FINAL
WORK PLAN

for

BLACK HILLS ARMY DEPOT
REMEDIAL INVESTIGATION AND
FEASIBILITY STUDY

at

Fall River County, South Dakota

FUDS Project No. B08SD000800

Submitted to

U.S. Army Engineering & Support Center, Huntsville

Prepared by

PARSONS

1700 Broadway, Suite 900

Denver, CO

Revision No. 0

30 March 2012

USAESC Huntsville
Contract No. W912DY-09-D-0062
Delivery Order 0003 & 0009
Parsons Project No. 747769

FINAL
WORK PLAN

Approval Signature Sheet

Project Title:	**Black Hills Army Depot Remedial Investigation and Feasibility Study at Fall River County, South Dakota**
Project Number:	**747769**
Client Name:	**U.S. Army Engineering & Support Center, Huntsville**
Contract Number:	**W912DY-09-D-0062, Delivery Order 0003 & 0009**
Contractor:	**Parsons Infrastructure & Technology Group, Inc.**
Task Order Period:	**August 5, 2010 – December 31, 2013**
Date of Version:	**30 March 2012**

First Update

March 2012

(Revision 0)

Reviewed and Approved by:

Project Manager:  3/30/12

Chris ten Braak Date

Technical Manager:  3/30/12

Greg Nivens Date

FINAL
WORK PLAN

Technical Review Signature Sheet

Project Title: **Black Hills Army Depot Remedial Investigation and Feasibility Study at Fall River County, South Dakota**

Project Number: **747769**

Document Date: **30 March 2012**

Document Revision: **0**

The following technical specialists have participated in the production and review of the relevant parts of this document, and are satisfied with its technical adequacy regarding their fields of expertise.

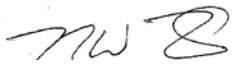
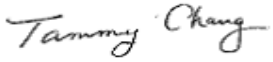
Discipline	Reviewer, Title	Signature	Date
Health and Safety	Mr. Ed Grunwald, CIH *Project Safety and Health Manager*		12/22/11
MEC Operations	Mr. Neil Feist *MEC Operations Manager*		3/30/12
SUXOS/Site Safety Manager	Mr. David Hurtle *MEC Saftey*		2/3/11
Geophysics	Mr. Craig Murray *Project Geophysicist*		3/30/12
Chemistry	Ms. Tammy Chang *Project Chemist*		3/30/12
Hazard/Risk Assessment	Dr. Steve Rembish *Risk Assessor*		3/30/12
MEC Quality Control and Safety	Mr. Michael Short *MEC QC & Safety Manager*		12/30/11
QC and Technical Manager	Ms. Carrie Ross *Deputy PM*		3/30/2012

TABLE OF CONTENTS

Table of Contents (continued)

Appendices (Included as Volume II of the Work Plan)

LIST OF TABLES

LIST OF FIGURES

Standard Operating Procedures are bounded separately (Parsons, 2011c).

ACRONYMS AND ABBREVIATIONS

°C	Degrees Centigrade
°F	Degrees Fahrenheit
µg	Microgram
ABP	Agent Breakdown Product
AC	Hydrocyanic Acid
AP	Armor Piercing
APC-T	Armor Piercing Capped – Tracer
APP	Accident Prevention Plan
APPL	Agriculture & Priority Pollutants Laboratories, Inc.
ARAR	Applicable or Relevant and Appropriate Requirement
ASR	Archives Search Report
ASTM	American Society for Testing and Materials
AT	Anti-Tank
ATFP	Bureau of Alcohol, Tobacco, Firearms, and Explosives Publication
BATF	Bureau of Alcohol, Tobacco, Firearms, and Explosives
BE	Base Ejection
BEHP	Bis (2-ethylhexyl) Phthalate
BEM	Buried Explosion Module
BG-1	Burning Ground No. 1
BG-2	Burning Ground No. 2
bgs	Below Ground Surface
BHAD	Black Hills Army Depot
BIP	Blown-in-Place
BP	Breakdown Product
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CA	Chemical Agent or Cost Analysis
CAA	Clean Air Act
CACM	Chemical Agent Contaminated Media
CAD	Computer-Aided Design and Drafting
Cal	Caliber
CAP	Contractor-Acquired Property
CARA	CBRNE Analytical and Remediation Activity
CBRNE	Chemical, Biological, Radiological, Nuclear and High-yield Explosives
CD	Compact Disk OR Cultural Debris
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CENWO	U.S. Army Corps of Engineers, Omaha District
CFR	*Code of Federal Regulations*
CG	Phosgene
CK	Cyangen Chloride
CN	Chloroacetophenone
CNB	Chloroacetophenone, Carbon Tetrachloride, and Benzene (Irritant)
CNS	Irritant
COC	Chain of Custody
COPC	Chemical of Potential Concern
CP	Command Post
CPFF	Cost Plus Fixed Fee
CRREL	Cold Regions Research Engineering Laboratory
CS	Chemical Agent Contaminated
CSM	Conceptual Site Model
CSP	CWM Site Plan
CSS	Chemical Safety Submission
CVAA	2-Chlorovinyl Arsenous Acid
CVAO	2-Chlorovinyl Arsenous Oxide
CWA	Clean Water Act
CWBPA	Chemical Warfare Burn Pit Area
cu yd	Cubic yard
CWM	Chemical Warfare Materiel
DA	Department of the Army
DAAMS	Depot Area Agent Monitoring System
DANC	Decontamination Agent Non-Corrosive
DASAF	Department of the Army Safety Office
DD	Decision Document
DDESB	Department of Defense Explosives Safety Board
DERP	Defense Environmental Restoration Program
DGM	Digital Geophysical Mapping
DID	Data Item Description
DNT	Dinitrotoluene
DoD	Department of Defense
DOT	Department of Transportation
DP-19	Chemical Plant Area
DP-31	Chemical Warfare Burning Plant Area
DP-32	Chemical Plant Disposal Pit Area
DP-35	Suspected Pits
DQCR	Data Quality Control Report
DQO	Data Quality Objective
DS	Decontaminated Chemical Agent Soil
DTL	Demolition Team Leader
DVD	Digital Video Disk
ECBC	Edgewood Chemical Biological Center
EE	Engineering Evaluation

EM	Engineering Manual
EMA	Emergency Medical Assistance
EMD	Emergency Management Department
EOD	Explosive Ordinance Disposal
EP	Engineering Pamphlet
EPDS	Emergency Personnel Decontamination Station
EPP	Environmental Protection Plan
ER	Engineer Regulation
ESRI	Environmental Systems Research Institute
EZ	Exclusion Zone
^{o}F	Degrees Fahrenheit
FD	Field duplicate
FFP	Firm Fixed Price
FGDC	Federal Geographic Data Committee
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FM	Field Manual
frag	Fragmentation
FS	Feasibility Study
FSP	Field Sampling Plan
ft	Foot
FT	Field Triplicate
FTP	File Transfer Protocol
FUDS	Formerly Used Defense Sites
FUDSMIS	FUDS Management Information System
GB	Sarin
GFP	Government Furnished Property
GIS	Geographical Information System
gl	Gallon
GPL	General Population Limit
GPS	Global Positioning System
GSA	General Services Administration
H	Mustard
H2O Rain	Rain Water
HA	Hazard Assessment
H&S	Health and Safety
HAZCOM	Hazard Communications
HBESL	Health-Based Environmental Screening Level
HC	Hexachloroethane
HE	High Explosive
HFD	Hazardous Fragment Distance
HHRA	Human Health Risk Assessment
HS	Mustard OR Hazardous and Toxic Waste Contaminated Soil
HT	Mustard + T Mixture
HTRW	Hazardous, Toxic, and Radioactive Waste
HTW	Hazardous and Toxic Waste
IC	Industrial Chemical OR Intact Container
ID	Identification
IDS	Intrusion Detection System
IDW	Investigation Derived Waste
IGD	Interim Guidance Document
IHF	Interim Holding Facility
IVS	Instrument Verification Strip
JATO	Jet Assist Take Off
kg	Kilogram
L	Lewisite OR Liter
lb	Pound
LDD	Loss/Damage/Destruction
LW	Onsite Laboratory Waste
,m^3	Cubic Meter
MACOM	Major Command
MARB	Material Assessment Review Board
MBP	Mustard Breakdown Product
MC	Munitions Constituents
MCE	Maximum Credible Event
MD	Munitions Debris
MDAS	Material Documented As Safe
MEC	Munitions and Explosives of Concern
mg	Milligram
MGFD	Munitions with the Greatest Fragmentation Distance
MINICAMS	Miniature Chemical Agent Monitoring System
mL	Milliliter
mm	Millimeter
MM-CX	Military Munitions Center of Expertise
MMRP	Military Munitions Response Program
mph	Miles per Hour
MPPEH	Material Potentially Presenting an Explosive Hazard
MQO	Measurement Quality Objective
MRR	Material Receiving Report
MRS	Munitions Response Site
MS	Matrix Spike
MSD	Minimum Separation Distance OR Matrix Spike Duplicate
msl	Mean Sea Level
mV	Millivolts
MW	Metallic Debris
NCP	National Contingency Plan
NCR	Nonconformance Report
NDAI	No DoD Action Indicated
NEW	Net Explosive Weight
NGVD	National Geodetic Vertical Datum
NOSE	No Significant Effects
NTP	Notice to Proceed
OB	Open Burning
OD	Open Detonation
OE	Ordnance and Explosive
OSD	Overage/Shortage/Damage
OSHA	Occupational Safety and Health

	Administration
OU	Operable Unit
oz	Ounce
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbon
Parsons	Parsons Infrastructure & Technology Group, Inc.
PCB	Polychlorinated Biphenyl
PDA	Personal Digital Assistant
PDF	Portable Document Format
PDS	Personnel Decontamination Station
PINS	Portable Isotopic Neutron Spectroscopy
PIP	Public Involvement Plan
PM	Project Manager
PMNSCM	Project Manager for Non-Stockpile Chemical Materiel
POC	Point of Contact
PP	Proposed Plan OR Priority Pollutant
PPE	Personal Protective Equipment
PSHO	Project Safety and Health Officer
PSR	Project Status Report
PSV	Preliminary Screening Value
PWS	Performance Work Statement
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QCP	Quality Control Plan
Q-D	Quantity-Distance
RCRA	Resource Conservation and Recovery Act
RCWM	Recovered Chemical Warfare Materiel
RER	Risk Evaluation Report
RI	Remedial Investigation
ROE	Right of Entry
RQ	Reportable Quantity
ROM	Read-Only Memory
RR	Recoilless Rifle
RSL	Regional Screening Level
RTK	Real-Time Kinematic
SAP	Sampling and Analysis Plan OR Semi-Armor Piercing
SARA	Superfund Amendments and Reauthorization Act
SDDENR	South Dakota Department of Environment and Natural Resources
SDSFIE	Spatial Data Standards for Facilities Infrastructure and Environment
SDTS	Spatial Data Transfer Standards
SDWA	Safe Drinking Water Act
SF	Semi-Fixed
SI	Site Inspection
SIM	Selected Ion Mode
SM	Site Manager
SOP	Standard Operating Procedures
SOW	Scope of Work
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
SSL	Soil Screening Level
STEL	Short-Term Exposure Limit
SU	Sample Unit
SUXOS	Senior UXO Supervisor
SVOC	Semi-Volatile Organic Compound
T&E	Threatened and Endangered
TBC	To Be Considered
TCE	Trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TDG	Thiodiglycol
TE	U.S. Army 22nd Chemical Battalion
TEC	Topographic Engineering Center
TMP	Technical Management Plan
TNT	Trinitrotoluene
TPP	Technical Project Planning
TSCA	Toxic Substances Control Act
UFP	Uniform Federal Policy
UDMH	Unsymmetrical Dimethylhydrazine
USACE	U.S. Army Corps of Engineers
USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
USAESCH	U.S. Army Engineering and Support Center, Huntsville
USAEWES	U.S. Army Engineer Waterways Experimental Station
USATCES	U.S. Army Technical Center for Explosives Safety
USC	*United States Code*
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	Underground Storage Tank
UTM	Universal Transverse Mercator
UXO	Unexploded Ordnance
UXOQCS	UXO Quality Control Specialist
UXOSO	UXO Safety Officer
VOA	Volatile Organic Compound Analysis
VOC	Volatile Organic Compound
VX	Nerve Agent
WAAS	Wide Area Augmentation System
WP	White Phosphorus OR Work Plan
WS	Worksheet

CHAPTER 1
INTRODUCTION

1.1 PROJECT AUTHORIZATION

1.1.1 Parsons Infrastructure & Technology Group, Inc. (Parsons) is serving as the prime contractor to the U.S. Army Engineering and Support Center, Huntsville (USAESCH) under Contract W912DY-09-D-0062, Delivery Order 0003 and Delivery Order 0009. These delivery orders were established to conduct a remedial investigation (RI) and feasibility study (FS) at the former Black Hills Army Depot (BHAD) in Fall River County, South Dakota, for the following three areas: Burning Ground No. 1 (BG-1), Burning Ground No. 2 (BG-2) and the Chemical Plant Area. The requirements are described in two separate performance work statements (PWS) for Delivery Order 0003 and Delivery Order 0009, dated 13 May 2011 and 28 June 2011, respectively. The PWSs are included as Appendix A.

1.1.2 The Department of Defense (DoD) has established the Military Munitions Response Program (MMRP) to address DoD sites suspected of containing munitions and explosives of concern (MEC), including chemical warfare materiel (CWM) and munitions constituents (MC). Under the MMRP, the U.S. Army Corps of Engineers (USACE) is conducting environmental response activities at formerly used defense sites (FUDS) for the Army, the DoD's executive agent for the FUDS program. The former BHAD site is an eligible FUDS that falls within the DoD's MMRP. The FUDS project number for the former BHAD is B08SD00800.

1.1.3 Pursuant to Engineer Regulation (ER) 200-3-1 (USACE, 10 May 2004) and the *Management Guidance for the Defense Environmental Restoration Program* (DERP) (Office of the Deputy Under Secretary of Defense [Installations and Environment], September 2001), the USACE is conducting FUDS response activities in accordance with the DERP statute (10 *United States Code* [USC] 2701 *et seq.*), the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) (42 USC §9620 *et seq.*), Executive Orders 12580 and 13016, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 *Code of Federal Regulations* [CFR] Part 300). As such, the USACE is conducting this RI/FS, as set forth in the NCP, to evaluate hazardous substance releases or threatened releases from three investigation areas at the former BHAD (that is, BG-1, BG-2, and Chemical Plant Area). Activities involving work in areas potentially containing explosive hazards will be conducted in full compliance with DoD, Department of the Army (DA), USACE, and state and local requirements regarding personnel, equipment, and procedures.

1.2 PURPOSE AND SCOPE

1.2.1 The purpose and scope of this work plan is to perform an RI/FS for BG-1, BG-2 and the Chemical Plant Area that will achieve acceptance of Decision Documents (DDs) in compliance with CERCLA and DoD, DA, and USACE regulations and guidance to include interim guidance documents (IGD) and data item descriptions (DIDs).

1.2.2 This RI/FS work plan has been prepared in accordance with DID WERS-001.01, USACE Engineering Manual (EM) 1110-1-4009, and the PWSs. The objectives of this project will be met when the following is accomplished:

- Work plans are prepared in accordance with the PWS and referenced governing regulations and requirements. These plans identify appropriate fieldwork elements and define and present a cost-effective approach to the planning and implementation of fieldwork.
- Investigations are safely completed that are sufficient to determine the nature and extent (if present) of MEC/CWM and MC, identify and quantify any associated risk, and support an FS for remedial action.
- A FS report is completed that identifies at least one appropriate, applicable, cost-effective, implementable remedy for each investigation area.
- A proposed plan (PP) is prepared that summarizes for the public the proposed remedial alternatives and specifies the preferred alternative.
- A DD is prepared for each investigation area that documents remedial action decisions and meets the requirements of ER 200-3-1 and Military Munitions Center of Expertise (MM-CX) IGD 06-04.

1.3 WORK PLAN ORGANIZATION

1.3.1 This work plan covers the activities necessary to complete the RI/FS at BG-1, BG-2, and the Chemical Plant Area at the former BHAD. The work plan is organized to address each of the components of the PWS in accordance with DID WERS-001.01 and EM1110-1-4009, Engineer Pamphlet (EP) 75-1-3, and other guidance. The work plan contains several subplans, each discussing a different aspect of the investigation. These chapters are summarized below. A separate work plan was developed for the geophysical investigation (Parsons, 2011b).

1. **Introduction**: Chapter 1 plan details the authorization, scope, and objective of the project; presents the organization of the work plan; presents an overview of the site and its history; summarizes the MEC/CWM risk; and describes the potential for presence or absence of MC.
2. **Technical Management Plan**: Chapter 2 documents the technical approach and procedures to be used to manage project tasks and details the organizational structure, lines of authority, and communication of the project team.

3. **Field Investigation Plan**: Chapter 3 describes the procedures that will be implemented at each individual site to complete the required field work.
4. **Quality Control (QC) Plan**: Chapter 4 describes Parsons' procedures for controlling and measuring the quality of work performed, including training requirements, audit procedures, and corrective/preventive action procedures.
5. **Explosives Management Plan**: Chapter 5 describes the details for the management of explosives used to destroy unexploded ordnance (UXO) recovered during the project, including acquisition, receipt, storage, transportation, and inventory. The explosives management plan was written in accordance with DID WERS-002.01.
6. **Environmental Protection Plan (EPP)**: Chapter 6 provides general information and lists applicable requirements for avoiding, minimizing, and mitigating potential impacts on environmental and cultural resources during field activities.
7. **Property Management Plan**: Chapter 7 describes how property management will be performed. The property management plan has been written in accordance with DID WERS-008.01.
8. **Interim Holding Facility Siting Plan for Recovered Chemical Warfare Materiel (RCWM) Projects**: Chapter 8, the interim holding facility (IHF) siting plan, typically addresses the siting requirements of the IHF. Since these requirements are mandatory pieces of the CWM site plan (CSP), which is in Appendix K, and the IHF site plan, which is a standalone document incorporated by reference, this chapter serves as a placeholder.
9. **Physical Security Plan for RCWM Project Sites**: Chapter 9 addresses the security procedures to be employed during RCWM operations, including storage of RCWM within the IHF. This plan was written in accordance with EP 75-1-3.
10. **References**: Chapter 10 includes a list of references used in the preparation of this work plan.

1.3.2 Additional information and plans are attached to this work plan as appendices:

A. **Performance Work Statement**: The most recent PWSs for Delivery Order 0003 and Delivery Order 0009 are included as Appendix A.

B. **Site Maps**: Appendix B is a placeholder. Maps are in the body of the report for ease of referencing.

C. **Local Points of Contact**: Points of contact are listed in Appendix C.

D. **Accident Prevention Plan**: Appendix D contains the accident prevention plan (APP). The APP describes the health and safety procedures, personal protection standards, and environmental health hazards applicable to this project. The site safety and health plan (SSHP) is included as Attachment 1 to the APP. The APP and SSHP were written in accordance with DID WERS-006-1, APP for RCWM Projects.

E. **Sampling and Analysis Plan (SAP)**: The field sampling plan (FSP) and Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP) in Appendix E outline the anticipated sampling and analysis procedures for the project. The UFP-QAPP contains a list of the required analytes and the associated sampling procedures.

F. **Forms**: Relevant forms and templates are provided in Appendix F.

G. **Minimum Separation Distance (MSD) Calculation Sheets**: This appendix includes the appropriate MSD calculations associated with the munitions with the greatest fragmentation distance (MGFD) associated with the site.

H. **Resumes**: This appendix includes resumes for key management and safety personnel filling core labor categories. Key UXO personnel are listed in the USAESCH database and, therefore, resumes for these personnel are not included in Appendix H.

I. **Support Plans**: Appendix I includes the chemical agent air monitoring plan developed by Chemical, Biological, Radiological, Nuclear and High-yield Explosives (CBRNE) Analytical and Remediation Activity (CARA), and the chemical agent capable laboratory sampling and analysis plan developed by Edgewood Chemical Biological Center (ECBC). These plans provide specifics on processes and procedures related to industrial chemical and chemical agent air monitoring and analysis of chemical agent and agent breakdown products (ABPs).

J. **Technical Project Planning (TPP) Work Sheets**: Appendix J includes documentation from the TPP meetings.

K. **CWM Site Plan / Probability Assessment**: The probability assessment regarding the likelihood of encountering CWM during RI field activities is included in Appendix K. In addition, the identification of the maximum credible event (MCE) is provided. Appendix K also includes a copy of the CSP.

L. **CARA Operating Procedures**: Appendix L describes CARA's standard operating procedures (SOPs) associated with various work and safety procedures.

M. **Risk Assessment Work Plan:** Appendix M provides the methods that will be used to conduct the human health and ecological risk assessments for BHAD. Preliminary conceptual site models (CSM) are also included in this appendix.

N. **Grid Sheets:** Appendix N includes detailed maps of each grid showing the locations of the anomalies. The appendix also includes single-point anomaly locations.

1.4 PROJECT LOCATION

The RI/FS project will address three investigation areas associated with the former BHAD in Fall River County, approximately 30 miles southwest of Hot Springs, South Dakota. The location of the site is shown on Figure 1.1. The three investigation areas within the former BHAD are shown on Figure 1.2 and include:

- **Burning Ground No. 1:** This investigation area consists of 438 acres in the south-central portion of BHAD.
- **Burning Ground No. 2:** This investigation area consists of 1,627 acres in the southwestern portion of BHAD.
- **Chemical Plant Area:** The Chemical Plant Area, which sometimes was called the Chemical Area (or Areas) in early investigations, is in the northwestern portion of BHAD, where four subareas totaling approximately 55 acres have been identified for further investigation and are included in this RI/FS.

1.5 SITE DESCRIPTION

1.5.1 Site Location

The former BHAD covers approximately 21,095 acres in the southwest portion of South Dakota, approximately 5 miles east of the Wyoming border and 8 miles north of the Nebraska border.

1.5.2 Topography

The former BHAD area is characterized by gently to steeply sloping topography, dissected by ephemeral streams and channels. The topographic relief of Fall River County is approximately 1,800 feet. Elevations at BHAD range from approximately 3,600 feet above mean sea level (msl) National Geodetic Vertical Datum (NGVD) at Coal Creek in the northeast corner of the facility to 4,155 feet msl along the southwest side near BG-2 (Figure 1.2). In general, the land surface slopes downward toward the east and northeast in the eastern half of the depot and to the west and northwest in the western half of the depot. Much of the facility consists of relatively flat to gently rolling upland areas that are dissected by intermittent streams and dry washes (URS 2009).

1.5.3 Climate

Former BHAD is situated in a continental climate characterized by warm to hot summers and cold winters, sometimes interrupted with mild periods. The average winter temperature (January to March) is 27.7°F, and the average summer temperature (July to September) is 69.2°F. The average annual precipitation is 16.0 inches. Of that total, an average of 11.9 inches (about 74 percent) commonly falls between April 1 and September 30 (URS 2009).

1.5.4 Vegetation

Although the predominant trees in the region are pine and spruce, the site contains few trees. Most of the BHAD is covered by western wheat grass, with some buffalo grass (URS 2009).

1.5.5 Geology

1.5.5.1 Three bedrock formations of Upper Cretaceous age outcrop at BHAD. In ascending order, these are the Carlile Shale, Niobrara Formation, and Pierre Shale. In general, the Carlile Shale is present across the higher elevations in the northern part of BHAD, the Niobrara Formation occupies the central lowlands portion, and the Pierre Shale is present along the higher elevations at the southern edge. The strata dip gently southward away from the center of the Black Hills uplift.

1.5.5.2 **Carlile Shale**: The Carlile Shale is the oldest exposed bedrock formation at BHAD and is approximately 500 feet thick in the area. The formation consists largely of dark-gray to black, sandy shale with limestone concretions, thin sandstone layers, and rare bentonite layers. The lowest portion of the Carlile is generally poorly exposed and consists of dark-gray shale with thin lenses of siltstone and thin limestone beds. It is overlain by fine to coarse sand (sometimes called the Wall Creek Sand Member) and units that consist of very fine-grained sandstone or sandy siltstone interbedded with shale and siltstone. The upper portion consists primarily of gray to black, fissile shale, with zones of calcareous concretions and thin beds of siltstone and fine-grained sandstone. This upper portion is primarily what outcrops at BHAD.

1.5.5.3 **Niobrara Formation**: The Niobrara Formation unconformably overlies the Carlile Shale. The contact between the Carlile Shale and the Niobrara Formation correlates with an erosional event that created an uneven surface. The Niobrara is poorly exposed but generally forms recognizable lowland between the dip slope of the Carlile Formation and the ridge formed by the lowermost member of the overlying Pierre Shale. The Niobrara is about 240 feet thick in the BHAD area and consists of gray, calcareous shale and sparsely fossiliferous, impure, chalky limestone.

1.5.5.4 **Pierre Shale**: The Pierre Shale overlies the Niobrara Formation and is the youngest of the Cretaceous formations exposed at BHAD. Regionally, the Pierre Shale is 1,200 to 2,700 feet thick and is exposed over very wide areas in western South Dakota from the Missouri River Valley to the Black Hills region. The Pierre consists primarily of dark-gray to black shale, with minor limestone lenses and zones of large concretions or laterally extensive concretion layers. The lowermost member of the Pierre Shale, the Sharon Springs member, is exposed near the southern edge of BHAD, where it forms a prominent ridge. The Sharon Springs Member consists primarily of black, fissile, organic shale but also contains three major concretionary layers and thin bentonite beds. Locally, the unit is about 200 feet thick, but the entire Pierre Shale thickens to more than 1,000 feet south of the BHAD (URS 2009).

1.6 SITE HISTORY

1.6.1 General History

1.6.1.1 The former BHAD, originally called the Black Hills Ordnance Depot, was established in 1942 and remained in continuous operation until 1967. The BHAD consisted of approximately 21,095 acres and was used to store, maintain, demilitarize, and issue conventional and chemical munitions. As constructed, the facility was to provide 1,500,000 square feet of space for long-term, reserve storage of ammunition, including storage of ammunition containing high explosives (HE) and chemical agent fillers. Areas associated with the disposal of chemical-filled munitions and chemical warfare agents included BG-1, BG-2, and the Chemical Plant Area.

1.6.1.2 Ammunition at the depot was stored in 802 igloo-type magazines, open storage sites between the igloos, 12 standard magazines, and miscellaneous outdoor storage areas. By 1964, the depot stored more than 250,000 tons of ammunition in the 802 igloos located throughout the facility. The facility also included 504 structures used for administrative, residential, and general operational purposes. The amounts and types of ordnance stored, renovated, and destroyed at the facility varied from year to year. Millions of tons of ordnance and bulk explosives passed through the depot during its existence. During the final years of operation, the majority of ordnance present at the BHAD was either shipped to other facilities or destroyed onsite. On June 30, 1967, the facility was permanently closed and transferred to the General Services Administration (GSA). Additional details regarding historic operations of the three areas being investigated under this RI are presented below.

1.6.2 Burning Ground No. 1

BG-1 is in the south-central portion of BHAD (Figure 1.2). The FUDS management information system (FUDSMIS) database identifies a 220-acre area as the munitions response site (MRS) for BG-1. The investigation area was expanded to 438 acres to incorporate the area identified in the 2009 Operable Unit 1 (OU-1) RI report (URS, 2009). This was historically the BHAD ordnance disposal area prior the construction of BG-2 in 1946. The area was reportedly used for the destruction of ordnance containing chemical agents, incendiary materials, and high explosives. Destruction was reportedly performed by burning and/or detonation. Based on previous investigations, the following 6 sub-areas have been identified at the site:

- DP-17A: One trench approximately 500 feet long and 50 feet wide;
- DP-17B: One trench approximately 680 feet long and 50 feet wide. A second trench, approximately 480 feet long, is west of the first trench.
- DP-17C: One trench approximately 800 feet long and 50 feet wide. A second trench, approximately 300 feet long, is east of the first trench.
- DP-17D: Disturbed area, approximate dimensions of 150 feet by 150 feet.

- DP-17E: Disturbed area, approximate dimensions of 200 feet by 300 feet.
- DP-17F: Disturbed area, approximate dimensions of 100 feet by 600 feet.

1.6.3 Burning Ground No. 2

BG-2 is in the southwestern portion of BHAD (Figure 1.2). The area encompasses approximately 1,627 acres with its southern and eastern limits extending outside the BHAD boundary.

BG-2 was constructed in 1946 as a facility for the demolition and burning of small arms, conventional weapons, bombs (high explosive, chemical, and incendiary), grenades, mines, rockets, and ordnance components. Many of the structures for the area, such as the demolition shelter, store house, and popping furnace, are still intact.

According to the former demolition foreman, chemicals, including mustard, were poured into trenches 20 to 25 feet deep and were allowed to seep into the ground. Occasionally, chemical bombs were not placed in pits but were burned along the sides of the roads at BG-2.

Large bombs were detonated in 12 pits, which ranged from 20 to 40 feet deep and which were reportedly in continual use at the burning ground. After detonation charges were connected to ignition wires, the munitions and charges were buried with earthen materials, and the munitions were detonated. All large detonations were initiated from behind the remote control shelter. Smaller bombs were placed in open sites and detonated in place, and small ammunition components such as primers and igniter tubes were burned in the popping furnace. Burned-out components were then placed on the ground in the vicinity of the popping furnace. Based on previous investigations, the following 6 sub-areas have been identified at the site:

- DP-18A: Two trenches on opposite sides of Demo Road. Approximately 300 feet by 50 feet.
- DP-18B: 85 acres identified as burning area.
- DP-18C: 70 acres known as demolition area.
- DP-18D: Three trenches; two each 500 feet by 50 feet and one 300 feet by 50 feet.
- DP-18E: 7 acres, unknown use, possible trenches.
- DP-18F: 6 acres, unknown use, near former demolition furnace.

1.6.4 Chemical Plant Area

The Chemical Plant Area is the northwestern corner of the former BHAD (Figure 1.2). According to available documentation, the Chemical Plant Area was used from 1949 through the 1960s for the draining, renovation, and destruction of mustard (H), cyanogen

chloride (CK), and phosgene (CG) bombs ranging in size from 100 to 1,000 pounds (lbs). Based on results from previous investigations, four areas have been identified within the chemical plant area for additional investigation:

- Chemical Plant Area (DP-19): This approximately 32-acre area includes the locations of the former demilitarization building and rotary kiln used for destruction of chemical munitions.
- Chemical Warfare Burning Pit Area (DP-31): This 21-acre, circular-shaped investigation area includes three potential disposal trenches.
- Chemical Plant Disposal Pit Area (DP-32): This investigation area is less than 1 acre and includes up to four potential disposal pits where remnants of the demilitarization building and rotary kiln were reportedly buried.
- Suspected Pits (DP-35): This investigation area includes five separate suspected pits (approximately 0.75 acres total). Past use of these five areas is not well documented.

1.7 CURRENT AND PROJECTED LAND USE

1.7.1 Of the 2,120 acres to be investigated at BHAD during the RI, approximately 28% (585 acres) of the area is privately owned. The privately owned land is primarily used for grazing; no residents are located within the privately owned investigation areas. The remaining investigation area (1,535 acres) is public land under the jurisdiction of the U.S. Department of Agriculture (USDA), and it is managed by one of its agencies, the U.S. Forest Service (USFS), as part of the Buffalo Gap National Grassland. The USDA has closures in place in certain areas that prevent leasing for grazing and limit access to authorized personnel. Ownership and land use for each investigation area are presented in Table 1.1 and illustrated on Figure 1.3.

Table 1.1
Investigation Area Ownership and Land Use

Investigation Area	Acres	Ownership/Land use
BG-1	438	Privately owned, primarily used for grazing.
BG-2	1,627	1,510 acres owned by USDA and managed as part of Buffalo Gap National Grassland, with about 945 acres closed to the public. 116 acres privately owned and used for grazing.
Chemical Plant Areas		
Chemical Plant Area (DP-19)	32	Privately owned, primarily used for grazing, one landowner.
Chemical Warfare Burning Pit Area (DP-31)	21	Owned by USDA and managed as part of Buffalo Gap National Grassland.
Chemical Plant Disposal Pit Area (DP-32)	< 1	Owned by USDA and managed as part of Buffalo Gap National Grassland.
Suspected Pits (DP-35)	0.75	Privately owned, primarily used for grazing, one landowner.

1.7.2 It is expected that most of the private property within the former BHAD will continue to be used for grazing. Although changes in use of the Buffalo Gap National Grassland are not anticipated, oil and natural gas exploration in the area has increased.

1.8 PREVIOUS INVESTIGATIONS

Many previous investigations have been conducted on areas of the former BHAD. These included record searches, interviews, surface assessments, geophysical surveys, and sampling. The investigations specifically associated with BG-1, BG-2, and the Chemical Plant Area are summarized in Table 1.2.

Table 1.2
Previous Site Investigations

Date/ Investigation	Activities/ Results
1992 inventory project report	This study established the former BHAD as a FUDS and concluded that unsafe debris and potentially hazardous water remains at the site.
1992 archives search report	This study obtained, reviewed, and evaluated historical records. The BHAD sites were categorized into the five OUs. OU-1 incorporated BG-1, while BG-2 and the Chemical Areas are included in OU-2 (TCT, 1992).
1994 phase I RI	BG-1, BG-2, and the Chemical Area were investigated to determine the location, nature, and extent of ordnance and explosive (OE) contamination. The study established geophysical survey grids at each location and obtained the following results: • At BG-1, the presence of large quantities of surface debris consisting of OE and general trash was identified. • At BG-2, the ground surface within the grids was saturated with metal fragments, fuses, and various ordnance components. • Within the Chemical Area, approximately 200 subsurface contacts were detected, although not all contacts are within the RI area (HFA, 1994).
1996 preliminary assessment / site inspection (PA/SI)	Surface water and sediment sampling was conducted within the Chemical Area, BG-1, and BG-2 to determine if contamination may be migrating towards offsite surface water locations. No CWM, explosives, or volatile organic compounds (VOCs) were detected in surface water or sediment samples (Rust, 1996).
1996/1997 OE removal action (phase I)	In 1996 and 1997, 340 acres of BG-1 and 512 acres of BG-2 were cleared of surface munitions debris (MD) and UXO. BG-1 produced 9,878 pounds of MD and 18 UXO items, and 46,526 pounds of MD and 558 UXO items were removed from BG-2. Pre- and post-detonation samples were collected and baseline analysis showed no significant contamination of explosives or metals (HFA, 1999).
1998 OE removal action (phase II)	In 1998, a continuation of surface OE removal at BG-2 was conducted on 220 acres. At BG-2, 154,770 pounds of MD and 364 UXO items were removed. Although UXO was removed, MD was not removed from approximately 24% (223 acres) of BG-2 (HFA, 2000).
2001 engineering evaluation / cost analysis (EE/CA) data summary report	The EE/CA evaluated potential investigative and/or remedial options for each area. The EE/CA summarized surface soil, sediment, and surface water sampling at BG-1 and BG-2, and no OE or CWM were detected. The Chemical Area was assessed by performing geophysical surveys on 230 grids encompassing approximately 211 acres (URS, 2001).
2001 preliminary assessment / site	This PA/SI for BG-1 and BG-2 determined whether contamination had migrated from source areas (for example, trenches and disposal areas) within the site. The

Table 1.2
Previous Site Investigations

Date/ Investigation	Activities/ Results
inspection Operable Unit 1	investigation included sampling of surface soil, subsurface soil, bedrock, ground water, surface water, and sediment. No CWM or CWM breakdown products (BP) were detected in any environmental samples from BG-1 or BG-2 (Dames & Moore, 2001). This investigation did not include direct sampling within or subsurface investigation of the suspect trenches and disposal areas.
2002 PA/SI Operable Unit 2	This PA/SI was completed at areas within the Chemical Plant Area to determine the presence or absence of chemical constituents in surface and subsurface soils, surface water, sediment, and ground water. Soil gas surveys were also conducted. No CWM was detected in the surface or subsurface soil samples. Low levels of chlorinated solvents and fuel residuals were present in soil and ground water sampling locations (Baker, 2001). This investigation did not include direct sampling within or subsurface investigation of the suspected trenches and disposal areas.
2004 phase 3 OE removal action	In 2003 and 2004, a surface removal was conducted on 25 acres in BG-1 and 7.6 acres in BG-2. Approximately 7,000 pounds of MD were removed from BG-1 and BG-2. Ten UXO items were removed from BG-1 but no UXO was found in BG-2. Erosion controls were installed in select areas of each burning ground to control further munitions exposure along stream drainages and prevent migration of ordnance-related debris (URS, 2004).
2005 historical photograph analysis report	Historic air photos and maps were analyzed to identify storage facilities, trenches, burn pits, and ground scars at BHAD (TEC, 2005).
2005 Operable Unit 2 outside the fence RI	The field investigation for this RI included additional surface soil, sediment, surface water, and soil gas sampling at select OU-2 sites outside the perimeter fence. These Chemical Plant Area sites are on USDA property. Right-of-entry was refused for privately owned property inside the former BHAD perimeter fence. Except for the contents of the disposal trenches, which were not assessed during this RI, the investigation recommended no further action outside the perimeter fence (USACE, 2005).
2007 CWM scoping and security study	This was part of a nationwide study developed to prioritize CWM sites, including the former BHAD, for future funding and actions. The outcome was a recommendation of further action in the form of an RI/FS for the former BHAD (Parsons, 2007).
2009 Operable Unit 1 RI	The OU-1 RI developed six sub-sites within BG-1 trench and disturbed areas and six sub-sites at BG-2 in trench, burn, demolition, and disturbed areas. Surface soil samples were collected at BG-1 and BG-2. Except for the contents of the disposal trenches, which were not assessed during this RI, the results indicated no further action for human health (URS, 2009).
2010 risk evaluation report (RER)	This supplemental report addressed outstanding comments on existing human health and ecological risk evaluations conducted at BHAD. The report refined prior risk evaluations to determine if data gaps existed that needed investigation and analysis prior to development of an FS. The results indicated chemicals of potential concern (COPCs) in surface and subsurface soil requiring additional action or evaluation for the protection of human health and the environment (USACE, 2010).

1.8.1 Previous Investigations Conducted at Burning Ground No. 1 and Burning Ground No. 2

1994 Phase I Remedial Investigation

1.8.1.1 The Phase I RI established geophysical survey grids at 11 areas in BG-1 and 19 areas in BG-2. Visual and Schonstedt magnetometer surveys were conducted within the grid areas. At BG-1, large quantities of surface debris consisting of MEC and general trash were found. At BG-2, much of the ground surface in the grids was covered with metal fragments, fuses, and other ordnance components (HFA, 1994).

1996 Preliminary Assessment / Site Inspection

1.8.1.2 Although the 1996 PA/SI was conducted primarily in areas outside the burning grounds, it included surface water and sediment sampling in BG-1 and BG-2. The investigation included the collection and analysis of two sets of co-located sediment and surface water samples to determine if contamination may be migrating towards offsite surface water locations.

1.8.1.3 Sample locations near BG-1 included an area west of the site in a small drainage ditch and southeast of the site in a moderately sized stock pond. Sample locations near BG-2 included a small drainage spot near a concrete culvert north of the site and a small stream near the southeast boundary of the site. The northern sample location was selected because an orange-red substance was observed coating the sediment. No CWM, explosives, or VOCs were detected in the surface water and sediment samples. It was concluded that COPCs were not migrating toward downstream surface water bodies (Rust, 1996).

1.8.1.4 Background samples were collected during the 1996 PA/SI. The resulting background concentrations for metals are used in this RI (Appendix E – UFP QAPP).

1996/1997 and 1998 Surface Clearances

1.8.1.5 In 1996 and 1997, 340 acres of BG-1 and 512 acres of BG-2 were cleared of surface MD and MEC. This work included a thorough visual inspection of the surface, identification of MD and MEC items, and the removal and disposal of this material. BG-1 produced 9,878 pounds of MD and 18 UXO items, and 46,526 pounds of MD and 558 UXO items were removed from BG-2.

1.8.1.6 No CWM-filled munitions were located on BG-1 and BG-2. All monitored scrap was cleared as being below the detectable limit for mustard and lewisite. Pre- and post-detonation samples were collected and baseline analysis showed no significant contamination of explosives or metals. During the removal, it was noted that several areas had large amounts of OE-related scrap on the surface. Additionally, the field teams noted large numbers of subsurface anomalies in both BG-1 and BG-2 (HFA, 1999).

1.8.1.7 In 1998, a continuation of surface OE removal action on 220 acres in BG-2 removed 154,770 pounds of OE-related scrap. MD was not removed from approximately 24% (223 acres) of BG-2 (HFA, 2000). A summary of the MEC identified during the removals is presented in Table 1.3. Surface removal MD density results for BG-1 and BG-2 are illustrated on Figures 1.6 and 1.7.

Table 1.3
MEC Identified During 1996/1997 and 1998 Surface Clearance

Item (count) [a]/			
Burning Ground 1			
20-millimeter (mm) (1)	20mm pile (unknown)	M103 nose fuze (12)	M47 bomb (5)
Burning Ground 2			
105mm projectile (9)	23 lb fragmentation (frag) bomb (1)	40mm projectile (58)	81mm mortar and projectile (2)
155mm projectile (7)	3"/50 projectile (1)	50-caliber (cal) projectile (1)	90 lb frag bomb (2)
20 lb frag bomb (2)	35-gallon (gl) barrel explosives (1)	60mm PD fuze (3)	90mm projectile (5)
20mm projectile (1)	37mm projectile (110)	75mm projectile (67)	Base detonation fuze (4)
BD fuze with tracer (15)	Bomb (base, fuze, nose w/H, and tail) (5)	Booster cup (1)	Burster tube (17)
Electrical blasting cap (2)	Flash tube (7)	Fuze (13)	M104 fuze (1)
M110 booster (21)	M110 fuze (172)	M110 nose fuze (49)	Mk 18 detonator (1)
M130 detonator (1)	M15 mine booster (3)	M22 booster (1)	M404 rocket fuze (1)
M47 bomb (9)	M48 SQ element (1)	M51 fuze (1)	M502 MT SQ fuze (1)
M54 time fuze (3)	M57 fuze (12)	M57 detonator (1)	M61 rocket (2)
M83 bomblet (17)	Mk27 PD fuze (2)	SD tracer (17)	Unknown item (22)

a/ Counts are approximate and were adapted from OE Removal Reports (HFA, 1999) and (HFA, 2000).

2001 Engineering Evaluation / Cost Analysis

1.8.1.8 The EE/CA initially evaluated data collected during the 1996 PA/SI. Large quantities of metallic surface debris were still present at BG-1 and BG-2 during the investigation. As a result, it was decided that a geophysical investigation would be ineffective at these sites. Therefore, the following tasks were performed during the 2001 PA/SI and summarized in the EE/CA:

- Soil gas sampling modules were installed over trench areas and in the disturbed areas identified in historical aerial photographs.

- Surface soils from above the trenches and from disturbed areas noted in historical aerial photographs were sampled and analyzed.
- Soil borings were advanced to assess the presence of MC/CWM contamination in surface and subsurface soils adjacent to areas of concern (primarily the trench areas).
- Monitoring wells were installed in soil boring locations where ground water was detected.
- Sediment and surface water in drainages within the areas were sampled and analyzed.
- Borings were advanced into bedrock to assess the presence of MC/CWM contamination in the bedrock and evaluate the ability of the bedrock to inhibit migration of potential MC/CWM contamination.
- Field personnel were monitored for potential exposure to CWM/HTW during the sampling activities.

1.8.1.9 No OE or CWM were detected in soil, bedrock, sediment, surface water, or ground water samples. The investigation concluded that potential hazards associated with the area include the following:

- OE may be present throughout BG-1 and BG-2 in trenches, ravines, and near-surface soils;
- CWM may be present in trench areas; and
- The soil in the trenches may be contaminated with OE, CWM, or both (URS, 2001).

2001 Preliminary Assessment / Site Inspection Operable Unit 1

1.8.1.10 This PA/SI was completed at BG-1 and BG-2 to determine whether contamination had migrated from source areas (for example, trenches and disposal areas) within the site. The investigation included sampling and analysis of soil gas, surface soil, subsurface soil, bedrock, ground water, surface water, and sediment. With a few exceptions, such as bedrock, samples were analyzed for CWM, CWM BPs, explosives, VOCs, semi-volatile organic compounds (SVOCs), and metals. Three COPCs, including benzo(a)pyrene, phenanthrene, and lead, were identified in surface soils at BG-1. One COPC, 2,4-dinitrotoluene (DNT), was identified in surface soils at BG-2. PA/SI sample locations in BG-1 and BG-2 are presented on Figures 1.4 and 1.5, respectively.

1.8.1.11 No CWM contamination was detected in environmental samples from BG-1 or BG-2, although a number of ABPs were detected in soil gas samplers installed in several areas. Except for a few UXO items that were found and destroyed, no evidence of an imminent hazard was encountered during the site activities. However, the investigation did not include any drilling or excavation in potential source areas (such as trenches) where explosives, CWM, and other hazardous materials were more likely (Dames & Moore, 2001).

2004 Ordnance and Explosive Removal Action

1.8.1.12 This removal action was completed to locate, identify, characterize, and remove surface debris on 25 acres in BG-1 and 7.6 acres in BG-2. Approximately 7,000 lbs of MD were removed and inspected, and approximately 5,000 lbs of other debris were removed. Surface removal MD density results for BG-1 and BG-2 are illustrated on Figures 1.6 and 1.7. No MEC was identified with BG-2 during the 2004 removal. MEC identified in BG-1 included:

- 105mm HE (1);
- 155mm glycol (1);
- 37mm M54 (3);and
- Fuzes (5).

Four pre- and post-detonation samples were collected during this removal action. The only explosive detected during analysis of the post-detonation samples was tetryl, which was detected in one sample at a concentration of 1,300 micrograms per kilogram (µg/kg). This detection was far below the action level of 780,000 µg/kg and was not considered a potential concern.

Erosion control was also installed in both burning grounds to control further exposure and prevent the migration of ordnance-related debris (URS, 2004). The erosion control locations are presented on Figures 1.6 and 1.7.

2009 Operable Unit 1 Remedial Investigation

1.8.1.13 The field investigation for this RI included the collection and analysis of surface soil samples at BG-1 and BG-2. This effort was intended to supplement existing data in characterizing the nature and extent of potential contaminants in the surface soil. The OU-1 RI developed six sub-sites involving trench and disturbed areas in BG-1 and trench, burn, demolition, and disturbed areas in BG-2, as discussed previously. The sub-sites are presented on Figures 1.4 and 1.5.

1.8.1.14 The only intrusive activities completed at BG-1 and BG-2 during the RI involved collection of 16 additional samples at BG-1 and 22 additional samples at BG-2. These samples were collected to further delineate the horizontal extent of metals and to provide additional data for metals to be used in the background statistical analysis. A list of COPCs was developed for BG-1 and BG-2 based on a comparison to risk-based concentrations, a comparison to background concentrations, and review of potential site-related chemicals. Three “hot spots” of lead contaminated soil that were identified in surface soil within BG-1 (Figure 1.4) were recommended for further evaluation.

1.8.1.15 Risk assessments conducted during the RI for BG-1 and BG-2 concluded that all noncarcinogenic hazard indices were below 1 (that is, they will likely not result in adverse noncancer health effects over a lifetime of exposure) for the rancher and

hunter/recreator. Cancer risks for all scenarios were within or below the U.S. Environmental Protection Agency (USEPA) target risk range of 1E-06 to 1E-04. Except for the contents of the disposal trenches, which were not addressed during the RI, the results of the investigation indicated no further action for human health (URS, 2009).

1.8.2 Previous Investigations Conducted in the Chemical Plant Area

1.8.2.1 The four areas (DP-19, DP-31, DP-32, and DP-35) in the Chemical Plant Area that are included in this RI/FS encompass approximately 55 acres. Previous investigations have included geophysical surveys; soil gas surveys; and sampling of soil, sediment, ground water, and surface water.

1994 Phase I Remedial Investigation

1.8.2.2 The Phase I investigation established geophysical survey grids at four locations in the Chemical Plant Area, with particular attention given to denuded portions of known or suspected chemical plant operations and burn pit areas. Visual and Schonstedt magnetometer surveys were conducted in the grids. Approximately 200 subsurface contacts were detected, although not all contacts are in the current RI area. The depth and nature of these contacts could not be determined because intrusive investigations were prohibited. The anomalies detected in the Chemical Plant Area do not appear to correlate to the anomalies detected by the U.S. Army Engineer Waterways Experimental Station (USAEWES) flyover (HFA, 1994).

1996 Preliminary Assessment / Site Inspection

1.8.2.3 Although the 1996 PA/SI was conducted primarily in other areas, it included the collection and analysis of three sets of sediment and surface water samples in the Chemical Plant Area. The samples were collected to determine if contamination was migrating toward offsite surface water locations. Two sets of samples were collected in areas immediately downgradient from potential source locations that include the mustard agent disposal kiln and Chemical Plant Area burn pits. One set of samples was collected upgradient from suspected source areas for comparison with results from the downgradient samples. Background samples were also collected during the 1996 PA/SI. The resulting background concentrations of metals are used in this RI (Appendix E – UFP QAPP).

1.8.2.4 No CWM, explosives, or VOCs were detected in surface water or sediment samples. It was concluded that COPCs were not migrating toward downstream surface water bodies (Rust, 1996).

2001 Engineering Evaluation / Cost Analysis

1.8.2.5 For the EE/CA investigation, the potential sources, nature, and extent of MEC/CWM associated with the Chemical Plant Area were assessed by performing

geophysical surveys on 230 grids covering about 211 acres. Analysis of the geophysical data identified the presence of subsurface anomalies in the following areas:

- DP-19: Linear anomalies appear to represent piping connecting the change house to the pump house and kiln area. In addition, an anomaly extends east from the kiln area. Identification of remaining anomalies is less clear, but they may represent the leach bed and recycle pond.
- DP-31: Three linear subsurface anomalies are assumed to be burn pits. One additional, single-point anomaly (Anomaly B) was identified to the south, but it was determined to be too small to be associated with disposal.
- DP-32: The EE/CE identified four separate features: main disposal pit, a potential disposal pit, and two small areas about 250 feet southwest of the main disposal pit. Two additional features are present in the northwest area of the site.

1.8.2.6 The geophysical results for DP-19 and DP-32 are shown on Figure 1.8. The possible disposal trenches identified at DP-31 are presented on Figure 1.10 and are discussed further in Chapter 3. The identified trenches in DP-31 and DP-32 have not been intrusively investigated but, based on the site history, it is assumed that these trenches were used for burning, decontamination, and disposal of CWM and chemical agent processed at the Chemical Plant Area. It is also believed that the identified trenches at DP-32 may contain portions of the Chemical Plant itself. No information is currently available regarding the total depths of the pits (URS, 2001).

2002 Preliminary Assessment / Site Inspection Operable Unit 2

1.8.2.7 This PA/SI was completed at areas in the Chemical Plant Area to determine the presence or absence of chemical constituents in surface and subsurface soils, surface water, sediment, and ground water and to identify COPCs for future investigations. Passive soil gas surveys were performed to identify the location of potential source areas to guide placement of soil and ground water sampling locations.

1.8.2.8 In DP-19, DP-31, DP-32, and DP-35, soil gas surveys and surface/subsurface sampling were conducted. Samples were analyzed for VOCs, SVOCs, polychlorinated biphenyls (PCBs), explosives, metals, mustard breakdown products (MBPs, which include thiodiglycol, 1,4-oxathiane, 1,4-dithiane, and benzothiazole), industrial chemicals (ICs, which include chloropicrin, acetophenone, and chloroacetophenone), and mustard.

1.8.2.9 DP-19 was divided into 11 subareas for the assessment. Table 1.4 provides an overview of the subareas, including the COPCs and recommendations. The sampling locations and identified COPCs are presented in Figure 1.9.

Table 1.4
DP-19 Subarea COPCs and Recommendations

Subarea	COPCs [a/]		Recommendation
	Surface Soil	Subsurface Soil	
DP-19A Demilitarization Building	Benzo(a)pyrene Benzo(ghi)perylene	--	RI recommended for surface soil. RI also recommended for subsurface soil based on historical activities and limited investigation in source area.
DP-19B Acid Neutralization Pit	--	Benzo(ghi)perylene	RI recommended for subsurface soil.
DP-19C Fume Scrubber	Benzo(a)pyrene Benzo(ghi)perylene	--	RI recommended for surface soil. RI also recommended for subsurface soil based on historical activities and limited investigation in source area.
DP-19D Recycle Ponds	Benzo(a)pyrene Benzo(ghi)perylene	Arsenic	RI recommended for surface and subsurface soil.
DP-19E Spent Recycle Water Pond	--	--	--
DP-19F Condensate Bed	--	--	--
DP-19G Decontamination Pit	Benzo(a)pyrene Benzo(ghi)perylene	--	RI recommended for surface soil. RI also recommended for subsurface soil based on historical activities and limited investigation in source area.
DP-19H Punch Chamber	--	--	RI recommended for subsurface soil based on historical activities and limited investigation in source area.
DP-19 I Disturbed Area	--	--	No DoD action indicated.
DP-19 J Disturbed Area	Benzo(ghi)perylene	--	RI recommended for surface soil.
DP-19K Kiln Scale Disposal Area	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(ghi)perylene Indeno(1,2,3-cd)pyrene	Benzo(a)pyrene, Benzo(ghi)perylene	RI recommended for surface and subsurface soil.

a/ Ground water is not a potential exposure pathway. Therefore, ground water COPCs and recommendations associated with ground water are not presented.

1.8.2.10 During the assessment at DP-31, the MBP 1,4-dithaine was detected in one soil gas sampler, but mustard was not detected. VOCs, including toluene and trichloroethene (TCE), and thiodiglycol (an MBP) were detected in surface soil samples. The SVOC bis (2-ethylhexyl) phthalate (BEHP) was detected in a subsurface sample. None of these occurred at concentrations that exceeded data screening criteria. No COPCs were identified in surface soil or subsurface soil, but a RI was recommended at DP-31 for subsurface soil based on historical activities and limited investigation in the source area. Sample locations, detected analytes, and results of the soil gas sampling at DP-31 are presented on Figure 1.10.

1.8.2.11 During the assessment at DP-32, the passive soil gas survey indicated the presence of chlorinated compounds and fuels residues at the center of the primary trench. No explosives, mustard, MBPs, or ICs were detected in soil gas samples. Low concentrations of VOCs and SVOCs were detected in surface soil samples and acetone was detected in subsurface soil samples, although concentrations did not exceed data screening criteria. No mustard, MBPs, or ICs were detected in surface or subsurface soil samples. Benzo(a)pyrene and benzo(ghi)perylene were identified as COPCs in surface soil and a RI was recommended. Sample locations and COPCs at DP-32 are presented on Figure 1.11.

1.8.2.12 During the investigation at DP-35, the passive soil gas survey indicated low concentrations of chloroform and benzene, toluene, ethylbenzene, and xylenes (BTEX) throughout each of the suspect pit areas. No explosives, mustard, MBPs, or ICs were detected in soil gas samples. Low concentrations of acetone, methylene chloride, diethyl phthalate, antimony, and thallium were detected in surface soil samples. Low concentrations of acetone, methylene chloride, diethyl phthalate, and barium were detected in subsurface soil samples. Concentrations in both surface and subsurface samples did not exceed data criteria and no COPCs were identified. No mustard, MBPs, or ICs were detected in surface or subsurface soil samples and "no DoD action indicated" (NDAI) was recommended. Sample locations and detected analytes at DP-35 are presented on Figure 1.12.

1.8.2.13 During the 2002 OU-2 assessment, subsurface soil sample collection was not permitted in potential CWM source areas. Therefore, subsurface samples were only collected near and/or adjacent to potential source areas (Figures 1.4. 1.5 and Figures 1.9 through 1.12). No CWM was detected in the surface soil samples collected at the trenches delineated during the 1998 EE/CA or subsurface soil samples collected adjacent to the trenches. However, the PA/SI stated that the potential remains for CWM to exist in the subsurface in areas where subsurface sample collection was not authorized (Baker, 2001).

2005 Operable Unit 2 Outside the Fence Remedial Investigation

1.8.2.14 The field investigation for this RI included additional surface soil, sediment, surface water, and soil gas sampling at select OU-2 areas outside the perimeter fence, including areas DP-19 sub-area E19E, DP-31, and DP-32. Most of DP-19 and all of DP-

35 were excluded in this investigation because right of entry was not granted for these areas.

1.8.2.15 At DP-32, passive soil gas sampling sorbers were installed and analyzed for VOCs, SVOCs, explosives, mustard, MBPs, and ICs. No SVOCs, explosives, mustard, MBPs, or ICs were detected in the soil gas sorbers. VOCs detected were toluene and undecane. Four surface soil samples were collected and analyzed for mustard, MBPs, polynuclear aromatic hydrocarbons – selected ion mode (PAHs-SIM), priority pollutant (PP) metals, barium, cobalt, and manganese. No mustard or MBPs were detected in any of the surface soil samples. PAHs-SIM and metals were detected in one or more samples. Sample locations, soil gas locations, and concentrations of the COPCs benzo(a)pyrene and benzo(ghi)perylene identified during the 2002 PA/SI are presented on Figure 1.11.

1.8.2.16 No additional soil sampling was conducted at DP-19E or DP-31.

1.8.2.17 The RI was designed to assess the lateral extent of hazardous and toxic waste (HTW) and to prepare a qualitative and quantitative human health risk assessment (HHRA) based on site characteristics and analytical results from the PA/SI and RI samples. The vertical extent of contamination was not defined because MEC and CWM avoidance procedures precluded intrusive work. The HHRA assessed the trespasser, hunter/recreator, and occupational worker as potential receptors to surface soil, sediment, and surface water via ingestion, dermal contact, and inhalation of particulates and vapors in outdoor air. Excluding disposal trenches, which were not directly assessed, NDAI was recommended for OU2 outside the perimeter fence in regard to human health risks (USACE, 2005).

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

CWM and MEC are safety hazards that constitute an imminent and substantial danger to the general public, site personnel, and the environment. Surface removals have been completed in BG-1 and BG-2 and extensive investigations have been conducted within each of the three investigation areas. Although not anticipated, CWM and MEC could potentially be encountered on the surface at the investigation areas because of frost heave and soil erosion. CWM and MEC may also be present in burial pits and trenches. In addition, kick-outs associated with MEC from open burning and open detonation (OB/OD) operations at BG-1 and BG-2 may be present in the shallow subsurface, where they were covered over time by dust and soil. The following tables summarize CWM and MEC with the potential to present a risk during this RI.

- Table 1.3 (presented previously) lists MEC items found during the removal actions conducted at BG-1 and BG-2.
- Table 1.5 presents a comprehensive list of CWM identified in the archives search report (ASR) as potentially present at BHAD.

- Table 1.6 presents the disposal of chemical ordnance from 1943 through 1966.
- Table 1.7 presents a list of MEC potentially present at BHAD.

1.10 MUNITIONS CONSTITUENTS RISK ASSESSMENT

Prior MC sampling data associated with RIs outside the fence at the Chemical Plant Area, BG-1, and BG-2 has confirmed that MC is not present at concentrations that pose an unacceptable risk to human health. However, an ecological risk evaluation completed in 2010 indicated that COPCs were present in surface and subsurface soil and that additional action or evaluation was required. The prior investigations indicated that data gaps exist because no sampling has been conducted within the suspected pits, trenches, and agent disposal locations. Therefore, there is a possibility that MC from the conventional MEC and/or CWM may be present in burial trenches and disposal locations.

Sampling will be conducted to determine if there is evidence of a release of MC to environmental media at these locations. If such evidence is found, the observed concentrations will be evaluated to determine the potential risk to human and ecological receptors via complete exposure pathways as indicated in the conceptual site models. Methods that will be used to conduct the human health and ecological risk assessments are provided in Appendix M.

Table 1.5
Summary of Chemical Warfare Materiel [a/] Present during the Operation of the Former Black Hills Army Depot

Specific Chemical Munition or CWM	
Lewisite	Rocket, CG [b/], 7.2-inch
Captured German chemicals	CML, Mustard H-55 lb container
CN, AC	Projectiles, H-filled, 75mm
HC Hexachloroethane	Shell, gas, CNB, irritant, 4.2-inch mortar
White phosphorus (WP)	Shell, gas, CNS, irritant, 4.2-mortar
Shell gas, HT, M2, 4.2-inch mortar	Shell, fixed, HE, M48, HC, 75mm gun
Shell, gas, CG, M2, 4.2-inch mortar	Shell, smoke, WP, M64, 75mm Howitzer
Shell, semi-fixed, gas, persistent, (H), M60 for 105mm Howitzer	Shell, smoke, WP, 60mm mortar
Bomb, gas, CK 500 lb, M78	Shell, WP, M57, 81mm mortar
Bomb, gas, CK 500 lb, M79	Shell, smoke, WP, 155mm Howitzer
Bomb, gas, CK 1,000 lb, M79	Cart, incendiary, caliber 50
Bomb, gas, CG 500 lb, M78	Shell, FS, 4.2-inch mortar
Bomb, gas, CG 1,000 lb, M79	Projectile, WP smoke
Bomb, gas, persistent, H or L, 115 lb, M70	Smoke bombs (WWII), 10 lbs to 100 lbs, M67 (WP) bomb or M74 or M77
Mustard containers	100 lb M47A2 WP bomb
Shell, H, inert, 4.2-inch mortar, M2	60mm WP
1-ton containers of CG	57mm smoke
Bomb, HE, AC, HC, 4,000 lb	M47A4 US incendiary bomb
Bomb, H, 100 lb, M47A2	155mm, smoke, filled with red phosphorus
Grenade, rifle, smoke, WP	Shell, WP, 105mm

a/ Historically, chemical warfare materiel included smoke, incendiaries, and white phosphorus. These items are no longer considered CWM.

b/ Abbreviations: AC = Hydrocyanic acid. CG = Phosgene. CK = Cyanogen chloride. CN = Chloroacetophenone. CNB = irritant. CNS = irritant. GB = Sarin. H = Mustard. HC = HC mixture. HE = High explosive. HT = Mustard + T mixture. SF = Semi-fixed. WP = White phosphorus.

Source: ASR Supplement (TCT, 1993).

Table 1.6
Summary of Disposition of Chemical Ordnance, Black Hills Army Depot

Year	Ordnance	Action	Quantity
1943	109/155mm chemical	Stored	155,376
	115 lb, M-70, HD [a/]	Leaker	7
	105mm, M-60, H	Stored	5,178
	155mm, MK-II	Stored	60,025
	115 lb, M-70, HD	Stored	29,511
1944	155mm, H	Stored	116,036
	1,000 lb, CG	Leaker	91
	155mm, HD	Stored	85
	155mm, HD	Leaker	138,404
	Phosgene, CG	Recovered from bomb	6,464 lbs
1945	115 lb, M-70, HD	Destroyed	7
	500/1,000 lb bomb CG	Drained	7
	SIGHA/SIGKA	Leaking	66
	SIGHA/SIGKA	Stored	41,000
	SIGNA	Drained/stored	5,415 lb (62,275 lbs total or part)
	100 lb, M-47A2, H	Stored	434
	20,367 lbs CG	Transferred	
	25 [b/]	Leaking and destroyed	
1946	CG	Recovered from leaking bomb	50,005 lbs
	100 lb, M-47, WP	Stored	434
	75mm, M-64, CNS	Destroyed	2,886
	100 lb, M-47, WP	Stored	13,777
	75mm, M-64, CNS	Destroyed	2,886
	155mm, MK-II CNS	Destroyed	1,780
	1,000 lb, M-79, CG	Drained	168
	100 lb, M-47, WP	Involved in fire	38,500
1947	M70 H-filled	Stored	317,000
	7.2 CG chemical rockets	Destroyed by venting demolition area	500
	M47A2	Destroyed by burning	7,000 +
	M79 CG	Destroyed by venting	420,000 lbs
	M70 H-filled	Moved to demolition area	270
	M70 H-filled	Stored	293,975
	155mm, HD	Shipped to Rocky Mountain	233,812
	500 lb CK-M-78	Shipped	4
	500 lb CK-M-78		4
	75mm, H	Shipped to Rocky Mountain	100
	105mm, H	Shipped to Rocky Mountain	100
	155mm, H	Shipped to Rocky Mountain	100

Table 1.6 (continued)
Summary of Disposition of Chemical Ordnance, Black Hills Army Depot

Year	Ordnance	Action	Quantity
1948	M70 H-filled	Stored	307,740
1949	M70 H-filled	Stored	302,187
	75mm, H	Shipped to Rocky Mountain	131,0111
1950	105mm, H	Shipped to Rocky Mountain	33,128
	155mm, H	Shipped to Rocky Mountain	35,774
1951	M70 H-filled	Destroyed by burning	10,863
	M70 H-filled	Moved to burning ground	4,135
	M70 H-filled	Palletized for transport to burning ground	11,343
	M70 H-filled	Stored	304,000
	M70 H-filled	Stored leakers	27,431
	Chemical	Stored	30,761 tons
1952	M70 H-filled	Stored	299,682
	M70 H-filled	Moved to Rocky Mountain	3,940
	M70 H-filled	Stored	302,187
	Chemical	Stored	25,151
1953	M79 CG & CK	Destroyed	21
	M70 H-filled	Moved to Rocky Mountain	4,096
	M70 H-filled	Moved to Rocky Mountain	20,766
	M70 H-filled	Destroyed	1,787
	M70 H-filled	Stored	267,658
	M70 H-filled	Stored	267,658
	M70 H-filled	Moved to Rocky Mountain	21,968
1954	Chemical	Stored	25,151
	CK H-Filled	Destroyed	4
1955	M70 H-filled	Stored leakers	654
	Bulk mustard	Stored	580,000 lbs
	Chemical	Stored	26,055 tons
	1-ton CG containers	Stored	4
	M70 H-filled	Stored (Navy)	59,469
	M78 CG	Stored (Air Force)	286
	M78 CK	Stored (Air Force)	5030
	M79 CG	Stored (Air Force)	185
	M79 CG	Stored (Air Force)	16,186
	CG	Stored (Army)	603
	H	Stored (Army)	4,790 lbs
	H gas shells (105mm)	Destroyed by burning	2,258
	M64 WP	Destroyed by burning	455

Table 1.6 (continued)
Summary of Disposition of Chemical Ordnance, Black Hills Army Depot

Year	Ordnance	Action	Quantity
	105mm, H	Stored	61,444
	Bomb, CK/CG	Stored	857
	Bomb, H	Stored	98,179
1956	M70 H-filled	Destroyed by burning	771
	M79 CK	Destroyed by burning	6
	M79 CG	Destroyed by burning	2
	M70 H-filled	Destroyed by burning	224
1957	M79 CG	Destroyed by burning	4
	M70 H-filled	Emptied and destroyed by burning	160
	1-ton containers	Emptied by venting	4
1958	M70 H-filled	Converted to bulk mustard	All
1959	M70 H-filled	Destruction of M70 H-filled held up by problems with kiln	All
1961	M70 H-filled	Destroyed, incinerated	130,000
1962	M70 H-filled	Destroyed, incinerated	75,527
	GB-VX	Stored	454 tons
1965	500 & 1000 lb CK	Stored and needed to be destroyed	12,000
1966	CK bombs	Destroyed, incinerated	5,200

a/ Abbreviations: AC = Hydrocyanic acid. CG = Phosgene. CK = Cyanogen chloride. CN = Chloroacetophenone. CNB = Irritant. CNS = Irritant. GB = Sarin. H = Mustard. HC = High capacity. HD = HE = High explosive. HT = Mustard + T mixture. VX = Nerve agent. WP = White phosphorus.

b/ Some data are incomplete in the source document, but this does not materially affect the design of the current RI/FS.

Source: ASR Supplement (TCT, 1993).

Table 1.7
Summary of Conventional Ordnance Present during the Operation of the Former Black Hills Army Depot

Specific Ordnance		
Fuze, M103A1	M61 Pract chemical rocket	Rocket, HE, M32 (T160) series 4.5-inch
Flare, surface, trip	Wafer, frag bomb, 4 lb, M83 (butterfly)	Blasting caps, cannon primers
Powder, propellant	M103 bomb fuze	Nitrostarch
Cart, 76mm, HE, M42A1	37mm shells	JATO, smoke and illuminating
Projectile HE, M114, F/240mm	Bomb, GP, 250 lb AN-M57	Pyrotechnics – signal and photoflash cartridges and bombs
Case, cart, M5A1, 76mm	Projectile, AP MK18 for 12-inch gun	5-inch rocket mortars
Case, cart	Projectile, HE, MK11 for 16-inch gun	Charge, propelling, 155mm gun
Cart, 57mm, HE, M306, A1	Projectile, AP, MK3 for 16–inch gun, 2100 lb	Detonator, concussion type, M1
TNT, flake	Cart, APC-T, M86, 57mm	Shell, proof T1E1, inert
Projectile, 8-inch HE, M106	Bomb, AP Explosive D, 1600 lb, AN-MK-1	Mine, AP, practice M8
10,000 lb tritonal GP bomb	Cart. .30 and .50 caliber	Mine, AP, M2, M3, and M7
30 caliber ball ammunition	Bomb, demo, 750 lb /	Shell, HE, 40mm gun
260 lb frag bomb	Bomb, SAP, 1,000 lb	Signal, ground, high-burst range
UDMH-unsymetrical dimethlyhadrazine, M-3 fuel, jet fuel	Charge, propelling for 120mm gun	Cart, HE-T for 40mm guns
Mines	Shell, HE, M107, 155mm Howitzer	Shell, HE, 81mm mortar
40mm	Shell, AP, 6–inch gun, 108 lb M1911	Cart, ball, cal. 22 long rifle
81mm mortar, HE M56	Scrap comp B	Rocket HE AT, 3.5”
4.2-inch mortar, HE	2.25 rocket, MK3 Mod 2	Cart 106mm
3.5-inch rocket	Cart APC-T, 57mm, 90mm	Mine, antitank HE M15
120mm HE	Bomb 2,000 lb	Bomb, demolition, 300 lb, 750 lb
105mm RR	Projectile, fixed APC-T, M61 for 75mm gun	Shell, HE, AT 105mm Howitzer
155mm HE	Shell, fixed APC_T, M61 for 75mm gun	Miscellaneous 12-, 14-, and 16-inch ammunition
750 lb bomb	Cart, HE-7 comp B, flashless, smokeless for 90mm gun	Bomb, 12,000 lb, T-10

a/ Abbreviations: AP = Armor piercing. APC-T = Armor piercing capped-tracer. AT = Anti-tank. HE = High explosive. JATO = Jet assist take off. RR = Recoilless rifle. SAP = Semi-armor piercing. TNT = 2,4,6-trinitrotoluene. UDMH = Unsymmetrical dimethylhydrazine.

Source: ASR Supplement (TCT, 1993).

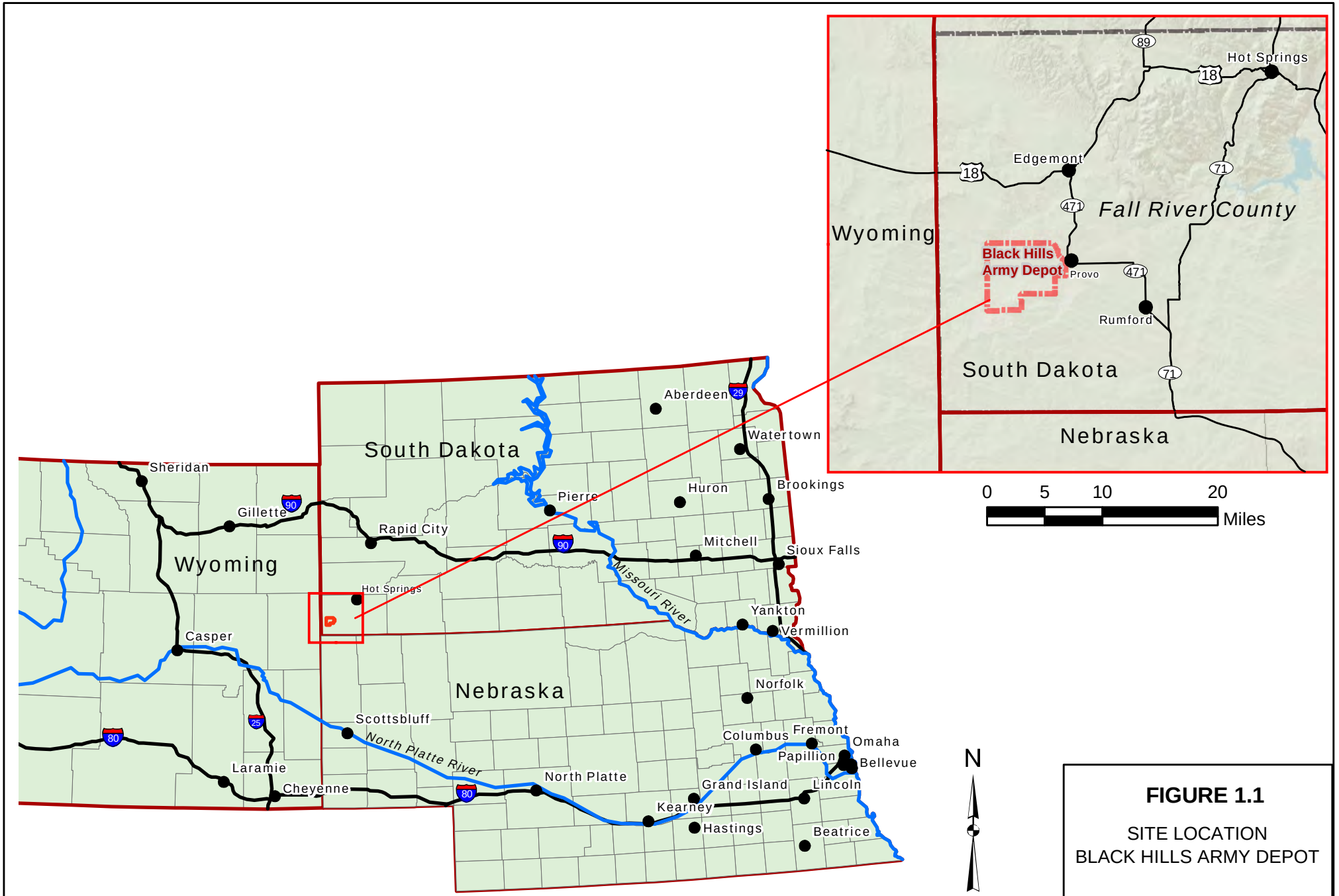


FIGURE 1.1

SITE LOCATION
BLACK HILLS ARMY DEPOT

PARSONS	U.S. ARMY ENGINEERING & SUPPORT CENTER HUNTSVILLE, ALABAMA
DESIGNED BY: CR	Black Hills Army Depot
DRAWN BY: CR	
CHECKED BY: CtB	SCALE: As Shown — PROJECT NUMBER: 747769
SUBMITTED BY: CtB	DATE: December 2011 — PAGE NUMBER:
	FILE: S:\ES\shared\Black Hills\DO 003_Initial\GIS\CSP

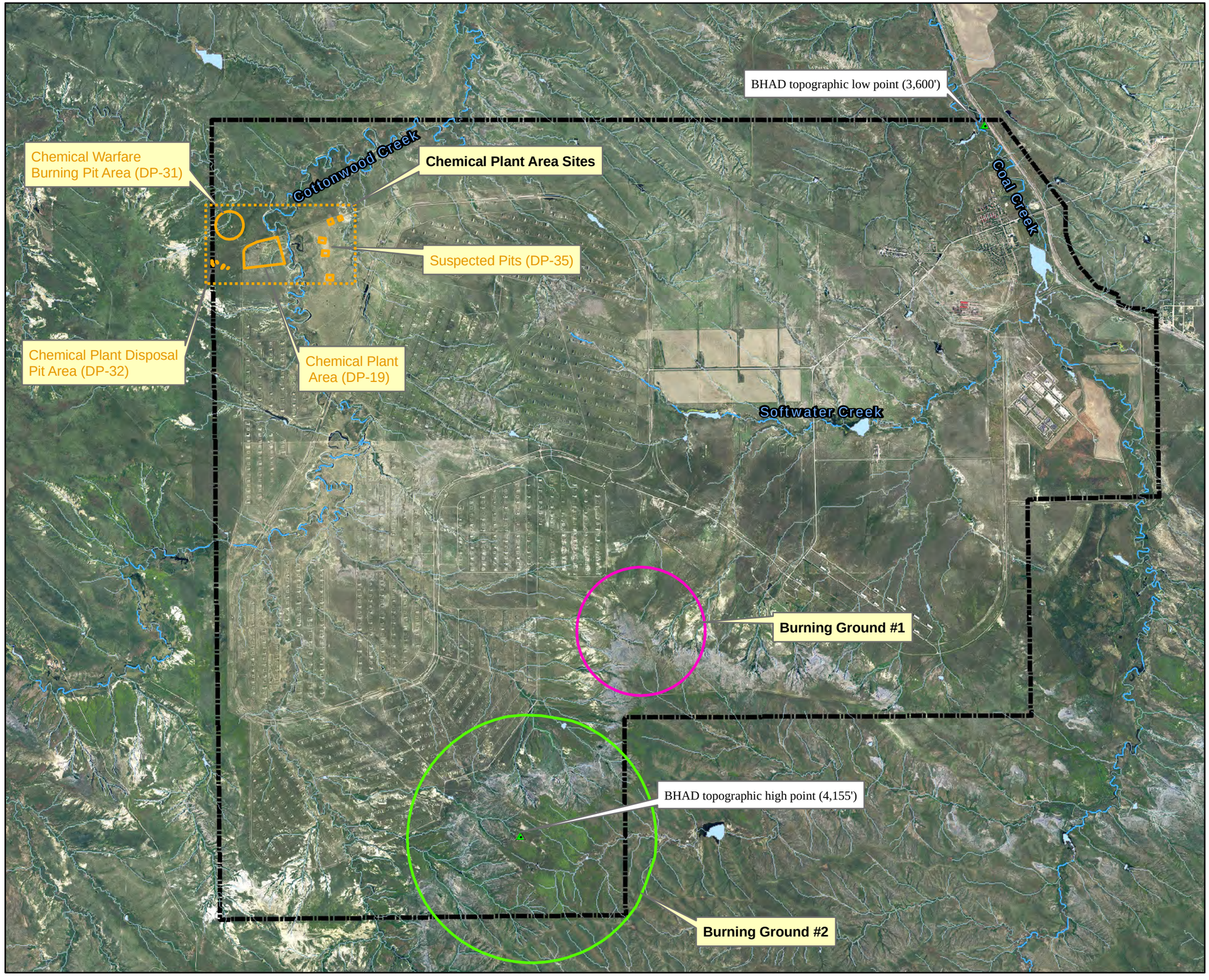


Figure 1.2

Investigation Area Overview
Formerly Used Defense Site
Black Hills Army Depot
FUDS Project # B08SD000800
Black Hills, SD

Legend

- Burning Ground No. 1 (438 Acres)
- Burning Ground No. 2 (1,627 acres)
- Chemical Plant Area sites (55 acres)
- Approximate BHAD Boundary

N

Image Source: Orthophoto 2010
Projection: NAD_1983_UTM_Zone_13N

3,000 1,500 0 3,000 Feet

PARSONS	U.S. ARMY ENGINEERING & SUPPORT CENTER HUNTSVILLE, ALABAMA
DESIGNED BY: CR	Former Black Hills Army Depot
DRAWN BY: CR	
CHECKED BY: CtB	SCALE: As Shown — PROJECT NUMBER: 747769
SUBMITTED BY: CtB	DATE: December 2011 — PAGE NUMBER:
	FILE: S:\ES\shared\S:\ES\shared\Black Hills \GIS\work plan\BHAD_MRS_overview.mxd

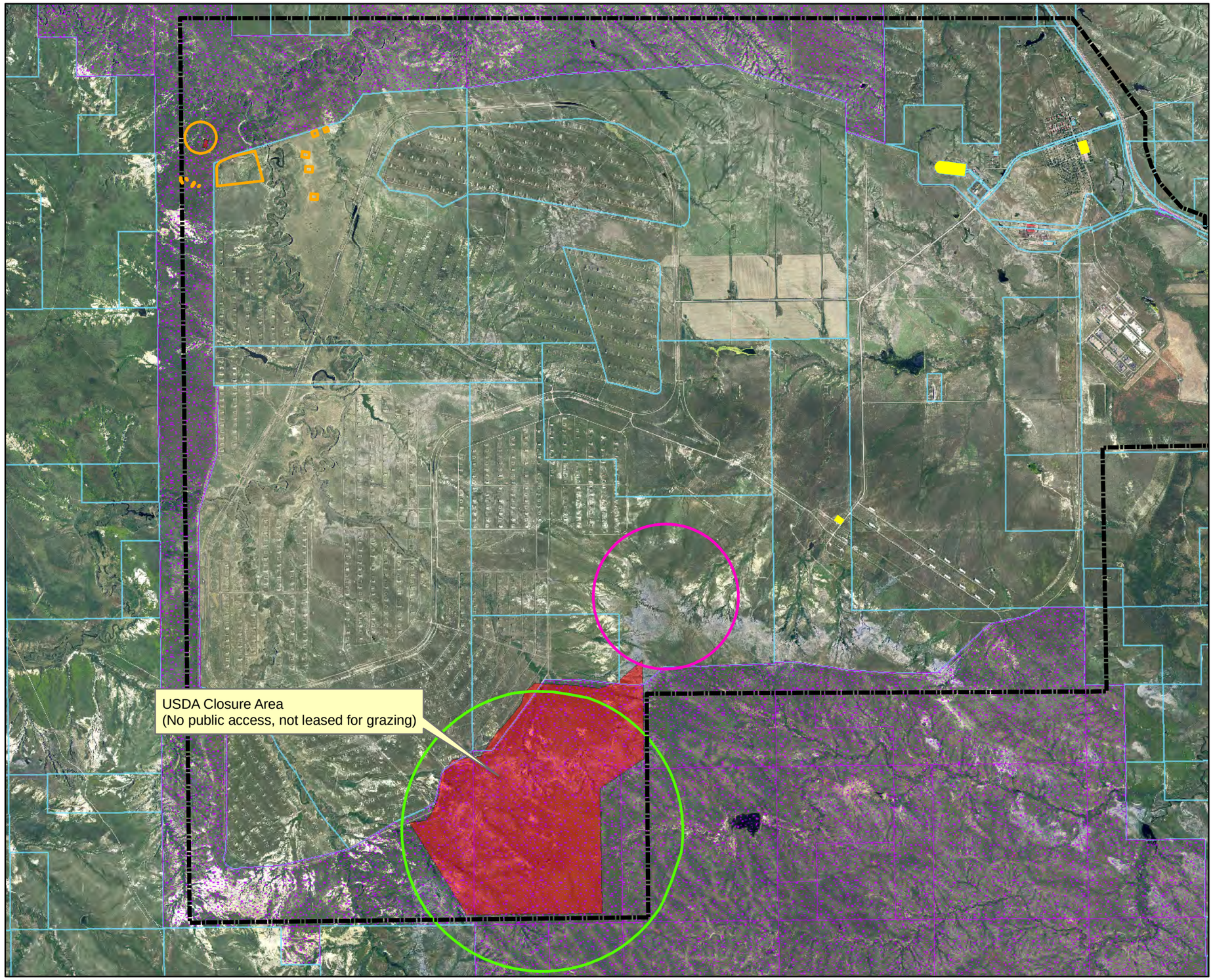


Figure 1.3

Land Use
Formerly Used Defense Site
Black Hills Army Depot
FUDS Project # B08SD000800

Black Hills, SD

Legend

- Approximate BHAD Boundary
- Burning Ground No. 1 (438 Acres)
- Burning Ground No. 2 (1,627 acres)
- Chemical Plant Area sites
- Residential
- Privately Owned used for grazing
- Owned by USDA, leased for grazing
- BUFFALO GAP NATIONALGRASSLANDS
- Approximate "Closed Area"

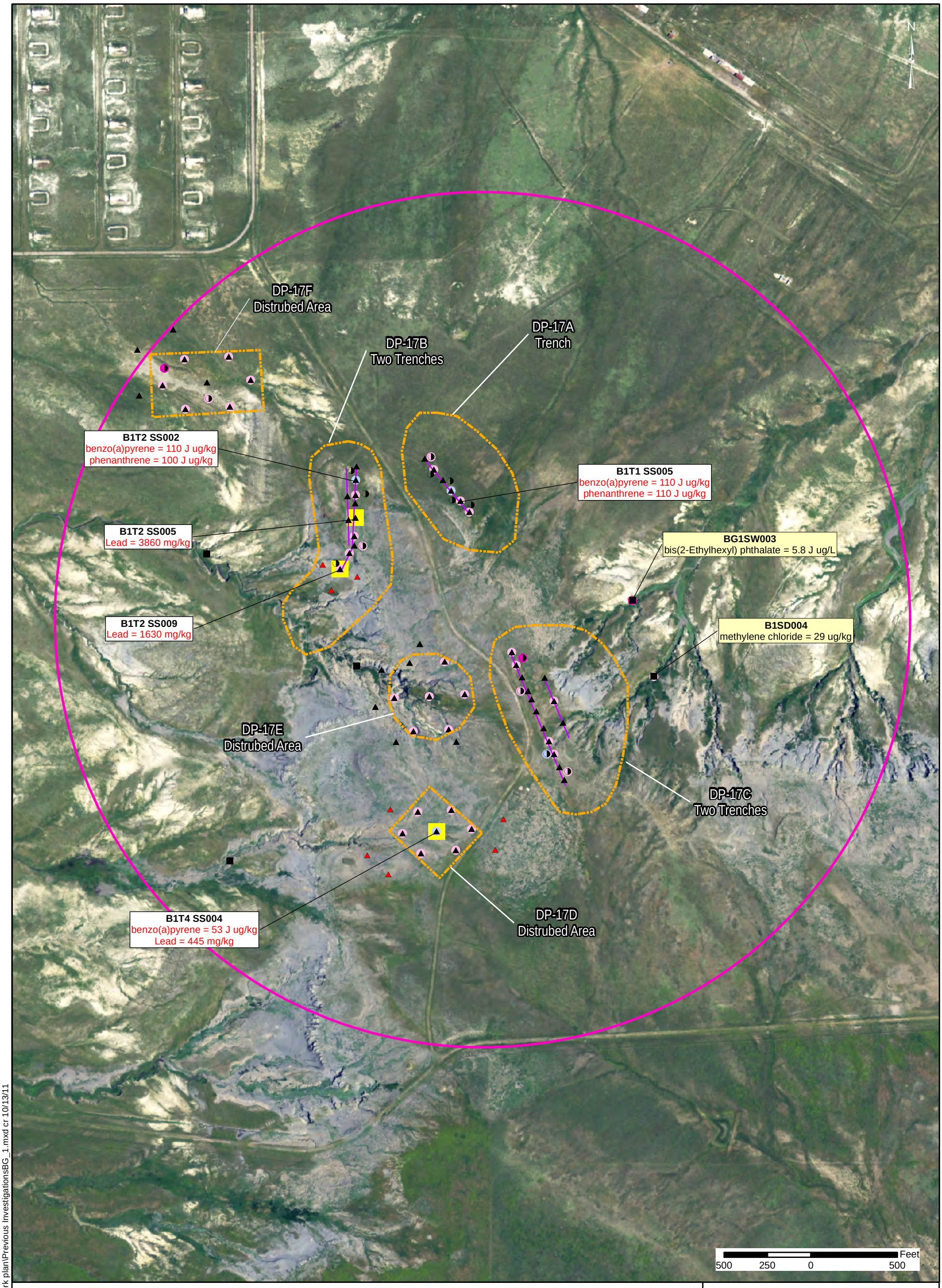
Note: Parcel Boundary information provided by Fall River County, SD GIS department March 2011.
Closed Area as identified by Special Restriction Order Number: FRD-2000-01, Nebraska National Forest

N

Image Source: Orthophoto 2010
Projection: NAD_1983_UTM_Zone_13N

3,000 1,500 0 3,000 Feet

PARSONS	U.S. ARMY ENGINEERING & SUPPORT CENTER HUNTSVILLE, ALABAMA
DESIGNED BY: CR	Former Black Hills Army Depot
DRAWN BY: CR	
CHECKED BY: CtB	SCALE: As Shown — PROJECT NUMBER: 747769
SUBMITTED BY: CtB	DATE: December 2011 — PAGE NUMBER:
	FILE: S:\ES\shared\S:\ES\shared\Black Hills\GIS\Work plan\land use.mxd



Legend

- Surface Water/Sediment Sample (2001 PA/SI, Dames & Moore)
- Surface Soil Sample (2001 PA/SI, Dames & Moore)
- Surface/Subsurface Soil Sample From Soil Boring (2001 PA/SI, Dames & Moore)
- Surface Soil Sample (2009 OU1 RI, URS)
- Trench Location (2001 PA/SI, Dames & Moore)
- Burning Ground No. 1 (438 acres)
- Sub Areas (2009 OU1 RI, URS)

Detected Analytes (2001 PA/SI, Dames & Moore)

- VOC
- SVOC
- VOC & SVOC
- Possible Lead Contamination

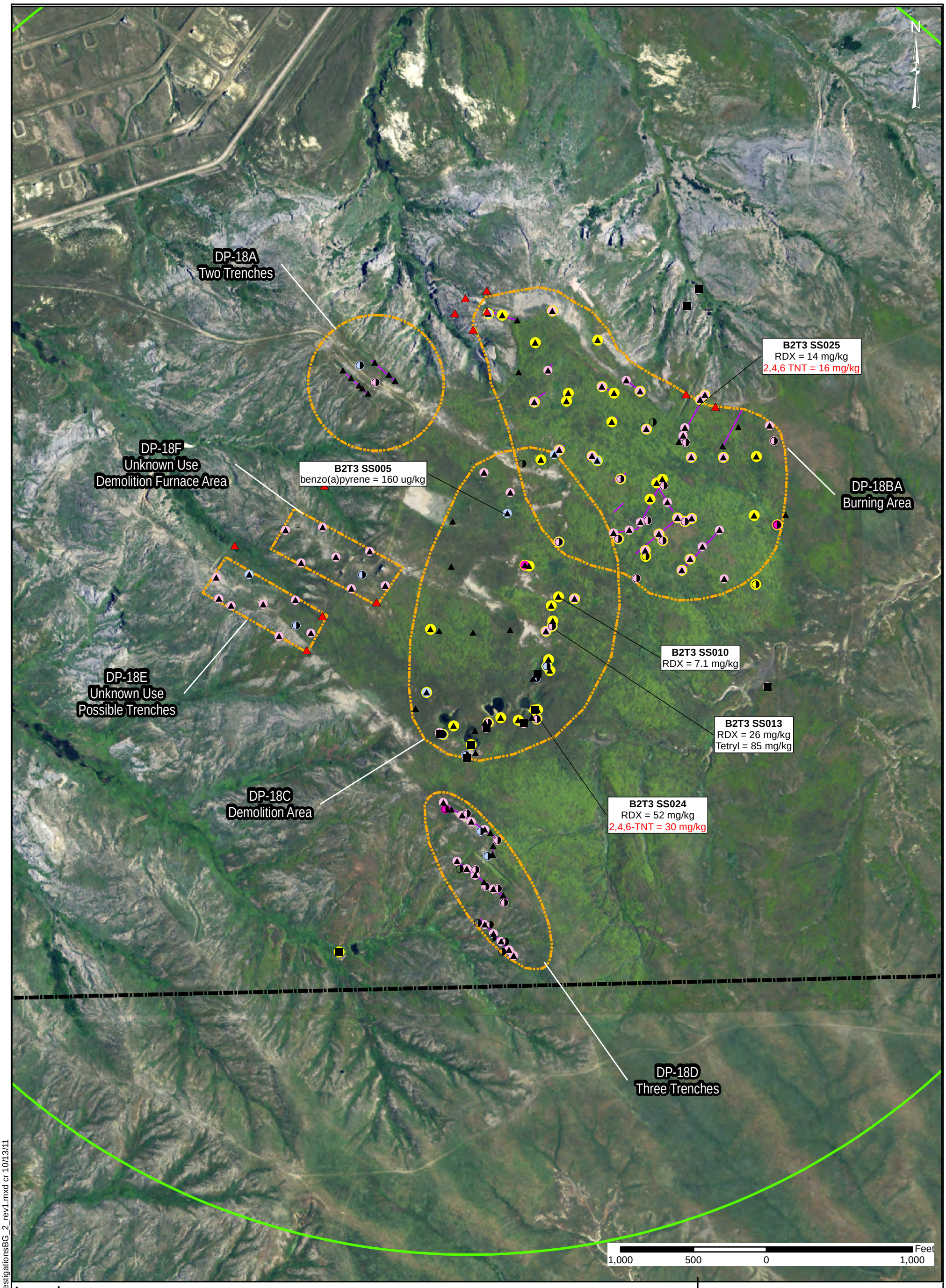
Notes:
Samples collected during 2001 PA/SI were analyzed for CWM, CWMBP, explosives, VOCs, SVOCs, and metals.
Metals were detected across the site, however, only lead exceedances were recommended for further evaluation and are presented on the figure.
Benzo(a)pyrene, phenanthrene and lead were identified as a COPCs in surface soil during 2001 PA/SI - concentrations are indicated in red on figure.
Only concentrations that exceeded risk-based screening levels (excluding metals) are presented on the figure.
Samples collected during the 2009 OU1 RI were only analyzed for metals.
No further action is indicated for human health COPCs identified out side the source areas (vertical extent of contamination within trenches and disturbed areas) (2009 OU1 RI, URS).

Figure 1.4

Previous Investigations
Burning Ground No. 1
Formerly Used Defense Site
Black Hills Army Depot
FUDS Project # B08SD000800

Image Source: Orthophoto 2010
Projection: NAD_1983_UTM_Zone_13N

S:\ES\shared\Black Hills\DO 003_Initial\GIS\work plan\Previous InvestigationsBG_1.mxd cr 10/13/11



Legend

- Surface Soil Sample (2001 PA/SI, Dames & Moore)
- Surface/Subsurface Soil Sample from Soil Boring (2001 PA/SI, Dames & Moore)
- Surface Water/Sediment Sample (2001 PA/SI, Dames & Moore)
- Surface Soil Sample (2009 RI, URS)
- Sub Areas (2009 RI, URS)
- Burning Ground No. 2 (1,627 acres)
- Approximate BHAD Boundary
- Trench Location (2001 PA/SI, Dames & Moore)

Detected Analytes (2001 PA/SI, Dames & Moore)

- VOC
- SVOC
- VOC & SVOC
- Explosives

Notes:
Samples collected during 2001 PA/SI were analyzed for CWM, CWMBP, explosives, VOCs, SVOCs, and metals.
Metals were detected across the site, however, detections are not presented on the figure.
Only concentrations that exceeded risk-based screening levels (excluding metals) are presented on the figure.
2,4-DNT was identified as a COPC in surface soil during 2001 PA/SI - concentrations are indicated in red on figure.
Samples collected during the 2009 OU1 RI were analyzed for metals and explosives.
No further action is indicated for human health COPCs identified out side the source areas (vertical extent of contamination within trenches and disturbed areas) (2009 OU1 RI, URS).

Figure 1.5

Previous Investigation
Burning Ground No. 2
Formerly Used Defense Site
Black Hills Army Depot
FUDS Project # B08SD000800

Image Source: Orthophoto 2010
Projection: NAD_1983_UTM_Zone_13N

S:\ES\shared\Black Hills\GIS\work plan\Previous InvestigationsBG_2_rev1.mxd cr 10/13/11

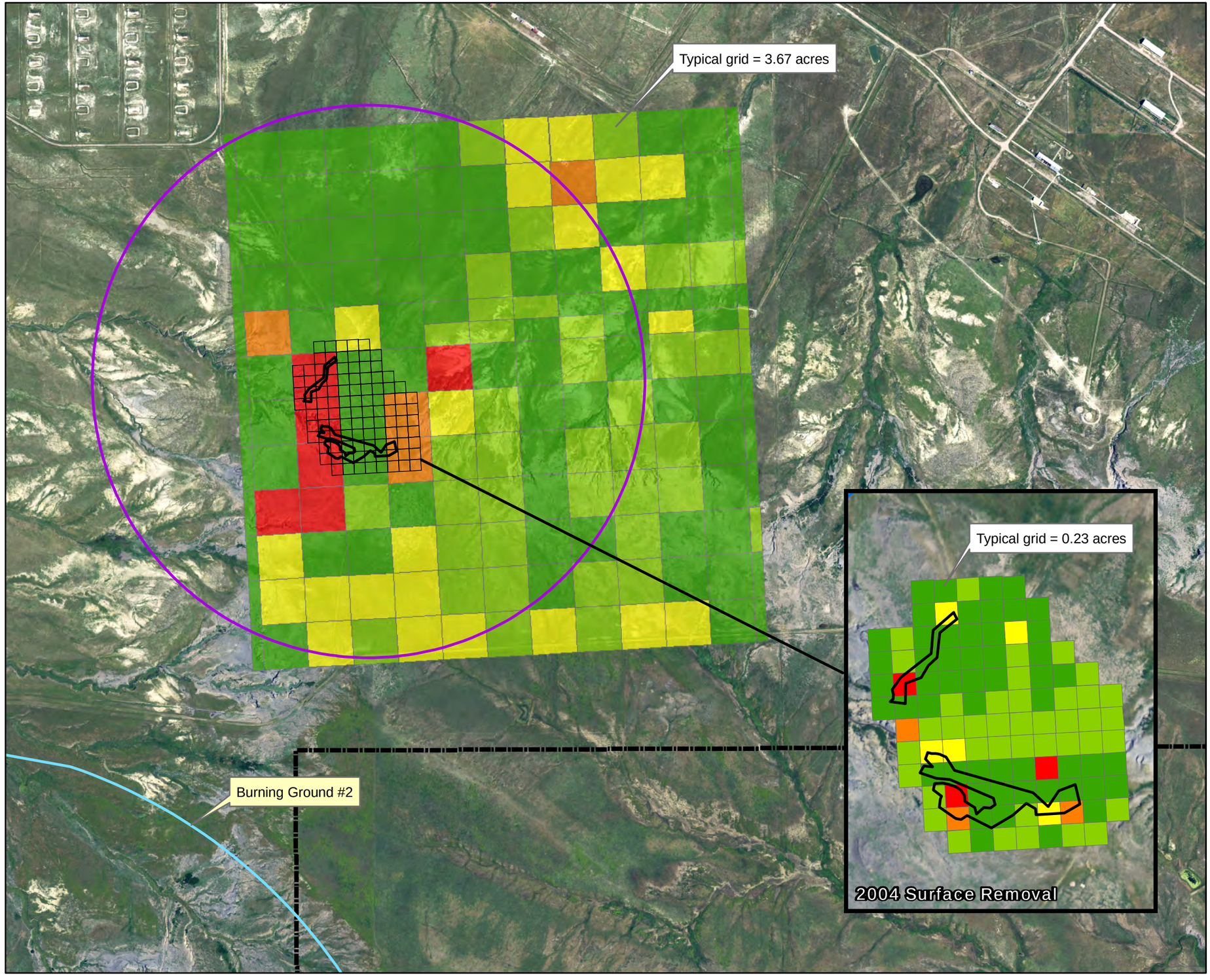


Figure 1.6

BG-1 Surface Removal Results
Formerly Used Defense Site
Black Hills Army Depot
FUDS Project # B08SD000800

Black Hills, SD

Legend

- Burning Ground No. 1 Investigation Area (438 acres)

MD Removed (lbs)

- 0
- 0.5 - 10
- 10.1 - 100
- 100.1 - 500
- 500.1 - 7500
- Approximate BHAD Boundary
- Erosion Control Area

Note: Values were adapted from URS 2004, HFA 2000 and HFA 1999 OE Removal Reports.

1996/1997 = 9,878 lbs of MD and 18 UXO
2004 = 5,153 lbs. of MD and 10 UXO
TOTAL = 15,031 lbs. of MD and 28 UXO
No CWM recovered.

N

Image Source: Orthophoto 2010
Projection: NAD_1983_UTM_Zone_13N

1,000 500 0 1,000 Feet

PARSONS	U.S. ARMY ENGINEERING & SUPPORT CENTER HUNTSVILLE, ALABAMA
DESIGNED BY: CR	Former Black Hills Army Depot
DRAWN BY: CR	
CHECKED BY: CtB	SCALE: As Shown — PROJECT NUMBER: 747769
SUBMITTED BY: CtB	DATE: November 2011 — PAGE NUMBER:
	FILE: S:\ES\shared\S:\ES\shared\Black Hills \GIS\Workplan\BG_No1_Surface.mxd

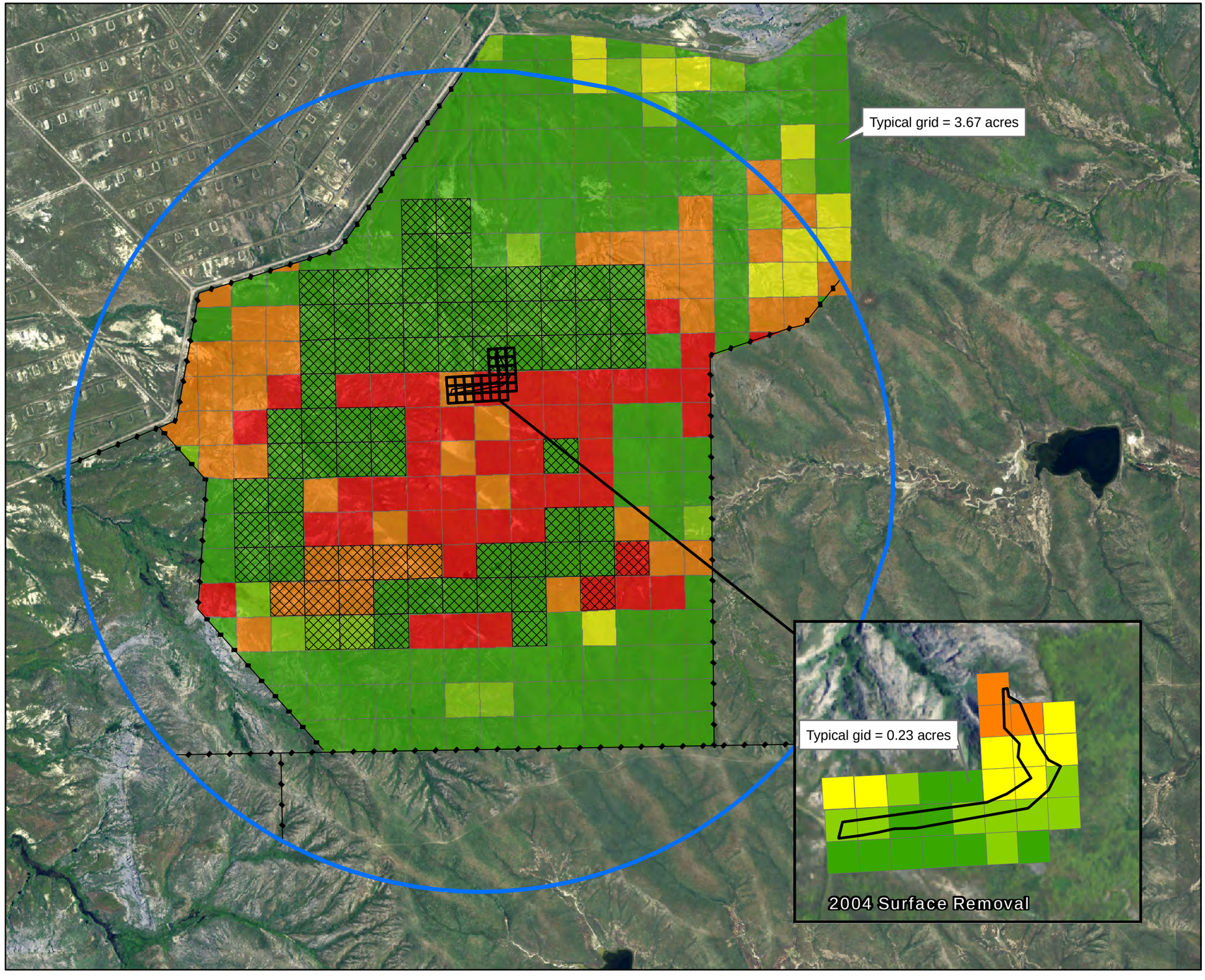


Figure 1.7

BG-2 Surface Removal
MD Density Results
Formerly Used Defense Site
Black Hills Army Depot
FUDS Project # B08SD000800
Black Hills, SD

Legend

- Burning Ground No. 2 (1,627 acres)
- Fences
- MEC Removed, Not All Scrap Removed

1999/2000 Surface Clearance

MD Removed (lbs)

- < 10
- 10- 50
- 50.1 - 100
- 100.1 - 1000
- 1000.1 - 15400
- Erosion Control Area

Note: Values are approximate and were adapted from URS 2004, HFA 2000 and 1999 OE Removal Reports.

1996/1997 = 201,296 pounds of MD and 558 UXO
2004 = 1,940 pounds of MD and 0 UXO
TOTAL = 203,236 pounds of MD and 558 UXO
No CWM recovered.

N

Image Source: Orthophoto 2010
Projection: NAD_1983_UTM_Zone_13N

1,000 500 0 1,000 Feet

PARSONS	U.S. ARMY ENGINEERING & SUPPORT CENTER HUNTSVILLE, ALABAMA	
DESIGNED BY: CR	Former Black Hills Army Depot	
DRAWN BY: CR		
CHECKED BY: CtB	SCALE: As Shown	PROJECT NUMBER: 747769
SUBMITTED BY: CtB	DATE: December 2011	PAGE NUMBER:
	FILE: S:\ES\shared\S:\ES\shared\Black Hills IG\Drawings\arm\BG_No2_surface_removal_md.mxd	

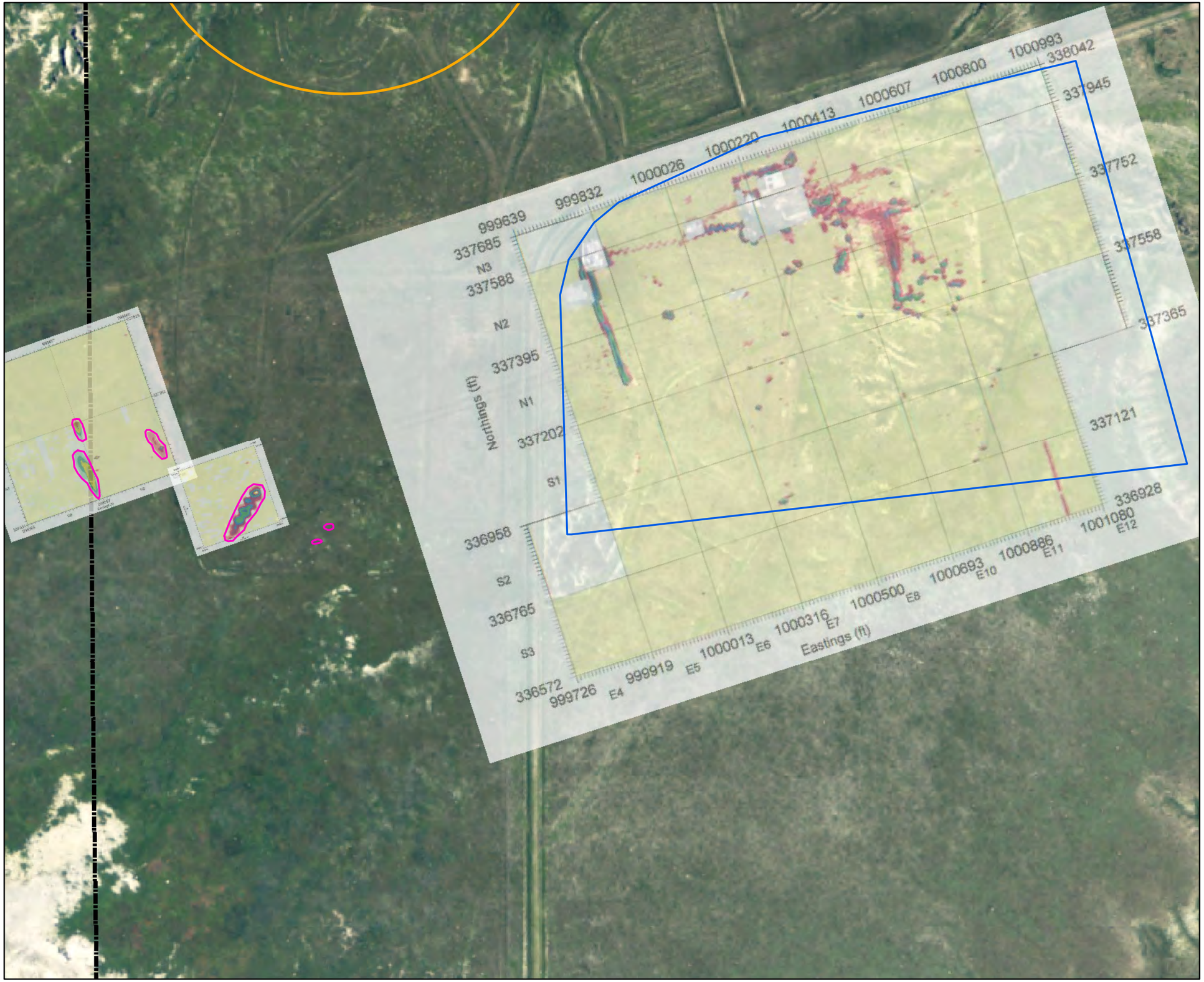


Figure 1.8

DP-19 and DP-32 Previous Geophysical Investigations
Formerly Used Defense Site
Black Hills Army Depot
Black Hills, SD

Legend

- Approximate BHAD Boundary
- Chemical Plant Area (DP-19)
- Chemical Plant Disposal Pit Area (DP-32)
- Chemical Warfare Burning Pit Area (DP-31)

Source:
2001 Engineering Evaluation/ Cost Analysis, URS

N

0 150 300 600 Feet

Image Source: Orthophoto 2010
Projection: NAD_1983_UTM_Zone_13N

PARSONS	U.S. ARMY ENGINEERING & SUPPORT CENTER HUNTSVILLE, ALABAMA
DESIGNED BY: CR	Former Black Hills Army Depot
DRAWN BY: CR	
CHECKED BY: CtB	SCALE: As Shown — PROJECT NUMBER: 747769
SUBMITTED BY: GN	DATE: December 2011 — PAGE NUMBER:
	FILE: S:\ES\shared\Black Hills\DO 003_Initial\GIS\work plan\CWBA_geo_EECA.mxd

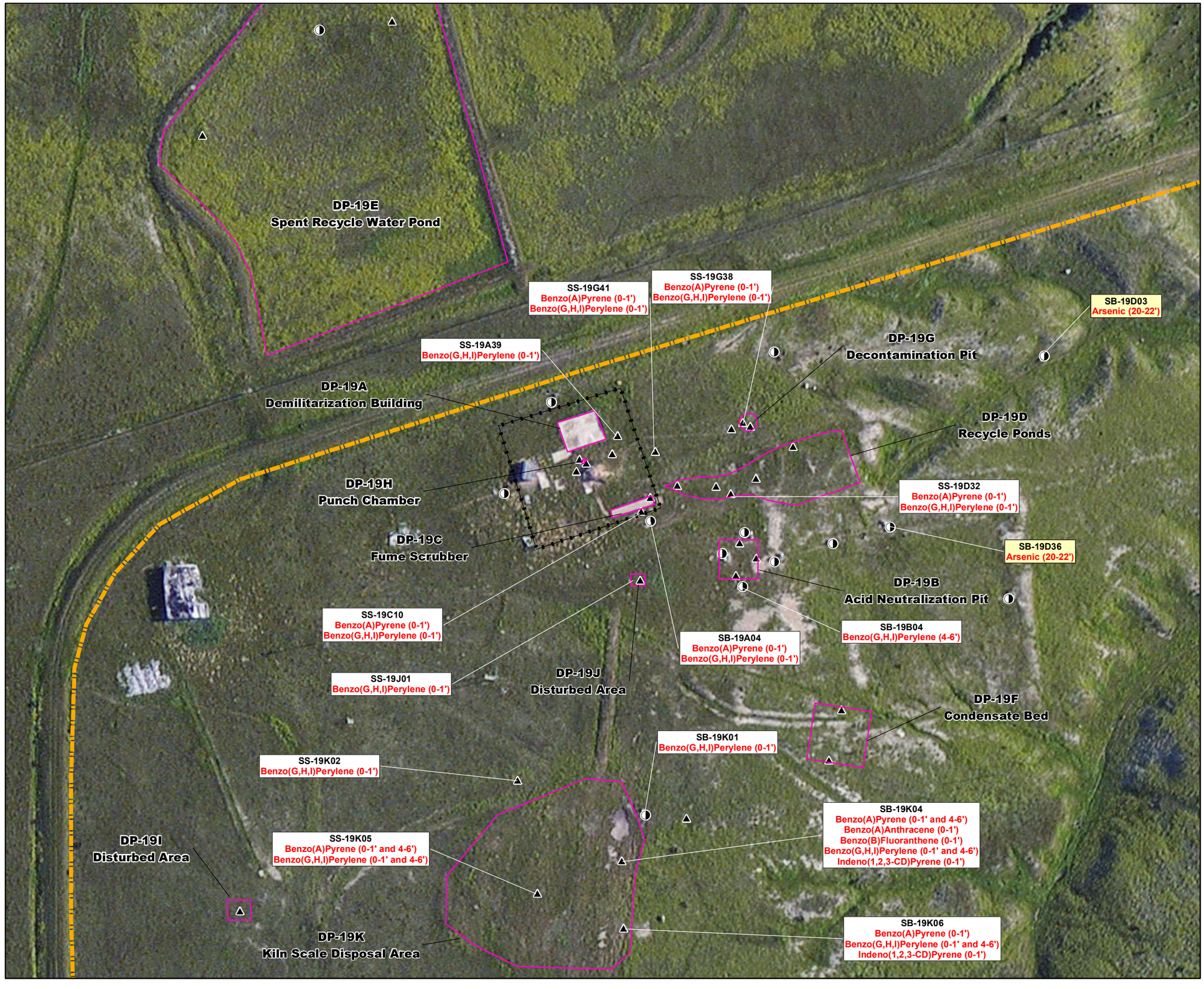


Figure 1.9

Previous Sampling Locations
Chemical Plant Area
DP-19 Sub Areas
Formerly Used Defense Site
Black Hills Army Depot

Black Hills, SD

Legend

- ▲ Surface Soil Sample (2002 PA/SI, Baker)
- ◑ Subsurface Soil Boring Sample (2002 PA/SI, Baker)
- Chemical Plant Area Sites
- DP19 Sub Areas
- Fence
- (0-1') Soil Sample Interval (feet bgs)

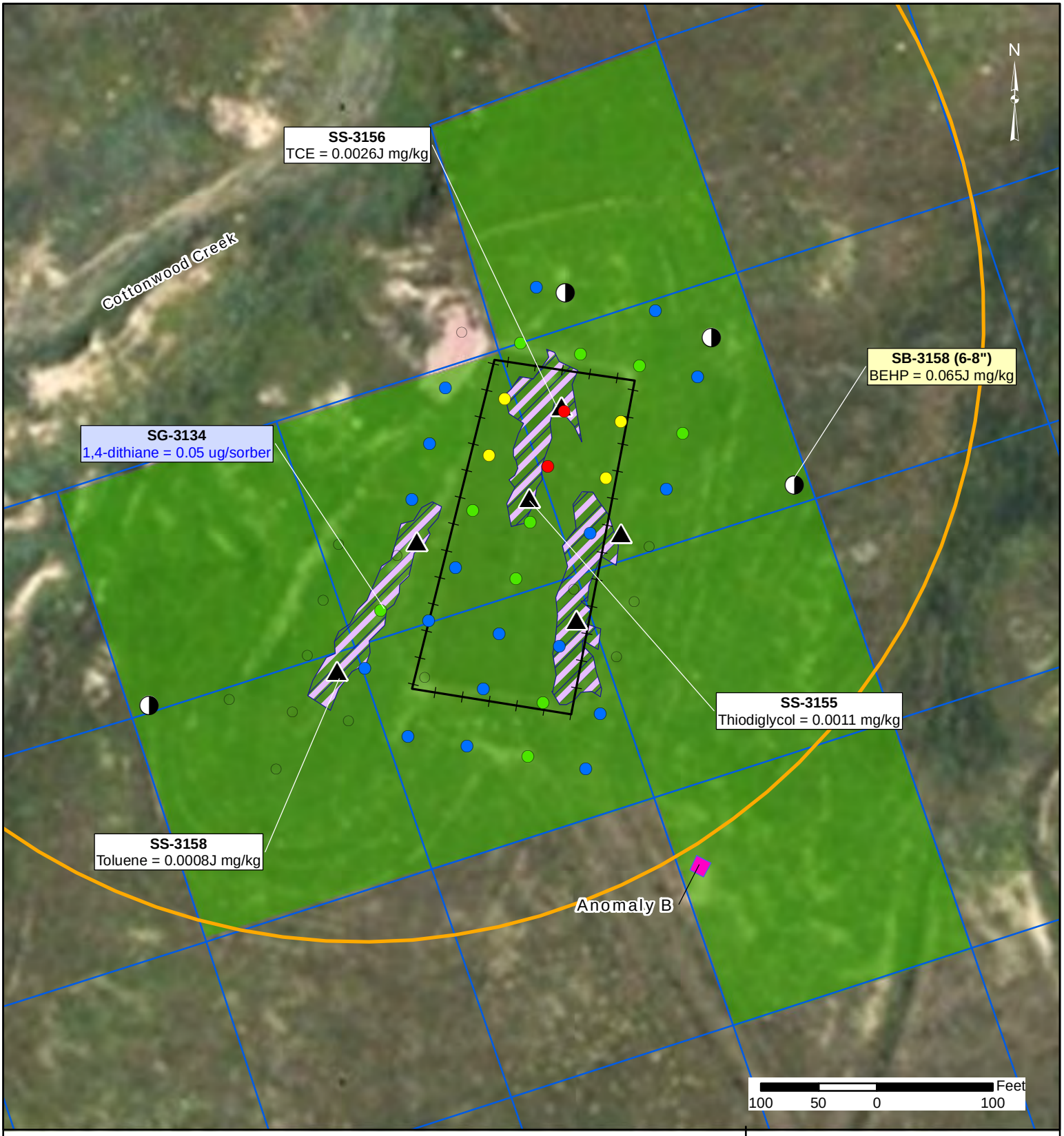
Notes:
Samples were analyzed for VOCs, SVOCs, PCBs, explosives, metals, MBPs (mustard breakdown products: thiodiglycol, 1,4-oxathiane, 1,4-dithiane, and benzothiazole), Ics (industrial chemicals: chloropicrin, acetophenone, and chloroacetophenone) and Mustard. Constituents identified as COPCs in surface or subsurface soil samples are presented on figure. Groundwater is not considered a potential exposure pathway; therefore, COPCs for groundwater are not presented.
Monitoring well locations are based on coordinates provided in the 2002 PA/SI OU2, Baker.
Surface soil sample locations and subarea locations were adapted from previous reports (2002 PA/SI OU2, Baker) and are approximate.

N

0 75 150 300 Feet

Image Source: Bing Maps Aerial 2011
Projection: NAD_1983_UTM_Zone_13N

PARSONS		U.S. ARMY ENGINEERING & SUPPORT CENTER HUNTSVILLE, ALABAMA
DESIGNED BY: CR	Former Black Hills Army Depot	
DRAWN BY: CR		
CHECKED BY: CtB	SCALE: As Shown	PROJECT NUMBER: 747769
SUBMITTED BY: CtB	DATE: March 2012	PAGE NUMBER:
	FILE: S:\ES\shared\Black Hills\DO 003_Initial \GIS\work plan\CWBA_DP-19.mxd	



Legend

Soil Gas Sampling (2002 PA/SI, Baker)
Total Target Chlorinateds (ug)

- 0
- 0 - 0.05
- 0.05 - 0.75
- 0.75- 10
- 10 - 100

- Surface/Subsurface Soil Boring Sample (2001 PA/SI, Baker)
- Surface Soil Sample (2002 PA/SI, Baker)
- Fence ("Non-Use" signs present)
- Possible Disposal Trenches (2001 EECA, Dames & Moore)
- Anomaly B (2001 EECA, Dames & Moore)
- Chemical Warfare Burning Pit Area (DP-31)
- Geophysical Survey Grids (2001 EECA, Dames & Moore)
- Grids Containing Anomalies (2001 EECA, Dames & Moore)

Notes:
Samples were analyzed for VOCs, SVOCs, PCBs, explosives, metals, MBPs (mustard breakdown products: thiodiglycol, 1,4-oxathiane, 1,4-dithiane, and benzothiazole), Ics (industrial chemicals: chloropicrin, acetophenone, and chloroacetophenone) and Mustard during the 2002 PA/SI.
No explosives, mustard or industrial chemicals were detected in soil gas samples.
Detected analytes are presented on figure, however, concentrations did not exceed data screening criteria.
NDAI is recommended for OU2 outside the perimeter fence in regards to human health risks associated with hazardous and toxic waste excluding disposal trenches (2005 OU2 RI, USACE).

Figure 1.10

Previous Sampling Locations
Chemical Warfare Burning Pit Area
Formerly Used Defense Site
Black Hills Army Depot
FUDS Project # B08SD000800

Image Source: Orthophoto 2010
Projection: NAD_1983_UTM_Zone_13N

S:\ES\shared\Black Hills\GIS\work plan\Previous Investigation CWBPA_2.mxd cr 12/12/11

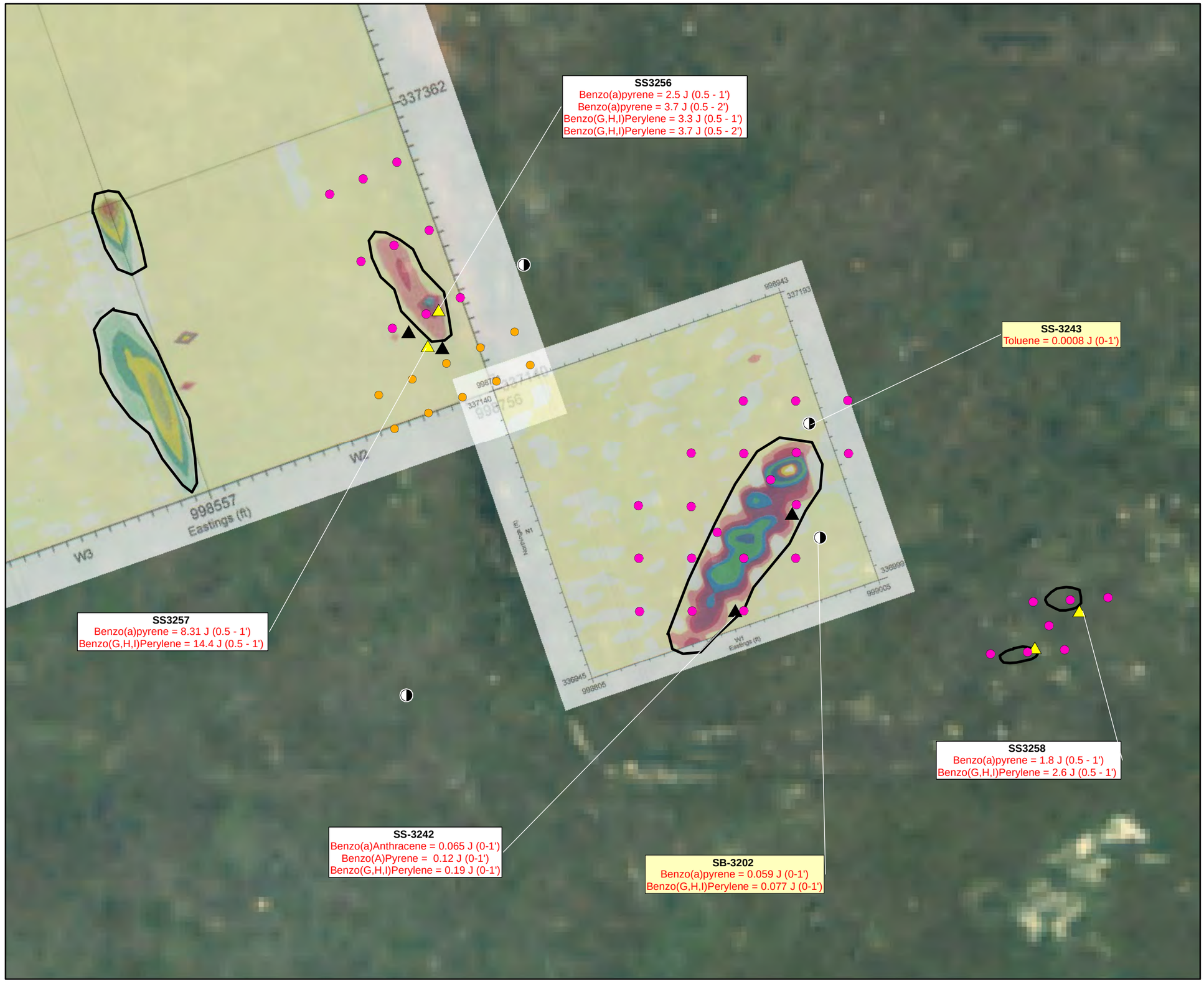


Figure 1.11

Previous Investigations DP-32
Formerly Used Defense Site
Black Hills Army Depot

Black Hills, SD

Legend

- Surface/Subsurface Soil Boring Sample (2002 PA/SI, Baker)
- Soil Gas Sample Location (2002 PA/SI, Baker)
- Surface Soil Sample (2002 PA/SI, Baker)
- Soil Gas Sample (2005 RI, USACE)
- Surface Soil Sample (2005 RI, USACE)
- DP-32 Investigation Areas

Notes:
Samples were analyzed for VOCs, SVOCs, PCBs, explosives, metals, MBPs (mustard breakdown products: thiodiglycol, 1,4-oxathiane, 1,4-dithiane, and benzothiazole), Ics (industrial chemicals: chloropicrin, acetophenone, and chloroacetophenone) and Mustard during the 2002 PA/SI.
Constituents identified as COPCs in soil samples are presented on figure in mg/kg.
No groundwater was encountered at this site.
Sample locations were adapted from previous reports and are approximate.
Source of geophysical data (2001 EE/CA,URS).
NDAI is recommended for OU2 outside the perimeter fence in regards to human health risks assoicated with hazardous and toxic waste excluding disposal trenches (2005 OU2 RI, USACE).

N

0 40 80 160 Feet

Image Source: Orthophoto 2010
Projection: NAD_1983_UTM_Zone_13N

PARSONS	U.S. ARMY ENGINEERING & SUPPORT CENTER HUNTSVILLE, ALABAMA	
DESIGNED BY: CR	Former Black Hills Army Depot	
DRAWN BY: CR		
CHECKED BY: CtB	SCALE: As Shown	PROJECT NUMBER: 747769
SUBMITTED BY: GN	DATE: December 2011	PAGE NUMBER:
	FILE: S:\ES\shared\Black Hills\DO 003_Initial\GIS \work plan\Previous_InvestigationsDP_32.mxd	

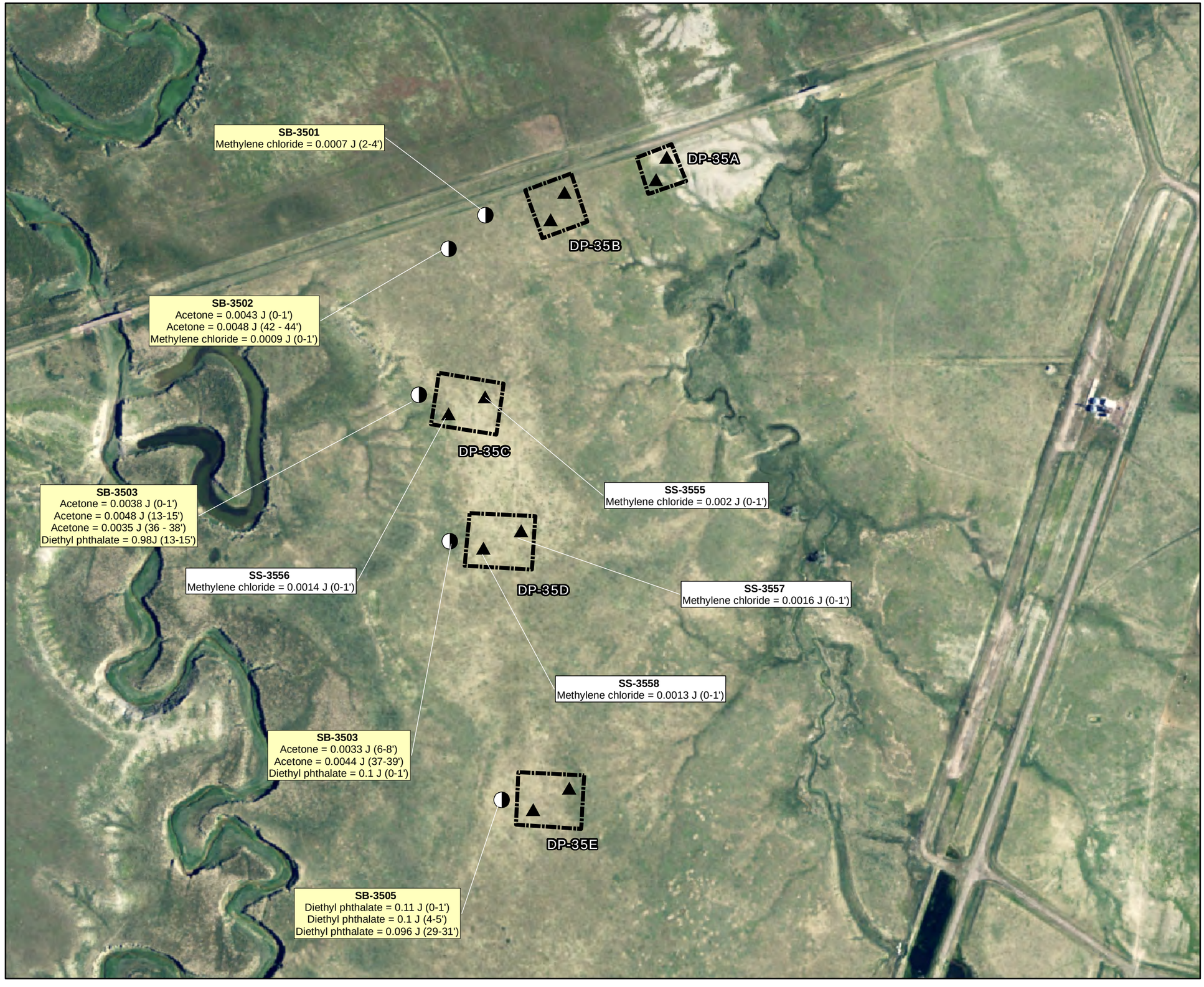


Figure 1.12

Previous Investigations DP-35 Formerly Used Defense Site Black Hills Army Depot

Black Hills, SD

Legend

- Surface/Subsurface Soil Boring Sample (2002 PA/SI, Baker)
- Surface Soil Sample (2002 PA/SI, Baker)
- Suspected Pits (DP-35)

Notes:
Samples were analyzed for VOCs, SVOCs, PCBs, explosives, metals, MBPs (mustard breakdown products: thiodiglycol, 1,4-oxathiane, 1,4-dithiane, and benzothiazole), Ics (industrial chemicals: chloropicrin, acetophenone, and chloroacetophenone) and Mustard during the 2002 PA/SI.
Detected analytes are presented on figure in mg/kg.
No COPCs were identified for the site.
Soil sample locations were adapted from previous reports (2002 PA/SI OU2, Baker) and are approximate.

N

0 250 500 1,000 Feet

Image Source: Orthophoto 2010
Projection: NAD_1983_UTM_Zone_13N

PARSONS	U.S. ARMY ENGINEERING & SUPPORT CENTER HUNTSVILLE, ALABAMA
DESIGNED BY: CR	Former Black Hills Army Depot
DRAWN BY: CR	
CHECKED BY: CtB	SCALE: As Shown — PROJECT NUMBER: 747769
SUBMITTED BY: GN	DATE: December 2011 — PAGE NUMBER:
	FILE: S:\ES\shared\Black Hills\DO 003_Initial\GIS \work plan\Previous_InvestigationsDP_32.mxd

CHAPTER 2
TECHNICAL MANAGEMENT PLAN

2.1 INTRODUCTION

The purpose of the technical management plan (TMP) is to provide the procedures to be used to execute the project tasks. Field procedures for this project, including remedial investigation and MC sampling, are contained in separate chapters of this work plan. This chapter focuses on project objectives, organization, communication and reporting, deliverables, schedule, cost and billing, public relations, duties and responsibilities, the functional relationships between organizations, field operations management, data management, and data quality objectives (DQOs).

2.2 PROJECT OBJECTIVE

The primary objective for these delivery orders is to perform an RI/FS at BHAD. The work will fill data gaps and supplement the information gathered in previous studies, particularly the 2009 OU1 RI/FS for BG-1 and BG-2 and the OU2 outside the fence RI for the Chemical Plant Area. This primary objective will be met when the following are accomplished:

- Work plans are prepared in accordance with the PWSs and reference governing regulations and requirements. These work plans identify appropriate field work and define and present a cost-effective approach to the planning and implementation of field work.
- A RI is safely completed that is sufficient to determine the nature and extent (if present) of hazardous, toxic, and radioactive waste (HTRW), MEC, CWM, and MC; identify and quantify associated risk; and support an FS for remedial action.
- A FS is completed that identifies at least one appropriate, applicable, cost-effective, implementable remedy for each investigation area.
- A PP is prepared presenting the recommended alternative to the public.
- The Government accepts DDs meeting the requirements of ER 200-3-1 and MM-CX IGD 06-04.

2.3 PROJECT ORGANIZATION

This section describes the organizations and their project roles. Table 2.1 lists the key organizations and their responsibilities. In addition to these organizations, local governments, local emergency management agencies, and other stakeholders may also have roles in the project.

Table 2.1
Key Project Organizations

Organization	Responsibility
U.S. Army Corps of Engineers, Omaha District (CENWO)	Project management
U.S. Army Engineering Support Center, Huntsville (USAESCH)	Project management
Parsons	Project management, technical support
Edgewood Chemical Biological Center (ECBC)	Agent analysis
CBRNE Analytical and Remediation Activity (CARA)	Technical support, air monitoring
South Dakota Department of Environment and Natural Resources (SDDENR)	Review and concurrence
U.S. Environmental Protection Agency (USEPA)	Review and concurrence
U.S. Army 22nd Chemical Battalion (TE) [a/]	Technical support
Project Manager for Non-Stockpile Chemical Materiel (PMNSCM) [a/]	Technical support
Department of the Army Safety Office (DASAF) [a/]	Review and approval
U.S. Army Technical Center for Explosives Safety (USATCES) [a/]	Review and approval
Department of Defense Explosives Safety Board (DDESB) [a/]	Review and approval
U.S. Army Center for Health Promotion and Preventive Medicine (USACHPMM) [a/]	Technical support

a/ This organization will be involved if CWM is encountered and contingency plans are enacted.

2.3.1 U.S. Army Corps of Engineers, Omaha District

CENWO is the overall project manager for the RI/FS. CENWO responsibilities include reviewing project plans and documents; obtaining rights-of-entry to properties in the work area; working with the news media and public; and coordinating with Federal, state, and local agencies on issues pertaining to implementation of this project and protection of ecological and cultural resources. Other responsibilities include providing proper notifications to the USEPA and state regulators regarding transportation operations, notifying the National Response Center and state officials in the event of a release or spill, and signing the hazardous waste manifest as generator of any hazardous waste. If appropriate, CENWO will provide an onsite representative to handle waste manifests and to coordinate public affairs.

2.3.2 U.S. Army Engineering Support Center, Huntsville

USAESCH is the implementing agency for execution of this project, providing technical expertise for MEC/CWM activities and serving as the project manager for conduct of the RI/FS. USAESCH responsibilities include procuring and directing the prime contractor (Parsons) and supporting agencies, coordinating document reviews and approvals, and controlling the budget and schedule. USAESCH also provides the onsite UXO-qualified safety specialist. The USAESCH will coordinate an assessment of the investigation team capabilities before the intrusive investigation activities begin.

2.3.3 Parsons

2.3.3.1 Parsons is the prime contractor to USAESCH. Parsons prepared this work plan and will provide engineering support and services for implementation of the RI/FS. Parsons is responsible for performance of the activities detailed in the PWS.

2.3.3.2 Parsons may subcontract some services to ensure successful completion of the delivery orders. These services may include, but are not limited to:

- Site support (examples could include site preparation and access, including road building; fence removal and replacement; temporary storage; and equipment transportation).
- Medical support services.
- Security.
- Transportation and disposal of waste streams.
- Surveying.
- Site restoration.

2.3.3.3 Parsons plans to use Agriculture & Priority Pollutants Laboratories, Inc. (APPL) to provide non-chemical agent analytical services, including waste stream characterization. Waste removed from excavations will be disposed in accordance with state and Federal regulations by a disposal contractor.

2.3.3.4 A UXO services contractor may be used to supply UXO-qualified personnel in support of the field operations. Services provided may include assisting with the intrusive excavations, decontamination of personnel, and site support. The UXO services contractor will be responsible for the conduct of UXO operations, including explosives licensing, purchasing, handling, and detonating, and disposing of conventional MEC, in the event it is encountered. The UXO services contractor may also provide properly trained and qualified personnel for UXO operations. UXO-qualified personnel required for this project will include UXO-qualified supervisors and technicians.

2.3.4 Chemical, Biological, Radiological, Nuclear and High-yield Explosives Analytical and Remediation Activity

CARA provides air monitoring for chemical agents (CAs). In addition to providing equipment and personnel, CARA may obtain support and personnel through subcontractors. During intrusive operations, CARA conducts the air monitoring for select ICs and CAs in the work and support zones. CARA can also provide headspace analysis for CAs on soil samples and scrap collected from excavations and discrete locations. CARA will also be responsible for transport of suspect RCWM from the RI sites and storage of the items in the IHF.

2.3.5 Edgewood Chemical Biological Center

ECBC will be the chemical agent laboratory, providing offsite laboratory analyses for CA and ABP on soil samples and decontamination water (agent only).

2.3.6 South Dakota Department of Environment and Natural Resources and U.S. Environmental Protection Agency

SDDENR's mission is to adopt and enforce rules and regulations consistent with statutory authority to protect and improve the quality of South Dakota's environment and the health of all its citizens. USEPA Region 8 will oversee enforcement of Federal environmental laws. The project team will coordinate with SDDENR and USEPA Region 8 throughout the project. SDDENR and USEPA Region 8 will be reviewers during the development of work plans and other project documents for the operations at the site. CENWO will act as the primary contact with SDDENR and USEPA Region 8 and will keep both agencies informed of project progress.

2.3.7 Supporting Agencies for CWM Contingency

The following agencies will be involved if suspect or confirmed CWM is encountered.

- TE provides a worldwide capability to conduct chemical, biological, radiological, and industrial hazards operations in support of DoD, local, state, and other Federal agencies.
- PMNSCM provides support to USAESCH for planning and implementation of temporary storage and final disposition of CWM, including destruction. PMNSCM will provide assistance in the event that confirmed CWM is found onsite during operations.
- DASAF is responsible for approving the chemical safety submission (CSS). This authority has been delegated to the USATCES.
- USATCES provides Army approval of the CSS and performs as the Army member of the Major Command (MACOM) pre-operational survey team.

- DDESB provides DoD approval of the CSS.
- USACHPPM provides technical support for Army reviewing and approving agencies during preoperational surveys.

2.3.8 Local Agencies

2.3.8.1 Two local agencies may participate in the RI/FS in the following roles.

2.3.8.2 **Fall River County Emergency Management Department (EMD)**: BHAD is entirely within Fall River County. Fall River County EMD will be asked to participate in tabletop exercises and will be consulted by the project team for contingency planning. They will also be contacted on a regular basis during intrusive operations to inform them of planned operations and schedule.

2.3.8.3 **Emergency Responders**: Local fire and police departments will be contacted and invited to participate in tabletop exercises. In addition, these organizations will be kept informed through the county's EMD.

2.3.9 Other Stakeholders

The property owners and neighbors who may be impacted by the RI/FS will be contacted. Landowners where work will be conducted will be invited to meetings or briefings held for local agencies. The USDA owns most of the land associated with the former BHAD and will be kept informed of the planned operations and schedule.

2.3.10 Responsibility Matrix

The responsibilities of the key RI personnel are presented in Table 2.2. Figure 2.1 shows the organization structure for the RI/FS.

2.4 PROJECT COMMUNICATION AND REPORTING

2.4.1 Record Keeping

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

Table 2.2
Responsibilities of Key Remedial Investigation Personnel

Title	General Description	Responsibilities
Project manager (PM)	Reports to upper-level management. Has authority to direct response operations and implement the PWS for USAESCH.	• Coordinates and reviews the records review, work plan, APP and SSHP, and all reporting. • Organizes the field team. • Obtains approval to start field work and coordinates activities with appropriate officials. • Uses the project safety and health officer (PSHO) to ensure that safety and health requirements are met. • Oversees the performance of all project team members. • Coordinates subcontract activities in conjunction with procurement specialists. • Ensures that technical and contractual issues are resolved. • Controls cost and schedules to meet all targets.
Site manager (SM)	Responsible for field team operations and safety.	• Manages field operations and determines the sequence and locations of intrusive and field team activities. • Serves as primary, onsite point-of-contact between Parsons, USAESCH, and the air monitoring team. • Oversees subcontractors' field operations and reviews their weekly status reports. • Coordinates with the Parsons PM to ensure budgets and schedules are met during the field work. • Reports QC failures and corrective actions to the PM and QC manager. • Enforces site control. • Documents field activities and reports to the Parsons PM. Documents deviations from plans. • Understands field procedures and ensures that they are followed • Ensures that investigation-derived waste (IDW) is correctly sampled and packaged properly for disposal.
Project safety and health officer (PSHO)	Advises PM on all aspects of health and safety (H&S) and supervises the site safety and health officer (SSHO).	• Provides technical support concerning health and safety issues. • Manages/oversees the preparation of the APP/SSHP. • Ensures that the Parsons H&S protocols conform with established industry protocols and standards. • Confirms each team member's suitability for work based on a physician's recommendation. • Conducts field H&S audits to ensure APP/SSHP conformance and Parsons policy compliance. • Certifies that workers have proper training. • Investigates each accident or reportable incident.

Table 2.2 (Continued)
Responsibilities of Key Remedial Investigation Personnel

Title	General Description	Responsibilities
Site safety and health officer (SSHO)	Reports to the PSHO on all aspects of H&S on the site. Performs day-to-day H&S tasks. Stops work if any operation threatens work or public health or safety.	• Knows emergency procedures, evacuation routes, and telephone numbers of the local ambulance, hospital, poison control center, fire department, and police department. • Coordinates decontamination procedures/provisions for medical care with USAESCH and air monitoring personnel. • Notifies USAESCH of emergency conditions. • Conducts hazard communications (HAZCOM) training. • Advises medical personnel of potential exposures and consequences. • Notifies emergency response personnel by telephone or radio in the event of an emergency. • Acts as spokesperson if an Occupational Safety and Health Administration (OSHA) inspector visits the site. • Conducts onsite training concerning H&S issues and new concerns. • Reports accidents or H&S incidents to the PSHO and USAESCH. • Provides UXO/CWM safety oversight during intrusive activities. • Conducts UXO/CWM safety briefings/training. • Reports/investigates UXO/CWM accidents and incidents.
Quality control manager	Independent of the project team. Interacts and communicates with subcontractor and USAESCH quality assurance (QA) personnel.	• Reviews QA and QC procedures to be used in the project. • Reviews subcontractor system audits and QC procedures to ensure compliance with the project QC guidelines. • Performs a quality review to ensure the quality of deliverables from the project team.
Quality control specialist	Coordinates with the Parsons PM and QC manager.	• Oversees and implements the QC program. • Monitors the project's performance in accordance with safety protocols and technical compliance. • Provides guidance and performs scheduled reviews of documentation, including QC reports, field progress reports, and technical findings. • Tracks IDW and ensures that the correct samples have been collected to characterize the waste.
Project chemist	Advises PM on all aspects of the SAP. Supervises the sample coordinator. Communicates with the laboratory subcontractor and USAESCH personnel.	• Ensures sampling activities are conducted in accordance with the approved SAP. • Serves as liaison to laboratory subcontractors. • Provides QC of daily reports from sample coordinator. • Coordinates with the PM.

Table 2.2 (Continued)
Responsibilities of Key Remedial Investigation Personnel

Title	General Description	Responsibilities
Sample coordinator	Responsible for soil, ground water, surface water, and sediment sampling operations.	• Ensures sampling activities are conducted in accordance with the approved SAP. • Ensures sampling teams are familiar with proper sampling procedures. • Responsible for documentation and transfer of samples for headspace analysis, low-level chemical agent analysis, and HTRW analysis. • Ensures the laboratory has provided sufficient sample containers to complete the required sampling for each phase of the project. • Coordinates with the Parsons SM.
Field team	The work party must consist of at least two people.	• Safely completes onsite tasks. • Complies with APP/SSHP. • Notifies SSHO/Parsons SM or supervisor of suspected unsafe conditions. • Inspects personal protective equipment (PPE) prior to, during, and after each use.
Senior UXO supervisor (SUXOS)	Most senior UXO-qualified onsite representative. Meets the USACE requirements for experience. Ability to temporarily stop work to correct safety deficiencies. May not be required onsite for all operations.	• Ensures efficient performance of the approved work plan and APP/SSHP. • Makes daily progress reports to the Parsons SM. • Coordinates with other subcontractor activities/work onsite. • Ensures compliance with all safety- and work-related SOPs. • Meets scheduled time lines and budgetary control amounts. • Complies with all Federal and state regulations. • Coordinates with the SSHO to ensure all site safety considerations are enforced. • Responsible for equipment and onsite vehicles.
UXO supervisor (UXO technician III)	Takes daily instruction from and reports directly to the SUXOS. Directs the action of downrange team in accordance with the approved plans and the daily verbal directions of the SUXOS.	• Supervises the direct field operations for assigned tasks. • Complies with all safety and work related SOPs, including the APP/SSHP. • Meets schedules on task/team time lines and budgetary control amounts. • Coordinates with the SSHO to ensure all site safety considerations are enforced. • Supervises assigned personnel. • Responsible for task/team assigned equipment and vehicles.
UXO technician II	Under direct supervision of the UXO supervisor. Authorized to temporarily stop performance of work to immediately alert UXO supervisor of unsafe conditions.	• Provides safe and efficient performance of field operations, including location, identification, removal, and disposal of chemical agent contaminated media (CACM) and 3X scrap in accordance with the approved work plan and APP/SSHP.

Table 2.2 (Continued)
Responsibilities of Key Remedial Investigation Personnel

Title	General Description	Responsibilities
Heavy equipment operator	Takes instruction from the SM and SSHO for most operations. Under direct instruction of the field team leader during intrusive operations.	• Demonstrates daily that safety features of the equipment (for example, backup alarm, brakes, and fire extinguisher) are operational and/or in-place. • Ensures the equipment is mechanically sound and operates with no engine oil or hydraulic oil leaks. • Ensures that cables, chains, or other lifting/towing devices are free of defects and obvious signs of wear and tear. • Demonstrates proficiency in the safe operation of the equipment. • Ensures spotter is available during the operation of the equipment.
USAESCH safety specialist	Reports to USAESCH safety office.	• Provides safety oversight of project-related activities. • Monitors operations within the exclusion zone. • Ensures proper certification of MEC-related debris. • Stops work in the event of unsafe conditions or if approved H&S procedures are not being followed.
Air monitoring onsite coordinator	Responsible for air monitoring operations and safety. Coordinates with Parsons SM.	• Manages air monitoring personnel onsite. • Ensures air sampling, headspace sampling, and monitoring is conducted in accordance with the approved work plan. • Ensures laboratory capabilities necessary to conduct required analyses are available onsite. • Coordinates with the Parsons SM to ensure proper reporting of monitoring results.
Personnel decontaminatio n station (PDS) supervisor	Manages decontamination operations	• Responsible for the setup, organization, and operation of the PDS and emergency personnel decontamination station (EPDS).
PDS assistant	Supports decontamination operations	• Support the PDS supervisor with the setup, organization, and operation of the PDS and EPDS.
Rescue personnel	Conducts rescue operations for downrange emergencies	• These personnel who are properly trained, qualified, and equipped respond to emergencies at an intrusive investigation site or other site where CA may have been released.

2.4.2 Office Communications and Reporting

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

- Meeting minutes, which are due 5 business days after a meeting;
- A record of telephone conversations, which is included in each project status report (PSR); and
- PSRs, which are prepared in accordance with DID WERS-016.01.

2.4.2.2 A PSR will be issued monthly for the duration of the project and weekly during field operations. The PSR will include a summary of the work performed during the

reporting period and work planned for performance in the upcoming period. The report also will summarize results of meetings and telephone conversations that occurred during the reporting period.

2.4.3 Field Communications and Reporting

2.4.3.1 The following communications will be documented in a chronological communications log maintained by the Parsons SM and the SSHO:

- Each and every occasion that suspect CWM/MEC is encountered;
- When and why work is stopped for safety reasons;
- Health and safety violations;
- Personnel changes and reason for changes; and
- Deviations from the approved work plan or SAP that occur in the field (for example, number of samples, analysis, or problems encountered).

2.4.3.2 When activity is occurring onsite, a daily progress report will be completed by the Parsons SM. The report will include the following:

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

2.4.3.3 During the MC/HTRW sampling activities, a data quality control report (DQCR) 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, problems encountered, and government personnel directives.

2.5 PROJECT DELIVERABLES

2.5.1 Project deliverables will meet schedule requirements and will be prepared in accordance with the applicable DID format. Deliverables will coincide with payment milestones and will undergo internal Parsons review prior to submittal to other organizations. As specified in the PWS, the following deliverables will be submitted:

- TPP meeting minutes – draft and final;
- CSP – (developed collaboratively with USAESCH);
- Work plan - draft, draft final, and final;
- RI/FS report – draft, draft final, and final;

- PP - draft, draft final, and final;
- DD - draft, draft final, and final;
- Final administrative record; and
- Final geographic information system (GIS) files.

2.5.2 Other submittals that may be prepared as required as the project progresses include the followinng:

- CSM as part of the TPP meetings;
- DQCR, which will be prepared daily during the execution of field activities;
- Weekly status report, which will be submitted weekly during the execution of field activities; and
- Monthly status reports, which will be submitted monthly during the project.

2.6 PROJECT SCHEDULE

A project schedule prepared for work planning purposes is presented in Figure 2.2. This schedule will be updated whenever necessary and submitted to the USACE with the associated progress report. The schedule in Figure 2.2 is based on this draft final version of the work plan and the anticipated time needed for USACE review and Parsons' response to comments and final work plan preparation.

2.6.1 Periodic Reporting

Periodic reports such as daily progress reports and project status reports will be required to document project activities. Parsons will prepare these reports in accordance with the PWS, the applicable DIDs, and the project schedule.

2.7 COST AND BILLING

The delivery orders for this project were awarded as a combination of firm fixed price (FFP) and cost plus fixed fee (CPFF) tasks. The FFP tasks are billed based on negotiated milestones or unit rates. Parsons will invoice the CPFF tasks monthly along with the PSR report and the back-up information required by the contract.

2.7.1 Project Public Relations Support

A public involvement plan (PIP) was prepared as a stand-alone document (Parsons, 2011d). The PIP was developed in accordance with FUDS program policy and serves as the foundation for future public involvement activities associated with the RI/FS of BG-1, BG-2, and the Chemical Plant Area at BHAD. The PIP defines the focus and direction

of community participation efforts and presents an organized, targeted approach for effective communication and positive, beneficial public involvement.

2.8 SUBCONTRACTOR MANAGEMENT

2.8.1 UXO Subcontractor

Parsons will contract with USA Environmental, Inc. to provide support UXO personnel. Parsons will manage the UXO subcontractor by issuing a definitive PWS. The UXO subcontractor will furnish labor, tools, equipment, supplies, material, and licenses, and will perform technical, professional, supervisory, and other services necessary to complete the PWS in accordance with the technical specifications, industry standards, and schedule requirements set forth in the subcontract.

South Dakota requires a permit for the purchase, use, transport, sale, or manufacture of explosives. Parsons' subcontractor, USA Environmental, will obtain the appropriate permits from the South Dakota State Fire Marshal's office prior to the start of field work.

USA Environmental will conduct QC operations as part of the field operations team under the guidance of the Parsons UXOQCS. Invoices will be submitted to Parsons according to the agreed payment schedule in the subcontract.

2.8.2 Additional Subcontracted Services

Parsons will subcontract for additional services, such as laboratory services, land surveying, and security services, that are necessary to complete the investigation. Parsons will manage these subcontracts by issuing definitive scopes of work. The subcontractors will furnish all labor, tools, equipment, supplies, material, and licenses, and will perform all technical, professional, supervisory, QC, and other services necessary to complete their scopes of work in accordance with the technical specifications, industry standards, and schedule requirements set forth in the subcontract. Invoices will be submitted to Parsons on a monthly basis as work is completed.

2.9 FIELD OPERATIONS MANAGEMENT

The major field operation steps that will lead to the successful completion of the RI/FS are listed below. Detailed descriptions and field procedures for each of these steps are presented later in this work plan. Sampling of HTRW/MC may take place concurrently with other steps listed. The steps include:

- Site preparation and set-up;
- Debris removal;
- Pre-operational survey and tabletop exercises;
- Geophysical anomaly reacquisition;

- Intrusive investigation;
- MC sampling;
- Disposal of CACM and material potentially presenting an explosive hazard (MPPEH);
- Site restoration; and
- Site demobilization.

2.10 DATA MANAGEMENT PROCEDURES

2.10.1 Data management procedures will be applied to all data collected during the RI/FS. These procedures were designed to facilitate data development, modification, storage, retrieval, and use. Additional information on data management is included in the SAP.

2.10.2 The processing of data in the field will vary depending on the technology and/or instrument being used. Raw data from field measurements, such as global positioning system (GPS) data, will be recorded electronically. Records such as field data forms, field note copies, and personal data assistant (PDA) files will be maintained onsite in a portable file. Records will be logged and stored so 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 project reports, they will be reduced and summarized, and the reduction method will be documented in the report.

2.10.3 Data collected in the field will be stored electronically in the collecting instrument's data logger or in PDAs. Data also will be recorded in field log books. Each will be synchronized with the field computer daily. If necessary, data will be transferred at regular intervals to ensure that the work performed will not be interrupted by a lack of storage capacity in the loggers. Upon completion of the project, data will be transferred to the Parsons PM's office for storage and archiving.

2.11 DATA QUALITY OBJECTIVES AND DATA GAPS

2.11.1 DQOs are statements that specify the quality and quantity of the data required to support the decision-making processes during each project. Data quality objectives are discussed in detail in Chapter 3.

2.11.2 Data needs were determined by reviewing project objectives and the available historical data described in 1.8 with the TPP team. This process identified data gaps, which were then used to determine the data needs (type, quantity, and quality) for the current project. The data gaps that will be addressed during the field phase of the RI/FS are presented below.

BG-1 and BG-2:

- Characterization of material within select anomalies identified as trenches, disposal areas, and burial pits.
- Determination of vertical extent of select anomalies identified as trenches, disposal areas, and burial pits.
- Characterization of the nature of material in select grids within low, medium, and high anomaly density areas outside the trench and pit areas.
- Assessment of the presence of CA, ABP, MC, and HTW constituents in soils where MEC/CWM is identified or suspected.

Chemical Plant Area DP-19:

- Intrusive investigation of previously identified geophysical anomalies.
- Assessment of the presence of CA, ABP, MC, and HTW constituents in soils where contamination from past demilitarization is suspected.

Chemical Plant Area DP-31:

- Accurate location and lateral extent of the three trench-like anomalies previously identified.
- Determination if other potential disposal pits exist in the investigation area.
- Characterization of the material within trenches.
- Determination of the vertical extent of trenches.
- Identification of the source of single-point subsurface anomalies within the investigation area and determination of the potential for contamination.
- Assessment of the potential for single, subsurface CWM items to exist within the investigation area.
- Assessment of the presence of CA, ABP, MC, and HTW constituents in soils where CWM or CWM-related contamination is identified or suspected.

Chemical Plant Area DP-32:

- Accurate location and lateral extent of the trench-like anomalies previously identified.
- Characterization of the material within trenches.
- Determination of the vertical extent of trenches.
- Assessment of the presence of CA, ABP, MC, and HTW constituents in soils where CWM or CWM-related contamination is identified or suspected.

Chemical Plant Area DP-35:

- Assessment of the presence of CA, ABP, MC, and HTW constituents in subsurface soils within suspected pits.

Figure 2.1
BHAD RI/FS Organization

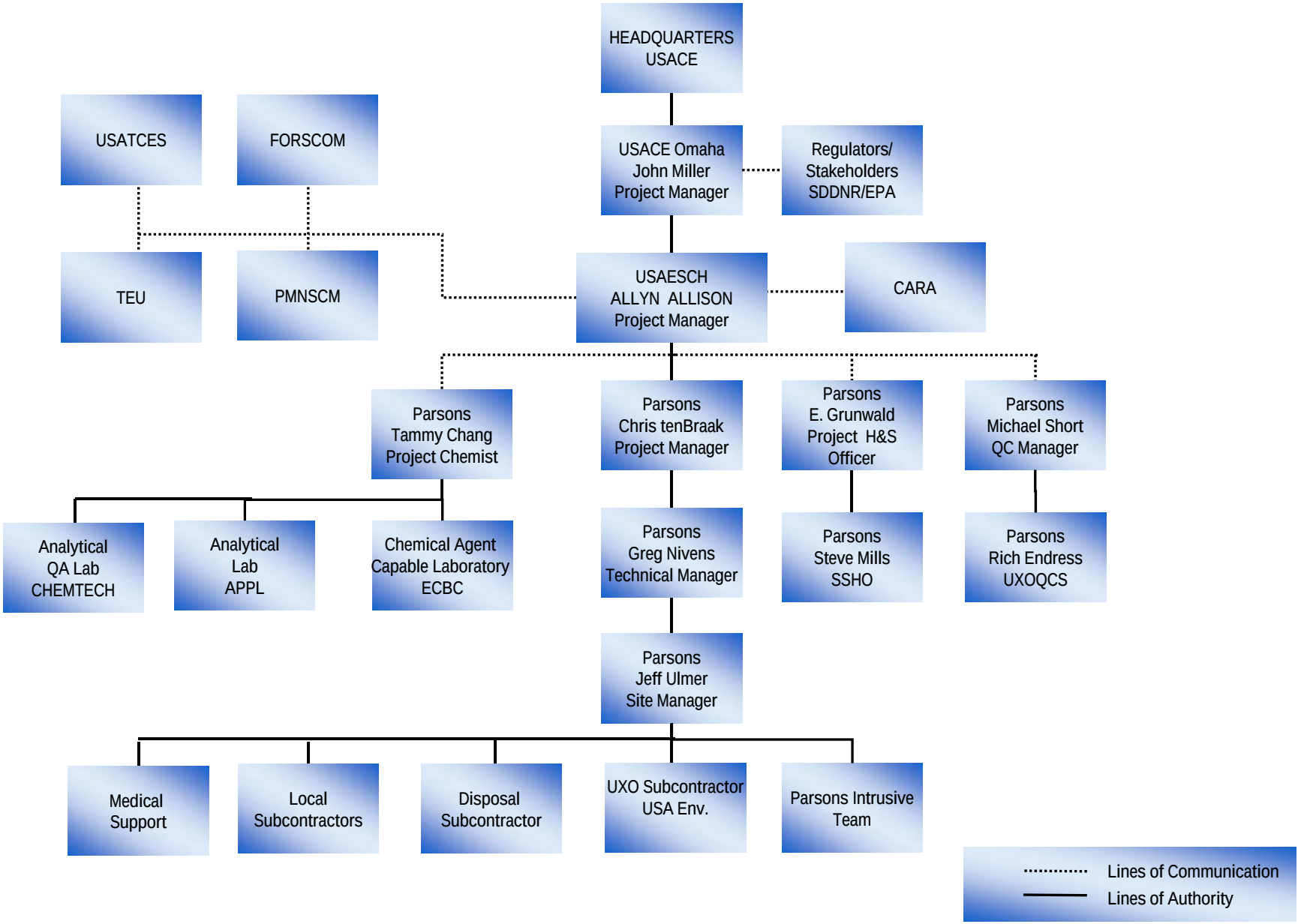
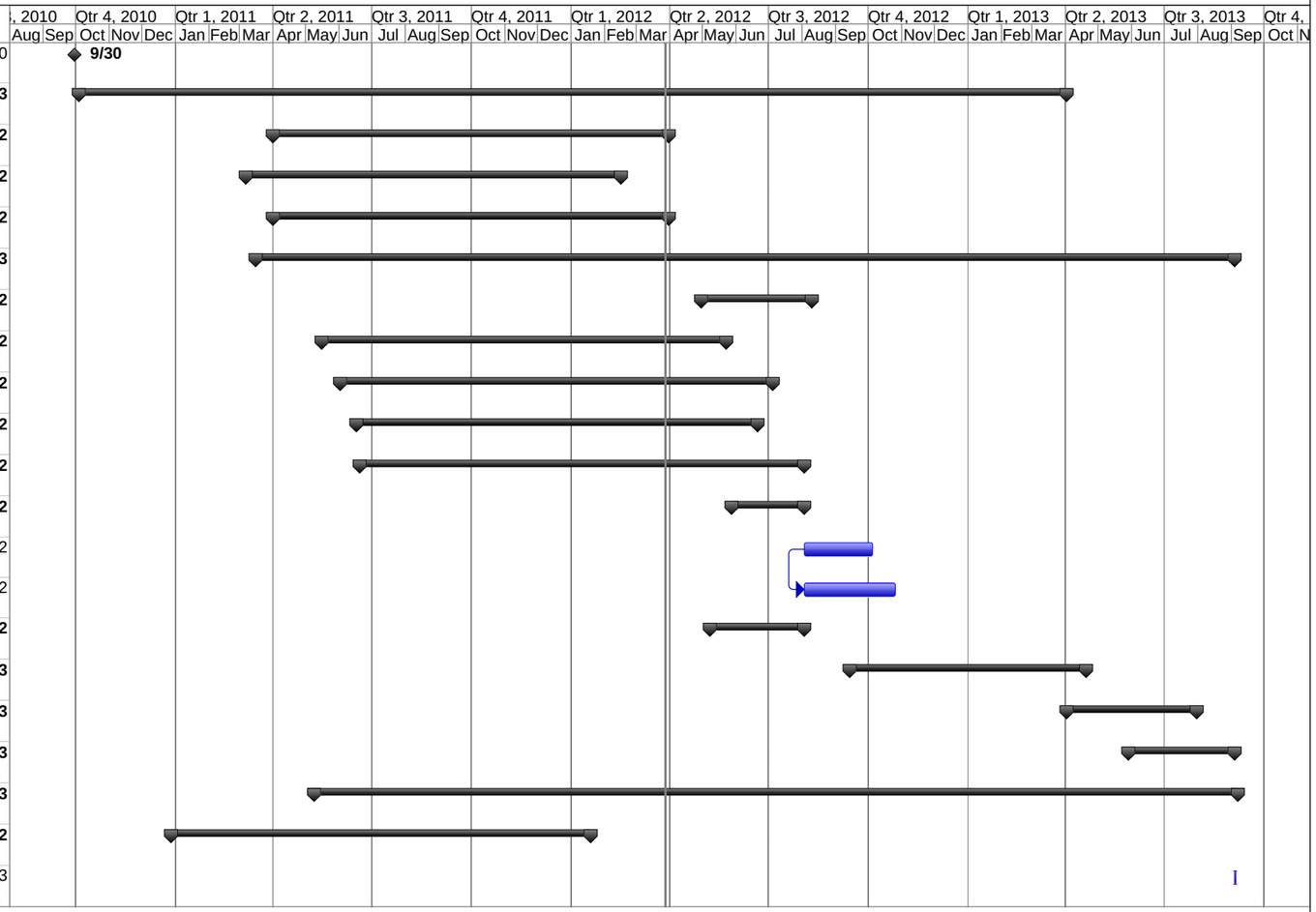


Figure 2.2: Project Schedule
Remedial Investigation/Feasibility Study at the Former Black Hills Army Depot, SD

ID	Task Name	Duration	Start	Finish
1	Task Order Award	0 days	Thu 9/30/10	Thu 9/30/10
2	**Task 1, Technical Project Planning**	**648 days**	**Mon 10/4/10**	**Mon 4/1/13**
21	**Task 2, RIFS Work Plan, UFP-QAPP, and QASP**	**261 days**	**Fri 4/1/11**	**Fri 3/30/12**
32	**Task 2a, CWM Site Plan**	**248 days**	**Mon 3/7/11**	**Wed 2/15/12**
42	**Task 2b, Mob/Demob, Communication, and Logistics Support Plan**	**261 days**	**Fri 4/1/11**	**Fri 3/30/12**
46	**Task 3, GeoSpatial Data**	**646 days**	**Wed 3/16/11**	**Tue 9/3/13**
49	**Task 4, Mob/Demob, Communication, and Logistics Support**	**74 days**	**Mon 4/30/12**	**Thu 8/9/12**
58	**Task 5, RIFS Field Activities - Prep/Training**	**267 days**	**Mon 5/16/11**	**Tue 5/22/12**
66	**Task 5a, Chemical Plant Area**	**285 days**	**Thu 6/2/11**	**Wed 7/4/12**
69	**Task 5b, Burning Ground #1**	**264 days**	**Fri 6/17/11**	**Wed 6/20/12**
73	**Task 5c, Burning Ground #2**	**294 days**	**Mon 6/20/11**	**Thu 8/2/12**
77	**Task 6, Environmental Sampling and Analysis**	**49 days**	**Mon 5/28/12**	**Thu 8/2/12**
85	Analytical Data Submittal for QA Evaluation	45 days	Fri 8/3/12	Thu 10/4/12
86	Electronic Laboratory Data Submittal	60 days	Fri 8/3/12	Thu 10/25/12
87	**Task 7, Medical Support - CWM Field Activities**	**63 days**	**Tue 5/8/12**	**Thu 8/2/12**
89	**Task 8, RI / FS Report**	**157 days**	**Fri 9/14/12**	**Fri 4/19/13**
95	**Task 9, Proposed Plan**	**86 days**	**Tue 4/2/13**	**Tue 7/30/13**
102	**Task 10, Decision Document**	**70 days**	**Wed 5/29/13**	**Tue 9/3/13**
109	**Task 11, Community Relations Support**	**611 days**	**Mon 5/9/11**	**Fri 9/6/13**
123	**Task 12, Public Involvement Plan**	**276 days**	**Tue 12/28/10**	**Wed 1/18/12**
129	**Task 13, Final Administrative Record**	1 day	Wed 9/4/13	Wed 9/4/13



Project: Black Hills Army Depot RI/FS
Date: 30 Mar 2012

Task	Project Summary	Inactive Milestone	Manual Summary Rollup	Progress
Split	External Tasks	Inactive Summary	Manual Summary	Deadline
Milestone	External Milestone	Manual Task	Start-only	
Summary	Inactive Task	Duration-only	Finish-only	

CHAPTER 3
FIELD INVESTIGATION PLAN

3.1 APPROACH

3.1.1 Overview

3.1.1.1 Parsons will conduct an RI/FS at three investigation areas (BG-1, BG-2 and the Chemical Plant Area) to define the nature and extent of MEC/CWM and/or MC (including CA), assess the related risk, screen potential response alternatives, and select the most appropriate response alternative for each investigation area. This field investigation plan outlines the procedures that will be used during intrusive RI field activities at the former BHAD.

3.1.1.2 Digital geophysical mapping (DGM) was conducted during the spring and summer of 2011 under a separate, stand-alone geophysical survey work plan (Parsons, 2011b). Therefore, although the DGM results are presented, the geophysical data collection techniques are not included here.

3.1.1.3 The field investigation plan for intrusive investigation activities is organized as presented below. Additional details relating to MC and HTRW sampling and analysis are discussed in the SAP, included as Appendix E to this work plan.

- Subchapter 3.2 – Conceptual Site Model
- Subchapter 3.3 – General Technical Approach
- Subchapter 3.4 – Geospatial Information and Electronic Submittals
- Subchapter 3.5 – Mobilization/Demobilization Plan
- Subchapter 3.6 – Intrusive Investigation
- Subchapter 3.7 – Munitions Constituent Sampling
- Subchapter 3.8 – Investigation-Derived Waste Plan
- Subchapter 3.9 – Packaging
- Subchapter 3.10 – Risk Characterization and Analysis
- Subchapter 3.11 – Analysis of Land Use Controls
- Subchapter 3.12 – Preparation of a Recurring Review Plan

3.1.2 Remedial Investigation Goals

3.1.2.1 As noted in Subchapter 1.8 of this RI work plan, numerous investigations have been conducted at each of the investigation areas. The goal of the upcoming field effort is to fill data gaps that remain in each investigation area. The data gaps are identified in Subchapter 2.11. The goal of this RI is to sufficiently characterize each investigation area to support the development of a risk assessment and follow-on feasibility study.

3.1.2.2 The RI will include intrusive investigations and soil sampling. At the completion of the RI, the FS will be prepared to develop and evaluate remedial alternatives and select the appropriate remedy for the site. The site remedy will be selected based on evaluating the threshold criteria (that is, the overall protection of human health and the environment and compliance with applicable or relevant and appropriate requirements), primary balancing criteria (that is, short-term and long-term effectiveness; the reduction of toxicity, mobility, and volume through treatment; ability to implement; and cost), and modifying criteria that can include community and support agency acceptance. The RI/FS will be completed upon Government acceptance of a DD meeting the requirements of ER 200-3-1 and MM-CX IGD 06-04. Table 3.1 provides an overview of the investigation tasks planned for each investigation area.

Table 3.1
Activities by Investigation Area, Black Hills Army Depot, Black Hills, South Dakota

Tasks	Investigation Area					
	Burning Ground No. 1	Burning Ground No. 2	Chemical Plant Area			
			DP-19	DP-31	DP-32	DP-35
Geophysical mapping (ground-based)	X	X		X		
Geophysical mapping (aerial)	X	X				
Trench characterization	X	X		X	X	
Single-point anomaly investigation			X	X		
Grid-based anomaly investigation	X	X				
MC/CA soil sampling	X	X	X	X	X	X
Geoprobe direct push MC/CA subsurface soil sampling						X

Note: Geophysical investigation was completed in the summer of 2011.

3.2 CONCEPTUAL SITE MODEL

For the purposes of this RI/FS, a preliminary CSM was developed for the following areas:

- BG-1;
- BG-2;
- Chemical Plant Area outside the perimeter fence;

- Chemical Plant Area inside the perimeter fence; and
- Site-wide ecological.

These CSMs are presented in the risk assessment work plan in Appendix M.

3.3 GENERAL TECHNICAL APPROACH

3.3.1 Tables 3.2 through 3.4 summarize the known or suspected CWM/MEC/CA/MC contamination sources, the potential/suspected locations and distribution of contamination, the related source or exposure media, the current and future receptors, and the potentially complete exposure pathways. In addition, the tables identify the activities that Parsons will use to successfully complete field operations during this project.

3.3.2 The technical approach for this RI has been designed to identify and characterize areas that have been impacted by concentrated munitions/chemical use and/or concentrated munitions/chemical disposal. Areas impacted by concentrated munitions or chemical use/disposal are considered to be "contaminated by MEC/CWM" for purposes of this RI. The remaining portions of each investigation area that are not deemed to have been impacted by concentrated munitions or chemical use/disposal are considered to be "not impacted by concentrated MEC/CWM use/disposal." These uncontaminated areas are considered either to present no explosive/chemical hazards or to only present explosive/chemical hazards at very low probability of occurrence.

3.3.3 Detailed field procedures are described in subsequent subchapters of this work plan.

3.3.1 Data Quality Objectives

3.3.1.1 DQOs are qualitative and quantitative statements that specify the quality and level of data required to support the decision-making processes for a project. Guidance for DQO development is contained in Chapter 4 of EM 200-1-2 *Technical Project Planning Process* (USACE, 1998), *Guidance for Performing Site Inspections Under CERCLA* (USEPA, 1992), and *Guidance on the Data Quality Objectives Process* (USEPA, 2006).

3.3.1.2 The overall project DQOs, were developed by the project team as part of the TPP process (Appendix J). The DQOs are to obtain data to adequately characterize the site to define the nature and extent of MEC/CWM/MC, evaluate risk, and select an effective remedial alternative. Specific DQOs have been established for the MEC/CWM/MC investigations, and these are presented in Tables 3.2 through 3.4. In addition, measurement quality objectives (MQO) developed for the MC analytical results are presented in the UFP-QAPP in Part II of the SAP (Appendix E).

Table 3.2
Overview of Preliminary Conceptual Site Model and Remedial Investigation Technical Approach for Burning Ground #1
Black Hills Army Depot, Black Hills, South Dakota

INVESTIGATION AREA DETAILS	PRELIMINARY CONCEPTUAL SITE MODEL SUMMARY					INTENDED DATA USE(S)	REMEDIAL INVESTIGATION TECHNICAL APPROACH			
	Known or Suspected Contamination Source(s)	Project Objective(s) Satisfied	Source or Exposure Medium	Current and Future Receptors	Potentially Complete Exposure Pathway	Project Objective(s) Satisfied	Investigation Method	Investigation Location(s)	Investigation Acreage/ Number of Samples	Decision Rule(s)
NAME: Burning Ground #1 Acreage: 438 acres Suspected Past DoD Activities (*release mechanisms*): Disposal of CWM and MEC in trenches and on ground surface; CA potentially released via spills and leaks to surface or near surface, though direct release to subsurface could also occur within disposal trenches Current and Future Land Use: Owned by one private land owner; current land use includes cattle grazing. Future land use is expected to remain the same; however, future development cannot be ruled out.	*CWM/MEC*: MEC stored at BHAD is summarized as Table 1.3. Most common MEC items recovered during prior surface removal actions were the M103 nose fuze and the 37MM M54 (refer to Section 1.8). Summary of Disposal of CWM at BHAD provided as Table 1.6. M70 H-filled bomb is most likely CWM to be encountered.	Characterize nature and extent of CWM/MEC burial/disposal pits	Subsurface MEC/CWM. Surface removal conducted over pit/trench areas. No visual evidence of MEC/CWM on the surface at the suspect pits/trenches during 2011 field effort.	Current rancher hunter Future excavation worker, resident, hunter/recreational user	Interaction with surface or subsurface CWM/MEC (*surface exposure less likely, but may occur due to erosion or frost heave*)	Characterize nature and extent of CWM/MEC burial/disposal pits	Intrusive investigation and visual inspection: – test pits across geophysical anomalies that are consistent with burial pit/trench.	Potential disposal pit/trench locations identified by geophysical survey of 438 acre BG-1. Erosion control placed along two drainages - covers potential disposal areas. The erosion control features will not be removed; therefore, possible disposal pits in these areas will not be intrusively investigated. Locations identified on Figure 3.2	*Intrusive investigation (trench-like features)*: Twelve test pit locations to assess pits/trenches. Locations identified on Figure 3.2.	*Pit/trench-like features Investigation*: If no MEC/CWM nor a significant quantity of MD [a] are found during test pit excavation at a pit/trench-like feature, then that feature will be considered to have no significant MEC/CWM presence; features for which this cannot be established will be considered contaminated by MEC and/or CWM and further action will be recommended for next CERCLA phase
	MEC Most common MEC items recovered during prior surface removal actions were the M103 nose fuze and the 37MM M54 (refer to Section 1.8). *[CWM not anticipated as disposal methods for CWM should not have resulted in kick out].*	Determine presence/absence of MEC contamination from kick-outs Characterize nature and extent of MEC contamination (i.e., Types of MEC and density) associated with kick-outs if contamination is identified	Surface and shallow subsurface MEC. Surface removal conducted over majority of BG-1; therefore, surface MEC considered less likely (although frost heave and erosion may expose subsurface MEC). MEC at depths greater than 1.5 feet not anticipated from kick out	Current rancher Future excavation worker, resident, hunter/recreational user	Interaction with surface and/or shallow subsurface MEC (*due to completion of surface removal action over majority of BG-1, surface exposure less likely, but may occur due to erosion or frost heave of shallow subsurface MEC, if present)*	Determine presence/absence of MEC contamination from kick-outs Characterize nature and extent of MEC contamination (i.e., Types of MEC and density) associated with kick-outs if contamination is identified	Intrusive investigation of geophysical anomalies	DGM grids randomly distributed throughout BG-1. Locations identified on Figure 3.2. Excluding the pit/trench areas, all of BG-1 exhibited low geophysical anomaly density.	17 grids, each 15 meter x 50 meter. Each anomaly within each of the 17 grids will be intrusively investigated. Appendix N includes the DGM results and anomaly locations for each grid.	If no MEC is identified within the 17 grids, 90% confidence that MEC density is < 1 item/acre (using the UXO Estimator software tool) and BG-1 (outside the identified pit/trench areas) will be considered unaffected by concentrated MEC use. If MEC density of < 1 item/acre cannot be established at 90% confidence, then re-delineate areas where MEC are found and recalculate statistical confidences and/or resample to achieve 90% confidence that MEC density is < 1 item/acre in uncontaminated areas; further actions or recommendations for the MRS will be discussed with the project team.
	CA/MC: CA/ABPs, explosives, and MC metals Other constituents of interest may include VOCs and SVOCs (associated with decontamination/disposal)	Determine presence/absence of MC contamination Characterize nature and extent of MC contamination, if contamination is identified	Subsurface soil Surface soil at the trenches has been sampled and the prior RI identified no significant human health risk	Current rancher Future excavation worker, resident, hunter/recreational user, and ecological receptors	Exposure to MC in soil (incidental ingestion, dermal contact, or inhalation of suspended particulates or volatiles)	Determine presence/absence of MC contamination Characterize nature and extent of MC contamination, if contamination is identified	Collect soil samples and analyze for CA, ABPs, explosives, metals, VOCs, PAHs, and SVOCs	Suspected burial/disposal pits/trenches suspected to be MEC/CWM-contaminated	The number of samples varies based on the size of the test pit. Samples to be collected in accordance with the SAP (Appendix E) Additional discrete samples may be collected to characterize extent of identified contamination	If CA/MC concentrations below Preliminary Screening Values, then soil not MC-contaminated and no further analysis required If CA/MC concentrations in initial samples exceed Preliminary Screening Values, then soil is potentially contaminated and secondary samples may be collected to delineate extent of MC contamination in soil; once delineation is complete, conduct CA/MC risk assessment for soil pathway (refer to Appendix M for risk assessment work plan) If unacceptable risks to human receptors are identified from exposure to CA/MC in soil, then further actions or recommendations for the area will be discussed with the project team

a) Statistical confidences concerning MEC densities at the project site will be analyzed using the UXO Estimator software tool.

Table 3.3
Overview of Preliminary Conceptual Site Model and Remedial Investigation Technical Approach for Burning Ground #2
Black Hills Army Depot, Black Hills, South Dakota

INVESTIGATION AREA DETAILS	PRELIMINARY CONCEPTUAL SITE MODEL SUMMARY					INTENDED DATA USE(S)	REMEDIAL INVESTIGATION TECHNICAL APPROACH			
	Known or Suspected Contamination Source(s)	Potential/Suspected Location and Distribution	Source or Exposure Medium	Current and Future Receptors	Potentially Complete Exposure Pathway	Project Objective(s) Satisfied	Investigation Method	Investigation Location(s)	Investigation Acreage/ Number of Samples	Decision Rule(s)
NAME: Burning Ground #2 Acreage: 1,627 acres Suspected Past DoD Activities (*release mechanisms*): Disposal of CWM and MEC in trenches and on the ground surface Current and Future Land Use: Owned by the USDA: No current use Future land uses may include cattle grazing , wildlife management, recreation, and mineral extraction (oil and gas) Non-Use Restricted Area, but no signs present	*CWM/MEC*: MEC stored at BHAD is summarized as Table 1.3. Most common MEC item recovered during prior surface removal actions was the M103 nose fuze and the 37MM M54 (refer to Section 1.8). Summary of Disposal of CWM at BHAD provided as Table 1.6. M70 H-filled bomb is most likely CWM to be encountered.	Concentrated at former disposal sites(e.g., pits and trenches)	Subsurface MEC/CWM. Surface removal conducted over pit/trench areas. No visual evidence of MEC/CWM on the surface at the suspect pits/trenches during 2011 field effort.	Current authorized Buffalo National Grasslands (USDA) employees). Future rancher and hunter/recreational user Mineral extraction	Interaction with surface or subsurface CWM/MEC (*surface exposure less likely, but may occur due to erosion or frost heave*)	Characterize nature and extent of CWM/MEC burial/disposal pits	Intrusive investigation and visual inspection: – test pits across geophysical anomalies that are consistent with burial pit/trench.	Potential disposal pit/trench locations identified by geophysical survey of 438 acre BG-1. Erosion control placed along two drainages - covers potential disposal areas. The erosion control features will not be removed; therefore, possible disposal pits in these areas will not be intrusively investigated. Locations identified on Figure 3.4	*Intrusive investigation (trench-like features)*: Twelve test pit locations to assess pits/trenches. Locations identified on Figure 3.4.	*Pit/trench-like features Investigation*: If no MEC/CWM nor a significant quantity of MD [a] are found during test pit excavation at a pit/trench-like feature, then that feature will be considered to have no significant MEC/CWM presence; features for which this cannot be established will be considered contaminated by MEC and/or CWM and further action will be recommended for next CERCLA phase
	MEC MEC stored at BHAD is summarized as Table 1.3. Most common MEC item recovered during prior surface removal actions was the M110 fuze and the 37MM projectile (refer to Section 1.8). *[CWM not anticipated as disposal methods for CWM should not have resulted in kick out]*	Possible discrete, single MEC items throughout BG-2 as a result of kick-out during demolition.	Surface and shallow subsurface MEC. Surface removal conducted over majority of BG-2; therefore, surface MEC considered less likely (although frost heave and erosion may expose subsurface MEC). MEC at depths greater than 1.5 feet not anticipated from kick out.	Current authorized Buffalo National Grasslands (USDA) employees). Future rancher and hunter/recreational user	Interaction with surface or shallow subsurface MEC (*due to completion of surface removal action, surface exposure less likely, but may occur due to erosion or frost heave of shallow subsurface MEC, if preset*)	Determine presence/absence of MEC contamination from kick-outs Characterize nature and extent of MEC contamination (i.e., Types of MEC and density) associated with kick-outs, if contamination is identified.	BG-2 divided into low, medium, and high anomaly density areas based on DGM results (refer to Figure 3.3): High and medium anomaly density areas will be assumed to be contaminated by MEC Intrusive investigation of geophysical anomalies	Seventeen DGM grids randomly distributed throughout low density area. Six DGM grids randomly distributed throughout low density area. Grid locations identified on Figure 3.3. Mag and dig of 6 randomly distributed 5 meter by 5 meter grids in high density area	Each anomaly within each of the 17 low density grids will be intrusively investigated. The southern half of each of the 6 medium density grids will be intrusively investigated. Appendix N includes the DGM results and anomaly locations for each low density and medium density grid. Mag and Dig will be completed to “clear” 6 randomly distributed 5 meter by 5 meter grids within high density area	If no MEC is identified within the 17 low density grids, 90% confidence that MEC density is < 1 item/acre (using the UXO Estimator software tool). If no MEC identified, low density area will be considered unaffected by concentrated MEC use. Medium density area and high density area are assumed to be MEC contaminated and intrusive investigation data will be used to support the FS. For example, the time and resources required to investigate and “clear” a small area (grid) within the high anomaly density area will be recorded and the quantities extrapolated for various FS alternatives within the high density area.
	CA/MC: CA/ABPs, explosives, and MC metals Other constituents of interest may include VOCs and SVOCs (associated with decontamination/disposal)	Associated with CWM, MEC, or MD (and decontamination/ disposal) at former disposal sites	Subsurface soil Surface soil at the trenches has been sampled and the prior RI identified no significant human health risk	Current authorized Buffalo National Grasslands (USDA) employees). Future rancher and hunter/recreational user, and ecological receptors.	Exposure to MC in soil (incidental ingestion, dermal contact, or inhalation of suspended particulates or volatiles)	Determine presence/absence of MC contamination Characterize nature and extent of MC contamination, if contamination is identified.	Collect soil samples and analyze for CA, ABPs, explosives, metals, VOCs, PAHS, and SVOCs	Suspected burial/disposal pits/trenches suspected to be MEC/CWM-contaminated	The number of samples varies based on the size of the test pit. Samples to be collected in accordance with the SAP (Appendix E) Additional discrete samples may be collected to characterize extent of identified contamination	If CA/MC concentrations below Preliminary Screening Values, then soil not MC-contaminated and no further analysis required If CA/MC concentrations in initial samples exceed Preliminary Screening Values, then soil is contaminated and secondary samples may be collected to delineate extent of MC contamination in soil; once delineation is complete, conduct CA/MC risk assessment for soil pathway (refer to Appendix M for risk assessment work plan) If unacceptable risks to human receptors are identified from exposure to CA/MC in soil, then further actions or recommendations for the area will be discussed with the project team

Table 3.4
Overview of Preliminary Conceptual Site Model and Remedial Investigation Technical Approach for Chemical Plant Areas
Black Hills Army Depot, Black Hills, South Dakota

Investigation Area DETAILS	PRELIMINARY CONCEPTUAL SITE MODEL SUMMARY					INTENDED DATA USE(S)	REMEDIAL INVESTIGATION TECHNICAL APPROACH			
	Known or Suspected Contamination Source(s)	Potential/Suspected Location and Distribution	Source or Exposure Medium	Current and Future Receptors	Potentially Complete Exposure Pathway	Project Objective(s) Satisfied	Investigation Method	Investigation Location(s)	Investigation Acreage/ Number of Samples	Decision Rule(s)
NAME: Chemical Plant Area (DP-19) Acreage: 32 acres Suspected Past DoD Activities (*release mechanisms*): Destruction of CWM, within demilitarization facility and kiln. CA potentially released via spills and leaks to surface or near surface. Direct release to subsurface could also occur along former process lines Current and Future Land Use: Owned by one private land owner; land use includes cattle grazing	*Buried process lines associated with former demilitarization facility. The process lines may have leaked over time or they may still contain contaminated material.*	Locations include linear shaped geophysical anomalies within DP-19 (from prior geo survey)	Subsurface soil	Future excavation worker involved in intrusive activities	Exposure to contaminated subsurface soil from intrusive activities (incidental ingestion, dermal contact, or inhalation of suspended particulates or volatiles)	Determine potential for CA/MC and decontamination contamination associated with former demilitarization facility process lines. If contamination identified, characterize nature and extent of CA contamination	Intrusive investigation of linear shaped geophysical anomalies in DP-19 that may represent buried process lines. Subsurface soil sampling for CA, ABPs, explosives, metals, VOCs, PAHS, and SVOCs if contamination is suspected	Prior geo survey completed at DP-19. Ten proposed locations shown on Figure 3.7.	Up to 10 anomalies will be intrusively investigated and if sampled, analyze for CA, ABPs, metals, VOCs, and SVOCs. Discrete subsurface soil samples collected where CA contamination suspected at former process lines.	If the anomaly does not represent a potential process line, then it will be assumed that no process line is present and no sample will be collected. If the anomaly is found to represent a potential process line, then the area will be sampled and the anomaly investigated further to determine the extent of the process lines. The process line contents will also be sampled (if present). Once the extent of the process line is determined further action will be recommended for next CERCLA phase
	CA/MC: CA/ABPs, explosives, MC metals, VOCs, and SVOCs (associated with spills, leaks, process, decontamination/ disposal activities from demilitarization of 100-lb to 1,000-lb bombs, containing mustard agent (H), cyanogen chloride (CK), and phosgene (CG) fillers	Facilities where demil took place (refer to 9 sub areas identified in Table 1.4)	Surface soil	Current rancher. Future excavation worker, resident, hunter/recreational user , and ecological receptors	Exposure to MC in soil (incidental ingestion, dermal contact, or inhalation of suspended particulates or volatiles)	Determine presence/absence of MC contamination Characterize nature and extent of MC contamination	Collect soil samples at DP-19 sub-areas (identified in Table 1.4). Analyze for CA, ABPs, explosives, metals, VOCs, PAHS, and SVOCs.	Nine former facility or demil activity locations.	Four composite surface soil samples at each of the nine sub-areas. Additional discrete samples may be collected to characterize extent of identified contamination	If CA/MC concentrations below Preliminary Screening Values, then soil not CA/MC-contaminated and no further analysis required If CA/MC concentrations in initial samples exceed Preliminary Screening Values, then soil is potentially contaminated and secondary samples may be collected to delineate extent of MC contamination in soil; once delineation is complete, conduct MC risk assessment for soil pathway If unacceptable risks to human receptors are identified from exposure to CA/MC in soil, then further actions or recommendations for the area will be discussed with the project team
NAME: Chemical Warfare Burning Pit Area (DP-31) Acreage: 21 acres Suspected Past DoD Activities (*release mechanisms*): Disposal and destruction of CWM, primarily located at pits/trenches, but possibly also via burial of single items; CA potentially released via spillage and leaks to surface or near surface, though direct release to subsurface could also occur within disposal trenches Current and Future Land Use: Owned by the USDA; land use currently limited to wildlife management and not expected to change in future Portion of the pit area is fenced and "non-use" signs are present	*CWM*: 100-lb to 1,000-lb bombs containing mustard agent (H), cyanogen chloride (CK), and phosgene (CG) fillers. Intact, full munitions are not anticipated because the chemical plant area was a demilitarization facility. Bomb casings with residual mustard contamination is considered the most likely source of contamination (CK and CG are non-persistent and are not anticipated).	Concentrated at former disposal sites(e.g., pits and trenches), primarily in the subsurface Possible discrete, single items buried/disposed of throughout DP-31 (not including pits/trenches) in shallow subsurface	Interaction with subsurface CWM. No CWM observed on the surface during 2011 geophysical survey of the area (although erosion and frost heave of subsurface CWM is possible)	Commercial workers (USDA employees) and site visitors	Exposure to surface or subsurface CWM (*surface exposure less likely, but may occur due to erosion or frost heave*)	Characterize nature and extent of CWM burial/disposal pits Determine presence/absence of CWM contamination in areas surrounding burial pits Characterize nature and extent of CWM contamination (i.e., Types of CWM)	Intrusive investigation and visual inspection of geophysical anomaly source.	Intrusive investigation of test pits at each pit/trench-like feature and single point anomalies elsewhere in DP-31 (outside suspect pit/trench areas)	*Intrusive investigation (trench-like features)*: Two test pits per suspect burial pit (*Figure 3.5*) *Intrusive investigation (single point anomalies)*: 101 anomalies will be intrusively investigated (figure 3.5).	*Pit/trench-like features Investigation*: 90% confidence that pit/trench-like features >6m diameter have been identified within the 21-acre MRS (using geophysical survey results and Visual Sampling Plan software analysis). If no CWM nor a significant quantity of MD [a] are found during test pit excavation at a pit/trench-like feature, then that feature will be considered to have no significant CWM presence; features for which this cannot be established will be considered contaminated by CWM and further action will be recommended for next CERCLA phase *Single Point Anomaly Investigation*: If no single point anomalies are found to represent CWM, then burial of single items will be assumed not to have occurred at DP-31 If single point anomalies are found to represent CWM, then burial of single items will be assumed to have occurred at the MRS and further action to address discrete anomalies will be recommended for next CERCLA phase
	CA/MC: CA/ABPs, explosives, and MC metals Other constituents of interest may include VOCs and SVOCs (associated with decontamination/disposal activities)	Associated with CWM and their decontamination/ disposal (most likely concentrated at former burial pits/trenches)	Subsurface soil	Commercial workers (USDA employees), site visitors, and ecological receptors	Exposure to MC in soil (incidental ingestion, dermal contact, or inhalation of suspended particulates or volatiles)	Determine presence/absence of MC contamination Characterize nature and extent of MC contamination	Collect soil samples and analyze for CA, ABPs, explosives, metals, VOCs, PAHs, and SVOCs	Intrusive locations identified or suspected to be to be CA-contaminated	Composite or discrete samples to be collected based on CA/CWM contamination identified Additional discrete samples may be collected to characterize extent of identified contamination	If analyzed constituent concentrations below their respective Preliminary Screening Values, then soil not CA/MC-contaminated and no further analysis required If CA/MC concentrations in initial samples exceed Preliminary Screening Values, then soil is potentially contaminated and secondary samples may be collected to delineate extent of MC contamination in soil; once delineation is complete, conduct MC risk assessment for soil pathway If unacceptable risks to human receptors are identified from exposure to CA/MC in soil, then further actions or recommendations for the area will be discussed with the project team

Table 3.4
Overview of Preliminary Conceptual Site Model and Remedial Investigation Technical Approach for Chemical Plant Areas
Black Hills Army Depot, Black Hills, South Dakota

INVESTIGATION AREA DETAILS	PRELIMINARY CONCEPTUAL SITE MODEL SUMMARY					INTENDED DATA USE(S)	REMEDIAL INVESTIGATION TECHNICAL APPROACH			
	Known or Suspected Contamination Source(s)	Potential/Suspected Location and Distribution	Source or Exposure Medium	Current and Future Receptors	Potentially Complete Exposure Pathway	Project Objective(s) Satisfied	Investigation Method	Investigation Location(s)	Investigation Acreage/ Number of Samples	Decision Rule(s)
NAME: Chemical Plant Disposal Pit Area (DP-32) Acreage: 1 acre Suspected Past DoD Activities (*release mechanisms*): Disposal/burial of building material associated with former demilitarization and kiln facilities. CA-contaminated material potentially present in subsurface disposal trenches Current and Future Land Use: Owned by the USDA; land use currently limited to wildlife management and not expected to change in future	*CA-contaminated debris* : Burial/disposal of former demil and kiln facilities used to destroy 100-lb to 1,000-lb bombs containing mustard agent (H), cyanogen chloride (CK), 4.2-inch M2/M2A1 chemical mortar and phosgene (CG) fillers	Former disposal sites(e.g., pits and trenches), primarily in the subsurface, including six features identified during previous investigations	Subsurface contaminated debris	Commercial workers (USDA employees) and site visitors	Exposure to subsurface contaminated debris (*surface exposure less likely, but may occur due to erosion or frost heave*)	Characterize nature and extent of CWM burial/disposal pits	Intrusive investigation of previously identified pit/trench-like geophysical anomalies	Intrusive investigation test pits at each pit/trench-like feature	*Intrusive investigation (trench-like features)*: Two test pits per suspect burial pit longer than 100 feet (3 locations will have 2 test pits); *and one test pit for smaller trenches/disposal sites* (3 locations will have 1 test pit). Up *to 9 test pits at the six suspect burial pits anticipated*	*Pit/trench-like features Investigation*: If no CWM or suspected contaminated debris are found during test pit excavation at a pit/trench-like feature, then that feature will be considered to have no significant CWM or contaminated debris presence; features for which this cannot be established will be considered contaminated by CWM or CA contaminated debris and further action will be recommended for next CERCLA phase
	CA/MC: CA/ABPs, explosives, and MC metals Other constituents of interest may include VOCs and SVOCs (associated with decontamination/disposal activities)	Former disposal sites(e.g., pits and trenches), primarily in the subsurface, including six features identified during previous investigations	Subsurface soil	Commercial workers (USDA employees), site visitors, and ecological receptors	Exposure to CA/MC in soil (incidental ingestion, dermal contact, or inhalation of suspended particulates or volatiles)	Determine presence/absence of MC contamination Characterize nature and extent of MC contamination	Collect soil samples and analyze for CA, ABPs, explosives, metals, VOCs, PAHs, and SVOCs	Areas identified or suspected to be CA/CWM-contaminated	Composite or discrete samples to be collected based on CA/CWM contamination suspected/identified Additional discrete samples may be collected to characterize extent of identified contamination	If CA/MC concentrations below Preliminary Screening Values, then soil not CA/MC-contaminated and no further analysis required If CA/MC concentrations in initial samples exceed Preliminary Screening Values, then soil is potentially contaminated and secondary samples may be collected to delineate extent of MC contamination in soil; once delineation is complete, conduct MC risk assessment for soil pathway If unacceptable risks to human receptors are identified from exposure to CA/MC in soil, then further actions or recommendations for the area will be discussed with the project team
NAME: Suspect Pits (DP-35) Acreage: 0.75 acres Suspected Past DoD Activities (*release mechanisms*): Past activities not well documented. Possible disposal and destruction of CA/CWM, at five suspected pits/trenches. CA/MC potentially released via spillage and leaks to near surface. Direct release to subsurface could also occur within disposal trenches Current and Future Land Use: Owned by one private land owner; land use includes cattle grazing	*CA/MC*: CA/ABPs, explosives, and MC metals Other constituents of interest may include VOCs and SVOCs (associated with decontamination/disposal activities)	Associated with CA/CWM decontamination/disposal (most likely concentrated within five suspect pits)	Surface and subsurface soil	Current rancher, Future excavation worker, resident, hunter/recreational user.	Exposure to MC in soil (incidental ingestion, dermal contact, or inhalation of suspended particulates or volatiles)	Determine presence/absence of MC contamination Characterize nature and extent of MC contamination	Collect soil samples and analyze for CA, ABPs, explosives, metals, VOCs, PAHs, and SVOCs	Areas identified or suspected to be CA/CWM-contaminated	Composite or discrete samples to be collected based on CA/CWM contamination suspected/identified Additional discrete samples may be collected to characterize extent of identified contamination	If CA/MC concentrations below Preliminary Screening Values, then soil not CA/MC-contaminated and no further analysis required If CA/MC concentrations in initial samples exceed Preliminary Screening Values, then soil is potentially contaminated and secondary samples may be collected to delineate extent of MC contamination in soil; once delineation is complete, conduct MC risk assessment for soil pathway If unacceptable risks to human receptors are identified from exposure to CA/MC in soil, then further actions or recommendations for the area will be discussed with the project team

(a) For each suspect burial area investigated, the quantity, type, and distribution of MD will be qualitatively evaluated by Parsons to assess its significance with regard to making determinations about potential MEC contamination; these assessments will be presented to the Project Team.

3.4 GEOSPATIAL INFORMATION AND ELECTRONIC SUBMITTALS

The following procedures and data formats will be used for geospatial information and the production of electronic submittals for the RI/FS at the BHAD. They address accuracy and methods of location surveys as well as mapping. Parsons will perform activities related to gathering and maintaining geospatial information in accordance with DID WERS-007.01. Geospatial information will be in UTM Zone 13 North NAD83 meters. Geospatial data layers will conform to the computer-aided design and drafting (CAD) / GIS Technology Center Spatial Data Standards for Facilities Infrastructure and Environment (SDSFIE). Metadata will be prepared for the core geospatial data layers in accordance with Federal Geographic Data Committee (FGDC) standards.

3.4.1 Location Survey and Mapping

Control points will be established as needed for the project and will be certified by a licensed professional land surveyor registered in the state of South Dakota. Horizontal and vertical control of "Class I, Third Order" or better will be established for the network monuments. Establishment of the control points will be in accordance with EM 1110-1-1004 and DID MR-005-07.01. Control points will be identified on maps with name and number, with final adjusted coordinates and elevations shown.

3.4.2 Geospatial Information Formats

Vector data incorporated into the GIS will be stored in geodatabase formats. These files will be delivered upon completion of the project, along with nonproprietary Spatial Data Transfer Standards (SDTS) format. Examples of vector data sets include physical-, cultural-, biological-, and ordnance-related items. Raster GIS data will be used in either TIF or MrSid-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. ArcGIS map files (.mxd) for plates, figures, and drawings used in the final report will be included in the electronic deliverable.

3.4.3 Digital Field Data Collection Methodology

3.4.3.1 Field data collection will be tracked by converting completed intrusive investigations into GIS shapefiles, as appropriate. Weekly uploads will be made to the project's primary GIS system. Backups will be made daily of the field database either by offsite storage on a removable storage device or by transfer to a file transfer protocol (FTP) site.

3.4.3.2 In-progress and field GIS data, design drawings, survey data, relational databases, geophysical data, and other related data will be available online to the USACE by FTP download.

3.4.4 Metadata

Metadata created in accordance with FGDC standards 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 items of interest to the project team.

3.4.5 Electronic Submittals

3.4.5.1 Final document files will be submitted to USAESCH in MS Office 2007 and Adobe Portable Document Format (PDF). Products will be suitable for viewing, without modification, on the Internet.

3.4.5.2 Geospatial data sets will be delivered to USAESCH in Geodatabases format, as well as in nonproprietary SDTS format. Metadata will be delivered with the files. A freeware GIS viewer, such as the Environmental Systems Research Institute (ESRI) ArcExplorer, will be included with final GIS deliverables. Data will be submitted on CD-ROM or, if accepted by USAESCH, on DVD-ROM.

3.5 MOBILIZATION/DEMOBILIZATION PLAN

3.5.1 This sub-plan details the activities necessary to mobilize personnel and equipment for site work and to shut down the site at the conclusion of the field work. As part of mobilization, the following general activities are required for the project to proceed:

- Site access;
- Site preparations;
- Establishment of command post;
- Equipment mobilization;
- Training and briefing;
- Communications; and
- Work zone preparations.

3.5.2 Demobilization will consist of performing (or undoing) the same activities in reverse order. In general, staging areas will be demobilized last, so that they can be used as a staging area for the demobilization efforts.

3.5.1 Right-of-Entry

Right of entry (ROE) has been obtained for BG-1, BG-2 and the Chemical Plant Areas located outside the perimeter fence (DP-31 and DP-32). This also includes the area encompassing the IHF and site compound. Chemical Plant Area sites located inside the perimeter fence (i.e., DP-19 and DP-35) are on private property and ROE is still pending. This intrusive work plan assumes that the ROE for those sites will be obtained prior to intrusive field activities.

3.5.2 Preparations and Siting

3.5.2.1 Preparations for mobilization will not commence until receipt of the notice to proceed (NTP) from the USAESCH Contracting office. When the NTP is received, activities will include notifying the field team, making travel and lodging arrangements, and assembling applicable documents that include the work plan, SOPs, and historical records review. The field team will have already reviewed the available documentation on the site, including the work plan and additional data obtained during previous site visits.

3.5.2.2 The site compound was established as part of preparing for the geophysical investigation that was conducted in the summer of 2011. A fence has been installed around the compound and electricity has been established. The compound has cell phone service and MiFi capabilities. An office trailer and storage trailer are currently on site and a break trailer will likely be added prior to the start of the 2012 field activities. Details regarding the various facilities needed to complete the RI are described in the following paragraphs:

- Site Office/Site Compound: The site office consists of project trailers with electrical power in an area with cellular telephone service. The site office will be the primary point for onsite administration, receiving routine deliveries, personnel training, equipment storage and sign in and briefing.
- Access Improvements: Access improvements will consist of placing gravel along portions of the existing road network, as needed. Additional roadway may be added as needed to allow access to intrusive investigation areas. Additional roads and staging areas will be developed as necessary.
- Equipment Staging Area: The equipment staging area is located within the site office compound and is the primary location where trucks, trailers, and other equipment are organized and stored, when they are not being used at the investigation areas. This area will also contain the flammable storage locker and a 40-foot-long lockable storage container. A portable diesel storage tank with secondary containment and proper grounding may be installed to prevent interruptions to operations from fuel deliveries.
- Waste Holding Area: A waste holding area will be in the site compound and will be constructed for the staging of IDW containers containing munitions-related

waste prior to offsite disposal. The area be clearly marked within the fenced compound area. The waste holding area will be patrolled or guarded to prevent public access when wastes are present.

- Command Post (CP): During intrusive activities, a CP will be established. It will consist of an office facility and smaller equipment storage facility. The CP area will also include a separate trailer or tent for use by the field teams when they are on break. The CP will be equipped with electricity in an area with cellular telephone service. The CP will be the central point of communications, the storage site for records needed on a daily basis and a rally point for emergencies. Because of the mobile nature of the work, which involves intrusive investigations over large areas, the CP will be moved several times.

3.5.2.3 There is a potential for domestic livestock to be present in or near the areas to be investigated. Therefore, precautions will be taken to secure livestock and protect workers. Gates will be kept closed and secured, especially in areas where livestock are present. Field teams will actively communicate with landowners to ensure that livestock are protected.

3.5.3 Utility Needs

3.5.3.1 Electrical service was obtained from the nearest accessible power pole and brought to the office trailer during the geophysical investigation conducted in summer 2011. Electrical power has not been installed for the IHF; therefore, if an RCWM is found and placed in the IHF, the IHF will initially run off generators until shore power can be installed. Providing electricity from the grid to the IHF would require installing approximately 2,500 feet of power poles and line from the existing power line to the IHF.

3.5.3.2 Portable toilets and water coolers will be made available at the site office, CP, and other convenient locations.

3.5.4 Equipment Mobilization

Equipment and materials will be sent to the site via commercial carrier, transported to the site by the field team, or obtained locally. Equipment will include, but is not limited to, PDAs, analog metal detectors (i.e., Schonstedt or similar instrument), DGM instruments, sampling supplies, intrusive investigation equipment, documents, first aid kits, fire extinguishers, GPS, digital cameras (if not incorporated within the PDA), field radios, engineer tapes, etc. Site vehicles will be rented and in most cases will be four-wheel drive sport utility vehicles or pickup trucks that will accommodate site personnel and equipment. Larger equipment (e.g., rubber tire back hoe) will either be rented from a local vendor or supplied by subcontractors.

3.5.5 Training and Briefing

3.5.5.1 Prior to field activities, team members will be trained in:

- Activities to be performed;
- Archaeological and historical resources awareness;
- MEC/CWM known and suspected to be present at the sites;
- Action to take upon encountering MEC/CWM; and
- Safe work practices.

3.5.5.2 The field team will be briefed each day before they start field activities. Daily briefings will include a discussion of weather conditions, the previous day's findings (if related to safety issues), emergency response and evacuation procedures, and a review of the general procedures to deal with MEC/CWM, if encountered.

3.5.6 Communications

Given the remote nature of the site, two forms of equipment will be used to ensure effective communication between site members: two-way radios and cellular phones. Communication equipment will be checked each day after the morning safety briefing. Each field team will remain together throughout the field activities.

3.5.7 Work Zone Preparation and Support

Before field activities begin, affected areas will be cleared of brush and debris as necessary. Access routes to/from intrusive investigation sites will be checked for the presence of MEC/CWM, sharp objects (e.g., large fragments from munitions), and other potential obstacles (soft ground, gullies, etc.). Magnetic locators will be used to assist the visual inspection and routes will be marked to avoid objects/obstacles or routes will be cleared of objects/obstacles. For intrusive investigations, anomalies identified from the geophysical data interpretation will be reacquired in phases so as to optimize conduct of the intrusive phase of work. Additional details for layout of the sites are included in subsequent subchapters of the work plan.

3.5.8 Demobilization

Several demobilizations or partial demobilizations may be required as part of this investigation. In general, personnel and rental equipment, unless otherwise needed for the demobilization effort, will be demobilized as early as possible upon completion of use for the intended purpose. The CP and waste storage area will be dismantled only after IDW is transported off-site. Other areas (e.g., magazine, IHF) may be dismantled/demobilized when they are no longer needed. Site restoration will be coordinated through CENWO.

3.6 INTRUSIVE INVESTIGATION

3.6.1 General Methodology

Intrusive investigations will be performed in accordance with procedures outlined in the IGD 06-04 and the U.S. Army's EP 1110-1-18, *Military Munitions Response Process*, EP 75-1-3, *Recovered Chemical Warfare Materiel (RCWM) Response*, and the OSHA requirements for excavations in 29 CFR 1926 Subpart P. MEC disposal operations will be performed in accordance with EM 385-1-97, *Explosives – Safety and Health Requirements Manual*, and TM 60A-1-1-31, *EOD Disposal Procedures*. The SSHP developed for the BHAD RI/FS (Attachment 1 of Appendix D) will be followed at all times, as will procedures outlined in DoD 6055.09-M, *Ammunition and Explosives Safety Standards*. The procedures described in the following subchapters anticipate a downrange team performing excavation operations within the EZ; however, an alternative approach involving a remote control robotic excavation system may be implemented to increase field team safety.

3.6.2 Pre-operational Surveys and Tabletop Exercise

Pre-operational surveys (both USAESCH and DA) and tabletop exercises will be conducted prior to intrusive investigation activities. USAESCH will prepare the pre-operational survey plan, assemble the pre-operational survey team, and conduct the MACOM pre-operational survey (delegated by USACE headquarters) for the startup of chemical operations. Local emergency responders and stakeholders will be invited to the tabletop exercises, which will evaluate the responses to various emergency scenarios in a meeting room environment. More information regarding the pre-operational surveys can be found in Subchapter 17.4.2 of the SSHP (Appendix D). Information regarding the tabletop exercise is in Subchapter 17.4.3 of the SSHP (Appendix D).

3.6.3 Establishing Exclusion Zones (EZs)

3.6.3.1 At BHAD, exclusion zones (EZs) will be established to minimize the potential for contamination to leave the work area, and to reduce the risk of exposure to humans. Access to the EZ will be limited to essential personnel conducting the fieldwork. Ingress and egress from the EZ will be made through a decontamination station. Support staff and other non-essential personnel will remain outside the EZ while it is in effect. The location of the decontamination station will vary depending on the site conditions, access, and prevailing wind direction.

3.6.3.2 Two hazard types are present at BHAD, including explosive hazards and CWM hazards. Each will have its own EZ. For the intrusive investigation an MCE will be considered when determining the EZ for each type of hazard. The MCE for an explosive hazard will be based on the MGFD. The MCE for a CWM hazard is the worst-case release of a chemical agent from a munition, bulk container, or process that could

reasonably be expected to occur as a result of an unintended, unplanned, or accidental release.

3.6.3.3 No explosively configured munitions are anticipated within the Chemical Plant Area because it was used as a punch-and-drain operation for CWM. Therefore, it is not considered likely that explosively configured CWM (i.e., with an explosive fuze and burster) would have been stored at BHAD. The possibility exists, however, that conventional UXO may be encountered in BG-1 and BG-2. The MGFD determined for BG-1 and BG-2 is the Projectile, 155mm, HE, M107. The MSD associated with this munition is 450 feet for unintentional detonations, without the use of engineering controls. For MSDs associated with intentional detonations, with or without the use of engineering controls, see the CSP in Appendix K. During the course of the investigation, if a MEC item with a greater fragmentation distance is encountered, the MSD will be adjusted in accordance with procedures as described in the CSP.

3.6.3.4 The MCE associated with CWM hazards is the release of CA from a munition, bulk container, or process that could occur as a result of an unintended, unplanned, or accidental incident. The calculated distances for the MCE are for intrusive activities that are conducted outside of engineering controls. The MCE used at BHAD will be based on the activity and the investigation area.

3.6.3.5 The distances used for the EZ are presented in the CWM Site Plan (CSP) (Appendix K). Table 3.6 presents the EZ distances for different areas of the site.

Table 3.6
Selected Exclusion Zone Distance

Intrusive Activity Location	1% Lethality Distance (feet)	HFD (feet)
BG-1 and BG-2/ Test Pit Investigation	190	**450**
Chemical Plant Area/Test Pit Investigation	**53**	NA
Chemical Plant Area (DP-35)/Subsurface Sampling	**3**	NA

Bolded distance values (the larger of the 1% lethality distance and HFD) will be used for the Exclusion Zones.
NA = not applicable (no explosive hazards within Chemical Plant Area).

3.6.3.1 Evacuation and Shelter-in-Place

Although it is not anticipated, evacuations or shelter-in-place will be conducted if nonessential personnel or occupied structures are outside, but near the EZ, and additional engineering controls cannot mitigate the potential release or blast effects. The evacuation or shelter-in-place will be implemented in accordance with the procedures outlined in the accident prevention plan (Appendix D).

3.6.4 Team Composition

The field operations will be conducted by personnel divided into teams. Each team will have assigned duties. In some instances, individuals may be considered a member of more than one team. For example, a member of an off-duty downrange team may sometimes participate in the PDS team or a rescue team. Teams required for the intrusive operations are shown in Table 3.7. Non-intrusive work such as setup of equipment will require only a minimal team.

Table 3.7
Intrusive Operations Teams and Roles

Team	Role On-Duty	Role Off-Duty
Command Post Team	Intrusive Operations, Assessment, Transport, Rescue	N/A
Down Range Teams	Intrusive Operations	Resting, PDS Team, Rescue
Air Monitoring Team	Intrusive Operations	Headspace monitoring
Rescue Team	Rescue	PDS, Resting
Medical Support	Spearfish Ambulance	N/A
PDS Team	Intrusive Operations	N/A
Assessment/Package/Transport Team	Assess, package, and transport CWM	N/A
Other Workers	Any (Outside EZ)	N/A

3.6.4.1 Command Post (CP) Team

The CP team, which is responsible for communications and directing field activities, resides outside the EZ in the support zone. The CP team will consist of the SM, SSHO, QC specialist, and sampling coordinator. One member of the CP team, on rotation, is designated as the CP team's "radio voice" and is responsible for communicating with the other teams.

3.6.4.2 Down Range Teams

The down range teams are responsible for excavating within the EZ. Two teams are typically employed, although, depending on the work being conducted additional teams may be added to increase productivity or a single team may be used. Each team will consist of a team leader who acts as the safety observer and is responsible for managing the team and for radio communications. The team will also have, one to three spotter-samplers, with the number depending on the work being performed and equipment being used. If excavation equipment, a direct push rig, or other heavy equipment is required, one or two workers will be the equipment operators, while other workers conduct the sampling, air monitoring, and act as a ground guides. The use of multiple teams allows one team to be resting while one or more teams are working, providing for continuous

productivity during the warm months. The division of duties of the team members described here is typical and may be rearranged if safe and practical.

3.6.4.3 Air Monitoring Team

The onsite CARA air monitoring team typically consists of instrument operators in numbers proportional to the number of active sites at a worksite. One team member is designated as the monitoring lead and/or supervisor, and any operator may be required to operate one or more types of instruments in the field. At a minimum for the BHAD project, there will be one operator each for the three mobile real-time analytical platforms. Refer to the Appendix I, air monitoring plan, for additional information regarding air monitoring team personnel responsibilities.

3.6.4.4 Rescue Team

The level of PPE being routinely used on the site will determine whether a rescue team is staffed in the support zone. If down range teams are working in modified level D PPE, the rescue team will not be staffed. If results from air monitoring or sampling reveal the presence of contaminants requiring the down range teams to wear level C or level B PPE, a two-person rescue team will be staffed and on stand-by in the support zone. The rescue team will consist of a minimum of two people and will be responsible for helping members of the Down Range Team who need assistance.

3.6.4.5 PDS Team

The PDS team operates the PDS and is responsible for decontaminating potentially contaminated personnel and for verifying that decontamination has been completed. When down-range teams are operating in modified level D PPE, the PDS will only be staffed by the PDS supervisor. In this case, decontamination will be conducted by the down-range team members themselves with the PDS supervisor providing QC and assistance. If site conditions require level B or level C operations, the PDS team will consist of at least three people and a dedicated team will be maintained as long as hazardous conditions exist.

3.6.4.6 Assessment/Package/Transport Team

The assessment/package/transport team is comprised of members of the government agency contracted to perform the assessment, packaging, and transportation of CWM during the RI, and will be sufficiently staffed in a manner that allows them to fulfill the obligations set forth in the CARA Operating Procedures (Appendix L).

3.6.4.7 Other Workers

Other workers may be present at the site including escorted visitors, geophysical survey teams, geophysical anomaly reacquisition teams, surveyors, and other contractors. All of this work must occur outside the EZ.

3.6.5 Overall Approach

3.6.5.1 Characterization of Trenches (BG-1, BG-2, DP-31 and DP-32)

3.6.5.1.1 The technical approach of trench characterization will focus on characterizing the contents and determining approximate extent of the trench-like features at BG-1, BG-2, DP-31 and DP-32. Test pits will be used to characterize the trench-like features at each MRS, and it is assumed that each test pit will be completed to an approximate depth of up to 15 feet. Based on the depth to bedrock and the maximum reach of common construction equipment, the trenches are not anticipated to extend more than 15 feet below ground surface. Trenching and Excavation Safety Procedures are specified in Section 2.2.3 of the SSHP and SOP 13 (bound separately); however, benching and sloping of the trenches are not anticipated because no persons shall be entering the test pits. In general, the test pits will be advanced through waste until natural soils are encountered, which will aid in defining the vertical extent of waste. To aid in the characterization of the material in the disposal trenches soil samples will be collected from each test pit. Sampling procedures are discussed in Appendix E.

3.6.5.1.2 At BG-1 and BG-2 an aerial geophysical survey was conducted in accordance with the Final Geophysical Investigation Work Plan (Parsons, 2011b). The aerial geophysical survey data for BG-1 and BG-2 are presented in Figures 3.2 and 3.3. The survey identified the location and extent of trenches in the area as well as other potential subsurface disposal areas and anomaly density information. Reconnaissance was conducted at possible trench locations apparent from the aerial survey data. The reconnaissance data was used to help determine if the anomalies were caused by potential subsurface trenches or visible surface structures (buildings, fences, ect.). The delineation of aerial and reconnaissance data was used to determine the number of disposal trenches to be investigated within BG-1 and BG-2. The number of test pits proposed for each location is presented in Table 3.8. The proposed locations of the test pits for BG-1 and BG-2 are presented on Figures 3.2 and 3.4.

3.6.5.1.3 At DP-31 a ground based geophysical survey was conducted in accordance with the Final Geophysical Investigation Work Plan (Parsons, 2011b). The geophysical data confirmed presence of three trenches at the site; therefore, a total of 6 test pits (Table 3.8) will be completed; two within each of the trenches. The geophysical survey data and the locations of the test pits are presented on Figure 3.5.

3.6.5.1.4 At DP-32 previous geophysical surveys presented in the 2001 EE/CA illustrated six features that may be associated with disposal pits. The geophysical survey

data is presented on Figure 3.6. A total of 12 test pits (Table 3.8) will be completed during the intrusive investigation. Ground-based analog geophysics (e.g., Schonstedt) will be performed to confirm the location and extent of the trenches at DP-32.

Table 3.8
Investigation Area Test Pits
Black Hills Army Depot, Black Hills, South Dakota

Investigation Areas	Number of Indentified Trench-Like Features	Number of Trench-Like Features to be Investigated	Proposed Number of Test Pits [a/]
BG-1	7	6 [b/]	12
BG-2	144	10 [c/]	18
DP-31	3	3	6
DP-32	6	6	9
		Total	**44**

[a/] Proposed test pit locations are illustrated on Figures 3.2, 3.4, 3.5 and 3.6, respectively.
[b/] Erosion control at BG-1 covers a potential disposal area and will not be removed; therefore, possible disposal pits in these areas will not be intrusively investigated.
[c/] Ten of the 144 trench like features in BG-2 will be investigated to evaluate the extent of contamination. If necessary additional acreage in BG-2 will be investigated.

3.6.5.1.1 Test Pit Excavation Procedures

3.6.5.1.1.1 This subchapter establishes the process for safely removing, stockpiling and/or containerizing soils and debris from the excavations. At each test pit, the process will be to remove suspect contaminated materials and progress toward uncontaminated areas. If CA-contamination is detected in the excavations, it will be pursued to whatever lateral and vertical extent it exists. If warranted, larger equipment and widening the excavation will be used; but there can be practical limitations to direct excavation. It is assumed that the test pits will be completed to an approximant depth of 15 feet. It is assumed that contaminated materials would not penetrate into bedrock; therefore, if bedrock is encountered further vertical excavation will not be warranted. The goal of the test pit excavation is to determine the vertical and lateral extent of contamination and not to "remove suspect contaminated materials".

3.6.5.1.1.2 The excavation process will follow the procedures outlined in Safety Considerations during Trenching and Excavation (SOP document, Chapter 13). The SOP applies equally to digging from excavations, managing surface soil piles, and removing contaminated material from temporary storage containers such as roll-offs and hoppers. Air monitoring for CA and ICs will be conducted as described in the air monitoring plan (Appendix I) and SSHP (Appendix D, Attachment 1).

3.6.5.1.1.3 Removing soil and debris from the excavations will be conducted as an open-air operation. The team conducting the excavation operations will consist of an equipment operator, an observer, and material handler-samplers. Workers will also handle soil and debris outside the immediate area of the excavation to prepare the waste for disposal (e.g., moving soil from drums to roll-offs). This work may include

transferring soil from hoppers to roll-offs, headspacing of samples and drums, and decontamination of CA-contaminated media.

3.6.5.1.1.4 Soils from the test pits will be visually inspected for MPPEH, CWM, suspect chemical drums, or discolored soil. Air monitoring readings also will be used to identify contamination within the test pits. If no evident contamination is noted the soil will be placed to the side of the excavation on geotextile or plastic sheeting and covered with plastic and sandbagged to prevent runoff. The purpose of storing this soil is to reduce the amount of waste to be shipped offsite and to reduce the amount of backfill needed when the excavation is completed. If materials such as suspect CWM, suspect chemical drums, discolored soil, or unusual odors are encountered during excavation, the soil will be placed in hoppers, roll-offs or drums and representative grab samples will be collected at various intervals during the placement of soils into the drum or hopper. Sampling procedures for stockpiles and containers are presented in Appendix E - Sampling and Analysis Plan. Procedures outlined in Section 3.6.6.4 and 3.6.6.5 will be followed in the event that CWM or MEC is discovered.

3.6.5.1.1.5 Soil that has been demonstrated to be non-contaminated via analysis of samples may be accumulated for use as backfill. Depending on the soil characteristics, the soil may need to be sorted manually by spreading the materials on a liner prior to containerizing the materials. In areas of gross contamination, soil and material may be placed directly in hoppers or drums from the excavator. Procedures for properly disposing contaminated soil are provided in Subchapter 3.8, the IDW plan.

3.6.5.1.1.6 In addition, an SOP (bounded separately) for the closing of operations at the end of the day has been prepared and will be kept onsite.

3.6.5.2 Grid Investigation (BG-1 and BG-2)

3.6.5.2.1 The technical approach of the grid investigation will be to investigate anomalies associated with "kickout" debris from open detonation at BG-1 and BG-2. In the summer 2011, an aerial and ground based geophysical survey was conducted in accordance with the Final Geophysical Investigation Work Plan (Parsons, 2011b). The aerial survey identified anomaly density information that was utilized to select grid locations (Figures 3.2 and 3.3). Geophysical data collected in BG-1 illustrated negligible kickout, as a result, the entire investigation area is considered low density; therefore, it was agreed that only seventeen grids would be collected in BG-1. Boundaries between high and medium anomaly density areas at BG-2 were established based on the airborne magnetic data and grid locations were selected in both the medium and low anomaly density areas. No grids were placed in the high anomaly density area at BG-2 because the anomaly density is too high to distinguish between individual DGM anomalies. Instead of collecting DGM grids in the high density section of BG-2, six 5 meter by 5 meter grids will be intrusively investigated with GA-52/Cx Schonstedt magnetic locators to determine the nature of the magnetic materials and the level of effort required to perform a removal of potential MEC in this area.

3.6.5.2.2 The ground based geophysical survey within grids at BG-1 and BG-1 identified grid anomalies that may represent MEC. These anomalies will be intrusively investigated. The number of anomalies associated with each grid, maps indicating the location of the grids and the coordinates of the anomalies are provided in Appendix M.

3.6.5.3 Single-Point Anomaly Investigation (DP-31)

The technical approach of the single-point anomaly investigation within DP-31 will be to investigate anomalies potentially associated with CWM or CA disposal. In the summer 2011, a ground based geophysical survey was conducted in accordance with the Final Geophysical Investigation Work Plan (Parsons, 2011b). The ground based geophysical survey within DP-31 identified 540 single-point anomalies. From these 100 were selected and approved by the USACE to be intrusively investigated (Figure 3.5). At the request of SDDENR, one anomaly outside DP-31 will be investigated (Anomaly B), resulting in a total of 101 single-point anomalies. The coordinates of the 100 single point anomalies identified during the geophysical survey are provided in Appendix M. CWM encountered during the intrusive investigation will be handled and disposed using the procedures described in Subchapter 3.6.6.4.

3.6.5.4 Linear-Shaped Anomaly Investigation (DP-19)

The technical approach of the linear shaped anomaly investigation will be to investigate anomalies associated with possible process lines within DP-19. Ten locations along linear shaped anomalies within DP-19 have been selected for intrusive investigation (Figure 3.7). The linear shaped geophysical anomalies were identified as part of the 2001 EE/CA, but were not intrusively investigated at that time. During the upcoming RI, ground-based analog geophysics (e.g., Schonstedt) will be performed to confirm the location of the anomalies.

3.6.5.5 Intrusive Investigation Procedures for Grid-Based, Single Point, and Linear-Shaped Anomalies

3.6.5.5.1 For the grid based anomaly investigation at BG-1 and BG-2 only MEC is anticipated (no CWM). MEC is not anticipated (just CA/CWM) at the DP-19 and DP-31 linear shaped and single point locations. The investigation of geophysical anomalies typically will be conducted by a three-person investigation/demolition team consisting of at least one UXO Technician III, and additional UXO Technicians. The UXO team personnel excavating an anomaly selected by the Parsons site geophysicist will initially remove soil by hand digging. Soil then will be placed to the side of the excavation. Excavation will initially be to the side of the anomaly using hand tools. A visual and electronic search of the excavation will then be made. This process will be repeated until the audible signal from the handheld magnetic locator (Schonstedt or equivalent instrument) indicates the object is close to the surface of the excavation. Once this determination is made, additional soil will be removed by hand until the anomaly is located. Excavations greater than 4 feet in depth will not be made without prior approval of the USACE Safety Specialist.

3.6.5.5.2 Once an anomaly is identified and necessary MEC/CWM operations are completed, the excavation will be filled in and tamped to the approximate consistency of the surrounding soil with sod if applicable replaced on top of the excavation. The excavation site will be restored as close to its original condition as possible.

3.6.5.5.3 Subsurface anomaly operations will be performed on selected single point anomalies within DP-19 and DP-31 and within grids in BG-1 and BG-2. The site geophysicist has selected the anomalies that will be reacquired and these locations are presented in Appendix N in accordance to the procedures outlined below. The locations of successfully reacquired anomalies will be provided to the intrusive teams for excavation.

3.6.5.5.1 Anomaly Reacquisition

3.6.5.5.1.1 A dig sheet listing all anomalies selected for reacquisition with their respective UTM coordinates and maps showing the extent of the anomalies have been developed and approved by the USACE (Appendix N).

3.6.5.5.1.2 The following steps will be performed to reacquire the location of the selected anomalies:

- The team will use an RTK system to determine the location of the anomaly.
- Once the coordinates of an anomaly have been found, a sweep will be conducted within a 1-meter radius of the anomaly location with a handheld magnetic locator (Schonstedt or equivalent instrument).
- If the anomaly is detected, it will be noted on the reacquisition form. The team will refine the anomaly location by finding peak response of the anomaly and will intrusively investigate that location.
- If no contact is made, the dig team should record a GPS waypoint for the location (to confirm that they are in the correct location).

3.6.5.5.1.3 The site geophysicist will review the dig results and compare them with the anomalies selected from the DGM data. Dig results will be compared to the original pick data for QC purposes to establish whether the reacquired anomaly is representative of the picked anomaly.

3.6.5.5.2 Anomaly Resolution Procedures

After excavating at the reacquired location and removing the source of the geophysical anomaly (large cultural items such as culverts may not be practical to remove and will be left in place) the intrusive team will recheck the location with a Schonstedt to confirm that the anomaly source has been removed. In addition, the UXOQCS will revisit a portion of each day's digs to confirm that they were resolved. Digs completed in a single day will be considered a "lot" of anomalies. The number of anomalies revisited in each lot by the UXOQCS will be sufficient to demonstrate that less than 5% of anomalies are unresolved with a 90% confidence level (i.e. 27 anomalies if the lot size is 50, or 37

the lot size is 50, or 37 anomalies if the lot size is 100). If the UXOQCS discovers any unresolved anomalies the SUXOS will prepare a root cause analysis to investigate the reason the anomaly was not resolved and will propose a remedy to the situation. All anomalies in the lot with the unresolved anomaly will be reinvestigated.

3.6.5.5.2.2 Grids within the high density area of Burning Ground #2, will be intrusively investigated using "mag and dig" techniques. The dig team will use analog instruments, such as the Schonstedt magnetometer, to identify anomaly locations. These locations will be intrusively investigated to determine the source of the anomaly. After excavating the anomaly and removing the source of the anomaly (large cultural items such as culverts may not be practical to remove and will be left in place) the intrusive team will recheck the location with a Schonstedt to confirm that the anomaly source has been removed. In addition, the UXOQCS will re-sweep the entire grid using an analog instrument (e.g., Schonstedt) to confirm that no anomalies remain within the grid (or items left in place are clearly noted). If the UXOQCS discovers any unresolved anomalies the SUXOS will prepare a root cause analysis to investigate the reason the anomaly was not resolved and will propose a remedy to the situation. The entire grid with the unresolved anomaly will be reinvestigated.

3.6.5.5.3 Accountability and Records Management for MEC/CWM

3.6.5.5.3.1 Individual grid sheets will be maintained and a Trimble GEO XH handheld GPS, or equivalent, will be used to record the data. Data collection will account for materials encountered (e.g., CWM/MEC and non-MEC) during the subsurface investigations. These data entries will be made indicating the anomaly ID being investigated, location (Northing and Easting), depth, size/type (e.g. 155mm), model/mark number (e.g. 155mm M107) and condition (i.e. UXO, DMM or MPPEH), as appropriate. An entry will be made for MPPEH, indicating the general types of materials encountered.

3.6.5.5.3.2 An account of recovered CWM/UXO/MEC items will be maintained in the project database. Each piece of recovered ordnance will be given a unique database ID number, and the item will be tracked from discovery to final disposition listing location, dates and disposition. The UXOQCS is responsible for the tracking and maintenance of ordnance recovered during the project. Procedures for recovered CWM are presented in Subchapter 3.6.6.4.

3.6.5.6 Soil Borings

3.6.5.6.1 Five suspected pits were identified within DP-35 in the Chemical Plant Area that were possibly used to dispose CWM and/or chemical agent, explosives, and/or propellants by burning with dunnage. The locations of the suspected pits were based on historical data and are shown on Figure 1.12. Previous investigations conducted surface soil sampling in the pits, and in soil borings adjacent to the pits, however, subsurface samples have not been collected from within the suspected pits. Previous geophysical surveys found no significant anomalies in the five areas. No COPCs were identified during sampling at DP-35.

surveys found no significant anomalies in the five areas. No COPCs were identified during sampling at DP-35.

3.6.5.6.2 In an effort to assess the presence of potential contamination associated with past operations in the subsurface soil within the pits, soil boring samples will be collected using a direct push rig in accordance with procedures present in the SAP (Appendix E). The number of samples collected from each boring will vary from 2 to 5, according to the level of suspected contamination encountered. The soil will be sampled to a depth of 10 feet (i.e., the estimated depth of intrusive risk in the vicinity of the suspected pits), and will be analyzed for CA, ABPs, explosives, VOCs, PAHs, SVOCs, and metals.

3.6.6 Overall Intrusive Operations

3.6.6.1 Daily Operations and Project Work Flow

The schedule of daily operations, which governs activities necessary to complete the intrusive excavation, is presented in Table 3.10. This table provides a quick reference summary of procedures to be followed each day. Many of these activities are described in detail in the applicable chapters of this work plan.

Table 3.10
Schedule of Daily Operations

1. Workers and support staff arrive at the office compound, CP, or other designated meeting point and receive a daily safety briefing by the SSHO.
2. Team leaders receive a daily operations schedule. Support personnel, such as police, security, and emergency medical assistance (EMA), will be notified of the daily operations schedule.
3. Air monitoring team performs equipment checks and set-up.
4. Work force sets up the equipment and mitigation supplies at the excavation and assembles the PDS.
5. Once monitoring equipment, including the Miniature Chemical Agent Monitoring System (MINICAMS) and Depot Area Agent Monitoring System (DAAMS) are operational and the site is ready for the day, the CP will contact the USAESCH SSO for permission to start intrusive work.
6. The SSHO gives a short, specific safety briefing to the Down Range Teams, the USAESCH Safety Specialist is notified, and work will commence, pending approval of the USAESCH Safety Specialist.
7. During the workday, there will be some QC checks, as well as operational challenges of the equipment being used on-site.
8. During intrusive operations, Down Range Team in PPE will undergo medical monitoring following each rotation downrange to determine appropriate work cycles and rest times.
9. During intrusive operations, a down range operations log will be kept and appropriate entries will be made on the geophysical dig sheets indicating the findings.

Table 3.10
Schedule of Daily Operations

10. Samples that are obtained during the day's operations will be collected and processed in accordance with the SAP. Daily QC Reports will be created to document each day's sampling activities.
11. If suspect CWM/MEC/HTW is encountered, operations will be conducted in accordance with Subchapters 3.6.6.4, 3.6.6.5 and 3.6.6.6 of this Work Plan.
12. The air monitoring team gathers DAAMS for subsequent processing back at the mobile lab.
13. The work force will conduct necessary cleanup of the work site before the day's work ends.
14. The SM may or may not conduct a daily debrief for the day's operations.
15. Soil and IDW drums generated during the day will be labeled and placed in the appropriate temporary storage facility.

3.6.6.2 Backfilling and Site Restoration

3.6.6.2.1 Test pit excavation procedures were provided in Subchapter 3.6.5.1.1. Once the CA-contaminated materials are removed from a test pit, the hole will be backfilled with clean soil. Prior to adding clean soil, the existing excavations will be covered with a layer of geotextile for creating a barrier between the native soils and the new clean fill soil. Backfilling will be conducted using loaders and other equipment. An excavator will be used to minimize settling of the fill soil. The fill will be added and compacted in layers. The excavation will be considered filled once the level is approximately the same as the original grade. The disturbed ground surface will be reseeded with grass seed and straw.

3.6.6.2.2 Temporary gravel-covered areas, fencing and other materials will be removed and the disturbed ground surface will be reseeded with grass seed and straw, if approved by the landowner.

3.6.6.3 Detection of Chemical Agent or Other Chemicals in Air

3.6.6.3.1 If a MINICAMS alarm occurs, the following sequence of events will be employed:

- After the first alarm, the team working in Level C or Level B PPE may continue working if the alarm level is within the protective capability of the PPE, and at the discretion of the SSHO. The PDS/rescue team will be on standby with the proper PPE to support the returning team, which may need to process through the PDS pending additional cycles. If the team is in Level D, they will don masks and move upwind as far as the 1% lethality distance; the team will remain at this location awaiting additional cycles from the MINICAMS.
- If two additional cycles indicate the presence of CA or industrial chemicals at levels above their current PPE approval ratings, the downrange team will be processed through the PDS. Personnel who have been exposed to levels above

their current PPE approval ratings must undergo decontamination monitoring before proceeding to the hospital for medical evaluation.

- If two additional cycles indicate the possible presence of CA or industrial chemicals at levels below their current PPE approval ratings, the Down Range Team may continue working. The workers should attempt to locate the source and, if located, remove the source by containerizing the contaminated media. The team must recover the DAAMS pumps within the EZ at the end of their work shift. The team will undergo decontamination at the PDS. Decontamination monitoring is unnecessary unless there is a breach in the PPE.
- If two additional cycles are clear of CA and ICs, the downrange team may assume the appropriate PPE level and continue work.

3.6.6.3.2 DAAMS samples will be collected for analysis at the end of their specified monitoring period. DAAMS will also be retrieved if personnel are suspected to have been exposed to CA – such as when CA is detected in the air. When a downrange team is working at an excavation and analysis of the DAAMS confirms the detection of CA but there is no suspect CWM or MEC present, a downrange team may re-enter the EZ with the appropriate PPE and continue excavation to identify a source. The Down Range Team will also perform mitigation activities once the source is confirmed. Mitigation procedures may include containerizing the surrounding soil or materials. Mitigation for work will likely involve covering the drum or containerizing spilled soil. If CA is confirmed by perimeter DAAMS, a chemical event report will be initiated by the USAESCH in accordance with the Interim Guidance for CWM responses dated April 2009.

3.6.6.3.3 If MINICAMS monitoring continues with the detection of CA or ICs but there is no apparent suspect CWM or MEC present, a Down Range Team with the appropriate PPE will continue excavating to remove the source (CWM) or CA-contaminated media. The downrange team will also perform mitigation activities if a source is confirmed. Mitigation procedures will include containerizing the surrounding soil or materials. If CWM is encountered, workers are exposed to CA, or CA is released outside to the environment (determined by positive MINICAMS readings interpreted to be accurate or positive DAAMS readings for the workspace or perimeter), a chemical event report will be initiated by USAESCH in accordance with AR 50-6. An example chemical event report will be kept on site.

3.6.6.3.4 If analysis of the DAAMS confirms the detection of CA and an item is encountered that appears to be CWM, the procedures in Subchapter 3.6.6.4 will be followed.

3.6.6.4 Contingency for Suspect CWM

3.6.6.4.1 For the purposes of this RI, suspect CWM will be defined as follows:

- Munitions or containers with CWM markings,

- Munitions or containers suspected to be associated with CA, or
- Munitions or unidentifiable intact containers that contains a liquid or potential CA residue.

3.6.6.4.2 The following procedures shall be followed when such an "unknown" is encountered and is suspected to be CWM. The downrange team will perform a preliminary visual assessment of the unknown item. If the item is suspected to be CWM, the USAESCH Safety Specialist will be contacted to arrange further assessment by the Assessment/Packaging/Transport Team. If the item has been confirmed by the Assessment/Packaging/Transport Team as being CWM, it will be packaged and transported to the IHF in accordance with the IHF Site Plan (Chapter 8). Work may continue in other burial pits and other site locations while waiting for the assessment of any of the types of suspect CWM containers listed above. SDDENR will be notified if known or suspected CWM is discovered (contact information is provided in Appendix C).

3.6.6.4.3 If the further assessment determines that the item is not CWM but is still an unknown, or if container markings clearly indicate that the contents are not CA and the container is not explosively configured, it will be transported to and staged within a fenced area until characterization can be performed. The item will be packaged and headspace monitored in accordance with the air monitoring plan. If possible, samples will be collected from the container for CA analysis. If cleared for CA and ABPs by headspace monitoring and low-level extraction analysis, potential HTW samples may be shipped to a laboratory for characterization and disposal determination. Disposal determination will be in accordance with Subchapter 3.6.6.5.4.

3.6.6.5 Contingency for MEC

3.6.6.5.1 This subchapter summarizes the response procedures to be used to ensure the safety and protection of the public and site workers in the event that MEC is encountered during the intrusive operations.

3.6.6.5.2 This plan outlines the procedures to be used to perform conventional ordnance identification, removal, and disposal operations in the event that such items are found.

3.6.6.5.3 If an item is encountered that appears to be a munition or an item that could be explosively configured, excavation will halt. The USAESCH SSO and the Parsons SSHO will be notified and the down range team will begin a preliminary assessment. These assessment procedures will determine if the item is actually a piece of ordnance or is explosively configured. If the item could be potential CWM or an HTRW container, then the procedures in Subchapters 3.6.6.4 or 3.6.6.6, respectively, shall be followed.

3.6.6.5.4 If an item is not a potential CWM, but is potential MEC, the USAESCH SSO and UXO-qualified personnel will perform an assessment of the item. UXO-qualified personnel will perform UXO identification and characterization in accordance with EM 385-1-95a, Basic Safety Concepts and Considerations for Unexploded Ordnance.

3.6.6.5.5 If the item is determined to be MEC, the MSD will be calculated by USAESCH staff based on the munition that was found. If the MSD is revised to a greater hazard than that used for performing previous activities, the EZ will be re-calculated and the new EZ will be instituted for that site and will remain in effect for the remainder of the intrusive operations at the site. The revised MSD and EZ will be approved by USAESCH prior to implementation. UXO-qualified personnel will begin destruction procedures on the MEC item. In order to avoid a secondary detonation by a nearby item, a safe radius around the MEC item will be calculated using DDESB's Buried Explosion Module (BEM). Suspect anomalies within the calculated radius must be investigated prior to detonation operations.

3.6.6.5.6 If MEC is encountered in a location where CWM, CA-contamination or HTRW exists, measures must be taken to prevent the spread of contamination from the intentional or unintentional detonation of a UXO. Protective measures to be considered include:

- Moving an acceptable-to-move UXO outside the excavation to a safer location for detonation.
- Removing the CWM or contaminated material to reduce the risk of spreading the contamination.
- Protecting the CWM or contaminated areas using sandbags or clean fill soil.

3.6.6.5.7 The measures to be taken will be determined by the types of UXO encountered, their position and the relative positions of contaminated materials. Because of the potential delay in obtaining donor explosives needed to detonate UXO, any UXO encountered must be secured and guarded until it can be safely detonated.

3.6.6.5.1 MEC Identification

Suspected or known MEC encountered during excavation will be clearly marked and its position noted on the anomaly dig sheet or Trimble GEO XH and other appropriate site maps. The downrange team leader (UXO Technician III) will evaluate the item found and immediately report the condition of the item to the SM/SUXOS and UXOSO. No UXO will be moved without positive identification of the item and evaluation of its condition. No UXO identified will be moved for destruction without concurrence from the USAESCH OE safety office and onsite safety officer.

3.6.6.5.2 MEC Removal

3.6.6.5.2.1 If the excavated anomaly is considered to be suspected UXO, it will be uncovered sufficiently to obtain a positive identification of the item to include its fuzing.

3.6.6.5.2.2 With concurrence from the USAESCH safety specialist, unfuzed MEC may be moved for consolidation with an item which cannot be moved in order to reduce the number of demolition shots required. A determination on disposal will be made by the SUXOS and UXOSO for each occurrence.

3.6.6.5.2.3 Fuzed UXO will not be moved. If the UXO cannot be safely BIP under the existing conditions, the Parsons PM and the USACE Safety Specialist will be notified and a determination will be made as to how to safely resolve the issue.

3.6.6.5.3 MEC Storage

3.6.6.5.3.1 MEC recovered during this project will be disposed of on site.

3.6.6.5.3.2 Munitions debris and range-related debris will be stored in separate containers until the SUXOS certifies that the debris is free of explosive hazards. The USAESCH safety specialist or UXOQCS will verify that the inspection process has been followed. After inspection, MD and range related debris will be stored in a secured area within locked containers to prevent materials from being added that may not have been through the inspection process.

3.6.6.5.4 MEC Disposal

3.6.6.5.4.1 General Procedures

3.6.6.5.4.1.1 During disposal of MEC and related material, safety is the primary concern. The most obvious requirements are to protect personnel, the public, and the environment from fire, blast, noise, fragmentation, and toxic releases. Planned detonation of explosives requires more stringent safety distance requirements than those for ordnance in storage, and they will be conducted in accordance with the requirements outlined in the data contained in the appropriate fragmentation data review form and DoD 6055.09-STD.

3.6.6.5.4.1.2 The field team will employ either an electric firing system or a non-electric (shock tube) initiating system, based on availability from the supplier, for control and safety.

3.6.6.5.4.1.3 Personnel directly or indirectly engaged in MEC operations will be thoroughly trained and capable of recognizing hazardous explosive components. Personnel are required to read, become familiar with, and adhere to the requirements contained in this subchapter to ensure that all general safety regulations and safe work practices are observed at all times. Absence of a written safety requirement does not indicate that safeguards are not required.

3.6.6.5.4.1.4 Personnel engaged in MEC demolition activities will follow these procedures. However, situations may warrant additional safety measures, such as fire trucks, medical personnel, and protective clothing. The UXOSO has the overall responsibility to comply with the minimum requirements listed below and has the authority to upgrade as the situation dictates.

3.6.6.5.4.1.5 Demolition operations will not begin at a work site until all non-essential personnel are outside of the MSD established for the ordnance and net explosives weight (NEW) being detonated. UXO that cannot be moved (e.g., fuzed or hazardous items)

must be BIP. The SM will use the appropriate engineering controls whenever it is necessary to BIP items near structures that could be damaged by the detonation.

3.6.6.5.4.1.6 Disposal will be under the direct control of an experienced and trained UXO Technician III charged with the responsibility for all demolition activities. The UXOSO will be responsible for training personnel regarding the nature of the materials handled, the hazards involved, and the precautions necessary, and will also be present during disposal operations.

3.6.6.5.4.1.7 Data such as type, size, depth, condition, and location of MEC located during the field investigation will be recorded.

3.6.6.5.4.1.8 The SUXOS will ensure that the appropriate local authorities are notified prior to on-site demolitions. SDDENR will be notified prior to a planned detonation (contact information is provided in Appendix C).

3.6.6.5.4.2 MEC Demolition

MEC items will be detonated the day they are found, if possible. If a MEC item cannot be detonated on the day it is found, 24-hour security will be provided until the item(s) can be detonated. Demolition/disposal operations will be conducted in accordance with the demolition SOP. Explosive operations will follow the procedures outlined in TM 60A-1-1-31 and EM 385-1-97, Explosives Safety and Health Requirements Manual. Blasting activities will be suspended when an electrical storm approaches. Information regarding lightning can be found in Subchapter 2.5.3 of the SSHP (Appendix D).

3.6.6.5.4.3 BIP Procedures

- The UXOSO will coordinate with USAESCH upon mobilization to facilitate detonation reporting procedures.
- The demolition team, SUXOS, and UXOSO will evaluate the MEC and either detonate it in place or – with the concurrence of both the USAESCH OE safety office and the onsite safety officer, relocate the ordnance item to consolidate it with other items. Detonations will occur only after all non-essential personnel have left the area, road guards are posted, and required personnel are notified. Prior to conducting the demolition, the SUXOS will check the area and available drawings to determine if there are underground or overhead utilities that may be affected by a detonation.
- UXO team personnel not involved in the disposal operation will act as perimeter guards, as directed by the UXOSO and/or SUXOS.

3.6.6.5.4.4 Operations in Populated/Sensitive Areas

- Evacuation of the public during demolition of a MEC item is a last resort if engineering controls are not adequate. If, due to MEC-related activities, an evacuation is deemed necessary, Parsons will notify the USACE. Personnel will

be evacuated to a safe location (to be determined by the UXOSO). Parsons will apply the USAESCH-approved MSDs, and will establish and control these boundaries as necessary. It may be necessary to augment project personnel with local law enforcement personnel to accomplish this task.

- Demolition operations will be conducted only after personnel protective measures are completed and reported to the SUXOS and UXOSO.
- Property protective measures will be taken, these could include, but are not limited to, sandbagging, tamping with earth, and barricading.
- For demolition operations that take place around sensitive areas, Parsons will coordinate with the USACE and/or the onsite USACE Safety Specialist for engineering support to ensure the proper engineering controls are in place before detonation. The preferred engineering control will be the placement of sandbags to control fragmentation and noise.
- Evacuees will only be permitted to re-enter the area after the demolition area is inspected and the "all clear" is given by the UXOSO.

3.6.6.5.5 Material Potentially Presenting an Explosive Hazard

3.6.6.5.5.1 A detailed account of all MPPEH encountered during the investigation will be maintained. A log entry will be made for MPPEH indicating the general types of materials encountered and the weight (in pounds) found in the project areas. Items found to present an explosives hazard will be handled as stated for MEC in Subchapter 3.6.6.5.4.

3.6.6.5.5.2 MPPEH identification procedures and record keeping will be in accordance with EM 1110-1-4009 Chapter 14 and Errata Sheet 2. These documents will be available on site during intrusive operations.

3.6.6.5.6 Material Documented as Safe

3.6.6.5.6.1 MPPEH that is inspected, verified and certified to be free of explosive hazards will be classified as MDAS. MDAS generated during the project will be stored in a secure area inside locked containers. Once the field investigation is complete, the sealed containers will be shipped to a facility for proper disposal.

3.6.6.5.6.2 MDAS will be sent to a designated demilitarization subcontractor who will certify (on company letterhead) that the material has been received; agrees with the provided documentation that the sealed containers contained no explosive hazards when received; and confirms the contents 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. This documentation must be returned to the Parsons PM and will be incorporated in the RI report.

3.6.6.6 Contingency for HTRW Containers

3.6.6.6.1 If the item is not MEC or CWM but is a potential HTRW container, it will undergo HTRW assessment on-site. The potential HTRW item will be headspaced according to procedures presented in the Air Monitoring Plan (Appendix I). Liquid and soil samples will be collected in accordance with the procedures presented in the SAP in Appendix E. Three sample splits will be collected. One sample split will be used for headspace monitoring. If clear of CA, a second split will be submitted to the ECBC laboratory for low-level CA and ABP analysis prior to the third split being shipped to a HTRW laboratory for characterization. If the item is sealed and cannot be sampled, the item will go through the non-destructive assessment process of x-ray, portable isotopic neutron spectroscopy (PINS), and Material Assessment Review Board (MARB).

3.6.6.6.2 If the item contains HTRW components, it will be packaged in a polyethylene drum, overpacked, and stored at the fenced storage area until proper disposal can be arranged. All items that are removed from the site and determined to be MD, without obvious HTRW contamination, will be staged in the fenced storage area for headspace monitoring and proper disposal.

3.7 MUNITIONS CONSTITUENT SAMPLING

MC Sampling in the test pits will characterize the material within the disposal trenches, evaluate the vertical extent of the trenches, and analyze IDW to facilitate final disposition. MC sampling will also be conducted at the Chemical Plant Area (DP-19) to assess the potential for contamination from historic demilitarization and kiln facility operations (surface soil and possible buried process lines). Geophysical anomalies are not present at the suspect pits in DP-35 so subsurface soils at these locations will be sampled with a direct push rig. Pre- and post-demolition samples will also be collected at locations where MEC disposal operations are conducted. Detailed sample collection procedures, analytical methods, and data quality requirements for the MC sampling are described in the SAP (Appendix E). Details concerning the methods to be used for conducting the baseline risk assessment are presented in Appendix M.

3.8 INVESTIGATION-DERIVED WASTE PLAN

This subchapter presents the disposal procedures for IDW. It addresses waste streams potentially requiring disposal including; soil, cultural debris, decontamination water, PPE and other solid waste, sampling waste, and on-site laboratory-generated waste. This IDW plan does not address the procedures for CWM, MEC, or HTRW containers; those procedures are identified in Subchapters 3.6.6.4, 3.6.6.5, and 3.6.6.6, respectively. CA-contaminated media (e.g., soil, water) and debris containing measurable amounts of CA is not CWM and will be managed in accordance with applicable federal, state and local laws.

3.8.1 Personnel

Personnel involved in packaging, labeling, manifesting transport and disposal of IDW include:

Site Manager	Plan and coordinate daily activities.
SSHO	Ensure safety guidelines are followed. Ensure personnel training certifications are current and proper PPE is donned during packaging and transport activities.
USAESCH Safety Officer	Provide oversight of daily operations.
UXO-QCS	Verify actions regarding packaging, labeling, manifesting, transport, and disposal of IDW are IAW approved work plan.
Sample Coordinator	Ensure sampling is conducted IAW the SAP-QAPP, coordinate information between the Project Chemist and Site Manager.
Down Range Team Members	Perform sampling, fill, label, and transport containers.
Parsons Project Chemist	Coordinate between ECBC and APPL and provide analytical results for disposal decisions.
Disposal Subcontractor PM	Provide assistance with preparing waste profiles, coordination with transporter and waste facilities.
Equipment Operators/Truck Drivers	Transport of containers within the site and off site.
CARA	Provide air monitoring and on-site headspace analysis.
ECBC	Provide low-level CA analysis
APPL	Provide HTW analysis.

3.8.2 Contaminated Soil

3.8.2.1 Potentially contaminated soil will be sampled, extracted and analyzed for determination of CA levels or toxic or hazardous characteristics for consideration of decontamination, disposal, or reuse. Based on the CSM and proposed RI field activities, contaminated IDW soil may be produced during:

- Test pit excavation within BG-1, BG-2, DP-31, and DP-32; and
- Intrusive investigation of linear shaped geophysical anomalies within DP-19.

3.8.2.2 Direct-push subsurface soil sampling at DP-35 and surface soil sampling at DP-19 may also encounter contaminated soil, but excess soil (beyond what is needed for sampling) is not anticipated from these sampling activities. Regardless of the RI activity, if it is suspected that IDW soil may be contaminated (e.g., if CA has been detected at the excavation through air monitoring), soils will be segregated, containerized, and sampled using the methods in the SAP (Appendix E). The process for disposal of waste soil is presented in Figure 3.8. The soil will be managed according to the following process:

3.8.2.3 When soil suspected to be contaminated with mustard (H) and/or Lewisite (L), or other contamination is encountered, it will be tested onsite to evaluate the off gas in the headspace of the container. This is referred to as headspacing.

1. If headspacing indicates CA is present at or above the short term exposure limit (STEL) (i.e., > 0.003 milligrams per cubic meter (mg/m^3) for H and L), the soil will be decontaminated with a 5% solution of bleach, the decontamination documented, and the soil disposed of offsite as CA contaminated waste.
2. If headspacing indicates CA is not detected or is present below the STEL, the soil sample will be sent to a government laboratory for low-level extraction and analysis to determine if is at or above the Hazardous Waste Control Limit (HWCL) levels for H or L (i.e., $\geq$ 6.7 mg/kg for H and $\geq$ 37 mg/kg for L).
    a. If the soil exceeds either of the HWCL limits, it will be decontaminated with bleach to below the HWCL, and disposed off site as CA contaminated waste.
    b. If the soil is below the HWCL limits it will be disposed as CA contaminated waste (no decontamination required).
3. If no CA or ABPs are detected in the headspace sample or in the low level extraction sample, the soil will be sent to a commercial laboratory for analysis by toxicity characteristic leaching procedure (TCLP)-metals, TCLP-VOCs, and TCLP-SVOCs analysis. (Additionally one sample will be collected per roll-off for totals analysis.) TCLP reference values are found in Appendix E, UFP-QAPP, Worksheets 15.6, 15.7, and 15.8.
    a. If Constituents are detected above TCLP criteria, the soil will be disposed of as HTW contaminated waste.
    b. If no constituents are detected above TCLP criteria, and the results from the Totals analysis are above screening levels, the soil may be disposed as non-hazardous waste. Screening levels for Totals results will be residential screening levels (RSLs) for explosives, VOCs, SVOCs, and PAHs (UFP-QAPP WS 15.1b, 15.3b and 15.4c, 15.4d); for metals, the greater of background values or RSLs (UFP-QAPP WS 15.2b, 15.2c).

c. If no constituents are detected above TCLP criteria, and the results from the Totals analysis are below the screening levels, the soil may be stockpiled for potential reuse. Screening levels for Totals results will be residential screening levels (RSLs) for explosives, VOCs, SVOCs, and PAHs (UFP-QAPP WS 15.1b, 15.3b and 15.4c, 15.4d); for metals, the greater of background values or RSLs (UFP-QAPP WS 15.2b, 15.2c).

Note: where a RSL is not available, a substitute is listed in the appropriate table.

3.8.2.4 Following decontamination, re-headspacing is not possible due to interferences between the bleach and the monitoring equipment. All decontaminated materials will be sent for disposal off site as hazardous waste and documented as decontaminated.

3.8.2.5 In soil where H, L, or ABPs has been detected, soil samples cannot be sent to the HTW laboratory, therefore TCLP parameters necessary for disposal purposes will be determined through adjacent samples or through the collection of additional samples from a nearby location (i.e., locations cleared of CA/ABPs).

3.8.3 Wastewater and Decontamination Solution

3.8.3.1 Wastewater will be produced through equipment and personnel decontamination. The process for managing this waste stream is presented in Figure 3.9. Equipment and personnel decontamination waters from the PDS will be collected daily in holding tanks or drums. The date the water is collected will be marked on the side of the container, and included in the electronic drum log that is maintained by the UXOQCS. The decontamination solutions will be segregated into two categories.

- Decontamination solutions used during operations when DAAMS confirmed air monitoring detections of CA or other hazardous constituents have occurred or when RCWM is encountered; and
- Decontamination solutions used when no RCWM has been encountered and there have been no DAAMS confirmed air monitoring detections of CA or other hazardous constituents.

3.8.3.2 The waste stream will be managed by the following process:

1. If air monitoring confirms a detection of CA, suspected RCWM is encountered, or there is stained or discolored soil or other indications of HTW, aqueous samples will be collected from the decontamination solution for offsite CA analysis. If separate phase liquids are encountered in the container, care will be taken to sample each phase to allow for proper disposal characterization. One composite sample will be collected for every 5 drums or 200 gallons of accumulated aqueous investigative waste. The composite sample will be analyzed for disposal characterization and will be collected using either disposable bailers or a powered sampling pump with disposable tubing. Headspace monitoring is not conducted before shipping aqueous samples offsite.

a. If H is detected in an aqueous sample at a concentration equal to or greater than 0.7 mg/L or L is detected at a concentration equal to or greater than 3.3 mg/L, bleach will be added to decontaminate. The waste will be labeled, staged, and disposed as CA contaminated waste.

b. If the sample has CA detections below the H and L concentrations listed above or if ABPs are detected, the waste will be disposed as CA contaminated waste. (No decontamination necessary)

c. If no H, L or ABPs are detected, the second sample split will be shipped offsite to a commercial laboratory for disposal characterization analyses for TCLP-metals, TCLP-VOCs, TCLP-SVOCs, pH, and ignitability for disposal documentation. TCLP reference values are found in Appendix E, UFP-QAPP, Worksheets 15.6, 15.7, and 15.8. Values for corrosivity (pH) and ignitability are referenced in 15.9.

3.8.3.4 If constituents are detected above TCLP criteria and/or hazardous characteristics are present, the decontamination solution will be disposed off site as HTW contaminated waste. If it is not characteristically hazardous, is non-detect for CA and ABPs, and does not contain other hazardous constituents, the solution will be disposed off site as non-hazardous waste.

2. If air monitoring does not detect CA, no suspected RCWM is encountered, and there is no stained soil or other indications of HTW, the decontamination solution will be containerized in drums or tanks and kept segregated until the analytical results of the soil samples collected during operations associated with the decontamination solutions are available.

    a. If soil samples from the day the aqueous IDW was collected indicate CA or HTW contamination is detected, the aqueous IDW will be kept segregated. The soil samples will be considered contaminated if CA or ABPs are detected; or when TCLP analytes exceed criteria (UFP-QAPP WS 15.6, 15.7, 15.8). When contamination is detected, sampling will be conducted at a rate of one composite sample for every 5 drums or 200 gallons of accumulated aqueous investigative waste. The sample will be sent off site for CA analysis and will follow the same process as described in subsection 3.8.3.2.

    b. If soil samples from the day the aqueous IDW was collected indicate no CA or HTW contamination is detected, the waste will be staged as non-hazardous waste. Prior to shipment, a composite sample will be collected from the container and sampled for CA/ABPs, TCLP-metals, TCLP-SVOCs, TCLP-VOCs, pH, and ignitability, to document for the disposal facility that no hazard is present.

3.8.4 Metallic Debris and Other Cultural Materials

3.8.4.1 During intrusive operations, teams may encounter metal cans, drums, and other debris. The process for managing waste consisting of metallic debris or other cultural materials is presented in Figure 3.10. Debris material will be classified as either being a CA hazard or a non-CA hazard. Management of this waste stream will be according to the following process.

1. If a MINICAMS alarm occurs and is confirmed by DAAMS, or if other indications of CA contamination are observed during the investigation at that site, the debris will be containerized and will undergo headspace screening by the air monitoring team. The items assessed in the field to be related to CWM will be placed in containers (e.g., drums) or wrapped in plastic capable of being sealed and heated. The containers will be heated in accordance with the procedures outlined in the air monitoring plan (Appendix I) and the ambient air in the container will be monitored for CA by the air monitoring team.

    a. If monitoring reveals presence of agent vapor and the level is below the STEL, the waste will be disposed as CA contaminated waste (with no decontamination required).

    b. If monitoring reveals the presence of agent vapor above the STEL, the items will be decontaminated with bleach. The decontamination procedure will be documented and associated with the container the debris is placed in. Following decontamination and removal of the decontamination solution, the tops of the drums will be propped open to allow items to dry. The waste will be disposed of as CA contaminated waste. Porous debris that has been decontaminated will remain in the drum. Following decontamination, drums will be sealed and the exterior of the drum will be washed with a decontaminating 5% solution of bleach and rinsed. Decontamination solution and rinse water will be drummed for later sampling and disposal. The drums will be labeled as appropriate following sampling and prepared for shipment to a disposal facility.

2. If there is no indication of CA from air monitoring, or other indications of CA contamination observed during the investigation at that site, the debris will be staged in appropriate containers until sampling results of soil where the debris was found are available.

    a. If CA or HTW contamination was detected in the soil the debris was found in, the debris will be labeled and staged for disposal as CA or HTW contaminated waste according to analytical results. The soil will be considered contaminated when CA or ABPs are detected, or when TCLP analytes exceed criteria (UFP-QAPP WS 15.6, 15.7, 15.8).

b. If the associated soil is free of CA or HTW contamination, the debris will be staged and disposed as non-hazardous waste. The soil will be considered contaminated when CA or ABPs are detected or when TCLP analytes exceed criteria (UFP-QAPP WS 15.6, 15.7, 15.8).

3.8.4.2 Following decontamination, re-headspacing is not possible due to interferences between the bleach and the monitoring equipment. All decontaminated materials will be sent for disposal off site as hazardous waste and documented as decontaminated.

3.8.4.3 Non-metallic debris that is not suspect of CA or HTW contamination as described in Section 3.8.4.1-2b will be containerized and disposed off site as non-hazardous waste.

3.8.5 Personal Protective Equipment and Other Solid Wastes

3.8.5.1 Wastes from disposal of PPE and other solid wastes will be created daily during intrusive activities. The process for managing PPE and other solid wastes is presented in Figure 3.11. These wastes will include items such as boots, fabric, tape, disposable outer garments, and plastic sheeting. Management of PPE and other solid wastes will be according to the following process:

1. If there are no DAAMS confirmed detections of CA during air monitoring conducted during intrusive operations and no other indicators of contamination, the PPE waste can be packaged in clear plastic bags, labeled as "PPE used - not contaminated" and disposed of in a dumpster or other similar container as Non-Hazardous Waste.

2. If agent is detected by air monitoring during that day's activities, the PPE wastes will be sealed within a plastic bag or drum and labeled as "PPE used – contaminated." The contents will be allowed to off gas at least four hours at a temperature above 70º F, prior to the plastic bag or drum undergoing headspace monitoring.

   a. If CA is detected above the STEL, the contents will be decontaminated and the decontamination procedure documented. The waste will be staged for disposal as CA contaminated waste.

   b. If CA is detected below the STEL, the waste will be disposed of as CA contaminated waste (no decontamination necessary).

3.8.5.2 Following decontamination, re-headspacing is not possible due to interferences between the bleach and the monitoring equipment. All decontaminated materials will be sent for disposal off site as CA contaminated waste and documented as decontaminated.

3.8.5.3 Wastes from sampling will be produced on a regular basis. The process for managing sample jars containing media is presented in Figure 3.12. Sample jars

remaining onsite that still contain media should be placed in appropriate containers once it is determined whether or not their related splits were contaminated. Sample jars containing media will be managed according to the following process.

1. If air monitoring of headspace vapors indicates H or L above the STEL (.003 mg/m3), all jars from all splits onsite will be decontaminated with bleach. Jar lids will be removed to allow media to come in contact with bleach. All jars, lids and media will be disposed of as CA contaminated waste.

2. If air monitoring of headspace vapors indicates H or L below the STEL or there is no detection of CA, the jars for split 1 (headspacing), splits 3 (TCLP analysis), and splits 4 (Totals Analysis, if collected) will be held in chain of custody until the low level results are determined.

    a. If low level results indicate a presence of CA above the Hazardous Waste Control Limits (HWCLs) (6.7 mg/kg for H or 37 mg/kg for L), the remaining splits onsite will be decontaminated according to process 1 above and disposed off site as CA contaminated waste.

    b. If low level results indicate a presence of CA below the HWCLs, or ABPs are present, the remaining splits onsite will be disposed as CA contaminated waste (no decontamination necessary).

    c. If low level results indicate NO presence of CA or ABPs, the 3rd split (and 4^{th}, if collected) will be forwarded to the commercial laboratory for HTW analysis. If constituents are detected above TCLP criteria, Split 1 will be disposed off site as HTW contaminated waste. Sample jars for which no CA or HTW constituents were detected or are below TCLP criteria can be disposed off site as non-hazardous waste. TCLP reference criteria are found in Appendix E, UFP-QAPP, Worksheets 15.6, 15.7, and 15.8.

3.8.5.4 Jars will remain in plastic bags to manage potential broken glass. Records will be maintained as to where used sample jars are disposed, either on a container log, container record, or sample log.

3.8.6 Laboratory Waste

The onsite laboratory is expected to generate small quantities of several types of waste. These wastes include: a mixture of used isopropyl alcohol and acetone, spent bleach, sharps (i.e., needles, syringes), spent decontamination water, and used pump oil. Bottles of dilute CA used for challenging air monitoring equipment will also be generated, and will be decontaminated prior to disposal. Syringes will be placed in impenetrable containers and placed in separate drums. Waste profiles will be developed based on generator knowledge and wastes will be packaged and staged for disposition. The used acetone/isopropyl alcohol mixture will be stored separately due to flammability issues.

Decontamination bleach will be stored separately. The pump oil will be sent for recycling.

3.8.7 Material Potentially Presenting an Explosive Hazard

3.8.7.1 A detailed account of MD and MPPEH encountered during the investigation will be maintained. Initially MD and MPPEH will be reported by the downrange team leader and the CP will enter the information in to the downrange log. The UXOQCS will maintain a separate log for MD and MPPEH indicating the general types of materials encountered and the weight (in pounds) found in the project areas. Items found to present an explosives hazard will be handled as stated for MEC in the subchapter 3.6.6.5.

3.8.7.2 The SUXOS will designate a team leader (UXO Technician III) who will perform a 100% reinspection of all recovered items to determine if each is free of explosives hazards or other dangerous fillers. This team leader will supervise the demolition of items found to contain explosive hazards, and will also supervise the consolidation of MPPEH, MD, and range-related debris. Inert munitions debris, range-related debris, and MPPEH may be stored in the same general area, but will be stored in separate containers. All known MPPEH will be stored in locked containers to prevent materials from being added that may not have been through the inspection process.

3.8.7.3 The UXOQCS will conduct daily audits of the procedures used by the UXO teams and individuals for processing MPPEH. The UXOQCS will also perform random sampling (by pieces, volume, or area) of all MPPEH collected from various teams to ensure no items with explosive hazards are identified as MD or range-related debris.

3.8.7.4 MPPEH inspection, certification, verification and disposition will be performed in accordance with the procedures outlined in EM 1110-1-4009, *Engineering and Design - Military Munitions Response Actions*, Chapter 14, Corps of Engineers Contractors MPPEH Inspection, Certification, and Final Disposition Procedures. The USAESCH safety specialist and SUXOS will perform an inspection of MD and/or range-related debris to verify and certify that it is free from explosive material. The inspected debris will be secured in a closed, labeled, sealed container that will carry a unique identification number (see subchapter 3.9). The container must be sealed in a manner in which the seal must be broken for the container to be opened. The seal number must be recorded and maintained in the site documents, as presented in subchapter 3.9.

3.8.7.5 A DD Form 1348-1A will be filled out by the SUXOS and used as certification/verification documentation. This form must show the typed or printed names of the SUXOS and USAESCH safety specialist, organization, signature, and home office and field office phone numbers of the persons certifying and verifying the debris as free of explosive hazards. The form must also clearly state the basic material content, estimated weight, container and seal numbers, and site location. The form will also contain the following statement:

> *"This certifies and verifies that the material listed has been 100% inspected and, to the best of our knowledge and belief, are inert and/or free of explosives or related materials."*

3.8.7.6 The MD will be sent to a designated demilitarization subcontractor who will certify (on company letterhead) that the material has been received; agrees with the provided documentation that the sealed containers contained no explosive hazards when received; and that the containers would not be sold, traded, or otherwise given to another party until the contents have been smelted; and the containers are only identifiable by their basic content. This documentation must be returned to the Parsons PM and will be incorporated in the RI report.

3.8.8 General Site Trash

General site trash that has not been down range or has not come into contact with CA/HTW can be disposed in a local solid waste facility.

3.8.9 Containerization

The largest volume of IDW needing containerization is anticipated to be soil from test pit excavations. Other wastes needing containerization may include metal debris, plastic, liquids, PPE, and general site trash.

3.8.9.1 Containerizing Soil

3.8.9.1.1 If it is necessary for soil to be placed directly in hoppers or drums, the soil will remain in containers adjacent to the excavations while awaiting the results of headspace testing of samples. If the sample headspace results are below the STEL, the containers may be staged in a separate holding area at BHAD while awaiting low-level CA and ABP analysis.

3.8.9.1.2 Department of Transportation (DOT) – approved 30-gallon, plastic drums or equivalent will be used to allow incineration as a disposal method without further handling. Drums will be filled to a predetermined level that will allow for the addition of bleach if headspace testing of the drums indicates CA in excess of the STEL. This approach will ensure that the total weight of the drum remains within the waste disposal contractor's specified weight limit. The final weight of drums will not exceed the weight limit specified by the waste disposal contractor. To improve the saturation of soil by bleach, a perforated plastic pipe or equivalent may be placed in the drum prior to filling so that the added bleach may readily penetrate the soil. Once drums are filled, they will be covered and sealed. Drums destined for incineration may have maximum weight limits depending on the facility that will receive the waste. The drums will be marked in accordance with Subchapter 3.9 and staged in a designated area while awaiting the headspace testing and low-level analysis results of the composite samples collected when the drum was filled. If CA is detected in headspace analysis above the STEL, the drum

contents will be decontaminated before it is moved to the Waste Holding Area. The exteriors of drums containing materials that required decontamination must also be decontaminated before the drums can be moved to the waste holding area. Each drum destined for disposal will be represented by headspace analysis and decontamination documentation, or with the CA laboratory analytical results. All documentation will be referenced to the associated container.

3.8.9.1.3 Self-dumping hoppers or equivalent may be used to temporarily store soil from the excavation instead of transferring it directly to roll-offs in suspect areas while awaiting sample headspace results. A liner will be placed in each hopper each time it is used, and when soil is transferred from the hopper, the liner will be transferred with the soil. Hoppers may be filled as full as practical. Once the level of contamination is determined by headspace testing of samples associated with the hopper, the soil in the hopper will be transferred to a roll-off with soils of similar contamination levels, or decontaminated if necessary. A clear trail documenting each container and the associated sampling will be kept in a container log.

3.8.9.1.4 Roll-off containers may be used for the storage and shipment of soils. Roll-off containers will be placed near the excavation to allow convenient dumping of hoppers or drums. Each roll-off will be protected by a liner. Twenty-cubic-yard roll-off containers are planned to be used; however, other sizes may be used if practical. The roll-offs will be covered when they are not being filled to secure contents and to keep out rain. If needed, the roll-offs may be moved to the Waste Holding Area or other secure area to await pickup for offsite disposal.

3.8.9.2 Containerizing Non-Soil

3.8.9.2.1 Metal and debris that was associated with CA-contamination, that had a positive headspace result for CA-contamination, or that was decontaminated must be containerized in DOT-approved 55 gallon plastic drums. Plastic drums are used to facilitate disposal by incineration. To fit in the drums, the metal may be crushed with the excavator or other equipment. The drums will be marked in accordance with Subchapter 3.9. Once filled, plastic drums will be covered and sealed. The drums will be labeled with the last date debris was added. A detailed description of types of debris added to the drum will be maintained on the container form. If headspace testing indicates the materials exceed the STEL, the drum contents and exterior will be decontaminated. Materials that have been decontaminated may be disposed of in permitted landfills. If material is not decontaminated, and cannot be certified to levels below facility requirements it may not go to a landfill, and other disposal methods such as incineration will be required.

3.8.10 Methods to Minimize Hazardous Waste

The primary method of minimizing hazardous waste will be through the segregation of wastes suspected of containing hazardous constituents until analytical results are

received. If analytical results confirm the hazard as present, the wastes will be kept segregated, minimizing the volume of contamination.

3.8.11 Tracking of Waste Containers

3.8.11.1 The following tracking system will be used for each waste stream encountered. The tracking system will be administered by the Parsons SM (or his designee) and reviewed by the UXO-QCS. Each container will be tracked from point of recovery to disposal

3.8.11.2 Drums – Drums will initially receive a temporary number that will change to a permanent number according to results of headspace testing and, laboratory analyses. This system allows for a streamlined approach to characterize waste and also for the consolidation of waste into larger containers for disposal. Once it is deemed necessary that a drum or other container receives a permanent number, the drum will be marked with a container number using the following method.

3.8.11.3 Container Number – Each container will be given a unique container number that will be marked directly on the top and side of the container. The container number will be an alphanumeric sequence that also identifies the site waste stream, and container number. Waste stream designations for the project consist of the following:

- CA-Contaminated – CS;
- Decontaminated CA Soil – DS;
- HTW-Contaminated Soil – HS;
- Decontamination Water – H2O Decon;
- Rain Water – H2O Rain;
- Personal Protective Equipment/Solid Waste – PPE/SW;
- On-site Laboratory Waste – LW;
- Intact Container – IC;
- Cultural Debris – CD;
- Munitions Debris – MD; and
- Metallic Debris – MW.

Note: An inventory will be kept of intact containers containing materials that are placed within another container. When shipping, the inventory will accompany the manifest of the outer container.

3.8.11.4 An example of the numbering scheme is: BHAD-DP31-TP1-MW-001. This designation identifies the container as being from former BHAD, DP31, Test Pit 1, containing metallic debris, and identified as container number 1. Containers will be sequentially numbered with no numbers reused, for example BHAD-DP31-TP1-MW-001, BHAD-DP31-TP1-MW-002, and BHAD-DP31-TP1-MW-003. For soils that can be

in more than one category (e.g., CS and HS), the more hazardous category will take precedence (for this example, CS).

1. Hoppers – Hoppers used to temporarily store soil while waiting for headspace testing or analytical results will be designated by the letter H followed by the hopper number and a sequential number (e.g. H2-001). A new sequential number will be applied every time a hopper is refilled. This will allow tracking of soils from the excavation to the final container. Only soils are planned to be stored in the hoppers.
2. Roll-Offs – Roll-offs usually arrive with a number already assigned to them by the disposal company. If present, these numbers will be used. If not present, the roll-off will be designated by the letter R followed by a sequential number (e.g., R-0001), and the number painted on the roll-off. A sequential number will be designated for every unnumbered roll-off arriving on site. Pre-numbered roll-offs returning to the site after disposal will be designated with letters, an A after the name on the first return, followed by B on second return, and so on.
3. Container Form - Each drum or container will be associated with a container form that documents the pertinent information about the container contents, including waste type, generation date, source, associated sample numbers, and location. An example container form is presented in Appendix F. The container forms will be maintained in the site filing system, by the Parsons SM.
4. Container Log - The container log is a form that tabulates all of the information found on the individual container forms. An example container log is presented in Appendix F.
5. Storage Area Loading Plan - The Storage Area Loading Plan tracks the exact location of an individual container inside Waste Holding Area and other secure storage areas. This layout will be posted on the inside of the office trailer by the Parsons SM.

3.8.12 Hazardous Waste Labeling

When it is determined a waste is characteristically hazardous, the container holding the waste will be labeled as hazardous and dated in a clear and durable manner. This will ensure disposal is to a facility capable of handling hazardous wastes. Additionally, while onsite, containers of hazardous wastes will be stored segregated from non-hazardous wastes.

3.9 PACKAGING

Materials to be transported off site to an appropriate disposal facility will be transported in containers in accordance with DOT Hazardous Material Regulation 49 CFR 100-199. Containers will be of approved materials and sizes appropriate to the hazard and characteristics of the waste.

3.9.1 Shipping Labels

3.9.1.1 Containers will be labeled in accordance with DOT and USEPA regulations and restrictions. The following is an example of information pertaining to shipment of H-contaminated materials:

Shipping Name:	Poisonous liquids (or solids), n.o.s. (Sulfide bis 2-chloroethyl)
ID Number:	UN2810 (for liquids) or UN2811 (for Solids)
Reportable Quantity (RQ) and notation, if over 100 pounds	RQ, Poisonous liquids (or solids), n.o.s. 6.1 UN2810 PG I (D003) or 6.1 UN2811 PG I (D003)
DOT Label (49 CFR 172.430)	Poison
Consignee's or consignor's name and address	U.S. Army Corps of Engineers, Omaha District (CENWO)

3.9.1.2 Additionally, each outside container will be marked on the top and sides with the following information:

- Generation date;
- Waste approval code;
- USEPA ID number;
- Hazardous Waste Label;
- Unique drum number; and
- Waste profile sheet number.

3.9.2 Transportation

Upon review of analytical data and assignment of the waste approval code from the disposal facility, Parsons and the waste disposal contractor will arrange transport of the containers to the appropriate facility. Transportation will be in accordance with DOT hazardous material regulations in 49 CFR 100-199. An approved licensed disposal contractor will be used as a transporter and the waste will be disposed at an approved disposal facility appropriate to the hazard level and physical properties of the waste. Shipments will be coordinated and scheduled when a sufficient number of containers have accrued (or when a specific waste stream is exhausted) for a timely and cost effective disposal. Field teams will endeavor to remove wastes in an expeditious manner.

3.9.3 Disposal Documentation

3.9.3.1 Hazardous waste will be disposed at a facility that operates as a Treatment, Storage, and Disposal Facility under RCRA regulations. Disposal documentation will be in full compliance with applicable rules and regulations, USEPA requirements, and DOT hazardous material regulations (49 CFR 100-199). CENWO will be listed as the

generator of waste streams and will provide a person responsible for signing required paperwork. For items that once were CA-contaminated but were subsequently decontaminated, certification of decontamination will be required prior to release of the item outside government control.

3.9.3.2 Completed copies of disposal documentation required for transport will be forwarded to the designated government representative for review at least 10 working days prior to shipment of the IDW. Parsons will make revisions to the manifest as requested. No shipping will occur until USAESCH is satisfied that all entries are correct and the authorized representative of CENWO has signed the waste profile representing the manifest.

3.9.3.3 Disposal documentation will include manifests (data packages), waste profiles land ban notifications, special approvals required from state/local authorities, shipping manifests (with generator/transporter/disposal facility signatures), weight tickets, and certificates of destruction. Documentation will be included as an appendix to the final RI/FS report

3.9.4 Manifesting

Manifests will be prepared in accordance with 40 CFR 260-268, applicable state regulations, and 49 CFR 171-178. Parsons, as the shipping agent, is responsible for preparing information necessary for manifesting the waste in compliance with existing rules and regulations. A separate manifest will be required for each waste stream to be shipped from the site. Manifests will include a correct description of wastes to be shipped including approximated quantities. The manifest will include an analytical data package, waste profile sheet summarizing the characteristics of the waste stream, and shipping manifest for each vehicle leaving the site. The manifest describing the waste stream and containers associated with the waste stream will be included as an appendix to the final BHAD RI/FS report.

3.9.5 Analytical Data Package

Prior to shipment of waste from the worksite, Parsons will forward – to the selected commercial laboratory – samples of the waste for the purpose of waste profile analysis. Parsons will prepare a data package of analytical documentation from sampling (and when necessary generator knowledge) as part of the hazardous waste manifest. For waste containing CA, the headspace or lab analysis will be used to characterize the waste for disposal.

3.9.6 Waste Profile Sheet

From analytical information provided in the data package, a waste profile sheet will be produced for each waste stream onsite. The disposal contractor will coordinate with Parsons, the disposal facility, and state regulators (if required) in preparation of the waste

profile. The waste profile will be issued by the disposal facility, and signed by a CENWO representative as the generator. Parsons will coordinate with CENWO to obtain a USEPA ID number specific to this site, and any identification numbers required by state or local authorities.

3.9.7 Shipping Manifests

Upon USACE acceptance of the manifest, shipping manifests will be prepared by the disposal facility for each vehicle of waste leaving the site. Parsons will coordinate delivery of the shipping manifests to the designated CENWO representative for their signature, and will then forward the signed manifest to the site.

3.9.8 Weight Slips

A signed weight slip will be furnished to CENWO and the USAESCH by the disposal facility indicating the actual weight of the waste that has been shipped to the approved disposal facility. The weight slip will be included in disposal documentation.

3.9.9 Notification of Waste Shipped

A notification of waste shipped form, required under the land ban disposal restrictions, will be completed by the waste management subcontractor. This form will identify treatment standards required in 40 CFR 268. This form will be prepared as an addendum to the manifest for all hazardous waste shipped off site, and will be included in disposal documentation.

3.9.10 Certificate of Disposal

A certificate of disposal indicating acceptance of materials and final disposition by the disposal facility will be signed by the disposal facility representative and furnished to CENWO and the USAESCH within 10 working days of final disposition. The completion of this form will be coordinated by Parsons.

The certificate of disposal will include:

- The material (by item and quantity) that was disposed;
- The specific method of treatment;
- The date of treatment; and
- Manifest number of the waste.

The certificate of disposal will be included in disposal documentation.

3.9.11 Applicable or Relevant and Appropriate Requirements

The IDW plan will be administered in accordance with appropriate applicable or relevant and appropriate requirements (ARARS) as indicated in each subchapter of the IDW plan.

3.10 RISK CHARACTERIZATION AND ANALYSIS

Risk assessment for MEC and MC will be conducted in accordance with risk assessment work plan (Appendix M).

3.11 ANALYSIS OF LAND USE CONTROLS

Using the same criteria discussed in Appendix M regarding the need for a risk assessment or MEC hazard assessment (HA), site data will be reviewed by USAESCH and Parsons to determine if an analysis of land use controls is needed for the sites being evaluated. If deemed necessary, an institutional controls alternatives analysis will be conducted as part of the investigation process. The results of that analysis will gauge the willingness of jurisdictional stakeholders to participate in the implementation of institutional controls. Based on (and if warranted by) the results of that analysis, a recommendation will be made regarding the need for an institutional control plan to be prepared as a part of the RI/FS. 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* and DID WERS-017.01.

3.12 PREPARATION OF A RECURRING REVIEW PLAN

A recurring review plan, if required, will be prepared as a part of the RI and will be included as an appendix to the RI/FS report. The DD 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 in accordance with EP 75-1-4, *Recurring Reviews on Ordnance and Explosive (OE) Response Actions* (USACE, 2003).

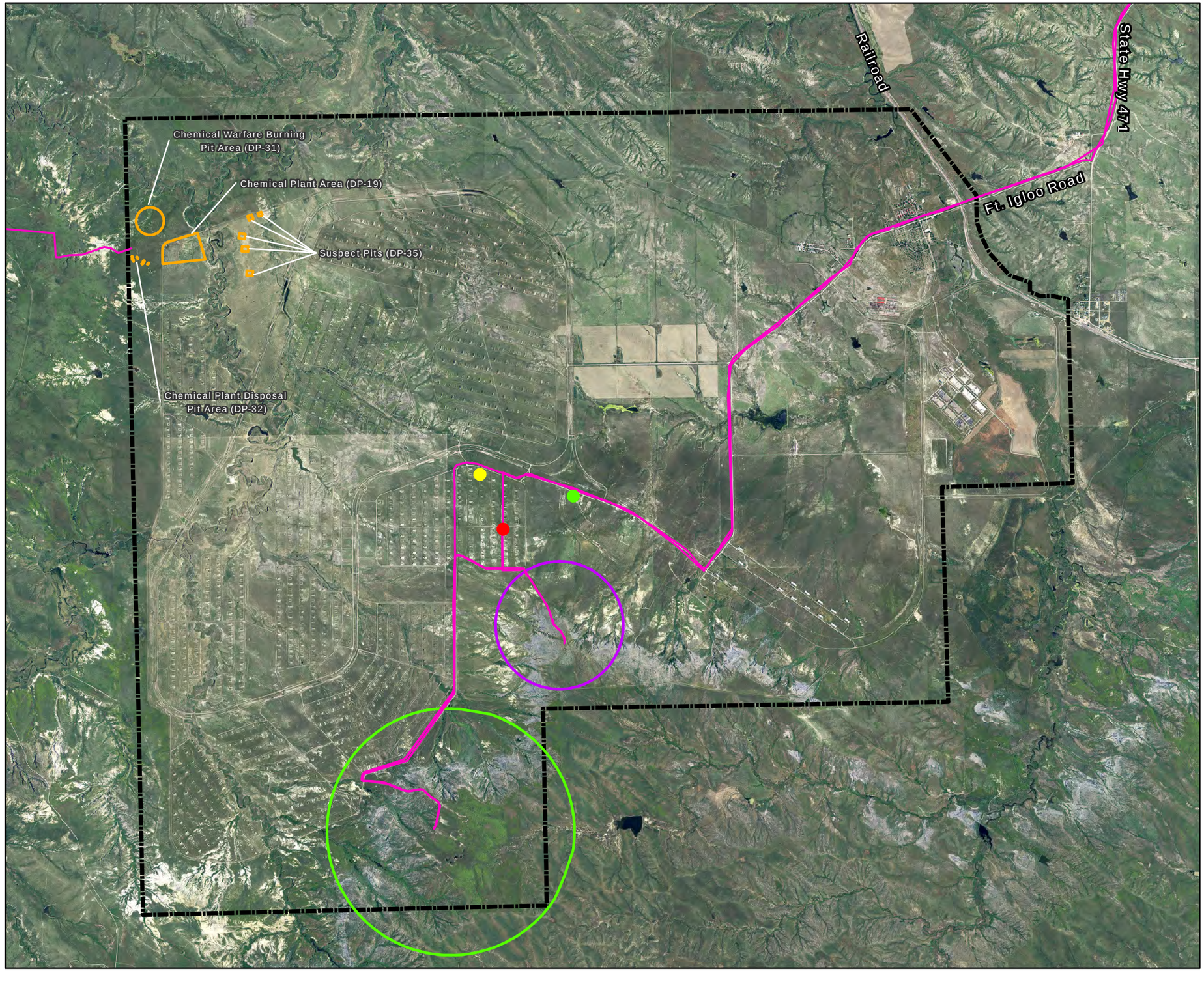


Figure 3.1

Locations of Site Facilities
Formerly Used Defense Site
Black Hills Army Depot
FUDS Project # B08SD000800
Black Hills, SD

Legend

- Site Compound
- Proposed Portable Explosives Storage Magazine
- Interim Holding Facility - Igloo 1205
- Access Roads
- Burning Ground No. 1 (438 Acres)
- Burning Ground No. 2 (1,627 acres)
- Chemical Plant Area sites
- Approximate BHAD Boundary

Note:
Site Compound will include project trailers, equipment storage and a waste handling area.

N

Image Source: Orthophoto 2010
Projection: NAD_1983_UTM_Zone_13N

3,000 1,500 0 3,000 Feet

PARSONS

U.S. ARMY ENGINEERING & SUPPORT CENTER HUNTSVILLE, ALABAMA

DESIGNED BY: CR
DRAWN BY: CR
CHECKED BY: CtB
SUBMITTED BY: CtB

Former Black Hills Army Depot

SCALE: As Shown
PROJECT NUMBER: 747769
DATE: December 2011
PAGE NUMBER:
FILE: S:\ES\shared\S:\ES\shared\Black Hills\DO 003_Initial\GIS\workplan\Site Facilities_Loc_rev2.mxd

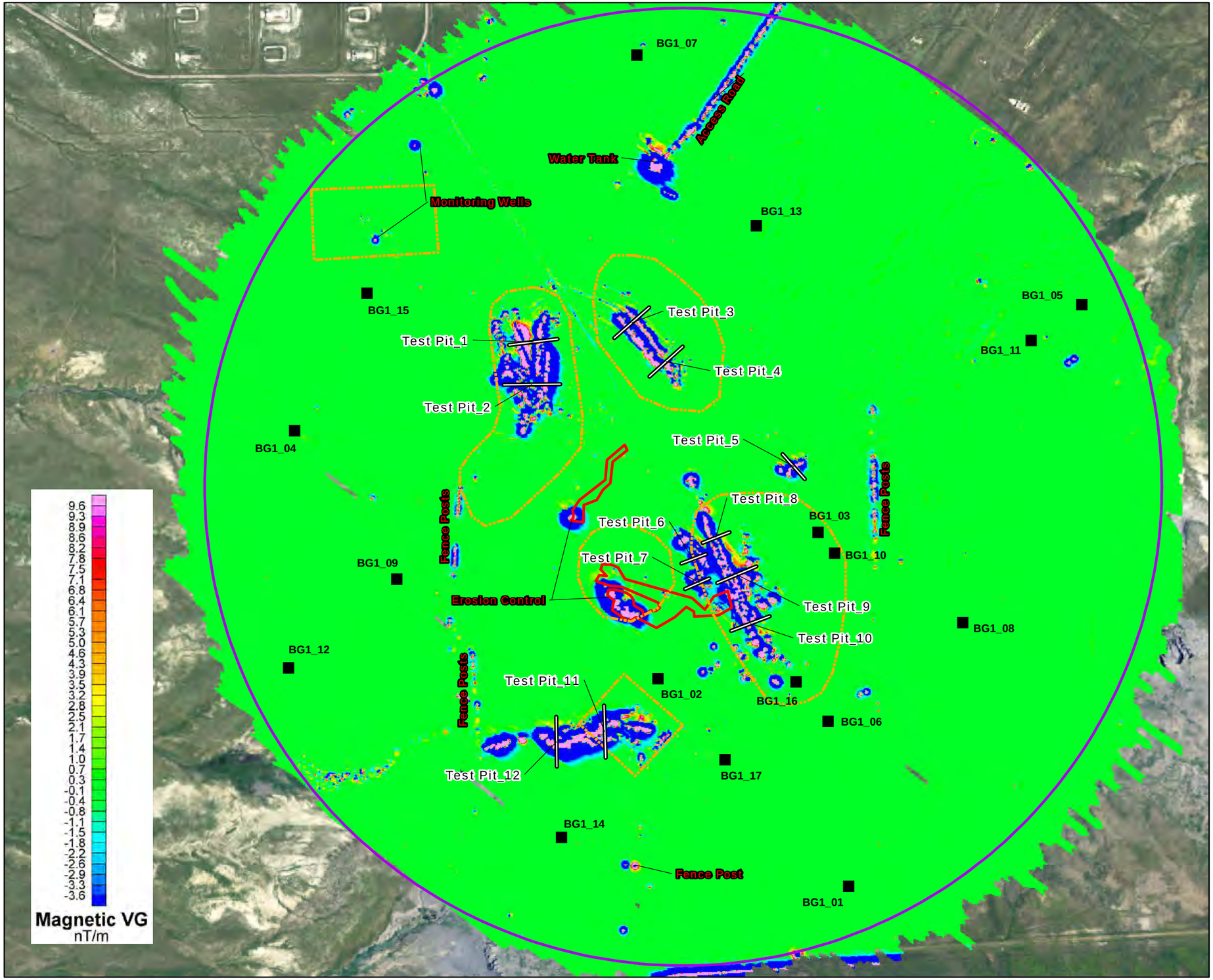


Figure 3.2

BG-1 Geophysical Data Results and Proposed Test Pit Locations Formerly Used Defense Site Black Hills Army Depot FUDS Project # B08SD000800

Black Hills, SD

Legend

- Grid Locations (not to scale)
- Proposed Test Pit Location
- Erosion Control Work Area (2004 OE Removal, URS)
- Burning Ground No. 1 Investigation Area (438 acres)
- Sub Areas (2009 OU1 RI, URS)
- Approximate BHAD Boundary

Notes:
Erosion control placed along two drainages - covers potential disposal areas. The erosion control features will not be removed; therefore, possible disposal pits in these areas will not be intrusively investigated.
BG-1 includes 17 grids that are 15 meters by 50 meters.
The number of anomalies associated with each grid, coordinates, and grid maps are provided in Appendix N.

N

Image Source: Orthophoto 2010
Projection: NAD_1983_UTM_Zone_13N

500 250 0 500 Feet

PARSONS	U.S. ARMY ENGINEERING & SUPPORT CENTER HUNTSVILLE, ALABAMA
DESIGNED BY: CR	Former Black Hills Army Depot
DRAWN BY: CR	
CHECKED BY: CtB	SCALE: As Shown — PROJECT NUMBER: 747769
SUBMITTED BY: CtB	DATE: March 2012 — PAGE NUMBER:
	FILE: S:\ES\shared\S:\ES\shared\Black Hills \GIS\Workplan\Aerial_Geo_Grids_BG_No1.mxd

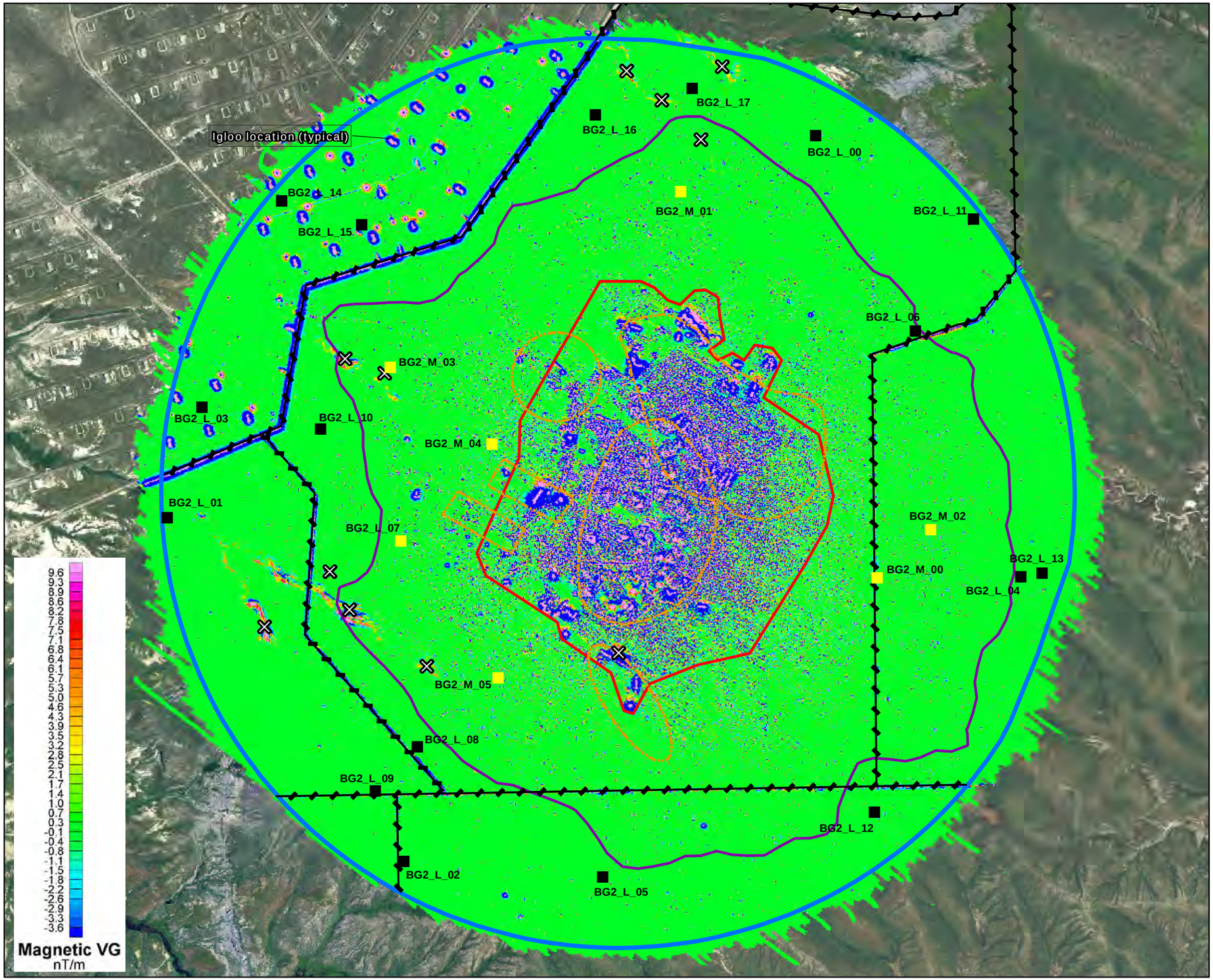


Figure 3.3

BG-2 Aerial Geophysical Survey and Grid Locations
Formerly Used Defense Site
Black Hills Army Depot
FUDS Project # B08SD000800
Black Hills, SD

Legend

Grid Location (not to scale)

- Low Anomaly Density Area Grid (17)
- Medium Anomaly Density Area (7)
- Unrelated to Past Depot Use
- Fences
- Sub Areas (2009 OU1 RI, URS)
- High Geophysical Anomaly Density Boundary
- Medium Geophysical Anomaly Density Boundary
- Burning Ground No. 2 (1,627 acres)

Notes:
Erosion control placed along drainages - covers potential disposal areas. The erosion control features will not be removed; therefore, possible disposal pits in these areas will not be intrusively investigated.
The number of anomalies associated with each grid, coordinates, and grid maps are provided in Appendix N.

N

Image Source: Orthophoto 2010
Projection: NAD_1983_UTM_Zone_13N

1,000 500 0 1,000 Feet

PARSONS	U.S. ARMY ENGINEERING & SUPPORT CENTER HUNTSVILLE, ALABAMA
DESIGNED BY: CR	Former Black Hills Army Depot
DRAWN BY: CR	
CHECKED BY: CtB	SCALE: As Shown — PROJECT NUMBER: 747769
SUBMITTED BY: CtB	DATE: December 2011 — PAGE NUMBER:
	FILE: S:\ES\shared\S:\ES\shared\Black Hills \GIS\fieldwork\BHAD_Geo_BG_No2.mxd

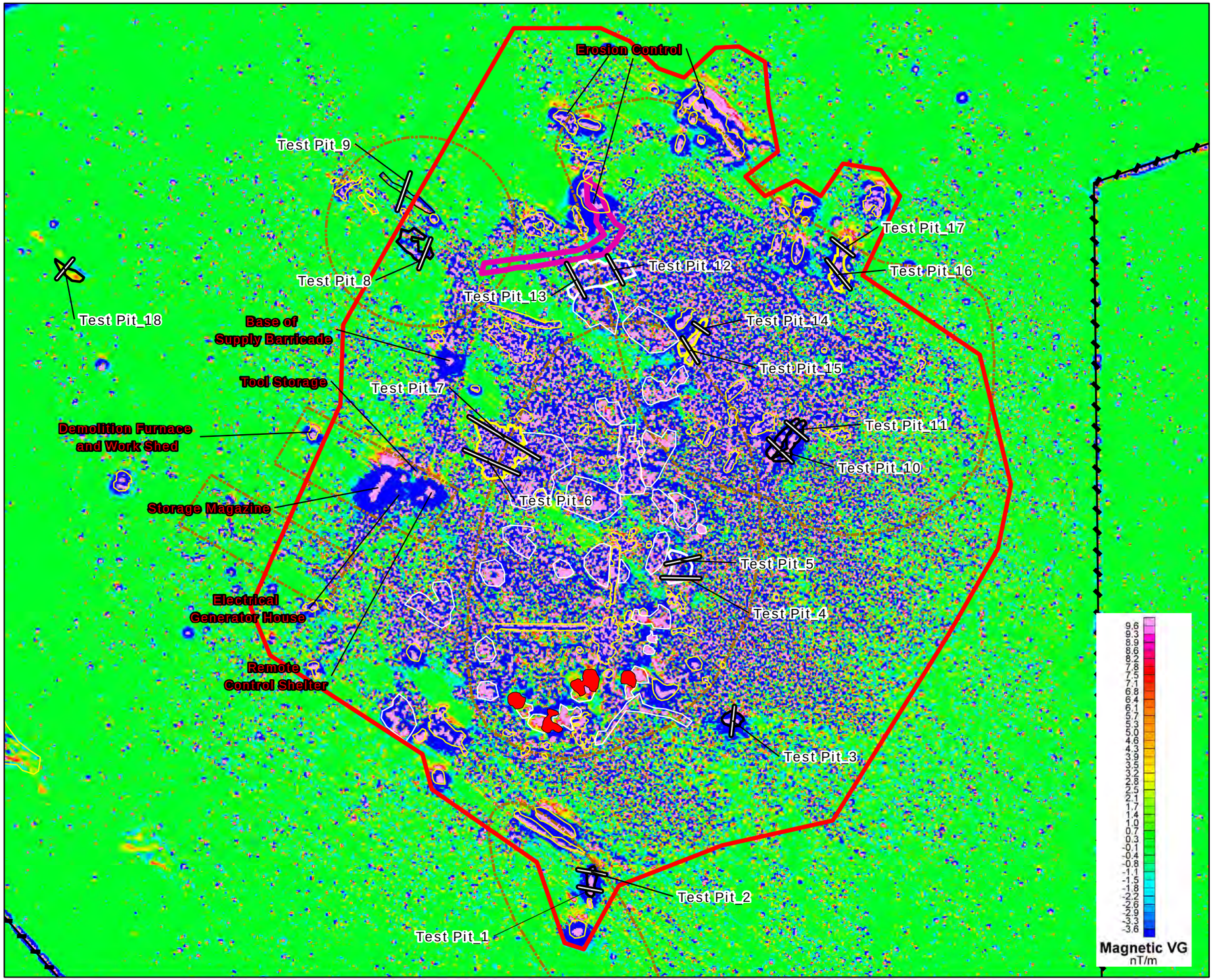


Figure 3.4

BG-2 Proposed Test Pit Locations
Formerly Used Defense Site
Black Hills Army Depot
FUDS Project # B08SD000800
Black Hills, SD

Legend

- Proposed Test Pit Location
- Demolition Hole*

Trench Like Features (Total Count 144)

- Priority 1 (7)
- Priority 2 (104)
- Priority 3 (33)
- High Geophysical Anomaly Density Boundary
- Sub Areas (2009 OU1 RI, URS)
- Erosion Control Work Area (2004 OE Removal, URS)
- Fences

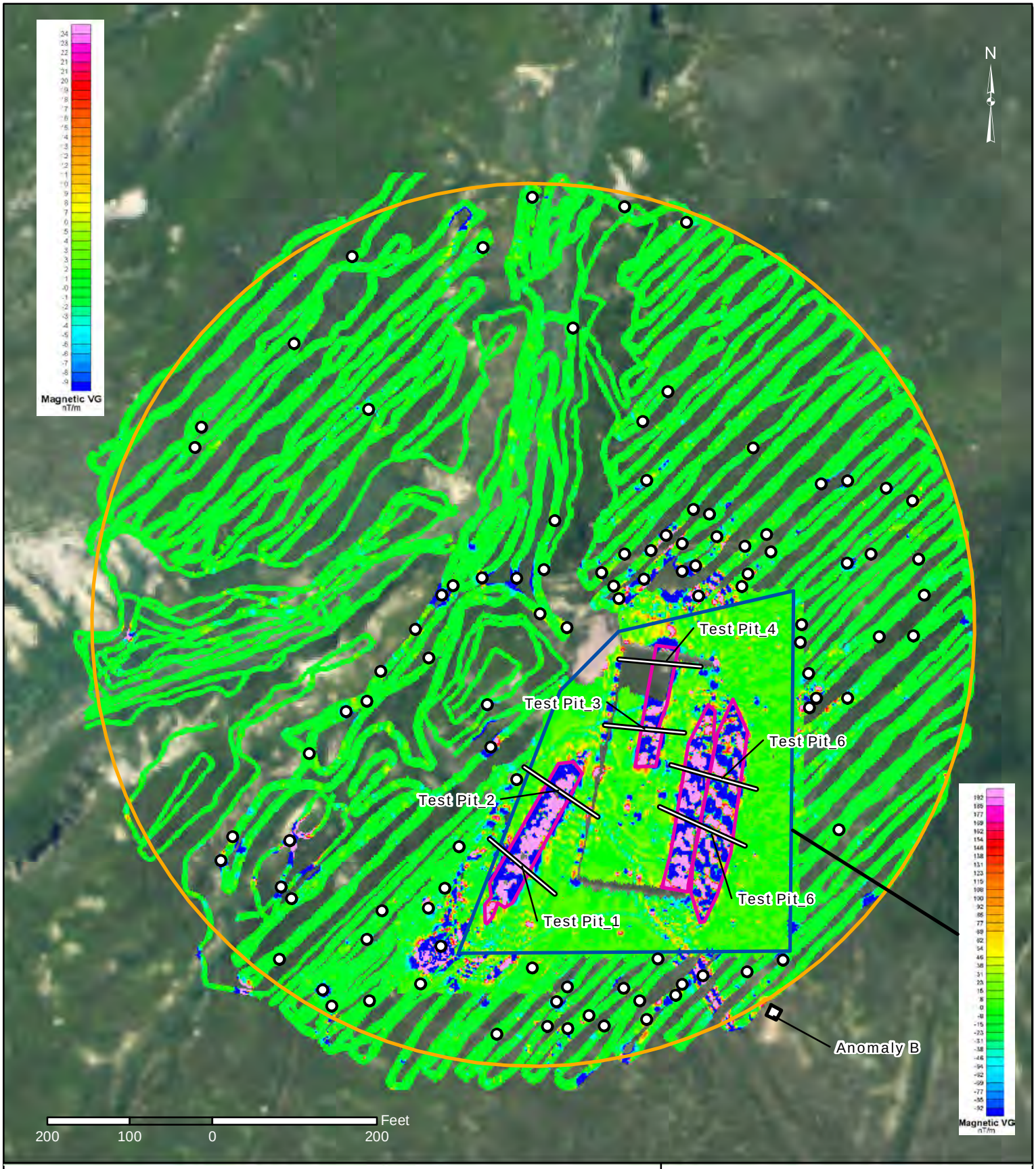
Note:
*Previously used for demolition activities, currently filled with water.
Locations of priority 1 trenches were verified during recon. Outlines for trenches identified for intrusive investigation are bolded.
Priority 1 trench like features are identified by the project geophysicist and recon team as the most likely location for burial/disposal. Priority 2 and 3 locations are less likely then priority 1 location to be burial/disposal locations. All priority 1 locations will investigated. Three priority 2 and two priority 3 locations will be investigated.

N

Image Source: Orthophoto 2010
Projection: NAD_1983_UTM_Zone_13N

500 250 0 500 Feet

PARSONS	U.S. ARMY ENGINEERING & SUPPORT CENTER HUNTSVILLE, ALABAMA
DESIGNED BY: CR	Former Black Hills Army Depot
DRAWN BY: CR	
CHECKED BY: CtB	SCALE: As Shown; PROJECT NUMBER: 747769
SUBMITTED BY: CtB	DATE: March 2012; PAGE NUMBER:
	FILE: S:\ES\shared\S:\ES\shared\Black Hills \GIS\workplan\Geo_BG_No2_zoom.mxd



S:\ES\shared\Black Hills\GIS\work plan\CWBPA_GEO.mxd cr 10/27/11

Legend

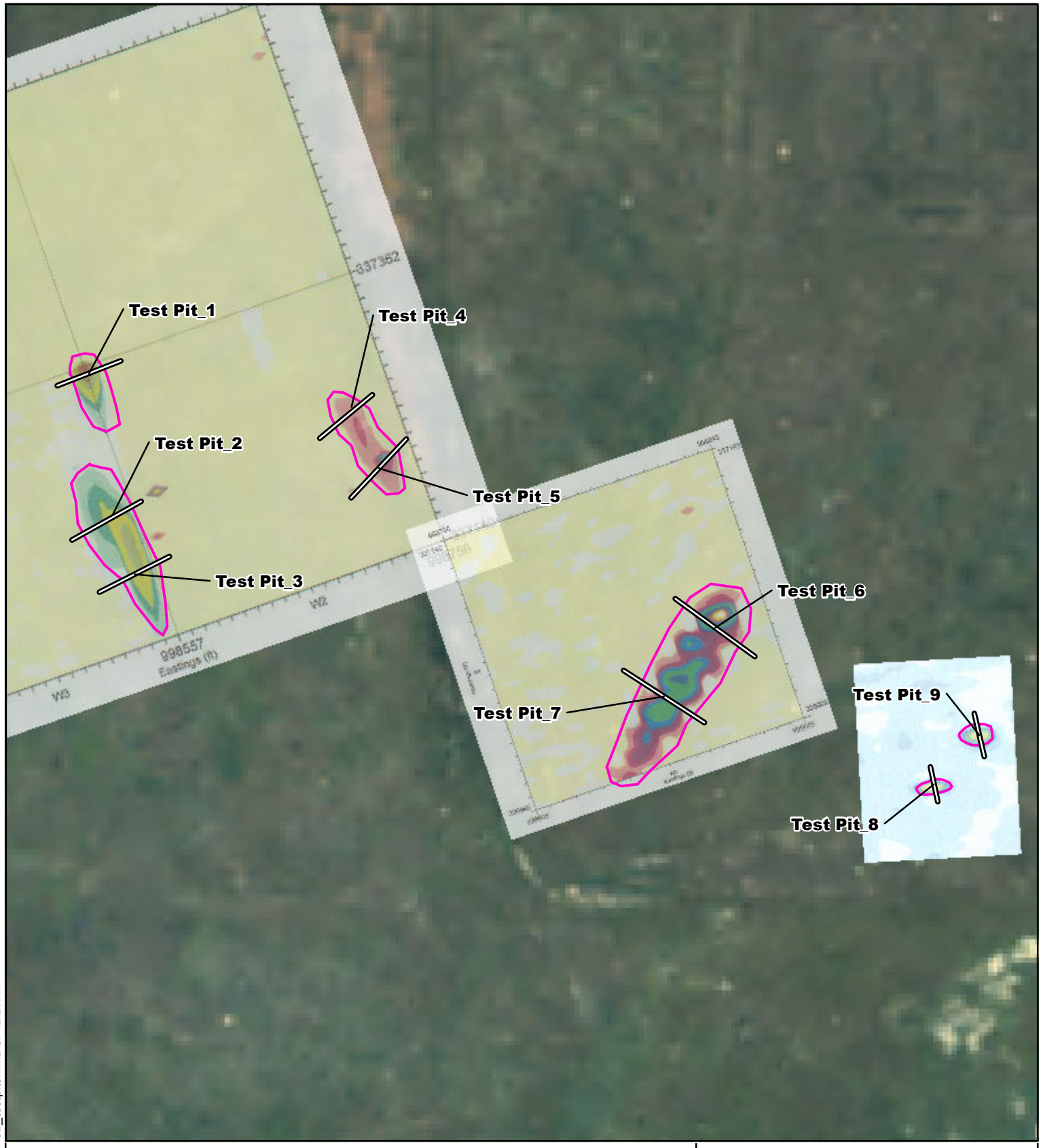
- Single Point Anomaly Location (100)
- Proposed Test Pits
- Anomaly B (2001 EECA, Dames & Moore)
- Chemical Warfare Burning Pit Area DP-31 (21 acres)
- Full Geophysical Coverage*

* Geophysical survey included 1.5 meter line spacing in the immediate vicinity of the trenches. The remaining area included 5 meter line spacing, terrain/access permitted. Refer to Section 1.8.2 regarding details on Anomaly B.

Figure 3.5

Geophyscial Survey Results and
Proposed Test Pit Locations
Chemical Warfare Burning Pit Area (DP-31)
Formerly Used Defense Site
Black Hills Army Depot
FUDS Project # B08SD000800

Image Source: Orthophoto 2010
Projection: NAD_1983_UTM_Zone_13N



Legend

- Proposed Test Pit
- Chemical Disposal Pit Area Sites

N

0 50 100 200 Feet

Image Source: Orthophoto 2010
Projection: NAD_1983_UTM_Zone_13N

Figure 3.6

Test Pit Locations
Chemical Disposal Pit Area (DP-32)
Formerly Used Defense Site
Black Hills Army Depot
FUDS Project # B08SD000800

Image Source: Orthophoto 2010
Projection: NAD_1983_UTM_Zone_13N

S:\ES\shared\Black Hills\GIS\work plan\DP32_testpits.mxd cr 12/27/11

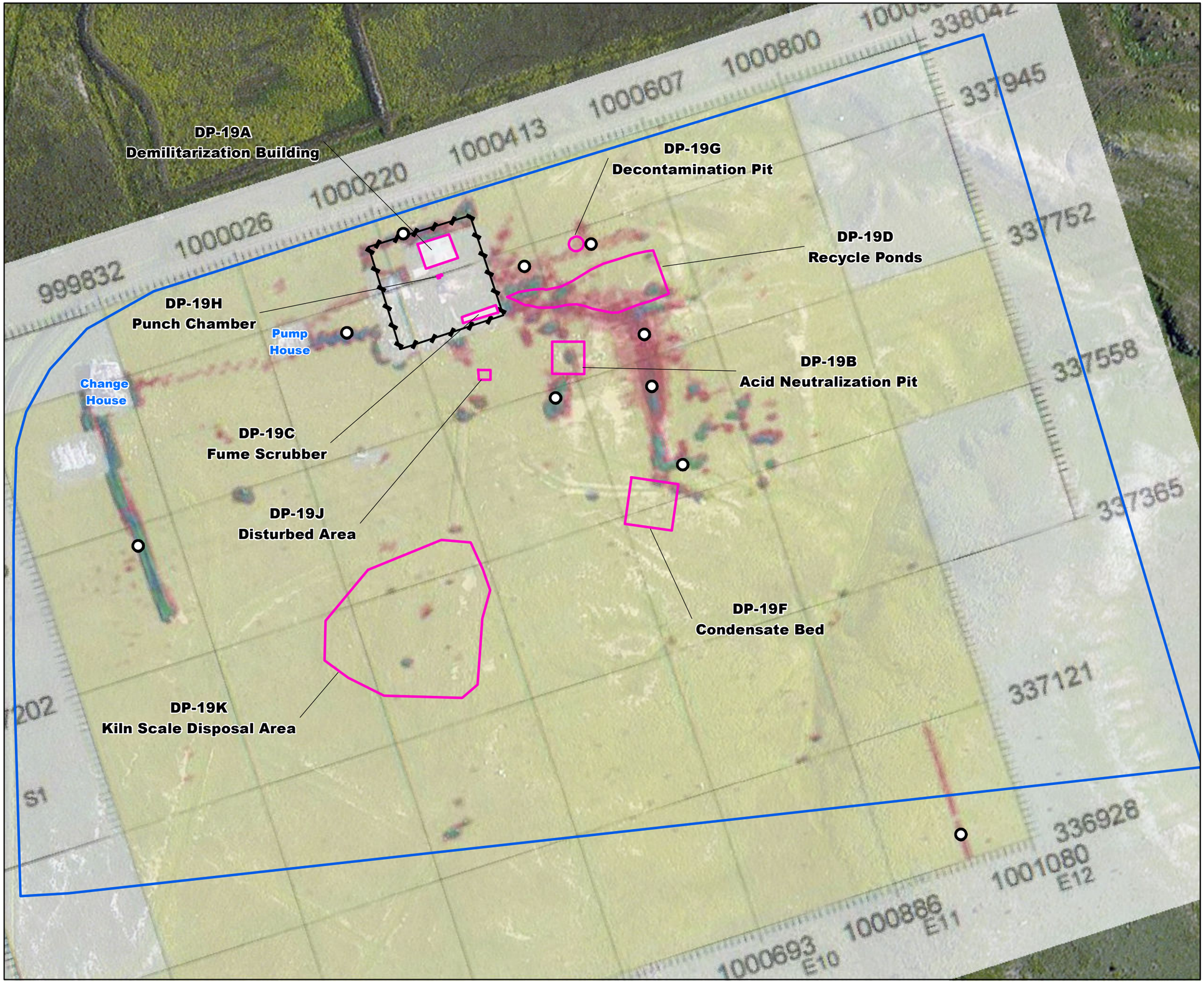


Figure 3.7

DP-19 Linear Anomaly Locations Geophysical Investigations Formerly Used Defense Site Black Hills Army Depot

Black Hills, SD

Legend

- Proposed Anomaly Intrusive Investigation Location (10)
- DP-19 Sub Areas
- Chemical Plant Area DP-19 (32 acres)
- Fence

Linear geophysical features that may represent buried process lines will be intrusively investigated. Refer to Table 3.4 for further detail.
Geophysical Date Source:
2001 Engineering Evaluation/ Cost Analysis, URS

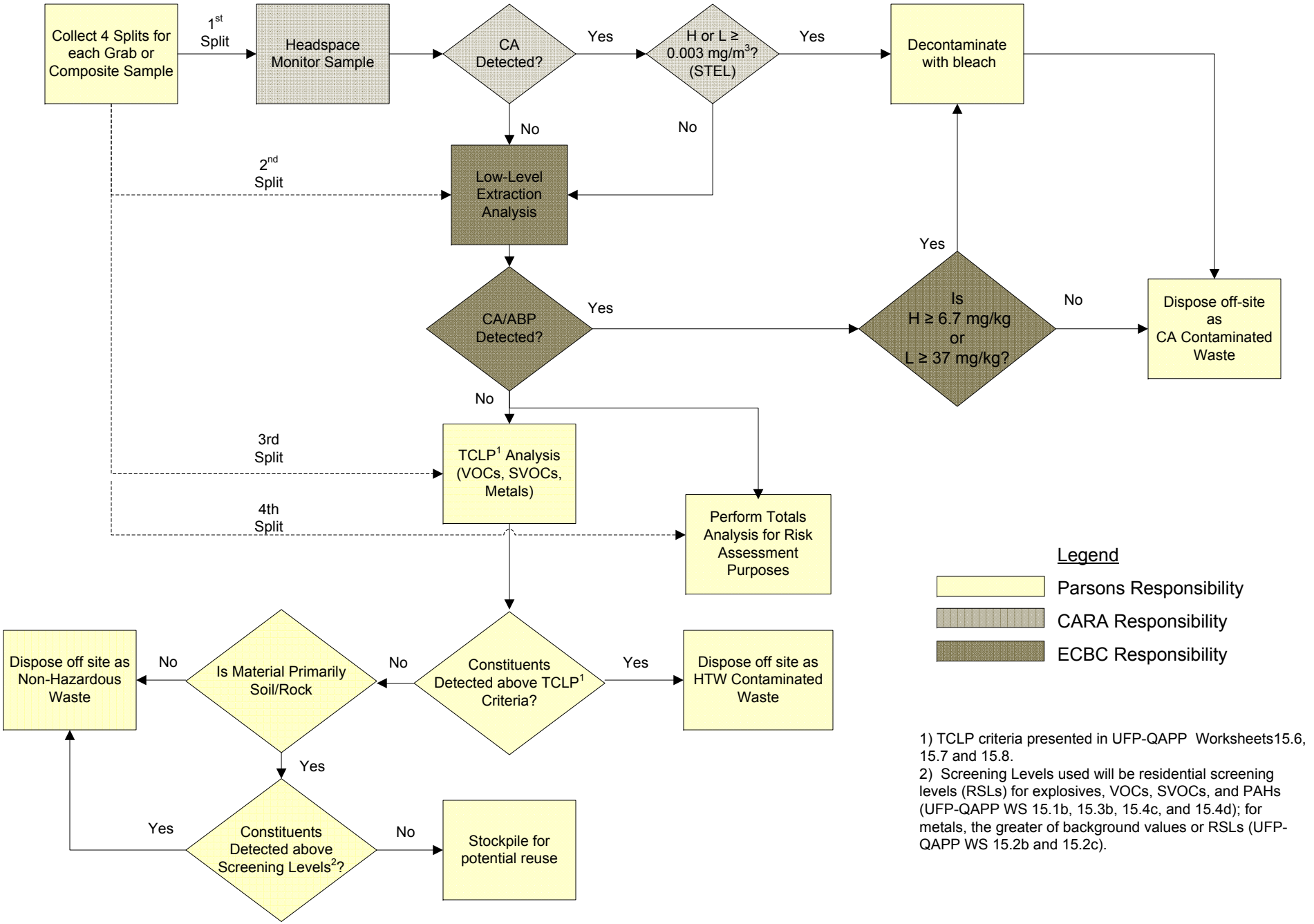
N

0 87.5 175 350 Feet

Image Source: Orthophoto 2010
Projection: NAD_1983_UTM_Zone_13N

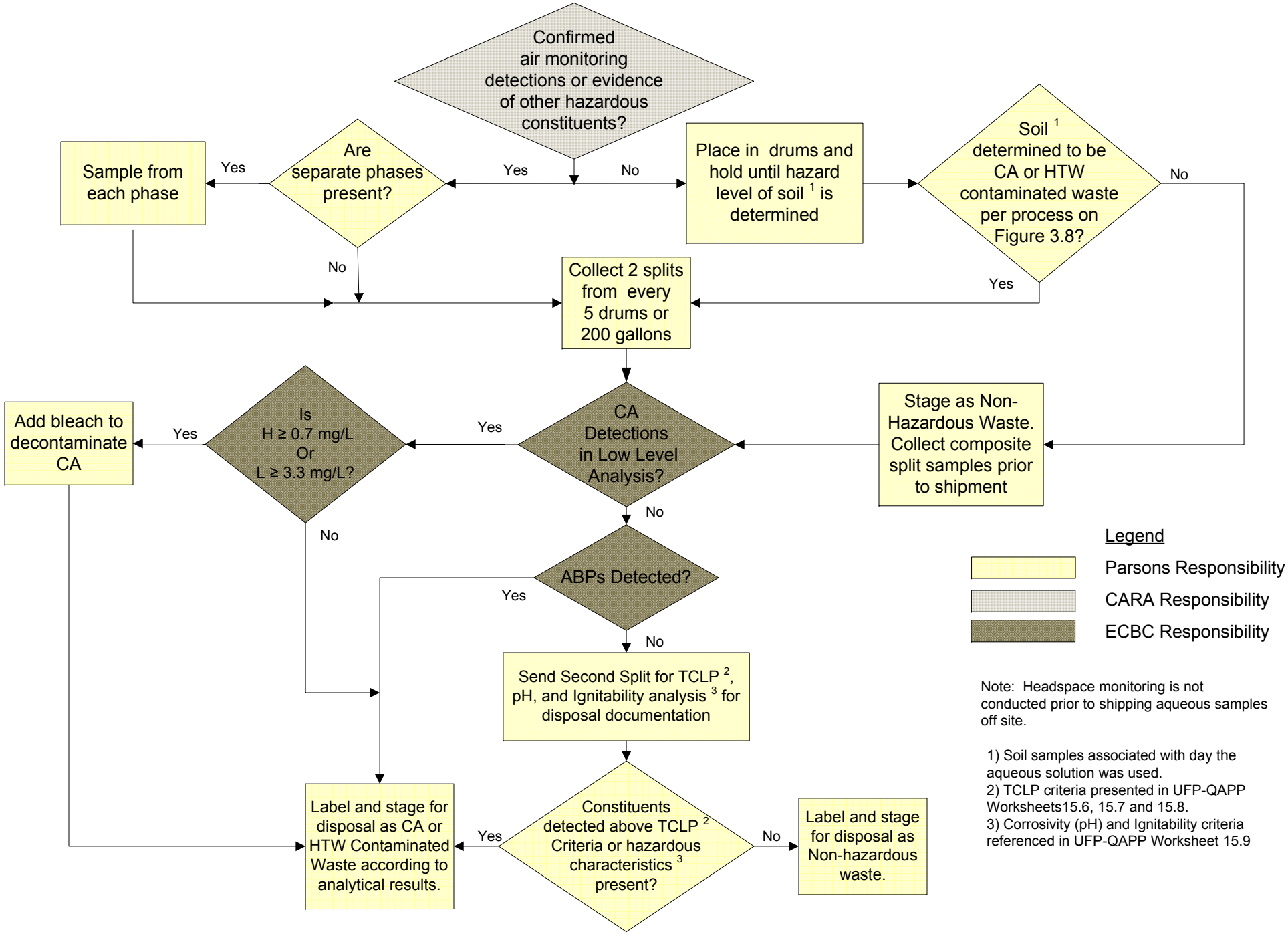
PARSONS	U.S. ARMY ENGINEERING & SUPPORT CENTER HUNTSVILLE, ALABAMA
DESIGNED BY: CR	Former Black Hills Army Depot
DRAWN BY: CR	
CHECKED BY: CtB	SCALE: As Shown — PROJECT NUMBER: 747769
SUBMITTED BY: CtB	DATE: December 2011 — PAGE NUMBER:
	FILE: S:\ES\shared\Black Hills\DO 003_Initial \GIS\work plan\DP-19_Anomalies.mxd

Figure 3.8
Process for Mixed Soil/Debris IDW Analysis
Black Hills Army Depot, Fall River County, SD



1) TCLP criteria presented in UFP-QAPP Worksheets15.6, 15.7 and 15.8.
2) Screening Levels used will be residential screening levels (RSLs) for explosives, VOCs, SVOCs, and PAHs (UFP-QAPP WS 15.1b, 15.3b, 15.4c, and 15.4d); for metals, the greater of background values or RSLs (UFP-QAPP WS 15.2b and 15.2c).

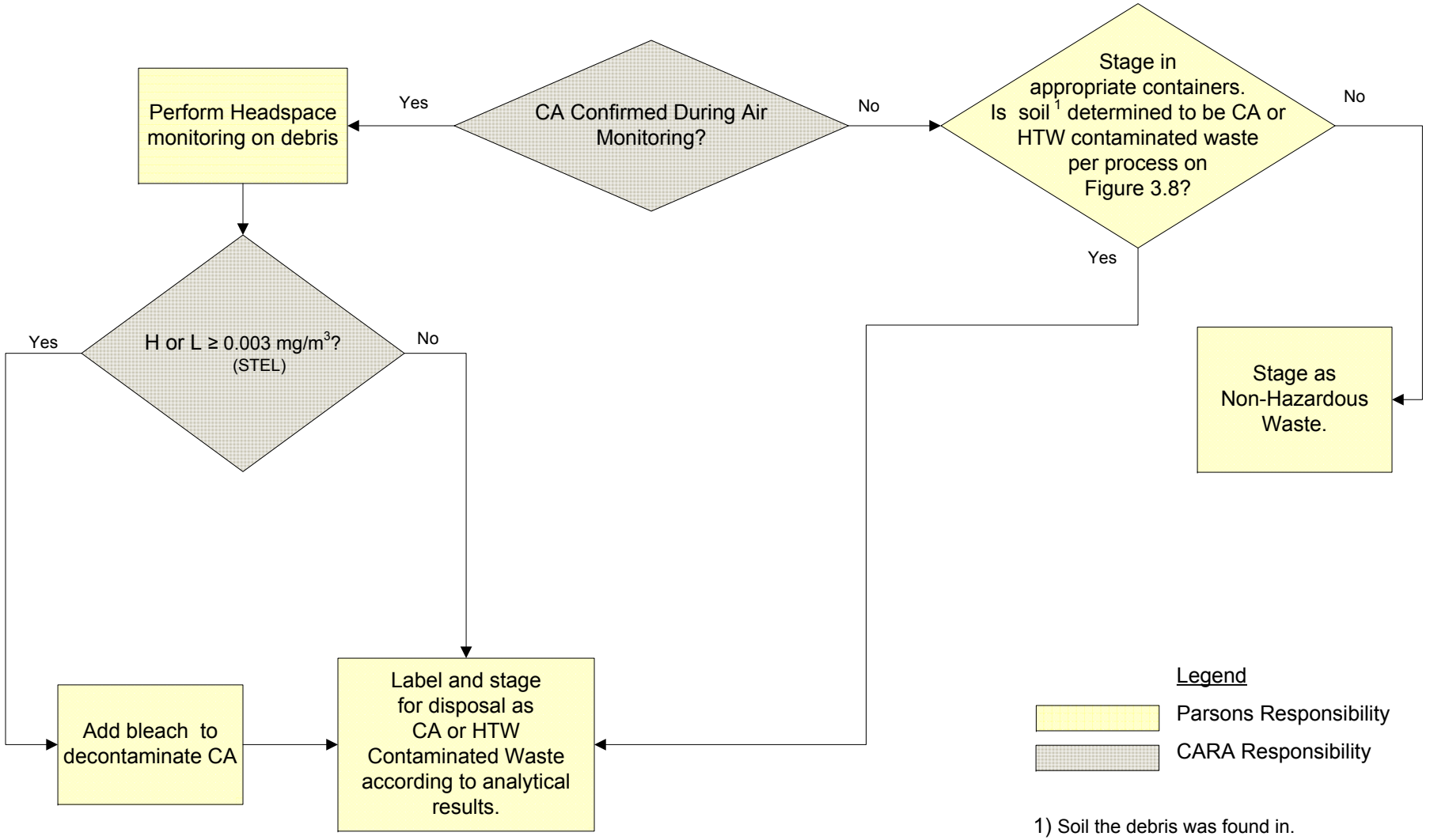
Figure 3.9
Process for Aqueous IDW
Black Hills Army Depot, Fall River County, SD



Note: Headspace monitoring is not conducted prior to shipping aqueous samples off site.

1) Soil samples associated with day the aqueous solution was used.
2) TCLP criteria presented in UFP-QAPP Worksheets15.6, 15.7 and 15.8.
3) Corrosivity (pH) and Ignitability criteria referenced in UFP-QAPP Worksheet 15.9

Figure 3.10
Process IDW – Metallic/Cultural Debris
Black Hills Army Depot, Fall River County, SD



1) Soil the debris was found in.

Figure 3.11
Process for IDW-Personnel Protection Equipment (PPE)
Black Hills Army Depot, Fall River County, SD

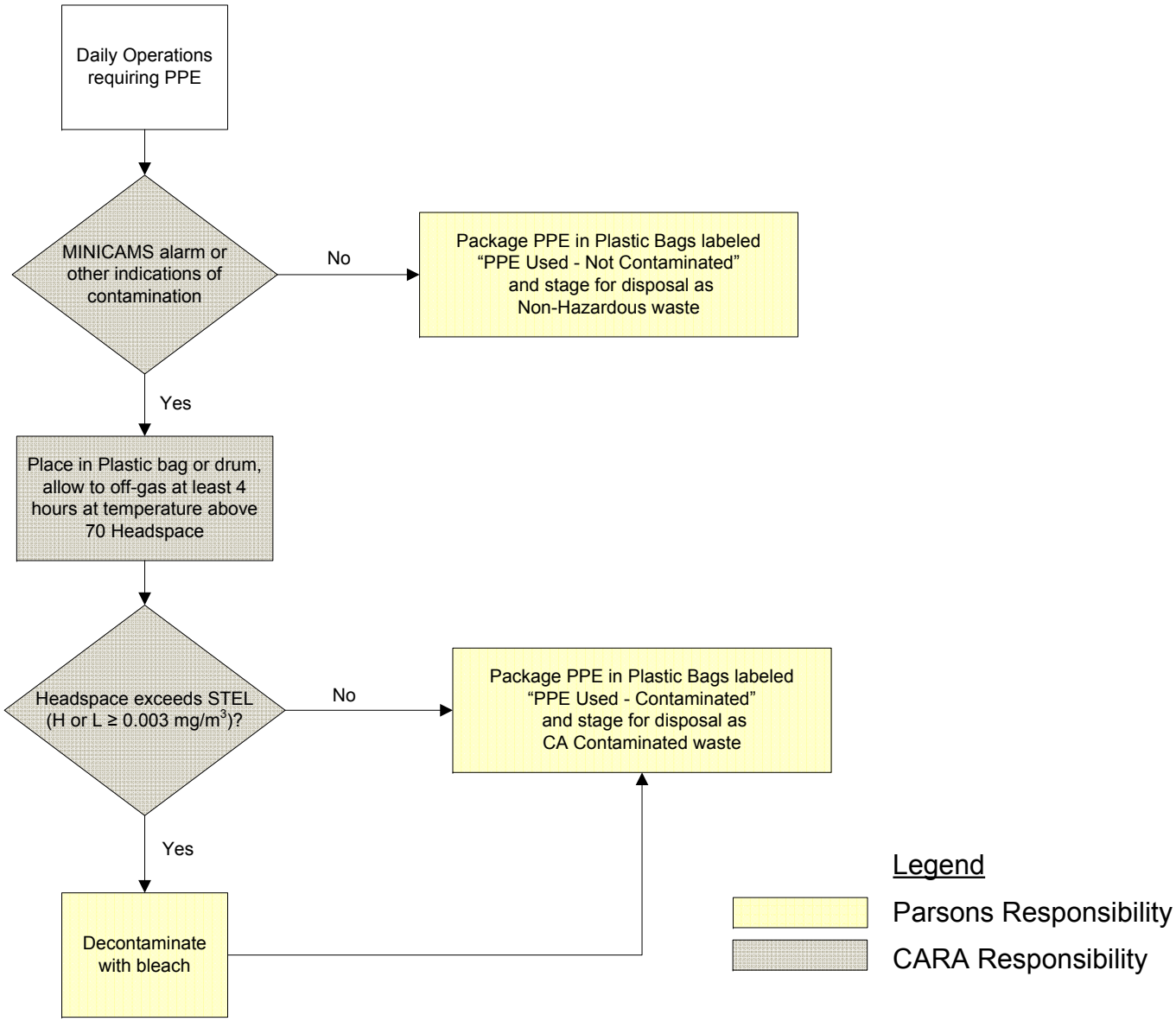
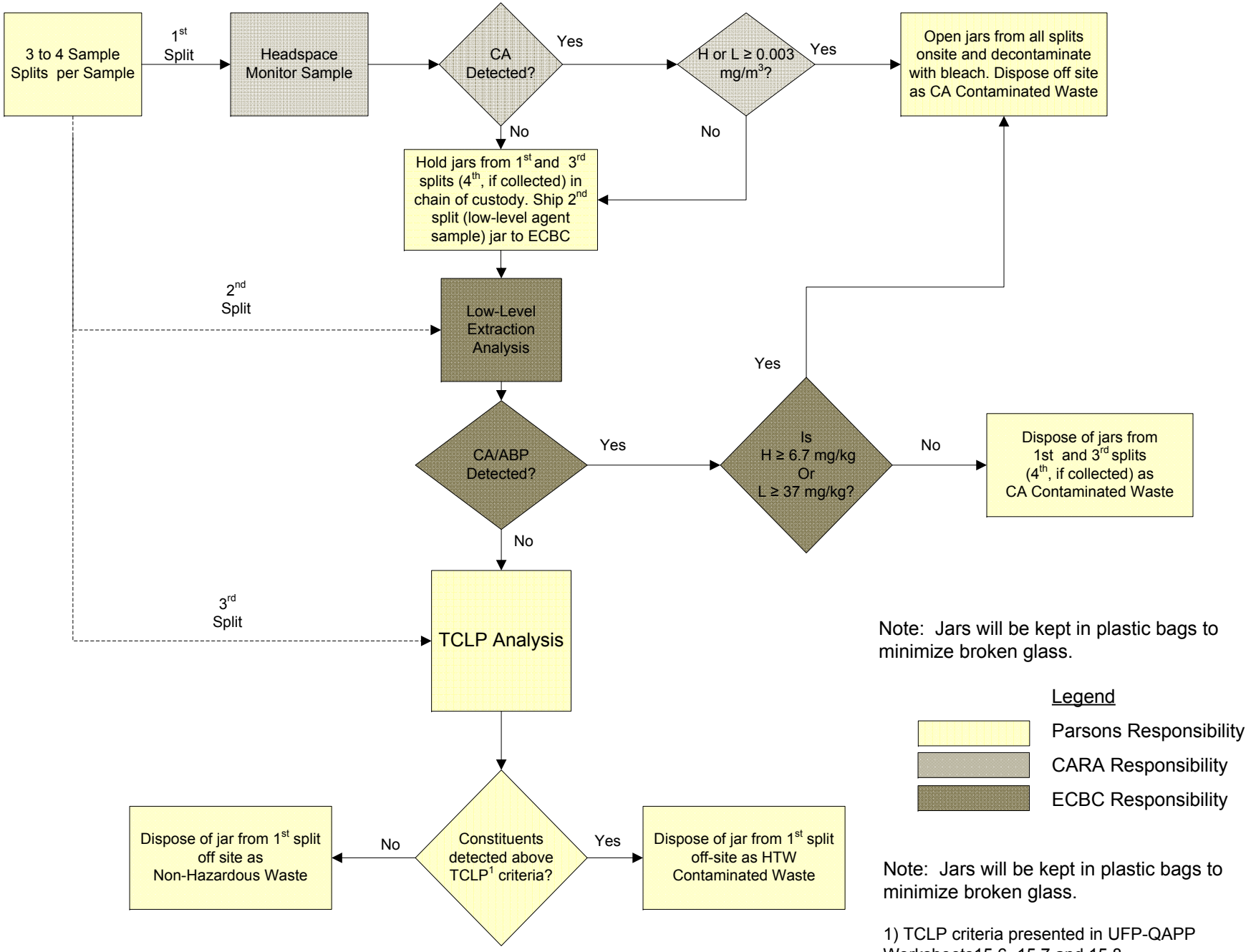


Figure 3.12
Process for IDW-Sample Jars That Contain Media
Black Hills Army Depot, Fall River County, SD



Note: Jars will be kept in plastic bags to minimize broken glass.

Legend

- Parsons Responsibility
- CARA Responsibility
- ECBC Responsibility

Note: Jars will be kept in plastic bags to minimize broken glass.

1) TCLP criteria presented in UFP-QAPP Worksheets15.6, 15.7 and 15.8.

CHAPTER 4
QUALITY CONTROL PLAN

4.1 INTRODUCTION

This quality control plan (QCP) provides procedures for controlling and measuring the quality of work throughout the execution of the tasks required by the scope of work (SOW). This plan includes the policies, responsibilities, documentation, and training requirements for maintaining the highest standards. The QCP applies to work performed by Parsons and its subcontractors. Parsons recognizes the importance of quality and has a quality process at the corporate level, with the commitment and involvement of its top management. The process provides a permanent, workable system that allows each employee to understand the job performance expected. By promoting teamwork and by focusing attention on the solutions, the quality of work can be increased and assured throughout the project.

Parsons Corporation Quality Policy

We are committed to providing quality services and products. We will, as a corporation and as individuals, meet the mutually agreed-to requirements the first time and strive for continuous improvement of our work processes.

4.2 PURPOSE OF THE QUALITY CONTROL PLAN

4.2.1 The QCP for the BHAD RI/FS has been written to encourage positive communication throughout the project team and to foster clear communication between Parsons, CARA, USAESCH, and CENWO. Honest and effective communication among the project team requires that all parties clearly understand the project requirements. This QCP includes audit procedures, and corrective/preventive action procedures for data management, field operations, equipment maintenance/calibration, PPE, and contract submittals. It documents the pass/fail criteria for quality audits as well as the records generated and the process for capturing and submitting lessons learned to the Government. The QCP also addresses site-specific and routine training requirements for contractor personnel and site visitors.

4.2.2 The QC procedures and reporting for chemical data quality management are discussed in the SAP (Appendix E) and are written in accordance with ER 1110-1-263.

4.3 ROLES AND RESPONSIBILITIES

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

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

- Implements applicable Parsons policies and procedures.
- Identifies the qualifications and selects project staff, subcontractors, and suppliers.
- Submits contract deliverables on time.
- Analyzes QC failures with the QC manager and the appropriate QC person, and then implements corrective actions.

4.3.3 The project QC manager communicates with the PM on project-related QC matters. The project QC manager, as a management representative, has the following authorities and responsibilities:

- Ensures that the QCP has been established, maintained, and implemented.
- Establishes guidelines to assist in the development of program, project, site, and task-specific QC policies and procedures.
- Initiates, recommends, approves, and provides solutions for the quality problems identified in the QCP during system audits.
- Conducts periodic audits/inspections of the project and submits reports to the Parsons sector manager with copies to the PM.
- Reports the adequacy, status, and effectiveness of ongoing projects to the Parsons sector manager.

4.3.4 The UXOQCS reports to the project QC manager on quality matters, is the key QC person on site, and has responsibility for overall quality of work performed on site. The responsibilities include, but are not limited to, the following:

- Develops QC procedures to implement the QCP;
- Verifies implementation of corrective actions;
- Initiates actions to identify and prevent the occurrence of nonconformance relating to the services and QCP;

- Stops nonconforming work;
- Ensures that QC procedures are being followed and are appropriate for demonstrating data validity sufficient to meet DQOs;
- Recommends actions to take in the event of QC failures, both to the PM and the project QC manager;
- Reports noncompliance with QC criteria to the PM and project QC manager;
- Suspends project activities when a condition adverse to quality is identified and notifies the PM and senior personnel responsible for investigation activities when such action is required;
- Conducts daily QC audits and inspections; and
- Conducts weekly and monthly QC compliance inspections.

4.4 QUALITY CONTROL METHODS AND PROCEDURES

The QC procedures for field operations include QC for the intrusive operations, geophysical data collection, GIS procedures, and environmental sampling.

4.4.1 Instrument and Equipment Testing

Instruments and equipment used to gather and generate 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. Testing, repair, or replacement records will be maintained by the SM and are subject to audit by the UXOQCS and project QC manager. Testing records of the field instrumentation will be filed with the Parsons PM after the fieldwork is completed. Instruments and equipment subject to QC checks and review include those that are used for data gathering and those that could affect project safety. These include, but are not limited to:

- GPS instruments;
- Geophysical instruments; and
- Vehicles and machinery.

4.4.2 GPS QC

A GPS unit will be used for reacquiring the anomalies picked in the geophysical data and documenting any other locations of interest observed during the project. An "out-of-the-box" inventory and inspection of the equipment will be performed (for example, batteries, including backup; data logger; data card; and cables). As part of the ongoing QC procedures, GPS equipment will be checked for proper operation by placing the system's antenna over a known point and recording the calculated location at the beginning and end of each day. GPS units used during the digital geophysical surveys will be checked using a moving test described in the geophysics work plan. Accuracy

standards are based on type of GPS receiver and applicable real-time corrections. The following standards must be met to consider the units operating correctly:

- Uncorrected course acquisition code receivers: 6 meters (for example, Garmin or Delorme handhelds in uncorrected mode);
- Wide area augmentation system (WAAS) corrected handheld receivers: 3 meters (for example, Garmin or Delorme handhelds with WAAS enabled);
- Space Base Augmentation System or Beacon corrected "one meter" receivers: 1 meter (for example, Trimble Pro-XRS or Geo-XT with beacon corrections);
- Uncorrected dual-channel carrier phase receivers: 2.5 meters (for example, Trimble 5700 real-time kinematic (RTK) or NAVCOM SF-2040G in uncorrected mode); and
- Real-time corrected dual-channel carrier phase receivers: 0.5 foot (for example, Trimble 5700 in RTK mode or NAVCOM SF-2040G when receiving StarFire corrections) for a stationary test or one foot for a moving test.

4.4.3 Analog Instrument QC

An out-of-the-box inventory and inspection of the equipment will be performed (for example, batteries, including backup; end probe; and sensitivity adjustment device) upon arrival at the site. The analog instrument, such as the Schonstedt magnetometer, will be checked at the start of each day by operating the instrument over a buried inert 20mm (or item of similar size and composition) approximately 10 centimeters bgs. This test will be conducted to verify that the equipment has the capability of detecting the smallest anticipated item. 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. The analog instruments will be used for safety and for refining the position of intrusive investigations, not for MEC detection to support the RI. This limited use does not require rigorous validation of the detection capabilities of these instruments.

4.4.4 GIS QC Procedures

4.4.4.1 The accuracy of the geographic analysis is equivalent to the accuracy of the underlying data being analyzed. Therefore, 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.

4.4.4.2 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.

4.4.4.3 **Geometric Accuracy**: After the coordinate data for control 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 dataset to represent identifiable elements of the feature such as corners or intersections. Original files will be backed up before making edits to prevent errors during the editing process.

4.4.4.4 **Geographic Accuracy**: One of the strengths of GIS is the accuracy with which geographic locations can be mapped. However, this strength can become a weakness if the 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 in accordance with the data dictionary, they will be corrected.

4.4.4.5 **Data Loss and File Corruption**: Several programs manipulate the various files used by the GIS and relational database. Due to hard disk limitations, random access memory 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.

4.4.4.6 **Schema QC**: The database values are the other part of the data structure that requires QC. The database is generally treated as a single file with unique properties. Before editing database tables, the tables will be unloaded for backing up the schema. Another safeguard is to use a reference file describing how data entry is performed.

4.4.4.7 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.

4.4.5 Chemical Data Quality Management Plan

The QCP procedures for the chemical data quality management plan are discussed in the SAP (Appendix E).

4.4.6 Preventive Maintenance

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. Extra batteries and spares of components that require frequent replacing will be kept on site.

4.4.6.1 Maintenance Procedures

Measurement equipment used on site (for example, magnetometers and monitors) will be checked daily for operational reliability. Equipment such as vehicles, backhoes, and chipping/grubbing equipment will have before-, during-, and after-operation maintenance performed in accordance with the equipment operating manual. Each piece of rental equipment will have a written maintenance schedule provided by the manufacturer that will be followed 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. At a minimum, equipment used daily will be cleaned at the end of each workday and kept in good operating condition. Qualified personnel shall perform service to equipment, instruments, and tools. In the absence of manufacturer's recommended maintenance criteria, a maintenance procedure will be developed by the operator based on experience and previous use of the equipment.

4.4.6.2 Maintenance Records

Logs will be established to record and control maintenance and service procedures and schedules. Maintenance records will be documented and traceable to the specific equipment, instruments, tools, and gauges. Records produced will be reviewed, maintained, and filed by the geophysical equipment operators or UXO technicians when this equipment is used at the site. The Parsons QC manager may audit these records to verify complete adherence to these procedures.

4.4.7 Field Data Management QC

The SM is the onsite field data manager and will be responsible for tabulating data collected and placing the data under the custody and control of the project data management system.

4.4.8 Equipment Checkout and Receiving Inspections

4.4.8.1 Equipment pre-operation checklists will be audited by the UXOQCS and recorded in the daily log. If equipment field checks indicate that equipment is not operating correctly and field repair cannot be made, the equipment will be tagged and removed from service. The SM will be notified, and a request for replacement equipment will be expedited. Replacement equipment will meet the same specifications for accuracy and sensitivity as the equipment removed from service.

4.4.8.2 When contractor-acquired property (CAP) or government-furnished property (GFP) is received, it will be examined to detect damage in transit, for completeness, and to ensure that the equipment is adequate to perform its intended task. Receiving inspections will also include a function test, if applicable. CAP and GFP are considered government property. Inventories of CAP and GFP will be performed by the individuals designated by the SM. The checkout of equipment will vary, depending on the types and models of equipment. Equipment operators must perform inspections and daily checks

when equipment is in use and when it is first received. Forms for heavy equipment daily inspection, direct reading instrument log, and vehicle inspection are provided in Appendix F. The UXOQCS will review the forms prepared by others to verify that the inspections were performed and that the equipment is in compliance.

4.5 QC INSPECTION SYSTEM

QC inspections will be conducted on an as-needed basis and on a regular schedule, depending on the type of inspection and the activities being conducted. For instance, the UXOQCS will verify that equipment checks, calibrations, and safety checks have been conducted and properly documented in the QC log. The safety/quality compliance checklist provides pass/fail criteria for audits. A summary of the inspections and results will be provided to the SM for inclusion in the daily status report. Table 4.1 shows the responsibility and schedule for QC inspection activities.

Table 4.1
Schedule of QC Activities

Activity	Responsibility	Frequency				
		As Needed	Weekly	Monthly	Quarterly	Annually
QC audits and Inspections	UXOQCS / corporate QC manager				X	
QC activity log	UXOQCS	X				
QC compliance inspections	UXOQCS		X	X		
Review corrective actions and lessons learned	UXOQCS		X			
Corrective actions	UXOQCS	X				
Approval of solutions to quality problems	Corporate QC manager	X				
QC review of work plans and reports	Senior staff / corporate QC manager	X				
Analysis of QC failures	Corporate QC manager / PM	X				
QC weekly report	UXOQCS		X			
QC report	Corporate QC manager				X	
Surveillance/reporting on overall QC program	Corporate QC manager					X

4.6 NONCONFORMING ITEMS OR ACTIVITIES AND CORRECTIVE ACTIONS

4.6.1 Identification

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 will be maintained in a log, and progress of their resolutions will be documented and reviewed monthly to ensure prompt attention to their conclusion.

4.6.2 Resolution, Corrective Action, and Verification

The appropriate level of management is responsible for evaluating the cause of a nonconformance report (NCR) and will recommend solutions for correcting the deficiency identified. Actions and technical justifications for an action proposed to resolve the nonconformance 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 actions, monitoring the effectiveness of preventive actions, and reporting any findings to the Parsons QC manager.

4.6.3 Material and Item Nonconformance

4.6.3.1 The project QC manager ensures that 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 (for example, whether the item is on hold or whether its use is conditional);
- Names and dates of the individual(s) identifying the nonconformance;
- Identification of the individual(s) or organization(s) responsible for resolution;
- Indication of the severity of the nonconformance(s); and
- Indication of the continuance or stoppage of work associated with each nonconforming activity, material, or item.

4.6.3.2 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.

4.6.4 Review and Disposition of Nonconformance

The review is conducted by the PM, project QC manager, and UXOQCS (if applicable) to ensure the following:

- The responsibility for review and disposition of nonconformance is defined.
- Nonconforming materials and items are reviewed in accordance with procedures. Nonconformance can be evaluated according to four criteria:
  - Reworked to meet the original requirements;
  - Accepted with or without repair;
  - Regraded for alternative applications; or
  - Rejected or scrapped.
- Repaired or reworked materials and items are reinspected.
- Each document used to identify and correct nonconforming conditions allows for the evaluation and approval of proposed actions by the appropriate authority.

4.6.5 Trend and Root Cause Analysis

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

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

4.6.5.2 The UXOQCS will verify the implementation of preventive actions resulting from the trend analysis. The QC manager is responsible for evaluating, on a semiannual basis, NCRs affecting quality and recommending solutions, as well as steps for verifying their implementation.

4.6.6 Lessons Learned

Opportunities to share lessons learned with the entire 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, provide a forum for dissemination among project team members, and distribute to other applicable Parsons' project locations and the Government.

4.7 AUDITS AND SURVEILLANCES

4.7.1 Audit Execution

The QC manager or designee will audit project activities at least once for every three months of field activities. Pre-audit and post-audit briefings 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 provide information on the progress of the audit and potential findings or concerns.

4.7.2 Audit Reporting

4.7.2.1 The audit results will include the following information:

- 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.

4.7.2.2 Conditions determined to be in nonconformance with the contract, procedure, or other specified requirements are identified as findings. Conditions in compliance when first identified, but which 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.

4.7.3 Review, Approval, and Verification of Recommended Action Response

The recommended corrective action proposed in response to the nonconformity will be reviewed and approved by the project QC manager. Justification for rejection of the response will be documented by the project QC manager. The project QC manager will report the implementation of corrective action to close out the audit nonconformity.

4.8 FIELD OPERATIONS DOCUMENTATION

4.8.1 Daily Field Activity Records

Field activities will be documented using standardized forms and logbooks. Forms included in Appendix F include the daily status report, safety inspection form, daily QC log, and safety audit form. Electronic copies of completed forms will be provided on a weekly basis. Field activity logbooks will be maintained daily, if applicable, and entries will be clearly recorded in ink. Personnel will use bound and numbered field logbooks with consecutively numbered pages. The following logs will be maintained:

Daily activity log, including:

- Date and recorder of field information;
- Start and end time of work activities, including breaks, lunch, and down times;
- Visitors;
- Weather conditions;
- Relevant events;
- Important phone calls;
- Changes from approved or planned work instructions; and
- Signature of the Parsons SM.

Safety log, including:

- Date and recorder of log;
- Tailgate safety briefing (time conducted and by whom);
- Weather conditions;
- Significant site events relating to safety
- Accidents;
- Stop work due to safety;
- Safety audits; and
- Signature of the Parsons SM indicating concurrence.

Training log, including:

- Date and recorder of log;
- Nature of training (personnel will complete the site-specific training form);
- Visitor training; and
- Signature of both the Parsons SM and the SSHO indicating concurrence.

QC activity log, including:

- Date and recorder of log;
- Ordnance accountability;
- Equipment testing (daily GPS position test);
- Equipment monitoring results;
- QC audits (analog QC);
- NCRs; and
- Signature of the Parsons SM indicating concurrence.

Explosives usage record, including:

- Date and recorder of log;

- Assigned identification number;
- Type, condition, and location;
- Disposition; and
- Signature of the Parsons SM indicating concurrence.

4.8.2 Photographic Records

Digital photographic records of significant site activities will be maintained by site personnel. Photographic records will supplement information recorded in the daily activity logs, including photographs of equipment before use and the condition of site locations before, during, and after field activity. Photographs will be taken of MEC/CWM and representative samples of munitions debris or cultural debris.

4.8.3 Working Maps

Working maps of the site will be used to track the progress of field activities. As anomalies are reacquired, the assigned technician will note the progress on the map.

4.8.4 Dig Sheets

A written record will be kept of each anomaly excavated and the results of intrusive excavations. The dig sheets will contain unique identification numbers for the anomalies and contain information on the locations and status of anomalies. Examples of dig sheets can be found in Appendix F (Forms). Detailed grid anomaly maps are provided in Appendix N.

4.8.5 Records of Inert Ordnance Items

4.8.5.1 All MPPEH will be inspected, certified, and disposed of in accordance with DoD Instruction 4140.62 - Management and Disposition of MPPEH, DoD Manual 6055.9-M – DoD Ammunition and Explosives Safety Standards, and EM 1110-1-4009 Engineering and Design - Military Munitions Response Actions. All MPPEH will be assessed and its explosives safety status will be determined and documented prior to transfer. Prior to release to the public, MPPEH will be documented by authorized and technically qualified Parsons personnel as material documented as safe (MDAS) after a 100% inspection and an independent 100% re-inspection to determine that it is safe from an explosives safety perspective. Certification will be documented on a Form 1348-1A.

4.8.5.2 Once inspected and certified, the MDAS will be placed in an onsite storage container and safeguarded until proper disposition can be arranged. The storage container will be locked at all times when not in use. MDAS will be segregated from other metallic debris. All MDAS shall be disposed of at a foundry and/or recycler where it will be processed through a smelter prior to resale or release in accordance with all governing regulations. Parsons will document transport of MDAS to the next responsible party and will provide certification of destruction as part of the RI report

4.8.6 Field Office and Communications

Field QC procedures will include establishing site office entry requirements and communication protocols. The site office will consist of a project trailer that has electric power and communications lines for phone and fax. Official visitors will report to the site office to sign in. No official visitors will be allowed to visit any portion of the site without an escort. Internal communications will be by use of a two-way radio or cell phone. Official external communications will be via cell phone from the site office or field site.

4.9 TRAINING

4.9.1 General

Qualifications and training of project personnel will comply with the requirements specified in Chapter 5 of the APP (Appendix D). The UXOQCS will verify that the required training has been conducted and will audit the training documentation for compliance.

4.9.2 Training Requirements

4.9.2.1 Parsons and subcontractor personnel assigned to perform activities affecting quality and safety are required to review this plan. Additional training in the QC requirements and responsibilities from this plan will be included in the classroom training at the start of the intrusive investigation. Updates may be provided during daily safety briefings.

4.9.2.2 Implementing the training program specified in Chapter 5 of the APP (Appendix D) will ensure that project personnel meet the following requirements:

- Understand the safety conditions and requirements of the work task;
- Possess adequate knowledge of the processes and procedures needed to conduct assigned tasks;
- Have working knowledge of the tools to be used;
- Understand DQOs for the work process;
- 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.

4.9.2.3 Visitors shall be required to go through safety training and an orientation to the general and specific hazard requirements.

4.9.2.4 Training records, including certifications, will be maintained as project records. Documentation of their review by the UXOQCS or project QC manager will be maintained in accordance with requirements in this QCP.

CHAPTER 5
EXPLOSIVES MANAGEMENT PLAN

5.1 PURPOSE

5.1.1 This explosives management plan outlines the explosives management procedures Parsons and the UXO subcontractor will use while performing the RI at the BHAD. The procedures listed here are in accordance with DID WERS-002.01 and the following documents:

- DoD 6055.9-M, DoD Ammunition and Explosives Safety Standards;
- EM 385-1-97, Explosives Safety and Health Requirements Manual;
- Bureau of Alcohol, Tobacco, Firearms and Explosives (BATF) Publication 5400.7, Federal Explosives Laws and Regulations;
- Federal Acquisition Regulation 45.5;
- Applicable sections of U.S. Department of Transportation (DOT), 49 CFR Parts 100-199; and
- Local and state laws and regulations.

5.1.2 The SUXOS will maintain a copy of the following documents on site. These documents will be made available, upon request, to any authorized Federal, state, or local authority:

- BATF User of High Explosives License; License Number 1-FL-103-20-1J-00784 (Expiration Date: September 1, 2014) (Figure 5.1);
- A letter signed by the UXO subcontractor's authorized official designating the onsite personnel who are authorized to purchase, receive, access, and use explosives.

5.1.3 Explosives may be needed for the investigation in the event that conventional MEC is recovered at the site. Parsons, with the UXO subcontractor, will be responsible for complying with BATF requirements for on-call explosives needed for the destruction of MEC.

5.1.4 Before fieldwork starts, the UXO subcontractor will designate one of their UXO technician III personnel at the project site as the demolition team leader (DTL). The DTL will be responsible for maintaining documentation concerning demolition materials and, by signing the receipt documents, will assume accountability for the material. Further responsibilities of the DTL are described later in this chapter.

5.1.5 Details regarding explosives siting and site facilities are presented in the CSP (Appendix K).

5.2 ACQUISITION

Parsons and the UXO subcontractor hold BATF permits to purchase and use explosives. These permits will be available on site for Federal, state, or local inspection. Delivery of demolition explosives required for the destruction of UXO will be coordinated by the UXO subcontractor with a local explosives distributor.

5.2.1 Description and Estimated Quantities

The UXO subcontractor will order up to the maximum amount of commercial counter charges and initiating explosives allowed to be stored on site, which is 100 lbs net explosive weight (NEW). This quantity will be used as needed for disposal and demilitarization operations and will be restocked as often as is necessary to carry out demolition operations for the duration of the project.

5.2.2 Acquisition Source

The UXO subcontractor will purchase the necessary explosives and demolition materials from a licensed commercial explosives distributor, who will deliver the materials to the site. The DTL will be authorized to request and receive explosives from the explosives distributors.

5.2.3 Listing of Proposed Explosives

The explosives listed in Table 5.1 are the demolition materials, quantities, and NEW required for the initial shipment.

Table 5.1
Proposed Initial Shipment of Explosives

Type	Contents	Hazard Division	Amount	Net Explosive Weight (lbs)
High explosive	1 lb boosters	1.1D	50 each	50
	Detonating cord (80 grain)	1.1D	1,000 feet	11.44
	Perforator	1.4S	50 each	0.5
Total NEW				**61.94**
Initiating explosives	Blasting cap, electrical	1.4B	5 each	0.096
Total NEW				**62.036**

5.3 INITIAL RECEIPT

Shipments of explosives will be by the explosives distributor in accordance with Federal and state transportation requirements. The explosive distributor is responsible for all permits and documentation required by Federal, state, and local regulations.

5.3.1 Procedures for Receipt of Explosives

The DTL and UXOQCS will conduct a 100 percent inventory of incoming explosives to reconcile the delivery shipping documentation with the amounts of explosives ordered and received. This procedure will involve checking the type, quantity, and lot number of each explosive item received against both the quantity ordered and the shipping manifest, and recording this information on the magazine data card (Appendix F). The magazine data card will remain in the magazine with the explosive items and be updated upon each issue and receipt (see 5.6). Discrepancies will be addressed as described in 5.7.2. If there are no document discrepancies, the DTL will sign the receipt documents and will assume accountability for the material. The DTL will maintain both the original receipt documents, a duplicate magazine data card, and the explosives usage record (Appendix F) on file with the SUXOS.

5.3.2 Procedures for Reconciling Receipt Documents

As described in 5.3.1 the DTL and UXOQCS will conduct a 100 percent inventory of the incoming explosives to reconcile the delivery shipping documentation with the amounts of explosives ordered and received. Shortages or overages of explosives will be immediately reported to the SUXOS, the Parsons SM, and the Parsons and UXO subcontractor PMs. The UXO subcontractor PM will contact the explosives distributor and reconcile any differences, and the Parsons PM will notify the USACE PM. The DTL will only sign the receipt documents for the actual quantity of material received and actual quantities will be correctly annotated on the shipping documentation prior to delivery acceptance.

5.4 STORAGE

5.4.1 Storage Magazines

Parsons will store explosives in a portable BATF Type 2 explosives storage magazine with an attached, separate, detonator magazine (or in two separate magazines, to comply with explosive compatibility requirements (that is, storing bulk explosives separately from initiating explosives). The portable magazine(s) will be installed and maintained to comply with applicable storage and distance requirements as described in Chapter 9 of DoD 6055.9-M, Ammunition and Explosive Safety Standards. The CSP (Appendix K) provides details on the magazine storage location.

5.4.2 Establishment of Storage Facilities

5.4.2.1 Parsons will comply with BATF, other Federal, and state storage and compatibility criteria and procedures when siting the portable explosives storage magazines. These include:

- Use of portable, approved, BATF Type 2 structures;
- Location, installation, and maintenance of the magazine(s) to comply with the magazine criteria and quantity-distance (Q-D) requirements established in BATF Publication (ATFP) 5400.7 and DoD 6055.9-M, DoD Ammunition and Explosives Safety Standards;
- Installation of sufficient magazines, or a type of magazine with an attached separate detonator magazine, to comply with explosive compatibility requirements (that is, storing bulk explosives separately from initiating explosives); and
- Compliance with National Fire Protection Association 780: Standard for the Installation of Lightning Protection Systems.

5.4.2.2 The SUXOS and DTL will verify the condition of the magazines prior to their use for the storage of explosives.

5.4.3 Physical Security of Storage Facilities

The explosives storage magazines will be located within a fenced compound. The magazines will be locked with two high-security padlocks that meet BATF ATFP 5400.7, Section 55.208(a). The keys for the storage magazine will be kept by the SUXOS and DTL, both of whom will be responsible for controlling access to the magazines. The magazine storage area will be inspected every workday by the DTL and the UXOSO or UXOQCS to ensure the integrity of the magazine(s). Access to the magazine(s) will be limited to the SM, SUXOS, demolition team, UXOSO, UXOQCS, and USACE safety personnel.

5.5 TRANSPORTATION

During transportation of explosive materials, safety is the primary concern. Transportation of explosives and demolition materials will comply with Federal, state, and local regulations. The UXO subcontractor will secure permits as required for transportation of the explosives to be used on site. The most expeditious route will be used when transporting explosives from the explosives storage facility to the detonation location.

5.5.1 Procedures for Transportation from Storage to Disposal Location

Should transportation of explosives at the BHAD project site require travel on public highways, placarding and inspections will be conducted in accordance with applicable

DOT sections of 49 CFR Parts 100-199 and a DD Form 626. 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 may be issued and may transport explosive materials, with the second individual in the vehicle being a minimum of a UXO technician II. 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 miles per hour (mph).
- Personnel will not ride in the cargo compartment of a vehicle transporting explosives.

5.5.2 Explosives Transportation Vehicle Requirements

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 or a DD Form 626 (Appendix F), as applicable;
- Vehicle engines will not be running when loading or 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 BC-rated (or higher) fire extinguishers, and a means of communication with the UXOSO.

5.6 RECEIPT PROCEDURES

The SUXOS and DTL 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 DTL and UXOQCS.

5.6.1 Records Management and Accountability

All original explosives records will be forwarded to the UXO subcontractor's office for archiving in accordance with BATF regulations. Copies of all records will be maintained on site by the SUXOS and will be available for inspection by authorized agencies and personnel. Explosives items will be tracked by their respective lot number until the item is expended, transferred to Government control and accountability, or returned to the distributor.

5.6.2 Authorized Individuals

The UXO subcontractor will provide explosives distributors with documentation of individuals authorized to request and receive explosives. The individuals authorized to receive and issue explosives are the DTL and the UXOSO. The SUXOS will designate in writing the individual(s) authorized to transport and use explosives at the project site.

5.6.3 Procedures for Reconciling Receipt Documents and Proposed Intervals

As described in 5.3.2, the DTL will reconcile the delivery shipping documentation with the requested amounts ordered and received. Any shortages or overages will be immediately reported to the SUXOS, Parsons SM, and Parsons and UXO subcontractor PMs. The UXO subcontractor PM will contact the explosives distributor and reconcile any differences, and the Parsons PM will notify the USACE PM.

5.6.4 Certification

The SUXOS and DTL will sign and date the explosives usage record (Appendix F) certifying that the explosives were used for their intended purpose.

5.7 INVENTORY PROCEDURES

The DTL and UXOQCS will perform a physical inventory of explosives stored at the project site each week and each time there is a delivery (at a minimum). The DTL and UXOQCS will also conduct complete physical inventories after any issues/turn-ins of demolition material. The purpose of these inventories is to reconcile the actual quantities stored and used with the quantities annotated on the magazine data card and explosives usage record (Appendix F).

5.7.1 Physical Inventory Procedures

5.7.1.1 The SUXOS and DTL will strictly control access to all explosives. All issues and turn-ins of explosives will be properly documented and verified, through physical count, by the DTL and UXOQCS. On receipt, the type, quantity, and lot number of each explosive item will be recorded on the magazine data card (Appendix F).

5.7.1.2 The DTL will review all requests for explosives from the individual operating sites and only sufficient explosives for the day's operations will be requested and issued. All issues of explosives will be recorded on the explosives usage record (Appendix F) and deducted from the magazine data card (Appendix F), as well as being 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.

5.7.1.3 At the end of each disposal operation, the DTL and UXOQCS will reconcile the entries on the explosives usage record (Appendix F) and then turn these records over to the SUXOS. The record of ordnance items destroyed along with the explosives consumed will be kept in the SUXOS' daily log.

5.7.1.4 Entries made on the magazine data cards and explosives usage records will be verified through physical count by the DTL, and corroborated by the UXOQCS, when drawing or turning-in the explosives.

5.7.2 Procedures for Reconciling Inventory Discrepancies

The DTL and UXOQCS will be responsible for performing a weekly inventory of the explosives stored within the magazine(s). If a discrepancy is discovered between the recorded inventory and the quantity of explosives stored within the magazine, then the explosives usage record and other relevant sources of information will be reviewed to ensure that inventory records are current. If this records review does not reconcile the discrepancy, the situation will be reported to the Parsons PM, USACE PM, and USACE contracting officer for investigation (also see 5.9).

5.8 INSPECTION OF MAGAZINES

The Parsons SM, SUXOS, and/or the DTL will inspect the magazine(s) at least the first work day of each week. This inspection need not be an inventory, but must be sufficient to determine whether there has been unauthorized entry or attempted entry into the magazines, or unauthorized removal of the contents of the magazines.

5.9 REPORTING LOSS OR THEFT OF EXPLOSIVE MATERIALS

If it is confirmed that explosives are missing, the Parsons PM will contact the USACE contracting officer immediately by telephone, and in writing within 24 hours. In

addition, the Parsons PM will notify the BATF and immediately begin an investigation. USACE authorities will be notified and a written report will be issued within 24 hours. Individuals or agencies that should be notified immediately include the following:

- USACE contracting officer: Ms. Janice Jamar, (256) 895-1793;
- USACE PM: Allyn Allison (256) 895 -1121;
- USACE safety specialist: TBD;
- BATF Rapid City satellite office: (605) 355-0015; and
- Fall River County sheriff: (605)745-4444.

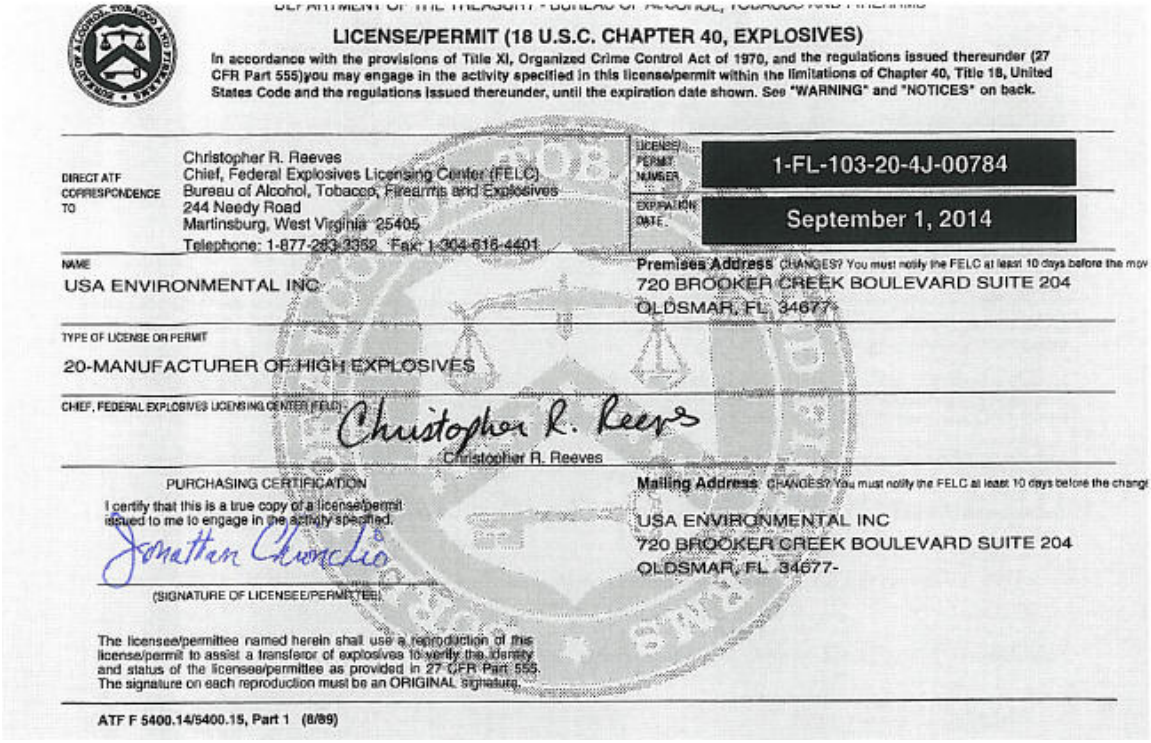
5.10 PROCEDURES FOR RETURN TO STORAGE OF EXPLOSIVES NOT EXPENDED

Explosives issued for use, but not expended, will be returned daily to the magazine(s) following the completion of disposal operations. The DTL will record the transaction on the magazine data card and explosives usage record (Appendix F).

5.11 DISPOSAL OF REMAINING EXPLOSIVES

During operations at BHAD, Parsons and the UXO subcontractor will minimize the explosives inventory stored at the project site. At the end of site activities, Parsons will perform an economic analysis to determine the most cost-effective method to manage the remaining explosives. This information will be forwarded to the USACE PM and contracting officer for consideration and selection. The available alternatives may include one of the following or a combination thereof: returning unopened containers to the commercial distributor/manufacturer for credit; transferring stocks to another USACE project; donating the remaining demolition material to local law enforcement; or destroying the remaining stores. Returned, destroyed, or transferred items will be recorded on the magazine data card and explosives usage record (Appendix F).

Figure 5.1 Bureau of Alcohol, Tobacco, Firearms and Explosives License of USA Environmental



LICENSE/PERMIT (18 U.S.C. CHAPTER 40, EXPLOSIVES)

In accordance with the provisions of Title XI, Organized Crime Control Act of 1970, and the regulations issued thereunder (27 CFR Part 555)you may engage in the activity specified in this license/permit within the limitations of Chapter 40, Title 18, United States Code and the regulations issued thereunder, until the expiration date shown. See "WARNING" and "NOTICES" on back.

DIRECT ATF CORRESPONDENCE TO
Christopher R. Reeves
Chief, Federal Explosives Licensing Center (FELC)
Bureau of Alcohol, Tobacco, Firearms and Explosives
244 Needy Road
Martinsburg, West Virginia 25405
Telephone: 1-877-283-3362 Fax: 1-304-616-4401

LICENSE/PERMIT NUMBER: 1-FL-103-20-4J-00784

EXPIRATION DATE: September 1, 2014

NAME
USA ENVIRONMENTAL INC

Premises Address CHANGES? You must notify the FELC at least 10 days before the mov
720 BROOKER CREEK BOULEVARD SUITE 204
OLDSMAR, FL 34677-

TYPE OF LICENSE OR PERMIT
20-MANUFACTURER OF HIGH EXPLOSIVES

CHIEF, FEDERAL EXPLOSIVES LICENSING CENTER (FELC)
Christopher R. Reeves
Christopher R. Reeves

PURCHASING CERTIFICATION
I certify that this is a true copy of a license/permit issued to me to engage in the activity specified.
Jonathan Chronchio
(SIGNATURE OF LICENSEE/PERMITTEE)

Mailing Address CHANGES? You must notify the FELC at least 10 days before the chang
USA ENVIRONMENTAL INC
720 BROOKER CREEK BOULEVARD SUITE 204
OLDSMAR, FL 34677-

The licensee/permittee named herein shall use a reproduction of this license/permit to assist a transferor of explosives to verify the identity and status of the licensee/permittee as provided in 27 CFR Part 555. The signature on each reproduction must be an ORIGINAL signature.

ATF F 5400.14/5400.15, Part 1 (8/89)

CHAPTER 6
ENVIRONMENTAL PROTECTION PLAN

6.1 INTRODUCTION

6.1.1 This EPP was prepared for the former BHAD RI/FS for BG-1, BG-2, and the Chemical Plant Area in accordance with DID WERS-001 and the SOW. The purpose of the EPP is to establish general procedures for avoiding, minimizing, and mitigating potential impacts on environmental and cultural resources during field activities. Information sources used to prepare this plan included, but were not limited to:

- USFS staff;
- South Dakota Natural Heritage Program resources;
- South Dakota State Historic Preservation Office resources;
- U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory Maps;
- Natural Resources Conservation Service soil maps;
- U.S. Geological Survey (USGS) 7.5- minute topographic maps; and
- Aerial photographs.

6.1.2 The locations of BG-1, BG-2 and the Chemical Plant Areas are presented on Figure 1.2. The following sections discuss the natural resources and issues present within these sites, as well as the details, procedures, and methods to protect or mitigate them.

6.2 THREATENED AND ENDANGERED SPECIES

As of the date of the 2009 OU-1 RI, no threatened and endangered (T&E) species had been found at the site (URS, 2009). According to the USFWS, there are no T&E species in the vicinity of the former BHAD (USFWS, 2010). Also, personnel at the Fall River Ranger District who are local resource experts were consulted regarding T&E species and did not identify any within the investigation areas.

6.3 WETLANDS

USFWS National Wetland Inventory maps and aerial photographs were used to evaluate potential wetlands. These maps indicates that two freshwater emergent wetlands, four freshwater ponds, and two other water sources are located within BG-2. These features are depicted on Figure 6.1. Discussion with USFS personnel indicate that these areas contain very little water and should not be a concern during the investigation (2011c,

Parsons). To minimize impacts in the event that they contain water in the future, no roads or other structures will be constructed in these areas.

6.4 CULTURAL AND ARCHEOLOGICAL RESOURCES

There are no known archeological or culturally significant sites in the areas of investigation. Separate field archeological investigations are not proposed as part of this project. The primary intrusive activities will take place in areas that have been previously disturbed; therefore, it is unlikely that cultural artifacts will be encountered. The USFS, which manages most of the land within BG-2, DP-31, and DP-32, employs a paleontologist and archeologist who will be notified in the event that potential cultural artifacts are encountered during the investigation activities in BG-2, DP-31, and DP-32 (2011a, Parsons). BG-1, DP-19, and DP-35 are on privately owned land, and if one of these investigation areas is confirmed to be associated with cultural artifacts, excavation will cease and the USAESCH and property owner will be notified.

6.5 WATER RESOURCES

6.5.1 The primary water resource at the investigation areas is Cottonwood Creek, which is in the northern portion of the Chemical Plant Area (Figure 1.2). BG-1 and BG-2 are on upland sites and do not encompass any water resources. (Parsons, 2011a). Standing water is unlikely to occur on the site, but if pools or drainage channels with more than a few inches of water are encountered, they will not be entered for safety reasons.

6.5.2 Parsons will perform project activities in a manner that prevents the discharge of pollutants into adjacent waterways within and outside the area. If necessary, the use of berms, dikes, and barriers with silt fencing will be employed to control water runon/runoff and sediment migration or siltation. All sediment and erosion control measures will be monitored and properly maintained.

6.6 COASTAL ZONES

The former BHAD lies outside the coastal zone, so there is no potential for impacts on coastal resources.

6.7 TREES AND SHRUB REMOVAL

Field activities will include limited brush clearing (primarily sagebrush) using a combination of mechanized equipment and hand tools. Clearing will provide access to operate and maneuver field equipment, perform geophysical mapping, and investigate geophysical anomalies. The brush clearing activities will also involve mowing access roads to reduce the potential for starting fires with hot vehicle engines.

6.8 WASTE DISPOSAL SITES

Waste materials generated by site operations, such as trash and general debris, will be collected and placed in appropriate trash receptacles for removal and disposal by an authorized waste contractor. Within the investigation areas, MEC or CACM-related scrap metal and debris will be segregated, certified, and properly disposed off site. See Chapter 3 of this work plan for information on waste disposal.

6.9 IMPACT MITIGATION MEASURES

The following measures will be taken to mitigate the environmental impacts during onsite activities for surveying, brush clearing, geophysical mapping, reacquisition of anomalies and disposal pits, and excavation of anomalies:

- If significant mitigation of any other type is required, it will be accomplished by USAESCH and CENWO through Parsons.
- Damage to trees, shrubs, and the native wildlife habitat will be minimized to the greatest extent possible. Areas that have been impacted by the project will be restored to the greatest extent practicable to the previously existing condition at the completion of the project.
- Excavated soil will be placed adjacent to the excavation and returned to its original location when possible. If needed, fabric silt fencing or other erosion-control structures will be constructed to prevent sediment migration. The area of soil exposed during excavation activities will be kept to a minimum and soil piles will be covered with plastic sheeting or a tarp to minimize soil runoff.
- All excavations will be restored by backfilling with the displaced soil or clean fill brought to the site. Backfilling will be accomplished using mechanized equipment and manually with shovels and rakes in smaller areas.
- No burning activities will take place during this project, so air pollution from smoke will not be a concern. Parsons will monitor for excessive dust levels during intrusive operations that involve heavy equipment and will apply control measures, such as soil wetting, as needed.
- Air emissions sources will consist of heavy equipment used on site, site vehicles, and generators. All vehicles and equipment will be in good working order and will meet applicable vehicle emissions requirements.
- Access roads may require brush mowing to reduce vehicle-started fires, and it may be necessary to place gravel on some roads to prevent vehicles from getting stuck during rain events.
- The temporary facilities and storage areas that will be used during the project consist of the site office and scrap and roll-off holding area.
- Fueling for heavy equipment will be performed onsite. If a severe leak of fuel or other fluid such as hydraulic or transmission fluid occurs in the field because of a tank puncture or a ruptured line, the following should be implemented:

- Promptly berm the area with soil so that the fuel or fluid does not spread along the ground surface.
- Apply oil-absorbing material such as sawdust or kitty litter to the spill. This material will be stored onsite.
- Report the spill to the SM and follow instructions for cleanup. It is anticipated that this will involve digging up and drumming contaminated soil, followed by its disposal. All reportable spills will also be reported to the onsite USAESCH Safety.

In the event of a spill, notifications and procedures will be followed in accordance with 8.11 of the BHAD SOP document.

6.10 IDENTIFICATION AND COMPLIANCE WITH PRELIMINARY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

6.10.1 Applicable or relevant and appropriate requirements (ARARS) were developed and approved during the OU-1 and OU-2 RIs conducted at BHAD in 2005 and 2009. The following text and tables were taken from these reports (USACE, 2005 & URS, 2009), and updates were made as applicable.

6.10.2 The Superfund Amendments and Reauthorization Act (SARA) of 1986 requires attainment of Federal and state ARARs. A requirement under other environmental laws may be either applicable or relevant and appropriate to remedial activities at a site, but not both. Onsite remedial actions must meet the ARARs of the Resource Conservation and Recovery Act (RCRA); Clean Water Act (CWA); Clean Air Act (CAA); Toxic Substances Control Act (TSCA); Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA); and other Federal and state environmental laws, as required by CERCLA (Section 121). These ARARs typically serve as threshold criteria for site cleanup.

6.10.3 South Dakota identified applicable or relevant and appropriate state statutory and regulatory requirements for the BHAD FUDS remedial action(s). Remedy selection and ARARs refinement will be presented in the Decision Documents. As provided by Section 121 of CERCLA (42 U.S.C. § 9621) where more than one ARAR applies to a contaminated medium or cleanup activity, the more stringent standard, requirement, criteria, or limitation will be used.

6.10.4 Applicable requirements are those cleanup criteria, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances at a site. In other words, they would be legally applicable notwithstanding CERCLA. Applicable standards can be either state- or Federal-based.

6.10.5 If a requirement is not applicable, it may still be relevant and appropriate. The basic considerations are whether the requirement: 1) regulates or addresses problems or situations sufficiently similar to those encountered at the subject site (i.e., relevance), and

2) is appropriate to the circumstances of the release or threatened release, such that its use is well suited to the particular site. A requirement might be relevant but not appropriate for a specific site; in this case, the requirement would not be an ARAR. Determining whether a requirement is relevant and appropriate is site-specific and must be based on best professional judgment. This judgment is based on a number of factors, including the characteristics of the remedial action, the hazardous substances present at the site, and the physical circumstances of the site and the release.

6.10.6 Compliance with all requirements found to be applicable or relevant and appropriate is required under SARA. Waivers of ARARs may be obtained under the provisions of SARA under certain circumstances. These waivers apply only to meeting ARARs with respect to remedial actions on site; other CERCLA statutory requirements, such as the requirement that remedies be protective of human health and the environment, cannot be waived.

6.10.7 Identification of ARARs, made on a site-specific basis, involves a two-part analysis: 1) determining if a requirement is applicable and 2) if the requirement is not applicable, determining if it is both relevant and appropriate.

6.10.8 The USEPA has identified three categories of ARARs:

- Chemical-specific (health- or risk-based values established under statutes)
- Action-specific (e.g., performance design standards used during remediation)
- Location-specific

6.10.9 In addition to ARARs, other criteria, advisories, and guidance developed by state and Federal agencies may be relevant considerations for the identification and implementation of remedial alternatives. These "To Be Considered" (TBC) criteria are not legally binding. They are typically useful in determining what is protective for a site and are intended to complement ARARs in developing remedial alternative or removal actions. In this category, however, South Dakota has identified no TBCs.

6.10.10 The following categories or regulations and criteria were considered for identification of ARARs for this investigation:

- Solid and Hazardous Waste Management (RCRA, South Dakota)
- Underground Storage Tank (UST) Management (RCRA, SDDENR)
- Water Pollution Programs (South Dakota)
- CWA
- Safe Drinking Water Act (SDWA)
- Drinking Water and Groundwater Quality Standards (South Dakota)
- Surface Water Quality Standards (South Dakota)
- Remediation Criteria for Petroleum-Contaminated Soils (SDDENR)

- TSCA
- CAA
- Air Pollution Control
- Emergency Planning and Community Right-to-Know
- FIFRA
- National Historic Preservation Act and Cultural Resources
- Endangered Species Act and Natural Resources
- Fish and Wildlife Coordination Act
- Scenic Rivers Act
- Farmland Protection Policy Act
- Occupational Safety and Health
- Various Safety Practices

6.10.11 The following criteria were identified as TBC criteria for use in the risk evaluation process and/or development of recommendations for remedial action or further investigation.

- Drinking Water Health Advisories (USEPA)
- USEPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites for Soil, November, 2011 (USEPA, 2011)

6.10.12 Tables 6.1 through 6.6 identify potential chemical-, action-, and location-specific ARARs and TBC criteria that might apply to investigation activities. These are also identified to support the selection and implementation of remedial alternatives.

Table 6.1
Potential Chemical-Specific ARARs
Black Hills Army Depot, South Dakota

Standard, Requirement, or Criterion	Description	Comment
Federal		
Safe Drinking Water Act (SDWA) (42 United States Code [U.S.C.] Sect. 300(f) et Seq.)		
National Primary Drinking Water Standards (40 Code of Federal Regulations [CFR] Parts 141, 142, (1990, 1991))	Establishes maximum contaminant levels (MCLs) for specific contaminants, which are health-based standards for public drinking water systems.	Applicable. Ground water quality standards are potential ARARs for ground water cleanup when public drinking water systems are present.
Solid Waste Disposal Act (SWDA), as amended by Resource Conservation and Recovery Act of 1976 (RCRA) (42 U.S.C. Sect 6901-6987)		
Definition of solid waste (40 CFR 261.2)	Defines when munitions become solid waste.	Applies to remedial activities.
Characteristics of Reactivity (40 CFR 261.23)	Identifies solid waste subject to regulations as hazardous waste.	Applies to remedial activities.
Release from Solid Waste Management Units (40 CFR 264)	Subpart F (264.94) gives concentration limits in ground water for hazardous constituents from a regulated unit.	Not Applicable or Relevant and Appropriate (ARAR). Applicable only to permitted treatment, storage, or disposal units.
	Subpart N provides land disposal operating standards.	Applicable if on-site disposal is part of the remedy.
RCRA Facility Investigation Guidance (USEPA, 1989)	Guidance levels for cleanup of contaminated soils based on USEPA-derived chronic exposure assumptions; intended as screening levels at RCRA facilities to determine if a more detailed health-risk evaluation is warranted.	To be considered (guidance, not statutory or regulatory requirements).
Federal Water Pollution control Act (FWPCA), as amended by the Clean Water Act (CWA) of 1977 33 U.S.C. Sect. 1251-1376		
Designation of Hazardous Substances (40 CFR 116)	Designates hazardous substance the discharge of which are regulated under Section 11(b)(2)(A) of the CWA.	Not applicable. No discharges into waters of the U.S. are occurring at the site.

Table 6.1 (Continued)
Potential Chemical-Specific ARARs
Black Hills Army Depot, South Dakota

Standard, Requirement, or Criterion	Description	Comment
Federal		
Federal Water Pollution control Act (FWPCA), as amended by the Clean Water Act (CWA) of 1977 (Continued) 33 U.S.C. Sect. 1251-1376		
National Pollutant Discharge Elimination System (NPDES) (40 CFR 125)	Establishes procedures for determination of effluent limitations for discharges of pollutants to navigable waters.	Not applicable. No treatment or discharge into navigable waters is occurring.
Toxic Pollutant Effluent Standards (40 CFR 129)	Establishes effluent standards for certain toxic pollutants (as designated by 40 CFR 401); aldrin/dieldrin, dichlorodiphenyltrichloroethane (DDT), endrin, toxaphene, benzidine. polychlorinated biphenyls (PCBs).	Not applicable. No discharge of effluent is expected.
Ambient Water Quality Standards (40 CFR 131)	Requires state to develop water quality criteria for surface waters based on their use and the criteria provided under Section 304(a) of the CWA.	Not applicable. No surface water present at the site.
Guidelines Establishing Test Procedures for the Analysis of Pollutants (40 CFR 136)	Specific analytical procedures to NPDES applicants and reports.	Not applicable. No discharge into surface water is expected.
Clean Air Act (42 U.S.C. Sect. 7401-7642)		
National Primary and Secondary Ambient Air Quality Standards (40 CFR 50)	Establishes ambient air quality standards to protect public health and welfare.	ARAR for lead (40 CFR 50.12 – National primary and secondary ambient air quality standards for lead.).
National Emissions Standards for Hazardous Air Pollutants (NESHAPs) (40 CFR 61)	Establishes emission standards for certain industrial pollutants and sources.	ARAR for lead.
Occupational Safety and Health Administration (OSHA) Act		
29 CFR 1910.1000	Establishes permissible exposure limits for airborne contaminants.	Applies to remedial activities.
State		
Hazardous Waste Management (South Dakota Codified Law, Title 34A, Chapter 11)		
Hazardous Waste, Administrative Rules of South Dakota (ARSD) 74:28	Identifies solid wastes subject to regulations as hazardous wastes.	Applies to remedial activities.

Table 6.1 (Continued)
Potential Chemical-Specific ARARs
Black Hills Army Depot, South Dakota

Standard, Requirement, or Criterion	Description	Comment
Air Pollution Control (South Dakota Codified Law Title 34A, Chapter 1)		
Air Pollution Control Requirements, Ambient Air Quality Standards, ARSD 74:36, Chapter 2	Establishes ambient air quality standards to protect public health and welfare.	ARAR for lead; 40 CFR 50.12 – national primary and secondary ambient air quality standards for lead.
Water Pollution Control (South Dakota Codified Law Title 34A, Chapter 2)		
Groundwater Quality Standards, ARSD 74:54, Chapter 1	Establishes the maximum concentration limits for ground water in the state of South Dakota.	Applicable. Groundwater quality standards are potential ARARs for groundwater cleanup.
Surface Water Quality Standards, ARSD 74:51, Chapter 1	Establishes water quality standards for surface waters in the state of South Dakota.	Potentially applicable to surface water and/or effluent limitations on discharges to surface waters.
Safe Drinking Water (South Dakota Codified Law Title 34A, Chapter 3A)		
Drinking Water Standards, ARSD 74:04, Chapter 12	Establishes the MCLs for public water systems.	Not applicable. Not a drinking water source.
Soils and Sediments		
Remediation Criteria for Petroleum-Contaminated Soils, ARSD 74:56, Chapter 5	Establishes criteria for the remediation of petroleum-contaminated soils.	Not applicable. No known petroleum contaminated soils at this site.

Table 6.2
Potential Action-Specific ARARs
Black Hills Army Depot, South Dakota

Standard, Requirement, or Criterion	Description	Comment
Federal		
Standards for owners and operators of hazardous waste treatment, storage, and disposal facilities (40 Code of Federal Regulations [CFR] 264)	Placement of a cap over waste requires a cover designated and constructed to minimize migration of liquids through the capped area, function with minimal maintenance, have permeability less than the bottom liner or native soils.	Applies to area for which capping is selected as a remedial option.
Land disposal restrictions (40 CFR 268)	Placement of wastes on or in land outside the boundaries of the area of contamination will trigger land disposal restrictions. Movement of excavated materials containing Resource Conservation and Recovery Act (RCRA) hazardous waste to new location and placement in or on land will trigger land disposal restrictions.	Applicable if wastes excavated during remediation are excavated and landfilled on-site or off-site. Applies to remedial activities.
Standards applicable to generators of hazardous waste (40 CFR 262)	A generator of hazardous waste can accumulate hazardous waste on-site for 90- days or less without a permit.	Applies to remedial activities.
Occupational Safety and Health Administration (OSHA) Safety Practices (29 CFR 1926)	Regulates safety practices as they relate to construction (e.g., excavation, shoring, hoisting, etc.).	Applies to remedial activities.
OSHA Safety Practices (29 CFR 1910)	Establishes health and safety program requirements for general industry including hazardous waste operations.	Applies to remedial activities.

Table 6.2 (Continued)
Potential Action-Specific ARARs
Black Hills Army Depot, South Dakota

Standard, Requirement, or Criterion	Description	Comment
State		
Air Pollution Control (South Dakota Codified Law Title 34A, Chapter 1)		
Air Pollution Control Requirements, Ambient Air Quality Standards, Administrative Rules of South Dakota (ARSD) 74:36	Establishes the Air Pollution Control program.	Applicable if a removal action or remedial action were selected that would result in emissions to ambient air.
National Emission Standards for Hazardous Air Pollutants (NESHAPs), ARSD 74:36:08:01	Establishes national emission standards for hazardous air pollutants.	Applicable for lead.
Hazardous Waste Management (South Dakota Codified Law, Title 34A, Chapter 11)		
Hazardous Waste, ARSD 74:28	Establishes hazardous waste criteria.	These criteria are relevant and appropriate for on-site activities and applicable if hazardous waste is transported off-site.
Water Quality (South Dakota Codified Law Title 34A, Chapter 2)		
Groundwater Quality Standards, ARSD 74:54, Chapter 1	Establishes the maximum concentration limits for ground water in the state of South Dakota.	Applicable. Ground water quality standards are potential ARARs for ground water cleanup.
Groundwater Discharge Permits, ARSD 74:54, Chapter 2	Establishes the requirement for ground water discharge permits.	Not applicable. No discharge is expected.
Surface Water Quality Standards, ARSD 74:51, Chapter 1	Establishes water quality standards for surface waters in the state of South Dakota.	Potentially applicable to surface water and/or effluent limitations on discharges to surface waters.
Surface Water Discharge Permits, ARSD 74:52	Establishes the requirements for surface water discharge permits in the State of South Dakota.	Not applicable. No discharge to surface water is expected
Soils and Sediments		
Remediation Criteria for Petroleum Contaminated Soils, ARSD 74:56, Chapter 5	Establishes criteria for the remediation of petroleum contaminated soils	Not applicable. No known petroleum contaminated soils at this site
Solid Waste Management (South Dakota Codified Law, Title 34A, Chapter 6)		

Table 6.2 (Continued)
Potential Action-Specific ARARs
Black Hills Army Depot, South Dakota

Standard, Requirement, or Criterion	Description	Comment
Solid Waste, ARSD 74:27	Establishes solid waste criteria.	Relevant and appropriate to the landfills at the site and if any removal or remedial actions generate a solid waste.

Table 6.3
Potential Location-Specific ARARs
Black Hills Army Depot, South Dakota

Standard, Requirement, or Criterion	Description	Comment
Federal		
42 United States Code (U.S.C.) Sect 6901-6987		
32 Code of Federal Regulations (CFR) 178	Identifies the process for evaluating appropriate responses on closed, transferred, and transferring military ranges or bases.	Applies to remedial activities.
Standards for owners and operators of hazardous waste treatment, storage, and disposal facilities (40 CFR 264)	Placement of non-containerized or bulk liquid Resource Conservation and Recovery Act (RCRA) hazardous waste prohibited within a salt dome formation, underground mine, or cave.	Not applicable.
Archeological and Historic Preservation Act (AHPA) (16 U.S.C. 469 et seq./36 CFR 65)	The AHPA preserves cultural resources that may be damaged by Federal or federally authorized construction activities.	The AHPA may be "applicable" if "unanticipated archeological materials are discovered during construction of a Federal undertaking."
Farmland Protection Policy Act (7 CFR 658)	This act prohibits Federal programs from contributing to the unnecessary conversion of farmland to non-agricultural uses.	It may be applicable if a remedial alternative impacted the ability for use of land for grazing
Wetlands and Floodplain Management(40 CFR 6.302, Appendix A, 11988)	Federal regulations governing wetlands are considered "applicable" if remedial activities impact wetland areas at the site. Actions within floodplain must be conducted to avoid adverse effect, minimize potential harm, restore and preserve natural and beneficial values.	This is not applicable at the former BHAD, as no locations are within a designated floodplain, and BHAD is not a treatment, storage, and disposal (TSD) facility.
Protection of Wetlands (33 CFR 320 et seq./Executive Order [EO] 11900)	Requires that actions taken minimize loss or degradation of wetlands.	Not applicable. No wetlands are present in these areas.

Table 6.3 (Continued)
Potential Location-Specific ARARs
Black Hills Army Depot, South Dakota

Standard, Requirement, or Criterion	Description	Comment
Federal		
RCRA (40 CFR 264)	When designed in a floodplain, a hazardous waste TSD facility must be designed, operated, and maintained to avoid a washout. Applicable if such activity is located within a floodplain.	This is not applicable, as no locations at BHAD are considered to be within a flood plain, and BHAD is not a TSD facility.
Clean Water Act (404/ 40 CFR 230 and 231, and 125)	Action must be taken to prevent the discharge of dredged or fill material into a wetland without a permit. 40 CFR 125 requires a permit for the disposal of dredged or fill material in water of the United States.	May be "applicable," dependent on remedial alternative and the location with respect to waters of the state.
Fish and Wildlife Coordination Act (FWCA) (16 U.S.C. 661 et seq./40 CFR 6.302)	The FWCA protects fish and wildlife when Federal actions result in the control or modification of a natural stream or body of water.	The FWCA may be "applicable" if remedial activities affect or modify surface waters.
Threatened/Endangered Species Act (16 U.S.C. 1531-1543/50 CFR 200 and 402)	Prohibits actions from jeopardizing the continued existence of protected species and prohibits the modification of critical habitat.	As of the date of this report, no threatened or endangered (T&E) species have been found at the site; this act is not "applicable or relevant and appropriate" for this site. However, this act would be "applicable or relevant and appropriate" if a threatened or endangered species is identified at the site in the future.
Migratory Bird Treaty Act (16 U.S.C. 703-712/50 CFR 21.11)	Applies to sites affected by remediation activity within migratory bird flight patterns.	This act would be "applicable or relevant and appropriate" if remedial actions have the potential to impact migratory birds habitats.
Species of Special Concern and Undetermined Status	Currently, species classifications have no legal authority in South Dakota; however, the North	As of the date of this report, no species of special concern have been found at the site.

Table 6.3 (Continued)
Potential Location-Specific ARARs
Black Hills Army Depot, South Dakota

Standard, Requirement, or Criterion	Description	Comment
Federal		
	Dakota Game and Fish Department has published a species checklist for North and South Dakota (*Fishes of the Dakotas, Species Checklist, North Dakota Game and Fish Department, 1994).* Several fish species are listed as having special concern status in South Dakota.	However, coordination with the Game and Fish Department is strongly urged if species of special concern are identified at the site in the future.
National Historic Preservation Act (NHPA) (16 U.S.C. 470 et seq./36 CFR 800)	The NHPA directs Federal agencies to either integrate historic preservation into all activities, which directly or indirectly involve land use decisions.	According to the South Dakota State Historical Society, the BHAD site is not listed in the protected historic places, making the NHPA not "applicable or relevant and appropriate."
Scenic Rivers Act (16 U.S.C. 1271 et seq/40 CFR 6:302(e))	Activity must avoid adverse effect or impact to national wild scenic or recreational rivers.	This is not applicable as no scenic or recreational rivers are present.
State		
ARSD 74:51:01:11	Establishes criteria for the protection of wetlands as surface waters of the state.	Not applicable. No wetlands are present.
Ground Water		
USEPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites for Soil, November, 2011 (USEPA, 2011)	USEPA RBC values were a screening tool where chemical concentrations exceed BHAD background values and there is no regulatory standard.	The risk-based standard is designated "To Be Considered" criteria for ground water quality evaluation at the BHAD. For BHAD risk screening, the tap water ingestion RSLs were selected for residential water use. Comparison is made to total recoverable metal concentrations.

Table 6.3 (Continued)
Potential Location-Specific ARARs
Black Hills Army Depot, South Dakota

Standard, Requirement, or Criterion	Description	Comment
Federal		
USEPA office of Drinking Water Health Advisories and MCL Goals (USEPA, 2002)	In the absence of a promulgated Federal or state standard for a given COPC in the water medium, a human health advisory concentration or MCL goal will be considered as relevant criteria. Typically, health advisory concentrations are expressed as drinking water equivalent levels (DWELs). MCL goals are a non-enforceable concentration of a drinking water contaminant that is protective of adverse human health effects and allows an adequate margin of safety.	Not applicable. Not a drinking water source.
Surface Water		
Clean Water Act Water Quality Criteria (Title 40 CFR, Part 131)		Federal freshwater ambient water quality criteria (AWQC) and standards may be "relevant and appropriate" if contaminants are released to site surface waters or if treated ground water is discharged to a surface water.
Soil		
USEPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites November, 2011 (USEPA, 2011)	USEPA RBC values were a screening tool where chemical concentrations exceed BHAD background values and where no other regulatory standard is applicable.	This risk-based standard is considered to be considered criteria for soils at BHAD. Comparisons are made to residential standards.

Table 6.4
Potential Chemical-Specific TBCs
Black Hills Army Depot, South Dakota

Standard, Requirement, or Criterion	Description	Comment
Soil		
United States Environmental Protection Agency (USEPA) Soil Screening Guidance (USEPA, 1996b)	The USEPA Soil Screening Guidance identifies generic soil screening level (SSL) values for future residential land use scenarios, taking into consideration various exposure pathways. The SSL values are risk-based concentrations (RBCs) derived from standardized equations combining exposure information with toxicity data.	These are "To Be Considered" (TBC) criteria for the evaluation of human health and environmental risk at the former Black Hills Army Depot (BHAD). Generic SSL values have been identified for use in evaluating the soil to ground water and soil to air pathways. A dilution–attenuation factor (DAF) of 20 for migration to ground water is appropriate for BHAD. The soil to ground water, and the soil to air concentrations identify the level of a chemical that may remain in soil without generating adverse health impacts via ground water or air exposure.
Groundwater – Drinking Water Systems		
National Secondary Drinking Water Standards (40 CFR Part 143)	Establishes secondary maximum contaminant levels (SMCLs) that are nonenforceable guidelines for public drinking water systems to protect the aesthetic quality of water.	Considered for cleanup of public drinking water systems.
Maximum Contaminant Level Goals (MCLGs) (PL No.99-339, 100 Stat. 642 (1989), (1990, 1991): 40 (CFR) 141, 142	Establishes drinking water quality goals at a level at which no adverse health effects may occur with an adequate margin of safety.	Considered for cleanup of public drinking water systems.

Table 6.5
Potential Action-Specific TBCs
Black Hills Army Depot, South Dakota

Standard, Requirement, or Criterion	Description	Comment
TM 9-1300-206	Regulates transport of hazardous material for off-site disposal.	Applies to remedial activities.
EM 385-1-1	Defines safety and health requirements for United States Corps of Engineers (USACE) projects.	Applies to remedial activities.

Table 6.6
Potential Location-Specific TBCs
Black Hills Army Depot, South Dakota

Standard, Requirement, or Criteria	Description	Comment
No specific citation – common law will apply.	To be determined as the result of negotiations between the government and the landowners.	Applies to remedial activities

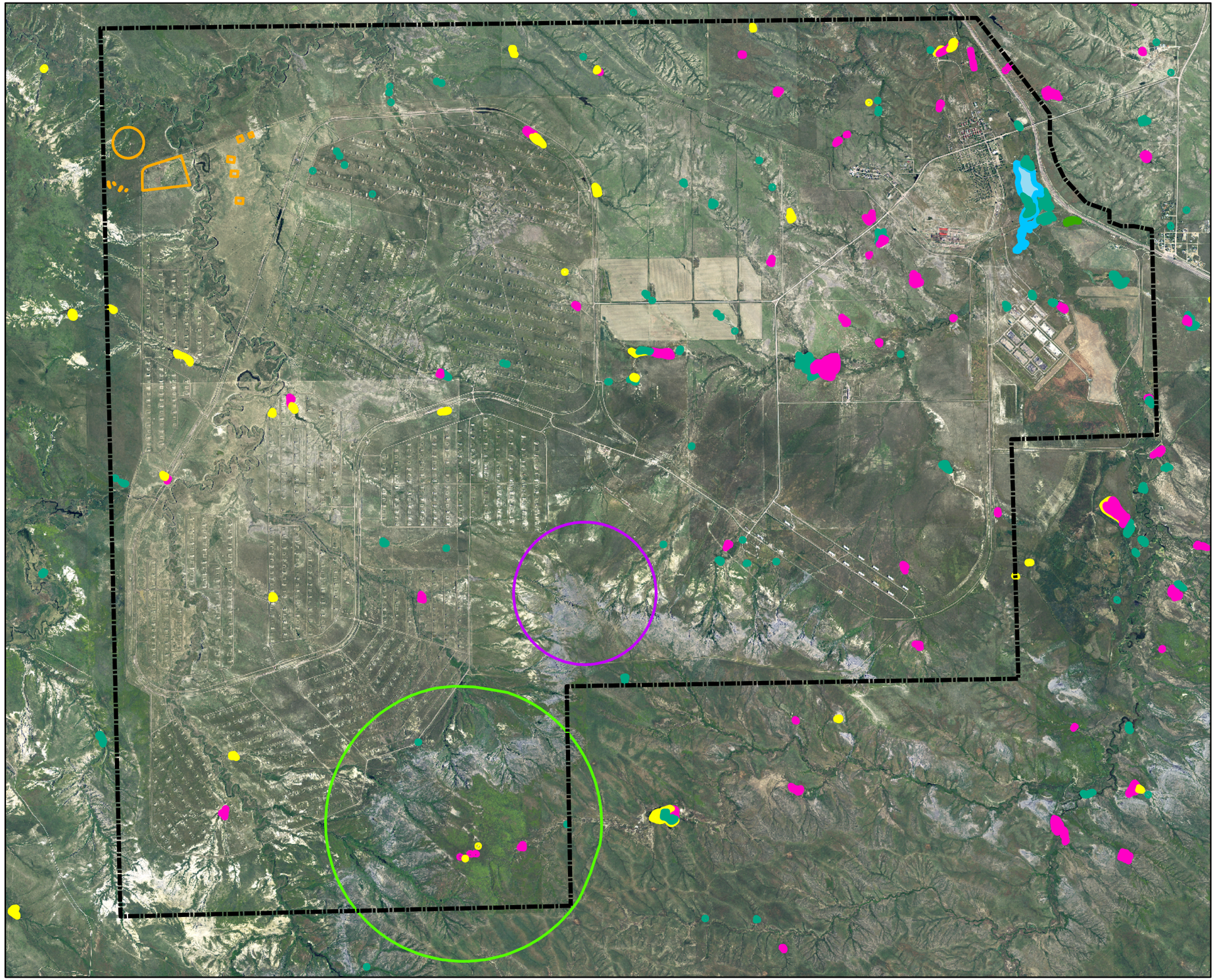


Figure 6.1

Wetlands
Formerly Used Defense Site
Black Hills Army Depot
FUDS Project # B08SD000800

Black Hills, SD

Legend

- Approximate BHAD Boundary
- Burning Ground No. 1 (438 Acres)
- Burning Ground No. 2 (1,627 acres)
- Chemical Plant Area sites

Wetland Type

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other

Note:
Other = Palustrine/Unconsolidated Shore/Seasonally Flooded/ Excavated

Wetland Source:
USFWS, 2010b. Wetlands Online Mapper, National Wetlands Inventory. <http://wetlandsfws.er usgs.gov /wtlnds/launch.html> Last Updated November 2010

N

Image Source: Orthophoto 2010
Projection: NAD_1983_UTM_Zone_13N

3,000 1,500 0 3,000 Feet

PARSONS	U.S. ARMY ENGINEERING & SUPPORT CENTER HUNTSVILLE, ALABAMA
DESIGNED BY: CR	Former Black Hills Army Depot
DRAWN BY: CR	
CHECKED BY: CtB	SCALE: As Shown — PROJECT NUMBER: 747769
SUBMITTED BY: CtB	DATE: December 2011 — PAGE NUMBER:
	FILE: S:\ES\shared\S:\ES\shared\Black Hills\GIS\workplan\BHAD_wetlands.mxd

CHAPTER 7
PROPERTY MANAGEMENT PLAN

7.1 DESCRIPTION

7.1.1 Every project that has GFP and/or CAP is required by FAR subpart 45.5, DFARS Part 245, and DoD Manual 4161.2-M to have a Property Management Plan in place to ensure that the government's property is accounted for, maintained and controlled. The PM is responsible to ensure a system to meet this requirement is prepared, implemented and enforced. The designated Project Property Manager for the BHAD project is Roddy Allen; he is a Certified Professional Property Manager and will be responsible for oversight of project property operations and providing the PM feedback about compliance with the plan.

7.1.2 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 activities to be performed to complete the fieldwork. Office operations include tasks performed in support of project management and the implementation of project work in the field through completion consistent with the requirements of the PWS. The types of equipment recommended, selected, and proposed for this work 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.

7.1.1 Field Equipment

7.1.1.1 Geophysical and Location Equipment

The Schonstedt GA-52Cx magnetometer will be used for anomaly reacquisition. The GA-52Cx will be tested on an instrument verification strip (IVS) twice daily to verify that the instrument is functioning correctly. The instrument will also be used for anomaly avoidance, such as clearing access routes and grids, or during intrusive work such as installing stakes and pin flags. Hand-held GPS instruments will be used to record the locations of anomalies, excavations, and other features.

7.1.1.2 Transportation and Construction Equipment

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 ½-ton and ¾-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 steer loaders, backhoes, trackhoes, bulldozers, and cranes.

7.1.1.3 Safety Gear

Work during the remedial investigation will be conducted within potential CWM sites. 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. In accordance with EM 385-1-1, site personnel are required to arrive on site with the proper PPE. Appropriate levels of PPE are presented in Appendix D (Accident Prevention Plan).

7.1.1.4 Equipment for Handling and Disposal of CACM, Soil, and Scrap

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 MD, CA contaminated material (CACM), and other metallic debris, as well as for off-site transportation and disposal.

7.1.1.5 Communication Equipment

Communications equipment to be used includes hand held two-way radios and cellular phones.

7.1.2 Office Equipment

The majority of the office equipment to be used on this project is located in the Parsons' Denver and Huntsville Offices. Most of the equipment 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, field office fax machines, and field office printers will be rented or purchased for fieldwork.

7.2 VENDORS AND ASSOCIATED COSTS

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.

7.2.1 Leased Vehicles

Leased vehicles will be selected by comparing rate quotes from different commercial vendors. The number of vehicles will be determined as needed to facilitate field work. The type of vehicles used 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 fieldwork area.

7.2.2 Consumable Supplies and Personal Property

Materials and supplies required for the performance of the contract and task order will be direct charged to that order, and such materials and supplies are not included in the basis for overhead computation. The exception is limited to home office supplies and equipment such as letterhead, pens, pencils, standard personal computers, office furnishings, etc. Field office supplies are typically direct charged to the project and not included in the overhead computation.

7.3 ACQUISITION AND TRACKING PROCEDURES FOR PROPERTY

The procedures outlined below include the procedures for acquisition, identification, tracking, and disposition of GFP or CAP.

7.3.1 Acquisition

7.3.1.1 Equipment will be procured or purchased for successful completion of project activities during this field effort. Items acquired by means other than furnished by the government will follow adequate procurement policies and procedures that have been approved by the Defense Contract Management Agency. An evaluation will be performed whether to rent or purchase needed equipment. When possible, equipment will be priced through three different vendors, and Parsons will select the most economical option. In certain cases involving special maintenance and calibration requirements for an instrument, a sole-source vendor may be used.

7.3.1.2 The government may furnish the contractor property for this project. Normally, this is accomplished by identifying the property in the contract or, if provided after issuance of the contract, through a contract modification adding the GFP. When the property is received, it will be inspected for condition before signing for it. If government property is received in unserviceable status, a written statement to the government property assessor will contain relevant facts, such as cause of condition and a recommended course of action if overages, shortages, or damages and/or other discrepancies are discovered. The government may require the contractor to repair the property at the government's expense. Upon receipt, the asset property should be bar-tagged for tracking and identification, and a list of the GFP should be sent to the property manager so he can add it to the master property database and records file.

7.3.2 Receiving

7.3.2.1 When property is received on site, it must be inspected for damage and to see if it meets the specifications of what was ordered. The receiving process for property is accomplished on a material receiving report (MRR), as found in Appendix F. MRRs are completed on everything received except purchases of services; a service receiving report is used for services purchased or contracted. The MRR will record the MRR number, the purchase document number, date, condition of items, bar tag number, serial number, any damages or shortages, and the name and signature of the person completing the MRR.

The completed MRR will be maintained in a permanent record file along with the acquisition document for audits, reporting, and project close-out activities. The PM or designee will use the MRR to update the property database and maintain the official property records.

7.3.2.2 Items of accountable property (items costing over $500 or items that are "sensitive") will be bar-tagged for identification as government property. The bar tag number is the key component used to identify each item of property in the registry. At present, materials or consumables are not bar-tagged. Accessory items should be accounted for as part of the major item they are to be used with, and their cost should be added to the major item records and database tracking. If this is not done, then they must be tagged and treated as standalone items. No items should leave the receiving area without being signed for.

7.3.2.3 If orders are received damaged or short of what was ordered, then an overage/shortage/damage (OSD) report must be completed and sent to the procurement official. A copy of the OSD report along with the MRR will be kept in a "pending" file until the discrepancy is resolved by procurement. Once it has been resolved, the documents go into a completed file. An example of an OSD report is provided in Appendix F.

7.3.3 Tracking

A 100% physical inventory of government CAP/GFP will be conducted at least annually on nonconsumable items purchased on cost plus fixed fee tasks for this project. When applicable, the serial number, model or manufacturer, date purchased, present location of item, cost, current status (e.g., functional, need of repair, needs batteries), and a description of the item will be recorded on the inventory list.

7.3.4 Loss Notification

At the time an incident occurs involving the loss of, destruction of, or damage to government property, the person most knowledgeable about the incident must complete a Loss/Damage/Destruction (LDD) report and submit it through the PM to the property manager. An example of an LDD can be found in Appendix F. The report must provide sufficient detail about the facts in the incident so that the reader will know exactly what happened. The facts must include the date of incident, names of those involved, name of person filing the report, estimated cost to repair the item(s) affected, description of the item (to include bar tag and serial number), make and model, and a detailed explanation about how the incident occurred.

7.3.5 Property Storage

Government property will be maintained in a secure area/container when not in use. The area/container must adequately protect the property from the elements and must be locked to avoid unauthorized entry.

7.3.6 Ultimate Disposal

7.3.6.1 Disposition of property occurs when the property has been written off, damaged, or becomes excess to the needs of a current task order. Before property is turned over, the bar tags must be removed from the property. When it becomes excess or non-repairable, a letter goes to the government requesting disposition. The letter will include a list of property by description, quantity, bar tag number and acquisition cost. The Property Manager must be involved in this process to ensure it is done correctly.

7.3.6.2 An inventory of the project's property will be conducted at project close-out and the results will be balanced against the prior property inventories. LDDs will be prepared to account for any damaged, destroyed or missing items that have not been addressed in an LDD prior to close-out.

CHAPTER 8
INTERIM HOLDING FACILITY SITING PLAN

8.1 The IHF Siting Plan addresses the layout, explosive safety requirements, and security measures for the IHF at BHAD. CARA will transport suspect RCWM from the RI sites and store the items in the IHF. The Project Manager for Non-Stockpile Chemical Materiel (PMNSCM) is responsible for destroying RCWM at BHAD.

8.2 The IHF Siting Plan for Black Hills Army Depot, developed by PMNSCM, is a standalone document and is incorporated by reference (PMNSCM, 2012).

CHAPTER 9
PHYSICAL SECURITY PLAN FOR RCWM

A Physical Security Plan is required by EP 75-1-3 for suspect CWM project sites. The Physical Security Plan describes the security criteria to be employed during CWM operations including the storage of RCWM within an IHF.

9.1 MISSION

The purpose of the project is to perform a RI at selected suspect CWM sites within the former BHAD and dispose of RCWM, ordnance-related debris, and explosives hazards.

9.2 PURPOSE

This plan defines the areas of security interest related to BG-1, BG-2 and the Chemical Plant Areas, and specifies the equipment, forces, and devices used to protect RCWM and provide an effective security posture.

9.3 OBJECTIVE

- Prevent unauthorized access to RCWM.
- Prevent damage from sabotage, espionage, or unauthorized use of RCWM.
- Prevent theft or diversion of RCWM or government equipment and supplies.

9.4 THREAT ANALYSIS

Contact with local law enforcement agencies indicated no terrorist threat at this time. The most likely threat may come from trespassers accessing the investigation areas and the selected locations for the IHF, magazine, CP, and storage areas.

9.5 VULNERABILITIES

The following security areas are considered the most vulnerable because of their locations and uses:

- Existing ammunition igloo, F-1205, located on private property within BHAD and leased by the government will be utilized for the IHF. The IHF is where RCWM will be stored. The IHF will be installed with utility services connected and surrounded by a fence meeting the minimum requirements (FE-5) as specified in

AR 190-11, Chapter 5. Once an item is placed in the IHF, the IHF will be patrolled by the subcontracted services of an armed guard.

- 24-hour security will be provided during intrusive operations or any time equipment is left on site.

9.6 PRIORITIES

The priority of physical security is:

- First, to any RCWM identified at the site, during transportation of the RCWM to the IHF, and in storage at the IHF.
- Second, to the security of equipment and supplies at the investigation areas due to the sensitive nature of the work and the properties.
- Third, to the security of the equipment and supplies at the CP.

9.7 LIMITED AND EXCLUSION AREAS

Access to the project work sites will be controlled by the project staff and a subcontracted security force. Only those personnel on approved access rosters will be allowed on the site without an escort. The IHF will also be a limited access area. Only authorized personnel from USAESCH, the Air Monitoring Team, the Assessment/Package/Transport Team, and Parsons and its subcontractor (i.e., USA Environmental) will be allowed access to the inside of the IHF area once RCWM has been placed in the facility.

9.8 EQUIPMENT AND DEVICES TO DETECT OR DELAY INTRUSION

9.8.1 Site Office Area

The site office area includes the site office trailer and the equipment storage area. The Site office will consist of either an office trailer facility or a conex with office facilities. Equipment will be stored in both the office facility and a steel conex. Both offices and equipment conexes will be properly secured to prevent the entry of non-authorized personnel.

9.8.2 IDW Storage Area, IHF, and MSA

The IDW storage area, IHF, and magazine storage area (MSA) will be located near each other (while ensuring proper safety distances) for the purposes of surveillance. The CSP (Appendix K) provides details on the locations and proper safety distances for the IHF and MSA. The MSA will house a BATF Type 2 magazine, which in itself will be secured in accordance with 5.4.2 of this work plan. These areas should be secured in the following manners:

- Perimeter boundary: A security fence will be installed around the IHF and separate security fences will be installed around the MSA and IDW Storage areas.
- Gates: All gates will be locked to the compounds during the non-operational hours and monitored during operational periods at times when no RCWM is stored. The gate to the MSA will be locked at all times except when being accessed by authorized personnel.
- Signs: metallic Restricted Area signs will be used on the IHF fence, one per side.
- Inspections and maintenance: The security patrol will monitor security of the IHF. If no RCWM is in storage, the security patrol will periodically check the building as they would any other building. When RCWM is stored in the IHF, the security patrol will visit the facility every four hours to observe conditions. The patrol will check the integrity of the fence, including the gate and lock, and observe the condition of the IHF and surrounding area. If there are signs of unauthorized activity or if any out-of-the-ordinary circumstances are noticed, site management personnel will be called in the following order—USAESCH Safety Specialist, SM/SUXOS, SSHO/UXOSO, then UXOQCS—until one is contacted. Thereafter, site management personnel will notify PMNSCM, CENWO, USAESCH, the Air Monitoring Team, and the Assessment/Package/Transport Team. The security guard will not enter the IHF under any circumstances. If there is reason to suspect that the integrity of the IHF has been compromised, the Air Monitoring Team will conduct first entry monitoring and the Assessment/Package/Transport Team will inventory and inspect stored items.
- If RCWM is stored in the IHF then there will be a 24-hour armed guard posted outside the IHF to prevent access.

9.9 SECURITY LIGHTING

Security lighting will allow security personnel to maintain visual-assessment capability during darkness.

9.9.1 Investigation Area Lighting

Work is not anticipated to be conducted during nighttime hours; therefore, the investigation areas will not be equipped with lighting.

9.9.2 Site Office and IHF Area Lighting

- Lighting will be provided on the outside of the IHF and at the Site Office. The lights will either have photoelectric cells to turn on automatically at dusk and off at dawn, or will be run by shore power or a generator which is turned on at dusk and off at dawn.
- Use control and standards: Where electricity is provided, lighting will be switched on (to operate automatically) at all times when RCWM is placed in the IHF. The

control switch for the lighting will be locked to prevent unauthorized access. If lighting is run off of a generator, the security force will be charged with starting the lighting prior to darkness and ensuring the lighting runs through the night.

- Inspection and maintenance: The security force will check the security lighting and the fences of the IHF compound at the site every four hours when RCWM is stored.
- Emergency actions for power failure: If a power failure occurs due to a power outage or equipment failure, Security Forces may be enlarged until the situation is corrected.

9.10 COMMUNICATION SYSTEMS

The security force will be equipped with two forms of communication equipment which has been demonstrated to work in the area. A cell phone will also be maintained (even if it is not one of the required forms of equipment) to ensure contact with off-site personnel.

9.11 LOCKS AND KEYS

Locks and keys for the IHF gate are controlled by the USAESCH, and the IHF doors are controlled by the Assessment/Package/Transport Team, once RCWM is stored within the IHF. Locks and keys for collateral areas and equipment will be maintained by Parsons.

9.12 MEASURES TO CONTROL PERSONNEL, VEHICLES AND MATERIAL

- Personnel Access Controls: Only authorized personnel will be permitted entry into the site or the IHF. Control procedures will assure positive identification of all personnel prior to entry. Visitors and maintenance personnel will be escorted at all times.
- Escort Requirements: Escorts will keep visitors under constant observation at all times.
- Non-operation hours access procedures: The SM/SUXOS or his designated representative must approve non-duty hour access. All pertinent facts concerning the access will be recorded and reviewed by the operations officer.

9.13 PERSONNEL IDENTIFICATION SYSTEM

Security personnel will check photo identification against the access roster prior to admittance to the IHF.

9.14 VEHICLE CONTROL

Only authorized vehicles are allowed at the investigation sites. Only authorized transportation vehicles are allowed in the IHF compound.

9.15 MATERIAL CONTROL

The Assessment/Package/Transport Team will manifest all RCWM being transported from the investigation areas to the IHF. RCWM will be transported by the Assessment/Package/Transport Team. All movement will be logged using DD Form 1911.

9.16 SECURITY FORCES

Security forces for the IHF consist of:

- Type and composition: The facility will be patrolled periodically by the security contractor.
- Authority and Jurisdiction: Parsons will contact the local authorities to provide standard local security procedures.
- Weapons, Ammunition, and Equipment: When items are stored in the IHF, security personnel will be armed and equipped in accordance with standard local procedures.
- Rules of engagement and use of deadly force: These are commensurate with the rules employed by the local security forces.
- Training: This is the responsibility of the security subcontractor. Instructions to the security guards will be provided by the SM/SUXOS. The SSHO/UXOSO will provide safety and health training.
- Actions to be taken under adverse weather and limited visibility conditions: Patrols will be maintained during these conditions to ensure security integrity.
- Posts: Security posting will be designated by the SM/SUXOS in cooperation with the USAESCH Safety Specialist.
- Working dogs: may be used if available and deemed necessary.
- Response force: The armed guard on duty will call for the appropriate response force from the police, emergency responder, or other designated authority depending on his assessment of the situation. Response times will be approximately 30 minutes.

9.17 EMERGENCY ACTIONS OF GENERAL NATURE

Actions pertaining to emergency situations will be in accordance with the APP.

9.18 RECOVERED CHEMICAL WARFARE MATERIEL MOVEMENT

PMNSCM will be responsible for any off-site movement of RCWM.

9.19 COORDINATION

USACE will be responsible for coordination of any offsite movement of suspect RCWM.

9.20 KEY AND LOCK CONTROL AND INSTRUCTIONS FOR SECURITY FORCE

A Key Control Register and Inventory form and written instructions for the security force are provided in Appendix F of this Work Plan.

CHAPTER 10
REFERENCES

Baker Environmental Inc. (Baker), 2001. Final Preliminary Assessment/Site Inspection Report for Operable Unit No. 2, Chemical Area. Former Black Hills Army Depot, South Dakota. July 2002.

Dames & Moore, 2001. Final Preliminary Assessment/Site Inspection Report for Operable Unit No. 1, Burning Ground 1 and Burning Ground 2. Former Black Hills Army Depot, Igloo, South Dakota. August 2001.

Human Factors Applications, Inc. (HFA), 1994. Final Ordnance and Explosives Phase I Remedial Investigation, Black Hills Army Depot. December 1994.

HFA, 1999. Revised Final Removal Report, Phase I, Volume I, Ordnance and Explosives Removal Action, Black Hills Army Depot, Burning Grounds 1 &2, Igloo, South Dakota, for the Period of September 16, 1996 through October 15, 1997. December 1999.

HFA, 2000. Revised Final Removal Report, Phase II, Ordnance and Explosives Removal Action, Black Hills Army Depot, Burning Grounds 1 &2, Igloo, South Dakota, January 2000.

Parsons, 2007. Site Specific Chemical Warfare Materiel Scoping and Security Study Report, Former Black Hills Army Depot, Igloo, South Dakota. August 2007.

Parsons, 2011a. Telephone Memo, Mike McNeill's discussion regarding the Environmental Protection Plan for BHAD RI/FS. March 2011.

Parsons, 2011b. Final Geophysical Work Plan, Former Black Hills Army Depot, Fall River County, South Dakota. May 2011.

Parsons, 2011c. Standard Operating Procedures, Former Black Hills Army Depot, Fall River County, South Dakota. May 2011.

Parsons, 2011d. Public Involvement Plan, Former Black Hills Army Depot, Fall River County, South Dakota. May 2011.

PMNSCM, 2012. IHF Siting Plan for Black Hills Army Depot.

Rust Environment & Infrastructure (Rust), 1996. Black Hills Army Depot, Preliminary Assessment/Site Inspection. March 1996.

TEC, 2005. Final GIS based Historical Photo Analysis, Black Hills Army Depot, Fall River County South Dakota. June 2005.

Twin City Testing (TCT), 1992. Archives Search Report, Black Hills Army Depot, South Dakota. October 1992.

TCT, 1993. Archives Search Report Supplement, Black Hills Army Depot, South Dakota. November 1993.

USEPA, 1992. *Guidance for Performing Site Inspections Under CERCLA.*

USACE, 1995. Remote Sensing of Surface Unexploded Ordnance at Black Hills Army Depot, Edgemont, South Dakota. August 1995.

USACE, 1998. EM 200-1-2 *Technical Project Planning Process.*

USACE, 2005. Final Remedial Investigation Report Operable Unit No. 2 – Chemical Area, Outside the Perimeter Fence. September 2005.

USEPA, 2006. *Guidance on the Data Quality Objectives Process.*

USACE, 2009. Interim Guidance for Chemical Warfare Material Responses. April 2009

USACE, 2010. Final Risk Evaluation Report, Black Hills Army Depot, South Dakota. February 2010.

U.S. Fish and Wildlife Service (USFWS), 2010a. South Dakota Endangered Species by County. <http://www.fws.gov/southdakotafieldoffice/endsppbycounty.html> Last updated May 2010.

USFWS, 2010b. Wetlands Online Mapper, National Wetlands Inventory. <http://wetlandsfws.er usgs.gov/wtlnds/launch.html> Last Updated November 2010

URS, 2001. Draft Engineering Evaluation/Cost Analysis Summary Report for Site-Wide OE/CWM. August 2001.

URS, 2004. Site-Specific Final Report Phase 3 Ordnance and Explosives Removal Action Former Black Hills Army Depot Igloo, South Dakota. November 2004.

URS, 2009. OU1 RI Report, Former Black Hills Army Depot, Black Hills, South Dakota. 2009

U.S. Environmental Protection Agency (EPA), 2010. USEPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites for Soil, http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/pdf/master_sl_table_run_NOVEMBER2010.pdf). November, 2010

WERS-001.01 Work Plans, CEHNC, 28 Apr 2010.

WERS-002.01 Explosives Management Plan, CEHNC, 28 Apr 2010.

WERS-004.01 Geophysics, CEHNC-ED-CS-G, 28 Apr 2010.

WERS-006.1 APP for RCWM Projects.

WERS-007.1 GIS for RCWM Projects.

WERS-008.01 Property Management Plan/Property Management Control System, CEHNC, 28 Apr 2010.

WERS-016.02 Periodic Status Reports, CEHNC-CX-MM, 9 Jun 2010.

WERS-017.01 Institutional Analysis and Control Plan, CEHNC-CX-MM, 28 Apr 2010.