at a predetermined flow rate, the tube is removed from the vacuum line. The tube is transferred to the Mobile Analytical Platform where it is analyzed (approximately one hour process time) or, if necessary to prevent work stoppages, sent to the ECBC Monitoring Branch laboratory. DAAMS monitoring is performed for one of two purposes. The purpose of DAAMS confirmation samples is to confirm or refute a near real time (MINICAMS) alarm. The purpose of historical DAAMS samples is to verify the absence of low level CWM in and around the site.

3.1.7 Work Space Monitoring.

Work space monitoring provides notification to personnel that there is a problem and that action must be taken. Monitoring devices or sample lines are placed in strategic locations in the work area where there is a potential for encountering agent vapors. The sample locations are determined based on such factors as the agent involved, the airflow patterns in the area, the operation(s) being performed, and the location of the source of the potential release.

3.1.8 Miniature Continuous Air Monitoring System (MINICAMS®).

A MINICAMS® is an automatic air monitoring system that collects compounds on a solid sorbent trap, thermally desorbs them into a capillary gas chromatography column for separation, and detects the compounds with a Halogen Specific Detector (XSD). It is a lightweight, transportable, low-level monitor designed to respond in less than ten minutes. The MINICAMS® is designed to provide a visual and audible alarm if agent vapors exceed the alarm set point. MINICAMS® can be configured to detect industrial compounds including phosgene, chloropicrin, and cyanogen chloride. These units are configured with a sample loop and XSD detector.

3.1.9 Mobile Analytical Platform (MAP).

The MAP is a self-contained mobile platform that can be moved from site to site. It contains all the equipment necessary to analyze and confirm samples taken with DAAMS tubes. Although it may also be configured with the capability to extract soil and surface water samples, these samples are most often cleared for shipment and analyzed at the ECBC fixed site laboratory. The MAP will function as the on-site laboratory to support the critical on-site chemical analysis and monitoring needs of this project.

3.1.10 Internal Operating Procedures (IOP).

Previously approved written monitoring and analysis procedures used by the RDECOM at remediation sites. ECBC IOP's will be located within the MAP vehicle.

3.1.11 Low-level Alarm.

A low-level alarm is a device used in conjunction with a low-level monitor or detector, which

produces an audible sound and flashing light when the appropriate concentration (STEL) is detected.

3.1.12 Low-level Detection System.

Low-level detection systems are those detection devices or systems that can provide detection capability for concentrations at or below the established exposure limit for Chemical Warfare Material. Examples of low level detection systems are MINICAMS, DAAMS and the instrumentation used in the MAP.

3.1.13 QL.

A Quality Laboratory sample is a quality control sample that has been spiked with a solution of an analyzed dilute chemical agent in the laboratory but which has not been aspirated at a sampling site.

3.1.14 QP.

A Quality Process sample is a quality control sample that has been spiked with a solution of an analyzed dilute chemical agent and exposed to the sampling environment.

3.1.15 Flow Log.

The Flow Log is an ECBC, Monitoring Branch record of the flow measurements taken during the set up and operations of monitoring stations.

3.1.16 Scratch Log.

The Scratch Log is an ECBC, Monitoring Branch record that contains all pertinent sample information and is also used as a chain of custody document.

3.2 MONITORING CONCEPTS FOR THE SPRING VALLEY REMEDIATION

3.2.1 Near-real-time Monitoring.

ECBC will conduct near real time monitoring for CWM and industrial compounds using MINICAMS during Spring Valley remediation operations. When an engineering control structure (ECS) with a chemical agent filtration system (CAFS) is utilized, the CAFS will provide vapor containment and be monitored to the STEL at the inlet, mid-bed, and exhaust locations. The CAFS will be monitored for H, L, CG, PS, and CK using MINICAMS. During intrusive operations conducted without an ECS, the MINICAMS will monitor as close as reasonably possible to the site for H, L, CG, PS and CK.

3.2.2 Confirmation Monitoring.

Confirmation monitoring for H and L will be performed using DAAMS. DAAMS samples will be collected concurrently at all H and L MINICAMS sample locations. DAAMS samples are not used to immediately warn of hazardous conditions, but will be used to confirm the results of the real time monitors. Confirmation DAAMS samples are not fully quantified and are only

analyzed if the corresponding near real time monitor alarms**.**

DAAMS samples may be analyzed in the on-site mobile analytical platform (MAP), or if the analytical equipment is not operational, samples will be mailed via commercial courier to the ECBC Laboratory at APG.

DAAMS confirmation methods for the industrial compounds CG, PS, and CK are not effective and are therefore not employed. Confirmation of industrial compounds will be based on consecutive MINICAMS alarms.

3.2.3 Historical Monitoring.

DAAMS samples are collected to provide historical evidence that agent concentrations in the area did not exceed published limits. Historical DAAMS samples are collected to document that no agent was released to the environment and that workers are not exposed to very low concentrations over long periods of time. Worker population limit (WPL) monitoring will be conducted based on local requirements and conditions. WPL monitoring is required when workers are in an area of potential exposure to CWM. WPL monitoring is performed using historical DAAMS samples. All WPL and historical DAAMS samples will be analyzed. MINICAMS may be used to meet WPL monitoring requirements for L.

3.2.4 First Entry Monitoring.

If an interim holding facility is present and in use, MINICAMS will be used to verify that chemical vapors of H, L, CG, PS, and CK are not present prior to entering the facility after a suspect item has been placed in storage.

3.2.5 Soil Sample Headspace Monitoring and Verification.

Prior to shipment to ECBC laboratory for low-level agent analysis, headspace monitoring of soil samples for H and L will be completed through the use of the "Soil Headspace Monitoring" procedure with (Section 3.3.4) MINICAMS and/or DAAMS.

3.2.6 Scrap/PPE/Bulk Item Headspace Monitoring.

The ECBC will conduct headspace monitoring, for the purpose of XXX determination, for recovered scrap and bulk items. The procedure is located in Section 3.3.5 using MINICAMS and DAAMS for the detection of H and L as required by site-specific requirements. Used personnel protective equipment (PPE) will be cleared to the WPL.

3.2.7 Monitoring of Potentially Exposed Worker.

Workers that have been exposed or who have potentially been exposed to chemical agent will be monitored as outlined in Appendix A: Procedures for Near-Real-Time Monitoring of Agent-Contaminated Workers on Non-Stockpile Sites. Monitoring potentially exposed workers will take place in an isolated portion of the PDS. PDS personnel assigned to assist in doffing of PPE will use the distal end of the MINICAMS heated sample transfer line to sample subject personnel.

3.2.8 MINICAMS Alarm Conditions – the following terminology will be used when referring to MINICAMS alarm conditions:

i. MINICAMS Alarm – A single event when the MINICAMS result exceeds the alarm set point. The CP is notified by the MINICAMS operator. The operator reports the MINICAMS reading in STEL units.

ii. MINICAMS Ring off – Three consecutive alarms from a MINICAMS. DAAMS confirmation is required for all chemical agent ring offs (industrial agents are addressed below).

iii. Confirmed Ring off – If DAAMS results confirm a chemical agent MINICAMS ring off, the event is considered confirmed. For industrial agents (loop MINICAMS), three consecutive alarms is automatically considered a confirmed ring off.

3.3 MONITORING PROCEDURES/ANALYSIS.

3.3.1 Process Controls.

Upon receipt of the DAAMS sample tubes and signing of the proper chain-of-custody sheets, the DAAMS tubes will be desorbed on a thermal desorption unit and analyzed on a gas chromatograph (GC) with a mass selective detector (MSD) per IOP #MT-13, "Analysis of CWA and Degradation Products on DAAMS Tubes using GCMS".

All MINICAMS will be operated in accordance with MINICAMS IOP # MT-16 "Operation and Maintenance Procedures for MINICAMS Mounted in a Mobile Vehicle" or in accordance with MINICAMS IOP # MT-2 "Operation and Maintenance Procedures for Fixed Site MINICAMS. A matrix of monitoring procedures is attached as Table 1.

During the project, ECBC will maintain control over all results and data generated from the analyses. All monitoring operations will be conducted in accordance with the ECBC Monitoring Branch's Quality Control Plan. All requested data generated during the project would be tabulated, formalized and turned over to the USAESCH after completion of the project. ECBC will incorporate the data generated into the Monitoring Branch 40 year data storage program, should access to additional information be required.

3.3.2 Near Real Time Monitoring

3.3.2.1 MINICAMS

3.3.2.1.1 Near real time air monitoring will be accomplished by using MINICAMS set to alarm at 0.4 times the STEL hazard level for H and L (0.003 mg/m^3). The MINICAMS system will provide warning of airborne exposure hazards at the work site.

3.3.2.1.2 The MINICAMS consists of a monitor (sample collection, analysis, detection, and alarm equipment), vacuum pump, heated sample transfer lines, compressed gases, and computer. In the sampling cycle, a vacuum pump draws air into the MINICAMS system through a heated sample transfer line. The transfer line is heated to prevent condensation of any CWM material on the walls of the transfer line. The current maximum length of the

heated sample line shall not exceed 150 feet. The air sample is drawn through an automated gas chromatograph that first collects agent on a solid sorbent, or in a specific volume sample loop, and then thermally desorbs the agent into a separation column for analysis. A direct readout, in units of the hazard level, is provided. A permanent trace of the chromatogram is stored in the computer. If CWM is detected at the hazard level preprogrammed by the operator, the MINICAMS system alarm will activate and the workers will take immediate actions. The MINICAMS is considered a near real time monitor because it does not sample continuously, air sampling is stopped during the thermal-desorption step.

3.3.2.1.3 The MINICAMS unit shall be calibrated IAW the instructions given in the appropriate IOP. After the calibration has been completed, a challenge injection containing 1.00 STEL of the agent shall be made. If the MINICAMS response is between 0.75 and 1.25 STEL, the calibration is considered satisfactory.

3.3.2.1.4 Near Real Time Data Evaluation. The performance of the MINICAMS is monitored daily. Each day a QL challenge is made to the MINICAMS using standards of known concentration. Each standard is prepared to reflect the 1.00 STEL level for the agent being monitored. The area, peak height, retention time, peak width, injection volume, and the name of the technician are recorded on a log sheet.

3.3.2.1.5 Near Real Time Data Notification. The USAESCH Safety Officer at the Spring Valley Site shall be notified in the event of any MINICAMS alarm. The USAESCH Site Safety Officer shall be re-notified in the event of any subsequent or additional consecutive MINICAMS alarms.
The USAESCH Site Safety Officer's actions will depend on the number of MINICAMS alarms. Actions include, but are not limited to: await the result of the next MINICAMS cycle and evaluate current level of PPE, increase the level of PPE, determine possible location and/or source of contamination, attempt to locate and mitigated the source of contamination, evacuation of personnel inside the EZ, and actions to confirm MINICAMS alarms with DAAMS tubes. It is important to note that the final decision on the course of actions to be taken resides with the USAESCH Site Safety Officer.

3.3.2.1.6 Near Real Time Control Samples: Each day a QP challenge shall be injected at the end of the heated sample line of the MINICAMS using standard solutions of chemical agents at concentrations equaling 1.00 STEL.

3.3.2.1.7 Agent Challenge Log Sheet: All challenges of chemical agent monitors with agent will be recorded on an agent challenge log sheet.

Table 2
RDECOM Monitoring Matrix

	MINICAMS (CWA Monitoring)	MINICAMS (Industrial Chemicals)	DAAMS (Confirmation)	DAAMS (Historical)
Locations	CAFS inlet CAFS midbed CAFS exhaust PDS (ECS and open air) Near the intrusive site(open air)	CAFS inlet CAFS midbed CAFS exhaust Near the intrusive site(open air)	CAFS inlet CAFS midbed CAFS exhaust PDS (available- ECS and open air) Near the intrusive site(open air)	CAFS inlet as required At the intrusive site and 4 points surrounding the intrusive site during open air operations.
Sampling Frequency	Continuously during intrusive operations	Continuously during intrusive operations	Confirmation – up to 12 hrs	Historical - up to 8 hours
Analysis Time	10 minutes	10 minutes	Approximately 30-60 minutes	Approximately 30-60 minutes
Number of People Required	2 MINICAMS Operators	2 MINICAMS Operators	1 Sample Technician 1 GC Operator	1 Sample Technician 1 GC Operator
Target Agents	Mustard (H) Lewisite (L)	Phosgene (CG) Chloropicrin (PS) Cyanogen chloride (CK)	Mustard (H) Lewisite (L)	Mustard (H) Lewisite (L)
Lowest Level Of Detection	H, L: 0.00075 mg/m^3 (0.25 STEL)	CG: 0.1 mg/m^3 (0.25 STEL) PS: 0.175 mg/m^3 (0.25 STEL) CK: 0.15 mg/m^3 (0.25 STEL)*	H[1]: 0.00008 mg/m^3 L[1]: 0.00008 mg/m^3	H[1]: 0.00008 mg/m^3 L[1]: 0.00008 mg/m^3
Required USAESCH Site Safety Notification Level	H, L: 0.0012 mg/m^3 (0.4 STEL)	CG: 0.28 mg/m^3 (0.7 STEL) PS: 0.49 mg/m^3 (0.7 STEL) CK: 0.42 mg/m^3 (0.7 STEL)*	H, L: Any Confirmed Detection	H, L: Any Confirmed Detection

1: Detection limit for the DAAMS tubes assumes a 24 liter sample is collected.

* based on a calibration target concentration of 0.49 mg/m^3 (0.1 ppm) used to avoid MINICAMS overload

3.3.3 Confirmation/Historical Monitoring.

Historical/Confirmation monitoring utilizes DAAMS samplers located as near as operationally possible to the sampling point of the MINICAMS. The MINICAMS and DAAMS station will be collecting samples at the same time. Therefore, depending upon the time of a MINICAMS alarm the DAAMS sampling station may be used to confirm the alarm. Each pump collects a set of two DAAMS tubes and pumps are set to run for a maximum of twelve hours or a minimum of one hour. Flow rates for monitoring pumps are determined in accordance with sample collection internal operating procedures. Each DAAMS sampling station consists of a pump and two DAAMS tubes. The second tube is used as a back up and may be analyzed if there is a problem with the first tube or if further analysis is necessary to confirm agent identification.

3.3.3.1 Confirmation/Historical Data Notification: The USAESCH Safety Officer at the Spring Valley Site will be notified of all confirmed detections of any monitored compound. This includes concentration levels below the STEL or WPL value.

3.3.3.2 Confirmation/Historical Air Sampling Records: Copies of all confirmation/historical air sampling results will be maintained. A copy of the results will be forwarded to the USAESCH, Project Health and Safety Manager for further disposition.

3.3.4 Soil Headspace Analysis Procedures.

3.3.4.1 Under normal conditions soil sample headspace analysis will be conducted using the MINICAMS. If DAAMS tubes are used in place of MINICAMS, start the following sequence at step 11. DAAMS tubes must be used to confirm all positive MINICAMS readings (i.e. readings above the alarm set point). This monitoring shall be used to screen soil samples for H and L contamination. Once agent has been confirmed in soil/debris from a location, confirmation of MINICAMS alarms may be discontinued with written approval from the USAESCH Safety Officer. Headspace Monitoring Procedures of soil samples using the MINICAMS and DAAMS are as follows:

1. Contractor delivers soil sample to monitoring personnel with proper chain of custody documentation.

2. Don protective gloves. Don protective mask when soil sample is collected by personnel wearing EPA/OSHA Level C PPE or above.

3. Place up to six samples in a heated sample box. Open bags and remove sample jar lids. Insert temperature probe into a selected soil sample. Close sample box lid and allow samples to equilibrate at 90° ± 10 degrees Fahrenheit for 15 minutes.

4. Insert MINICAMS probe into the heated sample box. Monitor headspace for two complete cycles on the MINICAMS.

   a. If both MINICAMS results are below 0.25 STEL, go to step 13.

b. If either of the MINICAMS results is at or above 0.25 STEL reading, go to step 5.

5. Don Mask and Gloves.

6. Open sample box and replace lids on sample containers and close bags.

7. Allow sample box to re-equilibrate for 15 minutes.

8. Insert MINICAMS into heated sample box and monitor headspace. Once the MINICAMS result is below the alarm set point go to step 9.

9. Don mask and gloves, open lid of sample box. Samples will be monitored one at a time.

10. Open bag and remove lid from a single sample container. Insert temperature probe into soil sample. Close sample box lid and allow sample to equilibrate at 90° ± 10 degrees Fahrenheit for fifteen (15) minutes.

11. Insert MINICAMS probe into the heated sample box. Monitor the headspace for two complete cycles on the MINICAMS.

a. If the MINICAMS result is below 0.25 STEL, replace lid and close bag, go to step 9 for next sample container.

b. If the MINICAMS result is at or above 0.25 STEL, the sample must be confirmed with DAAMS tubes. Go to step 12.

12. Allow samples to re-equilibrate at 90° ± 10 degrees Fahrenheit for 15 minutes. Collect DAAMS tubes at 400 milliliters per minute for 60 minutes. Transport DAAMS tubes to the MAP for analysis by Dynatherm/GC/MS.

a. If agent is detected from the DAAMS tubes analysis, the USAESCH Site Safety Officer must be immediately notified.

b. If DAAMS analysis results in a non-detect for agent the go to step 13.

13. Give clear samples to the contractor for proper disposition.

3.3.4.2 Soil Headspace Data Notification: The USAESCH Site Safety Officer will be notified of all confirmed detections. This includes concentration levels below the STEL or WPL value.

3.3.4.3 Soil Resample Procedure: In the event that soil has been decontaminated, the soil can not be re-sampled using the headspace analysis procedure. Therefore, the ECBC shall request a sample of the decontaminated soil for extraction and subsequent analysis for H and L by GC/MS to confirm complete decontamination.

3.3.4.4 Soil Headspace Sampling Records. Copies of all soil headspace air sampling results will be maintained.

3.3.5 Scrap/PPE/Bulk Item Headspace Analysis Procedures.

3.3.5.1 A sample of scrap, discarded PPE, or a bulk item must be contained in an environment heated to a minimum of 70°F for 4 hours prior to monitoring with the MINICAMS/DAAMS. The item may be monitored at temperatures of at least 50°F if the item is under full sunlight for 4 hours. However, the use of a heated box may be used to raise the temperature of the items in the case of inclement weather. PPE monitored for re-use must meet the above temperature/time requirements and be monitored to the WPL using DAAMS.

3.3.5.2 Once the item has been contained for 4 hours and meets the referenced temperatures, monitoring may proceed in accordance with the procedure, "Scrap/PPE/Bulk Headspace Analysis". Any items suspected of CWM contamination must follow the procedures using the DAAMS tubes rather than screening with MINICAMS.

1. Contractor delivers scrap/PPE/bulk sample to monitoring personnel with proper chain of custody documentation.

2. Utilize heated sample box, if necessary, to achieve temperature requirements stated in Section 3.3.5.1.

3. Don protective gloves and safety glasses. Don protective mask when sample is collected by personnel wearing EPA/OSHA Level C PPE or above.

4. Insert MINICAMS probe directly into single sample bag or container. Monitor headspace for two complete cycles on the MINICAMS.

    a. If the MINICAMS result is below a 0.25 STEL reading, go to step 6.

    b. If the MINICAMS result is above the alarm set point or the result is at or above 0.25 STEL reading, go to step 5.

5. Allow samples to re-equilibrate at 70° ± 10 degrees Fahrenheit for 4 hours. Collect DAAMS tubes at 400 milliliters per minute for 60 minutes. Transport DAAMS tubes to for analysis by Dynatherm/GC/MS.

    a. If DAAMS sample analysis indicates an agent detection, the SSO must be immediately notified.

b. If DAAMS analysis results in a non-detect for agent then go to step 6.

6. Give clear samples to the contractor for proper disposition.

3.3.5.4 Headspace Data Notification.

The USAESCH Site Safety Officer will be notified of all confirmed detection's. This includes concentration levels below the STEL value.

3.3.5.5 Headspace Sampling Records.

Copies of all headspace air sampling results will be maintained.

3.3.6 First Entry Monitoring for the ECS.

Prior to entry of personnel into the ECS, both filtration systems will be active and monitoring results (two MINICAMS cycles) will indicate that the atmosphere inside the ECS is below 1.00 STEL.

3.3.7 Monitoring of Unmasked Workers in the ECS

If unmasked workers are present in the ECS before daily operations or at the end of the operational day, WPL monitoring will be performed at the CAFS inlet using DAAMS. WPL DAAMS tubes may be aspirated outside of the ECS once unmasked workers have exited the ECS and operations have begun.

3.4 Historical Records. The ECBC Monitoring Branch shall maintain an electronic database for all samples collected, including DAAMS samples, a record of all MINICAMS analyses, and calibration and quality control data for all monitoring systems. Monitoring branch personnel shall be responsible for certifying that monitoring operations are conducted according to this plan. ECBC will prepare a final report in support of the Spring Valley Site project and forward copies of all analytical results to the USAESCH Project Manager.

3.5 Quality Control. At **least one QP sample** shall be run daily for each DAAMS method performed. A QP sample for each method employed shall be run every 20 samples on the DAAMS system and a minimum of every three to five hours on the MINICAMS.

3.6 Monitoring Contingency. In the event of unforeseen circumstances, the Monitoring Branch will notify the Site Safety Officer to briefly halt operations in order to catch up in the analysis of field samples.

Appendix A

Procedures for Near-Real-Time Monitoring of Agent-Contaminated Workers on Non-Stockpile Sites

1. Purpose. This guidance provides monitoring procedures for workers that are contaminated or potentially contaminated with mustard (sulfur or nitrogen), Lewisite, or nerve agents.

2. Applicability. These procedures will be followed during activities where workers may potentially encounter chemical warfare agents on suspected non-stockpile Chemical Warfare Materiel (CWM) sites where Reference a applies. A waiver must be obtained if these procedures are not followed. All waivers shall be submitted to the USAESCH for approval.

3. References.

   a. Memorandum dated 1997, Subject: Interim Guidance on Biological Warfare Materiel (BWM) and Non-Stockpile Chemical Warfare Materiel (CWM) Response Activities.

   b. Memorandum dated June 10, 2003, Subject: Interim Guidance on Nerve and Mustard Agent Decontamination and Medical Services in Industrial Activities.

   c. Department of Army Pamphlet 50-6, Chemical Accident or Incident Response & Assistance Operations (CAIRA), dated 26 March 2003.

4. Definitions.

   a. Exposed worker. An individual working in an agent environment who exhibits clinical signs or symptoms of agent exposure.

   b. Potentially exposed worker. A potentially exposed worker is an individual who works in an agent environment where:

      i. Levels of chemical warfare agent exceed the protective capability of the personal protective equipment (PPE) or

      ii. Levels of chemical warfare agent are above the exposure limit and there is a breach in the PPE, or

      iii. There is an indeterminate casualty from an agent environment.

5. Discussion.

   a. Hospital Evaluation. Any exposed or potentially exposed worker working in mustard, Lewisite or nerve agent environment is required by Army Regulation to be sent immediately to the supporting medical facility for a medical evaluation. Therefore, any exposed or potentially exposed worker on a non-stockpile site shall be sent to the designated health clinic or hospital. These workers shall not return to duty on a non-stockpile site until medically cleared.

b. Monitoring. Army Regulation also requires, that prior to sending an exposed or potentially exposed worker to a medical facility, the worker must be decontaminated and monitored with a low-level monitor to ensure complete decontamination.

c. Traumatic Injury. At any time during the decontamination procedure, the site safety personnel in coordination with the on-site medical staff and the hospital may decide to transport the contaminated worker to the contract hospital. Lifesaving measures for traumatic injury have priority over immediate decontamination, provided that medical personnel remain protected against the chemical agent. If the medical personnel are not properly protected against the chemical agent, at a minimum,

i. The person shall go through decontamination, and

ii. The Site Safety Officer shall notify the medical personnel (ambulance and hospital) of the extent of decontamination of the potentially contaminated workers and whether low-level monitoring was conducted.

6. Monitoring Procedures.

a. *Action Level*. Workers who are exposed or potentially exposed to chemical agent shall be decontaminated to below 1.00 STEL before the worker is transported to the contracted hospital.

b. *Instrument.* The primary type of instrument for low-level monitoring of potentially contaminated personnel is a near real-time chemical agent monitor, the Miniature Chemical Agent Monitoring System (MINICAMS). Trained personnel shall maintain, calibrate, and operate the low level near real-time monitor. A dedicated MINICAMS will be used for this monitoring. It must be operational and stationed inside a monitoring vestibule prior to the start of intrusive operations on-site. Note: This MINICAMS may be used for other activities but only after intrusive operations have ceased.

c. *Monitoring Location*. The decontamination line shall include a monitoring chamber between the dirty side and the clean side. This chamber shall be large enough to contain a stretcher and one other worker. It shall contain a port and a stand for the MINICAMS probe. The monitoring chamber can remain open during non-emergency operations but shall be capable of being closed off when monitoring is required. Once closed, the chamber must maintain an ambient temperature of at least 65 degrees Fahrenheit.

d. *Monitoring Procedures*. Properly protected site personnel shall enter the chamber with the decontaminated worker. Upon notification of the start of the MINICAMS sampling cycle, the site personnel shall pass the MINICAMS probe slowly and deliberately within one to two inches of the contaminated worker's body. The probe shall be moved over all potentially contaminated areas of the worker's body. The MINICAMS operator must remain in constant communication to ensure the entire body is screened within one MINICAMS sampling cycle.

i. If the MINICAMS result is less than the alarm level, the casualty shall be moved to the ambulance.

ii. If the MINICAMS result is greater than or equal to the alarm level, the casualty shall be moved back into the dirty area of the decontamination line and be decontaminated again. The casualty shall be re-decontaminated as long as the medical situation permits.

iii. **Note**: Lifesaving measures for a traumatic injury have priority over immediate decontamination, provided that rescuers/medical personnel remain protected against chemical agent.

7. Training. This monitoring procedure should be included as part of the site-specific training conducted at non-stockpile CWM site.

EDGEWOOD CHEMICAL BIOLOGICAL CENTER

CHEMICAL APPLICATIONS DIVISION

MONITORING BRANCH

SAMPLE ANALYSIS PLAN FOR THE SPRING VALLEY SITE-WIDE SITE SAFETY SUBMISSION

MARCH 2007
Version 4.1

U.S. ARMY RESEARCH, DEVELOPMENT AND ENGINEERING COMMAND

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1.0 INTRODUCTION.

This document presents a soil and aqueous sample analysis plan for the U.S. Army Engineering and Support Center - Huntsville (USAESCH) remediation efforts at the Spring Valley Site.

1.1 PURPOSE.

The purpose of this plan is to illustrate the strategy used by U. S. Army Edgewood Chemical Biological Center (ECBC) to analyze soil and aqueous samples for the presence of chemical and biological warfare agents and specific breakdown products during operations at the Spring Valley Site.

1.2 SCOPE.

This plan establishes the policies, objectives, procedures, and responsibilities for the execution of an analysis program at the Spring Valley Site. This monitoring plan applies to all facilities and operations within the Spring Valley Site and at the ECBC laboratory in Edgewood Maryland involving analysis of samples suspected of containing chemical warfare materiel (CWM) and biological warfare materiel (BWM).

1.3 OBJECTIVES.

The objectives of this plan are:

A. To illustrate the methods used for each analysis of soil and aqueous samples performed within the on-site mobile analytical platform or at the ECBC laboratory in Edgewood, Maryland.

B. To assure that workers and public safety and health are maintained by providing adequate environmental monitoring as specified in AR 385-61.

2.0 RESPONSIBILITIES.

The U.S. Army Research, Development and Engineering Command (RDECOM) will:

- Collect and retain all ECBC analytical data generated during this project.
- Provide guidance on monitoring operations conducted on-site.
- Conduct analysis with soil samples for chemical and biological warfare agents and specific breakdown products as listed in Section 3.0.
- Provide equipment capable of completing analyses utilizing the ECBC laboratory in Edgewood, MD.

- Provide trained and certified personnel to operate the laboratory and maintain certification data as part of the Monitoring Branch 40-year database.

- Provide trained and certified personnel to set-up, and calibrate equipment and analyze soil and aqueous samples for chemical and biological warfare agents and specific breakdown products.

- Perform sample analysis procedures as outlined in the Corps of Engineers Scope of Work, and consistent with RDECOM capabilities.

3.0 SOIL AND AQUEOUS SAMPLE MONITORING.

3.0.1 The intent of this monitoring is to properly profile the waste characteristics of the excavated soil and aqueous samples to ensure appropriate off-site disposal. The monitoring will provide information documenting the cleanup effort by indicating low-level CWM/BWM contamination areas. The results will also ensure that soils and aqueous samples may be safely shipped to off-site contractors for further HTW analyses. Soil samples may be analyzed for the presence of the following compounds based on site requirements and request:

Table 1: List of Chemicals of Interest for the Spring Valley Site

Chemical Name	Abbreviation	Chemical Abstract Number (CAS)
Bis(2-chloroethyl)sulfide	Mustard, H	505-60-2
1,4-dithiane		505-29-3
1,4-oxathiane	1,4-thioxane	15980-15-1
Thiodiglycol	TDG	540-63-6
Dichloro(2-chlorovinyl)arsine	Lewisite, L	541-25-3
2-chlorovinyl arsenous acid *	CVAA	85090-33-1
2-chlorovinyl arsenous oxide *	CVAO	3088-37-7
Ricin	not applicable	not applicable

* CVAA and CVAO are reported as L.

3.0.2 Samples with detections above the Reporting Limit (Table 2) for 1,4-dithiane or 1,4-thioxane will be extracted and analyzed for thiodiglycol (TDG). Samples with confirmed detections of HD will not be analyzed for TDG. Soil samples will be extracted and analyzed at ECBC (Edgewood, MD), after on-site headspace clearance and shipment by commercial carrier.

3.0.3 Ricin analysis is performed using an electrochemiluminescent (ECL) immunoassay that is specific for the A-chain subunit of the ricin glycoprotein. The assay is obtained from the Critical Reagent Program (Edgewood, MD) and is performed on a BioVeris M8 Analyzer. The assay is sensitive to approximately 1 ng of material in a pristine sample. Solid samples are combined with clean buffer and the supernatant is analyzed for ricin. Liquid samples are diluted into clean buffer prior to analysis. Samples that are unable to be processed with the M8 platform will be analyzed with hand held immunoassays if possible.

3.1 ANALYTES OF CONCERN

The following table contains the analytes of concern for the CWM analyses and also the specific breakdown products.

Table 2: Soil and Aqueous Sample Analytes of Concern

Analyte	Method of Analysis	Reporting Limit Soil Matrix (µg/kg)	Reporting Limit Aqueous Matrix (µg/L)
H	1	10	10
1,4-Dithiane	1	100	100
1,4-Thioxane	1	100	100
L, CVAA, CVAOA	1	100	100
Thiodiglycol	2	5000	5000

3.2 QUALITY CONTROL

3.2.1 The mass spectrometer instrument utilized for the analysis of the soil and water will be calibrated and challenged in accordance with the EML Laboratory and Monitoring Quality Control Plan (Revision 0, December 2004). Table 3 contains the quality control requirements for these analyses. The current laboratory limits have been established based on laboratory historical data and are in Table 4.

Table 3. Quality Control Requirements

QC Sample	Frequency	Acceptance Limits	Corrective Action
Method Blank: DI water for liquid samples Clean solid (e.g., clean sand) for solid samples	1 per batch of 20 or fewer samples	Target analytes less than reporting limit.	Reanalyze all samples associated with unacceptable blank.
Laboratory Control Spike/ Laboratory Control Spike Duplicate (LCS/LCSD)	1 per batch of 20 or fewer samples	Recovery within current laboratory control limits. Limits updated annually at a minimum.	Verify calculations. Re-inject sample to verify validity of analysis. If still non-compliant, re-extract the entire batch.
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	Conducted with specified samples or batch samples'.	No limits applied. Not used to control laboratory operations.	Verify calculations. Correct if needed. If calculations are correct, note in narrative.
Surrogate	Spiked into every field sample and laboratory QC sample	Recovery within current laboratory control limits.	Verify calculations. Re-inject sample to verify the validity of analysis. If still non-compliant, re-extract the sample with MB, LCS, and LCSD.

Table 4. Current Laboratory Control Limits

	Soil				Water			
	LCS/LCSD**		MS/MSD*		LCS/LCSD**		MS/MSD*	
Spiking Compound	**% $\bar{R}$**	**RPD**	**%R**	**RPD**	**% $\bar{R}$**	**RPD**	**%R**	**RPD**
Sulfur mustard (HD)	71-139	21	62-150*	31*	63-143	25	55-150*	27*
Lewisite (L,CVAA, CVAO)	36-158	26	10-179*	31*	23-157	23	10-169*	43*
1,4-Dithiane	75-129	20	64-139*	31*	71-134	26	55-149*	29*
1,4-Thioxane	74-133	20	66-138*	25*	69-133	22	56-143*	23*
Thiodiglycol (TDG) by HPLC	50-130+	30+	50-130*	30*	50-130+	30+	50-130*	30*

** For LCS and LCSD, limits are based on the average recovery for the control sample pair.
* Advisory limits only.
+ Tentative limits based on fewer than 20 data points. To be updated as more points are generated.

3.2.2 A set of MS/MSD sample must be extracted and analyzed in every analytical batch. ECBC will use the specified sample if listed on the COC. If there were no samples requested for MS/MSD analyses on the COC, ECBC will use a batch sample for the MS/MSD analyses.

3.2.3 The instrument is calibrated by analyzing multiple concentrations using the parameters described in the specific methods. The calibration is accepted if the correlation coefficient is greater than or equal to 0.99. A method blank and LCS/LCSD are analyzed with every batch.

3.2.4 Calibration verification samples are standards that are recommended to be analyzed once every ten samples in any injection batch. These standards reveal to the analyst whether the calibration of the instrument continues to be in control. The control limits are ±20 %D for all target compounds. If the calibration check sample is greater than these limits, analysis must stop however previous samples may be reported according to the Appendix II of the Environmental Monitoring Laboratory IOP Number MT-8, June 2006, Revision 4.

3.3 DATA REPORTING

The ECBC shall report the results of each days soil and water extractions in an Analytical Report that will document the following information; (1) Date of analyses, (2) Location of analyses, (3) Analyst name, (4) Field sample identification number, located on the chain-of-custody received; and (5) Results for each analysis, including units and (6) Results of quality control samples. Additional data reporting shall be provided including the information contained in ECBC IOP MT-08.

3.4 HISTORICAL RECORDS

Monitoring branch technicians shall maintain the electronic database for all soil and aqueous samples extracted and analyzed. Monitoring branch personnel shall be responsible for certifying that operations are conducted according to this plan or the site-specific QC plan. ECBC will prepare a final report, if requested, in support of the remediation efforts at the Spring Valley Site and forward copies of all analytical results to the U.S. Army Engineering and Support Center – Huntsville (USAESCH) Project Manager.

APPENDIX K
PMNSCM PLANS

U.S. Army
Chemical Materials Agency
Program Manager for the Elimination of Chemical Weapons

Spring Valley
Interim Holding Facility Plan

Final
Revision 8

Distribution limited to U.S. Government agencies and their contractors only; administrative or operational use. This determination was made in November 2001. Other requests for this document shall be referred to the Project Manager for Non-Stockpile Chemical Materiel, Building E4405, Aberdeen Proving Ground-Edgewood Area, Maryland 21010-4405.

U.S. Army
Chemical Materials Agency
Program Manager for the Elimination of Chemical Weapons

Spring Valley
Interim Holding Facility Plan

Final
Revision 8

March 2007

EXECUTIVE SUMMARY

The Spring Valley Interim Holding Facility (IHF) Plan provides a scope of effort intended to support the storage of chemical warfare materiel (CWM) recovered in the Spring Valley section of northwest Washington, D.C. This Plan was prepared to be used in conjunction with the U.S. Army Corps of Engineers, Baltimore District (CENAB) CWM investigation/removal action.

The Program Manager for the Elimination of Chemical Weapons (PM ECW) is responsible for the destruction of all United States CWM, which includes recovered CWM (RCWM). The Project Manager for Non-Stockpile Chemical Materiel (PMNSCM) is responsible for destroying non-stockpile chemical materiel. PMNSCM will support CENAB and the 22nd Chemical Battalion activities at Spring Valley. The temporary storage, transportation, and final disposition of RCWM is the responsibility of PM ECW.

The PM ECW is committed to public input and to timely and accurate information exchange with all stakeholders. This commitment includes a continuing pro-active public outreach and involvement program. PM ECW Agency Communications Office (ACO) has developed a national strategy that encompasses exchanging information with partners at the national and local levels prior to initiating disposal or treatment options.

The telephone number and point of contact for the CENAB is provided in section 8 of this IHF Plan. For additional information and comments about this Plan, contact Karen Drewen, Non-Stockpile Chemical Materiel Project ACO, Aberdeen Proving Ground, Maryland 21010-5401, or call 800-488-0648.

The CENAB is the lead agency responsible for the investigation and restoration of CWM disposal trenches left over from the American University Experiment Station, which was an active Department of Defense site during World War I for the study of CWM. The suspected CWM are the blister agents mustard (H and HD), arsine, and lewisite (L).

The IHF hazard analysis (HA) presented in annex A examines the risk of IHF operations for the RCWM. The HA encompasses the risks associated with onsite transportation of RCWM to the IHF. Based on the HA findings, it has been determined that the CWM overpacked in multiple round containers will not challenge the integrity of the IHF and that the IHF protects the public and the environment. In addition, the total carrier risk for transporting RCWM onsite is 2.60×10^{-7}.

In preparation of the HA, potential incidents that could occur during storage are discussed qualitatively. To assign quantitative values to potential risk, risk assessment codes (RACs) are identified for potential accident scenarios. A maximum credible event (MCE) is an accident that is likely to occur which would result in a release of CWM. Assessment of the hazards associated with the activities described in this Plan led to an MCE of one explosively configured 75mm round filled with H leaking 1 percent of its fill. On the basis of the HA, onsite transport and storage of RCWM at the IHF can be performed safely, if all participants adhere to procedures developed for the safe handling, movement, and storage of RCWM.

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SECTION 1
INTRODUCTION

The Department of Defense (DoD) has designated the Department of the Army (DA) as the Defense Executive Agent for destruction of all United States chemical warfare materiel (CWM). The Program Manager for the Elimination of Chemical Weapons (PM ECW) has, in turn, been given the responsibility for destroying the CWM. The Project Manager for Non-Stockpile Chemical Materiel (PMNSCM) is responsible for destroying the five categories of non-stockpile chemical materiel, which include recovered CWM (RCWM). This document examines onsite transportation and storage of RCWM from the Spring Valley section of northwest Washington, D.C.

1.1 Objective

The objective of this Interim Holding Facility (IHF) Plan is to provide information about plans to perform temporary storage of RCWM in a safe, secure, and environmentally sound manner. A description of the plans to perform onsite transportation of RCWM is included.

To support the premise that RCWM can be safely transported and temporarily stored onsite, a hazard analysis (HA) was performed to evaluate the plans and procedures presented in this IHF Plan. The complete HA is presented in annex A.

1.2 Assumptions

When required, assumptions about site conditions, applicable regulations, and storage of RCWM are made to complete the work assignment. This Plan was prepared using the assumptions listed in the following paragraphs.

a. RCWM stored in the IHF will consist of 75 millimeter (mm) projectiles filled with mustard agent (H), 5-gallon ceramic or glass containers of lewisite

(L), and 75mm projectiles filled with arsine (SA). It is possible that items containing cyanogen chloride (CK), phosgene (CG), or chloropicrin (PS) may also be encountered. For this reason, monitoring capabilities will be on hand for H (monitored as distilled mustard agent [HD]), L, SA, CK, CG, and PS.

b. The RCWM will be classified as hazardous waste in accordance with 40 Code of Federal Regulations (CFR) 266 as required by Army Regulation (AR) 50-6 and will be managed in accordance with the Comprehensive Environmental Response Compensation and Liability Act (CERCLA).

c. All required environmental studies will be determined and completed by the U.S. Army Corps of Engineers, Baltimore District (CENAB). All required documentation will be completed before implementation of this Plan.

d. As currently laid out, the Spring Valley IHF site includes three holding facility structures. Two of the structures are used to hold recovered items awaiting assessment and Material Assessment Review Board (MARB) consideration of assessment data. The third structure is the IHF where items containing CWM are held awaiting disposition, which includes onsite destruction or transportation to a storage or destruction facility at another location. This is the structure referred to in this Plan as the IHF. Unless otherwise specified, the activities described in this IHF Plan pertain to the IHF where RCWM are held. Assessment activities, associated with the other onsite holding facilities, are not part of this IHF Plan.

e. Upon recovery of an item suspected to contain CWM, the item will be transported from the recovery site to the IHF site and placed into the pre-assessment holding facility. After assessment, the item will be placed in a second holding facility until the MARB has reached a conclusion about the contents of the item. If the MARB concludes the item is RCWM,

the item will be moved to the IHF. Items determined to NOT be RCWM will not be placed in the IHF, rather those items will be held in a non-RCWM facility until disposition.

f. Onsite transportation will be by truck and consists of movement of items known or suspected to contain CWM from a recovery site to the IHF site. Typically, items brought to the IHF site from a recovery site will be placed into the pre-assessment holding facility. They will not be moved into the IHF for RCWM until they have been fully assessed and the MARB has concluded that they were RCWM. The discussion of onsite transportation in this IHF Plan also includes use of material handling equipment, primarily a hand truck, to move items into and out of the IHF.

g. Security will be provided per the requirements of AR 190-11 for category II ammunition and explosives.

1.3 IHF Regulatory Requirements

IHF operations will follow DA and other regulatory guidelines. An evaluation of regulatory requirements that may be applicable to IHF operations is presented in the Generic Site Scoping Study [U.S. Army Chemical Materiel Destruction Agency (USACMDA), 1993]. Some major requirements include:

a. A U.S. Environmental Protection Agency (USEPA) identification number will be obtained by the CENAB as generator of the CWM per 40 CFR 262.12.

b. CWM hazardous waste must be characterized according to 40 CFR 262.11, then labeled in accordance with 40 CFR 262.32. An operating record must be maintained in accordance with 40 CFR 262 subpart D and applicable local regulatory requirements.

c. Appropriate signs must be posted restricting access to the facility per 40 CFR 262.33.

d. All personnel involved in hazardous waste management must be trained in Hazardous Waste Operations and Emergency Response (HAZWOPER) in accordance with 29 CFR 1910 to ensure they can implement emergency procedures and activate the facility contingency plan.

1.4 Background

Spring Valley is located in the northwest portion of the District of Columbia (see figure 1-1). During World War I, the U.S. Government established the American University Experiment Station. The Experiment Station was used to prepare and test chemical warfare compounds, incendiaries, smokes, and signals. Other projects involved developing methods for manufacture of these compounds and developing masks, canisters, and protective clothing for use with chemical warfare compounds.

Since 1993, U.S. Army Corps of Engineers, Baltimore District, has conducted a number of investigations and removals of World War I contamination in the Spring Valley neighborhood. Historical records such as World War I era maps and photographs plus modern geophysical studies are being used to identify sites of interest. The IHF will be used for temporary storage of any RCWM. Further information about the Spring Valley projects can be found at the Corps of Engineers Web site: www.nab.usace.army.mil/projects/WashingtonDC/springvalley.htm.

1.5 Chemicals of Concern

Based on historical records and experience gained since 1993, the items that may be recovered include 75mm projectiles filled with H or HD, and glass or ceramic carboys containing as much as 5 gallons of L, and 75mm projectiles filled with SA. In addition, there will be onsite capability to monitor for CG, CK, and PS.

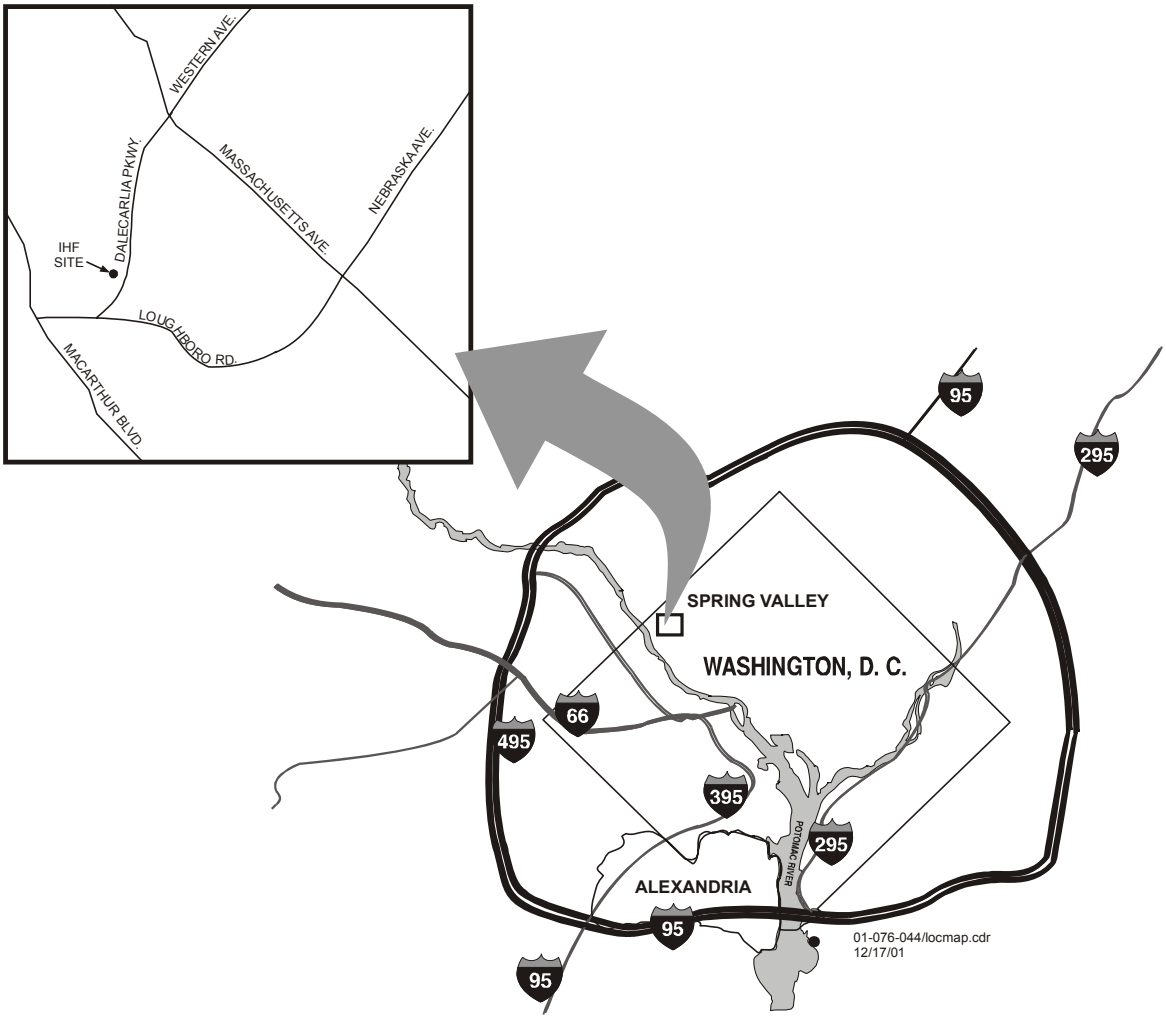

Figure 1-1. Location of Spring Valley Site

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SECTION 2
ORGANIZATION

The primary organizations that will participate in IHF activities are presented in figure 2-1. Specific details of each organization's role and responsibilities are provided in section 7.

2.1 CENAB

The CENAB has overall responsibility for site operations. The CENAB, as generator, will coordinate with the USEPA, the U.S. State Department, and local government agencies.

2.2 PM ECW/PMNSCM

The PM ECW has the programmatic responsibility for ensuring that the onsite transportation and storage of RCWM at Spring Valley are accomplished in a safe and environmentally acceptable manner. The PMNSCM is responsible for the proper storage, transportation, and disposal of all RCWM.

2.3 22nd Chemical Battalion/U.S. Army Edgewood Chemical Biological Center (ECBC)

The 22nd Chemical Battalion will perform the remedial activities at the site. If CWM is recovered, the 22nd Chemical Battalion will characterize them, package them in appropriate overpack containers and store them in the IHF. The 22nd Chemical Battalion will be first responders to emergencies involving CWM. 22nd Chemical Battalion or ECBC will conduct first entry and surveillance monitoring of the IHF as required.

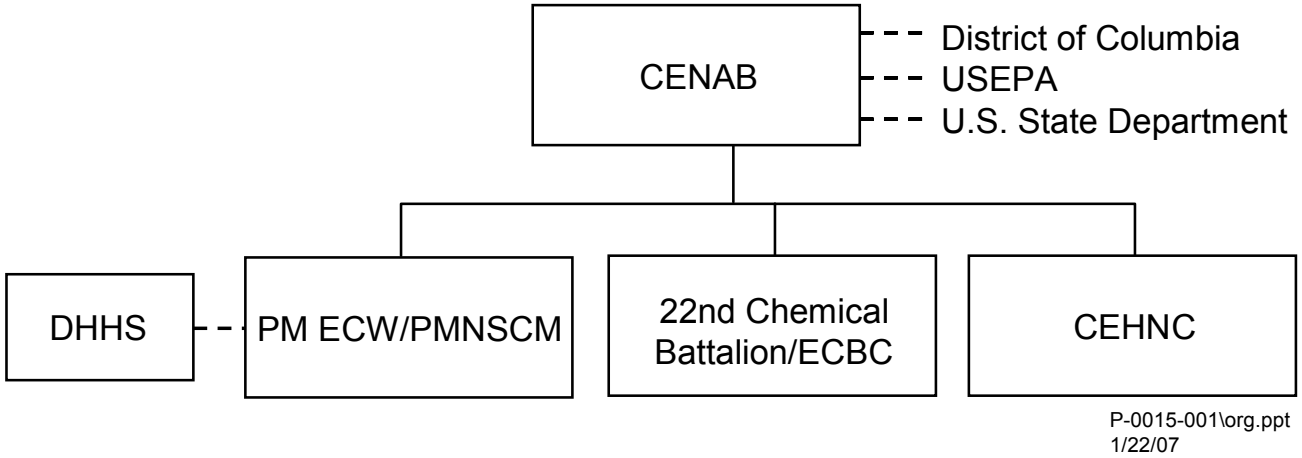

Figure 2-1. Organization for Spring Valley IHF Plan

2.4 U.S. Army Engineering and Support Center, Huntsville (CEHNC)

CEHNC will provide support to the CENAB for matters relating to remedial activities at the site. CEHNC will be responsible for safety oversight and will control keys to the IHF gates.

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SECTION 3
INTERIM HOLDING FACILITY DESCRIPTION

3.1 Background

A portable IHF will be operated at Spring Valley to temporarily store the RCWM. The purpose of the IHF is to provide temporary, safe, secure, and segregated storage of RCWM. The IHF will be supplied by the PM ECW.

3.2 Location and Accessibility

3.2.1 Location. The IHF will be located at a staging area approximately 3 miles from the furthest potential recovery site. The staging area is the same federal property used in previous Spring Valley recovery operations.

3.2.2 Roads. Roads connecting the IHF site to main roads are maintained by the District of Columbia. Anticipated vehicles with special requirements for road weight and overhead clearances are:

a. Local fire truck, weight and overhead clearance to be identified locally

b. Tractor with 40-foot trailer, 60,000-pound road weight, with 13.6-foot overhead clearance

c. A 20-ton mobile crane, 51,000-pound road weight, with 11-foot overhead clearance.

During implementation of this IHF Plan, the CENAB will improve and maintain IHF access roads to meet the needs of the anticipated traffic. The local highway maintenance department will be contacted for road construction specifications. There is sufficient turnaround capability for the most demanding vehicle anticipated at the site.

3.2.3 Through Traffic. The IHF site is not located on a throughway. The site containing the area around the IHF will be fenced by CENAB.

3.3 IHF Construction

Two different styles of IHF will be used at Spring Valley. The following paragraphs contain descriptions of both the large transportable IHF and the small portable IHF.

3.3.1 Large Transportable IHF.

3.3.1.1 Design and Construction Materials. The large transportable IHF is a storage building designed to store RCWM. The building is approximately 24 feet long by 9.5 feet wide by 8.5 feet high and is capable of being transported on a flatbed truck without special Department of Transportation (DOT) permits. The weight and size of the building require it to be loaded and unloaded with a 20-ton crane. Figure 3-1 shows the configuration of the IHF.

The building is a prefabricated, single-story modular unit constructed of insulated metal panels and equipped with secondary containment by an integral leak-tight sump beneath metal floor grating. Two double doors on the front of the unit provide for easy flow-through handling of overpacked RCWM. This facility is waterproofed and designed to withstand a Zone 4 seismic load to ensure the integrity of stored materials. Figure 3-1 shows the modular construction of the storage facility. (For simplification, the under-floor containment is not shown.) The facility conforms to generally accepted safety codes and standards, such as the National Fire Protection Association (NFPA) codes, Uniform Building Codes, Standard Building Codes, and Building Officials and Codes Administration.

3.3.1.2 Doors. There are two sets of double doors located on the front of the IHF. Each set of double doors is 54 inches wide by 82 inches high and is self-closing with a magnetic core. The doors are insulated, equipped with thermoplastic gaskets for superior seal, and include cylinder locks. The doors also have hooded, high-security

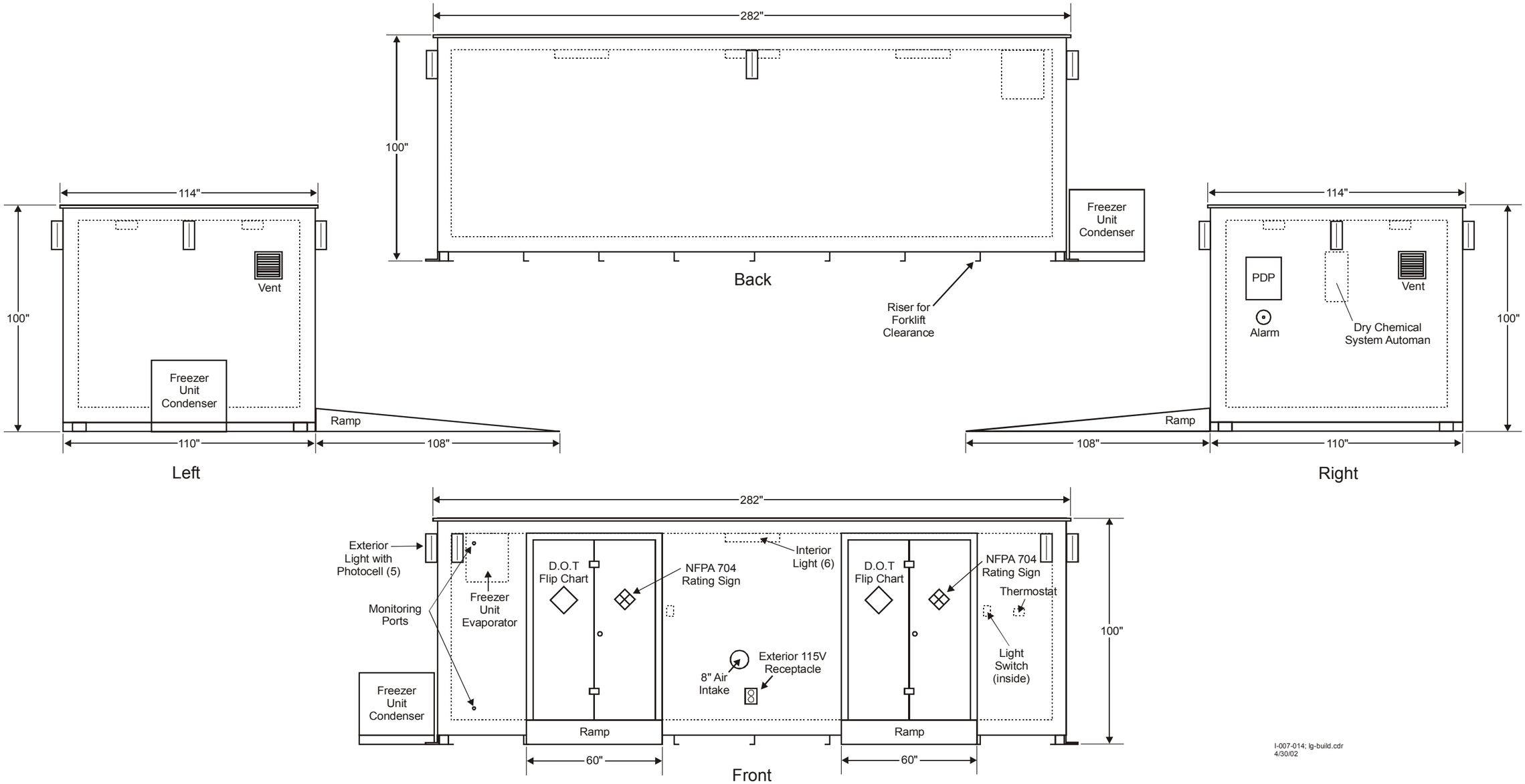

Figure 3-1. IHF (Large 23.5' x 9.5' x 8')

locking hasps. Metal shielding above each door diverts precipitation from the door opening.

3.3.1.3 Layout. The IHF consists of one room. The two sets of double doors facilitate flow-through material handling on carts. RCWM overpacks will be stored so that access to each overpack is maintained and labels are clearly visible. Overpacks will not be stacked in the IHF and incompatible materials will be separated as necessary.

3.3.1.4 Refrigeration. This IHF may be equipped with a self-contained refrigeration system. If used, the system can maintain temperature inside the IHF at 32°F, even with an outside temperature of 95°F. The system can also prevent condensation inside the facility at 100 percent relative humidity outside. The refrigeration unit is mounted externally for easy access.

The IHF is equipped with an automatic thermostat with an audible and visual alarm to warn of cooling system failure. The alarm has a manual silencing switch on an exterior control panel.

3.3.1.5 Monitoring Ports. Two monitoring ports, one 6 inches from the floor and one 6 inches from the ceiling, have been installed for sampling the interior air of the IHF. Each monitoring port is fitted with a female, quick-connect shutoff, bulkhead fitting.

3.3.1.6 Ventilation. This IHF is equipped with passive ventilation. The system includes dual louvered vents that can be closed in case of a chemical leak. The IHF design also includes a filter connector port with a replaceable plug. The port can be hooked up to the filter system that can remove agent-contaminated air from inside the IHF.

3.3.1.7 Lightning Protection. The storage building is equipped with a lightning rod and a ground rod. The lightning rod and ground rod will be installed by CENAB to conform to local requirements and DA Pamphlet (DA Pam) 385-64 for equipment and structures.

3.3.1.8 Electrical Power. A weather-protected distribution panel is located on the exterior wall of the IHF for connecting 100-ampere, 230-volt, single-phase electrical service. The distribution panel allows maintenance personnel access without entering the IHF and accommodates external outlets. All branch circuits are detailed inside the distribution panel. The facility is provided with a weather-protected external outlet near each monitoring port. The outlets have ground fault interrupter circuit protection to prevent operator injury.

The IHF is equipped with at least one waterproof interior light. The light fixture is Underwriters Laboratories, Inc. (UL)-listed for class 1, division 1 hazardous locations. The lamp is rated for 100 watts and protected with metal guards.

There are five externally mounted, photocell-activated, lighting fixtures around the perimeter of the IHF, two fixtures on the front, one on the rear, and one on each side. During periods of darkness, the illumination intensity will be no less than 1.0 foot-candle at any point to a height of 8 feet, and to a horizontal distance of 8 feet from the entrance.

3.3.1.9 Fire Protection. The storage building is equipped with an internal self-actuated fire-suppression unit. The storage building has 2-hour fire-rated walls. Portable fire extinguishers will also be mounted inside and outside the IHF for use by personnel working at the IHF.

3.3.1.10 Water. Normal IHF site operations will not require water. Drinking water shall be supplied by each individual organization as required. The 22nd Chemical Battalion shall provide a portable eyewash and personnel decontamination station to be located outside the IHF. Water for facility fire protection and decontamination will be supplied by the CENAB in coordination with the local fire department responding to emergencies.

3.3.1.11 Communication. The IHF does not require installation of communication systems, however, primary and backup forms of communication will be provided.

Two-way radios or cell telephones will be available at the IHF and in the transport vehicles.

3.3.2 Small Portable IHF.

3.3.2.1 Design and Construction Materials. The small portable IHF is 8 feet wide by 16 feet long by 8.5 feet high and is capable of being transported on a flatbed truck without special DOT permits. The weight and size of the building require it to be loaded and unloaded with a 20-ton crane. Figure 3-2 shows the configuration of the IHF.

3.3.2.2 Doors. The small transportable IHF has one set of double doors in the center of one of the long walls. The doors provide an opening 60 inches wide by 84 inches high. The doors are equipped with two hooded high-security locking hasps to accommodate padlocks.

3.3.2.3 Layout. The interior of the IHF contains approximately 100 square feet of clear space. This area is sufficient to store up to 15 overpacks with a 15 x 15-inch footprint and to provide enough room to maneuver the overpacks within the building. A secondary containment sump is located below the floor and is equipped with an accessible exterior drain. RCWM overpacks will be stored so that access to each overpack is maintained and labels are clearly visible. Overpacks will not be stacked in the IHF and incompatible materials will be separated as necessary.

3.3.2.4 Refrigeration. The IHF may be equipped with a 21,000 British thermal unit (Btu) explosion proof air conditioning unit, mounted on the side of the building and near the roof.

3.3.2.5 Monitoring Ports. The IHF has two Swagelok® monitoring ports near the entry door, one 6 inches from the floor and one 6 inches from the ceiling, for sampling the interior air quality of the IHF. Each port is 1/4 inch in diameter and allows for the monitoring sample lines to be connected inside the IHF.

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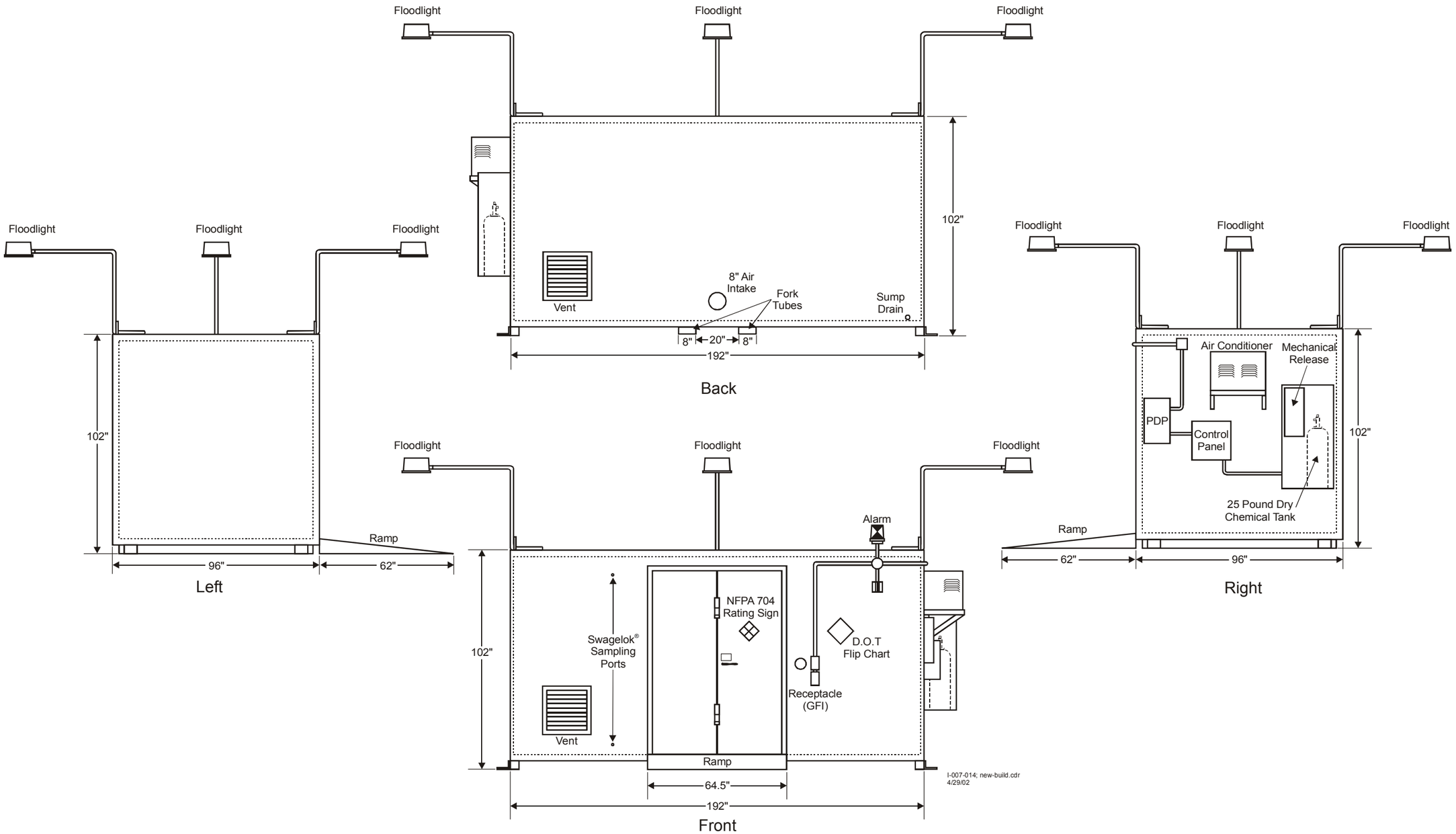

Figure 3-2. IHF (New Style 16' x 8' x 8.5')

3.3.2.6 Ventilation. The IHF is ventilated by passive airflow through two 22-inch square louvered vents located 12 inches above the floor, 12 inches from the end of the building, and diagonally across from each other on the front and rear of the building on each end. The controls for the louvered vents are accessible from outside the IHF.

3.3.2.7 Lightning Protection. For the IHF to meet the requirements of DA Pam 385-64, lightning protection will be installed in accordance with NFPA Lightning Protection Code NFPA78, and testing of lightning protection will be performed in accordance with Army procedures.

3.3.2.8 Electrical Power. The building has four 200-watt explosive-proof interior lights and four 70-watt compact exterior floodlights with photo control located 3 feet above the roof and 3 feet out from the wall in the middle of each side of the building.

3.3.2.9 Fire Protection. The storage building is equipped with an internal self-actuated, 25-pound dry chemical fire-suppression unit. The storage building has 2-hour fire-rated walls.

3.3.2.10 Water. Normal IHF site operations will not require water. Drinking water shall be supplied by each individual organization as required. The 22nd Chemical Battalion shall provide a portable eyewash and decontamination station to be located outside the IHF during operations. Water for facility fire protection and decontamination will be supplied by the CENAB in coordination with the local fire department responding to emergencies.

3.3.2.11 Communication. The IHF does not require installation of communication systems, however, primary and backup forms of communication will be provided. Two-way radios or cell telephones will be available at the IHF and in the transport vehicles.

3.4 Security Requirements

The following paragraphs provide an overview of security requirements.

3.4.1 Fencing. A fence must surround the IHF site to delineate the IHF operations area, prevent unknowing entry to the site, and minimize the possibility of unauthorized entry into the storage building. The fence shall be 6-feet high, constructed in accordance with commercial practice, and meet the requirements of this specification. The fence shall be chain link (galvanized, aluminized, or plastic-coated woven steel) with 2-inch mesh and 9-gauge wire.

The bottom of the fence shall extend to 2 inches or less above firm ground. Ground under the fence should be stabilized in areas where erosion could be a concern. Areas prone to standing water shall be graded and drained to prevent the fence line from standing in water.

Posts, bracing, and structural members of the fence should be placed on the interior of the fence, and galvanized steel or aluminum tie wires of the same gauge as the fence shall secure the fabric to the posts or structural members. Tie wires shall be installed in such a way as to prevent easy removal by hand. Fence posts shall be set in concrete to a depth of 24 inches. If the life of the fence is envisioned to be less than 90 days, the use of the concrete may be waived and the posts shall be driven into existing soil to a depth of 24 inches. The posts shall be set at a maximum of 10-foot intervals. If practicable, clear zones will extend 12 feet on the outside and 30 feet on the inside of the perimeter fence.

A personnel gate and a vehicle gate shall provide access to the IHF. The personnel gate shall be located upwind of the storage building(s) and will be used for emergency egress. The vehicle gate shall provide general access to the IHF. The gates shall be constructed of the same material as the fence and provide structural integrity equivalent to the fence.

3.4.2 Signs. A sign with the legend “Danger – Unauthorized Personnel Keep Out” shall be posted at each entrance to the IHF and at other locations on the fence, in sufficient numbers to be seen from any approach. The legend must be written in English and any other language dominant in the area and must be legible from a distance of at least 25 feet. The sign shall be approximately 12 by 14 inches and shall comply with 26 CFR 1910.145. Gates to the IHF site will be posted with signs stating conditions of entry.

When RCWM are stored in the IHF, the storage building will have appropriate signs posted in such as the Symbol 1, Set 1 Chemical Hazard Symbol along with supplemental chemical hazard symbols.

3.4.3 Intrusion Detection Alarms. The IHF is equipped with an intrusion detection system that will alarm at the security guard shack. Security shall be provided in accordance with AR 190-11.

3.4.4 Lighting. The large transportable IHF has five exterior lights and the small portable IHF has four exterior lights. These lights should provide adequate security lighting.

3.4.5 Guard Force. When work is being conducted at the IHF site, 22nd Chemical Battalion will implement site controls to ensure that access to the RCWM is limited to 22nd Chemical Battalion personnel or personnel approved by 22nd Chemical Battalion. At other times, the CENAB will provide a security patrol to perform periodic surveillance of the IHF site. The guards will check the locks on the gates and look for signs of unauthorized entry.

3.4.6 Locks and Keys. The gates to the fence around the IHF site and the doors to the storage building will be equipped with high security locking hardware. The doors and gates will be locked whenever personnel are not at the IHF site. 22nd Chemical Battalion will maintain control of the keys to the locks on the storage building when

RCWM are stored inside. CEHNC will maintain keys for the gates and will control keys to the storage building when no items are in storage.

3.5 Equipment

3.5.1 Material Handling Equipment. A list of material handling equipment provided by the 22nd Chemical Battalion to be available at the IHF and a description of how the equipment may be used are presented as follows:

a. *Forklift, Crane (1,500-pound capacity).* To lift and lower larger objects, remove them from the vehicle and place them on the ground.

b. *Dolly (hand truck).* To move overpack containers into and around the inside of the IHF.

c. *Ramp.* To allow the dolly to traverse sharp changes in elevation, such as into and out of the IHF, and to help the forklift to traverse sharp changes in elevation in the staging area (that is, to get over a curb).

d. *Tool Kit.* Hammer, screwdrivers, pliers, and other small tools for minor repairs.

3.5.2 Safety Equipment. During operation of the IHF, safety equipment will be readily available to all workers. All equipment will be inspected to ensure operability. Those safety items necessary include cellular telephones, lighting, and power for the IHF. Other safety equipment requirements are spill-containment materials, protective clothing, air-monitoring supplies, first aid supplies, and fire-suppression supplies. All safety equipment will be conveniently located for use at the IHF and will be clearly marked. The following is a list of equipment that will be available for use at the IHF.

a. *Personal Protective Equipment.* The following personal protective equipment (PPE) will be available in the 22nd Chemical Battalion response vehicle:

- Level B Occupational Safety and Health Administration (OSHA) PPE
- Gloves
- Eye protection
- Respirators.

b. *Eyewash.* A portable eyewash and personnel decontamination station will be located outside the entrance to the IHF.

c. *First Aid Supplies.* A first aid kit will be available onsite. It will be easily accessible, clearly displayed, and marked. A kit will also be available in the 22nd Chemical Battalion vehicle.

d. *Fire Extinguisher.* In addition to the self-actuating fire suppression system built into the IHF, two 5-pound, ABC-rated fire extinguishers will be available. These are to be inspected monthly and recharged or replaced as necessary.

e. *Spill Kit.* A spill kit will be available to provide quick and easy access in case of a material spill.

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SECTION 4
INTERIM HOLDING FACILITY ACTIVITIES

4.1 General

The operation of the IHF involves the receipt, temporary storage, and removal of RCWM. During the operation of the IHF, receipt and removal of RCWM will be tracked and accurate records of the material in the facility will be maintained. IHF operations begin when RCWM is received at the IHF.

4.1.1 PPE. During CWM handling activities at the IHF, the 22nd Chemical Battalion will dress in OSHA Level D PPE with a slung mask, leather work gloves, and safety shoes. OSHA Level D may only be used if the following conditions are met and agent is not detected:

a. CWM is packaged in appropriate overpack containers.

b. Recovery and packaging monitoring and first entry monitoring were conducted in accordance with section 5. The RCWM will be labeled, placed into an overpack container, and the contents identified. Once inside the overpack, the CWM can be considered to be not leaking.

4.1.2 Training. Each agency participating in IHF activities will provide an employee training program complying with, but not limited to, the requirements of 29 CFR 1910.120. Training topics will include hazardous waste operations, PPE use, heavy equipment operation (if needed), hazards of the chemicals that may be encountered, and any other topics of concern to the IHF activities. At the time of mobilization, all personnel will have completed at least 40 hours of HAZWOPER training in health and safety issues associated with hazardous substance work. Documentation

of training requirements will be the responsibility of each agency. The following paragraphs describe the required training.

a. *Health and Safety Training.* Health and safety training will be conducted prior to job start up to ensure that personnel have a thorough understanding of the Emergency Response Contingency Plan (section 6), standing operating procedures (SOPs), and physical and chemical hazards of the site. The following topics will be addressed in the health and safety training:

(1) Names and titles of employees and their duties

(2) Persons responsible for safety and health

(3) Acute and chronic effects of exposure to hazardous substances that may be present, potential routes of exposure, exposure limits, and the level exposure that can be anticipated

(4) Monitoring procedures and the functions, limitations, and maintenance of monitoring equipment

(5) SOPs

(6) Site control measures

(7) PPE

(8) Emergencies.

b. *Site-Specific Training.* Site-specific training will be provided for all employees, contractors, and subcontractors who have met the

requirements of 29 CFR 1910.120. Site-specific training will include operational training and safety meetings.

c. *Operational Training.* Operational training will include procedures related to the storage of CWM. Topics addressed will include:

(1) Handling CWM containers
(2) Storing CWM
(3) Performing emergency measures.

d. *Safety Meetings.* Personnel involved in storage activities must attend a safety meeting at the beginning of IHF operations. This meeting, conducted by the 22nd Chemical Battalion Supervisor, will include topics such as specific health and safety issues, storage activities planned, changes in plans, PPE, personnel and equipment decontamination, potential chemical and physical hazards, and contingency actions.

e. *Hazard Information Training.*

(1) *Hazard Communication Training.* In accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200 and 1926.59), copies of all Material Safety Data Sheets (MSDSs) for the suspected hazardous chemical materials that are to be stored will be available. Training will include, but not be limited to, identification of the hazards or potential hazards associated with IHF onsite transportation activities and any hazardous chemical materials to be stored.

(2) *Chemical Warfare Materiel Training.* All personnel involved with storage of CWM will undergo training concerning the CWM, although site activity involving CWM or contamination resulting from CWM will only involve the 22nd Chemical Battalion. The intent of

this training is to inform personnel of the hazards associated with CWM. The 22nd Chemical Battalion personnel have undergone U.S. Army training to qualify and maintain proficiency in their respective military and civilian occupational specialties.

4.1.3 Contingency Planning. If conditions are observed that threaten public, worker, or environmental health, or if an agent leak is confirmed that requires immediate action, a response will be performed in accordance with the Emergency Response Contingency Plan described in section 6. The 22nd Chemical Battalion will implement decontamination procedures per 22nd Chemical Battalion procedures. The site coordinator will notify the regulatory, supervisory, emergency response, and contingency personnel who are not already positioned at the storage facility to respond to an accident or incident. Only the 22nd Chemical Battalion and personnel accompanied by 22nd Chemical Battalion will enter the IHF while CWM is stored there.

4.2 Preactivation Activities

Before activation of the IHF Plan, the PMNSCM Project Officer will be responsible for ensuring that sufficient space is available for storage as planned. The IHF will also be inspected to ensure that all equipment used during storage is operable. Preparation and use of a checklist will simplify the inspection. These procedures should be used hand-in-hand with the IHF Inspection Checklist (figure 4-1). The items on the checklist provide a more specific listing of what should be examined during an inspection. The results of the inspection will be reviewed with the 22nd Chemical Battalion, supervisors, and the site safety coordinator responsible for ensuring compliance of the storage area operations.

Spring Valley

IHF Inspection Checklist

Site: _____

Period Covered: From _____ to _____

Inspector: Date: Time:	_____		_____		_____		_____		_____		_____		_____	
	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail
Outside														
Signs posted on IHF entrance gate	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Area secure, gate closed and locked, IHF door closed and locked	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Storage Area														
Building structurally sound	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Area clean of debris	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Aisle space adequate for emergency response	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
All containers on pallets (if required)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
All containers sealed	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
No leaks, spills, leaking containers, or residue	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Containers turned so that labels are visible	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Container labels														
Composition of waste	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Quantity of waste	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Generator	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Date of acceptance	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Secondary containment sumps	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Accessibility of drains	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Properly fitted with caps	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Monitoring port caps or plugs in place	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Equipment														
Exterior lighting on IHF operable (on/off)	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Note: NA should be inserted for those items not applicable for the inspection.

Figure 4-1. IHF Inspection Checklist (Sheet 1 of 3)

Spring Valley

IHF Inspection Checklist (Continued)

Site: _____

Period Covered: From _____ to _____

Inspector:
Date:
Time:

	_____		_____		_____		_____		_____		_____		_____	
	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail
Equipment (Continued)														
Emergency shower/eyewash operable	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Absorbent available	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Fire extinguishers available and charged	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Gloves available	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Eye protection available	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Respirators available	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Protective clothing available	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Spill kit available and complete	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Tool kit available and complete	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Records/Reports														
Waste logs complete, accurate and up-to-date	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Manifests logged and filed	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Copies of returned manifests	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Emergency Response Contingency Plan on file	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Sample records on file	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Discrepancy reports prepared and filed	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Incident reports for spills on file	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Comments: _____

_____

Note: NA should be inserted for those items not applicable for the inspection.

Figure 4-1. IHF Inspection Checklist (Sheet 2 of 3)

Spring Valley

IHF Inspection Checklist (Continued)

Site: _____

Period Covered: From _____ to _____

Corrective Action:

Mon:	Item:	_____	Action Taken:	_____
	Date:	_____	Signature:	_____
Tue:	Item:	_____	Action Taken:	_____
	Date:	_____	Signature:	_____
Wed:	Item:	_____	Action Taken:	_____
	Date:	_____	Signature:	_____
Thur:	Item:	_____	Action Taken:	_____
	Date:	_____	Signature:	_____
Fri:	Item:	_____	Action Taken:	_____
	Date:	_____	Signature:	_____
Sat:	Item:	_____	Action Taken:	_____
	Date:	_____	Signature:	_____
Sun:	Item:	_____	Action Taken:	_____
	Date:	_____	Signature:	_____

Note: NA should be inserted for those items not applicable for the inspection.

Figure 4-1. IHF Checklist (Sheet 3 of 3)

4.2.1 Inspect IHF. The PMNSCM Project Officer will perform an internal and external inspection of the IHF. Inspection procedures include:

a. Inspect the IHF for sound structure and working electrical systems.

b. Inspect inside the IHF. Note any nonstandard conditions or deficiencies.

c. Confirm that debris and prohibited materials (for example, paint, oil, rags, and tools) are not present.

d. Confirm that aisles are adequate for CWM handling equipment and inspection.

4.2.2 Inspect Equipment. 22nd Chemical Battalion shall inspect all vehicles, handling equipment, and safety equipment used in CWM transport, transfer, and storage operations to ensure that the needed equipment is on hand and operable. Equipment inspection procedures include:

a. Inspect the emergency eyewash and personnel decontamination station. Water should be clear and flowing steadily.

b. Inspect supply of absorbent material available for spill cleanup. Spill kits and other emergency items, including decontamination supplies, must be clearly visible and accessible.

c. Check that safety equipment, eye protection, gloves, PPE, and respirators are available and in usable condition.

d. Inspect fire extinguishers. Each fire extinguisher inspection tag will be up-to-date.

e. Ensure adequate tools are available (hammer, screwdrivers, pliers, and duct tape and other miscellaneous items).

4.2.3 Inspect Records/Reports Procedures. 22nd Chemical Battalion shall review the following record keeping items. If there are any discrepancies, action must be taken to correct problems cited.

a. Review last inspection report.

b. Inspect any outstanding deficiencies from past reports.

c. Ensure that data in the waste logs are complete and up-to-date.

d. Ensure that completed copy of the hazardous waste manifest has been returned to the generator (CENAB).

4.2.4 Transportation Route. A specific transportation route must be verified before this IHF Plan is implemented. The route will be as direct as possible. Control of traffic on public streets during CWM transportation will be in accordance with local laws.

4.3 Predeparture Activities

Prior to commencement of onsite transportation, RCWM will have been placed inside a DOT-approved overpack container and the container monitored/decontaminated to verify that it is not leaking and that there is no contamination on the outside of the container. The 22nd Chemical Battalion will notify the CEHNC and 22nd Chemical Battalion personnel at the IHF of the pending shipment. IHF personnel will prepare for receipt of the material and CEHNC will notify emergency response personnel and other required agencies.

4.3.1 Cargo Configuration and Order of Movement. The 22nd Chemical Battalion will determine cargo configuration based on the number of containers to be moved and the design of the cargo vehicle. Two escort vehicles will be used, one ahead of and one behind the cargo vehicle.

4.3.2 Safety Briefing and Route Plan. All personnel participating in the transportation operation will receive a safety briefing by the 22nd Chemical Battalion. Vehicle operators and assistant operators will have clear instructions and maps identifying the route they will follow.

4.3.3 Verify Contingency Personnel and Systems in Place. The 22nd Chemical Battalion will verify that emergency response personnel are available, and that spill response kits, and monitoring equipment are operational before execution of loading procedures.

4.3.4 Execute Loading Procedures. Preapproved procedures will be executed to load the overpack(s) onto the cargo vehicle at the recovery site.

4.3.5 Inspect and Monitor Containers. Each overpack will be inspected and monitored to verify its integrity. Tie-downs and bracing will be inspected to ensure containers are adequately secured.

4.3.6 Verify Hazardous Waste Manifest. The 22nd Chemical Battalion will inspect each overpack with the CENAB accountable officer to verify information on the hazardous waste manifest. The 22nd Chemical Battalion and CENAB representatives will both sign the manifest to certify its accuracy.

4.3.7 Perform Communications Check. A communications check will be made with each piece of communications equipment on each vehicle before departure in accordance with the 22nd Chemical Battalion operations plan.

4.3.8 Give Notification of Departure. Upon departure of the transport vehicle, notification will be made to CEHNC.

4.4 En Route Activities

En route activities from the recovery site to the staging area will be performed by the 22nd Chemical Battalion. 22nd Chemical Battalion personnel at the IHF will be in contact with the transport vehicle and will be aware of the location and status of the move. The maximum speed for the transport and escort vehicles will be 25 miles per hour. Halting procedures will be established and used when the transport vehicle is required to stop for the following circumstances.

4.4.1 Mechanical Problems. Procedures will be in place to stop the vehicle as safely and as quickly as possible. Escort personnel will attempt to move the disabled vehicle so as not to impede other traffic. The PMNSCM and the CEHNC will be notified of the situation. The cargo will be secured until a vehicle can be repaired or a replacement vehicle has been provided. Before restarting transportation, the 22nd Chemical Battalion will account for all personnel and cargo.

4.4.2 Accident without Damage to Cargo. Procedures will be in place for the transport vehicle to stop as safely and quickly as possible and for 22nd Chemical Battalion personnel to inspect the cargo for leaks, secure loose cargo, and administer first aid. The PMNSCM and the CEHNC will be notified of the situation.

4.4.3 Accident with Damage to Cargo. Emergency response procedures for leaking CWM are addressed in section 6.

4.4.4 Public Disturbance or Traffic Obstruction. Procedures will be developed to allow the transportation team to respond to an unexpected blockage of the transportation route. If necessary, the transport vehicle and escorts will stop, the 22nd Chemical Battalion will communicate their status to the CEHNC and the PMNSCM, choose an alternate route, and react according to the situation.

4.5 Prearrival Activities

After the IHF has been activated, prearrival activities will occur at the IHF before each CWM delivery. To prepare for arrival of the CWM, the following tasks must be completed.

4.5.1 Inspection. 22nd Chemical Battalion personnel will be responsible for opening the IHF before the CWM arrives. The 22nd Chemical Battalion will perform a daily internal inspection of the IHF whenever new material enters the IHF or when material is removed from the IHF for transport. The IHF inspection will be conducted to ensure that the storage operations are conducted in accordance with CERCLA storage requirements and this IHF Plan.

All equipment used to unload the CWM and transfer it from the vehicle to the storage facility will be inspected to ensure serviceability. Safety and contingency response equipment will be checked to be sure it is available and operational.

4.5.2 Open and Close Procedures. 22nd Chemical Battalion personnel will be responsible for opening the IHF and performing IHF operations. Likewise, when the operations are finished for the day, 22nd Chemical Battalion personnel will secure and close the facility. Coordination with other 22nd Chemical Battalion members will be maintained to ensure the facility is open and ready to receive CWM, and prepared to stage CWM when offsite transportation is required. The IHF open and close procedures are as follows:

a. *Open the IHF.* The 22nd Chemical Battalion will open the IHF to receive CWM and to prepare and stage CWM for offsite transportation. The procedures to open the IHF are described below.

(1) Notify the CEHNC and security of pending opening.

(2) Establish site access controls at the IHF.

(3) Notify and position emergency response personnel for the pending arrival of the CWM as required by the contingency plans.

(4) Open the IHF gate.

(5) Inspect the outside of the IHF.

(6) 22nd Chemical Battalion or ECBC will perform first-entry monitoring. Follow instructions in air-monitoring procedures (section 5).

(7) If monitoring indicates a chemical of potential concern is not present above the airborne exposure limit (AEL) for chemical agents, or time-weighted average (TWA) for industrial chemicals, begin IHF operations.

(8) If monitoring indicates agent contamination greater than 1.0 TWA, begin contingency response as required by the contingency plans (section 6).

b. *Close the IHF.* Close procedures will be observed following transfer of the items into storage at the IHF (paragraph 4.6.2), or following removal of items from the IHF for offsite shipment. The 22nd Chemical Battalion will perform the following procedures to close the IHF.

(1) Confirm that CWM is stored in designated areas, is labeled, and that labels are filled out completely and are easily visible.

(2) Observe containers for signs of agent leakage. If agent leakage is suspected, all operators will exit the IHF. In case of emergency, the 22nd Chemical Battalion will follow emergency response contingency plan procedures (section 6) and appropriate SOPs.

(3) Turn off interior lights.

(4) Secure IHF doors and locks.

(5) Notify the CEHNC and security that the IHF has been secured.

(6) CEHNC will secure and lock the IHF gate and personnel gate.

4.6 Arrival Activities

4.6.1 Pretransfer Activities. When CWM arrives at the IHF from the recovery site, an inspection and inventory of the CWM items will be performed as described below.

a. *Inspect Containers.* The 22nd Chemical Battalion will inspect the containers for damage during transit.

b. *Unload CWM from Vehicle.* The CWM will be unloaded from the vehicle and placed at the entrance of the IHF.

c. *Conduct Inventory.* The 22nd Chemical Battalion will prepare an inventory using Department of Defense (DD) Form 1911 Materiel Courier Receipt (figure 4-2) and the Container Information form (figure 4-3). The 22nd Chemical Battalion will initial and date the receipt of CWM on the shipping form. These forms and the IHF Inventory Log (figure 4-4) will serve as a chain-of-custody inventory and will ensure that the CWM has been accounted for as required. In addition, the 22nd Chemical Battalion will inventory the CWM in the IHF at the completion of each transfer.

4.6.2 Transfer Activities. The procedures for transferring the CWM into the IHF are as follows:

a. Open the IHF in accordance with paragraph 4.5.2a.

MATERIEL COURIER RECEIPT	SHIPPER'S CONTROL/DOCUMENT NO.
SHIPPER	SUPPLY ACCOUNT NUMBER
DESTINATION	SUPPLY ACCOUNT NUMBER

PRIVACY ACT STATEMENT

AUTHORITY 5 U.S.C., Sec 552a (PL 93 579)

PRINCIPLE PURPOSES: To provide a receipt for transfer of controlled materiel. The use of the SSAN is required and is necessary to provide positive identification of the individuals receipting for the materiel.

ROUTINE USES: To document transfer of materiel from a shipper to a courier, courier to courier and/or receiver.

DISCLOSURE IS VOLUNTARY: Since the SSAN must be used, refusal to provide SSAN may be grounds for action to remove the individual concerned from duties involving the materiel transferred by use of this form.

I certify by my signature that I have received the materiel listed on this form and am aware of the applicable safety and security requirements.

SHIPMENT DESCRIPTION

LINE NUMBER	QUANTITY	SERIAL NUMBERS	REMARKS

SHIPMENT TRANSFERS

FIRST	LOCATION OF TRANSFER	DATE(YR/MO/DAY)				
RECIPIENT'S PRINTED NAME (LAST, FIRST, M.I.)	ORGAN. OR ACCOUNT NO.					
SIGNATURE	SOCIAL SECURITY NUMBER					
SECOND	LOCATION OF TRANSFER	DATE (YR/MO/DAY)				
RECIPIENT'S PRINTED NAME (LAST, FIRST, M.I.)	ORGAN. OR ACCOUNT NO.					
SIGNATURE	SOCIAL SECURITY NUMBER					
THIRD	LOCATION OF TRANSFER	DATE (YR/MO/DAY)				
RECIPIENT'S PRINTED NAME (LAST, FIRST, M.I.)	ORGAN. OR ACCOUNT NO.					
SIGNATURE	SOCIAL SECURITY NUMBER					
FOURTH	LOCATION OF TRANSFER	DATE (YR/MO/DAY)				
RECIPIENT'S PRINTED NAME (LAST, FIRST, M.I.)	ORGAN. OR ACCOUNT NO.					
SIGNATURE	SOCIAL SECURITY NUMBER					
FIFTH	LOCATION OF TRANSFER	DATE (YR/MO/DAY)				
RECIPIENT'S PRINTED NAME (LAST, FIRST, M.I.)	ORGAN. OR ACCOUNT NO.					
SIGNATURE	SOCIAL SECURITY NUMBER					

DD FORM 82 MAY 1911

PREVIOUS EDITION MAY BE USED UNTIL 31 DEC 82

Figure 4-2. DD Form 1911 (Materiel Courier Receipt)

CONTAINER INFORMATION
for
Spring Valley

Generator Information:

Container #_____

Contents: 1)_____

2)_____

3)_____

4)_____

5)_____

Date: _____ Certified: _____
Signature

CONTAINER INFORMATION
for
Spring Valley

Generator Information:

Container #_____

Contents: 1)_____

2)_____

3)_____

4)_____

5)_____

Date: _____ Certified: _____
Signature

Figure 4-3. Container Information Form

IHF Inventory Log

Date Rec'd	Rec'd By	Container #	Date Shipped	Shipped By

Figure 4-4. IHF Inventory Log

b. Move containers into the IHF by using a dolly.

c. Place containers so that the labels are clearly visible.

d. Do not stack containers.

e. Leave sufficient aisle space for emergency access to any of the containers in the IHF.

f. Perform a physical inventory of the CWM containers just received. Perform a physical inventory of all other CWM containers in the IHF. Compare the total quantity in stock with shipping forms on file.

g. File the new shipping form with others previously received.

h. Close the IHF in accordance with paragraph 4.5.2b.

4.6.3 Post-Transfer Activities. Following the successful transfer of suspect CWM from the transport vehicle to the IHF, the 22nd Chemical Battalion will verify that the transport vehicle and handling equipment are not contaminated before being released from the storage facility. This can be accomplished by physically checking the cargo bay, by collecting vapor samples, and by using low-level monitors and detectors listed in the monitoring procedures (section 5). If contamination is found, the truck or piece of equipment will be decontaminated and confirmed uncontaminated before it leaves the IHF site.

After delivery of suspect CWM to the IHF, the 22nd Chemical Battalion will assess the item on an as-needed basis. The recovered item will remain sealed inside its DOT-approved overpack throughout the analysis procedure. If the assessment confirms that the item contains CWM, the item will remain stored in the IHF until final disposition. If the assessment confirms that the item does not contain CWM, the item will be moved to the hazardous waste storage area for further characterization and

appropriate disposal. If the assessment yields inconclusive data, the item will remain as suspected CWM and be returned to the IHF. Any recovered glassware suspected of containing CWM that does not have sufficient volume to allow assessment will be shipped to ECBC for characterization. ECBC will dispose of the item based on the results of its characterization.

4.7 Support Activities

Some of the essential support activities applicable during all phases of IHF operations are presented in the following paragraphs.

4.7.1 Surveillance, Maintenance, and Repair. It is expected that the items stored in the IHF will be transported offsite within a few days of the end of the recovery operation. However, in the event of an unforeseen transportation delay, the 22nd Chemical Battalion will perform monthly external inspections of the IHF and 22nd Chemical Battalion or ECBC will conduct surveillance monitoring using the Depot Area Air Monitoring System (DAAMS) for the CENAB as described in section 5. Maintenance and repair of the IHF structure and equipment will be performed in a timely manner. If the structure or equipment cannot be repaired, a replacement will be provided.

4.7.2 Security. The IHF must be secure at all times. The gate to the IHF storage area and IHF doors must be secured when the facility area is unoccupied.

a. *Security Patrol.* A security guard service (coordinated by the CENAB) will provide roving security 24 hours a day while CWM is stored in the IHF. Visual inspections to verify that the IHF is secure will be performed by the roving guards at least once each 24 hours. During inspections, the condition of the IHF and surrounding area will be observed. The storage site gate and locks will be checked. Any unusual circumstances will be immediately reported.

b. *Control of Site Access.* Access to the storage site must be controlled to ensure that no personnel, beyond the minimum necessary, are exposed to potential hazards of CWM transfer and storage. Before arrival of the CWM, the IHF area will be checked to ensure that only authorized persons are onsite. The area will be controlled to prevent access by unauthorized or unnecessary persons. Only authorized personnel (known or approved by the 22nd Chemical Battalion supervisor and CEHNC) will be given access to the facility.

SECTION 5
MONITORING APPROACH

Chemical agents (H, HD, and L) and industrial chemicals (CG, CK, and SA) will be monitored as needed using the sampling devices and at the concentrations specified in this Plan. The frequency and location of sampling described by this IHF Plan are based on the type of monitoring required by DA Pam 385-61.

5.1 Types of Monitoring

5.1.1 First Entry Monitoring. First entry monitoring will be performed before entering the IHF and will be conducted by 22nd Chemical Battalion or ECBC. The appropriate monitor(s) will be used for the chemical(s) of concern being stored in the IHF. First entry monitoring procedures are based on AR 385-61 and DA Pam 385-61. Before entry into the IHF, monitoring will be conducted remotely (see figure 5-1) using low-level, near real-time air monitoring equipment (MINICAMS®) to ensure that interior airborne chemical concentrations are below the AEL levels (see tables 5-1, 5-2, and 5-3). AEL levels are provided for operator information. Agent concentrations that correspond to the AEL are included in tables 5-1 and 5-2. Industrial chemicals are included in table 5-3.

5.1.2 Surveillance Monitoring. Surveillance monitoring of the IHF containing recovered chemical agents will be conducted monthly by ECBC or the 22nd Chemical Battalion for the CENAB, if required due to transport delay. Surveillance monitoring will be required only if RCWM is stored in the IHF for more than 1 month following the completion of onsite activities and will continue as long as CWM remains in the IHF. Surveillance monitoring will not negate the requirements for first entry monitoring. Surveillance monitoring using DAAMS tubes is recommended as the most economical method. CEHNC, CENAB, and PMNSCM will be contacted immediately if a reading over the action level is obtained during surveillance monitoring.

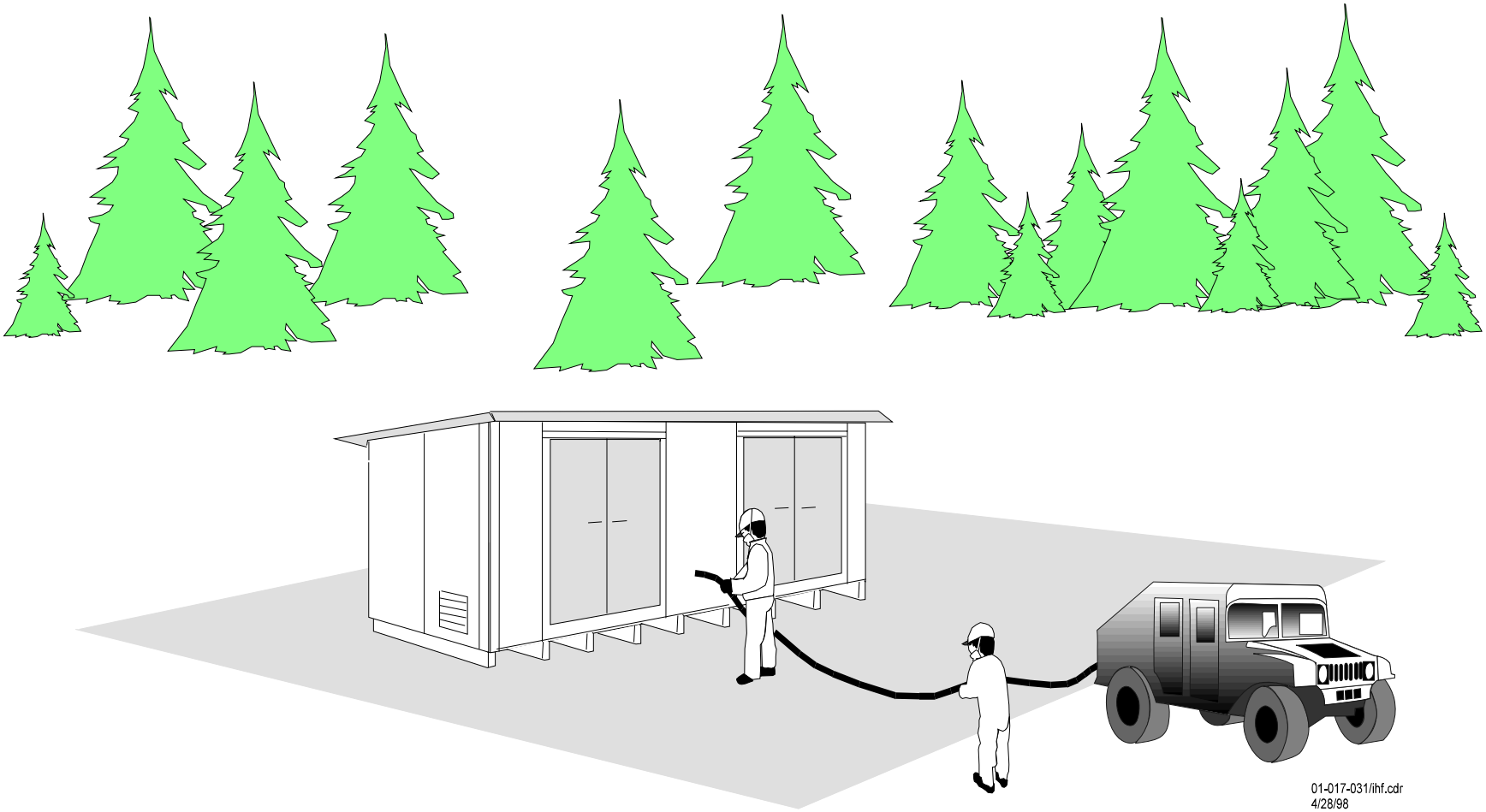

Figure 5-1. First Entry Monitoring

Table 5-1. Sulfur Mustard Airborne Exposure Limits

H or HD	Averaging Time						
	GPL (12 hours)	WPL (12 hours)	WPL (8 hours)	WPL (4 hours)	WPL (2 hours)	STEL[a] (15 minutes)	Variable
General Population	2×10^{-5} mg/m^3						
No Respiratory Protection		2.7×10^{-4} mg/m^3	4×10^{-4} mg/m^3	8×10^{-4} mg/m^3	1.6×10^{-3} mg/m^3	3×10^{-3} mg/m^3	
Air-purifying Respirator	For sulfur mustard agents, air-purifying respirators are used for escape purposes only.						
Supplied-air Respirator w/o Escape Bottle		0.27 mg/m^3	0.4 mg/m^3	0.4 mg/m^3	0.4 mg/m^3	0.7 mg/m^3	
Self-contained Breathing Apparatus or Supplied-air w/ Escape Bottle		2.7 mg/m^3	4 mg/m^3	8 mg/m^3	16 mg/m^3	30 mg/m^3	
Demilitarization Protective Ensemble					100 mg/m^3[b]		
Vapor Screening Limit							3×10^{-3} mg/m^3
Source Emission Limit							3×10^{-2} mg/m^3

Notes:

[a] Exposures at the STEL shall occur not more than one time per day.
[b] Implemented as a ceiling value.

GPL = general population limit
STEL = short-term exposure limit
mg/m^3 = milligram per cubic meter
WPL = worker population limit

Table 5-2. Lewisite Exposure Limits

L	Averaging Time						
	GPL (12 hours)	WPL (12 hours)	WPL (8 hours)	WPL (4 hours)	WPL (2 hours)	STEL (15 minutes)	Variable
General Population	3×10^{-3} mg/m^3						
No Respiratory Protection		3×10^{-3} mg/m^3	3×10^{-3} mg/m^3	3×10^{-3} mg/m^3	3×10^{-3} mg/m^3	3×10^{-3} mg/m^3	
Air-purifying Respirator	For lewisite, air-purifying respirators are used for escape purposes only.						
Supplied-air Respirator w/o Escape Bottle		0.4 mg/m^3	0.4 mg/m^3	0.4 mg/m^3	0.4 mg/m^3	0.4 mg/m^3	
Self-contained Breathing Apparatus or Supplied-air w/ Escape Bottle		30 mg/m^3	30 mg/m^3	30 mg/m^3	30 mg/m^3	30 mg/m^3	
Demilitarization Protective Ensemble	The Demilitarization Protective Ensemble is not authorized for use with L.						
Vapor Screening Limit							3×10^{-3} mg/m^3
Source Emission Limit							3×10^{-3} mg/m^3

Notes:

AELs are taken from Army Regulation 385-61 (12 October 01).

All AELs are concentration only values, regardless of duration. Personal protective equipment may be used to limit potential exposure to workers.

AEL = airborne exposure limit
GPL = general population limit
L = lewisite
mg/m^3 = milligram per cubic meter
STEL = short-term exposure limit
WPL = worker population limit

Table 5-3. Monitoring Equipment and Levels

Chemical of Concern	Type of Monitoring: Instrument	Workplace Exposure Level[a] TWA	Workplace Exposure Level[a] mg/m^3	Estimated Limit of Quantification[b] mg/m^3
Industrial Chemical:				
Phosgene (CG)	First Entry: MINICAMS®	1.0	0.4	≤0.4
	First Entry Confirmation: Colorimetric Tube	1.0	0.4	0.1
	Surveillance: Colorimetric Tube	1.0	0.4	0.1
	Contingency: MINICAMS	1.0	0.4	≤0.4
	Contingency Confirmation: Colorimetric Tube	1.0	0.4	0.1
Chloropicrin (PS)	First Entry: MINICAMS	1.0	0.7	≤0.7
	First Entry Confirmation: Colorimetric Tube	Gross Level		6.8
	Surveillance: Colorimetric Tube	Gross Level		6.8
	Contingency: MINICAMS	1.0	0.7	≤0.7
	Contingency Confirmation: Colorimetric Tube	Gross Level		6.8
Cyanogen Chloride (CK)	First Entry: MINICAMS	1.0	0.6	≤0.6
	First Entry Confirmation: Colorimetric Tube	1.0	0.6	0.3
	Surveillance: Colorimetric Tube	1.0	0.6	0.3
	Contingency: MINICAMS	1.0	0.6	≤0.6
	Contingency Confirmation: Colorimetric Tube	1.0	0.6	0.3

Table 5-3. Monitoring Equipment and Levels (Continued)

Chemical of Concern	Type of Monitoring: Instrument	Workplace Exposure Level[a] TWA	Workplace Exposure Level[a] mg/m^3	Estimated Limit of Quantification[b] mg/m^3
Arsine (SA)	First Entry: ATI C16 PortaSens II (or equivalent)	1.0	0.2[c]	0.016
	First Entry Confirmation: Colorimetric Tube	Gross Level		0.0096
	Surveillance: ATI C16 PortaSens II (or equivalent)	1.0	0.2[c]	0.016
	Contingency: ATI C16 PortaSens II (or equivalent)	1.0	0.2[c]	0.016
	Contingency Confirmation: Colorimetric Tube	Gross Level		0.0096

Notes:

[a] Workplace exposure level is an umbrella term encompassing all such levels, including the 8-hour TWA, the permissible exposure limit, the threshold limit value, and other levels developed to protect workers during normal operations.
[b] The lowest level that can be reliably quantified based on sampling and analytical procedures and calibration of the monitor
[c] The Occupational Safety and Health Administration permissible exposure limit is 0.2 mg/m^3 (0.05 parts per million).

mg/m^3 = milligram per cubic meter
TWA = time-weighted average

5.1.3 Contingency Monitoring. Contingency monitoring will be conducted during an emergency response (section 6). Contingency monitoring will be initiated after detection of a release in the IHF during first entry or surveillance monitoring, or after a catastrophic event, such as damage to the IHF or a transportation accident, where there is indication of a release.

a. *Release During Storage.* Upon detection of a release during surveillance monitoring, the 22nd Chemical Battalion or ECBC dressed in OSHA Level B PPE will conduct first entry monitoring to confirm the release. If first entry monitoring confirms a release, the 22nd Chemical Battalion will enter the IHF, identify the source of the release, and contain the leaking item in accordance with 22nd Chemical Battalion operation procedures. After the leakage has been contained, the area will be decontaminated by the 22nd Chemical Battalion according to DA Pam 50-6 or Technical Manual (TM) 60A-1-1-11. Monitoring of the IHF will be continuous until readings fall below the TWA (tables 5-1 through 5-3) for a minimum of three consecutive sampling periods.

b. *Potential Release after Catastrophic Event.* If a potential release is suspected in the area of the IHF as the result of a catastrophic event (for example, earthquake or tornado) or at the scene of an accident during onsite transportation, downwind monitoring will be initiated. An example for monitoring at the IHF is shown in figure 5-2. Example arrays for situations involving transport of CWM are shown in figures 5-3 through 5-6. The appropriate monitors (tables 5-1 through 5-3) will be used at each of the monitoring stations in the monitoring array.

5.1.4 Monitoring During Onsite Transportation. Onsite transportation consists of movements from the recovery site to the staging area and from the staging area into the IHF. Once the RCWM is inside an overpack and monitoring determines that there are no leaks, the item may be moved without further monitoring. If the integrity of the overpacks does not appear to be sufficient, or any evidence of leakage is observed, the

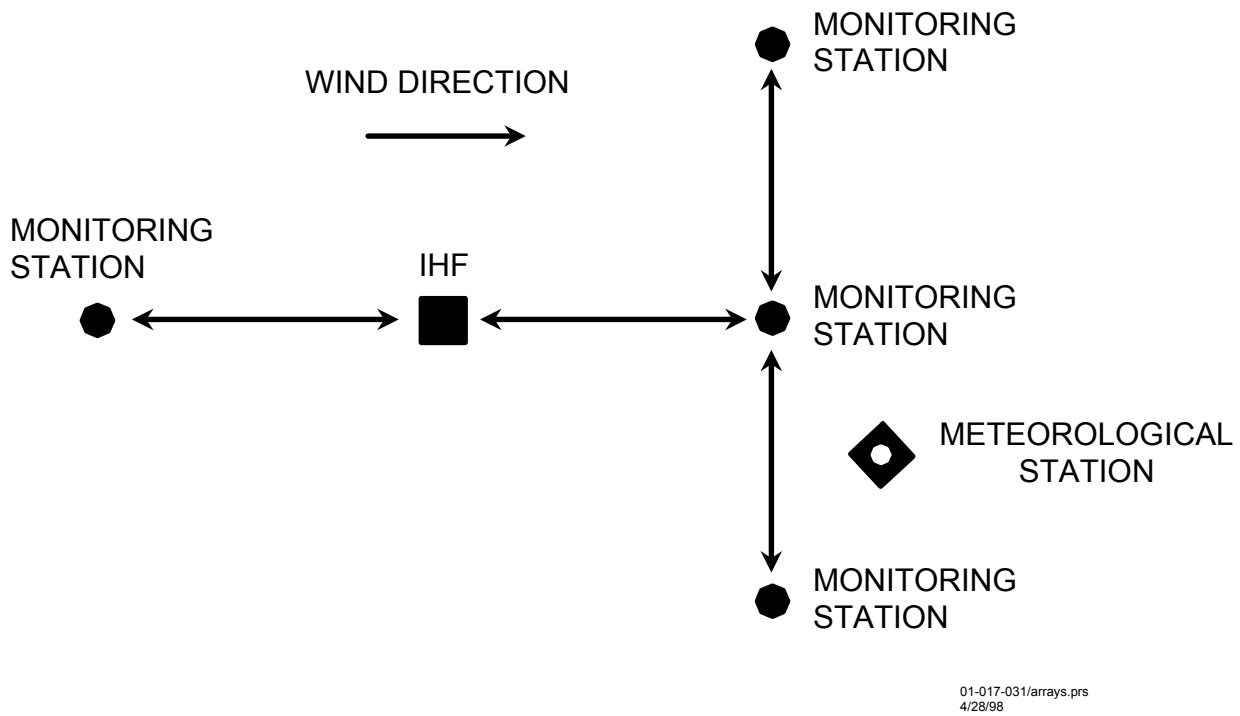

Figure 5-2. Example of a First Level Contingency Monitoring Array

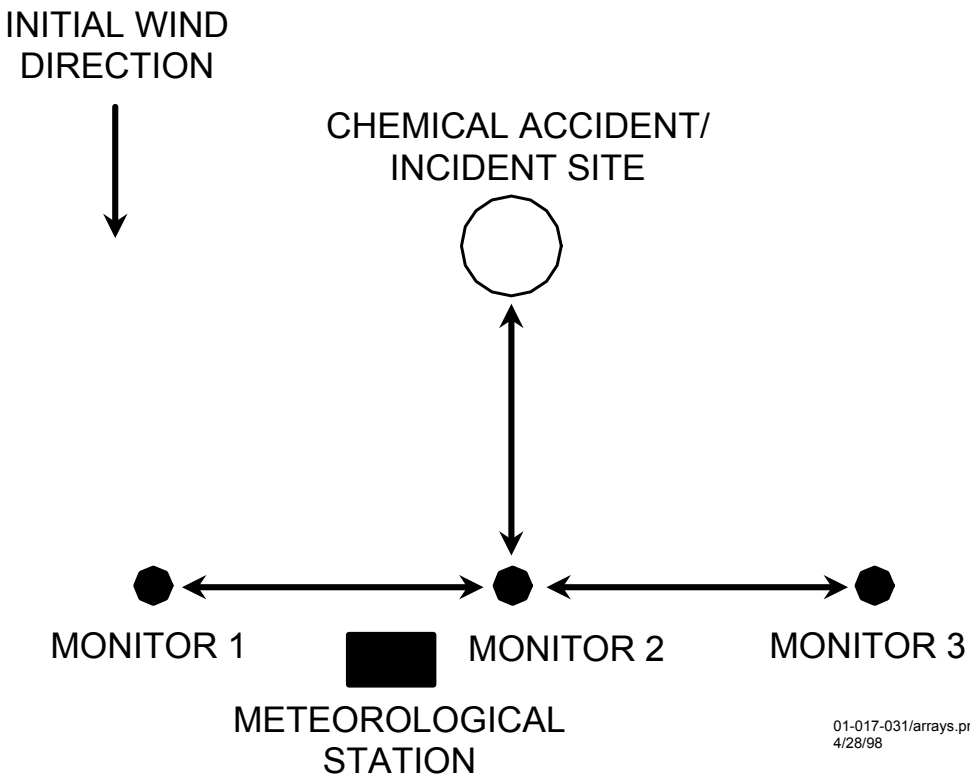

Figure 5-3. Initial Monitoring During Offsite Emergency Response

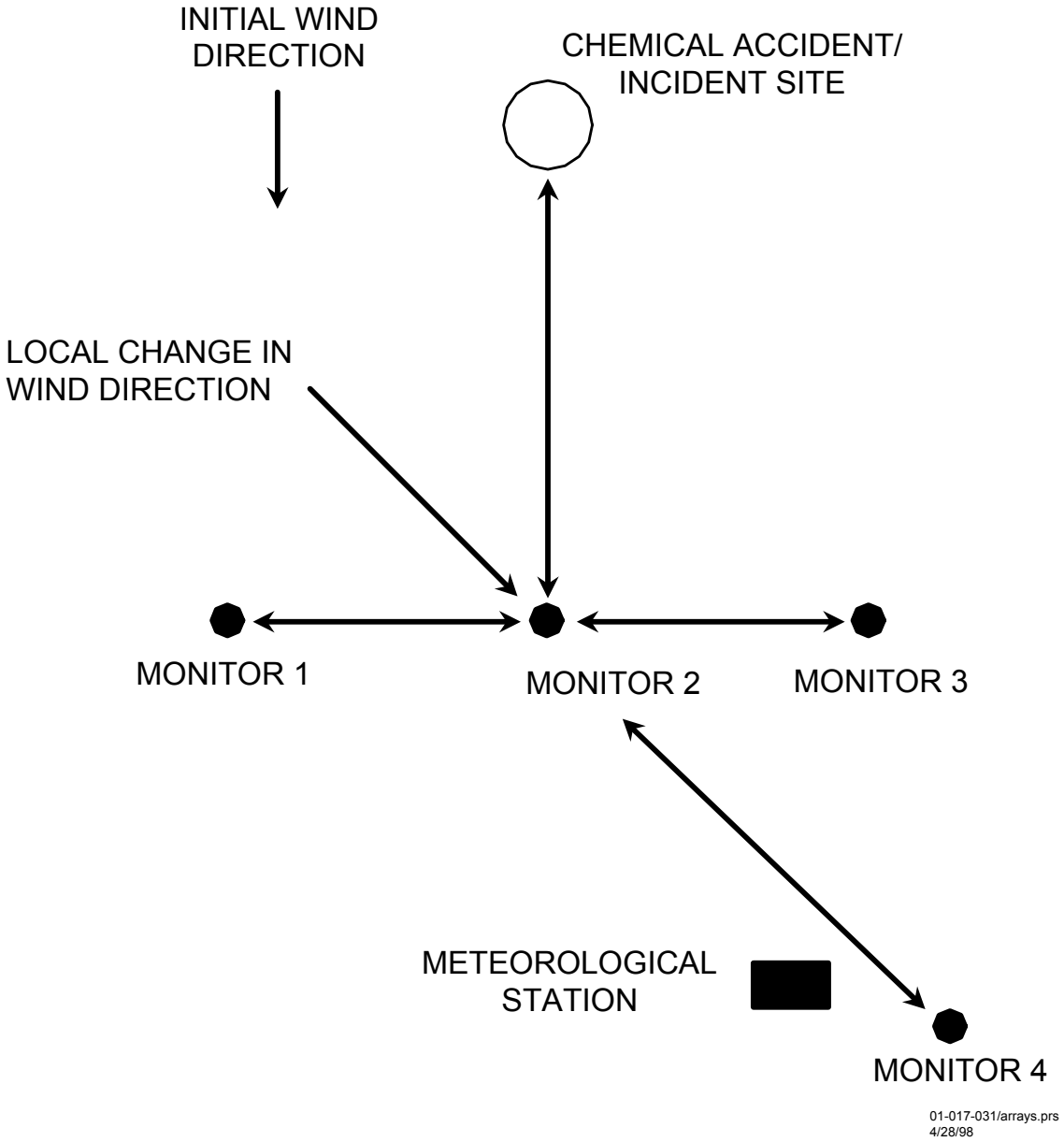

Figure 5-4. Second Array Monitoring During Offsite Emergency Response

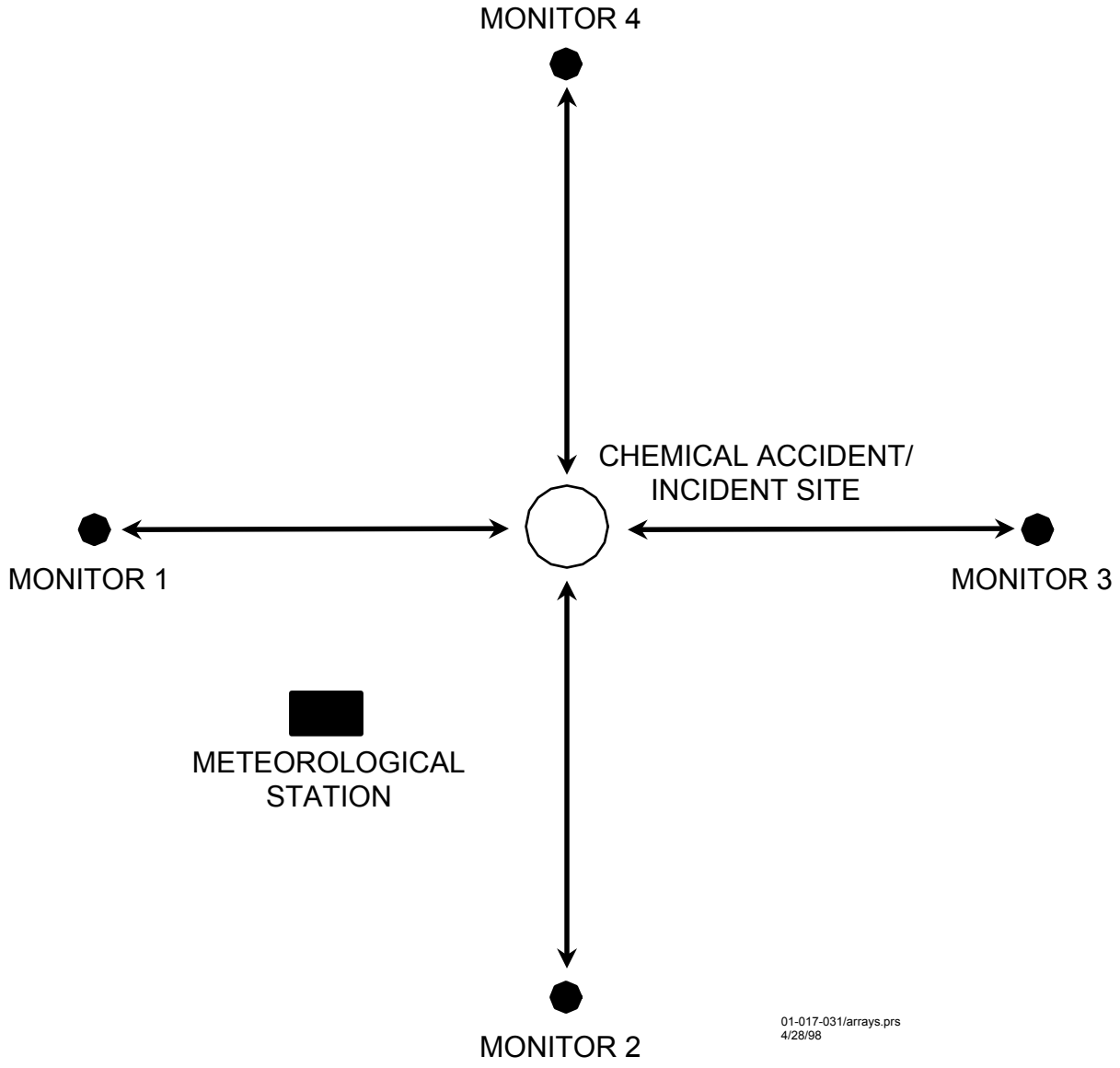

Figure 5-5. Second Array Monitoring During Emergency Response

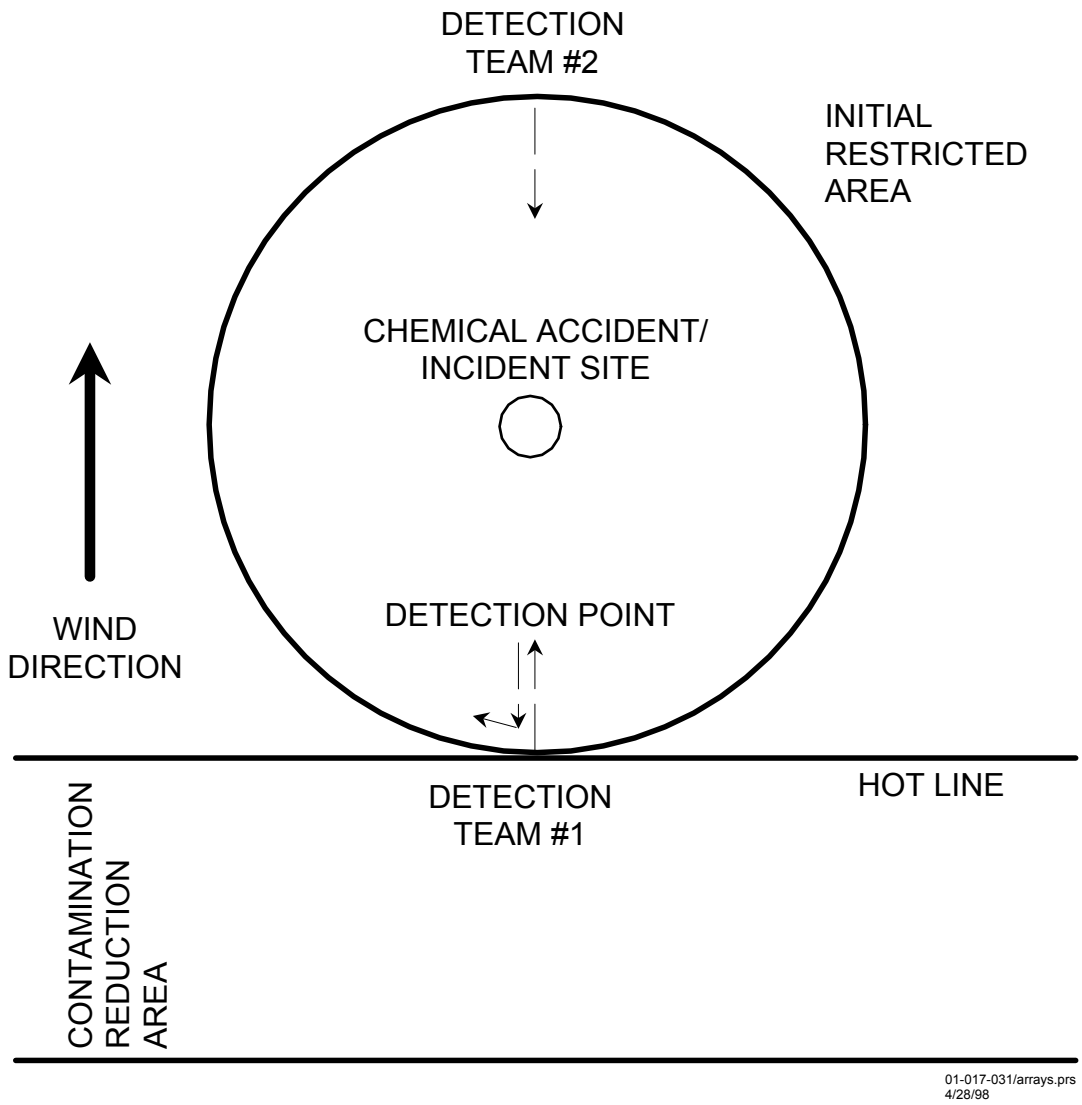

Figure 5-6. Surveillance Monitoring of the Restriction Area

item contained in the overpack will be repackaged by the 22nd Chemical Battalion, wearing appropriate PPE, and monitored with the appropriate equipment to ensure the overpack is sealed.

5.2 Roles and Responsibilities

ECBC or 22nd Chemical Battalion will provide qualified personnel to perform chemical agent monitoring during packaging and storage of RCWM. ECBC or 22nd Chemical Battalion will:

a. Provide and configure equipment such as the MINICAMS and DAAMS to conduct monitoring operations for chemical agents. (The Corps of Engineers site contractor will provide the SA monitoring capability.)

b. Obtain agent standards for HD and L.

c. Record calibration data, instrument parameters, and agent standards, (when used) in bound instrument logbooks.

d. Maintain daily printouts of calibration data and monitoring results, including hardcopy MINICAMS monitoring results.

e. Provide the required personnel, equipment, and support vehicles to conduct monitoring.

f. Coordinate with the CENAB and other onsite organizations to ensure that the monitoring plan is understood and actions to be taken in the event agent is detected are known.

g. Ensure MINICAMS and DAAMS are tested and serviceable before commencing daily operations.

h. Perform hazard prediction modeling using the D2SV personal computer hazard prediction program before commencing daily operations. Ensure that the daily downwind hazard distance does not exceed that determined for the planning maximum credible event (MCE).

i. Provide logistical support and resupply assets to sustain continuous operation throughout the duration of the project.

5.3 Monitoring Chemicals of Concern

5.3.1 Mustard (H and HD). A MINICAMS or comparable near real-time (NRT) instrument will be used for first entry and contingency monitoring. The vapor screening level (VSL) for H and HD is 0.003 milligram per cubic meter (mg/m^3). DAAMS tubes will be collected for surveillance monitoring and confirmation monitoring of a MINICAMS alarms. The estimated limit of quantification for H and HD using DAAMS or MINICAMS is 0.0006 mg/m^3.

5.3.2 Lewisite (L). L will be monitored using a Lewisite MINICAMS or comparable NRT instrument for first entry and contingency monitoring. The VSL for L is 0.003 mg/m^3. DAAMS tubes will be collected for confirmation of a MINICAMS alarm. The estimated limit of quantification for L using DAAMS is 0.0006 mg/m^3 and less than 0.0015 mg/m^3 for MINICAMS.

5.3.3 Chloropicrin (PS). PS will be monitored using a MINICAMS for first entry and contingency monitoring. The National Institute for Occupational Safety and Health (NIOSH) permissible exposure limit (PEL) and OSHA Recommended Exposure Limit (REL) for PS are 0.7 mg/m^3. The MINICAMS estimated limit of quantification is less than or equal to 0.7 mg/m^3. A Draeger colorimetric tube (8101021), or comparable device will be used for surveillance monitoring and confirmation of a MINICAMS alarm. The estimated limit of quantification for the Draeger tube is 6.8 mg/m^3.

5.3.4 Arsine (SA). SA will be monitored using an Analytical Technologies, Inc. ATI C16 PortaSens II gas detector or equivalent instrument. Colorimetric tubes or badges, such as the Draeger detector tube (CH25001) or comparable devices, will be used for confirmation monitoring. The OSHA PEL for SA is 0.16 mg/m^3 (0.05 parts per million [ppm]). The estimated detection limit is 0.016 mg/m^3 for the ATI C16 PortaSens II and 0.096 mg/m^3 for the Draeger tube.

5.3.5 Phosgene (CG). CG will be monitored using a MINICAMS or equivalent instrument for first entry and contingency monitoring. The workplace exposure level is 1.0 TWA (0.4 mg/m^3). The MINICAMS estimated quantification limit is less than or equal to 0.4 mg/m^3. A Draeger colorimetric tube (81-01521) or equivalent will be used for surveillance monitoring and confirmation of a MINICAMS alarm. The estimated quantification limit for the Draeger tube is 0.1 mg/m^3.

5.3.6 Cyanogen Chloride (CK). CK will be monitored using a MINICAMS or equivalent for first entry and contingency monitoring. The workplace exposure level for CK is 1.0 TWA (0.6 mg/m^3). The MINICAMS estimated quantification limit is less than or equal to 0.6 mg/m^3. Draeger tubes (CH-19801) or equivalent will be used for confirmation of MINICAMS alarms and surveillance monitoring. The estimated limit for quantification for the Draeger tube is 0.3 mg/m^3.

5.4 Monitoring Devices

5.4.1 MINICAMS. Air samples for first entry and contingency monitoring of H, HD, and L will be collected and analyzed with MINICAMS. The MINICAMS is a low-level, near real-time monitor designed to detect nerve and blister agents. The MINICAMS uses a preconcentration sampler that passes air through a solid sorbent, such as coarse mesh Tenax®, to collect the sample. The sample is collected over a timed sampling cycle then the sample is desorbed and carried into a gas chromatograph (GC) temperature-programmed capillary column. The appropriate detector will be configured for the chemical that is to be monitored.

5.4.2 DAAMS. The DAAMS is not an instrument but an air-sampling and analysis method that provides surveillance sampling data by using sorbent tubes. The system consists of small, glass, sorbent-packed tubes, a vacuum pump, and flow control hardware. Sorbent tubes will be used for sampling all chemical agents. In the DAAMS method, air is drawn through the tube at a specified flow rate, and contaminants are collected by adsorption onto the tube packing. After sample collection, the tubes are thermally desorbed into the carrier stream of a GC and subsequently detected using the appropriate detector.

5.4.3 Colorimetric Techniques. Colorimetric techniques are based on specific chemical reactions that lead to the formation of colored reaction products when agents are present above threshold concentrations. Colorimetric tubes are available for PS and SA.

5.4.4 C16 PortaSens II. The C16 PortaSens II uses a 0 to 500/2,000 parts per billion (ppb) electrochemical sensor to detect SA. The instrument's scale can be adjusted to measure SA at a concentration of 0 to 500 ppb or 0 to 2,000 ppb. The C16 PortaSens II has data logging capabilities and alarms with adjustable setpoints.

SECTION 6
EMERGENCY RESPONSE CONTINGENCY PLAN

6.1 Introduction

This Plan outlines procedures to be taken in the unlikely event of an accident, emergency, or release of chemical agent while CWM is being recovered, transported onsite, or stored in the IHF. These procedures are tailored to the Spring Valley site and the specific CWM that will be stored in the IHF; however, they rely heavily on existing emergency response procedures, including:

a. 22nd Chemical Battalion Regulation 50-1
b. TM 60A-1-1-11
c. DA Pam 50-6.

In developing these emergency response procedures, consideration was also given to requirements in the Emergency Response Guidebook developed by the Research and Special Programs Identification of the DOT. DA contingency plans and procedures, including the "Oil and Hazardous Substance Spill Contingency Planning, Control, and Emergency Response," Chapter 8 of AR 200-1, Environmental Protection and Enhancement, were also considered.

6.2 Objective

The primary concern of emergency response to a chemical incident will be to protect human health and the environment by controlling the release. It is essential that personnel be prepared in case of an emergency. All emergency response operations should be performed in the safest manner and in accordance with preapproved contingency plans. The three major types of emergencies that can be encountered are: (1) spills that may include exposure to chemical agents or hazardous materials, (2) fire, and (3) incidents requiring medical help.

This Emergency Response Contingency Plan complies with 29 CFR 1910.120(1) and addresses the following elements:

- Planning
- Emergency recognition
- Personnel, authority, and communications
- Emergency alerting, reporting, and evacuation routes
- PPE and emergency equipment
- Procedures for decontamination and medical treatment.

As recommended by the USEPA, this Plan also addresses procedures to protect the local affected population in case of an accident or emergency. These topics are:

- First responders to incidents involving the IHF (22nd Chemical Battalion only)
- First responders to incidents not involving the IHF
- First aid and medical information
- Air monitoring
- Spill control and countermeasures.

6.3 Notifications

This project will be conducted on private and public land within the District of Columbia. In situations where the public is threatened by release of a potentially hazardous chemical, emergency response actions will be under the jurisdiction of the District of Columbia.

In the event of an accidental release, the 22nd Chemical Battalion will take necessary steps to save lives and protect property. CENAB will notify local authorities in accordance with this Plan. Once local authorities arrive at the scene, 22nd Chemical Battalion personnel will coordinate fully with the local authorities. For example, the 22nd Chemical Battalion will provide advice on the need for evacuation, size of the hazard area, and the need for PPE. Notifications will be made in accordance with the CENAB site work plan.

6.4 IHF Operation

These paragraphs outline contingency-related operational tasks that will be performed before storing CWM and in the event of an accident or incident involving the overpacked CWM.

6.4.1 Contingency Planning. The Corps of Engineers representative, ECBC, and the 22nd Chemical Battalion personnel responsible for responding to emergency conditions will review the emergency procedures and ensure that all necessary emergency equipment is ready for use. All training will have been accomplished before operations begin. All personnel will be briefed on their roles in emergencies, such as leak seal procedures, perimeter monitoring, personnel, and equipment decontamination, fire suppression, evacuation, cleanup, and first aid.

Medical support will be required to respond to chemical accidents or incidents that may affect workers or the public during the transportation or interim storage of the RCWM. Corps of Engineers will develop such memoranda of agreement as are necessary to ensure ambulance and hospital services are available. Medical services programmed to respond to chemical incidents will be trained in the signs, symptoms, and treatment of chemical agent casualties and how to protect themselves, their equipment, and their patients from becoming contaminated.

6.4.2 Personnel. The daily operations of the IHF will be conducted by the 22nd Chemical Battalion, coordinating closely with the PM ECW. The 22nd Chemical

Battalion will respond in case of an accident during onsite transportation or storage of CWM. 22nd Chemical Battalion personnel are trained and will be equipped for responding to any type of incident that may occur. The 22nd Chemical Battalion, augmented by CENAB, will have the capability to implement the same primary public safety measures used by community officials in fixed-site emergency response programs. The proper tools will be available to monitor contamination and to provide first aid, decontamination, fire protection, and leak control during an unexpected situation.

a. *Training and Certification.* All personnel who participate in a chemical incident emergency response will be trained and certified in emergency procedures, first aid, cardiopulmonary resuscitation (CPR), and use of PPE, and will have a basic knowledge of agent exposure symptoms. This will include, at a minimum, 29 CFR 1910.120 and DA Pam 385-61 training. All emergency response organizations should have their supervisory and team members familiarize themselves with 22nd Chemical Battalion operations procedures and SOPs applicable to CWM decontamination and spill cleanup.

b. *22nd Chemical Battalion Coordination with Support Personnel.* The 22nd Chemical Battalion will have the capability to coordinate responses with other participating organizations and local emergency response agencies who will provide response management expertise in areas such as public alert, notification, traffic and access control, assistance to affected populations, and initial medical intervention and care.

6.4.3 Emergency Response Resources.

a. *Local*. The Spring Valley Site-wide Chemical Safety Submission will be reviewed before acceptance of the first CWM at the IHF. These documents will specify the onsite emergency coordinators, phone contacts for local emergency response agencies, and safety and environmental

officials. The Spring Valley Site-wide Chemical Safety Submission should be referred to for specific instructions and protocol for contacting emergency response organizations. These resources will be available for use, if necessary, in the event of a chemical agent emergency.

(1) *Medical Support Vehicle.* An ambulance will be available at a nearby facility to transport injured personnel to the identified emergency medical facility.

(2) *Fire Support Vehicle.* A fire truck will be available to respond during onsite transport and while the CWM is stored in the IHF.

b. *District of Columbia Emergency Response Resources.* District of Columbia emergency response resources will be needed to provide secondary supporting activities. These resources should be identified and used as necessary, though the necessity for this type of response is extremely remote due to the type and quantity of chemical agent expected to be recovered and transported onsite.

6.5 Contingency Plans

The Spring Valley Site-wide Chemical Safety Submission will be used as a source of reference for emergency planning and implementation.

Emergency procedures would begin upon the detection of chemical agent by a monitor, activation of an alarm, the presence of smoke, the witnessing of an accident, or the suspicion of CWM contamination.

An accident during CWM recovery, packaging, and transfer into the IHF is more likely than an accident during storage. The following paragraphs incorporate those procedures and notifications necessary to respond to any incident.

6.5.1 Response to a CWM Incident. Detailed procedures for responding to a CWM incident are addressed in the 22nd Chemical Battalion Operations Plan, 1994. Key elements of those procedures are discussed in the following paragraphs.

a. *Isolation.* The following steps will be taken to isolate a spilled or leaking container:

(1) Upon observing a spill, leak, or discharge of any size, 22nd Chemical Battalion personnel will immediately don their masks, proceed to a safe distance upwind, direct other personnel away from the site, and initiate other emergency response actions as appropriate.

(2) Sources of ignition, including vehicles, within 50 feet will be extinguished or turned off immediately.

(3) Workers who may have been in contact with spilled materials will undergo decontamination consistent with the extent and nature of the contact.

(4) The 22nd Chemical Battalion will take action to identify the contamination, mitigate leaking CWM, and segregate it from the surroundings.

b. *Notification.* The following steps will be taken to notify authorities of an emergency:

(1) The CENAB will be contacted by whichever organization discovers the emergency.

(2) As conditions dictate, CENAB will initiate offsite notifications following U.S. Army and local requirements.

c. *First Aid.* The following actions will be taken as appropriate:

(1) If workers are unable to evacuate themselves, their rescue will be the responders' first priority after inspecting the scene and securing the CWM items.

(2) Responders will wear the OSHA Level B, or higher, PPE to conduct rescues.

(3) Responders will provide first aid appropriate to the victim's injuries. If a victim has been exposed to chemical agent, decontamination will be performed as soon as it is determined that the victim is breathing and life-threatening bleeding has been controlled.

d. *Characterization.* The following steps may be performed:

(1) The 22nd Chemical Battalion will investigate the incident site to determine the conditions of the CWM and areas of possible contamination. Re-entry to the area will be conducted in the appropriate level of PPE.

(2) Unless evidence indicates otherwise, the following three hazard categories will apply: oxidizing, corrosive, and acutely toxic by skin contact or inhalation. Material will be presumed to volatilize significantly unless proven otherwise.

(3) At the discretion of the 22nd Chemical Battalion, samples will be collected for field or laboratory testing.

(4) The area of the spill will be determined and documented. The quantity spilled will be estimated. The area will be marked with stakes and barrier tape.

(5) Spill site monitoring will be conducted in accordance with table 5-1 and the monitoring arrays shown in figures 5-2 through 5-6.

(6) The spread of material will be contained as soon as circumstances permit. Dikes, berms, sorbent pads, or loose sorbent may be used to prevent the spread of spilled material. Vapor-suppression foams may be applied if it has been verified that the spilled material is not reactive. Clay or other inorganic sorbent should be used on material not fully identified.

e. *Cleanup and Disposal.*

(1) Damaged containers will be repackaged into new overpack containers containing suitable loose sorbents.

(2) Saturated sorbents, soil, spill-control pads, etc. will be collected in compatible containers using appropriate equipment. Empty drums will be maintained near the IHF for use in cleanup of contaminated soil and sorbents.

(3) Contaminated tools and equipment for decontamination or disposal will be collected.

(4) Disposal will depend on the identity of the spilled material. Unidentified overpacked material will be stored in a segregated area of the IHF, pending identification.

6.5.2 Fire. Procedures for responding to a fire are as follows:

a. *Isolation.* Upon detecting a fire, the 22nd Chemical Battalion will determine whether the fire is small enough to extinguish with a portable

extinguisher or with water that is immediately available. Non-essential personnel will be directed a safe distance upwind.

b. *Notification.* The CENAB will be notified as soon as possible of the location, size, and nature of the fire. As conditions dictate, site personnel will declare an emergency, initiate remedial procedures, request assistance from the local fire department, and make necessary notifications as listed in the emergency response notification list. The Spring Valley Site-wide Chemical Safety Submission will provide additional details of local notification requirements.

c. *Rescue.* Rescue of persons unable to evacuate themselves shall be the first priority of responders after evaluating and securing the area. The 22nd Chemical Battalion or the Site Safety Officer will determine whether onsite resources are sufficient to proceed.

d. *Firefighting Procedures.* Firefighting procedures include:

(1) Stop the vehicle (if during movement)
(2) Sound the alarm
(3) Evacuate
(4) Use fire extinguisher
(5) Request assistance from the fire department.

The following guidelines are to be used during a response to a fire:

- No attempt should be made to extinguish large fires. These should be handled by the fire department.

- If human life appears to be in danger or if the fire is spreading rapidly, personnel should be moved further upwind away from the fire.

e. *Fire Extinguishing.* There are three classes of fire.

(1) Class A (wood, cloth, paper, rubber, many plastics, and other ordinary combustibles); extinguishing agents include:

- Water
- Water with 1-percent aqueous film forming foam (AFFF)
- Water with 5-percent AFFF or fluoroprotein foam
- ABC dry chemical
- Halon 1211.

(2) Class B (flammable liquids, gases, and greases); extinguishing agents include:

- ABC dry chemical
- Purple K
- Halon 1211
- Carbon dioxide
- Water with 6-percent AFFF.

(3) Class C (energized electrical equipment); extinguishing agents include:

- ABC dry chemical
- Halon 1211
- Carbon dioxide.

f. *Protective Clothing.* Based on conditions, the Site Safety Officer will determine appropriate safe distances and selection of PPE. In addition to firefighting turnout gear, the 22nd Chemical Battalion may require that other protective gear be worn, depending on the potential for chemical agent release.

g. *Decontamination.* After the fire has been extinguished, the 22nd Chemical Battalion will determine, to the extent practicable, the nature of the contaminants encountered and arrange for equipment to be decontaminated or labeled and isolated for further action.

6.5.3 Medical Emergencies. Seriously injured or ill persons should not be moved, unless their lives are endangered, until an assessment has been made by a competent medical authority. If the injury or illness is minor, first aid should be administered and full decontamination completed before transport. If the injury or illness is serious, first aid should be administered and as much decontamination done as possible while awaiting an ambulance or paramedics. All injuries and illnesses must be reported to the CENAB Site Coordinator.

Coordination with medical facilities is outlined in the CENAB Site Safety Submission. The following medical facilities may be contacted for emergency care:

a. For all chemical agent casualties:

George Washington University Medical Center
901 23rd Street, NW
Washington, D.C.
202-994-3211

b. For illness or injury not involving chemical agent.

Sibley Memorial Hospital
5255 Loughboro Road, NW
Washington, D.C. 20016
202-537-4000

6.5.4 Hazardous Material Handling. Onsite emergency response will be performed by the 22nd Chemical Battalion. When a leak or spill occurs, immediate containment

and preventive measures must be taken. Procedures for material handling are specified in 22nd Chemical Battalion SOPs. Upon completion of cleanup efforts, responsible personnel should notify the local authorities, collapse the exclusion area, and give the order to resume the transportation or storage operation.

SECTION 7
ROLES AND RESPONSIBILITIES

The primary participating organizations include CENAB, PM ECW/PMNSCM, 22nd Chemical Battalion, ECBC, and CEHNC. The organization is shown in figure 2-1.

The organizations participating in onsite transportation and storage of RCWM have both shared and individual roles and responsibilities. For example, the IHF is operated by the 22nd Chemical Battalion under the authority of CENAB in close coordination with PM ECW and CEHNC. CENAB will also be supported by CEHNC, ECBC, and a private engineering firm. Close coordination between all organizations will be maintained.

Common responsibilities include:

a. Coordinating with other participants

b. Performing duties in accordance with accepted health and safety procedures

c. Using established supply procedures and providing supplies necessary to support their operations

d. Providing emergency response support

e. Developing training plans for use by emergency response teams.

Specific responsibilities for each of the primary organizations associated with IHF operations are presented in the following paragraphs.

7.1 Corps of Engineers Representatives (CENAB/CEHNC)

CENAB is the supported agency and provides CEHNC Corps of Engineers expertise in CWM operations and directs remediation activities at Spring Valley. In support of this IHF Plan, the Corps of Engineers representatives will:

a. Exercise site control, per this plan and the Spring Valley Site-wide Chemical Safety Submission, during all phases of CWM recovery operations.

b. Coordinate with the District of Columbia, the USEPA, the State Department, and other agencies as necessary.

c. In close coordination with PM ECW, select the IHF location and exercise control of CWM after receipt from the recovery site until the CWM is removed from the IHF and shipped offsite for treatment.

d. Sign the hazardous waste manifest as generator at the time of recovery and immediately transfer physical custody of the CWM to the 22nd Chemical Battalion. As generator of the waste, CENAB will retain accountability until the waste is transported offsite.

e. Coordinate standby decontamination, medical support, and emergency response during all phases of recovery, onsite transport and storage.

f. Oversee site operations conducted by 22nd Chemical Battalion to manage CWM safely.

g. Support routine maintenance of the IHF.

h. Inspect IHF operations to ensure compliance with directives.

i. Provide physical security support for Spring Valley operations.

j. Conduct public affairs in coordination with PM ECW Agency Communications Office (ACO).

k. Coordinate with PMNSCM if failure of the IHF structure or major components occurs. Should repair be impractical, coordinate with PMNSCM to replace IHF and ensure that CWM is transferred following procedures developed for receipt, and storage of CWM.

l. Provide radios and cellular telephones to be used by the 22nd Chemical Battalion, Site Safety Officer, ECBC, and PM ECW for communication among key organizations and emergency services.

m. Coordinate with local law enforcement and emergency response agencies to provide a system for alerting the public to contingency situations.

n. Provide safety oversight related to ordnance, explosives, and CWM operations.

7.2 PM ECW/PMNSCM

Some responsibilities of the PM ECW and the PMNSCM are to:

a. Provide safe and environmentally acceptable storage, transportation, and disposal of RCWM. Coordinate activities with supporting agencies to transfer CWM from the recovery site to the IHF, and store CWM in the IHF. Ensure that CWM is stored in accordance with federal and state environmental regulations.

b. Ensure that CWM is handled in a safe and environmentally acceptable manner during the time they are received and stored at the IHF.

c. In coordination with the 22nd Chemical Battalion, safely store, on an interim basis, suspect CWM recovered during site remediation in preparation for final disposition.

d. Perform an HA that addresses the relative risk associated with this Plan. (The HA is provided in annex A. Annex B provides information on the physical characteristics of the CWM. Annex C provides information on the health hazards associated with the CWM.)

e. Develop and oversee CWM handling programs, such as monitoring (section 5), inspecting, packaging, labeling, storing, transferring from storage, and emergency response (section 6).

f. Ensure accountability through proper documentation at Spring Valley.

g. Provide a portable IHF for use at Spring Valley.

7.3 22nd Chemical Battalion

The 22nd Chemical Battalion is tasked to:

a. Support the CENAB, CEHNC, and PM ECW.

b. Recover suspect CWM items at Spring Valley.

c. When directed by the CENAB/PM ECW, assume physical custody of CWM when recovered; perform initial characterization tests to determine fill contents; and package the RCWM in overpack containers.

d. Escort CWM during onsite transportation and operate the IHF.

e. Inspect the IHF periodically for signs of deterioration or other damage that could lead to release of chemical agent.

f. Provide first response during any emergency situations that occur during recovery, overpacking, transportation, and storage operations.

g. Train personnel in IHF operations, to include proper lifting techniques and hazard communication training for all chemicals used at the site.

h. Provide monitoring capability (monitoring equipment and personnel) if requested.

i. Provide other direct support to the CENAB during storage of CWM.

7.4 ECBC

ECBC will:

a. Provide direct support to the 22nd Chemical Battalion.

b. Perform laboratory analyses of DAAMS tube samples and any solid or liquid samples to determine if chemical agent is present.

c. Provide the 22nd Chemical Battalion with material handling equipment, monitoring devices, and calibration solutions as requested.

d. Provide direct support to CENAB/PM ECW/22nd Chemical Battalion to perform monitoring. The ECBC will monitor the IHF for chemical agents and industrial chemicals stored in the IHF prior to opening and, if necessary, will train CENAB designated personnel to perform surveillance monitoring.

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SECTION 8
PUBLIC OUTREACH

The Corps of Engineers is responsible for public outreach and PM ECW will provide support as needed.

Annex H contains answers to questions that might be asked about this Plan. Further questions should be directed to the individuals listed below. All information about this IHF Plan will be distributed through PM ECW. Telephone numbers and points of contact include:

U.S. Army Corps of Engineers, Baltimore District
City Crescent Building
Baltimore, Maryland
ACO
Attn: Joyce Conant
Phone: 410-962-2626
Fax: 410-962-3660

For additional information or comments, contact:

Non-Stockpile Chemical Materiel Project
ACO
Attn: Karen Drewen
Aberdeen Proving Ground, Maryland 21010-5401
Phone: 410-436-3445/7491 or 800-488-0648
Fax: 410-436-8737
E-mail: karen.j.drewen@us.army.mil.

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SECTION 9
CONCLUSIONS

This IHF Plan provides a scope of effort intended to support activities at possible CWM disposal sites in the Spring Valley area of Washington, D.C. This Plan describes procedures and resources to safely manage the RCWM in the IHF. The CWM will be managed, transported, and stored in an IHF as a hazardous waste.

The IHF HA, presented in annex A, examines the risk of IHF operations for the RCWM. The HA encompasses the risks associated with the onsite transportation and storage of RCWM in the IHF. The conclusion of the HA is that the CWM will not challenge the integrity of the IHF, and that the IHF adequately protects the public and the environment. In addition, the total carrier risk for transporting the RCWM onsite is 2.60×10^{-7}.

The Plan is based on onsite transportation of known and suspected CWM and storage of RCWM consisting of 75mm projectiles filled with H, 5-gallon ceramic or glass containers of L, and 75mm projectiles filled with SA.

The HA considers potential incidents that could occur during storage and discusses them qualitatively. To assign quantitative values to potential risk, risk assessment codes (RACs) are identified for potential accident scenarios. An MCE is an accident that is likely to occur which would result in a release of CWM. Assessment of the hazards associated with the activities described in this Plan led to an MCE of one explosively configured 75mm projectile filled with H leaking 1 percent of its contents in the IHF. On the basis of the HA, storage of the RCWM at the IHF can be performed safely, provided procedures developed for the safe handling, movement, and storage of CWM are followed.

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ANNEX A

INTERIM HOLDING FACILITY HAZARD ANALYSIS

ANNEX A
INTERIM HOLDING FACILITY HAZARD ANALYSIS

1. INTRODUCTION

This hazard analysis (HA) is the product of an analysis of hazards associated with the handling and storage of chemical warfare materiel (CWM), and was developed to support the Interim Holding Facility (IHF) Plan for CWM that may be recovered from the Spring Valley area of Washington, D.C. The HA was performed in accordance with Military Standard (MIL-STD) 882E, 2005, and the *System Safety Management Plan for the Non-Stockpile Chemical Materiel Product* (PMCD, 2001). In the HA, incidents that could occur during storage are discussed qualitatively. To evaluate relative values of potential risk, risk assessment codes (RACs) are identified for each hazard based on the analyst's judgment. The risk assessment includes the risks associated with onsite handling and storage of CWM that will be recovered from Spring Valley in Washington, D.C. Hazards of onsite transportation were considered separately because the IHF is approximately 3 miles from the furthest potential recovery site and is located in an urban setting.

Spring Valley is located in the northwest portion of the District of Columbia in the area of the American University. During World War I, the U.S. Government established the American University Experiment Station (AUES) in this vicinity. The Experiment Station was used to prepare and test chemical warfare compounds, incendiaries, smokes and signals. Other projects involved developing methods for manufacture of these compounds and developing masks, canisters, and protective clothing for use with chemical warfare compounds.

Since 1993, U.S. Army Corps of Engineers, Baltimore District, has conducted a number of investigations and removals of World War I contamination in the Spring Valley neighborhood. Historical records, such as World War I era maps and photographs, plus

modern geophysical studies are being used to identify sites of interest. The IHF will be used for temporary storage of any recovered CWM (RCWM).

2. CONCEPT OF OPERATIONS

This section provides an overview that includes: (1) the activities performed for handling, storage, and onsite transportation of CWM; (2) the IHF facilities; and (3) the weather and geographic surroundings.

2.1 IHF Activities

Under the Non-Stockpile Chemical Materiel Product (NSCMP), CWM is held at or near the recovery site until it can be transported to a larger CWM facility that can provide longer-term storage. IHFs provide safe, secure, and environmentally sound storage of limited quantities of CWM. The IHF will be located at a staging area approximately 3.0 miles from the recovery site. The staging area is located on the same federal property used in previous Spring Valley recovery operations. Figure 1-1 in this IHF Plan shows the location of the IHF and the recovery site.

In order to assess potential hazards and calculate transporter risk, assumptions had to be made about the number and kinds of items that will be found. Based on historical records, knowledge gained since 1993, and a recent recovery action, it is assumed that two types of RCWM may be recovered. The items of concern are 75mm rounds containing either up to 1.35 pounds of mustard (H) or up to 1.2 pounds of arsine (SA). Any munition transported to the IHF will have been assessed to determine whether it is armed and burstered. To calculate transporter risk, it was assumed that one trip would be made to deliver RCWM to the IHF. The trip was assumed to be 3 miles long, the approximate distance to the furthest potential recovery site.

Personal protective equipment (PPE), decontamination solutions, and other required safety equipment will be readily available when operations are conducted at the IHF, but will not be stored at or within the IHF.

2.2 Facility Description

Descriptions of the IHFs to be used at Spring Valley can be found in paragraph 3.3 of this IHF Plan.

2.3 Facility Location

The Spring Valley IHF will be located on federal property in northwest Washington, D.C., at the intersection of Loughboro Road and Dalecarlia Parkway. Previous Spring Valley operations have used this area for the IHF facility without mishap or reportable incidence.

2.3.1 Weather. Historical weather data for the Spring Valley area was obtained from the Dalecarlia Reservoir weather station through the Washington Post. The reservoir is approximately 1.5 miles from the recovery site and will accurately reflect the weather at the site. For purposes of D2SV calculations, releases will be treated as if they occurred at the reservoir. The climate of the Spring Valley area is characterized as temperate. The summers are warm and of average length, and winter is relatively mild. Extreme temperatures above 37°C (100°F) occur occasionally, while temperatures below -17°C (0°F) are very rare. Annual precipitation averages about 109 centimeters (43 inches) and is almost entirely in the form of rain with occasional snow, sleet, and frozen rain. Precipitation amounts are lower during the months of January and February, on average, than other months of the year. January and February are also the coldest months of the year, which is optimal for handling mustard agent since mustard freezes at approximately 58°F.

2.3.2 Chemical Warfare Materiel Characterization. RCWM will be assessed before being placed into the IHF. Only items believed to contain chemical agent will be transported to the IHF.

2.3.3 Overpack Containers. The exact dimensions of the 5-gallon carboys will not be known until one is recovered. It is expected that a carboy will fit into a Department of

Transportation (DOT)-approved multiple round container (MRC) 12 x 56. If this container proves to be too small, a larger MRC such as the 55-gallon drum overpack will be used. All MRCs are designed to:

a. Meet, as a minimum, the general packaging criteria required by the DOT

b. Meet container requirements for original munitions

c. Provide long-term storage capability

d. Provide capability to be shipped by air transportation.

2.3.4 Multiple Round Container Leak Testing. The test plan for MRC leak testing exceeds DOT requirements, with the addition of many tests that stimulate the temperature and vibrations these containers are likely to experience during their serviceable life. The goal of the testing is to ensure the integrity, survivability, and serviceability of the containers after multiple reuses. At a minimum, the MRCs are subjected to tests in accordance with the following standards:

- American Society for Testing and Materiels (ASTM) E-499-73 Method A, Helium Leak Testing

- MIL-STD 453C and MIL-STD 1264B, Radiographic Testing

- Technical Provision (TP)-94-01, Transportability Testing

- MIL-STD-810E Method 14.4, Low and High Frequency Tests

- United Nations Performance Oriented Packaging Testing in accordance with 49 Code of Federal Regulations (CFR) Section 178.600

- MIL-STD-1660 Tests, First Article Tests (compression, vibration, drop and incline plane).

As a result of this rigorous testing the MRC 12 x 56, MRC 7 x 27, and other MRCs have been approved by the DOT and the Army for transportation and storage of RCWM.

2.4 Ground Transportation

Ground transportation of CWM from the recovery site to the IHF will be accomplished using a truck operated by the U.S. Army (22nd Chemical Battalion). All RCWM will be inspected, decontaminated, leak-sealed (if necessary), and overpacked before loading the transport vehicle.

It is expected that each movement will be accomplished with a minimum of two escort vehicles and one cargo vehicle (the minimum complement of vehicles permitted by 22nd Chemical Battalion Regulation 50-1). RCWM is classified as non-surety, hazardous waste. The trucks used to transport the RCWM must pass an inspection by 22nd Chemical Battalion before use. Each inspection will be documented on Department of Defense (DD) Form 626. Each truck will have a licensed driver and an assistant at all times. 22nd Chemical Battalion personnel have been accepted in the Chemical Personnel Reliability Program, as required by Army Regulation (AR) 50-6. These personnel must pass a medical examination before participation in any escort mission.

The truck could make up to 20 trips to transport RCWM from the site to the IHF. The maximum distance for each trip is estimated to be 3 miles along urban two-lane roads. The 22nd Chemical Battalion will use radios or cellular telephones to communicate during ground transportation operations. Truck speed will be limited to 25 miles per hour.

3. HAZARD ANALYSIS

To aid in the evaluation of identified hazards, potential incident and accident scenarios have been defined and RACs have been assigned in accordance with the *System Safety Management Plan for the Non-Stockpile Chemical Materiel Product* (PMCD, 2001). The RACs are based on a combination of hazard severity categories and hazard probability (or frequency of occurrence) categories. The RAC matrix is shown in table A-1, and the definitions of the hazard severity and hazard probability are listed in tables A-2 and A-3.

Paragraphs 3.1 through 3.3 of this annex describe scenarios that can result in hazardous conditions, the controls that are in place to mitigate each hazard, and recommendations that will reduce either the severity of a hazard or the probability that it will occur. Each hazard is assigned two RAC values. A basic RAC is assigned without accounting for accident prevention measures, while a controlled RAC takes into account efforts to mitigate either the probability that the hazard will result in an accident, or the severity of the accident should one occur. Both the initial RAC assigned and a controlled RAC are reported in attachment A-1, table A-1-1. RAC 1 and RAC 2 hazards require corrective action before any recovery work is started. A RAC 3 hazard represents that the operation can be conducted safely. However, reasonable efforts to reduce accident probability or severity must be implemented even when these efforts produce a controlled RAC that is still a 3. RAC 3 hazards can be accepted as is, after appropriate review by the Program Manager for Elimination of Chemical Weapons Risk Management Directorate.

Accident scenarios were considered for handling operations involving movement from the recovery site to the IHF and for storage of the recovered material in the IHF.

Table A-1. Risk Assessment Codes (RACs)

Frequency of Occurrence	Consequence Category			
	I Catastrophic	II Critical	III Marginal	IV Negligible
A – Frequent	1	1	1	3
B – Probable	1	1	2	3
C – Occasional	1	2	3	4
D – Remote	2	2	3	4
E – Improbable	3	3	3	4

Hazard Risk Index	Risk Assessment Code	Action Required
IA, IB, IC, IIA, IIB, IIIA	1	Unacceptable – immediate corrective action required. Asst. Sec. Army Decision.
ID, IIC, IID, IIIB	2	Undesirable – reduced priority, corrective action required. Product Manager for Non-Stockpile Chemical Materiel decision.
IE, IIE, IIIC, IIID, IIIE, IVA, IVB	3	Acceptable – low priority for corrective action (may not warrant action). System Safety Program Manager decision.
IVC, IVD, IVE	4	Acceptable – no corrective action required.

Source: *System Safety Management Plan for the Non-Stockpile Chemical Materiel Product* (PMCD, 2001)

Table A-2. Hazard Severity Categories

Description	Category	Mishap Definition
Catastrophic	I	May cause death, system loss, or severe environmental damage.
Critical	II	May cause severe injury, severe occupational illness, or major system or environmental damage.
Marginal	III	May cause minor injury, minor occupational illness, or minor system or environmental damage.
Negligible	IV	May cause less than minor injury, occupational illness, or less than minor system or environmental damage.

Source: *System Safety Management Plan for the Non-Stockpile Chemical Materiel Product* (PMCD, 2001)

Table A-3. Hazard Probability Categories

Frequency of Occurrence	Level	Description
Frequent	A	Will be continuously experienced.
Probable	B	Will occur frequently in the life of the system.
Occasional	C	Will occur several times in the life of the system.
Remote	D	Unlikely, but can reasonably be expected to occur in the life of the system.
Improbable	E	Unlikely, but possible to occur in the life of the system.

Source: *System Safety Management Plan for the Non-Stockpile Chemical Materiel Product* (PMCD, 2001)

3.1 Hazards During Handling

3.1.1 Improper Handling of Decontaminants. Decontaminants are available onsite for use during contingency operations. The possible decontaminants are listed in table 4-2 of Army Technical Manual (TM) 60A-1-1-11 as follows:

a. Supertropical bleach
b. Decontaminating solution DS2
c. Sodium hydroxide (caustic soda)
d. Calcium hypochlorite
e. Sodium carbonate (washing soda)
f. Sodium hydroxide in alcohol-water solution (alcoholic caustic solution).

Most of these materials are hazardous chemicals and require special handling. Exposure of workers may occur during the mixing of decontaminants, or containers may be broken during handling, exposing workers to health hazards. Chemical injury is considered to be of remote likelihood (category D), but critical severity (category II), resulting in a RAC 2 (IID). TM 60A-1-1-11 specifies the use of PPE to reduce personnel exposure while mixing decontaminants. 22nd Chemical Battalion personnel shall be trained in proper mixing techniques and in the selection and donning of PPE. Implementation of these mitigators results in an event judged to be critical (hazard severity II) and improbable (likelihood category E). Therefore, a controlled RAC 3 ranking is assigned.

3.1.2 Dropping of an Overpack. One event that may occur during handling is the dropping of an MRC during loading or unloading operations. Before an overpack is selected for this operation, drop testing will be performed to ensure that there is little chance of an overpack being breached by the short drop that could occur during loading or unloading operations. If dropping an overpack results in the carboy breaking, the agent would be absorbed by the cushioning material. This hazard is judged to be catastrophic (hazard severity I), but such an event is judged to be improbable (likelihood category E). Therefore, a RAC 3 is assigned. To alleviate some of the possible

dangers that could occur from dropping an overpack, it is recommended that workers minimize handling to reduce the likelihood of a drop and use proper equipment to handle the overpacks. Implementation of this mitigation results in a controlled RAC 3 and an event judged to be improbable (likelihood category E).

3.1.3 Drop Multiple Round Container with Detonation. A handling accident with an MRC containing an armed munition could result in detonation of the burster in the munition and release of chemical agent. This event would be catastrophic (severity category I) and is considered to be of remote frequency (category D), resulting in a RAC 2 (ID). The likelihood of such an accident can be reduced if munitions are x-rayed to determine if they are safe to move. Only munitions safe to move will be transported. The hazard can also be mitigated by handling the munitions as few times as possible, thus reducing the potential for a handling accident. Implementation of these mitigations will reduce the frequency to improbable (category E) for a controlled RAC 3 (IE).

3.1.4 Physical Hazards and Pinching Injuries. Physical hazards that do not involve the release of agent also exist. The most likely physical injuries to workers are back injuries from lifting heavy objects, foot injuries from dropping objects, injuries from tripping and falling, or a situation where a worker is caught between two objects (pinch points) or between a vehicle and a stationary object.

a. *Improper Lifting.* Improper lifting injuries are judged to be critical (hazard severity II), but such an event is judged to be remote (likelihood category D). Therefore, a RAC 2 ranking is assigned. Workers should be given training in proper lifting techniques to avoid back injuries. Mechanical lifting aids should be used when necessary. Implementation of this mitigator allows assignment of a controlled RAC 3 and a likelihood category E for this physical hazard.

b. *Pinching Injuries.* Pinching hazards are considered to be of remote likelihood, but critical severity, resulting in a RAC 2. Workers should wear leather gloves to reduce the severity of injuries to hands caused by

pinching between containers, and workers should wear safety shoes to reduce injuries in the event that an overpack is dropped. Implementation of these mitigators results in a controlled RAC 3 for pinching hazards.

c. *Pinning Injuries.* Workers will be transporting overpacks between the recovery site and the IHF. The possibility of a worker being pinned between a transport vehicle and a stationary object has a remote likelihood and a critical severity resulting in a RAC 2. This type of accident can be reduced by using ground guides, using a backup alarm on the truck, and not allowing vehicles to be driven within 5 feet of the IHF. Implementation of these mitigators results in a controlled RAC 3 for pinning hazards with an improbable likelihood (category E).

d. *Tripping/Falling.* Tripping and falling injuries are judged to be critical (hazard severity II), but such an event is judged to be remote (likelihood category D). Therefore, a RAC 2 ranking is assigned. Overpacks should be stored in the appropriate place. Overpacks and other materials should not be placed in aisles. Implementation of these mitigators allows assignment of a controlled RAC 3 and a likelihood category E (an improbable event) for tripping and falling injuries.

3.2 Hazards During Storage

3.2.1 Earthquake or Severe Weather. During storage, the IHF could be damaged by natural phenomena such as earthquakes or severe weather. Because of the structural rigidity of the overpacks, release of the CWM is unlikely even if the IHF is damaged. Release of CWM as a result of an earthquake or severe weather is judged to have catastrophic consequences (hazard severity I) and to be improbable (likelihood category E), resulting in a RAC 3 ranking. The overpacks will not be stacked while in storage to ensure that the containers do not fall in case of an earthquake. The controlled RAC remains a 3 (IE).

3.2.2 Fire Adjacent to the IHF. The effect of a fire outside the IHF is judged to be critical (hazard severity II) and such an event is judged to be remote (likelihood category D), resulting in a RAC 2 ranking. The IHF has a fire suppression system. It is recommended that a firebreak be maintained around the IHF, and that fire extinguishers be available at all times. Implementation of this mitigation can lead to an event judged to be marginal (hazard severity III) with a remote probability of occurrence (likelihood category D), resulting in a controlled RAC 3.

3.2.3 Lightning. The possibility of lightning striking the IHF should also be considered. This could result in a fire, which could damage overpack seals, rupture CWM containers, and release agent. Lightning striking the IHF is considered to be catastrophic (severity category I), but improbable (likelihood category E), giving this event a RAC 3. Lightning protection will be provided on the IHF which will reduce the probability of lightning starting a fire. However the controlled RAC remains a 3 (IE).

3.2.4 Leak of Improperly Sealed Overpack. Liquid leaks from the containers are possible but unlikely. The consequences of an overpack leak or rupture during storage are judged to be critical (hazard severity II), but such an event is judged to be improbable (likelihood category E), resulting in a RAC 3. Any significant vapor leaks would be detected by low-level, near real-time (NRT) monitoring equipment before entry into the IHF. If a leak from an overpack is detected, 22nd Chemical Battalion personnel are trained for spill response and know how to safely handle a leaking overpack. These mitigators further reduce the probability of accidental exposure to agent, though the controlled RAC remains a 3 (IIE).

3.2.5 Aircraft Crashes. Although there are not any airports in the immediate vicinity, the possibility of an aircraft crash into the IHF site must be considered. The crash of an aircraft into the IHF would be expected to result in release of CWM from containment. If a fire resulted from the aircraft fuel, the small quantities of CWM that may be released and not consumed in the fire would be rapidly volatilized and transported to over 200 feet in the air. The resulting dispersion of this elevated release would not present a threat to people on the ground and was assigned a severity of III, marginal. The

likelihood of this scenario occurring is considered improbable because of the relatively short duration of storage, less than six months, and was assigned a probability of E, improbable. This results in a RAC 3 (IIIE).

3.3 Hazards During Transportation

3.3.1 Earthquake. There is the possibility that an earthquake could occur during transportation, which could cause excessive bumping of the truck, resulting in damage to the overpack and possible leakage of agent. Leakage of agent outside of engineering controls is considered a category I accident. However, due to the low level of seismic activity of the area, the probability of an earthquake during transport is considered improbable (category E). The resulting RAC is a 3. It is recommended that containers not be stacked during transport, to prevent toppling. Implementation of this mitigation does not lower the RAC, however, it does reduce the risk of an overpack toppling during transport. Speed is limited during transport. The ruggedness of the overpacks will be demonstrated by drop testing to ensure they would provide protection in case of an earthquake.

3.3.2 Leak or Rupture of Overpack. The possibility of an overpack leaking during truck transportation should be considered. This event would result in a slow agent release. This event is judged to be critical, category II, but is considered improbable. This event is assigned a RAC 3. Implementation of low-level, NRT monitoring of CWM prior to loading in the overpack(s) and inspection and verification that overpack(s) are not leaking will result in reduction of severity to marginal, category III. This results in a controlled RAC 3.

3.3.3 Lightning Strike. The possibility of lightning striking the truck should be considered. This could result in a fuel fire, which could breach the overpack and release agent. Lightning striking the vehicle is considered improbable, giving this event a RAC 3. It is recommended that transport occur only during clear weather; however, the controlled RAC remains a 3 (IE).

3.3.4 Single or Multi-Vehicle Accident. The cargo truck transporting the RCWM could have an accident. The truck could be involved in a single-vehicle accident or a multi-vehicle accident, either of which could result in damage to the overpack(s) and leaking of agent. Leakage of agent during a motor vehicle accident is considered a severity category I accident, but since the probability of such an accident along the route taken is considered improbable, the resulting RAC is a 3. The accident probability of 2.60×10^{-6} (see attachment A-2) gives credit for an experienced driver, driving in clear weather, use of escort vehicles, intersection closures, and preventive maintenance on the truck. The resulting controlled RAC remains a 3 (IE).

A summary of the hazards identified, along with the RACs assigned, is given in table A-4.

4. MAXIMUM CREDIBLE EVENT

The maximum credible event (MCE) is a dropped 75mm round that leaks 1 percent of its contents, releasing 0.0135 pound (6,123 milligrams) of HD over a 10 minute period. The D2PC computer program (Whitacre et al., 1987) modified for Spring Valley (D2SV) estimated downwind chemical agent hazard distances and was used to estimate hazard distances for the IHF MCE. The model was run using the following meteorological conditions for Spring Valley (summertime, 95°F, wind 1 meter per second, stability D, response time 10 minutes). This produced a 1 percent lethality distance of 3 meters, a no deaths hazard distance of 4 meters, and a no effects hazard distance of 54 meters. The D2SV analysis is found in attachment A-3.

5. MITIGATION OF HAZARDS

Throughout the report, as possible events and mishaps have been described, mitigating actions have been recommended. Table A-1-1 in attachment A-1 contains: (1) a summary of the handling, transportation, and storage events; (2) possible incidents; and (3) hazards associated with the incidents. In addition, the following paragraphs provide

Table A-4. Assigned RACs for Postulated Accident Scenarios

Item	Accident Scenario	RAC	Controlled RAC
	Hazards During Handling		
1	Improper handling of decontaminants results in personal injury.	2	3
2	Dropping of overpack during handling results in agent release.	3	3
3	Explosion of an armed munition while positioning an MRC	2	3
4	Improper lifting of overpack(s) results in back injury.	2	3
5	Improper handling of overpack results in pinching injury.	2	3
6	Truck pins worker against stationary object and results in pinching injury.	2	3
7	Tripping/falling injury.	2	3
	Hazards During Storage		
8	Earthquake or severe weather damages IHF, overpack(s), and causes agent release.	3	3
9	Fire in area adjacent to IHF causes agent release.	2	3
10	Lightning strike on IHF causes fire and agent release.	3	3
11	Leaking of overpacked CWM container with improper sealing of overpack.	3	3
12	Aircraft crashes into IHF.	3	3
	Hazards During Transportation		
13	Earthquake or severe weather damages overpack(s) and causes agent release.	3	3
14	Leaking of overpacked CWM container with improperly sealed overpack.	3	3
15	Lightning strike on truck causes fuel fire and agent release.	3	3
16	Truck accident causes damage to overpack(s) and agent release.	3	3

Notes:

CWM = chemical warfare materiel
IHF = interim holding facility
MRC = multiple round container
RAC = risk assessment code

specific information on how to mitigate hazards associated with handling, transporting, and storing CWM.

When handling CWM, workers shall minimize the handling of overpacks to reduce the likelihood of dropping one and reduce the possibility of injury. Workers shall wear work gloves, safety shoes, and use proper lifting techniques and lifting mechanisms. 22nd Chemical Battalion personnel shall be trained in proper handling techniques and in the use of PPE. Implementation of these mitigations can reduce both the severity and likelihood of hazard conditions that can occur.

When transporting CWM by truck, low-level NRT monitoring of CWM shall be performed prior to loading CWM into an overpack, containers shall not be stacked, and bracing and tie-downs shall be used to secure overpacks on the truck. The speed of the vehicle shall be limited to 25 miles per hour. Implementation of these mitigations can reduce both the severity and likelihood of hazard conditions that can occur.

During storage, containers shall not be stacked inside the IHF, low-level NRT monitoring of CWM shall be performed, and MRCs shall not be stored in aisles. Lightning protection shall be provided on the IHF, a fire break shall be maintained around the IHF, and fire extinguishers shall be available at all times. Implementation of these mitigations can reduce both the severity and likelihood of hazard conditions that can occur.

Emergency response plans require 22nd Chemical Battalion personnel to be onsite during recovery and during entry into the IHF. 22nd Chemical Battalion personnel are trained in spill response procedures for the chemical agents involved. The use of PPE will protect 22nd Chemical Battalion workers from hazards resulting from release of agent. Radios and/or telephones will be available in case of an accident.

First entry monitoring using low-level NRT monitors, and a visual inspection of the overpacks reduces the probability of leaks occurring and prohibits workers from unknowingly entering an Immediately Dangerous to Life and Health contaminated area.

6. SUMMARY

An HA has been performed to evaluate the risk potential of transporting CWM and storing it at the IHF on federal property in northwest Washington, D.C. Mishaps were identified from the concept of operations and from historical information for Spring Valley and RACs were assigned. The transportation risk of 2.60×10^{-7} was categorized as improbable though catastrophic consequences could result yielding a RAC 3. Based upon assessment of hazards associated with this Plan, the MCE was identified as a 75mm round that leaks 0.0135 pounds of HD. The location of the IHF is acceptable for the recovery operation and hazards can be controlled if the identified mitigations are implemented. Previous Spring Valley operations have used this area for the IHF facility without mishap or reportable incident.

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ATTACHMENT A-1
HAZARD CONTROL LOG WORKSHEETS

Table A-1-1. Spring Valley IHF Hazards

Item	Hazardous Condition	Cause	Effect	RAC	Recommendation	Resolution	Controlled RAC[a]	Remarks
1	Chemical injury	Improper handling of decontamination chemicals	Personal injury	2 (IID)	Train personnel in proper handling of decontaminants and in use of PPE.	Personnel will be trained in proper handling of decontaminants and in use of PPE.	3 (IIE)	
2	Uncontrolled agent release	Overpack is dropped during handling.	Overpack seal damaged and CWM container ruptures, releasing agent.	3 (IE)	Minimize handling of overpacks to reduce the likelihood of dropping one.	Handling of overpacks will be minimized to reduce the likelihood of dropping one.	3 (IE)	Overpacks will be tested to show the ability to withstand drops in various orientations without loss of seal.
3	Uncontrolled release of hazardous chemicals with detonation	Explosion of an armed munition resulting from improper handling of an MRC	Release of chemical agent	2(ID)	Minimize handling of MRCs.	Munitions will be x-rayed to determine the condition of the explosive train.	3(IE)	
4	Back injury	Improper lifting of overpack	Personal injury	2 (IID)	Use proper lifting techniques and mechanical assistance.	Proper lifting techniques and mechanical assistance will be used.	3 (IIE)	
5	Pinching injury	Overpack is dropped on foot. Hand is caught between two objects.	Personal injury	2 (IID)	Require workers to wear safety shoes and gloves.	Workers will wear safety shoes and gloves.	3 (IIID)	

Table A-1-1. Spring Valley IHF Hazards (Continued)

Item	Hazardous Condition	Cause	Effect	RAC	Recommendation	Resolution	Controlled RAC[a]	Remarks
6	Pinning injury	Worker caught between truck and IHF	Personal injury	2 (ID)	Use ground guides when backing the truck near the IHF. Do not allow truck to be driven within five feet of the IHF. Install backup alarms on trucks.	Ground guides will be used when backing the truck near the IHF.	3 (IE)	
7	Tripping/ falling injury	Insufficient aisle space inside IHF	Personal injury	2 (IID)	Do not store overpacks in aisles. Do not place materials other than CWM in the IHF. Maintain 36-inch aisle spacing. Perform housekeeping inspections.	Overpacks will not be stored in aisles. No material other than CWM will be stored in the IHF. 36-inch aisle will be maintained. Housekeeping inspections will be performed.	3 (IIE)	
8	Uncontrolled agent release	Earthquake or severe weather	Damaged overpack seals and ruptured CWM container result in agent release.	3 (IE)	To prevent toppling, do not stack containers inside the IHF. Maintain 36-inch aisle spacing.	Containers will not be stacked inside IHF. 36-inch aisle will be maintained.	3 (IE)	Overpacks will be tested to show the ability to withstand drops in various orientations without loss of seal.

Table A-1-1. Spring Valley IHF Hazards (Continued)

Item	Hazardous Condition	Cause	Effect	RAC	Recommendation	Resolution	Controlled RAC[a]	Remarks
9	Fire	Fire adjacent to the IHF	Damaged overpack seals and ruptured CWM container result in release of agent.	2 (IID)	Maintain fire break around IHF. Have fire extinguishers available at all times.	Area around IHF will be cleared of brush on all sides. Fire extinguishers will be available at all times and IHF has a fire suppression system.	3 (IIID)	Agent not expected to be released in the event of fire. Damage to IHF considered marginal.
10	Fire	Lightning strike	Damaged overpack seals and ruptured CWM container result in release of agent.	3 (IE)	Provide lightning protection on IHF. Do not store flammable or combustible material in IHF.	Lightning protection is provided. No flammable or combustible material other than CWM will be stored in the IHF.	3 (IE)	
11	Slow chemical agent release	Container leaks, and overpack is improperly sealed.	Agent release	3 (IIE)	Do low-level monitoring of overpacks after they are sealed. Do first entry monitoring of IHF.	Overpacks will be monitored when first sealed and before placement in the IHF. First entry monitoring will be conducted each time IHF is opened.	3 (IIE)	
12	Agent release	Aircraft crash into IHF	Release to environment, personal injury	3 (IIIE)			3 (IIIE)	
13	Uncontrolled agent release	Earthquake or severe weather	Overpack seals damaged and CWM container ruptured resulting in agent release	3 (IE)	To prevent toppling, do not stack container. Use bracing and tie-downs to secure overpack(s) to truck.	Containers will not be stacked. Bracing and tie-downs will be used.	3 (IE)	

Table A-1-1. Spring Valley IHF Hazards (Continued)

Item	Hazardous Condition	Cause	Effect	RAC	Recommendation	Resolution	Controlled RAC[a]	Remarks
14	Slow agent release	Container leaks, and overpack is improperly sealed.	Agent release	3 (IIE)	Perform low-level NRT monitoring of CWM prior to loading in overpack. Inspect CWM for leakage and verify to be decontaminated/sealed as necessary prior to loading in an overpack.	Low-level, NRT first entry monitoring will be performed. CWM will be inspected for leaks and verified to be decontaminated and sealed before being placed in overpack.	3 (IIIE)	
15	Truck accident	Lightning strikes truck.	Breaching of overpack(s) resulting in agent release	3 (IE)	Use bracing and tie-down straps to secure overpack(s) to truck.	Bracing and tie-down straps will be used to secure overpack(s) to truck bed.	3 (IE)	
16	Truck accident	One or multi-vehicle collision	Breaching of overpack(s) resulting in agent release	3 (IE)	Limit speed of truck to 25 miles per hour. Use escort vehicle.	Truck speed limited to 25 miles per hour. Escort vehicle will be used.	3 (IIIE)	

Note:

RAC = risk assessment code (See tables A-1 through A-3 for explanation of what the RACs mean and how they are derived.)

ATTACHMENT A-2

DERIVATION OF TRUCK ACCIDENT RATES

ATTACHMENT A-2
DERIVATION OF TRUCK ACCIDENT RATES

This attachment presents a derivation of truck accident rates for the specific road types to be used for transporting CWM approximately 3 miles to the IHF located on federal property near the intersection of Loughboro Road and Dalecarlia Parkway. These accident rates are derived by modifying published highway truck accident rate data to account for situation-specific factors. The modifications are made on the basis of the analyst's judgment and supplementary accident data. This approach is taken because the published highway truck accident rates reflect average conditions—generally less stringent controls on traffic, speed, driver training, and other factors than will be the case for CWM transport. A similar analysis approach has previously been used for CWM transport and successfully defended (Rhyne et al., 1985 and 1988).

The truck accident rate data used as a basis for this analysis are described in paragraph A-2.1. An analysis of the factors that affect accident rates and development of adjusted rates for use in this HA are presented in paragraph A-2.2. In paragraph A-2.3, the adjusted accident rates are coupled with mileage estimates for the chosen transport route to estimate the probability of a truck accident during the movement of CWM.

A-2.1 Truck Accident Rates By Highway Class

Truck accident rates have been compiled as a function of road type and surrounding population by various researchers since the early 1980s. The most widely cited values are those published by Harwood and Russell (1990). These rates are presented in table A-2-1. More recently published data were reviewed for this analysis; however, the Harwood and Russell data are judged to be the best available. The "base" accident rate used in this analysis is the value for two-lane, urban roads, 8.66×10^{-6} accidents per mile. This road type is most similar to the type of road that makes up the chosen CWM transport route.

Table A-2-1. Truck Accident Rates by Highway Class

Highway Class		Truck Accident Rate (accidents/mile)
Area Type	Roadway Type	
Rural	Two-lane	2.19×10^{-6}
Rural	Multilane, undivided	4.49×10^{-6}
Rural	Multilane, divided	2.15×10^{-6}
Rural	Freeway	6.40×10^{-7}
Urban	Two-lane	8.66×10^{-6}
Urban	Multilane, undivided	1.39×10^{-5}
Urban	Multilane, divided	1.25×10^{-5}
Urban	One-way street	9.70×10^{-6}
Urban	Freeway	2.18×10^{-6}

Source: Harwood and Russell (1990)

A-2.2 Modification of Accident Rates

A partial listing of the factors that are believed to affect truck accident rates is shown in table A-2-2 (Harwood and Russell, 1990). Data are lacking to correlate accident rate with most of these factors. In addition, some of these factors (for example, time of day and type of truck) are constant for the chosen ground transportation route. The effects of such “global” factors on accident rates are discussed in paragraph A-2.2.1.

Factors that are specific to certain portions of the route are discussed separately in paragraph A-2.2.2.

Table A-2-2. Partial Listing of Factors Considered to Affect Truck Accident Rates

Truck Type or Configuration	Highway
Number of trailers	Function
Number of axles on tractor/trailer(s)	Access control
Cab type	Number of lanes
Cargo area configuration	Lane width
	Shoulder width
Truck Size and Weight	Shoulder surface
Width of trailer	Median width
Length, overall	Horizontal alignment
Length, trailer(s)	Vertical alignment
Empty/loaded	Surface condition (wet/dry/etc.)
Weight, gross	Pavement condition
Weight, trailer	Pavement type
Truck Operations	Traffic
Cargo type	Volume (average daily traffic)
Operator type	Volume (day/night)
Trip type	Percent trucks
Truck Driver	Environment
Age	Visibility
Experience with rig	Weather
Hours of service	Light
Driver condition	
	Temporal Factors
Location	Month/season of year
State	Day of week
Urban/rural	Time of day

Source: Harwood and Russell (1990)

A-2.2.1 Global Factors. Fractional distributions of truck accidents by type are shown in table A-2-3 for the average conditions reflected in the published accident rates (column 2). Modified distributions that reflect the effects of various administrative controls and physical factors are also presented in this table (columns 3 to 6). The modified fractional distributions shown in the table reflect the cumulative effect of the listed factors, moving from left to right across the table. For example, the distribution shown for operation-specific factors also includes the effects of safe drivers. The effects of these administrative controls and physical factors on the accident type distribution and on accident rate are described in the following paragraphs.

Effects of Safe Drivers. 22nd Chemical Battalion personnel who will operate the cargo trucks and escort vehicles are certified as being proficient. They have SECRET security clearances and have passed a physical examination as required by the Motor Carrier Safety Regulations. Their training includes en route procedures, accountability, load limitations, vehicle maintenance standards, and cargo-specific handling procedures. Before movement of any CWM, 22nd Chemical Battalion personnel ensure that the vehicle maintenance documentation is current, inspect the transportation documentation, and inspect the loading of the CWM cargo. Each vehicle will have a driver and one assistant. The 22nd Chemical Battalion Officer in Charge has the responsibility of ensuring that both are alert. The distance between vehicles will be at least one car length for each 10 miles per hour of vehicle speed. Truck speed should be limited to 25 miles per hour.

The 22nd Chemical Battalion safety practices are at least as sound as those of commercial trucking firms that emphasize a good safety culture. Trucking firms that strongly emphasize safety can achieve a factor of 10 reduction in accident rate (Anonymous, 1990; Anonymous, 1994; Wilson, 1990; U.S. Congress, Office of Technology Assessment, 1988). Truck drivers who reduce their overall accident rate do so primarily by reducing the number of accidents for which they are at fault and to a lesser extent by lowering the accident rates of other truck and car drivers by driving defensively. A driver has much more control over single-vehicle accidents than

Table A-2-3. Truck Accident Type Distributions

Tractor-Trailer Accident Type	Fractional Distribution				
	Base Case	With Safe Drivers Considered	With Operation-Specific Factors Considered	With Escort Considered	With Road Closure Considered
Noncollision					
• Ran off road	0.062	0.00062	0.00012	0.00008	0.00008
• Jackknife	0.077	0.00077	0.00000	0.00000	0.00000
• Overturn	0.072	0.00072	0.00014	0.00009	0.00009
• Separation of units	0.004	0.00004	0.00000	0.00000	0.00000
• Fire	0.006	0.00006	0.00001	0.00001	0.00001
• Other	0.009	0.00009	0.00002	0.00001	0.00001
Collision					
• Fixed object	0.114	0.00114	0.00023	0.00015	0.00015
• Parked vehicle	0.093	0.00093	0.00019	0.00013	0.00013
• Train	0.005	0.00005	0.00000	0.00000	0.00000
• Nonmotorist (e.g., pedestrian)	0.015	0.00015	0.00000	0.00000	0.00000
• Other	0.034	0.00034	0.00007	0.00005	0.00005
Multiple-Vehicle Accidents					
• Head-on collision	0.015	0.00280	0.00056	0.00028	0.00002
• Rear-end collision	0.133	0.02490	0.00498	0.00249	0.00025
• Sideswipe	0.185	0.03460	0.00692	0.00346	0.00017
• Angle	0.103	0.01930	0.00386	0.00193	0.00010
• Other	0.070	0.01310	0.00262	0.00131	0.00006
TOTAL	0.997	0.09960	0.01972	0.00999	0.00102
Net Reduction Factor	1	10	50	100	977

[a] Source: Harwood and Russell (1990)

multiple vehicle accidents; safe drivers cannot always prevent other drivers from causing multiple-vehicle accidents.

The second column of table A-2-3 shows the fractional distribution of accident types for average truck drivers, and the third column of this table shows the estimated distribution of accident types for safe drivers (that is, those who achieve a factor of 10 reduction in accident rate). Because safe driving practices are most effective in lowering the rate of single-vehicle accidents, the distribution in the third column was obtained by
(1) lowering the fraction of single-vehicle accident types by a factor of 100 and
(2) lowering the fractions of multiple-vehicle accident types such that the overall accident rate reduction factor is 10, as reported in the literature. Mathematically, this procedure is expressed as follows:

$$\frac{A}{100} + \frac{B}{X} = \frac{0.997}{10}$$

where

A = Fraction of single-vehicle accidents
B = Fraction of multiple-vehicle accidents
X = Reduction factor to be determined for multiple-vehicle accidents.

Values of A and B are obtained from the second column of table A-2-3. Application of this model yields an accident rate reduction factor of 5.34 for multiple-vehicle accidents.

Effects of Operation-Specific Factors. The following factors are expected to produce an additional factor of 5 reduction in accident rate for all accident types.

- Transport of CWM will only occur in good weather.

- Transport of CWM will only occur during daylight hours.

- Trips will be short, which will minimize boredom and fatigue.

- Line-of-sight conditions along the chosen route will be excellent.

- Drivers of vehicles with CWM cargo will be expected to be even more cautious than typical safe commercial truck drivers.

- The 22nd Chemical Battalion management is more effective than the management of the average trucking firm.

The net result of these considerations is an additional factor of 5 reduction in accident rate. The combination of safe drivers and these operation-specific factors can be expected to reduce the accident rate by a factor of 50 below the published value for two-lane, urban roads.

Effects of Escorting the Cargo Truck. An escort vehicle will precede the cargo truck during ground transportation of CWM. The escort vehicle is expected to be marked with warning signs. Oncoming traffic will not be stopped, and same-direction passing will not be prohibited. The presence of the escort vehicle will alert drivers of other vehicles, thus reducing the rate of multiple-vehicle collisions by a factor of at least 2. The escort vehicle will also reinforce safe driving requirements on the driver of the cargo vehicle; therefore, the rate of single-vehicle collisions is expected to be reduced by an additional factor of 1.5. The overall effect of escorting on the estimated accident rate is a factor of 2 reduction above the reductions achieved by safe driving and operation-specific factors. The cumulative effect of the global factors (safe drivers, operation-specific factors, and escorting) is then a factor of 100 reduction in accident rate, leading to a modified rate of 8.66×10^{-8} accidents per mile.

Effects of Closing Roads. Closing the roads to other traffic would further reduce the expected accident rate by approximately a factor of 10. However, since road closure is not planned for this project, the cumulative effect of the global factors (safe drivers,

operation-specific factors, and escorting) remains at a modified rate of 8.66×10^{-8} accidents per mile.

A-2.2.2 Route Segment-Specific Factors. The ground transportation routes to the IHF are all two-lane, urban. As discussed previously, the effect of safe drivers, operation-specific factors, and escorting reduces the accident yield by a factor of 100, yielding a modified rate of 8.66×10^{-8} accidents per mile. The accident rate will not increase or decrease based upon local factors and will remain at 8.66×10^{-8}.

A-2.3 Summary

The modified accident rate for the transport route is shown in table A-2-4 along with the total distance and number of trips. The product of accident rate (accidents per mile) times distance times number of trips yields the probability of experiencing an accident during this project.

Table A-2-4. Modified Accident Rate and Accident Probability for Ground Transportation Route

Route Segment	Accident Rate (per mile)	Segment Length (miles)	Number of Trips	Accident Probability
Recovery site to IHF	8.66×10^{-8}	3	1	2.6×10^{-7}

Note:

IHF = Interim Holding Facility

ATTACHMENT A-3
D2SV ANALYSIS

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              ------------------------------
              ¦ DOWNWIND HAZARD PROGRAM D2PC ¦
              ¦ SPRING VALLEY VERSION        ¦
              ------------------------------
    TYPE ? FOR DEFINITIONS

 1. YOUR NOVICE LEVEL: 3,2,1 OR 0 NOV
 INPUT:0

 2. LOCATION                        LOC
 INPUT:EWA

 3. SEASON                          SEA
 INPUT:SUM

 5. MUNITION TYPE                   MUN
 INPUT:NON

 6. AGENT TYPE                      AGN
 INPUT:HD

 8. RELEASE TYPE                    REL
 INPUT:SEM

 9. STABILITY TYPE                  STB
 INPUT:D

10. WINDSPEED (M/SEC)               WND
 INPUT:1
BRT=25. DI=     2.0   100.0   150.0

13. Q(>(MG), TQ(>(MIN)
 INPUT:6123 10
ALL OTHER INPUT
NDI 2
 INPUT: DI(>S  (ASCENDING)
2 6
ALL OTHER INPUT
ALL


   1 MUN:NON  AGN:HD  REL:SEM  WND= 1.0(M/S)  TMP=  .0(C)  EWA-SUM STB:D

   Q(MG)   TS(MIN)  HTS(M)   HML(M)   SXS(M)   SYS(M)   SZS(M)
6.123E+03 1.00E+01  .00E+00 5.25E+02  .00E+00  .00E+00  .00E+00  D

       15. (M) IS DISTANCE TO   .600E+01 (MG-MIN/M^3)

       29. (M) IS DISTANCE TO   .200E+01 (MG-MIN/M^3)


      NOTE: RESULTS HAVE BEEN REDUCED BY A FACTOR
            OF ~2 TO ACCOUNT FOR COMPLEX TERRAIN

ALL OTHER INPUT
STB F
ALL
 2. LOCATION                        LOC  EWA
 3. SEASON                          SEA  SUM
 5. MUNITION TYPE                   MUN  NON
 6. AGENT TYPE                      AGN  HD
 8. RELEASE TYPE                    REL  SEM
 9. STABILITY TYPE                  STB  F
10. WINDSPEED (M/SEC)               WND      1.00
BRT=25. DI=     2.0   100.0   150.0
13. Q(>(MG), TQ(>(MIN)              6.123E+03 1.000E+01

ALL OTHER INPUT
ALL
```

```
D:\MYDOCU~1\D2SV.EXE

   1 MUN:NON  AGN:HD  REL:SEM  WND= 1.0(M/S)  TMP=  .0(C)  EWA-SUM STB:F

   Q(MG)   TS(MIN)  HTS(M)   HML(M)   SXS(M)   SYS(M)   SZS(M)
6.123E+03 1.00E+01  .00E+00 2.10E+02  .00E+00  .00E+00  .00E+00  F

        3. (M) IS DISTANCE TO 1% LETHALITY


        4. (M) IS DISTANCE TO NO DEATHS


       54. (M) IS DISTANCE TO NO EFFECTS


      NOTE: RESULTS HAVE BEEN REDUCED BY A FACTOR
            OF ~2 TO ACCOUNT FOR COMPLEX TERRAIN

ALL OTHER INPUT
NDI 2
 INPUT: DI()S  (ASCENDING)
2 6
ALL OTHER INPUT
ALL


   1 MUN:NON  AGN:HD  REL:SEM  WND= 1.0(M/S)  TMP=  .0(C)  EWA-SUM STB:F

   Q(MG)   TS(MIN)  HTS(M)   HML(M)   SXS(M)   SYS(M)   SZS(M)
6.123E+03 1.00E+01  .00E+00 2.10E+02  .00E+00  .00E+00  .00E+00  F

       25. (M) IS DISTANCE TO   .600E+01 (MG-MIN/M^3)

       54. (M) IS DISTANCE TO   .200E+01 (MG-MIN/M^3)


      NOTE: RESULTS HAVE BEEN REDUCED BY A FACTOR
            OF ~2 TO ACCOUNT FOR COMPLEX TERRAIN

ALL OTHER INPUT
```

ANNEX B

CHEMICAL AND PHYSICAL DATA

ANNEX B

CHEMICAL AND PHYSICAL DATA

Table B-1. Chemical and Physical Properties of Chemicals of Concern

Chemical Name	Levinstein Mustard (H) 70% bis (2-Chloroethyl) sulfide 30% Higher Molecular Weight Polysulfides	Distilled Mustard (HD/HS) Diethyl,2,2-dichloride sulfide [Bis (2-chloroethyl) sulfide]	Arsine (SA) Arsenic trihydride	Lewisite (L) Dichloro (2-chlorovinyl) arsine	Chloropicrin (PS)
Chemical Formula	$C_4H_8Cl_2S$	$C_4H_8Cl_2S$	AsH_3	$C_2H_2AsCl_3$	Cl_3CNO_2
Molecular Weight	159.08 (pure mustard)	159.08	77.95	207.32	164.38
Physical State	Amber to brown oily liquid	Pale yellow oily liquid	Colorless gas	Colorless to brownish liquid	Slightly oily liquid
Vapor Density (relative to air)	Generally exceeds 5.5	5.5	2.7	7.2	5.6
Liquid Density	1.27 g/mL at 25°C	1.27 g/mL at 20°C	1.667 g/mL at -75°C	1.89 g/mL at 20°C	1.66 g/mL at 20°C
Solid Density	N/A	Crystal, 1.37 g/cm^3 at 0°C	N/A	N/A	N/A
Normal Freezing Point	8°C	14.45°C	-116.9°C	-18°C ± 0.1°C based on purity	-69.2°C
Boiling Point	Decomposes at about 180°C	217°C extrapolated	-62.2°C extrapolated	190°C	112°C
Vapor Pressure	Impurities tend to lower vapor pressure below 0.11 mm Hg	0.11 mm Hg at 25°C	400 mm Hg at -75°C	0.394 mm Hg at 20°C	18.3 mm Hg at 20°C
Volatility	Approximately 920 mg/m^3 at 25°C (reported for HD)	610 mg/m^3 at 20°C 920 mg/m^3 at 25°C	2.55 x 10^6 at -75°C	4,480 mg/m^3 at 20°C	165,000 mg/m^3 at 20°C
Viscosity	3.95 centistokes at 25°C (HD)	3.95 centistokes at 25°C	N/A	2.05 centipoise at 77°F	N/A
Solubility	0.092 g/100 g H_2O at 22°C; completely soluble in acetone, CCL_4, CH_3Cl tetrachloroethane, ethyl benzoate, and ether. Completely soluble in 92.5% ethanol above 28.6°C	0.092 g/100 g H_2O at 22°C; completely soluble in acetone, CCL_4, CH_3Cl tetrachloroethane, ethyl benzoate, and ether. Completely soluble in 92.5% ethanol above 28.6°C	0.028 g/100 g H_2O at 20°C	Insoluble in water and dilute mineral acids. Soluble in organic solvents and oils. Miscible with other chemical warfare agents	Insoluble in water. Soluble in organic solvents, liquid organophosphorus compounds, mustards, phosgene, diphosgene, and Cl_2.

Table B-1. Chemical and Physical Properties of Chemicals of Concern (Continued)

Chemical Name	Levinstein Mustard (H) 70% bis (2-Chloroethyl) sulfide 30% Higher Molecular Weight Polysulfides	Distilled Mustard (HD/HS) Diethyl,2,2-dichloride sulfide [Bis (2-chloroethyl) sulfide]	Arsine (SA) Arsenic trihydride	Lewisite (L) Dichloro (2-chlorovinyl) arsine	Chloropicrin (PS)
Heat of Combustion	4,500 cal/g	756.03 kcal/mole		N/A	N/A
Latent Heat of Vaporization	94 cal/g	94 cal/g	4.17 kcal/mol	58 cal/g	57.3 cal/g
Latent Heat of Fusion	26.5 cal/g	26.5 cal/g		Unknown	N/A
Special Properties					
Flash Point	105°C	105°C (Can be ignited by large explosive charges)	Flammable; forms explosive mixtures with air	Does not flash	Not flammable, but with strong ignition-heated material in confinement will detonate.
DOT Classification	Poison A	Poison A	Poison Gas, Flammable Gas	Poison A	Poison A
Corrosivity	Brass rapidly corroded. Cast iron poor.	Brass rapidly corroded at 65°C; 0.0001 inches/month at 65°C on steel		None if dry	If dry, has little or no effect on metals
Decontaminants	Bleaching powder, sodium hypochlorite	Bleaching powder, sodium hypochlorite, fire	Ventilation	Bleach powder, sodium hypochlorite, fire, caustic soda	Large amounts of water or rinse with 5% solution of bisulfite
Stabilizers Commonly Used	Can be stabilized with acridine or naphthoquinoline	Can be stabilized with acridine or naphthoquinoline	N/A		

Notes:

cal/g = calorie per gram
DOT = Department of Transportation
g = gram
g/cm^3 = gram per cubic centimeter
g/mL = gram per milliliter
kcal = kilocalorie
mg/m^3 = milligram per cubic meter
mm Hg = millimeters of mercury
N/A = not available

ANNEX C

MATERIAL SAFETY DATA SHEETS

ANNEX C
MATERIAL SAFETY DATA SHEETS

The following pages provide examples of Material Safety Data Sheets (MSDSs) for the chemical agents discussed in this document. Preference was given to Department of the Army data sheets prepared by the Edgewood Chemical Biological Center (formerly known as Edgewood Research, Development and Engineering Center). MSDSs for HD and L can be seen at www.sbccom.apgea.army.mil/RDA/msds.

H (Levinstein Mustard) - Department of the Army, Special Report EO-SR-74001, Chemical Agent Data Sheets, Volume 1, pp. 29 through 31, December 1974.

HD/HS (Distilled Sulfur Mustard) - Edgewood Chemical Biological Center, Material Safety Data Sheet, Revised 16 March 2006.

L (Lewisite) - Edgewood Chemical Biological Center, Material Safety Data Sheet, Revised 15 March 2006.

PS (Chloropicrin) - U.S. Department of Health and Human Services, September 1978.

SA (Arsine) - ATMI, Inc., 3 November 2003.

CG (Phosgene) - ChemWatch Pty Ltd., 30 March 2001.

CK (Cyanogen Chloride) - IPCS CEC, 1993.

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Material Safety Data Sheet

Distilled Mustard (HD)

Revised: 15 March 2006

Section I - General Information

Manufacturer's Address:
U.S. Army Edgewood Chemical Biological Center (ECBC)
ATTN: AMSRD-ECB-CB-CR
Aberdeen Proving Ground, MD 21010-5424
Business Phone: 410-436-4411 or 4414, Monday through Friday during the hours of 8:00 AM to 4:30 PM EDT

CAS Registry Number: 505-60-2

Chemical Name: Bis- (2-chloroethyl) sulfide

Trade name and synonyms:
H; HD; HS
Mustard Gas
Sulfur mustard; Sulphur mustard gas
Sulfide, bis (2-chloroethyl)
Bis (beta-chloroethyl) sulfide
1,1'-thiobis(2-chloroethane)
1-chloro-2 (beta-chloroethylthio) ethane
Beta, beta'-dichlorodiethyl sulfide
2,2'dichlorodiethyl sulfide
Di-2-chloroethyl sulfideBeta, beta'-dichloroethyl sulfide
2,2'-dichloroethyl sulfide
EA 1033
Iprit
Kampstoff "Lost"; Lost
S-Lost; S-yperite; Schewefel-lost
Senfgas
Yellow Cross Liquid
Yperite;Y

Chemical Family: Chlorinated sulfur compound

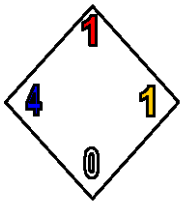
Molecular Formula and Structural Formula:

$C_4 H_8 Cl_2 S$

$ClCH_2CH_2SCH_2CH_2Cl$

NFPA 704 Signal:

Health - 4
Flammability - 1
Reactivity - 1
Special - 0



Section II - Ingredients

Ingredients/Name: Sulfur Mustard
Percentage by Weight: 100%

Section III - Physical Data

Boiling Point: 218 ºC (424.4 ºF); at atmospheric pressure HD starts to decompose below the boiling point.

Vapor Pressure (torr): 0.106 @ 25 ºC

Vapor Density (relative to air): 5.5

Solubility: HD is practically insoluble in water; solubility of HD in distilled water is 0.92 g HD/100 g @ 22 ºC. HD is freely soluble in fats and oils, gasoline, kerosene, most organic solvents and chemical warfare agents.

Specific Gravity (H_20=1): 1.27 @ 25 ºC

Freezing/Melting Point (ºC): 14.45 ºC

Liquid Density (g/mL): 1.2685 g/mL @ 25 ºC

Volatility (mg/m^3): 906 @ 25 ºC

Viscosity (Centipoise): 5.175 @ 20 ºC

Molecular Weight: 159.07

Appearance and Odor: Pale yellow to dark brown oily liquid; colorless when pure. Garlic-like or horseradish odor.

Section IV - Fire and Explosion Data

Flashpoint: 105 ºC

Flammability Limits (% by volume): Unknown

Extinguishing Media: Water, fog, foam and CO_2. Avoid use of extinguishing methods that will cause splashing or spreading of HD.

Special Fire Fighting Procedures: All persons not engaged in extinguishing the fire should be immediately evacuated from the area. Fires involving HD should be contained to prevent contamination to uncontrolled areas. When responding to a fire alarm in buildings or areas containing agents, fire-fighting personnel should wear full firefighter protective clothing (flame resistant) during chemical agent fire-fighting and fire rescue operations. Respiratory protection is required. Positive pressure, full facepiece, NIOSH-approved self-contained breathing apparatus (SCBA) will be worn where there is danger of oxygen deficiency and when directed by the fire chief or chemical accident/incident (CAI) operations officer. In cases where fire fighters are responding to a chemical accident/incident for rescue/reconnaissance purposes they will wear appropriate levels of protective clothing (See Section VIII).

Do not breathe fumes. Skin contact with agent must be avoided at all times. Although the fire may destroy most of the agent, care must still betaken to assure the agent or contaminated liquids do not further contaminate other areas or sewers. Contact with the agent liquid or vapor can be fatal.

Section V - Health Hazard Data

Airborne Exposure Limits (AEL) [2]:

Worker Population Limit (WPL) 8-hr TWA [1] mg/m^3	STEL 15-min TWA [1] mg/m^3	IDLH [1] mg/m^3	General Population Limit (GPL) 12-hr TWA [1] mg/m^3
0.0004	0.003	0.7	0.00002

[1] These values can be found in the DA, Office of the Assistant Secretary, Installations and Environment memo, subject: Implementation Guidance Policy for New Airborne Exposures Limits for GB, GA, GD, GF, VX, H, HD, and HT, 18 June 2004.
[2] To date, the Occupational Safety and Health Administration (OSHA) have not promulgated a permissible exposure concentration for HD.

Routes of Entry: The routes of entry for mustard agents are inhalation and ingestion, as well as eye and skin contact.

Effects Of Exposure: HD is a vesicant (causing blisters) and alkylating agent producing cytotoxic action on the hematopoietic (blood-forming) tissues, which are especially sensitive. The rate of detoxification of HD in the body is very slow and repeated exposures produce a cumulative effect.

HD is a human carcinogen as cited by the International Agency for Research on Cancer (IARC). HD has also been shown to be mutagenic in animals.

Signs and Symptoms: The acute signs and symptoms following mustard exposure are not immediate; they are delayed in appearance. The duration of the latent period and the degree of injury are both dependent on the severity of exposure as well as organs affected. The delay of onset is dose-dependent and may range from hours to days. The latency period for ocular (eye) effects is shorter than that for other tissues.

Mild eye exposure symptoms to mustard include inflammation, conjunctivitis possibly with lacrimation, grittiness in the eye, and erythema (reddening) of the lids and conjunctiva. Severe symptoms include photophobia, blepharospasm, pain, corneal erosion, iritis, conjunctival vascularization, ulceration and corneal opacification (blindness).

Skin exposure to mustard vapor is marked by delayed appearance. Mild symptoms include erythema, edema, itching, burning and pain. Severe symptoms include vesication or blisters. Liquid mustard exposure on skin may

result in an area of gray-white necrotic skin surrounded by erythema and vesication.

Inhalation of mustard vapor causes damage primarily to the nasopharygeal, larygeal and tracheobronchial mucosa. Respiratory symptoms to mustard vapor vary in degree of onset and intensity related to the degree of exposure. Mild symptoms to the airway include hoarseness, inflammation of the respiratory mucosa, congestion, coughing and edema. Severe symptoms include necrosis, sloughing of the mucosa and chemical pneumonia. Repeated exposures or prolonged inhalation can cause bronchiectasis or chronic bronchitis.

Gastrointestinal symptoms of intense mustard exposure include nausea and vomiting.

Like other alkylating agents, systemic absorption results in injury to the bone marrow, lymph nodes, and spleen producing leukopenia and thrombocytopenia. Other systemic effects include: fever; CNS depression; bradycardia or cardiac irregularities; hemoconcentration; and shock.

Chronic Exposure: Chronic mustard-induced illnesses are most common in the eyes, skin, respiratory track or bone marrow. Delayed, recurrent keratoconjunctivitis of the eyes has been documented in some cases as long as 45 years from original exposure. Healing of mustard blisters may result in skin exfoliation and areas of hypo- or hyperpigmentation. Exposure can cause chronic lung impairment (productive cough, shortness of breath, chest pain, frequent pulmonary infections and bronchitis). Prolonged human exposure has been associated with cancer of the tongue, paranasal sinus, larynx, bronchus, lung, and mediastinum (cavity between the right and left lung). Tumors observed have been of squamous (scale like) or undifferentiated (alterated) cell types. Consider the possibility of skin cancer because of the frequency of this lesion in animal studies. Since sulfur mustard agent is similar in its effects to nitrogen mustard, which has been associated with human leukemia, this disease might also be expected to occur in humans chronically exposed to mustard.

Toxicity Values:

Vapor (Inhalation/Ocular)[1]
ECt50 (Mild) = 25 mg-min/m^3
ECt50 (Severe)[2] = 100 mg-min/m^3 {3}
LCt50 = 1000 mg-min/m^3

Vapor (Percutaneous)[4,5]
ECt50 (Mild) = 50 mg-min/m^3
ECt50 (Severe)[2] = 500 mg-min/m^3
LCt50 = 10000 mg-min/m^3

Liquid (Percutaneous)
ED50 = 600 mg/70 kg man
LD50 = 1400 mg/70 kg man

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[1] Estimates for inhalation vapor exposure are based on a minute volume (MV) of 15 liters. The exposure time is 2 minutes. The concentration-time profile for lethality is described by the toxic load model ($C^n t=k$). The toxic load exponent (n) for lethality is 1.5.
[2] Based on ocular (eye) effects.
[3] Recent analysis of archival human data has indicated that this value may be 75 mg-min/m^3.
[4] Personnel are masked.
[5] Values for percutaneous vapor are for moderate temperatures (85 °F and below). The effective dosages for hot temperatures (85 °F and above) will be less by at least a factor of 2.

Emergency And First Aid Procedures:

Prior to rendering first aid, take steps for self protection such as donning a protective mask and other protective equipment. **Immediately** remove individual from contaminated area. Decontaminate the individual as indicated

below.

Vapor Exposure: Vapor-exposed mustard agent casualties should be decontaminated by removing all clothing in a clean air environment and shampooing or rinsing the hair to prevent vapor off-gassing.

Liquid Exposure: Wash the skin surface and hair in warm or hot water at least three times. The rapid physical removal of a chemical agent is essential. Scrubbing of exposed skin with a stiff brush or bristles is discouraged, because skin damage may occur and may increase absorption of agent. Use liquid soap (dispose of container after use and replace), copious amounts of water, and mild to moderate friction with a single-use sponge or washcloth in the first and second washes. The third wash should be a rinse with copious amounts of warm or hot water. Shampoo can be used to wash the hair. If warm or hot water is not available, but cold water is, use cold water. Do not delay decontamination to obtain warm water. Two permissible alternative skin decontaminants include the M291 Skin Decontaminating Kit (SDK) and a 0.5% sodium hypochlorite solution. (**NOTE:** The use of the M291 SDK and/or 0.5% sodium hypochlorite on skin is appropriate in situations where soap and water may not be as efficacious in physically removing particular types of mustard agents, such as those used in certain research and development laboratories. Neither soap and water, 0.5% sodium hypochlorite or the M291 SDK have been shown to be more efficacious than the other for physically removing every type of mustard agent from the skin.) If used, the 0.5% sodium hypochlorite should be applied with mild to moderate friction, with a single-use sponge or washcloth in the first and second washes. The third wash should be a rinse to remove any residual sodium hypochlorite with copious amounts of warm or hot water.

Eye Contact: Immediately leave area of contamination and begin flushing eyes, mucous membranes, or open wounds with sterile saline or water. Flush the eyes **Immediately** with sterile saline or water by tilting the head to the side, pulling the eyelids apart with gloved fingers and pouring slowly into the eyes. A Morgan lens may also be used for continuous eye irrigation.

Ingestion: Do not induce vomiting. First symptoms are likely to be gastrointestinal. Seek medical attention **Immediately. Do not handle vomited material to avoid further contamination.**

Inhalation: If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. Mouth-to-mouth resuscitation should be used when approved mask-bag or oxygen delivery systems are not available. Do not use mouth-to-mouth resuscitation when facial contamination is present. Seek medical attention **Immediately**.

NOTE: The Office of the Surgeon General is responsible the medical guidance provided in this MSDS. Questions concerning medical guidance provided in the this MSDS may be addressed to HQDA (DASG-PPM-NC), 5109 Leesburg Pike, Falls Church, VA 22041-3258.

Section VI - Reactivity Data

Stability: A small amount of degradation occurs when stored in steel containers for over 50 years. This degradation appears to be caused by the formation of solid deposits "heels" comprised of a six membered ring cyclic sulfonium ion {1-(2-chloroethyl)-1, 4-dithianium chloride}, HD and Fe, which are detected at the bottom of containers.

Decomposition Temperature: 180 ºC

Rate of Hydrolysis: HD on or under water undergoes hydrolysis only if dissolved. The rate of HD hydrolysis is controlled by the rate of mass transfer and is very slow.

Hydrolysis Products: Hydrogen chloride, thiodiglycol and sulfonium ion aggregates one of which is also very toxic.

Action on Metals and Other Materials: Very little when pure. The corrosion rate of HD on steel is 0.0001 in./month @ 65 °C using munitions grade HD.

Hazardous Polymerization: Does not occur.

Section VII - Spill, Leak, And Disposal Procedures

Steps To Be Taken In Case Material Is Released Or Spilled: Only personnel in full protective clothing (See Section VIII) will be allowed in an area where HD is spilled. See Section V for emergency and first aid instructions.

Recommended Field Procedures: The HD should be contained using vermiculite, diatomaceous earth, clay or fine sand and neutralized as soon as possible using copious amounts of nominal 5% sodium hypochlorite solution. Scoop up all material and place in an approved DOT container. Cover the contents with decontaminating solution as above. The exterior of the container will be decontaminated and labeled according to EPA and DOT regulations. All leaking containers will be over packed with sorbent (e.g. vermiculite) placed between the interior and exterior containers. Decontaminate and label according to EPA and DOT regulations. Dispose of the material in accordance with waste disposal methods provided below. Conduct general area monitoring with an approved monitor to confirm that the atmospheric concentrations do not exceed the STEL (See Sections V and VIII).

If 5% sodium hypochlorite solution is not available then the following decontaminants may be used instead and are listed in the order of preference: **Calcium Hypochlorite and Super Tropical Bleach Slurry (STB).

****WARNING:** DO NOT USE PURE SOLID, UNDILUTED CALCIUM HYPOCHLORITE (HTH); it will BURN UPON CONTACT with liquid mustard.

Leaking munitions should be processed in accordance with established chemical demilitarization SOPs, see "DA Pam 385-61, Toxic Chemical Agent Safety Standards".

Recommended Laboratory Procedures: Use a minimum of 65 grams of decontamination solution for each gram of HD. Allow 24 hours for decontamination to take place. Agitate solution at least one hour. Agitation is not necessary after the first hour. Test for presence of active chorine by use of acidic potassium iodide solution to give free iodine color. Adjust the resulting solution pH to between 10 and 11.

Place three millileters (ml) of decontaminated solution in a test tube. Add several crystals of potassium iodine and swirl to dissolve. Add 3 ml of 50 wt.% sulfuric acid: water and swirl. Immediate iodine color shows the presence of active chlorine. If negative, add additional decontaminate to the decontaminated solution, wait two hours and test again for active chlorine. This works for either 5.5% sodium hypochlorite or 10% calcium hypochlorite decontamination solutions. Scoop up all materials and clothing and place in an approved DOT container. The exterior of the container will be decontaminated and labeled according to EPA and DOT regulations. All leaking containers will be over packed with sorbent (e.g. vermiculite) placed between the interior and exterior containers. Decontaminate and label according to EPA and DOT regulations. Dispose of contents according to Federal, state and local regulations. Conduct general area monitoring with an approved monitor to confirm that the atmospheric concentrations do not exceed the STEL (See Sections V and VIII).

NOTE: Surfaces contaminated with HD, then rinsed and decontaminated may evolve sufficient HD vapor to produce a physiological response. HD on laboratory glassware may be oxidized by its vigorous reaction with concentrated nitric acid.

Waste Disposal Method: Open pit burning or burying of HD or items containing or contaminated with HD in any quantity is prohibited. Waste HD and associated decontamination solutions may be Resource Conservation and Recovery Act (RCRA) regulated hazardous wastes due to a State listing of the chemical agent, or the characteristics of the waste, to include contaminates. An evaluation of the Federal and State waste disposal regulations must be

conducted to determine the appropriate disposal method.

Section VIII - Special Protection Information

Exposure Limits for Respiratory Protection for HD:

Unprotected Workers:

Concentration (mg/m^3)	Time Limits
Less than or equal to 0.0004[1]	8 hours
Up to or less than 0.0016	2 hours[2]

Protected Workers:

Type of Respiratory Protection Worn (based on air monitoring results):

1. M40 Military Mask, CBRN NIOSH Approved Full Face Air Purifying Respirator

Concentration (mg/m^3)	Time Limits
$\leq$ 0.003	Time limit will be kept at a minimum to perform the operation, and will be dictated by the local Heat Stress Program for personal protective equipment and clothing[3]

2. Pressure Demand Supplied Air Respirator with Full Face Respirator

Concentration (mg/m^3)	Time Limits[4]
0.0004 to 0.7[5]	Time limit will be kept at a minimum to perform the operation, and will be dictated by the local Heat Stress Program for personal protective equipment and clothing.

3. Pressure Demand Supplied Air Respirator with Full Face Respirator in combination with an Auxiliary Self-contained Breathing Apparatus (SCBA) or just SCBA

Concentration (mg/m3)	Time Limits[4]
Greater than 0.7	These concentrations should be expected only in emergency situations. Operations should not be conducted at these concentrations.

[1] As an 8-hr TWA average.
[2] Maximum continuous time at this concentration. Equivalent to 8-hr TWA. Source: Implementation Guidance Policy for Revised Airborne Limits for GB, GA, GD, GF, VX, H, HD, and HT, Dept of Army, Office of the Assistant Secretary of the Army Installations and Environment, 18 June 2004. See Table 5.
[3] The M40 mask may be used for escape from environments containing concentrations above the STEL. The M40 mask may used for routine entry with real-time monitoring for the STEL and historical monitoring for the WPL. The M40 mask will not be used for routine protection above the STEL or in the absence of WPL monitoring.

[4] For SCBA wearers, time limit is constrained by life of the air cylinder (maximum of 30 to 45 minutes). For Air Supply wearers, time limits should be kept to a minimum. Should use of the auxiliary SCBA be necessary, time limit will be constrained by the life of the breathing air cylinder, and egress from the area must be performed before its expiration.
[5] The Immediately Dangerous to Life and Health Value.

Ventilation

Local Exhaust: Mandatory. Must be filtered or scrubbed to limit exit concentrations. Air emissions shall meet local, state and federal regulations.

Special: Chemical laboratory hoods will have an average inward face velocity of 100 linear feet per minute (lfpm) +/- 20% with the velocity at any point not deviating from the average face velocity by more than 20%. Existing laboratory hoods will have an inward face velocity of 150 lfpm +/- 20%. Laboratory hoods will be located such that cross drafts do not exceed 20% of the inward face velocity. A visual performance test using smoke producing devices will be performed in assessing the ability of the hood to contain agent HD.

Other: Recirculation of exhaust air from agent areas is prohibited. No connection between agent area and other areas through the ventilation system is permitted. Emergency backup power is necessary. Hoods should be tested semiannually or after modification or maintenance operations. Operations should be performed 20 centimeters inside hoods.

Protective Gloves: Butyl Rubber gloves M3 and M4
Norton, Chemical Protective Glove Set

Eye Protection: As a minimum, safety glasses with side shields will be worn. For splash hazards use goggles and face shield. Maintain eyewash facilities in work area.

Other Protective Equipment: For laboratory operations, wear lab coats, gloves and have mask readily accessible. In addition, daily clean smocks, foot covers, and head covers will be required when handling contaminated lab animals. In the case of a spill, the minimum protective clothing should be Level B after the site has been evaluated, otherwise Level A.

Monitoring: Available monitoring equipment for agent HD is the M8/M9 detector paper, blue band tube, M256/M256A1 kits, bubbler, Depot Area Air Monitoring System (DAAMS), Automated Continuous Air Monitoring System (ACAMS), CAM-M1, Hydrogen Flame Photometric Emission Detector (HYFED), the Miniature Chemical Agent Monitor (MINICAM), and Real Time Analytical Platform (RTAP). Real-time, low-level monitors (with alarm) are required for HD operations. In their absence, an Immediately Dangerous to Life and Health (IDLH) atmosphere must be presumed. Laboratory operations conducted in appropriately maintained and alarmed engineering controls require only periodic low-level monitoring.

Section IX - Special Precautions

Precautions To Be Taken In Handling and Storing: When handling agents, the buddy system will be incorporated. No smoking, eating, or drinking in areas containing agents is permitted. Containers should be periodically inspected for leaks, (either visually or using a detector kit). Stringent control over all personnel practices must be exercised. Decontaminating equipment will be conveniently located. Exits must be designed to permit rapid evacuation. Chemical showers, eyewash stations, and personal cleanliness facilities must be provided. Wash hands before meals and, as appropriate, shower thoroughly with special attention given to hair, face, neck, and hands using plenty of soap and water before leaving at the end of the workday.

Other Precautions: HD should be stored in containers made of glass for Research, Development, Test and Evaluation (RDTE) quantities or one-ton steel containers for large quantities. Agent containers will be stored in a single containment system with in a laboratory hood or in double containment system.

For additional information see "AR 385-61, The Army Toxic Chemical Agent Safety Program," "DA Pam 385-61, Toxic Chemical Agent Safety Standards," and "DA Pam 40-173, Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Mustard Agents H, HD, and HT"; and DA Implementation Guidance Policy for New Airborne Exposures Limits for GB, GA, GD, GF, VX, H, HD, and HT dated 18 June 2004.

Section X - Transportation Data

NOTE: Forbidden for transport other than via military (Technical Escort Unit) transport according to 49 CFR Part 173.7(b), DOD 4500.9-R and AR 50-6.

Proper Shipping Name: Toxic liquids, organic, n.o.s. (Bis- (2-chloroethyl) sulfide)

UN ID Number: UN2810

DOT Hazard Class: 6.1, Packing Group I, Inhalation Hazard Zone A

DOT Label: Poison Inhalation Hazard or Toxic Inhalation Hazard. See 49 CFR 172.400a(a)(3) for exceptions to unit packaging labeling and 173.7(b) for other exceptions when material is transported by Technical Escort Units.

NOTE: "Poison" and "Toxic" are used interchangeably for all markings, labels and placards in continental US transportation. "Toxic" is required for international transportation.

DOT Marking: Toxic liquids, organic, n.o.s. (Bis- (2-chloroethyl) sulfide) UN 2810, Inhalation Hazard Zone A

DOT Placard: Poison Inhalation Hazard or Toxic Inhalation Hazard

Emergency Accident Precautions and Procedures: See Sections IV, VII and VIII.

Precautions To Be Taken In Transportation: Motor vehicles will be placarded regardless of quantity. Drivers will be given full information regarding shipment and conditions in case of an emergency. AR 50-6 deals specifically with the shipment of chemical agents.

The Edgewood Chemical Biological Center (ECBC), Department of the Army believes that the data contained herein are actual and are the results of the tests conducted by ECBC experts. The data are not to be taken as a warranty or representation for which the Department of the Army or ECBC assumes legal responsibility. They are offered solely for consideration. Any use of this data and information contained in this MSDS must be determined by the user to be in accordance with applicable Federal, State, and local laws and regulations.

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Material Safety Data Sheet

Lewisite (L)

Revised: 15 March 2006

Section I - General Information

Manufacturer's Address:
U.S. Army Edgewood Chemical Biological Center (ECBC)
ATTN: AMSRD-ECB-CB-CR
Aberdeen Proving Ground, MD 21010-5424
Business Phone: 410-436-4411 or 4414, Monday through Friday during the hours of 8:00 AM to 4:30 PM EDT

CAS Registry Number: 541-25-3

Chemical Name: Dichloro- (2-chlorovinyl) arsine

Trade name and synonyms:
Arsine, (2-chlorovinyl) dichloro-
Arsonous dichloride, (2-chloroethenyl)
Chlorovinylarsine dichloride
2-Chlorovinyldichloroarsine
Beta-Chlorovinyldichloroarsine
Lewisite
L
EA 1034

Chemical Family: Arsenical (vesicant)

Molecular Formula and Chemical Structure:
$C_2 H_2 As Cl_3$

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                Cl
                /
Cl CH = CH - As
                \
                 Cl
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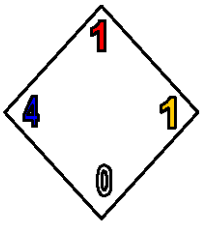
NFPA 704 Signal:

Health - 4
Flammability - 1
Reactivity - 1
Special - 0



Section II - Ingredients

Ingredients/Name: Lewisite
Percentage by Weight: 100%

Section III - Physical Data

Boiling Point: 196 °C (384.8 °F)

Vapor Pressure (torr): 34.6 @ 25 °C

Vapor Density (relative to air): 7.1

Solubility: Lewisite on contact with water or moist surfaces immediately hydrolyzes to form lewisite oxide (solid), which dissolves very slowly in water. Readily soluble in common organic solvents, oils and chemical warfare agents.

Specific Gravity (H_20=1): 1.891 @ 20 °C

Freezing/Melting Point (°C): -44.7 to -1.8 °C (Depending on purity)

Liquid Density (g/mL): 1.8793 @ 25 °C

Volatility (mg/m^3): 3,860 @ 25 °C; 330 @ 0 °C

Viscosity (CENTIPOISE): 2.257 @ 20 °C

Molecular Weight (g/mol): 207.32

Appearance And Odor: Brown liquid; colorless when pure. A characteristic odor is usually geranium-like; odorless when pure.

Section IV - Fire and Explosion Data

Flashpoint: Nonflammable

Flammability Limits (% by volume): Not Applicable

Extinguishing Media: Water, fog, foam and CO_2. Avoid use of extinguishing methods that will cause splashing or spreading of L.

Special Fire Fighting Procedures: All persons not engaged in extinguishing the fire should be immediately evacuated from the area. Fires involving L should be contained to prevent contamination to uncontrolled areas. When responding to a fire alarm in buildings or areas containing agents, fire-fighting personnel should wear full firefighter protective clothing (flame resistant) during chemical agent fire-fighting and fire rescue operations. Respiratory protection is required. Positive pressure, full facepiece, NIOSH-approved self-contained breathing apparatus (SCBA) will be worn where there is danger of oxygen deficiency and when directed by the fire chief or chemical accident/incident (CAI) operations officer. In cases where firefighters are responding to a chemical accident/incident for rescue/reconnaissance purposes they will wear appropriate levels of protective clothing (See Section VIII).

Do not breathe fumes. Skin contact with agent must be avoided at all times. Although the fire may destroy most of the agent, care must still betaken to assure the agent or contaminated liquids do not further contaminate other areas or sewers. Contact with the agent liquid or vapor can be fatal.

Unusual Fire and Explosion Hazards: None known

Section V - Health Hazard Data

Airborne Exposure Limit (AEL): The permissible airborne exposure concentration of L for an 8-hour workday or a 40-hour workweek is an 8-hour time weighted average (TWA) of 0.003 mg/m^3 as a ceiling value. A ceiling value may not be exceeded at anytime. The ceiling value for Lewisite is based upon the present technologically feasible detection limits of 0.003 mg/m^3. This value can be found in "DA Pam 40-173, Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Mustard H, HD, and HT." To date, however, the Occupational Safety and Health Administration (OSHA) have not promulgated permissible exposure concentration for L.

Routes of Entry: The routes of entry for L are inhalation and ingestion, as well as eye and skin contact.

Effects of Exposure: L is a vesicant (causing blisters). Also, it acts as a systemic poison, causing pulmonary edema, diarrhea, restlessness, weakness, subnormal temperature, and low blood pressure. L is not detoxified by the body.

L is generally considered a suspect carcinogen because of its arsenic content.

Signs and Symptoms: The acute signs and symptoms following L exposure are much quicker than exposure to mustard type agents. Contact to the skin with liquid L is immediately painful and is absorbed more promptly than mustard type agents. When inhaled in high concentrations, L may be fatal in as short a time as 10 minutes. Vapor exposure to the eye can cause blindness within 1 minute.

Mild ocular (eye) symptoms to L are thought to parallel those for HD and include immediate pain, inflammation, conjunctivitis possibly with lacrimation, grittiness in the eye, and erythema (reddening) of the lids and conjunctiva. Severe symptoms include blepharospasm, pain, corneal erosion, iritis, ulceration and blindness.

Skin exposure to L is marked by stinging pain which increase with severity over time. Mild symptoms include erythema, edema, itching, burning and pain. Severe symptoms include vesication or blisters. Erythema appears within 30 minutes after exposure accompanied by pain with itching and irritation for 24 hours. Blisters appear within 12 hours after exposure with more pain that diminishes after 2-3 days. Skin burns are much deeper than with mustard type agents.

Inhalation of L is irritating to nasal passages and produces a burning sensation followed by profuse nasal secretions and violent sneezing. Prolonged exposure causes coughing and production of large quantities of froth mucus. In experimental animals, injury to respiratory tracts, due to vapor exposure is similar to mustards; however, edema of the lung is more marked and frequently accompanied by pleural fluid.

Systemic Effects: L on the skin and inhaled vapor, cause systemic poisoning. A manifestation of this is a change in capillary permeability, which permit's loss of sufficient fluid from the bloodstream to cause hemoconcentration, shock and death. In nonfatal cases, hemolysis of erythrocytes has occurred with a resultant hemolytic anemia. The excretion of oxidized products into the bile by the liver produces focal necrosis of that organ, necrosis of the mucosa of the biliary passages with periobiliary hemorrhages, and some injury to the intestinal mucosa. Acute systematic poisoning from large skin burns cause's pulmonary edema, diarrhea restlessness, weakness, subnormal temperature, and low blood pressure in animals.

Chronic Exposure: Lewisite can cause sensitization and chronic lung impairment.

Toxicity Values[1]:

Vapor (Inhalation/Ocular)
ECt50 (Mild) = 25 mg-min/m^3
ECt50 (Severe)[2] = 75 mg-min/m^3
LCt50 = 1000 mg-min/m^3

Vapor (Percutaneous)[3,4]
ECt50 (Mild) = 50 mg-min/m^3
ECt50 (Severe)[2] = 500 mg-min/m^3
LCt50 = 5000 - 10000 mg-min/m^3

Liquid (Percutaneous)
ED50 = 600 mg/70 kg man
LD50 = 1400 mg/70 kg man

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[1] Data for L are limited and toxicity estimates are based upon HD, as applicable. Estimates for inhalation vapor exposure are based on a minute volume (MV) of 15 liters. The exposure time is 2 minutes. The concentration-time profiles are unknown.
[2] Based on ocular (eye) effects.
[3] Personnel are masked.
[4] Values for percutaneous vapor are for moderate temperatures (85 °F and below). The effective dosages for hot temperatures (85 °F and above) will be less by at least a factor of 2.

Emergency and First Aid Procedures:

Prior to rendering first aid, take steps for self protection such as donning a protective mask and other protective equipment. **Immediately** remove individual from contaminated area. Decontaminate the individual as indicated below.

Vapor Exposure: Vapor-exposed lewisite agent casualties should be decontaminated by removing all clothing in a clean air environment and shampooing or rinsing the hair to prevent vapor off-gassing.

Liquid Exposure: Wash the skin surface and hair in warm or hot water at least three times. The rapid physical removal of a chemical agent is essential. Scrubbing of exposed skin with a stiff brush or bristles is discouraged, because skin damage may occur and may increase absorption of agent. Use liquid soap (dispose of container after use and replace), copious amounts of water, and mild to moderate friction with a single-use sponge or washcloth in the first and second washes. The third wash should be a rinse with copious amounts of warm or hot water. Shampoo can be used to wash the hair. If warm or hot water is not available, but cold water is, use cold water. Do

not delay decontamination to obtain warm water. Two permissible alternative skin decontaminants include the M291 Skin Decontaminating Kit (SDK) and a 0.5% sodium hypochlorite solution. (**NOTE:** The use of the M291 SDK and/or 0.5% sodium hypochlorite on skin is appropriate in situations where soap and water may not be as efficacious in physically removing particular types of chemical agents, such as those used in certain research and development laboratories. Neither soap and water, 0.5% sodium hypochlorite or the M291 SDK have been shown to be more efficacious than the other for physically removing every type of chemical agent from the skin.) If used, the 0.5% sodium hypochlorite should be applied with mild to moderate friction, with a single-use sponge or washcloth in the first and second washes. The third wash should be a rinse to remove any residual sodium hypochlorite with copious amounts of warm or hot water.

Eye Contact: Immediately leave area of contamination and begin flushing eyes, mucous membranes, or open wounds with sterile saline or water. Flush the eyes **immediately** with sterile saline or water by tilting the head to the side, pulling the eyelids apart with gloved fingers and pouring slowly into the eyes. A Morgan lens may also be used for continuous eye irrigation.

Ingestion: Do not induce vomiting. First symptoms are likely to be gastrointestinal. Seek medical attention **Immediately. Do not handle vomited material to avoid further contamination.**

Inhalation: If breathing is difficult, administer oxygen. If breathing has stopped, give artificial respiration. Mouth-to-mouth resuscitation should be used when approved mask-bag or oxygen delivery systems are not available. Do not use mouth-to-mouth resuscitation when facial contamination is present. Seek medical attention **Immediately**.

NOTE: The Office of the Surgeon General is responsible the medical guidance provided in this MSDS. Questions concerning medical guidance provided in the this MSDS may be addressed to HQDA (DASG-PPM-NC), 5109 Leesburg Pike, Falls Church, VA 22041-3258.

Section VI - Reactivity Data

Stability: Fairly stable in glass and steel containers, but decomposes considerably upon denotation. Alkalis decompose L at ambient temperatures.

Decomposition Temperature: At 149 °C 0.5 % of L is destroyed and at 493 °C greater than 99.99% of L is destroyed.

Rate of Hydrolysis: Rapid.

Hydrolysis Products: 2-Chlorovinylarsonous acid (CVAA), 2-chlorovinylarsenious oxide (lewisite oxide) and hydrochloric acid.

Action on Metals and Other Materials: None if dry; corrosive penetration on steel is 0.00001 to 0.00005 in./month @ 65 °C. Extremely corrosive on aluminum and aluminum alloys.

Hazardous Polymerization: Does not occur.

Section VII - Spill, Leak, And Disposal Procedures

Steps To Be Taken In Case Material Is Released Or Spilled: If leaks or spills of L occur only personnel in full protective clothing will be allowed in the area (See Section VIII). See Section V for emergency and first aid instructions.

Recommended Field Procedures: Lewisite should be contained using vermiculite, diatomaceous earth, clay, or fine sand and neutralized as soon as possible using copious amounts of alcoholic caustic or carbonate. Caution must be exercised when using these decontaminates since acetylene will be given off. Household bleach can also be used if accompanied by stirring to allow contact. Scoop up all material and place in a DOT approved container. Cover the contents with decontaminating solution as above. After sealing, the exterior of the container will be decontaminated and labeled according to EPA and DOT regulations. All leaking containers will be over packed with sorbent (e.g. vermiculite) placed between the interior and exterior containers. Dispose of decontaminate according to Federal, state, and local laws. Conduct general area monitoring to confirm that the atmospheric concentrations do not exceed the airborne exposure limits (See Sections V and VIII).

Leaking munitions should be processed in accordance with established chemical demilitarization SOPs, see "DA Pam 385-61, Toxic Chemical Agent Safety Standards".

Recommended Laboratory Procedures: A 10 wt.% alcoholic sodium hydroxide solution is prepared by adding 100 grams of denatured ethanol to 900 grams of 10 wt.% NaOH in water. A minimum of 200 grams of decon is required for each gram of L. The decon and agent solution is agitated for a minimum of one hour. At the end of the hour the resulting pH should be checked and adjusted to above 11.5 using additional NaOH, if required. It is permitted to substitute 10 wt.% alcoholic sodium carbonate made and used in the same ratio as the NaOH listed above. Reaction time should be increased to 3-hours with agitation for the first hour. Final pH should be adjusted to above 10. Scoop up all material and place in an approved DOT container. Cover the contents with decontaminating solution as above. The exterior of the container will be decontaminated and labeled according to EPA and DOT regulations. All leaking containers will be over packed with sorbent (e.g. vermiculite) placed between the interior and exterior containers. Decontaminate and label according to EPA and DOT regulations. Dispose of the material in accordance with waste disposal methods provided below. Conduct general area monitoring with an approved monitor to confirm that the atmospheric concentrations do not exceed the airborne exposure limits (See Sections V and VIII).

It is permitted to substitute 5.25% sodium hypochlorite for the 10% alcoholic sodium hydroxide solution above. Allow one hour with agitation for the reaction. Adjustment of the pH is not required. Conduct general area monitoring to confirm that the atmospheric concentrations do not exceed the airborne exposure limit (See Section VIII).

Waste Disposal Method: Due to the arsenic content, all waste L, and associated decontamination solutions, should be disposed IAW the Resource Conservation Recovery Act (RCRA) regulations.

Section VIII - Special Protection Information

Concentration	Respiratory Protective Equipment
< 0.003 mg/m^3	A CBRN NIOSH approved full face piece, chemical canister air-purifying, protective masks will be on hand for escape. The M-40 series protective masks are acceptable for this use.
> or = 0.003 mg/m^3	CBRN NIOSH approved Air Supply Line with Full Face Respirator and Auxiliary Self-contained Breathing Apparatus (SCBA), or SCBA. (See DA Pam 386-61 for examples)

Ventilation

Local Exhaust: Mandatory. Must be filtered or scrubbed to limit exit concentrations. Air emissions shall meet local, state and federal regulations.

Special: Chemical laboratory hoods will have an average inward face velocity of 100 linear feet per minute (lfpm) +/- 20% with the velocity at any point not deviating from the average face velocity by more than 20%. Existing laboratory hoods will have an inward face velocity of 150-lfpm +/- 20%. Laboratory hoods will be located such that cross drafts do not exceed 20% of the inward face velocity. A visual performance test using smoke producing devices will be performed in assessing the ability of the hood to contain Lewisite.

Other: Recirculation of exhaust air from agent areas is prohibited. No connection between agent area and other areas through the ventilation system is permitted. Emergency backup power is necessary. Hoods should be tested semiannually or after modification or maintenance operations. Operations should be performed 20 centimeters inside hoods.

Protective Gloves: Butyl Rubber gloves M3 and M4
Norton, Chemical Protective Glove Set

Eye Protection: As a minimum, safety glasses with side shields will be worn. For splash hazards use goggles and face shield. Maintain eyewash facilities in work area.

Other Protective Equipment: For laboratory operations, wear lab coats, gloves and have mask readily accessible. In addition, daily clean smocks, foot covers, and head covers will be required when handling contaminated lab animals. In the case of a spill, the minimum protective clothing should be Level B after the site has been evaluated, otherwise Level A.

Monitoring: Available monitoring equipment for agent L is the M18A2 (yellow band), bubblers (arsenic and GC method), M256 and A1 Kits, and the Miniature Chemical Agent Monitor (MINICAM).

Real-time, low-level monitors (with alarm) are required for L operations. In their absence, an Immediately Dangerous to Life and Health (IDLH) atmosphere must be presumed. Laboratory operations conducted in appropriately maintained and alarmed engineering controls require only periodic low-level monitoring.

Section IX - Special Precautions

Precautions To Be Taken In Handling And Storing: When handling agents, the buddy system will be incorporated. No smoking, eating, or drinking in areas containing agents is permitted. Containers should be periodically inspected for leaks, (either visually or using a detector kit). Stringent control over all personnel practices must be exercised. Decontaminating equipment will be conveniently located. Exits must be designed to permit rapid evacuation. Chemical showers, eyewash stations, and personal cleanliness facilities must be provided. Wash hands before meals and shower thoroughly with special attention given to hair, face, neck, and hands using plenty of soap and water before leaving at the end of the workday.

Other Precautions: L should be stored in containers made of glass for Research, Development, Test and Evaluation (RDTE) quantities or one-ton steel containers for large quantities. Agent will be stored in a single containment system within a laboratory hood or in a double containment system.

For additional information see "AR 385-61, The Army Toxic Chemical Agent Safety Program," "DA Pam 385-61, Toxic Chemical Agent Safety Standards," and "DA Pam 40-173, Occupational Health Guidelines for the Evaluation and Control of Occupational Exposure to Mustard Agents H, HD, and HT"; and DA Implementation Guidance Policy for New Airborne Exposures Limits for GB, GA, GD, GF, VX, H, HD, and HT dated 18 June 2004.

Section X - Transportation Data

NOTE: Forbidden for transport other than via military (Technical Escort Unit) transport according to 49 CFR Part 173.7(b), DOD 4500.9-R and AR 50-6.

Proper Shipping Name: Toxic liquids, organic, n.o.s. (Dichloro- (2-chlorovinyl) arsine)

UN ID Number: UN2810

DOT Hazard Class: 6.1, Packing Group I, Inhalation Hazard Zone A

DOT Label: Poison Inhalation Hazard or Toxic Inhalation Hazard. See 49 CFR 172.400a(a)(3) for exceptions to unit packaging labeling and 173.7(b) for other exceptions when material is transported by Technical Escort Units.

NOTE: "Poison" and "Toxic" are used interchangeably for all markings, labels and placards in continental US transportation. "Toxic" is required for international transportation.

DOT Marking: Toxic liquids, organic, n.o.s. (Dichloro- (2-chlorovinyl) arsine) UN 2810, Inhalation Hazard Zone A

DOT Placard: Poison Inhalation Hazard or Toxic Inhalation Hazard

Emergency Accident Precautions And Procedures: See Sections IV, VII and VIII.

Precautions To Be Taken In Transportation: Motor vehicles will be placarded regardless of quantity. Drivers will be given full information regarding shipment and conditions in case of an emergency. AR 50-6 deals specifically with the shipment of chemical agents.

The Edgewood Chemical Biological Center (ECBC), Department of the Army believes that the data contained herein are actual and are the results of the tests conducted by ECBC experts. The data are not to be taken as a warranty or representation for which the Department of the Army or ECBC assumes legal responsibility. They are offered solely for consideration. Any use of this data and information contained in this MSDS must be determined by the user to be in accordance with applicable Federal, State, and local laws and regulations.

MATERIAL SAFETY DATA SHEET

Chloropicrin, 98+% (gc)
20104

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Chloropicrin, 98+% (gc)

Trichloronitromethane;nitrochloroform;
Company Identification: Acros Organics N.V.
One Reagent Lane
Fairlawn, NJ 07410
For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	EINECS#
76-06-2	Chloropicrin	98.0	200-930-9

Hazard Symbols: T+
Risk Phrases: 22 26 36/37/38

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: clear very faint yellow.
Danger! May cause digestive tract irritation. Lachrymator. Harmful if swallowed. Poison! May cause liver and kidney damage. Causes eye and skin irritation. Causes severe respiratory tract irritation. May cause pulmonary edema. May be fatal if inhaled.
Target Organs: Kidneys, liver, lungs.

Potential Health Effects

Eye:

Causes severe eye irritation. Lachrymator.

Skin:

Causes severe skin irritation.

Ingestion:

May cause irritation of the digestive tract.

Inhalation:

May cause asthmatic attacks due to allergic sensitization of the respiratory tract. May cause pulmonary edema and severe respiratory disturbances. Causes irritation of the mucous membranes.

Chronic:

Chronic inhalation may cause effects similar to those of acute inhalation.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:

Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids. Get medical aid immediately.

Skin:

Get medical aid. Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.

Ingestion:

If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation:

Get medical aid immediately. Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Notes to Physician:

Treat symptomatically.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.

Extinguishing Media:

Use water spray to cool fire-exposed containers. Water may be ineffective. In case of fire use water spray, dry chemical, carbon dioxide, or chemical foam.

Autoignition Temperature: Not available.

Flash Point: Not available.

NFPA Rating: Not published.

Explosion Limits, Lower: Not available.
Upper: Not available.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:

Absorb spill with inert material, (e.g., dry sand or earth), then place into a chemical waste container. Provide ventilation.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:

Wash thoroughly after handling. Avoid contact with eyes, skin, and clothing. Keep container tightly closed. Do not ingest or inhale. Use only in a chemical fume hood.

Storage:

Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:

Use only under a chemical fume hood.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Chloropicrin	0.1 ppm ; 0.67 mg/m3	0.1 ppm TWA; 0.7 mg/m3 TWA 2 ppm IDLH	0.1 ppm TWA; 0.7 mg/m3 TWA

OSHA Vacated PELs:

Chloropicrin:

0.1 ppm TWA; 0.7 mg/m3 TWA

Personal Protective Equipment

Eyes:

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133.

Skin:

Wear appropriate protective gloves to prevent skin exposure.

Clothing:

Wear appropriate protective clothing to prevent skin exposure.

Respirators:

Follow the OSHA respirator regulations found in 29CFR 1910.134. Always use a NIOSH-approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Liquid
Appearance:	clear very faint yellow
Odor:	Tear gas odor
pH:	Not available.
Vapor Pressure:	24 mm Hg @25C
Vapor Density:	5.7
Evaporation Rate:	Not available.

Viscosity:	Not available.
Boiling Point:	112 deg C
Freezing/Melting Point:	-64 deg C
Decomposition Temperature:	Not available.
Solubility:	Insoluble.
Specific Gravity/Density:	1.6920g/cm3
Molecular Formula:	CCl3NO2
Molecular Weight:	164.37

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:

Stable.

Conditions to Avoid:

Incompatible materials.

Incompatibilities with Other Materials:

Strong oxidizers, alcoholic sodium hydroxide, aniline, sodium methoxide, 3-bromopropyne.

Hazardous Decomposition Products:

Hydrogen chloride, phosgene, carbon monoxide, oxides of nitrogen, carbon dioxide.

Hazardous Polymerization: Has not been reported

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:

CAS# 76-06-2: PB6300000

LD50/LC50:

CAS# 76-06-2: Inhalation, mouse: LC50 =66 mg/m3/4H; Inhalation, rabbit: LC50 =800 mg/m3/20M; Inhalation, rat: LC50 =14400 ppb/4H; Oral, rat: LD50 = 250 mg/kg.

Carcinogenicity:

Chloropicrin -

ACGIH: A4 - Not Classifiable as a Human Carcinogen

Epidemiology:

No data available.

Teratogenicity:

No data available.

Reproductive Effects:

No data available.

Neurotoxicity:

No data available.

Mutagenicity:

No data available.

Other Studies:

No data available.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration of Contaminants:
None listed.
RCRA D-Series Chronic Toxicity Reference Levels: None
listed.
RCRA F-Series: None listed.
RCRA P-Series: None listed.
RCRA U-Series: None listed.
Not listed as a material banned from land disposal
according to RCRA.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT

Shipping Name: CHLOROPICRIN
POISON INHALATION HAZARD ZONE B
Hazard Class: 6.1
UN Number: UN1580
Packing Group: I

IMO

Shipping Name: CHLOROPICRIN
Hazard Class: 6.1
UN Number: 1580
Packing Group: I

IATA

Shipping Name: CHLOROPICRIN

Hazard Class: 6.1

UN Number: 1580

Packing Group:

RID/ADR

Shipping Name: CHLOROPICRIN

Dangerous Goods Code: 6.1(17A)

UN Number: 1580

Canadian TDG

Shipping Name: CHLOROPICRIN

Hazard Class: 6.1

UN Number: UN1580

**** SECTION 15 - REGULATORY INFORMATION ****

US FEDERAL

TSCA

CAS# 76-06-2 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

SARA

Section 302 (RQ)

None of the chemicals in this material have an RQ.

Section 302 (TPQ)

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 76-06-2: acute, chronic.

Section 313

This material contains Chloropicrin (CAS# 76-06-2, 98.0%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

This material does not contain any hazardous air pollutants.

This material does not contain any Class 1 Ozone depletors.

This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.

None of the chemicals in this product are listed as Priority Pollutants under the CWA.

None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

CAS# 76-06-2 is considered highly hazardous by OSHA.

STATE

Chloropicrin can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

California No Significant Risk Level:

None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: T+

Risk Phrases:

R 22 Harmful if swallowed.

R 26 Very toxic by inhalation.

R 36/37/38 Irritating to eyes, respiratory system and skin.

Safety Phrases:

S 36/37 Wear suitable protective clothing and gloves.

S 38 In case of insufficient ventilation, wear suitable respiratory equipment.

S 45 In case of accident of if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)

CAS# 76-06-2:

Canada

CAS# 76-06-2 is listed on Canada's DSL/NDSL List.

This product does not have a WHMIS classification.

CAS# 76-06-2 is not listed on Canada's Ingredient Disclosure List.

Exposure Limits

CAS# 76-06-2:. OEL-AUSTRALIA:TWA 0.1 ppm (0.7 mg/m3);STEL 0.3 ppm (2 mg/m3). OEL-AUSTRIA:TWA 0.1 ppm (0.7 mg/m3). OEL-BELGIUM:TWA 0.1 ppm (0.67 mg/m3);STEL 0.3 ppm (2 mg/m3). OEL-DENMARK:TWA 0.1 ppm (0.7 mg/m3). OEL-FINLAND:TWA 0.1 ppm (0.7 mg/m3);STEL 0.3 ppm (2.1 mg/m3). OEL-F RANCE:TWA 0.1 ppm (0.7 mg/m3). OEL-GERMANY:TWA 0.1 ppm (0.7 mg/m3). OE L-JAPAN:TWA 0.1 ppm (0.67 mg/m3). OEL-THE NETHERLANDS:TWA 0.1 ppm (0.7 mg/m3). OEL-THE PHILIPPINES:TWA 0.1 ppm (0.7 mg/m3). OEL-RUSSIA:TWA 0 .1 ppm. OEL-SWITZERLAND:TWA 0.1 ppm (0.7 mg/m3);STEL 0.2 ppm (1.4 mg/m 3). OEL-TURKEY:TWA 0.1 ppm (0.7 mg/m3). OEL-UNITED KINGDOM:TWA 0.1 ppm (0.7 mg/m3);STEL 0.3 ppm. OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA ch eck ACGIH TLV. OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

**** SECTION 16 - ADDITIONAL INFORMATION ****

MSDS Creation Date: 2/28/1995 Revision #5 Date: 9/02/1997

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

Back to product information.

MALLINKRODT-BAKER -- CHLOROFORM - CHLOROFORM,NF

MATERIAL SAFETY DATA SHEET

NSN: 6505007534775

Manufacturer's CAGE: 70829

Part No. Indicator: A

Part Number/Trade Name: CHLOROFORM

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General Information

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Item Name: CHLOROFORM,NF

Company's Name: MALLINKRODT-BAKER (FORMALLY J.T. BAKER COMPANY)

Company's Street: 222 RED SCHOOL LANE

Company's City: PHILLIPSBURG

Company's State: NJ

Company's Country: US

Company's Zip Code: 08865-2219

Company's Emerg Ph #: 908-859-2151/800-424-9300(CHEMTREC)

Company's Info Ph #: 908-859-6975/800-354-2050

Distributor/Vendor # 1: MALLINCKRODT INC (314-539-1600)

Distributor/Vendor # 1 Cage: 37940

Record No. For Safety Entry: 001

Tot Safety Entries This Stk#: 001

Status: SE

Date MSDS Prepared: 08DEC95

Safety Data Review Date: 08MAY97

Supply Item Manager: KX

MSDS Preparer's Name: UNKNOWN

MSDS Serial Number: CDQLX

Specification Number: NONE

Spec Type, Grade, Class: NONE

Hazard Characteristic Code: T3

Unit Of Issue: BT

Unit Of Issue Container Qty: 1 PT

Type Of Container: BOTTLE

Net Unit Weight: 1.5 LBS

NRC/State License Number: NOT RELEVANT

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Ingredients/Identity Information

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Proprietary: NO

Ingredient: CHLOROFORM (SARA 302/313) (CERCLA)

Ingredient Sequence Number: 01

Percent: 100

NIOSH (RTECS) Number: FS9100000

CAS Number: 67-66-3

OSHA PEL: C 50 PPM

ACGIH TLV: 10 PPM; A2; 9596

Other Recommended Limit: NONE RECOMMENDED

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Physical/Chemical Characteristics

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Appearance And Odor: CLEAR, COLORLESS LIQUID WITH A PLEASANT (ETHEREAL) ODOR

Boiling Point: 142F,61C

Melting Point: -82F,-63C

Vapor Pressure (MM Hg/70 F): 100 @ 51F

Vapor Density (Air=1): 4.1

Specific Gravity: 1.49

Decomposition Temperature: UNKNOWN

Evaporation Rate And Ref: 11.6 (N-BUTYL ACETATE=1)

Solubility In Water: 0.8% @ 20C/68F

Percent Volatiles By Volume: 100

Viscosity: NOT RELEVANT

Radioactivity: NOT RELEVANT

Corrosion Rate (IPY): UNKNOWN

==========

Fire and Explosion Hazard Data

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Flash Point: NONE

Lower Explosive Limit: NOT RELEVANT

Upper Explosive Limit: NOT RELEVANT

Extinguishing Media: USE MEDIA APPROPRIATE FOR SURROUNDING FIRE. MOVE CONTAINER AWAY FROM FIRE, IF POSSIBLE. COOL CONTAINER WITH WATER SPRAY.

Special Fire Fighting Proc: WEAR FULL PROTECTIVE CLOTHING AND NIOSH-

APPROVED SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN THE POSITIVE PRESSURE MODE.

Unusual Fire And Expl Hazrds: MAY RELEASE TOXIC AND CORROSIVE GASES, INCLUDING CHLORINE, PHOSGENE AND HYDROGEN CHLORIDE.

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Reactivity Data

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Stability: YES

Cond To Avoid (Stability): HEAT, OPEN FLAMES, LIGHT, MOISTURE

Materials To Avoid: STRONG CAUSTICS AND CHEMICALLY ACTIVE METALS SUCH AS ALUMINUM, MAGNESIUM POWDER, SODIUM, POTASSIUM; ACETONE, METHANOL

Hazardous Decomp Products: MAY RELEASE TOXIC/CORROSIVE FUMES, INCLUDING OXIDES OF CHLORINE AND CARBON, PHOSGENE, CHLORINE GAS AND HYDROGEN CHLORIDE

Hazardous Poly Occur: NO

Conditions To Avoid (Poly): NOT RELEVANT

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Health Hazard Data

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LD50-LC50 Mixture: LD50 (ORAL, RAT) IS 908 MG/KG.

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: YES

Route Of Entry - Ingestion: YES

Health Haz Acute And Chronic: TARGET ORGANS:LIVER, KIDNEY, HEART, EYE, SKIN, LUNG. ACUTE- EYE:IRRITATION. MAY CAUSE EYE DAMAGE. SKIN:RAPID ABSORPTION. MAY CAUSE PAIN, IRRITATION. INHALED:MAY CAUSE IRRITATION, LIVER INJURY, DIZZINESS, UNCONSCIOUSNESS, EVEN DEATH. ORAL:CAUSES SEVERE BURNING. MAY BE FATAL. CHRONIC- DERMATITIS, KIDNEY, LIVER DAMAGE.

Carcinogenicity - NTP: YES

Carcinogenicity - IARC: YES

Carcinogenicity - OSHA: NO

Explanation Carcinogenicity: THE AGENT IS POSSIBLY CARCINOGENIC TO HUMAN.

Signs/Symptoms Of Overexp: SEVERE IRRITATION, HEADACHE, NAUSEA, VOMITING, DIZZINESS, DROWSINESS, DRYNESS OF MOUTH AND THROAT, UNCONSCIOUSNESS, SKIN DERMATITIS, BURNS TO MOUTH AND THROAT, PAIN, DEATH

Med Cond Aggravated By Exp: PERSONS WITH PRE-EXISTING SKIN DISORDERS, EYE PROBLEMS OR IMPAIRED LIVER, KIDNEY OR RESPIRATORY FUNCTION MAY BE MORE SUSCEPTIBLE TO THE EFFECTS OF THIS PRODUCT.

Emergency/First Aid Proc: GET MEDICAL ATTENTION IF SYMPTOMS PERSIST.

EYES/SKIN:IMMEDIATELY FLUSH WITH WATER FOR 15 MINUTES. HOLD EYELIDS OPEN. INHALED:REMOVE TO FRESH AIR. PROVIDE OXYGEN/CPR IF NEEDED. ORAL:IF CONSCIOUS, INDUCE VOMITING IMMEDIATELY AS DIRECTED BY MEDICAL PERSONNEL. CALL A PHYSICIAN/POISON CONTROL CENTER IMMEDIATELY. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

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Precautions for Safe Handling and Use

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Steps If Matl Released/Spill: CONTAIN SPILL IMMEDIATELY. DO NOT ALLOW SPILL TO ENTER SEWERS OR WATER COURSES. VENTILATE AREA. USE WATER SPRAY TO REDUCE VAPORS. ABSORB MATERIAL WITH CLAY, SAND, OR SIMILAR ABSORBENT MATERIAL. PLACE IN DISPOSAL CONTAINER. FOR LARGE SPILL, DIKE AHEAD

Neutralizing Agent: NOT RELEVANT

Waste Disposal Method: DISPOSED OF IN ACCORDANCE WITH ALL APPLICABLE U044 (TOXIC WASTE). NATIONAL RESPONSE CENTER PHONE NUMBER: 800-424-8802. REPORTABLE QUANTITY (RQ): 10 LBS.

Precautions-Handling/Storing: STORE IN COOL, DRY, VENTILATED PLACE. KEEP CONTAINER TIGHTLY CLOSED. STORE IN SECURE POISON AREA AWAY FROM INCOMPATIBLE MATERIALS.

Other Precautions: STORAGE COLOR CODE IS BLUE (HEALTH). CONTAINERS MAY EXPLODE IN HEAT OF FIRE. KEEP AWAY FROM REACH OF CHILDREN. AVOID CONTACT WITH EYES AND SKIN. DO NOT BREATHE VAPORS OR MISTS. USE UNDER THE HOOD OR WELL VENTILATED PLACE. AVOID INGESTION.

==========

Control Measures

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Respiratory Protection: IF TLV IS EXCEEDED (ABOVE 10 PPM) OR FOR SYMPTOMS OF OVER EXPOSURE, WEAR NIOSH-APPROVED POSITIVE-PRESSURE SELF-CONTAINED BREATHING APPARATUS.

Ventilation: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

Protective Gloves: POLYVINYL ALCOHOL

Eye Protection: CHEMICAL SAFETY GOGGLES & FACE SHIELD

Other Protective Equipment: EYE WASH STATION, SAFETY SHOWER, UNIFORM, PROTECTIVE SUIT

Work Hygienic Practices: DO NOT TAKE INTERNALLY. AVOID SKIN CONTACT. WASH SKIN AFTER USING PRODUCT. DO NOT EAT, DRINK OR SMOKE IN WORK AREA.

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Transportation Data

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Trans Data Review Date: 97128

DOT PSN Code: DHF

DOT Proper Shipping Name: CHLOROFORM

DOT Class: 6.1

DOT ID Number: UN1888

DOT Pack Group: II

DOT Label: 6.1

DOT/DoD Exemption Number: NOT RELEVANT

IMO PSN Code: EEH

IMO Proper Shipping Name: CHLOROFORM

IMO Regulations Page Number: 6103

IMO UN Number: 1888

IMO UN Class: 6.1

IMO Subsidiary Risk Label: -

IATA PSN Code: GJO

IATA UN ID Number: 1888

IATA Proper Shipping Name: CHLOROFORM

IATA UN Class: 6.1

IATA Label: TOXIC

AFI PSN Code: GJO

AFI Prop. Shipping Name: CHLOROFORM

AFI Class: 6.1

AFI ID Number: UN1888

AFI Pack Group: II

AFI Special Prov: N36

AFI Basic Pac Ref: A10.5

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Disposal Data

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Label Data

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Label Required: YES

Technical Review Date: 08MAY97

MFR Label Number: UNKNOWN

Label Status: F

Common Name: CHLOROFORM

Signal Word: DANGER!

Acute Health Hazard-Severe: X

Contact Hazard-Moderate: X

Fire Hazard-None: X

Reactivity Hazard-None: X

Special Hazard Precautions: TARGET ORGANS:LIVER, KIDNEY, HEART, EYE, SKIN, LUNG. ACUTE- EYE:MAY CAUSE INJURY. SKIN:RAPID ABSORPTION. MAY CAUSE PAIN. INHALED:IRRITATION, LIVER INJURY, CNS EFFECTS. ORAL:SEVERE BURNING. CHRONIC- DERMATITIS, KIDNEY, LIVER DAMAGE. STORE IN VENTILATED AREA AWAY FROM INCOMPATIBLES. ABSORB SPILL WITH CLAY. PLACE IN DISPOSAL CONTAINER FOR REMOVE TO FRESH AIR. PROVIDE OXYGEN/CPR IF NEEDED. ORAL:IF CONSCIOUS, INDUCE VOMITING IMMEDIATELY AS DIRECTED BY MEDICAL PERSONNEL. CALL A PHYSICIAN IMMEDIATELY.

Protect Eye: Y

Protect Skin: Y

Label Name: MALLINKRODT-BAKER (FORMALLY J.T. BAKER COMPANY)

Label Street: 222 RED SCHOOL LANE

Label City: PHILLIPSBURG

Label State: NJ

Label Zip Code: 08865-2219

Label Country: US

Label Emergency Number: 908-859-2151/800-424-9300(CHEMTREC)

1. Chemical Code or EA Number: H

2. Chemical Name: Levinstein Mustard. Composed of about 70% Bis (2-chloroethyl) sulfide and 30% of usually higher MW polysulfides.

3. Chemical Formulae:

   a. Empirical.

   b. Structural.

4 - 17. Most Levinstein H consists of about 70% pure H with about 30% of polysulfides. The percent of pure H in Levinstein H varies from sample to sample and therefore no specific data can be given on its colligative properties.

The biological properties of H are similar to those given for HD (q.v.).

18. Molecular Weight: Average MW varies with purity, but is generally higher than that of pure mustard (159.08).

19. Purity Range (average):

   a. Laboratory Sample.

   b. Plant Sample. 64 to 69 wt%.

20. Physical Appearance: Amber to dark brown liquid.

21. Vapor Density, Relative to Air: Varies with MW, generally exceeds value for HD of 5.5.

22. Liquid Density: 1.27 g/ml 0 25° C; fairly constant, independent of product purity.

23. Solid Density:

   a. Bulk Density. Not applicable.

   b. Crystal Density. Not applicable.

Levinstein Mustard

24. Normal Freezing Point or Melting Point: approx. 8° C.

25. Boiling Point: Varies with product composition; decomposes around 130° C.

26. Vapor Pressure :

    No general value since vapor pressure varies with purity of sample. High molecular weight impurities of H tend to lower vapor pressure below 0.11 torr reported for HD.

27. Volatility: approx. 920 mg/m^3 @ 25° C (reported for HD).

28. Viscosity: See HD.

29. Flash Point: 105° C.

30. Autoignition Temperature: Unknown.

31. Latent Heat of Vaporization: In the range of 94 cal/g reported for HD.

32. Latent Heat of Fusion: See HD.

33. Vapor-Air-Explosive Hazard Range: Not available.

34. Relative Persistency:

    a. Soil. Persistent.

    b. Surface (Wood, Methal, Masonry, Rubber, Paint).

    c. Water. Persistent due to low solubility.

35. Solubility: Similar to HD.

36. Thermal Decomposition Rate (half-life): See HD.

37. Heat of Combustion: 4500 cal/g (calculated from bomb calorimetry for products given in Item 38).

38. Products of Combustion: CO_2, Cl_2, H_2O, H_2SO_4, HCl (bomb calorimetry).

39. Rate of Hydrolysis: See HD.

40. Hydrolysis Products: See HD.

41. Corrosive Properties: Brass rapidly corroded; cast iron poor.

42. Detection Methods and Equipment:

Spotted Disk (SD) Test, Dragendorff Test.

For Liquid: ABCM8 detector paper; M6A1 detector paper.
For Vapor: M15A2, M18A2, M19 kits
(DB-3 Test, blue band detector tube)

43. Decontaminants:

a. Personnel. Flush eyes with H_2O. Protective ointment M1, M5 ointment; M13 kit (liquid on skin). M13 Kit - outer clothing. Shower with soap and water.

b. Equipment. Bleaching powder, DANC, DS2, sodium hypochlorite, fire.

c. Areas. Terrain: Aeration. STB slurry applied by M9 or M12A1 decontaminating apparatus.

44. DOT Classification: Poison A.

45. Stabilizer Utilized:

a. Laboratory Sample. See HD.

b. Production Sample.

46. Types of Containers Required for Storage:

a. RDT&E Quantities. Glass.

b. Stockpile Quantities. One-ton containers, 55-gallon steel drums, steel cylinders.

47. O-D Classification: 3
Compatability Group: A
Chemical Group: A

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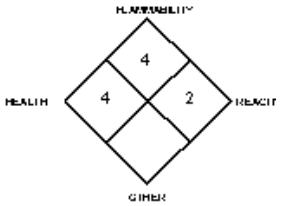
NFPA RATING



MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS and European Union Standards

PART I *What is the material and what do I need to know in an emergency?*

1. PRODUCT IDENTIFICATION

CHEMICAL NAME:	**ARSINE SDS3®**
CHEMICAL FAMILY:	Hydride
TRADE NAME/SYNONYMS:	AsH_3; Arsenic Hydride; Arsenic Tetrahydride; Arsenous Hydride, Hydrogen Arsenide
PRODUCT USE:	For General Analytical/Synthetic Chemical Uses
SUPPLIER/MANUFACTURER'S NAME:	ATMI, INC.
ADDRESS:	7 Commerce Drive Danbury, CT 06810
BUSINESS PHONE:	1-203-794-1100
EMERGENCY PHONE:	North America: 1-800-424-9300 International: 1-703-527-3887
DATE OF PREPARATION:	November 3, 2003

2. COMPOSITION and INFORMATION ON INGREDIENTS

This gas is packaged in a SDS® (Safe Delivery Source Technology Cylinder). This cylinder contains an absorbent material that allows gas contents to be at sub-atmospheric pressures. There is no possibility of contact or exposure to the absorbent and so this MSDS addresses only the hazards of the gas.

CHEMICAL NAME	CAS # EINCES #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH-TLV		OSHA-PEL		NIOSH	OTHER
			TWA mg/m^3	STEL mg/m^3	TWA mg/m^3	STEL mg/m^3	IDLH mg/m^3	mg/m^3
Arsine	7784-42-1 232-066-3	≥ 99.0%	0.16	NE	0.2	NE	3	NIOSH REL: TWA = 0.002/15 minutes Carcinogen: NIOSH-Ca
Maximum Impurities		≤ 1	None of the trace impurities of this gas contribute significantly to the hazards associated with the product. All hazard information pertinent to this product has been provided in this Material Safety Data Sheet, per the requirements of the Federal Occupational Safety and Health Administration Standard (29 CFR 1910.1200), U.S. State equivalent Standards and Canadian Workplace Hazardous Materials Identification System Standards (CPR 4).					

EC CLASSIFICATION: [T+]: Very Toxic. [F+]: Extremely Flammable. [Xn]: Harmful. [N]: Dangerous for the Environment.

EC RISK PHRASES: [R: 12]: [R: 26]: [R: 48/20]: [R: 50]: [R:53]:

NE = Not Established. See Section 16 for Definitions of Terms Used.

NOTE: ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1998 format. This gas has been classified in accordance with the hazard criteria of the CPR and EU Directives, and the MSDS contains all the information required by the CPR and EU Directives for MSDS preparation.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: Arsine is a colorless, extremely toxic, irritating, pyrophoric gas with a pungent odor. **Health Hazards:** This gas is toxic and irritating and can be harmful or fatal if inhaled. Inhalation can damage red blood cells, liver, kidneys, and central nervous system. Exposure to even very small quantities can cause severe health effects and death. Contact by all routes of exposure can severely irritate exposed tissue. **Flammability Hazards:** This gas is pyrophoric. It can ignite spontaneously in contact with air; however its ignition is not frequently encountered. Vapors from compressed Arsine gas are initially heavier than air and may travel a considerable distance to source of ignition and flash back to a leak. Arsine decomposes violently at 300ºC (572ºF) with a large pressure and temperature increase. A cylinder rupture hazard exists when this product, which is under pressure, is subjected to heat or flames. **Reactivity Hazards:** Arsine reacts violently with oxidizers, halogens, and acids. Arsine reacts with light to deposit arsenic. **Environmental Hazards:** Arsine is toxic. Release of this gas to the environment may harm plants and animals and should be avoided. **Emergency Recommendations:** Emergency responders must wear personal protective equipment appropriate for the situation to which they are responding and to the chemical hazards of this gas.

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: Contact with this gas by all routes of exposure may be harmful. Inhalation may be fatal. Symptoms of exposure, by route of entry, are described below.

INHALATION: This gas is toxic and irritating and inhalation can severely irritate the nose, throat, mucous membranes and respiratory system. Acute and chronic inhalation can damage red blood cells, liver, kidneys, and the central nervous system. Arsine is considered a hemolytic gas (causes adverse blood effects). Symptoms of inhalation exposure can include coughing, difficulty breathing, general malaise, headache, fever, chills, dizziness, nausea, vomiting, diarrhea, blood in urine, tightness in the chest, and pain in the abdomen, lower back, and loins. Hemolysis can continue for 96 hours after the overexposure ends. Inhalation overexposure can cause pulmonary edema (a potentially life-threatening accumulation of fluid in the lungs); symptoms may be delayed by hours or days. Recovery may be prolonged and relapses are possible. In cases of severe exposure, death due to lack of oxygen can occur within a few hours after onset of pulmonary edema or following a relapse. Symptoms of inhalation exposure may be delayed for up to 24 hours.

SKIN AND EYE CONTACT: Depending on the duration and concentration of overexposure, skin contact may cause redness, pain, and irritation. Repeated overexposures to low levels of this gas may cause persistent irritation and dermatitis (dry, red, scaly skin). Contact with liquid or rapidly expanding gases (which are released under high pressure) may cause frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after contact with liquid can subside quickly. Depending on the duration and concentration of overexposure, eye contact can cause irritation, redness, and tearing.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM

HEALTH HAZARD	(BLUE)	4
FLAMMABILITY HAZARD	(RED)	4
PHYSICAL HAZARD	(YELLOW)	2

PROTECTIVE EQUIPMENT

EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8

For Routine Industrial Use and Handling Applications

See Section 16 for Definition of Ratings

SKIN ABSORPTION: Arsine is not known to be absorbed though intact skin

INGESTION: As a compressed gas, ingestion is an unlikely route of exposure.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**.

ACUTE: This gas can severely irritate eyes, skin, mucous membranes, and any other exposed tissue. If inhaled, this gas can irritate the respiratory system and cause coughing and difficulty breathing. Acute inhalation exposure can damage red blood cells, liver, kidneys, and the central nervous system. Severe inhalation overexposure can be fatal. Contact with rapidly expanding gases (which are released under high pressure) may cause frostbite.

CHRONIC: Repeated skin overexposures to low levels of this gas may cause persistent irritation and dermatitis (dry, red, scaly skin). Chronic inhalation can damage red blood cells, liver, kidneys, and central nervous system. See Section 11 (Toxicological Information) for further information.

TARGET ORGANS: ACUTE: Respiratory system, blood, liver, kidneys, central nervous system. CHRONIC: Blood, liver, kidneys, central nervous system, skin.

PART II *What should I do if a hazardous situation occurs?*

4. FIRST-AID MEASURES

RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO THIS GAS WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus and chemical resistant clothing should be worn.

Remove victim(s) to fresh air, as quickly as possible. Trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation if necessary. Only trained personnel should administer supplemental oxygen. Victim(s) must be taken for medical attention. Rescuers should be taken for medical attention if necessary. Take copy of label and MSDS to physician or other health professional with victim(s). Consult a physician and/or the nearest Poison Control Center for all exposures except minor instances of skin contact.

INHALATION: If this gas is inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Remove or cover gross contamination to avoid exposure to rescuers. Seek immediate medical attention.

SKIN EXPOSURE: If the gas contaminates the skin, immediately begin decontamination with running water. Minimum flushing is for 15 minutes. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victim must seek immediate medical attention if any adverse effect occurs. In the event of frostbite after exposure to cold gas, remove any clothing that may restrict circulation to any frozen area. Do not rub frozen parts as tissue damage may occur. As soon as practicable, place any affected area in warm water bath that has a temperature that does not exceed 105°F (40°C). NEVER USE HOT WATER. NEVER USE DRY HEAT. If area of frostbite is extensive and if possible, remove clothing while showering with warm water. If warm water is not available or is impractical to use, wrap the affected parts gently in blankets. Alternatively, if the fingers or hands are frostbitten, place the affected area of the body in the armpit. Encourage victim to gently exercise the affected part while being warmed. Seek immediate medical attention.

EYE EXPOSURE: If gas enters the eyes, open victim's eyes while under gently running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Seek immediate medical attention.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Respiratory, blood, kidney, liver, nervous system, and skin disorders may be aggravated by overexposure to this gas.

RECOMMENDATIONS TO PHYSICIANS: The health effects of Arsine overexposure will be related to the destruction of the blood's red cells. The oxygen transport capability may be diminished and there is a risk of kidney failure. Administer oxygen. Be observant for pulmonary edema.

Basic Treatment: Establish a patent airway. Suction if necessary. Watch for signs of respiratory insufficiency and assist ventilations if necessary. Administer oxygen by non-rebreather mask at 10 to 15 L/minutes. Monitor for shock and treat if necessary. Monitor for pulmonary edema and treat if necessary. For eye contamination, flush eyes immediately with water. Irrigate each eye continuously with normal saline during transport.

Advanced Treatment: Wash the skin of the victim copiously. Insert an IV line, administer fluids, and provide oxygen and cardiac monitoring during transport. Consider orotracheal or nasotracheal intubation for airway control in the patient who is unconscious. Positive pressure ventilation techniques with a bag valve mask device may be beneficial. Monitor cardiac rhythm & treat arrhythmias if necessary. Start an IV with lactated Ringer's. Titrate flow to maintain urine output. Watch for signs of pulmonary edema. Treat hypotension with fluid administration. Vasopressors should only be used if fluid admin can not maintain an adequate blood pressure. Administer furosemide (Lasix). Consider drug therapy for pulmonary edema.

BY DIRECT PHYSICIAN ORDER Administer I to 2 amps (adult dose) of sodium bicarbonate IV push. This will alkalinize the urine and prevent hemoglobin precipitation and acute renal failure. Because the hemoglobin-arsine complex cannot be dialyzed, exchange transfusion is recommended in severe cases; forced alkaline diuresis also may be employed. Even if subjects are removed form the source of toxic exposure, hemolysis is likely to continue and may last as long as 4 days. Dimercaprol has no effect on the hemolysis, and beneficial effects on renal function have not been established; it is thus not recommended.

Use proparacaine hydrochloride to assist eye irrigation. Cover skin burns with dry sterile dressings after decontamination.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable; spontaneously combustible gas.
AUTOIGNITION TEMPERATURE: Not applicable.
FLAMMABLE LIMITS (in air by volume, %):

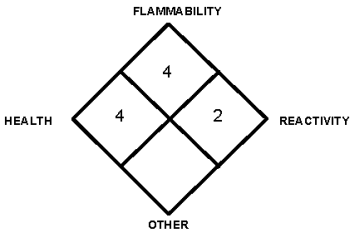
Lower (LEL): 5.1%
Upper (UEL): 78.0%

5. FIRE-FIGHTING MEASURES (Continued)

FIRE EXTINGUISHING MATERIALS:

Water Spray: YES (for cooling) Carbon Dioxide: YES
Dry Chemical: YES Halon: NO
Foam: YES Other: Any "ABC" Class.

NFPA RATING



See Section 16 for Definition of Ratings

UNUSUAL FIRE AND EXPLOSION HAZARDS: Arsine is pyrophoric. It can ignite spontaneously in contact with air. Arsine decomposes violently at 300ºC (572ºF) with a large pressure and temperature increase. A cylinder rupture hazard exists when this product, which is under pressure, is subjected to heat or flames. Catastrophic failure of the cylinder can release the contents in a massive fireball and explosion, which can cause severe equipment damage and personnel injury or death over a large area around the cylinder. This gas is highly toxic and irritating and presents a severe health hazard to firefighters. Arsine reacts violently with oxidizers, halogens, and acids. Arsine reacts with light to deposit arsenic.

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Sensitive. Static charge can build up due to the low conductivity of liquid Arsine and may cause this product to ignite explosively if released.

SPECIAL FIRE-FIGHTING PROCEDURES: Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Chemical resistant clothing may be necessary. If possible, stop the flow of gas. Use non-sparking tools to close container valves. Inerting the atmosphere to reduce oxygen levels may extinguish flame, allowing capping of leaking container. Do not attempt this unless specifically trained. Reduce the rate of flow and inject an inert gas, if possible, before completely stopping the flow to prevent flashback. Do not extinguish the fire until the supply is shut off as otherwise and explosive re-ignition may occur. If the fire is extinguished and the flow of gas continues, use increased ventilation to prevent build-up of explosive atmosphere. Ventilation fans must be explosion proof. Move fire-exposed cylinders from area if it can be done without risk to firefighters. Use water spray to cool sealed containers that have been exposed to heat to avoid explosion. Withdraw immediately in case of rising sounds from venting pressure relief devices or any discoloration of tanks or cylinders due to a fire. If this gas is involved in a fire, fire runoff water should be contained to prevent possible environmental damage. All contaminated equipment must be thoroughly cleaned and rinsed with water before such equipment is returned to service.

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: If a leak of dangerous levels of Arsine occurs, evacuate the immediate area of all personnel. Eliminate any possible sources of ignition and provide maximum explosion-proof ventilation. If the gas is leaking from cylinder or valve, contact the supplier. Trained personnel using pre-planned procedures should respond to uncontrolled releases. Proper protective equipment should be used. Minimum Personal Protective Equipment should be **Level A: fully encapsulating suit, triple-gloves (neoprene gloves and nitrile gloves over latex gloves), chemical resistant boots, hard hat, and Self-Contained Breathing Apparatus.** Level A protection must be worn during emergency response situations in all areas in which the level of exposure to Arsine is above 50% of the TLV (0.16 mg/m^3). Fire retardant clothing must also be worn under Level A gear. Monitor the surrounding area for oxygen levels and the level of Arsine. The atmosphere must have at least 19.5 % oxygen and levels of other compounds must be below exposure limits listed in Section 2 (Composition and Information on Ingredients) before personnel can be allowed in the area without Self-Contained Breathing Apparatus. Attempt to close the main source valve prior to entering the area. Use only non-sparking tools and equipment during the response. Locate and seal the source of the leaking gas. If it is not possible to stop the release, allow the gas to release in place or remove the tank to a safe area and allow the gas to be released there. **THIS IS AN EXTREMELY TOXIC, PYROPHORIC GAS.** Protection of all personnel and the area must be maintained at all times.

PART III *How can I prevent hazardous situations from occurring?*

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: Use only in well ventilated areas. All areas where Arsine is used should be monitored with very sensitive gas detection instruments. Detection of concentrations below 50% of the TLV level of 0.16 mg/m^3 should trigger immediate response and corrective action. Detection of higher levels should initiate an alarm calling for evacuation of all personnel who could be exposed. Due to the toxicity of this gas, all contaminated clothing should be removed and placed in a sealed container for proper disposal. All areas where this gas is used should be monitored with very sensitive gas detection instruments.

(section continued on next page)

7. HANDLING and STORAGE (Continued)

WORK PRACTICES AND HYGIENE PRACTICES (continued): Avoid all contact with this gas. All employees who handle this material should be trained to handle it safely. Wash thoroughly after handling this material. Do not eat, drink, apply cosmetics, or smoke while handling this gas. All work practices should minimize the release of this gas. Eyewash stations and safety showers should be in areas of use of this material.

STORAGE AND HANDLING PRACTICES: Earth ground and bond all lines and equipment associated with the arsine system. All equipment should be non-sparking or explosion-proof. Cylinders should be stored in cool, dry, well-ventilated area, away from sources of heat, ignition, and direct sunlight. Compressed gases can present significant safety hazards. Keep the smallest amount on site as is necessary. Store containers away from heavily trafficked areas and emergency exits. Full and empty cylinders should be segregated. Use a first-in, first-out inventory system to prevent full containers from being stored for long periods of time. Post "No Smoking or Open Flames" signs in storage or use areas. Isolate from other flammable materials and incompatible chemicals (refer to Section 10, Stability and Reactivity). Cylinders should be separated from oxygen cylinders, or other oxidizers, by a minimum distance of 20 ft., or by a barrier of non-combustible material at least 5 ft. high, having a fire-resistance rating of at least 0.5 hours. Storage areas must meet national electrical codes for Class 1 Hazardous Areas. Consider installation of leak detection and alarm for storage and use areas. Have appropriate extinguishing equipment in the storage area (e.g., sprinkler system, portable fire extinguishers). Use closed ventilation systems, approved equipment, and appropriate electrical systems.

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: Protect cylinders against physical damage. Do not allow area where cylinders are stored to exceed 52°C (125°F). Cylinders should be stored upright and be firmly secured to prevent falling or being knocked over. Cylinders can be stored in the open, but in such cases they should be protected against extremes of weather and from the dampness of the ground to prevent rusting. Never tamper with pressure relief devices in valves and cylinders. The following rules are applicable to situations in which cylinders are being used:

Before Use: Move cylinders with a suitable hand-truck. Do not drag, slide, or roll cylinders. Do not drop cylinders or permit them to strike each other. Secure cylinders firmly. Leave the valve protection cap in place until cylinder is ready for use.

During Use: Use designated CGA fittings and other support equipment. Do not use adapters. Do not heat cylinder by any means to increase the discharge rate of the product from the cylinder. Use check valve or trap in discharge line to prevent hazardous backflow into the cylinder. Do not use oils or grease on gas-handling fittings or equipment.

After Use: Close main cylinder valve. Replace valve protection cap. Mark empty cylinders "EMPTY".

NOTE: Use only DOT or ASME code containers. Close valve after each use and when empty. Cylinders must not be recharged except by or with the consent of owner. For additional information refer to the Compressed Gas Association Pamphlet P-1, *Safe Handling of Compressed Gases in Containers*. Additionally, refer to CGA Bulletin SB-2 "*Oxygen Deficient Atmospheres*".

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Always use product in areas where adequate ventilation is provided.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Install automatic monitoring equipment to detect the level of Arsine. Due to the extreme toxicity of Arsine, cylinders of this product should always be placed in a properly designed and constructed gas cabinet. Double wall piping should be used to deliver gas to the point of use. Exhaust from the cabinet and from the annular space of the tubing should be monitored.

RESPIRATORY PROTECTION: Maintain Arsine levels below 50% of the TLV (0.16 mg/m^3) and oxygen levels above 19.5% in the workplace. The use of supplied air respiratory protection is recommended when changing cylinders or working on other delivery systems. Use supplied air respiratory protection when inorganic fluoride compound levels exceed 50% of the TLV (0.16 mg/m^3), when oxygen levels are below 19.5%, or during emergency response to a release of this product. During an emergency situation, before entering the area, check the concentration of inorganic fluoride compounds and oxygen. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations, the Canadian CSA Standard Z94.4-93, applicable standards of Canadian Provinces, the European Standard EN149, or applicable standards of EU member states. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure/demand SCBA or a full facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA's Respiratory Protection Standard (1910.134-1998).

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8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

RESPIRATORY PROTECTION (continued): The following are NIOSH respiratory protection equipment recommendations for Arsine.

ARSINE

CONCENTRATION	**RESPIRATORY EQUIPMENT**
AT CONCENTRATIONS ABOVE THE NIOSH REL OR AT ANY DETECTABLE CONCENTRATION:	Positive pressure, full-facepiece Self-Contained Breathing Apparatus (SCBA) or positive pressure, full-facepiece Supplied Air Respirator (SAR) with an auxiliary positive pressure SCBA.
Escape	Gas mask with canister to protect against Arsine or escape-type SCBA.

INTERNATIONAL OCCUPATIONAL EXPOSURE LIMITS: The following are international exposure limits currently in-place for Arsine.

ARAB Republic of Egypt: TWA = 0.05 ppm (0.2 mg/m^3), JAN 1993
Australia: TWA = 0.05 ppm (0.2 mg/m^3), JAN1993
Austria: MAK = 0.05 ppm (0.2 mg/m^3), JAN 1999
Denmark: TWA = 0.01 ppm (0.03 mg/m^3), JAN 1999
France: VME = 0.05 ppm (0.2 mg/m^3), VLE = 0.2 ppm (0.8 mg/m^3), JAN 1999
Germany: Carcinogen, JAN 1999
Hungary: TWA = 0.05 mg/m^3, STEL = 0.1 mg/m^3, Skin, JAN 1993
Japan: OEL = 0.01 ppm (0.032 mg/m^3), JAN 1999
The Netherlands: MAC-TGG = 0.05 ppm (0.2 mg/m^3), JAN 1999
Norway: TWA = 0.003 ppm (0.01 mg/m^3), JAN 1999
The Philippines: TWA = 0.05 ppm (0.5 mg/m^3), JAN 1993
Poland: MAC (TWA) = 0.2 mg/m^3, MAC(STEL) = 0.6 mg/m^3, JAN 1999
Russia :TWA = 0.05 ppm, STEL = 0.1 mg/m^3, JAN 1993
100 ppm; STEL= 50 mg/m^3 JAN 1993
Sweden: NGV 0.02 ppm (0.05 mg/m^3), JAN 1999
Switzerland: MAK-W = 0.05 ppm (0.16 mg/m^3), KZG-W = 0.25 ppm, JAN 1999
Thailand: TWA = 0.05 ppm (0.2 mg/m^3), JAN 1993
Turkey: TWA = 0.05 ppm (0.2 mg/m^3), JAN 1993
United Kingdom: TWA = 0.05 ppm (0.16 mg/m^3), SEP 2000
In Argentina, Bulgaria, Colombia, Jordan, Korea, New Zealand, Singapore, Vietnam check ACGIH TLV

EYE PROTECTION: Splash goggles, face-shield, or safety glasses. If necessary, refer to U.S. OSHA 29 CFR 1910.133, Canadian Standards, or the European Standard EN166.

HAND PROTECTION: Wear gloves resistant to mechanical tears when handling cylinders of this gas. Wear chemical resistant gloves. If necessary, refer to U.S. OSHA 29 CFR 1910.138, appropriate Standards of Canada, or the European Union.

BODY PROTECTION: Use body protection appropriate for task. Chemical resistant body protection may be needed when contact with the gas is possible. If necessary, refer to appropriate Standards of Canada and the European Union. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee's feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR.

9. PHYSICAL and CHEMICAL PROPERTIES

VAPOR DENSITY (air = 1) @ 25°C: 2.66
GAS DENSITY: Not established.
SOLUBILITY IN WATER: Insoluble.
EXPANSION RATIO: Not applicable
ODOR THRESHOLD: Not available.
COEFFICIENT WATER/OIL DISTRIBUTION: Not available.
MOLECULAR WEIGHT: 77.9
EVAPORATION RATE (nBuAc = 1): Not applicable.
FREEZING POINT: -117°C (-179°F)
BOILING POINT: -62°C (-81°F)
pH: Not applicable.
VAPOR PRESSURE @ 20°C: > 760 mm Hg
SPECIFIC VOLUME (ft^3/lb): Not established.
MOLECULAR FORMULA: AsH_3

APPEARANCE, ODOR, and COLOR: Arsine is a colorless gas with a pungent odor.

HOW TO DETECT THIS SUBSTANCE (warning properties): There are no unusual warning properties associated with a release of this product. In terms of leak detection, fittings and joints can be painted with a soap solution to detect leaks, which will be indicated by a bubble formation.

10. STABILITY and REACTIVITY

STABILITY: Stable at standard temperatures and pressures. Arsine decomposes violently at 300ºC (572ºF) with a large pressure and temperature increase.

DECOMPOSITION PRODUCTS: Combustion of Arsine generates arsenic trioxide. Thermal decomposition of Arsine generates arsenic. Arsine reacts with light to deposit arsenic.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Arsine reacts violently with oxidizers, halogens, and acids.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid exposing cylinders to extremely high temperatures, which could cause the cylinders to rupture. Avoid exposing this gas to light and incompatible chemicals.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following data are available for Arsine:

TCLo (inhalation, human) = 3 ppm; Blood: pigmented or nucleated red blood cells, other hemolysis with or without anemia

TCLo (inhalation, man) = 325 $\mu g/m^3$; Gastrointestinal: other changes; Kidney, Ureter, Bladder: hematuria

LCLo (inhalation, human) = 25 ppm/30 minutes; Blood: other hemolysis with or without anemia; Endocrine: changes in growth hormone

LCLo (inhalation, human) = 300 ppm/5 minutes

LC_{50} (inhalation, rat) = 390 mg/m^3/10 minutes

LC_{50} (inhalation, rat) = 0.3 mg/m^3/15 minutes

LC_{50} (inhalation, rat) = 0.4 mg/m^3/15 minutes; Peripheral Nerve and Sensation: flaccid paralysis with appropriate anesthesia; Gastrointestinal: necrotic changes; Kidney, Ureter, Bladder :hematuria

LC_{50} (inhalation, mouse) = 250 mg/m^3/10 minutes

LC_{50} (inhalation, mouse) = 0.5 mg/m^3/2 minutes

LC_{50} (inhalation, mouse) = 0.1 mg/m^3/15 minutes

LD_{50} (intraperitoneal, mouse) = 3 mg/kg

LC_{50} (inhalation, dog) = 350 mg/m^3/30 minutes

LC_{50} (inhalation, dog) = 0.5 mg/m^3/15 minutes

LC_{50} (inhalation, rabbit) = 650 mg/m^3/10 minutes

LD_{50} (intraperitoneal, rabbit) = 2500 $\mu g/kg$

LD_{50} (intraperitoneal, cat) = 2 mg/kg

LD_{50} (intraperitoneal, mammal) = 3 mg/kg

LCLo (inhalation, monkey) = 600 mg/m^3/1 hour

LCLo (inhalation, cat) = 150 mg/m^3/20 minutes

LCLo (inhalation, frog) = 4500 mg/m^3/3 hours; Peripheral Nerve and Sensation: spastic paralysis with or without sensory change; Behavioral: altered sleep time (including change in righting reflex); Cardiac: other changes

LCLo (inhalation, mammal) = 1 g/m^3/10 minutes

TCLo (inhalation, rat) = 2500 ppm/6 hours/14 days/intermittent; Liver: changes in liver weight; Endocrine: changes in spleen weight; Blood: other changes

TCLo (inhalation, rat) = 500 ppm/6 hours/28 days/intermittent; Endocrine: changes in spleen weight; Blood: other changes; Biochemical: Enzyme inhibition, induction, or change in blood or tissue levels: other Enzymes

TCLo (inhalation , rat) = 500 ppm/6 hours/90 days/intermittent; Endocrine: changes in spleen weight; Blood: pigmented or nucleated red blood cells, changes in erythrocyte (RBC) count

TCLo (inhalation, rat) = 0.3 mg/m^3/24 hours/13 weeks/continuous; Kidney, Ureter, Bladder: other changes; Blood: methemoglobinemia-carboxyhemoglobin; Blood: changes in leukocyte (WBC) count

TCLo (inhalation, mouse) = 5 ppm/6 hours/14 days/intermittent; Liver: changes in liver weight; Endocrine: changes in spleen weight; Blood: changes in other cell count (unspecified)

TCLo (inhalation, mouse) = 500 ppb/12 weeks/intermittent; Endocrine: changes in spleen weight; Blood: changes in spleen, changes in leukocyte (WBC) count

TDLo (intraperitoneal, mouse) = 12 mg/kg/10 days/intermittent; Related to Chronic Data: death

TCLo (inhalation, hamster) = 2500 ppm/6 hours/28 days/intermittent; Liver: changes in liver weight; Endocrine: changes in spleen weight; Blood: other changes

TDLo (intraperitoneal, rabbit) = 5500 $\mu g/kg$/ days/intermittent; Related to Chronic Data: death

SUSPECTED CANCER AGENT: Arsine is listed by agencies tracking the carcinogenic potential of chemical compounds, as follows:

NIOSH-Ca (Potential Occupational Carcinogen, With No Further Categorization)

Arsine is not found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, and therefore is neither considered to be nor suspected to be a cancer-causing agent by these agencies.

IRRITANCY OF PRODUCT: This gas is severely irritating by all routes of exposure. Contact with rapidly expanding gases can cause frostbite and damage to exposed skin and eyes.

SENSITIZATION OF PRODUCT: There is no evidence of human respiratory or skin sensitization effects from this gas.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this gas and its components on the human reproductive system.

Mutagenicity: This gas is not reported to cause mutagenic effects in humans.

Embryotoxicity: This gas is not reported to cause embryotoxic effects in humans.

Teratogenicity: This gas is not reported to cause teratogenic effects in humans.

Reproductive Toxicity: This gas is not reported to cause adverse reproductive effects in humans.

A mutagen is a chemical that causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An embryotoxin is a chemical that causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical that causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance that interferes in any way with the reproductive process.

BIOLOGICAL EXPOSURE INDICES: Currently, there are no Biological Exposure Indices (BEIs) determined for Arsine.

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: This gas will be dissipated rapidly in well ventilated areas. Currently, there are no environmental data for this gas.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Due to the toxicity of this gas, contact with animals and plants may cause damage or be fatal. Additionally, frost produced in the presence of rapidly expanding gases may adversely affect plant life.

12. ECOLOGICAL INFORMATION (Continued)

EFFECT OF CHEMICAL ON AQUATIC LIFE: No evidence is currently available on the effects of this gas on aquatic life. Due to the toxicity of this gas, contact with aquatic animals and plants may cause damage or be fatal.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Product removed from the cylinder must be disposed of in accordance with appropriate U.S. Federal, State, and local regulations, those of Canada and its Provinces, or those of the EC and EC Member States. Return cylinders with residual product to ATMI. Do not dispose of locally.

14. TRANSPORTATION INFORMATION

THIS GAS IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Arsine)
HAZARD CLASS NUMBER and DESCRIPTION: 2.3 (Toxic Gas)
UN IDENTIFICATION NUMBER: UN 2188
PACKING GROUP: Not Applicable
DOT LABEL(S) REQUIRED: Class 2.3 (Toxic Gas); Class 2.1 (Flammable Gas)
ADDITIONAL REQUIRED MARKING: Inhalation Hazard, Zone A
EMERGENCY RESPONSE GUIDEBOOK NUMBER (2000): 119
MARINE POLLUTANT: Arsine is not classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This gas is classified as Dangerous Goods, per regulations of Transport Canada. The use of the above U.S. DOT information from the U.S. 49 CFR regulations is allowed for shipments that originate in the U.S. For shipments via ground vehicle or rail that originate in Canada, the information on the following page is applicable.

PROPER SHIPPING NAME: Arsine
HAZARD CLASS NUMBER and DESCRIPTION: 2.3 (Toxic Gas); 2.1 (Flammable Gas)
UN IDENTIFICATION NUMBER: UN 2188
PACKING GROUP: Not Applicable
HAZARD LABEL(S) REQUIRED: Class 2.3 (Toxic Gas); 2.1 (Flammable Gas)
SPECIAL PROVISIONS: 38
EXPLOSIVE LIMIT & LIMITED QUANTITY INDEX: 0
ERAP INDEX: 0
PASSENGER CARRYING SHIP INDEX: Forbidden
PASSENGER CARRYING ROAD OR RAIL VEHICLE INDEX: Forbidden
MARINE POLLUTANT: Not applicable.

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA): This gas is classified as Dangerous Goods, by rules of IATA:

PROPER SHIPPING NAME: Arsine
HAZARD CLASS NUMBER and DESCRIPTION: 2.3 (Toxic Gas); 2.1 (Flammable Gas)
UN IDENTIFICATION NUMBER: UN 2188
PACKING GROUP: Not Applicable
HAZARD LABEL(S) REQUIRED: None
SPECIAL PROVISIONS: A2
ERG CODE: 10P

PASSENGER AND CARGO AIRCRAFT				CARGO AIRCRAFT ONLY	
Limited Quantity					
Packing Instruction	Max. Qty per Pkg	Packing Instruction	Max. Qty per Pkg	Packing Instruction	Max. Qty per Pkg
None	None	Forbidden	Forbidden	Forbidden	Forbidden

14. TRANSPORTATION INFORMATION (Continued)

INTERNATIONAL MARITIME ORGANIZATION (IMO): This gas is classified as Dangerous Goods, per rules of the IMO.

UN IDENTIFICATION NUMBER:	UN 2188
PROPER SHIPPING NAME:	Arsine
HAZARD CLASS NUMBER and DESCRIPTION:	2.3 (Toxic Gas)
SUBSIDIARY RISK:	2.1 (Flammable Gas)
PACKING GROUP:	Not Applicable
SPECIAL PROVISIONS:	None
HAZARD LABEL(S) REQUIRED:	Class 2.3 (Toxic Gas); Class 2.1 (Flammable Gas)
LIMITED QUANTITIES:	None
PACKING INSTRUCTION:	P200
EmS:	F-D, S-U
STOWAGE AND SEGREGATION	Category D - Clear of Living Quarters

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR): This gas is classified as Dangerous Goods, per regulations of the U.N. Economic Commission for Europe.

UN NUMBER:	UN 2188
NAME AND DESCRIPTION:	Arsine
CLASS:	2
CLASSIFICATION CODE:	2TF
PACKING GROUP:	Not Applicable
LABELS:	2.3 + 2.1
SPECIAL PROVISIONS:	632
LIMITED QUANTITIES:	LQ0
PACKING INSTRUCTION:	P200
MIXED PACKING INSTRUCTION:	MP9
HAZARD IDENTIFICATION NUMBER:	None

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: Arsine is not subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act.

CHEMICAL NAME	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Arsine	Yes	Yes	No

U.S. SARA SECTION 302 EXTREMELY HAZARDOUS SUBSTANCE (EHS) THRESHOLD PLANNING QUANTITY: Arsine = 100 lb (45 kg)

U.S. SARA SECTION 304 REPORTABLE EXTREMELY HAZARDOUS SUBSTANCE (EHS) QUANTITY: Arsine = 100 lb (45 kg)

U.S. CERCLA REPORTABLE QUANTITY (RQ): Not applicable.

U.S. TSCA INVENTORY STATUS: Arsine is listed on the TSCA Inventory.

OTHER U.S. FEDERAL REGULATIONS: EPA: Arsine is listed as a hazardous air pollutant (HAP) generally known or suspected to cause serious health problems. The Clean Air Act, as amended in 1990, directs EPA to set standards requiring major sources to sharply reduce routine emissions of toxic pollutants. EPA is required to establish and phase in specific performance based standards for all air emission sources that emit one or more of the listed pollutants. Arsine is included on this list.

U.S. STATE REGULATORY INFORMATION: Arsine is covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: Arsine.
California - Permissible Exposure Limits for Chemical Contaminants: Arsine.
Florida - Substance List: Arsine.
Illinois - Toxic Substance List: Arsine.
Kansas - Section 302/313 List: Arsine.
Massachusetts - Substance List: Arsine.
Michigan Critical Materials Register: No.
Minnesota- List of Hazardous Substances: Arsine.
Missouri - Employee Information/Toxic Substance List: Arsine.
New Jersey - Right to Know Hazardous Substance List: Arsine.
North Dakota - List of Hazardous Chemicals, Reportable Quantities: No.
Pennsylvania - Hazardous Substance List: Arsine.
Rhode Island - Hazardous Substance List: Arsine.
Texas - Hazardous Substance List: Arsine.
West Virginia - Hazardous Substance List: Arsine.
Wisconsin - Toxic and Hazardous Substances: Arsine.

15. REGULATORY INFORMATION (Continued)

ADDITIONAL U.S. REGULATIONS (continued):

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): This gas is not on the California Proposition 65 lists.

LABELING (For Compressed Gas):

DANGER: PYROPHORIC GAS – CAN SPONTANEOUSLY IGNITE.
POISONOUS, IRRITATING GAS UNDER PRESSURE.
MAY BE FATAL IF INHALED
SYMPTOMS MAY BE DELAYED.
MAY CAUSE FROSTBITE.
Store and use with adequate ventilation.
Cylinder temperature should not exceed 52°C (125°F).
Avoid contamination with product to eyes, skin or clothing.
Close valve after each use and when empty.
Use in accordance with the Material Safety Data Sheet.

FIRST-AID: **IF INHALED or suspicion of any exposure**, remove to fresh air. If not breathing, give artificial respiration and supplemental oxygen. If breathing, give oxygen. Call a physician even if no symptoms are present. Symptoms may be delayed. Consider any exposure as a potentially toxic dose.
IN CASE OF FROSTBITE, obtain immediate medical attention.
Use in accordance with the Material Safety Data Sheet.

POISON

CALL A PHYSICIAN

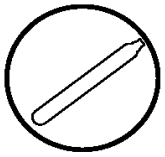
DO NOT REMOVE THIS PRODUCT LABEL.

ADDITIONAL CANADIAN REGULATIONS:

CANADIAN DSL INVENTORY: This gas is listed on the DSL Inventory.

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: This gas is not on the CEPA Priorities Substances Lists.

CANADIAN WHMIS CLASSIFICATION AND SYMBOLS: **Class A:** Compressed Gases
Class B1: Flammable Material
Class D1A: Toxic Material/Immediate and Serious Effects



EUROPEAN COMMUNITY REGULATIONS:

EC LABELING AND CLASSIFICATION: Arsine has the following classification under EC regulations.

EC CLASSIFICATION: [T+]: Very Toxic. [F+]: Extremely Flammable. [Xn]: Harmful. [N]: Dangerous for the Environment.

EC RISK PHRASES: [R: 12]: Extremely flammable. [R: 26]: Very toxic by inhalation. [R: 48/20]: Harmful: Danger of serious damage to the health by prolonged exposure through inhalation. [R: 50]: Very toxic to aquatic organisms. [R:53]: May cause long-term adverse effects in the aquatic environment.

EC SAFETY PHRASES: [S: 1/2]: Keep locked up and out of reach of children. (*This safety phrase can be omitted from the label when the substance or preparation is sold for industrial use only.*) [S: 9]: Keep container in a well-ventilated place. [S: 16]: Keep away from sources of ignition - No smoking. [S: 28]: After contact with skin, wash immediately with plenty of….(to be specified by the manufacturer). [S: 33]: Take precautionary measures against static discharges. [S: 36/37]: Wear suitable protective clothing and gloves. [S: 45]: In case of accident or if you feel unwell, seek medical advice immediately (show label where possible). [S: 60]: This material and its container must be disposed of as hazardous waste. [S: 61]: Avoid release to the environment. Refer to special instructions/Safety data sheets.

15. REGULATORY INFORMATION (Continued)

EUROPEAN COMMUNITY REGULATIONS (continued):

EUROPEAN COMMUNITY ANNEX II HAZARD SYMBOLS:

16. OTHER INFORMATION

PREPARED BY: CHEMICAL SAFETY ASSOCIATES, Inc.
PO Box 3519, La Mesa, CA 91944-3519
619/670-0609

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. ATMI, Inc. assumes no responsibility for injury to the vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, ATMI, Inc. assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these, which are commonly used, include the following:

CAS #: This is the Chemical Abstract Service Number that uniquely identifies each constituent.

EXPOSURE LIMITS IN AIR:

CEILING LEVEL: The concentration that shall not be exceeded during any part of the working exposure.

IDLH-Immediately Dangerous to Life and Health: This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury.

LOQ: Limit of Quantitation.

MAK: Federal Republic of Germany Maximum Concentration Values in the workplace.

NE: Not Established. When no exposure guidelines are established, an entry of NE is made for reference.

NIC: Notice of Intended Change.

NIOSH CEILING: The exposure that shall not be exceeded during any part of the workday. If instantaneous monitoring is not feasible, the ceiling shall be assumed as a 15-minute TWA exposure (unless otherwise specified) that shall not be exceeded at any time during a workday.

NIOSH RELs: NIOSH's Recommended Exposure Limits.

PEL-Permissible Exposure Limit: OSHA's Permissible Exposure Limits. This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL that was vacated by Court Order.

SKIN: Used when a there is a danger of cutaneous absorption.

STEL-Short Term Exposure Limit: Short Term Exposure Limit, usually a 15-minute time-weighted average (TWA) exposure that should not be exceeded at any time during a workday, even if the 8-hr TWA is within the TLV-TWA, PEL-TWA or REL-TWA.

TLV-Threshold Limit Value: An airborne concentration of a substance that represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour.

TWA-Time Weighted Average: Time Weighted Average exposure concentration for a conventional 8-hr (TLV, PEL) or up to a 10-hr (REL) workday and a 40-hr workweek.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS: This rating system was developed by the National Paint and Coating Association and has been adopted by industry to identify the degree of chemical hazards.

HEALTH HAZARD:

0 (Minimal Hazard: No significant health risk, irritation of skin or eyes not anticipated. *Skin Irritation*: Essentially non-irritating. PII or Draize = "0". *Eye Irritation*: Essentially non-irritating, or minimal effects which clear in < 24 hours [e.g. mechanical irritation]. Draize = "0". *Oral Toxicity LD_{50} Rat*: < 5000 mg/kg. *Dermal Toxicity LD_{50}Rat or Rabbit*: < 2000 mg/kg. *Inhalation Toxicity 4-hrs LC_{50} Rat*: < 20 mg/L.); **1** (Slight Hazard: Minor reversible Injury may occur; slightly or mildly irritating. *Skin Irritation*: Slightly or mildly irritating. *Eye Irritation*: Slightly or mildly irritating. *Oral Toxicity LD_{50} Rat*: > 500-5000 mg/kg. *Dermal Toxicity LD_{50}Rat or Rabbit*: > 1000-2000 mg/kg. *Inhalation Toxicity LC_{50}* 4-hrs *Rat*: > 2-20 mg/L); **2** (Moderate Hazard: Temporary or transitory injury may occur. *Skin Irritation*: Moderately irritating; primary irritant; sensitizer. PII or Draize > 0, < 5. *Eye Irritation*: Moderately to severely irritating and/or irritating; reversible corneal opacity; corneal involvement or irritation clearing in 8-21 days. Draize > 0, ≤ 25. *Oral Toxicity LD_{50} Rat*: > 50-500 mg/kg. *Dermal Toxicity LD_{50}Rat or Rabbit*: > 200-1000 mg/kg. *Inhalation Toxicity LC_{50} 4-hrs Rat*: > 0.5-2 mg/L.); **3** (Serious Hazard: Major injury likely unless prompt action is taken and medical treatment is given; high level of toxicity; irritating. *Skin Irritation*: Severely irritating and/or irritating; may destroy dermal tissue, cause skin burns, dermal necrosis. PII or Draize > 5-8 with destruction of tissue. *Eye Irritation*: Irritating, irreversible destruction of ocular tissue; corneal involvement or irritation persisting for more than 21 days. Draize > 80 with effects irreversible in 21 days. *Oral Toxicity LD_{50} Rat*: > 1-50 mg/kg. *Dermal Toxicity LD_{50}Rat or Rabbit*: > 20-200 mg/kg. *Inhalation Toxicity LC_{50} 4-hrs Rat*: > 0.05-0.5 mg/L.); **4** (Severe Hazard: Life-threatening; major or permanent damage may result from single or repeated exposure. *Skin Irritation*: Not appropriate. Do not rate as a "4", based on skin irritation alone. *Eye Irritation*: Not appropriate. Do not rate as a "4", based on eye irritation alone. *Oral Toxicity LD_{50} Rat*: ≤ 1 mg/kg. *Dermal Toxicity LD_{50}Rat or Rabbit*: ≤ 20 mg/kg. *Inhalation Toxicity LC_{50} 4-hrs Rat*: ≤ 0.05 mg/L).

FLAMMABILITY HAZARD:

0 (Minimal Hazard-Materials that will not burn in air when exposure to a temperature of 815.5°C [1500°F] for a period of 5 minutes.); **1** (Slight Hazard-Materials that must be pre-heated before ignition can occur. Material require considerable pre-heating, under all ambient temperature conditions before ignition and combustion can occur, Including: Materials that will burn in air when exposed to a temperature of 815.5°C (1500°F) for a period of 5 minutes or less; Liquids, solids and semisolids having a flash point at or above 93.3°C [200°F] (e.g. OSHA Class IIIB, or; Most ordinary combustible materials [e.g. wood, paper, etc.];

DEFINITIONS OF TERMS (Continued)

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

FLAMMABILITY HAZARD (continued):

2 (Moderate Hazard-Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not, under normal conditions, form hazardous atmospheres in air, but under high ambient temperatures or moderate heating may release vapor in sufficient quantities to produce hazardous atmospheres in air, Including: Liquids having a flash-point at or above 37.8°C [100°F]; Solid materials in the form of course dusts that may burn rapidly but that generally do not form explosive atmospheres; Solid materials in a fibrous or shredded form that may burn rapidly and create flash fire hazards (e.g. cotton, sisal, hemp; Solids and semisolids that readily give off flammable vapors.); **3** (Serious Hazard- Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures, or, unaffected by ambient temperature, are readily ignited under almost all conditions, including: Liquids having a flash point below 22.8°C [73°F] and having a boiling point at or above 38°C [100°F] and below 37.8°C [100°F] [e.g. OSHA Class IB and IC]; Materials that on account of their physical form or environmental conditions can form explosive mixtures with air and are readily dispersed in air [e.g., dusts of combustible solids, mists or droplets of flammable liquids]; Materials that burn extremely rapidly, usually by reason of self-contained oxygen [e.g. dry nitrocellulose and many organic peroxides]);**4** (Severe Hazard-Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air, and which will burn readily, including: Flammable gases; Flammable cryogenic materials; Any liquid or gaseous material that is liquid while under pressure and has a flash point below 22.8°C [73°F] and a boiling point below 37.8°C [100°F] [e.g. OSHA Class IA; Material that ignite spontaneously when exposed to air at a temperature of 54.4°C [130°F] or below [e.g. pyrophoric]).

0 (*Water Reactivity*: Materials that do not react with water. *Organic Peroxides*: Materials that are normally stable, even under fire conditions and will not react with water. *Explosives*: Substances that are Non-Explosive. Unstable *Compressed Gases*: No Rating. *Pyrophorics*: No Rating. *Oxidizers*: No "0" rating allowed. *Unstable Reactives*: Substances that will not polymerize, decompose, condense or self-react.); **1** (*Water Reactivity*: Materials that change or decompose upon exposure to moisture. *Organic Peroxides*: Materials that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. *Explosives*: Division 1.5 & 1.6 substances that are very insensitive explosives or that do not have a mass explosion hazard. *Compressed Gases*: Pressure below OSHA definition. *Pyrophorics*: No Rating. *Oxidizers*: Packaging Group III; Solids: any material that in either concentration tested, exhibits a mean burning time less than or equal to the mean burning time of a 3:7 potassium bromate/cellulose mixture and the criteria for Packing Group I and II are not met. Liquids: any material that exhibits a mean pressure rise time less than or equal to the pressure rise time of a 1:1 nitric acid (65%)/cellulose mixture and the criteria for Packing Group I and II are not met. *Unstable Reactives*: Substances that may decompose, condense or self-react, but only under conditions of high temperature and/or pressure and have little or no potential to cause significant heat generation or explosive hazard. Substances that readily undergo hazardous polymerization in the absence of inhibitors.);**2** (*Water Reactivity*: Materials that may react violently with water. *Organic Peroxides*: Materials that, in themselves, are normally unstable and will readily undergo violent chemical change, but will not detonate. These materials may also react violently with water. *Explosives*: Division 1.4 – Explosive substances where the explosive effect are largely confined to the package and no projection of fragments of appreciable size or range are expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package. *Compressed Gases*: Pressurized and meet OSHA definition but < 514.7 psi absolute at 21.1°C (70°F) [500 psig].

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

PHYSICAL HAZARD (continued):

2 (continued): *Pyrophorics*: No Rating. *Oxidizers*: Packing Group II Solids: any material that, either in concentration tested, exhibits a mean burning time of less than or equal to the mean burning time of a 2:3 potassium bromate/cellulose mixture and the criteria for Packing Group I are not met. Liquids: any material that exhibits a mean pressure rise time less than or equal to the pressure rise of a 1:1 aqueous sodium chlorate solution (40%)/cellulose mixture and the criteria for Packing Group I are not met. *Unstable Reactives*: Substances that may polymerize, decompose, condense, or self-react at ambient temperature and/or pressure, but have a low potential for significant heat generation or explosion. Substances that readily form peroxides upon exposure to air or oxygen at room temperature); **3** (*Water Reactivity*: Materials that may form explosive reactions with water. *Organic Peroxides*: Materials that are capable of detonation or explosive reaction, but require a strong initiating source, or must be heated under confinement before initiation; or materials that react explosively with water. *Explosives*: Division 1.2 – Explosive substances that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but do not have a mass explosion hazard. *Compressed Gases*: Pressure ≥ 514.7 psi absolute at 21.1°C (70°F) [500 psig]. *Pyrophorics*: No Rating. *Oxidizers*: Packing Group I Solids: any material that, in either concentration tested, exhibits a mean burning time less than the mean burning time of a 3.:2 potassium bromate/cellulose mixture. Liquids: Any material that spontaneously ignites when mixed with cellulose in a 1:1 ratio, or which exhibits a mean pressure rise time less than the pressure rise time of a 1:1 perchloric acid (50%)/cellulose mixture. *Unstable Reactives*: Substances that may polymerize, decompose, condense or self-react at ambient temperature and/or pressure and have a moderate potential to cause significant heat generation or explosion.); **4** (*Water Reactivity*: Materials that react explosively with water without requiring heat or confinement. *Organic Peroxides*: Materials that are readily capable of detonation or explosive decomposition at normal temperature and pressures. *Explosives*: Division 1.1 & 1.2-explosive substances that have a mass explosion hazard or have a projection hazard. A mass explosion is one that affects almost the entire load instantaneously. *Compressed Gases*: No Rating. *Pyrophorics*: Add to the definition of Flammability "4". *Oxidizers*: No "4" rating. *Unstable Reactives*: Substances that may polymerize, decompose, condense or self-react at ambient temperature and/or pressure and have a high potential to cause significant heat generation or explosion.).

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS:

HEALTH HAZARD: **0** (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); **1** (materials that on exposure under fire conditions could cause irritation or minor residual injury); **2** (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); **3** (materials that can on short exposure could cause serious temporary or residual injury); **4** (materials that under very short exposure could cause death or major residual injury).

FLAMMABILITY HAZARD: **0** Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand. **1** Materials that must be preheated before ignition can occur. Materials in this degree require considerable preheating, under all ambient temperature conditions, before ignition and combustion can occur **2** Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not under normal conditions form hazardous atmospheres with air, but under high ambient temperatures or under moderate heating could release vapor in sufficient quantities to produce hazardous atmospheres with air. **3** Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures or, though unaffected by ambient temperatures, are readily ignited under almost all conditions. **4** Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air and will burn readily.

DEFINITIONS OF TERMS (Continued)

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

INSTABILITY HAZARD: **0** Materials that in themselves are normally stable, even under fire conditions. **1** Materials that in themselves are normally stable, but that can become unstable at elevated temperatures and pressures. **2** Materials that readily undergo violent chemical change at elevated temperatures and pressures. **3** Materials that in themselves are capable of detonation or explosive decomposition or explosive reaction, but that require a strong initiating source or that must be heated under confinement before initiation. **4** Materials that in themselves are readily capable of detonation or explosive decomposition or explosive reaction at normal temperatures and pressures.

FLAMMABILITY LIMITS IN AIR: Much of the information related to fire and explosion is derived from the **N**ational **F**ire **P**rotection **A**ssociation (**NFPA**). Flash Point - Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. Autoignition Temperature: The minimum temperature required to initiate combustion in air with no other source of ignition. LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:

Human and Animal Toxicology: Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD_{50}** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC_{50}** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m^3** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **Cancer Information:** The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. **Other Information: BEI** - ACGIH Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV.

ECOLOGICAL INFORMATION:

EC is the effect concentration in water. **BCF** = Bioconcentration Factor, which is used to determine if a substance will concentrate in lifeforms which consume contaminated plant or animal matter. **TL_m** = median threshold limit; Coefficient of Oil/Water Distribution is represented by **log K_{ow}** or **log K_{oc}** and is used to assess a substance's behavior in the environment.

REGULATORY INFORMATION:

U.S. and CANADA:

ACGIH: American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits.

This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. **O**ccupational **S**afety and **H**ealth **A**dministration (**OSHA**). **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. Superfund Amendments and Reauthorization Act **(SARA)**; the Canadian Domestic/Non-Domestic Substances List **(DSL/NDSL)**; the U.S. Toxic Substance Control Act **(TSCA)**; Marine Pollutant status according to the **DOT**; the Comprehensive Environmental Response, Compensation, and Liability Act **(CERCLA or Superfund)**; and various state regulations. This section also includes information on the precautionary warnings which appear on the material's package label. **OSHA** - U.S. Occupational Safety and Health Administration. **EU,** European Union).

EUROPE:

EINECS: This the European Inventory of Now-Existing Chemical Substances. The **ARD** is the European Agreement Concerning the International Carriage of Dangerous Goods by Road and the **RID** are the International Regulations Concerning the Carriage of Dangerous Goods by Rail.

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PHOSGENE

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

PHOSGENE

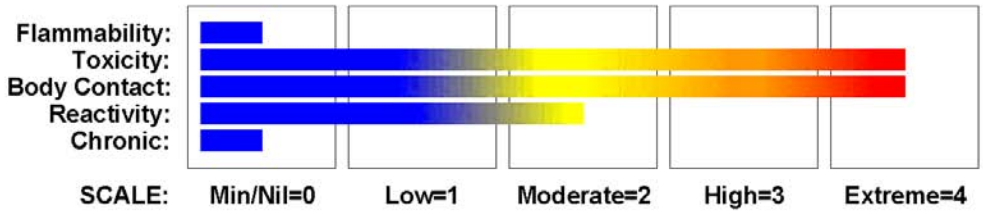
STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

SUPPLIER

ChemWatch Pty Ltd
Toll Free +800 2436 2255
Email chemwatch@chemwatch.net

HAZARD RATINGS



PRODUCT USE

Organic synthesis, especially of isocyanates, polyurethane and poly-carbonate resins, carbamates, organic carbonates and chloroformates, pesticides, herbicides and dye manufacture.

SYNONYMS

C-O-Cl2
carbonic acid dichloride
carbonyl chloride
chloroformyl chloride
carbon oxychloride
carbon dichloride oxide
diphosgene
Combat gas
CG

Section 2 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
phosgene	75-44-5	> 99

continued...

Section 3 - HAZARDS IDENTIFICATION

CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW

RISK

Reacts violently with water.
Very toxic by inhalation.
Causes burns.
Risk of serious damage to eyes.
Skin contact may produce health damage*.
Risk of explosion if heated under confinement.
* (limited evidence).

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion.

EYE

If applied to the eyes, this material causes severe eye damage.
Although the material is not thought to be an irritant, direct contact with the eye may produce transient discomfort characterized by tearing or conjunctival redness (as with windburn).

SKIN

Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.
The material is not thought to be a skin irritant (as classified using animal models). Temporary discomfort, however, may result from prolonged dermal exposures. Good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.

INHALED

Very toxic by inhalation.
The material is not thought to produce respiratory irritation (as classified using animal models). Nevertheless inhalation of the material, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.

CHRONIC HEALTH EFFECTS

Primary route of exposure is usually by inhalation of vapour

continued...

Section 3 - HAZARDS IDENTIFICATION ...

The extremely short half life in aqueous solution (0.026 secs), with rapid release of hydrochloric acid means no significant retention of phosgene in the body is possible.
Odour fatigue and development of tolerance may be trigger for chronic effects of emphysema and fibrosis [RCS Phosgene 119].

Section 4 - FIRST AID MEASURES

SWALLOWED

DO NOT induce vomiting.
Observe the patient carefully.
Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
Give water (or milk) to rinse out mouth. Then provide liquid slowly and as much as casualty can comfortably drink.
Transport to hospital or doctor without delay.

EYE

If this product comes in contact with the eyes:
Immediately hold the eyes open and wash continuously for at least 15 minutes with fresh running water.
Ensure irrigation under eyelids by occasionally lifting the upper and lower lids.
Transport to hospital or doctor without delay.
Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

If this product comes in contact with the skin:
Immediately flush body and clothes with large amounts of water, using safety shower if available.
Quickly remove all contaminated clothing, including footwear.
Wash affected areas with water (and soap if available) for at least 15 minutes.
Transport to hospital, or doctor.

INHALED

If fumes or combustion products are inhaled:
Remove to fresh air. Lay patient down. Keep warm and rested.
If available, administer medical oxygen by trained personnel.
If breathing is shallow or has stopped, ensure clear airway and apply resuscitation.
Transport to hospital, or doctor, without delay.

NOTES TO PHYSICIAN

Toxic effects of phosgene may be delayed and any person exposed to phosgene should be medically observed for onset of symptoms for at least 24 hours.
In the absence of special detector badges worn by workers, there is no way of knowing the extent of phosgene exposure. But if one waits for the appearance of symptoms, pulmonary oedema may be lethal. Consequently, any exposed person must be treated as if the exposure is life threatening. person should be kept at rest and given a glucocorticoid anti-inflammatory medication, and should be given oxygen-enriched air. [Patty's]

continued...

Section 4 - FIRST AID MEASURES ...

Section 5 - FIRE FIGHTING MEASURES

Flash Point (°F): Non combustible
Lower Explosive Limit (%): Not applicable.
Upper Explosive Limit (%): Not applicable.
Autoignition Temp (°F): Not applicable.

EXTINGUISHING MEDIA

Water spray or fog.
Foam.
Dry agent.
Carbon dioxide.

FIRE FIGHTING

Alert Emergency Responders and tell them location and nature of hazard.
Wear full body protective clothing with breathing apparatus.
Prevent, by any means available, spillage from entering drains or water course.
Consider evacuation (or protect in place).
Use fire fighting procedures suitable for surrounding area.
Water spray or fog may be used to disperse vapour.
DO NOT approach containers suspected to be hot.
Cool fire exposed containers with water spray from a protected location.
If safe to do so, remove containers from path of fire.
Equipment should be thoroughly decontaminated after use.
When any large container (including road and rail tankers) is involved in a fire, consider evacuation by 4921 feet in all directions.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

Non flammable gas
Heating may cause expansion or decomposition leading to violent rupture of containers releasing gaseous phosgene.
In the presence of moisture, it is corrosive to most metals, and produces hydrogen which is flammable and may cause an explosive mixture with air.
Reacts with water or steam to produce toxic and corrosive fumes of HCl.
Decomposes on heating and produces toxic fumes of chlorine and carbon monoxide (CO).

FIRE INCOMPATIBILITY

Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous
Avoid reaction with water, ammonia, alcohols, phenols, amines, powdered aluminium, potassium, sodium and lithium.

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

Refer to major spills.

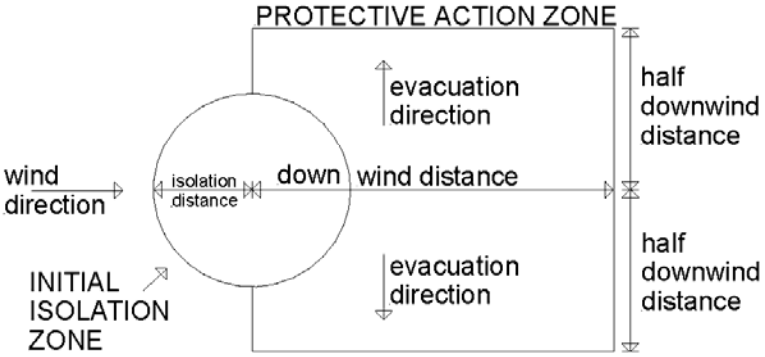
continued...

Section 6 - ACCIDENTAL RELEASE MEASURES ...

MAJOR SPILLS

Alert Fire Brigade and tell them location and nature of hazard.
Clear area of all unprotected personnel and move upwind.
Wear full body protective clothing with breathing apparatus. Prevent, by any means available, spillage from entering drains or water courses. Consider evacuation. Increase ventilation. Stop leak if safe to do so.
Water spray or fog may be used to disperse vapour. DO NOT spray water directly on liquid spills.
Remove leaking cylinders to a safe place. Release pressure under safe controlled conditions by opening the valve. Ammonia and sodium hydroxide solution have been reported to be useful in neutralising phosgene gas.
Contain liquid spills with sand, earth or vermiculite.
Use soda ash or slaked lime to neutralise.
If contamination of drains or waterways occurs, advise emergency services.
After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.

PROTECTIVE ACTIONS FOR SPILL



From US Emergency Response Guide 2000
Guide 125

SMALL SPILLS

Name	Isolation Distance	Downwind Day	Protection Night
CG (when used as a weapon)	500 ft (155 m)	0.8 miles (1.3 km)	2 miles (3.2 km)
DP (when used as a weapon)	200 ft (60 m)	0.2 miles (0.3 km)	0.6 miles (1 km)
Diphosgene	200 ft (60 m)	0.1 miles (0.2 km)	0.3 miles (0.5 km)
Phosgene	300 ft (95 m)	0.5 miles (0.8 km)	1.7 miles (2.7 km)

LARGE SPILLS

Name	Isolation Distance	Downwind Day	Protection Night
CG (when used as a weapon)	2500 ft (765 m)	4.5 miles (7.2 km)	(7.0+ miles (11.0+ kr
DP (when used as a weapon)	600 ft (185 m)	1 miles (1.6 km)	2.8 miles (4.5 km)
Diphosgene	300 ft (95 m)	0.6 miles (1 km)	1.2 miles (1.9 km)
Phosgene	2500 ft (765 m)	4.1 miles (6.6 km)	6.9 miles (11 km)

From IERG (Canada/Australia)

Isolation Distance	100 meters
Downwind Protection Distance	800 meters

continued...

Section 6 - ACCIDENTAL RELEASE MEASURES ...

FOOTNOTES
1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.
2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.
3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.
4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills".
LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.
5 Guide 125 is taken from the US DOT emergency response guide book.
6 IERG information is derived from CANUTEC - Transport Canada.

EMERGENCY RESPONSE PLANNING GUIDLINES (ERPG)

The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour WITHOUT experiencing or developing

life-threatening health effects is	1 ppm
irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is	0.2 ppm
other than mild, transient adverse effects without perceiving a clearly defined odour is	N/A ppm

American Industrial Hygiene Association (AIHA)

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.
Use good occupational work practice.
Avoid breathing vapours and contact with skin and eyes
Wear personal protective equipment when handling
Use in a well-ventilated area
Use only in completely enclosed system.

continued...

Section 7 - HANDLING AND STORAGE ...

Avoid contact with incompatible materials.
Wear personal protective equipment when handling
Keep containers securely sealed when not in use
When handling, DO NOT eat, drink or smoke.
Handle and open container with care
Avoid physical damage to containers.
until atmosphere has been checked.
Always wash hands with soap and water after handling. Work clothes should be laundered separately.

RECOMMENDED STORAGE METHODS

Check that containers are clearly labele
Packaging as recommended by manufacturer.
Cylinder Ensure the use of equipment rated for cylinder pressure . Ensure the use of compatible materials of construction. Valve protection cap to be in place until cylinder is secured, connected. Cylinder must be properly secured either in use or in storage. Cylinder valve must be closed when not in use or when empty. Segregate full from empty cylinders. WARNING: Suckback into cylinder may result in rupture. Use back-flow preventive device in piping.
Cylinder fitted with valve protector cap.
Ensure the use of equipment rated for cylinder pressure.
Ensure the use of compatible materials of construction.
Cylinder valve must be closed when not in use or when empty.
Cylinder must be properly secured either in use or in storage.
WARNING: Suckback into cylinder may result in rupture.
Use back-flow preventive device in piping.

STORAGE REQUIREMENTS

Observe manufacturer's storing and handling recommendations.
Store in a cool, dry place.
Outside or detached storage is preferred.
Store in a well-ventilated area.
Store away from incompatible materials.
Store away from foodstuff containers.
DO NOT store in pits, depressions, basements or areas where vapours may be trapped
Keep containers securely sealed
Protect containers against physical damage
Check regularly for gas leaks.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

SUMMARY:

TLV TWA: 0.1 ppm [ACGIH]
PEL TWA: 0.1 ppm, 0.4 mg/m³ [OSHA Z1]

continued...

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION ...

DETAILS:

TLV TWA: 0.1 ppm, 0.4 mg/m³
ES TWA: 0.1 ppm, 0.4 mg/m³
PROPOSED CHANGE
ES TWA 0.02 ppm, 0.08 mg/m³; STEL 0.06 ppm, 0.25 mg/m³
OES TWA: 0.02 ppm, 0.08 mg/m³; STEL: 0.06 ppm, 0.25 mg/m³
NIOSH REL-TWA: 0.1 ppm; C: 0.2 ppm/15min. [NIOSH, 1985].
IDLH Level: 2 ppm
Odour Threshold: 0.9 ppm
At 1.2 ppm, 39% of subjects detect a "musty hay" or "green corn odour". None could detect it at 0.4 ppm.
Develops a pungent, irritating odour at 2 ppm.

Response	Concentration (ppm)
Maximum amount for prolonged exposure	1
Dangerous to life, for prolonged exposure	1.25-2.5
Cough or other subjective symptoms within 1 min	5
Irritation of eyes and respiratory tract in < 1 min	10
Dangerous to life in 30 to 60 min	12.5
Severe lung injury within 1 to 2 min	20
Dangerous to life for as little as 30 min	25
Rapidly fatal (30 min or less)	90 [Patty's]

NOTE: Detector tubes for phosgene, measuring in excess of 0.04 ppm, are commercially available.
The recommended exposure value recognises the potential for pulmonary irritation after exposure to concentrations of phosgene slightly greater to 0.1 ppm but to which tolerance may develop. It is noted that subsequent exposures can induce tolerance against pulmonary irritation from concentrations permitted under the excursion limits criteria.

PERSONAL PROTECTION

Consult your EHS staff for recommendations

EYE
Close fitting gas tight goggles
DO NOT wear contact lenses.
Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

HANDS/FEET
Neoprene gloves
Rubber gloves
Impervious gloves
Rubber boots

continued...

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION ...

WARNING: Rescuers must use protective equipment.

OTHER
Rubber apron
Impervious protective clothing
Eyewash unit.
Ensure there is ready access to a safety shower

RESPIRATOR
Where the concentration of gas/particulates in the breathing zone, approaches or exceeds the OSHA Permissible Exposure Limit (or PEL), respiratory protection is required.
Degree of protection varies with both face-piece and Class of filter; the nature of protection varies with Type of filter.

Protection Factor	Half-Face Respirator	Full-Face Respirator	Powered Air Respirator
10 x PEL	B-1	-	B-PAPR-1
50 x PEL	-	B-1	-
100 x PEL	-	B-2	B-PAPR-2 ^

^ - Full-face
Explanation of Respirator Codes:

Class 1	low to medium absorption capacity filters.
Class 2	medium absorption capacity filters.
Class 3	high absorption capacity filters.
Type A	for use against certain organic gases and vapors.
Type AX	for use against low boiling point organic compounds (less than 65ºC).
Type B	for use against certain inorganic gases and other acid gases and vapors.
Type E	for use against sulfur dioxide and other acid gases and vapors.
Type K	for use against ammonia and organic ammonia derivatives
Class P1	intended for use against mechanically generated particulates of sizes most commonly encountered in industry, e.g. asbestos, silica.
Class P2	intended for use against both mechanically and thermally generated particulates, e.g. metal fume.
Class P3	intended for use against all particulates containing highly toxic materials, e.g. beryllium.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.
Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

ENGINEERING CONTROLS

Full-face air supplied breathing apparatus.
Phosgene will not be adequately absorbed by an organic vapour respirator.

[NSW D.I.R. 3-1982]

continued...

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Gas.
Does not mix with water.
Sinks in water.
Corrosive.
Toxic or noxious vapors/ gas.
Reacts violently with water.

Molecular Weight: 98.92
Boiling Range (°F): 45.68
Melting Range (°F): 32
Specific Gravity (water=1): 1.381 @ 20 C.
Solubility in water (g/L): Immiscible
pH (as supplied): Not applicable
pH (1% solution): Not applicable
Evaporation Rate: Not available
State: Compressed gas

Vapor Pressure (kPa): 162 @ 20 C
Volatile Component (%vol): 100
Relative Vapor Density (air=1): 3.4 @ 20 C.
Flash Point (°F): Non combustible
Lower Explosive Limit (%): Not applicable.
Upper Explosive Limit (%): Not applicable.
Autoignition Temp (°F): Not applicable.
Decomposition Temp (°F): > 572

APPEARANCE

Colourless, poisonous, non-flammable gas or volatile liquid with a characteristic sweet odour of musty hay.
Slightly soluble in water and is hydrolysed to carbon dioxide and hydrochloric acid; corrosive in the presence of water and reacts with most metals to produce hydrogen.
Freely soluble in benzene, toluene, glacial acetic acid, liquid hydrocarbons
Note: All chlorinated hydrocarbon liquids in a fire evolve phosgene.

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

Presence of incompatible materials
Stable under normal storage conditions
Product is considered stable under normal handling conditions
Hazardous polymerisation will not occur.

STORAGE INCOMPATIBILITY

Avoid reaction with oxidizing agents
Segregate from alcohol, water.
Avoid strong bases.
Acyl halides tend to react violently with protic organic solvents, water, and the aprotic solvents, dimethylformamide and dimethyl sulfoxide. Their facile reaction with ethers is also potentially dangerous. In the absence of diluent or other effective control of reaction rate, These violent reactions may be explained in terms of exothermic polymerisation of formaldehyde which is formed under a variety of conditions by interaction of the sulfoxide with reactive halides.
BRETHERICK L.: Handbook of Reactive Chemical Hazards
Avoid storage with ammonia, phenols, amines, powdered aluminium,

continued...

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION ...

potassium, sodium and lithium.

Section 11 - TOXICOLOGICAL INFORMATION

phosgene

unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances

TOXICITY	IRRITATION
Inhalation (human) LC50: 3300 mg/m3	Nil reported
Inhalation (human) LCLo: 50 ppm/5m	
Inhalation (man) LCLo: 360 mg/m3/30m	
Inhalation (human) TCLo: 25 ppm/30m	
Inhalation (rat) LC50: 1400 mg/m3/30m	

Section 12 - ECOLOGICAL INFORMATION

Hazardous Air Pollutant: Yes
Half-life Soil - High (hours): 1
Half-life Soil - Low (hours): 0.05
Half-life Air - High (hours): 7.20E+14
Half-life Air - Low (hours): 989880
Half-life Surface water - High (hours): 1
Half-life Surface water - Low (hours): 0.05
Half-life Ground water - High (hours): 1
Half-life Ground water - Low (hours): 0.05
Aqueous biodegradation - Aerobic - High (hours): 672
Aqueous biodegradation - Aerobic - Low (hours): 168
Aqueous biodegradation - Anaerobic - High (hours): 2688
Aqueous biodegradation - Anaerobic - Low (hours): 672
Photolysis maximum light absorption - High (nano-m): 274.5
Photolysis maximum light absorption - Low (nano-m): 234.2
First order hydrolysis half-life (hours): 1.9
Hydrolysis in Air - High (hours): 7.20E+14
Hydrolysis in Air - Low (hours): 989880

Toxicity Fish: LD50(24) 60mg/L

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

A. General Product Information

Corrosivity characteristic: use EPA hazardous waste number D002 (waste code C)

B. Component Waste Numbers

When phosgene is present as a solid waste as a discarded commercial chemical product, off-specification species, as a container residue, or a spill residue,

continued...

Section 13 - DISPOSAL CONSIDERATIONS ...

use EPA waste number P095 (waste code T).

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.
Consult manufacturer for recycling options.
Consult Waste Management Authority for disposal.
Treat and neutralise at an effluent treatment plant.
Bury residue in an authorized landfill.
Recycle containers if possible, or dispose of in an authorized landfill.

Section 14 - TRANSPORTATION INFORMATION

DOT Information
Shipping Name: PHOSGENE
CARBONYL CHLORIDE
Hazard Class: 2.3
UN/NA Number: 1076
Packing Group: None
Labels Required: toxic gas,corrosive
Additional Shipping Information:
International Transport Regulations:
IMO: 2.3, 8 IMDG Page Number: 2172

Section 15 - REGULATORY INFORMATION

US Federal Regulations

A. General Product Information
In addition to Federal and State regulation, local regulations may apply. Check with your local regulatory authorities.

The substance (phosgene) appears on the TSCA Inventory

B. Component Information
This material contains one or more of the following chemicals required to be identified under SARA Section 302 (40 CFR 455 Appendix A) SARA Section 313 (40 CFR 372.65) and/or CERCLA (40 CFR 302.4):
- -
phosgene (75-44-5,>99%)
SARA 313: form R reporting required for 1.0% de minimus concentration

continued...

Section 15 - REGULATORY INFORMATION ...

CERCLA: final RQ = 10 pounds (4.54 kg)
- -

State Regulations

A. General Product Information
No component(s) require labeling under California Proposition 65

B. Component Information
The following components appear on one or more of the following state hazardous substance lists.

Component	CAS No	CA	FL	MA	MN	NJ	PA
phosgene	75-44-5	Y	Y	Y	Y	Y	Y

Other Regulations

A. General Product Information
Component listed in the European Inventory of New and Existing Chemical Substances (EINECS)
B. Component Information
CANADA

Component	CAS No	%	Min Conc.
phosgene	75-44-5	> 99	1% item 1289 (1390)

Component found on the Canadian Domestic Substances List.

Section 16 - OTHER INFORMATION

Reasonable care has been taken in the preparation of this information, but the author makes no warranty of merchantability or any other warranty, expressed or implied, with respect to this information. The author makes no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use. For additional technical information please call our toxicology department on +800 CHEMCALL.

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CYANOGEN CHLORIDE ICSC: 1053 CYANOGEN CHLORIDE
Chlorine cyanide
Chlorocyanide
Chlorocyanogen
(cylinder)
ClCN
Molecular mass: 61.5
CAS # 506-77-4
RTECS # GT2275000
ICSC # 1053
UN # 1589 (inhibited)
TYPES OF
HAZARD/
EXPOSURE ACUTE HAZARDS/
SYMPTOMS PREVENTION FIRST AID/
FIRE FIGHTING FIRE Not combustible. Heating will cause rise in pressure with risk of bursting. Gives off irritating or toxic fumes (or gases) in a fire.

In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION

In case of fire: keep cylinder cool by spraying with water but NO direct contact with water.
EXPOSURE
AVOID ALL CONTACT!

• INHALATION Confusion. Drowsiness. Nausea. Sore throat. Unconsciousness. Vomiting. Symptoms may be delayed (see Notes).
Local exhaust or breathing protection.
Fresh air, rest. Half-upright position. Artificial respiration if indicated. Refer for medical attention.
• SKIN Redness. Pain. THE LIQUID MAY BE ABSORBED! ON CONTACT WITH LIQUID: FROSTBITE.

Cold-insulating gloves. Protective clothing.
ON FROSTBITE: rinse with plenty of water, do NOT remove clothes. Refer for medical attention.
• EYES ON CONTACT WITH LIQUID: FROSTBITE. Redness. Pain.
Safety goggles, face shield, or eye protection in combination with breathing protection.
First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• INGESTION

SPILLAGE DISPOSAL STORAGE PACKAGING & LABELLING Evacuate danger area! Consult an expert! Ventilation. Contain or absorb leaking liquid with sand or inert absorbent. Do NOT wash away into sewer. NEVER direct water jet on liquid. Remove vapour cloud with fine water spray (extra personal protection: complete protective clothing including self-contained breathing apparatus).
Fireproof if in building. Cool.

UN Hazard Class: 2.3
Marine pollutant.
SEE IMPORTANT INFORMATION ON BACK ICSC: 1053 Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities © IPCS CEC 1993

International Chemical Safety Cards

CYANOGEN CHLORIDE ICSC: 1053
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PHYSICAL STATE; APPEARANCE:
COLOURLESS, COMPRESSED LIQUEFIED GAS , WITH PUNGENT ODOUR.

PHYSICAL DANGERS:
The gas is heavier than air.

CHEMICAL DANGERS:
The substance may polymerize violently if contaminated with hydrogen chloride or ammonium chloride. The substance decomposes on heating producing toxic and corrosive fumes (hydrogen cyanide, hydrochloric acid, nitrogen oxides). Reacts slowly with water or water vapour to form hydrogen chloride. Attacks copper and brass.

OCCUPATIONAL EXPOSURE LIMITS (OELs):
TLV: 0.3 ppm; 0.75 mg/m3 (as CEILING) (ACGIH 1992-1993).

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation.

INHALATION RISK:
A harmful concentration of this gas in the air will be reached very quickly on loss of containment.

EFFECTS OF SHORT-TERM EXPOSURE:
Tear drawing. The substance severely irritates the eyes, the skin and the respiratory tract. Inhalation of the substance may cause lung oedema (see Notes). Rapid evaporation of the liquid may cause frostbite. Exposure above the OEL may result in death. The effects may be delayed. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
PHYSICAL

PROPERTIES

Boiling point: 13.8°C

Melting point: -6°C

Relative density (water = 1): 1.186

Solubility in water: soluble (2500 ml/100 ml at 20°C)

Vapour pressure, kPa at 21.1°C: 1987

Relative vapour density (air = 1): 2.16

ENVIRONMENTAL

DATA

NOTES The applying occupational exposure limit value should not be exceeded during any part of the working exposure. The symptoms of lung oedema often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Immediate administration of an appropriate spray, by a doctor or a person authorized by him/her, should be considered. Specific treatment is necessary in case of poisoning with this substance; the appropriate means with instructions must be available. Do NOT spray water on leaking cylinder (to prevent corrosion of cylinder). Turn leaking cylinder with the leak up to prevent escape of gas in liquid state.

Transport Emergency Card: TEC (R)-801

ADDITIONAL INFORMATION

ICSC: 1053 CYANOGEN CHLORIDE © IPCS, CEC, 1993 IMPORTANT LEGAL NOTICE: Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.

ANNEX D

HAZARDOUS WASTE MANIFEST FORMS AND INSTRUCTIONS AND OTHER TRANSPORTATION FORMS

ANNEX D
HAZARDOUS WASTE MANIFEST FORMS AND INSTRUCTIONS AND OTHER TRANSPORTATION FORMS

The following pages provide the following forms and instructions to support the transportation and storage of chemical warfare materiel (CWM):

- Hazardous Waste Manifest Forms and Instructions
- DD Form 626 Motor Vehicle Inspection
- DD Form 1911, Materiel Courier Receipt.

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator ID Number | 2. Page 1 of | 3. Emergency Response Phone | **4. Manifest Tracking Number**

GENERATOR

5. Generator's Name and Mailing Address | Generator's Site Address (if different than mailing address)

Generator's Phone:

6. Transporter 1 Company Name | U.S. EPA ID Number

7. Transporter 2 Company Name | U.S. EPA ID Number

8. Designated Facility Name and Site Address | U.S. EPA ID Number

Facility's Phone:

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	13. Waste Codes
	1.					
	2.					
	3.					
	4.					

14. Special Handling Instructions and Additional Information

15. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent.
I certify that the waste minimization statement identified in 40 CFR 262.27(a) (if I am a large quantity generator) or (b) (if I am a small quantity generator) is true.

Generator's/Offeror's Printed/Typed Name | Signature | Month | Day | Year

INT'L

16. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:

Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

17. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name | Signature | Month | Day | Year

Transporter 2 Printed/Typed Name | Signature | Month | Day | Year

DESIGNATED FACILITY

18. Discrepancy

18a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

18b. Alternate Facility (or Generator) | U.S. EPA ID Number

Facility's Phone:

18c. Signature of Alternate Facility (or Generator) | Month | Day | Year

19. Hazardous Waste Report Management Method Codes (i.e., codes for hazardous waste treatment, disposal, and recycling systems)

1. | 2. | 3. | 4.

20. Designated Facility Owner or Operator: Certification of receipt of hazardous materials covered by the manifest except as noted in Item 18a

Printed/Typed Name | Signature | Month | Day | Year

EPA Form 8700-22 (Rev. 3-05) Previous editions are obsolete.

DESIGNATED FACILITY TO DESTINATION STATE (IF REQUIRED)

VOID

Note: Emergency Response phone number information should only be entered in Item 3 when there is one phone number that applies to all the waste materials described in Item 9b. If a situation (*e.g.*, consolidated shipments) arises where more than one Emergency Response phone number applies to the various wastes listed on the manifest, the phone numbers associated with each specific material should be entered after its description in Item 9b.

Item 4. Manifest Tracking Number

This unique tracking number must be pre-printed on the manifest by the forms printer.

Item 5. Generator's Mailing Address, Phone Number and Site Address

Enter the name of the generator, the mailing address to which the completed manifest signed by the designated facility should be mailed, and the generator's telephone number. Note, the telephone number (including area code) should be the normal business number for the generator, or the number where the generator or his authorized agent may be reached to provide instructions in the event the designated and/or alternate (if any) facility rejects some or all of the shipment. Also enter the physical site address from which the shipment originates only if this address is different than the mailing address.

Item 6. Transporter 1 Company Name, and U.S. EPA ID Number

Enter the company name and U.S. EPA ID number of the first transporter who will transport the waste. Vehicle or driver information may not be entered here.

Item 7. Transporter 2 Company Name and U.S. EPA ID Number

If applicable, enter the company name and U.S. EPA ID number of the second transporter who will transport the waste. Vehicle or driver information may not be entered here.

If more than two transporters are needed, use a continuation sheet(s) (EPA Form 8700-22A).

Item 8. Designated Facility Name, Site Address, and U.S. EPA ID Number

Enter the company name and site address of the facility designated to receive the waste listed on the manifest. Also enter the facility's phone number and the U.S. EPA twelve-digit identification number of the facility.

Item 9. U.S. DOT Description (Including Proper Shipping Name, Hazard Class or Division, Identification Number, and Packing Group)

> *Item 9a.* If the wastes identified in Item 9b consist of both hazardous and nonhazardous materials, then identify the hazardous materials by entering an "X" in this Item next to the corresponding hazardous material identified in Item 9b.
>
> *Item 9b.* Enter the U.S. DOT Proper Shipping Name, Hazard Class or Division,

Identification Number (UN/NA) and Packing Group for each waste as identified in 49 CFR 172. Include technical name(s) and reportable quantity references, if applicable.

Note: If additional space is needed for waste descriptions, enter these additional descriptions in Item 27 on the continuation sheet (EPA Form 8700-22A). Also, if more than one Emergency Response phone number applies to the various wastes described in either Item 9b or Item 27, enter applicable Emergency Response phone numbers immediately following the shipping descriptions for those Items.

Item 10. Containers (Number and Type)

Enter the number of containers for each waste and the appropriate abbreviation from Table I (below) for the type of container.

Table I - Types of Containers

BA = Burlap, cloth, paper, or plastic bags.	DT = Dump truck.
CF = Fiber or plastic boxes, cartons, cases.	DW = Wooden drums, barrels, kegs.
CM = Metal boxes, cartons, cases (including roll-offs).	HG = Hopper or gondola cars.
CW = Wooden boxes, cartons, cases.	TC = Tank cars.
CY = Cylinders.	TP = Portable tanks
DF = Fiberboard or plastic drums, barrels, kegs.	TT = Cargo tanks (tank trucks).
DM = Metal drums, barrels, kegs.	

Item 11. Total Quantity

Enter, in designated boxes, the total quantity of waste. Round partial units to the nearest whole unit, and do not enter decimals or fractions. To the extent practical, report quantities using appropriate units of measure that will allow you to report quantities with precision. Waste quantities entered should be based on actual measurements or reasonably accurate estimates of actual quantities shipped. Container capacities are not acceptable as estimates.

Item 12. Units of Measure (Weight/Volume)

Enter, in designated boxes, the appropriate abbreviation from Table II (below) for the unit of measure.

Table II - Units of Measure

G = Gallons (liquids only)	N = Cubic Meters
K = Kilograms	P = Pounds
L = Liters (liquids only)	T = Tons (2000 Pounds)
M = Metric Tons (1000 Kilograms)	Y = Cubic Yards

Note: Tons, Metric Tons, Cubic Meters, and Cubic Yards should only be reported in connection with very large bulk shipments, such as rail cars, tank trucks, or barges.

Item 13. Waste Codes

Enter up to six federal and state waste codes to describe each waste stream identified in Item 9b. State waste codes that are not redundant with federal codes must be entered here, in addition to the federal waste codes which are most representative of the properties of the waste.

Item 14. Special Handling Instructions and Additional Information

1. Generators may enter any special handling or shipment-specific information necessary for the proper management or tracking of the materials under the generator's or other handler's business processes, such as waste profile numbers, container codes, bar codes, or response guide numbers. Generators also may use this space to enter additional descriptive information about their shipped materials, such as chemical names, constituent percentages, physical state, or specific gravity of wastes identified with volume units in Item 12.

2. This space may be used to record limited types of federally required information for which there is no specific space provided on the manifest, including any alternate facility designations; the manifest tracking number of the original manifest for rejected wastes and residues that are re-shipped under a second manifest; and the specification of PCB waste descriptions and PCB out-of-service dates required under 40 CFR 761.207. Generators, however, cannot be required to enter information in this space to meet state regulatory requirements.

Item 15. Generator's/Offeror's Certifications

1. The generator must read, sign, and date the waste minimization certification statement. In signing the waste minimization certification statement, those generators who have not been exempted by statute or regulation from the duty to make a waste minimization certification under section 3002(b) of RCRA are also certifying that they have complied with the waste minimization requirements. The Generator's Certification also contains the required attestation that the shipment has been properly prepared and is in proper condition for transportation (the shipper's certification). The content of the shipper's certification statement is as follows: "I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked, and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. If export shipment and I am the Primary Exporter, I certify that the contents of this consignment conform to the terms of the attached EPA Acknowledgment of Consent." When a party other than the generator prepares the shipment for transportation, this party may also sign the shipper's certification statement as the offeror of the shipment.

2. Generator or Offeror personnel may preprint the words, ''On behalf of'' in the signature block or may hand write this statement in the signature block prior to signing the generator/offeror certification, to indicate that the individual signs as the employee or agent of the named principal.

Note: All of the above information except the handwritten signature required in Item 15 may be pre-printed.

II. Instructions for International Shipment Block

Item 16. International Shipments

For export shipments, the primary exporter must check the export box, and enter the point of exit (city and state) from the United States. For import shipments, the importer must check the import box and enter the point of entry (city and state) into the United States. For exports, the transporter must sign and date the manifest to indicate the day the shipment left the United States. Transporters of hazardous waste shipments must deliver a copy of the manifest to the U.S. Customs when exporting the waste across U.S. borders.

III. Instructions for Transporters

Item 17. Transporters' Acknowledgments of Receipt

Enter the name of the person accepting the waste on behalf of the first transporter. That person must acknowledge acceptance of the waste described on the manifest by signing and entering the date of receipt. Only one signature per transportation company is required. Signatures are not required to track the movement of wastes in and out of transfer facilities, unless there is a change of custody between transporters.

If applicable, enter the name of the person accepting the waste on behalf of the second transporter. That person must acknowledge acceptance of the waste described on the manifest by signing and entering the date of receipt.

Note: Transporters carrying imports, who are acting as importers, may have responsibilities to enter information in the International Shipments Block. Transporters carrying exports may also have responsibilities to enter information in the International Shipments Block. See above instructions for Item 16.

IV. Instructions for Owners and Operators of Treatment, Storage, and Disposal Facilities

Item 18. Discrepancy

Item 18a. Discrepancy Indication Space

1. The authorized representative of the designated (or alternate) facility's owner or operator must note in this space any discrepancies between the waste described on the manifest and the waste actually received at the facility. Manifest discrepancies are: significant differences (as defined by §§ 264.72(b) and 265.72(b)) between the quantity or type of hazardous waste designated on the manifest or shipping paper, and the quantity and type of hazardous waste a facility actually receives, rejected wastes, which may be a full or partial shipment of hazardous waste that the TSDF cannot accept, or container residues, which are residues that exceed the quantity limits for "empty" containers set forth in 40 CFR 261.7(b).

2. For rejected loads and residues (40 CFR 264.72(d), (e), and (f), or 40 CFR 265.72(d), (e), or (f)), check the appropriate box if the shipment is a rejected load (*i.e.*, rejected by the designated and/or alternate facility and is sent to an alternate facility or returned to the generator) or a regulated residue that cannot be removed from a container. Enter the reason for the rejection or the inability to remove the residue and a description of the waste. Also, reference the manifest tracking number for any additional manifests being used to track the rejected waste or residue shipment on the original manifest. Indicate the original manifest tracking number in Item 14, the Special Handling Block and Additional Information Block of the additional manifests.

3. Owners or operators of facilities located in unauthorized states (*i.e.*, states in which the U.S. EPA administers the hazardous waste management program) who cannot resolve significant differences in quantity or type within 15 days of receiving the waste must submit to their Regional Administrator a letter with a copy of the manifest at issue describing the discrepancy and attempts to reconcile it (40 CFR 264.72(c) and 265.72(c)).

4. Owners or operators of facilities located in authorized states (*i.e.*, those states that have received authorization from the U.S. EPA to administer the hazardous waste management program) should contact their state agency for information on where to report discrepancies involving "significant differences" to state officials.

Item 18b. Alternate Facility (or Generator) for Receipt of Full Load Rejections

Enter the name, address, phone number, and EPA Identification Number of the Alternate Facility which the rejecting TSDF has designated, after consulting with the generator, to receive a fully rejected waste shipment. In the event that a fully rejected shipment is being returned to the generator, the rejecting TSDF may enter the generator's site information in this space. This field is not to be used to forward partially rejected loads or residue waste shipments.

Item 18c. Alternate Facility (or Generator) Signature

The authorized representative of the alternate facility (or the generator in the event of a returned shipment) must sign and date this field of the form to acknowledge receipt of the fully rejected wastes or residues identified by the initial TSDF.

Item 19. Hazardous Waste Report Management Method Codes

Enter the most appropriate Hazardous Waste Report Management Method code for each waste listed in Item 9. The Hazardous Waste Report Management Method code is to be entered by the first treatment, storage, or disposal facility (TSDF) that receives the waste and is the code that best describes the way in which the waste is to be managed when received by the TSDF.

Item 20. Designated Facility Owner or Operator Certification of Receipt (Except As Noted in Item 18a)

Enter the name of the person receiving the waste on behalf of the owner or operator of the facility. That person must acknowledge receipt or rejection of the waste described on the manifest by signing and entering the date of receipt or rejection where indicated. Since the Facility Certification acknowledges receipt of the waste except as noted in the Discrepancy Space in Item 18a, the certification should be signed for both waste receipt and waste rejection, with the rejection being noted and described in the space provided in Item 18a. Fully rejected wastes may be forwarded or returned using Item 18b after consultation with the generator. Enter the name of the person accepting the waste on behalf of the owner or operator of the alternate facility or the original generator. That person must acknowledge receipt or rejection of the waste

described
on the manifest by signing and entering the date they received or rejected the waste in Item 18c. Partially rejected wastes and residues must be re-shipped under a new manifest, to be initiated and signed by the rejecting TSDF as offeror of the shipment.

What are the instructions for completing the continuation sheet (EPA Form 8700-22A)?

Read all instructions before completing the form.

The form has been designed for use on a 12-pitch (elite) typewriter; a firm point pen may also be used—press down hard.

The form must be used as a continuation sheet to U.S. EPA Form 8700-22 if:

- More than two transporters are to be used to transport the waste; or
- More space is required for the U.S. DOT descriptions and related information in Item 9 of U.S. EPA Form 8700-22.

Federal regulations require generators and transporters of hazardous waste and owners or operators of hazardous waste treatment, storage, or disposal facilities to use the uniform hazardous waste manifest (EPA Form 8700-22) and, if necessary, the continuation sheet (EPA Form 8700-22A) for both interstate and intrastate transportation.

I. Generators

Item 21. Generator's ID Number

Enter the generator's U.S. EPA twelve-digit identification number or, the state generator identification number if the generator site does not have an EPA identification number.

Item 22. Page ___

Enter the page number of the continuation sheet.

Item 23. Manifest Tracking Number

Enter the Manifest Tracking Number from Item 4 of the manifest form to which the continuation sheet is attached.

Item 24. Generator's Name—

Enter the generator's name as it appears in Item 5 on the first page of the manifest.

Item 25. Transporter—Company Name

If additional transporters are used to transport the waste described on the manifest, enter the company name of each additional transporter in the order in which they will transport the waste. Enter after the word "Transporter" the order of the transporter. For example, Transporter 3 Company Name. Also enter the U.S. EPA twelve-digit identification number of the transporter described in Item 25.

Item 26. Transporter—Company Name

If additional transporters are used to transport the waste described on the manifest, enter the company name of each additional transporter in the order in which they will transport the waste. Enter after the word "Transporter" the order of the transporter. For example, Transporter 4 Company Name. Each continuation sheet can record the names of two additional transporters. Also enter the U.S. EPA twelve-digit identification number of the transporter named in Item 26.

Item 27. U.S. D.O.T. Description Including Proper Shipping Name, Hazardous Class, and ID Number (UN/NA)

For each row enter a sequential number under Item 27b that corresponds to the order of waste codes from one continuation sheet to the next, to reflect the total number of wastes being shipped. Refer to instructions for Item 9 of the manifest for the information to be entered.

Item 28. Containers (No. And Type)

Refer to the instructions for Item 10 of the manifest for information to be entered.

Item 29. Total Quantity

Refer to the instructions for Item 11 of the manifest form.

Item 30. Units of Measure (Weight/Volume)

Refer to the instructions for Item 12 of the manifest form.

Item 31. Waste Codes

Refer to the instructions for Item 13 of the manifest form.

Item 32. Special Handling Instructions and Additional Information

Refer to the instructions for Item 14 of the manifest form.

II. Transporters

Item 33. Transporter—Acknowledgment of Receipt of Materials

Enter the same number of the Transporter as identified in Item 25. Enter also the name of the person accepting the waste on behalf of the Transporter (Company Name) identified in Item 25. That person must acknowledge acceptance of the waste described on the manifest by signing and entering the date of receipt.

Item 34. Transporter—Acknowledgment of Receipt of Materials

Enter the same number of the Transporter as identified in Item 26. Enter also the name of the person accepting the waste on behalf of the Transporter (Company Name) identified in Item 26. That person must acknowledge acceptance of the waste described on the manifest by signing and entering the date of receipt.

III. Owner and Operators of Treatment, Storage, or Disposal Facilities

Item 35. Discrepancy Indication Space

Refer to Item 18. This space may be used to more fully describe information on discrepancies identified in Item 18a of the manifest form.

Item 36. Hazardous Waste Report Management Method Codes

For each field in Item 36, enter the sequential number that corresponds to the waste materials described under Item 27, and enter the appropriate process code that describes how the materials will be processed when received. If additional continuation sheets are attached, continue numbering the waste materials and process code fields sequentially, and enter on each sheet the process codes corresponding to the waste materials identified on that sheet.

What is the public reporting burden associated with the manifest?

Public reporting burden for this collection of information is estimated to average: 30 minutes for generators, 10 minutes for transporters, and 25 minutes for owners or operators of treatment, storage, and disposal facilities. This includes time for reviewing instructions, gathering data, completing, reviewing and transmitting the form. Any correspondence regarding the Paperwork Reduction Act burden statement for the manifest must be sent to the Director of the Collection Strategies Division in EPA's Office of Information Collection at the following address: U.S. Environmental Protection Agency (2822T), 1200 Pennsylvania Ave., NW., Washington, DC 20460. Do not send the completed form to this address.

Instructions for Completing the Hazardous Waste Manifest

What are the instructions for completing the manifest form (EPA Form 8700-22)?

Read all instructions before completing the form.

1. The form has been designed for use on a 12-pitch (elite) typewriter which is also compatible with standard computer printers; a firm point pen may also be used—press down hard.

2. Federal regulations require generators and transporters of hazardous waste and owners or operators of hazardous waste treatment, storage, and disposal facilities to complete the manifest form (EPA Form 8700–22) and, if necessary, the continuation sheet (EPA Form 8700–22A) for both inter- and intrastate transportation of hazardous waste.

I. Instructions for Generators

Item 1. Generator's U.S. EPA Identification Number

Enter the generator's U.S. EPA twelve-digit identification number, or the state generator identification number if the generator site does not have an EPA identification number.

Item 2. Page 1 of ___

Enter the total number of pages used to complete the manifest (*i.e.*, the first page (EPA Form 8700-22) plus the number of continuation sheets (EPA Form 8700-22A), if any).

Item 3. Emergency Response Phone Number

Enter a phone number for which emergency response information can be obtained in the event of an incident during transportation. The emergency response phone number must:

1. Be the number of the generator or the number of an agency or organization who is capable of and accepts responsibility for providing detailed information about the shipment;

2. Reach a phone that is monitored 24 hours a day at all times the waste is in transportation (including transportation related storage); and

3. Reach someone who is either knowledgeable of the hazardous waste being shipped and has comprehensive emergency response and spill cleanup/incident mitigation information for the material being shipped or has immediate access to a person who has that knowledge and information about the shipment.

MOTOR VEHICLE INSPECTION (TRANSPORTING HAZARDOUS MATERIALS)

(Read Instructions before completing this form.)

This form applies to all vehicles which must be marked or placarded in accordance with Title 49 CFR.	1. GOVERNMENT BILL OF LADING/TRANSPORTATION CONTROL NUMBER

SECTION 1 - DOCUMENTATION	ORIGIN a.	DESTINATION b.
2. CARRIER/GOVERNMENT ORGANIZATION		
3. DATE/TIME OF INSPECTION		
4. LOCATION OF INSPECTION		
5. OPERATOR(S) NAME(S)		
6. OPERATOR(S) LICENSE NUMBER(S)		
7. MEDICAL EXAMINER'S CERTIFICATE*		

8. *(X if satisfactory at origin)*

a. MILITARY HAZMAT ENDORSEMENT		d. ERG OR EQUIVALENT COMMERCIAL:		YES		NO	
b. VALID LEASE*		e. DRIVER'S VEHICLE INSPECTION REPORT*					
c. ROUTE PLAN		f. COPY OF 49 CFR PART 397					

9. CVSA DECAL DISPLAYED ON COMMERCIAL EQUIPMENT*	YES	NO
a. TRUCK/TRACTOR		
b. TRAILER		

SECTION II - MECHANICAL INSPECTION

All items shall be checked on empty equipment prior to loading. Items with an asterisk shall be checked on all incoming loaded equipment.

10. TYPE OF VEHICLE(S)	11. VEHICLE NUMBER(S)

12. PART INSPECTED *(X as applicable)*	ORIGIN (1)		DESTINATION (2)			ORIGIN (1)		DESTINATION (2)		COMMENTS (3)
	SAT	UNSAT	SAT	UNSAT		SAT	UNSAT	SAT	UNSAT	
a. SPARE ELECTRICAL FUSES					k. EXHAUST SYSTEM					
b. HORN OPERATIVE					l. BRAKE SYSTEM*					
c. STEERING SYSTEM					m. SUSPENSION					
d. WINDSHIELD/WIPERS					n. COUPLING DEVICES					
e. MIRRORS					o. CARGO SPACE					
f. WARNING EQUIPMENT					p. LANDING GEAR*					
g. FIRE EXTINGUISHER*					q. TIRES, WHEELS, RIMS					
h. ELECTRICAL WIRING					r. TAILGATE/DOORS*					
i. LIGHTS AND REFLECTORS					s. TARPAULIN*					
j. FUEL SYSTEM*					t. OTHER *(Specify)*					

13. INSPECTION RESULTS *(X one)* ACCEPTED ☐ REJECTED ☐

(If rejected give reason under "Remarks". Equipment will be approved if deficiencies are corrected prior to loading.)

14. SATELLITE MOTOR SURVEILLANCE SYSTEM: *(X one)* ACCEPTED ☐ REJECTED ☐

15. REMARKS

16. INSPECTOR SIGNATURE *(Origin)*	17. INSPECTOR SIGNATURE *(Destination)*

SECTION III - POST LOADING INSPECTION

This section applies to Commercial and Government/Military vehicles. All items will be checked prior to release of loaded equipment and shall be checked on all incoming loaded equipment.

	ORIGIN (1)		DESTINATION (2)		COMMENTS (3)
	SAT	UNSAT	SAT	UNSAT	
18. LOADED IAW APPLICABLE SEGREGATION/COMPATIBILITY TABLE OF 49 CFR					
19. LOAD PROPERLY SECURED TO PREVENT MOVEMENT					
20. SEALS APPLIED TO CLOSED VEHICLE; TARPAULIN APPLIED ON OPEN EQUIPMENT					
21. PROPER PLACARDS APPLIED					
22. SHIPPING PAPERS/DD FORM 836 FOR GOVERNMENT VEHICLE SHIPMENTS					
23. COPY OF DD FORM 626 FOR DRIVER					
24. SHIPPED UNDER DOT EXEMPTION 868					

25. INSPECTOR SIGNATURE *(Origin)*	26. DRIVER(S) SIGNATURE *(Origin)*
27. INSPECTOR SIGNATURE *(Destination)*	28. DRIVER(S) SIGNATURE *(Destination)*

INSTRUCTIONS

SECTION I - DOCUMENTATION

General Instructions.

All items (2 through 9) will be checked at origin prior to loading. Items with an asterisk (*) apply to commercial operators or equipment only. Only Items 2 through 7 are required to be checked at destination.

Items 1 through 5. Self explanatory.

Item 6. Enter operator's Commercial Driver's License (CDL) number or Military OF-346 License Number. CDL and OF-346 must have the HAZMAT and other appropriate endorsements IAW Part 383.

Item 7. *Enter the expiration date listed on the Medical Examiner's Certificate.

Item 8.a. APPLIES TO MILITARY OPERATORS ONLY. Military Hazardous Materials Certification. In accordance with applicable service regulations, ensure operator has been certified to transport hazardous materials.

b. *Valid Lease. Shipper will ensure a copy of the appropriate contract of lease is carried in all leased vehicles and is available for inspection. (Defense Transportation Regulation (DTR) requirement.)

c. Route Plan. Prior to loading any Hazard Class/Division 1.1, 1.2, or 1.3 (Explosives) for shipment, ensure that the operator possesses a written route plan in accordance with 49 CFR Part 397. Route Plan requirements for Hazard Class 7 (Radioactive) materials are found in 49 CFR 397.101.

d. Emergency Response Guidebook (ERG) or Equivalent. Commercial operators must be in possession of an ERG or equivalent document. Shipper will provide applicable ERG page(s) to military operators.

e. *Driver's Vehicle Inspection Report. Review the operator's Vehicle Inspection Report. Ensure that there are no defects listed on the report that would affect the safe operation of the vehicle.

f. Copy of 49 CFR Part 397. Operators are required by regulation to have in their possession a copy of 49 CFR Part 397 (Hazardous Materials Driving and Parking Rules). If military operators do not possess this document, shipper may provide a copy to operator.

Item 9. *Commercial Vehicle Safety Alliance (CVSA) Decal. Check to see if equipment has a current CVSA decal and mark applicable box. Vehicles without CVSA, check documentation of the last vehicle periodic inspection.

SECTION II - MECHANICAL INSPECTION

General Instructions.

All items (12.a. through 12.t.) will be checked on all incoming empty equipment prior to loading. All UNSATISFACTORY conditions must be corrected prior to loading. Items with an asterisk (*) shall be checked on all incoming loaded equipment. Unsatisfactory conditions that would affect the safe off-loading of the equipment must be corrected prior to unloading.

SECTION II *(Continued)*

Item 12.a. Spare Electrical Fuses. Check to ensure that at least one spare fuse for each type of installed fuse is carried on the vehicle as a spare or vehicle is equipped with an overload protection device (circuit breaker). (49 CFR 393.95)

b. Horn Operative. Ensure that horn is securely mounted and of sufficient volume to serve purpose. (49 CFR 393.81)

c. Steering System. The steering wheel shall be secure and must not have any spokes cracked through or missing. The steering column must be securely fastened. Universal joints shall not be worn, faulty or repaired by welding. The steering gear box shall not have loose or missing mounting bolts or cracks in the gear box mounting brackets. The pitman arm on the steering gear output shaft shall not be loose. Steering wheel shall turn freely through the limit of travel in both directions. All components of a power steering system must be in operating condition. No parts shall be loose or broken. Belts shall not be frayed, cracked or slipping. The power steering system shall not be leaking. (49 CFR 396 Appendix G)

d. Windshield/Wipers. Inspect to ensure that windshield is free from breaks, cracks or defects that would make operation of the vehicle unsafe; that the view of the driver is not obscured and that the windshield wipers are operational and wiper blades are in serviceable condition. Defroster must be operative when conditions require. (49 CFR 393.60, 393.78 and 393.79)

e. Mirrors. Every vehicle must be equipped with two rear vision mirrors located so as to reflect to the driver a view of the highway to the rear along both sides of the vehicle. Mirrors shall not be cracked or dirty. (49 CFR 393.80)

f. Warning Equipment. Equipment must include three bidirectional emergency reflective triangles that conform to the requirements of FMVSS No. 125. FLAME PRODUCING DEVICES ARE PROHIBITED. (49 CFR 393.95)

g. Fire Extinguisher. Military vehicles must be equipped with two serviceable fire extinguishers with an Underwriters Laboratories rating of 10 BC or more. (Commercial motor vehicles must be equipped with one serviceable 10 BC Fire Extinguisher). Fire extinguisher(s) must be located so that it is readily accessible for use and securely mounted on the vehicle. The fire extinguisher must be designed, constructed and maintained to permit visual determination of whether it is fully charged. (49 CFR 393.95)

h. Electrical Wiring: Electrical wiring must be clean and properly secured. Insulation must not be frayed, cracked or otherwise in poor condition. There shall be no uninsulated wires, improper splices or connections. Wires and electrical fixtures inside the cargo area must be protected from the lading. (49 CFR 393.28, 393.32, 393.33)

INSTRUCTIONS

SECTION II *(Continued)*

i. Lights/Reflectors. (Head, tail, turn signal, brake, clearance, marker and identification lights, Emergency Flashers). Inspect to see that all lighting devices and reflectors required are operable, of proper color and properly mounted. Ensure that lights and reflectors are not obscured by dirt or grease or have broken lenses. High/Low beam switch must be operative. Emergency Flashers must be operative on both the front and rear of vehicle. (49 CFR 393)

j. Fuel System. Inspect fuel tank and lines to ensure that they are in serviceable condition, free from leaks, or evidence of leakage and securely mounted. Ensure that fuel tank filler cap is not missing. Examine cap for defective gasket or plugged vent. Inspect filler necks to see that they are in completely serviceable condition and not leaking at joints. (49 CFR 393.83 and 396 Appendix G)

k. Exhaust System. Exhaust system shall discharge to the atmosphere at a location to the rear of the cab or if the exhaust projects above the cab, at a location near the rear of the cab. Exhaust system shall not be leaking at a point forward of or directly below the driver compartment. No part of the exhaust system shall be located where it will burn, char or damage electrical wiring, fuel system or any other part of the vehicle. No part of the exhaust system shall be temporarily repaired with wrap or patches. (49 CFR 393.83 and 396 Appendix G)

l. Brake System (to include hand brakes, parking brakes and Low Air Warning devices). Check to ensure that brakes are operational and properly adjusted. Check for audible air leaks around air brake components and air lines. Check for fluid leaks, cracked or damaged lines in hydraulic brake systems. Ensure that parking brake is operational and properly adjusted. Low Air Warning devices must be operative. (49 CFR 396 Appendix G)

m. Suspension. Inspect for indications of misaligned, shifted or cracked springs, loosened shackles, missing bolts, spring hangers unsecured at frame and cracked or loose U-bolts. Inspect for any unsecured axle positioning parts, and sign of axle misalignment, broken torsion bar springs (if so equipped). (49 CFR 396 Appendix G)

n. Coupling Devices (Inspect without uncoupling). Fifth Wheels: Inspect for unsecured mounting to frame or any missing or damaged parts. Inspect for any visible space between upper and lower fifth wheel plates. Ensure that the locking jaws are around the shank and not the head of the kingpin. Ensure that the release lever is seated properly and safety latch is engaged. Pintle Hook, Drawbar, Towbar Eye and Tongue and Safety Devices: Inspect for unsecured mounting, cracks, missing or ineffective fasteners (welded repairs to pintle hook is prohibited). Ensure safety devices (chains, hooks, cables) are in serviceable condition and properly attached. (49 CFT 396 Appendix G)

o. Cargo Space. Inspect to ensure that cargo space is clean and free from exposed bolts, nuts, screws, nails or inwardly projecting parts that could damage the lading. Check floor to ensure it is tight and free from holes. Floor shall not be permeated with oil or other substances. (49 CFR 177.815(e)(1) and 398.94)

p. Landing Gear. Inspect to ensure that landing gear and assembly are in serviceable condition, correctly assembled, adequately lubricated and properly mounted.

SECTION II *(Continued)*

q. Tires, Wheels and Rims: Inspect to ensure that tires are properly inflated. Flat or leaking tires are unacceptable. Inspect tires for cuts, bruises, breaks and blisters. Tires with cuts that extend into the cord body are unacceptable. Thread depth shall not be less than: 4/32 inches for tires on a steering axle of a power unit, and 2/32 inches for all other tires. Mixing bias and radial on the steering axle is prohibited. Inspect wheels and rims for cracks, unseated locking rings, broken, loose, damaged or missing lug nuts or elongated stud holes. (49 CFR 396 Appendix G)

r. Tailgate/Doors. Inspect to see that all hinges are tight in body. Check for broken latches and safety chains. Doors must close securely. (49 CFR 177.835(h))

s. Tarpaulin. If shipment is made on open equipment, ensure that lading is properly covered with fire and water resistant tarpaulin. (49 CFR 177.835(h))

t. Other Unsatisfactory Condition. Note any other condition which would prohibit the vehicle from being loaded with hazardous materials.

Item 14. For AA&E and other shipments requiring satellite surveillance, ensure that the Satellite Motor Surveillance System is operable. Shipper will instruct the driver to send a "test" emergency message to DTTS by having the driver activate the "emergency (panic) button". Shipper will contact DTTS at 1-800-826-0794 to verify that test message was received. Message must be received by DTTS for system to be considered operational.

SECTION III - POST LOADING INSPECTION

General Instructions.

All items will be checked prior to the release of loaded equipment. Shipment will not be released until deficiencies are corrected. All items will be checked on incoming loaded equipment. Deficiencies will be reported in accordance with applicable service regulations.

Item 18. Check to ensure shipment is loaded in accordance with 49 CFR Part 177.848 and the applicable Segregation or Compatibility Table of 49 CFR 177.848.

Item 19. Check to ensure the load is secured from movement in accordance with applicable service outload drawings.

Item 20. Check to ensure seal(s) have been applied to closed equipment; fire and water resistant tarpaulin applied on open equipment.

Item 21. Check to ensure each transport vehicle has been properly placarded in accordance with 49 CFR Part 172 Subpart F.

Item 22. Check to ensure operator has been provided shipping papers that comply with 49 CFR Part 172 Subpart C. For shipments transported by Government vehicle, shipping paper will be DD Form 836.

Item 23. Ensure operator(s) sign DD Form 626, are given a copy and understand the hazards associated with the shipment.

Item 24. Applies to Commercial Shipments Only. If shipment is made under DOT Exemption 868, ensure that shipping papers are properly annotated and copy of Exemption 868 is with shipping papers.

MATERIEL COURIER RECEIPT	SHIPPER'S CONTROL/DOCUMENT NO.
SHIPPER	SUPPLY ACCOUNT NUMBER
DESTINATION	SUPPLY ACCOUNT NUMBER

PRIVACY ACT STATEMENT

AUTHORITY 5 U.S.C., Sec 552a (PL 93 579)

PRINCIPLE PURPOSES: To provide a receipt for transfer of controlled materiel. The use of the SSAN is required and is necessary to provide positive identification of the individuals receipting for the materiel.

ROUTINE USES: To document transfer of materiel from a shipper to a courier, courier to courier and/or receiver.

DISCLOSURE IS VOLUNTARY: Since the SSAN must be used, refusal to provide SSAN may be grounds for action to remove the individual concerned from duties involving the materiel transferred by use of this form.

I certify by my signature that I have received the materiel listed on this form and am aware of the applicable safety and security requirements.

SHIPMENT TRANSFERS

FIRST	LOCATION OF TRANSFER	DATE(YR/MO/DAY)				
RECIPIENT'S PRINTED NAME (LAST, FIRST, M.I.)	ORGAN. OR ACCOUNT NO.					
SIGNATURE	SOCIAL SECURITY NUMBER					
SECOND	LOCATION OF TRANSFER	DATE (YR/MO/DAY)				
RECIPIENT'S PRINTED NAME (LAST, FIRST, M.I.)	ORGAN. OR ACCOUNT NO.					
SIGNATURE	SOCIAL SECURITY NUMBER					
THIRD	LOCATION OF TRANSFER	DATE (YR/MO/DAY)				
RECIPIENT'S PRINTED NAME (LAST, FIRST, M.I.)	ORGAN. OR ACCOUNT NO.					
SIGNATURE	SOCIAL SECURITY NUMBER					
FOURTH	LOCATION OF TRANSFER	DATE (YR/MO/DAY)				
RECIPIENT'S PRINTED NAME (LAST, FIRST, M.I.)	ORGAN. OR ACCOUNT NO.					
SIGNATURE	SOCIAL SECURITY NUMBER					
FIFTH	LOCATION OF TRANSFER	DATE (YR/MO/DAY)				
RECIPIENT'S PRINTED NAME (LAST, FIRST, M.I.)	ORGAN. OR ACCOUNT NO.					
SIGNATURE	SOCIAL SECURITY NUMBER					

SHIPMENT DESCRIPTION

LINE NUMBER	QUANTITY	SERIAL NUMBERS	REMARKS

DD FORM 82 MAY 1911

PREVIOUS EDITION MAY BE USED UNTIL 31 DEC 82

DD Form 1911, Materiel Courier Receipt

ANNEX E

GLOSSARY OF TERMS

ANNEX E
GLOSSARY OF TERMS

CEHNC	**U.S. Army Engineering and Support Center, Huntsville:** CEHNC is the Army Center of Excellence for unexploded ordnance including CWM. They will provide backup support to TEU during recovery operations
CENAB	**U.S. Army Corps of Engineers, Baltimore District:** CENAB is one of the Corps of Engineers geographic districts. They are in charge of the investigation project at Spring Valley.
CERCLA	**Comprehensive Environmental Response, Compensation, and Liability Act:** Law regulating cleanup of hazardous waste sites that pre-date 1978.
CWM	**Chemical Warfare Materiel:** Includes chemical weapons, containers, chemical agent identification sets, and any equipment that may contain or be contaminated with chemical agent.
D2SV	**D2SV:** A personal computer program for the prediction of chemical agent hazard distances at Spring Valley.
DHHS	**U.S. Department of Health and Human Services:** Federal department that must approve all plans to destroy or transport chemical agents and munitions; the Centers for Disease Control and Prevention (part of DHHS) provides support and guidance for chemical weapons programs.
DoD	**U.S. Department of Defense:** Federal department responsible for administering military programs to protect the nation from external

aggression; includes all of the military services, the Office of the Secretary of Defense, the Office of the Joint Chiefs of Staff, and several defense agencies.

DOT — **U.S. Department of Transportation:** Federal department that develops and enforces regulations governing the transport of hazardous and non-hazardous materials.

ECBC — **U.S. Army Edgewood Chemical Biological Center (formerly known as the U.S. Army Edgewood Research, Development and Engineering Center):** Agency responsible for development of methods for detecting and monitoring chemical agents. Provides standards for calibration of chemical agent monitors. They will conduct perimeter monitoring during excavation and recovery. ECBC will also provide laboratory services for chemical agent analysis of CWM samples.

OSHA — **Occupational Safety and Health Administration:** Federal agency that oversees and regulates workplace health and safety.

PM ECW — **Program Manager for the Elimination of Chemical Weapons (formerly Program Manager for Chemical Demilitarization):** Single Army agency responsible for all chemical warfare materiel destruction throughout DoD.

PMNSCM — **Project Manager for Non-Stockpile Chemical Materiel:** Part of PM ECW that provides centralized management and direction to DoD program for the reclamation, recovery, and disposal of non-stockpile chemical materiel in a safe, environmentally sound, and cost-effective manner.

USEPA	**U.S. Environmental Protection Agency:** Federal agency with primary responsible for enforcement of federal laws protecting the environment; ensures regulations mandated by the various environmental laws are followed.

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ANNEX F

ACRONYMS/ABBREVIATIONS

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ACRONYMS/ABBREVIATIONS

AEL	airborne exposure limits
AFFF	aqueous film forming foam
AR	Army Regulation
ASTM	American Society for Testing and Materials
AUES	American University Experiment Station
CAIRA	Chemical Accident or Incident Response and Assistance
CEHNC	U.S. Army Engineering and Support Center, Huntsville
CENAB	U.S. Army Corps of Engineers, Baltimore District
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CPR	cardiopulmonary resuscitation
CWM	chemical warfare materiel
DA	Department of the Army
DAAMS	Depot Area Air Monitoring System
DD	Department of Defense
DoD	Department of Defense
DOT	Department of Transportation
ECBC	U.S. Army Edgewood Chemical Biological Center
EDT	1,2-ethanedithiol
GC	gas chromatograph

H or HD	mustard agent
HA	hazard analysis
HAZWOPER	Hazardous Waste Operations and Emergency Response
IHF	Interim Holding Facility
L	lewisite
MCE	maximum credible event
mg/m^3	milligram per cubic meter
MIL-STD	Military Standard
mm	millimeter
MRC	multiple round container
MSDS	Material Safety Data Sheet
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
NRT	near real-time
NSCMP	Non-Stockpile Chemical Materiel Product
OSHA	Occupational Safety and Health Administration
Pam	pamphlet
PAO	Public Affairs Office
PBA	Pine Bluff Arsenal
PEL	permissible exposure limit
PINS	portable isotopic neutron spectroscopy
PM ECW	Program Manager for Elimination of Chemical Weapons
PMCD	U.S. Army Program Manager for Chemical Demilitarization
PMNSCM	Project Manager for Non-Stockpile Chemical Material
POIO	Public Outreach and Information Office
ppb	parts per billion

PPE	personal protective equipment
PS	chloropicrin
RAC	risk assessment code
RCWM	recovered chemical warfare materiel
REL	Recommended Exposure Limit
RMD	Risk Management Directorate
SA	arsine
SOP	standing operating procedure
TM	Technical Manual
TP	Technical Provision
TWA	time-weighted average
UL	Underwriters Laboratory
USACMDA	U.S. Army Chemical Materiel Destruction Agency
USEPA	U.S. Environmental Protection Agency
VSL	vapor screening level

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ANNEX G

REFERENCES

ANNEX G
REFERENCES

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ANNEX H
QUESTIONS AND ANSWERS FOR
SPRING VALLEY IHF PLAN

ANNEX H
QUESTIONS AND ANSWERS FOR
SPRING VALLEY IHF PLAN

Q: What items may be recovered at Spring Valley?

A: *The items include carboys and 75 millimeter (mm) projectiles of chemical warfare materiel that were used at the American University Experiment Station during World War I.*

Q: What was the American University Experiment Station?

A: *The Experiment Station was a laboratory set up to prepare and test chemical warfare compounds, incendiaries, smokes, and signals. Other projects involved developing methods for manufacture of these compounds and developing masks, canisters, and protective clothing for use with chemical warfare compounds.*

Q: What is in these items?

A: *The carboys are expected to contain mustard agent, but there is a small possibility that they might contain lewisite. Mustard and lewisite are blister agents that can cause severe irritation to the eyes, nose, and lungs. They also can cause blisters on exposed skin. The 75mm projectile may contain mustard or arsine.*

Q: Where are the carboys buried?

A: *The suspected disposal site is a pit called operable unit 3, which is on Glenbrook Road.*

Q: How did the items come to be in someone's backyard?

A: *In 1918, the land along Glenbrook Road was part of the American University Experiment Station. Old photographs and other documents indicate a pit was dug in this area to dispose of carboys containing mustard agent.*

Q: How large is the pit?

A: *The original pit was approximately 10 feet in diameter and 3 to 4 feet deep. It is now level ground covered with lawn and trees.*

Q: Why are the items being dug up?

A: *Public Law 102-484 of 1993 requires the military to recover any old chemical warfare materiel that it knows about, even when the materiel is on land that no longer belongs to the military.*

Q: Is there any danger to the public?

A: *There is very little danger to the public during the recovery, transport, or storage of these items. The recovery work will be carried out inside an enclosure built over the site. Air leaving the structure will be filtered to remove any mustard that may be in it. Once recovered, the carboys will be placed inside steel containers*

designed to withstand rough handling and prevent leaks even if the carboy should be broken.

Q: What will happen to the items once they have been recovered?

A: *The items will be placed inside steel storage containers, moved to a staging area on the federal property near the intersection of Loughboro Road and Dalecarlia Parkway, and stored in a building designed for storing hazardous waste. As the recovery project progresses, the items will be shipped to a military installation that has a permitted hazardous waste storage facility in accordance with Public Law 103-337.*

Q: How will the items be shipped?

A: *A truck will move the items from the recovery site to a staging area. This is the same staging area used for similar work in 1993. A helicopter will be used to transport the items from the interim holding facility to Andrews Air Force Base. From there they will be flown to Pine Bluff Arsenal, Arkansas.*

Q: Who will perform the work?

A: *The 22nd Chemical Battalion, specially trained individuals skilled in all aspects of storage, handling, and transport of chemical warfare materiel will perform the work. This is the same organization that recovered other chemical warfare materiel from the Spring Valley area in 1993.*

Q: What safeguards will be used to protect the public?

A: *As the items are dug out of the ground, they will be packed inside steel containers designed to withstand impact and contain leakage. A specially trained Army unit will monitor the containers before transport begins and upon arrival at the staging area. Throughout the process, medical and hazardous materiel response teams will be on standby should their assistance be needed. Personnel trained in hazardous materiel detection and spill response will accompany the items in transit.*

Q: What government organizations are involved in this project?

A: *The principal organizations are: the Program Manager for Chemical Demilitarization; the U.S. Army Corps of Engineers, Baltimore District, the U.S. Army Corps of Engineers, Huntsville; the U.S. Environmental Protection Agency, Region III; the 22nd Chemical Battalion; U.S. Army Edgewood Chemical Biological Center; and the U.S. State Department. In addition, plans and activities are coordinated, overseen, and approved by the U.S. Department of Health and Human Services and various District of Columbia agencies.*

Q: What will the recovery workers wear?

A: *Workers performing the recovery and handling the actual chemical containers will wear Occupational Safety and Health Administration personal protective equipment including a supplied air respirator, a one-piece disposable chemical resistant suit, and chemical resistant gloves and boot covers. Once the chemical containers have been placed into the steel overpacks, the workers will only need to wear regular workclothes such as coveralls, gloves, and safety shoes. As a precaution they will carry a respirator with them.*

Q: Will local authorities and the public be informed when the work is to take place?

A: *Yes. District of Columbia officials will be informed. Local emergency response agencies will be told whenever materiel is being moved from the recovery site to the staging area. Approval must come from the District government and the Environmental Protection Agency before work can begin.*

Q: Will the water in the reservoir be in danger of contamination?

A: *No. In addition to being inside leak-resistant containers, the recovered items will be stored inside a building designed to contain spilled material should any spill occur. Furthermore, the staging area does not drain into the reservoir.*

Q: How long will the items be stored at Spring Valley?

A: *The items will only be stored while recovery operations are ongoing. Once the contents of a recovered item have been sufficiently characterized to meet interstate shipping requirements, the containers will be shipped to Pine Bluff Arsenal, where they will be destroyed.*

Q: How will the items be destroyed?

A: *The items will be placed inside a treatment system where the steel shipping containers will be opened. The carboys containing chemical agent will be opened and the contents mixed with a caustic solution that will destroy the chemical agent.*

Q: Who can I call for more information?

A: *For questions about the recovery operation contact the U.S. Army Corps of Engineers, Baltimore District, Public Affairs Office, Ms. Lucy Lather, 410-962-2809. For information about the storage and transport of chemical warfare materiel, contact the Product Manager for Non-Stockpile Chemical Materiel, Public Outreach and Information Office, Ms. Louise Dyson, 800-488-0648.*

APPENDIX L
MEC TRANSPORTATION PLAN

SITE-WIDE MUNITIONS AND EXPLOSIVES OF CONCERN TRANSPORTATION PLAN

FOR THE

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

Prepared for:

U.S. Army Engineering and Support Center, Huntsville

and

Baltimore District
U.S. Army Corps of Engineers

Prepared by:

PARSONS

10521 Rosehaven Street, Suite 200
Fairfax, Virginia

March 2007

The views, opinions, and/or findings contained in this document are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentations.

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CHAPTER 1
PURPOSE

1.0.0.1 This plan was developed to comply with federal and state regulations, licensing, standards, protocols, and guidance applicable to the transportation of conventional Munitions and Explosives of Concern (MEC) items recovered at the Spring Valley Formerly Used Defense Site (SVFUDS) to off-site storage/disposal locations.

CHAPTER 2
SCOPE

2.0.0.1 This plan applies to all site personnel, including contractor and subcontractor personnel engaged in conventional MEC transportation activities. This plan does not contain site-specific requirements but rather is to be used as the guidance document in the preparation of a Site-Specific Work Plan (SSWP).

CHAPTER 3
REGULATORY REFERENCES

3.0.0.1 The following documents were used in the preparation of this plan. This plan complies with the pertinent federal and state regulations:

- 29 CFR Sections 1910;
- 49 CFR Sections 172,173, and 383;
- ATF P 5400.7, ATF-Explosives Laws and Regulations;
- EM 385-1-1, U.S. Army Corps of Engineers (USACE) Safety and Health Requirements Manual;
- DOD 6055.9-STD, Department of Defense Ammunition and Explosives Safety Standards;
- DOD 4145.26M-M, Department of Defense Contractors Safety Manual for Ammunition, Explosives, and related Dangerous Materials;

- Department of the Army Pamphlet 385-64, Ammunition and Explosives Safety Standards.

CHAPTER 4
RESPONSIBILITIES

4.1 PROJECT MANAGER

4.1.0.1 The Parsons Project Manager (PM) is responsible for ensuring that the transportation company selected for the transport of conventional MEC is properly licensed and permitted. He is also responsible for the procurement of appropriate packing material, either from the applicable ammunition depot or a suitable substitute from a commercial source.

4.2 SITE MANAGER

4.2.0.1 The Site Manager is responsible for the coordination of all transportation activities with the transportation company, the USACE, and any local law enforcement agencies involved in the transport. The Site Manager shall oversee the packaging and loading of conventional MEC, and, if appropriate, bracing of the transport vehicle. The Site Manager is also responsible for the proper completion of all applicable paperwork associated with the shipment.

4.2.0.2 In the event that a suspect Recovered Chemical Warfare Materiel (RCWM) item is discovered, the Site Manager shall make all necessary notifications contained in the Product Manager for Non-Stockpile Chemical Materiel (PMNSCM) Plans, located in Appendix K of the SVFUDS Site-Wide Work Plan.

4.3 PACKAGING/LOADING PERSONNEL

4.3.0.1 All personnel involved in the packaging and loading of conventional MEC shall be unexploded ordnance (UXO)-qualified and adhere to all pertinent safety practices related to the type of conventional MEC being handled.

4.4 UXO SAFETY OFFICER

4.4.0.1 The UXO Safety Officer (UXOSO) is responsible for ensuring that all phases of the handling, packaging and loading of conventional MEC for shipment is accomplished in a safe manner and in compliance with all pertinent regulations and this plan.

CHAPTER 5
PROCEDURES

5.1 DISCOVERY AND TRANSPORT TO THE FEDERAL PROPERTY STORAGE AREA

5.1.0.1 The UXO Contractor shall handle conventional MEC items and associated explosive components that have been certified by the Air Monitoring Team to have no detectable chemical agent contamination and that are acceptable to move.

5.1.0.2 Conventional MEC item(s) shall be packaged in accordance with this plan, transported to the Federal Property Storage Area, and placed in the Explosives Storage Magazine, prior to on-site or off-site disposal. The Senior UXO Supervisor (SUXOS) shall make all required notifications regarding conventional MEC.

5.1.0.3 In the event that a suspect RCWM item is discovered, the U.S. Army 22nd Chemical Battalion (Technical Escort) shall assume all responsibilities for packaging, transport, and placement of the item in the IHF.

5.2 PACKAGING

5.2.0.1 Prior to transport, conventional MEC items shall be packaged in accordance with Department of Transportation (DOT) requirements. Explosives shall be transported in covered containers and secured in the vehicle bed to prevent the release of materials in event of a vehicular accident. Other materials or supplies shall not be placed on or in the cargo space of the vehicle containing the explosives and only properly secured, non-sparking equipment shall be used in the handling of explosives. If explosives and detonators are transported in the same vehicle, they shall be packaged in separate containers.

5.2.0.2 While obtaining original containers for the item(s) being shipped would be preferred, containers can also be constructed. The original shipping containers may be obtained by contacting the U.S. Army Armaments, Munitions, and Chemical Command (AMCCOM). They will provide the boxes or identify an ammunition depot that can provide them.

5.3 MANIFESTING/PLACARDS

5.3.0.1 Conventional MEC items shall be manifested as Explosive Waste in accordance with 49 CFR 172.43, with a DOT Hazard Class Division of 1.1D and a United Nations (UN) Identification Number of UN 0168. The packaging standard shall be in accordance with Group II and be for a single item (non-bulk). Unless otherwise directed, USACE, Baltimore District (CENAB) shall act as the manifesting official for all MEC transportation loads. Placarding is required for all transports, regardless of the transporter.

5.4 SITE SELECTION

5.4.0.1 Conventional MEC items shall either be demilitarized on site in a contained detonation chamber or they shall be sent to an off-site facility for demilitarization and disposal. If the decision is made to use on site demilitarization, a site-specific Annex and SSWP shall be prepared to address the operation.

5.4.0.2 The selection of an off-site location to which conventional MEC item(s) will be shipped shall be made by Parsons and approved by USACE. Parsons shall select the carrier based on availability, location, and cost, ensuring that the carrier has the proper permits.

CHAPTER 6
HAZARDS

6.1 FIRE

6.1.0.1 A fire hazard includes one that consumes the trailer/van, and sustains a burn rate that produces internal cargo temperature greater than the detonation point of the MEC items, and may cause a detonation of all individually packaged items located within the trailer/van.

6.2 LEVEL OF EXPOSURE

6.2.0.1 The level of exposure during transportation is defined as the length of time a single or multiple loaded trailer/van with a secured and packaged cargo would be exposed to heat, shock, or friction during transport contrasted to the exposure risk to workers, population, and property. The general approach to risk is to regulate and coordinate the exposure time during movement of MEC items.

CHAPTER 7
EMERGENCY RESPONSE

7.0.0.1 The maintenance of certain types of emergency equipment, records, and information during the transportation of hazardous materials or waste is required. The following information shall be maintained in any vehicle transporting conventional MEC items:

- The basic description, technical name, quantity of the hazardous waste being transported, with a chain of telephone numbers to be called in the event of an accident.
- The type and level of immediate hazard to health.
- The risk of fire or explosion associated with the waste.
- The specific precautions to be taken in the event of an accident or incident.
- The immediate methods and actions to be taken in the event of a fire, and the responsibilities of persons reacting.
- The immediate methods for handling spills or leaks of fuels in the absence of a fire.
- Preliminary first aid to be administered.
- Shipping papers and manifest.

7.0.0.2 The above information shall be in plain English and available for use away from the hazardous material package. Duplicates of this information shall be also maintained at the Parsons project office and in the dispatch office of the transport company.

7.1 INCIDENT CONTAINMENT AND CONTROLLING OF HAZARDOUS WASTE

7.1.0.1 The requirements for the care of hazardous materials and waste while in transit should an incident occur (flat tire, overheated engine, mechanical failure) will be included in the transport company's instructions to its drivers.

7.1.0.2 If a situation exists of such a nature that it poses a danger to life at the scene of the incident then the carrier shall report it to the DOT.

7.2 HAZARDOUS MATERIAL REPORTING PROCEDURES

7.2.0.1 A written Hazardous Material Incident Report on DOT Form 5800.1 (Rev. 01/2004) shall be submitted to DOT within 30 days of date of discovery of an incident for which a telephone report (as described above) is required. Each incident that occurs during the course of transportation (including loading, unloading, and temporary storage) in which any of the circumstances described above occurs, or there has been an unintentional release of hazardous material from a package (including a tank), or any quantity of hazardous waste has been discharged during transportation, is reportable. For hazardous waste, a copy of the manifest shall be attached to the report, together with an estimate of the quantity of waste removed from the scene, and the name and address of the facility to which it was taken. The manner of disposition of any removed waste shall be entered in Section IX of Form F 5800.1.

7.2.0.2 Each carrier making a hazardous materials incident report shall send the report to the Information Systems Manager, DHM-63, Research and Special Programs Administration, Department of Transportation, Washington, D.C. 20590-0001. A copy of the report shall also be

retained, for a period of two years, at the carrier's principal place of business, or at other places as authorized and approved in writing by an agency of the DOT.

7.2.0.3 Incidents involving hazardous materials shall be reported to the United States Coast Guard National Response Center. The 24-hour emergency number is (800) 424-8802.

7.2.0.4 Following a release of hazardous materials/waste to the environment, once the emergency situation has stabilized, the Parsons PM shall place a coordination telephone call to EPA Region III within 24-hours of the event at (215) 814-9016.

7.3 MILITARY EOD PARTICIPATION

7.3.0.1 On-site TE EOD personnel shall be involved in all MEC operations associated with an investigation at a RCWM site.

APPENDIX M
ENGINEERING CONTROL STRUCTURE PLAN

SITE-WIDE ENGINEERING CONTROL STRUCTURES

FOR THE

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

Prepared for:

U.S. Army Engineering and Support Center, Huntsville

and

Baltimore District
U.S. Army Corps of Engineers

Prepared by:

PARSONS
10521 Rosehaven Street, Suite 200
Fairfax, Virginia

March 2007

The views, opinions, and/or findings contained in this document are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentations.

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ENGINEERING CONTROL DESIGN AND SPECIFICATION INFORMATION

1.0 INTRODUCTION

1.0.0.1 Chemical munitions could be uncovered during the Site-Wide Chemical Intrusive Investigation, given the historical background of the site. Engineering Controls represent engineered structures that minimize exposure of personnel and the public to chemical hazards associated with potential RCWM. These structures have been successfully used during remediation of Spring Valley Formerly Used Defense Site (SVFUDS) where there is potential chemical agent contamination.

1.0.0.2 The Maximum Credible Event (MCE) for a site is selected based on the maximum release of a chemical agent from a munition, bulk container, or process that could occur as a result of an unintended, unplanned, or accidental incident. The event must be realistic with reasonable probability of occurrence. For site-wide operations at the SVFUDS, U.S Army Engineering and Support Center Huntsville (USAESCH) performed a detailed MCE analysis that identified four possible MCEs for site-wide investigations, based on the record of items discovered at the SVFUDS to date. The identified MCEs are:

- The instantaneous release of mustard agent from an explosively configured 75mm Mk II chemical projectile, or
- The evaporative release of lewisite from a 5-gallon container, or
- The evaporative release of lewisite from a 1-liter container; or
- Instantaneous release of arsine from a non-explosively configured 75 mm Mk II chemical projectile.

1.0.0.3 The Munition with the Greatest Fragmentation Distance (MGFD) for a site is selected based on the ordnance item with the greatest fragmentation distance that can reasonably be expected to be found at the site. Based on the record of items discovered at the SVFUDS to date, the MGFD is a 75mm Mk II chemical projectile with an explosive burster.

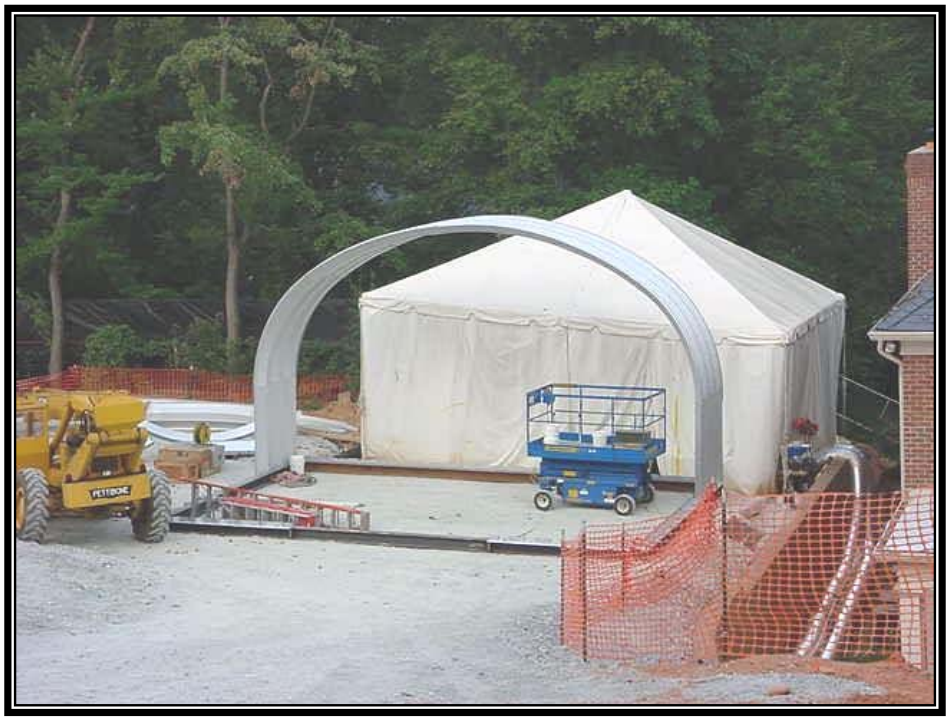
2.0 ENGINEERING CONTROL STRUCTURE DESCRIPTIONS

2.0.0.1 The following engineering controls may be employed during the Site-Wide Intrusive investigation (depending on site constraints and the MCE): a tent structure, a vapor containment structure (VCS), a modular aluminum containment structure (MACS), and filter assembly. The engineering controls will be selected on a site-specific basis depending on the site conditions to mitigate the MCE and/or the MPM. Attachment 1 contains the Department of Defense Explosives Safety Board (DDESB) approvals for the engineering control structures.

2.1 Tent Structure

2.1.0.1 Commercial tent structures could provide adequate protection to personnel and the public from hazards associated with RCWM, when used in conjunction with a filter assembly under negative pressure conditions. The tent structure is approved for the containment of evaporative releases of chemical agent. The tent is a commercial type, and made of reinforced vinyl material. It is large enough in size to accommodate mechanized equipment, such as the mini excavator. Tent structures could also be quickly demobilized and moved if necessary. This system was previously proven effective at the Mongmong, Guam removal site and at various locations within the SVFUDS. Once assembled, a smoke test will be conducted prior to start of operations. A 30 feet by 30 feet tent was initially used for the Test Pits at 4825 Glenbrook Road. This setup was connected to a filter assembly by two 12-inch filter intakes that exhausted the tent and prevented any potential chemical agent release to the atmosphere. A 60 feet by 100 feet Rubb tent structure was used for the AU Lot 18 investigation. Details on the size and specifications will be presented in the site-specific work plan. A typical tent structure is shown in Figure 2-1.

Figure 2-1
Typical Tent Structure



2.2 Vapor Containment Structure

2.2.0.1 The VCS provides the highest level of protection from hazards associated with chemical agent, especially when operations are over an extended area and last for an extended period of time. The VCS has been approved by DDESB for use with the 75 mm MkII chemical projectile as it will sustain minimal damage and maintain negative pressure.

2.2.0.2 The VCS is a steel quonset hut-shaped structure assembled on site in fixed modules of 30 feet wide by 20 feet long for maximum of 60 feet long. The VCS is built to cover the anomaly being investigated. Site conditions, such as the size or shape of a residential yard, or nearby landscaping, may affect the siting and location of the VCS. Additionally, in order to assemble the VCS, the site must be graded. Mobilization of the VCS takes approximately three weeks. The site-specific plan will detail the size of the VCS to be erected. The VCS is maintained under negative pressure with an air filtration system specifically designed to remove agent vapors and particulates. The size of the filter unit will depend on the size of the VCS. The specifications, capacities, and other design parameters of the VCS will be presented in the site-specific plans. The VCS will be smoke tested prior to operation to ensure the effectiveness of the filter system. Figure 2-2 shows a typical VCS structure.

2.2.0.3 The VCS will be considered the exclusion zone (EZ) and will only be entered by personnel wearing approved Personal Protective Equipment (PPE). Prior to starting excavation activities, all of the structure's doors will be secured, the air filtration system functional, and the air monitoring measures in place and operating.

Figure 2-2
Typical Vapor Containment Structure

2.3 Modular Aluminum Containment Structure (MACS)

2.3.0.1 The MACS consists of engineered panels configured in a rectangular box**.** The structure is reinforced with overlapping 5/16-inch aluminum sheets. This structure is specifically designed for the site-wide investigation to meet the requirements for protecting the public from fragmentation or containing the MCE. The configuration of the MACS presented in this plan has been approved by DDESB for containment of the MGFD. The MACS was also approved for the containment of an evaporative agent release (when combined with a chemical agent filtration system). However, it is not currently approved for containment of an agent release resulting from the detonation of a chemical munition. Any new configuration of the MACS will require

DDESB review and approval. The MACS may be used in conjunction with a Vapor Containment Cover (VCC) to allow the MACS to contain the hazards associated with the detonation of chemical agent filled, 75 mm MkII chemical projectile.

This structure will be best suited for site-wide investigation given the limited space on some of the properties being investigated. A typical MACS with wall and roof layout is presented in Figure 2-3.

2.3.0.2 The aluminum panels making up the structure come in 16, 12, 10, 6, and 4 feet long panels and corresponding end members. Once erected, a smoke test will be conducted prior to start of operations. Negative pressure will be maintained in the structure at all times. The structure will be built around the mini-excavator that will be used in the excavation. The mobile chemical agent air filtration system will also be ducted to the MACS by filter intakes that exhaust the MACS and prevents any potential agent release to the atmosphere.

Figure 2-3
Typical Modular Aluminum Containment Structure (MACS)

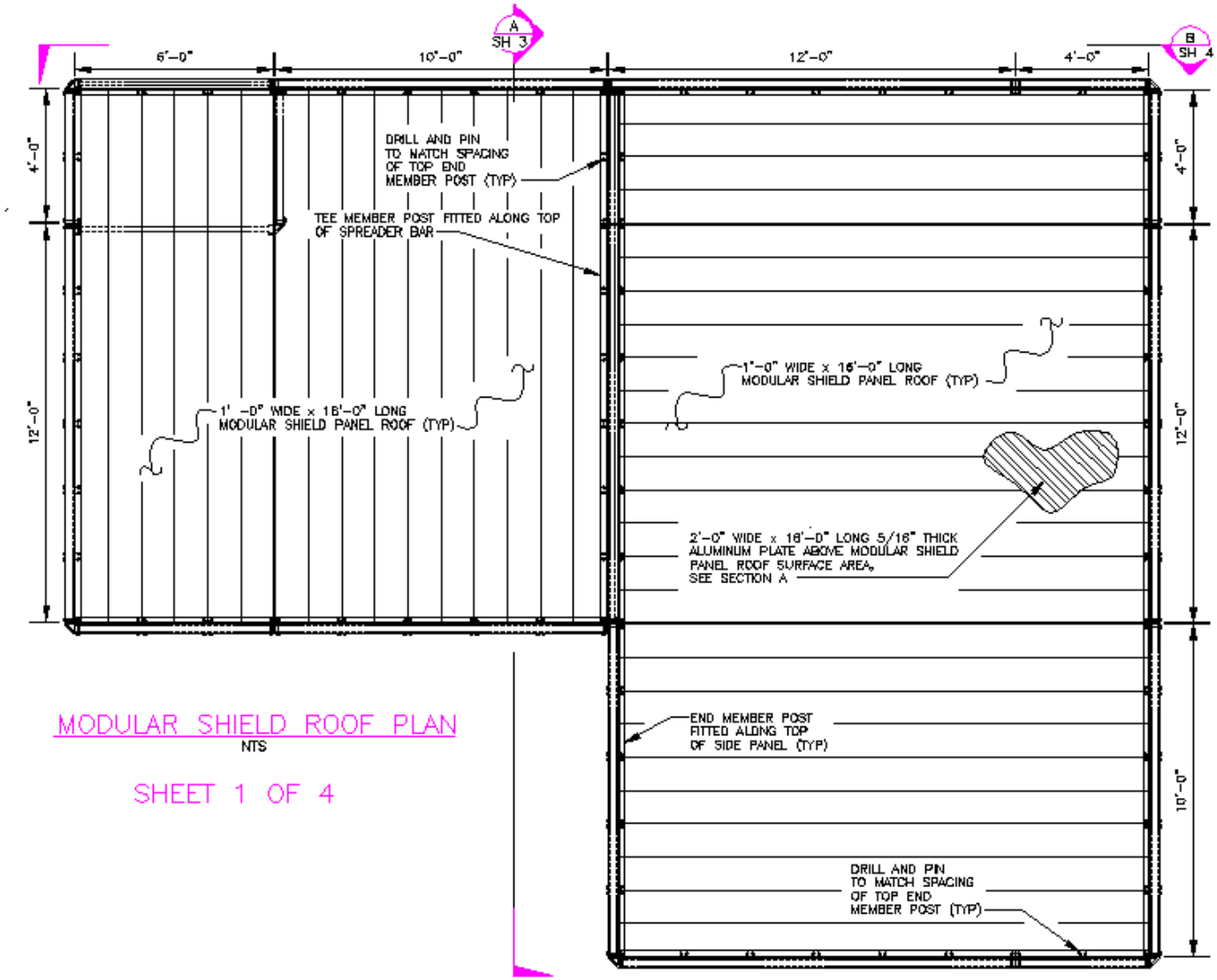


Figure 2-3 (Continued)
Typical Modular Aluminum Containment Structure (MACS)

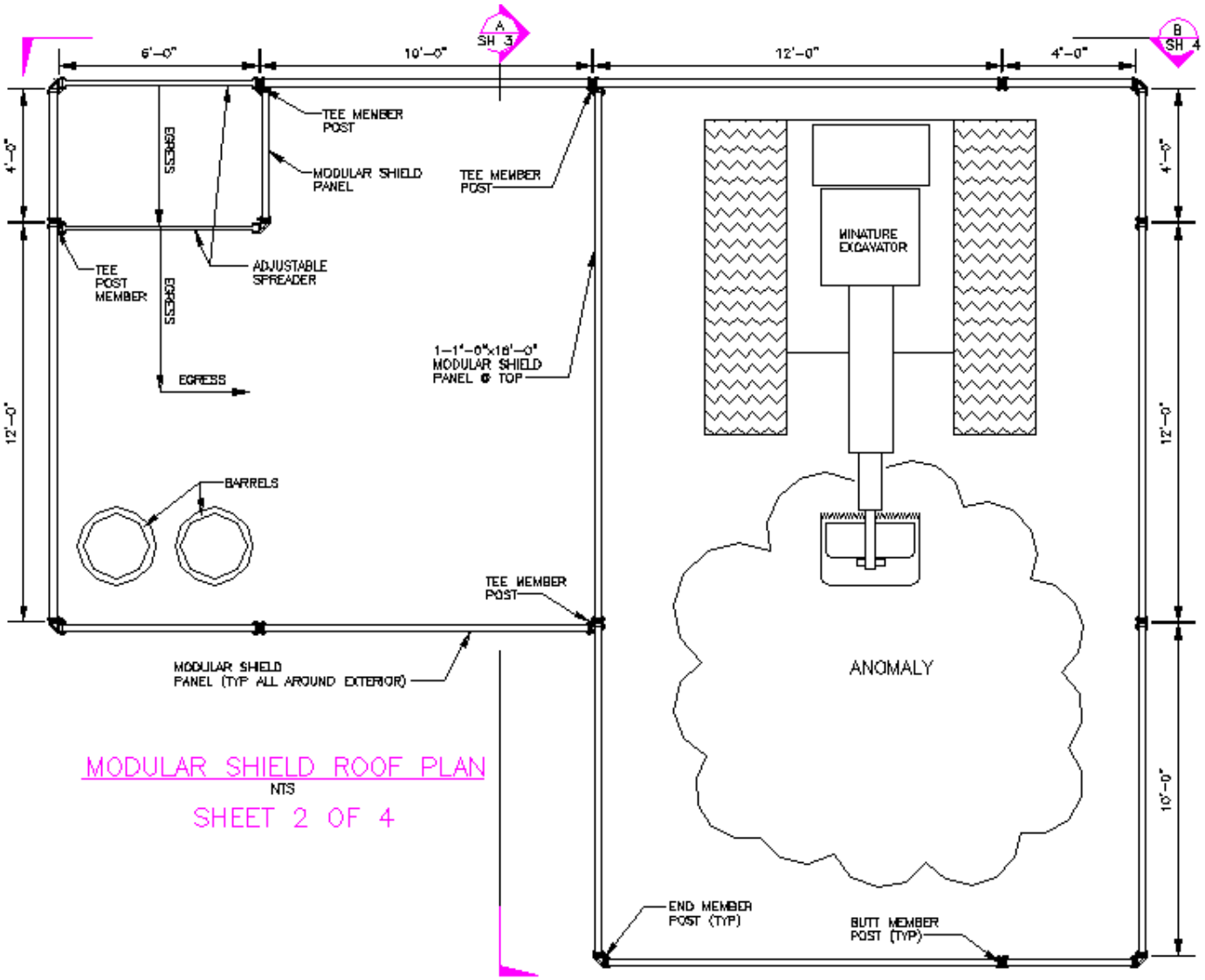


Figure 2-3 (Continued)
Typical Modular Aluminum Containment Structure (MACS)

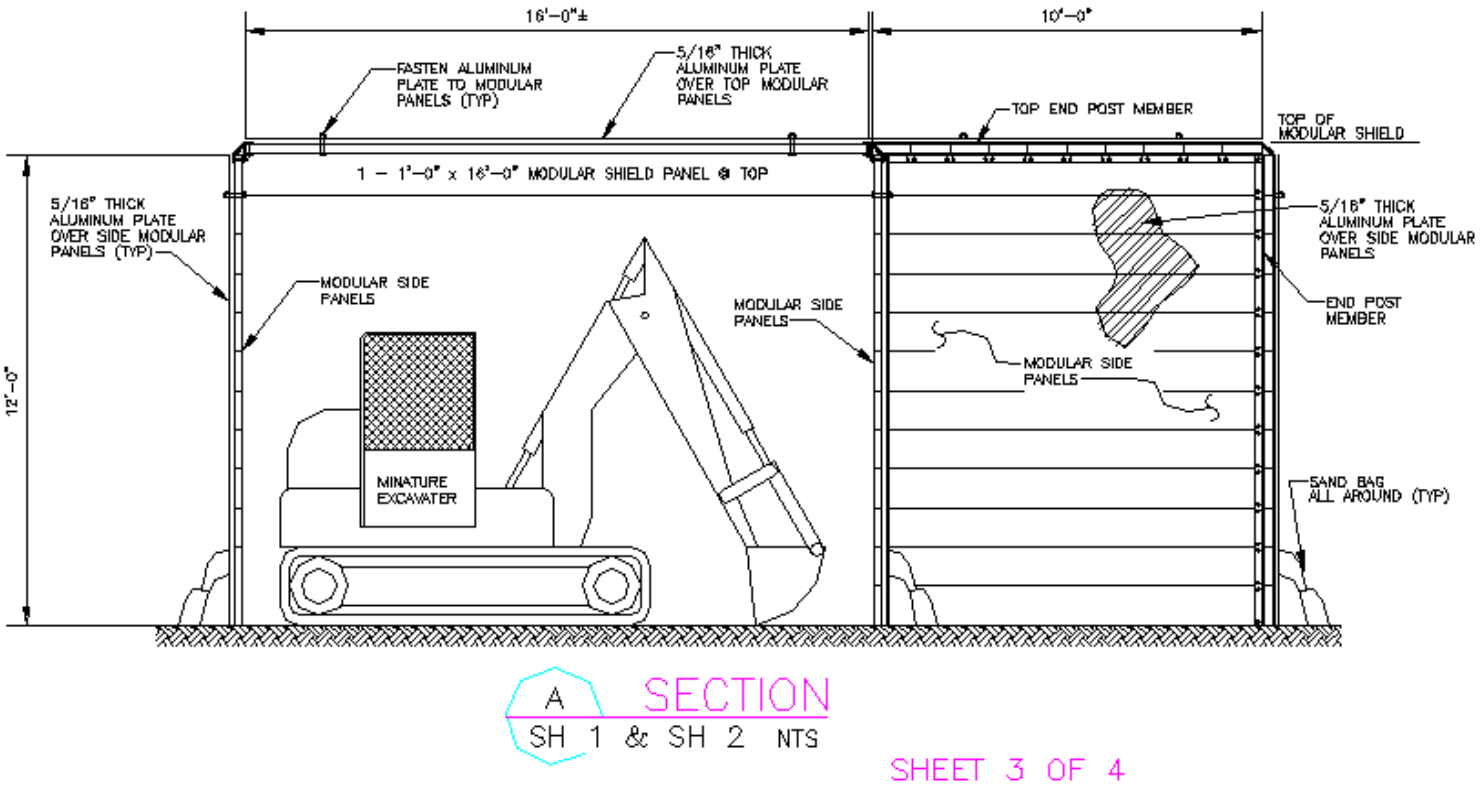
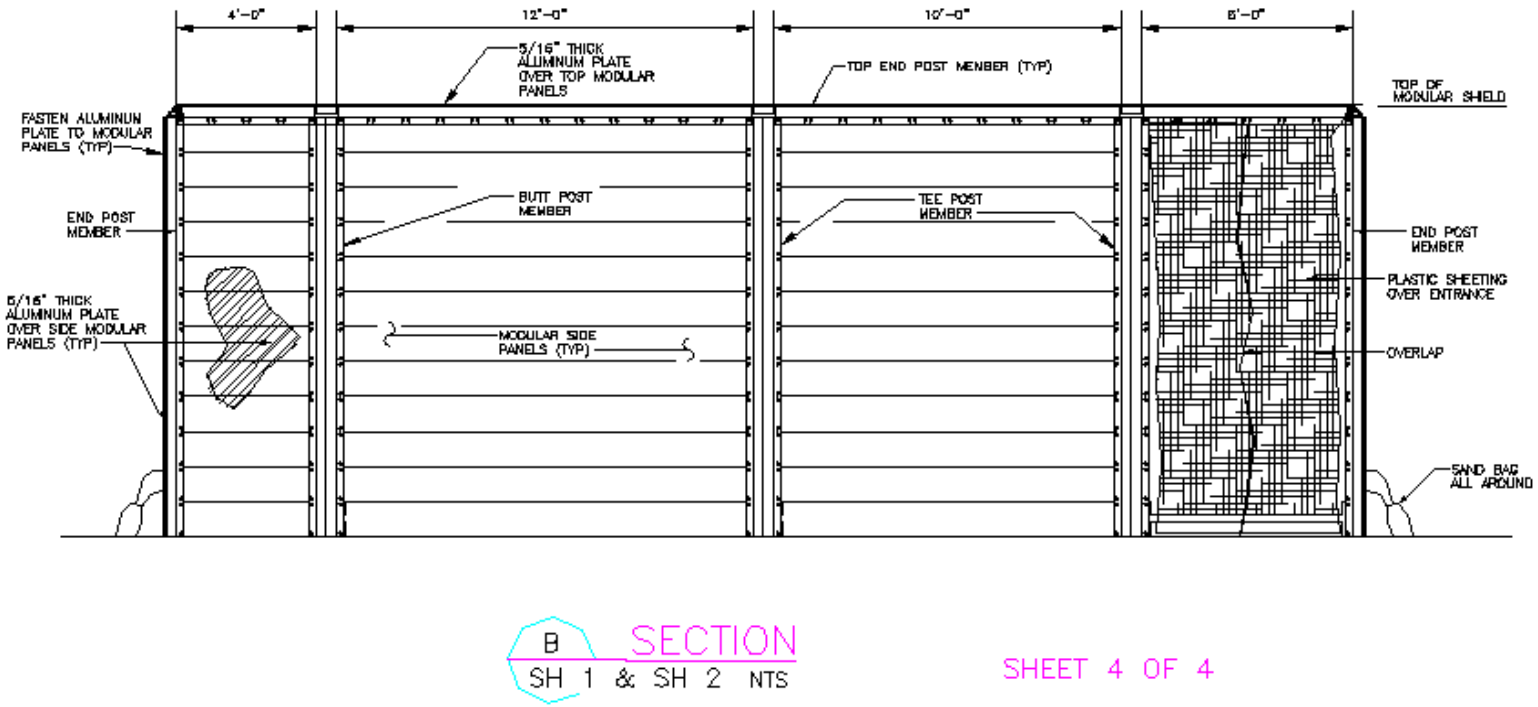


Figure 2-3 (Continued)
Typical Modular Aluminum Containment Structure (MACS)



2.4 Filter Assembly

2.4.0.1 The MACS and tent structure will use a filter assembly. Filter assemblies with 1200 cubic feet per minute (CFM) and 2500 CFM capacities have previously been used at Spring Valley FUDS. A typical filter assembly is shown in Figure 2-4. This filter assembly consists of:

- Pre-filters
- HEPA filter to remove particulates
- Two charcoal filter beds in series, and
- Exhaust stack.

2.4.0.2 This filter assembly meets the design requirements specified in DA PAM 385-61 for potentially encountering neat agent (i.e., H or L). These design requirements include:

- The overall structure must maintain negative pressure.
- Airflow must not exceed chemical agent filter design

2.4.0.3 A detailed discussion of this filter assembly specification will be presented in the site specific plans. The filter unit for the Air Monitoring Team will install the filter assembly for this project in accordance with site-specific plans.

Figure 2-4
Typical Filter Assembly

ATTACHMENT 1
DDESB APPROVALS

DEPARTMENT OF DEFENSE EXPLOSIVES SAFETY BOARD
2461 EISENHOWER AVENUE
ALEXANDRIA VIRGINIA A 22331-0600

AUG 0 9 2002

DDESB-KO

MEMORANDUM FOR DIRECTOR OF ARMY SAFETY (ATTENTION: DACS-SF)

SUBJECT: Final Site-Wide Chemical Safety Submission (CSS) for Spring Valley, Washington, D.C.

References: (a) DACS-SF Memorandum dated 31 July 2002, Subject as above

(b) E-mail from USATCES to DDESB dated 08 August 2002, Subject: Change pages for SV CSS

(c) E-mail from USATCES to DDESB dated 08 August 2002, Subject: Friday Changes to SV CSS

(d) E-mail from USATCES to DDESB dated 08 August 2002, Subject: Final SV CSS Change

(e) DoD 6055.9-STD, Department of Defense Ammunition and Explosives Safety Standards, dated July 1999

(f) E-mail from USATCES to DDESB dated 30 July 2002, Subject: MACS Update for Spring Valley

(g) DACS-SF Memorandum dated 07 June 1999, Subject: Approval of Spring Valley Operable Unit 3 Site Safety Submission Addendum

The Department of Defense Explosives Safety Board Secretariat has reviewed the subject site safety submission, forwarded by reference (a), and amended by reference (b), reference (c), and reference (d), with respect to explosives and toxic chemical safety criteria of reference (e). Based on the information provided, final approval is granted for the subject submission. The following pertain to this approval:

a. <u>The Modular Aluminum Containment Structure (MACS)</u>:

(1) The MACS, minimum total capacity of 1440 ft^3 (10W by 12L by 12H), is approved to contain fragments and blast overpressure from one 75 mm round with burster only (0.1 pounds of TNT equivalent) as described in reference (f). Reference (b) identified the non-agent filled 75 mm round with burster as the Most Probable Munition. The MACS is also approved as containment for the Maximum Credible Event of an evaporative

release of lewisite chemical agent from a 5 gallon container or Mustard agent from non-explosively configured 75 mm round or Livens Projector (reference (b)). The stand-off distance from MACS interior walls must be at least 8 ft.

(2) MACS must maintain a negative pressure with respect to outside ambient pressure during operations.

(3) Before beginning daily operations, an inspection must be conducted to ensure that the ventilation system of the MACS is in optimal operating condition.

b. Hazard Class of the Recovered Munitions with high explosives: In the absence of documented hazard classification signed by appropriate authority, the recovered munitions with high explosives are considered Hazard Division (HD) 1.1.

c. Explosive Storage: The net explosive weight for the explosive storage magazine, located at Federal property in Spring Valley, is limited to 10.5 pounds of TNT equivalent (HD 1.1), Annex 3 in reference (g), with an exclusion zone of 220 ft.

d. Soil Waste Handling: The 55 gallon drums that contain agent-contaminated soil must be monitored for the suspected agents on a regular basis. The contaminated soils and drums must be decontaminated as soon as possible. Plastic containers will not be relied upon for extended storage of agent-contaminated soil as the plastic will adsorb chemical agents then desorb it at a later time.

e. Filtration System: The performance of the filtration system must be closely monitored. Operations inside the MACS must not degrade the performance of the ventilation and filtration system.

f. Back-up Power Supply: Back-up power supply must be provided to ensure the filtration and ventilation system is continually operating. The back-up power supply must be supported by an uninterrupted power system to eliminate the lag time between the power interruption and back-up power supply kick off.

Point of contact is Mr. Aly Kewan, DSN: 221-1240; commercial: (703) 325-1240; and E-mail: Aly.Kewan@ddesb.osd.mil.

William E Wright

WILLIAM E. WRIGHT
Captain, US Navy
Chairman

DEPARTMENT OF THE ARMY
US ARMY DEFENSE AMMUNITION CENTER
1 C TREE ROAD
MCALESTER OK 74501-9053

REPLY TO
ATTENTION OF

SJMAC-ESM

10 JAN 2007

MEMORANDUM FOR Department of Defense Explosives Safety Board-, (DDESB-PE), 2461 Eisenhower Avenue, Alexandria, VA 22331-0600

SUBJECT: Engineering Controls Evaluation for 4825 Glenbrook Road, Spring Valley, Formerly Used Defense Site (FUDS), Washington, DC, Modular Aluminum Containment Structure (MACS) Engineering Controls, 10 November 2006, Revised Configuration

1. References:

a. AR 385-64, US Army Explosives Safety Program.

b. AR 385-61, The Army Chemical Agent Safety Program.

c. DOD 6055.9-STD, DOD Explosives Safety Standards.

2. This submission is to merge the blast mitigation of the MACS with a vapor containment cover (VCC). This is being done because of the close proximity to private residences near the excavation site.

3. The following supplemental information is provided to assist with your review:

a. This will allow removal of Munitions and Explosives of Concern (MEC) and Recovered Chemical Warfare Materiel (RCWM) or other American University Experimental Station (AUES) related items that remain in Test Pit 23.

b. The north end of Test Pit 23 is located at the southwest corner of the house at 4825 Glenbrook Road. The south end of Test Pit 23 is located on the property at 4801 Glenbrook Road, the South Korean Ambassador's residence. Both properties were part of AUES testing grounds for chemical weapons during World War I.

c. The maximum credible event (MCE) for this operation is the explosive release of a 75 mm MkII chemical round containing mustard agent.

d. Both the MACS and the VCC have been approved and used at other locations. Approval of this site plan will allow the MACS to be placed under a VCC. The MACS would mitigate hazards from the munition with the greatest fragmentation distance (MGFD) (75 mm MkII) while the VCC would provide containment of the MCE.

e. The combination of the VCC with the MACS provides the advantage of not requiring evacuation of residences and having the flexibility to meet site space constraints.

SJMAC-ESM
SUBJECT: Engineering Controls Evaluation for 4825 Glenbrook Road, Spring Valley, Formerly Used Defense Site (FUDS), Washington, DC, Modular Aluminum Containment Structure (MACS) Engineering Controls, 10 November 2006, Revised Configuration

4. This submission has been reviewed against the criteria of DOD 6055.9-STD as implemented by AR 385-61 and AR 385-64. Based on the information provided, this submission is granted Army approval and provided for your review with our recommendation for approval.

5. Point of contact is Dr. Jimmy Langley, SJMAC-ESM, DSN 956-8767, (918) 420-8767, facsimile DSN 956-8503, (918) 420-8503, or Jimmy.L.Langley@us.army.mil.

FOR THE DIRECTOR:

Jesse M. Granger

Encls
as

JESSE M. GRANGER
Toxic Chemical Agent Team Leader
Explosives Safety Knowledge,
OE and Chemical Division

CF (w/o encls):
Office of the Director of Army Safety (DACS-SF/Mr. Proper), 223 23rd Street, Crystal Plaza 5, Room 980, Arlington, VA 22202
US Army Corps of Engineers, Huntsville Center, ATTN: CEHNC-OE-CX, Mr. Hank Hubbard, P.O. Box 1600, Huntsville, AL 35807-4301.

DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO
ATTENTION OF:

CEHNC-DE

NOV 2 2 2006

MEMORANDUM FOR US Army Technical Center for Explosives Safety, Explosives Safety Knowledge, Ordnance and Explosives (OE) and Chemical Division, (SJMAC-ESM/Mr. Jesse Granger), Building 35, 1 C Tree Road, McAlester, OK 74501-9053

SUBJECT: Engineering Controls Evaluation for 4825 Glenbrook Road, Spring Valley, Formerly Used Defense Site (FUDS), Washington, DC, Modular Aluminum Containment Structure (MACS) Engineering Controls, 10 November 2006, Revised Configuration

1. References:

a. Modular Containment Structure Design and Specifications for Spring Valley DERP/FUDS Site Wide, 29 July 2002.

b. Memorandum, DDESB-KO, 9 August 2002, subject: Final Site Wide Chemical Safety Submission (CSS) for Spring Valley, Washington, DC, approval.

c. Memorandum, DDESB-KO, 12 March 2003, subject: Amendment 1 to the Chemical Safety Submission (CSS) for Recovered Chemical Warfare Materiel (RCWM) Site Wide CSS for Spring Valley, Washington, DC, approval.

d. Memorandum, DDESB-KO, 2 May 2003, subject: Amendments 2 and 3 to the Site Wide Chemical Safety Submission for Spring Valley, Washington, DC, approval.

e. Memorandum, DDESB-KO, 20 March 2004, subject: Amendment 4 to the Site Wide Chemical Safety Submission for Spring Valley, Washington, DC, approval.

f. Memorandum, DDESB-KO, 17 March 2004, subject: Amendment 5 to the Site Wide Chemical Safety Submission for Spring Valley, Washington, DC, approval.

g. Memorandum, CESO-E, 25 March 2003, subject: Headquarters, Corps of Engineers, Delegation of Authority.

2. Reference 1(b) provided DDESB approval for the MACS for blast and fragment mitigation of the explosive burster from a 75mm chemical projectile (.01 pounds of TNT equivalent). This reference also approved the MACS for the containment of an evaporative release of agent from the maximum credible event of five gallons of lewisite from a non-explosively configured container, or mustard from a non-explosively configured 75mm projectile.

NOV 2 2 2006

CEHNC-DE
SUBJECT: Engineering Controls Evaluation for 4825 Glenbrook Road, Spring Valley Formerly Used Defense Site, Washington, DC, Modular Aluminum Containment Structure (MACS) Engineering Controls, 10 November 2006, Revised Configuration

3. This submission merges the blast mitigation and the vapor containment capabilities of the MACS. This is accomplished by the addition of a vapor containment cover (VCC) to the MACS assembly. The specifications for the complete ensemble are included in this submittal.

4. This configuration of the MACS is anticipated to be used at 4825 Glenbrook Road, Spring Valley, Washington, DC. The extremely confined geographical area of this intrusive investigation necessitates this protective ensemble to ensure public protection.

5. The projected start date for intrusive operations at this location using the revised MACS configuration is early March 2007.

6. If you have any questions, please call Mr. Hank Hubbard at 256-895-1586.

Encl

LARRY D. McCALLISTER
Colonel, Corps of Engineers
Commanding

CF:
Commander, USACE, (CESO-SWD/Ms. Blanca Roberts) (wo/encl)