Final

WORK PLAN

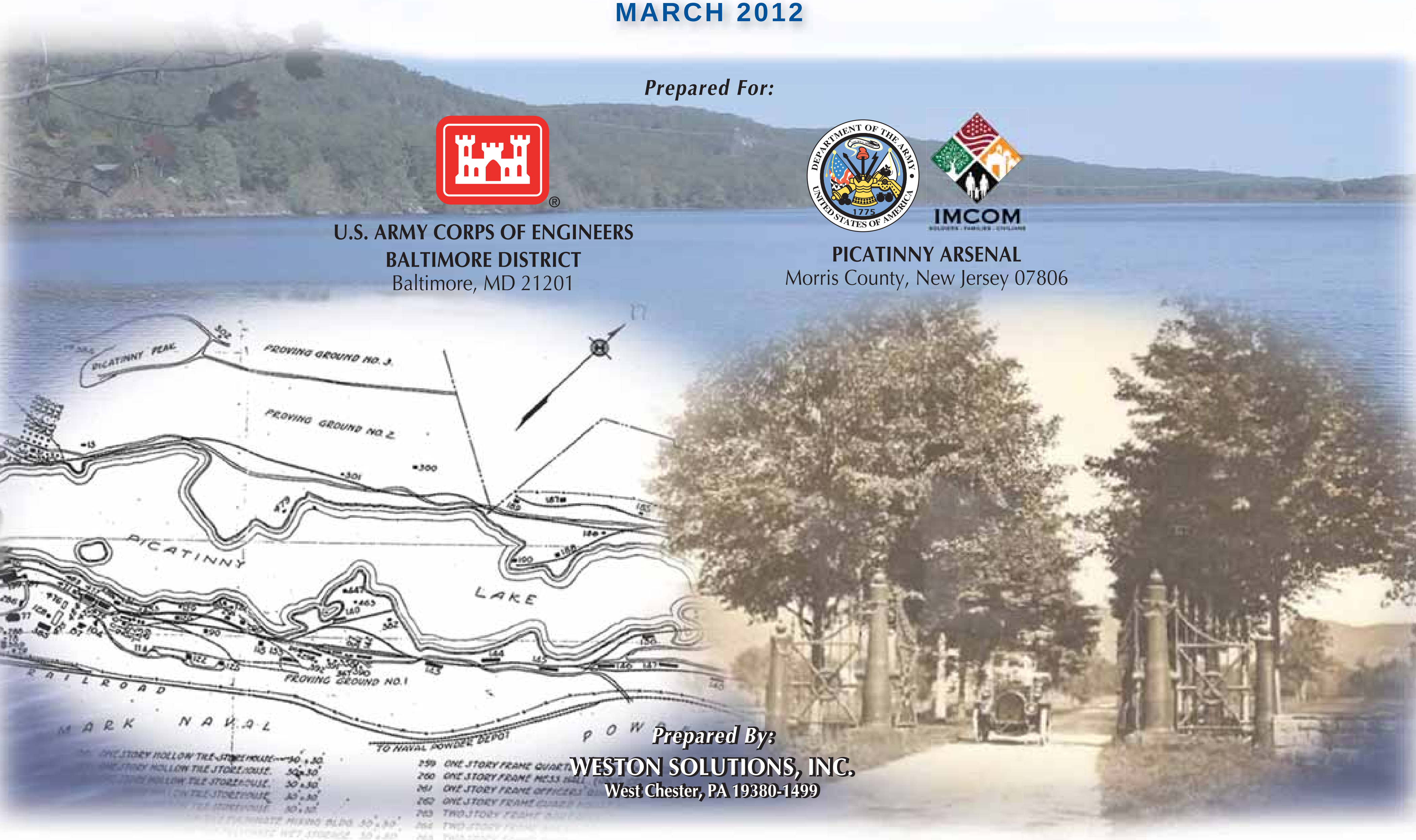
MILITARY MUNITIONS RESPONSE PROGRAM
REMEDIAL INVESTIGATION

PICATINNY ARSENAL
MORRIS COUNTY, NEW JERSEY

Contract No.: W912DR-09-D-0006

Delivery Order No.: 0002

MARCH 2012



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March 2012

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WESTON – Project Manager Laura Pastor	Date
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LIST OF ACRONYMS

AEDB-R	Army Environmental Database-Restoration
AGI	Advanced Geosciences, Inc.
amsl	above mean sea level
AP	armor piercing
APP	Accident Prevention Plan
ARCADIS/Pirnie	ARCADIS U.S., Inc./Malcolm Pirnie, Inc.
ARDEC	Armaments Research, Development and Engineering Center
ASTM	American Society for Testing and Materials
ATF	Bureau of Alcohol, Tobacco, Firearms and Explosives
ATSDR	Agency for Toxic Substances and Disease Registry
BD	base detonating
BDU	Bomb Dummy Unit
bgs	below ground surface
BIP	blown-in-place
BLU	Bomb Live Unit
BRAC	Base Realignment and Closure
CAA	Clean Air Act
CAR	Corrective Action Request
CDC	Child Development Center
CENAB	USACE, Baltimore District
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
cm	centimeter
COC	contaminant of concern
COPC	chemical of potential concern
COPEC	chemical of potential ecological concern
COR	Contracting Officer's Representative
CSF	cancer slope factor
CSM	conceptual site model
dbh	diameter at breast height
DDESB	U.S. Department of Defense Explosives Safety Board
DERP	Defense Environmental Restoration Program
DFW	Definable Features of Work
DGM	digital geophysical mapping
DID	Data Item Description

LIST OF ACRONYMS (CONTINUED)

DMM	discarded military munitions
DoD	U.S. Department of Defense
DoDI	U.S. Department of Defense Instruction
DOT	U.S. Department of Transportation
DQCR	Daily Quality Control Report
DQO	data quality objective
DRMO	Defense Reutilization Management Office
EE/CA	engineering evaluation and cost analysis
EM	electromagnetic
EOD	explosive ordnance disposal
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
EPP	Environmental Protection Plan
ER	electrical resistivity
ERAGS	Ecological Risk Assessment Guidance for Superfund
ERF	Electromagnetic Research Facility
ESIC	Enterprise and Systems Integration Center
ESP	Explosives Site Plan
ESRI	Environmental Systems Research Institute
FS	Feasibility Study
FSP	Field Sampling Plan
ft	feet
ftp	file transfer protocol
GIS	Geographic Information System
GPO	Geophysical Prove-Out
GPS	Global Positioning System
GSV	geophysical system verification
H&S	Health and Safety
HE	high explosive
HEAT	high explosive anti-tank
HEDP	high explosive dual purpose
HFD	hazardous fragment distance
HHRA	Human Health Risk Assessment
HI	hazard index
H_o	null hypothesis

LIST OF ACRONYMS (CONTINUED)

HQ	hazard quotient
HRR	Historical Records Review
IAP	Installation Action Plan
IC	institutional control
ICM	improved conventional munitions
ID	identification
IDW	investigation derived wastes
IEUBK	Integrated Exposure Update Biokinetic Model
IGD	Interim Guidance Document
ILCR	Incremental Lifetime Cancer Risks
INRMP	Integrated Natural Resources Management Plan
IRP	Installation Restoration Program
ISO	industry standard object
IT	Information Technology
IVS	instrument verification strip
kHz	kilohertz
KO	Contracting Officer
LANL	Los Alamos National Laboratory
LOC	levels of concern
LTM	long-term monitoring
LUC	land use control
MAMMS	Multiple Award Military Munitions Services
MC	munitions constituent
MD	munitions debris
MDAS	material documented as safe
MDEH	material documented as an explosive hazard
MEC HA	MEC Hazard Assessment
MEC	munitions and explosives of concern
MMRP	Military Munitions Response Program
mph	miles per hour
MPPEH	material potentially presenting an explosive hazard
MQO	measurement quality objective
MRA	Munitions Response Area
MRS	Munitions Response Site
MRSPP	Munitions Response Site Prioritization Protocol

LIST OF ACRONYMS (CONTINUED)

MSD	minimum separation distance
mS/m	millisiemens per meter
mV	millivolts
NAAQS	National Ambient Air Quality Standards
NAD	North American Datum
NEPA	National Environmental Policy Act
NEW	net explosive weight
NFA	no further action
NJDEP	New Jersey Department of Environmental Protection
NJHPO	New Jersey Historic Preservation Office
NJNHP	New Jersey Natural Heritage Program
NRL	Naval Research Laboratory
NRM	Natural Research Manager
OESS	Ordnance and Explosive Safety Specialist
OP	operating procedure
ORNL	Oak Ridge National Laboratory
PA	Preliminary Assessment
PAERAB	Picatinny Arsenal Environmental Restoration Advisory Board
PAO	Public Affairs Officer
PCB	polychlorinated biphenyl
PD	point detonating
PDA	personal digital assistant
PDAI	Percussion Direct Action Impact
PHS&T	Packaging, Handling, Storage, and Transportation Center
PM	Project Manager
POC	Point of Contact
PPE	personal protective equipment
PTA	Picatinny Arsenal
PVC	polyvinyl chloride
PWS	Performance Work Statement
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QCP	Quality Control Plan
R&D	research and development

LIST OF ACRONYMS (CONTINUED)

RAB	Restoration Advisory Board
RAGS	Risk Assessment Guidance for Superfund
RCI	Residential Communities Initiative
RDX	cyclonite
READ	Repository of Environmental Army Documents
RfC	reference concentrations
RfD	reference dose
RFD	remote firing device
RI	Remedial Investigation
RME	reasonable maximum exposure
ROD	Record of Decision
ROE	right-of-entry
ROTC	Record of Technical Change
RTI	Radiation Technologies, Inc.
SAP	Sampling and Analysis Plan
SDZ	surface danger zone
SI	Site Investigation
SLERA	Screening-Level Ecological Risk Assessment
SSHO	Safety and Health Officer
SSHP	Site Safety and Health Plan
SSL	Soil Screening Level
SUXOS	Senior UXO Supervisor
TAPP	Technical Assistance for Public Participation
TCRA	Time Critical Removal Action
Tilcon	Tilcon, New York, Inc.
TM	Technical Manual
TNT	trinitrotoluene
TP	target practice
TPI	three phase inspection
TPP	Technical Project Planning
U.S.	United States
U.S.C.	United States Code
UCL	upper confidence limit
UFP	Uniform Federal Policy
USACE	U.S. Army Corps of Engineers

LIST OF ACRONYMS (CONTINUED)

USAEC	U.S. Army Environmental Command
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
UXO	Unexploded Ordnance
UXOQCS	UXO Quality Control Specialist
UXOSO	UXO Safety Officer
VSP	Visual Sampling Plan
WESTON	Weston Solutions, Inc.
WMA	watershed management area
WP	white phosphorus
WWI	World War I
WWII	World War II

1. INTRODUCTION

1.1 GENERAL

Weston Solutions, Inc. (WESTON®) is performing a Remedial Investigation (RI) at Picatinny Arsenal (PTA), Morris County, NJ, in support of the Active Army Military Munitions Response Program (MMRP). Work is authorized under the United States Army Corps of Engineers (USACE), Baltimore District (CENAB) Multiple Award Military Munitions Services (MAMMS) Contract W912DR-09-D-0006, Delivery Order 0002. This Work Plan describes the work elements, technical approach, and safety guidance for the MMRP RI to be conducted at nine munitions response sites (MRSs) located at PTA (also referred to as "the installation").

1.2 PURPOSE AND SCOPE

The purpose of the RI is to collect sufficient data to characterize the nature and extent of munitions and explosives of concern (MEC) and, where applicable, munitions constituents (MC) at the following nine MRSs (listed by their Army Environmental Database-Restoration (AEDB-R) numbers:

- PICA-003-R-01 – 1926 Explosion Radius
- PICA-004-R-01 – 1926 Explosion Radius – TD[1]
- PICA-005-R-01 – Green Pond
- PICA-006-R-01 – Former Operational Areas
- PICA-008-R-01 – Lakes
- PICA-010-R-01 – Shell Burial Grounds
- PICA-012-R-01 – Lake Denmark – Off-Post
- PICA-013-R-01 – Inactive Munitions Waste Pit
- PICA-014-R-01 – Inactive Munitions Waste Pit – Off-Post

The results of the RI will be used to revise the conceptual site models (CSMs), as needed, and to assess the explosives hazard and the potential human health and ecological risks. The RI results will support the development and evaluation of the remedial alternatives and recommendations as part of the Feasibility Study (FS).

[1] The name of the MRS is presented exactly as listed in the AEDB-R; however, to be consistent with the Final SI Report (Malcolm Pirnie, 2008), the 1926 Explosion Radius - TD will be referred to as the 1926 Explosion Radius - Off-Post.

1.2.1 Military Munitions Response Program

The MMRP was established in 2001 under the Defense Environmental Restoration Program (DERP) to address the safety, health, and environmental issues presented by MEC and MC. Areas on or near a defense site that are known or suspected to contain MEC are called Munitions Response Areas (MRAs) and consist of one or more MRSs.

1.2.1.1 Munitions and Explosives of Concern

The term MEC distinguishes specific categories of military munitions that may pose unique explosives safety risks, including the following:

§ **Unexploded ordnance (UXO)—**Military munitions that fulfill the following criteria (United States Code (U.S.C.) 101(e)(5)(A-C)):

- Have been primed, fuzed, armed, or otherwise prepared for action;
- Have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material; and
- Remain unexploded either by malfunction, design, or any other cause.

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

§ **Munitions constituents—**Any materials originating from UXO, DMM, or other military munitions, including explosive and non-explosive materials, and emission, degradation, or breakdown elements of munitions; materials that are present in high enough concentrations to pose an explosive hazard (e.g., trinitrotoluene (TNT) and cyclonite (RDX)) (10 U.S.C. 2710(e)(3)).

1.2.1.2 Munitions Constituents

The use of the term MC, not under the MEC umbrella terminology as presented above, is essentially the same definition with the exception that the materials are not present in high enough concentrations to pose an explosive hazard. Generally, MC under this terminology refers to residual explosives and metals (e.g., lead, copper).

1.3 WORK PLAN ORGANIZATION

This RI Work Plan was prepared using components of the Army guidance documents, Engineering Manual 1110-1-4009 (U.S. Army Corps of Engineers (USACE), 2007), Data Item Description (DID)-MMRP-09-001 (USACE, 2009a), and the *Final Munitions Response Remedial Investigation/Feasibility Study Guidance* (United States Army Environmental Command (USAEC), 2009). Work Plan sections are as follows:

Section 1 – Introduction
Section 2 – Technical Management Plan
Section 3 – Field Investigation Plan
Section 4 – Reporting
Section 5 – Quality Control Plan
Section 6 – Explosives Management Plan
Section 7 – Explosives Site Plan
Section 8 – Environmental Protection Plan
Section 9 – References

The following information is presented as appendices to this Work Plan:

Appendix A – Project Points of Contact
Appendix B – Uniform Federal Policy - Quality Assurance Project Plan (UFP-QAPP)
Appendix C – Technical Project Planning (TPP) Meeting Minutes
Appendix D – UXO Finds Map and Table
Appendix E – Contractor Forms
Appendix F – Operating Procedure (OP) for Demolition Activities
Appendix G – Accident Prevention Plan/Site Safety and Health Plan
Appendix H – Explosives Site Plan
Appendix I – New Jersey Natural Heritage Program Report
Appendix J – Protection Procedures for Archaeological and Historical Artifacts

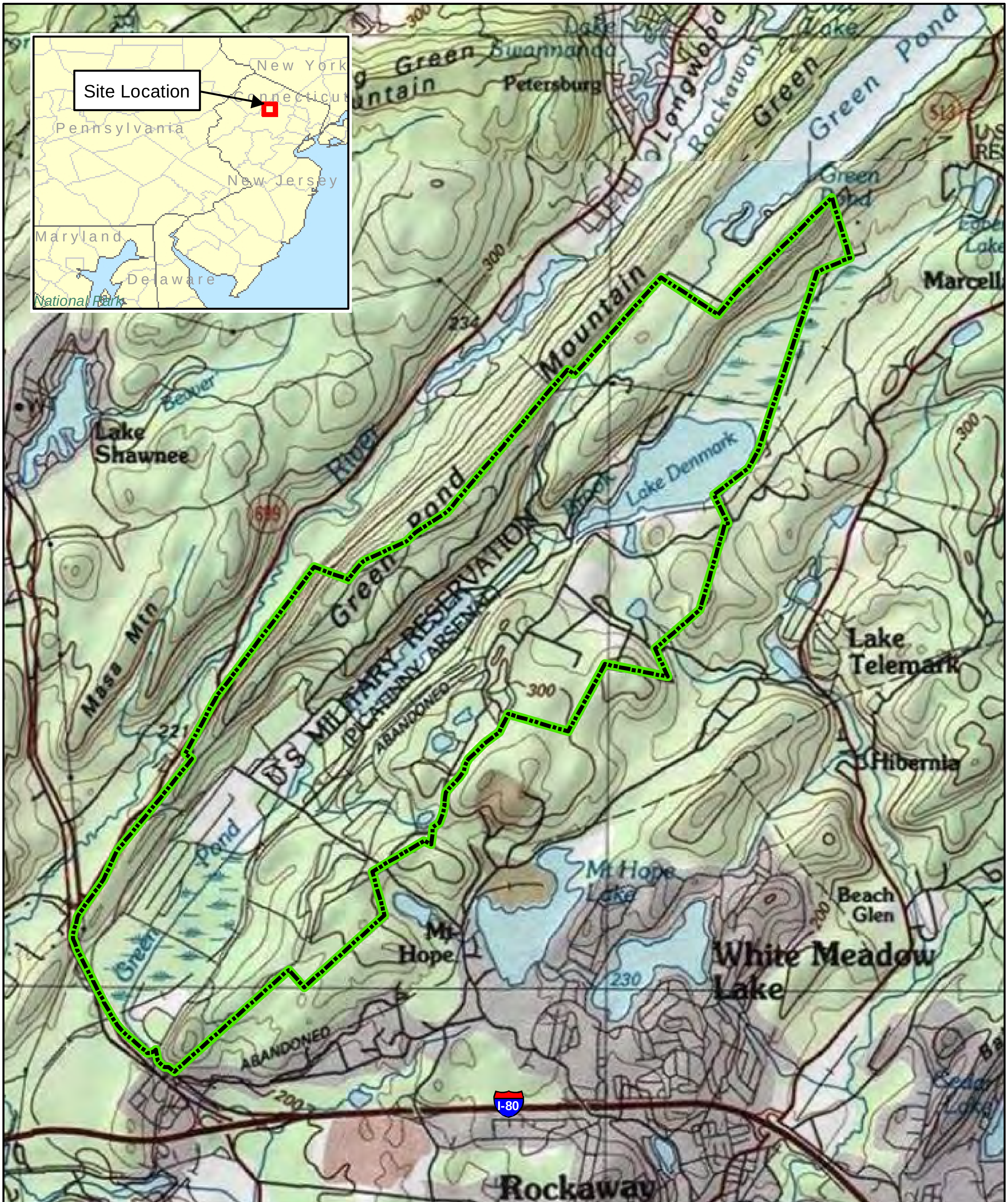
Unforeseeable circumstances or events may require a re-evaluation of and modification to this Work Plan. Proposed changes will be developed and coordinated with USACE, PTA, and the regulatory agencies, as appropriate. Technical changes that are approved will be provided to the individuals on the Work Plan distribution list in the form of a Record of Technical Change (ROTC). The project personnel will be briefed on these changes prior to their implementation.

1.4 PROJECT LOCATION

PTA is located in Morris County, NJ, approximately 45 miles west of New York City and approximately 4 miles north of Dover, NJ. Interstate 80 and State Route 15 highways border the southern portion of PTA. **Figure 1-1** shows the location of PTA.

1.5 HISTORY OF PICATINNY ARSENAL

- 1880 – Established as Picatinny Powder Depot.
- 1890s – Began assembly of powder charges for cannons to support the Spanish-American War. The Navy established the Lake Denmark Powder Depot, later known as Lake Denmark Naval Ammunition Depot, adjacent to the Picatinny Powder Depot. The property was used for storage of explosives, powder, and projectiles from the 1880s to 1960.
- 1907 – The Army changed the name of Powder Depot to Picatinny Arsenal and began expanding its role as a storage facility to include manufacturing of smokeless powder and propellants. Manufacturing continued during World War I (WWI).
- During WWI, the arsenal added storage and manufacturing facilities and began production of melt-loading projectiles, loading TNT into bombs, and experimental manufacturing of high explosive (HE), fuzes, and metal components.
- 1926 – Lightning set off a series of storage magazine explosions at the Lake Denmark Naval Ammunition Depot that destroyed most of the arsenal and killed 18 people. Approximately 2.4 million pounds of explosives were detonated or burned. Unexploded shells and shell fragments were recovered up to three-quarters of a mile to a mile away from the explosion centers, respectively.
- The arsenal was rebuilt, and by World War II (WWII), manufacturing and loading of pyrotechnics and smokeless powder, loading bombs and projectiles, and assembling fixed ammunition larger than .50 caliber was conducted. During WWII, the arsenal was the only facility in the United States capable of producing large amounts of explosives, bombs, and ammunition for the war.



Legend

Installation Boundary

Data Source: ESRI, USGS Map Service
Coordinate System: UTM Zone 18N
Datum: NAD 83
Units: Meters

0 0.5 1 Miles

WESTON SOLUTIONS

Figure 1-1
Picatinny Arsenal Location
Morris County, New Jersey

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- § After WWII, the arsenal focused primarily on research and engineering of new munitions; however, production of munitions and explosives continued through the Korean and Vietnam Wars. Between the Korean and Vietnam Wars, the arsenal contributed to the development of some nuclear weapons, including artillery shells and the Davy Crockett. The arsenal was also involved in the design of several different warheads.
- § 1960 – The Army reacquired the Lake Denmark Naval Ammunition Depot land from the Navy, adding the land back into the arsenal's boundary.
- § 1970s – Following the Vietnam War, research and development (R&D) work on nuclear and non-nuclear weapons continued at the arsenal. R&D applications included artillery, infantry, vehicle and aircraft weapons; demolition munitions; mines; bombs; grenades; pyrotechnic systems; rocket-assisted projectiles; flares; chemical systems/materials; and fuzes.
- § 2005 –The Department of Defense (DoD) recommended that the arsenal should grow in size under Base Realignment and Closure (BRAC) and be realigned with seven other DoD facilities and to gain new missions.
- § 2005 to present – The Arsenal is the home of the Army's Armaments Research, Development and Engineering Center (ARDEC), whose mission is conducting and managing R&D for all assigned weapons systems. There are several established partnerships with academia and industry throughout the R&D process at the arsenal.

1.6 OVERVIEW OF THE MMRP AT PICATINNY ARSENAL

Prior to the initiation of this RI, the previous studies conducted at PTA under the MMRP included the U.S. Army Closed, Transferred and Transferring Range/Site Inventory for Picatinny Arsenal (Malcolm Pirnie, 2003), which marked the completion of the Preliminary Assessment (PA) phase of work under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA); the Historical Records Review (HRR) (Malcolm Pirnie, 2006), and the Site Inspection (SI) (Malcolm Pirnie, 2008), which complete the PA/SI requirement for the MMRP eligible sites under the MMRP.

Since 2003, several actions/activities have been conducted under the MMRP at PTA. Engineering Evaluation/Cost Analysis (EE/CA) investigations and removals were conducted in several areas: the Residential Community Initiative (RCI) housing areas, the Child Development Center (CDC), and two BRAC facilities: Packaging, Handling, Storage and Transportation Center (PHS&T Center) and the Electromagnetic Research Facility (ERF). In addition, three separate Time Critical Removal Actions (TCRAs) were conducted at the off-post Mount Hope Quarry (also known as Tilcon) between 2006 and 2011, based on the MEC discovered during quarry operations. A discussion of the EE/CA and TCRA activities and their results is presented in Sections 3.2.1 and 3.3.1, respectively. A TCRA was conducted in conjunction with the Installation Restoration Program (IRP) during the removal and capping activities at the Former Defense Reutilization Management Office (DRMO) Yard. A discussion of the DRMO TCRA activities and their results is presented in Section 3.5.1.1.

Continuing projects and activities under the MMRP include UXO construction support for BRAC and other construction projects throughout the installation. Currently, under a separate program, an EE/CA Report is being prepared to determine interim land use controls (LUCs) to be put in place at PTA until a final remedy is selected and implemented. It should be noted that most of the interim LUCs that will be evaluated in the EE/CA and implemented through the Final LUC Plan (e.g., dig permits requiring construction support and educational outreach activities) are already in place at PTA. These interim LUCs will be established in a Final LUC Plan, which may be revised as the LUCs are adjusted (potentially as a result of the RI/FS) until a final remedy is implemented. The EE/CA and RI/FS are being completed simultaneously but independently of one another. The EE/CA will result in the interim LUCs until the RI/FS is completed and a final remedy, which may include some or all of the interim LUCs, is selected.

1.7 OVERALL DESCRIPTION AND ENVIRONMENTAL SETTING OF PICATINNY ARSENAL

Table 1-1 presents general and environmental information to provide the overall setting of PTA. This information supports the development of the CSMs for each of the nine MRSs.

Table 1-1 Overall Description and Environmental Setting of Picatinny Arsenal

Property

- PTA consists of 5,801 acres that house government-operated munitions R&D facilities, operational ranges for munitions testing, residential housing, and recreational facilities that include a golf course and water park.

Security

- Access to the installation is restricted through two guarded gates, the Front (main) Entrance, and the Mount Hope Entrance. The Truck Gate and Berkshire Valley Gate also restrict access onto the installation.
- PTA is enclosed by a fence with the exception of some sections of the 3500 area.

Climate (World Climate, 2010)

- PTA is located within a cool, humid continental climate.
- Average annual high temperature is 60.3 degrees Fahrenheit (^oF) with average annual low temperature of 40.1 ^oF.
- Daytime high temperatures average from 35 ^oF in January to 83 ^oF in July.
- Average annual precipitation is 47.4 inches, with monthly averages between 3 and 5 inches.

Geology

- PTA is located in the New Jersey Highlands physiographic province.
- The New Jersey Highlands are comprised of Proterozoic to Devonian rocks as part of the Appalachian Mountains formed when the continents collided.
- Four bedrock formations underlie PTA: Precambrian gneiss and other metamorphic rocks, Cambrian Hardyston quartzite, Cambrian Leithsville dolomite, and Silurian Green Pond conglomerate. Pleistocene glacial till and stratified drift overlie much of these formations (Lucey, 1972).
- Rocks with highly oxidized iron content are prevalent. Iron ore was extensively mined in the region (Lucey, 1972).

Topography

- PTA is located within Picatinny Valley with Green Pond and Copperas Mountains to the northwest and an unnamed hill to the southeast (U.S. Geological Survey (USGS), 1997).
- Elevations range from 685 feet (ft) above mean sea level (amsl) in the valley to approximately 1287 ft amsl along the ridgeline of Green Pond Mountain (USGS, 1997).
- Topographic gradient is from northeast to southwest.
- Rugged hills to mountainous terrain and low valleys.

Soil

- Twenty-six major soil associations are present at PTA.
- Soil is generally coarse-textured sandy loams derived from bedrock, glacial till, and colluviums (U.S. Department of Agriculture (USDA), 1976).
- Southern PTA is bordered by a terminal moraine that consists of poorly sorted clay, sand, gravel, and boulders (Lucey, 1972).
- Up to 20 ft of glacial till consisting of sand, gravel, and boulders covers the western portion of PTA. The eastern portion of PTA consists of uniform glacial till with thicknesses ranging from 10 to 25 ft.
- The valley floor consists of till and drift from glacial lakes and streams with thickness of up to 200 ft (Dames & Moore, 1991).
- Steep, rocky slopes with very little soil cover exist on the northwestern portion of PTA.
- Hydric soil makes up approximately 26% of the ground at PTA (USAEC, 2001).

Vegetation

- 70% of PTA is covered with second-growth forests with mixed species of oak in pole-sized stage (USAEC, 2001).
- Northern hardwood and red maple swamps, each comprising 13% of the forested areas, are the second dominant forest types on PTA (USAEC, 2001).

Table 1-1 General and Environmental Information for Picatinny Arsenal (Continued)

Hydrogeology § Three aquifers exist at PTA. § The uppermost aquifer is an unconfined aquifer consisting of stratified drift on top of fine sand and silt lake sediments. § A confined, glacial till aquifer consists primarily of sand and gravel and underlies the stratified drift aquifer. This aquifer is the primary water source for PTA. § The third aquifer is a bedrock aquifer separated from the confined glacial till aquifer by weathered bedrock with a maximum thickness of 60 ft (Dames & Moore, 1991).
Hydrology § PTA lies within the recharge area of the New Jersey Watershed Management Area 6 (WMA 6), northern New Jersey's primary water supply. § Two large man-made lakes (Picatinny Lake and Lake Denmark), 18 ponds, 4 perennial brooks (Green Pond, Burnt Meadow, Bear Swamp, and Ames), and intermittent streams, springs, seeps, and waterfalls (USAEC, 2001) exist at PTA. § Surface water drains primarily from northeast to southwest with Green Pond Brook serving as the primary drainage for PTA.
Current and Future Land Use § PTA will continue to be used for military R&D, industrial, residential housing, and recreational activities (fishing, boating, hunting, and golfing).
Potential Future Human Receptors § Future receptors are assumed to be similar to the current receptors, which are PTA employees; military personnel; recreationists; and families, including children. § Potential future human receptors may also include construction and maintenance workers.
Zoning/Land Use Restrictions § No known land use restrictions.
Beneficial Resources § PTA contains the largest tract of undeveloped, forested public land in the New Jersey Highlands Region (Malcolm Pirnie, 2006). § PTA provides prime habitat for wildlife species, including seasonal habitat for the federally listed endangered Indiana bat (*Myotis sodalis).* § The undeveloped acreage serves as groundwater recharge for NJ WMA 6. § The region surrounding PTA was mined for iron ore. § Quarrying operations for crushed stone are conducted next to PTA.
Demographics § PTA has over 750 permanent residents and employs approximately 3,900 personnel. § Nearby communities include Wharton, Dover, Rockaway, Boonton, and Morristown. § The two largest communities, Dover (located approximately 4 miles to the south) and Morristown (located 15 miles to the southeast), have populations of 18,188 and 18,544, respectively (U.S. Census Data, 2000).
Habitat Type § Habitats include upland forests, forested wetlands, and lakes and associated scrub/shrub wetlands (USAEC, 2001). § Aquatic habitats are present in Lake Denmark and Picatinny Lake (USAEC, 2001).
Ecological Receptors (USAEC, 2001; New Jersey Department of Environmental Protection (NJDEP), 2011) § Two federally listed endangered species exist or may exist on PTA and include the Indiana bat and the bog turtle. § A total of 65 species of animals listed as state endangered, threatened, or species of concern either exist on PTA or may be present within a ¼ mile of PTA. § A total of 14 species of rare plants listed as state endangered or under protection from the Highlands Water Protection and Planning Act within the jurisdiction of the Highlands Preservation Act exist on PTA or in the immediate vicinity of PTA.

Table 1-1 General and Environmental Information for Picatinny Arsenal (Continued)

Wetlands

- Approximately 1,250 acres of forested and scrub/shrub wetlands are located at PTA.
- Red maple swamp forests, lakes, and ponds and their associated wetlands comprise 92% of the wetlands on PTA.
- Picatinny Lake is designated by NJDEP and U.S. Fish and Wildlife Service (USFWS) as an open water wetland (USAEC, 2001).

Cultural, Archaeological, and Historical Resources (Chugach Industries, 2008; and Picatinny Environmental Affairs, 2011)

- A total of 108 potential and/or known historic archaeological sites and 27 potential and/or known prehistoric sites have been identified across the installation (Picatinny Environmental Affairs, 2011; and Chugach Industries, 2008) and the PTA Administration and Research District in downtown PTA is identified by the New Jersey Historic Preservation Office (NJHPO) as a cultural resource.

1.8 RECOMMENDATIONS FOR A REMEDIAL INVESTIGATION

Ten MRSs were identified as requiring further investigation, based on the results provided in the *Final Site Inspection Report, Picatinny Arsenal, New Jersey* (Malcolm Pirnie, 2008). However, one of the 10 MRSs, the Former Munitions and Propellant Test Area (PICA-001-R-01), is now an operational range and is not eligible under the MMRP.

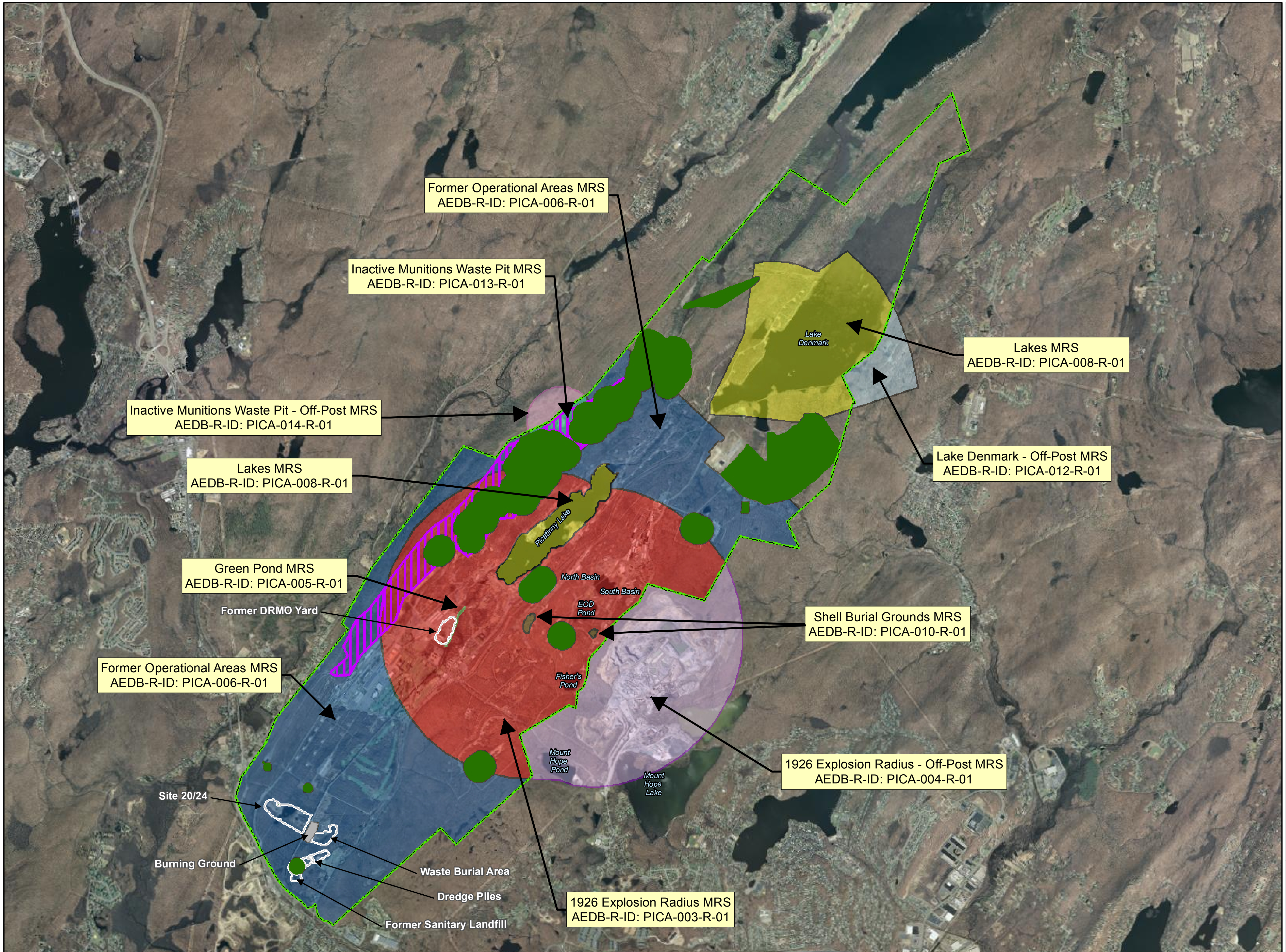
Table 1-2 presents a summary of the SI recommendations for each MRS. The locations of each of the nine MRSs are included in **Figure 1-2.** Recently, operational range boundaries at PTA have been redefined. **A**pproximately 370 acres are now eligible under the MMRP. At this time, the additional acres have been included in this Work Plan.

Table 1-2 Summary of the SI Recommendations

MRS	SI Recommendation	Basis for SI Recommendation (MEC)	Basis for SI Recommendation (MC)
1926 Explosion Radius PICA-003-R-01 1,544 acres	MRS to be further investigated for MEC and MC.	Numerous MEC have been recovered within the MRS, including HE and armor-piercing (AP) projectiles, small- to large-caliber ammunition, submunitions, and munitions debris (MD).	Copper, iron, lead, and zinc were detected in surficial soil samples at levels greater than the site-specific background level and at levels that exceed the comparison criteria.
1926 Explosion Site – Off-Post PICA-004-R-01 838 acres	MRS to be further investigated for MEC and MC. A TCRA was conducted at Mt. Hope Quarry in 2006-2007. Additional removal actions are recommended.	Numerous MEC have been recovered at the Mt Hope Quarry. Nine MEC were recovered between 2002 and 2007; 21 HE and four inert munitions were recovered during the 2006-2007 TCRA. MD was identified outside TCRA footprint. No MEC or MD was observed outside of quarry boundaries during the visual survey.	Metals and explosives have been detected in soil, surface water, and sediment samples collected from the 1926 Explosion Radius MRS.
Green Pond PICA-005-R-01 1.1 acres	MRS to be further investigated for MEC.	Munitions were observed protruding from and buried alongside the banks of the brook. A 66mm shell was recovered in Green Pond Brook. The source of MEC is unknown.	MC is being addressed under the IRP and, therefore, will not be included in the Active Army MMRP.
Former Operational Areas PICA-006-R-01 1,880acres	MRS to be further investigated for MEC and MC. Locations of the MRS where MC is being addressed under the IRP will not require additional MC investigation under the Active Army MMRP.	A PTA safety office map indicated the locations and types of MEC recovered across the Arsenal, including HE projectiles, small- to large-caliber ammunition, and submunitions.	Numerous IRP sites are located either wholly or partially within the MRS footprint. Extensive sampling, performed under the IRP, indicated the presence of metals and explosives in soil, surface water, and sediment at levels above levels of concern (LOCs) at several locations throughout this MRS. No perchlorate samples were collected.

Table 1-2 Summary of the SI Recommendations (Continued)

MRS	SI Recommendation	Basis for SI Recommendation (MEC)	Basis for SI Recommendation (MC)
Lakes PICA-008-R-01 741 acres	MRS to be further investigated for MEC.	60mm, 81mm and 4.2-inch inert projectile ranges, a 20mm cannon range, and a 3-inch Barbette gun firing range were located at this MRS. 125 anomalies were identified during previous geophysical surveys conducted at the MRS on the lakes.	MC is being addressed under the IRP and, therefore, will not be included in the Active Army MMRP.
Shell Burial Grounds PICA-010-R-01 5.7 acres	MRS to be further investigated for MEC.	After the 1926 explosion occurred, approximately 25 tons of explosives and materials, including projectiles, mines, depth charges, fuzes, and small arms ammunition were disposed of in the MRS. This MRS was also used by the Navy for explosives disposal until 1945.	MC is being addressed under IRP and, therefore, will not be included in the Active Army MMRP.
Lake Denmark – Off Post PICA-012-R-01 113 acres	MRS to be further investigated for MEC and MC.	The MRS is located where a portion of a mortar range safety fan extended. The range and the majority of the safety fan are included in the Lakes MRS.	No known MC sampling has occurred at this site. Metals have been detected in sediment samples collected from the Lake MRS under the IRP.
Inactive Munitions Waste Pit PICA-013-R-01 21 acres	MRS to be further investigated for MEC.	The MRS falls within a surface danger zone (SDZ) for a historical on-post range, where testing and storage of munitions and explosives may have occurred.	Metals and explosives have been detected in soil and sediment samples collected from the Inactive Munitions Waste Pit MRS.
Inactive Munitions Waste Pit-Off-Post PICA-014-R-01 39 acres	MRS to be further investigated for MEC.	The MRS falls within a surface danger zone (SDZ) for a historical on-post range, where testing and storage of munitions and explosives may have occurred. No MEC or MD was observed during SI visual survey	No known MC sampling has occurred at this site.



WESTON SOLUTIONS

Legend

- Installation Boundary
- Code 300 Area
- Operational Range Areas
- Ineligible Area - Burning Ground
- MRS Sub-Sites

Munitions Response Sites Locations

- 1926 Explosion Radius
- 1926 Explosion Radius - Off-Post
- Former Operational Areas
- Green Pond
- Inactive Munitions Waste Pit
- Inactive Munitions Waste Pit - Off-Post
- Lake Denmark - Off-Post
- Lakes
- Shell Burial Grounds

Base Imagery: NJ 2007 Natural Color Imagery
Data Source: Army GIS Layers (August 2011)

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N W E S

3,500 1,750 0 3,500
Feet

Figure 1-2
Location of Munitions Response Sites
Picatinny Arsenal
Morris County, New Jersey

File: Y:\Picatinny\MXD\workplan\Final\Fig_1-2_MRS_all.mxd, 1/5/2012 2:13:41 PM, ricksc

2. TECHNICAL MANAGEMENT PLAN

2.1 PROJECT OBJECTIVES

The goal for this project is to achieve an RI at each of the nine PTA MRSs identified in the contract's PWS. The following project objectives will be met:

- Characterize the type (nature), density and/or distribution (extent) of MEC on the surface and in the subsurface at each MRS.
- Characterize the nature and extent of MC in soil at applicable MRSs.
- Perform a hazard assessment for MEC, if recovered.
- Perform a baseline risk assessment for MC, as appropriate.
- Evaluate the MRS boundaries based on the RI results.

2.2 PROJECT ORGANIZATION

The overall project team for the MMRP RI at PTA includes representatives from USACE, USAEC, and PTA. **Figure 2-1** presents the Army's organization for this project. **Figure 2-2** presents WESTON's project team organization, and **Figure 2-3** presents WESTON's field team organization. **Table 2-1** provides a summary of the key positions and responsibilities. WESTON has developed a project team with the technical abilities required to safely and efficiently perform the RI at PTA. WESTON will use project resources from our West Chester, PA, office for investigation activities and will receive project support from our team subcontractor, ARCADIS U.S., Inc./Malcolm Pirnie, Inc. (ARCADIS/Pirnie). The contact information for project personnel is provided in **Appendix A**.

Additional personnel who will support the project include corporate quality control (QC), risk assessors, information management specialists, community relations specialists, technical editors, contract administrators, cost controllers, and administrative assistants. Subcontractors will support the project as needed (e.g., professional surveyors, laboratory resources).

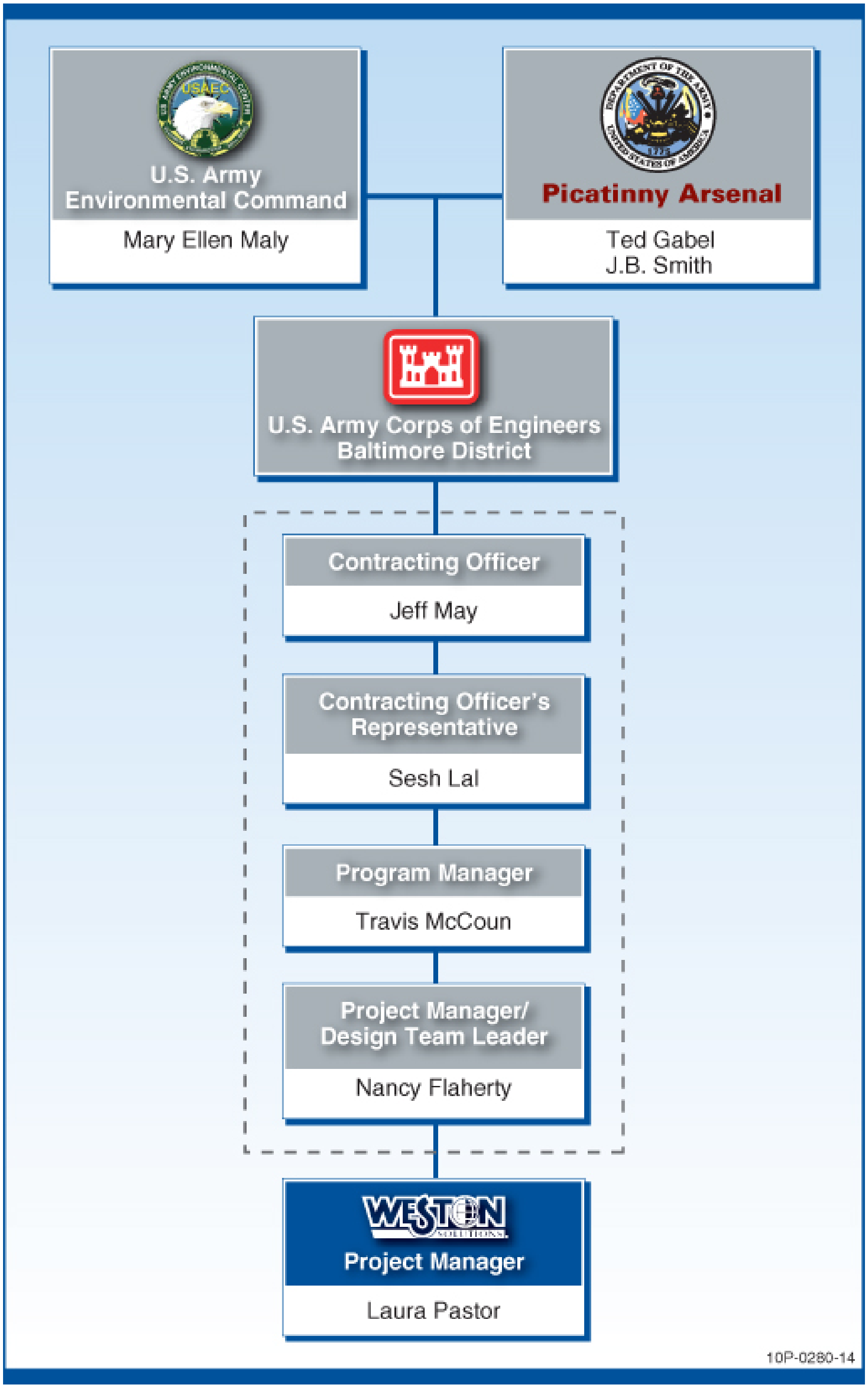


Figure 2-1 Army Organizational Chart

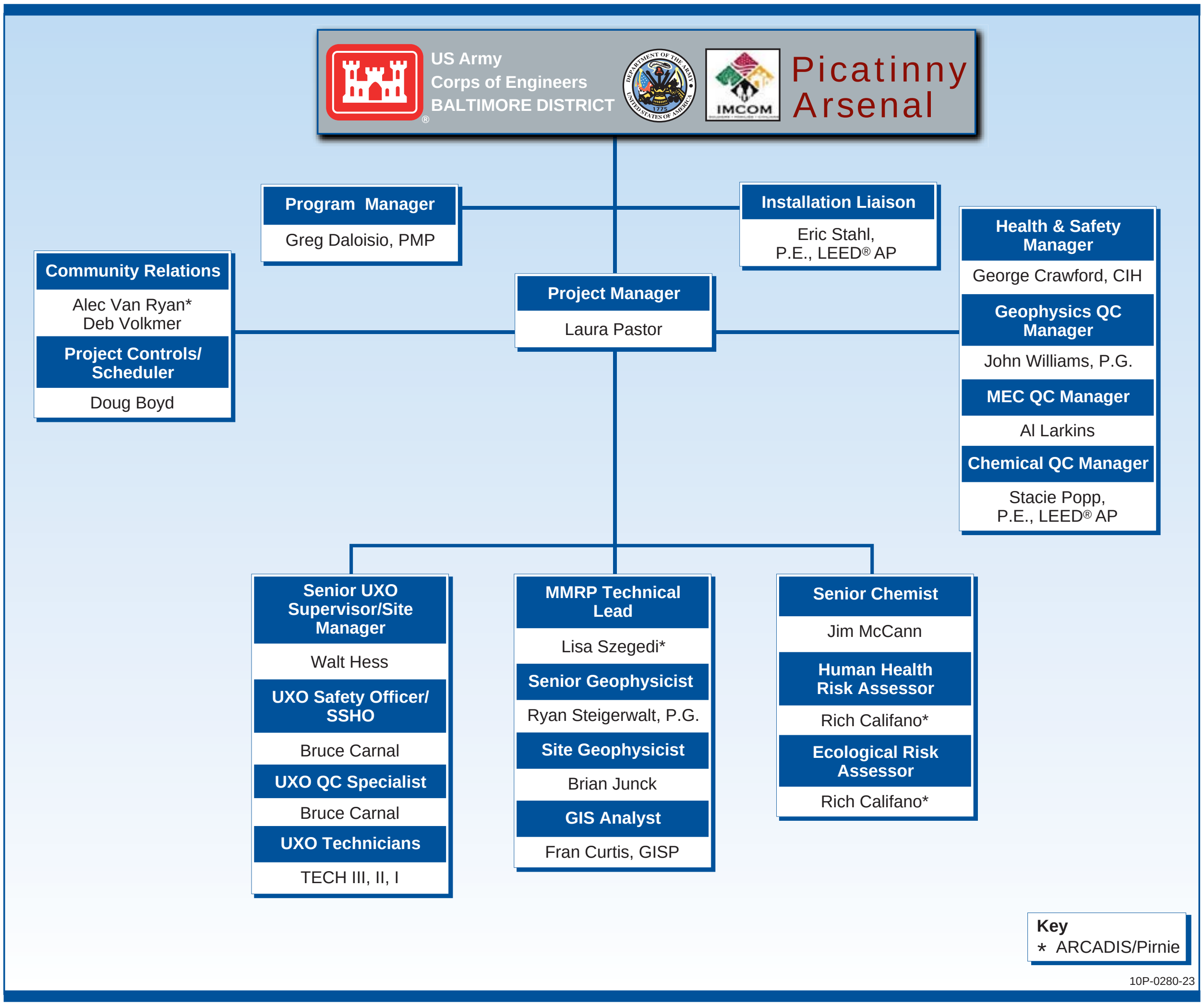


Figure 2-2 WESTON Project Team Organizational Chart

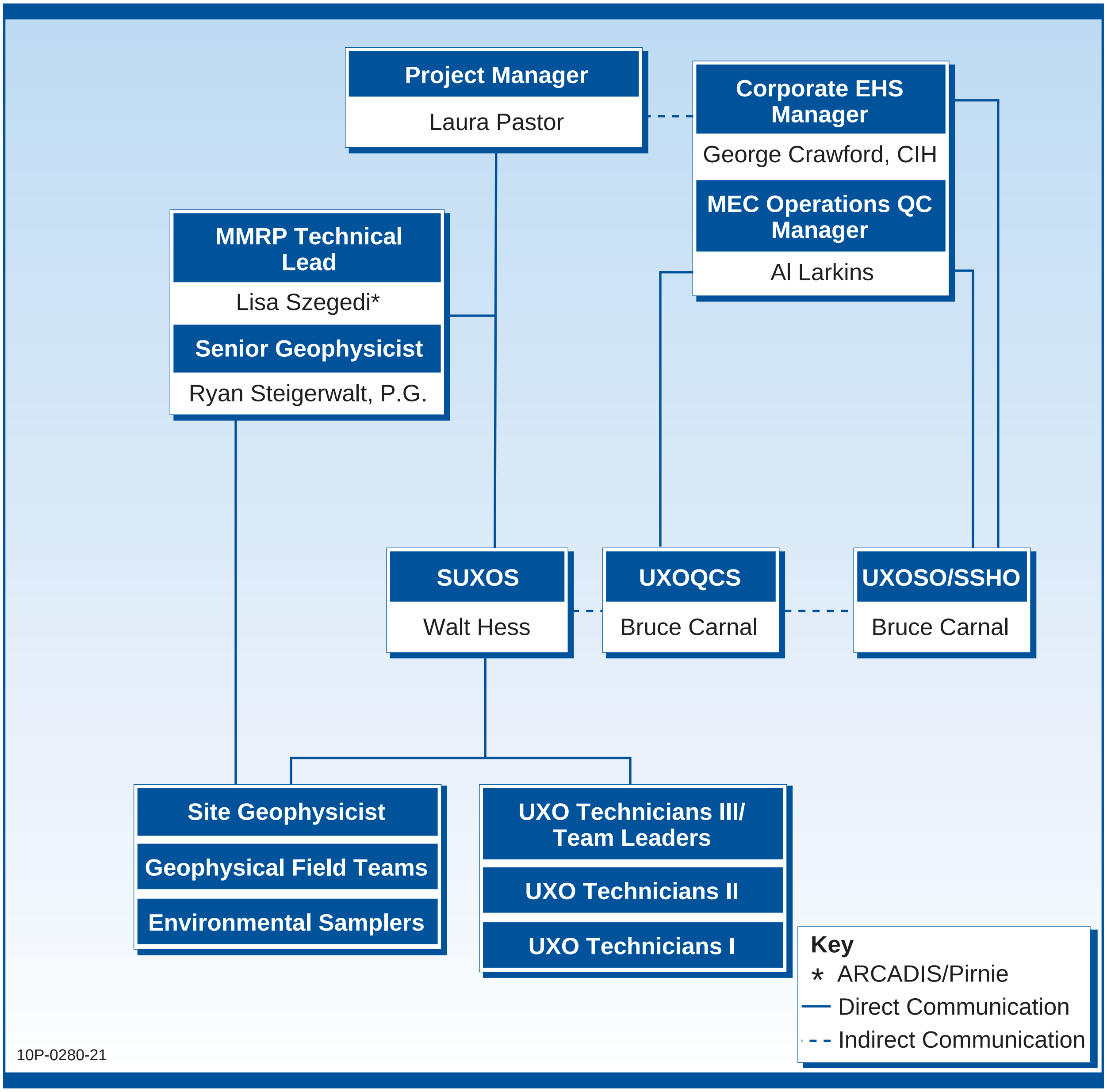


Figure 2-3 WESTON Field Team Organizational Chart

Table 2-1 Key WESTON Project Personnel and Responsibilities

Project Personnel	Key Responsibilities
Project Manager (PM) – Laura Pastor (WESTON)	▪ Serves as the primary point of contact (POC) and interacts with WESTON, ARCADIS/Pirnie, USACE, USAEC, and PTA. ▪ Maintains the Project Management Plan. ▪ Ensures on-time completion and approval of all deliverables. ▪ Ensures the implementation of the project health and safety and QC procedures.
MMRP Technical Lead – Lisa Szegedi (ARCADIS/Pirnie)	▪ Serves as the primary ARCADIS/Pirnie POC. ▪ Provides technical coordination and guidance to field staff. ▪ Ensures that the project requirements are followed and ensures the implementation of the UFP-QAPP. ▪ Ensures technical quality and reviews the analytical data and reports.
Senior Geophysicist – Ryan Steigerwalt (WESTON)	▪ Designs and implements the geophysical investigation plan to accomplish the project's objectives. ▪ Selects the proper instrumentation and navigational equipment. ▪ Provides oversight of the field geophysical activities and assurance of the overall quality and integrity of the geophysical field work. ▪ Analyzes and directs the anomaly selection for the reacquisition and digital geophysical mapping (DGM).
Site Geophysicist - (WESTON and ARCADIS/Pirnie)	▪ Coordinates data acquisition, performs data processing and analysis. ▪ Responsible for receiving the data, monitoring the technical performance of field teams, and coordinating with the field teams to develop the field reports. ▪ Prepares the target dig lists and dig sheets, coordinates target acquisition, and reviews the results of excavations.
Geophysical Survey Teams (WESTON and ARCADIS/Pirnie)	▪ Coordinates with the Site Geophysicist for field activities. ▪ Responsible for following the geophysical standard operating procedures, data collection, downloading data, and maintaining equipment. ▪ Provides daily field summaries of the geophysical activities.
Environmental Sampling Teams (WESTON and ARCADIS/Pirnie)	▪ Coordinates with the Senior UXO Supervisor (SUXOS) and MMRP Technical Manager for field activities. ▪ Responsible for following the UFP-QAPP and associated guidance/procedures for data collection. ▪ Provides daily field summaries of the sampling activities.
Senior UXO Supervisor (SUXOS) – Walt Hess (WESTON)	▪ Serves as the primary on-site POC and functions as the Site Manager. ▪ Plans, coordinates, and supervises the on-site activities. ▪ Implements the procedures and guidance for MEC operations (ensuring compliance with DoD directives and federal, state, and local statutes and codes). ▪ Certifies munitions documented as safe (MDAS) as ready for turn-in disposal. ▪ Maintains the administrative records of the project. ▪ Supervises the multiple project teams during the performance of field activities, including, but not limited to, the following: – UXO escort for vegetation clearance, land surveying, and anomaly avoidance; mag and dig surveys; underwater investigations; demolition activities; transport and storage of explosive material. ▪ Provides subject matter expertise and leadership to ensure the team's safety and the project's quality.

Project Personnel	Key Responsibilities
UXO Quality Control Specialist (UXOQCS) – Bruce Carnal (WESTON)	▪ Serves as the POC for all MEC operations quality issues. ▪ Monitors the activities affecting quality during RI activities. ▪ Performs QC to ensure that procedures are carried out in accordance with the established requirements and protocols. ▪ Prepares the Daily QC Report (DQCR). ▪ Provides subject matter expertise and leadership to ensure the project's quality.
UXO Safety Officer (UXOSO)/Site Safety and Health Officer (SSHO) – Bruce Carnal (WESTON)	▪ Monitors the site activities for compliance with the plans, procedures, and regulations relative to the health and safety of employees, project members, land users, residents, and visitors. ▪ Monitors the field activities and enforces compliance with the health and safety requirements as established in the plans and procedures. ▪ Provides subject matter expertise and leadership to ensure the team's safety.
UXO Technician III (WESTON and ARCADIS/Pirnie)	▪ Leads the team to which he/she is assigned. ▪ Provides subject matter expertise and leadership to ensure the team's safety and the project's quality. ▪ Ensures that the team's actions are accomplished safely and efficiently. ▪ Maintains the administrative records related to the team's operations. ▪ Implements the work, safety, and quality plans for this project. ▪ Leads the conduct of on-site evaluations directly related to the MEC operations. ▪ Is familiar with the duties of all assigned personnel and is able to perform the functions enumerated for UXO Technicians I and II. If assigned as Demolition Supervisor, additional responsibilities include the following: ▪ Trains personnel regarding the nature of the materials, hazards, and precautions. ▪ Coordinates with the SUXOS and UXOSO to ensure that the required notifications are completed prior to demolition. ▪ Is present and in direct control during the on-site disposal operations.
UXO Technicians II and I (WESTON and ARCADIS/Pirnie)	▪ Are the primary workers on-site and report directly to the UXO Technician III. ▪ Perform MEC operations, mag and dig, reacquisition, removal, and disposal operations. ▪ Will meet the qualifications of a UXO Technician I at a minimum and be under the direct supervision of a UXO Technician III.

2.2.1 Mag and Dig Teams[1]

The mag and dig teams will be composed of two UXO technicians managed by at least one UXO Technician III. Each UXO Team performing intrusive operations will be composed of one UXO Technician III and one UXO Technician II.

2.3 PROJECT COMMUNICATION AND REPORTING

WESTON will share project information with the project team and stakeholders by using the secure, WESTON web-based TeamLink[SM] system to facilitate electronic data-sharing/communication. TeamLink[SM] is an organized site that enables stakeholders to post and view project information, provides a means by which to track project action items, and establishes the various security levels to control which team members can view, access, and/or manipulate posted information. TeamLink[SM] will provide USACE, USAEC, PTA, NJDEP, U.S. Environmental Protection Agency (EPA), and other stakeholders with direct, secure, and reliable electronic access to project-specific documents and data from anywhere they have Internet access. If the information technology (IT) security requirements present a problem, a file transfer protocol (ftp) site will be used for data sharing/communication.

2.3.1 Monthly Status Reports

The WESTON PM will provide monthly status reports to USACE. Monthly status reports will be submitted to the Contracting Officer's Representative (COR) or designee (USACE PM) by the 15th of the following month and will provide summary information that includes, but is not limited to, work completed, work scheduled, technical issues, regulatory challenges/issues, issues that may hamper project schedule, and any other project-related issues raised by the stakeholders.

2.3.2 Daily and Weekly Status Reports

Progress status reports will be provided to USACE on a daily and weekly basis while field work is being conducted. The SUXOS/Site Manager will provide daily reports that will be posted to the PTA TeamLink[SM] site on the next business day. Weekly status reports will be provided

[1] The commonly used term "mag and dig" refers to a method to detect and investigate subsurface anomalies using magnetometers. The terminology will be used throughout this Work Plan; although, the UXO Teams will actually use all metal sensors rather than magnetometers to detect subsurface anomalies.

electronically to the USACE PM by the first work day of the following work week and will include a summary of the previous week's daily reports.

2.3.3 Phone Conferences/Informal Site Meetings

Phone conferences and informal site meetings with project team members or stakeholders will be documented through follow-up emails and summaries in the monthly status reports. Only the Contracting Officer (KO), COR, or designee can provide official direction to WESTON.

2.3.4 Regulatory Negotiations

Regulatory coordination must be approved by PTA through the COR or designee. The WESTON PM will provide the necessary support to initiate, schedule, and address regulatory aspects of the project. Any informal site conversations/meetings will be documented through email and/or status reports.

2.4 PROJECT DELIVERABLES

This Work Plan and the RI Report(s) will be produced in draft (Army Internal Draft), draft final, and final versions in both hard copy and electronic (PDF) format. The electronic format will have optical character recognition in accordance with the USAEC Repository of Environmental Army Documents (READ) requirements. WESTON will provide a sufficient number of copies of each submittal as requested by the various project stakeholders.

The COR or designee will provide the consolidated Army comments on the draft documents to WESTON within 30 calendar days. Once the initial comments are addressed, the Army will review the draft final documents before the submission to the appropriate regulatory agencies, the Technical Assistance for Public Participation (TAPP) contractor, and/or the Restoration Advisory Board (RAB), or other stakeholders. The documents will be identified as draft final until the completion of stakeholder coordination and review, when they will be signed and finalized. WESTON will place one copy of the final documents in both the project repository and the Administrative Record (for CERCLA documentation).

2.5 PROJECT SCHEDULE

Changes to the project schedule are likely to occur, and updated schedules will be submitted to the

USACE PM with the monthly status reports. The updated schedules will be made available to the project team at all times. Copies of the schedules will be kept at the site trailer and posted to TeamLink[SM].

2.6 PUBLIC INVOLVEMENT

The public involvement activities will be coordinated through the Army Public Affairs Officer (PAO) and the WESTON Team's community relations specialist. WESTON will not make available or publicly disclose any data or report generated under this contract unless specifically authorized by the COR or designee. If any person or entity requests information about the subject of this PWS or work being conducted hereunder, WESTON will refer them to the COR or designee.

WESTON will provide the necessary support to initiate, schedule, and address public participation aspects of the project (e.g., preparation of briefings, presentations, fact sheets, newsletters, and articles/public notices to news media, and notifications to RAB members). WESTON will request and address public comments consistent with applicable regulatory drivers.

WESTON will coordinate with the current TAPP contractor and support the RAB meetings as requested. WESTON will prepare letters, coordinate, assist with right-of-entry (ROE) documentation and/or court interaction, and schedule public and/or private meetings, as required for the off-site activities.

WESTON will coordinate with the PTA PAO to update the existing PTA Internet web-based geographic information system (GIS). This GIS stores and presents the chemical sampling results and the environmental and GIS layers in an Oracle database. The GIS will include applicable LUC data.

2.7 SUBCONTRACTOR MANAGEMENT

WESTON has teamed with ARCADIS/Pirnie, an experienced, pre-qualified subcontractor, to meet the specific needs on this Delivery Order. ARCADIS/Pirnie's responsibilities will include the following:

- Public involvement activities, including an update of the PTA Community Involvement Plan.
- Work Plan support and development of the UFP-QAPP.
- Field activities support.
- Implementation of the MC sampling program and data validation.
- Risk assessments and RI Report development support.
- Participation at TPP and RAB meetings.

Other subcontract services that will be used for this project include analytical laboratory, data validation services, professional land surveyors, and other supply vendors.

2.8 MANAGEMENT OF FIELD OPERATIONS

During field operations, WESTON will work with USACE and PTA to establish a site field office for RI activities. The SUXOS will serve as the Site Manager for field operations. Field operation safety and quality will be monitored by the UXOSO and UXOQCS, respectively.

3. FIELD INVESTIGATION PLAN

3.1 REMEDIAL INVESTIGATION APPROACH

The overall RI approach at the nine PTA MRSs includes the following:

- Develop the data quality objectives (DQOs) through the TPP process.
- Conduct the geophysical surveys using both analog and digital instruments to detect and delineate the extent of potential MEC. Development of the geophysical surveys included the use of statistical tools.
- Perform the intrusive investigation of anomalies to evaluate the nature and extent of MEC.
- Conduct MRS-specific media sampling (soil/sediment) and laboratory analysis to evaluate MC against the accepted criteria.
- Dispose of the recovered MEC and materials potentially presenting an explosive hazard (MPPEH).
- Inspect MD and designate as MDAS for turn-in and/or recycling.
- Collect scrap metal (e.g., cans, nails) for recycling at the end of the project.
- Perform an explosives hazard assessment if MEC is recovered.
- Perform a baseline risk assessment if MC is detected.
- Report results through the TPP process during the RI to gain stakeholder concurrence.
- Update the CSM and Munitions Response Site Prioritization Protocol (MRSPP).
- Submit an RI Report that provides detailed information to support the development of remedial alternatives as part of an FS.

3.1.1 Achieving MEC and MC Characterization Goals

The analog and DGM surveys will be performed at each of the eight MRSs to characterize the nature (type) and extent (distribution) of MEC. The MC sampling, which will be conducted to characterize the nature and extent of MC associated with MEC, is summarized in Section 3.1.2. The geophysical survey strategies are based on the USACE guidance, Engineering Manual 1110-1-4009 (USACE, 2007). Statistical tools, including UXO Estimator and Visual Sampling Plan (VSP) (PNNL, 2010), were used in developing the survey design and the coverage necessary to fully characterize each MRS for MEC. These tools calculate the area that is required for geophysical investigation, ensuring at a high level of confidence that MEC characterization is achieved without performing full coverage surveys across each MRS. The geophysical investigations will include both grids and transects based on the statistical tool calculations and subsequently tailored to the CSM (including the former munitions use/MEC release profile, terrain, vegetation, accessibility) for each MRS to achieve the coverage requirements.

3.1.1.1 Field Sampling Requirements Using UXO Estimator

UXO Estimator was used to develop the field sampling requirements at MRSs with a homogeneous distribution of MEC. This tool calculates the area requiring investigation based on the anticipated MEC density, future land use, and the project-specific selected confidence level (95%). The area calculated by UXO Estimator will be investigated during the RI to be 95% confident that the MEC density is less than or equal to the density determined from the CSMs. The investigation areas are randomly distributed across the MRS in order to meet the statistical requirements of the tool. The calculated investigation areas will be geophysically surveyed using analog mag and dig and DGM methods. The surveys will be grid- and transect-based, and the anomalies will be investigated for potential MEC. The results of the investigation will be reviewed and confirmed using UXO Estimator to ensure that the confidence level is achieved.

3.1.1.2 Field Sampling Requirements Using Visual Sample Plan

The VSP was used to develop the sampling plans for MRSs that have potential MEC releases whose locations are unknown. The transect spacing and placement is calculated to verify with a 95% confidence level (at a minimum) that a MEC release of a predetermined size and shape is traversed and detected. These transects are traversed using geophysical surveys. The survey results are evaluated to identify the areas with increased anomaly density. Additional surveys may be performed to further delineate potential MEC releases and to evaluate the nature and type of geophysical anomalies that were detected.

Table 3-1 Summary of MC Sampling

MRS	Sampling Approach	Basis for Approach
1926 Explosion Radius PICA-003-R-01	Biased associated with MEC	Three potential release mechanisms were identified for MC at this MRS. ▪ Dispersion of bulk TNT through an explosion—Based on a review of IRP data, TNT and its degradation products are not found throughout the MRS boundary. Therefore, random sampling for TNT and its degradation products is not proposed. ▪ Through historical site usage—A review of the IRP data from partially collocated IRP sites does not indicate the widespread presence of explosives in surface soils throughout the MRS boundary. Therefore, random sampling for MC is not proposed. ▪ Through association with MEC found at the MRS—If the MEC is not blown-in-place (BIP), biased sampling is proposed near MEC found during the MMRP RI, only when field observation indicates that a potential release has occurred (e.g., visual evidence of staining, cracked or corroded munitions, the item is not inert). No MC sampling is proposed for any MEC when the MEC is BIP.
1926 Explosion Radius – Off-Post PICA-004-R-01	Biased associated with MEC	Two potential release mechanisms were identified for MC at this MRS. ▪ Dispersion of bulk TNT through an explosion—Based on a review of the IRP data, TNT and its degradation products are not found throughout the MRS boundary. Therefore, random sampling for TNT and its degradation products is not proposed. ▪ Through association with MEC found at the MRS—If the MEC is not BIP, biased sampling is proposed near MEC found during the MMRP RI, only when field observation indicates that a potential release has occurred (e.g., visual evidence of staining, cracked or corroded munitions, the item is not inert). No MC sampling is proposed for any MEC when the MEC is BIP.
Former Operational Areas PICA-006-R-01	Random sampling and biased sampling associated with MEC	Two potential release mechanisms were identified for MC at this MRS. ▪ Through association with MEC found at the MRS—If the MEC is not BIP, biased sampling is proposed near MEC found during the MMRP RI, only when field observation indicates that a potential release has occurred (e.g., visual evidence of staining, cracked or corroded munitions, the item is not inert). No MC sampling is proposed for any MEC when the MEC is BIP. ▪ Through historical site usage— and because only a limited number of IRP samples are available within this MRS, random samples will be collected along grids developed using VSP software.
Lakes PICA-008-R-01	Biased associated with MEC	▪ This MRS consists of two lakes, Picatinny Lake and Lake Denmark, which had various ranges associated with them. For the land portion of Lake Denmark, biased MC sampling is proposed. It is assumed that any MC associated with this MRS would be associated with MEC. ▪ Through association with MEC found at the MRS— If the MEC is not BIP, biased sampling is proposed near MEC found during the MMRP RI, only when field observation indicates that a potential release has occurred (e.g., visual evidence of staining, cracked or corroded munitions, the item is not inert). No MC sampling is proposed for any MEC when the MEC is BIP.
Inactive Munitions Waste Pit PICA-013-R-01	Random sampling and biased sampling associated with MEC	▪ Through historical site usage—To the extent possible, MC sampling under the MMRP will be conducted during the IRP trenching. Random samples will be collected, developed using VSP software. Samples will only be collected from native soil, not the fill material, and will be collected from five evenly spaced locations within the trench. At each location three samples will be collected; two locations on the sidewalls and one location on the bottom of the trench. All locations will be field determined based on visual observation. ▪ Through association with MEC found at the MRS—If the MEC is not BIP, biased sampling is proposed near MEC found during the IRP trenching, only when field observation indicates that a potential release has occurred (e.g., visual evidence of staining, cracked or corroded munitions, the item is not inert). No MC sampling is proposed for any MEC when the MEC is BIP.

Table 3 1 Summary of MC Sampling (Continued)

MRS	Sampling Approach	Basis for Approach
Inactive Munitions Waste Pit - Off-Post PICA-014-R-01	Biased associated with MEC	▪ This MRS consists of the off-post portion of the surface danger zone (SDZ) associated with a potential range. It is assumed that any MC associated with this MRS would be associated with MEC. ▪ Through association with MEC found at the MRS — If the MEC is not BIP, biased sampling is proposed near MEC found during the MMRP RI, only when field observation indicates that a potential release has occurred (e.g., visual evidence of staining, cracked or corroded munitions, the item is not inert). No MC sampling is proposed for any MEC when the MEC is BIP.
Lake Denmark - Off-Post PICA-012-R-01	Biased associated with MEC	▪ This MRS consists of the off-post portion of the SDZ associated with the ranges at Lake Denmark. It is assumed that any MC associated with this MRS would be associated with MEC. ▪ Through association with MEC found at the MRS — If the MEC is not BIP, biased sampling is proposed near MEC found during the MMRP RI, only when field observation indicates that a potential release has occurred (e.g., visual evidence of staining, cracked or corroded munitions, the item is not inert). No MC sampling is proposed for any MEC when the MEC is BIP.

3.1.1 Munitions Constituents Field Sampling Requirements

MC sampling will be performed for six of the MRSs covered under this Work Plan, as briefly summarized in **Table 3-1**. The UFP-QAPP (formerly part of the Sampling and Analysis Plan (SAP)), in **Appendix B,** presents the MC sampling program and rationale in its entirety for the PTA MMRP RI. The UFP-QAPP, which will be used to guide the MC sampling teams, outlines the sampling procedures, types and locations of samples, equipment to be used, standard field operating procedures, and laboratory methods. For the following MRSs, MC is being addressed under the IRP and will not be sampled for during the MMRP RI:

- Shell Burial Grounds (PICA-010-R-01): MC at this MRS is being addressed under the IRP. Known as IRP Site PICA-162, this site is currently in the RI/FS phase with an anticipated approval date of September 2012. Groundwater, surface, and subsurface soil samples have been collected and analyzed for explosives and metals during the IRP.
- Green Pond MRS (PICA-005-R-01): MC at this MRS is being addressed under the IRP. Known as IRP Site PICA-193, this site is currently in the long-term monitoring (LTM) phase, with a Record of Decision (ROD) approval date of September 2007. Both surface water and sediment samples have been collected and analyzed for explosives and metals during the IRP.
- Lakes MRS (PICA-008-R-01): The water portion of this MRS, along with the land portion of Picatinny Lake, is being addressed under the IRP. Lake Denmark is known as IRP Site PICA-015, and Picatinny Lake is IRP Site PICA-057. The production buildings around Picatinny Lake are known as PICA-135. The FS for both water sites was

submitted in October 2009. Surface water and sediment samples were collected and analyzed for explosives and metals during the IRP. The RI/FS for the land portion of Picatinny Lake, which included the collection of groundwater, soil, and sediment samples, which were analyzed for explosives and metals, was submitted in December 2009.

3.1.2 Data Quality Objectives

The DQOs were developed for each MRS using the EPA QA/G-4HW guidance (2006). The DQOs are qualitative and quantitative statements that define the type, quantity, and quality of data necessary to support the decision-making process during the RI. The DQO process follows seven steps which has been incorporated into the characterization approach for each MRS:

1. **State the problem:** Provide a concise description of the problem.
2. **Identify the decisions:** Develop the decision statements to solve the problem.
3. **Identify inputs to the decision:** Identify the information and measurements needed to make the decisions.
4. **Define study boundaries:** Identify the conditions such as spatial and temporal boundaries.
5. **Develop a decision rule:** Qualify the decisions to understand the data needs.
6. **Specify tolerable limits on decision errors:** Develop the performance criteria.
7. **Optimize the design:** Design an effective data collection strategy based on the previous steps.

3.1.3 Technical Project Planning

On 10 November 2010, the PTA MMRP RI TPP 1 meeting was held to identify and discuss project expectations and the DQOs with the project team members and stakeholders. On 28 July 2011, the PTA MMRP RI TPP 2 meeting was held. Representatives from USACE, USAEC, PTA, EPA, NJDEP, Picatinny Arsenal Environmental Restoration Advisory Board (PAERAB), WESTON, and ARCADIS/Pirnie participated in the meetings. The final TPP 1 and TPP 2 meeting minutes are provided in **Appendix C**.

3.1.4 Overarching RI Data Inputs

3.1.4.1 Anticipated MEC

Based on a review of numerous documents, reports, maps (e.g., UXO Finds Map, IRP reports, and historical information), the following list of MEC potentially used and/or found at PTA throughout the years, was developed. Where specific information regarding the type of munitions is not available (e.g., HE versus practice), it was assumed that all types are potentially present so that the MC analytical program would capture all associated MC.

- 2.75-in rocket motor
- 3-in projectiles (HE, AP, AP-capped, smoke)
- 3.5-in rocket (high explosive antitank (HEAT), practice)
- 4-in projectile
- 5-in projectile
- 6-in projectile (HE, AP)
- 8-in projectile (HE, AP)
- 14-in projectile (HE, AP, target)
- 20mm projectile (HE Incendiary, HE, AP, practice)
- 37mm projectile (AP, AP-capped, practice, canister)
- 40mm projectile (HE tracer, HE, AP, practice
- 57mm projectile (AP, AP-capped, practice, HE, HEAT, smoke)
- 60mm mortar (HE, practice)
- 106mm (HEAT)
- 90mm projectile (blank, dummy, HE)
- 105mm projectile (HE, HEAT, smoke)
- 106mm projectile (HEAT)
- 122mm projectile
- 152mm projectile (Target Practice – Traced (TP)-T, dummy)
- 155mm projectile (HE, AP, practice)
- 175mm projectile (HE)
- Bomb (demolition, 50-lb, 1000lb, 350-lb)
- Fuzes
- Grenades (hand, rifle, practice, smoke, HE, high explosive dual purpose (HEDP))
- Mines (HEAT, anti-personnel, practice, gravel)
- Mortars (60mm and 81mm; HE, illumination, smoke, practice: 81mm; HE, practice: 120mm inert, 4.2-inch HE)
- Pyrotechnics (flares, signals, simulators, obscurant smokes)

3.1.4.2 UXO Finds Map

In 2008, near the end of the SI process, a map was discovered at the Picatinny Safety Office that provided the locations of munitions found sporadically throughout the portion of PTA located south of Lake Denmark. This map, along with a listing of MEC found, described/showed the locations of MEC found from 1986 through 1998, based on the Explosive Ordnance Disposal (EOD) incident reports. Throughout this Work Plan, this map is referred to as the UXO Finds Map (see **Appendix D)**. **Appendix D** also includes a table with details regarding the EOD report number, the type(s) of MEC found, and the location of MEC shown on this map. Based on this map, an additional area (the Former Operational Areas), which was identified in the HRR as an Area of Interest, was included as an MRS to move forward to the RI Phase.

During the planning process, this map was reviewed to determine whether the information on it could be used to help guide the characterization approach for the 1926 Explosion Radius MRS and the Former Operational Areas MRS. Because it is unknown how complete the information is on this map, it had limited use in determining characterization approaches. However, the information that this map provides will be important, in conjunction with the RI data to determine the nature and extent of MEC at PTA.

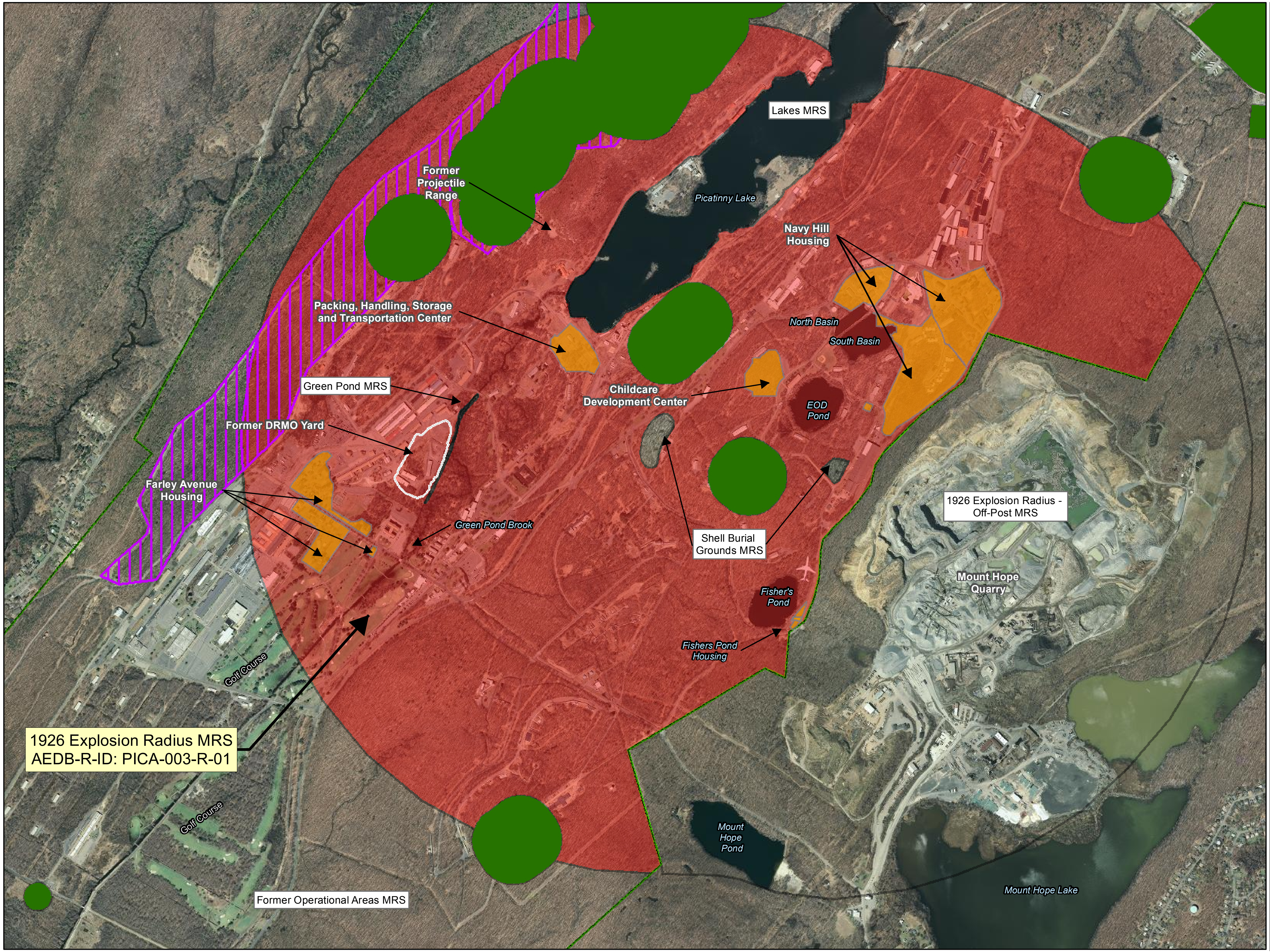
3.2 THE 1926 EXPLOSION RADIUS MRS (PICA-003-R-01)

The 1926 Explosion Radius MRS (PICA-003-R-01), which is 1,544 acres in size, consists of the on-post area within a 1-mile radius around the center of an explosion that occurred in 1926. **Figure 3-1** presents the location of the MRS. Much of this MRS, located in the center of PTA, is developed and includes portions of downtown PTA and the golf course, as well as several waterbodies, including the EOD Pond and portions of Green Pond Brook, Fisher's Pond, North Basin, and South Basin. In addition, three other MRSs, Green Pond MRS (PICA-005-R-01), Picatinny Lake of the Lakes MRS (PICA-008-R-01), and the Shell Burial Grounds (PICA-010-R-01), as well as approximately 40 IRP sites, are partially or wholly located within this MRS. This MRS does not include off-post property, areas that are within operational ranges, or areas identified as separate MRSs.

The Lake Denmark Naval Ammunition Depot, which was located on what is currently the eastern portion of PTA, near Picatinny Lake, was used by the Navy from the late 1800s to the 1960s, mainly for storage of materials such as HEs, smokeless powder, black powder, and projectiles. Reportedly, the Navy property contained between 160 and 200 buildings; approximately 40 to 50 of these were used for explosives storage. On 10 July 1926, lightning struck the southwest end of the depot, setting off a series of explosions. According to a historical report, it was estimated that 2.5 million pounds of the following explosives detonated in the explosion[1]:

- TNT
- 25-pound Navy Mark I bombs, loaded and plugged
- Mark II, III, IV, and V bombs, each loaded with TNT
- Bomb accessories (e.g., fins, tails)
- Aerial bombs, TNT center section
- 14-inch Class "B," loaded and fuzed
- 14-inch AP rounds, loaded and fuzed
- 8-inch shells, loaded and fuzed
- 5-inch shells, loaded and fuzed

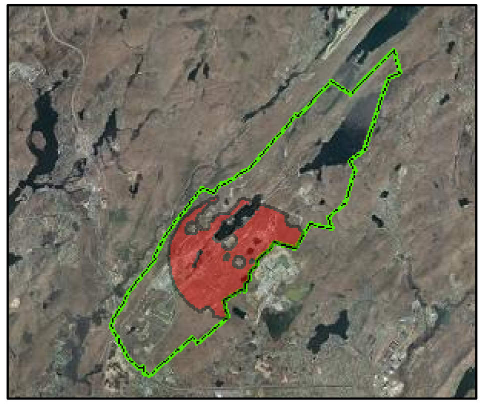
[1] Although not listed in the historical documents, 3-inch, 4-inch, and 6-inch common projectiles are also associated with the 1926 explosion. These MEC have been found off-post at Mount Hope Quarry either by the quarry workers during quarry operations or during TCRAs conducted at the Mount Hope Quarry.



WESTON SOLUTIONS

Legend

- Installation Boundary
- Operational Range Areas
- Munitions Response Site Boundaries
- 1926 Explosion Radius MRS
- MRS Sub-Sites
- Code 300 Area
- 2008 EE/CA Footprint



Base Imagery: NJ 2007 Natural Color Imagery
Data Sources: 2008 SI Report
Army GIS Layers (August 2011)

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N
W E
S

1,250 625 0 1,250
Feet

Figure 3-1
1926 Explosion Radius MRS
PICA-003-R-01
Picatinny Arsenal
Morris County, New Jersey

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In addition, explosive D (ammonium picrate or Dunnite) burned but did not detonate (Malcolm Pirnie, 2006; 2008). Nearly everything within a 3,000-foot radius of the explosion center was burned or otherwise destroyed. Many of the buildings within 4,000 feet of the explosion center were significantly damaged. Some minor damage, such as broken windows and bulging roofs, was also reported for buildings farther than 4,000 feet from the explosion center. Unexploded shells were found up to ¾ mile from the explosion center, and shell fragments were found up to 1 mile away.

Three large craters, two near the south-central portion of the installation and one near the installation boundary, were created in the explosion and were considered the explosion centers. These three craters are discussed in this Work Plan as the Shell Burial Grounds MRS (PICA-010-R-01).

In addition to the explosion, two other potential MEC release mechanisms were identified for portions of this MRS. However, as described below, it was subsequently determined that there is no MEC release mechanism for the Former Projectile Range, because it was likely used only for inert projectiles. A separate potential MEC release mechanism is present for the Code 300 Area.

Former Projectile Range—This former range, constructed in 1943, is located within the 1926 Explosion Radius MRS, near the MRS boundary. The range was less than 1 acre in size and consisted of a covered firing point (Building 622) and a slug butt (Building 646[2]) near the northwestern portion of Picatinny Lake adjacent to operational range and numerous buildings. It is unknown when the range was last utilized; however, it appears to be active on a 1951 aerial photograph and is overgrown with vegetation on a 1963 aerial photograph. Firing on the range was directed from west to east. Although no information is available to indicate the specific types of munitions used on the range, based on the size and configuration of the range (i.e., it is a short range with a stationary firing point and target), it is assumed that the range was used only to conduct impact testing of 20mm, 37mm, and 40mm inert projectiles.

Code 300 Artillery Firing and Fragmentation Pattern Testing Area (Code 300 Area)— According to DoD, *Executive Order 11508 Installation Survey Report, Picatinny Arsenal, Dover, New Jersey,* January 1973, in 1973 PTA had 975 acres of land on the northwestern

[2] The building numbers given for the firing point and slug butt are the former building numbers, which were used during the time the projectile range was active and are the building numbers given in historical reports. Since then, the buildings have been reconfigured and renumbered.

portion of the installation used for the artillery firing of shells up to 155mm, as well as for fragmentation pattern testing. Although a large portion of the Code 300 Area is located within operational ranges, portions of it fall within both the 1926 Explosion Radius MRS and the Former Operational Areas MRS. The firing point and target area are not discussed in the 1973 report, and no other information is currently available regarding this area.

As discussed in Section 3.1.5.2, a UXO Finds Map, which covers MEC finds at PTA from 1986 through 1998, was maintained by PTA's Safety Office. According to this map, with the exception of small arms, 141 MEC items were found at 46 locations within the 1926 explosion radius between 1986 and 1998. Refer to **Appendix D** for the locations and the list of MEC found. No MEC is shown on this figure within the Code 300 Area that overlaps the 1926 Explosion Radius MRS. In addition, a review of these data does not indicate the presence of any potentially unknown impact areas. Twenty-six MEC from 10 locations were likely associated with the 1926 explosion. Approximately 115 MEC are not associated with the 1926 explosion. Seventy-four MEC from 16 locations were found adjacent to buildings involved in munitions manufacturing or storage and 41 MEC were found in 20 separate locations near buildings or locations where the historical munitions use is unknown.

During a 2008 EE/CA that covered approximately 70 acres within the explosion radius, 96% (43 of 45 items) of the MEC found were associated with the 1926 explosion. Refer to Section 3.2.1.2 for additional information regarding the EE/CA.

3.2.1 Previous Investigations

3.2.1.1 Site Inspection Results

Under the MMRP, an SI was conducted at PTA from 2007 through 2008 to satisfy the CERCLA process. Field work was not performed in the 1926 Explosion Radius as part of the SI because the presence of MEC had already been documented through a variety of sources. Because the Former Projectile Range was a standalone MRS documented in the HRR, and was incorporated into the 1926 Explosion Radius MRS during the SI, a visual survey for MEC was conducted over approximately 0.45 acre around the perimeter of the former range. Although a visual survey of the range was planned, the range was inaccessible during the SI and the field crew conducted the survey around the perimeter of the range instead. During the survey, no MEC was identified; however, MD, including expended trip flares, flare brackets, and flare levers (spoons), were observed at two locations. None of the MD found is associated with the 1926 explosion; however, the MD was located within 50 feet of operational range.

Two composite and two grab soil samples were collected from biased locations adjacent to the MD and analyzed for copper, lead, iron, zinc, and explosives. No explosives were detected above laboratory reporting limits. All four metals were found at levels that exceeded site-specific background levels and screening levels.[3] Because these four soil samples were collected adjacent to MD that is not associated with the 1926 explosion, the sample results may not be representative of conditions in the MRS. No other MC activities were conducted at the 1926 Explosion Radius MRS during the SI based on the information from the HRR and the IRP (Malcolm Pirnie, 2008).

3.2.1.2 Engineering Evaluation/Cost Analysis

In 2008, an EE/CA investigation and removal action for MEC, MPPEH, and MD was conducted at six areas within the 1926 Explosion Radius MRS Boundary. This work was conducted because of the suspected presence of MEC in areas with planned construction activities. These areas, described below, include three parcels within the RCI Military Housing Project properties (Navy Hill, Fisher's Pond, and Farley Avenue), as well as the construction footprints for the CDC, ERF, and the PHS&T:

- RCI Properties:
  - Navy Hill—Consists of approximately 45 acres and is located in the northeast portion of the MRS. At the time of the EE/CA, all three housing properties included residential and recreational areas.
  - Fisher's Pond—Consists of approximately 0.1 acre and is located in the southern portion of the MRS.
  - Farley Avenue—Consists of approximately 14 acres and is located in the western portion of the MRS.

[3] For the SI, the screening levels used included NJDEP Residential Soil Cleanup Criteria and Region 3 Non-Industrial Risk Based Criteria.

- CDC—Was undeveloped land during the EE/CA and consists of 5.2 acres near the center of the MRS.
- ERF—Was an asphalted parking lot and consists of approximately 0.22 acre on the eastern portion of the MRS.
- PHS&T—Consists of approximately 6 acres just south of Picatinny Lake near the center of the MRS. This property was mainly an undeveloped grassy and wooded area; however, several buildings were present within the construction footprint.

As shown in **Table 3-2**, a total of 45 MEC items were found in four of the six EE/CA areas. MEC recovered included the following:

- MK 13 primer
- MK 10 base ignition fuze
- 3-inch MK 3 MOD 7 common projectile
- 6-inch MK 20 MOD 0 common projectile
- 5-inch MK 15 MOD 12 common projectile
- MK 3 base detonating (BD) fuze
- No. 45 PDAI fuze
- Practice BLU 36
- T46E4 bomb adapter booster

The majority of MEC found (43 of 45 items, or 96%) were associated with the 1926 explosion. The practice BLU 36 and T46E4 bomb adapter booster were not associated with the 1926 explosion. MEC was recovered within 2 feet below ground surface (bgs), with the majority of items located within the top foot. In addition, approximately 6,380 pounds of MD and approximately 25,500 pounds of non-munitions related metal waste were also recovered. A limited number of pre- and post-BIP soil samples were collected from areas where MEC were found; no explosives were detected at concentrations above the laboratory detection limits (Malcolm Pirnie, 2010).

Table 3-2 Summary of EE/CA Results

Location*	Acreage	Number of MEC Found	Number of MEC Associated with 1926 Explosion	Average MEC Density (MEC/acre)	Maximum Depth of MEC Found
Navy Hill Housing	43	9	9	0.2	24 inches
Fisher's Pond	0.1	1	1	10	12 inches
Farley Avenue	14	0	0	0	NA
CDC	5.5	34	32	6.18	18 inches
ERF	1.0	1	1	1	18 inches
PHS&T	7.0	0	0	0	NA

* With the exception of the southern portion of the Navy Hill Housing and the CDC, the rest of the areas investigated during the EE/CA are considered disturbed. All areas except Farley Avenue are located within the inner radius.

3.2.2 Conceptual Site Model

Table 3-3 presents the CSM for the 1926 Explosion Radius MRS. As discussed in Section 3.2, the Code 300 Area, although encompassed by the 1926 Explosion Radius MRS boundary, also has a separate potential MEC release mechanism. Therefore, where appropriate, the differences in the CSM between the Code 300 Area and the entire 1926 Explosion Radius MRS are noted.

Table 3-3 1926 Explosion Radius MRS (PICA-003-R-01) CSM

Profile Type	Site Characterization
Location Profile	**Area and Layout** ▪ The 1926 Explosion Radius MRS is 1,544 acres and covers a large portion of the south-central part of PTA, including the majority of the downtown area. ▪ The Code 300 Area, which covers approximately 400 acres on the western portion of the 1926 Explosion Radius MRS, is located on mainly undeveloped land adjacent to operational range.
	Structures ▪ Hundreds of buildings are located within this MRS as it encompasses the majority of the buildings and parking lots south of Farley Avenue to an area close to the northern end of Picatinny Lake. The buildings are used for a variety of purposes, including manufacturing, storage, testing, R&D, administration, and military housing. ▪ Although the Code 300 portion of the 1926 Explosion Radius MRS is not as developed as the remainder of the MRS, some buildings, mainly used for manufacturing, are present.
	Boundaries ▪ The 1926 Explosion Radius MRS is bordered to the south by 4th Street, to the east by the installation boundary, and to the west by the ridgeline of Green Pond Mountain. It is located approximately 1,000 ft (305 meters) south of the northern end of Picatinny Lake.

Table 3-3 1926 Explosion Radius MRS (PICA-003-R-01) CSM (Continued)

Profile Type	Site Characterization
	Utilities ▪ The utilities servicing the buildings within the MRS include electricity, drinking water, sewer, telephone/communications, and aboveground steam pipes that provide heat for the buildings on the installation.
	Security ▪ Access to the installation is restricted to two entrances (Main Gate and Mount Hope Entrance) although access to the majority of the 1926 Explosion Radius MRS, including the Code 300 Area, is not restricted once on the installation. Some sections of the 3500 Area are not fenced.
Land Use and Exposure Profile	**Current Land Use** ▪ This MRS has hundreds of buildings used for various purposes, including manufacturing, storage, testing, R&D, administration, and housing. The MRS also contains parking lots, recreational areas, and undeveloped property. Portions of this MRS contain habitat used by state and/or federal threatened and/or endangered species. ▪ PTA has existing institutional controls (ICs) and LUCs in place including, but not limited to, issuing safety permits for work on PTA, conducting UXO construction support, as required, during intrusive work, and requiring appropriate personnel to attend a safety course(s). A LUC Plan, which addresses the interim actions at MRSs, is currently being prepared for PTA under a separate program.
	Potential Future Land Use ▪ A significant amount of development is planned for PTA in both the short and long term. Because large portions of downtown PTA, as well as numerous buildings, are located within the 1926 Explosion Radius MRS, it is assumed that much of the proposed development, detailed below, will also occur within this area (Parsons, 2007a, 2007b). − Over 200 existing buildings will be demolished and numerous new buildings will be constructed throughout the installation. − Selected roads in the downtown area will be improved and widened. − Additional general improvements (e.g., pave roads, add curbs, and improve parking lots). ▪ The potential future use of the Code 300 Area is the same as the current use.
	Human Receptors ▪ The potential receptors include PTA personnel, residents, contractors (utility workers, construction workers), visitors, recreational users, and trespassers.
Ecological Profile	**Degree of Disturbance** ▪ The degree of disturbance is high because the majority of the site is developed or planned for construction or enhancement. ▪ The degree of disturbance within the Code 300 Area is low, as much of this area is undeveloped land adjacent to operational ranges.
	Wetlands ▪ Although the majority of this MRS is developed, there are some undeveloped areas consisting of wetlands, lakes, ponds, and streams. ▪ No wetlands have been identified within the Code 300 Area.

Table 3-3 1926 Explosion Radius MRS (PICA-003-R-01) CSM (Continued)

Profile Type	Site Characterization
	Ecological Habitat and Receptors ▪ Patches of forest, wetlands, and lakes used by state threatened and endangered plants and animals are present in this MRS. The MRS is located in both a Highlands Preservation Area and a Highlands Planning Area. ▪ General information on ecological habitat and receptors at PTA is presented in **Table 1-1** and Section 8.2.
Cultural Resource Profile	**Cultural, Archaeological, and Historical Resources** ▪ A total of 108 potential and/or known historical archaeological sites and 27 potential and/or known prehistoric sites have been identified across the installation (Picatinny Environmental Affairs, 2011; and Chugach Industries, 2008) and the PTA Administration and Research District in downtown PTA is identified by the New Jersey Historic Preservation Office (NJHPO) as a cultural resource. ▪ No cultural, archaeological, or historical resources have been identified within the Code 300 Area.
Munitions/Release Profile	**Munitions** ▪ The munitions associated with this MRS include: − 25-pound Navy Mark I bombs. − Mark II, III, IV, and V bombs, each loaded with TNT. − Bomb accessories (e.g., fins, tails). − Aerial bombs, TNT center section. − 14-inch Class “B.” − 14-inch AP rounds. − 3-inch, 4-inch, 5-inch, 6-inch, and 8-inch projectiles. − BD fuzes. ▪ Munitions associated with the Code 300 Area include all of the above MEC, as well as shells up to 155mm.
	Release Mechanisms ▪ The entire MRS has a release mechanism associated with a series of explosions at a storage magazine. In addition, as shown on the UXO Finds Map, munitions not related to the 1926 explosion have been found within the MRS boundary, indicating the potential for munitions to have been discarded in this area. ▪ The Code 300 Area also has a release mechanism associated with munitions firing and testing.
	MEC Density ▪ Based on the EE/CA and TCRA investigations, MEC density is known to vary across the MRS. During the EE/CA, MEC was typically found within the inner radius in the undisturbed areas (e.g., areas without construction) at an approximate average density of 3 MEC/acre. The actual MEC density found within the inner radius during the previous investigations was approximately 6 MEC/acre near the explosion center (e.g., see the CDC EE/CA and Tilcon Quarry TCRA III results) and approximately zero MEC/acre at a distance of 0.5 mile from the explosion center (e.g., see the Tilcon Quarry TCRA II results). No MEC was found in the outer radius during the previous investigations, but at least one MEC was found during construction support activities. Therefore, the MEC density in the outer radius is anticipated to be less than 0.5 MEC/acre. ▪ No information regarding MEC density is available for the Code 300 Area. On the UXO Finds Map, no MEC is identified within the 1926 Explosion Radius Code 300 Area.

Table 3-3 1926 Explosion Radius MRS (PICA-003-R-01) CSM (Continued)

Profile Type	Site Characterization
	Munitions Debris ▪ A historical report on the 1926 explosion indicates that shell fragments were found up to 1 mile away from the explosion center. The presence of MD was confirmed during the EE/CA when 6,380 pounds of MD were found in 133 of the 353 investigated grids.
	Associated Munitions Constituents ▪ The following MC is potentially associated with MEC at this MRS: − 2-Amino-4,6-dinitrotulene (2-AM-4,6-DNT), 4-Amino-2,6-dinitrotulene (4-AM-2,6-DNT), 2,4-dinitrotoluene (2,4-DNT), 2,6-dinitrotoluene (2,6-DNT), Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), Nitroglycerin (NG), Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX), Pentaerythritol tetranitrate (PETN), Tetryl, 2,4,6-Trinitrophenol (2,4,6-TNP, aka picric acid) 2,4,6-Trinitrotulene (2,4,6-TNT), Aluminum (Al), Antimony (Sb), Barium (Ba), Cadmium (Cd), Copper (Cu), Lead (Pb), Manganese (Mn), Strontium (Sr), Zinc (Zn) ▪ For additional information regarding MC potentially associated with this MRS, refer to Attachments 2 and 3 in the UFP-QAPP **(Appendix B)**.
	Transport Mechanisms/Migration Routes ▪ The primary transport mechanisms identified for the 1926 Explosion Radius include the following: − **Soil Disturbance:** The current degree of disturbance is relatively high, as the area is developed and building construction/maintenance and utility maintenance may require intrusive activities. A significant amount of future development is planned in this area, and this development could uncover potential MEC or MC in the surface or subsurface soil. MC may be released as respirable particulates in air during future construction or otherwise intrusive activities. − **Erosion**: Soil erosion may uncover MEC. MC adsorbed to soil particles may migrate in surface water runoff from the surface soil to nearby water bodies. Migration of dissolved MC is of lesser concern, as the MC has low water solubilities. − **Frost Heave**: Periodic, alternating freezing and thawing during the winter may uplift MEC from the soil subsurface to the soil surface. − **Infiltration**: Based on the soil types associated with the 1926 Explosion Radius MRS, the potential exists for MC to migrate from one environmental medium to another (surface to subsurface soil to groundwater) through the infiltration of percolating precipitation. However, this is a minor migration pathway, as the MC is relatively immobile and has low water solubilities. − **Recharge and Discharge**: Groundwater may discharge to water bodies, and surface water may recharge groundwater depending on the time of year, rainfall/snowmelt amounts, and location within the MRS. However, this is a minor migration pathway, as the MC is relatively immobile and has low water solubilities.

Table 3-3 1926 Explosion Radius MRS (PICA-003-R-01) CSM (Continued)

Profile Type	Site Characterization
	Pathway Analysis ▪ **MEC** - Exposure pathways are considered complete, because MEC has been found within this MRS. Complete exposure pathways exist for PTA personnel, PTA residents, and contractors/visitors who may contact, via handling or treading underfoot, MEC in surface soil or surficial sediments of the water bodies within the 1926 Explosion Radius MRS. Complete exposure pathways exist for biota that may contact MEC in surface soil or surficial sediments and that may nest or burrow at the site and thereby contact MEC in subsurface soil. Complete exposure pathways also exist for contractors who may need to access underground utilities in the subsurface soil or may perform intrusive work during future construction activities. ▪ **MC** – Exposure pathways are considered potentially complete, because it has not been established that MC is present at concentrations of concern. Potentially complete exposure pathways exist for PTA personnel, PTA residents, and contractors/visitors who may contact MC in surface soil. Potentially complete exposure pathways also exist for contractors who may contact MC in subsurface soil or subsurface sediment while accessing underground utilities or performing intrusive work during future construction activities. Potential exposure routes include incidental ingestion, dermal contact, and (for soil) inhalation of dust. Contractors may also contact MC via dermal contact with surface water. Potentially complete exposure pathways exist for biota that may contact MC in surface soil and that may nest or burrow at the site and may contact MC in subsurface soil. Aquatic and semi-aquatic receptors may contact MC in surface water and sediment of wetlands, lakes, ponds, and streams. Potential groundwater exposure pathways are not addressed in this RI, as all groundwater within PTA is addressed under the IRP.

3.3 1926 EXPLOSION RADIUS – OFF-POST MRS (PICA-004-R-01)

The 1926 Explosion Radius – Off-Post MRS (PICA-004-R-01), which is 838 acres in size, consists of the off-post area within a 1-mile radius of the explosion centers associated with the 1926 Lake Denmark Naval Ammunition Depot explosions. The MRS, which has seven property owners, consists of vacant land and commercial property. Mount Hope Quarry, owned and operated by Tilcon, New York, Inc. (Tilcon), covers approximately 50% of this MRS. **Figure 3-2** presents the location of the MRS. From 2001 through 2009, 16 MEC items associated with the 1926 explosion were found during quarry operations, either on the conveyor belt or at undocumented locations. Because of the presence of MEC at the quarry, the following TCRAs have been conducted:

- TCRA I – Conducted from December 2006 to March 2007 on 22 acres along the northwestern portion of the quarry.
- TCRA II – Conducted from May 2008 to June 2008 on an additional 22 acres along the northeastern portion of the quarry.
- TCRA III – Conducted from December 2009 to March 2011 to the west of TCRA I due to notification by Tilcon that quarry operations would continue in the northwestern portion of the quarry. This TCRA was conducted on a soils pile, on the soil underneath the pile, and in an area south/southwest of the pile. Additional information regarding these TCRAs is provided in Sections 3.3.1.2, 3.3.1.3 and 3.3.1.4.

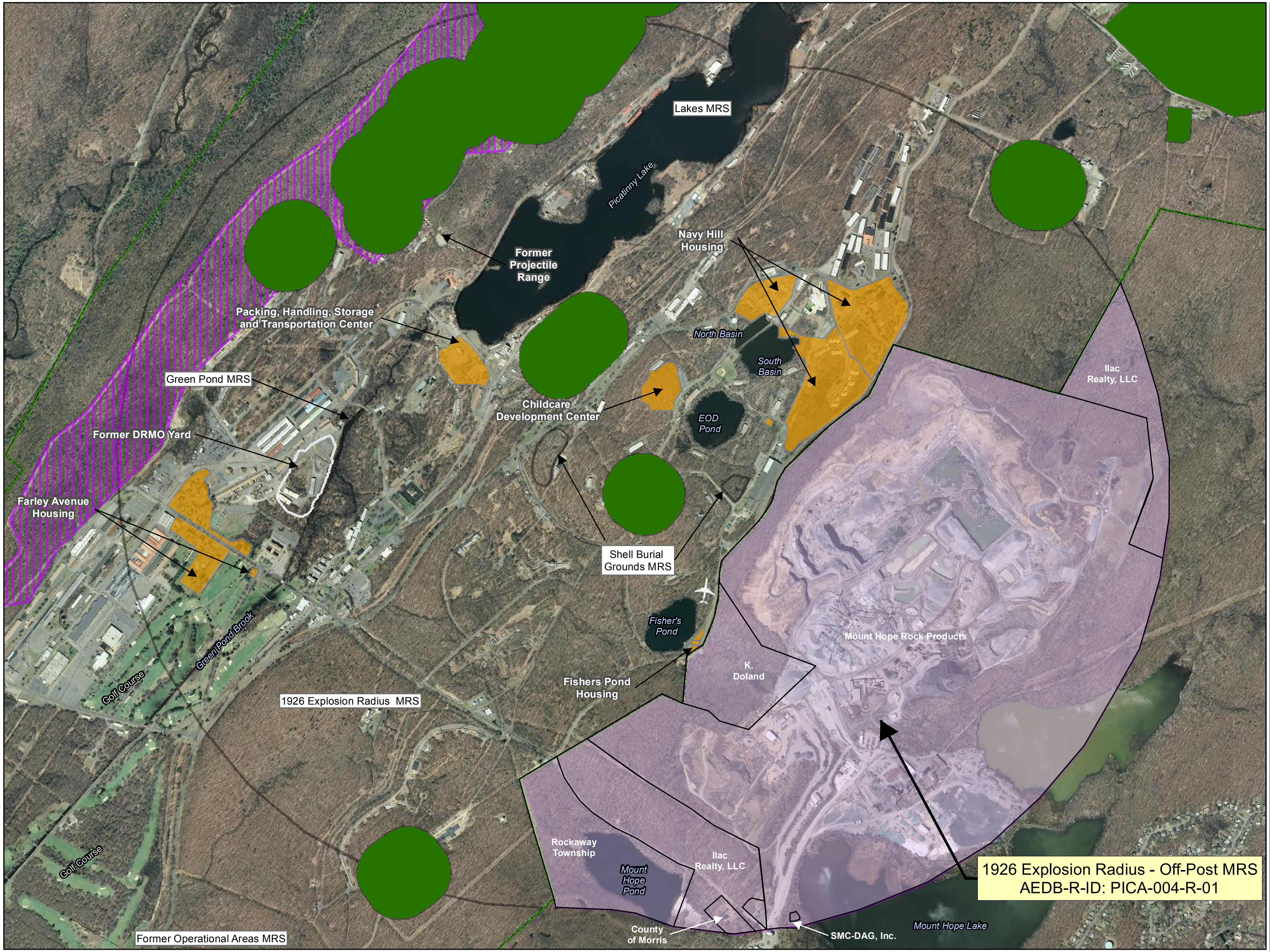
3.3.1 Previous Investigations

3.3.1.1 Site Inspection Results

During the SI, a visual survey of approximately 15 acres, which covered property owned by all seven property owners, was conducted. During the visual survey, no MEC or MD was identified. No MC activities were conducted at the 1926 Explosion Radius – Off-Post MRS during the SI because the on-post IRP data were used to evaluate this MRS (Malcolm Pirnie, 2008).

3.3.1.2 Time Critical Removal Action I

From December 2006 to March 2007, a TCRA was performed for 22.6 acres of the Mount Hope Quarry where Tilcon planned future quarrying activities. The purpose of the TCRA was to reduce the imminent safety hazard presented to the Mount Hope Quarry site employees because of the



Legend

- Installation Boundary
- Operational Range Areas
- Munitions Response Site Boundaries
- 1926 Explosion Radius - Off-Post MRS
- MRS Sub-Sites
- Code 300 Area
- 2008 EE/CA Footprint
- Current Property Boundaries

Base Imagery: NJ 2007 Natural Color Imagery
Data Sources: 2008 SI Report
Army GIS Layers (August 2011)

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N W E S

1,200 600 0 1,200
Feet

Figure 3-2
1926 Explosion Radius - Off Post MRS
PICA-004-R-01
Picatinny Arsenal
Morris County, New Jersey

File: Y:\Picatinny\MXD\workplan\Final\Fig_3-2_1926_explosion_radius_offf_post.mxd, 1/5/2012 8:02:55 AM, ricksc potential presence of MEC. The TCRA involved 100% coverage with DGM surveys and intrusive investigations across the site. Altogether, 25 MEC items were recovered, which equates to 1.11 MEC/acre. In addition, 3,775 pounds of MD and non-munitions related debris, and 1,583 pounds of scrap metal were recovered. MEC recovered included 5-inch and 6-inch projectiles (21 containing HE) and all were consistent with the munitions associated with the 1926 explosion. Fourteen items were found less than 1 foot bgs, nine items were found between 1 to 2 feet bgs, and two items were found at depths greater than 2 feet (26 inches and 48 inches) (Malcolm Pirnie, 2007).

3.3.1.3 Time Critical Removal Action II

From May 2008 to June 2008, TCRA II was performed for an additional 22 acres within the quarry. The MEC investigation involved mag and dig operations over 100% of the site. No MEC was located during the TCRA II; however, approximately 600 pounds (131 items) of MD were found and approximately 1,581 pounds of scrap metal were recovered (Malcolm Pirnie, 2009).

3.3.1.4 Time Critical Removal Action III

TCRA III was conducted in phases from December 2009 to March 2011. It consisted of the following:

- Soil pile removal and clearance in December 2009.
- Completion of the soil pile removal and a removal action beneath the pile from January to March 2010.
- Removal action of 2.6 acres of native soil (outside of the soil pile footprint) in May/June 2010.
- Completion of the native soil removal action (1.7 acres) in February/March 2011.

During the intrusive operations, 39 MEC were recovered, which equates to 9.1 MEC/acre. MEC recovered included 4-, 5- and 6-inch common projectiles and BD fuzes, which were consistent with the munitions associated with the 1926 explosion. In addition, approximately 6,400 pounds of MD and 1,300 pounds of scrap metal were recovered. MEC were typically found at less than 2 feet bgs.

3.3.2 Conceptual Site Model

Table 3-4 presents the CSM for the 1926 Explosion Radius – Off Post MRS.

Table 3-4 1926 Explosion Radius – Off-Post MRS (PICA-004-R-01) CSM

Profile Type	Site Characterization
Location Profile	**Area and Layout** ▪ The 1926 Explosion Radius – Off-Post MRS covers 838 acres and is located outside the eastern boundary of PTA. Mount Hope Pond and portions of Mount Hope Lake are located within the MRS boundary.
	Structures ▪ Structures located within this MRS include commercial businesses and their associated buildings including those structures associated with the operations of Tilcon Quarry. In addition, public utility towers, large piles of cultural debris, and a stonewall were observed during the visual survey.
	Boundaries ▪ This MRS is bordered by PTA to the north and west, Mount Hope Lake to the south, and vacant land to the east.
	Utilities ▪ The utilities servicing the buildings in this MRS are assumed to include electricity, drinking water, sewer, and telephone/communications. Public electric lines are located in the southern portion of the MRS. The locations of other utilities are unknown.
	Security ▪ The MRS is located outside the secured PTA boundary. With the exception of the quarry, which has a guarded gate at the main entrance and signs posted along the perimeter of the property, the off-post properties are not secured.
Land Use and Exposure Profile	**Current Land Use** ▪ The MRS contains vacant land and several businesses, including Mount Hope Quarry, which comprises approximately 80% of the MRS. ▪ The current land use is industrial and recreational with some vacant land.
	Potential Future Land Use ▪ During the SI, the property owners have indicated there are no future plans to change the current land use. ▪ In February 2007, Lieutenant Colonel Skelton, the Garrison Commander at the time, sent a letter to each of the off-post property owners regarding the munitions-related investigations being conducted by the Army. Included with the letter was a map identifying areas that could potentially contain munitions or MC, along with a fact sheet about the project, the MMRP process, and what steps to take if UXO are found. Each property owner was contacted via phone to ensure that they did not have any questions/concerns about the project. ▪ Note. During the RI, the land owners again will be asked about future land use plans.
	Human Receptors ▪ Potential receptors include quarry personnel, other workers (e.g., workers associated with other businesses, contractors, utility workers), visitors, recreationists (e.g., hunters, fishermen), and trespassers. Recreational use on Mount Hope Lake includes camping and fishing.

Table 3-4 1926 Explosion Radius – Off-Post MRS (PICA-004-R-01) CSM (Continued)

Profile Type	Site Characterization
Ecological Profile	**Degree of Disturbance** ▪ The degree of disturbance is high because the majority of this MRS is a quarry.
	Wetlands ▪ Patches of wetlands are present in this MRS, mainly near Mount Hope Lake.
	Ecological Habitat and Receptors ▪ Both forested and wetland areas are present in the MRS. No specific ecological receptors are identified; however, according to NJDEP's i-Map Landscape Project layer, the MRS contains habitat with at least one occurrence of a state-threatened species. ▪ General information on ecological habitat and receptors at PTA is presented in **Table 1-1** and Section 8.2.
Cultural Resource Profile	**Cultural, Archaeological, and Historical Resources** ▪ The Mount Hope Mine Historic District and the Ford-Faesch Manor House, both located on Mount Hope Road, have been identified by the NJHPO as historic places, and the bed of the Mount Hope Mine Railroad, which runs through the site, is identified by NJHPO as a cultural resource.
Munitions/Release Profile	**Munitions Types** ▪ The munitions associated with this MRS include: − 25-pound Navy Mark I bombs. − Mark II, III, IV, and V bombs, each loaded with TNT. − Bomb accessories (e.g., fins, tails). − Aerial bombs, TNT center section. − 14-inch Class "B". − 14-inch AP rounds. − 3-inch, 4-inch, 5-inch, 6-inch, and 8-inch projectiles. − Base-detonating (BD) fuzes.
	Release Mechanisms ▪ Series of explosions at a storage magazine.
	Maximum Probable Penetration Depth ▪ Munitions were not fired or tested in this area, thus the standard penetration depth calculation is not applicable. Munitions at the MRS would likely be below the surface because of the explosion and potential burial, but not from penetration.
	MEC Density ▪ Prior to any TCRA activities, 16 MEC were found by quarry workers at Mount Hope Quarry; these finds were reported to the PTA EOD. During TCRA activities to date, 64 MEC have been found at the quarry. MEC have been found only during TCRAs I and III, which were conducted at locations much closer to the explosion center than the area cleared under TCRA II. During previous investigations, the MEC density appears to be between zero (e.g., Tilcon TCRA II) to six MEC/acre (e.g., CDC, EE/CA and Tilcon Quarry TCRA III) on the western boundary of the MRS and approaches 0 MEC/acre approximately 0.5 mile from the explosion centers.
	Munitions Debris ▪ Thousands of pounds of MD have been found and removed during the three TCRA investigations at the Mount Hope Quarry.

Table 3-4 1926 Explosion Radius – Off-Post MRS (PICA-004-R-01) CSM (Continued)

Profile Type	Site Characterization
	Associated Munitions Constituents ▪ The following MC are potentially associated with MEC associated with this MRS: − 2-Amino-4,6-dinitrotulene (2-AM-4,6-DNT), 4-Amino-2,6-dinitrotulene (4-AM-2,6-DNT), 2,4-dinitrotoluene (2,4-DNT), 2,6-dinitrotoluene (2,6-DNT), Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), Nitroglycerin (NG), Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX), Pentaerythritol tetranitrate (PETN), Tetryl, 2,4,6-Trinitrophenol (2,4,6-TNP, aka picric acid), 2,4,6-Trinitrotulene (2,4,6-TNT), Aluminum (Al), Antimony (Sb), Barium (Ba), Cadmium (Cd), Copper (Cu), Lead (Pb), Manganese (Mn), Strontium (Sr), Zinc (Zn) ▪ Refer to **Attachments 2** and **3** in the UFP-QAPP (Appendix B) for additional information.
	Transport Mechanisms/Migration Routes ▪ The primary transport mechanisms identified for the MRS include: − **Soil Disturbance**: At Mount Hope Quarry, the current degree of disturbance is high. The quarry's process for obtaining rock for the crusher includes removing vegetation, scraping away the overburden, and removing the rock by detonation. The degree of disturbance for the areas of the site located outside the boundaries of the Mount Hope Quarry operation is relatively low, as the area is not densely populated. In addition, a large portion of the site is located in the Highlands Preservation Area, and major development in the Highlands Preservation Area is restricted and regulated. − **Erosion**: Soil erosion may uncover MEC. MC adsorbed to soil particles may migrate in surface water runoff from the surface soil to Mount Hope Lake or Mount Hope Pond. Migration of dissolved MC is of lesser concern, as the MC has low water solubilities. − **Frost Heave**: Periodic, alternating freezing and thawing during the winter may uplift MEC from the soil subsurface to the soil surface. − **Infiltration**: Based on the soil types associated with the MRS, the potential exists for MC to migrate from one environmental medium to another (surface to subsurface soil to groundwater) through infiltration of percolating precipitation. This applies to the Rockaway sandy loam and is likely not applicable to the rock outcrop areas. However, this is a minor migration pathway, as the MC is relatively immobile and has low water solubilities. − **Recharge and Discharge**: Groundwater may discharge to water bodies, and surface water may recharge groundwater, depending on the time of year, rainfall/snowmelt amounts, and location. However, this is a minor migration pathway for MC, as the MC is relatively immobile and has low water solubilities.

Table 3-4 1926 Explosion Radius – Off-Post MRS (PICA-004-R-01) CSM (Continued)

Profile Type	Site Characterization
	Pathway Analysis ▪ **MEC**—Exposure pathways are considered complete, because MEC has been found within this MRS. Complete exposure pathways exist for the Tilcon Quarry personnel who may contact, via handling/treading underfoot, MEC in the surface and subsurface soil. Complete exposure pathways exist for the workers/visitors and the recreationists/trespassers who may contact MEC in surface soil or surficial sediment and in the subsurface soil or sediment for contractors or utility workers performing intrusive work. The exposure pathways are complete for biota that may contact MEC in the surface soil during feeding and nesting activities and in subsurface soil during burrowing. Potentially complete exposure pathways exist for the aquatic and semi-aquatic ecological receptors that may contact MEC in the surficial sediments of Mount Hope Lake or Mount Hope Pond. ▪ **MC**—Exposure pathways are considered potentially complete, because it has not been established that MC is present at concentrations of concern. Potentially complete exposure pathways exist for Mount Hope Quarry personnel, residents, and contractors/visitors who may contact MC in surface soil. Potentially complete exposure pathways also exist for contractors who may contact MC in subsurface soil or subsurface sediment while accessing underground utilities or performing intrusive work during future construction activities. Potential exposure routes include incidental ingestion, dermal contact, and (for soil) inhalation of dust. Recreationists on Mount Hope Lake and contractors accessing underground utilities may contact MC through dermal contact with surface water. Potentially complete exposure pathways exist for biota that may contact MC in surface soil and that may nest or burrow at the site and may contact MC in subsurface soil. Aquatic and semi-aquatic receptors may contact MC in surface water and sediment of Mount Hope Lake or Mount Hope Pond. While potential MC transport/migration routes from soil to groundwater were identified above, exposure to MC in groundwater is not expected, because the MC has low water solubilities.

3.3.3 Characterization Approach for the 1926 Explosion Radius (On-Post and Off-Post)

Although the 1926 Explosion Radius has been designated as two separate MRSs, the 1926 Explosion Radius MRS and 1926 Explosion Radius – Off-Post MRS, the division is because of ownership differences and not due to technical issues. As discussed previously, with the exception of the presence of a former projectile range and the Code 300 Area artillery firing range within the on-post MRS, the release mechanisms for the 1926 Explosion Radius MRS and 1926 Explosion Radius – Off-Post MRS are the same. Therefore, the two sites will be investigated as one site and are discussed as such in the DQOs.

<u>Former Projectile Range</u>— No separate MEC investigation is planned for the Former Projectile Range during the RI because the probability of a release of MEC from the Former Projectile Range is extremely low. However, as the Former Projectile Range lies within the outer radius of the 1926 Explosion, it is possible that MEC exists at the Former Projectile Range because of the explosion and it will therefore be included in the general MEC evaluation of the 1926 Explosion Radius MRS. The probability that the MEC density at the range is increased over that expected from the explosion is low because the use of HE rounds would have presented a safety hazard to personnel due to the short distance between the firing point and the slug butt (approximately 100 feet) and due to the presence of numerous buildings near the range. Therefore, it is assumed that the site was used only for testing smaller diameter, likely inert projectiles (e.g., 20mm, 37mm, and 40mm inert projectiles).

<u>Code 300 Area</u>—Because the Code 300 Area, which is located on-post, has an additional release mechanism, the investigation protocol for this area is slightly different than that employed for the rest of the 1926 Explosion Radius MRS and will be discussed separately.

Problem Statement: Because of the 1926 explosions, MEC, MPPEH, and MD were strewn from the center of the explosions (i.e., the Shell Burial Grounds MRS) to approximately 1 mile from the center of the explosions. Information regarding MEC, MPPEH, and MD found to date within the explosion radius is available from an EE/CA, conducted on-post, and from three TCRAs, conducted off-post at the quarry, as well as through information obtained from PTA's Safety Office regarding MEC finds on the installation between 1986 and 1998. As this information does not adequately characterize the entire explosion radius, the anomaly and the MEC density and distribution across the explosion radius are unknown. Although no information is available regarding MEC that may be present within the Code 300 Area, it is possible the MEC density is greater than that expected from the 1926 explosion due to potential artillery testing activities.

***Identified Decisions*:** Previous investigations within the MRS (e.g., the EE/CA, TCRAs, and SI) suggest that MEC may be present only within 0.5 mile of the explosion centers. Therefore, the explosion radius has been divided into an inner and outer radius. The inner radius covers the area within 0.5 mile of the explosion centers. The outer radius encompasses the area from 0.5 to 1 mile of the explosion centers. **Figure 3-3** provides the results from the previous investigation/removal activities in the MRSs. The primary decisions being addressed at this MRS include:

- Determine the density and depth of MEC within the inner and outer radii.
- Determine whether a MEC release is present within the Code 300 Area from historical artillery firing practices. If MEC is present, determine the nature and extent of the MEC release.

***Inputs to the Decisions*:** Several inputs will be required during the RI to support the decisions:

- VSP input parameters for the Code 300 Area were based on historical information. According to DoD, *Executive Order 11508 Installation Survey Report, Picatinny Arsenal, Dover, New Jersey* (January 1973), artillery testing activities were performed for artillery up to 155mm in the Code 300 Area. No further information is available regarding this area, in any known historical report for PTA. Because the exact types and the quantity of projectiles used are unknown, as a conservative measure, a 57mm projectile was assumed due to the relatively small hazard fragmentation distance (HFD). Therefore, the smallest MEC release for the Code 300 Area is based on a 57mm projectile. No known target exists in the Code 300 Area; therefore, conservative assumptions about the shape, size, and nature of a potential target area have been used. The shape is assumed to be a 243-ft radius circle (based on 1.5 times the HFD of a 57mm projectile) and low anomaly densities (e.g., 40 anomalies/acre) have been assumed. **Table 3-5** presents the parameters for the Code 300 Area. The transect distance and area coverage requirements presented in **Table 3-5** apply to the Code 300 Area that lies within the 1926 Explosion Radius.
- Density transects (e.g., GPS locations of surface and subsurface anomalies; surface MEC, MPPEH, and MD; and the traversed transects) will be traversed within the Code 300 Area by the UXO technicians to determine the anomaly density and distribution.
- Digital and analog geophysical data will be collected in the inner and outer radii (as well as within the Code 300 Area). The DGM data will be evaluated and targets selected for the intrusive investigation using the anomaly selection criteria discussed in Section 3.15.7.4, while all detected analog anomalies will be investigated to determine the nature and extent of MEC and MPPEH within these areas.

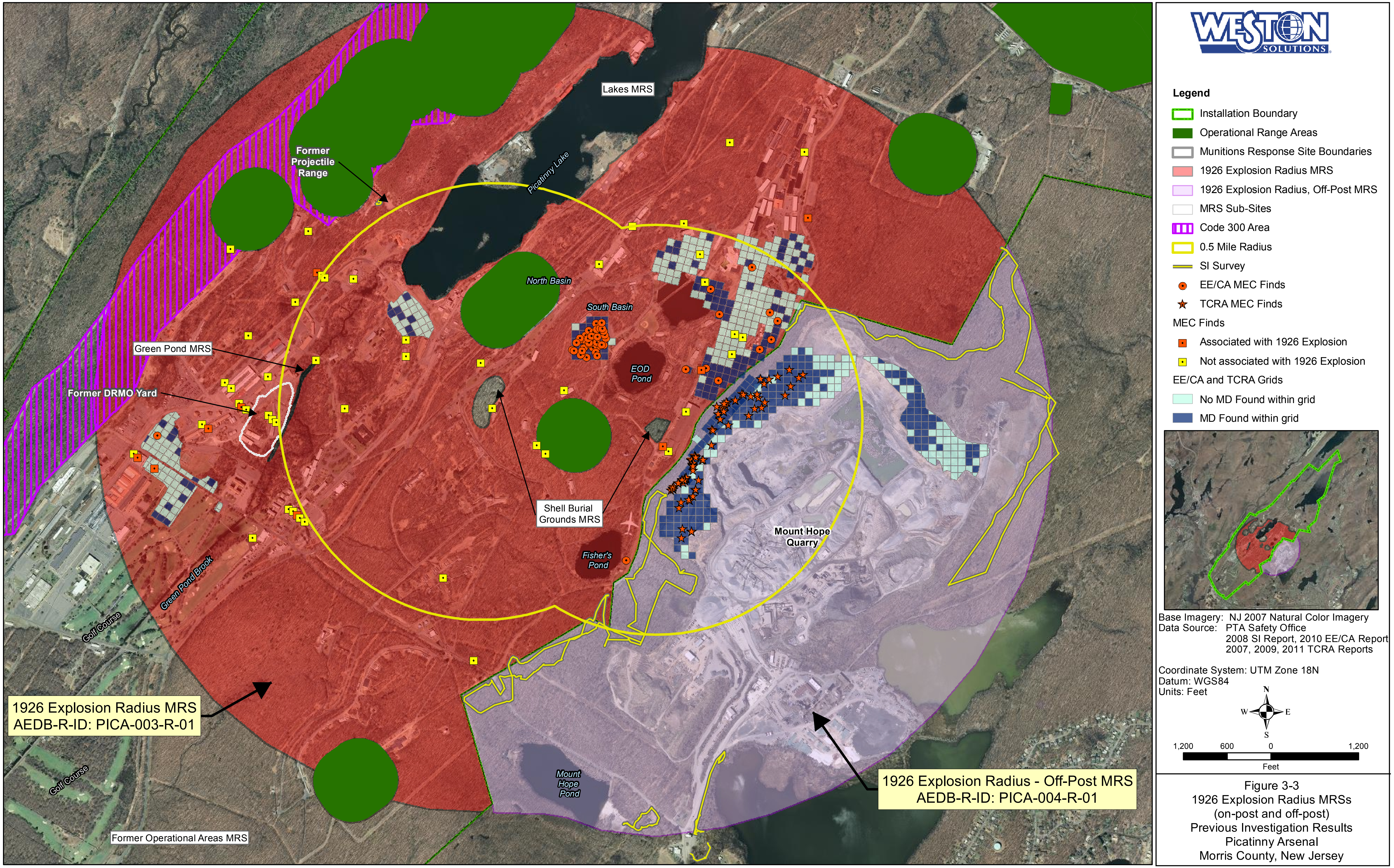


Figure 3-3
1926 Explosion Radius MRSs
(on-post and off-post)
Previous Investigation Results
Picatinny Arsenal
Morris County, New Jersey

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Table 3-5 VSP Parameters and Coverage Requirements for the Code 300 Area

VSP Parameter	VSP Input and Coverage Requirements
Munitions Response Site	Code 300 Area located within 1926 Explosion Radius (PICA-003-R-01)
Shape of Target Area	Circular
Target Area of Interest	243-ft radius (based on 1.5 times the HFD of a 57mm projectile)
Anomaly Density Indicator	40 anomalies/acre
Background Anomaly Density	10 anomalies/acre
Transect Width	10 ft (physical transect width)
Transect Spacing	193 ft (203 ft on centers)
Transect Distance	3.4 miles
Transect Area	4.2 acres (4.5% coverage for Code 300 Area)

***Study boundaries*:** Three horizontal study boundaries have been identified:

- Inner radius – Includes the area within a 0.5-mile radius of the explosion centers. This excludes the operational range areas, the Shell Burial Grounds and Green Pond MRSs, as well as the areas previously investigated during the EE/CA or TCRAs.
- Outer radius – Includes the area between a 0.5 and 1-mile radius of the explosion centers. This excludes the operational range areas and the Green Pond MRS, as well as the areas previously investigated during the EE/CA or TCRAs.
- Code 300 Area – Includes the area identified in the 1973 report as being used for “artillery firing of shells up to 155mm and fragmentation pattern testing.” This excludes the areas that fall outside the 1926 Explosion Radius MRS and the operational range areas.

The boundaries for the 1926 Explosion Radius MRS, 1926 Explosion Radius – Off-Post MRS, inner and outer radii, and 300 Code Area, as well as the boundaries of the EE/CA and the TCRA I through III investigations are shown in **Figure 3-1.**

Physical constraints on the investigation include, but are not limited to, the following:

- Temporal: The presence of threatened and/or endangered species (e.g., avoiding an area during the breeding season).
- PTA's mission: Coordination with PTA will be required to ensure that the sampling activities do not interfere with PTA's activities.
- Vegetation: Certain areas of the installation are marshy or heavily overgrown with vegetation. Sampling in these areas will be restricted to colder months when the ground is frozen and/or the vegetation has died back.

- Weather conditions.
- Access: Rights of entry will be required for sampling at the off-post MRSs.
- Topography and other physical conditions.

Decision Rules: The purpose of this step is to integrate the outputs from the previous steps into a statement that defines the conditions that would cause the decision-maker to choose among alternative actions. For this RI, the decision rules are:

- If anomalies are found within the Code 300 Area, then their density and distribution will be defined.
- If surface MEC is found during the investigation, then the type and density of the surface MEC will be defined for both the inner and outer radii.
- If subsurface MEC is found during these investigations, then the type, depth, and density of the subsurface MEC will be defined within the inner and outer radii.

Tolerable Limits on Decision Errors: The probability of decision errors can be controlled by adopting a scientific approach. In this approach, the data are used to select between one condition of the environment (the null hypothesis, H_o) and an alternative condition (the alternative hypothesis, H_a). The null hypothesis is treated as the baseline condition that is presumed to be true in the absence of strong evidence to the contrary. This feature provides a way to guard against making the decision error that the decision-maker considers to have the more undesirable consequences. A decision error occurs when the decision-maker rejects the null hypothesis when the null hypothesis is true (Type I decision error) or fails to reject the null hypothesis when the null hypothesis is false (Type II decision error). The consequences of a Type I decision error could include unnecessarily incurred project costs associated with additional investigation. The consequences of a Type II decision error could include increased risks to receptors.

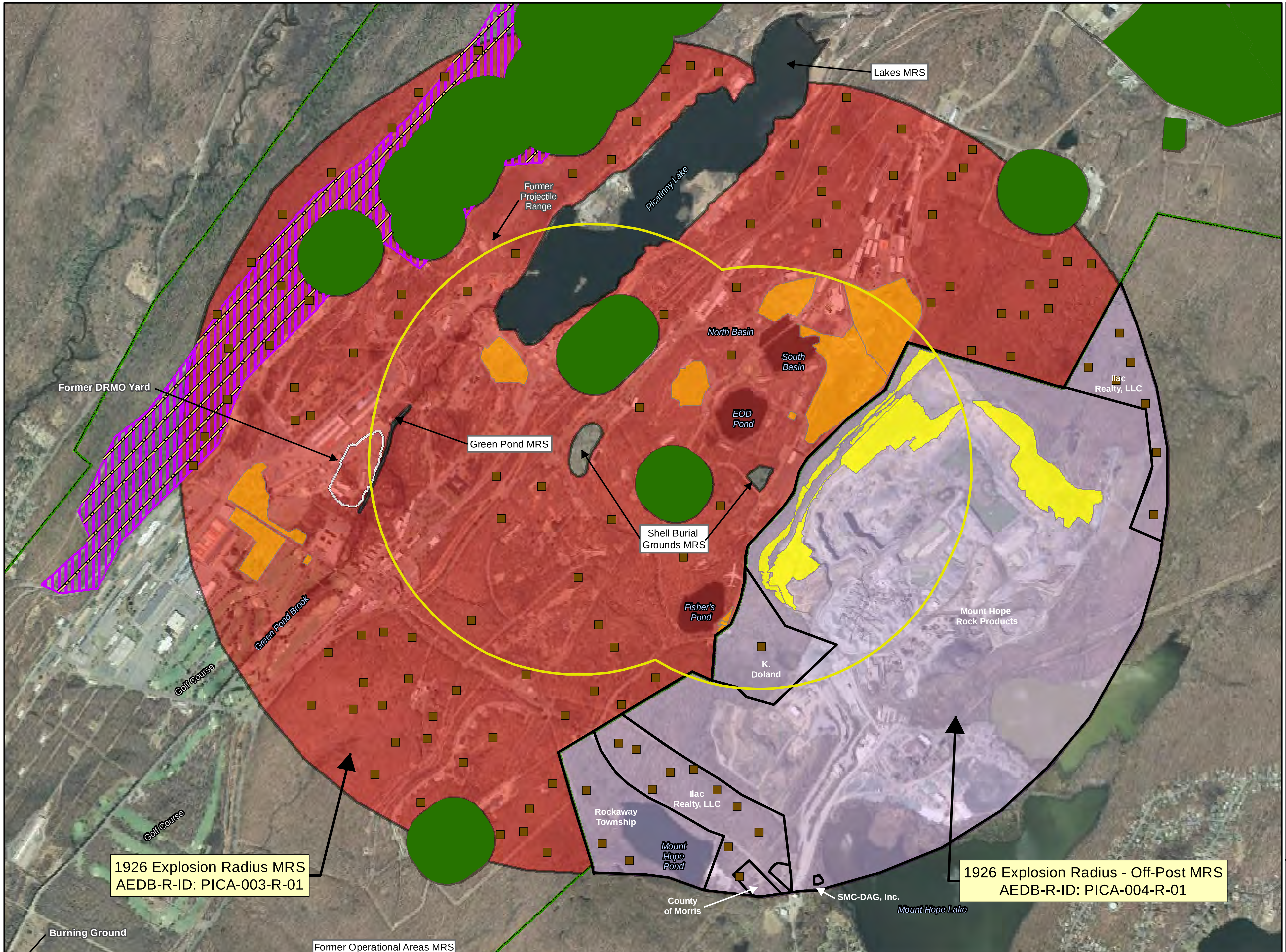
H_o for the 1926 Explosion Radius MRS is that the RI activities will confirm the results of the previous investigations and that MEC due to the 1926 explosion (both on- and off-post) is restricted to the 0.5-mile inner radius. The decision errors associated with this H_o are that there is MEC due to the 1926 explosion in the outer radius when there is not (Type I), and that there is no MEC due to the 1926 explosion in the outer radius, when there is (Type II). If H_o is rejected because MEC is identified in the outer radius, then the actual MEC density within the outer radius may be higher than the assumed MEC density used as an input in UXO Estimator. This could result in several outcomes, depending on numerous factors including, but not limited to, the type of MEC found (e.g., manufactured before or after 1926) and the location of the MEC found (e.g., on- or off-post). The outcomes could include revising the CSMs, re-evaluating the input and output statistical parameters in UXO Estimator, and/or additional investigations. The ultimate outcome will be determined based on an assessment of the historical and new data.

The H_o for the Code 300 Area is that the MRS does not contain a MEC impact area due to historical artillery firing and not necessarily individual MEC. The H_o is based on the lack of historical records that indicate a dedicated range and impact area existed and the lack of MEC finds within the Code 300 Area. The decision errors associated with this H_o are concluding that there is a MEC impact area within the Code 300 Area when there is not (Type I) and concluding that there is no MEC impact area within the Code 300 Area when there is (Type II). If H_o is rejected based on the identification of a potential MEC impact area (e.g., anomaly densities significantly greater than the background anomaly density over a large area) within the Code 300 Area, then intrusive investigations will be performed within the potential MEC impact area to determine the nature of the anomalies. If potential impact areas are not identified in the Code 300 Area, no additional intrusive investigations will be conducted in the Code 300 Area, with the exception of the intrusive investigations associated with the grids within the outer radius that happen to fall within the Code 300 Area.

Sampling Design: DGM grid surveys will be performed using a Geometrics EM61-MK2 electromagnetic (EM) induction sensor and analog grid surveys will be performed using either the Schonstedt GA-52 or the Vallon, or equivalent all metals sensor. The quantity of grids required to ensure at a 95% statistical confidence level that the MEC densities within the outer and inner radius are less than 0.5 and 3.0 MEC/acre, respectively, was determined using UXO Estimator. The 3.0 MEC/acre density for the inner radius is based on previous investigations (e.g., the RCI Housing EE/CA and the Tilcon Quarry TCRA) in which the MEC density in undisturbed areas ranged from 0 and 6 MEC/acre, for an average of 3.0 MEC/acre. Using the assumption that the outer radius has < 0.5 MEC/acre and the inner radius has 3 MEC/acre, UXO Estimator established that approximately 6 acres of grids are needed in the outer radius and 1 acre of grids is required in the inner radius. For both radii, the grids will be 50 feet by 50 feet and will be randomly distributed across the areas that have not been investigated previously through either the EE/CA or the TCRAs. DGM grids will be collected in accessible areas, while analog grids will be performed in areas of dense vegetation. The DGM data will be processed and evaluated to determine which targets meet the anomaly selection criteria for intrusive investigation. All detected analog anomalies will be investigated.

Within the Code 300 Area, density transect data will be collected in addition to the grids proposed for the inner and outer radii, to detect anomaly density and distribution across the Code 300 Area and to determine whether potential impact areas are present. The transect data will be collected by UXO technicians using the Vallon hand-held or equivalent all metals sensor. The Vallon or equivalent all metals sensor is being used due to the known magnetic rocks at PTA because this sensor is much less sensitive to magnetic rocks than magnetometers such as the Schonstedt. No anomalies will be intrusively investigated along the density transects. The position of all identified surface MEC/MPPEH/MD and subsurface anomalies will be recorded in a handheld Global Positioning System (GPS) unit (e.g., Trimble GeoXT or Garmin). The density transects were designed in VSP using the inputs shown in **Table 3-5** and are spaced 203 feet apart (on centers) for a total of 7 miles of transects. The anomaly data from the density transects will be imported into VSP and evaluated using the Geostatistical Mapping of Anomaly Density tool to locate the elevated anomaly density areas that could be potential impact areas. If potential impact areas are identified, 50-ft by 50-ft DGM or analog grids will be placed within the potential impact area and the grids will be surveyed and intrusively investigated to determine the nature of the anomalies. This approach will ensure that the information collected during the field activities can be evaluated in VSP. Locations of anomalies will be recorded by GPS for more precise anomaly density mapping and to enable geostatistical analysis in VSP. To determine whether an impact area has been identified, the anomaly data will be imported to VSP and analyzed using the (1) Locate and Mark Target Areas based on Elevated Anomaly Density and (2) Geostatistical Mapping of Anomaly Density tools.

Figure 3-4 presents the characterization approach for the 1926 Explosion Radius MRSs (On- and Off-Post).



WESTON SOLUTIONS

Legend

- Installation Boundary
- Operational Range Areas
- Munitions Response Site Boundaries
- 1926 Explosion Radius MRS
- 1926 Explosion Radius; Off-Post MRS
- MRS Sub-Sites
- Ineligible Area - Burning Ground
- Code 300 Area
- 2008 EE/CA Footprint
- TCRA Boundary
- 0.5 Mile Radius
- Grid Locations
- Density Transects

Base Imagery: NJ 2007 Natural Color Imagery
Data Source: 2008 SI Report, 2010 EE/CA Report
2007, 2009, 2011 TCRA Reports

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N W E S

1,200 600 0 1,200
Feet

Figure 3-4
1926 Explosion Radius MRSs
(on-post and off-post)
Characterization Approach
Picatinny Arsenal
Morris County, New Jersey

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3.4 SHELL BURIAL GROUNDS MRS (PICA-010-R-01)

The Shell Burial Grounds MRS (PICA-010-R-01) consists of three craters that were formed from the 1926 Lake Denmark Naval Ammunition Depot explosion (Refer to Section 3.2 for details on this explosion). **Figure 3-5** presents the location of the MRS. Two of the three craters are directly adjacent to one another, coalescing as a single site. The craters were subsequently used as two burial grounds to dispose of approximately 25 tons of explosives released during the 1926 explosion and used for disposal of material by the Navy until 1945, after which time the craters were backfilled/covered with as much as 20 feet of fill material. The burial areas are estimated at 25 to 35 ft deep (Malcolm Pirnie, 2006). Potential munitions disposed of at this MRS may include projectiles, mines, depth charges, fuzes, explosives, small arms ammunition, propellants, and possibly rocket fuels. It was also reported that the MRS potentially contained acids, pickling liquors, cyanide, and phenol (Malcolm Pirnie, 2008). No records of the types of materials or amounts of material disposed of in the burial grounds were maintained. Currently, ICs (i.e., chain-link fencing with warning signs) restrict access into the MRS and bound what is thought to be the horizontal extent of the burial areas.

3.4.1 Previous Investigations

No field activities were conducted during the SI. The recommendation in the SI Report is that the MRS be further investigated for MEC based on the data presented in the HRR.

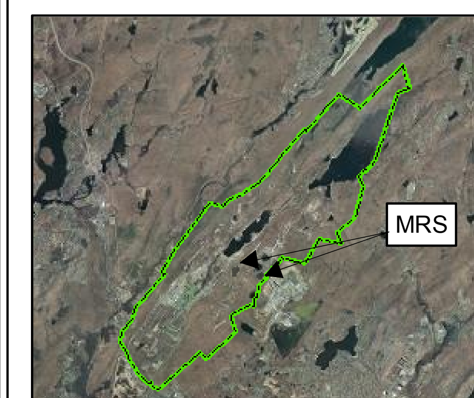
According to the 2006 Installation Action Plan (IAP), MC at these burial areas would be evaluated in an FS. Therefore, a No Further Action (NFA) for MC was recommended because MC is being addressed under the IRP (PICA-162, currently in the RI/FS phase with an anticipated approval date of September 2012) and will not be included in the Active Army MMRP.

3.4.2 Conceptual Site Model

Table 3-6 presents the CSM for the Shell Burial Grounds MRS.

Legend

- Installation Boundary
- Operational Range Areas
- Munitions Response Site Boundaries
- Shell Burial Grounds MRS



Base Imagery: NJ 2007 Natural Color Imagery
Data Sources: 2008 SI Report
Army GIS Layers (August 2011)

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N W E S

400 200 0 400
Feet

Figure 3-5
Shell Burial Grounds MRS
PICA-010-R-01
Picatinny Arsenal
Morris County, New Jersey

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Table 3-6 Shell Burial Grounds MRS (PICA-010-R-01) CSM

Profile Type	Site Characterization
Location Profile	**Area and Layout** ▪ Consists of two separate areas totaling approximately 5.7 acres. ▪ The smaller burial ground is located near the southeastern PTA boundary by Building 3150 and is approximately 1.5 acres. ▪ The larger burial ground is located in the southern half of the PTA near Building 3100 and is approximately 4.2 acres.
	Structures ▪ No structures are located within the MRS.
	Boundaries ▪ The burial ground near Building 3150 is bounded by Gately Road to the south and east and by Shrader Road to the west. The area is completely fenced. ▪ The burial ground near Building 3100 is bounded by 99th Road to the south, Bell Road and Main Road to the west, and Building 3100 to the east. Vacant land is located to the north.
	Utilities ▪ Two water lines pass through the area near Building 3150. ▪ A sanitary sewer line passes through the area near Building 3100.
	Security ▪ Access is restricted by a 6 1/2-foot tall chain-link fencing with warning signs.
Land Use and Exposure Profile	**Current Land Use** ▪ The MRS is not currently being used and has restricted access.
	Potential Future Land Use ▪ There are no planned land use changes for this MRS.
	Human Receptors ▪ Human receptors include PTA personnel, residents, and contractors (utility workers, maintenance and construction workers) and visitors. ▪ Because the MRS has restricted access, the potential for the human receptors to access the MRS is low
Ecological Profile	**Degree of Disturbance** ▪ The MRS is forested with deciduous trees. Access is restricted and the degree of disturbance is low. ▪ Potential ecological receptors are presented in Section 8, Environmental Protection Plan. A focused list of ecological receptors specific to this MRS will be developed with an ecological risk assessment if warranted following the RI.
	Wetlands ▪ No water bodies or wetlands exist within the MRS.
	Ecological Habitat and Receptors ▪ The MRS is comprised mainly of deciduous forest. There are no known ecological receptors identified at this MRS. ▪ General information on ecological habitat and receptors at PTA is presented in **Table 1-1** and Section 8.2.
Cultural Resource Profile	**Cultural, Archaeological, and Historical Resources** ▪ No known historical or archaeological sites have been identified in this MRS.

Table 3-6 Shell Burial Grounds MRS (PICA-010-R-01) CSM (Continued)

Profile Type	Site Characterization
Munitions/Release Profile	**Munitions Types** ▪ Based on the HRR, potential munitions may include mines, depth charges, fuzes, projectiles, explosives, small arms ammunition, and propellants.
	Release Mechanisms ▪ Disposal and burial of MEC and explosives released from the 1926 explosion. ▪ This area was also used for munitions disposal until 1945 by the Navy. Records on the amounts or types of explosive devices buried at the site were not kept.
	MEC Density ▪ MEC density is unknown, but the MRS was used for the disposal of 25 tons of MEC and the density is assumed to be very high.
	Munitions Debris ▪ It is probable that MD associated with the 1926 explosion is contained within the burial areas.
	Associated Munitions Constituents ▪ MC is addressed under the IRP and not included under the Active Army MMRP for this MRS.
	Transport Mechanisms/Migration Routes ▪ Include intrusive activities in the Shell Burial Area that disturbs the soil cover.
	Pathway Analysis ▪ **MEC –** Incomplete exposure pathways exist for humans because of ICs that restrict access or construction within the burial mounds. Incomplete pathways exist for ecological receptors because of the MEC within the burial mounds may be under approximately 20 ft of fill, which is below the biologically active zone. ▪ **MC –** Incomplete exposure pathways exist due to ICs and LUCs. In addition, MC for this MRS is addressed under the IRP.

3.4.3 Characterization Approach for Shell Burial Grounds

Problem Statement: No field inspection activities were performed during the SI; therefore, it is unknown whether current ICs completely or accurately bound the horizontal extent of the two burial areas comprising this MRS, nor has the vertical extent of the burial areas been determined.

Identified Decisions: The primary decisions being addressed at this MRS include:

- Determine the horizontal extent of the subsurface material to verify that the current ICs (fencing) bound the two burial areas using a non-intrusive investigative approach.
- Determine the vertical extent of the subsurface material as much as is possible without intrusive investigation.

Inputs to the Decisions: Several inputs will be acquired during the RI to support the decision:

- Collect and process EM and resistivity data.
- Evaluate digital data response characteristics.
- Collect planimetric survey information around the current fence line to integrate and assess with the geophysical data.
- Use historical and nearby well installation information with geophysical data to further estimate the depth of the burial areas.

Study Boundaries: The southern burial area covers approximately 1.5 acres. The northern burial area covers approximately 4.2 acres. The DGM transects will extend beyond the current MRS boundaries to ensure that the extent of the buried material is captured and defined. The digital data response characteristics of these transects will be evaluated to determine whether additional transects need to be added or the proposed transects extended to ensure that the extent of the buried material is captured and defined.

Physical constraints of the investigation include:

- Temporal – The area is unmaintained and vegetation is overgrown. Surveys will be restricted to colder months when leaf cover and ground vegetation is thin to increase accessibility during the geophysical surveys and to maintain adequate GPS coverage.
- Access – The burial grounds have restricted access and are enclosed by a fence. The geophysical survey activities will require coordination with the PTA safety office to gain entry access.

- Safety – It is documented that the burial grounds contain MEC and that approximately 20 feet of fill may cover the disposed material. To intrusively investigate beneath the fill to determine the vertical extent of buried material would require extensive excavation. The safety risk (could not investigate without encountering MEC) outweighs the data to be gained from intrusive investigation.

Decision Rule: The decision rules are as follows:

- If surveys detect buried material at each mound, then the horizontal and vertical extent of the buried material will be defined.
- Assess the footprint of the burial areas against the current ICs (fenceline). If the burial areas are found to fall within the ICs, then no change in the footprint of the MRS will be recommended.
- If the burial areas are found to extend beyond the current ICs, then additional controls or revised controls will be recommended to be assessed based on current and future land use.

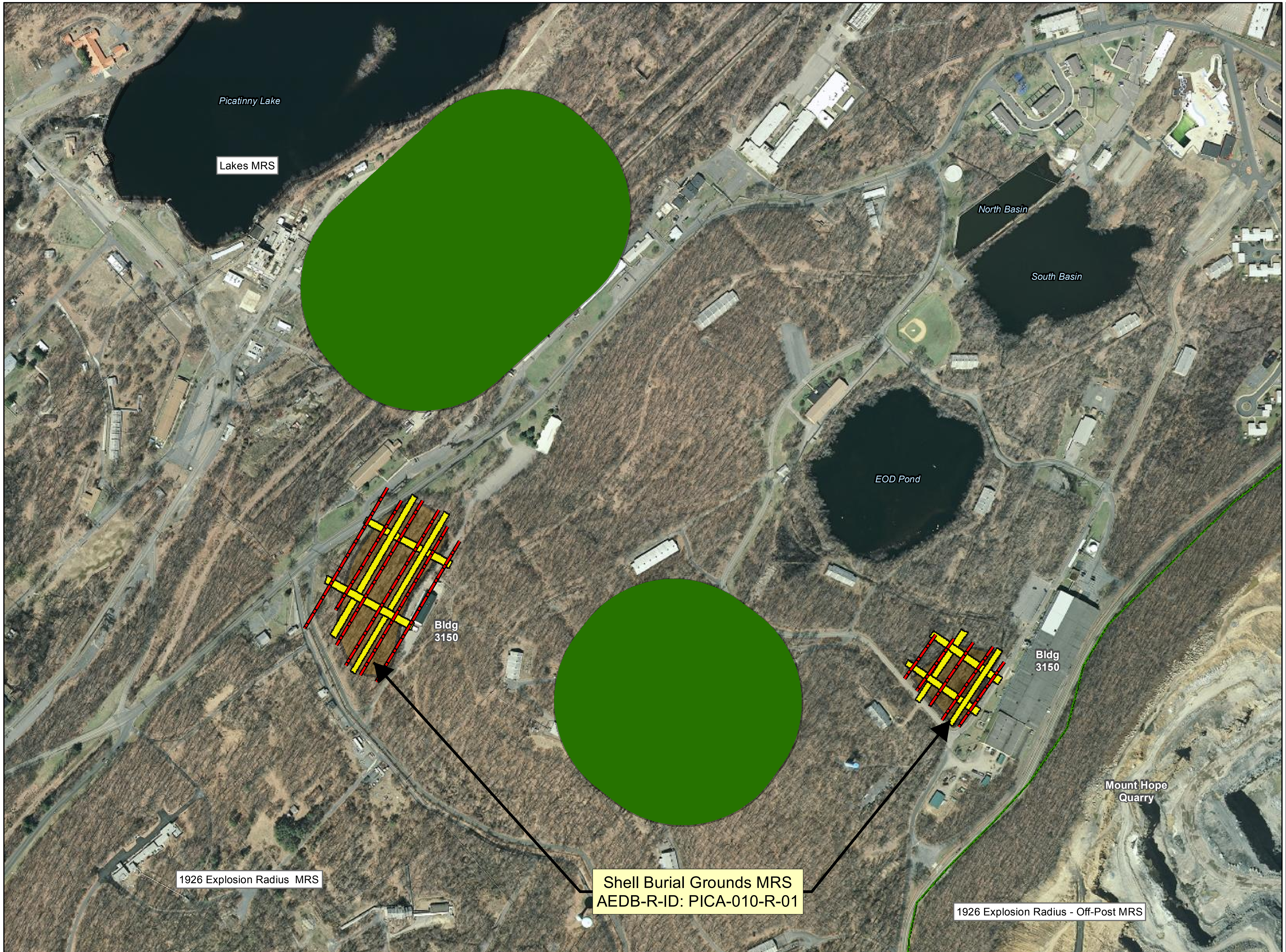
Tolerable Limits on the Decision Errors: It is currently thought that the ICs bound the subsurface material disposed of in the two burial areas. The null hypothesis (H_o) is that RI results will show that the burial area footprint is outside current ICs. The alternative hypothesis is that RI results will confirm that the burial area footprint is within current ICs. H_o is rejected if anomalous areas are confirmed only within the ICs.

A Type I decision error would be concluding that the burial area footprint is present within the current ICs when it is not. A Type II decision error would be concluding that the burial area footprint is present outside the current ICs when it is not. The consequences of both the Type I and Type II decision errors could include unnecessarily incurred project costs and increased risks to receptors.

Sampling Design: DGM surveys will be performed using a Geometrics EM31-MK2 EM induction sensor that measures ground conductivity and magnetic susceptibility. Approximately 5,500 linear feet of transects at a 75-foot spacing will be traversed across the two burial areas. Both the ground conductivity and magnetic susceptibility will be processed and evaluated to identify the inflection point where the elevated response associated with the buried material meets a background response associated with an area free from conductive material. This inflection point will define the burial area boundaries. Data collection and quality parameters for the EM31-MK2 data collection are presented and discussed in Subsection 3.15.5. No intrusive investigations are required to determine the horizontal extent of the burial areas.

Electrical resistivity (ER) imaging surveys will be performed using an Advanced Geosciences, Inc (AGI) SuperSting/Swift R8 earth resistivity imaging system to delineate the vertical extents of the burial areas. ER survey lines, two each, along the long and short axes, will be placed across each burial area to profile the varying subsurface conditions by measuring the voltage drop between various combinations of paired electrodes. The apparent resistivity data will be processed to produce resistivity cross-sections and will be analyzed against well logs of nearby wells, HRR information, and maps.

Figure 3-6 presents the characterization approach for the Shell Burial Grounds MRS.



WESTON SOLUTIONS

Legend

- Installation Boundary
- Operational Range Areas
- Munitions Response Site Boundaries
- Shell Burial Grounds MRS
- EM-31 Transects
- ER Survey

Base Imagery: NJ 2007 Natural Color Imagery
Data Sources: 2008 SI Report
Army GIS Layers (August 2011)

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

Figure 3-6
Shell Burial Grounds MRS
PICA-010-R-01
Characterization Approach
Picatinny Arsenal
Morris County, New Jersey

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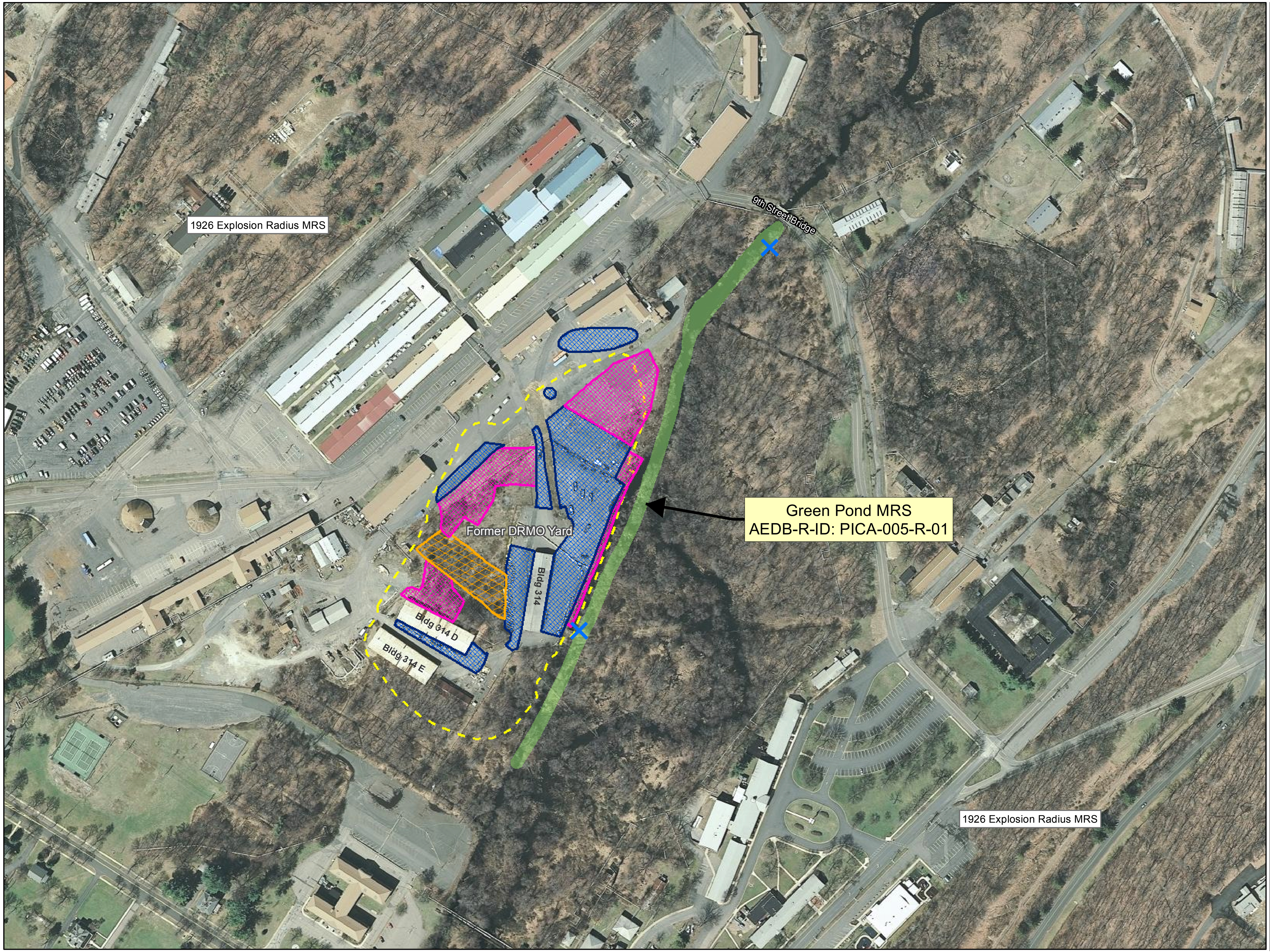
3.5 GREEN POND MRS (PICA-005-R-01) AND FORMER DRMO YARD

The Green Pond MRS (PICA-005-R-01) is located south of the 9th Street Bridge and east of and adjacent to the Former DRMO Yard. **Figure 3-7** shows the location of the MRS. The MRS includes a portion of the Green Pond Brook stream channel and a 15-foot buffer zone on each side of the bank. Green Pond MRS was separated out from the 1926 Explosion Radius MRS because it is a brook with different source and transport mechanisms. Remedies developed for this MRS would differ from the remedies adopted for the 1926 Explosion Radius MRS.

During the 1930s and 1940s, Green Pond Brook was channelized and dredged in the early 1980s to alleviate drainage problems upstream. The MRS falls within the 1926 Explosion Radius MRS and may be impacted by the release of explosives that occurred during the 1926 explosion. MEC has been found protruding from the banks of Green Pond Brook, although the source of the MEC is unknown. Documentation obtained from PTA's safety office indicates a 66mm shell was found in Green Pond Brook near the 9th Street Bridge; therefore, the MRS extends north to the 9th Street Bridge.

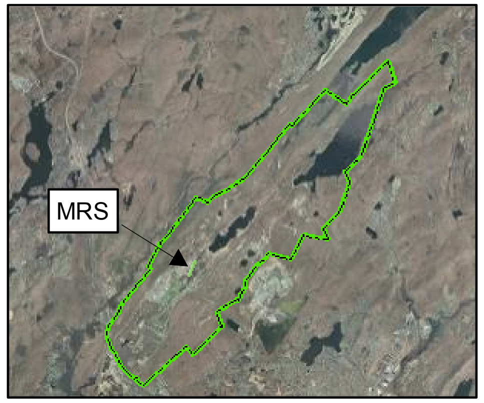
The Former DRMO Yard is located within the 1926 Explosion Radius MRS and is adjacent to the Green Pond MRS to the west. Due to their proximity and the potential MEC release mechanism similarity, the Former DRMO Yard will be investigated concurrently with the Green Pond MRS. The Former DRMO Yard is 9.5 acres and is predominantly covered with asphalt and structures. According to the HRR, the area was believed to be a low-lying marsh area that was later filled with debris related to the 1926 explosion. The Former DRMO Yard was primarily used for the storage of waste materials used in manufacturing and testing explosives, pyrotechnics and munitions, potential polychlorinated biphenyl (PCB)-containing transformers, vehicles, scrap metal, batteries, and construction debris. The HRR also indicated that flashed (exposed to a burst of intense heat which burns off any chemicals or explosives) and unflashed shells were reportedly located behind Building 314 in dumpsters. According to the HRR, buried UXO was discovered during the installation of a fence post in 1993. Subsequent investigation activities were performed; however, the results and the locations of the activities are not known.



WESTON SOLUTIONS

Legend

- Installation Boundary
- Green Pond MRS
- Former DRMO Yard/ Former Burning Ground
- Asphalt Cover
- Time Critical Removal Action Footprint
- Soil Cover
- Approximate Location of Reported MEC Finds Along Stream Banks



Base Imagery: NJ 2007 Natural Color Imagery
Data Source: 2008 SI Report, 2010 TCRA Report

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N W E S

250 125 0 250
Feet

Figure 3-7
Green Pond MRS
PICA-005-R-01
Picatinny Arsenal
Morris County, New Jersey

3.5.1 Previous Investigations

No field activities were conducted at this MRS during the SI. Sufficient information was obtained during the HRR to recommend that the Green Pond MRS proceed to an RI for MEC. MC at this MRS is being addressed under the IRP.

An NFA for MC was recommended in the SI Report because the Green Pond Brook MRS is being addressed under the IRP (PICA-193) and will not be included in the Active Army MMRP. The ROD for PICA-193 was signed in 2005 and includes LUCs for MC in sediment with chemical and biological monitoring.

3.5.1.1 Former DRMO Yard Time Critical Removal Action

In 2009, a TCRA was performed (not under the MMRP) over a 0.5 acres area of the Former DRMO Yard to remove improved conventional munitions (ICM) and submunitions from surface and near surface soil. The TCRA included conducting a surface clearance at the site, the removal of trees and shrubs and the installation of a 2-foot thick soil cover over the site. In total, 192 MEC/MPPEH were disposed of by detonation and 283 MD items were removed as part of the TCRA. Surface and subsurface removal activities in support of IRP activities at the former DRMO were conducted concurrently. A total of 208 MEC/MPPEH were disposed of by detonation and 14,950 lbs of MD was recovered (ARCADIS, 2010).

3.5.2 Conceptual Site Model

Table 3-7 provides the CSM for the Green Pond MRS and Former DRMO Yard.

Table 3-7 Green Pond MRS (PICA-005-R-01) and Former DRMO Yard CSM

<table>
<tr><th>Profile Type</th><th>Site Characterization</th></tr>
<tr><td rowspan="5">Location Profile</td><td>Area and Layout
▪ The Green Pond MRS is 1.1 acres and is located east of and adjacent to the Former DRMO Yard which is part of the 1926 Explosion Radius MRS. The MRS extends from the 9th Street Bridge to the southern edge of the Former DRMO Yard.
▪ The Former DRMO Yard is 9.5 acres and is located along 11th Avenue, south of the intersection of 6th Street and Reilly Road. The majority of the Former DRMO Yard has either asphalt or soil covers implemented from previous IRP activities.</td></tr>
<tr><td>Structures
▪ No structures are located within the Green Pond MRS.
▪ Five buildings are located within the Former DRMO Yard, Buildings 314 and 314B-E.</td></tr>
<tr><td>Boundaries
▪ The Green Pond MRS is bordered to the north by 9th Street, and by the Former DRMO Yard to the west.
▪ The 300 Marsh Area lies east of Green Pond Brook.
▪ The Former DRMO Yard is bordered to the east by Green Pond Brook and by Building 307 to the west. The investigation area at the Former DRMO Yard is limited to the southern portion; south and east of Buildings 314 E-D.</td></tr>
<tr><td>Utilities
▪ No utilities are present within the Green Pond MRS.
▪ Utilities may be present in the Former DRMO Yard and may include electric, water, and sewer lines.</td></tr>
<tr><td>Security
▪ Access to Green Pond Brook is unrestricted.
▪ A chain-link fence with an entrance gate on East 6th Street surrounds the Former DRMO Yard.</td></tr>
<tr><td rowspan="3">Land Use and Exposure Profile</td><td>Current Land Use
▪ The Green Pond MRS is located within a heavily developed and utilized area of PTA.
▪ The Former DRMO Yard was closed in the 1990s and is currently inactive.
▪ LUCs in the form of soil and asphalt caps cover much of the site. In the southern portion of the site, the land is undeveloped.</td></tr>
<tr><td>Potential Future Land Use
▪ There are no planned changes for land use for the Green Pond MRS. The 2005 ROD for Green Pond Brook includes chemical and biological monitoring, as well as LUCs.
▪ There is no known future land use for the Former DRMO Yard.</td></tr>
<tr><td>Human Receptors
▪ Human receptors for the Green Pond MRS include PTA personnel, residents, and contractors (utility and construction workers).
▪ Human receptors for the Former DRMO Yard include PTA personnel, contractors (utility and construction workers) and visitors.</td></tr>
</table>

Table 3-7 Green Pond MRS (PICA-005-R-01) and Former DRMO Yard CSM (Continued)

Profile Type	Site Characterization
Ecological Profile	**Degree of Disturbance** ▪ Currently, the Green Pond MRS has a low degree of disturbance and it is expected to remain so because of the proposed remedies of chemical/biological monitoring and LUCs. ▪ Currently the degree of disturbance of the Former DRMO Yard is low because of the presence of soil/asphalt caps over the majority of the site. The degree of disturbance in uncapped areas (e.g., the southern portion of the Former DRMO Yard) is moderate because of potential future construction activities (e.g., utility work).
	Wetlands ▪ A marshy area is located east of Green Pond Brook. ▪ The brook is a wide straight channel with warm water, slowly moving to the southwest from the outfall of Picatinny Lake.
	Ecological Habitat and Receptors ▪ An aquatic warm bed habitat comprises this MRS with some submerged aquatic vegetation beds. There is little shade and limited habitat present on the steeply sloped banks. ▪ Receptors include those species tolerant of slow, warm water. According to NJDEPs i-Map Landscape project layer, this MRS contains habitat with at least one occurrence of a state-threatened species (bog turtle). ▪ General information on ecological habitat and receptors at PTA is presented in **Table 1-1** and Section 8.2.
Cultural Resource Profile	**Cultural, Archaeological, and Historical Resources** ▪ A total of 108 potential and/or known historical archaeological sites and 27 potential and/or known prehistoric sites have been identified across the installation (Picatinny Environmental Affairs, 2011; and Chugach Industries, 2008). ▪ No known historical or archaeological sites have been identified in this MRS.
Munitions/Release Profile	**Munitions Types** ▪ A complete list of munitions types cannot be determined, but that the potential munitions in the MRS may include munitions that were used on or passed through PTA. ▪ The TCRA ICM/Submunitions Area within the Former DRMO Yard includes BLUs, 40mm, 105mm, 6-inch, and 37mm projectiles; point detonating (PD) fuzes, and M525 fuzes. ▪ A 66mm shell was reportedly found protruding from the banks of Green Pond Brook. ▪ Munitions released during the 1926 explosion (see Section 3.2)
	Release Mechanisms ▪ Discarded or malfunctioned munitions. ▪ 1926 explosion. ▪ DRMO Yard disposal/fill.

Table 3-7 Green Pond MRS (PICA-005-R-01) and Former DRMO Yard CSM (Continued)

Profile Type	Site Characterization
Munitions/Release Profile (Cont'd)	**MEC Density** ▪ The demolition of 400 MEC/MPPEH was performed during surface and subsurface removal activities in the Former DRMO Yard. The remaining areas outside of these activity areas in the Former DRMO Yard are expected to have a low density of MEC. ▪ The MEC density for the Green Pond MRS is unknown but is anticipated to be low to moderate because of the uncertainty of the source/release mechanism of MEC.
	Munitions Debris ▪ Approximately 15,000 pounds of MD was recovered in the Former DRMO Yard. ▪ Visual surveys were not conducted at the Green Pond MRS.
	Associated Munitions Constituents ▪ MC is addressed under the IRP.
	Transport Mechanisms/Migration Routes ▪ Soil erosion is the primary transport mechanism for MEC for the Green Pond Brook and the Former DRMO Yard. Erosion along the banks of Green Pond Brook could potentially expose MEC. Erosion of the undeveloped areas of the Former DRMO Yard could also uncover MEC. ▪ Soil disturbance (e.g., future construction activities) in the other areas at the DRMO Yard could allow for transport of MEC. ▪ Frost heave at both Green Pond and the DRMO Yard could bring MEC to the surface.
	Pathway Analysis ▪ **MEC**- Complete exposure pathways exist for PTA personnel and contractors/visitors who may contact, via handling or treading underfoot, MEC in surface soil or surficial sediments of the brook. Complete exposure pathways exist for biota that may contact MEC in surface soil or surficial sediments and that may nest or burrow at the site and thereby contact MEC in subsurface soil. Complete exposure pathways also exist for contractors who may need to access underground utilities in the subsurface soil or may perform intrusive work during future construction activities. ▪ **MC-** While potentially complete exposure pathways for MC may exist, MC is addressed under the IRP.

3.5.3 Characterization Approach for the Green Pond MRS and Former DRMO Yard CSM

Problem Statement: Burial areas containing MEC may exist along the banks of Green Pond Brook due to channelization and/or fill material potentially brought to the site and previous operations at the Former DRMO Yard (adjacent to the MRS). In addition, MEC may also be present based on the previous recovery of MEC protruding from the bank of Green Pond Brook and identified during the installation of fence posts at the Former DRMO Yard. The nature and extent of potential MEC burial areas or individual MEC is unknown at the Green Pond MRS and in the southern portion of the former DRMO Yard.

Identified Decisions: The primary decisions being addressed at the Green Pond MRS and Former DRMO Yard include:

- Determine if MEC burial areas or individual MEC exist in and along the banks of Green Pond Brook and if so, define their extent.
- Determine if MEC exists within the southern portion of the Former DRMO Yard and if so, define its extent.

Inputs to the Decisions: Several inputs will be acquired to support the decisions:

- Perform mag and dig surveys along the banks and in the water of Green Pond Brook and the southern portion of the Former DRMO Yard. Investigate all anomalies.
- Collect DGM data along the banks of the brook and evaluate the DGM data responses to identify and to determine the extents of the potential burial areas. Intrusively investigate the selected anomalies from the DGM data to determine if the source of the anomalies is related to the potential MEC burial areas.

Study Boundaries: The Green Pond MRS is bounded to the north by 9th Street and to the west by the 300 Marsh Area. The Former DRMO Yard is adjacent to the west. The Former DRMO Yard is bounded to the east by Green Pond Brook and by Building 307 to the west.

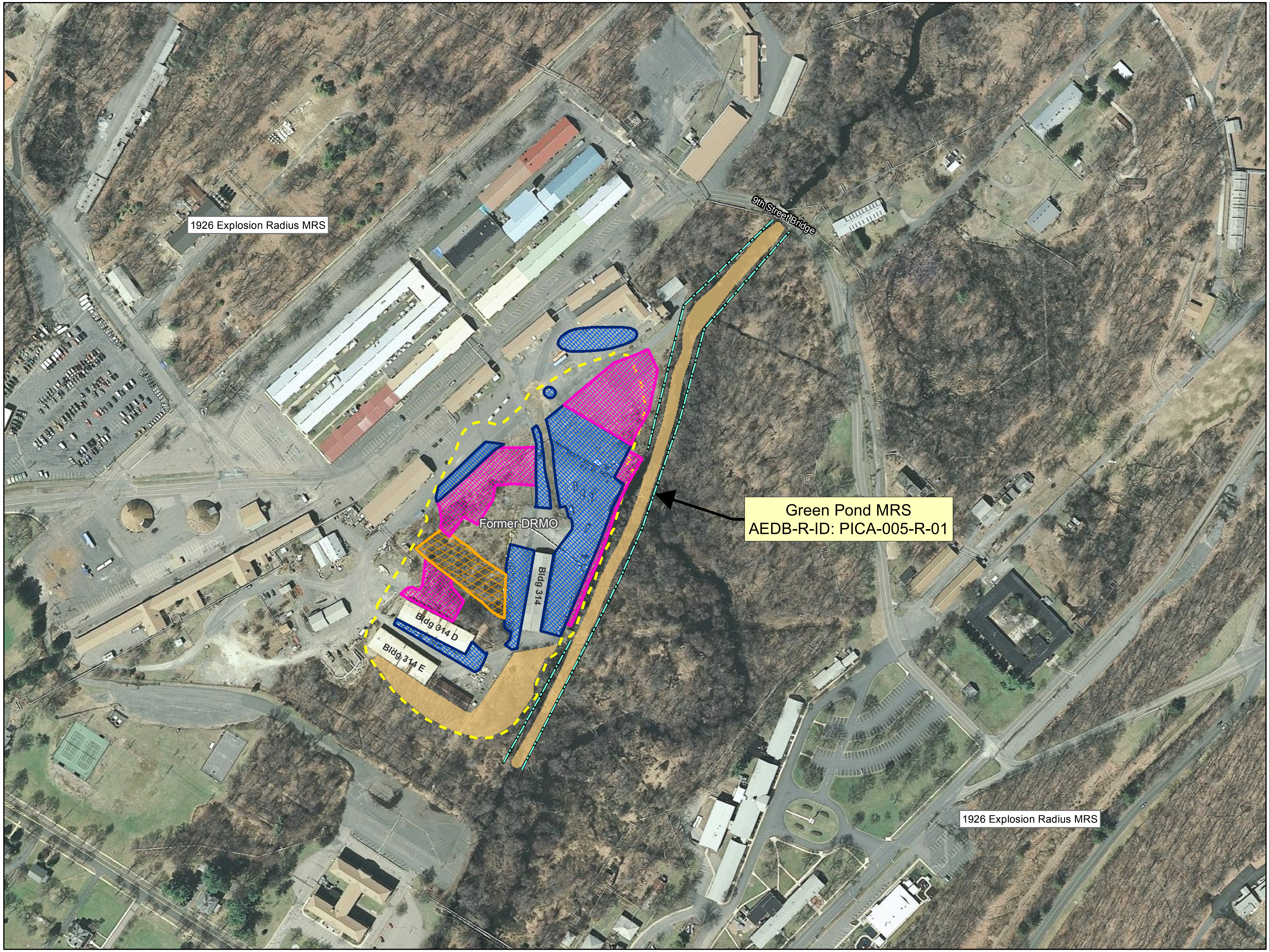
Decision Rules: The decision rules are:

- If MEC is found during the intrusive anomaly investigation, then assess the MEC density across the Green Pond MRS and in the southern portion of the Former DRMO Yard.
- If MEC burial areas are present along the banks of Green Pond Brook, then define the extent.

Tolerable Limits on Decision Errors: DGM and mag and dig surveys utilizing GPS will be performed in and along the banks of Green Pond Brook and specific investigation areas of the Former DRMO Yard.

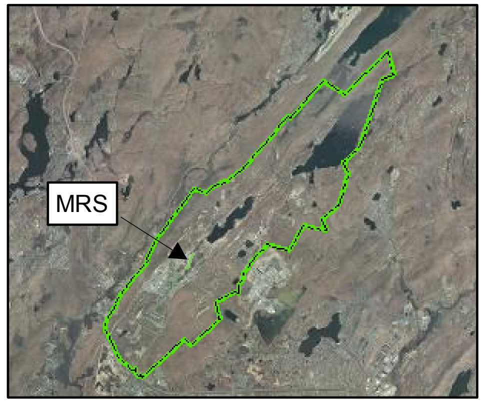
Sampling Design: Mag and dig will be performed over approximately 2.1 acres in the southwest portion of the Former DRMO Yard in and along the banks of Green Pond Brook. The total mag and dig coverage is approximately 2.5 acres or 2.08 miles. EM31-MK2 transect surveys will be performed along the banks of Green Pond Brook to identify the burial areas. The total DGM coverage is 0.26 acre or 3,800 linear feet. Both the ground conductivity and magnetic susceptibility measurements will be processed and evaluated to identify large anomalous areas indicative of burial areas. Anomalies within the burial features will be selected, reacquired, and investigated by the UXO technicians. Additional surveys will be performed as necessary to delineate the burial areas. The point between the elevated responses associated with the burial area and the background response associated with an area free from conductive material will be defined as the burial area boundary.

Figure 3-8 presents the characterization approach for the Green Pond MRS and the Former DRMO Yard.



Legend

- Installation Boundary
- Former DRMO Yard
- DGM Transects
- Mag and Dig Areas
- Asphalt Cover
- Time Critical Removal Action Footprint
- Soil Cover



Base Imagery: NJ 2007 Natural Color Imagery
Data Source: 2008 SI Report, 2009 MEC Support for IRP Activities 2010 TCRA Report

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

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Figure 3-8
Green Pond MRS
PICA-005-R-01
Characterization Approach
Picatinny Arsenal
Morris County, New Jersey

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3.6 FORMER OPERATIONAL AREAS MRS (PICA-006-R-01)

The Former Operational Areas MRS (PICA-006-R-01) consists of 1,880 acres and includes most areas of PTA, excluding operational ranges, areas already identified as an MRS, and the northeastern portion of PTA. **Figure 3-9** presents the location of the MRS. The MRS was identified from the UXO Finds Map that was found in the PTA Safety Office (**Appendix D**). The UXO Finds Map documents the numerous MEC recovered throughout the Former Operational Areas MRS between 1986 and 1998. In addition, a PTA Survey report (DoD, 1973) documents several areas within the Former Operational Areas MRS as being allocated for former R&D activities, these are shown in **Figure 3-10**. Originally, 2,036 acres were allocated for R&D and consisted of the following:

- Code 300 Artillery Firing and Fragmentation Pattern Testing Area (Code 300 Area) - According to DoD, *Executive Order 11508 PTA Survey Report, Picatinny Arsenal, Dover, New Jersey,* in 1973, PTA had 975 acres of land on the northwestern portion of the PTA used for artillery firing of shells up to 155mm and for fragmentation pattern testing. A large portion of the Code 300 Area, which is within both the 1926 Explosion Radius MRS and the Former Operational Areas MRS, is located in operational range areas. The firing point and target area are not discussed in the 1973 report, and no other information is currently available regarding this area.
- Rocket Surveillance (624 acres) - Located on the eastern portion of PTA, this area was used for the surveillance of rockets under climatic conditions and for static firing.
- Testing areas (51 acres) – This area is located on the southern portion of PTA and within operational range areas. Activities included testing mines, bombs, and bomblets under simulated tropical conditions; burying explosives and devices to develop technology; and testing equipment to locate/detect and quantify munitions. Pyrotechnics and flares were also tested in this area.
- QA inspections and nuclear component testing (13 acres) - Located on the southern portion of PTA, the area was used for QA inspections and testing of nuclear components used by DoD.
- Other (373 acres) – The remaining areas are located throughout PTA. The areas included computer centers, sites for experimental projects for lead azide and other highly explosive components; and live ammunition environmental testing.

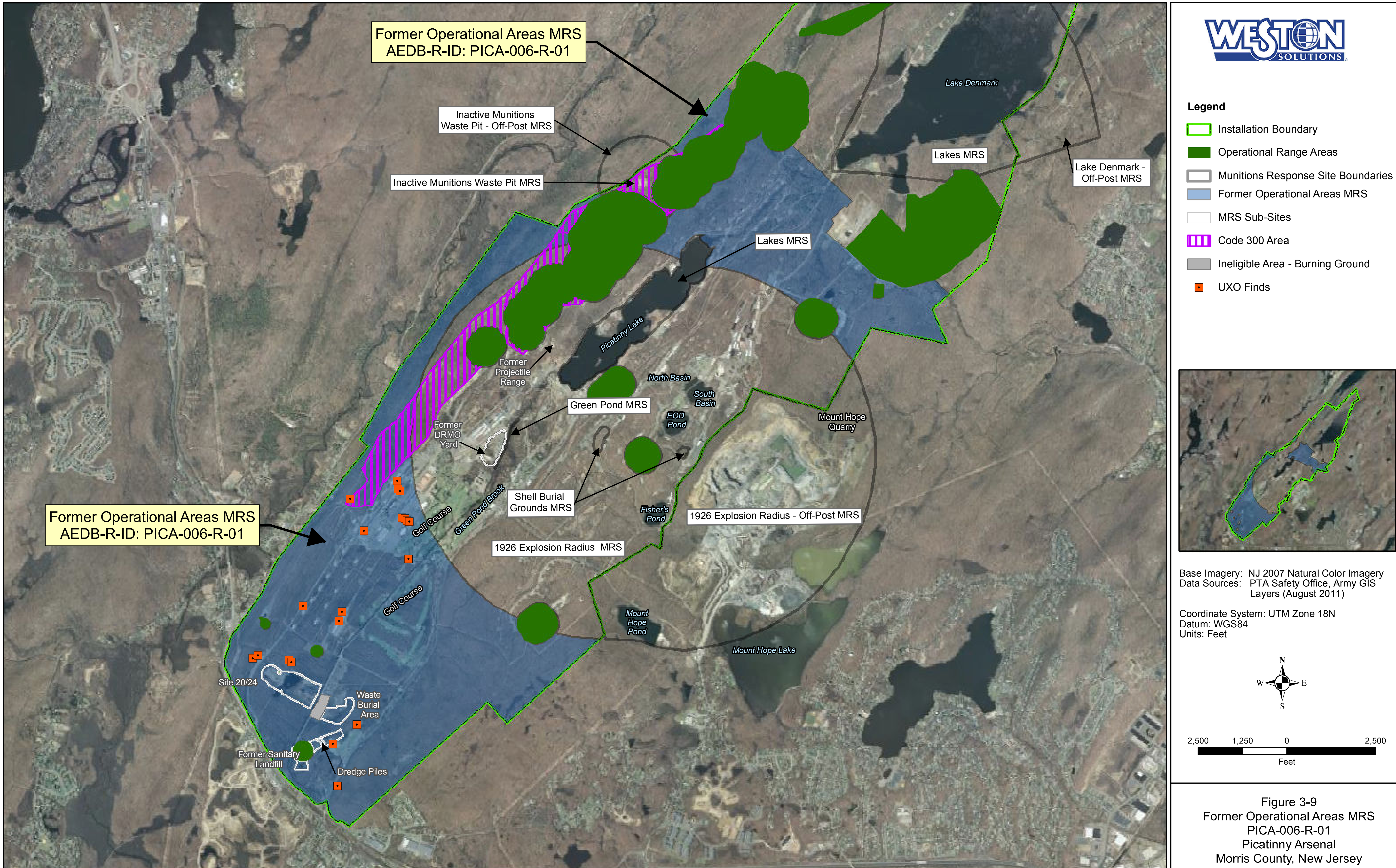

Figure 3-9
Former Operational Areas MRS
PICA-006-R-01
Picatinny Arsenal
Morris County, New Jersey

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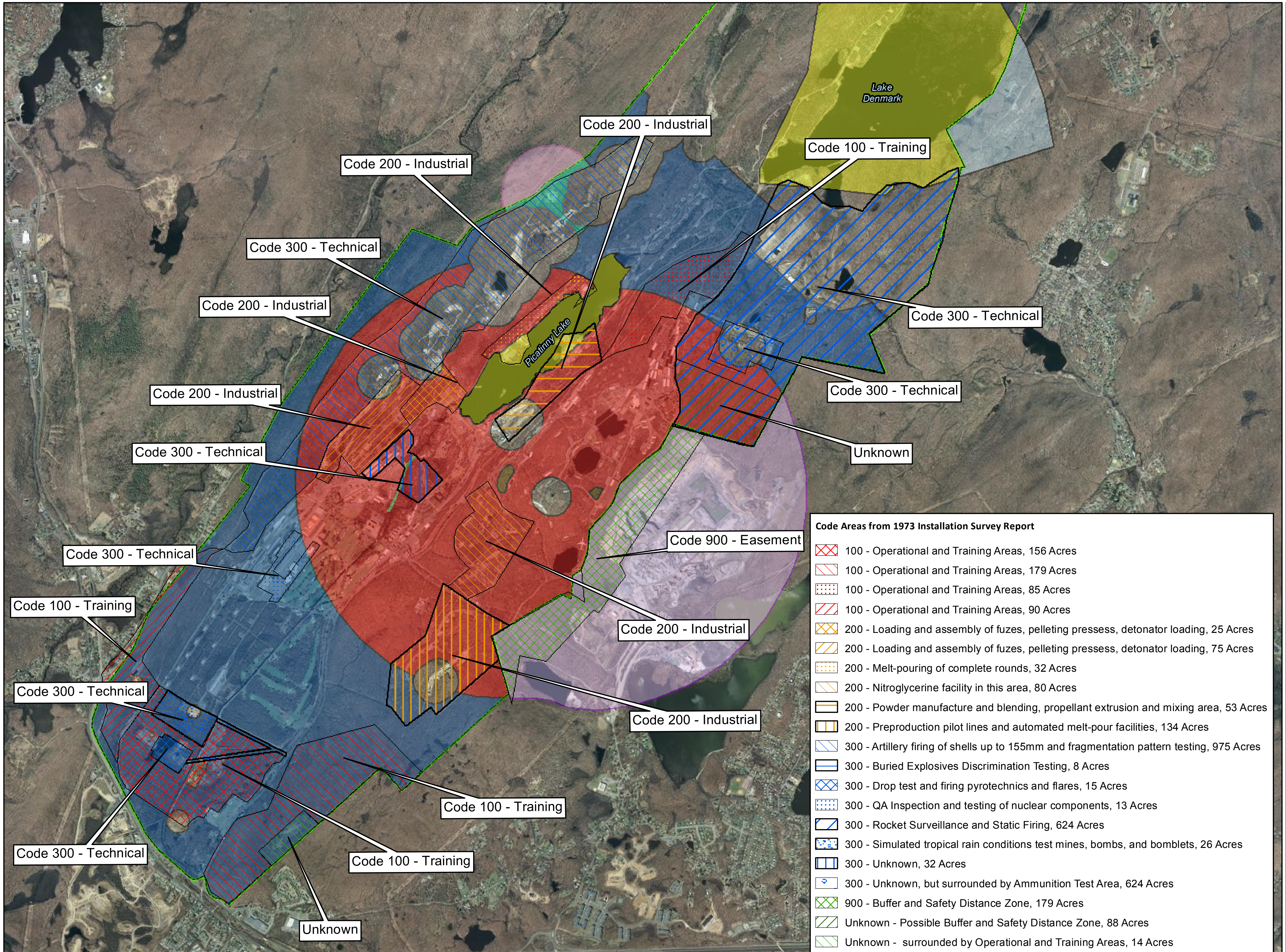

WESTON SOLUTIONS

Legend

Installation Boundary

Munitions Response Sites Locations

- 1926 Explosion Radius
- 1926 Explosion Radius, Off-Post
- Former Munitions and Propellant Test Area
- Former Operational Areas
- Green Pond
- Inactive Munitions Waste Pit
- Inactive Munitions Waste Pit, Off-Post
- Lake Denmark, Off-Post
- Lakes
- Shell Burial Grounds

Base Imagery: NJ 2007 Natural Color Imagery
Data Source: PTA GIS Layer, Army GIS Layers (August 2011)

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N W E S

2,500 1,250 0 2,500
Feet

Figure 3-10
Former R&D Areas (Code Areas)
Picatinny Arsenal
Morris County, New Jersey

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The following sub-sites including the Former Sanitary Landfill, Dredge Pile, Waste Burial Area, and Site 20/24 areas will also be investigated under the MMRP for MEC. MC at these sub-sites is being addressed under the IRP and will not be addressed under the MMRP.

- Former Sanitary Landfill and Dredge Pile (PICA 067/068) - The Former Sanitary Landfill is a 13-acre site located in the southern portion of the MRS (between Parker Road and Spicer Avenue). It consists of a dredge pile located on top of the former landfill, approximately 15 to 20 feet above the surrounding grade. This dredge pile is known to have been placed on top the former landfill's cap from dredging activities conducted at Green Pond Brook. During utilities trenching activities, MEC was reported within the landfill. MC is addressed under the IRP.
- Waste Burial Area (PICA 093) - An 8.5-acre unregulated waste burial area is also located in the southern portion of the MRS. During a 1998 site walk, MD and 40mm grenades were observed during IRP investigations**.** MC is addressed under the IRP.
- Site 20/24 (PICA 063/066) - Site 20/24 covers approximately 28 acres and is located in the southwestern corner of PTA between Phipps Road and Green Pond Brook in the MRS. Site 20 is approximately 1.5 acres of flat cleared area located entirely within the boundary of Site 24. Site 24 consists of approximately 26.5 acres of cleared, reclaimed/filled wetlands. In addition, a one-acre shallow pond referred to as Landfill Pond is located in the central portion of the site. The Landfill Pond was a swamp area used for dumping of miscellaneous waste. Approximately 7 acres of Site 20/24 has been used for miscellaneous waste and debris disposal that began in the 1960s and continued until 1972. The Site 20/24 area is identified as being used for munitions disposal and former pyrotechnic testing activities. Blocks of high explosives, burned and crushed flare bodies, 75mm and 155mm projectiles and boosters and tailpieces of mortars were discovered during the 2002 investigation of Site 20/24. A soil cap was constructed in 2002 over portions of the site identified with elevated levels of PCBs and lead. A smaller secondary cap was also placed nearby over terminated excavation sites where munitions were found.

3.6.1 Previous Investigations

3.6.1.1 Site Inspection Results

No field activities were conducted during the SI. Further investigation for MEC and MC was recommended in the SI Report based on the discovery of the UXO Finds Map (**Appendix D**).

3.6.2 Conceptual Site Model

Table 3-8 presents the CSM for the Former Operational Areas MRS.

Table 3-8 Former Operational Areas MRS (PICA-006-R-01) CSM

Profile Type	Site Characterization
Location Profile	**Area and Layout** ▪ Covers 1,880 acres and includes most areas of PTA but excludes operational ranges, SDZs for the operational ranges, areas already identified as an MRS and the northeastern portion of PTA. ▪ Includes the Sanitary Landfill, Dredge Pile, Waste Burial Area, and Site 20/24 near the southern boundary of the MRS as sub-sites.
	Structures ▪ Numerous buildings are present that are used for manufacturing, storage, testing, R&D, administration, and recreation.
	Boundaries ▪ PTA boundary to the south, west, and southeast. There is no distinct boundary to the northeast. ▪ 1926 Explosion Radius MRS to the east.
	Utilities ▪ Utilities are present throughout the MRS. Specific locations of the utilities are unknown.
	Security ▪ Access is unrestricted once on PTA.
Land Use and Exposure Profile	**Current Land Use** ▪ The MRS is currently used for manufacturing, storage, testing, R&D, administration, and recreation. ▪ Parking lots, recreational areas, and portions of a golf course. ▪ Undeveloped areas are used for hunting (including the Waste Burial Area). ▪ Site 20/24 is currently the site of a "safe haven" for trucks transporting explosives on interstate highways. According to Federal Highway Administration regulations, trucks transporting explosive materials are only permitted to make overnight stops at places designated as safe havens for that purpose.
	Potential Future Land Use ▪ Short-term and long-term development and redevelopment is planned for the MRS.
	Human Receptors ▪ With the addition of new missions, a significant increase in personnel is expected.
Ecological Profile	**Degree of Disturbance** ▪ A portion of the MRS is developed and the degree of disturbance is high. ▪ A large portion of the MRS is undeveloped and the degree of disturbance is low. ▪ Sub-sites − Site 20/24 - degree of disturbance is low. All soil in this area containing PCBs at concentrations greater than 300 mg/kg were excavated for off-site disposal as per stipulations in the ROD (Picatinny, 2002). Soil caps were later placed over the excavated areas. − Former Sanitary Landfill and Dredge Pile - Degree of disturbance is low due to a portion of the site containing a soil cap and the entire site being an undeveloped grassy area. − Waste Burial Area - Degree of disturbance is low due to the sites location in an isolated sporadically used area.
	Wetlands ▪ Numerous streams, ponds, and wetlands are present throughout the MRS.
	Ecological Habitat and Receptors ▪ The majority of the MRS is undeveloped and consists of deciduous forests, ponds, streams and wetlands. Several sensitive species are known to inhabit this MRS, including the veery (*Catharus Fuscescens*), barred owl (*Strix varia*), and American woodcock (*Scolopax minor*). A habitat with at least one occurrence of a state-threatened species is present at this MRS, according to NJDEP's i-Map landscape Project layer. ▪ General information on ecological habitat and receptors at PTA is presented in **Table 1-1** and Section 8.2.

Table 3-8 Former Operational Areas MRS (PICA-006-R-01) CSM (Continued)

Profile Type	Site Characterization
Cultural Resource Profile	**Cultural, Archaeological, and Historical Resources:** ▪ A total of 108 potential and/or known historic archaeological sites and 27 potential and/or known prehistoric sites have been identified across the installation (Picatinny Environmental Affairs, 2011; and Chugach Industries, 2008) and the PTA Administration and Research District in downtown PTA is identified by the NJHPO as a cultural resource.
Munitions/Release Profile	**Munitions Types** ▪ Based on HRR and SI work, MD/MEC include 20mm, 57mm, and 90mm HE; 8-inch, 40mm, 66mm, 81mm, 120mm, 175mm projectiles; 37mm, 105mm, and 122mm cartridges, 152mm, 155mm, and 3.5-inch practice rounds; BLU-7A/S; fuzes; grenades; mines; pyrotechnics; rifle grenades; and small arms ammunition.
	Release Mechanisms ▪ Release mechanisms are unknown but may include discarded or malfunctioned munitions, testing activities, and munitions waste disposal.
	Maximum Probable Penetration Depth ▪ Areas that were used as ranges may have calculated penetration depths of a few inches to 17 ft below ground surface (bgs). Because the ranges are small, and because of nearby targets and shallow bedrock, the maximum penetration depth is unlikely.
	MEC Density ▪ No SI field investigations were performed, thus, the density of MEC is unknown. ▪ There have been numerous, documented finds between 1986 and 1998 (UXO Finds Map) across the MRS. ▪ Sub-sites − Site 20/24 - According to reports approximately 4 feet of clean fill material was included in the soil caps so MEC density on the surface is expected to be low. Across other portions of Site 20/24 there is potential for MEC to exist in the subsurface and across the surface due to former munitions disposal activities, pyrotechnic testing, and during IRP investigations, MEC including blocks of HE were found. − Former Sanitary Landfill and Dredge Pile – MEC density on the surface is expected to be low due to the presence of soil caps over portions of the site. Across other portions of the site there is a potential for MEC to exist in the subsurface and across the dredge spoil piles. − Waste Burial Area – MEC density is expected to be low, but large projectiles were observed on the ground surface of the site 1998 site walk and trenching activities in 1998 revealed several 40-mm grenades.
	Munitions Debris ▪ No field investigations were performed in the MRS, but based on the UXO Finds Map, MD is likely present. ▪ Sub-sites − Site 20/24 - The nature and extent of MD is unknown, but MD was found during the 2002 investigation. − Former Sanitary Landfill and Dredge Pile – The nature and extent of MD is unknown but since MEC have been reported within the landfill, MD is assumed to also be present. − Waste Burial Area - The nature and extent of MD is unknown but since MEC have been reported within the site, MD is assumed to also be present.
	Associated Munitions Constituents ▪ MC sampling has been conducted under the IRP and data extrapolated to the MRS, but it is unknown if the MC contamination is related to activities in the MRS. ▪ MC detected includes copper, lead, zinc, TNT, DNT, HMX, NB, nitrocellulose, nitroglycerin, and tetryl.

Table 3-8 Former Operational Areas MRS (PICA-006-R-01) CSM (Continued)

<table>
<tr><th>Profile Type</th><th>Site Characterization</th></tr>
<tr><td></td><td>Transport Mechanisms/Migration Routes
The primary transport mechanisms identified for the Former Operational Areas include the following:
▪ Soil Disturbance: The current degree of disturbance is relatively low since a large portion of the MRS is undeveloped. However, MC may be released as respirable particulates in air during future construction or otherwise intrusive activities.
▪ Erosion: Soil erosion may uncover MEC. MC adsorbed to soil particles may migrate in surface water runoff from the surface soil to nearby water bodies. Migration of dissolved MC is of lesser concern, as the MC has low water solubilities.
▪ Frost Heave: Periodic, alternating freezing and thawing during the winter may uplift MEC from the soil subsurface to the soil surface for portions of the site that are not capped. Approximately up to 4 feet of fill material was included in the soil caps making frost heave unlikely.
▪ Infiltration: MC migration via infiltration is moderate since a large portion of the MRS is undeveloped and not covered with impermeable surface. However, this is a minor migration pathway as the MC is relatively immobile and has low water solubilities.
▪ Recharge and Discharge: Groundwater may discharge to water bodies, and surface water may recharge groundwater depending on the time of year, rainfall/snowmelt amounts, and location within the MRS. However, this is a minor migration pathway, as the MC is relatively immobile and has low water solubilities.</td></tr>
<tr><td></td><td>Pathway Analysis
▪ MEC- Exposure pathways are considered complete, because MEC has been found within this MRS. Complete exposure pathways exist for PTA personnel and contractors/visitors who may contact, via handling or treading underfoot, MEC in surface soil or surficial sediments of the brook. Complete exposure pathways exist for biota that may contact MEC in surface soil or surficial sediments and that may nest or burrow at the site and thereby contact MEC in subsurface soil. Complete exposure pathways also exist for contractors who may need to access underground utilities in the subsurface soil or may perform intrusive work during future construction activities.
▪ MC- Exposure pathways are considered potentially complete, because it has not been established that MC is present at concentrations of concern. Potentially complete exposure pathways exist for PTA personnel, PTA residents, and contractors/visitors who may contact MC in surface soil. Potentially complete exposure pathways also exist for contractors who may contact MC in subsurface soil while accessing underground utilities or performing intrusive work during future construction activities. Potential exposure routes include incidental ingestion, dermal contact, and inhalation of dust. Potentially complete exposure pathways exist for biota that may contact MC in surface soil and that may nest or burrow at the site and may contact MC in subsurface soil. While there may be potentially complete exposure pathways to MC in surface water and sediment, surface water at this MRS is addressed under the IRP. Potential groundwater exposure pathways are not addressed in this RI, as all groundwater within PTA is addressed under the IRP.</td></tr>
</table>

3.6.3 Characterization Approach for the Former Operational Areas MRS

Problem Statement: Several areas identified as being used for R&D activities have been documented within the Former Operational Areas MRS. The historical use and nature and extent of MEC at these areas is unknown. A MEC release may be present within the Code 300 Area because of artillery testing activities. The UXO Finds Map indicates sporadic MEC occurrences across the MRS, but the source and release mechanisms have not been documented. The Former Sanitary Landfill, Dredge Pile, Waste Burial Area, and Site 20/24 exist in the southern portion of the MRS. MEC have been observed in these areas, but their footprints are not well defined.

Decisions Needed: The primary decisions addressed at this MRS include:

- Determine whether a MEC release is present within the MRS and/or Code 300 Area using VSP.
- Approximate MEC density across the MRS.
- Determine the nature and extent of MEC release, if observed.
- Delineate the horizontal extent of the subsurface material at the Former Sanitary Landfill, Dredge Pile, and Waste Burial Area and evaluate the extent of MEC.
- Determine whether MEC burial sites are present within Site 20/24.
- Determine the nature and extent of MEC at MEC burial sites if detected.

Inputs to the Decisions: Several inputs will be acquired during the RI to support the decisions:

- Conduct a geophysical survey within the portions of the Former Operational Areas MRS where reported R&D activities may have occurred. Based on the potential infrastructure and standoff requirements used during testing activities at these R&D sites (Code Areas), it was determined that the entire Code Area would likely not be impacted by MEC. The smallest Code Area was identified as 8 acres in size. Based on the smallest Code Area, a more conservative MEC release of 5 acres was used as a VSP input parameter. Geophysical transects will be traversed across the applicable portions of the MRS on a 250-ft spacing to ensure a high probability of detection (greater than 95%) of a potential 5-acre MEC release. **Figure 3-11** depicts the locations of the transects and their extents. **Table 3-9** lists the VSP parameters and coverage requirements for the Former Operational Areas MRS. The 250-ft spaced transects will only be performed where R&D activities potentially occurred and they do not traverse the following sub-sites: Sanitary Landfill, Dredge Pile, Waste Burial Area, Site 20/24, or Code 300 Area. Each of these sites is discussed independently.
- Perform mag & dig surveys in areas inaccessible to the DGM instrumentation. DGM surveys will be used near developed areas of the MRS to aid in managing the exclusion

zone during intrusive work. This will allow the UXO team to schedule intrusive work so that evacuations in the developed areas are not necessary. Locations for each type of survey will be determined based on observed field conditions.

Table 3-9 VSP Parameters and Coverage Requirements - Former Operational Areas MRS

VSP Parameter	VSP Input and Coverage Requirements
Munitions Response Site	Former Operational Areas (PICA-006-R-01)
Shape of Target Area	Circular
Target Area of Interest	5 acres
Anomaly Density Indicator	50 anomalies/acre (conservative value used for an impact area)
Background Anomaly Density	10 anomalies/acre
Transect Width	10 ft for mag and dig; 3.25 ft for DGM (physical team transect widths)
Transect Spacing	250 ft
Transect Distance	55.4 miles
Transect Area	58.4 acres (3.11% coverage of the MRS)

Note: These VSP parameters do not apply to the Sanitary Landfill, Dredge Pile, Waste Burial Area, Site 20/24, or the Code 300 Area.

- Use revised VSP input requirements for the Code 300 Area better suit the potential MEC release profile. It has been documented that artillery testing activities were performed for artillery up to 155mm. The smallest MEC release for the Code 300 Area is based on a 57mm projectile. **Table 3-10** lists the VSP parameters and coverage requirements for the Code 300 Area within the Former Operational Areas MRS.
- Employ analog geophysical transects using the Vallon hand-held or equivalent all metals sensor in the Code 300 Area. No intrusive investigations will be performed along these transects in the Code 300 Area unless an area of increased anomaly density is detected, then intrusive investigations will be performed to determine the nature and extent of MEC.
- Collect EM31-MK2 DGM transects across the Former Sanitary Landfill, the Dredge Pile, the Waste Burial Area, and Site 20/24. The DGM anomaly response characteristics will be evaluated. EM61-MK2 transects will be used to evaluate the features identified in the EM31-MK2 surveys. Anomalies will be investigated to determine the nature and extent of MEC.

Table 3-10 VSP Parameters and Coverage Requirements - Code 300 Area

VSP Parameter	VSP Input and Coverage Requirements
Munitions Response Site	Code 300 Area located within the Former Operational Areas (PICA-006-R-01)
Shape of Target Area	Circular (based on the hazardous fragmentation distance of a 57mm projectile)
Target Area of Interest	243-ft radius
Anomaly Density Indicator	40 anomalies/acre (conservative value used for an impact area)
Background Anomaly Density	10 anomalies/acre
Transect Width	10 ft (physical team transect width)
Transect Spacing	193 ft (203 ft on centers)
Transect Distance	2.1 miles
Transect Area	2.6 acres (4.5% coverage of the Code 300 Area)

Note: These VSP parameters do not apply to the Sanitary Landfill, Dredge Pile, Waste Burial Area, Site 20/24, or the remaining portions of the Former Operational Area MRS.

Study Boundaries: This 1,880-acre MRS was created based on the UXO Finds Map and includes most areas, except for operational ranges and associated surface danger zones (SDZs), areas already identified as MRSs, and the northeastern portion of PTA. The MRS is bound to the south, west, and southeast. There is no distinct boundary to the northeast. Intrusive work will not be performed at the Golf Course.

Decision Rules: The decision rules are as follows:

- If an area of increased anomaly density as determined by VSP evaluation is detected during the geophysical transect surveys, then assess if the increased anomaly density is related to a MEC release. This will be evaluated using the VSP parameters presented in **Table 3-9** and **Table 3-10**.
- If MEC and/or MD are detected during mag & dig transect surveys the extent of the MEC and/or MD will then be delineated and used to determine if a MEC release is present.
- Define the horizontal extent of the Former Sanitary Landfill, Dredge Pile, and Waste Burial Area. If MEC releases are confirmed, then delineate the extent.
- If MEC burial sites are detected by DGM transect surveys at Site 20/24, then perform additional surveys as necessary to delineate the extent of the site.
- If MEC is present based on intrusive anomaly investigations, then assess the nature and extent of MEC.

Tolerable Limits on Decision Errors: The H_o is that a MEC release related to an impact area from historical testing activities and equating to 5 acres exists. The alternative hypothesis is that no MEC releases relating to an impact area exist and that MEC only exist with a sporadic distribution and uncertain source/release mechanism. The rejection of the H_o will not require additional investigation to determine the extent of a MEC release or impact area.

The decision errors associated with this H_o are that there are no MEC releases relating to an impact area when there are (Type I) and that there is a MEC release relating to an impact area when there is not (Type II). The consequence of a Type I decision error could include increased risks to receptors. The consequence of a Type II decision error could include revising the CSMs, re-evaluating the input and output statistical parameters in VSP, and/or conducting additional investigations. The ultimate outcome will be determined based on an assessment of the historical and new data.

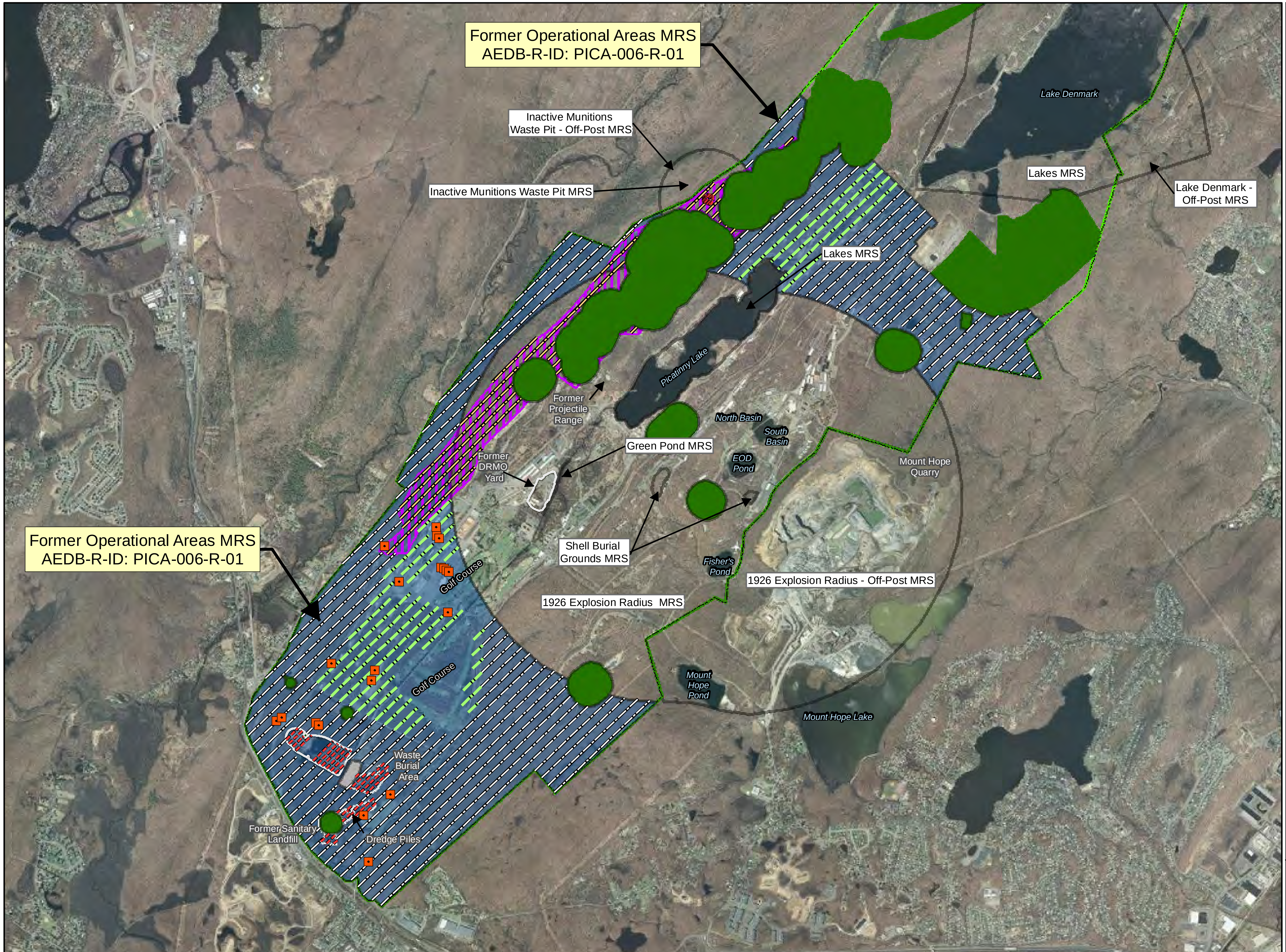
The H_o for Site 20/24 is that the RI results will show that there are no burial sites at Site 20/24. The alternative hypothesis is that RI results will confirm the presence of MEC burial sites. The H_o is rejected if anomalous areas are detected and intrusive investigations uncover MEC.

A Type I decision error would be concluding that MEC burial sites are present within the site when they are not. A Type II decision error would be concluding that MEC burial sites are not present when they are. The consequences of both the Type I and Type II decision errors could include unnecessarily incurred project costs and increased risks to receptors.

The H_o for the Code 300 Area is that the site does not contain a MEC impact area because of historical artillery firing and does not necessarily contain individual MEC. The H_o is based on the lack of historical records that indicate that a dedicated range or impact area existed and the lack of MEC finds within the Code 300 Area. The decision errors associated with this H_o are concluding that there is a MEC impact area within the Code 300 Area when there is not (Type I) and concluding that there is no MEC impact area within the Code 300 Area when there is (Type II). If H_o is rejected based on the identification of a potential MEC impact area (e.g., anomaly densities significantly greater than the background anomaly density over a large area) within the Code 300 Area, then intrusive investigations will be performed within the potential MEC impact area to determine the nature of the anomalies. If potential impact areas are not identified in the Code 300 Area, no additional intrusive investigations will be conducted in the Code 300 Area.

Sampling Design: Mag and dig or DGM transect surveys will be performed across the majority of the MRS at 250-foot spacing consistent with the VSP calculations. Mag and dig surveys will be used in areas inaccessible (e.g., steep hillsides) to the DGM instrumentation. DGM surveys will also be used near developed areas of the MRS to aid in managing the exclusion zones during intrusive work. This will allow the UXO team to schedule intrusive work so that evacuations in the developed areas are not necessary. Non-intrusive, analog geophysical transects will be performed within the Code 300 Area at 203-foot spacing (see Table 3-10 for basis). Anomaly densities will be calculated from the transect surveys to determine the locations of potential MEC releases. EM31-MK2 transect surveys will be performed across the Former Sanitary Landfill, the Dredge Pile, the Waste Burial Area, and Site 20/24 at 125-foot spacing, as described below.

Figure 3-11 shows the characterization approach for the Former Operational Areas MRS.



Legend

- Installation Boundary
- Operational Range Areas
- Former Operational Areas MRS
- Munitions Response Site Boundaries
- MRS Sub-Sites
- Code 300 Area
- Ineligible Area - Burning Ground
- Density Transects
- Mag and Dig Transects
- DGM Transects
- EM-31 Transects
- Recovered UXO Locations

Base Imagery: NJ 2007 Natural Color Imagery
Data Source: PTA Safety Office, Army GIS Layers (August 2011)

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

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Figure 3-11
Former Operational Areas MRS
PICA-006-R-01
Characterization Approach
Picatinny Arsenal
Morris County, New Jersey

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3.6.3.1 Former Sanitary Landfill, Dredge Pile and Waste Burial Area

MEC reportedly has been disposed of in the Former Sanitary Landfill. The dredge spoil piles removed from Green Pond Brook also have a potential to contain MEC. Projectiles have been discovered during utility trenching activities through the sanitary landfill area. Only a portion of the Former Sanitary Landfill is capped allowing unregulated access to potential MEC outside of the ICs and throughout the Dredge Pile. Similarly, the Burial Area is an unregulated disposal area. Projectiles were observed during a 1988 site walk and 40mm grenades were recovered during an IRP investigation. The extents of the Former Sanitary Landfill/Dredge Pile and Waste Burial Area are not well constrained. MEC is mixed with other disposal material in each of these areas. By delineating the extents of the disposal areas, the extent of MEC will also be defined. Initially, EM31-MK2 assessment surveys will be performed across each of the areas to evaluate the extents of exposed or buried disposal material. A 125-ft transect spacing was selected based on the size of the sites and the necessary resolution needed to delineate the disposal area boundaries and any micro-features or areas within the disposal areas that may be of interest for further investigation. Disposal area boundaries and micro-features within the disposal areas will be interpreted using anomaly density plots based on the measured EM31-MK2 data. EM31-MK2 transects surveys will be designed to ensure complete traversal across the burial features into ambient background anomaly densities. **Figure 3-12** presents the characterizations approach for this area.

3.6.3.2 Site 20/24

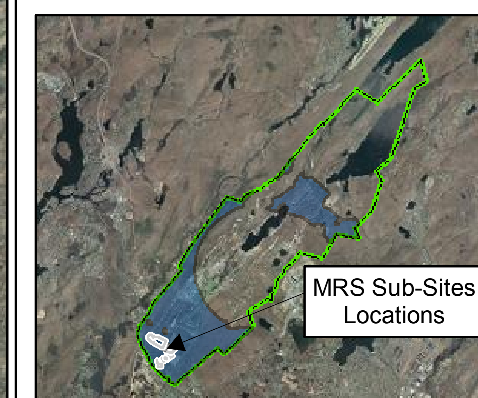
The Site 20/24 area is identified as being used for miscellaneous waste and debris disposal, munitions disposal, and former pyrotechnic testing activities. The extent of the former waste burial area is not well defined; MEC is mixed with other disposal material in this area. Only a small portion of Site 20/24 is capped allowing access to potential MEC throughout the site. EM31-MK2 transect surveys will be performed at a spacing of 125-feet, across Site 20/24 to delineate potential MEC burial sites. A 125-ft transect spacing was selected based on the size and characteristics of the former sanitary landfill, dredge pile, and waste burial area and the experience of the geophysics team. Additional grid surveys will be performed to delineate MEC burial sites if necessary. Test pitting will also be performed outside the soil caps to determine nature and extent of MEC where features indicative of MEC burial sites are detected along the DGM transects. **Figure 3-12** presents the characterizations approach for this area.

Sampling Design for sub-sites: Focused EM61-MK2 surveys will then be performed based on the results of the EM31-MK2 assessment surveys. A nominal transect spacing of 75 ft will be used to further evaluate the interior of the delineated disposal areas. Smaller anomalous features or areas detected during the EM31-MK2 surveys will be evaluated with a tighter EM61-MK2 transect spacing to traverse the area with three or more transects to fully delineate its extents. Additional grid surveys will be performed to delineate MEC burial sites if necessary. All anomalies will be selected based on background noise levels and predicted response values for a medium industry standard object (ISO) seed item as determined in the instrument verification strip (IVS). The EM61-MK2 anomaly detection results will guide the establishment of sample units or areas with similar anomaly characteristics and densities. The sample unit size and characteristics will be discussed with and approved by the project team. If the geophysical transect survey results indicate that the current site boundaries are not completely delineated, transects will be extended or added to bound the extents of each sub-site.

Anomalies will be selected in the sample units using a hypergeometric estimation process. This process is used to determine the necessary number of geophysical anomalies to be intrusively investigated. Intrusive investigation results can then be extrapolated within the sample unit to estimate the proportion of MEC to non-MEC within a specific confidence level. The confidence level for this project is 95%. The estimated number of anomalies to be selected for intrusive investigation based on the anomaly population size is presented in **Figure 3-13.** The results of the DGM surveys and intrusive investigations will delineate the Former Sanitary Landfill/Dredge Pile and Waste Burial Area and support determining MEC densities.

Legend

- Installation Boundary
- Operational Range Areas
- Former Operational Areas MRS
- MRS Sub-Sites
- Ineligible Area - Burning Ground
- DGM Transects



Base Imagery: NJ 2007 Natural Color Imagery
Data Source: 2008 SI Report, Army GIS Layers (August 2011)

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

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Feet

Figure 3-12
Former Sanitary Landfill, Drege Piles,
Waste Burial Area and Site 20/24
Characterization Approach
Picatinny Arsenal
Morris County, New Jersey

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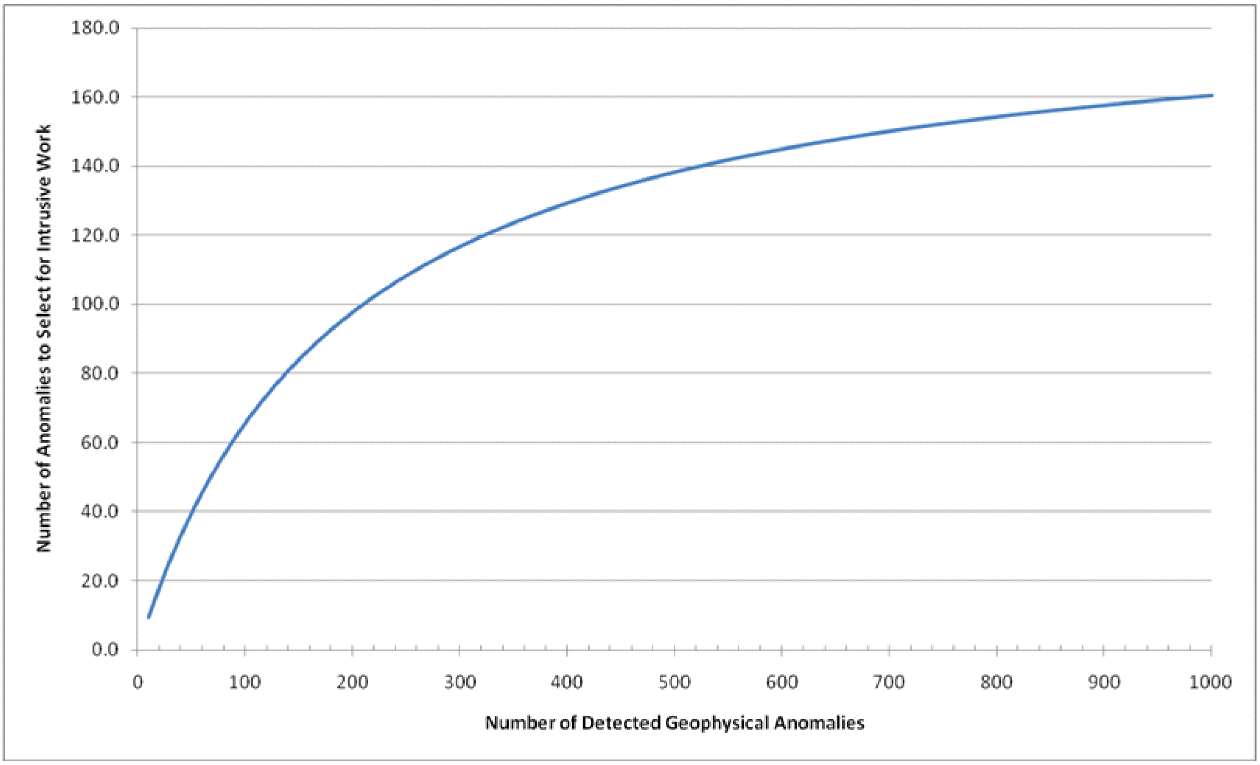


Figure 3-13 Selection of Anomalies for Intrusive Investigation Based on Population Size

3.7 LAKES MRS (PICA-008-R-01)

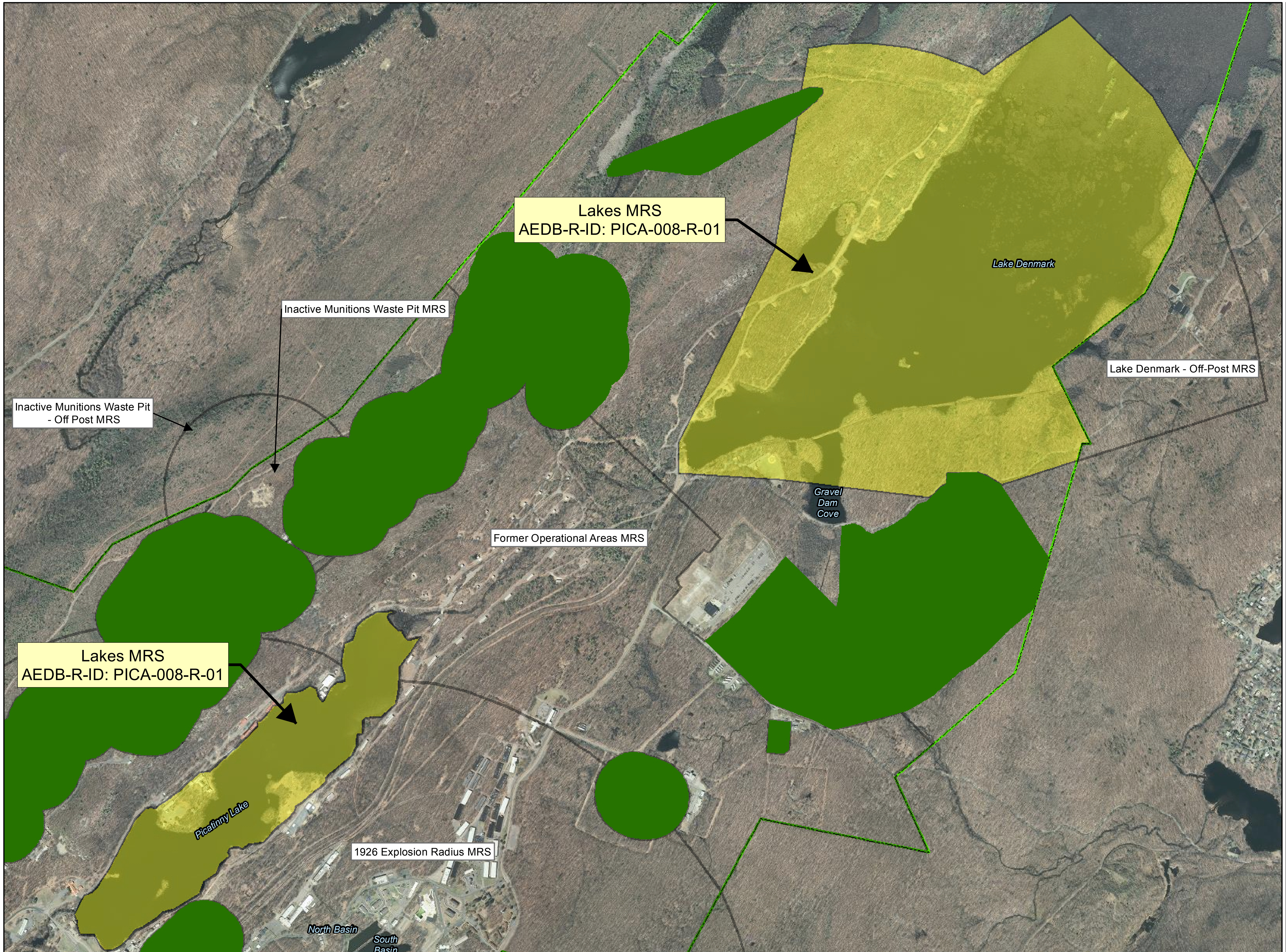
The Lakes MRS (PICA-008-R-01) consists of both Picatinny Lake and Lake Denmark and the shoreline area surrounding the lakes. Each lake has a different military-munitions-related history, which is discussed separately in the following subsections. **Figure 3-14** presents the location of the MRS.

3.7.1 Picatinny Lake Area

The Picatinny Lake Area covers 125 acres of the Lakes MRS. Picatinny Lake is an approximately 108-acre manmade lake that is centrally located on PTA. Approximately 17 acres of shoreline surrounding Picatinny Lake is included in the MRS. The majority of Picatinny Lake lies within the 1926 Explosion Radius MRS. **Figure 3-15** presents the location of the Picatinny Lake Portion of the MRS. The depth of the lake ranges from an average of 5 feet on the north end to an average depth of 12 feet toward the dam and outfall in the southwestern end of the lake (Blackhawk, 1995).

Two named islands are located within the lake: Flare Island, which is actually a man-made peninsula constructed of coal slag, and Picnic Island. According to the HRR, Flare Island was used for testing flares and pyrotechnics. There is no historical evidence of former munitions testing on Picnic Island. Numerous production buildings are currently located along the eastern and western edges of Picatinny Lake. The HRR indicated that several explosive-related accidents occurred in the back room of Building 800, located along the southwestern portion of the lake. The explosions released MEC into the surrounding area and lake. During IRP investigations, MEC was encountered during test pitting near several of the former production buildings.

Until 1931, a 3-inch projectile Barbette gun firing range was located centrally to the lake on the eastern shore with a sand butt located across the lake to the west. The firing range was most likely used for munitions testing and would have been located in a single fixed location. Between 1910 and 1960 smokeless powder and explosives were stored underwater in the lake to protect them from lightning, spontaneous ignition, and heat.



WESTON SOLUTIONS

Legend

- Installation Boundary
- Operational Range Areas
- Munitions Response Site Boundaries
- Lakes MRS

Base Imagery: NJ 2007 Natural Color Imagery
Data Sources: 2008 SI Report
Army GIS Layers (August 2011)

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

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Figure 3-14
Lakes MRS
PICA-008-R-01
Picatinny Arsenal
Morris County, New Jersey

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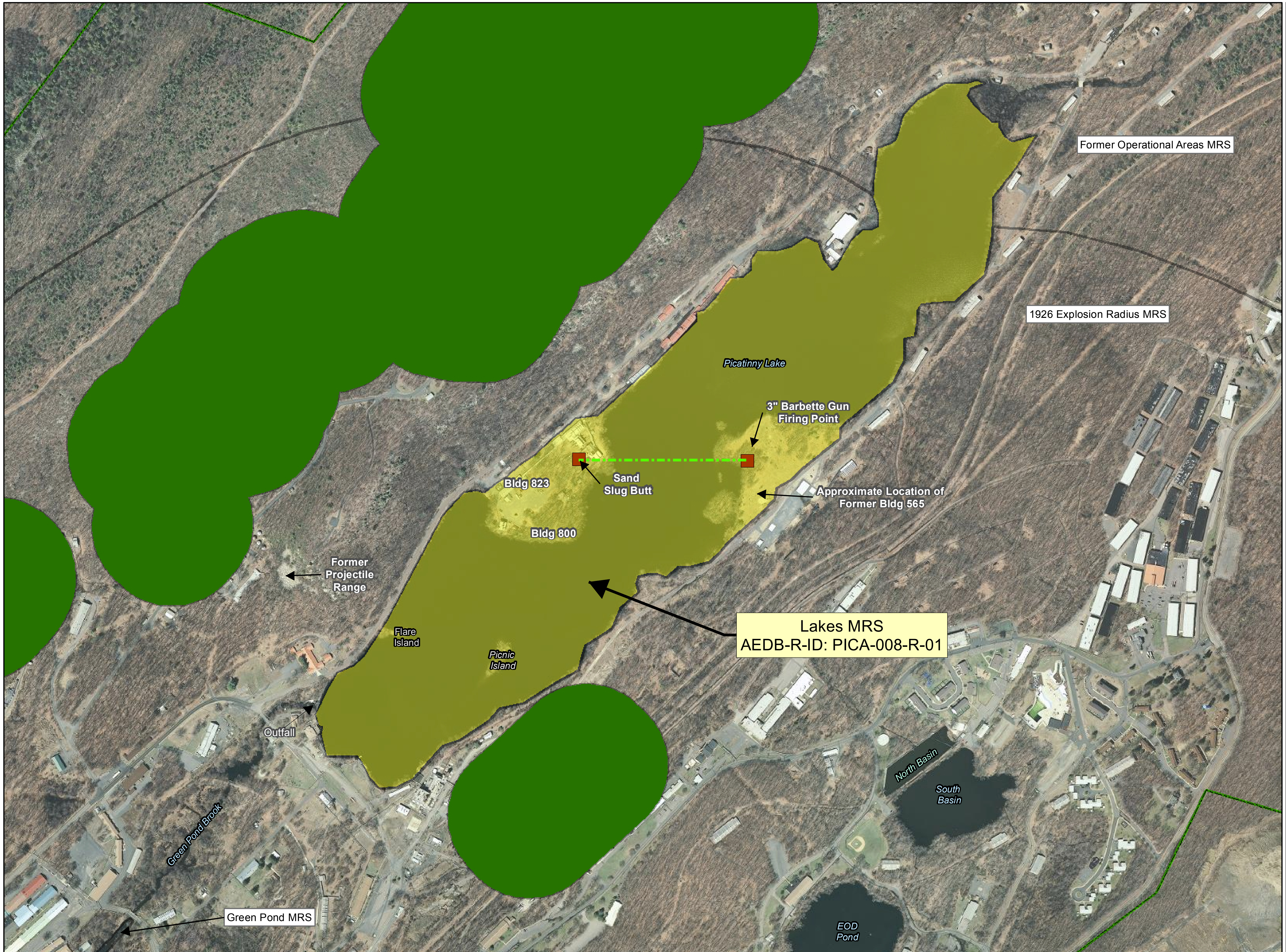

Legend

- Installation Boundary
- Operational Range Areas
- Munitions Response Site Boundaries
- Lakes MRS
- Firing Point and Slug Butt
- 3-inch Barbette Gun Range

Base Imagery: NJ 2007 Natural Color Imagery
Data Sources: 2008 SI Report
Army GIS Layers (August 2011)

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

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Feet

Figure 3-15
Lakes MRS - Picatinny Lake Portion
PICA-008-R-01
Picatinny Arsenal
Morris County, New Jersey

Currently, the lake is being used as a nonpotable water source for fire fighting and production purposes, fishing, and recreational boating. LUCs are in place that ban swimming/wading in the water. Fish consumption advisories are in effect due to elevated contaminant levels in fish tissue.

3.7.1.1 Previous Investigations

3.7.1.1.1 Site Inspection Results

No field activities were conducted for the Picatinny Lake Area during the SI. The SI Report recommends that the MRS be further investigated for MEC based on the information presented in the HRR. The SI Report recommends NFA for MC. MC is being addressed under the IRP (PICA-057) and an FS was submitted in October 2009.

3.7.1.1.2 Bathymetric and Magnetic Surveys

Bathymetric and magnetic surveys of Picatinny Lake were conducted in 1995. Bathymetric results provided lake depths (already stated above) as shown in **Figure 3-16.** Results of the magnetic surveys, presented in **Figure 3-17,** identified approximately 125 underwater magnetic anomalies. The majority of the anomalies were located around the islands and along the shorelines (Blackhawk, 1995).

3.7.1.1.3 USACE Analog Geophysical Survey

In 2010, the lakes were drawn down in order to perform construction on the dam. USACE conducted a limited site walk around the lakes while the lakes were drawn down. Several MD items were recovered on Flare Island at a single location.

3.7.1.1.4 IRP Investigations

A majority of the buildings and several locations along the shores of Picatinny Lake have been investigated under the IRP. During test pit installation, rocket-motor-housing sleeves (potential of explosive residue) and fins were found near former Building 565. BD fuzes and other MEC were reportedly found near Building 823 (Malcolm Pirnie, 2006).

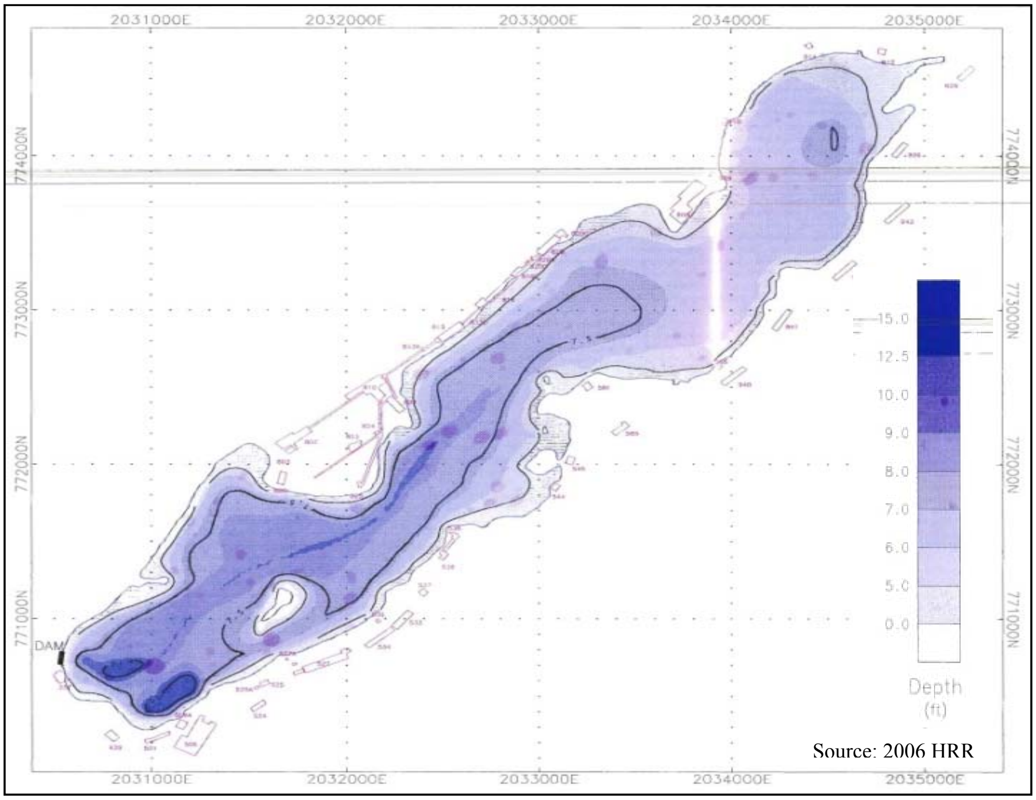


Figure 3-16 Picatinny Lake Bathymetric Results

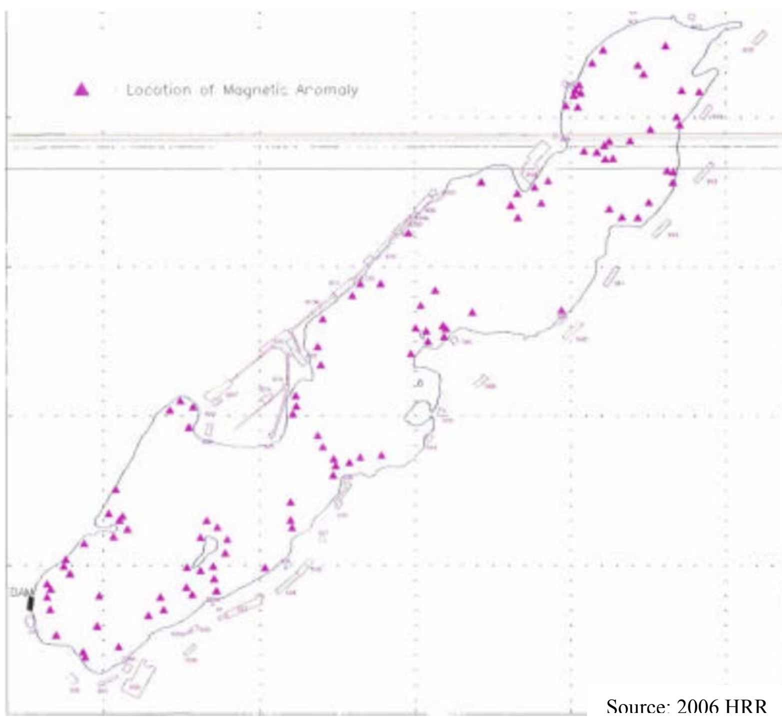


Figure 3-17 Results from 1995 Picatinny Lake Magnetic Survey

3.7.1.2 Conceptual Site Model

Table 3-11 presents the CSM for Picatinny Lake.

Table 3-11 Lakes MRS (PICA-008-R-01) – Picatinny Lake Area CSM

Profile Type	Site Characterization
Location Profile	**Area and Layout** ▪ Covers 125 acres, including the land and water body. ▪ The open water accounts for 108 acres.
	Structures ▪ Numerous munitions production, testing, and storage buildings are located in the 500 and 800 series around Picatinny Lake, Several of the 800-series buildings are within the MRS on the western edge of the lake, including Building 823.
	Boundaries ▪ Scrub/shrub wetlands and Green Pond Brook to the north. ▪ An earthen dam/spillway, R&D and production buildings, and power plant to the south. ▪ R&D and production buildings (500 and 900 series) are to the east. ▪ R&D and production buildings and Green Pond Mountain to the west.
	Utilities ▪ Utilities may be present around the 500 and 800 series buildings. ▪ There are no known utilities in Picatinny Lake; however, magnetic surveys detected linear features that could represent utilities.
	Security ▪ Access is generally unrestricted once on the PTA. ▪ There are some limited access areas along the shoreline (fenced).
Land Use and Exposure Profile	**Current Land Use** ▪ Picatinny Lake is used as a source for nonpotable water for production and fire-fighting purposes. ▪ The lake is used for recreational boating and fishing. No swimming is allowed and fish consumption advisories are in effect. ▪ R&D and production buildings surround the lake.
	Potential Future Land Use ▪ Upgrades to the dam and spillway are planned for Fiscal Year 2011. There no current plans to change the land use.
	Human Receptors ▪ Human receptors are PTA personnel, residents, contractors, visitors, and recreationists.
Ecological Profile	**Degree of Disturbance** ▪ For the lake, the degree of disturbance is low; however, dam upgrades will require lowering the lake 3 ft. ▪ A moderate degree of disturbance exists in land areas surrounding the lake.
	Wetlands ▪ Picatinny Lake is designated by NJDEP and USFWS as an open-water wetland.
	Ecological Habitat and Receptors ▪ Open-water wetland – The northern end of Picatinny Lake is dominated by scrub/shrub wetland with smooth alder (*Alnus serrulata)* and swamp azalea *(Rhodendron viscosum).* Ecological receptors known to be present at this MRS include fish, birds, including waterfowl, wading birds, piscivorous birds, songbirds, and raptors, reptiles, amphibians, and mammals. ▪ General information on ecological habitat and receptors at PTA is presented in **Table 1-1** and Section 8.2.

Table 3-11 Lakes MRS (PICA-008-R-01) – Picatinny Lake Area CSM (Continued)

Profile Type	Site Characterization
Cultural Resource Profile	**Cultural, Archaeological, and Historical Resources** ▪ A total of 108 potential and/or known historical archaeological sites and 27 potential and/or known prehistoric sites have been identified across the installation (Picatinny Environmental Affairs, 2011; and Chugach Industries, 2008). ▪ The north end of Picatinny Lake contains a culturally sensitive area (see **Appendix J**).
Munitions/Release Profile	**Munitions Types** ▪ A large portion of the lake lies within the 1926 explosion impact radius, therefore, munitions associated with this MRS may include 25-pound Navy Mark I bombs; Mark II, III, IV, and V bombs, aerial bombs; 14-inch Class “B;” 14-inch AP rounds; and 8-inch and 5-inch projectiles. ▪ 3-inch projectiles from the Barbette Gun Range. ▪ Munitions may also include mortars, medium to large ammunition, experimental munitions, pyrotechnics, and bulk primary and secondary explosives.
	Release Mechanisms ▪ Explosion-related accidents at nearby buildings around the lake. ▪ The 1926 explosion. ▪ Munitions firing and testing. ▪ Discarded munitions associated with firing point and material from the 1926 explosion. ▪ The lake has been used for underwater storage of smokeless powder and explosives.
	MEC Density ▪ No SI field investigations were performed on the lake, thus the density of MEC is unknown; however, based on HRR information, it is likely that MEC is present in the lake from the 1926 explosion, underwater storage, and explosion-related accidents from nearby buildings. A marine magnetometer survey of the lake revealed several metallic anomalies around Flare Island and along the shorelines.
	Munitions Debris ▪ No visual surveys were performed during the SI; however, based on HRR information, MD is likely present in the lake. ▪ MD was recovered from Flare Island during a 2010 USACE site walk.
	Associated Munitions Constituents ▪ No MC sampling was performed during the SI, and the lake is covered under the IRP for MC.
	Transport Mechanisms/Migration Routes The primary transport mechanisms identified for this MRS include the following: ▪ **Soil Disturbance**: The degree of disturbance in the land areas near the lake and shoreline areas is moderate. MC may be released as respirable particulates in air during future construction (e.g., dam upgrades) or otherwise intrusive activities. ▪ **Erosion**: Soil erosion may uncover MEC. For the land portion of this MRS, MC adsorbed to soil particles may migrate in surface water runoff from the surface soil to the lake. Migration of dissolved MC is of lesser concern, as the MC has low water solubilities. ▪ **Frost Heave**: Periodic, alternating freezing and thawing during the winter may uplift MEC from the soil subsurface to the soil surface. ▪ **Recharge and Discharge**: Groundwater may discharge to water bodies, and surface water may recharge groundwater depending on the time of year and rainfall/snowmelt amounts. However, this is a minor migration pathway, as the MC is relatively immobile and have low water solubilities. ▪ **Sedimentation**: MEC and debris that may be present in the lake may continue to be buried by sedimentation.

Table 3-11 Lakes MRS (PICA-008-R-01) – Picatinny Lake Area CSM (Continued)

Profile Type	Site Characterization
	Pathway Analysis ▪ **MEC** – Exposure pathways are considered complete, because the presence of MEC is assumed. Complete exposure pathways exist for PTA personnel, residents, contractors/visitors, and recreationists who may contact, via handling or treading underfoot, MEC in surface soil or surficial sediments. Residents and personnel who work in the buildings close to the lake may have access to the shorelines. Swimming is banned, but it is possible that recreationists and children could still try to swim in the lake and may contact MEC in the sediments. Potentially complete exposure pathways also exist for contractors who may need to access underground utilities in the subsurface soil and sediment or who may perform intrusive work during future construction or otherwise intrusive activities. Potentially complete exposure pathways exist from MEC in surface soil and surface sediment to terrestrial and aquatic vegetation and wildlife, and from MEC in subsurface soil to biota that burrow or nest in the subsurface soil. ▪ **MC** - While potentially complete exposure pathways for MC may exist, MC is addressed under the IRP.

3.7.1.3 Characterization Approach for the Lakes MRS - Picatinny Lake

Problem Statement: A large majority of Picatinny Lake lies within the 1926 explosion impact radius. MEC associated with the 1926 explosion and munitions testing and nearby production buildings may have contributed to munitions being present in the lake and along the shorelines.

Magnetic surveys of Picatinny Lake have identified 125 underwater anomalies. The anomalies were never investigated to determine the nature and extent of MEC, if present, in the lake.

A 3-inch projectile Barbette gun firing point and associated slug butt/impact area is also present within the Picatinny Lake Area. Burial of unused munitions was sometimes practiced at firing points during testing and training activities. Buried MEC may be present at the firing point. The presence and density of potential MEC at the slug butt/impact area are unknown.

Decisions Needed: The primary decisions being addressed at the Picatinny Lake Area include:

- Determine whether MEC is present on land portions of the Picatinny Lake Area and the source (e.g., 1926 explosion, building explosion, and/or other sources). If MEC is present on the land portions, delineate the extent of MEC.
- Evaluate whether underwater geophysical anomalies are associated with MEC.
- Detect and investigate the potential burial features associated with discarded munitions disposal at the 3-inch projectile Barbette gun firing point.
- Determine whether a MEC release is present at the former 3-inch projectile Barbette gun slug butt/impact area.

Inputs to the Decisions: Several inputs will be acquired to support the decisions:

- Collect underwater DGM transects to fill data gaps from the previous magnetic surveys performed at Picatinny Lake.
- Evaluate existing magnetic survey data with the underwater DGM transect data to identify anomaly trends and distribution.
- Select underwater and near-shore anomalies across Picatinny Lake to evaluate the nature and distribution of MEC.
- Use a mag and dig transect approach along the shoreline of the lake to detect MEC releases associated with the 1926 explosion, building explosions, and the 3-inch projectile Barbette gun slug butt/impact areas.

Perform DGM surveys at the firing point location as necessary to detect burial features and conduct intrusive investigation.

Intrusive results for MEC, MD, and non-MD will be evaluated in the project GIS.

Study Boundaries: This MRS covers approximately 125 acres, with the open water accounting for 108 acres. An earthen dam bound the lake to the south, and R&D and production buildings to the east and west. Wetlands exist on the north end of the lake. Approximately 17 acres of land surrounding the lake are within the MRS and include the former firing point for the 3-inch projectile Barbette gun and the slug butt. The extent of potential MEC will be delineated using DGM and mag and dig surveys.

Decision Rule: The results of the RI at Picatinny Lake will be used as follows:

- If MEC is detected along the shoreline and in the water of Picatinny Lake, then assess the data to determine the release mechanisms for MEC.
- If MEC burial areas are present at the firing point, then determine the nature and extent of MEC.

Tolerable Limits on Decision Errors: The null hypothesis (H_o) is that a MEC release along the shoreline and within Picatinny Lake (anomalies detected in the lake will be selected based on anomaly distribution and anomaly trends to effectively characterize the area) does not exist. The alternative hypothesis is that MEC releases along the shoreline and within Picatinny Lake do exist.

The H_o for the 3-inch projectile Barbette gun firing point is that a MEC burial area (large anomalous features detected at the 3-inch projectile Barbette gun firing point will trigger intrusive investigations) is not present at the firing point. The alternative hypothesis is that a MEC burial area exists at the firing point.

A Type I decision error is concluding that a MEC release is not present along the shoreline and within Picatinny Lake when it is. A Type II decision error is concluding that a MEC release is present along the shoreline and within Picatinny Lake when it is not. The consequences of a Type I decision error could include increased risks to receptors. The consequences of a Type II decision error could include unnecessarily incurred project costs associated with additional investigation.

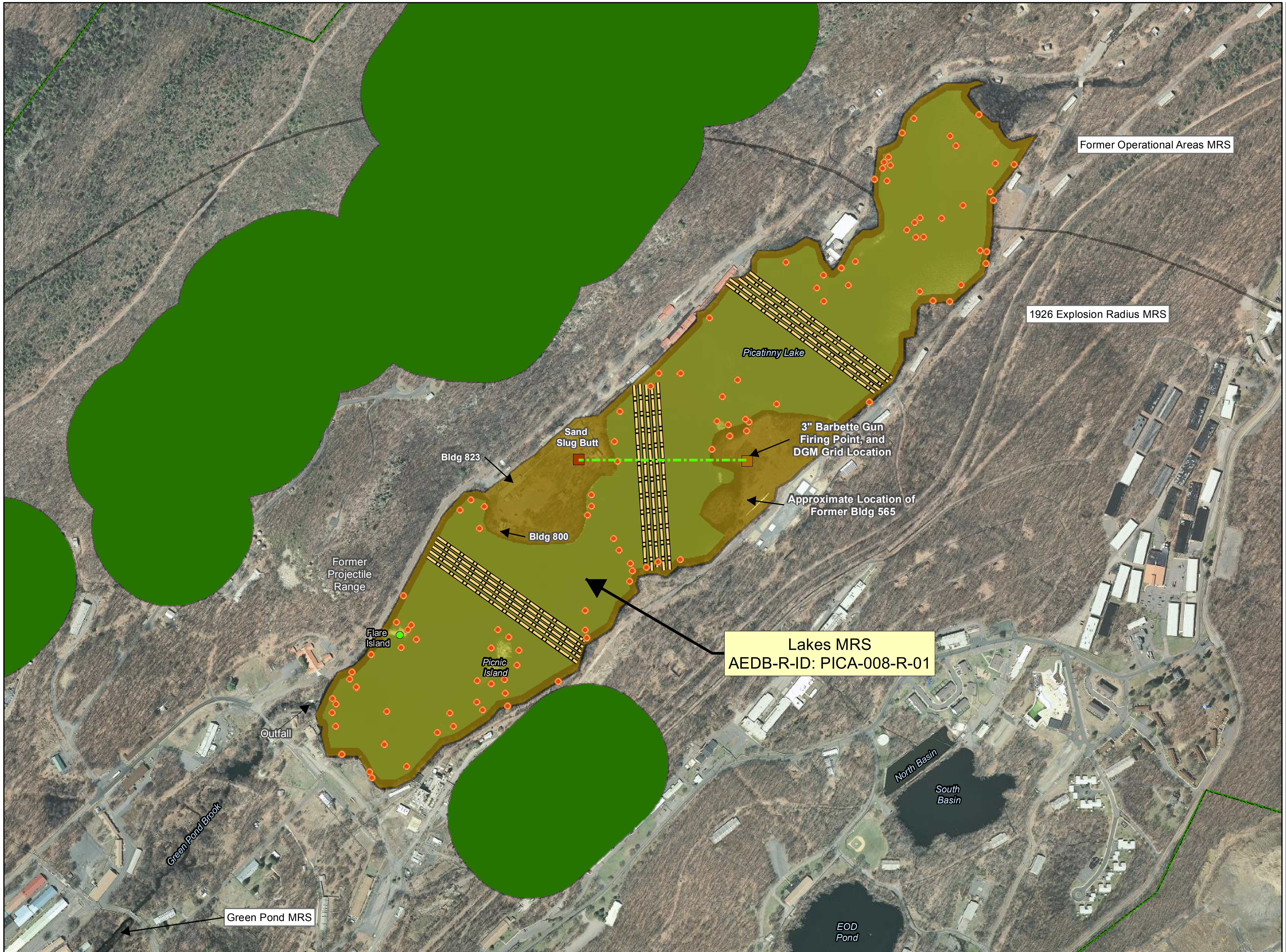
A Type I decision error for the 3-inch projectile Barbette gun firing point is concluding that a MEC burial is not present, when it is. A Type II decision error is concluding that a MEC burial area is present, when it is not. The consequences of a Type I decision error could include increased risks to receptors. The consequences of a Type II decision error could include unnecessarily incurred project costs associated with additional investigation.

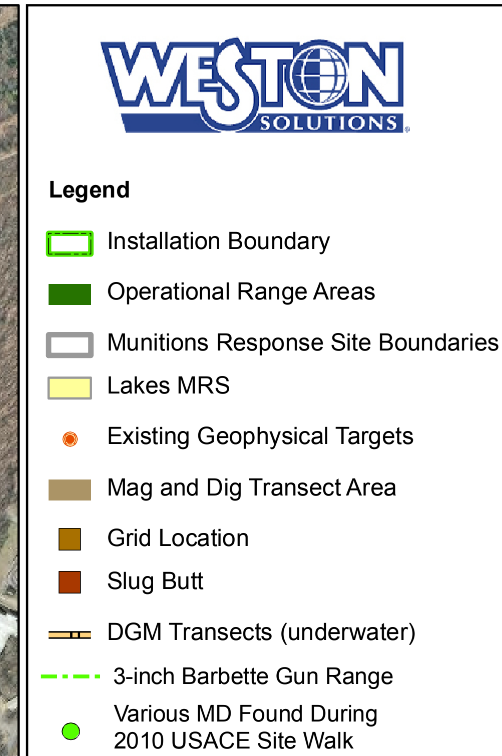
Sampling Design: Underwater DGM transects will be performed to fill data gaps identified in the existing magnetic geophysical data collected in the lake. A total of 3 miles or 1 acre of transects will be performed across the lake. The data will be analyzed cooperatively with the existing magnetic survey data to develop a composite dig list. Based on current anomaly trends and locations, it is estimated that approximately 25 anomaly locations will be selected for reacquisition and investigation in the lake and along the lake shoreline. Underwater intrusive investigations will be distributed across the lake to evaluate the nature of the anomalous sources. Targets will be investigated in anomaly clusters or aerially extensive features so the results can be interpolated to characterize the location. Discrete standalone anomalies not associated with the anomaly clusters will also be evaluated for MEC. Approximately 20% of the anomalies previously detected in the existing magnetic DGM data will be reacquired and investigated. Select anomalies detected in the newly collected DGM data not in the existing anomaly list will be added to the dig list. The dig list will be complemented by the ability to investigate near shore anomalies during the land-based investigations. Prior to performing underwater intrusive investigations, DGM instrumentation will be used to refine target locations. Qualified divers will investigate the approximately 25 anomalies.

Land investigations will consist of performing 2.7 miles or 3.2 acres of mag and dig transect surveys along the shoreline of the lake, and across the 3-inch projectile Barbette gun firing point and slug butt/impact area locations. A 100-foot by 100-foot grid (or 0.25-acre area based on accessibility) will be placed at the firing point to detect potential burial features. An EM61-MK2 will be used to survey the grid. Data will be evaluated for large anomalous areas indicative of burial features. Such features, if detected, will be intrusively investigated. Range layout and firing point location information is provided in a 1922 range map presented in the HRR. The map denotes the firing point location for the 3-inch projectile Barbette gun range.

The 100-foot by 100-foot grid will be centered on the firing point based on the 1922 map and existing structures (cement pads). If a full 100-foot by 100-foot grid cannot be placed at the firing point due to obstructions, an area of 0.25 acre will be digitally mapped around the firing point location.

Figure 3-18 presents the characterization approach for Picatinny Lake.





Base Imagery: NJ 2007 Natural Color Imagery
Data Source: 2008 SI Report, 1995 Blackhawk Geophysical Report

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

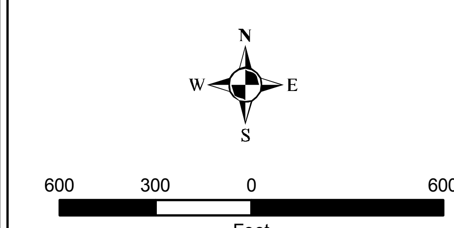


Figure 3-18
Lakes MRS - Picatinny Lake Portion
PICA-008-R-01
Characterization Approach
Picatinny Arsenal
Morris County, New Jersey

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3.7.2 Lake Denmark Area

The Lake Denmark Area covers approximately 616 acres of the Lakes MRS (PICA-008-R-01) located in the northern portion of the PTA. **Figure 3-19** presents the location of the Lake Denmark portion of the MRS. The MRS boundary coincides with the extent of overlapping safety fans from three former ranges and does not include the northeastern portion of the lake. The MRS consists of 263 acres of surface water area and 353 acres of land. The lake is manmade with an average depth of 6.5 feet and is used for recreational boating and fishing. Swimming in Lake Denmark is banned and fish consumption advisories are in effect.

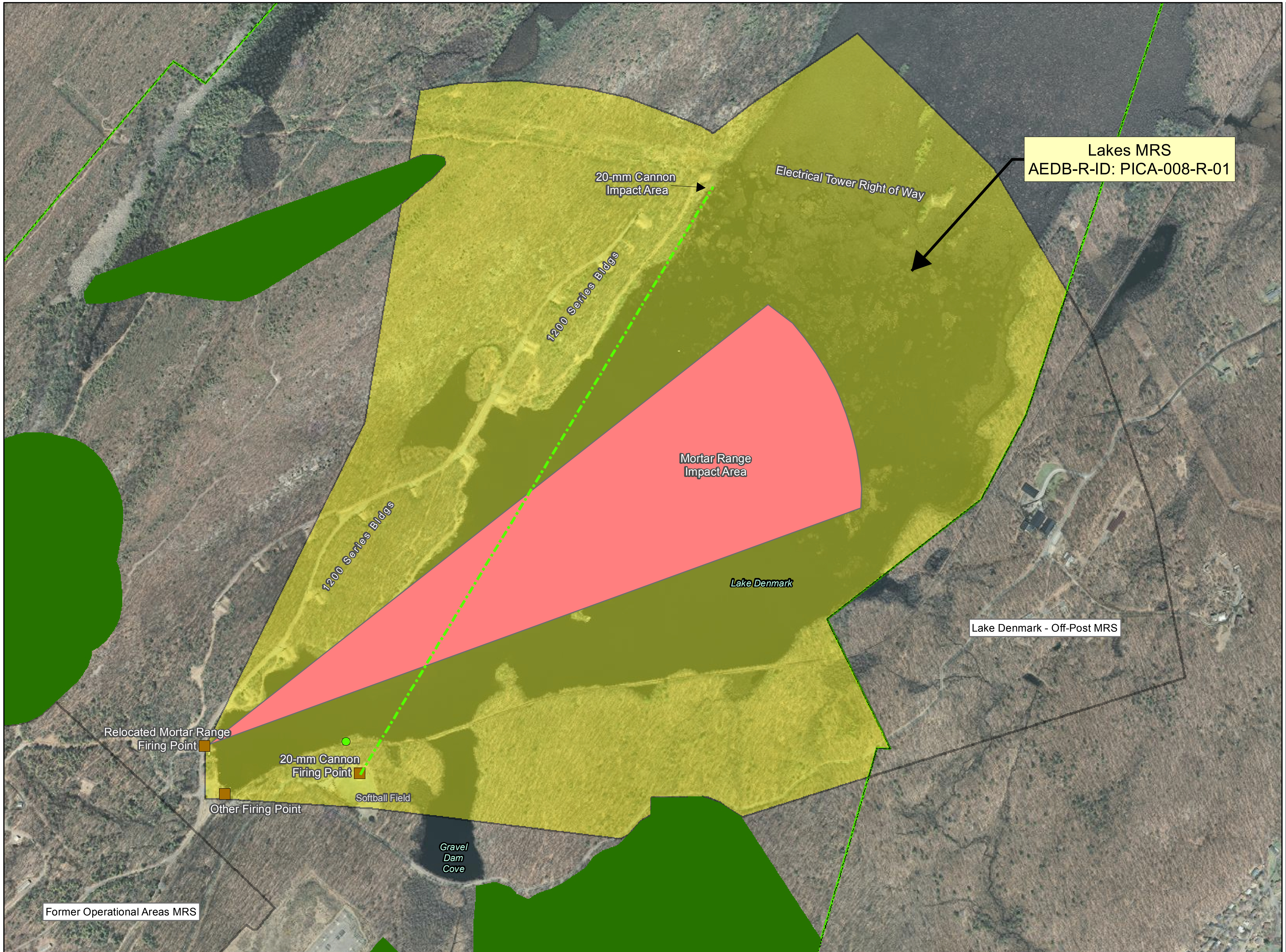
According to the HRR, Lake Denmark was used for experimental testing of 60mm, 81mm, and 4.2-inch mortars. The firing point for the mortar testing was located on the southern end of the lake with impact areas to the north and northwest end of the lake. According to the SI Report, a 60mm fuzed mortar was discovered near Building 1204 during an archaeological study. A 20mm cannon testing range was also identified in the HRR reports. The firing point was located toward the southern end of the lake near the baseball field. The impact area was located along the western shoreline on the north end of the lake. Range layout and firing point location information is provided in a 1974 range map presented in the HRR. The map denotes the firing point locations for both the abandoned firing point and the relocated firing point for the 60mm, 81mm, and 4.2 inch mortar ranges. A 1947 map presented in the HRR denotes the location of the 20mm range firing point.

In addition to the munitions testing, the HRR and SI indicated that the western shoreline might have been used for the disposal of 1926 explosion material and for munitions dumping.

3.7.2.1 Previous Investigations

3.7.2.1.1 Site Inspection Results

No field activities were conducted for the Lake Denmark Area during the SI. Further investigation for MEC was recommended in the SI Report based on the information presented in the HRR. No MC sampling of the water body was conducted as part of the SI, and a NFA recommendation was made because MC is addressed under the IRP (PICA-015). ICs (no swimming, fish consumption advisories) have been recommended for Lake Denmark.



WESTON SOLUTIONS

Legend

- Installation Boundary
- Operational Range Areas
- Munitions Response Site Boundaries
- Lakes MRS
- Former Mortar Range Impact Area (Lakes MRS)
- Grid Locations
- 60MM WP Mortar, WP recovered during USACG 2010 Site Walk

Base Imagery: NJ 2007 Natural Color Imagery
Data Sources: 2008 SI Report
Army GIS Layers (August 2011)

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N W E S

750 375 0 750
Feet

Figure 3-19
Lakes MRS - Lake Denmark Portion
PICA-008-R-01
Picatinny Arsenal
Morris County, New Jersey

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3.7.2.1.2 Geophysical Surveys and Media Sampling

According to the HRR, geophysical surveys were conducted during a previous RI of Lake Denmark that included media sampling. The geophysical survey identified several areas of potential metallic deposits. **Figure 3-20** shows the coverage and results from the geophysical survey.

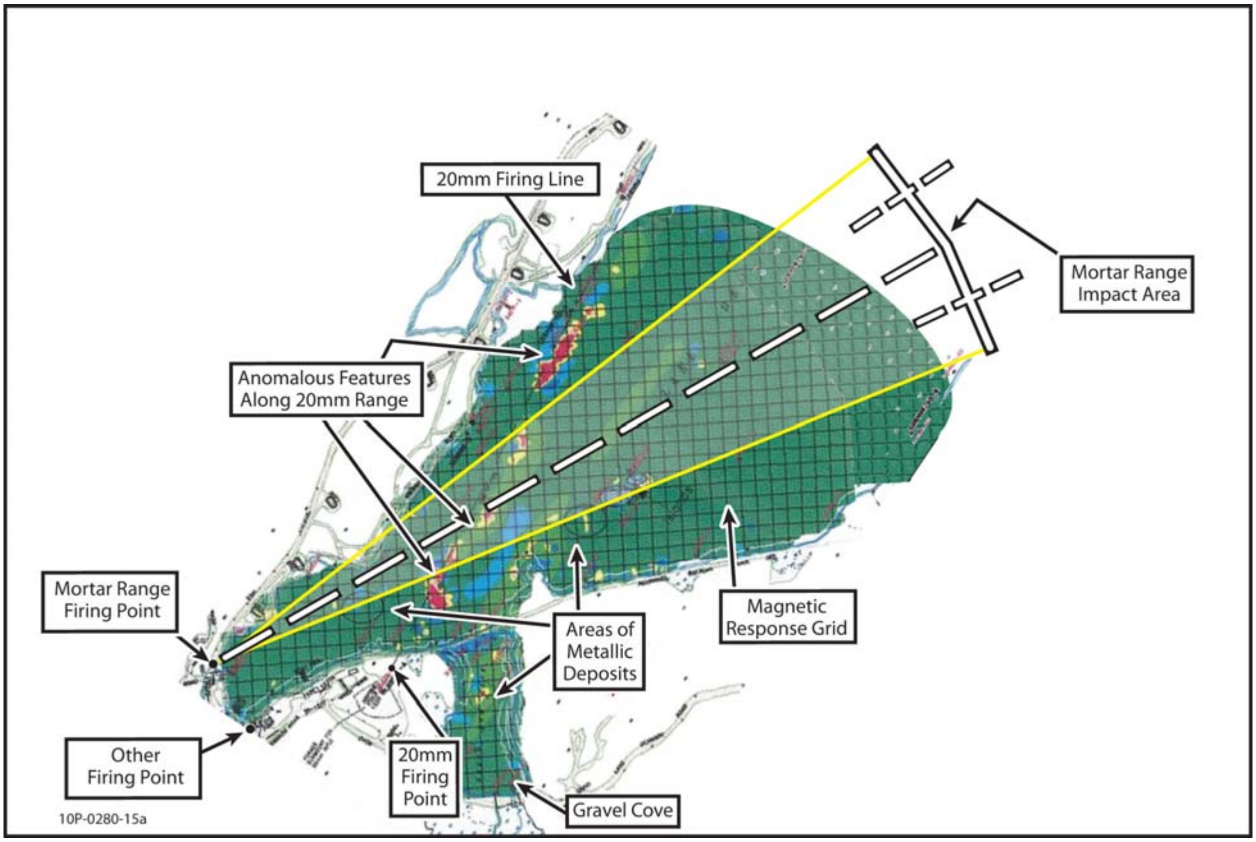

Figure 3-20 Geophysical Survey Results

3.7.2.1.3 USACE Analog Geophysical Survey

While the lakes were drawn down in 2010, a 60mm mortar, white phosphorus (WP) was identified on the southern shoreline of Lake Denmark (USACE, 2010).

Table 3-12 presents the CSM for the Lake Denmark Area MRS.

Table 3-12 Lakes MRS (PICA-008-R-01) – Lake Denmark Area CSM

Profile Type	Site Characterization
Location Profile	**Area and Layout** ▪ Covers 616 acres, including the land and water body. ▪ The open water accounts for 263 acres with average depth of 6.5 ft. ▪ MRS boundaries are based on SDZs for mortar ranges. ▪ Undeveloped wetlands on the northern end of the lake.
	Structures ▪ Explosive storage magazines in the 1200 series along the western shoreline. ▪ Three public service electric and gas utility towers.
	Boundaries ▪ Scrub/shrub wetlands and Burnt Meadow Brook to the north. ▪ Dam and 1200A and S-1200 Buildings and southern half of Gravel Dam Cove to the south. ▪ Undeveloped land to the east. ▪ Southern ridgeline of Copperas Mountain to the west.
	Utilities ▪ Public Service Electric and Gas utilities right-of-way crosses the north end of the MRS from west-northwest to east-southeast.
	Security ▪ Access is generally unrestricted once on the PTA.
Land Use and Exposure Profile	**Current Land Use** ▪ Former ranges at Lake Denmark and surrounding upland forested areas are designated as other than operational range. ▪ The lake is used for recreational boating and fishing. No swimming is allowed and fish consumption advisories are in effect.
	Current Human Receptors ▪ Human receptors include PTA personnel, residents, contractors, visitors, and recreationists.
	Potential Future Land Use ▪ There no current plans to change the land use.
	Potential Future Human Receptors ▪ Same as current human receptors.
Ecological Profile	**Degree of Disturbance** ▪ For the lake, the degree of disturbance is low; however, future dam upgrades will require lowering the lake 3 ft and expose additional shoreline. Recreational activities include fishing and waterfowl hunting. ▪ The degree of disturbance in the land areas surrounding the lake is low because of presence of wetland and sensitive habitats.
	Wetlands ▪ The northern end of Lake Denmark is dominated by scrub/shrub wetland with smooth alder and swamp azalea. ▪ Gravel Dam Cove and an unnamed pond are present to the south of the lake.

Table 3-12 Lakes MRS (PICA-008-R-01) – Lake Denmark Area CSM (Continued)

Profile Type	Site Characterization
Ecological Profile (Cont'd)	**Ecological Habitat and Receptors** ▪ The northern portion of Lake Denmark is dominated by scrub/shrub wetland with smooth alder (*Alnus serrulata)* and swamp azalea *(Rhodendron viscosum).* Undeveloped, forest surrounds the lake with a dominant canopy forest species belonging in the red oak subgroup. Ecological receptors known to be present at this MRS include fish, birds, including waterfowl, wading birds, piscivorous birds, songbirds, and raptors, reptiles, amphibians, and mammals. Four state-listed endangered aquatic plant species occur in Lake Denmark including featherfoil (*Hottonia inflate*), Robbin's pondweed (*Potamogeton robbinsii*), small bur (*Sparganium minimum*), and lesser bladderwort (*Utricularia minor).* ▪ Lake Denmark is located adjacent to Area J, which is a summer roosting area for the federally endangered Indiana bat. ▪ Gravel Dam Cove, located in the southern end of Lake Denmark is a unique pond habitat that supports breeding populations of the New England bluet, a rare damselfly. ▪ General information on ecological habitat and receptors at PTA is presented in **Table 1-1** and Section 8.2.
	Cultural, Archaeological, and Historical Resources ▪ A total of 108 potential and/or known historical archaeological sites and 27 potential and/or known prehistoric sites have been identified across the installation (Picatinny Environmental Affairs, 2011; and Chugach Industries, 2008). ▪ The Lake Denmark Area contains culturally sensitive areas and prehistoric sites (see **Appendix J**) (Chugach Industries, 2008; Picatinny Environmental Affairs, 2011).
Munitions/Release Profile	**Munitions Types:** ▪ Lake Denmark was used as a mortar range and a 20mm cannon range. Munitions may include 60mm, 81mm, and 4.2-inch inert mortars/projectiles; 20mm, primary, and secondary explosives; pyrotechnics; and experimental munitions.
	Release Mechanisms ▪ Munitions firing and testing. ▪ Discarded munitions associated with firing point and material from the 1926 explosion.
	Maximum Probable Penetration Depth ▪ The largest munition fired at Lake Denmark was the 4.2-inch mortar. The maximum depth for the mortar is 5.4 ft.
	MEC Density ▪ No SI field investigations were performed in the lake, thus the density of MEC is unknown; however, based on HRR information, it is likely that MEC, is at least present in the lake from the mortar testing and 20mm cannon range. ▪ A 60mm mortar, WP was recovered from the southern shoreline during a 2010 site walk.
	Munitions Debris: ▪ No visual surveys were performed, but based on HRR information, MD is likely present in the lake. Geophysical surveys of the lake revealed several metallic anomalies. The lake was reportedly used for dumping 1926 explosion debris and munitions along the western shoreline.
	Associated Munitions Constituents ▪ No MC sampling was performed during the SI, and the lake is covered under the IRP for MC.

Table 3-12 Lakes MRS (PICA-008-R-01) – Lake Denmark Area CSM (Continued)

Profile Type	Site Characterization
	Transport Mechanisms/Migration Routes The primary transport mechanisms identified for this MRS include the following: ▪ **Soil Disturbance**: The degree of disturbance in the land areas near the lake and shoreline areas is low because of the wetland and sensitive habitats. MC may be released as respirable particulates in air during future construction (e.g., dam upgrades) or otherwise intrusive activities. ▪ **Erosion**: Soil erosion may uncover MEC. For the land portion of this MRS, MC adsorbed to soil particles may migrate in surface water runoff from the surface soil to Lake Denmark and nearby wetlands. Migration of dissolved MC is of lesser concern, as the MC has low water solubilities. ▪ **Frost Heave**: Periodic, alternating freezing and thawing during the winter may uplift MEC from the soil subsurface to the soil surface. ▪ **Recharge and Discharge**: Groundwater may discharge to water bodies, and surface water may recharge groundwater depending on the time of year and rainfall/snowmelt amounts. However, this is a minor migration pathway, as the MC is relatively immobile and has low water solubilities. ▪ **Sedimentation**: MEC and debris that may be present in the lake may continue to be buried by sedimentation.
	Pathway Analysis ▪ **MEC** – Exposure pathways are considered potentially complete, because the presence and density of MEC are unknown. Potentially complete exposure pathways exist for PTA personnel, residents, contractors/visitors, and recreationists who may contact, via handling or treading underfoot, MEC in surface soil or surficial sediments. Residents and personnel who work in the buildings close to the lake may have access to the shorelines. Swimming is banned, but it is possible that recreationists and children could still try to swim in the lake and may contact MEC in the sediments. Potentially complete exposure pathways also exist for contractors who may need to access underground utilities in the subsurface soil and sediment or who may perform intrusive work during future construction or otherwise intrusive activities. Potentially complete exposure pathways exist from MEC in surface soil and surface sediment to terrestrial and aquatic vegetation and wildlife, and from MEC in subsurface soil to biota that burrow or nest in the subsurface soil. ▪ **MC** – For the land portion of this MRS, exposure pathways are considered potentially complete, because it has not been established that MC is present at concentrations of concern. Potentially complete exposure pathways exist for PTA personnel, PTA residents, contractors/visitors, and recreationists who may contact MC in surface soil. Potentially complete exposure pathways also exist for contractors who may contact MC in subsurface soil while accessing underground utilities or performing other intrusive work. Potential exposure routes include incidental ingestion, dermal contact, and inhalation of dust. Potentially complete exposure pathways exist for biota that may contact MC in surface soil and that may nest or burrow at the site and may contact MC in subsurface soil. While there may be potentially complete exposure pathways to MC in surface water and sediment, surface water at this MRS is addressed under the IRP. Potential groundwater exposure pathways are not addressed in this RI, as all groundwater within PTA is addressed under the IRP.

3.7.2.2 Characterization Approach - Lake Denmark Portion of the Lakes MRS

Problem Statement: Existing underwater magnetic geophysical data collected in Lake Denmark may not completely delineate the mortar range impact area. The extent and density of MEC in the impact area are unknown. No intrusive investigations were performed to evaluate the existing magnetic anomalies to determine whether they are MEC.

Similarly, MEC density and distribution at the 20mm cannon range impact area are not available. The presence of a MEC release in this area is unknown.

Three former firing points are located at the southern end of the lake. Burial of unused munitions was sometimes practiced during training. Buried MEC may be present at each of the firing points (See **Figure 3-19**).

Decisions Needed: The primary decisions being addressed at the Lake Denmark Area include:

- Determine whether a MEC release from the mortar and 20mm ranges is present on the land portions of the area based on VSP calculations.
- Delineate the Lake Denmark mortar range impact area with additional geophysical transect surveys.
- Determine whether MEC burial features are present at the firing points and determine the nature and extent of MEC at burial sites.

Inputs to the Decision: Several inputs will be acquired during the RI to support the decisions:

- Collect underwater DGM transects to fill data gaps from the previous magnetic surveys performed at Lake Denmark.
- Evaluate existing magnetic survey data with the underwater DGM transect data to identify anomaly trends and distribution.
- Select underwater and near-shore anomalies across Lake Denmark to evaluate the nature and distribution of MEC. Distribution of anomalies can be evaluated in existing and newly collected DGM data. Anomalous areas and trends will be selected for investigation. Investigations underwater and on the shoreline will support the nature of the anomalies.
- Perform DGM surveys and intrusive investigations at the firing point location as necessary to detect burial features.
- Conduct mag and dig transects based on VSP calculations on the land-based areas around Lake Denmark and along the shoreline of the lake. VSP input parameters were determined for the MRS based on munitions use. The northern side of Lake Denmark is part of the mortar range SDZ and also includes the 20mm cannon range impact area. The HFD for a 20mm projectile was used as the potential size of the MEC release on the northern side of the lake. The southern side of Lake Denmark is part of the mortar range SDZ. The smallest mortar used at the range was the 60mm. The HFD for a 60mm mortar was used as the potential size of the MEC release on the southern side of the lake. **Table 3-13** lists the VSP parameters and coverage requirements for the Lakes MRS – Lake Denmark Area.
- Evaluate intrusive results for MEC and MD in the project GIS

Table 3-13 VSP Parameters and Coverage Requirements for the Lakes MRS (PICA-008-R-01) – Lake Denmark Area

VSP Parameter	VSP Input and Coverage Requirements
Munitions Response Site	Lakes MRS (PICA-008-R-01) – Lake Denmark Area
Shape of Target Area	Circular
Target Area of Interest	61-ft radius for a 20mm projectile); 150 ft radius (for a 60mm mortar)
Anomaly Density Indicator	50 anomalies/acre (consistent with DGM surveys conducted during EE/CA and SI observations)
Transect Width	10 ft (team physical transect width)
Transect Spacing	120 ft (based on a 20mm projectile; 225 ft (based on a 60mm mortar)
Transect Distance	14 miles
Transect Area	17 acres (2.75% coverage of the MRS)

Study Boundaries: Approximately 263 acres of the Lake Denmark Area are surface water. The remaining 353 acres are land that falls within the SDZ for the mortar range and 20mm range. The lake is bound by a dam and Gravel Dam Cove to the south and wetlands to the north. Undeveloped land is to the east and the southern ridgeline of Copperas Mountain lies to the west.

The shoreline and northern end of the lake is marshy and heavily vegetated. Accessing these areas with digital instrumentation will be difficult. The nearby high power transmission lines are accessed by helicopter and may impact data quality.

Decision Rule: The results of the RI at the Lake Denmark Area will be used as follows:

- If, through intrusive investigation of the DGM, transects confirm the mortar range impact area in Lake Denmark, then evaluate the density and extent of MEC based on trends and anomaly distribution in the lake.
- If a MEC release is present on the northern and southern sides of Lake Denmark, then determine the nature and extent.
- If MEC burial areas are present at any firing point, then determine the nature and extent of the MEC.

Tolerable Limits on Decision Errors: The null hypothesis (H_o) is that a MEC release on the land portion and along the shoreline and within Lake Denmark (anomalies detected in the lake will be selected based on anomaly distribution and anomaly trends to effectively characterize the area) does not exist. The alternative hypothesis is that MEC releases on the land portion and along the shoreline and within Lake Denmark do exist.

The H_o for the firing points is that a MEC burial area (large anomalous features detected will trigger intrusive investigations) is not present at the firing point. The alternative hypothesis is that a MEC burial area at one or more of the firing points exists.

A Type I decision error is concluding that a MEC release is not present on the land portion, along the shoreline or within Lake Denmark when it is. A Type II decision error is concluding that a MEC release is present on the land portion, along the shoreline or within Lake Denmark when it is not. The consequences of a Type I decision error could include increased risks to receptors. The consequences of a Type II decision error could include unnecessarily incurred project costs associated with additional investigation.

A Type I decision error for the firing points is concluding that a MEC burial is not present when it is. A Type II decision error is concluding that a MEC burial area is present when it is not. The consequences of a Type I decision error could include increased risks to receptors. The consequences of a Type II decision error could include unnecessarily incurred project costs associated with additional investigation.

Sampling Design: Underwater DGM transects will be performed to fill in data gaps identified in the existing magnetic geophysical data collected in the lake. A total of 5 miles or 2 acres of transects will be performed across the northern end of the lake. The data will be analyzed cooperatively with the existing magnetic survey data to develop a composite dig list. Based on current anomaly trends and locations, it is estimated that approximately five anomaly locations will be selected for reacquisition and investigation in the lake and along the lake shoreline. Qualified divers will investigate at the five locations.

Land investigations will consist of performing 14 miles/17 acres of mag and dig transect surveys. A 100-foot by 100-foot grid (or 0.25-acre area based on accessibility) will be placed at each of the three firing points to detect potential burial features. An EM61-MK2 will be used to survey each grid. Data will be evaluated for large anomalous areas indicative of burial features. Such features, if detected, will be intrusively investigated.

The 100-ft by 100-ft grid size was selected based on the terrain and cultural development at the locations of the firing points. The mortar range firing points are located on the edge of Lake Denmark. Directly to the west is the 25th Avenue roadway and exposed bedrock. The 20mm range firing point is located near the baseball field. To the south of the firing point is a fence, backstop, and paved parking area near the baseball diamond. To the north of the firing point is Lake Denmark.

The grids at the mortar ranges firing points will be centered on each firing point based on the 1974 map. Terrain and development will dictate final grid placement. DGM will not be performed over exposed bedrock because it is unlikely burial would have taken place in those locations.

The grid location for the 20mm range firing point will be centered on the firing point based on the 1947 map. The developed areas on and near the baseball field will obstruct DGM effectiveness and accessibility. The grid will extend toward the lake as far as possible.

If a full 100-foot by 100-foot grid cannot be placed at the firing points because of obstructions, an area of 0.25 acre will be digitally mapped around the firing point locations. Final survey area placement will be based on field observations.

Figure 3-21 presents the characterization approach for the Lake Denmark portion of the MRS.

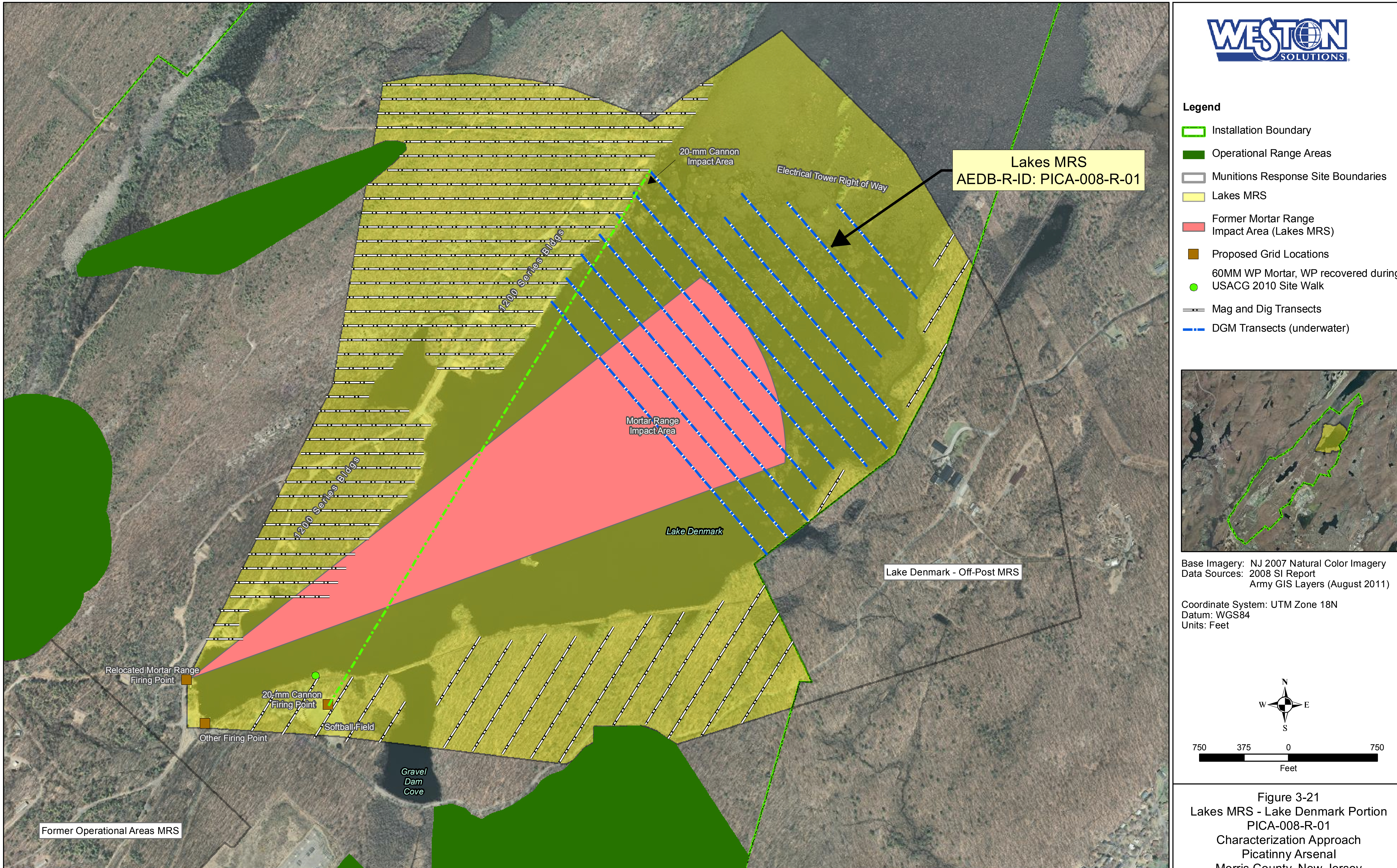

Figure 3-21
Lakes MRS - Lake Denmark Portion
PICA-008-R-01
Characterization Approach
Picatinny Arsenal
Morris County, New Jersey

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3.8 LAKE DENMARK – OFF-POST MRS (PICA-012-R-01)

The Lake Denmark – Off-Post MRS (PICA-012-R-01) consists of 113 acres and is a portion of the Lake Denmark mortar range SDZ. It was designated as a separate MRS from the Lakes MRS because it is located off-post and has a different CSM. The MRS is located on privately owned property and is primarily undeveloped with some light residential and industrial development. The majority of the MRS is occupied by the Radiation Technologies, Inc. (RTI) Superfund site. **Figure 3-22** presents the location of the MRS. Previous industrial activities at RTI included testing and development of rocket engines and propellants. Perchlorate, a contaminant of concern (COC) associated with RTI, has been found in groundwater. Sterigenics, a gamma facility that provides sterilization and ionization services for healthcare, food safety, and advance applications industries, currently lease the RTI facility.

3.8.1 Previous Investigations

3.8.1.1 Site Inspection Results

Approximately 4.75 acres of visual surveys were conducted as part of the SI on the MRS. No MEC or MD was observed during the surveys (see **Figure 3-22**). No MC field activities were conducted; however, due to the proximity of this MRS to the Lakes MRS (PICA-008-R-01), Lake Denmark Area, MC data were extrapolated from the on-post property results. Samples from the On-Post MRS indicated the presence of metals above LOCs. The SI recommended an RI for MEC and MC for the Lake Denmark – Off-Post MRS.

3.8.1.2 Remedial Investigations at the RTI Superfund Site

Based on a 2010 RI Report, there have been several investigations at the RTI Superfund Site since 1987. According to the report, there is a waste/drum disposal area located in the northern portion of the MRS. In 2008, 32 test pits were completed at this disposal area with no MEC observed. Numerous surface assessments and soil borings have been completed along the western portion of the MRS with no MEC observed.

3.8.2 Conceptual Site Model

Table 3-14 presents the CSM for the Lake Denmark – Off-Post MRS.

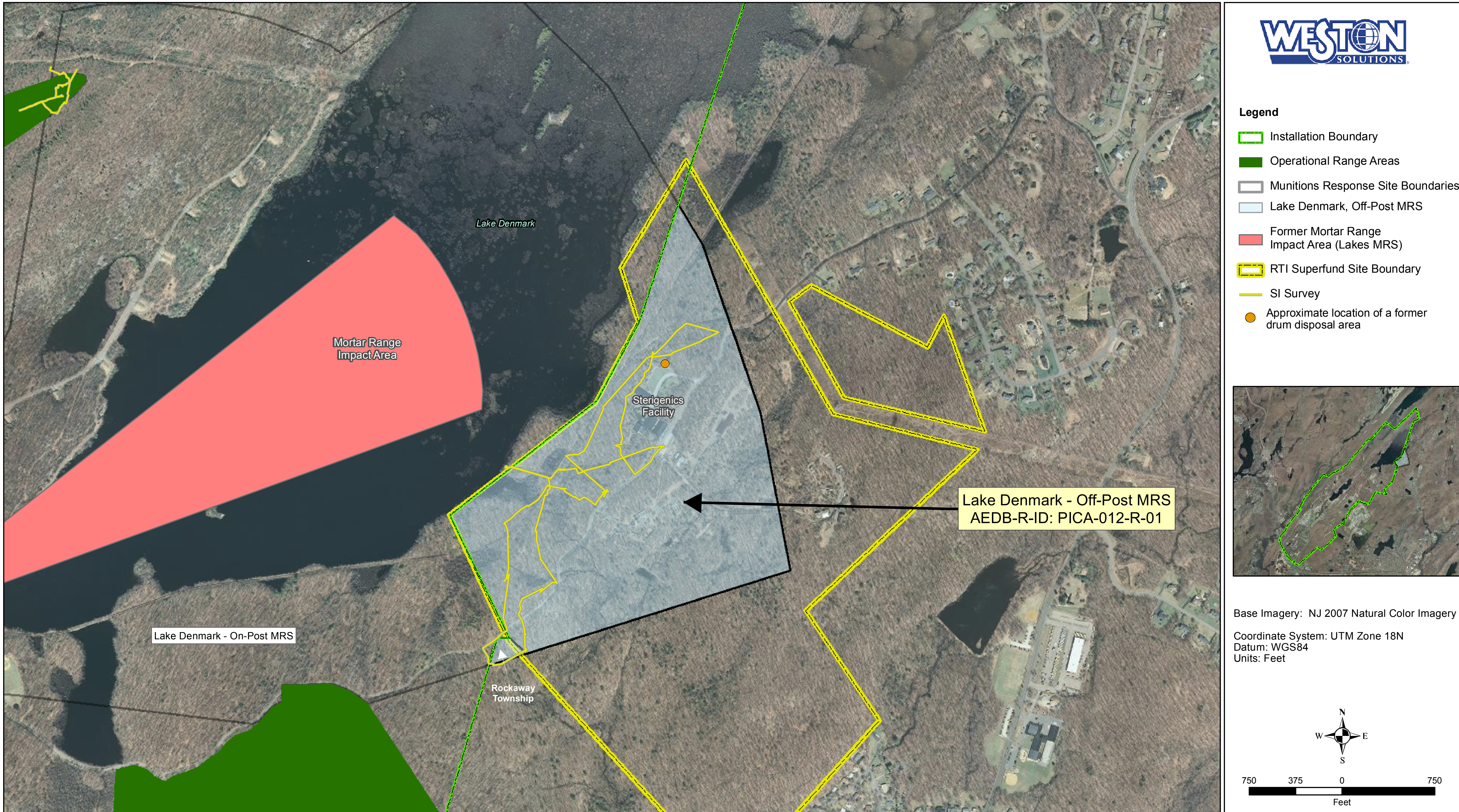


Figure 3-22
Lake Denmark - Off-Post MRS
PICA-012-R-01
Picatinny Arsenal
Morris County, New Jersey

File: Y:\Picatinny\MXD\workplan\Final\Fig_3-22_Lake_Denmark_offpost.mxd, 1/6/2012 11:32:43 AM, ricksc

Table 3-14 Lake Denmark – Off-Post MRS (PICA-012-R-01) CSM

Profile Type	Site Characterization
Location Profile	**Area and Layout** ▪ Covers 113 acres of off-post property that fall within the safety buffer of the mortar range fan on Lake Denmark. ▪ A majority of the MRS is occupied by the RTI Superfund site and vacant land.
	Structures ▪ Buildings associated with Sterigenics operations. ▪ Fence surrounding the Sterigenics operational areas. ▪ Pumphouse to supply water for Sterigenics operations.
	Boundaries ▪ Bordered by PTA and Lake Denmark to the north and west. ▪ No distinct boundaries to the south and east.
	Utilities ▪ Utilities likely include electricity, drinking water, sewer, and telecommunications. ▪ A 10-inch water main from the pumphouse on Lake Denmark to the Sterigenics operations area exists for fire-fighting purposes.
	Security ▪ Access to Sterigenics operational areas is restricted by a guarded gate. ▪ Access is generally unrestricted on the other areas of the MRS. ▪ Court approval for right-of-entry is required in advance.
Land Use and Exposure Profile	**Current Land Use** ▪ Sterigenics currently operates on a portion of the site. ▪ Much of the site is forested and located in the Highlands Preservation Area.
	Potential Future Land Use ▪ Same as the current use.
	Human Receptors ▪ Human receptors include Sterigenics workers, utility workers, contractors, and visitors. ▪ Recreationists including hunters and hikers.
Ecological Profile	**Degree of Disturbance** ▪ A portion of the site is developed and intrusive investigation activities are ongoing at the RTI Superfund site; thus, the degree of disturbance is moderate. ▪ The portions of the site that are forested have a low degree of disturbance.
	Wetlands ▪ The MRS is adjacent to Lake Denmark, and wetlands are present throughout the MRS and surrounding the RTI Superfund site. ▪ Scrub/shrub wetlands are located on the northern end of the MRS near the lake.
	Ecological Habitat and Receptors ▪ Wetlands and forested areas, dominated by members of the red oak subgroup comprise much of this MRS. Flora and fauna that inhabit the habitats in the Lake Denmark MRS also may be present in this MRS. Nesting sites of the federally endangered Indiana bat are believed to located either on or near the MRS. ▪ General information on ecological habitat and receptors at PTA is presented in **Table 1-1** and Section 8.2
Cultural Resource Profile	**Cultural, Archaeological, and Historical Resources** ▪ The Lake Denmark – Off-Post MRS contains culturally sensitive areas and prehistoric sites (see **Appendix J**). According to NJHPO, Mount Hope Mine Railroad is identified as a cultural resource.

Table 3-14 Lake Denmark – Off-Post MRS (PICA-012-R-01) CSM (Continued)

Profile Type	Site Characterization
Munitions/Release Profile	**Munitions Types** ▪ Munitions may include 60mm, 81mm, and 4.2-inch mortars from the former mortar range in Lake Denmark. ▪ Experimental munitions and pyrotechnics may be present; however, munitions other than the mortars (defined above) are associated with this MRSs source/release mechanism.
	Release Mechanisms ▪ Overshot from firing at Lake Denmark.
	Maximum Probable Penetration Depth ▪ The largest of the munitions, the 4.2-inch mortar, has a maximum probable penetration depth of 5.4 ft.
	MEC Density ▪ MEC was not observed during the SI visual survey; MEC density is unknown.
	Munitions Debris ▪ No MD was observed during the SI visual survey of the MRS.
	Associated Munitions Constituents ▪ No MC sampling was performed during the SI; however, numerous samples collected from the Lake Denmark – On-Post MRS indicated the presence of metals above LOCs. The results were extrapolated to this MRS. ▪ Note: Testing and development of rocket engines and propellants has occurred at the RTI Superfund site but not associated with the PTA MMRP RI.
	Transport Mechanisms/Migration Routes The primary transport mechanisms identified include the following: ▪ **Soil Disturbance**: The current degree of disturbance from continuing groundwater investigations at the RTI Superfund Site is moderate. MC may be released as respirable particulates in air during intrusive activities. The forested portions of the site have a low degree of disturbance. ▪ **Erosion**: Soil erosion may uncover MEC. MC adsorbed to soil particles may migrate in surface water runoff from surface soil to nearby surface water bodies. However, there are no surface water bodies located directly on this MRS. In addition, migration of dissolved MC is of lesser concern, as the MC has low water solubilities. ▪ **Frost Heave**: Periodic, alternating freezing and thawing during the winter may uplift MEC from the soil subsurface to the soil surface. ▪ **Infiltration**: The potential exists for MC to migrate from one environmental medium to another (surface to subsurface soil to groundwater) through the infiltration of percolating groundwater. However, this is a minor migration pathway, as the MC are relatively immobile and has low water solubilities. ▪ **Discharge**: Groundwater may discharge to surface water bodies. However, this is a minor migration pathway, as the MC is relatively immobile and has low water solubilities. In addition, there are no surface water bodies located directly on this MRS.

Table 3-14 Lake Denmark – Off-Post MRS (PICA-012-R-01) CSM (Continued)

Profile Type	Site Characterization
	Pathway Analysis ▪ **MEC –** Exposure pathways are considered potentially complete, because the presence and density of MEC is unknown. Potentially complete exposure pathways exist for contractors performing intrusive work at the Superfund site. Potentially complete exposure pathways exist for recreationists via handling and treading on surface soil. Potentially complete exposure pathways exist for biota that may contact MEC in surface soil and that may nest or burrow at the site and thereby contact MEC in subsurface soil. ▪ **MC –** Exposure pathways are considered potentially complete, because it has not been established that MC is present at concentrations of concern. Potentially complete exposure pathways exist for Sterigenics workers and contractors who may contact MC in surface and subsurface soil when performing intrusive investigations or accessing underground utilities. Potential exposure routes include incidental ingestion, dermal contact, and inhalation of dust. Potentially complete exposure pathways exist for biota that may contact MC in surface soil and that may nest or burrow at the site and may contact MC in subsurface soil. Exposure pathways are potentially complete through the food chain for both human and ecological receptors from consumption of biota that have bioaccumulated MC. While potential MC transport/migration routes from soil to groundwater were identified above, exposure to MC in groundwater is not expected, because the MC has low water solubilities.

3.8.3 Characterization Approach for the Lake Denmark – Off-Post MRS

Problem Statement: The Lake Denmark – Off-Post MRS is an SDZ of a former mortar range. No MEC or MD has been observed in the MRS; however, overshots from the mortar range may have impacted this MRS.

Decisions Needed: The primary decisions being addressed at this MRS include:

- Determine whether a MEC release is present within the MRS using VSP.

Inputs to the Decision: Several inputs will be acquired during the RI of the MRS to support the decisions. Initially, VSP input parameters were determined for the MRS based on the munitions used at the former Lake Denmark mortar range. The smallest mortar used at the range was a 60mm. The HFD of the 60mm mortar was used to determine the size of the potential MEC release. **Table 3-15** lists the VSP parameters and coverage requirements for the Lake Denmark – Off-Post MRS. Intrusive results for MEC, MD, and non-MD will be evaluated in the project GIS.

Table 3-15 VSP Parameters and Coverage Requirements for the Lake Denmark – Off-Post MRS (PICA-012-R-01)

VSP Parameter	VSP Input and Coverage Requirements
Munitions Response Site	Lake Denmark – Off-Post MRS (PICA-012-R-01)
Shape of Target Area	Circular
Target Radius	150-ft radius
Anomaly Density Indicator	50 anomalies/acre
Transect Width	10 ft
Transect Spacing	225 ft
Transect Distance	4 miles
Transect Area	4.9 acres

Study Boundaries: the RTI Superfund Site and vacant land occupy the majority of the 113-acre MRS. The MRS is bordered by PTA and Lake Denmark to the north and west. There are no distinct boundaries to the south and east; therefore, they will be defined by the extent of MEC associated with the former mortar range in Lake Denmark. The extent of potential MEC will be delineated using DGM.

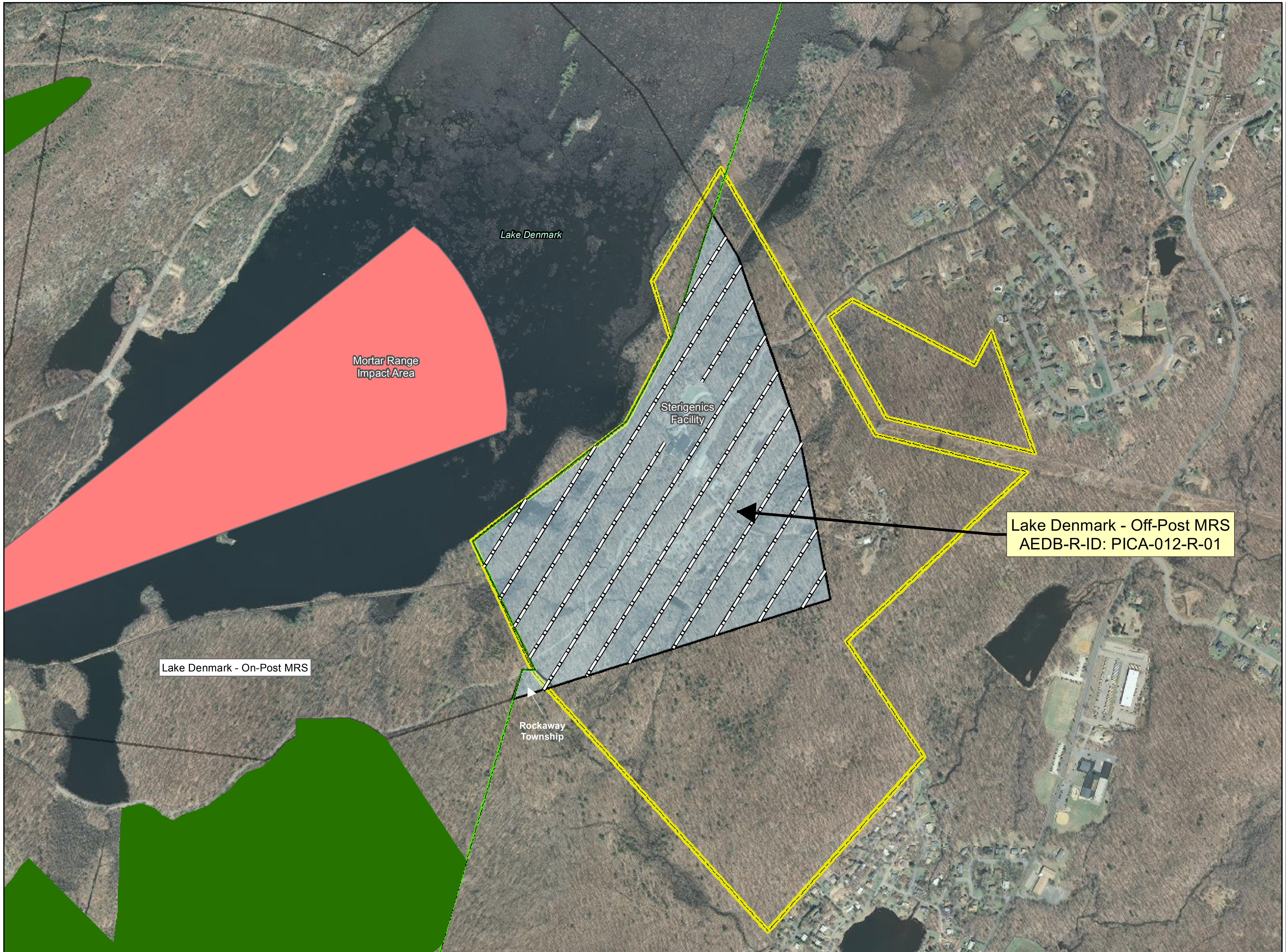
Decision Rule: The results of the RI at the Lake Denmark – Off-Post MRS will be used as follows:

- If through intrusive investigation MEC is determined, then assess if increased MEC densities represent MEC releases associated with the former mortar range at Lake Denmark.

Tolerable Limits on Decision Errors: The null hypothesis (H_o) is that RI results confirm that a MEC release due to mortar firing from Lake Denmark does exist. The alternative hypothesis is that RI results confirm that a MEC release due to former mortar firing from Lake Denmark does not exist. A Type I decision error is concluding that a MEC release associated with the former mortar range in Lake Denmark is not present when it is. A Type II decision error is concluding that a MEC release associated with the former mortar range in Lake Denmark is present when it is not. The consequences of a Type I decision error could include increased risks to receptors. The consequences of a Type II decision error could include unnecessarily incurred project costs associated with additional investigation.

Sampling Design: Mag and dig transect surveys will be performed across the MRS at a 225-foot spacing based on VSP calculations. Total mag and dig coverage will be approximately 4 miles or 4.9 acres. MEC density will be determined based on intrusive work during the mag and dig surveys. Anomalies will be investigated to determine the approximate MEC density.

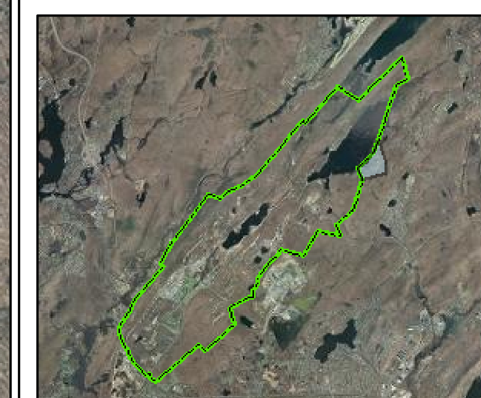
Figure 3-23 presents the characterization approach for the Lake Denmark – Off-Post MRS.



WESTON SOLUTIONS

Legend

- Installation Boundary
- Operational Range Areas
- Munitions Response Site Boundaries
- Lake Denmark, Off-Post MRS
- Former Mortar Range Impact Area (Lakes MRS)
- Mag and Dig Transects
- RTI Superfund Site Boundary



Base Imagery: NJ 2007 Natural Color Imagery

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N W E S

750 375 0 750
Feet

Figure 3-23
Lake Denmark - Off-Post MRS
PICA-012-R-01
Characterization Approach
Picatinny Arsenal
Morris County, New Jersey

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3.9 INACTIVE MUNITIONS WASTE PIT MRS (PICA-013-R-01)

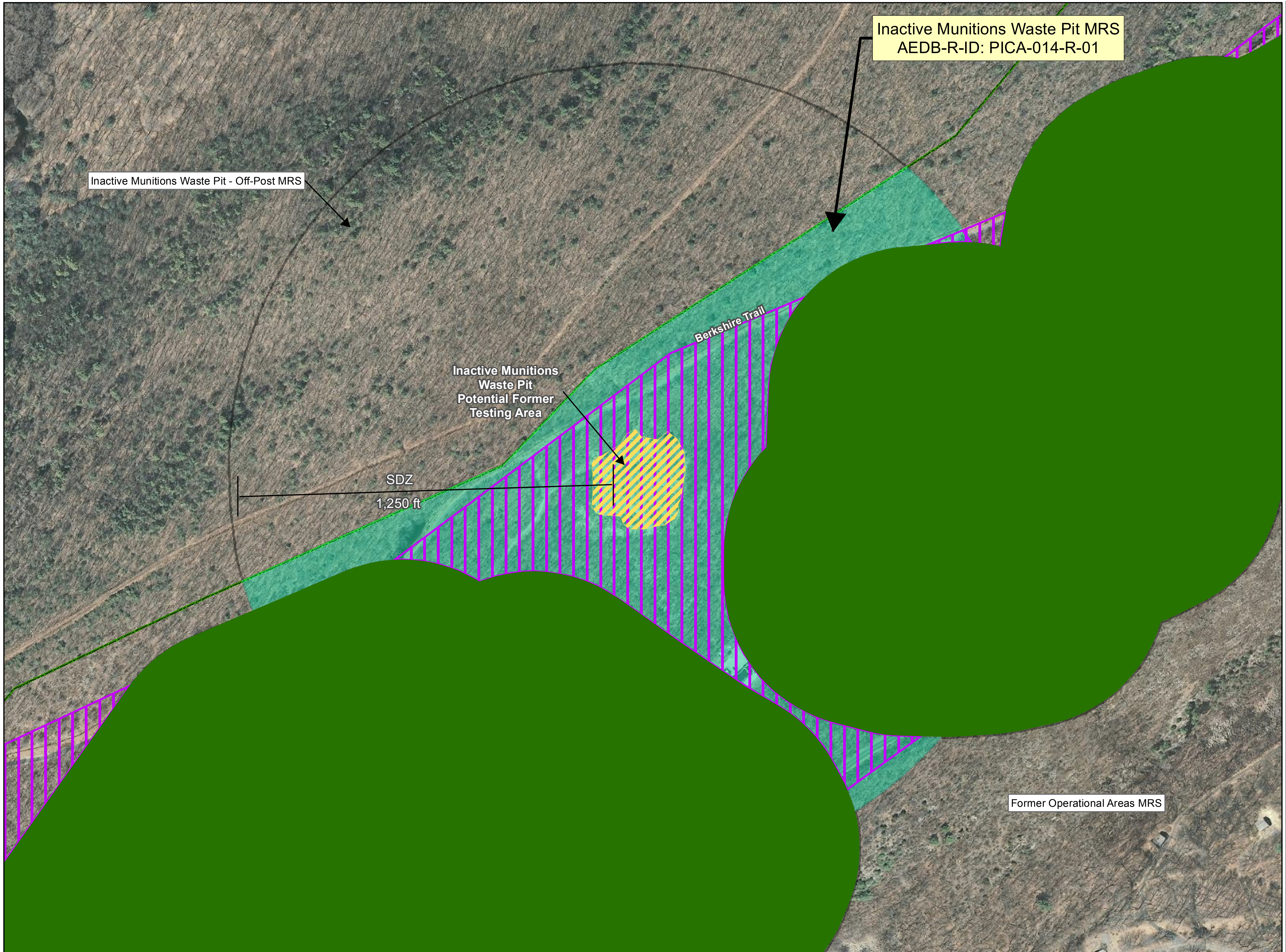
The Inactive Munitions Waste Pit MRS (PICA-013-R-01) is 21 acres. The MRS is on Green Pond Mountain and bordered by the installation boundary to the northwest. Additionally the MRS is bordered to the East and South by operational range areas. The MRS is surrounded by forested areas, including some shrubby habitat. In addition, a swampy area is located on the southern boundary of the potential former testing area. **Figure 3-24** presents the location of the MRS.

The previous munitions use at the Inactive Waste Pit MRS is largely undocumented, but it was reported that this MRS was used from 1955 to the mid-1980s for the testing and storage of munitions and explosives. Potential uses may have included the evaluation of munitions and static testing of explosives and propellant, with possible historical waste munitions disposal. Disposal includes burial and detonation of munitions. After 1956 munitions were disposed of by detonation/burning but historical records do not state the method of disposal prior to 1956. It was confirmed that DMM was disposed onsite during the 2011 600 Area Vapor Intrusion and Source Area Investigation conducted by Shaw (Shaw, 2010). Intact gravel mine canisters were found while soil samples were collected at the former testing area. The gravel mines have since been disposed of.

Since no specific discussion of munitions testing was available, during the SI a minimum surface danger zone (SDZ) radius of 1,250 feet (381 meters), around the potential former testing area, was used to define the MRS boundary. The minimum SDZ was chosen based on the proximity of a large number of buildings surrounding the MRS. It is unlikely that munitions requiring a larger SDZ would have been detonated at the MRS as this would have increased the likelihood of damaging the surrounding buildings. The areas within the two operational ranges, one to the east and another to the southwest, which overlap the SDZ, will not be investigated.

In the 1980s, the MRS was partially covered with topsoil and sand, and in the late 1990s, the majority of the MRS where munitions testing may have occurred was covered with fill and rock. A review of recent aerial photographs confirms that fill material is present at the MRS. Structures currently present at the Inactive Munitions Waste Pit MRS include a burn cage, gun turret, and a building (Bldg. 656) along with other various objects and debris including one partial jet hull. It is unknown whether all these structures were present throughout the MRS's operation. All structures, except for the building, are currently present within the Potential Former Testing Area, where the main body of fill was placed. It is not certain to what extent the fill extends beyond the Potential Former Testing Area Boundaries.

A portion of the Inactive Munitions Waste Pit MRS overlaps with the Code 300 Area. The Code 300 Area includes the area identified in the DoD, *Executive Order 11508 PTA Survey Report, Picatinny Arsenal, Dover, New Jersey* 1973 report as being used for "artillery firing of shells up to 155mm and fragmentation pattern testing".



WESTON SOLUTIONS

Legend

- Installation Boundary
- Operational Range Areas
- Code 300 Area
- Munitions Response Site Boundaries
- Inactive Munitions Waste Pit MRS
- Potential Former Testing Area

Base Imagery: NJ 2007 Natural Color Imagery
Data Sources: 2008 SI Report; Army GIS Layers (August 2011)

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N W E S

300 150 0 300
Feet

Figure 3-24
Inactive Munitions Waste Pit MRS
PICA-013-R-01
Picatinny Arsenal
Morris County, New Jersey

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3.9.1 Previous Investigations

3.9.1.1 Site Inspection Results

No field activities were conducted in the Inactive Munitions Waste Pit MRS during the MMRP SI. No activities were planned during the MMRP SI Work Plan for the Inactive Munitions Waste Pit MRS. Previous work has been conducted by Dames and Moore (1989) near the center of the Inactive Munitions Waste Pit MRS where potential munitions testing would have occurred. According to the SI conducted by Dames and Moore (1989), four surface soil samples and two sediment samples were collected and analyzed for propellants, metals, and explosives. Surface soil samples collected from the metal burn cage area and the potential testing area at the center of the MRS contained concentrations of copper; RDX; 1,3-DNB; and 2,4- DNT above comparison criteria. The Inactive Munitions Waste Pit MRS has been recommended for further investigation during the RI phase of the MMRP based on information presented in the HRR.

3.9.1.2 Vapor Intrusion and Source Area Investigation

The U.S. Army Corps of Engineers (USACE) had tasked Shaw Environmental, Inc. (Shaw) to conduct a follow-on Investigation and prepare a Feasibility Study (FS) addendum for the Picatinny Arsenal (PTA) 600 Area groundwater operable unit, also known as PICA 58 (Shaw, 2010). The PTA 600 Area encompasses the Inactive Munitions Waste Pit MRS. Test pit and/or trench excavations were conducted to investigate areas of elevated soil gas concentrations of TCE. During the 2011 Vapor Intrusion and Source Area Investigation conducted by Shaw, intact gravel mine canisters and MD were found while soil samples were collected at the former testing area.

3.9.2 Conceptual Site Model

Table 3-16 presents the CSM for the Inactive Munitions Waste Pit MRS.

Table 3-16 Inactive Munitions Waste Pit MRS (PICA-013-R-01) CSM

Profile Type	Site Characterization
Location Profile	**Area and Layout** ▪ 21 acres located on Green Pond Mountain including a portion of the Berkshire Trail. The MRS is within a 1,250-ft SDZ centered on the potential former testing area, excluding a portion to the east and another to the southwest consisting of operational range areas.
	Structures ▪ Objects and structures currently present at the Inactive Munitions Waste Pit MRS include a gun turret, an elevated stand from which munitions were hung and/or fired, a metal cage in which munitions were detonated, three concrete bases with a cut projectile casing in each, several 8-inch gun barrels, one partial jet hull, two pieces of 18-inch long concrete storm sewer pipes, and several mounds of asphalt/concrete/brick debris. It is unknown whether all these structures were present throughout the MRSs operation. ▪ Historically, a control building (Bldg. 656), a guard shack, another elevated stand, two additional jet hulls, a steel test unit, and steel observation towers existed at the MRS.
	Boundaries ▪ This MRS is bordered by the installation boundary to the northwest. There are no distinct boundaries to the south and east.
	Utilities ▪ There is no information available regarding utilities that may be present at this MRS.
	Security ▪ A locked gate controls access to the Inactive Munitions Waste Pit MRS and no personnel are allowed on site during testing operations at nearby ranges.
Land Use and Exposure Profile	**Current Land Use**: ▪ A non-operational area on the installation that acts as a buffer between active ranges.
	Current Human Receptors ▪ Authorized PTA personnel, PTA residents, contractors/visitors.
	Potential Future Land Use ▪ Same as current use.
	Potential Future Human Receptors ▪ Same as current human receptors.
Ecological Profile	**Degree of Disturbance** ▪ The degree of disturbance at this MRS is high. In the 1980s, the MRS was covered with topsoil and sand, and in the late 1990s, the majority of the MRS was covered with fill and rock.
	Wetlands ▪ The MRS has a swampy area located on the southern boundary of the potential former testing area.

Table 3-16 Inactive Munitions Waste Pit MRS (PICA-013-R-01) CSM (Continued)

Profile Type	Site Characterization
	Ecological Habitat and Receptors ▪ The MRS is surrounded by forested areas, including some shrubby habitat. In addition, a swampy area is located on the southern boundary of the potential former testing area. NJDEP's i-Map Landscape Project layer indicates this MRS contains habitat with at least one occurrence of a state threatened species. ▪ General information on ecological habitat and receptors at PTA is presented in **Table 1-1** and Section 8.2.
Cultural Resource Profile	**Cultural, Archaeological, and Historical Resources** ▪ Portions of the MRS are designated as sensitive and potentially sensitive, yet disturbed.
Munitions/Release Profile	**Munitions Types** ▪ No field activities were conducted in the Inactive Munitions Waste Pit MRS during the MMRP SI. ▪ During the 2011 Vapor Intrusion and Source Area Investigation conducted by Shaw, intact gravel mine canisters were recovered while soil samples were collected at the former testing area, they have since been disposed of. ▪ The munitions associated with the Code 300 Area include those potentially tested at the Inactive Munitions Waste Pit MRS and projectiles up to 155mm.
	Release Mechanisms ▪ Information on specific munitions types utilized at the MRS was not available. ▪ Release mechanisms may be from munitions testing activities, munitions debris projected out from the MRS, and possible historical waste munitions disposal. ▪ The Code 300 Area has a potential release mechanism associated with munitions firing and testing.
	MEC Density ▪ No field activities were conducted in the Inactive Munitions Waste Pit MRS during the MMRP SI. According to the 2011 Vapor Intrusion and Source Area Investigation conducted by Shaw, approximately 12 feet and deeper of fill material covers the surface of this MRS so MEC density on the surface is expected to be low in the central portion of the MRS. There is potential for MEC to exist in the subsurface as a MEC release in the SDZ radius. ▪ No information regarding MEC density is available for the Code 300 Area.
	Munitions Debris ▪ No field activities were conducted in the Inactive Munitions Waste Pit MRS during the MMRP SI. ▪ According to the 2011 Vapor Intrusion and Source Area Investigation conducted by Shaw, approximately 12 feet and deeper of fill material covers the surface of this MRS so MD on the surface is expected to be low in the central portion of the MRS. ▪ There is also potential for MD to exist in the subsurface as a MEC release in the SDZ radius. During the investigation conducted by Shaw, MD were found in the subsurface while soil samples were collected at the former testing area.

Table 3-16 Inactive Munitions Waste Pit MRS (PICA-013-R-01) CSM (Continued)

Profile Type	Site Characterization
	Associated Munitions Constituents ▪ In this MRS, four surface soil and two sediment samples were collected in 1989 by Dames and Moore. Results indicate that copper and explosives were detected above comparison criteria. These samples were collected in the portion of the MRS that overlaps with the Code 300 Area. ▪ For more information regarding potential MC associated with this MRS, refer to Attachments 2 and 3 in the UFP-QAPP (**Appendix B**).
	Transport Mechanisms/Migration Routes The primary transport mechanisms identified include the following: ▪ **Erosion**: Soil erosion may uncover MEC. MC adsorbed to soil particles may migrate in surface water runoff from surface soil to nearby surface water bodies. However, there are no surface water bodies located directly on this MRS. ▪ **Frost Heave**: Periodic, alternating freezing and thawing during the winter may uplift MEC from the soil subsurface to the soil surface for part of the MRS. Frost heave is an unlikely transport mechanism for the portion of the site covered with approximately 12 feet and deeper of fill material, which places it below the freezing line. ▪ **Infiltration**: The potential exists for MC to migrate from one environmental medium to another (surface to subsurface soil to groundwater) through the infiltration of percolating precipitation. ▪ However, MC migration from soil to groundwater is a minor migration pathway, as the MC are relatively immobile and have low water solubility's.
	Pathway Analysis ▪ **MEC** – Potentially complete exposure pathways exist for PTA personnel/residents, and contractors/visitors who may contact, via handling/treading underfoot, MEC in surface soil or surficial sediment of the swampy area. Potentially complete exposure pathways also exist for contractors who may contact MEC in subsurface soil or subsurface sediment while performing intrusive work. It should be noted that clearance must be given by PTA's Safety Office prior to any subsurface activity. Potentially complete exposure pathways exist for biota that may contact MEC in surface soil or surficial sediment and that may nest or burrow at the MRS and thereby contact MEC in subsurface soil. ▪ **MC** – Several chemical parameters were detected in environmental media, complete exposure pathways exist for receptors with access to the Inactive Munitions Waste Pit MRS. ▪ Complete exposure pathways exist for PTA personnel/residents, contractors/visitors who may contact MC in surface soil or sediment at the MRS. Complete exposure pathways also exist for contractors who may contact MC in subsurface soil while performing intrusive work. Exposure routes include ingestion and dermal contact and, for soil, inhalation of dust. Complete exposure pathways exist for biota that may contact MC in surface and subsurface soil or sediment while feeding, nesting, or burrowing.

3.9.3 Characterization Approach for the Inactive Munitions Waste Pit MRS

Problem Statement: Based on available evidence, MEC and MD could have been released in this MRS from former testing activities and munitions disposal. It is unknown whether MEC or MC is present at the MRS. It is also unknown whether a MEC release is present within the Code 300 Area due to artillery testing activities.

Decisions Needed: The primary decisions being addressed at this MRS include:

- Determine the nature and extent of MEC in burial sites if present within the MRS.
- Determine whether a MEC release is present within the MRS due to potential munitions testing activities. If a MEC release is present, determine nature and extent of the MEC release.
- Determine whether a MEC release is present within the Code 300 Area from historical artillery firing practices. If a MEC release is present, determine nature and extent of the MEC release.

Inputs to the Decision: Several inputs will be acquired to support the decisions:

- Perform EM31-MK2 transect surveys to detect burial features in the central portion of the MRS where potential testing and burial activities would have occurred.
- Perform mag & dig surveys to evaluate the remaining portion of the MRS for MEC/MD and MEC releases.
- Use VSP coverage requirements for the Code 300 Area to better suit the potential MEC release profile. It has been documented that artillery testing activities may have been performed for artillery up to a 155mm. The smallest MEC release for the Code 300 Area is based on a 57mm projectile. **Table 3-17** lists the VSP parameters and coverage requirements for the Code 300 Area within the Inactive Munitions Waste Pit MRS.

Table 3-17 VSP Parameters and Coverage Requirements - Code 300 Area

VSP Parameter	VSP Input and Coverage Requirements
Munitions Response Site	Code 300 Area located within the Inactive Munitions Waste Pit (PICA-013-R-01)
Shape of Target Area	Circular (based on the hazardous fragmentation distance of a 57mm projectile)
Target Area of Interest	243-ft radius
Anomaly Density Indicator	40 anomalies/acre (conservative value used for an impact area)
Background Anomaly Density	10 anomalies/acre

VSP Parameter	VSP Input and Coverage Requirements
Transect Width	10 ft (physical team transect width)
Transect Spacing	193 ft (203 ft on centers)
Transect Distance	2,668 linear feet
Transect Area	.6 acres (28.5% coverage of the Code 300 Area)

Study Boundaries: The MRS study area consists of a potential testing area located centrally within the MRS and surrounding 1,250-ft SDZ. The MRS includes forested areas and some shrubby habitat and a swamp located on the southern boundary of the potential former testing area. The MRS is bordered by the installation boundary to the northwest. Additionally the MRS is bordered to the East and South by operational range areas that intersect the 1,250-ft SDZ. The Code 300 Area lies between these two operational ranges. The extent of potential MEC and burial sites will be delineated using DGM and mag & dig surveys. DGM will concentrate near the potential former testing area in the center of the MRS, while mag & dig transect surveys will be performed in the remaining SDZ radius.

Decision Rules: The results of the RI will be used as follows:

- If MEC burial sites are detected by DGM transect surveys, then delineate the extent of MEC.
- If an increased anomaly density is detected during mag & dig transect surveys in the remaining portion of the MRS, outside the Code 300 Area; then determine if the increase in anomaly density is related to a MEC release.
- If an increased anomaly density is detected during density transect surveys in the Code 300 Area, then determine if the increase in anomaly density is related to a MEC release.
- If MEC is present in the Code 300 based on intrusive anomaly investigation results, then determine the nature and extent of MEC.

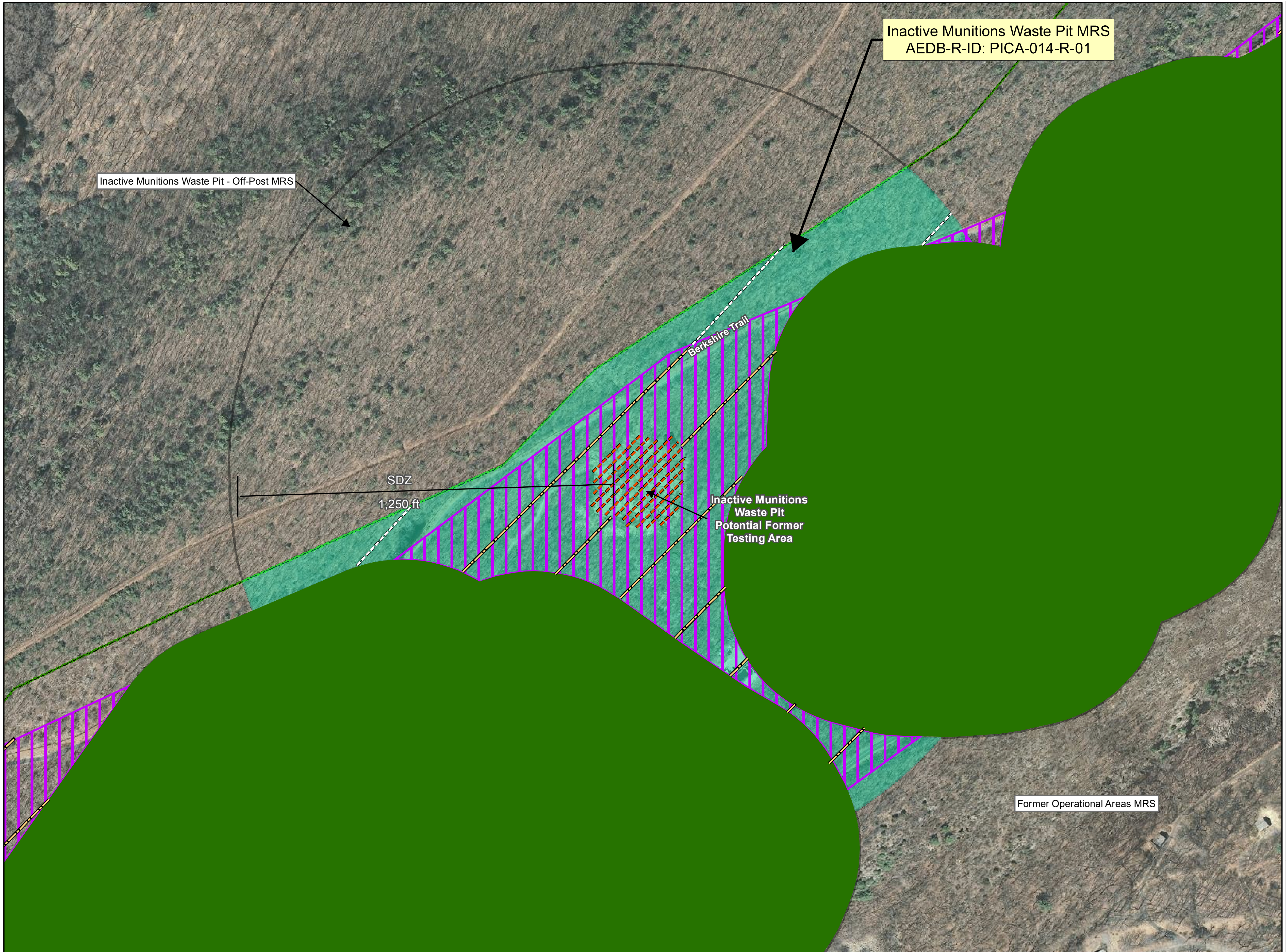
Tolerable Limits on Decision Errors: The null hypothesis (H_o) for the area where potential munitions testing occurred in the MRS is that no MEC burial sites related to historical disposal activities exist. The alternative hypothesis is that burial sites exist and they contain MEC. The Type I decision error associated with this H_o is to conclude that burial sites are present when there is not. The Type II decision error is to conclude there are no burial sites present when there are. The consequences of a Type I decision error could include unnecessarily incurred project costs associated with additional investigation. The consequences of a Type II decision error could include increased risks to receptors. If H_o is rejected based on the detection of a potential burial site, intrusive investigations will be performed to determine the nature and extent of MEC if present. If no potential burial sites are detected within this area of the MRS, intrusive investigations will not be performed.

The H_o for remaining portions of the MRS, outside the Code 300 Area, is no MEC releases from potential munitions testing activities exist. The alternative hypothesis is that MEC releases exist and MEC and MD are present. The Type I decision errors associated with this H_o are that there is a MEC release when there is not. The Type II decision error is to conclude there are no MEC releases when there are. The consequences of a Type I decision error could include unnecessarily incurred project costs associated with additional investigation. The consequences of a Type II decision error could include increased risks to receptors. If H_o is rejected based on the detection of a potential MEC release, intrusive investigations will be performed to determine the nature and extent of MEC and MD if present. If no potential MEC releases are detected within this area of the MRS, no additional grid surveys will be performed.

H_o for the Code 300 Area is that the site does not contain a MEC impact area because of historical artillery firing and does not necessarily contain individual MEC. The H_o is based on the lack of historical records that indicate that a dedicated range or impact area existed and the lack of MEC finds within the Code 300 Area. The decision errors associated with this H_o are concluding that there is a MEC impact area within the Code 300 Area when there is not (Type I) and concluding that there is no MEC impact area within the Code 300 Area when there is (Type II). If H_o is rejected based on the identification of a potential MEC impact area (e.g., anomaly densities significantly greater than the background anomaly density over a large area) within the Code 300 Area, then additional grid surveys will be performed within the potential MEC impact area to determine the nature of the anomalies. If potential impact areas are not identified in the Code 300 Area, no additional grid surveys will be conducted in the Code 300 Area.

Sampling Design: DGM transects will be performed with the EM31-MK2 in the central area of the MRS where testing may have occurred. Both the ground conductivity and magnetic susceptibility measurements will be processed and evaluated to identify high density areas indicative of burial sites. The EM31-MK2 will be conducted along a transect spacing of 25 feet covering approximately 2,767 linear feet. The point between the elevated responses associated with the burial site and the background response associated with an area free from conductive material will be defined as the burial site boundary. Mag & dig transect surveys will be conducted at 300-foot spacing in the remaining portions of the MRS to detect potential MEC releases. Density transect surveys will be conducted in the Code 300 Area at a spacing of 203 feet. This will satisfy the coverage requirements for both the Code 300 Area and the potential MEC release area associated with the Inactive Munitions Waste Pit MRS.

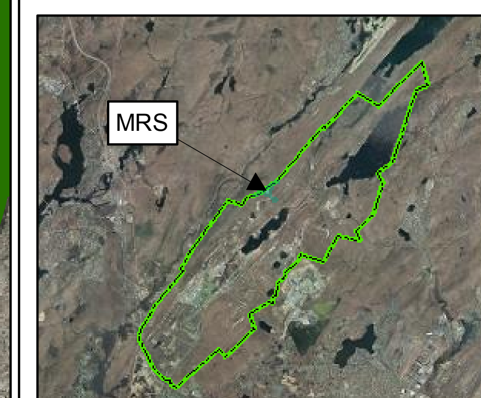
If the MEC is not BIP, biased sampling is proposed near MEC found during the MMRP RI, only when field observation indicates that a potential release has occurred (e.g., visual evidence of staining, the munition is cracked or corroded, the item is not inert). No MC sampling is proposed for any MEC when the MEC is BIP. **Figure 3-25** presents the characterization approach for the Inactive Munitions Waste Pit MRS.



WESTON SOLUTIONS

Legend

- Installation Boundary
- Operational Range Areas
- Code 300 Area
- Munitions Response Site Boundaries
- Inactive Munitions Waste Pit MRS
- EM-31 Transects
- Mag and Dig Transects
- Density Transects



Base Imagery: NJ 2007 Natural Color Imagery
Data Sources: 2008 SI Report; Army GIS Layers (August 2011)

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

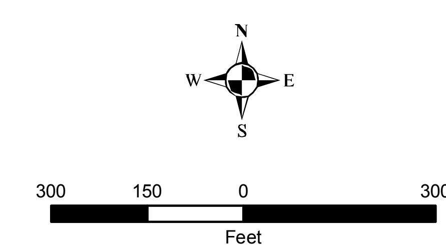


Figure 3-25
Inactive Munitions Waste Pit MRS
PICA-013-R-01
Characterization Approach
Picatinny Arsenal
Morris County, New Jersey

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3.10 INACTIVE MUNITIONS WASTE PIT - OFF-POST MRS (PICA-014-R-01)

The Inactive Munitions Waste Pit – Off-Post MRS (PICA-014-R-01) is 39 acres. This MRS is part of a 1,250-foot SDZ implemented around an on-post site known as the Inactive Munitions Waste Pit. **Figure 3-26** presents the location of the MRS. The previous munitions use at the Inactive Munitions Waste Pit is undocumented. Potential uses may have included the evaluation of munitions and static testing of explosives and propellant. The Inactive Munitions Waste Pit – Off-Post MRS is on the northwestern edge of the SDZ away from the on-post location of the site. The MRS is a state-owned Wildlife Management Area and is heavily wooded, steep terrain.

3.10.1 Previous Investigations

3.10.1.1 Site Inspection Results

During the SI, approximately 2.25 acres of visual surveys were performed on a small portion of the Inactive Munitions Waste Pit – Off-Post MRS. No MEC or MD was observed during the surveys. Because MEC and MD were not recovered, no MC sampling was conducted. The SI recommended that this MRS be furthered investigated for MEC and MC during the RI.

3.10.2 Conceptual Site Model

Table 3-18 presents the CSM for the Inactive Munitions Waste Pit – Off-Post MRS.

3.10.3 Characterization Approach for the Inactive Munitions Waste Pit Off-Post

Problem Statement: Based on available evidence, MEC and MD could have been released in this MRS from former testing activities on-post. Limited inspections within this MRS were performed during the SI. It is unknown whether MEC or MC associated with MEC is present at the MRS.

Decisions Needed: The primary decisions being addressed at this MRS include:

- Determine whether MEC is present within the MRS and at what density.
- Determine the nature and extent of MEC if a MEC release is observed.

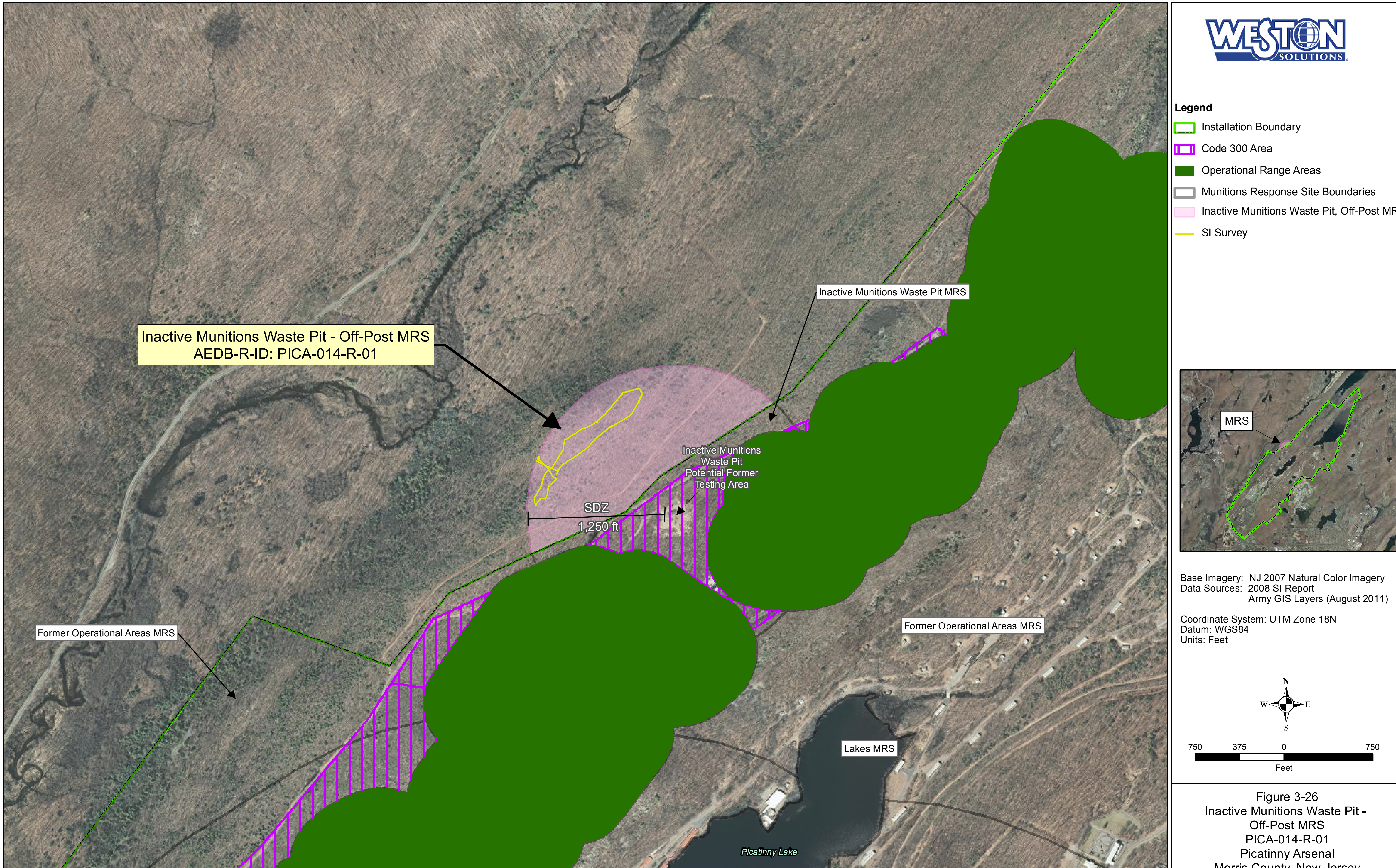

Figure 3-26
Inactive Munitions Waste Pit - Off-Post MRS
PICA-014-R-01
Picatinny Arsenal
Morris County, New Jersey

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Table 3-18 Inactive Munitions Waste Pit – Off-Post MRS (PICA-014-R-01) CSM

Profile Type	Site Characterization
Location Profile	**Area and Layout** ▪ 39 acres located on Green Pond Mountain. The MRS is within a 1,250-ft SDZ centered on the potential former testing area. ▪ MRS is vacant land located in Jefferson Township.
	Structures ▪ No structures are within the MRS.
	Boundaries ▪ There are no distinct boundaries to the north and west. ▪ The PTA boundary is to the south and east. .
	Utilities ▪ The property is vacant, and it is unlikely that utilities are present.
	Security ▪ Access is unrestricted but very difficult to access because of the steepness of the terrain in the western portion.
Land Use and Exposure Profile	**Current Land Use:** ▪ The MRS is currently undeveloped and is designated as a Wildlife Management Area.
	Current Human Receptors ▪ Recreationists (hunters and hikers).
	Potential Future Land Use ▪ Same as current use.
	Potential Future Human Receptors ▪ Same as current human receptors.
Ecological Profile	**Degree of Disturbance** ▪ The MRS is undeveloped and part of the Wildlife Management Area, therefore, the degree of disturbance is very low.
	Wetlands ▪ None
	Ecological Habitat and Receptors ▪ This MRS consists of steep, mountainous terrain located within a Highlands Preservation Areas and a Wildlife Management Area. A habitat with at least one occurrence of a state-threatened species is present at this MRS, according to NJDEP's i-Map landscape Project layer. ▪ General information on ecological habitat and receptors at PTA is presented in **Table 1-1** and Section 8.2.
Cultural Resource Profile	**Cultural, Archaeological, and Historical Resources** ▪ No known cultural, archaeological, or historical resources are known at this MRS.
Munitions/Release Profile	**Munitions Types** ▪ No MEC was observed during the SI, and information on specific munitions types used at the MRS is unavailable.
	Release Mechanisms ▪ Release mechanisms may be from burning or detonation activities if testing activities were conducted. MEC might have been kicked-out from the test area.
	MEC Density ▪ No MEC was observed during the SI visual survey, indicating that MEC density is likely to be very low to none.

Table 3-18 Inactive Munitions Waste Pit - Off-Post MRS (PICA-014-R-01) CSM (Continued)

Profile Type	Site Characterization
	Munitions Debris ▪ No MD was observed during the SI visual survey.
	Associated Munitions Constituents ▪ MC sampling has not been performed on the MRS; however, four surface soil and two sediment samples collected from the on-post portion of the SDZ indicated that copper and explosives were detected above comparison criteria.
	Transport Mechanisms/Migration Routes The primary transport mechanisms identified include the following: ▪ **Erosion**: Soil erosion may uncover MEC. MC adsorbed to soil particles may migrate in surface water runoff over the steep terrain. Migration of dissolved MC is of lesser concern, as the MC has low water solubilities. ▪ **Frost Heave**: Periodic, alternating freezing and thawing during the winter may uplift MEC from the soil subsurface to the soil surface. ▪ **Infiltration**: The potential exists for MC to migrate from one environmental medium to another (surface to subsurface soil to groundwater) through the infiltration of percolating precipitation. ▪ However, MC migration from soil to groundwater is a minor migration pathway, as the MC are relatively immobile and have low water solubilities.
	Pathway Analysis ▪ **MEC –** The exposure pathway for recreationists who might contact MEC via handling or treading on surface soil is incomplete, due to the steep terrain and difficulty accessing this MRS. There are, however, potentially complete exposure pathways for biota that may contact MEC in surface soil and that may nest or burrow at the site and thereby contact MEC in subsurface soil. These pathways are potentially complete, because the presence and density of MEC is unknown. ▪ **MC –** The exposure pathway for recreationists who might contact MC in surface soil is incomplete, due to the steep terrain and difficulty accessing this MRS. Potentially complete exposure pathways exist for biota that may contact MC in surface soil and that may nest or burrow at the site and may contact MC in subsurface soil. These exposure pathways are potentially complete, because it has not been established that MC are present at concentrations of concern. While potential MC transport/migration routes from soil to groundwater were identified above, exposure to MC in groundwater is not expected, because the MC has low water solubilities and the site is currently undeveloped.

Inputs to the Decision: Several inputs will be acquired to support the decisions:

- Perform mag and dig surveys in accessible areas of the MRS, at the top of the ridge and bottom of the slope, to detect and recover surface and subsurface MEC. Investigate all anomalies.
- Perform mag & dig transect surveys to evaluate the remaining portion of the MRS, near the PTA boundary, for MEC/MD and MEC releases.
- Evaluate intrusive results for MEC, MD, and non-MD in the project GIS.

Study Boundaries: Accessible areas of the MRS are located in the northwest at the bottom of the steep slope, and on top of the ridge, with the remaining portion to the southeast near the PTA boundary.

Decision Rule: The results of the RI will be used as follows:

- If MEC is present based on intrusive anomaly investigations, then assess the MEC density in the MRS.
- If an increased anomaly density is detected during mag & dig transect surveys in the remaining portion of the MRS; then determine if the increase in anomaly density is related to a MEC release.

Tolerable Limits on Decision Errors: Full coverage mag and dig surveys utilizing GPS will be performed in accessible areas at the top of the ridge and bottom of the slope in the northwest portion of the MRS.

The H_o for remaining portions of the MRS is no MEC releases from potential munitions testing activities exist. The alternative hypothesis is that MEC releases exist and MEC and MD are present. The Type I decision errors associated with this H_o are that there is a MEC release when there is not. The Type II decision error is to conclude there are no MEC releases when there are. The consequences of a Type I decision error could include unnecessarily incurred project costs associated with additional investigation. The consequences of a Type II decision error could include increased risks to receptors. If H_o is rejected based on the detection of a potential MEC release, intrusive investigations will be performed to determine the nature and extent of MEC and MD if present. If no potential MEC releases are detected within this area of the MRS, no additional grid surveys will be performed.

Sampling Design: Full coverage mag and dig surveys will be performed in accessible areas at the top of the ridge and bottom of the slope, in the northwest portion of the MRS, where the terrain is accessible to the UXO teams. All anomalies will be investigated to determine the approximate MEC density. Mag & dig transect surveys will be conducted at 300-foot spacing in the remaining portions of the MRS to detect potential MEC releases.

Figure 3-27 presents the characterization approach for the Inactive Munitions Waste Pit – Off-Post MRS.

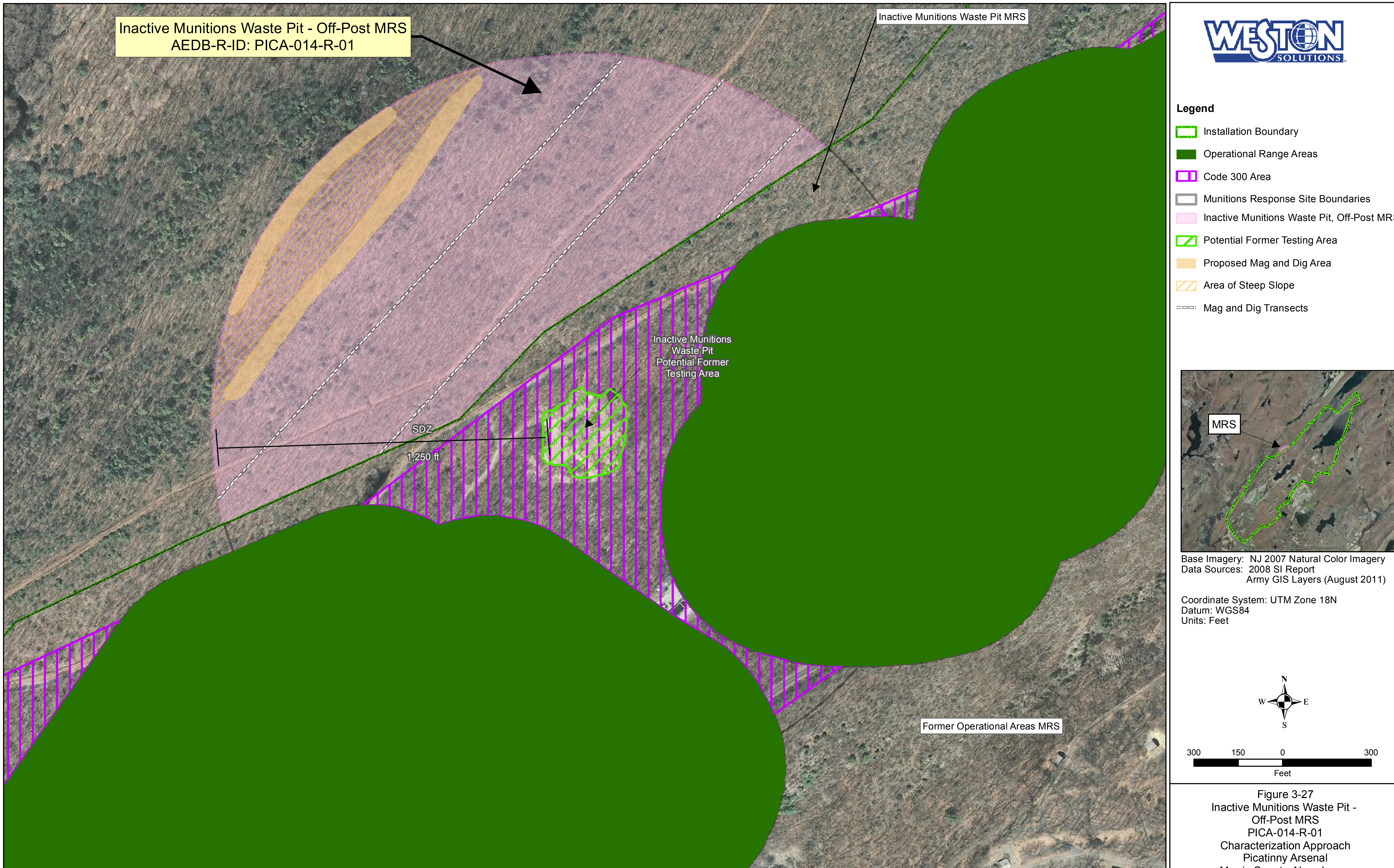

Figure 3-27
Inactive Munitions Waste Pit -
Off-Post MRS
PICA-014-R-01
Characterization Approach
Picatinny Arsenal
Morris County, New Jersey

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3.11 DATA INCORPORATION INTO THE RI REPORT

The geophysical survey and intrusive investigation results will be entered into the project GIS database that will be continually updated and managed over the course of the project. These data will be incorporated into the RI Report.

3.12 TIME CRITICAL REMOVAL ACTIONS

TCRAs are removal actions intended to address the imminent safety hazard posed by explosives hazards. During the course of the RI, if an area is discovered that poses an imminent danger, USACE will be notified for the purpose of reevaluating the area for a TCRA.

3.13 LOCATION SURVEYING AND MAPPING

A location survey will be conducted by a New Jersey Professional Licensed Surveyor. The surveyor will establish control monuments or survey markers with a minimum of third order accuracy. Horizontal control Class I, third order will be established for all new primary control monuments established by the licensed surveyor. Horizontal control is referenced to the Universal Transverse Mercator (UTM), North American Datum (NAD) 83, with units of U.S. Survey Feet. Staking of control points and points of interest will be accomplished by driving wooden stakes for temporary markers. Six-inch steel spikes will also be used to mark the temporary survey points for relocation purposes. The surveyed geographic position and UTM coordinates will be referenced to the primary control monuments established for the project. Vertical control or topography will not be surveyed.

The survey locations of the geophysical grids will be shifted away from the large cultural features, as needed, to ensure that the coverage requirements are achieved for the MRS. If large, prominent cultural features are observed in a grid during surveyor activities, the location of the object will be recorded. Other cultural features observed during DGM operations will be logged by the geophysical team and presented on the grid contour maps for evaluation during the target selection processes.

A UXO Technician II or higher will provide escort for all authorized and survey personnel while providing anomaly avoidance support as needed for intrusive work. Pertinent information related to items recovered during the surface sweep process will be entered into the GIS database and included in the RI Report.

3.14 BRUSH CLEARING

Brush clearing may be conducted within the investigation areas in order to perform the geophysical transect and grids. Only the minimum amount of vegetation will be removed to facilitate the geophysical surveys, as necessary. The goal is to collect the necessary data without significant impact to the surrounding environment. Brush clearing will be conducted immediately following the location survey and will mainly be within the DGM grid footprints established by the surveyor. A UXO Technician II or higher will escort a brush clearing crew when utilized. The areas designated for brush clearance will be approved by PTA and USACE prior to any clearing activities.

3.15 GEOPHYSICAL SYSTEM VERIFICATION

The geophysical system verification (GSV) approach is used to monitor and verify DGM sensor functionality during the RI geophysical mapping activities. The GSV approach uses an IVS and is a USACE-accepted alternative to the traditional Geophysical Prove-Out (GPO). The GSV approach capitalizes on the known performance of the geophysical sensors (Naval Research Laboratory (NRL), 2009). It provides the advantage of reallocating resources traditionally devoted to a GPO to support a simplified, yet more rigorous, verification method for the geophysical system operations. In addition, it incorporates a seeding program to continually monitor the production mapping work within each MRS.

3.15.1 Instrument Verification Strip

The objective of the IVS is to provide a means to verify that the geophysical detection system is operating properly. The seed items placed within the IVS should be observed in the geophysical data with a signal consistent with the physics-based instrument response curves developed for the EM61-MK2. The analog mag and dig survey instrumentation will also be tested at the IVS each day.

The IVS will be constructed in an accessible area near the former GPA area. An additional IVS may be established to maximize the efficiency of the field activities. If an additional IVS is warranted, PTA and USACE will approve the construction location. An additional IVS will not be established for water-based surveys, the land IVS will be utilized.

For the EM61-MK2, ambient site noise will be measured and evaluated against the instrument response curves to determine the detection depths for the items of interest anticipated for each MRS. In addition, this methodology provides an ongoing monitoring of system performance, as well as an additional QC of production work by using a blind seeding program.

3.15.1.1 Instrument Verification Strip Design

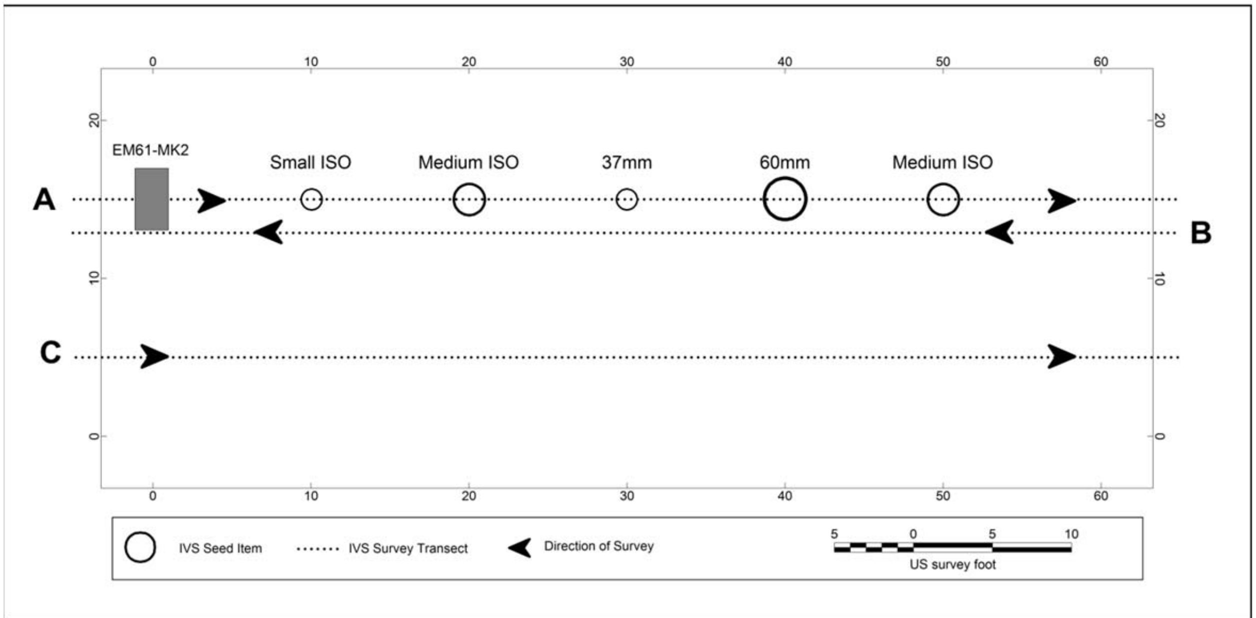
The IVS will be linearly seeded with five items, including one small surrogate industry standard object (ISO), two medium ISOs, one inert 37mm projectile, and one inert 60mm mortar. The ISOs listed in **Table 3-19** are Schedule 40 pipe nipples, threaded on both ends, made from black welded steel and manufactured to an American Society for Testing and Materials (ASTM) specification. The three ISOs and the 37mm seeds were chosen because they are sufficiently similar in size to munitions historically used and encountered at PTA. The 60mm mortars were chosen because they have been historically used and found on Lake Denmark and the instrument response curves are already generated for these mortars.

Table 3-19 Industry Standard Objects Characterized for Use as Munitions Surrogates (Adapted from NRL/MR/6110_09_99183)

Item	Nominal Pipe Size	Outside Diameter	Length	Part Number*	ASTM Specification
Small ISO	1"	1.315" (33mm)	4" (102mm)	44615K466	A53/A773
Medium ISO	2"	2.375" (60mm)	8" (204mm)	44615K529	A53/A773

*Part number from the McMaster-Carr catalog.

The seeds will be placed in the IVS and distributed sufficiently to prevent overlapping signals. The proposed seed layout of the IVS is detailed in **Figure 3-28**. The items will be buried horizontally (least favorable orientation) with the long axis aligned parallel to the ground surface, and at depths between the ground surface and the anticipated detection depth near the noise and the least favorable orientation response curve intersection. The items will be placed at the discretion of the Site Geophysicist and the USACE QA Geophysicist prior to mobilization. Seed locations will be surveyed by a New Jersey Professional Licensed Surveyor to a minimum of third order accuracy. The item parameters (i.e., the surveyed location, size, depth, orientation) will be recorded and entered into the database. An unseeded test strip will be established adjacent to the seeded portion of the IVS to monitor the background noise.



Notes: Line A: Directly over IVS seeds; used to verify that instrument response is within established response curve metrics.
Line B: Adjacent to Line A to use for offset detection and evaluate latency.
Line C: 10-ft offset from seeded IVS transect; used to measure local background noise.

Figure 3-28 Proposed IVS Layout and Process

3.15.1.2 Instrument Verification Strip Procedures

Prior to the burial of any seed items, a background survey will be conducted within the proposed IVS area to determine the suitability of the site and to assist the Site Geophysicist in the placement of the seed items.

Following the background survey, the seed items will be buried in accordance with the proposed IVS layout (**Figure 3-28**), each at a depth between the ground surface and the anticipated detection depth (to be determined based on the background noise). The location and depths of the seed items will be surveyed and recorded. Each seed item, as well as the start and end points of each IVS transect, will be marked at the surface with PVC pin flags or wooden stakes.

A DGM survey will be performed over the IVS using the EM61-MK2, following the transect pattern detailed in **Figure 3-28**. The data collected will then be evaluated to determine a seed item response baseline to compare against the production surveys.

3.15.2 Blind Seeding

The geophysical grids will be seeded with medium ISOs. The seed locations will be surveyed by a New Jersey Professional Licensed Surveyor and will be blind to the data collection teams. Blind seeds will not be used for the underwater investigations at Picatinny Lake and Lake Denmark. The objective of the seed program will be to provide ongoing monitoring of the quality of the geophysical data collection and target selection process related to the production survey for each MRS. Each geophysical grid and DGM transect will include at least one medium ISO seed item, similar to the items used within the IVS.

After each data set is collected, the Site Geophysicists will overlay the locations of the blind seeds on the processed data and verify that the detection and navigation DQOs are met in the data set. The response of each ISO will be compared against the IVS results and the instrument response curves.

3.15.3 GSV Procedures

The IVS and unseeded test strip will be visited daily before and after DGM surveys. Analog mag and dig instrumentation will be tested each day at the IVS before performing surveys. For each IVS survey event, the EM61-MK2 will first traverse the IVS, then an adjacent line used for offset detection and then unseeded area. The data will be processed similarly to the production mapping data. The GSV process is not suitable for use with EM31-MK2 transect surveys or with the underwater detection systems. The QC tests designed for these instruments are sufficient to determine that they are functioning and capable of achieving the RI objectives.

3.15.4 GSV Results

The initial results of the IVS will be discussed between the WESTON Senior and Site Geophysicists and the USACE QA Geophysicist. The peak responses from the IVS seed items will be plotted against their respective instrument response curves. The blind seed items will also be monitored for positional accuracy and response and compared to the IVS results. All seed item responses should plot higher than the calculated response curve for the least favorable orientation response curve. The average noise values across the unseeded test strip and the geophysical grids will be calculated and monitored during the life of the project. The seed items detected during the mag and dig surveys will be catalogued and tracked via RespondFast – UXO Investigation in the project GIS database. The GSV results will be included for the digital geophysical data packages. The IVS results will include the following:

- As-built drawing of the IVS including depth and orientation of seeded items.
- Representative photographs of the surrogate ISO seed items (initial results).
- Color plots of the DGM data.
- Instrument response curves.
- Seed target list showing comprehensive results.

3.16 DIGITAL GEOPHYSICAL MAPPING

The DGM surveys will be used in areas where the quality measurement criteria can be achieved. Both DGM transect and grid surveys will be performed based on the investigation strategies and DQOs presented in Subsections 3.1.1, 3.1.2, and 3.1.3. Underwater DGM survey methods and procedures are presented in Subsection 3.16.

3.16.1 Instrumentation

The DGM surveys will be performed using the Geonics EM61-MK2 all metals detector and the Geonics EM31-MK2 electromagnetic terrain conductivity meter. Descriptions of the instrumentation are presented in **Table 3-20**.

Table 3-20 Digital Geophysical Mapping Instrumentation

Instrument	Description
EM61-MK2 	▪ Time Domain Electromagnetic. ▪ Battery-powered with maximum output of 10,000 millivolts (mV). ▪ Detects ferrous and non-ferrous metallic objects in the shallow subsurface. ▪ Acts as a transmitter and receiver. ▪ Transmitter induces eddy currents in metallic objects (ferrous and non-ferrous). ▪ Receiver measures the amplitude and decay time of the induced eddy currents. ▪ Receiver measures at 216, 366, 660, and 1260 micro-second intervals during the decay period. ▪ The standard EM61-MK2 cannot detect single objects at depths greater than 3-4 meters. ▪ Data collection at frequency of 10Hz. ▪ Integrated with RTK GPS antenna mounted over center of coils.
EM31-MK2 	▪ Electromagnetic Terrain Conductivity Meter. ▪ Battery-powered and operating at a frequency of 9.8 kilohertz (kHz). ▪ Detects ferrous and non-ferrous metallic objects in the shallow subsurface ▪ Acts as a transmitter and receiver. ▪ Measures quadrature (apparent conductivity) and inphase (metal detection: ferrous and non-ferrous). ▪ Quadrature component is sensitive to conductors with low induction numbers (i.e., soils) and measures in units of millisiemens per meter (mS/m) in materials with conductivity ranging up to 1,000 mS/m. ▪ Depth of penetration is 18 ft. ▪ Data collection at frequency of 9.8 kHz. ▪ Interfaced with GPS mounted above the center point of the transmitter/receiver coils.

3.16.2 Navigation and Positioning Equipment

The project personnel will use several types of navigation systems and methods best suited for navigation and positioning along the transects and within the grids as well as for anomaly reacquisition. **Table 3-21** presents the types of positioning and navigation instrumentation.

Table 3-21 Navigation and Positioning Instrumentation

Trimble Robotic Total Station	Trimble Global Positioning Real Time Kinematic Base Station and Rover(s)	Trimble Pro-XRS
		
Used in the event GPS coverage is inadequate due to canopy cover for DGM positioning in grids and anomaly reacquisition.	Used for positioning on DGM transects or grids; anomaly reacquisition; and general surveyor tool.	Capable of sub-meter accuracy and will be used to navigate and track EM31-MK2 DGM transects.

3.16.2.1 Local Navigation Methodology (Line and Fiducial)

For the line and fiducial DGM surveying (using the Cartesian X, Y grid system), geo-referencing the geophysical data will be accomplished using the information recorded in a field log/note book (e.g., start and end of line stations, lane spacing, and fiducial mark intervals) and the information digitally recorded in each geophysical survey data file. An example of line and fiducial navigation is presented in **Figure 3-29**.

(*Adapted from Engineering Manual 1110-1-4009, USACE, 2007*)

Figure 3-29 Line and Fiducial Navigation

The procedure for collecting geophysical data using the line and fiducial method will include the following:

- The geodetic coordinates of the grid corners will be used to geo-reference the geophysical data after data collection.
- The surveyor's tapes (or graduated static ropes) will be laid out in an east-west or north-south direction as the terrain allows. Typically the southwestern corner of the grid surveyed is assigned a relative coordinate of 0E, 0N.
- The range markers (traffic cones or high visibility tripods) will then be placed along the line to be surveyed and will provide the geophysical operator with a navigation aid, allowing him or her to traverse the line in a linear manner.

- The fiducial data markers will be inserted manually by the operator at intervals not to exceed 20 feet. In areas of rough terrain or thick vegetation, smaller intervals will be used. These markers will be used to accurately locate each data measurement point during the post-processing stages.
- A 20-ft fiducial spacing will be used in grids that have an open to moderately level terrain. The Site Geophysicist will dictate a smaller fiducial interval to account for the varying terrain. This decision will be made on-site based on the field conditions and following grid placement.

The geodetic coordinates of the grid corners will be used to transform or "warp" the Cartesian coordinates and the associated geophysical data to the UTM coordinates in the post-processing step.

3.16.3 Production Rates

Based upon past experience in similar terrain, and assuming no delays caused by weather or other unexpected factors, WESTON will have a goal of achieving the following production rates during the field geophysical surveys:

- **DGM Transects —** The DGM transects are expected to be completed at a rate of 3 to 4 miles per day. However, if poor site or weather conditions occur, this production rate may be reduced to 1 to 3 miles per day, per team.
- **DGM Grid Surveys —** The production rate is anticipated to be approximately 0.25 to 1.0 acre per day for the DGM grid surveys. Production rates will depend on the size and location of the grids and the field conditions encountered.

3.16.4 Instrument Standardization

To verify the instrument accuracy, the EM61-MK2 and the EM31-MK2 will be checked at the beginning and end of each workday based on the tests and frequencies identified in **Table 3-22**. Dynamic data will be collected over the instrument verification strip (IVS) daily. Additional function checks may be performed throughout the day, as the operator deems necessary. The data from each system test will be compared with the data collected on previous days. If there is a significant change in the results, the instrument will be rechecked. If the difference in the data cannot be accounted for, the instrument will be taken out of service until repaired.

To facilitate the detection of buried munitions, USACE has defined standard equipment tests and data quality criteria. **Table 3-22** identifies the USACE QC function tests and acceptance criteria for the EM61-MK2 and the EM31-MK2.

Table 3-22 DGM QC Test Frequency and Acceptance Criteria

Test Description	Acceptance Criteria	Power On	Start of Day	End of Day	1st Day of Project for Each Operator	1 Line per Grid
Equipment Warm-Up	Equipment Specific (5-15 minutes)	X				
Record Sensor Positions	+/- 1 inch (2.54 centimeter (cm))		X			
Personnel Test	EM61-MK2 2mVp-p		X			
Cable Connection Test	Data profile does not exhibit spikes		X			
Static Background	Background: EM61-MK2 < 2.5 mV std dev EM31-MK2 inphase: 0+/- 0.1		X	X		
Static Spike	+/- 20% of standard item response		X	X		
6-Line Test (man-towed cart)	Repeatable +/- 20 % of response amplitude, +/- 20 cm for positional accuracy				X	
Repeat Data	Repeatable +/- 20 % of response amplitude, EM61-MK2 transect surveys within +/-20cm. EM61-MK2 grid surveys within +/-20cm. EM31-MK2 transect surveys within 10 ft (due to canopy cover and GPS accuracy).					X
IVS	Seed item responses should plot higher than the calculated response curve for the least favorable orientation response curve.		X	X		

3.16.4.1 Instrument Function Checks

Prior to conducting the QC function tests, spot measurements will be taken at various locations around the proposed DGM survey area to identify the most suitable area to establish a QC station. The IVS, static background, static spike, and cable connection tests will be performed daily before and after surveying at the fixed QC station identified from the spot measurements. The QC test statistics will be entered and saved to a database, which will be electronically submitted with each data package.

The purpose of the static spike test is to determine the ability of the EM61-MK2 instrumentation to collect stable readings consistently throughout the survey. Instrument functionality and ambient electromagnetic (EM) cultural noise are the likely sources of non-repeatable readings.

The static spike test demonstrates the sensor's sensitivity to a chosen test object. A conductive spike item of appropriate size will be used for the EM tests to quantify the instrument response and to document its ability to collect stable readings.

The cable connection test is used to identify mechanical and electrical problems with the EM61-MK2 and EM31-MK2 instrumentation. Large anomalous spikes within the test data indicate poor connectivity between the cables and the field data logger.

The IVS test is used to demonstrate the EM61-MK2 instrumentation repeatability and accuracy. The peak responses from the IVS seed items will be plotted against their respective instrument response curves. Seed item responses should plot higher than the calculated response curve for the least favorable orientation response curve.

3.16.4.2 Corrective Measures

One of the main goals throughout the RI will be to achieve and maintain a high standard of data quality. This will be accomplished by a vigilant compilation of QC checks and QA reviews on data collection and processing procedures. Any deficiencies identified will require a corrective measure, and a root-cause analysis will be performed to document the issue, analysis, and corrective action. Such root-cause analyses will be submitted to USACE and PTA as memorandums.

3.16.5 DGM Measurement Quality Objectives

The geophysical performance criteria provided in **Table 3-23** are based on Engineering Manual 1110-1-4009 (USACE, 2007) and the most recent version of the *Performance Requirements for Using DGM and Analog Methods* (USACE, 2009c). The geophysical quality measurement criteria establish the specific metrics concerning the sensor performance, navigation accuracy, data density, data processing standard, and anomaly selection criteria to meet the minimum goals for the investigation. The metrics will be confirmed or appropriately adjusted based on the TPP and the results of the GSV.

Table 3-23 DGM Measurement Quality Objectives (MQOs)

MQO	Measurement Performance Criteria	Testing Method
System and Data Positioning – Potential MEC burial features and possible individual MEC items can be effectively reacquired.	Known surveyed positions and detected anomaly positions in DGM survey data for seed items and calibration spike objects are within specification offsets: EM61-MK2 transect surveys within +/-20cm. EM61-MK2 grid surveys within +/-20cm. EM31-MK2 transect surveys within 10 ft (due to canopy cover and GPS accuracy). Line and fiducial grid corners are internally consistent within 30 cm on any leg or diagonal.	Use GSV process for full coverage surveys (ISO in IVS and production survey areas). Perform calibration spike tests for transect surveys within heavily wooded areas to verify positional accuracy under tree canopy. Geodetic internal consistency through the use of grid corner spikes and seeds for line and fiducial surveys.
Data Density – Data density along line and across line are sufficient to detect potential MEC burial features and possible individual MEC items.	EM61-MK2 grid survey: Across track spacing for EM61-MK2 full coverage surveys will be verified using IVS. 98% of data along line will be spaced no greater than 0.5 ft. 95% of across track data will not exceed 3 ft. EM61-MK2 transect survey: 98% of data along line will be spaced no greater than 0.5 ft. EM31-MK2 transect surveys will be run on a pre-designed spacing. 98% of data along line will be spaced no greater than 3 ft.	Use Geosoft and spatial analysis tools to identify locations where data density does not achieve measurement performance criteria. Verify instrument functionality daily at IVS.
Anomaly Detection Performance – ISO and calibration spike object responses are repeatable.	ISOs and calibration spike objects will not vary more than 20% from test to test or ISO to ISO.	Monitor and compare spike test data daily before and after survey. Evaluate IVS results daily before and after survey.
Repeatability – Positional and detection performance are consistent for the duration of the project.	Review DQOs and spot trends or exceedances from performance criteria.	Use a quantitative review of test data daily and weekly. Evaluate detection and positional information at IVS daily.

3.16.5.1 False Positives

False positives result when an anomaly is detected at a given location, declared as a significant anomaly to be intrusively investigated, or otherwise posted to a dig sheet, and no basis for the anomaly is identified in the field. False positives can be a result of a low threshold selection of anomalies (i.e., conservative anomaly picking), spikes in the data not successfully removed during processing, instrument jolts resulting from terrain, and heterogeneities in the subsurface. False positives are unavoidable and do not affect the data quality in terms of removing MEC items from the subsurface. The performance goal with respect to false positives is to minimize their occurrences while maintaining the same MEC identification rates.

For the DGM surveys at PTA, a false positive goal of no more than 15% is established for this project, in accordance with USACE DID MMRP-09-004 (USACE, 2009d). False positives will be minimized to the extent possible through the use of the best available geophysical practices executed by the geophysical field team and the data analyst. False positives will be documented in the database so that the 15% false positive metric can be monitored.

The false positive rates will be calculated and tracked for each transect or grid. Exceeding 15% false positives (calculated as a running average for each transect or grid) will result in a re-evaluation of the detection methods, data, and project QC. QA targets chosen below the selection criteria will not be considered a false positive. A Corrective Action Request (CAR), if appropriate, will be provided to explain the root cause for the excessive false positive rate. Additional corrective actions may be performed as deemed necessary for false positives less than 15%.

3.16.6 Geophysical Mapping Data

3.16.6.1 Records Management

The data related to the DGM surveys will be managed using Geosoft Oasis Montaj software. Spatial data will be managed using GIS, and will be stored in Environmental Systems Research Institute (ESRI)-compatible GIS file formats, primarily ArcInfo coverages and ArcView shape files.

The data will be stored in site-specific folders that indicate the individual field efforts, data type, and file extension. The DGM data will be submitted in accordance to MMRP-09-004 (USACE, 2009d). The data will be provided electronically to the USACE QA Geophysicist on compact disc or via the WESTON TeamLink® Website and will be backed up on WESTON's internal network and project workstation.

3.16.6.2 Data Storage and Preliminary Processing

The digital geophysical data will be downloaded directly from the data-logger to a work station for processing. Sensor manufacturer software (NavMaker61MK2 or Dat31) will be used to review and edit the data as necessary, normalize the data to the fiducial control marks, generate profile lines, and convert the DGM data to (*x,y*) coordinates for contouring, map generation, and interpretation.

3.16.7 Data Processing

3.16.7.1 Standard Data Analysis

The geophysical teams will provide the raw digital data, digital records, and field notes to the Site Geophysicist after the completion of the day's field activities. The digital data will be submitted in an ASCII-delimited file (XYZ) suitable for input into the *Geosoft*™ analysis software.

The field crews will initially process the data to correct the file names, line numbers, survey direction, start and end line locations, and grid identification. Data spikes artificially induced from cultural interference unrelated to subsurface material will be documented and removed where appropriate. The pre- and post-survey QC data will be reviewed real-time and during the data download to identify any abnormal readings.

3.16.7.2 Advanced Data Processing, Corrections, Digital Filtering, and Enhancement

Once the initial data processing procedures are complete, Geosoft's UX-Detect and QC Geophysical Mapping modules will be used to further reduce the data. The following data processes will be performed where appropriate:

- **Instrument Latency:** Instrument latency will be corrected based on the lags or time differences observed in anomaly peak positions from the IVS test. Corrections will be applied using an appropriate correction routine that accounts for instrument latency time and sensor velocity. Chevron effects should not be visible in the data maps when plotted at the scales used to detect the smallest amplitude signal for a given MEC item.

- **Instrument Drift Correction:** A drift correction process will be applied to the EM61-MK2 and the inphase component of the EM31-MK2 geophysical data to remove any unwanted signal indicative of instrument drift.
- In addition to the standard geophysical data processing procedures, the following statistics will be calculated for each dataset to ensure that the data collection is meeting MQOs:
- **Background Noise:** The standard deviation will be calculated in areas free of anomalous responses to identify the background noise levels.
- **Average Speed:** The data acquisition rates should be <3 mph or consistent with the speeds demonstrated on the IVS that achieve the along-track sample-separation metrics.
- **Along-Track Sampling:** The along-track sampling will be evaluated with respect to the mean speed. For the EM61-MK2, the average along-track sampling will not exceed 0.5 foot between the data points. It is anticipated that the along-track sampling will average approximately 0.35 foot based on the sampling frequency. For the EM31-MK2, it is anticipated that the along-track sampling will average approximately 3 feet based on the sampling frequency.
- **Across-Track Sampling:** The across-track sampling for the EM61-MK2 grid survey will not exceed 3 feet. Minor data gaps may occur if obstructions exist in the DGM grid. The data gaps due to obstructions will be excluded from this metric; however, data gaps will be cumulatively tracked.

3.16.7.3 Preliminary Anomaly Selection Criteria

Site Geophysicists will use the UX-Detect Blakely Test to perform an initial automatic anomaly selection, using the parameters determined from the initial IVS results for the EM61-MK2 data. The GX parameters will be refined to produce anomaly selections of all signals above the mean plus 2.5 to 3 times the standard deviation of the background data. Alternative levels may be required for some datasets and will be documented on a case-by-case basis. A review of the EM61-MK2 decay profiles (for the 4 channels) at all suspect and/or low-amplitude anomalies will be performed to remove from the list anomalies not exhibiting response characteristics typical of buried metallic objects. This step may be performed using a scripted routine that will automatically find the nearest peak and compare the values for all associated channels in order to compute, identify, and flag negative time constants. Flagged anomalies, not having the decay characteristics of buried metallic objects, will be removed. A manual review of the remaining anomalies will be conducted to center the anomaly response as needed.

EM31-MK2 data will be analyzed for potential MEC burial areas. Both the inphase and quadrature phases will be evaluated. A map will be generated in Geosoft overlaid with a site map loaded with the site attributes, such as manhole covers, utilities, trees, fences, and lights. The site attribute data will be used to eliminate cultural anomalies. Large anomalies not associated with the cultural anomalies will be identified as targets and will be digitized as polygons.

All corrected geophysical data and anomaly locations will be exported to a database. Throughout the geophysical survey, the field personnel will use logbooks to record observations such as variances in the background interference/noise when collecting data, and/or note changes in the soil characteristics. Such observations will provide valuable insights during the selection of anomalies in the areas where significant variations in background interference/noise exist.

3.16.7.4 Anomaly Selection Decision Criteria

For the grids located using UXO Estimator results, anomalies will be selected for excavation based on the electromagnetic noise levels and the least favorable orientation instrument response curves for the smallest anticipated munitions item in the MRS. The intersection of the site noise and least favorable orientation response curves will provide an estimate of the detection depth for a particular munitions item. All anomalies above this value will be reacquired and investigated.

A discussion of UXO Estimator and VSP is provided in Sections 3.1.1 and 3.1.1.2, respectively. VSP was used to develop the investigation strategies to ensure to a 95% confidence level a high traversal and detection of the MEC releases within the appropriate MRSs. The transects developed using VSP will primarily be traversed using a mag and dig like approach using analog all-metals detectors due to the terrain. Anomalies detected will be intrusively investigated by UXO Technicians as they are detected. The DGM transects will be collected in accessible and developed areas to reduce the exclusion zone impacts. Anomaly reacquisition will be performed before intrusive investigations in the DGM transects. The location and results of the investigation will be recorded and tracked for evaluation. The locations where a MEC release is observed will be further delineated with transects and the additional grid-based surveys as necessary to determine the nature and extent of MEC. The results of the anomaly investigations in areas outside of the MEC releases can be used to evaluate the MEC densities.

Density transects using analog all metals detectors will be performed within the designated Code 300 Area. Density transects will only be performed in the Code 300 Area. Intrusive investigation work will not be conducted as anomalies are detected. Results from the density transects will be reported to determine if follow-on intrusive investigations are necessary.

Focused grids located using VSP results will be selected based on the response and the size of the anomalous areas identified following data processing and interpretation. The grid size will depend on the anomaly density and terrain characteristics. The default grid size will be 50 feet by 50 feet; however, the size of the emplaced grids will be increased (100 feet by 100 feet) to encompass the anomaly clusters of interest. The grid placement and size will be coordinated with the USACE QA Geophysicist prior to the grid surveys. Anomalies will be selected for these grids at a rate of approximately 50 anomalies per acre. The response range and the number of anomalies within that range are estimated as follows:

- Background noise to 20 mV (stack response): Investigate 20% of the target list.
- Background noise >20 mV to 150 mV: Investigate 40% of the target list.
- Background noise >150 mV: Investigate 40% of the target list.
- <50 anomalies per acre in grid: Investigate 100%.

All selected anomalies will be approved by the USACE QA Geophysicist before intrusive investigations occur.

3.16.7.5 Dig Sheet Development

Following the identification of the potential target anomalies from the geophysical data evaluation listed above, the anomaly locations will be digitized based on the position of the target in UTM Zone 18, NAD coordinates in U.S. Survey Feet on a Target Dig Sheet and Target History Database Form (**Appendix E**). The Site Geophysicists will assign each anomaly a unique target identifier and will enter the corresponding information for the target into the database. The Dig Sheet will also include the QC target anomalies. At a minimum, the following information will be included in the database for each target anomaly:

- Unique Target ID including grid ID (A19-01, {grid ID-target number}).
- Unique Polygon ID for the potential MEC burial areas.
- Easting and northing position.
- Channel ID.

- Response amplitude of the peak response.

One dig list will be generated for all anomalies, including the MEC burial areas for EM31-MK2 and the point source anomalies for the EM61-MK2. Each polygon will have a unique ID that can be input in the target list consistent with the individual anomalies. GPS waypoints for the EM31-MK2 polygon anomalies will be presented in a separate table.

3.16.8 Anomaly Reacquisition and Marking

Anomaly reacquisition will be performed once the geophysical and location data are processed. The selected targets will be located in the field using an RTK GPS system. In areas where the topography or the tree canopy prevents the use of GPS, alternative reacquisition methods, such as RTS or tape measures, will be used. The geophysical target location will be marked with a non-metallic pin flag. The burial areas will be marked with non-metallic pin flags with GPS waypoint information and placed along the perimeter of the burial areas. A UXO Technician will refine the location prior to excavation using the peak response detected by the handheld all-metals detector. Offsets between the reacquired location and the excavated location will be entered into the database. In the event that the handheld all-metals detector is unable to resolve the DGM anomaly location, the EM61-MK2 will be used as an alternative in this situation.

The EM61-MK2 is the digital sensor planned to be used for DGM. It is anticipated that the sensor will need to be deployed in a gurney mode rather than the standard wheel configuration due to the difficult terrain. Using the sensor in this configuration will require multiple personnel to operate the sensor during the data collection. Using this configuration for the anomaly reacquisition will be cumbersome. A handheld sensor is planned for use during the reacquisition to make the process more efficient. In the event that the handheld all-metals detector is unable to resolve the DGM anomaly location, the EM61-MK2 will be used as an alternative.

3.16.9 Anomaly Excavation and Reporting

The SUXOS will maintain records of all MEC/MPPEH recovered on the project. These records will be kept using the RespondFast^{SM} electronic data entry program on a hand-held PDA. The data entered into the PDA will be transferred to a computer and project database each day and subsequently loaded into the project GIS so that all anomaly information is contained in the project GIS.

3.16.10 Feedback Process

The Senior Geophysicist or his designee will review the RespondFast^{SM} database to assess that the physical characteristics of the item(s) found are consistent or appropriate relative to the size and amplitude of detected geophysical anomaly.

If it is determined that the item was likely not the entire source of the anomaly, the anomaly location will be reinvestigated using the instrument utilized during the initial survey. Anomalies of this type will be tracked separately in the database in the event that future analysis is required. In addition, the information derived from the feedback process of comparing the dig results to the predicted results will be continually evaluated to identify the improvements that can be incorporated into the anomaly selection process. The Geophysics QC Manager will provide periodic progress reports with recommendations (as needed) to the USACE Geophysicist.

The measured response values will be compared only with the excavated item characteristics. The UXO Team will confirm there is a reduction in signal with the hand-held instrumentation during the anomaly investigation.

3.16.11 Geospatial Information and Electronic Submittals

The transects and grids will be used to characterize the PTA MRSs. The transects and grids will be uniquely labeled based on the MRS name for surveying and tracking purposes. A licensed surveyor will mark the location of each of the survey grid corners intended for DGM. If large cultural features are observed in a grid location, the location of the feature will be recorded by the surveyor. The geophysical team will use GPS or fiducial positioning at the control points to reference the geophysical data to the UTM Zone 18 projection, NAD 83 datum, with units of U.S. Survey Feet.

3.16.11.1 Control Points

The surveyor will establish horizontal control Class I, third order monuments or survey markers used to locate survey grid corners or transect lines. Staking of the control points and the points of interest will be accomplished by driving wooden stakes for temporary markers.

3.16.11.2 GIS Incorporation

The MEC and MC investigation results will be referenced to the MRS grid or transect where the item was recovered, the feature of interest was observed, or the sample was collected. File names for the electromagnetic data will be referenced to the grid in which the data were collected. The MEC and MC investigation results will be logged using WESTON's RespondFast^{SM} – UXO Investigation field data software for seamless integration into a GIS database.

3.16.11.3 Plotting

The X/Y location and the description of all MEC, MD, and non-MD related items identified during the course of the RI will be recorded electronically on a PDA. All locations will be compiled, tracked, and plotted in a GIS database. In addition to the MEC locations, grid corners and inaccessible areas will be stored in the GIS database. Maps will be generated as applicable. The information overlaid on the base maps will include, at a minimum, a point referencing the location of the MEC and grid identification (ID). Because of the extensive number of points anticipated, all other data (such as northing, easting, anomaly ID, anomaly description, depth) will be recorded in the Dig Sheet (**Appendix E**) and stored in a database for retrieval at a later date.

3.16.11.4 Mapping

The GIS data are being stored and managed using ESRI ArcGIS software, and are spatially referenced to the UTM Zone 18 projection, NAD83 datum, and U.S. Survey Feet units. Metadata are created for all GIS layers managed by WESTON on this project, and conform to Federal Geographic Data Committee metadata standards.

3.16.11.5 Electronic Submittal

At the close of the project, the DGM data will be submitted in accordance to MMRP-09-004 (USACE, 2009d). The GIS data will be submitted in non-proprietary Spatial Data Transfer

Standard format, as well as in the proprietary format used for the execution of the project, specifically AutoCAD 2000 and ESRI ArcGIS geodatabases. The final DGM data will be submitted in accordance with DID MMRP-09-004 in electronic format on DVD. The daily or weekly submittals will be performed via the TeamLink® project website. The pertinent in-progress and field GIS data, design drawings, survey data, relational databases, and other related data will be made available online to the government on the project's TeamLink® website. The formal GIS data submittals will be made on PC-compatible CD. Each submittal will be accompanied by a freeware viewer application appropriate for reviewing the proprietary formatted GIS data (e.g., ArcExplorer for ESRI format geodatabases). Instructions will be included with each submittal for loading the data and the viewer application. No other additional software is required, and no data modification is required for viewing the submittal.

3.17 UNDERWATER INVESTIGATIONS

The investigation activities for the characterization of underwater military munitions will be performed at the Lakes MRS (PICA-008-R-01). This subsection describes the methods and procedures for the underwater investigations that include:

- Evaluate the existing geophysical data results from the previous magnetic surveys conducted in Picatinny Lake and Lake Denmark.
- Perform geophysical transect surveys as part of the RI where data gaps are identified in the previous magnetic surveys.
- Develop composite anomaly dig lists for both Picatinny Lake and Lake Denmark based on the anomaly trends and distribution.
- Intrusively investigate the selected anomalies to determine the anomaly source.
- Evaluate the dig results to achieve the established DQOs for each lake.

Prior to initiating the underwater investigations, a dive plan, including pertinent safety procedures, will be submitted as an addendum to the APP (**Appendix G**).

3.17.1 Underwater Mapping Procedures

Prior to performing the underwater DGM transect surveys at the Lakes MRS, a support boat equipped with a depth finder and GPS navigation will establish visible control markers at the start, middle, and end of the pre-designed transects to aid the production mapping. Bottom features will also be evaluated to identify the potential obstacles that may impede the deployment of the geophysical sensors. Although significant depth changes are not anticipated, any changes will also be marked with GPS. These waypoints will be used to establish the instrument depth settings along each transect.

After QC function checks are performed, the EM61-MK2 deployment platform will be configured to achieve the appropriate depths for each transect. At each of the waypoints along the transects, the EM61-MK2 may be raised or lowered to maintain a consistent height from the lake bottom. The boat will traverse each transect using a navigational light bar to maintain course and speeds to maintain forward motion and helm control.

Some locations in Lake Denmark may be shallow and marshy and thus boat access would not be possible. Instrument deployment systems similar to those used during land-based surveys may be used in lieu of the underwater system.

3.17.2 Instrumentation

The DGM surveys will be performed using an EM61-MK2 modified for underwater investigations pulled behind a low metallic signature support boat. A Trimble RTK GPS will position the underwater mapping system as it is deployed across the pre-defined transects as presented in **Figures 3-18** and **3-21**. A depth finder will be used to establish the transect locations and to determine the appropriate depths below the water surface for the EM61-MK2.

3.17.2.1 Instrument Standardization

To verify the instrument accuracy, the EM61-MK2 will be checked at the beginning and end of each workday following the QC criteria (i.e., equipment warm-up, sensor nulling, static, static spike, and cable shake). Additional function checks may be performed throughout the day, as the operator deems necessary. The data from each system test will be compared with the data collected on previous days. If there is a significant change in results, the instrument will be rechecked. If the difference in the data cannot be accounted for, the instrument will be taken out of service until repaired. **Table 3-24** presents the DGM QC function tests and the acceptance criteria for the underwater EM61-MK2.

Table 3-24 Underwater DGM QC Test Frequency and Acceptance Criteria

Test Description	Acceptance Criteria	Power On	Start of Day	End of Day
Equipment Warm-Up	Equipment Specific (5-15 minutes)	X		
Record Sensor Positions	+/- 1 inch (2.54 cm)		X	
Vibration Test (Cable Shake)	Data profile does not exhibit spikes		X	
Static Background	Background: EM61-MK2 < 2.5 mV std dev		X	X
Static Spike	+/- 20% of standard item response		X	X

3.17.2.2 Function Checks

Prior to conducting the QC function tests, spot measurements will be taken at various locations around the boat launch areas to identify the most suitable area to establish a QC station. Prior to deploying the EM61-MK2 in the water, function checks will be performed. The static background, static response/spike, and vibration/cable connection tests will be performed daily before and after surveying at the fixed QC station identified from the spot measurements. Once the function checks are completed on land, the EM61-MK2 will be deployed into the water and additional checks will be performed to monitor for electrical interference, engine noise, and propeller wash from the tow boat. All QC test statistics will be entered and saved to a database, which will be electronically submitted with each data package.

3.17.3 Underwater DGM Measurement Quality Objectives

The geophysical performance criteria for the underwater DGM are provided in **Table 3-25**. The geophysical quality measurement criteria metrics will be confirmed or appropriately adjusted based on the TPP and the results of the initial QC data.

Table 3-25 Underwater DGM Measurement Quality Objectives

MQO	Measurement Performance Criteria	Testing Method
System and Data Positioning – Potential MEC items or anomalies from existing data can be effectively reacquired.	Known surveyed positions and or detected anomaly positions in DGM survey data are within specification offsets of 3.3 ft.	Conduct a latency test over a spike placed in the water prior to and after the transect surveys.
Data Density – The data density along line is sufficient to detect anomalous areas that include potential MEC.	EM61-MK2 transect survey: 98% of data along line will be spaced no greater than 1 ft. Boat speed will be <3.0 mph.	Use Geosoft and spatial analysis tools to identify locations where data density does not achieve measurement performance criteria.
Anomaly Detection Performance – The calibration spike object responses are repeatable.	Calibration spike object will not vary more than 20% from test to test.	Monitor and compare spike test data daily before and after survey. Evaluate QC station results daily before and after survey.
Repeatability – Positional and detection performance are consistent for the duration of the water investigations.	Review data and spot trends or exceedances from performance criteria.	Evaluate anomaly reacquisition results. Use quantitative review of all test data daily. Evaluate detection and positional information at QC station daily.

3.17.4 Data Processing

3.17.4.1 Data Processing and Standard Data Analysis

The raw digital data will be preprocessed to correct for file names, line numbers, survey direction, and start and end line locations. The data spikes artificially induced from contact with underwater obstructions will be documented and removed where appropriate. The pre-and post survey QC data will be reviewed real-time and during the data download to identify any abnormal changes. The digital data will then be submitted in an ASCII-delimited file (XYZ) suitable for input into the Geosoft analysis software.

3.17.4.2 Advanced Data Processing, Corrections, Digital Filtering, and Enhancement

Once the initial data processing procedures are complete, Geosoft's UX-Detect and QC Geophysical Mapping modules will be used to further reduce the data. Data processing will follow the same procedures discussed in Subsection 3.15.7.2. Statistics for each data set will be calculated to ensure that the measurement quality objectives (MQOs), including the following, are achieved:

- **Background Noise:** The standard deviation will be calculated in areas free of anomalous responses to identify the background noise levels.
- **Average Speed:** The data acquisition rates should be <3 mph.
- **Along-Track Sampling**: The along-track sampling will be evaluated with respect to mean speed. The average along-track sampling will not exceed 2 feet between the data points. It is anticipated that the along-track sampling will average approximately 0.35 foot based on the sampling frequency.

3.17.4.3 Preliminary Anomaly Selection Criteria

Preliminary anomaly selection will follow the same procedures for the EM61-MK2 data discussed in Subsection 3.15.7.3.

3.17.4.4 Anomaly Selection Criteria

The data from the EM61-MK2 survey will be cooperatively analyzed with the existing magnetic survey data to identify the anomaly trends and distribution. Based on the response and the size of the anomalous areas identified, a select number of anomalies will be chosen for excavation. Approximately 25 anomalies will be selected and distributed to effectively characterize the large anomaly clusters or linear features identified following data processing and interpretation. Not all anomalies identified in the DGM data will be placed on the dig list for further investigation.

3.17.4.5 Dig Sheet Development

The dig sheet development will follow the same procedures discussed in Subsection 3.15.7.5.

3.17.5 Anomaly Reacquisition and Marking

The anomaly reacquisition for underwater targets will be accomplished using an RTK GPS system mounted on a boat. The boat operator will maneuver the boat into a location above the target and a PVC pipe will be lowered by hand and inserted into the lake bed. Once the boat and the PVC pipe are positioned, the divers will descend to the search area by following the pipe to the bottom. The diver will then perform an initial search around the PVC pipe using an underwater magnetometer to ensure that the area is clear of MEC. The diver will then set up and perform a circle line search for the targets at 3.25-foot intervals. Once the anomaly location is found, a buoy will be deployed to mark the actual location of the anomaly.

3.17.6 Anomaly Excavation and Reporting

In addition to the procedures in Subsection 3.15.9, a UXO-qualified dive team will dive to the anomaly and investigate the source by using hand tools. The depth of the investigation will be limited to 2 feet for safety reasons. The anomaly will then be positively identified. MEC that cannot be moved will be left in place. Photos and descriptions of the item will be recorded in RespondFast. MEC that can be moved will be brought to the shore for demolition. Large non-munitions related objects identified during dive operations will be left in place.

3.18 MAG AND DIG SURVEYS

Mag and dig surveys will be used in the locations where the DGM surveys would be ineffective for characterizing the nature and extent of MEC. These locations may include rough or inaccessible terrain where the surveys could not be performed using the digital equipment. The mag and dig transects and the grid surveys will be performed in the MRSs based on the DQOs presented in Subsection 3.1.3.

3.18.1 Instrumentation

The mag and dig surveys will be performed using the Vallon or equivalent all-metals detector and as a backup, the Schonstedt magnetic locator. **Table 3-26** presents the descriptions of each instrument.

Table 3-26 Mag and Dig Instrumentation

Instrument	Description
Schonstedts 	▪ Analog magnetic locator. ▪ Hand-held unit that detects changes in the Earth's ambient magnetic field caused by ferrous metal. ▪ Contains two flux-gate sensors mounted at fixed distance and aligned in gradiometer configuration. ▪ Generates an audible output when either of the two sensors detects a disturbance of the Earth's ambient or permanent field associated with a ferrous object. ▪ Detects ferrous objects only. ▪ Very difficult to use in highly mineralized ferrous soils. ▪ May be used as a backup instrument.
Vallon 	▪ Vallon all-metals detector. ▪ Hand-held pulse-induction detector that contains both transmitting and receiver coils. ▪ Electromagnetic pulses transmitted to induce eddy currents in ferrous and non-ferrous objects. ▪ Receiver coils measures the decay of the pulse response. ▪ Successfully used in areas with highly mineralized ferrous soils where magnetometers cannot be used.
Handheld GPS unit (i.e., Garmin or Trimble XT) 	▪ Capable of meter accuracy and used by the UXO Teams to navigate and track the analog instrument transects, and captures positions of discovered items. ▪ A Brunton compass may be used in conjunction with the handheld GPS during transect surveys for better control.

3.18.2 Mag and Dig Transects

The mag and dig transect surveys will be performed by the UXO technicians along the pre-designated pathways as described in the characterization approach for each MRS. The waypoints or the transect line features will be taken from the MRS-specific field investigation approaches as GIS-compatible SHP files and loaded onto handheld GPS units. These waypoints and/or line features will be used by the UXO technicians to ensure that the transect pathways are followed as closely as possible (terrain and obstacle dependent). The GPS will also record the exact pathways the UXO technicians walk. These pathways will be migrated into the project GIS to review the investigation coverage.

Each mag and dig transect will be approximately 10 feet wide, equating to 5 feet for each UXO technician. The subsurface anomalies detected will be intrusively investigated in real-time to determine the presence of potential MEC. In areas where large amounts of cultural debris (e.g., cans, metal scrap) are identified, the UXO technicians will adjust the intrusive investigation as appropriate based on professional judgment. These locations will be recorded by GPS, tracked and reported to the SUXOS and/or UXOQCS. The details of the anomaly counts and the information obtained during the transect surveys will be logged into RepondFast-UXO Investigation and added to the project GIS for analysis.

3.18.3 Mag and Dig Grids

The focused grids will be placed in accordance with the individual characterization approach for each MRS. Full coverage mag and dig surveys will be performed across each grid. The UXO Team will mark out 5-foot intervals along the north and south or the east and west bounds of the grid. The 5-foot intervals will then be connected with ropes to delineate the lanes to be surveyed during the mag and dig. In areas of steep or difficult terrain, the UXO teams may use marking tape or pin flags to locate the survey lanes. The teams will traverse the grids using the Vallon or equivalent all-metals detection equipment to detect the subsurface anomalies. As they are detected, the anomalies will be investigated for potential MEC. The details of the anomaly counts and the information obtained during the transect surveys will be logged into RespondFast-UXO Investigation and added to the project GIS for analysis.

3.18.4 Production Rates

Based upon past experience in similar terrain, and assuming no delays caused by the weather or other unexpected factors, WESTON will have a goal of achieving the following production rates during the mag and dig surveys:

- **Mag and Dig Transects** - The typical production rate for the analog survey transects by using a two-man UXO Team is expected to be 3 to 4 miles per day, depending on the site conditions. However, if poor site or weather conditions occur, this production rate may be reduced to 1 to 3 miles per day, per team.
- **Mag and Dig Grid Surveys** - The production rate is anticipated to be approximately 0.75 to 1.25 acres per day for the mag and dig surveys. Production rates will depend on the size and location of the grids and the field conditions encountered.

3.19 INTRUSIVE INVESTIGATION

3.19.1 General Methodology

Anomalies will be selected for investigation during the initial geophysical mapping effort. Anomaly reacquisition will be performed by an anomaly reacquisition team under the direction of the UXO Team Leader and Site Geophysicists. Anomalies will be intrusively investigated using hand tools. Prior to excavations, each work area will be evaluated for underground utilities by the SUXOS and the UXOSO acting under an active dig permit approved by PTA. Non-essential personnel will be evacuated from the area in accordance with the appropriate minimum separation distance as presented in the approved Explosive Site Plan (ESP), provided in **Appendix H**.

The UXO Team will excavate at the anomaly location to determine/assess whether MEC/MPPEH are present. The depths of the excavations will not exceed 4 feet. If the anomaly cannot be uncovered within the specified depth, the UXO Team will conspicuously mark the site with flagging material and continue to the next location. The anomaly will be reported to the SUXOS for documentation and evaluation of the anomaly. The project team will then determine whether additional excavations are required.

If the subsurface contact proves to be munitions-related debris or cultural debris, the item will be removed and the hole rechecked with a geophysical instrument. If the hole is "clear," it will be refilled and tamped. The excavation/detonation holes will be backfilled with the soils excavated from the hole to the extent possible. If the subsurface contact is MEC/MPPEH, it will be disposed of in accordance with the procedure detailed in Subsection 3.12, MEC/MPPEH Disposal. Each MEC will have its condition and identification determined by UXO technicians.

3.19.2 Accountability and Records Management for Munitions and Explosives of Concern

WESTON will maintain records of all items recovered on the project. These records will be kept using an electronic data entry program on a hand-held PDA. The software program, WESTON's RespondFast^{SM} – UXO Investigation, has modules for the surface and subsurface recovery information. The data acquired during the course of this RI will be maintained in accordance with the data requirements specified in DID MMRP-09-004 (USACE, 2009d). The data entered into the PDA will be transferred to a computer and the project database each day and subsequently loaded into the project GIS so that all anomaly information is contained in the project GIS.

3.19.3 Identification of Munitions and Explosives of Concern

The positive identification and the inspection/certification of MEC/MPPEH will be conducted in accordance with the standard explosive ordnance reconnaissance procedures, Department of Defense Instruction (DoDI) 4140.62 and Engineering Manual 1110-1-4009. The physical characteristics and field information about the item will be recorded into WESTON's RespondFast^{SM} – UXO Investigation.

3.19.4 Storage of Munitions and Explosives of Concern

MEC/MPPEH may be stored on-site during this project in an approved magazine (see ESP for details). The MEC recovered will either be disposed of daily or stored in the approved magazine. If an item cannot be destroyed daily, it will be guarded until demolition or storage is achieved.

Donor explosives will be stored in an approved and sited on-site magazine or WESTON will utilize a local vendor for daily explosives delivery on an as-needed basis.

3.20 MEC DISPOSAL

3.20.1 General Procedures

MEC and/or MPPEH will be disposed of in one of three ways: (1) transported to a demolition area on PTA and destroyed, (2) BIP or (3) EOD will respond.

Treatment by demolition of any item will not occur until positive identification has been achieved. The SUXOS or designee will notify the USACE OESS, who will request EOD support if the following scenarios are encountered during the course of this project:

- MEC cannot be identified as a conventional explosive.
- The fuze cannot be identified by type or function.
- Chemical warfare materiel is suspected.

The USACE OESS and EOD will coordinate and determine the proper course of action.

3.20.2 Demolition Activities

WESTON will conduct the demolition activities on an as-needed basis and in accordance with the approved ESP, presented in **Appendix H** of this Work Plan and the Demolition Operating Procedure (OP) (**Appendix F**). The demolition activities will follow the requirements of Technical Manual (TM) 60A-1-1-31, Engineering Manual 385-1-97, applicable Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF), and federal, state, and local regulations. The inspection/certification of MEC/MPPEH will be conducted in accordance with Department of Defense Instruction (DoDI) 4140.62 and Engineering Manual 1110-1-4009. WESTON will use remote firing devices (RFD) to ensure the safety of personnel. WESTON will coordinate with the USACE, PTA, and local authorities prior to demolition activities. The demolition activities will not commence until all parties on the notification roster have been notified in advance. The Demolition Notification Roster is provided in **Table 3-27**.

Table 3-27 Demolition Notification Roster

Call Order	Contact Name	Contact Information
FIRST CALL	Mr. Chris Yonet OESS USACE	(410) 340-8459 (cell) Baltimore District, USACE ATTN: CENAB-EN-HI Baltimore, MD 21201-1715
SECOND CALL	Ted Gable Project Manager for Environmental Restoration	(973) 724-6748 (work) (312) 880-6748 (DSN) INCOM-NERO-PIC-PWE B319 Picatinny Arsenal, NJ 07806-5000
ALTERNATE *SECOND CALL*	J.B. Smith UXO Safety/MMRP Technical Project Manager/PTA Safety Office	(973) 724-2522 (work) (973) 880-4236 (cell) (312) 880-2522 (DSN) IMNE-PIC-PW B3002 Picatinny Arsenal, NJ 07806-5000
THIRD CALL	Rodney Morgan Team Leader Demilitarization US Army ARDEC	(973) 724-3134 (work) (973) 945-7610 (cell) (312) 880-3134 (DSN) RDAR-EIL-LA Picatinny Arsenal, NJ 07806
FOURTH CALL	Nancy Flaherty Project Manager/Design Team Leader USACE	(410) 779-2796 (office) (443)-844-8193 (cell) Baltimore District, USACE CENAB-EN-HI Baltimore, MD 21201-1715
FIFTH CALL	Laura Pastor Project Manager WESTON	(610) 701-3445 (work) (484) 467-9466 (cell) Weston Solutions, Inc. West Chester, PA 19380
SIXTH CALL	Police (non-emergency) Picatinny Arsenal, NJ 07806-5000 Police Chief	(973) 724-7273 (973) 724-4161
SEVENTH CALL	Picatinny Fire Department (non-emergency) Picatinny Arsenal, NJ 07806-5000 Fire Chief	(973) 724-3097 (973)724-3842

If demolition is required outside PTA boundaries, the designated demolition supervisor will possess a New Jersey Blaster's License and will be responsible for all aspects of conducting demolition operations. Detonations will be scheduled by the SUXOS in conjunction with the USACE OESS and PTA on the basis of the weather and logistical considerations.

A minimum of three UXO qualified personnel, one of whom will be the Team Leader, will conduct demolition operations. An electrical firing system provides better control of the demolition activities. The control of the initiation devices will remain with the Demolition Team Leader until attachment to the firing circuit.

The demolition team will account for demolition materials at all times. Only the estimated amount needed to complete the day's demolition operations will be ordered (or removed from the magazine) from a local vendor and transported to the work area.

The unique demolition sites will be photographed with a digital camera prior to, and after firing of the shot, and the photograph(s) will be saved electronically for the RI Report. At a minimum after each detonation, the detonation points and general demolition site will be inspected to ensure that a misfire, low order, or kick-out has not occurred. The area where demolition operations are being conducted will remain secured until the SUXOS, in consultation with the UXOSO and/or the USACE OESS, gives the "all clear."

3.20.3 Evacuation and Site Control

The control of the demolition site must be maintained during the demolition operations. The personnel who are not essential to demolition operations must evacuate to a safe area. The occupied buildings must be evacuated and the access roads entering the detonation area will be blocked during the explosive disposal operations to ensure that unsuspecting individuals are not placed in jeopardy by the explosion. The UXOSO and Demolition Team Leader will ensure that the area is clear of unauthorized personnel and equipment prior to permitting the attachment of the initiation devices to the priming charge.

An observer will be stationed where there is a good view of the air and surface approaches to the demolition site. It will be the responsibility of the observer to notify the Team Leader to suspend firing if any aircraft, vehicle, or personnel are seen approaching the general demolition site.

The PTA fire department may need to be alerted to stand by during demolition operations. In the event of a fire or unplanned explosion, site personnel will be responsible for extinguishing the fire. If they are unable to do so, they will notify the PTA fire department and evacuate the area. NOTE: Do not attempt to fight explosive fires.

Prevailing weather condition information will be obtained from a reliable source. These data will be logged before each on-site detonation. The demolition charges will not be primed or connected for electrical firing during the approach or presence of a thunderstorm. Other weather conditions (high winds, dust storms, temperature inversions, low altitude clouds, or cloud coverage of more than 50%) may adversely impact planned demolition operations. The SUXOS will consider these conditions when determining whether or not to conduct demolition operations. If the weather conditions preclude the disposal by BIP, WESTON personnel will secure and cover the UXO with sandbags and properly mark the area, until favorable conditions allow the demolition. The personnel will remain at the site as long as the possibility of fire exists as the result of a demolition operation.

3.20.4 Engineering Controls

WESTON will use engineering controls in accordance with HNC-ED-CS-S-98-7 to reduce the fragmentation distances of demolition shots. A copy of HNC-ED-CS-S-98-7 will be on-site and available to site personnel. Additional engineering controls that may be used include the buried explosion module in accordance with Department of Defense Explosives Safety Board (DDESB) TP-16 and water mitigation in accordance with HNC-ED-CS-S-00-3. In areas where an acceptable fragmentation distance cannot be achieved, items acceptable to move may be moved to the approved demolition area, with the concurrence of the Ordinance and Explosive Safety Specialist (OESS). If these methods of disposal are determined to be impractical, then WESTON will notify the on-site OESS.

3.20.5 Fragmentation Distance

Fragmentation distances and overpressure distances are based upon the net explosive weight (NEW) of a single demolition item plus the donor charge as outlined in the ESP, the minimum separation distance (MSD) calculations in the ESP (**Appendix H**) or Chapter 9 of DoD

6055.09M. The calculation of the fragmentation and overpressure distances is important in order to ensure the safety of not only site personnel, but also the public. These distances will be calculated using DDESB Technical Paper 16.

Detonating multiple shots will be sequentially timed to ensure they are not simultaneous. The K328 overpressure for the consolidation shot will not exceed the maximum fragment distance for the munitions with the greatest fragmentation distance. WESTON ensures that all demolition shots are conducted using the appropriate minimum separation distances for the munitions and donor explosives involved. If this is not possible, tamping or other engineering controls will be used.

3.20.6 Material Potentially Presenting an Explosive Hazard

WESTON UXO technicians will inspect MPPEH to determine whether an item/material is MEC, material documented as an explosive hazard (MDEH) or MDAS. WESTON will classify items of undetermined explosive hazard as MDEH and will dispose and/or vent the item with other demolition shots. MPPEH will be disposed of by detonation using the standard demolition procedures outlined in Technical Manual (TM) 60A-1-1-31 and procedures described in Subsection 3.19, MEC Disposal, of this Work Plan and the Demolition OP in **Appendix F**.

WESTON ensures that the materials are inspected on the exterior and interior surfaces to be certain that these items do not present an explosive hazard. WESTON employs a four-level process for the inspection of MPPEH.

1. 100% inspection and 100% re-inspection by the UXO team, once by a UXO Technician II and once by the UXO Team Leader (Technician III).
2. Inspection by the UXOQCS during daily audits of the procedures used by UXO teams for processing MPPEH.
3. The UXOQCS ensures that the procedures and responsibilities for processing MPPEH for certification as MDAS are being followed and performs random checks of processed MDAS and metal debris.
4. The SUXOS/UXOQCS is responsible for ensuring that the Work Plan and the QC plan detail the specifics of the procedures to be followed to process MPPEH. The SUXOS will perform or witness a 100% re-inspection and will sign the DD Form 1348-1A. The UXOQCS or other technically qualified personnel will perform or witness the 100%

inspection or an independent quality assurance (QA) inspection of the processed material using an approved sampling method.

3.20.7 Munitions Debris

During the intrusive operations, metal scrap will be inspected by an UXO Technician II and segregated into the following three categories:

1. Other related scrap (e.g., nails, wire, tin cans).
2. MDAS (e.g., fragments, shrapnel, and munitions components free of explosives).
3. MDEH requiring venting to ensure it is free of explosive hazards.

Upon the completion of the daily operations, the team will collect the material in temporary collection points for transport to the secure holding area. As the material is being loaded, an UXO Technician III will perform a second inspection of the material to ensure it is segregated correctly. Any MDEH that is identified will be vented with the other demolition shots.

When certified and verified as free of explosives hazards, the material collected during the RI will be placed in containers and sealed. Each container will be closed in a manner that requires that the seal be broken to gain access to the interior of the container. The containers will be labeled with a unique identification as follows:

- USACE/PTA/Weston Solutions, Inc./Container number (eg 0001)/Seal number.

DD form 1348-1A will be used as the certification/verification documentation for MDAS. DD form 1348-1A will clearly show the printed names of the SUXOS and USACE OESS, organization, signature, and contractor's home office and field office phone numbers of the SUXOS. DD form 1348-1A will list the following:

- Basic material content
- Estimated weight
- Unique identification of each of the container and seal number
- Location where the MDAS was obtained"

Certified MDAS will be transferred to PTA (or if off-post to a recycler) with the completed DD Form 1348-1A. The SUXOS will sign the Certificate as follows: *"This certifies and verifies that* *the material listed has been 100 percent inspected and to the best of our knowledge and belief, is inert and/or free of explosives or related materials."*

This documentation will be included in the RI Report. MDAS will be turned over to PTA at the end of the project or periodically as necessary.

For wastes generated in off-post MRSs, WESTON will arrange for MDAS and scrap metal to be recycled by a local vendor. In accordance with 40 CFR 261.6(a)(3), scrap metal, if recycled, is not subject to Parts 262-266, or 268, 270, or 124. WESTON will recycle scrap metal generated as a result of necessary removal and maintain records of recycling.

3.20.8 Personnel Responsibilities

Personnel responsibilities will be as follows:

- UXO Technicians II: Check, classify, and segregate MDAS as they are recovered.
- UXO Technicians III: Re-inspect all MDAS, as it is loaded for transport to the MDAS holding area.
- The UXOQCS:
  - Conducts daily audits of the procedures used by the UXO teams and of the MPPEH handling process.
  - Randomly inspects and documents a minimum of 10% of the MDAS being processed to ensure the handling procedures are being followed.
  - Performs or witnesses the 100% re-inspection.
- The UXOSO:
  - Ensures that the specific procedures for MPPEH are being followed, performed safely, consistent with applicable regulations, and in accordance with the Work Plan.
  - Performs random checks to ensure that MDAS is being handled correctly.
- SUXOS:
  - Ensures that the specific procedures for MPPEH processing are being followed, performed safely, consistent with applicable regulations, and in accordance the project Work Plan.
  - Performs random checks to ensure that MDAS is being handled correctly.
  - Performs or witnesses the 100% re-inspection.
  - Certifies that MDAS is free from explosive hazards.

- Takes responsibility for ensuring that the inspected materials are secured in locked containers while awaiting shipment off-site.
- Ensures that prior to shipping material off-site, the inspected materials are in a closed, labeled, and sealed container and documented as follows:
  - Unique label including "PTA/Weston Solutions, Inc./Container No. (e.g., 0001)/Seal Number."

4. REPORTING

4.1 RI REPORT

The RI Report(s) will be prepared at the conclusion of the field investigation(s). More than one RI Report may be prepared and submitted, based on the recommendations of the project planning team (e.g., off-post MRSs may be discussed in one combined RI Report). In general, the RI Report(s) will:

§ Present the findings of the investigations conducted as part of the MEC and MC characterization at PTA (including the detailed geophysical and laboratory data).

§ Discuss the usability of the data based on the satisfaction of the DQOs.

§ Revise the CSM for each MRS (based on the RI results).

§ Present the results of the hazard and risk assessments.

§ Identify preliminary remedial action objectives.

4.1.1 Assessment of Explosive Hazards

A MEC risk assessment, using the MEC Hazard Assessment (MEC HA), along with a description of how the RI results may influence the current and future use of the MRSs at PTA, will be included in the RI Report(s). The potential explosive hazards to the human receptors at each MRS will be assessed using the Interim MEC Hazard Assessment Methodology guidance document (EPA, 2008). The severity, accessibility, and sensitivity of the MEC found at the MRSs will be evaluated in accordance with this guidance so that the project team can establish a baseline hazard assessment in support of the CERCLA process. The MEC HA will also enable the project team to assess the MRSs on the most appropriate scale by dividing an MRS into subunits if necessary.

4.1.2 Assessment of Munitions Constituents Risks

As part of the RI Report, a baseline human health risk assessment (HHRA) and a screening-level ecological risk assessment (SLERA) may be prepared for the MRSs. Whether or not an HHRA and SLERA will be prepared for a specific MRS, and how the HHRA and SLERA will be prepared and reported, will be determined based on the following:

- If no MC samples are collected at an MRS, no HHRA or SLERA will be conducted. However, for consistency with EPA's CERCLA RI/FS guidance, a risk assessment section will be included in the RI Report to note that an HHRA and SLERA are not required.

- If MC samples are collected and all constituents are non-detect, no HHRA or SLERA will be conducted. However, for consistency with EPA's CERCLA RI/FS guidance, a risk assessment section will be included in the RI Report to note that an HHRA and SLERA are not required.

- If MC samples are collected and MC is detected, but no chemicals of potential concern (COPCs) for the HHRA and/or no chemicals of potential ecological concern (COPECs) for the SLERA are identified, the HHRA and SLERA will be initiated but will be truncated at the data evaluation stages, with the noted statement that further HHRA and/or further SLERA are not warranted.

- If MC is detected and COPCs and/or COPECs are selected, the data utilization for the HHRA and/or SLERA (i.e., whether to evaluate the MRS as one exposure unit or multiple exposure units) will be decided at that time.

As noted below, the HHRA and SLERA will be conducted in accordance with EPA's Risk Assessment Guidance for Superfund (RAGS) series of guidance documents. A detailed risk assessment work plan (typically termed a Pathways Analysis Report) will be prepared for those MRSs where an HHRA or SLERA is warranted, based on evaluation of the validated analytical data, once the fieldwork is completed. The risk assessment work plan, which will include RAGS Part D (EPA, 2001) Tables 1 to 6, will serve as a predecessor to the HHRA and/or SLERA but will not be finalized upon review by the USACE and the regulatory agencies. Comments requiring resolution will be discussed via teleconference; response-to-comments will be prepared only for unresolved comments. Resolved comments will be incorporated directly into the HHRA and/or SLERA. The risk assessment work plan will include selected draft, report-ready text, figures, and appendices to facilitate completion of the risk assessment.

According to the SI for PTA, further investigation for MC was recommended for the following MRSs:

- PICA-003-R-01: 1926 Explosion Radius.
- PICA-004-R-01: 1926 Explosion Site - Off-Post.
- PICA-006-R-01: Former Operational Areas.
- PICA-014-R-01: Inactive Munitions Waste Pit – Off-Post.
- PICA-008-R-01: Lakes (Land Portion Only).

- PICA-012-R-01: Lake Denmark - Off-Post.

As described in QAPP Worksheet 17 (**Appendix B)**, only biased soil sampling, based on the MEC field investigations, is proposed for all the MRSs except the 300 Marsh Area located within the 1926 Explosion Radius MRS and the Former Operational Areas MRS. Screening values to identify COPCs and COPECs that are protective of adverse human and ecological health effects will include, but not be limited to, the EPA's regional screening levels (accessed online: www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/) and EPA's ecological soil screening levels (accessed online: www.epa.gov/ecotox/ecossl/), respectively.

4.2 RISK ASSESSMENTS

Baseline HHRAs and SLERAs will be prepared, in accordance with the general outline noted above, as part of the RI and presented in a section of the RI Report. Separate HHRAs and SLERAs will be prepared for each MRS, as appropriate. The locations of the majority of the proposed MC samples will be biased (as discussed in Worksheet 17 and Attachment 3 to the UFP-QAPP) because, based on the CSM for each MRS, it was determined that MC is likely associated with MEC in the environment and is not widespread throughout the MRS. Non-biased locations are proposed for MC samples at only the following MRSs:

- 1926 Explosion Radius MRS: Fifteen gridded sediment samples in the 300 Marsh Area, which is located within the MRS.
- Former Operational Areas MRS: Ninety gridded soil samples across the MRS.

The biased MC soil sampling (as described in Worksheet 17 of the UFP-QAPP) will be conducted immediately under, or adjacent to, MEC, where contamination is likely (e.g., visual staining, near cracks/corrosion). Soil samples will not be collected near inert or intact MEC/MPPEH unless the field observations indicate potential contamination (e.g., staining. No MC sampling is proposed for any MEC when the MEC is BIP. MC samples will be analyzed for explosives and select metals.

Therefore, with the exception of MC data for the samples collected within the 300 Marsh Area (located within the 1926 Explosion Radius On-Post MRS) and the samples collected at the Former Operational Areas MRS, MC data may or may not be available at the remaining MRSs.

4.2.1 Baseline Human Health Risk Assessment

The potential for current and future risks to human health posed by exposure to MC at the MRSs will be evaluated, as appropriate, by preparation of a baseline HHRA. The HHRA will be prepared in accordance with applicable and current USACE (1999), EPA *Risk Assessment Guidance for Superfund* (RAGS) series (1989, 2001, 2004, and 2009), and other relevant EPA guidance. Accordingly, the HHRA(s) will be presented in a series of tables in RAGS, Part D format (EPA, 2001). Each baseline HHRA will include the hazard identification, exposure assessment, toxicity assessment, and risk characterization components, as briefly described below.

4.2.2 Hazard Identification

The hazard identification will begin with a refinement of the CSM, which will be used to focus the HHRA. The CSM will identify scenario timeframes, exposure media and exposure points, receptor populations and ages, exposure routes, type of analysis (i.e., quantitative or qualitative), and the rationales for selecting or excluding an exposure pathway for evaluation.

The usability of the MC data collected during the RI to support the HHRA will be determined based on satisfying the DQOs and the validation criteria. Only validated data, as defined in EPA's RAGS Part A (1989) and EPA's *Guidance for Data Usability in Risk Assessment (Part A)* (1991), will be used.

The occurrence and distribution of detected MC in soil (sediment for the 300 Marsh Area) will be summarized and evaluated. From these data, the environmental media of concern and the specific COPCs will be identified for subsequent evaluation. As described previously, at a minimum, MC samples will be collected with the following frequencies:

- 1926 Explosion Radius MRS – 15 sediment samples in the 300 Marsh Area.
- Former Operational Areas MRS – 90 soil samples within the MRS.

The MC data collected within the 300 Marsh Area of the 1926 Explosion Radius MRS will be evaluated independently because of the different media and because the 300 Marsh is not an MRS. Depending on the quantity and location of any additional MC soil data collected in association with MEC, the additional soil data may be combined for the entire MRS as one exposure unit or grouped into smaller exposure units.

Because of the size of the Former Operational Areas MRS and the number of samples to be collected, these data may be grouped by smaller exposure units, yet to be determined. Any additional MC soil data collected within the Former Operational Areas MRS will be grouped with other data within an exposure unit.

Data utilization for other MRSs will be determined based on the quantity and locations of the samples.

Consistent with EPA RAGS Part A, COPCs will be selected on the basis of the detected concentrations in excess of the screening toxicity values. The maximum concentration of each detected MC will be compared to a risk-based screening toxicity value, and MC with maximum concentrations below the screening toxicity values will be eliminated as COPCs. The screening toxicity values for soil will be derived from the latest EPA/Oak Ridge National Laboratory (ORNL) and the NJNHP (2011).

ORNL Regional Screening Levels for Chemical Contaminants at Superfund Sites for residential soil. The screening toxicity values will correspond to a 10^{-6} risk (for carcinogens) or a hazard index (HI) of 0.1 (for noncarcinogens).

4.2.3 Exposure Assessment

The exposure assessment will focus on the potentially exposed human populations and the exposure routes and will estimate the magnitudes of actual or potential human exposures based on the COPC concentrations, contact rates, frequency of occurrence, and duration of exposure. It will address each potential current and future exposure pathway. Exposure point concentrations (EPCs) will be calculated for each COPC, either MRS-wide or by exposure unit, as appropriate.

The receptors to be evaluated may include PTA personnel, residents, contractors (e.g., construction/utility workers), visitors, and recreationists, as appropriate, for the MRS being assessed.

The EPCs for each COPC will be determined in accordance with EPA guidance. To the extent possible (i.e., a minimum of 10 samples and a sufficient number of detected values), the 95% upper confidence limit (95% UCL) on the arithmetic average concentration will be calculated for each COPC using the EPA's ProUCL software (Version 4.1 or later). The data distribution for each COPC will be determined, and a 95% UCL concentration will be selected based on the recommendation of the software. In the event a 95% UCL concentration cannot be calculated, another ad hoc estimate will be used (i.e., median, mode, maximum). Appropriate EPCs will be developed for an exposure unit based on the nature and extent of contamination.

The selected exposure parameters will represent the reasonable maximum exposure (RME). The relevant equations for assessing the intakes and the exposure factors will be obtained from the EPA RAGS Part A, (EPA, 1989), *Exposure Factors Handbook* (EPA, 1997b), *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (EPA, 2002a), RAGS Part E (EPA, 2004), and RAGS Part F (EPA, 2009). The RME case will be based on the estimated EPCs and a combination of the average (e.g., body weight) and the high-end (e.g., 90th percentile exposure duration) exposure parameter values.

Adult and child exposures to lead will be evaluated, as appropriate, if lead is selected as a COPC at an MRS. The potential for adverse health effects from exposure to lead currently is evaluated on the basis of estimated blood lead levels relative to a benchmark blood lead level rather than through the conventional toxicological criteria described below. As necessary, the adult exposures may be evaluated using the methodologies established in the EPA *Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil* (EPA, 2003b). The exposure of a young child may be evaluated in accordance with the EPA *Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children (IEUBK)* (EPA, 2007, 2002b, 1994) using IEUBKwin v. 1.1 or later.

4.2.4 Toxicity Assessment

The COPCs will be evaluated based on their intrinsic toxicity as carcinogens and/or noncarcinogens (i.e., systemic toxicants). The toxicological criteria that describe the relationship between chemical exposure (as an intake or dose) and the likelihood of that exposure resulting in adverse health effects (response) will be used to characterize risk. For carcinogens, the toxicological criteria are cancer slope factors (CSFs) or unit risk factors; for noncarcinogens, the toxicological criteria are reference doses (RfD) or reference concentrations (RfCs). As recommended by EPA (2003a), the toxicological criteria for the COPCs will be obtained from the following hierarchy of sources:

- Tier 1 – EPA's Integrated Risk Information System.
- Tier 2 – EPA's Provisional Peer Reviewed Toxicity Values.
- Tier 3 – Other toxicity values (e.g., Agency for Toxic Substances and Disease Registry (ATSDR) minimum risk levels, California Environmental Protection Agency toxicity values, EPA's Health Effects Assessment Summary Tables (EPA, 1997c).

Oral CSFs and RfDs typically are based on the administered dose. However, because the methodologies for evaluating dermal exposure to soil estimate the absorbed dose, the oral CSFs and RfDs will be adjusted accordingly. Subchronic RfDs and RfCs may be used, depending on the receptor and modeled exposure scenario.

4.2.5 Characterization

Chemical-specific toxicity information, combined with the intake and dose estimates from the exposure assessment, will be used to calculate cancer risks and to evaluate the potential for adverse noncancer health effects. For carcinogenic COPCs, the risks are expressed as incremental lifetime cancer risks (ILCRs). The estimated ILCR values will be discussed relative to EPA's 10^{-4} to 10^{-6} acceptable risk range. The potential for adverse noncancer health effects is evaluated through computation of the COPC-specific hazard quotients (HQs) and the total pathway HIs. Initially, the HIs will be summed over all COPCs and pathways for each receptor. Depending on the results, toxic endpoint–specific HIs may be calculated. The calculated HQs and HIs will be discussed relative to the EPA target ratio of 1.

Brief toxicological profiles will be prepared for those COPCs that cannot be evaluated quantitatively because of the lack of toxicity values.

Because uncertainties are inherent in the process of conducting an HHRA, the main sources of uncertainty and the implications of those uncertainties to the risk characterization will be briefly discussed. This discussion will include, but may not be limited to, the uncertainties associated with sampling and analysis, the selection of the COPCs, and the components of the exposure assessment and of the toxicity assessment.

4.2.6 Screening Level Ecological Risk Assessment Reports

A SLERA will be prepared, as appropriate, for each MRS, in accordance with the applicable and current USACE guidance (1996), EPA guidance (1997a and updates), and other relevant guidance. The SLERA will include Steps 1 and 2 and portions of Step 3 (to refine the results of the SLERA, as needed) of the EPA's *Ecological Risk Assessment Guidance for Superfund* (ERAGSs) (EPA, 1997a). The objectives of the SLERA will be to evaluate the potential for adverse health effects in ecological receptors from exposure to MC detected at the MRS and to present the results in a manner that facilitates risk management decisions. The need for further ecological evaluation (e.g., Baseline Risk Assessment) will be determined by USACE and the regulatory agencies based on the SLERA findings and recommendations.

The SLERAs will include a screening level problem formulation/ecological effects evaluation and screening-level preliminary exposure estimates/risk calculation components, as described below.

The screening level problem formulation and ecological effects evaluation component will:

- Describe the environmental setting and ecological resources at the MRS.
- Identify COPECs at the MRS.
- Identify the potential ecological receptors and assessment endpoints at the MRS.
- Describe the chemical fate and transport pathways at the MRS, if warranted.
- Develop an ecological CSM (refine the CSM from the SI) that illustrates potential exposure pathways to ecological receptors.

The field data presented in the SLERA will include a description of the habitats observed at the MRS, including the vegetative cover types and the potential ecological receptor species. The potential chemical fate and transport mechanisms will be discussed in the context of the potential for MC to migrate to areas on the MRS supporting ecological receptors. An exposure pathway analysis will assess the potential exposure pathways through which the ecological receptors may be exposed.

The screening level preliminary exposure estimates and risk calculation will include the following:

- Comparison of the EPCs of MC in soil to the ecotoxicity screening values, including but not limited to, EPA Ecological SSLs, EPA Region 5 ecological screening levels (EPA, 2003c), and for explosives, ecological screening levels from the Los Alamos National Laboratory (LANL) ECORISK Database Release 2.5 (October 2010) (LANL, 2010). EPCs will be the 95% UCL on the arithmetic average concentrations or ad hoc estimates, as described previously.

- Comparison of the EPCs of MC in sediment in the 300 Marsh Area, if applicable, to the ecotoxicity screening values, including, but not limited to, the NJDEP *Site Remediation Program Guidance for Sediment Quality Evaluations* (NJDEP, 1998; updated 2011); the lowest ORNL value from Jones et al. (1997); and for explosives, the ecological screening levels from the LANL ECORISK Database (LANL, 2010). The EPCs will be the 95% UCL on the arithmetic average concentrations or ad hoc estimates, as previously described.

- Evaluation of the potential for risks to the ecological receptors from the identified exposure pathways. Appropriate indicator species will be selected for a variety of feeding guilds appropriate for each MRS and based on representative species that are or could be present at the MRS.

Feeding guilds that may be evaluated include herbivorous, omnivorous, insectivorous, and/or carnivorous birds and mammals. As discussed further in Section 8, several federal or state threatened, endangered, or species of concern are or may be present at PTA. Several state endangered plant species occur or may occur at PTA. In the event a threatened, endangered, or species of concern is known or likely to be present at an MRS, special consideration will be given to those species; specifically, evaluation will be limited to toxicity benchmarks based on no-observed adverse effects levels.

The basic assumptions, the applications of the assumptions, or the variables used in the SLERA will be identified, and the overall impact on risk estimation will be discussed.

If the results of a SLERA indicate a potential for adverse health effects in ecological receptors, the SLERA will be refined. Because the SLERA uses a variety of conservative assumptions, the list of COPECs and the corresponding HQs generated will be further evaluated to determine whether the use of site-specific exposure parameters would result in lower HQs. Additionally, the on-site COPEC concentrations will be evaluated against both naturally occurring and anthropogenic background concentrations, as described in the *Picatinny Arsenal Facility-Wide Background Investigation, Picatinny Arsenal Installation Restoration Program* (IT Corporation, 2002). For this refinement, the following parameters will be re-evaluated, as appropriate, and intakes and HQs will be recalculated for those indicator species and exposure pathways indicating a potential for adverse health effects:

- Area use percentage (home range).
- Bioavailability < 100%.
- Diet composition < 100% from the most contaminated media.
- Food concentration.

Uncertainties inherent in the process of conducting SLERAs will be briefly discussed, as described previously.

4.3 MUNITIONS RESPONSE SITE PRIORITIZATION PROTOCOL

The Munitions Response Site Prioritization Protocol (MRSPP) requirements in 32 Code of Federal Regulations (CFR) Section 179 require that DoD, in consultation with representatives of the states and Indian tribes, assign each MRS a relative priority for response actions. The initial MRSPP score for MRSs was developed during the SI phase. These MRSPP scores will be revised based on the new data obtained during the RI and will be submitted to the Army.

4.4 ARMY ENVIRONMENTAL DATABASE

Once the RI has been completed (i.e., appropriate documentation is finalized) for the MRSs identified in the PWS, WESTON will provide the COR, or designee, with the data and documentation required for each MRS in the AEDB-R.

5. QUALITY CONTROL PLAN

This Quality Control Plan (QCP) identifies quality requirements to be implemented to ensure that overall project activities are accomplished using internal controls and review procedures. The intent of such controls is to eliminate conflicts, errors, and omissions and to ensure the technical accuracy of deliverables. This QCP is applicable to the PTA project activities that will be performed by WESTON and its subcontractors, as described in this work plan. QC requirements for specific technical tasks, such as the DGM, are covered in Section 3 of this work plan.

The QC requirements for MC sampling and laboratory analysis are presented in the UFP-QAPP (**Appendix B)**.

5.1 QUALITY MANAGEMENT STRUCTURE

WESTON's staff of experienced technical professionals and subcontractors will execute the project. Project personnel will be responsible for ensuring that quality methods and procedures are implemented. The quality management structure and specific quality duties are detailed in the following subsections.

5.1.1 MEC Operations QC Manager

The MEC Operations QC Manager is responsible for providing corporate QC oversight of MEC activities on the project. Responsibilities include providing technical support as needed and performing scheduled and unscheduled audits of the project. The MEC Operations QC Manager will provide technical assistance to the project manager and guidance to the SUXOS. The UXOQCS will communicate directly with the MEC Operations QC Manager on quality issues, findings, and recommendations.

5.1.2 Project Manager

The project manager is responsible for project activities and for ensuring that contractual requirements are met and that the project is performed in an efficient, safe, and quality manner. Additional responsibilities include implementing project QC procedures, analyzing QC failures with the QC Managers and field managers (SUXOS, UXOQCS, and UXOSO), and ensuring that corrective actions are implemented and lessons learned are documented.

5.1.3 Senior UXO Supervisor

The SUXOS is responsible for managing, overseeing, and guiding MEC operations and UXO Teams. The SUXOS is responsible for ensuring that field personnel are properly trained and indoctrinated, and that they have the necessary experience and skills to perform the assigned task. The SUXOS will ensure that the RI activities are in compliance with DoD directives and federal, state, and local statutes and codes. Additionally, the SUXOS is responsible for providing subject matter expertise and leadership to ensure the team's safety and the quality of the project.

5.1.4 UXO Quality Control Specialist

The UXOQCS reports independently to the MEC Operations QC Manager on quality-related matters. The UXOQCS is responsible for monitoring site activities affecting quality and for ensuring that these activities are being carried out in accordance with established requirements and protocols in this QCP. The UXOQCS is responsible for conducting QC inspections of intrusive and explosives operations for compliance with the established procedures. The UXOQCS will perform daily surveillance of the work activities and issue corrective actions as necessary. The UXOQCS will prepare daily QC reports documenting QC processes and results. The UXOQCS will perform the inspection process based on definable features of work (DFW) in **Table 5-1**.

5.1.5 Geophysics QC Manager

The Geophysics QC Manager is responsible for the quality of the digital geophysical data. Responsibilities include performing reviews of raw and processed geophysical data and audits of geophysical team procedures, and recommending actions to be taken in the event of geophysical data QC nonconformance. The Geophysics QC Manager will recommend and provide solutions to quality problems. The Geophysics QC Manager will perform the inspection process based on the DFWs in **Table 5-1**.

Table 5-1 Definable Features of Work and Inspection Checklist

Inspection Description	Frequency of Inspection	Inspection Responsibility	Possible Action if Failure Occurs
1. Site Setup/Mobilization of Personnel, Equipment and Supplies			
Verify planning documents have been approved and are available onsite.	Once at mobilization and as required if new documents are generated or revised.	UXOQCS	Do not proceed with field activities until approval has been granted.
Verify work personnel are available and are qualified to perform the work.	Once at mobilization and follow-up as new employees mobilize.	Project manager, SUXOS, UXOQCS	Do not allow personnel onsite until qualifications are confirmed.
Verify all personnel have read and understand the planning documentation.	Once at mobilization and follow-up as new employees mobilize.	UXOQCS	Do not proceed with field activities until inspection is passed.
Confirm all personnel have signed the work plan and APP acknowledgement forms.	Once at mobilization and follow-up as new employees mobilize.	UXOQCS	Do not proceed with field activities until inspection is passed.
Calibrate and test equipment initially to confirm it is functional.	Once as equipment arrives on site.	UXOQCS, geophysicist	Do not proceed with field activities until inspection is passed.
2. Land Survey and Mapping			
Verify survey team has appropriate qualifications including safety/training and state licensing.	Once at start of survey activity.	Project manager, SUXOS, UXOQCS, UXOSO	Surveyor must provide qualifications, training certificates and licensing prior to starting work or change surveyor.
Confirm location of established control points are suitable for use (located in proximity to work area, no tree canopy) with the RTK base station.	As control points are being established.	geophysicist	Move control to improved location and resurvey.
Corner points for DGM grids requiring professional survey have been located and marked as described in the work plan.	As grid points are being surveyed.	geophysicist	Resurvey and mark corner points.
Each DGM grid has at least one seed item as described in the work plan (location, depth, orientation and seed type are recorded).	As grid points are being surveyed.	UXOQCS or UXO escort	Return to grid, place seed item and survey.

Table 5-1 Definable Features of Work and Inspection Checklist (Continued)

Inspection Description	Frequency of Inspection	Inspection Responsibility	Possible Action if Failure Occurs
Grid corners and control points are of suitable quantity and location to be used during line and fiducial data positioning if necessary.	As grid points are being surveyed.	geophysicist	Add additional control.
3. Vegetation Clearance			
Ensure equipment is available, properly operated, and maintained.	Once and follow up through duration of vegetation clearance activities.	UXOQCS	Do not proceed with field activities until inspection is passed.
PPE is properly worn and maintained.	Daily.	UXOQCS, UXOSO	Do not proceed with field activities until inspection is passed.
Confirm brush is sufficiently thinned so that digital and analog surveys can be conducted while compliance of the environmental protection plan is maintained.	Once following clearance of a grid or area. Follow up as needed.	UXOQCS, geophysicist	Return to location and clear vegetation as necessary to pass inspection.
4. Geophysical Equipment Testing and Verification			
IVS was constructed in accordance with the work plan (type and number of seed items, depth, and separation).	Once during IVS construction.	geophysicist	Re-seed and re-survey seed items.
Confirm geophysical sensors (digital and analog) selected for the project are capable of achieving detection performance requirements based on noise levels and depths to be encountered.	Once after initial IVS surveys.	UXOQCS, geophysicist	Repair sensors or recommend changing instrumentation/method. Rerun IVS.
Positioning systems are capable of achieving accuracy requirements documented in the work plan.	Once after initial IVS surveys.	geophysicist	Repair equipment or recommend changing positioning system. Rerun IVS.

Table 5-1 Definable Features of Work and Inspection Checklist (Continued)

Inspection Description	Frequency of Inspection	Inspection Responsibility	Possible Action if Failure Occurs
Responses for seed items fall on or above the least favorable orientation sensor response curves within the appropriate tolerance as documented in the work plan.	Once after initial IVS surveys.	geophysicist	Rerun IVS.
Noise levels, anomaly selection thresholds, and appropriate processes are documented and approved by the USACE geophysicist prior to performing production surveys.	Once after initial IVS surveys.	Project manager, UXOQCS, geophysicist	Do not allow production surveys to commence before approval.
Confirm digital functionality tests are performed before and after surveys and results are verified against metrics established in the work plan.	Daily and following repair or maintenance.	geophysicist	Recollect data between tests where discrepancies were observed if a resolution cannot be determined.
The IVS procedures documented in the work plan are being performed by each DGM team before and after surveys.	Daily.	geophysicist	If data quality is poor and IVS data is not available to support a resolution, data may need to be recollected for the time period in question.
Analog instruments are tested on the IVS to confirm functionality before transect and grid mag & dig activities.	Daily and following repair or maintenance.	UXOQCS	Replace/repair instrument if functionality is questionable.
5. DGM Operations *(Detailed QC requirements for DGM operations are provided in Section 3 of the work plan rather than this QCP.)*			
Confirm processes detailed in Section 3 are being performed and metrics are being achieved.	Daily during DGM.	UXOQCS, geophysicist	Data may need to be repackaged, reprocessed, or recollected.
Confirm digital data packages are submitted for USACE review.	Weekly and as needed.	Project manager, UXOQCS, geophysicist	Data may need to be repackaged, reprocessed, or recollected based on results from USACE review.

Table 5-1 Definable Features of Work and Inspection Checklist (Continued)

Inspection Description	Frequency of Inspection	Inspection Responsibility	Possible Action if Failure Occurs
6. Intrusive Operations			
Ensure the appropriate exclusion zones are established and maintained in active work areas.	Daily.	SUXOS, UXOQCS, UXOSO	Stop activities until the appropriate exclusion zones have been established and maintained.
Verify team separation distances.	Daily.	SUXOS, UXOQCS, UXOSO	Stop activities until the appropriate separation distance is being followed.
Confirm all personnel have the appropriate PPE and supplies.	Daily.	SUXOS, UXOQCS, UXOSO	Stop activities until PPE and supplies are in place.
Observe anomaly reacquisition/ intrusive work accuracy and completeness.	Daily and as required.	UXOQCS	Stop activities until work plan procedures are being followed and any activities not performed within compliance are reevaluated and re-performed if necessary.
Observe mag & dig operations for accuracy and completeness.	Daily and as required.	UXOQCS	Stop activities until work plan procedures are being followed and any activities not performed within compliance are reevaluated and re-performed if necessary.
Confirm UXO teams are recording/ logging all required parameters during item recovery.	Daily.	UXOQCS, geophysicist	Retrain or replace personnel.
Verify all seed items have been recovered within a specific grid or area.	As required, at completion of grid.	UXOQCS, geophysicist	Resurvey grid and resubmit for QC.
Conduct anomaly/ area verification sampling when removal activities are complete in a grid or area.	At completion of grid/ area.	UXOQCS	Resurvey grid/ area and resubmit for QC.
Verify excavations have been backfilled and properly restored.	Daily.	UXOQCS	Return to excavation to perform necessary restoration.

Table 5-1 Definable Features of Work and Inspection Checklist (Continued)

Inspection Description	Frequency of Inspection	Inspection Responsibility	Possible Action if Failure Occurs
7. MEC/MPPEH Disposal			
Verify the determination of acceptable to move MEC/ MPPEH for consolidation is appropriate.	Each MEC/MPPEH item, as required.	UXOQCS	MEC/MPPEH item will be BIP. Retrain or replace personnel.
Ensure appropriate notifications and procedures are in place to transport MEC/MPPEH and the designated consolidation point is used for demolition.	Each MEC/MPPEH item, as required.	UXOQCS	Do not move MEC/MPPEH item until inspection passes. Retrain or replace personnel.
Verify disposal procedures are being conducted in accordance with the work plan.	Each MEC item, as required.	UXOQCS	Stop activities until work plan procedures are being followed and any activities not performed within compliance are reevaluated and re-performed if necessary.
8. MPPEH and MD Accountability *(Detailed procedures for MPPEH and MD certification and verification are provided in Section 3 of the work plan.)*			
Verify personnel qualifications.	Once.	UXOQCS	Replace unqualified personnel with qualified personnel.
Perform inspections on accumulated MDAS.	Daily as accumulated.	UXOQCS	Stop activities until work plan procedures are being followed and any activities not performed within compliance are reevaluated and re-performed if necessary.
9. Demobilization			
Confirm all site features, equipment, supplies and personnel are removed and all work locations are restored as documented in the work plan.	Completion of project.	Project manager, SUXOS, UXOQCS, geophysicist	Perform inspection following completion of DFW.

5.1.6 Chemical QC Manager

The Chemical QC Manager is responsible for ensuring the implementation of the MC sampling QC program in accordance with project requirements, as specified in the UFP-QAPP (**Appendix B**). In addition, the Chemical QC Manager is responsible for reviewing the technical quality of the analytical data, the data validation, and the reports, as identified in the UFP-QAPP.

5.2 PERSONNEL QUALIFICATIONS AND TRAINING

Project staff will be qualified to perform the specific tasks they are assigned on the project, as discussed in Section 2 of the work plan. At the beginning of the project, personnel will provide their training and qualification records to the UXOQCS for approval. The records will be available on-site and will be reviewed periodically so that current records are maintained.

5.2.1 Qualification and Training for UXO Personnel

UXO-qualified personnel and/or UXO technicians will meet the requirements of DDESB TP-18, Minimum Qualifications for Unexploded Ordnance Technicians and Personnel (DoD, 2004). Prior to beginning field work or new phases of work, the UXOQCS will review the work processes with project personnel to ensure that they are adequately trained/versed in the phase of work requirements, standards, and procedures. The health and safety training requirements will be documented in the Accident Prevention Plan/Site Safety and Health Plan (APP/SSHP).

5.3 THREE PHASE INSPECTION PROCESS

The UXOQCS or their designee is responsible for verifying compliance with this portion of the QCP. A three phase inspection (TPI) process will be used to ensure that project activities comply with approved procedures and methods. The TPI process includes a preparatory, initial, and follow-up phase inspection for each project DFW. A final inspection will be performed at the completion of a DFW. The DFWs, inspection descriptions, responsible personnel and potential failure actions are provided in **Table 5-1**. Specific geophysical inspection methods and failure criteria are presented in **Table 5-2**. The TPI process elements are presented in the following sections.

Table 5-2 Geophysical Inspection Methods and Failure Criteria

Activity	Inspection Method	Failure Criteria
Equipment and instrument checks	§ Inspect equipment and instrumentation at IVS § Observe operation by personnel § Record results on appropriate forms	§ Equipment is not operational. § Personnel are not proficient with operation.
Process and procedure inspections	§ Visual observations of personnel and accuracy of methods being employed. § Part of the follow-up inspection phase. § Confirm the requirements of the work plan, inspections for DFWs, regulations and industry standards comply with project objectives.	§ Any discrepancies identified will need to be resolved as discussed in the QCP. § Unresolved discrepancies or nonconformance will require a CAR. § If the same discrepancy is reoccurring, prepare a CAR.
Mag & dig for grids or transects	§ Visual observations during operations to confirm procedures documented in the work plan are being properly executed. § Conduct random inspections of at least 10% of the grid or transect with the same type of instrumentation used for mag & dig to determine if metallic anomalies remain in the grid or along the transect. § Evaluate if MEC/MPPEH, MD, and non-MD (size of a 37mm or greater) were completely removed within a 3.25-ft radius of dig locations. § Verify seed items were recovered, as applicable.	§ Failure to investigate subsurface anomalies. § MEC/MPPEH, MD, and non-MD (size of a 37mm or greater) were found within 3.25-ft of dig location. § One seed item is missed. § MEC/MPPEH of the same or greater size of what was anticipated remains in grids or along transects.
DGM operations	§ Discussed in Section 3 of the work plan.	§ Discussed in Section 3 of the work plan.
Anomaly reacquisition and investigation	§ Respond to grid or transect following excavation for inspection. § Inspect at least 10% of anomaly locations to confirm metal has been removed from a 2-ft radius. § Confirm excavations have been restored to work plan specified conditions. § Verify seed items were recovered, as applicable.	§ Failure to reacquire all anomalies on dig list. § Failure to investigate subsurface anomalies that were reacquired. § MEC/MPPEH, MD, and non-MD (size of a 37mm or greater) were found within 2-ft of dig location. § One seed item is missed. § MEC/MPPEH of the same or greater size of what was anticipated remains in grids or along transects. § Restoration not performed in is incomplete.

5.3.1 Preparatory Phase Inspection

The preparatory phase inspection comprises the planning and design process leading up to the field activities. The preparatory phase inspection will be performed prior to initiating each DFW. The UXOQCS or designee will review the appropriate documentation to ensure the requirements to carry out each DFW are in place and compliant.

The UXOQCS will verify that required planning documentation including the work plan and appendices have been approved and available for site personnel. Equipment, sensors, and materials delivered to the site will be inspected to ensure they are functional and all required components are inventoried. Personnel certifications will be reviewed to ensure that appropriate training, medical clearance, licenses, and instruction has been performed based on assigned responsibilities and site specific requirements. The UXOQCS or designee will determine if the personnel needed to carry out the DFW are identified, available, meet the qualifications of the position and those positions are filled accordingly.

Where site conditions or constraints prohibit carrying out a specific DFW, the UXOQCS will designate personnel to correct or resolve discrepancies. Work plan discrepancies will be corrected and subsequently verified by the UXOQCS or designee before beginning the DFW.

5.3.2 Initial Phase Inspection

The initial phase inspection will begin at the startup of a DFW. The work performed as part of the DFW will be inspected for compliance with established procedures so that a high level of quality can be obtained from task commencement to completion. The UXOQCS will document the inspection results in the QC logbook that will be transcribed daily to the QC Report. The QC Report will list the DFW(s), QC requirements, and inspection processes performed that day based on the DFW checklist (**Table 5-1**). An example of the QC Report is provided in **Appendix E**.

If the inspection results identify discrepancies between the approved plans and site practices, a discrepancy resolution process will be implemented. The appropriate expert based on discipline (DGM, chemistry, safety, munitions) will be engaged to support the project manager and project team in resolving discrepancies immediately after being identified. The ultimate resolution will be made by the project manager. If the discrepancy cannot be resolved, the nonconformance will be documented in a Corrective Action Request (CAR). A discussion of the CAR process is presented in Section 5.4.3. When an unresolved discrepancy is identified as potentially causing a nonconformance, the work activities will be recommended to stop until a resolution can be documented and approved.

5.3.3 Follow-Up Phase Inspection (Surveillance)

Scheduled and unscheduled inspections will be performed as part of the follow-up phase. The purpose of these inspections are to ensure a high level of quality is maintained by monitoring compliance to the project plans and procedures on an ongoing basis. The UXOQCS has primarily responsibility for on-site verification of the work practices against the DFW inspection requirements. However, the SUXOS and geophysicist are also responsible for monitoring performance. The following will be performed for each DFW:

- Inspections and surveillance to ensure compliance with project plans.
- Inspections and surveillance to ensure a high level of workmanship is maintained.
- Inspections and surveillance to ensure log books are complete.
- Inspections and surveillance to ensure compliance with the inspection frequency and requirements documented in **Table 5-1**.

Results of the follow-up phase inspections will be documented in the UXOQCS log book and summarized in the QC Report.

5.3.4 Final Phase Inspection

At the completion of all work associated with a DFW, the UXOQCS will conduct an inspection of the work. The work should be inspected for conformance to plans, specifications, quality, workmanship, and completeness. An itemized list will be compiled that includes a summary of work not properly completed, inferior workmanship, and work not conforming to plans and specifications. The list will be documented as a nonconformance in the QC Report with an estimated date for correction of each discrepancy. If the discrepancy cannot be reconciled, a CAR will be prepared as discussed in Section 5.4.3.

Following correction of work, a second inspection will be conducted by the UXOQCS to ensure that all deficiencies have been corrected. The inspections and resolutions will be completed within the schedule stated for completion of the entire work, or any particular increment thereof if the project is divided into increments by separate completion dates.

5.3.5 Definable features of work

DFWs have been developed for each aspect of the project from planning to implementation to reporting. DFWs for this RI project are presented in **Table 5-1**. The primary DFWs are as follows:

1. Site setup/mobilization of personnel, equipment and supplies.
2. Land survey and mapping.
3. Vegetation clearance.
4. Geophysical equipment testing and verification.
5. DGM operations.
6. Intrusive operations.
7. MEC/MPPEH disposal.
8. MPPEH and MD accountability.
9. Demobilization.

5.3.6 Geophysical inspection Methods and Failure Criteria

Inspection methods will be implemented during the RI to ensure that the DFWs are being achieved. The inspection descriptions for the primary DFWs are presented in **Table 5-1**. Each field task has specific inspection methods and failure criteria. Inspection methods and failure criteria for the geophysical methods are presented in **Table 5-2**.

5.4 DOCUMENTING DEFICIENCIES AND CORRECTIVE ACTIONS

The UXOQCS is responsible for verifying compliance with this QCP through audits and inspections of the DFWs. The project manager will also coordinate with the MEC Operations QC Manager as deemed necessary following reviews, audits, and inspections at the project level to confirm that work is progressing in accordance with the work plan. Discrepancies are to be communicated to the responsible individual and documented in the QC Report.

5.4.1 Corrective Action Process

The project manager and UXOQCS are responsible for ensuring that the procedures for reporting, evaluating, and correcting nonconformance are addressed through the planned QC procedures. The determination of any nonconforming conditions must be supported with objective evidence. The nonconforming conditions will be evaluated and corrected and may be considered as opportunities to improve the process during the RI.

5.4.2 Continuous Improvement

Personnel are encouraged to continuously review their processes and to suggest changes that improve the process; provide benefits; or improve project efficiency, safety, and quality. These suggestions can be submitted either formally through a written memorandum to the SUXOS or to the UXOQCS or informally through verbal discussions at project meetings.

5.4.3 Deficiency Identification and Resolution

Personnel have the responsibility to identify and report conditions adverse to quality. The deficiencies will be identified, documented, investigated, and corrected appropriately. The project manager and UXOQCS is responsible for evaluating the causes of the deficiencies or the nonconformance and for recommending solutions to correct the deficiency identified. The UXOQCS will be responsible for verifying implementation of the corrective action and for monitoring the effectiveness of the corrective action for each DFW (**Table 5-1**).

5.4.4 Corrective Action Request

A Corrective Action Request (CAR) can be issued by any member of the project team, including subcontractor personnel. The CAR is also issued by the UXOQCS when a discrepancy is identified that cannot be resolved following the DFW inspection (at any phase). The CAR will be provided to the project manager, who will evaluate the request based on input from the UXOQCS and subject matter experts. If the CAR is accepted, the project manager will develop a corrective strategy, assign resources, and specify a schedule for corrective actions. The UXOQCS will verify the effectiveness of the corrective action once it has been implemented and completed. Reoccurring reviews of the CAR will be performed to ensure that the established protocols for corrective actions are being implemented properly and the desired intent is being achieved.

As part of the CAR, a root cause analysis will be conducted to identify the factors which led to the problem. Criteria to be considered in the analysis will include personnel qualifications, training, adequacy of procedures, adequacy of equipment, and adequacy of QC inspections and measures. Input will be obtained from field personnel as necessary and technical experts to support the analysis. The nonconformance will be traced back to the problem using reverse engineering as applicable.

An example of the CAR form is provided in **Appendix E**. At a minimum, the nonconformance will be documented on the CAR within 24 hours of occurrence. The date when the corrective action will need to be completed and integrated will be discussed with the project team and documented on the CAR and QC Report.

5.4.5 Corrective Action Tracking

Each CAR will be tracked with a unique identifier for the duration of the field activities. The review, approval, implementation, and completion dates will be tracked in a tabular format in the project file.

5.4.6 Lessons Learned

CARs will be attached to the QC Reports. The intent is to transparently document discrepancies and corrective actions to share lessons learned with the project team. CARs will be made topics of daily tailgate meetings as appropriate to ensure that project staff are aware of the situation and the corrective strategy.

5.5 PROJECT COMMUNICATION

Daily briefings will be held with the field personnel to review the project activities and to discuss technical and safety issues. The SUXOS and UXOQCS will conduct the meetings and ensure that the Daily Summary Report is completed and signed by the field personnel. The UXOQCS may schedule additional meetings to discuss technical and quality issues at any time. The SUXOS will maintain communications with the project management team and report any significant problems or decisions to the project manager for assistance. The project QC aspects will also be documented in the UXOQCS Log and QC Report for specific DFWs.

5.5.1 Weekly Project Meeting

A project team meeting will be held at least once per week during the RI field activities with the field operations and project management personnel. The meeting will be used to discuss project progress and QC related issues. An agenda will be distributed prior to the meeting. Notes from the meeting will be captured and distributed for review and approval.

5.5.2 Project Documentation

The project manager will control the project documentation to ensure that the documents are prepared and approved as part of the contractual requirements. The project manager will monitor and track the submission of the project documentation and delegate reviews to the appropriate quality management staff based on the document type, the content, and DFW. Digital records will be kept on the project's TeamLink website for secure access of authorized users. **Table 5-3** lists the documents that will be field generated and maintained in the project file. Example documents are provided in **Appendix E**.

Table 5-3 Project Documentation Schedule

DFW	Primary Documentation Associated with the DFW
Site setup/ mobilization of personnel, equipment, and supplies	§ Daily Summary Report § Work plan acknowledgement § APP/SSHP acknowledgement § QC Report § SUXOS logbook § UXOQCS logbook § Weekly report (as required)
Land survey and mapping	§ Daily Summary Report § APP/SSHP acknowledgement § QC Report § SUXOS logbook § UXOQCS logbook § Weekly report (as required)
Vegetation clearance	§ Daily Summary Report § APP/SSHP acknowledgement § QC Report § SUXOS logbook § UXOQCS logbook § Weekly report (as required)

Table 5-3 Project Documentation Schedule (Continued)

DFW	Primary Documentation Associated with the DFW
Geophysical equipment testing and verification	§ Daily Summary Report § APP/SSHP acknowledgement § QC Report § DGM processing form § Analog equipment checkout § SUXOS logbook § UXOQCS logbook § Weekly report
DGM operations	§ Daily Summary Report § APP/SSHP acknowledgement § QC Report § DGM processing form § SUXOS logbook § UXOQCS logbook § Dig list § Weekly report
Intrusive operations	§ Daily Summary Report § APP/SSHP acknowledgement § QC Report § SUXOS logbook § UXOQCS logbook § Dig list § Weekly report
MEC/MPPEH disposal	§ Demolition Notification Contact List § Daily Summary Report § APP/SSHP acknowledgement § QC Report § SUXOS logbook § UXOQCS logbook § Dig list § Magazine data cards § Weekly report

Table 5-3 Project Documentation Schedule (Continued)

DFW	Primary Documentation Associated with the DFW
MPPEH and MD accountability	§ Daily Summary Report § APP/SSHP acknowledgement § QC Report § SUXOS logbook § UXOQCS logbook § Dig list § DoD Form 1348-1A § Weekly report
Demobilization	§ Daily Summary Report § APP/SSHP acknowledgement § QC Report § SUXOS logbook § UXOQCS logbook § Weekly report (as required)

The comments received during the documentation review will be tracked in the project file and disseminated to the project team to ensure that corrective actions are incorporated for the life of the project. A response to comments document will be prepared and submitted to the reviewer for approval. After approval, the comments and responses will be incorporated into the document and it will be resubmitted.

5.5.3 Logs, Records, and Reports

The documentation and minimum required content are described in **Table 5-4**. Examples of the documentation are provided in **Appendix E**.

Table 5-4 QC Reporting Logs and Records

Report/Form/Log Name	Description and Minimum Requirements
Work plan acknowledgement Manager: UXOQCS	All WESTON employees and applicable subcontractors will read and acknowledge by signature they have read and understand the work plan.
APP/SSHP acknowledgement Manager: UXOQCS/ UXOSO	All WESTON employees and subcontractors will read and acknowledge by signature they have read and understand the APP/SSHP. This form will be used as the daily sign in sheet and tailgate safety brief acknowledgement.

Table 5-4 QC Reporting Logs and Records (Continued)

Report/Form/Log Name	Description and Minimum Requirements
Daily Summary Report Manager: SUXOS, UXOQCS/ UXOSO, geophysicist	This report will summarize the day's activities and tasks performed for any and all DFWs and may include the following as required: § QC findings § Safety and health findings § DGM progress and activities § SUXOS activity summary § MEC/MPPEH recovery information § MD recovery information § Records of site work and progress
QC Report Manager: UXOQCS	The QC Report will provide inspection results for each activity that was monitored. It will generally document and summarize the information recorded in the UXOQCS log. The QC Report includes: § Each DFW undergoing inspection § Phase of inspection § Results of inspection § Summary of discrepancies § Summary of nonconformance § Resulting actions
SUXOS log Manager: SUXOS	This log is maintained by the SUXOS and records at a minimum: § Activities started and completed § Work stoppage § Official correspondence § Personnel list § Team location and assigned activities § Demolition activity § Visitors
UXOQCS log Manager: UXOQCS	This log is maintained by the UXOQCS and records at a minimum: § Equipment testing and results § QC inspections and documentation as required by the QC Report § Work stoppage due to QC issues § Date and personnel observed/checked
Analog equipment checkout Manager: UXOQCS	Analog instrument testing results at the IVS will be documented daily. Instruments will be taken out of service until repaired and functionality can be demonstrated. Serial numbers, date of test, and operability will be recorded.
DGM processing form Manager: geophysicist	DGM processing parameters and results will be recorded. The form also includes IVS results and descriptions of field conditions, dates of survey, instrument type, and results of the QC function tests.

Table 5-4 QC Reporting Logs and Records (Continued)

Report/Form/Log Name	Description and Minimum Requirements
Dig list Manager: UXOQCS and geophysicist	Dig lists will be generated by the geophysicist or as anomalies are investigated during intrusive operations. Dig results will be logged using the WESTON RespondFast system. Records include: § Date of intrusive activity § Grid/transect location and ID § Anomaly ID § Waypoint coordinates Depth of item § Appropriate offsets § Item classification, type and description § Dig team ID § Disposition
Demolition notification list Manager: UXOQCS	The demolition notification list is provided in Section 3 of the work plan. All parties will be notified prior to performing demolition.
Magazine data cards Manager: SUXOS	To record donor explosives stored in the magazines and to document when materials are accessed, added, and/or removed. Form is to be completed at least every 7 days from the last recorded date of access.
DoD Form 1348-1A Manager: SUXOS	Form will be completed when MD is transferred to Picatinny for flashing and recycling as required. Process and instructions for the form are provided in Section 3 of the work plan.

6. EXPLOSIVES MANAGEMENT PLAN

6.1 GENERAL

This Explosives Management Plan outlines the procedures to be used by the UXO Technicians to acquire, receive, store, transport, issue, and report the loss of explosives utilized during the RI. The personnel involved with explosives will comply with federal, state, and local laws, as required.

6.2 LICENSES/PERMITS

WESTON has a Type 33-User of High Explosives Permit from the Department of the Treasury, Bureau of Alcohol, Tobacco, Firearms, and Explosives (ATF) and will secure a New Jersey permit to use explosives, as required by local regulations. A copy of the licenses and permits will be maintained on-site and will be made available to any local, state, or federal authority.

6.3 ACQUISITION

The acquisition of demolition material will be made by the SUXOS in a timely manner. The SUXOS will purchase explosives on an as-needed-basis from a licensed commercial vendor. Vendor information will be provided as required. Prior to bringing the explosives on-site to PTA property, the SUXOS will coordinate with the USACE OESS, PTA POC, and security. Before the demolition materials are ordered, the Purchase/Receipt Authorization List will be completed and forwarded to the explosives distributor(s), along with a copy of the WESTON ATF license.

6.4 INITIAL RECEIPT OF EXPLOSIVES

Only those individuals named on the authorization list may sign for explosives from the shipper. To ensure that the quantity shipped is the same as the quantity listed on the shipping documents, the SUXOS will inventory the shipment before signing for it. If the SUXOS is unavailable, a designee from the Purchase/Receipt Authorization List will inventory the shipment before signing for the shipment.

Explosives may be ordered by the SUXOS periodically if the on-site storage magazines are being used. Otherwise, explosives will be ordered for same day delivery. Explosives that are delivered to the site will be placed in a Day Box mounted in the bed of a truck and will be used the same day. The following procedures will be adhered to upon initial receipt of explosive materials (see **Figure 6-1**):

1. Upon arrival at the site, the SUXOS will meet the explosives vendor at the designated gate and notify the Armament Research, Development and Engineering Center (ARDEC) of the delivery.

2. The SUXOS will escort the vendor to the explosives storage magazine.

3. The vehicle transporting the explosives will be escorted to the explosives magazine prior to unloading.

4. The SUXOS or a designee from the Purchase/Receipt Authorization List will compare the explosives delivery record to the actual quantity delivered prior to accepting custody for the explosives.

5. Once the quantity has been confirmed, the explosives delivery record will be signed and the explosives will be transferred to and stored in the approved magazine.

6. All material introduced or removed from the magazine will be entered on magazine data cards, and explosives records will be updated. Explosives having a different lot/day/shift run will be entered on separate magazine data cards whether or not the items are the same nomenclature. ARDEC will be notified of any changes to the magazine data cards.

7. If it is determined that there is a discrepancy between the quantity delivered and the quantity shipped, the following will occur:

    - Notify the UXOSO.
    - Do not accept shipment.
    - Contact the shipper immediately to resolve the discrepancy.

Note: If the discrepancy cannot be resolved within 24 hours, notify the local law enforcement agency, ATF, the WESTON Program H&S Manager, the WESTON MEC Operations Manager, and the WESTON PM.

The original receipts, shipping documents, or invoices will be retained on-site as part of records management. Copies of the documentation will be provided in the final report as an appendix.

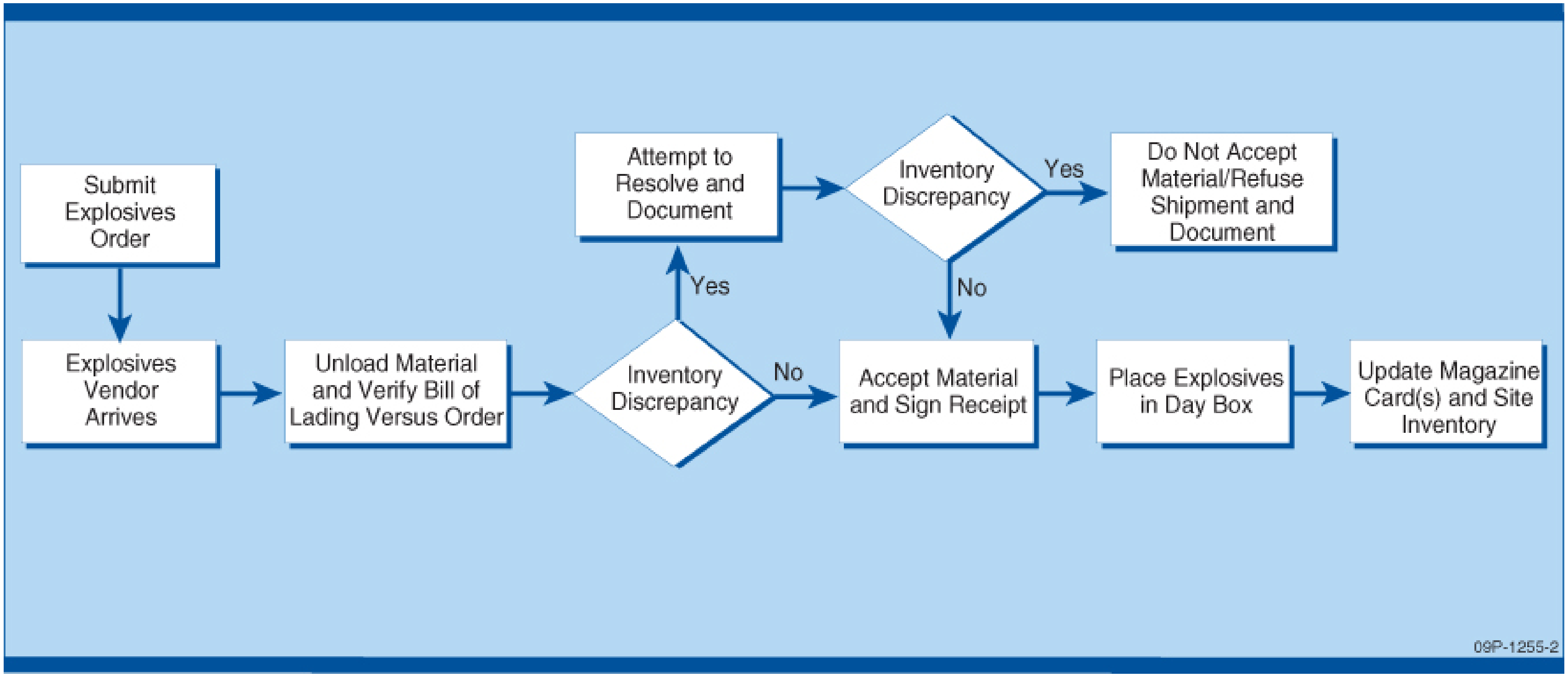


Figure 6-1 Receipt of Explosive Materials Process

6.5 EXPLOSIVES STORAGE MAGAZINE

USACE has established/sited magazines on PTA that may be the primary storage location for explosives used during the RI field work. The location of the magazines is provided in the approved Explosives Site Plan (ESP) (**Appendix H**). Magazine permits held by PTA will be updated and renewed by the USACE prior to use of the explosives storage magazines.

6.6 EXPLOSIVES ISSUE AND INVENTORY

Prior to accepting any explosives, the procedures outlined above in the initial receipt procedures will be accomplished.

The SUXOS is authorized to purchase, receive, access, issue, transport, and use explosives for this project. Any other project personnel who will have access, issue, transportation, and use authority for explosives on this project will be annotated on the approved user list that will be maintained within the explosives management records.

Upon completion of each demolition operation, an ammunition (donor explosives) consumption report will be completed. Upon expenditure of all donor explosives, the authorized person will certify in writing the expenditure of all donor explosives in inventory.

A physical inventory of all explosives will be conducted in accordance with the following schedule:

- Whenever explosives are removed from the magazine for demolition operations.
- Whenever the door to the magazine is unlocked. **Exception**: When the magazine is opened for inspection by state, federal, or USACE inspectors, an inventory is not required.
- On a weekly basis (at a minimum) when the magazine is unlocked and opened.
- ARDEC will be notified with any changes to the magazine data cards.

A running inventory will be completed using the Department of Army Form 3020-R Magazine Data Card or a commercially available alternative. If a discrepancy exists between the physical inventory and the inventory records, the following steps will be taken:

- Notify the UXOSO, UXOQCS, SUXOS, and the USACE OESS.
- Re-inventory the explosives.
- Inspect the data cards for errors.

§ Reconcile the data cards, the physical inventory, and the ammunition consumption reports.

Note: If discrepancies continue to exist, see Section 6.9, Reporting Lost or Stolen Explosives.

6.7 TRANSPORTATION

Vehicles transporting explosives will be properly inspected, equipped, and placarded prior to loading the explosives onto the vehicle, in accordance with Section 29 of Engineering Manual 385-1-1, "Safety and Health Requirements," dated 3 November 2003. The transportation of explosives from the magazine to locations requiring demolition operations will be conducted in the following manner:

1. Vehicles will be inspected and documented using the project's vehicle inspection form each time explosives are being transported and will be properly placarded.
2. Explosives will be transported in closed vehicles whenever possible. When using an open vehicle, explosives will be covered with a flame-resistant tarpaulin (except when loading/unloading) or transported in an approved container.
3. The vehicle engine will be turned off and the wheel chocks and the brakes will be set when loading/unloading explosives.
4. The beds of vehicles will have dunnage, a plastic bed liner, or sandbags to protect the explosives from contact with the metal bed and fittings.
5. The vehicles transporting explosives will have a first aid kit, two 10-ABC-rated fire extinguishers, and communication capabilities.
6. Initiating explosives, such as detonators, will remain separated from other high explosives during loading and unloading, and while on vehicles.
7. Compatibility requirements will be observed.
8. The operators transporting explosives will have a valid commercial driver's license, with a hazmat endorsement.
9. The drivers will comply with posted speed limits, but will not exceed a safe and reasonable speed for conditions.
10. The vehicles transporting explosives off-road will not exceed 20 mph.

6.8 DOCUMENTATION

When explosives are being transported, completed copies of the documents described below will be in the vehicle.

§ Instructions for Motor Vehicle Owners-Emergency Response Information Form: This form will be used to enter only the items that are being transported.

§ Explosives Purchase/Receipt/Transport Authorization List: This list will be completed to ensure that the pertinent data for the personnel transporting explosives are included on the form. As with the other required forms, this form will be part of the transport paperwork. Only the route shown will be used unless there is an emergency or the route is blocked.

§ Motor Vehicle Inspection Checklist: The checklist will be completed before explosives are placed in the vehicle and will accompany the shipment.

§ ATF Permit/License: A copy of the current ATF license will be maintained in the field office.

6.9 REPORTING LOST OR STOLEN EXPLOSIVES

Loss or theft of explosives will be reported as stated in 27 Code of Federal Regulations (CFR), Commerce in Explosives. Upon the discovery of theft or loss of explosives, **Table 6-1** lists the individuals or organization to be notified.

Table 6-1 Reporting Lost or Stolen Explosives

Position	Name	Telephone Number
WESTON SUXOS	Walt Hess	-
WESTON UXO Safety Officer	Bruce Carnal	502-664-7926
WESTON PM	Laura Pastor	610-701-3445
WESTON MEC QC Manager	Al Larkins	410-696-7260
USACE OE Safety Specialist	Chris Yonat	410-340-8459
PTA Representative	J.B. Smith	973-724-2522
PTA	Security	973-724-7711
ATF		800-461-8841

6.10 RETURN TO STORAGE OF UNUSED EXPLOSIVES

Explosives not used for demolition operations will be returned to the magazine at the end of the day. The magazine data cards will be annotated, and an inventory will be completed in accordance with inventory requirements above.

Explosives ordered on an as-needed-basis will be consumed on the same day received.

6.11 DISPOSAL OF REMAINING EXPLOSIVES

WESTON is required by ATF to account for explosives purchased and used. Explosives remaining upon completion of the work at PTA will be returned to the supplier.

Explosives ordered and received for same day use will be consumed on the same day received. If explosives cannot be consumed on the same day, the explosives will be returned to the vendor.

7. EXPLOSIVES SITE PLAN

An ESP will be prepared as a standalone document in accordance with the USACE Interim Guidance Document (IGD) 08-01, Explosives Site Plans (ESP) for Military Munitions Response Program (MMRP) Projects (USACE, 2008b). The ESP will be prepared following the requirements of Engineering Manual 385-1-97, Explosives Safety and Health Requirements Manual, Errata No. 3 (USACE, 2008a) (see **Appendix H)** and staffed through the Army and DDESB for approval.

8. ENVIRONMENTAL PROTECTION PLAN

8.1 GENERAL

This Environmental Protection Plan (EPP) was prepared in accordance with components of DID MR-005-12 (USACE, 2003). The objective of this EPP is to provide adequate procedures and methods during site activities to safeguard against detrimental impacts to the surrounding environment and its natural resources, to correct any damage done to the environment as a result of site activities, and to control noise and dust on-site within reasonable limits. This EPP addresses the known environmental concerns/issues associated with this project; however, during operations, unforeseen concerns/issues may arise. In this event, operations in the affected area will be suspended until the full potential environmental impact is understood and appropriate safeguards can be implemented.

8.2 IDENTIFICATION OF ENVIRONMENTAL RESOURCES AND EFFECTS

8.2.1 Endangered/Threatened Species

WESTON submitted a request for review of the Natural Heritage Database and Landscape Project (Version 3) by the New Jersey Natural Heritage Program (NJNHP) to determine whether there are records of any known rare, threatened, and endangered species, species of special concern, and/or significant natural communities located within or near the MRSs. The NJNHP correspondence dated 31 January 2011 of rare or state-listed animals and plants, significant natural communities, and other significant habitats is presented in **Appendix I** (locations of these sensitive species have been redacted to protect them from disturbance and/or those who would seek to collect them. **Table 8-1** lists the federal and state–listed threatened and endangered species documented at PTA or within ¼ mile of PTA, as well as species listed as special concern, rare, and historical resident species. Additionally, species identified from the Integrated Natural Resources Management Plan (INRMP) for Picatinny Arsenal, Dover, NJ (USAEC, 2001) are included in the table. **Table 8-2** lists the rare plants that are either potentially present or a confirmed resident at PTA. Flora and fauna listed in the NJNHP correspondence are also presented in **Table 8-1** and **Table 8-2**.

Table 8-1 Federal and State Listed Endangered, Threatened, and Special Concern Animal Species Found at/near Picatinny Arsenal

Scientific Name	Common Name	Location	Federal and State Status	Picatinny Status
Mammals				
Myotis leibii	Small-footed bat	PTA	SC	R
Myotis sodalis	Indiana bat	PTA	FE, SE	V,P
Neotoma floridana ssp magister	Eastern Wood Rat	The Gorge	SC, SE	H
Lynx rufus	Bobcat	PTA	SE	R
Birds				
Accipiter cooperii	Cooper's hawk	PTA	ST	R
Accipiter gentilis	Northern goshawk	PTA	SE/SC	R
Ammodramus savannarum	Grasshopper Sparrow	PTA	ST	V
Asio otus	Long eared owl	PTA	ST	V
Bartramia longicauda	Upland sandpiper	PTA	SE	V
Botaurus lentignosus	American bittern	PTA	SE/SC	V
Buteo lineatus	Red-shouldered hawk	PTA	SE/T	R
Circus cyaneus	Northern harrier	PTA	SE	V
Dendroica cerulea	Cerulean warbler	PTA	SC	V
Dolichonyx oryzivorus	Bobolink	PTA	ST	V
Egretta caerulea	Little Blue Heron	PTA	SC	V
Falco Peregrines anatum	Peregrine falcon	PTA	SE	V
Haliaeatus leucocephalus	Bald eagle	PTA	FT, SE	V
Hirundo pyrrhonata	Cliff swallow	PTA	SC	V
Lanius ludovicianus ssp migrans	Loggerhead shrike	PTA	SC	V
Melanerpes erythrocephalus	Red Headed Woodpecker	PTA	ST	V
Pandion haliaetus	Osprey	PTA	ST	V
Passerculus sandwichensis	Savannah sparrow	PTA	ST	V
Podilymbus podiceps	Pied Billed Grebe	Lake Denmark	SE	P,V
Pooecetes graminceus	Vesper Sparrow	PTA	SE	V
Strix varia	Barred Owl	PTA	ST	V,R
Vermivora chrysoptera	Golden-wing warbler	PTA	SC	V,R
Ardea herodias	Great blue heron forage	PTA	SC	V,R
Ixobrychus exillis	Least bittern	PTA	SC	V,R

Table 8 1 Federal and State Listed Endangered, Threatened, and Special Concern Animal Species Found at/near Picatinny Arsenal (Continued)

Scientific Name	Common Name	Location	Federal and State Status	Picatinny Status
Reptiles				
Clemmys insculpta	Wood turtle	PTA	ST	R
Clemmys muhlenbergii	Bog turtle	Green Pond	FE, SE	H,R
Crotalus horridus	Timber rattlesnake	PTA, Green Pond & Copperas Mountains; The Gorge	SE	R
Agkistrodon contortrix contortrix	Northern copperhead	PTA	SC	R
Terrapene caroliniana	Eastern box turtle	PTA	SC	R
Amphibians				
Ambystoma jeffersonianum	Jefferson salamander	PTA	SC	R
Ambystoma laterale	Blue-spotted salamander	PTA	SE	R
Ambystoma opacum	Marbled salamander	PTA	SC	R
Fish				
Salvilinus fontinalis	Brook Trout	Green Pond	SC	R
Insects				
Aeshma Canadensis	Aesh. Canadensis	PTA	SC	R
Aeshna clepsydra	Mottled darner	PTA	SC	R
Aeshna mutata	Spatterdock darner	PTA	SC	R
Aeshna tubiculifera	Black tipper darner	PTA	SC	R
Aeshna verticalis	Aesh. Canadensis	PTA	SC	R
Anax longipes	Comet darner	PTA	SC	R
Arigomphus furcifer	Lilypad clubtail	PTA	SC	R
Enallagma boreale	Boreal bluet	PTA	SC	R
Enallagma carsunculatum	Enal. Carunculatum	PTA	SC	R
Enallagma cyathigerum	Enal. Cyathigerum	PTA	SC	R
Enallagma laterale	New England bluet	Gravel Dam Cove; Lake Denmark	SC	R
Lanthus vernalis	Single striped clubtail	PTA	SC	R
Lestes congeer	Les. Congenter	PTA	SC	R

Table 8 1 Federal and State Listed Endangered, Threatened, and Special Concern Animal Species Found at/near Picatinny Arsenal (Continued)

Scientific Name	Common Name	Location	Federal and State Status	Picatinny Status
Lesteseurinus	Amber wing spreadwing	PTA	SC	R
Leucorhinnia glacialis	Leuc. Glacialis	PTA	SC	R
Nasiaeschna pentacantha	Nasi pentacantha	PTA	SC	R
Phanogomphus spicatus	Phan. Spicatus	PTA	SC	R
Somatachlora linearts	Soma. Linearis	PTA	SC	R
Somatachlora elongata	Ski-tailed emerald	PTA	SC	R
Somatochlora williamsoni	Williamson's emerald	PTA	SC	R
Stenogomphurus rogersi	Sable clubtail	PTA	SC	R
Taenioegaster oblique	Arrowhead spiketail	PTA	SC	R
Amblyscirtes hegon	Salt and pepper skipper	PTA	SC	R
Chlosyne harrisli	Harris Checkerspot	PTA	SC	R
Polites mystic	Long dash skipper	PTA	SC	R
Polygonia progne	Gray Comma	PTA	SC	R
Nemoria lexaria	Red bordered emerald	PTA	SC	R
Idaea obfusaria	Rippled wave	PTA	C, SC	R

Notes:

Federal Status

FE = Federal Endangered
FT = Federal Threatened
C = Federal Species of Concern
F = Federal Protected; listed under Convention on International Trade in Endangered Species (CITES)

State Status

SE = State Endangered
ST = State Threatened
SC = Special Concern
X = Extinct/Extirpated

Picatinny Status

R = Resident
V = Visitor, Migrant
P = Possible Resident
H = Historical Resident
? = Status Unknown
X = Locally Extinct

Source: Picatinny INRMP (USAEC, 2001), and the NJNHP (2011).

Table 8-2 Rare Plants at PTA

Species Name	Common Name	NJ Legal Statute	Picatinny Status
S1 Plants			
Asplenium bradleyi	Bradley's Spleenwort	Endangered	P
Equi. pretense	Meadow Horsetail	Endangered	R
Lycopodium annotinum	Stiff Clubmoss	Endangered	P
Hott. inflata	Featherfoil	Endangered	R
Polo. robinnsil	Robbin's Pondweed	Endangered	R
Spar. minimum	Small Bur Reed	Endangered	R
Ulri, minor	Lesser Bladderwort	Endangered	R
Cinna latifolia	Slender Wood Reedgrass	Endangered	R
Clit. mariana	Butterfly Pea	Endangered	P
Sysy. montanum	Common Blue Eyed Grass	Endangered	P
Tria. fraseri	Frasier's Marsh St. Johns Wort	Endangered	P
Spirea alba var alba	Narrow Leaved Meadowsweet	Special Concern	P
Hex montana	Large Leaved Holly	Endangered	R
S2 Plants			
Sphagnum tenellum	Sphanum Tenellum	Special Concern	R
Aspi. Montanum	Mountain Spleenwort	Special Concern	R
Carex bebbit	Bebb's Sedge	Special Concern	P
Carex disperma	Two Fruited Sedge	Special Concern	R
Carex lupuliformis	Hop Like Sedge	Special Concern	P
Carex rostrata	Beaked Sedge	Special Concern	P
Spar. Chlorocarpum	Green Fruited Bur Reed	Special Concern	R
Adlu. Fungosa	Allegheny Vine	Special Concern	R
Clem. Occidentalis	Purple Virgin's Bower	Special Concern	R
Card. Douglassil	Purple Cress	Special Concern	R
Desm. Viridifolia	Velvety Tick Trefoil	Special Concern	P
Galt. Pohistre	Marsh Bedstraw	Special Concern	P
Pedi. Lanceolata	Swamp Lousewort	Special Concern	P
S3 Plants			
Nymp. Cordata	Floating Heart	Special Concern	R
Utri. Gibba	Humped Bladderwort	Special Concern	R
Utri. Intermedia	Flat leaved Bladderwort	Special Concern	R
Utri. Purpurea	Purple Bladderwort	Special Concern	R
Aris. Serpentaria	Virginia Snakeroot	Special Concern	R
Epil. Leptophyllum	Narrow Leaved Willow Herb	Special Concern	P
Habe. Psycodes	Purple Fringed Orchid	Special Concern	R
Lili. Philadelphicum	Wood Lily	Special Concern	R
Mimu. Alatus	Winged Monkey Flower	Special Concern	P
Pote. Arguta	Tall Cinquifoil	Special Concern	R
Salix petiolaris	Meadow Willow	Special Concern	P
SH Plants			
Lobelia dorimanna	Water Lobelia	Endangered	P
Spar. Angustifolim	Narrow Leaved Bur Reed	Endangered	P
Desm. Humifesum	Trailing Tick Trefoil	Special Concern	P

Source: USAEC, 2001.

Notes:
Picatinny Status: P=Potentially present; R=Resident/Confirmed
S1: Typically 5 or fewer occurrences; very few remaining individuals, acres, or miles of stream; or especially vulnerable to extirpation in New Jersey State for other reasons.
S2: Typically 6 to 20 occurrences; few remaining individuals, acres, or miles of stream; or very vulnerable to extirpation in New Jersey State for other reasons.
S3: Typically 21 to 100 occurrences; limited acreage, or miles of stream in New Jersey State.
SH: No extant sites known in New Jersey State, but it may still exist.

Sections 8.2.1.1 through 8.2.1.3 describe the federal and state-listed endangered and threatened species listed in the NJNHP Report (**Appendix I**), and Section 8.2.1.4 describes the state-listed species of special concern. The NJNHP Report also identified two Natural Heritage Priority Sites located around Lake Denmark and Picatinny Lake that contain occurrences of state imperiled and other rare species (**Appendix I**).

WESTON has coordinated with the PTA Natural Resources Manager (NRM) and will continue to coordinate with the PTA NRM during the field activities to assess the potential for impacts to the listed species and the sensitive habitats within the MRSs, based on changing field activities and/or schedule. Based on the current proposed field activities and schedule, there are no impacts on threatened and endangered species as long as all vegetation clearing/removal of any sort, including woody species up to 5 inches in diameter, is performed between 16 November and 31 March. There may be clearing of woody vegetation in some areas of the MRSs. At this time, it is anticipated that any clearing or cutting of vegetation will be minimal (will not involve the clear cutting of large areas), and no trees with a diameter at breast height (dbh) of 5 inches or greater will be cut. Prior to field activities, field personnel will be provided on-site training to recognize and avoid the listed species and the sensitive habitats both on and off the installation and to implement the appropriate recommendations and applicable guidance (USAEC, 2001; U.S. Army, 2007). Additional coordination with NJDEP and USFWS will be undertaken to address the potential impacts to listed species and sensitive habitats, if avoidance cannot be achieved (e.g., BIP activities).

8.2.1.1 Mammals

Photo source: WPC 2002

Indiana bat (Myotis sodalis). In 1993 and 1994, bat hibernacula were located in caves within 2 miles from PTA. In 1995, a female Indiana bat was captured on PTA and was the first summer resident of this species found in Northeastern America in decades (USAEC, 2001). The Indiana bat is small (3 to 3.5 inches) and grayish-brown. It huddles on cave walls at densities of up to 2,700 individuals per square meter. The Indiana bat is vulnerable to human disturbance of its roosting sites and during its winter hibernation (in caves and abandoned mine shafts).

A Screening Level Ecological Report confirmed that Indiana bats are roosting in Area J. Indiana bats are believed to roost on or near Lake Denmark as well as in caves and abandoned mine shafts. Because of the rarity of the bat and the sensitivity of the bats to human disturbances, PTA has developed a special protection plan (U.S. Army, 2007).

These activities will follow guidelines presented in PTA's *Endangered Species Management Plan and Environmental Assessment for the Indiana Bat, Myotis sodalis* (U.S. Army, 2007) and will be coordinated with the PTA Natural Resources Manager.

Bobcat (Lynx rufus). The bobcat has been documented at PTA near Picatinny Lake and Lake Denmark. These animals are highly adaptable and can survive in nearly all environments except urbanized/suburbanized areas and highly altered agricultural areas. With regard to PTA and the surrounding areas, bobcats tend to live in areas of highly mixed habitat. They prefer dense and thin wooded areas, agricultural land, and early succession areas.

Photo source: Wayne Simpson, Conserve Wildlife Foundation of New Jersey

8.2.1.2 Birds

Red-shouldered hawk (Buteo lineatus). The red-shouldered hawk is particular about its habitat and will not nest in areas near roads or buildings. This habitat preference, along with hunting, egg collecting, and general habitat degradation, has led to the decline of the red-shouldered hawk. The red-shouldered hawk is known to live throughout PTA's wetlands.

Photo Source: G.M.Jett/VIREO

Red-shouldered hawks nest in old growth forests with nests in large deciduous and coniferous trees (NJDEP, 2011). Although NJDEP lists the hawk as endangered, the NJNHP lists the bird as stable but in danger because of its rarity.

Northern goshawk (Accipiter gentilis). Northern goshawks are a shy species, inhabiting areas with nearly no human interruptions. They prefer undisturbed forest and have experienced continuous population decline. Northern goshawks have been observed flying above PTA from Picatinny Peak.

American bittern (Botaurus lentiginosus). The American bittern is a water bird living primarily in brackish, fresh, or salt water marshes. They also inhabit grasslands and cattail ponds. This species has been listed as threatened because of continuous habitat destruction.

Cooper's hawk (Accipiter cooperii). The Cooper's hawk has experienced a rebound in population numbers but is still under protection because of habitat degradation. Cooper's hawks inhabit a variety of forest types from wetlands to closed canopy deciduous forests.

Red headed woodpecker (Melanerpes erythrocephalus). The red headed woodpecker prefers open woodland areas with dying or decaying trees. This species is listed as threatened because of habitat loss and road mortality.

Barred owl (Strix varia). Barred owls have been spotted at PTA. This species avoids human disturbances and chooses old growth forests with open understories. These forests are predominantly in wetland or riparian habitats. Despite state protection, the barred owl is still experiencing population decline due to habitat loss and property development.

8.2.1.3 Reptiles

Timber rattlesnake (Crotalus horridus). This snake is a sensitive and retiring species, unable to persist in the face of too much human disturbance. The timber rattlesnake is listed as endangered by New Jersey, and the species and its hibernacula are of special interest for protection. They prefer forested areas to forage for small mammals (e.g., mice and chipmunks) and talus, south to southeastern facing rocky slopes for hibernating and other thermoregulatory activities (NJDEP, 2011). The timber rattlesnake lives around Green Pond Mountain and the 1222 Test Area on the rocky outcrops and ridges. The timber rattlesnake is threatened by overhunting, poaching, and habitat alteration.

Photo source: NJfishandwildlife.com, 2011

There are occasional conflicts between humans and snakes. Snakes are accidentally killed when crossing or basking on roadways. During summer months, military and civilian personnel occasionally encounter rattlesnakes at PTA, and although regulations prohibit harming or harassing the snakes, negative results sometimes happen.

Bog turtle (Clemmys muhlenbergii). The bog turtle is a federally listed threatened animal. The last documented sighting of a bog turtle was in the shrub-swamp wetlands associated with Green Pond at PTA in 1987. Suitable habitat is present at PTA for the bog turtles; therefore, it is assumed they are still present. PTA has a habitat management program to ensure that appropriate bog turtle habitat is not destroyed. Bog turtles inhabit wetland areas such as bogs, wet or flooded pastures, and limestone fens.

Photo Source: NJDEP Fish and Wildlife, 2011

Wood turtle (Clemmys insculpta). Wood turtles prefer living conditions at least ½ mile from developed areas and are one of the few turtle species that require both terrestrial and aquatic habitats. The last sighting of a wood turtle at PTA occurred in 1999. Although not listed as federally endangered or threatened and only listed as state threatened, the wood turtle faces possible extinction due to the illegal trade of these animals (NJDEP, 2011).

8.2.1.4 State-Listed Species of Special Concern

Thirteen state species of special concern are residents, breeders, or visitors at PTA, as listed in the NJNHP Report (2011) and the INRMP (USAEC, 2001). They include seven bird species (cliff swallow, little blue heron, cerulean warbler, loggerhead shrike, golden-wing warbler, great blue heron; and least bittern); two species of amphibians (Jefferson salamander and marbled salamander); two reptiles (eastern box turtle and northern copperhead snake); one mammal species (small-footed bat); and one fish (brook trout). Additionally, 27 species of insects of special concern have been confirmed at PTA (see **Table 8-1**), including the rare New England Bluet damselfly found in Gravel Dam Cove and along the shoreline of Lake Denmark (USAEC, 2001).

8.2.1.5 Rare Plants

No federally threatened or endangered plant species were found or are likely to be found at PTA. Seven state-listed endangered plants are known to occur at PTA, four of which are aquatic species found in Lake Denmark: featherfoil, Robbin's pondweed, small burr-reed, and lesser bladderwort (USAEC, 2001). Slender wood reed grass, meadow horsetail, and large-leafed holly are commonly associated with wetlands (USAEC, 2001). Seven state-listed endangered plant species are potentially present at PTA but have not been confirmed. In addition, 14 state-listed species of special concern are present or potentially present at PTA (USAEC, 2001). **Table 8-2** lists the rare plants at PTA, along with their rarity status, and frequency and distribution.

8.2.2 Wetlands and Water Resources

PTA contains many wetlands as well as two large lakes, 18 ponds, and four perennial brooks. The following provides a description of the wetlands/water bodies at each MRS (Malcolm Pirnie, 2006 and 2008):

- 1926 Explosion Radius (PICA-003-R-01): PTA is located in WMA 6 and contains multiple bodies of water and wetlands. The bodies of water include Green Pond, Picatinny Lake, Lake Denmark, and Mount Hope Pond. PTA's many wetlands support an abundance of wildlife and play a key role in well recharge for northern New Jersey (USAEC, 2001).
- 1926 Explosion Site – Off-Post (PICA-004-R-01): This MRS encompasses Mount Hope Pond and portions of Hope Lake.
- Former Operational Areas (PICA-006-R-01): Substantial amounts of wetland habitat exist in this MRS along with a pond and a brook.
- Green Pond MRS (PICA-005-R-01): This MRS is a portion of Green Pond Brook, which is a warm, shallow, aquatic habitat that drains from Picatinny Lake.
- Inactive Munitions Waste Pit (PICA-013-R-01): This MRS contains a small swampy area to the south of the potential former testing area.
- Inactive Munitions Waste Pit – Off-Post (PICA-014-R-01): None.
- Lakes MRS (PICA-008-R-01): Consists of Lake Denmark and Picatinny Lake. Lake Denmark is fed by Brunt Meadow Brook and discharges to Lake Picatinny. Picatinny Lake is also fed by Green Pond Brook. Picatinny Lake is designated by NJDEP and USFWS as an open water wetland (USAEC, 2001).
- Lake Denmark-Off-Post: Wetlands are present in this MRS but there are no water bodies.
- Shell Burial Grounds: None.

DGM surveys will be conducted in wetlands and transition areas only if these areas can be accessed with DGM instrumentation with minimal vegetation removal. If areas are not conducive to DGM surveys, mag and dig procedures will be used, which will require very minimal (if any) vegetation removal.

WESTON will coordinate with the PTA Natural Resources Manager and NJDEP, as necessary, and will obtain the necessary permits prior to any RI field activities that occur within mapped and potentially unmapped wetlands and/or within the 300-ft buffer of C-1 riparian zones or water bodies. If project activities occur in proximity to the areas where the surface waters could potentially be impacted, WESTON will contact the PTA NRM to determine and implement the appropriate measures of protection.

8.2.3 Vegetation Removal

Limited vegetation removal will be necessary in the MRSs to aid survey and investigation activities. It is anticipated that any clearing or cutting of vegetation will be minimal (will not involve the clear cutting of large areas) and no trees with a dbh of 5 inches or greater will be cut. Brush will be slashed so that it lies close to the ground.

Vegetation removal in wetlands is not anticipated. If this activity is required, it will not begin until all required permits are obtained. Surveying activities that involve locating boundaries and points may require minimal brush clearing. Vegetation around survey points or boundary lines may be cleared up to 3 ft in diameter or width using hand tools. Trimming/pruning of vegetation may be performed as long as it does not alter the character of the wetland. Once the survey is complete, these areas will not be maintained.

Clearing of vegetation will be conducted only between November 16 and March 31. Vegetation clearing will follow the guidelines presented in PTA's *Endangered Species Management Plan and Environmental Assessment for the Indiana Bat, Myotis sodalist* (U.S. Army, 2007) and will be coordinated with the PTA Natural Resources Manager.

8.2.4 Cultural, Archaeological, and Historical Resources

Numerous archaeological, historical, and potential archaeological and historical sites exist throughout PTA. WESTON has coordinated with the PTA Cultural Resources Manager and will continue to coordinate during the activities at the approximately 14 archaeological sites that will be directly impacted by the investigations. Additionally, 50 or more culturally sensitive sites may potentially be impacted by the investigation. PTA has provided a site map that identifies culturally sensitive areas that will be potentially impacted by the investigations (**Appendix J**). A full SHPO consultation is required, and work performed in or near these areas will be coordinated with the PTA Cultural Resources Manager. WESTON field personnel will adhere to applicable requirements of the PTA Cultural Resources Management Plan and PTA's SOPs (**Appendix J**) on protection of archaeological or historical artifacts. In addition, training will be provided to field personnel prior to beginning field activities on recognizing potential cultural, archaeological, and historical resources; the criteria for stopping work activities; and the reporting procedures. WESTON will have an archaeologist on-call to support the field activities and to identify potential cultural, archaeological and historical resources, as necessary.

If the unexpected discovery of potential archaeological or historical cultural artifacts occurs during intrusive activities, work will be stopped immediately and the PTA Cultural Resources Manager will be notified.

8.2.5 Existing Waste Disposal Sites

Existing waste disposal sites with known caps or established LUCs will be avoided during intrusive investigations. Known sites at PTA are listed in the PTA Installation Action Plan (IAP). Prior to conducting intrusive activities, the most current IAP will be reviewed to ensure that the most updated information about caps or LUCs is known so that these areas can be avoided or the execution of intrusive activities near these sites can be carefully planned. The MRSs with known existing waste disposal sites are as follows:

- Former Operational Areas (PICA-006-R-01): MRS contains the Former Sanitary Landfill and Dredge Spoils site that is approximately 13.5 acres. An 8.5-acre Waste Burial Area is also present. Another waste and disposal site is present, the 28 acre Site 20/24. All of these areas are located in the southern portion of PTA.
- Lake Denmark – Off-Post MRS (PICA-012-R-01): A 6-foot deep pit filled with 55-gallon drums.
- Shell Burial Grounds: A 1.5-acre crater and a 4-acre crater from the former explosions contain 25 tons of explosive and munitions debris.

8.3 MITIGATION PROCEDURES

8.3.1 Manifesting, Transportation, and Disposal of Wastes

Generated waste will be properly characterized and disposed of in accordance with applicable regulations.

Transportation of wastes will be conducted in accordance with applicable U.S. Department of Transportation (DOT) regulations, including labeling, use of placards, and documentation of transportation.

8.3.1.1 Non-Hazardous Wastes

It is expected that only non-hazardous material will be generated as a result of this project. No investigation-derived wastes (IDW) are expected to be generated by field activities. Personal Protective Equipment (PPE) and disposable sampling equipment are considered non-hazardous. PPE and disposable sampling equipment will be sealed in a plastic bag and placed in labeled 55-gallon steel drums. The labels will indicate the contents of the drum (i.e., PPE) and the date(s) the wastes were generated. When full, the drums will be transported to the PTA DRMO Yard. WESTON will arrange for off-site disposal of these materials. Storage of IDW will be coordinated with PTA POCs.

Nonhazardous solid waste materials, such as trash and general debris, will be removed and transported off-site for disposal through the municipal waste system.

Although MEC/MPPEH are potentially hazardous, once detonated in place or at a designated demolition area, the only remaining material requiring disposal will be MDAS. For waste generated on PTA, WESTON will turn in MDAS and scrap metal to the PTA Enterprise and Systems Integration Center (ESIC) for flashing and subsequent recycling. DA Form 1348 will be completed by the SUXOS and submitted with the material.

For wastes generated in off-post MRSs, WESTON will arrange for MDAS and scrap metal to be recycled by a local vendor. In accordance with 40 CFR 261.6(a)(3), scrap metal, if recycled, is not subject to Parts 262-266, or 268, 270, or 124. WESTON will recycle scrap metal generated as a result of necessary removal and maintain records of recycling.

8.3.1.2 Hazardous Wastes

The generation of hazardous waste is not anticipated during this project. If WESTON personnel visually observe or notice odors indicating the potential presence of hazardous materials and/or waste during intrusive activities, those work activities will cease in that area and the Site Manager will notify PTA, USACE, and WESTON's H&S Manager.

8.3.2 Security of Hazardous Materials

WESTON personnel will provide security to control the work area. UXO, DMM, and MPPEH, as well as donor explosives, will be secured as discussed in Section 6, Explosives Management Plan.

8.3.3 Burning Activities

No burning activities that could result in releasing potential toxic contamination into the environment are planned.

8.3.4 Dust and Emission Control

EPA has established National Ambient Air Quality Standards (NAAQS) pursuant to Sections 109 and 301(a) of the Clean Air Act (CAA). These standards, expressed in micrograms per cubic meter, establish safe concentration levels for each criteria pollutant. NAAQS have been set for six pollutants: particulate matter, sulfur dioxide, carbon monoxide, nitrogen dioxide, ozone, and lead.

MEC demolition activities and normal vehicle use are considered minor sources of air emissions, and it is not anticipated that project activities will have any significant effect on air quality. The vehicles and equipment will be in good working order and will meet the applicable vehicle emissions requirements.

8.3.5 Noise Control and Prevention

It is expected that this project will generate two primary sources of noise: noise from mechanical equipment (i.e., trucks), and noise from demolition activities, if conducted. WESTON will control the noise emissions from mechanical equipment by ensuring that the manufacturer's noise control equipment is in place and functioning (i.e., mufflers). To minimize nuisance noise, equipment will be powered off when it is not in use.

The second source of noise will be pulse noises resulting from demolition activities. Both tamping the demolition shot with earth and/or sandbags and observing weather conditions on the day of the shot will control this type of noise. For example, noise is transmitted more extensively on a day with a low cloud ceiling than on a clear day. To reduce the noise on a cloudy day, various options will be assessed, including but not limited to, not conducting the demolition shot, waiting for a shift in prevailing winds, reducing the NEW of the shot, or some combination of controls. The SUXOS and the Demolition Supervisor, in coordination with PTA, will determine the applicable method of noise control during demolition.

8.3.6 Spill Control and Prevention

WESTON anticipates that unleaded gasoline, diesel fuel No.2, and motor oil may be stored on-site and in quantities less than 5 gallons. To decrease the amount of pollutants to be stored on-site, WESTON plans, to the greatest extent possible, to conduct fueling and repair of vehicles off-site.

8.3.6.1 Spill Response

Because of the nature of the operations, the potential for a spill of pollutants during operations is low. The highest probability for a spill will occur during re-fueling operations of equipment (i.e., filling a chainsaw's gas and oil tanks). In the event of a spill, WESTON will notify PTA security and will report the following:

- Type of material (chemical name, if known).
- Description of material (e.g., liquid, solid, color, odors).
- Approximate amount (e.g., gallons, pounds).
- Location (e.g., indoor, outdoor, leaking drum or tank, closest building).
- Any nearby waterways, sewers, etc.
- Any known hazards nearby (e.g., fire, other chemicals).
- Name and telephone number of person reporting spill and building number, if different from spill area, or provide a POC for further details.

If a spill occurs on public property (off-post), the local fire department will be contacted, as necessary.

WESTON will be equipped with spill kits during field activities for immediate cleanup if a petroleum product is inadvertently spilled. Any spills originating from small containers (e.g., gasoline cans) will be contained using absorbent materials.

If fuel or oil is spilled, the following measures will be taken:

- The spill area will be isolated and contained.
- The liquid and affected soil will be shoveled into a plastic bag and subsequently placed into a DOT-approved shipping container.
- Each container will be labeled to identify its contents.
- The container(s) will be shipped off-site and disposed of at a permitted facility in accordance with the CFR 260 – 270.

8.3.7 Storage Areas and Temporary Facilities

Storage of materials will be in a designated on-site area approved by PTA and coordinated with the USACE and other PTA tenants prior to the field activities. MDAS and scrap metals will be stored in lockable containers until recycled. Based on the planned field activities, it is not anticipated that the construction or use of a temporary storage area for hazardous materials will be necessary.

Temporary facilities other than a field site trailer (site office) are not anticipated. The location of a temporary site trailer, if used, will be identified prior to field activities and a site layout plan will be included in the APP/SSHP.

8.3.8 Access Routes

WESTON will use the existing road network inside the facility, and county and private community roads outside the facility to gain access into investigation locations.

8.3.9 Site Water Runon and Runoff

Runon and runoff water controls are not necessary based on the planned excavations, which are very limited in extent, are to be conducted with hand tools, and to be opened/closed on the same day.

8.3.10 Decontamination Procedures

Equipment used for MC sampling will require decontamination in accordance with the UFP QAPP (**Appendix B**), which specifies that the decontamination of sampling equipment will be performed at an off-site facility.

8.3.11 Minimizing Areas of Disturbance

During the RI, activities will be conducted in a manner that will minimize impacts to land resources within and outside the project boundaries and in accordance with the ROEs. Field personnel will minimize the areas of disturbed soil while intrusively investigating anomalies as much as possible. Excavations during the RI are not anticipated to exceed the 5,000 sq ft soil disturbance that would require erosion and sediment control plans and provisions.

8.4 POST-ACTIVITY SITE RESTORATION

The ground surface will be disturbed during intrusive activities, which may require some site restoration. In wooded areas, restoration will be limited to back-filling and compacting the excavated material. In grassy areas, reseeding will occur, as appropriate. If MEC are encountered that require BIP detonations, these holes will be backfilled with the same material that was excavated from the location and reseeded as appropriate. No additional restoration activities will be conducted.

Wastes will be removed from the work area immediately upon completion of each day's field activities. Therefore, no post–activity cleanup should be required. A post–activity inspection will be conducted by the SUXOS/Site Manager and the UXOQCS to ensure that the location is left clean.

8.5 AIR MONITORING

Air monitoring is not required for planned investigation activities. Intrusive activities are minimal and will not generate dust and there are no volatile contaminants associated with the anticipated MEC.

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APPENDIX A

PROJECT POINTS OF CONTACT

Appendix A – Project Points of Contact Information

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J.B. Smith	UXO Safety/MMRP Technical Project Manager/Installation Safety Office	IMNE-PIC-PW Bldg 3002 Picatinny Arsenal, NJ 07806-5000	973-724-2522 (office) 973-796-4236 (mobile) 880-2522 (DSN) 973-724-4354 (fax) Jb.smith1@us.army.mil
USAEC			
Mary Ellen Maly	Army Restoration Manager	US Army Environmental Command 11711 North IH 35, Suite 110 San Antonio, TX 78233-5498	210-424-8646 (office) maryellen.h.maly@us.army.mil
USACE			
Jeffrey May	USACE Contracting Officer (KO)	U.S. Army Corps of Engineers, Baltimore District 10 South Howard Street Baltimore, MD 21201-1715	410-962-5617 (office) Jeffrey.B.May@usace.army.mil
Sesh Lal	USACE Contracting Officer's Representative (COR)	U.S. Army Corps of Engineers, Baltimore District 10 South Howard Street Baltimore, MD 21201-1715	410- 962-2778 (office) sesh.p.lal@nab02.usace.army.mil
Travis McCoun	Military Munitions Design Center (MMDC) Program Manager	U. S. Army Corps of Engineers, Baltimore District 10 South Howard Street Baltimore, MD 21201-1715	410-962-6728 (office) 443-844-8192 (mobile) Travis.Mccoun@usace.army.mil
Nancy Flaherty	USACE Project Manager and Design Team Leader (DTL)	U. S. Army Corps of Engineers, Baltimore District 10 South Howard Street Baltimore, MD 21201-1715	410-962-4256 (office) 443-844-8193 (mobile) Nancy.E.Flaherty@usace.army.mil
Kathy Brown	Contract Specialist	U. S. Army Corps of Engineers, Baltimore District 10 South Howard Street Baltimore, MD 21201-1715	410-962-2585 (office) 410-962-2001 (fax) Kathryn.E.Brown-Tarbalouti@usace.army.mil
EPA			
William Roach	Project Manager Federal Facilities Section	U.S. EPA Region 2 290 Broadway, 18th Floor New York, NY 10007-1866	212- 637-4335 (office) 212- 637-3256 (fax) roach.bill@epa.gov

Appendix A – Project Points of Contact Information (continued)

Name	Title/Project Function	Address	Contact Information
NJDEP			
Gregory Zalaskus	Case Manager, Emergency Management Program	PO Box 028 401 East State Street Trenton, NJ 08625-0413	609-984-2065 (direct) 609-633-2168 (main) 609-633-1439 (fax) Greg.Zalaskus@dep.state.nj.us
WESTON			
Greg Daloisio	Program Manager	Weston Solutions, Inc. 1400 Weston Way P.O. Box 2653, Bldg 4-2 West Chester, PA 19380	610-701-3786 (office) 610-306-7351 (mobile) 610-701-3187 (fax) G.Daloisio@westonsolutions.com
Laura Pastor	Project Manager	Weston Solutions, Inc. 1400 Weston Way P.O. Box 2653, Bldg 4-2 West Chester, PA 19380	610-701-3445 (office) 484-467-9466 (mobile) 610-701-3187 (fax) Laura.Pastor@westonsolutions.com
Ryan Steigerwalt	Senior Geophysicist	Weston Solutions, Inc. 1400 Weston Way P.O. Box 2653, Bldg 4-2 West Chester, PA 19380	410-612-5940 (office) 267-258-2672 (mobile) 410-612-5901 (fax) Ryan.Steigerwalt@westonsolutions.com
Lisa Szegedi	MMRP Technical Manager (Subcontractor)	ARCADIS/Pirnie 17-17 Route 208 North 2nd Floor Fair Lawn, NJ 07410	201-398-4428 (office) 201-398-4443 (fax) LSzegedi@pirnie.com
Al Larkins	UXO Operations Manager	Weston Solutions, Inc. 1400 Weston Way P.O. Box 2653 West Chester, PA 19380	410-696-7260 (office) 443-280-7049 (mobile) Al.Larkins@westonsolutions.com
Walter Hess	Senior UXO Supervisor	Weston Solutions, Inc. 1400 Weston Way P.O. Box 2653, Bldg 4-2 West Chester, PA 19380	540-287-0081 (mobile) 610-701-3187 (fax) wfhess@gmail.com
Bruce Carnal	UXO Safety Officer	Weston Solutions, Inc. 1400 Weston Way P.O. Box 2653, Bldg 4-2 West Chester, PA 19380	610-701-3775 (office) 610-701-3187 (fax) Bruce.Carnal@westonsolutions.com
Bruce Carnal	UXO Quality Control Specialist	Weston Solutions, Inc. 1400 Weston Way P.O. Box 2653, Bldg 4-2 West Chester, PA 19380	610-701-3775 (office) 610-701-3187 (fax) Bruce.Carnal@westonsolutions.com

APPENDIX B

UNIFORM FEDERAL POLICY-QUALITY ASSURANCE PROJECT PLAN

FINAL

UNIFORM FEDERAL POLICY-QUALITY ASSURANCE PROJECT PLAN

REMEDIAL INVESTIGATION FOR MILITARY MUNITIONS RESPONSE PROGRAM
PICATINNY ARSENAL, ROCKAWAY TOWNSHIP, NEW JERSEY
Contract No. W912DR-09-D-0006

February 2012

Document Control Number: P0001

Report Prepared By:

ARCADIS U.S., Inc./Malcolm Pirnie, Inc. and Weston Solutions, Inc.

For USACE - Baltimore District

Picatinny Arsenal

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FIGURES

ATTACHMENTS

ACRONYMS

2-AM-4,6-DNT	2-Amino-4,6-Dinitrotulene
4-AM-2,6-DNT	4-Amino-2,6-Dinitrotulene
Al	Aluminum
ARDEC	Armament Research, Development, and Engineering Center
Ba	Barium
BIP	Blow in Place
CCV	Continuing Calibration Verification
Cd	Cadmium
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CENAB	USACE - Baltimore District
COC	Chain of Custody
CRREL	Cold Regions Research and Engineering Laboratory
CSM	Conceptual Site Model
Cu	Copper
DERP	Defense Environmental Restoration Program
DMM	Discarded Military Munitions
DNT	Dinitrotoluene
DoD	Department of Defense
DQO	Data Quality Objective
DU	Depleted Uranium
EDD	Electronic Data Deliverable
ELAP	Environmental Laboratory Accreditation Program
ERDC	Engineer Research and Development Center
FY	Fiscal Year
GPS	Global Positioning System
HE	High Explosive
HMX	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
HPLC	High Pressure Liquid Chromatography
HRR	Historical Records Review
ICAL	Initial Calibration
ICP	Inductively Coupled Plasma
ICS	Interference Check Sample
ICV	Initial Calibration Verification
IRP	Installation Restoration Program

ACRONYMS

LCS	Laboratory Control Sample
LOD	Limit of Detection
LOQ	Limit of Quantification
MAMMS	Multiple Award Military Munitions Services
MC	Munitions Constituents
MD	Munitions Debris
mm	Millimeter
MMRP	Military Munitions Response Program
Mn	Manganese
MRS	Munitions Response Site
MS	Matrix Spike
MSD	Matrix Spike Duplicate
N/A	Not Applicable
NG	Nitroglycerin
NJ	New Jersey
NJDEP	New Jersey Department of Environmental Protection
OSHA	Occupational Safety and Health Administration
PA	Preliminary Assessment
PAERAB	Picatinny Arsenal Environmental Restoration Advisory Board
Pb	Lead
PETN	Pentaerythritol tetranitrate
POC	Point of Contact
PTA	Picatinny Arsenal
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QL	Quantitation Limit
QSM	Quality Systems Manual
R	Recovery
R&D	Research and Development
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine
RI	Remedial Investigation
RPD	Relative Percent Difference
RSL	Risk Screening Level
SAP	Sampling and Analysis Plan
SARA	Superfund Amendment and Reauthorization Act
Sb	Antimony
SDZ	Surface Danger Zone

ACRONYMS

SI	Site Investigation
SL	Screening Level
SMO	Sample Management Officer
Sr	Strontium
SRS	Soil Remediation Standard
TAL	Target Analyte List
TNP	Trinitrophenol
TNT	Trinitrotoluene
TSA	Technical System Audit
UFP	Uniform Federal Policy
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Command
USEPA	United States Environmental Protection Agency
USC	United States Code
UXO	Unexploded Ordnance
VSP	Visual Sampling Plan
Zn	Zinc

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INTRODUCTION

In 2002, the Department of Defense (DoD) established the Military Munitions Response Program (MMRP) under the Defense Environmental Restoration Program (DERP), to address unexploded ordnance (UXO), discarded military munitions (DMM), and munitions constituents (MC) located on defense sites. This program provides for munitions response actions to be conducted under the process outlined in the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations 300) as authorized by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 United States Code (USC) 9605, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, Pub. L. 99-499 (hereinafter CERCLA).

At Picatinny Arsenal (PTA), both the Preliminary Assessment (PA) and Site Inspection (SI) phases of the CERCLA process have been completed under the MMRP. According to the SI, a Remedial Investigation (RI) for MC was recommended for the following Munitions Response Sites (MRS):

- PICA-003-R-01: 1926 Explosion Radius
- PICA-004-R-01: 1926 Explosion Site - Off-Post
- PICA-006-R-01: Former Operational Areas
- PICA-013-R-01: Inactive Munitions Waste Pit
- PICA-014-R-01: Inactive Munitions Waste Pit – Off-Post
- PICA-008-R-01: Lakes (Land Portion Only)
- PICA-012-R-01: Lake Denmark - Off-Post

This UFP-QAPP addresses the MC investigation that will be conducted under the RI. The purpose of this UFP-QAPP is to detail the planning processes for collecting data and describes the implementation of the quality assurance (QA) and quality control (QC) activities developed for this program. The objectives of this QAPP are to generate project data that are technically valid, legally defensible, and are useful in meeting the project goals, as well as integrate the technical and QC requirements for future investigation activities. The QAPP consists of four main components:

- Project Management
- Measurement and Data Acquisition
- Assessment and Oversight
- Data Validation and Usability

The above components will incorporate QA/QC requirements cited within the following documents:

- *USEPA Requirements for Quality Assurance Project Plans*, USEPA QA/R-5, March 2001.
- *USEPA Guidance for the Data Quality Objectives Process*, QA/G-4, August 2000.
- *Uniform Federal Policy for Quality Assurance Project Plans*, Final Version March 2005
- *Department of Defense Quality System Manual*, Version 4.2, October 2010

PROJECT BACKGROUND AND HISTORY

PTA, which covers 5,801 improved and unimproved acres, is located in Morris County, NJ approximately 45 miles west of New York City. The installation is bordered by numerous major highways including State Route 15, Interstate 80, and U.S. Route 46.

PTA was established in the late 1800s as a storage and powder depot. Production activities began several years before the Spanish-American War, which started in 1898. At the beginning of World War I, PTA was manufacturing smokeless powder and munitions of various sizes. By the end of the war, PTA had begun new operations including the melt-loading of projectiles, the manufacture of pyrotechnic signals and flares, the experimental manufacture of modern propellants, high explosives (HE), fuzes, and metal components, and the loading of trinitrotoluene (TNT) and amatol into bombs and projectiles. During World War II, PTA produced thousands of pounds of smokeless powder, boosters, primers, and detonators. PTA also produced thousands of pounds of explosives for the Korean and Vietnam Conflicts.

In recent years, PTA's mission has shifted to become an integrated weapons and armaments specialty site for guns and ammunition. To help support this mission, PTA is the site of the Armaments Research, Development and Engineering Center (ARDEC), whose mission is conducting and managing research and development (R&D) for all assigned weapons systems. PTA has also established several partnerships with academia and industry and has involved them in the R&D process.

QAPP Worksheet #1 (UFP-QAPP Manual Section 2.1) -- Title and Approval Page

Site Name/Project Name: Remedial Investigations, Picatinny Arsenal
Site Location: Rockaway Township, Morris County, New Jersey (NJ)

Document Title: Quality Assurance Project Plan Picatinny Arsenal RI

Lead Organization: U.S. Army Corps of Engineers (USACE) Baltimore District (CENAB)

Preparer's Name and Organizational Affiliation: James McCann and Lisa Szegedi of ARCADIS/Pirnie

Preparer's Address, Telephone Number, and E-mail Address:
17-17 Route 208 North, Fair Lawn, NJ 07410, 201-797-7400, e-mail: james.mccann@arcadis-us.com; lisa.szegedi@arcadis-us.com

Preparation Date (Day/Month/Year): 01 November 2011

Laura Pastor — 11/21/11
WESTON – Project Manager — Date
Laura Pastor

Stacie A. Popp — 11/21/11
WESTON – Quality Control Manager — Date
Stacie Popp

Lisa Szegedi — 11/17/11
ARCADIS/Malcolm Pirnie – MMRP Technical Manager — **Date**
Lisa Szegedi

James McCann — 11/17/11
ARCADIS/Malcolm Pirnie – Senior Chemist/Site QC Officer — **Date**
Jim McCann

Approval Dates:

QAPP Worksheet #2 (UFP-QAPP Manual Section 2.2.4) -- QAPP Identifying Information

Site Name/Project Name:	Picatinny Arsenal MC RI (6 MRSs)
Site Location:	Rockaway Township, Morris County, New Jersey (NJ)
Site Number/Code:	Not Applicable (N/A)
Operable Units:	N/A
Contractor Name:	Weston Solutions, Inc (WESTON)
Contract Number:	W912DR-09-D-0006
Contract Title:	Multiple Award Military Munitions Services (MAMMS)
Work Assignment Number:	N/A

1. Guidance Used to Prepare QAPP: Uniform Federal Policy for Quality Assurance Project Plans, Final Version March 2005

2. Regulatory Program: MMRP

3. Approval Entities: U.S. Army Corps of Engineers (USACE) - Baltimore District (CENAB), Picatinny Arsenal, United States Environmental Protection Agency (USEPA) Region 2 and New Jersey Department of Environmental Protection (NJDEP)

4. The QAPP is (select one): ☐Generic ☒Project Specific

5. Dates of Scoping Sessions that were held: November 10, 2010 and July 28, 2011

6. Dates and Titles of QAPP Documents Written for Previous Site Work, if applicable:

Title	Approval Date
Final Site Inspection Work Plan, Picatinny Arsenal, NJ, prepared by Malcolm Pirnie, Inc.	June 2007

7. Organizational Partners (stakeholders) and Connection with Lead Organization: The primary project organizational partners include representatives from USACE-CENAB, PTA, U.S. Army Environmental Command (USAEC), USEPA, Region 2, and NJDEP.

8. Data users: PTA, USACE, AEC, NJDEP, USEPA Region 2, WESTON and ARCADIS/Pirnie.

9. If any required QAPP elements and required information are not applicable to the project, then circle the omitted QAPP elements and required information on the attached table. Provide an explanation for their exclusion below: All worksheets are applicable.

QAPP Worksheet #2
QAPP Identifying Information
(continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	***Required Information***	***Crosswalk to Worksheet # or Related Documents***
Project Management and Objectives		
2.1 Title and Approval Page	- Title and Approval Page	1
2.2 Document Format and Table of Contents 2.2.1 Document Control Format 2.2.2 Document Control Numbering System 2.2.3 Table of Contents 2.2.4 QAPP Identifying Information	- Table of Contents - QAPP Identifying Information	2
2.3 Distribution List and Project Personnel Sign-Off Sheet 2.3.1 Distribution List 2.3.2 Project Personnel Sign-Off Sheet	- Distribution List - Project Personnel Sign-Off Sheet	3 4
2.4 Project Organization 2.4.1 Project Organizational Chart 2.4.2 Communication Pathways 2.4.3 Personnel Responsibilities and Qualifications 2.4.4 Special Training Requirements and Certification	- Project Organizational Chart - Communication Pathways - Personnel Responsibilities and Qualifications Table - Special Personnel Training Requirements Table	5 6 7 8
2.5 Project Planning/Problem Definition 2.5.1 Project Planning (Scoping) 2.5.2 Problem Definition, Site History, and Background	- Project Planning Session Documentation (including Data Needs tables) - Project Scoping Session Participants Sheet - Problem Definition, Site History, and Background - Site Maps (historical and present)	9 10
2.6 Project Quality Objectives and Measurement Performance Criteria 2.6.1 Development of Project Quality Objectives Using the Systematic Planning Process 2.6.2 Measurement Performance Criteria	- Site-Specific PQOs - Measurement Performance Criteria Table	11 12

QAPP Worksheet #2
QAPP Identifying Information
(continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	*Required Information*	*Crosswalk to Worksheet # or Related Documents*
2.7 Secondary Data Evaluation	- Sources of Secondary Data and Information - Secondary Data Criteria and Limitations Table	13
2.8 Project Overview and Schedule 2.8.1 Project Overview 2.8.2 Project Schedule	- Summary of Project Tasks - Reference Limits and Evaluation Table - Project Schedule/Timeline Table	14 15 16
	Measurement/Data Acquisition	
3.1 Sampling Tasks 3.1.1 Sampling Process Design and Rationale 3.1.2 Sampling Procedures & Requirements 3.1.2.1 Sampling Collection Procedures 3.1.2.2 Sample Containers, Volume, and Preservation 3.1.2.3 Equipment/Sample Containers Cleaning and Decontamination Procedures 3.1.2.4 Field Equipment Calibration, Maintenance, Testing, and Inspection Procedures 3.1.2.5 Supply Inspection and Acceptance Procedures 3.1.2.6 Field Documentation Procedures	- Sampling Design and Rationale - Sample Location Map - Sampling Locations and Methods/SOP Requirements - Analytical Methods/SOP Requirements Table - Field Quality Control Sample Summary Table - Sampling SOPs - Project Sampling SOP References Table - Field Equipment Calibration, Maintenance, Testing, and Inspection Table	17 18 19 20 21 22
3.2 Analytical Tasks 3.2.1 Analytical SOPs 3.2.2 Analytical Instrument Calibration Procedures 3.2.3 Analytical Instrument and Equipment Maintenance, Testing, and Inspection Procedures 3.2.4 Analytical Supply Inspection and Acceptance Procedures	- Analytical SOPs - Analytical SOP References Table - Analytical Instrument Calibration Table - Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table	23 24 25

QAPP Worksheet #2
QAPP Identifying Information
(continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	*Required Information*	*Crosswalk to Worksheet # or Related Documents*
3.3 Sample Collection Documentation, Handling, Tracking, and Custody Procedures 3.3.1 Sample Collection Documentation 3.3.2 Sample Handling and Tracking System 3.3.3 Sample Custody	- Sample Collection Documentation Handling, Tracking, and Custody SOPs - Sample Container Identification - Sample Handling Flow Diagram - Example Chain-of-Custody Form and Seal	26, 27
3.4 Quality Control Samples 3.4.1 Sampling Quality Control Samples 3.4.2 Analytical Quality Control Samples	- QC Samples Table - Screening/Confirmatory Analysis Decision Tree	28
3.5 Data Management Tasks 3.5.1 Project Documentation and Records 3.5.2 Data Package Deliverables 3.5.3 Data Reporting Formats 3.5.4 Data Handling and Management 3.5.5 Data Tracking and Control	- Project Documents and Records Table - Analytical Services Table - Data Management SOPs	29 30 See USEPA Region 2 Electronic Data Requirements
Assessment/Oversight		
4.1 Assessments and Response Actions 4.1.1 Planned Assessments 4.1.2 Assessment Findings and Corrective Action Responses	- Assessments and Response Actions - Planned Project Assessments Table - Audit Checklists - Assessment Findings and Corrective Action Responses Table	31 32
4.2 QA Management Reports	- QA Management Reports Table	33
4.3 Final Project Report		

QAPP Worksheet #2
QAPP Identifying Information
(continued)

Required QAPP Element(s) and Corresponding QAPP Section(s)	*Required Information*	*Crosswalk to Worksheet # or Related Documents*
	Data Review	
5.1 Overview		
5.2 Data Review Steps 5.2.1 Step I: Verification 5.2.2 Step II: Validation 5.2.2.1 Step IIa Validation Activities 5.2.2.2 Step IIb Validation Activities 5.2.3 Step III: Usability Assessment 5.2.3.1 Data Limitations and Actions from Usability Assessment 5.2.3.2 Activities	- Verification (Step I) Process Table - Validation (Steps IIa and IIb) Process Table - Validation (Steps IIa and IIb) Summary Table - Usability Assessment	34 35 36 37
5.3 Streamlining Data Review 5.3.1 Data Review Steps To Be Streamlined 5.3.2 Criteria for Streamlining Data Review 5.3.3 Amounts and Types of Data Appropriate for Streamlining		36

QAPP Worksheet #3 (UFP-QAPP Manual Section 2.3.1) -- Distribution List

QAPP Recipients	Title	Organization	Telephone Number	E-mail Address
Nancy Flaherty	Project Manager	USACE - CENAB	410-779-2796	nancy.e.flaherty@usace.army.mil
Deborah McKinley	Project Engineer	USACE - CENAB	410-962-6730	deborah.k.mckinley@usace.army.mil
Ted Gabel	Project Manager, Environmental Restoration	PTA	973-724-6748	ted.gabel@us.army.mil
J.B. Smith	MMRP Technical Project Manager	PTA	973-724-2522	jb.smith1@us.army.mil
Mary Ellen Maly	Army Restoration Manager	USAEC	210-424-8646	maryellen.h.maly@us.army.mil
Jim Kealy	Technical Coordinator	NJDEP	609-633-1352	Jim.Kealy@dep.state.nj.us
Greg Zalaskus	Case Manager	NJDEP	609-984-2065	Greg.Zalaskus@dep.state.nj.us
Bill Roach	Remedial Project Manager	USEPA	212-637-4335	roach.bill@epa.gov
Ryan Steigerwalt	Senior Geophysicist	WESTON	410-612-5940	Ryan.Steigerwalt@WestonSolutions.
Laura Pastor	Project Manager	WESTON	610-701-3445	laura.pastor@westonsolutions.com
Lisa Szegedi	MMRP Technical Manager	ARCADIS/Pirnie	201-398-4328	Lisa.szegedi@arcadis-us.com
Richard Califano	Risk Assessment Technical Manager	ARCADIS/Pirnie	201-398-4307	Richard.califano@arcadis-us.com
Elaine Walker	Project Manager	Test America	303-736-0156	Elaine.walker@testamericainc.com

Electronic copies of the QAPP and related project documents will also be available for all the personnel named in the organization chart in Worksheet 5, Figure 1, and other personnel who will be assigned to work on the project. Those named above will be responsible for distributing the QAPP and related documents to others in their organizations.

QAPP Worksheet #4 (UFP-QAPP Manual Section 2.3.2) -- Project Personnel Sign-Off Sheet

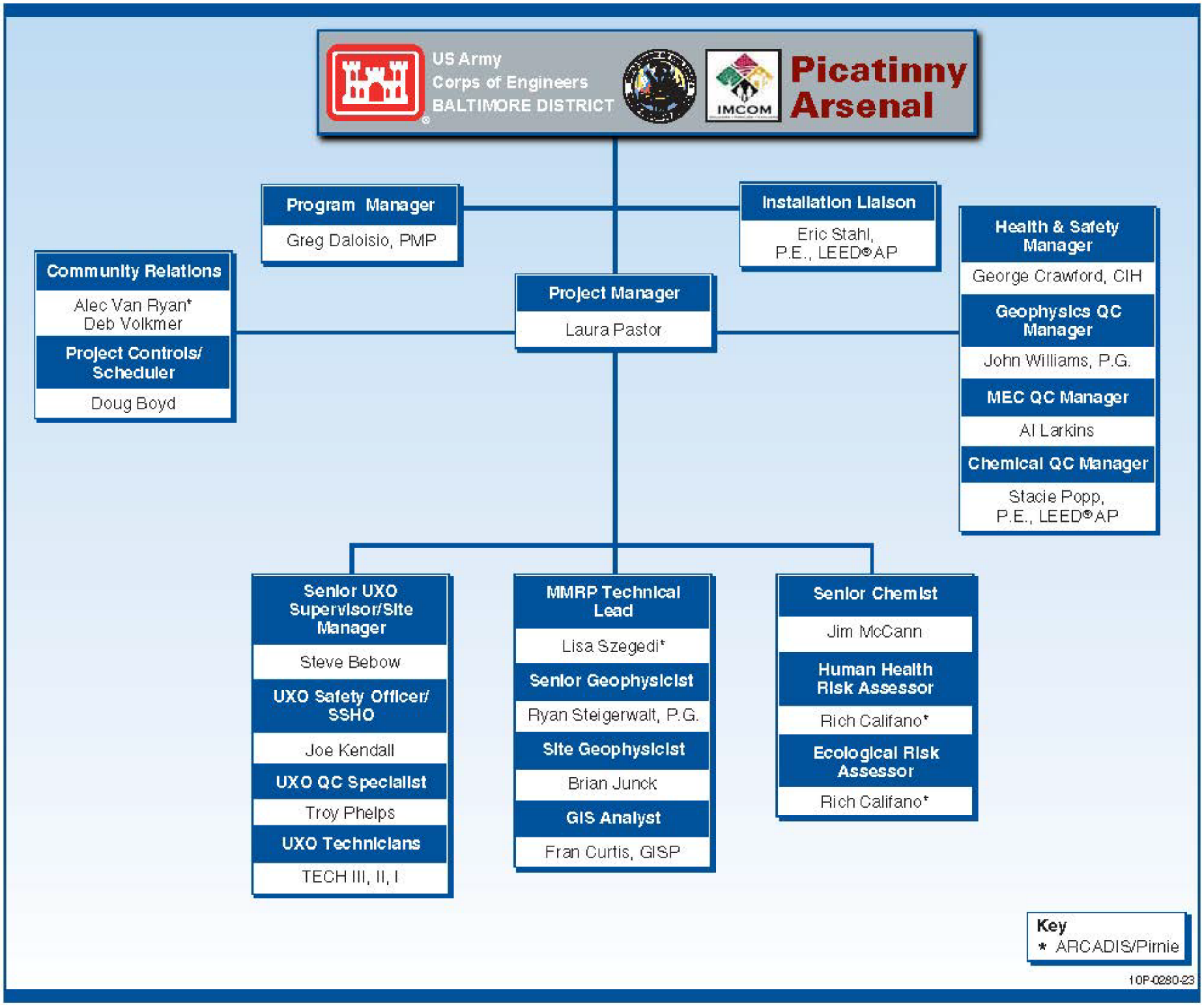
Project Personnel	Title	Organization	Signature	Date QAPP Read Email Receipt
Nancy Flaherty	Project Manager	USACE - CENAB		
Ted Gabel	Project Manager, Environmental Restoration	PTA		
J.B. Smith	MMRP Technical Project Manager	PTA		
Mary Ellen Maly	Army Restoration Manager	USAEC		
Laura Pastor	Project Manager	WESTON		
Stacie Popp-Young	QC Manager	WESTON		
Lisa Szegedi	MMRP Technical Manager	ARCADIS/Pirnie		
Jim McCann	QC Officer/Senior Chemist	ARCADIS/Pirnie		
Richard Califano	Risk Assessment Technical Manager	ARCADIS/Pirnie		
Elaine Walker	Project Manager	Test America		
Field Personnel (TBD)	Field Personnel	ARCADIS/Pirnie		

QAPP Worksheet #5 (UFP-QAPP Manual Section 2.4.1) -- Project Team Organization Chart

Project Team Organization Chart:

The Project Team Organization Chart is provided in Figure 1.

Figure 1: Project Team Organization Chart – MC Sampling



QAPP Worksheet #6 (UFP-QAPP Manual Section 2.4.2) -- Communication Pathways

While ARCADIS/Pirnie is the MC MMRP Technical Manager, the overall project management rests with WESTON. Therefore, ARCADIS/Pirnie will likely initiate communication with WESTON regarding any corrective actions; however, WESTON would ultimately communicate the action to USACE.

Communication Drivers	Responsible Entity	Name	Phone Number(s)	Procedure (timing, pathways, etc.)
Approval of QAPP Amendments	WESTON and ARCADIS/ Pirnie	WESTON Project Manager, Laura Pastor and ARCADIS/Pirnie MMRP Technical Manager, Lisa Szegedi	610-701-3445/ 201-398-4328	Obtain initial approval from ARCADIS/Pirnie's PM and Quality Control Officer. Submit documented amendments within 10 working days for transmittal to USACE for approval.
Document Control	WESTON and ARCADIS/ Pirnie	WESTON Project Manager, Laura Pastor and ARCADIS/Pirnie MMRP Technical Manager, Lisa Szegedi	610-701-3445/ 201-398-4328	Project document preparation and distribution to USACE for review and approval.
Stop Work and Initiation of Corrective action	WESTON and ARCADIS/ Pirnie	WESTON Project Manager, Laura Pastor and ARCADIS/Pirnie MMRP Technical Manager, Lisa Szegedi	610-701-3445/ 201-398-4328	The PM communicates within 24 hours of stop work to the USACE, USAEC, and PTA Project Managers by phone with confirming e-mail.
Real time modification, notifications and approval	WESTON and ARCADIS/ Pirnie	WESTON Project Manager, Laura Pastor and ARCADIS/Pirnie MMRP Technical Manager, Lisa Szegedi	610-701-3445/ 201-398-4328	Real time modification to the project will require the approval of the Project Quality Control Officer and PM or designees and will be documented using the Field Modifications Form within five working days.
Reporting of serious issues	WESTON	WESTON Project Manager, Laura Pastor	610-701-3445	Report any serious issues to USACE and other concerned parties by phone with a follow-up e-mail.
Reporting Laboratory Data Quality Issues	Test America	Test America Laboratory Project Manager, Elaine Walker	303-736-0165	All QA/QC issues with project field samples will be reported by the laboratory to the MMRP Technical Manager within two business days of identification of the technical concern.
Laboratory Analytical Corrective Actions	ARCADIS/ Pirnie and Test America	QA Officer/Senior Chemist, Jim McCann Test America Laboratory Project Manager, Elaine Walker	201-398-4310 303-736-0165	The need for laboratory corrective actions will be determined by the QA Officer/Senior Chemist and/or Laboratory Project Manager, as appropriate, and will be documented in a memorandum to WESTON, ARCADIS/Pirnie, and USACE Project Managers.

QAPP Worksheet #7 (UFP-QAPP Manual Section 2.4.3) -- Personnel Responsibilities and Qualifications Table

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Nancy Flaherty	Project Manager	USACE - CENAB	Project Manager	NA
Ted Gabel	Project Manager, Environmental Restoration	PTA	Project Manager	NA
Gregory Daloisio, PMP	Program Manager	WESTON	Single Point of Contact (POC). Ensures satisfaction of all contractual requirements such as cost, schedule, technical, and quality goals. Communicates with CENAB on delivery order progress. Develops/enforces systems for administrative QC and delivery order closeout. Holds regular status meetings with CENAB Program Manager/Contracting Officer.	B.S., Mechanical Engineering, 26 years of environmental experience, more than 20 years of Project Management experience.
Laura Pastor	Project Manager	WESTON	Provides overall management of the contract including cost, schedule, and technical quality. Acts as the single point of contact for the contract. Maintains communication and coordination with PTA and USACE.	B.S. Geology, Over 11 years experience managing and executing MMRP, CERCLA, and RCRA projects.
Stacie Popp-Young	QA/QC Manager	WESTON	Responsible for program quality management including training and programmatic quality processes and control. Provides senior technical support.	B.S. Chemical Engineering, M.S Chemical Engineering, 25 years experience in environmental assessments, including field laboratory method development, data quality reviews, QAPP preparation, and laboratory coordination.
Lisa Szegedi	Principal Environmental Scientist, ARCADIS/Pirnie MMRP Technical Manager	ARCADIS/ Pirnie	MMRP Project Manager for MC Investigations	BS and MS in Environmental Science, Project Manager with over 16 years experience managing a diverse array of multi-million dollar hazardous waste projects under various programs including Superfund and MMRP.

QAPP Worksheet #7 (UFP-QAPP Manual Section 2.4.3) -- Personnel Responsibilities and Qualifications Table (Continued)

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Jim McCann	Site Quality Control Officer and Senior Chemist	ARCADIS/ Pirnie	Oversees all aspects of project to ensure QA/QC requirements are met, manages laboratory subcontract, prepares QAPP, oversees data validation and data evaluation, resolves technical issues regarding analytical data, oversees technical system audits	BS and MA Chemistry - 40 plus years of chemistry and QA experience
Rich Califano	Principal Scientist/ARCADIS/Pirnie Risk Assessment Technical Manager	ARCADIS/ Pirnie	Oversees technical aspects of human health and ecological risk assessments. Coordinates risk assessors and implementation of risk assessment methodology.	BS and MS Biology, PhD Biology/Environmental Health – Science) New York University. Nearly 40 years experience in conducting human health and ecological risk assessments.
Hope Nemickas	Risk Assessor	ARCADIS/ Pirnie	Conduct human health and/or ecological risk assessments	BS Natural Resources – 17 years experience conducting human health and ecological risk assessments
Julie Conklin	Risk Assessor	ARCADIS/ Pirnie	Conduct human health and/or ecological risk assessments	BS Natural Resources and MS Environmental Science and Policy – 9 years experience conducting human health and ecological risk assessments
To be assigned	Field Team Leader	ARCADIS/ Pirnie	The Field Team Leader will be responsible for implementation of tasks performed as part of a given field event. They will also assist the MMRP Technical Lead in coordinating and scheduling field activities. If a deficiency from planned activities is noted during the course of the field investigation, the Field Team Leader is responsible for implementing the corrective action.	Must have acceptable education and field sampling experience.
To be assigned	Data Validator	To be assigned	Performs data validation of analytical data	Must have acceptable education and experience

QAPP Worksheet #7 (UFP-QAPP Manual Section 2.4.3) -- Personnel Responsibilities and Qualifications Table (Continued)

Name	Title	Organizational Affiliation	Responsibilities	Education and Experience Qualifications
Robert Hanisch	Laboratory Director	Test America	Supervises laboratory personnel and provides guidance and direction, as needed. Responsible for ensuring compliance and integration of facility operations with corporate and regulatory policies and procedures.	M.A., Chemistry, 40 years experience.
John Morris	Laboratory QA Manager	Test America	Responsible for laboratory QA oversight including development, implementation, and maintenance of the laboratory's quality system.	B.S., Environmental Science, 14 years experience.
Elaine Walker	Laboratory Project Manager	Test America	Manages laboratory operations and serves as laboratory's primary contact for project.	B.A., Geology, 20 years experience.

* Copies of resumes can be obtained by contacting the ARCADIS/Pirnie MMRP Technical Manager.

QAPP Worksheet #8 (UFP-QAPP Manual Section 2.4.4) -- Special Personnel Training Requirements Table

Special Personnel Training Requirements Table

Project Function	Specialized Training Title or Description of Course	Training Provider	Training Date	Personnel/Groups Receiving Training	Personnel Titles/ Organizational Affiliation	Location of Training Records/Certificates
Field Samplers	40-Hour Occupational Safety and Health Administration (OSHA) Hazardous Waste Site Work Training along with 8-Hour OSHA Refresher Training	Various Registered Training Organizations	Varies	All field team members working on site	All ARCADIS/Pirnie personnel working on site	ARCADIS/Pirnie Project Files

QAPP Worksheet #9 (UFP-QAPP Manual Section 2.5.1) -- Project Scoping Session Participants Sheet
Complete this worksheet for each project scoping session held.

November 2010 Meeting

Project Name: PTA MMRP RI Projected Date(s) of Sampling: 2011 - 2012 Project Manager: Laura Pastor, WESTON		Site Names: PICA-003-R-01: 1926 Explosion Radius; PICA-004-R-01: 1926 Explosion Site - Off-Post; PICA-006-R-01: Former Operational Areas; PICA-014-R-01: Inactive Munitions Waste Pit – Off-Post; PICA-008-R-01: Lakes (Land Portion Only); PICA-012-R-01: Lake Denmark - Off-Post Site Location: Rockaway Township, Morris County, NJ	
Date of Session: November 10, 2010 **Scoping Session Purpose:** Technical Project Planning			
Name	**Telephone Number**	**Organization/Title**	**E-Mail Address**
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Barbara Dolce	973-729-8814	Subsurface Solutions LLC/Picatinny Arsenal Environmental Restoration Advisory Board (PAERAB) Technical Assistance for Public Participation Contractor	subsurfacesolns@earthlink.net
Nancy Flaherty	410-779-2796	USACE - CENAB/Project Manager	nancy.e.flaherty@usace.army.mil
Ted Gabel	973-724-6748	PTA/Project Manager, Environmental Restoration	ted.gabel@us.army.mil
Megan G. Garrett	410-962-6813	USACE - CENAB /Geologist	megan.g.garrett@usace.army.mil
Michael Glaab	973-663-9605	PAERAB/Co-chair	michaelglaab@att.net
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Judy Hackett	610-701-3749	WESTON/Client Service Manager	judith.hackett@westonsolutions.com
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Deborah McKinley	410-962-6730	USACE - CENAB/Project Engineer	deborah.k.mckinley@usace.army.mil
Cliff Morris	973-659-3838	PAERAB	
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Tom Silecke		PTA	

QAPP Worksheet #9 (UFP-QAPP Manual Section 2.5.1) -- Project Scoping Session Participants Sheet (Continued)

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Diane Trocchio	973-983-2848 ext. 2041	PAERAB/Rockaway Township Health Department	dtrocchio@rockawaytownship.org
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Lisa K. Voyce	908-448-6785	PAERAB/Mine Hill Representative	gigiv@optonline.net
Greg Zalaskus	609-984-2065	NJDEP/Case Manager	Greg.Zalaskus@dep.state.nj.us

July 2011 Meeting

Project Name: PTA MMRP RI Projected Date(s) of Sampling: 2011 - 2012 Project Manager: Laura Pastor, WESTON		Site Names: PICA-003-R-01: 1926 Explosion Radius; PICA-004-R-01: 1926 Explosion Site - Off-Post; PICA-006-R-01: Former Operational Areas; PICA-014-R-01: Inactive Munitions Waste Pit – Off-Post; PICA-008-R-01: Lakes (Land Portion Only); PICA-012-R-01: Lake Denmark - Off-Post Site Location: Rockaway Township, Morris County, NJ	
Date of Session: July 28, 2011 **Scoping Session Purpose:** Technical Project Planning			
Name	**Telephone Number**	**Organization/Title**	**E-Mail Address**
Richard Braun, PhD	410-962-2842	USACE - CENAB/Risk Assessor	richard.j.braun@usace.army.mil
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Nancy Flaherty	410-779-2796	USACE - CENAB/Project Manager	nancy.e.flaherty@usace.army.mil
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Megan G. Garrett	410-962-6813	USACE - CENAB /Geologist	megan.g.garrett@usace.army.mil
Michael Glaab	973-663-9605	PAERAB/Co-chair	michaelglaab@att.net
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QAPP Worksheet #9 (UFP-QAPP Manual Section 2.5.1) -- Project Scoping Session Participants Sheet (Continued)

Mary Ellen Maly	210-424-8646	USAEC/Army Restoration Manager	maryellen.h.maly@us.army.mil
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Greg Zalaskus	609-984-2065	NJDEP	Greg.zalaskus@dep.state.nj.us

Action Items: See Appendix C of the Work Plan for meeting minutes, along with action items.

Consensus Decisions: Identified the project objectives and outlined the sampling tasks. See meeting minutes for details.

QAPP Worksheet #10 (UFP-QAPP Manual Section 2.5.2) -- Problem Definition

Data Quality Objectives (DQOs) are used to help decision-makers collect data of the right type, quality, and quantity to support the decision making process. The approach to developing DQOs is an iterative one, designed to take decision makers through a strategic planning process from broad project goals through a number of refining steps toward generating environmental data that will be appropriate to making the decisions needed to reach the goals. The DQO process consists of seven steps; each step is addressed below.

<u>Step 1: State the Problem</u>

Past land uses related to numerous munitions activities at PTA, including weapons production and testing, as well as munitions and bulk explosives storage, have potentially impacted installation soils with MEC. The *Final SI Report, Picatinny Arsenal, New Jersey*, April 2008, identified ten MRSs potentially impacted with MEC from historical activities at PTA. To assess whether MC concentrations above the screening levels are associated with the MEC, if MEC are found during the RI MEC investigation, soil samples may be collected for MC analysis. These data are required to confirm the presence or absence of MC contamination, and, if required, establish the nature and extent of the contamination. As applicable, these data will also be used to develop human health and screening level ecological risk assessments.

It should be noted that three of the MRSs have been sampled for MC analyses under the IRP; therefore, they were not recommended for an RI for MC during the SI. Therefore, seven MRSs are covered under this QAPP. These include:

- PICA-003-R-01: 1926 Explosion Radius
- PICA-004-R-01: 1926 Explosion Site - Off-Post
- PICA-006-R-01: Former Operational Areas
- PICA-013-R-01: Inactive Munitions Waste Pit
- PICA-014-R-01: Inactive Munitions Waste Pit – Off-Post
- PICA-008-R-01: Lakes (Land Portion Only)
- PICA-012-R-01: Lake Denmark - Off-Post

<u>Step 2: Identify the Decision</u>

This sampling will provide an answer to the following questions:

- *“If present, do explosive MC concentrations at an MRS exceed the soil screening levels?”*

QAPP Worksheet #10 (UFP-QAPP Manual Section 2.5.2) -- Problem Definition (Continued)

- *"If present, do metal MC concentrations at an MRS exceed the background concentrations, and if so do they also exceed the soil screening levels?"*
- *"If present at levels above the soil screening levels, and for metals, the background concentration, what is the extent of MC concentration exceedances?"*

The answers to these questions will determine whether the concentrations of MC in soil are below the screening levels so that no further action is required, or if the concentrations are above the screening levels and should, therefore, be further evaluated in a HHRA and/or SLERA.

Step 3: Identify the Inputs to the Decision

Numerous inputs are required to answer the questions identified in Step 2, above. These inputs are detailed below.

MC Parameter Determination

To identify the MC constituents to analyze for during the RI, a review of historical information was conducted to determine what munitions are known to have been used and/or have been found at PTA. This information was obtained from numerous historical reports, as well as a map from the PTA Safety Office regarding UXO finds at the installation between 1986 and 1998. Once the munitions were identified, various technical resources were reviewed to determine what MC are potentially associated with each munition. Based on this review, it was determined that the following MC parameters will be analyzed for during the RI. Refer to Attachment 1 for details regarding how the MC analytical list was developed.

- 2-Amino-4,6-Dinitrotulene (2-AM-4,6-DNT)
- 4-Amino-2,6-Dinitrotulene (4-AM-2,6-DNT)
- 2,4-Dinitrotoluene (2,4-DNT)
- 2,6-Dinitrotoluene (2,6-DNT)
- Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
- Nitroglycerin (NG)
- Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)
- Pentaerythritol tetranitrate (PETN)
- Tetryl
- 2,4,6-Trinitrophenol (2,4,6-TNP, aka picric acid)

QAPP Worksheet #10 (UFP-QAPP Manual Section 2.5.2) -- Problem Definition (Continued)

- 2,4,6-Trinitrotulene (2,4,6-TNT)
- Aluminum (Al)
- Antimony (Sb)
- Barium (Ba)
- Cadmium (Cd)
- Copper (Cu)
- Lead (Pb)
- Manganese (Mn)
- Strontium (Sr)
- Zinc (Zn)

It should be noted that the majority of the MRSs are not ranges but resulted from explosions, munitions-related tests, or disposal/filling activities. Therefore, it is assumed that any munitions known to be used at PTA could potentially be present at any MRS. As a result, soil samples from all MRSs will be analyzed for the list of potential MC associated with all munitions known to be used at the installation.

Screening Levels and Analytical Methods

The following screening levels (SL) will be used for the RI (Refer to Attachment 1). As a conservative measure for protection of human health, residential levels were selected. The actions levels will be determined based on the Risk Assessments.

- NJDEP Residential Direct Contact Soil Remediation Standard (SRS); N.J.A.C. 7:26D
- USEPA Resident Soil Regional Screening Level (RSL)
- Ecological:
  a) USEPA Ecological Soil Screening Levels (USEPA, 2011);
  b) USEPA Region 5 Ecological Screening Levels (USEPA, 2003); or
  c) If neither a nor b provide screening levels for explosives, the lowest Final Ecological Screening Levels from the Los Alamos National Laboratory (LANL) ECORISK Database Release 2.5 (October 2010) (LANL, 2010)

Based on these screening levels, the following analytical methods were selected in order to achieve the required levels of detection (LOD) and levels of quantitation (LOQ).

QAPP Worksheet #10 (UFP-QAPP Manual Section 2.5.2) -- Problem Definition (Continued)

- USEPA Method SW-846 8330A or B (for B non-incremental sampling preparation is required), Nitroaromatics and Nitroamines by High Performance Liquid Chromatography (HPLC)
- USEPA Method SW-846 6010B, Inductively Coupled Plasma (ICP)

Worksheet 15, Reference Limits and Evaluation Table, summarizes the analytical parameters and associated screening levels and project quantitation limits.

As noted in the following IRP Planning Documents; *Final Picatinny Arsenal Facility-Wide Field Sampling Plan*, September 1998, *Final Facility-Wide Picatinny Arsenal Quality Assurance Project Plan*, August 2004, *Final Facility-Wide Field Sampling Plan, US Army Garrison, Picatinny Arsenal, NJ*, May 2007, *Final Facility-Wide Field Sampling Plan, US Army Garrison, Picatinny Arsenal, NJ*, August 2007, these analytical methods have also been used for the IRP sampling events. Therefore, the QA/QC requirements for all data sets are comparable.

Historical Data

To determine if historical information can be used to refine the MC sampling approach, a review of available historical data was conducted. Under PTA's IRP, 175 sites where waste was previously handled and/or stored have been identified. A significant number of environmental samples from various media including surface and subsurface soil, sediment, surface water, and groundwater have been collected from the IRP sites and analyzed for a variety of parameters, including MC and depleted uranium (DU). For a summary of these data and their effect on the MC sampling approach, refer to Attachment 2.

These data were also used during the SI to guide the SI recommendations. Since many of the IRP sites are collocated with the MRSs, MC has already been adequately characterized at Green Pond MRS, the water potion of the Lakes MRS, and the Shell Burial Grounds MRS. Therefore, these MRSs were not recommended for further MC characterization in the SI and are not covered under this UFP-QAPP.

Sampling Method

To ensure that the IRP and MMRP RI data are comparable, the same soil sampling method employed during the IRP will be used during this RI. As discussed in the *Final Picatinny Arsenal Facility-Wide Field Sampling Plan*, September 1998 and the *Final Facility-Wide Field Sampling Plan, US Army Garrison, Picatinny Arsenal, NJ*, May 2007, discrete samples will be collected. Also in accordance these documents, the samples will be collected immediately below the vegetative mat from 0-6 inches. It should be noted that NJDEP also requires the collection of discrete samples rather than composite samples.

QAPP Worksheet #10 (UFP-QAPP Manual Section 2.5.2) -- Problem Definition (Continued)

Additional Field Data

For a detailed description of the field activities and tasks that will be conducted, refer to QAPP Worksheets 14, 17, and 18.

Step 4: Define the Boundaries of the Study

Physical Boundaries

The physical boundaries are the MRS boundaries shown on Figure 2. For all MRSs, MC sampling is not proposed in any collocated IRP Site. In addition, the Former Operational Areas (PICA-006-R-01) and Inactive Munitions Waste Pit (PICA-013-R-01) are the only MRSs that will require random sampling. When defining the study area for input to the Visual Sampling Plan (VSP) software, the following areas were excluded as potential sample locations:

- Ponds - All ponds within this MRS are IRP Sites and/or are located in operational areas. These ponds include G2 Pond, Stillwell Pond, and Hydro Pond;
- Any collocated IRP Site;
- Building footprints;
- PTA's golf course.

Practical Constraints

There are various physical constraints on the sampling due to various factors including, but not limited to:

- Time constraints due to:
  - The presence of threatened and/or endangered species (*e.g.*, avoiding an area during the breeding season);
  - PTA's mission; coordination with PTA will be required to ensure sampling activities do not interfere with PTA's activities;
  - Physical access; certain areas of the installation are marshy or heavily overgrown with vegetation. Sampling in these areas will be restricted to colder months when the ground is frozen and/or the vegetation has died back;
  - Weather conditions.
- Access - rights of entry will be required for sampling at the off-post MRSs.
- Topography – A portion of the Inactive Munitions Waste Pit - Off-Post is located on a very steep slope.
- Physical conditions - For the gridded samples, the conditions at the sampling locations may interfere with the collection of a desired sample. If so, it may be necessary to choose alternate sample locations.

QAPP Worksheet #10 (UFP-QAPP Manual Section 2.5.2) -- Problem Definition (Continued)

Step 5: Develop the Analytical Approach (Decision Rule)

The purpose of this step is to integrate the outputs from the previous steps into a statement that defines the conditions that would cause the decision-maker to choose among alternative actions. For this RI, the decision rules are:

- *If the MC concentration in all samples from an MRS are less than the screening levels identified in Worksheet 15, then no further action for that MRS will be required.*
- *If MC concentrations in samples from an MRS exceed the screening levels identified in Worksheet 15, and for metals, also exceed the background concentrations, an HHRA and SLERA will be developed to determine what further actions, if any, are required.*

Step 6: Specify Limits on Decision Errors

This step is to specify the decision-maker's acceptable limits on decision errors, which are used to establish appropriate performance goals for limiting uncertainty in environmental data. These acceptable limits on decision errors allow decision-makers to generate resource-effective sampling designs while limiting uncertainties in the collected data. Decision errors are associated with both field sampling and laboratory analyses.

Numerous procedures are in place for minimizing field sampling decision errors. These procedures, which include, but are not limited to, adhering to the planning documents and standard operating procedures and using proper sampling techniques, are described in more detail in Worksheet 12, and SOP PTA-04.

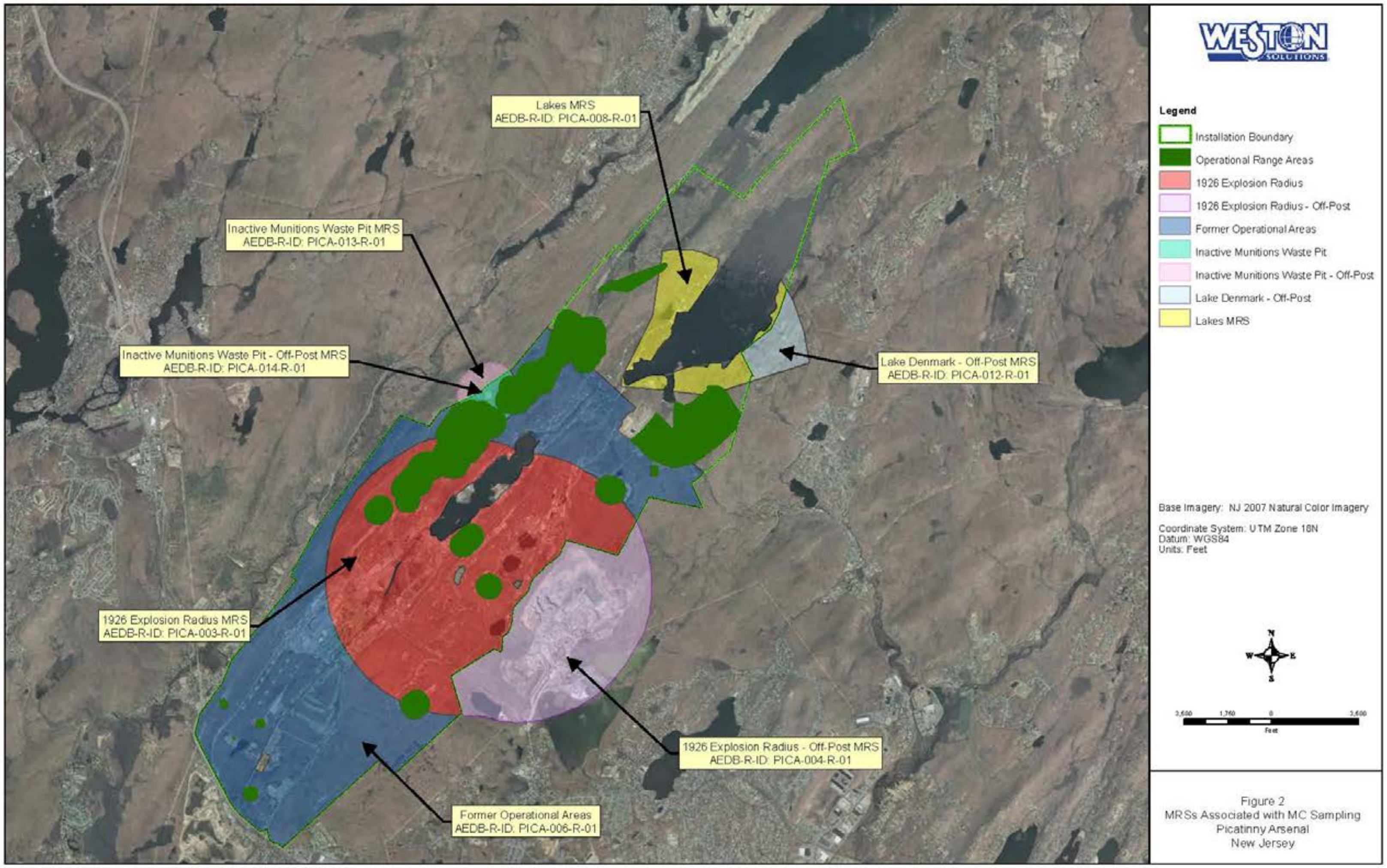
There are several types of decision errors associated with the laboratory data. The data can be biased high (false positive), biased low (false negative), or completely invalid (rejected). The amount of error associated with the laboratory data will be minimized through the data validation process (refer to Section 5.2.2) and through the use of analytical methods that produce precise, high-quality data. As part of the data validation process, the validator will evaluate all of the laboratory and field quality of the data. The conversion from raw data to the reporting forms will not be checked (*i.e.*, laboratory calculations) unless other transcription errors are noted during the validation process. This information will be included in the validation report. During the decision making process, the bias of the data, if any, will be considered.

QAPP Worksheet #10 (UFP-QAPP Manual Section 2.5.2) -- Problem Definition (Continued)

Step 7: Optimize the Design for Collecting Data

This step is used to produce the most resource efficient investigation design that will meet the DQOs. The investigation design chosen is detailed in Worksheet 17.

Figure 2: Map of Munitions Response Sites Associated with MC Sampling



QAPP Worksheet #11 (UFP-QAPP Manual Section 2.6.1) -- Project Quality Objectives/Systematic Planning Process Statements

Who will use the data?

USACE-CENAB, PTA, AEC, NJDEP, USEPA Region 2, WESTON, and ARCADIS/Pirnie.

What is the data use?

The purpose of the MC sampling is to collect sufficient data to determine if a No Further Action recommendation can be given to an MRS, or if a HHRA and SLERA need to be developed. The HHRA and SLERA will be used to determine whether the MRS poses unacceptable risks to human health and the environment, and if so, to evaluate the need for a feasibility study that will address the unacceptable risks. The data will also be sufficient to support an FS. Refer to Worksheet 10 for a more detailed discussion of the problem definition and project objectives.

What types of data are needed?

Soil samples will be collected and submitted to the off-site laboratory for analyses of the MC parameters identified in Work Sheet 10. Sample locations will be documented in accordance with SOP PTA-06, Documenting Sample Locations with a GPS, or SOP PTA-07, Documenting Sample Locations without a GPS, as appropriate.

How “good” do the data need to be in order to support the environmental decision?

The data must be technically defensible and of sufficient quality to support the project DQOs, which are described in Worksheet 10. See Worksheet 15, Reference and Evaluation Tables, which summarizes the analytical parameters and the associated potential screening levels and project quantitation limits (QL).

How much data are needed?

The number of samples to be collected at each MRS will be determined by the process outlined in Worksheet 17.

Where, when, and how should the data be collected/generated?

The sampling rationale is discussed in detail in Worksheet 17.

Who will collect and generate the data?

ARCADIS/Pirnie field personnel will collect the analytical samples, and document sample locations. The samples will be analyzed by Test America, a DoD Environmental Laboratory Accreditation Program (ELAP) certified laboratory.

QAPP Worksheet #12 (UFP-QAPP Manual Section 2.6.2) -- Measurement Performance Criteria Tables

QAPP Worksheet #12-1
(UFP-QAPP Manual Section 2.6.2)

Matrix	Soil				
Analytical Group	Explosives by 8330B				
Concentration Level	Low				
Sampling Procedure	**Analytical Method/SOP**[1]	**Data Quality Indicators (DQIs)**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&A)**
See Worksheet 21	DV-LC-0002 DV-0P-0018 (SW-846-8330B)	Accuracy	Per QAPP, < LOQ	Field Rinsate Blanks	S & A
		Precision	Per QAPP, %RPD < 40% for results 5X above the LOQ (RL)	Field Duplicate Samples	S & A
		Precision and Accuracy	Per DoD QSM ver. 4.2	Demonstration of capability	A
		Accuracy	Per DoD QSM ver.4.2, a) apparent signal-to-noise ratio at the LOQ (RL) must be at least 5:1; or b) linear regression r ≥ 0.995; or c) Internal Standardization RSD ≤ 15%.	Initial Calibration (ICAL)	A
		Accuracy	Per DoD QSM ver. 4.2, all analyte(s) and surrogates within ± 20% of true value.	Second source calibration verification (ICV)	A
		Precision	Per DoD QSM ver. 4.2, ±20% of expected value from ICAL	Continuing calibration verification (CCV)	A

QAPP Worksheet #12 (UFP-QAPP Manual Section 2.6.2) -- Measurement Performance Criteria Tables (Continued)

Matrix	Soil
Analytical Group	Explosives by 8330B
Concentration Level	Low

Sampling Procedure	**Analytical Method/SOP**[1]	**Data Quality Indicators (DQIs)**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&A)**
See Worksheet 21	DV-LC-0002 DV-0P-0018 (SW-846-8330B)	Accuracy	Per DoD QSM ver. 4.2, no analytes detected >1/2 RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater)	Method Blanks	A
		Accuracy	Per DoD QSM ver. 4.2, a solid reference material containing all reported analytes must be prepared and analyzed in exactly the same manner as a field sample. In-house laboratory control limits for the LCS must demonstrate the laboratory's ability to meet the project's DQOs.	Laboratory Control Standard (LCS)	A
		Accuracy	Per DoD QSM ver. 4.2, for matrix evaluation only. Therefore taken post grinding from same ground sample as parent subsample. %R must meet LCS limits.	Matrix Spike (MS)	A
		Accuracy/ Sensitivity	Per DoD QSM ver. 4.2, for matrix evaluation only. Therefore taken post grinding from same ground sample as parent subsample. %R must meet LCS limits and RPD < 20%.	Matrix Spike Duplicate (MSD) or sample duplicate	A

QAPP Worksheet #12 (UFP-QAPP Manual Section 2.6.2) -- Measurement Performance Criteria Tables (Continued)

Matrix	Soil
Analytical Group	Explosives by 8330B
Concentration Level	Low

Sampling Procedure	**Analytical Method/SOP**[1]	**Data Quality Indicators (DQIs)**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&A)**
See Worksheet 21	DV-LC-0002 DV-0P-0018 (SW-846-8330B)	Accuracy	Per DoD QSM ver. 4.2, calibration and QC criteria same as for intial or primary column analysis. Results between primary and second colum RPD ≤40%.	Confirmation analysis	A
		Completeness	>90% sample collection, >90% laboratory analysis	Data Completeness Check	S & A
	SOP PTA-06 SOP PTA-07	Accuracy	GPS data will be accurate to within one meter. To the extent possible, sample locations measured without a GPS will also be accurate to within one meter, depending on the locations of nearby benchmarks/control points.	In accordance with guidelines in SOP PTA-06 and SOP PTA-07.	S

1. Referenced SOPs beginning with DV are for Test America Denver while referenced SOPs beginning with SOP are field SOPs.
2. The lab is DoD ELAP certified for the test method and is expected to meet the Measurement Performance Criteria specified in DoD QSM version 4.2.

QAPP Worksheet #12 (UFP-QAPP Manual Section 2.6.2) -- Measurement Performance Criteria Tables (Continued)

QAPP Worksheet #12-2
(UFP-QAPP Manual Section 2.6.2)

Matrix	Soil				
Analytical Group	Metals				
Concentration Level	Low				
Sampling Procedure	**Analytical Method/SOP[1]**	**Data Quality Indicators (DQIs)**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&A)**
See Worksheet 21	DV-MT-0019 (SW-846 6010B)	Accuracy	< LOQ	Field Rinsate Blanks	S&A
		Precision	Per QAPP, %RPD < 35%	Field Duplicate Samples	S&A
		Precision and Accuracy	Per DoD QSM ver. 4.2	Demonstration of capability	A
		Accuracy	IDLs ≤ LOD	Instrument detection limit study (ICP only)	A
		Accuracy	Within ±10% of true value	Linear dynamic range or high-level check standard (ICP only)	A
		Accuracy	If more than one calibration standard is used, r ≥ 0.995.	Initial Calibration (ICAL) for all analytes - minimum one high standard and a calibration blank	A
		Accuracy	Value of second source for all analyte(s) within ± 10% of true value.	Second source calibration verification (ICV)	A
		Accuracy	Within ±10% of true expected value	Continuing calibration verification (CCV)	A
		Accuracy	Within ± 20% of true value.	Low-level calibration check standard	A

QAPP Worksheet #12 (UFP-QAPP Manual Section 2.6.2) -- Measurement Performance Criteria Tables (Continued)

Matrix	Soil
Analytical Group	Metals
Concentration Level	Low

Sampling Procedure	Analytical Method/SOP[1]	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&A)
See Worksheet 21	DV-MT-0019 (SW-846 6010B)	Accuracy/ Sensitivity	No analytes detected >1/2 RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). For common lab contaminants , no analytes detected >RL.	Method Blanks	A
		Accuracy	No analytes detected > LOD.	Calibration blank	A
		Accuracy	ICS-A: Absolute value of concentration for all non-spiked analytes < LOD (unless they are a verified trace impurity from one of the spiked analytes); ICS-AB: within ± 20% of the true value.	Interference check solutions (ICS) (ICP only)	A
		Accuracy	Specified in DoD QSM ver. 4.2	LCS containing all analytes to be reported	A
		Accuracy	QC acceptance criteria specified in DoD QSM ver. 4.2 for LCS.	Matrix spike (MS)	A

QAPP Worksheet #12 (UFP-QAPP Manual Section 2.6.2) -- Measurement Performance Criteria Tables (Continued)

Matrix	Soil
Analytical Group	Metals
Concentration Level	Low

Sampling Procedure	**Analytical Method/SOP[1]**	**Data Quality Indicators (DQIs)**	**Measurement Performance Criteria**	**QC Sample and/or Activity Used to Assess Measurement Performance**	**QC Sample Assesses Error for Sampling (S), Analytical (A) or Both (S&A)**
		Precision	MSD: QC acceptance criteria specified in DoD QSM ver. 2 for LCS. MSD or sample duplicate: RPD ≤ 20% (between MS and MSD or sample and sample duplicate).	Matrix spike duplicate (MSD) or sample duplicate	A
See Worksheet 21	DV-MT-0019 (SW-846 6010B)	Accuracy	Five-fold dilution must agree within ± 10% of the original measurement.	Dilution test	A
		Accuracy	Recovery within 75-125%	Post-Digestion spike (PDS) addition	A
		Completeness	>90% sample collection, >90% laboratory analysis	Data Completeness Check	S & A
	SOP PTA-06 SOP PTA-07	Accuracy	GPS data will be accurate to within one meter. To the extent possible, sample locations measured without a GPS will also be accurate to within one meter, depending on the locations of nearby benchmarks/control points.	In accordance with guidelines in SOP PTA-06 and SOP PTA-07.	S

1. Referenced SOPs beginning with DV are for Test America Denver while referenced SOPs beginning with SOP are field SOPs.
2. The laboratory is DoD ELAP certified for the test method and is expected to meet the Measurement Performance Criteria specified in DoD QSM version 4.2.

QAPP Worksheet #12 (UFP-QAPP Manual Section 2.6.2) -- Measurement Performance Criteria Tables (Continued)

More details regarding the DQIs in Worksheet 12 are given below.

Precision, Accuracy (or Bias), Representativeness, Completeness, and Comparability

To measure and control the quality of analyses, certain QA parameters are defined and utilized in data analysis activities. These QA parameters are defined below. Where applicable, the assigned subcontract laboratory will follow the QA/QC criteria specified in the DoD Quality Systems Manual for Environmental Laboratories (DoD-QSM).

Precision

Precision measures the reproducibility of data or measurements under specific conditions. Precision is a quantitative measure of the variability of a group of data compared to their average value. Duplicate precision is stated in terms of RPD or absolute difference between two measurements. Measurement of precision is dependent upon sampling technique and analytical method. Field duplicate and laboratory duplicate samples will be used to measure precision for project samples. Both sampling and analysis will be as consistent as possible. For a pair of measurements, RPD (or absolute difference) will be used, as presented below:

$$RPD(\%) = \frac{|D_1 - D_2|}{\left[\frac{(D_1 + D_2)}{2}\right]} \times 100$$

where: D_1 and D_2 = the two replicate values.

Accuracy/Bias

Accuracy measures the bias in a measurement system. Sources of error include the sampling process, field contamination, preservation, handling, shipping, sample matrix, sample preparation, and analysis technique. Analytical accuracy will be assessed through surrogate spike, matrix spike, laboratory control and/or quality check samples, where applicable. In general, accuracy is measured in terms of percent recovery (%R):

$$\%R = \frac{(SSR - SR)}{SA} \times 100$$

QAPP Worksheet #12 (UFP-QAPP Manual Section 2.6.2) -- Measurement Performance Criteria Tables (Continued)

where: SSR = spike sample result
SR = sample result
SA = spike added to spiking matrix

Representativeness

Representativeness expresses the degree to which data accurately and precisely reflects a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter that is dependent upon the proper design and implementation of the sampling program and proper laboratory protocol. The sampling design created for this project was designed to provide data representative of site conditions. During the development of the sampling designs, consideration was given to prior use of the MRS, existing analytical data, and physical setting. Refer to Worksheet 17 and Attachment 2 for further information regarding the sampling design rationale. Representativeness will be satisfied by adhering to the sampling design and standard operating procedures, ensuring proper sampling techniques, preservation, and handling are used, proper analytical procedures are followed, and holding times for the samples are not exceeded in the laboratory.

Completeness

Completeness is a measure of the amount of usable data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. It is expected that the laboratory(ies) used for this project will provide data that meet the QC acceptance criteria for 90 percent, or more, of all samples analyzed. Following the completion of the analytical testing, the percent completeness will be calculated by the following equation:

$$\text{COMPLETENESS } (\%) = \frac{\text{number of usable data}}{\text{number of samples collected for each parameter analyzed}} \times 100$$

The data validation process will be used to determine the quality and quantity of usable analytical data generated. The completeness acceptance criterion for samples collected in the field will be 90 percent of the quantity of samples planned for collection. Corrective action may be implemented to re-collect samples where necessary and possible (*e.g.*, modifying a planned sample location, sample jars broken during shipment). The laboratory sample receipt form will be used to determine, as soon as possible, whether any problems during sample shipment would necessitate recollection of samples.

QAPP Worksheet #12 (UFP-QAPP Manual Section 2.6.2) -- Measurement Performance Criteria Tables (Continued)

Comparability

Comparability expresses the confidence with which one data set can be compared to another. The extent to which existing and planned analytical data will be comparable depends on the similarity of sampling and analytical methods. The procedures used to obtain the planned analytical data are expected to provide comparable data.

As noted in the following IRP Planning Documents; *Final Picatinny Arsenal Facility-Wide Field Sampling Plan*, September 1998, *Final Facility-Wide Picatinny Arsenal Quality Assurance Project Plan*, August 2004, *Final Facility-Wide Field Sampling Plan, US Army Garrison, Picatinny Arsenal, NJ*, May 2007, *Final Facility-Wide Field Sampling Plan, US Army Garrison, Picatinny Arsenal, NJ*, August 2007, and the *Picatinny Arsenal Facility-Wide Background Investigation*, May 2002, the same analytical methods to be used in this RI were also used for the IRP and background sampling events. Therefore, the QA/QC requirements for all data sets are comparable. In addition, the same soil sampling method employed during the IRP and background sampling events will be used during this RI. As discussed in the *Final Picatinny Arsenal Facility-Wide Field Sampling Plan*, September 1998, the *Final Facility-Wide Field Sampling Plan, US Army Garrison, Picatinny Arsenal, NJ*, May 2007, and the *Picatinny Arsenal Facility-Wide Background Investigation*, May 2002, discrete samples will be collected. Also in accordance these documents, the samples will be collected immediately below the vegetative mat from less than one foot below ground surface.

Desired Method Sensitivity

Depending upon the use of the data and the type of test parameter, specific QLs will be required. Worksheet 15 lists the required QLs specified for the definitive chemical parameters for this project.

QAPP Worksheet #13 (UFP-QAPP Manual Section 2.7) -- Secondary Data Criteria and Limitations Table

Secondary Data	**Data Source (Originating Organization, Report Title, and Date)**	**Data Generator(s) (Data Types, Data Generation/ Collection Dates)**	**How Data Will Be Used**	**Limitations on Data Use**
Site Inspection	Malcolm Pirnie, Inc., *Final Site Inspection Report, Picatinny Arsenal, New Jersey*, April 2008	1. Background information on nature and distribution of MC and MEC; 2. Magnetometer-assisted visual surveys indicating presence of MEC and munitions debris (MD); 3. MC sampling and analysis indicating exceedances for screening criteria 4. Identification of MRSs requiring further investigation Data collection completed in July 2007	1. Revision of Conceptual Site Model (CSM), if needed. 2. Guide MC sampling approach	1. No limitations regarding use of definitive data from off-site laboratory analyses. 2. Limited field investigations conducted in MRSs.
Historical Records Review (HRR)	Malcolm Pirnie, Inc., *Final Historical Records Review, Picatinny Arsenal, New Jersey*, November 2006	Background information regarding historical activities/usage at each MRS including period(s) of use and potential munitions	Identification of areas potentially impacted by MEC and MC	1. The historical analytical data are considered valid, as identified by the data qualifiers and there are no limitations regarding their use. 2. For entire installation, insufficient information available regarding historical activities and their locations
UXO Find Map	PTA Safety Office, 1986 to 1998	PTA Safety Office 1986 through 1998	1. Identify munitions used at PTA 2. Identify UXO find locations	1. Not all UXO items found at PTA listed. 2. Only covers years from 1986 through 1998 3. Northern portion of installation not shown 4. Limited descriptions of items found

QAPP Worksheet #13 (UFP-QAPP Manual Section 2.7) -- Secondary Data Criteria and Limitations Table (Continued)

Secondary Data	**Data Source (Originating Organization, Report Title, and Date)**	**Data Generator(s) (Data Types, Data Generation/ Collection Dates)**	**How Data Will Be Used**	**Limitations on Data Use**
Various Historical Reports and Analytical Data	ICF Kaiser, IT Corporation, Dames & Moore, Shaw Environmental, and ARCADIS	1. Background information on nature and distribution of MC and MEC; 2. Data from various MEC and MC investigations conducted at PTA including some limited geophysical information From 1989 to present	1. Guide MC sampling approach 2. Initially identify areas potentially impacted by MEC and MC 3. Identify potential munitions associated with each MRS 4. Identify historical site activities/use	The historical analytical data are considered valid, as identified by the data qualifiers and there are no limitations regarding their use.
Installation Survey Report	DoD, *Executive Order 11508 Installation Survey Report, Picatinny Arsenal, Dover, New Jersey*, January 1973	Description of land usage throughout installation	1. Guide MC sampling approach 2. Identify historical site activities/use	Maps are not georectified; therefore, exact boundaries of site usage areas are not known
Short Range Master Plan	Parsons, *Real Property Master Plan: Short Range Component*, February 2007.	Summary of development activities and real property planning at PTA from Fiscal Year (FY) 2007 through FY 2012.	Revision of CSM	None
Long Range Master Plan	Parsons, *Real Property Master Plan: Long Range Component*, February 2007.	Summary of long-term development activities and real property planning at PTA.	Revision of CSM	None
Facility-Wide Background Investigation	IT Corporation, *Picatinny Arsenal Facility-Wide Background Investigation, Picatinny Arsenal Installation Restoration Program,* May 2002	Analytical data used to quantify naturally occurring levels of Target Analyte List (TAL) metals, inorganic anions, and radiological constituents in surface and subsurface soils, sediment, and surface water at PTA and the surrounding area. Data collection completed in January 2000	Determine background concentrations for MC metals to be analyzed for during the RI	The analytical data are considered valid, as identified by the data qualifiers and there are no limitations regarding their use.

QAPP Worksheet #14 (UFP-QAPP Manual Section 2.8.1) -- Summary of Project Tasks (Soil)

Summary of Project Tasks

Sampling Tasks: After obtaining clearance from a qualified UXO technician, soil samples will be collected for analyses for the MC parameters described in Worksheet 10. Soil samples will be collected from the locations as indicated in Worksheets 17 and 18. All samples will be discrete samples. Field activities will be documented in accordance with SOP PTA-02.
Analysis Tasks: Soil samples, along with their associated QC samples, will be collected and sent to Test America, an off-site laboratory, for MC analysis (specific metals and explosives as described in Worksheet 10). Test America is certified through the DoD ELAP. All analyses will be conducted in accordance with the applicable laboratory quality controls as specified in the DoD QMS and this MC UFP-QAPP. The testing methodologies are described in Worksheets 19 and 23.
Quality Control Tasks: The analytical laboratory will be required to analyze QC samples listed in accordance with the methods, as given in Worksheet 28.
Data Management Tasks: All data and field notes will be maintained in the WESTON project files as well as the ARCADIS/Pirnie Northern NJ office. The electronic data deliverable provided by the laboratory will be in a Region 2 format. See Worksheet 29 for a discussion of data management.
Documentation and Records: All hardcopy data (*e.g.*, field notebooks, photos, hard copies of Chain of Custody forms, Airbills) will be taken to the ARCADIS/Pirnie Northern NJ office and kept in the project files. Copies of all documents will be provided to WESTON for their project files.
Assessment/Audit Tasks: SOPs will be reviewed prior to the performance of tasks. Technical System Audits (TSAs) will be performed per SOP PTA-08, Performing a Technical System Audit. Also see Worksheet 31.
Data Review Tasks: Laboratory data will be validated by ARCADIS/Pirnie data validators or subcontract data validators against the criteria in the applicable analytical SOPs and the criteria contained in this QAPP.

QAPP Worksheet #15 (UFP-QAPP Manual Section 2.8.1) -- Reference Limits and Evaluation Table

QAPP Worksheet #15-1
Reference Limits and Evaluation Table

Matrix: Soils/Solids

Analytical Group: Explosives by EPA 8330B

Concentration Level: Low

Analyte	CAS Number	NJ Residential Direct Contact SRS (mg/kg)[1]	USEPA RSL for Resident Soil (mg/kg)[2]	Reference Limit in Soil Based on Ecological Health (mg/kg)[3]	Project Quantification Limit (mg/kg)[4]	Analytical Method		Achievable Laboratory Limits[5]		
						MDL	Method QL	MDL (mg/kg)	LOD (mg/kg)	LOQ (mg/kg)
HMX	2691-41-0	NA	3800	27	0.1	NA	0.1	0.0227	0.04	0.1
RDX	121-82-4	NA	5.6	7.5	0.2	NA	0.2	0.043	0.08	0.2
2,4,6-TNT	118-96-7	NA	19	6.4	0.1	NA	0.1	0.0307	0.04	0.1
Tetryl	479-45-8	NA	240	0.99	0.2	NA	0.2	0.0439	0.08	0.2
2-AM-4,6-DNT	35572-78-2	NA	150	2.1	0.1	NA	0.1	0.0329	0.04	0.1
4-AM-2,6-DNT	19406-51-0	NA	150	0.73	0.1	NA	0.1	0.0299	0.04	0.1
2,6-DNT	606-20-2	0.7	0.61	0.328	0.1	NA	0.1	0.0191	0.04	0.1
2,4-DNT	121-14-2	0.7	1.6	1.28	0.1	NA	0.1	0.0147	0.04	0.1
Nitroglycerin	55-63-0	NA	6.1	71	2	NA	2	0.215	0.4	2
PETN	78-11-55	NA	NA	8,600	2	NA	2	0.493	0.4	2
2,4,6-TNP (Picric Acid)	88-89-1	NA	NA	6.4	0.1	NA	0.1	0.0563	0.04	0.1

1. Action levels have not been established for this project. The values listed above are based upon the New Jersey Residential Direct Contact SRS per N.J.A.C. 7:26D Remediation Standards, Updated November 4, 2009.
2. Action levels have not been established for this project. The values listed above are the USEPA Regional Screening Level for Resident Soil, June 2011.
3. Action levels have not been established yet for this project. The values listed above are based on:
    a. USEPA Ecological Soil Screening Levels (USEPA, 2011);
    b. USEPA Region 5 Ecological Screening Levels (USEPA, 2003); or
    c. If neither a nor b provide screening levels for explosives, the lowest Final Ecological Screening Levels from the LANL ECORISK Database Release 2.5 (October 2010) (LANL, 2010)
4. The target PQLs should ideally be below the NJ standards (see note 1), the USEPA screening levels, and the LANL screening levels, and have been set at the laboratory achievable LOQs. Where the PQL is above the screening level, the laboratory MDL must be below.
5. All soil results will be reported on a dry weight basis.

QAPP Worksheet #15 (UFP-QAPP Manual Section 2.8.1) -- Reference Limits and Evaluation Table (Continued)

QAPP Worksheet #15-2
Reference Limits and Evaluation Table

Matrix: Soils

Analytical Group: TAL Metals

Concentration Level: Low

Analyte	CAS Number	NJ Residential Direct Contact SRS (mg/kg)[1]	USEPA RSL for Resident Soil (mg/kg)[2]	Reference Limit in Soil Based on Ecological Health (mg/kg)[3]	Project Quantification Limit (mg/kg)[4]	Analytical Method Methods			Achievable Laboratory Detection Limits[5]	
						MDLs	Method QLs	MDL (mg/kg)	LOD (mg/Kg)	LOQs (mg/kg)
Aluminum	7429-90-5	78,000	77,000	50	50	NA	50	1.55	3	50
Antimony	7440-36-0	31	31	0.27	2	NA	2	0.38	0.6	2
Barium	7440-39-3	16,000	15,000	330	2	NA	2	0.076	0.18	2
Cadmium	7440-43-9	78	70	0.36	0.5	NA	0.5	0.041	0.1	0.5
Copper	7440-50-8	3,100	3,100	28	5	NA	5	0.217	0.5	5
Lead	7439-92-1	400	400	11	0.9	NA	0.9	0.27	0.8	0.9
Manganese	7439-96-5	11,000	NA	220	4.5	NA	4.5	0.1	0.15	4.5
Strontium	7440-24-6	NA	47,000	NA	1	NA	1	0.036	0.08	1
Zinc	7440-66-6	23,000	23,000	46	8	NA	8	0.398	0.8	8

1. Action levels have not been established yet for this project. The values listed above are based upon the New Jersey Residential Direct Contact SRS per N.J.A.C. 7:26D Remediation Standards, Updated November 4, 2009.
2. Action levels have not been established for this project. The values listed above are the USEPA RSL for Resident Soil, June 2011.
3. Action levels have not been established yet for this project. The values listed above are based on:
    a. USEPA Ecological Soil Screening Levels (USEPA, 2011);
    b. USEPA Region 5 Ecological Screening Levels (USEPA, 2003)
4. The target PQLs should ideally be below the NJ standards (see note 1), the USEPA screening levels, and the LANL screening levels, and have been set at the laboratory achievable LOQs. Where the PQL is above the screening level, the laboratory MDL must be below.
5. All soil results will be reported on a dry weight basis.

QAPP Worksheet #16 (UFP-QAPP Manual Section 2.8.2) -- Project Schedule / Timeline Table

Activities	Organization	Dates		Deliverable
		Anticipated Date(s) of Initiation	Anticipated Date of Completion	
A detailed project schedule is attached as Figure 3 to this QAPP.				

Figure 3: Project Schedule

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Dates(s) of Initiation	Anticipated Date of Completion		
RI Fieldwork (MC)	WESTON, ARCADIS/PIRNIE	11/14/2011	3/8/2013	MC Sampling Logs, Data Analysis to be included in RI Report	3/30/2013
RI Fieldwork (DGM)	WESTON	11/14/2011	6/17/2012	Safety and field logs and forms, Photographic log, DGM data table, Daily reports, and Daily Data Quality Control Report (DQCR) – to be included in the appendices to the RI Report	3/30/2013
RI Fieldwork (Intrusive)	WESTON, ARCADIS/PIRNIE	3/19/2012	7/27/2012	Safety and field logs and forms, Photographic log, Daily reports, and Daily Data Quality Control Report (DQCR) – to be included in the appendices to the RI Report	3/30/2013
RI Fieldwork (water portion)	WESTON	8/30/2012	3/8/2013	Safety and field logs and forms, Photographic log, DGM data table, Daily reports, and Daily Data Quality Control Report (DQCR) – to be included in the appendices to the RI Report	3/30/2013
Final RI Report #1 1926 Explosion Radius, 1926 Explosion Radius Off-post, Green Pond, Former Operational Areas, Shell Burial Grounds	WESTON	2/10/2012	2/25/2013	Final RI Report with Appendices	3/30/2013
Final RI Report #2Lake Denmark Off-Post, and Lakes	WESTON	3/9/2013	1/13/2014	Final RI Report with Appendices	3/30/2013

QAPP Worksheet #17 (UFP-QAPP Manual Section 3.1.1) -- Sampling Design and Rationale

The DQOs for the sampling program can be found in Worksheets 10 and 11. The sampling design rationale for each MRS covered under this UFP-QAPP is given below.

1926 Explosion Radius 1926 Explosion Radius - On and Off-Post (PICA-003-R-01 and PICA-004-R-01, respectively)
There are three potential release mechanisms for MC at these MRSs:

1. Dispersion of Bulk TNT Through an Explosion (both MRSs) - As shown in Attachment 2, IRP data do not indicate the presence of TNT or its degradation products throughout the MRS boundary. Therefore, random sampling for TNT and its degradation products is not proposed.
2. By Association with MEC Found at the MRS (both MRSs) - As a result of the explosion, as well as other installation activities, there is a potential for MEC to be present within this MRS. Based on the results of MEC investigations that will be conducted under the MMRP RI, biased MC sampling is proposed. The biased sampling will be conducted in accordance with the biased sampling protocols detailed at the end of this Worksheet.
3. Through Site Usage (On-Post MRS only) -
    a. A range, which is less than 1 acre in size, is located on the northern portion of this MRS, immediately adjacent to operational area. Although no information is available to indicate the specific types of munitions used on the range, based on the size and configuration (i.e., short range with stationary firing point and target), it is assumed that the range was only used to conduct impact testing of 20mm, 37mm, and 40mm practice projectiles. Therefore, biased sampling associated with this range is not proposed.
    b. PTA has a long history of manufacturing and R&D. A report that details site usage, DoD, *Executive Order 11508 Installation Survey Report*, *Picatinny Arsenal, Dover, New Jersey*, January 1973, is available. This report indicates that the following site usages were present within the 1926 Explosion Radius. It should be noted that a geo-rectified version of the map that shows the site usage areas is not available. Therefore, the locations of these areas were approximated based on site features and the area boundaries are estimates only.
        i. Operational and Training Areas
        ii. Artillery Firing of Shells up to 155-mm and Fragmentation Pattern Testing. This is located in the 600 Area of PTA; much of it is operational area.
        iii. Loading and Assembly of Fuzes, Pelleting Presses, and Detonator Loading (appears to be partially collocated with several IRP Sites; one with similar use)
        iv. Easement (Buffer)
        v. Nitroglycerin Facility (appears to be partially collocated with several IRP Sites; one with the same use)

QAPP Worksheet #17 (UFP-QAPP Manual Section 3.1.1) -- Sampling Design and Rationale (Continued)

vi. Preproduction Pilot Lines and Automated Melt-Pour Facilities (appears to be partially collocated with several IRP Sites with same/similar uses)
vii. Melt-Pouring of Complete Rounds, Beta-tron x-ray Munitions Viewing for Cavities/Flaws (appears to be partially collocated with several IRP Sites with similar uses)
viii. Powder Manufacture and Blending, Propellant Extrusion and Mixing Area (appears to be partially collocated with several IRP Sites with same/similar uses)

For the Operational and Training Areas and the Artillery Firing Area, it is assumed that any MC would be associated with MEC. For the other areas, as shown in Attachment 2, IRP data from partially collocated IRP Sites do not indicate the widespread presence of explosives in surface soils throughout the MRS boundary. Therefore, random sampling for MC is not proposed.

In summary, only biased soil samples will be collected from these two MRSs. For both the on and off-post MRSs, biased samples will be collected based on the MEC field investigations.

Former Operational Areas (PICA-006-R-01)
There are two potential release mechanisms for MC at this MRS:

1. <u>Through Site Usage</u> - PTA has a long history of manufacturing and R&D. A report that details site usage, DoD, *Executive Order 11508 Installation Survey Report, Picatinny Arsenal, Dover, New Jersey*, January 1973, is available. This report indicates that the following site usages were present within the Former Operational Areas. It should be noted that a geo-rectified version of the map that shows the site usage areas is not available. Therefore, the locations of these areas were approximated based on site features and the area boundaries are estimates only.
   a. Operational and Training Areas
   b. Rocket Surveillance and Static Firing (appears to be partially collocated with IRP Site with same use)
   c. Preproduction Pilot Lines and Automated Melt-Pour Facilities
   d. Buried Explosives Discrimination Testing
   e. QA Inspection and Testing of Nuclear Components (appears to be partially collocated with IRP Sites)
   f. Artillery Firing of Shells up to 155-mm and Fragmentation Pattern Testing

   Unlike the 1926 Explosion Radius - On-Post MRS, there is not a significant amount of IRP data for this MRS. Therefore, random samples will be collected along a grid. The grid was developed using Visual Sampling Plan (VSP) software, version 6.0, with the following inputs/assumptions:

QAPP Worksheet #17 (UFP-QAPP Manual Section 3.1.1) -- Sampling Design and Rationale (Continued)

- The area to be sampled excludes the following:
  - Ponds - All ponds within this MRS are IRP Sites and/or are located in operational areas. These ponds include G2 Pond, Stillwell Pond, and Hydro Pond
  - PTA's golf course
  - Any collocated IRP Site
- Null hypothesis - the Site is contaminated
- It was assumed that the data are not normally distributed
- Sufficient data are required to reach a 95% confidence level

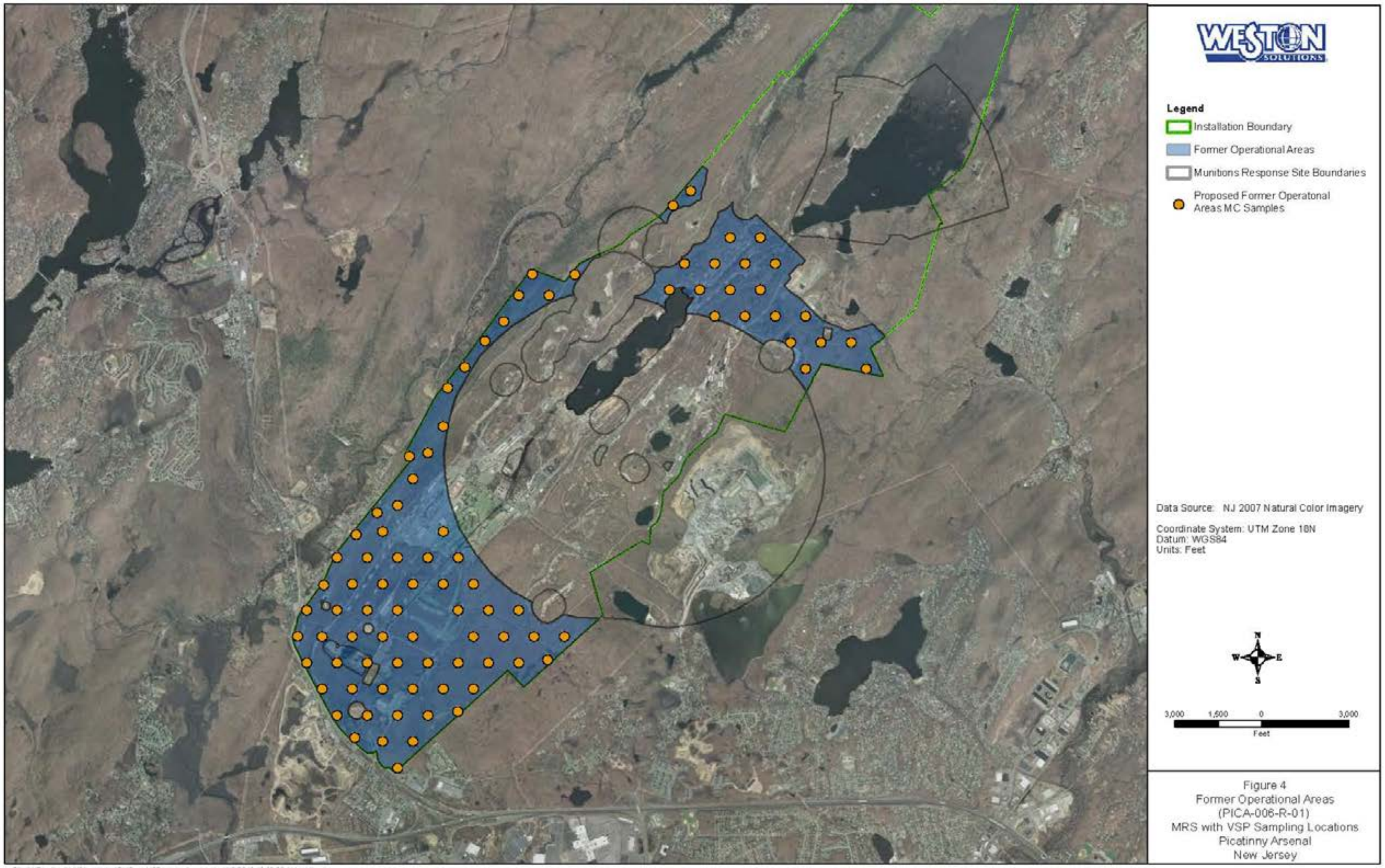
Based on these inputs, 89 samples will be collected and analyzed for the MC list given in Worksheet 10. As discussed in Attachment 2, sampling for perchlorate and DU is not proposed. Refer to Attachment 3 for the VSP output and Figure 4 for the sample locations. The sample locations may be field adjusted based on field conditions. (*e.g.*, area inaccessible, located on concrete or asphalt). In addition, note that five additional samples have been added to the sampling plan to account for samples that cannot be relocated. Therefore, up to five samples may be omitted from sampling, based on field conditions.

When explosives results exceed the SL and when the metals results exceed both the SL and the background concentration, Phase II step-out sampling may be performed to delineate the extent of the MC contamination. The Phase II sampling will be conducted using the protocols at the end of this section.

2. By Association with MEC Found at the MRS - Due to installation activities, there is a potential for MEC to be present within this MRS. Based on the results of MEC investigations that will be conducted under the MMRP RI, biased MC sampling is proposed. The biased sampling will be conducted in accordance with the biased sampling protocols detailed at the end of this Worksheet.

QAPP Worksheet #17 (UFP-QAPP Manual Section 3.1.1) -- Sampling Design and Rationale (Continued)

Figure 4: Former Operational Area VSP Map



QAPP Worksheet #17 (UFP-QAPP Manual Section 3.1.1) -- Sampling Design and Rationale (Continued)

Lakes MRS (PICA-008-R-01)

This MRS consists of two lakes, Picatinny Lake and Lake Denmark, which had various ranges associated with them. Therefore, there is a potential for MEC to be present within this MRS. It is assumed that any MC associated with this MRS would be associated with MEC. Based on the results of MEC investigations that will be conducted under the MMRP RI, biased MC sampling is proposed. The biased sampling will be conducted in accordance with the biased sampling protocols detailed at the end of this Worksheet.

It should be noted that the water portion of both Picatinny Lake and Lake Denmark, as well as the land portion of Picatinny Lake, are covered under the IRP. Therefore, MC sampling is not proposed for these areas and MC sampling at this MRS will only occur on the land portion of Lake Denmark.

Lake Denmark - Off-Post (PICA-012-R-01)

This MRS, which is land only, consists of the off-post portion of the surface danger zone (SDZ) associated with the ranges at Lake Denmark. It is assumed that any MC associated with this MRS would be associated with MEC. Based on the results of MEC investigations that will be conducted under the MMRP RI, biased MC sampling is proposed. The biased sampling will be conducted in accordance with the biased sampling protocols detailed at the end of this Worksheet.

Inactive Munitions Waste Pit (PICA-013-R-01)

This MRS, which is land only, consists of a potential munitions testing area and the on-post portion of the SDZ associated with the potential testing area. Although the exact use of this MRS is unknown, it reportedly consisted of an open field with a burn cage, a gun turret, and a building; it is unclear whether all of these structures were present throughout the site's history. Note that coordinates and exact locations of these features are not given in historical documents. According to the Installation Action Plan, this MRS was used for evaluating munitions; the 1989 SI report states that the area was used for static testing of explosives and propellants. While neither document indicates how the burn cage was used, they are typically used to control or prevent the ejection of fragments from items that might detonate when burned. Due to the potential for munitions debris to have been ejected from the site during testing operations an SDZ was included as part of the MRS. Since no specific discussion of munitions tested at the site was available, a SDZ radius of 1,250 feet was used. In the 1980s, much of the MRS was covered with topsoil and sand and in the 1990s much of the MRS, including the location of the burn cage, was covered with up to 12 feet of fill.

During a 1989 IRP SI, conducted prior to much of the site being covered with 12 feet of fill, four surface soil and two sediment samples were collected and analyzed for propellants, metals, and explosives. The surface soil samples were collected near the metal burn cage while the sediment samples were collected from a swampy area to the south of the burn cage. Analysis of these samples indicated the presence of copper, RDX, 1,3-DNB, and 2,4-DNT above the SI comparison criteria. No MC were found in any of the sediment samples at levels above the SI comparison criteria.

QAPP Worksheet #17 (UFP-QAPP Manual Section 3.1.1) -- Sampling Design and Rationale (Continued)

There are two potential release mechanisms for MC at this MRS:

1. <u>Through Site Usage</u> – It is likely that the area that was filled encompasses the former testing area. Trenching operations are currently scheduled to be conducted at this site under the IRP. To the extent possible, MC sampling under the MMRP will be conducted during the IRP trenching. At the current time, the exact location of the trenching operations are unknown. However, MC samples will be collected from any trench installed near the potential former location of the testing area. Using VSP, version 6.0 with the following inputs, and based on the approximate size of the former testing area, a maximum of 15 soil samples are required. Samples will only be collected from native soil, not the fill material, and will be collected from five evenly spaced locations within the trench. At each location three samples will be collected; two locations on the sidewalls and one location on the bottom of the trench. All locations will be field determined based on visual observation.

    - Null hypothesis - the Site is contaminated
    - It was assumed that the data are not normally distributed
    - Sufficient data are required to reach a 95% confidence level

2. <u>By Association with MEC Found at the MRS</u> – It is assumed that any MC associated with the SDZ, and not the testing area, would be associated with MEC. Recent trenching operations at this MRS, conducted under the IRP to locate the source of a tetrachloroethylene plume in groundwater, have indicated potential disposal activities and discarded gravel mines (anti-personnel mines filled with lead azide) have been found. It is unknown if a MEC disposal area is present or if individual MEC may have been disposed of in this area. Additional trenching activities are proposed under the IRP. Biased MC sampling from the trenches is proposed in accordance with the biased sampling protocols detailed at the end of this Worksheet. If a MEC disposal area is found during the MEC investigation of this site, a systematic sampling approach may be warranted, and an addendum to this QAPP will be developed.

Note that if modifications to the CSM for this MRS are warranted based on additional information obtained during the trenching operations, the proposed MC sampling scheme could be modified and an addendum to this QAPP will be developed.

Inactive Munitions Waste Pit - Off-Post (PICA-014-R-01)
This MRS, which is land only, consists of the off-post portion of the SDZ associated with a potential range. It is assumed that any MC associated with this MRS would be associated with MEC. Based on the results of MEC investigations that will be conducted under the MMRP RI, biased MC sampling is proposed. The biased sampling will be conducted in accordance with the biased sampling protocols detailed at the end of this Worksheet.

QAPP Worksheet #17 (UFP-QAPP Manual Section 3.1.1) -- Sampling Design and Rationale (Continued)

Biased MEC Sampling Approach/Rationale

1. Biased soil samples will only be collected when field observation indicates that a potential release has occurred (*e.g.*, visual evidence of staining, the munition is cracked or corroded).
2. As a conservative measure, the sample will be collected from the area that is most likely to have the highest levels of MC contamination. Therefore, one discrete soil sample will be collected immediately under, or adjacent to MEC, where contamination is likely (*e.g.*, visual staining, near crack/corrosion).
3. This sample will be analyzed for the MC list given in Worksheet 10. It should be noted that if MEC are found that are not on the list given in Attachment 1, a list of MC associated with that item will be developed. As required, additional MC parameters may be added to the analytical list.
4. The analytical results will be compared to the SLs levels given in Worksheet 10; the metals results will also be compared to the background concentrations given in the *Picatinny Arsenal Facility-Wide Background Investigation, Picatinny Arsenal Installation Restoration Program*, May 2002.
5. To ensure comparability with IRP samples, discrete samples will be collected in accordance with the *Picatinny Arsenal Facility-Wide Field Sampling Plan,* May 2007 (IRP document) and the NJDEP Field Sampling Procedures Manual (Sections 6.1.2.2 and 6.2.5).
6. Soil samples will not be collected when the MEC is blown-in-place (BIP). According to Engineer Research and Development Center (ERDC)/Cold Regions Research and Engineering Laboratory (CRREL) Reports TR-03-16 and TR-08-19, during high order BIP, there is > 99% consumption of explosives.
7. Soil samples will also not be collected near inert or intact MEC/MPPEH unless field observations indicate potential contamination (*e.g.*, staining).
8. Soil samples will be collected in accordance with SOP PTA-04, Soil Sample Collection.
9. Sample locations will be documented in accordance with SOP PTA-06, Documenting Sample Locations with a GPS, or SOP PTA-07, Documenting Sample Locations without a GPS, as appropriate.
10. When explosives results exceed the SL and when the metals results exceed both the SL and the background concentration, Phase II step-out sampling may be performed to delineate the extent of the MC contamination. The Phase II sampling will be conducted using the following protocols.

    A. Four surficial soil samples will be collected approximately 20 feet from the original sample.
    B. The samples will be collected north, south, east, and west of the original sample at two depths; the original depth and the six-inch interval located one foot below the original sample ending depth (*e.g.*, if the original sample was collected from 6 to 12 inches the second depth interval would be from 2 to 2.5 feet bgs). Locations may be modified based on field conditions.

QAPP Worksheet #17 (UFP-QAPP Manual Section 3.1.1) -- Sampling Design and Rationale (Continued)

C. The step-out samples will only be analyzed for the analytical group that exceeded the SL.

QAPP Worksheet #18 (UFP-QAPP Manual Section 3.1.1) -- Sampling Locations and Methods/SOP Requirements Table

Sampling Locations and Methods/SOP Requirements Table

As discussed in Worksheet 17, both random and biased sampling will be conducted. For the biased samples, the number of samples and their locations are not known at this time as the sample locations will be based on the MEC investigation results, along with field observations. All of the samples listed below are discrete soil samples.

MRS	Sampling Location/ID Number	Depth (inches)	Analytical Group[1]	Number of Samples	Sampling SOP Reference	Rationale for Sampling Location
1926 Explosion Radius - On-Post	ERFPR-SS01 through ERFPR-SS04	0-6	Select TAL Metals and Explosives	4	Refer to WS 21	Biased samples collected in front of slug butt associated with a former small caliber projectile range. Locations will be field determined.
1926 Explosion Radius - On-Post	ERONP-SS01 through TBD	0-6	Select TAL Metals and Explosives	Field Determined	Refer to WS 21	Sample locations determined based on MEC investigation results
1926 Explosion Radius - Off-Post	EROFP-SS01 through TBD	0-6	Select TAL Metals and Explosives	Field Determined	Refer to WS 21	Sample locations determined based on MEC investigation results
Former Operational Areas	FOA-SS01 through FOA-SS90	0-6	Select TAL Metals and Explosives	90	Refer to WS 21	Refer to WS 17. Gridded samples collected due to lack of sufficient IRP data from MRS, as well as types of activities conducted within MRS.
Former Operational Areas	FOA-SS01 through TBD	0-6	Select TAL Metals and Explosives	Field Determined	Refer to WS 21	Sample locations determined based on MEC investigation results
Lakes MRS	LAKE-SS01 through TBD	0-6	Select TAL Metals and Explosives	Field Determined	Refer to WS 21	Sample locations determined based on MEC investigation results
Lake Denmark - Off-Post	LDOP-SS01 through TBD	0-6	Select TAL Metals and Explosives	Field Determined	Refer to WS 21	Sample locations determined based on MEC investigation results
Inactive Munitions Waste Pit	IMWP-SS01 through TBD	0-6	Select TAL Metals and Explosives	Field Determined	Refer to WS 21	Sample locations determined based on MEC investigation results
Inactive Munitions Waste Pit - Off-Post	IMWPOP-SS01 through TBD	0-6	Select TAL Metals and Explosives	Field Determined	Refer to WS 21	Sample locations determined based on MEC investigation results

1 - Select explosives include 2-AM-4,6-DNT, 4-AM-2,6-DNT, 2,4-DNT, 2,6-DNT, HMX, Nitroglycerin, PETN, RDX, Tetryl, 2,4,6-TNP, and 2,4,6-TNT; Select metals include Al, Sb, Ba, Cd, Cu, Pb, Mn, Sr, and Zn

QAPP Worksheet #19 (UFP-QAPP Manual Section 3.1.1) -- Analytical SOP Requirements Table

Analytical SOP Requirements Table

Matrix	Analytical Group	Conc. Level	Analytical and Preparation Method/SOP Reference	Sample Volume/Mass per Analysis	Containers (number, size, and type)[1,2]	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/ analysis)
Soil	Explosives	Low	SOPs: DV-LC-0002 DV-0P-0018 (SW-846-8330B)	4 grams	1, 8oz. glass jar	Cool 4±2°C	14 days
Soil	Metals	Low	SOPs: DV-MT-0019 (SW-846 6010B)	5 grams	1, 8 oz. glass or plastic jar	Cool 4±2°C	6 months

1. The sample containers used for chemical parameter must be certified as being clean or they must have been decontaminated by the laboratory.

QAPP Worksheet #20 (UFP-QAPP Manual Section 3.1.1) -- Field Quality Control Sample Summary Table

The following table(s) summarizes by matrix, analytical group, and concentration level the number of field QC samples that will be collected and sent to the laboratory.

Field Quality Control Sample Summary Table

Matrix	Analytical Group	Conc. Level	Analytical and Preparation SOP Reference	Est. No. of Sampling Locations	No. of Field Duplicate Pairs	No. of MS/MSD	No. of Trip Blanks	No. of Equip. Blanks	No. of PT Samples	Est. Total No. of Samples to Lab
Soil	Explosives	Low	DV-LC-0002 DV-0P-0018 (SW-846-8330B)	Refer to Worksheet 18	1 per 20 samples	1 per 20 of less field samples	None	1 per batch of equip.	None	To be determined per Worksheets 17 and 18
Soil	Metals	Low	DV-MT-0019 (SW-846 6010B)	Refer to Worksheet 18	1 per 20 samples	1 per 20 of less field samples	None	1 per batch of equip.	None	To be determined per Worksheets 17 and 18

QAPP Worksheet #21 (UFP-QAPP Manual Section 3.1.2) -- Project Sampling SOP References Table

The Standard Operating Procedures are included in Attachment 4.

Reference Number	Title, Revision Date and/or Number
PTA-01	Procedure to Conduct Sample Management; includes sample identification, field documentation and COC procedures, sample labeling, packaging, and shipping, and QC/QC sample collection.
PTA-02	Field Documentation
PTA-03	Decontamination
PTA-04	Soil Sampling Procedures
PTA-05	Daily Quality Control Report
PTA-06	Documenting Sample Locations with a GPS
PTA-07	Documenting Sample Locations without a GPS
PTA-08	Performing a Technical System Audit

QAPP Worksheet #22 (UFP-QAPP Manual Section 3.1.2.4) -- Field Equipment Calibration, Maintenance, Testing, and Inspection Table

The following identifies field equipment and instruments (other than analytical instrumentation) that require calibration, maintenance, testing, or inspection and provide the SOP reference number for each type of equipment. In addition, document the frequency of activity, acceptance criteria, and corrective action requirements on the worksheet.

Field Equipment Calibration, Maintenance, Testing, and Inspection Table

Field Equipment	Calibration Activity	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
Global Positioning System (GPS)	Number of satellites acquired and quality of data will be checked periodically while collecting GPS data.	Sufficient frequency to ensure accuracy and reproducibility of results.	Acceptable data generation to provide location information and mapping of GPS points.	In the event that the equipment is not functioning at the specified standard, it will be fixed or replaced.	Daily, prior to use	Per equipment manual	Contact the ARCADIS/ Pirnie equipment facility manager for direction.	Field Team Leader	Per equipment manual

1. Where possible, the GPS will be used to record sample location northings and eastings.
2. Field equipment must be inspected and calibrated before use according to the criteria given in the field sampling SOPs or field equipment manual. If problems occur with field instruments or equipment, which cannot be resolved by the field team personnel, they should contact the field team leader. If field equipment fails inspection, it is the field team leader's responsibility to investigate and resolve the problem. The ARCADIS/Pirnie equipment facility manager can also be contacted by the field crew or the field team leader to help resolve problems with field equipment and supply or obtain any spare or replacement parts or equipment.
3. Refer to SOP PTA-06, Documenting Sample Locations with a GPS

QAPP Worksheet #23 (UFP-QAPP Manual Section 3.2.1) -- Analytical SOP References Table

Reference Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work?
DV-LC-0002	Nitroaromatic and Nitrosamine Explosive Compounds by HPLC [(SW-846-8330A & 8330B], DV-LC-0002, Rev. 12.1, 11/19/2010	Definitive	Explosive	HPLC	Test America - Denver	No
DV-OP-0018	Extraction of Nitroaromatic and Nitrosamine Explosive Compounds and Picric Acid from Soils Samples [(SW-846-8330A & 8330B], DV-OP-0018, Rev. 1, 08/19/09	Definitive	Explosive	Extraction Apparatus	Test America - Denver	No
DV-MT-0019	ICP Analysis for Trace Elements by SW-846 Method 6010B, DV-MT-0019, Rev. 1.1, 03/12/2010	Definitive	Metals	ICP-Atomic Emission Spectrometer (ICP-AES)	Test America - Denver	No

QAPP Worksheet #24 (UFP-QAPP Manual Section 3.2.2) -- Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action	Person Responsible	SOP Reference
TJA Trace	1-point plus blank	Every 20 samples	R $\geq$ 0.99	Perform maintenance and recalibrate	Test America - Denver Laboratory Analyst	SW-846 Method 6010B/SOP DV-MT-0019
HPLC Agilent 1100	5-point calibration	Daily	R $\geq$ 0.95	Perform maintenance and recalibrate	Test America - Denver Laboratory Analyst	SW-846 Method 8330B/SOP#DV-LC-0002

QAPP Worksheet #25 (UFP-QAPP Manual Section 3.2.3) -- Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
TJA Trace	Torch, nebulizer spray chamber, autosampler, and pump tubing maintenance	SW-846 Method 6010B	Check connections, flush lines, clean nebulizer	Frequency determined by instrument remaining in calibration and free of interference	Passing calibration	Reconnect sample pathways, recalibrate, reanalyze affected samples	Laboratory Analyst	SW-846 Method 6010B/SOP DV-MT-0019
HPLC Agilent 1100	Lamp and guard column inspection Pump maintenance	SW-846 Method 8330B-modified	Leak and pressure test, guard column and lamp performance	Frequency determined by instrument remaining in calibration and free of interference	Passing calibration	Replace lamp, replace guard column, tighten fittings, recalibrate, reanalyze	Laboratory Analyst	SW-846 Method 8330B/SOP#DV-LC-0002

a. All laboratory equipment will be inspected prior to use.
b. The maintenance of the analytical instruments, including the testing activity, inspection activity, frequency, acceptance criteria, responsible person, and SOP reference must be documented in the Laboratories Quality Control Manual. See the SOPs referenced in Worksheet 23.
c. Spare parts and maintenance of laboratory analytical instrumentation is the responsibility of the assigned laboratory.

QAPP Worksheet #26 (UFP-QAPP Manual Appendix A) -- Sample Handling System

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): ARCADIS/Pirnie Field Team supervised by the Field Team Leader
Sample Packaging (Personnel/Organization): ARCADIS/Pirnie Field Team
Coordination of Shipment (Personnel/Organization): ARCADIS/Pirnie Sample Management Officer (SMO)
Type of Shipment/Carrier: Federal Express for overnight delivery or courier to the laboratory
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): Test America - Denver personnel
Sample Custody and Storage (Personnel/Organization): Test America - Denver personnel
Sample Preparation (Personnel/Organization): Test America - Denver personnel
Sample Determinative Analysis (Personnel/Organization): Test America - Denver personnel
SAMPLE ARCHIVING
Field Sample Storage (No. of days from sample collection): Samples will not be stored in the field, but will be shipped within 24 hours of collection. If unable to ship a sample the day of collection, the sample will be kept in a cooler or transferred to a refrigerator kept at 4^{o}C.
Sample Extract/Digestate Storage (No. of days from extraction/digestion): Sample extraction and digestion must be conducted according to the requirements given in Worksheet 19.
SAMPLE DISPOSAL
Personnel/Organization: Test America - Denver personnel
Number of Days from Analysis: At least 60 days

QAPP Worksheet #27 (UFP-QAPP Manual Section 3.3.3) - Sample Custody Requirements

Sample Handling and Custody

Sample custody procedures ensure the timely, correct, and complete analysis of each sample for all parameters requested. A sample is considered to be in someone's custody if it:

- Is in his/her possession
- Is in his/her view, after being in his/her possession
- Is in his/her possession and has been placed in a secured location
- Is in a designated secure area

Sample custody documentation provides a written record of sample collection and analysis. The sample custody procedures provide for specific identification of samples associated with an exact location, the recording of pertinent information associated with the sample, including time of sample collection and any preservation techniques, and a Chain of Custody (COC) record that serves as physical evidence of sample custody. Custody procedures will be similar to the procedures outlined in the USACE's *Requirements for the Preparation of Sampling and Analysis Plans* (USACE, 2001) and the USEPA's *Contract Laboratory Program Guidance for Field Samplers* (USEPA, 2004).

The COC documentation system provides the means to individually identify, track, and monitor each sample from the time of collection through final data reporting. COC procedures document pertinent sampling data and all transfers of custody until the samples reach the analytical laboratory. The following information is typically recorded on manual COC forms. All COC forms must be signed in ink:

- Project name and/or project number
- Signature of SMO or designee
- Sampling station number
- Date and time of collection
- Discrete sample designation
- Sample matrix
- Sampling location description
- Field identification number
- Analyses required
- Preservation technique
- Signatures and dates for transfers of custody
- Air express/shipper's bill of lading identification numbers

QAPP Worksheet #27 (UFP-QAPP Manual Section 3.3.3) - Sample Custody Requirements (Continued)

The COC form serves as an official communication to the laboratory detailing the particular analyses required for each sample. The COC record will accompany the samples from the time of sampling through all transfers of custody. It will be kept on file at the laboratory where samples are analyzed and archived. Two copies of the COC form are created; one copy is retained by the Field Team Leader and one is sent to the laboratory. The SMO or designee completes a COC record to accompany each shipment from the field to the laboratory. The completed COC is put in a zip-lock bag and taped to the inside cover of the sample shipping container. If there are more than one container in a shipment, copies of the COC forms will be placed in each container. The container is then sealed with custody seals and custody is transferred to the laboratory.

Field Procedures

- The field sampler is personally responsible for the care and custody of the samples until they are transferred to the SMO or until they are properly dispatched. As few people as possible should handle the samples.
- The Field Team Leader, or designee, is responsible for entering the proper information in the field logbook, including all pertinent information such as sample identification number, date and time of sample collection, type of analysis, and description of sample location. The information entered into the field logbook will be used to generate a COC.
- All sample containers will be labeled with the project identification, sample number, matrix, type of analysis required, and preservation requirements.
- The samples will be properly preserved, bagged, and packed into coolers. The original COC form will be placed into the lead cooler and will be shipped to the laboratory.
- The SMO or designee will review all field activities to determine whether proper custody procedures were followed during the field work and if additional samples are required.

Transfer of Custody and Shipment

The custody of samples must be maintained from the time of sampling through shipment and relinquishment to the laboratory. Instructions for transferring custody are given below:

All samples are accompanied by a COC. When transferring custody of samples, the individuals relinquishing and receiving will sign, date, and note the time on the COC. This form documents sample custody transfer from the SMO or designee, through the shipper, to the analytical laboratory. Since a common carrier will usually not accept responsibility for handling COC forms, the name of the carrier is entered under "Received by," the bill-of-lading number is recorded in the comments section, and the COC form is placed in a zip-lock plastic bag and taped to the inside lid of the lead shipping cooler. Copies of the COC forms will be placed in each additional cooler in a shipment.

QAPP Worksheet #27 (UFP-QAPP Manual Section 3.3.3) - Sample Custody Requirements (Continued)

- Samples will be packaged for shipment and either picked up at the Site by the laboratory or dispatched to the appropriate laboratory via overnight delivery service. Samples will be shipped within 24 hours of sampling. SOP PTA-01 in Attachment 4 contains the proper sample packaging techniques. A separate COC record must accompany each shipment. Shipping containers will be sealed for shipment to the laboratory. Two custody seals will be applied to each cooler to document that the container was properly sealed and to determine if the container was tampered with during shipment. The custody seals will be placed on the coolers in such a manner that the custody seal would be broken if the cooler were opened (*i.e.*, diagonally opposite corners of the cooler lid).
- The original COC will accompany the shipment. A copy will be retained by the Field Team Leader.
- If the samples are sent by common carrier or air freight, proper documentation must be maintained. For example, the bill of lading must be retained by the Field Team Leader.

Sample Identification System

A sample numbering system will be used to identify each sample; the sample numbers will be sequentially assigned to ensure there is no duplication of sample numbers. This system will provide a tracking procedure to allow retrieval of information about a particular sample and will assure that each sample is uniquely numbered. The sample identification will consist of the components described below.

- Project Code: The first component consists of a four-letter designation that identifies the project site. For this project, the three letter designation will be PTA
- Sampling Year: The second component identifies the year the samples were collected in XXXX format
- MRS Identifier: Each MRS will have a unique identifier; they are shown below:

1926 Explosion Radius - On-Post - Former Projectile Range	ERFPR
1926 Explosion Radius - On-Post	ERONP
1926 Explosion Radius - Off-Post	EROFP
Former Operational Areas - Gridded Samples	FOAG
Former Operational Areas - Biased Samples	FOAB
Lakes MRS	LAKE
Lake Denmark - Off-Post	LDOP
Inactive Munitions Waste Pit	IMWP
Inactive Munitions Waste Pit - Off-Post	IMWPOP

- Sample Number: This is a sequential number that identifies the number of this type of sample collected from an MRS

QAPP Worksheet #27 (UFP-QAPP Manual Section 3.3.3) - Sample Custody Requirements (Continued)

- QA/QC Samples will be labeled with the following suffixes. Note that duplicate samples will be numbered uniquely as if they were samples. A record of identification for duplicate samples will be maintained.

  FB Field Blank
  MS Matrix Spike
  MSD Matrix Spike Duplicate

Examples of identification numbers are given below:

PTA-2010-FOAB-0008: This is the eighth biased soil sample collected from the Former Operational Areas

PTA-2010-FB-0002: This is the second rinsate sample collected in 2010

Laboratory Custody Procedures

- A designated sample custodian accepts custody of the samples and verifies that the information on the sample labels matches that on the COC(s). The sample custodian will document any discrepancies and will sign and date all appropriate receiving documents. The sample custodian will also document the condition of the samples upon receipt at the laboratory.

- Once the samples have been accepted by the laboratory, checked and logged in, they must be maintained in accordance with laboratory custody and security requirements.

- To assure traceability of samples while in the possession of the laboratory, a method for sample identification that has been documented in a laboratory SOP will be used to assign sample numbers.

- The following stages of analysis must be documented by the laboratory:
  - Sample Extraction/Preparation
  - Sample Analysis
  - Data Reduction
  - Data Reporting

- Laboratory personnel are responsible for the custody of the samples until they are returned to the sample custodian.

Sample Holding Times
Information on sample holding times and required preservation for each test method are provided in Worksheet 19.

QAPP Worksheet #27 (UFP-QAPP Manual Section 3.3.3) - Sample Custody Requirements (Continued)

Final Evidence Files

This is the final phase of sample custody. The COC records and sample analysis request form copies are archived in their respective project files. Laboratory custody forms, sample preparation and analysis logbooks, and data packages will become part of the laboratory final evidence file. Other relevant documentation including records, reports, and correspondence, logs, pictures, and data review reports will be archived by ARCADIS/Pirnie.

QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4) -- QC Samples Table

QAPP Worksheet #28-1
(UFP-QAPP Manual Section 3.4)

QC Samples Table

Matrix	Soil
Analytical Group	Explosives
Concentration Level	Low
Sampling SOP	See Worksheet 21
Analytical Method/ SOP Reference	SW846-8330B/ DV-LC-0002
Sampler's Name	ARCADIS/Pirnie personnel
Field Sampling Organization	ARCADIS/Pirnie
Analytical Organization	Test America
No. of Sample Locations	See Worksheet 28

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Field Rinsate Blanks	One per equipment batch	Per QAPP, < LOQ	The results will be considered by the data reviewer/user	Laboratory and Data Reviewer	Accuracy	Less than the LOQ
Field Duplicate Samples	One per 20 field samples	Per QAPP, %RPD < 40% for results 5X > LOQ (RL)	The results will be considered by the data reviewer/user	Data reviewer/user	Precision	%RPD < 40% for results 5X > LOQ (RL)
Demonstration of capability	Prior to using any test method and at any time there is a significant change in instrument type, personnel, test method, or sample matrix.	Per DoD QSM ver. 4.2	Re-run demonstration for analyses that did not meet the criteria	Laboratory Analyst	Precision and Accuracy	Per DoD QSM ver. 4.2

QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4) -- QC Samples Table (Continued)

QAPP Worksheet #28-1

(UFP-QAPP Manual Section 3.4)

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
ICAL	Minimum of 5 calibration standards; lowest standard concentration at or below the RL. Once calibration curve or line is generated, the lowest calibration standard must be re-analyzed.	Per DoD QSM ver.4.2., a) apparent signal-to-noise ratio at the LOQ (RL) must be at least 5:1; or b) for linear regression, r ≥ 0.995; or c) for Internal Standardization, RSD ≤ 15%.	Correct problem, then repeat ICAL	Laboratory Analyst	Accuracy	The apparent signal-to-noise ratio at the LOQ (RL) must be at least 5:1. If linear regression is used, r ≥ 0.995. If using Internal Standardization, RSD ≤ 15%.
Second source calibration verification (ICV)	Immediately following ICAL.	Per DoD QSM ver. 4.2, all analyte(s) and surrogates within ± 20% of true value.	Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat ICAL.	Laboratory Analyst	Accuracy	All analyte(s) and surrogates within ± 20% of true value. .
Continuing calibration verification (CCV)	Prior to analysis, after every 10 samples, and at the end of the analyses sequence	Per DoD QSM ver. 4.2 ±20% of expected value from ICAL	Correct problem, rerun CCV if that fails repeat the ICAL Reanalyze all samples since the last successful calibration	Laboratory Analyst	Accuracy	±20% of expected value from ICAL
Method Blanks	One per preparatory batch	Per DoD QSM ver. 4.2, no analytes detected >1/2 RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater).	Correct the problem than see the criteria in DoD QSM ver. 4.2 Box D-1. If required reprep and reanalyze method blank and all samples processed since the contaminated blank	Laboratory Analyst	Accuracy/ Sensitivity	No analytes detected >1/2 RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit. (whichever is greater). Blank result must not affect the sample results

QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4) -- QC Samples Table (Continued)

QAPP Worksheet #28-1

(UFP-QAPP Manual Section 3.4)

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
LCS	One per preparatory batch	Per DoD QSM ver. 4.2, a solid reference material containing all reported analytes must be prepared and analyzed in exactly the same manner as a field sample. In-house laboratory control limits for the LCS must demonstrate the laboratory's ability to meet the project's DQOs.	Correct problem, reprep and reanalyze LCS and all samples in the associated preparatory batch for failed analytes, See Appendix G in DoD QSM, ver. 4.2)	Laboratory Analyst	Accuracy	In-house laboratory control limits for the LCS must demonstrate the laboratory's ability to meet the project's DQOs.
MS	One per preparatory batch per matrix	Per DoD QSM ver. 4.2, for matrix evaluation only, therefore taken post grinding from same ground sample as parent subsample. Percent recovery must meet LCS limits.	Laboratory to contact Project Manager as to additional measures to be taken.	Laboratory Analyst	Accuracy	For matrix evaluation only, therefore taken post grinding from same ground sample as parent subsample. Percent recovery must meet LCS limits.
MSD or sample duplicate	One per preparatory batch per matrix	Per DoD QSM ver. 4.2 , for matrix evaluation only, therefore taken post grinding from same ground sample as parent subsample. Percent recovery must meet LCS limits and RPD < 20%.	Laboratory to contact Project Manager as to additional measures to be taken.	Laboratory Analyst	Accuracy/ Precision	For matrix evaluation only, therefore taken post grinding from same ground sample as parent subsample. Percent recovery must meet LCS limits and RPD < 20%.
Confirmation analysis	When target analytes are detected on the primary column using the UV Detector (HPLC) at concentrations exceeding the LOD.	Per DoD QSM ver. 4.2, calibration and QC criteria same as for initial or primary column analysis. Results between primary and second column RPD $\leq$40%.	Report from other column, If there is >40% RPD between the two columns results, qualify data accordingly	Laboratory Analyst	Accuracy	Calibration and QC criteria same as for initial or primary column analysis. Results between primary and second column RPD $\leq$40%.

QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4) -- QC Samples Table (Continued)

QAPP Worksheet #28-2
(UFP-QAPP Manual Section 3.4)

QC Samples Table

Matrix	Soil					
Analytical Group	Metals					
Concentration Level	Low					
Sampling SOP	See Worksheet 21					
Analytical Method/ SOP Reference	SW846-6010B/DV-MT-0019					
Sampler's Name	ARCADIS/Pirnie personnel					
Field Sampling Organization	ARCADIS/Pirnie					
Analytical Organization	Test America					
No. of Sample Locations	See Worksheet 18					
QC Sample:	**Frequency/Number**	**Method/SOP QC Acceptance Limits**	**Corrective Action**	**Person(s) Responsible for Corrective Action**	**Data Quality Indicator (DQI)**	**Measurement Performance Criteria**
Field Rinsate Blanks	One per equipment batch	Per QAPP, < LOQ	The results will be considered by the data reviewer/user	Laboratory and Data Reviewer	Accuracy	< LOQ
Field Duplicate Samples	One per 20 field samples	Per QAPP, %RPD < 35%	The results will be considered by the data reviewer/user	Data reviewer/user	Precision	Per QAPP, %RPD < 35%
Demonstration of capability	Prior to using any test method and at any time there is a significant change in instrument type, personnel, test method, or sample matrix.	Per DoD QSM ver. 4.2	Re-run demonstration for analyses that did not meet the criteria	Laboratory Analysts	Precision and Accuracy	Per DoD QSM ver. 4.2

QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4) -- QC Samples Table (Continued)

QAPP Worksheet #28-2
(UFP-QAPP Manual Section 3.4)

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Instrument detection limit study	At initial set-up and after significant change in instrument type, personnel, test method, or sample matrix.	Per DoD QSM 4.2, IDLs ≤ LOD	NA	Laboratory Analysts	Accuracy	IDLs ≤ LOD
Linear dynamic range or high-level check standard	Every 6 months.	Per DoD QSM 4.2, within ±10% of true value	NA	Laboratory Analysts	Accuracy	Within ±10% of true value
ICAL	Daily ICAL prior to sample analysis. Minimum one high standard and a calibration blank	Per DoD QSM ver.4.2, r ≥ 0.995	Correct problem, then repeat ICAL	Laboratory Analyst	Accuracy	r ≥ 0.995
Second source calibration verification (ICV)	Immediately following ICAL	Per DoD QSM ver. 4.2, value of second source for all analyte(s) within ± 10% of true value	Correct problem and verify second source standard. Rerun ICV. If that fails, correct problem and repeat ICAL.	Laboratory Analyst	Accuracy	Value of second source for all analyte(s) within ± 10% of true value.
CCV	Prior to analysis, after every 10 samples, and at the end of the analyses sequence	Per DoD QSM ver. 4.2, within ±10% of true value	Correct problem, rerun CCV. If that fails repeat ICAL. Reanalyze all samples since last successful calibration	Laboratory Analyst	Accuracy	Within ±10% of true value
Low-level calibration check standard	Daily, after one-point ICAL	Per DoD QSM 4.2, within ± 20% of true value	Correct problem, then reanalyze	Laboratory Analyst	Accuracy	Within ± 20% of true value
Method Blanks	One per preparatory batch	Per DoD QSM ver. 4.2, no analytes detected >1/2 RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). For common laboratory contaminants , no analytes detected >RL	Correct the problem than see the criteria in DoD QSM ver. 4.2 Box D-1. If required reprep and reanalyze method blank and all samples processed since the contaminated blank	Laboratory Analyst	Accuracy/ Sensitivity	No analytes detected >1/2 RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). Blank result must not affect the sample results. For common lab contaminants, no analytes detected >RL.

QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4) -- QC Samples Table (Continued)

QAPP Worksheet #28-2
(UFP-QAPP Manual Section 3.4)

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Calibration blank	Before beginning a sample run, after every 10 samples, and at end of the analysis sequence.	Per DoD QSM ver. 4.2, no analytes detected > LOD.	Correct problem, re-prep and reanalyze calibration blank. All samples following the last acceptable calibration blank must be reanalyzed.	Laboratory Analyst	Accuracy	No analytes detected > LOD.
ICS	At the beginning of an analytical run.	Per DoD QSM ver. 4.2, ICS-A: Absolute value of concentration for all non-spiked analytes < LOD (unless they are a verified trace impurity from one of the spiked analytes); ICS-AB: within ± 20% of the true value.	Terminate analyses; locate and correct problem; reanalyze ICS, reanalyze all samples	Laboratory Analyst	Accuracy	ICS-A: Absolute value of concentration for all non-spiked analytes < LOD (unless they are a verified trace impurity from one of the spiked analytes); ICS-AB: within ± 20% of the true value.
LCS containing all analytes to be reported	One per preparatory batch.	Per DoD QSM ver. 4.2., QC acceptance criteria specified by DoD, if available; see DoD QSM ver. 4.2 Box D-3 and Appendix G.	Correct problem, reprep and reanalyze LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available	Laboratory Analyst	Accuracy	QC acceptance criteria specified by DoD QMS ver. 4.2
MS	One per preparatory batch per matrix	Per DoD QSM 4.2, for matrix evaluation, use QC acceptance criteria specified by DoD for LCS.	If the matrix spike falls outside of DoD criteria, additional quality control tests are required to evaluate matrix effects.	Laboratory Analyst	Accuracy	For matrix evaluation, use QC acceptance criteria specified by DoD for LCS.

QAPP Worksheet #28 (UFP-QAPP Manual Section 3.4) -- QC Samples Table (Continued)

QAPP Worksheet #28-2
(UFP-QAPP Manual Section 3.4)

QC Sample:	Frequency/Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MSD or sample duplicate	One per preparatory batch per matrix	Per DoD QSM ver. 4.2, for matrix evaluation use QC acceptance criteria specified by DoD for LCS. MSD or sample duplicate: RPD ≤ 20% (between MS and MSD or sample and sample duplicate).	Laboratory to contact Project Manager as to additional measures to be taken.	Laboratory Analyst	Precision	MSD: For matrix evaluation use QC acceptance criteria specified by DoD for LCS. MSD or sample duplicate: RPD ≤ 20% (between MS and MSD or sample and sample duplicate).
Dilution test	One per preparatory batch.	Per DoD QSM Ver. 4.2, five-fold dilution must agree within ± 10% of original measurement.	Perform post-digestion spike addition	Laboratory Analyst	Accuracy	Five-fold dilution must agree within ± 10% of the original measurement.
Post-Digestion spike addition	When dilution test fails or analyte concentration in all samples < 50 X LOD	Per DoD QSM ver. 4.2, %R within 75-125%	Run all associated samples in the preparatory batch by method of standard additions or see flagging criteria.	Laboratory Analyst	Accuracy	%R within 75-125%

QAPP Worksheet #29 (UFP-QAPP Manual Section 3.5.1) -- Project Documents and Records Table

Sample Collection Documents and Records	On-Site Analysis Documents and Records	Off-Site Analysis Documents and Records	Data Assessment Documents and Records
Field notes and or data sheets	Sample collection and custody records	Copies of field notes and COC records will be made and stored in the project files	Quality Control Summary Report
Air bills	Air bills	Copies of Air Bills will be kept in project files	Project Records
Analytical and Testing Sample Data Packages	Custody records	Copies of all analytical data deliverables ,i nstrument calibration records, laboratory raw data	QA review sheet
Data Validation Reports	Custody records	Stored in project files	QA review sheet
Draft Final Summary Report		Stored in the project files	QA review sheet

A description of the data management process is given below.

QAPP Worksheet #29 (UFP-QAPP Manual Section 3.5.1) -- Project Documents and Records Table (Continued)

Data Management

This section describes the project data management process, tracing the path of the data from their generation to their final use or storage. All project data and information must be documented in a format useable to the project personnel. All project files will be maintained by Weston for a minimum of ten years after the end of the project. The laboratories will keep sample aliquots for three months after submission of the raw data package, and will maintain the data results for a minimum of one year after submission of the raw data package.

Project Document Control System

Project documents will be controlled by the ARCADIS/Pirnie MMRP Technical Manager who will maintain and distribute the hardcopies and electronic copies of the project documents and including any amendments. Electronic copies of project information will be maintained in the project directory on the ARCADIS/Pirnie server, which is backed up at least once per day.

Data Recording

Data for this project will be collected by handwritten entries and will be recorded onto field logbooks or forms.

Types of Project Documentation and Records

1. Sample collection and field measurement records include, but are not limited to:
   a. Field data collection or sampling data sheets or field notes
   b. COC records
   c. Air bills
   d. Corrective action reports and results
   e. Documentation of field modifications
2. Analytical Records including items such as:
   a. COC records
   b. Sample receipt records
   c. Records of sample preparation and analysis
   d. Instrument calibration records
   e. Raw data files
   f. Electronic Data Deliverables (see http://www.epa.gov/region02/superfund/medd.htm for an description of the USEPA Region 2 Electronic Deliverable which subcontract laboratories should provide)
   g. Analytical results and supporting data

QAPP Worksheet #29 (UFP-QAPP Manual Section 3.5.1) -- Project Documents and Records Table (Continued)

   h. Sample Data Packages
3. Project Data Assessment Records such as data validation reports

Data Quality Assurance Checks
ARCADIS/Pirnie will monitor the progress of sample collection to verify that samples are collected as planned. The progress of sample collection and processing will be monitored through documentation of the samples collected each day. The contracted laboratory has a formal in-house QA Plan to which it will adhere. Data generation processes will be reviewed and, if necessary, modified to meet project objectives. A formalized data generation procedure will be utilized.

Laboratory Data Transmittal
Laboratory data are managed by the laboratory's LIMS system, beginning with sample check-in on the sample-receiving data terminal. Full laboratory data reports will be delivered to ARCADIS/Pirnie within 21 days of the laboratory's receipt of the each sample delivery group, and will include electronic data deliverables (EDDs).

Data Storage and Retrieval
Paper copies of the forms and electronic copies of files will be regularly transmitted regularly to the ARCADIS/Pirnie MMRP Technical Manager. The completed forms and notebooks will be stored in the custody of the Technical Manager for the duration of the project. The full laboratory data reports submitted to ARCADIS/Pirnie will be stored in the custody of the Senior Chemist. The Laboratory will maintain copies of documents and magnetic tape backups of all data associated with the analyses of samples. Raw data and electronic media of all field samples, including QC samples and blanks will be archived from the date of generation and will be kept by the laboratory per the requirements of the subcontract. The laboratory shall archive, electronically, the sample analyses and submit the electronic data files along with the data deliverable package. A complete set of information including field notes, raw data packages, and data validation reports, will be provided to WESTON once the RI has been finalized.

QAPP Worksheet #30 (UFP-QAPP Manual Section 3.5.2.3) -- Analytical Services Table

Matrix	**Analytical Group**	**Concentration Level**	**Sample Location/ID Numbers**	**Analytical SOP**	**Data Package Turnaround Time**	**Laboratory Organization (Name and Address, Contact Person and Telephone Number)**	**Backup Laboratory Organization (Name and Address, Contact Person and Telephone Number)[2]**
Soil	Explosives	Low	See Worksheet 18	DV-LC-002 DV-OP-0018, (SW846-8330B)	21 days	Test America 4955 Yarrow Street Arvada, CO 80002 Phone: 303-736-0100 Contact: M. Elaine Walker Project Manager Phone: 303.736.0156	A backup lab has not been assigned at this time.
	Metals			DV-MT-0019 (SW846-6010B)			

1. The assigned laboratory will be responsible for properly disposing of any sample retains in an environmentally responsible manner.
2. A backup or alternate subcontractor laboratory may be selected at a future date pending procurement by ARCADIS/Pirnie.

QAPP Worksheet #31 (UFP-QAPP Manual Section 4.1.1) -- Planned Project Assessments Table

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment	Person(s) Responsible for Responding to Assessment Findings	Person(s) Responsible for Identifying and Implementing Corrective Actions (CA)	Person(s) Responsible for Monitoring Effectiveness of CA
Review of QAPP, SOPs and DCQR with field staff	Prior to sampling start up	Internal	ARCADIS/ Pirnie	Field Team Leader ARCADIS/Pirnie	Lisa Szegedi MMRP Technical Manager ARCADIS/Pirnie	Field Team Leader ARCADIS/Pirnie	Lisa Szegedi MMRP Technical Manager ARCADIS/Pirnie
Daily logbook and field forms	Daily	Internal	ARCADIS/ Pirnie	Field Team Leader ARCADIS/Pirnie	Lisa Szegedi MMRP Technical Manager ARCADIS/Pirnie	Field Team Leader ARCADIS/Pirnie	Lisa Szegedi MMRP Technical Manager ARCADIS/Pirnie
Laboratory assessment for appropriate certifications and capacity and QAPP review with laboratory staff	Prior to sampling start up	Internal	ARCADIS/ Pirnie	Jim McCann Senior Chemist ARCADIS/Pirnie	M. Elaine Walker Project Manager Test America	M. Elaine Walker Project Manager Test America	Jim McCann Senior Chemist ARCADIS/Pirnie
Daily tailgate safety meeting	Daily	Internal	ARCADIS/ Pirnie	Field Team Leader ARCADIS/Pirnie	Lisa Szegedi MMRP Technical Manager ARCADIS/Pirnie	Technical Team Leader ARCADIS/Pirnie	Lisa Szegedi MMRP Technical Manager ARCADIS/Pirnie
Field sampling and COC review against QAPP requirements	Daily	Internal	ARCADIS/ Pirnie	Jim McCann Senior Chemist ARCADIS/Pirnie	Lisa Szegedi MMRP Technical Manager ARCADIS/Pirnie	Technical Team Leader ARCADIS/Pirnie	Jim McCann Senior Chemist ARCADIS/Pirnie
Laboratory report deliverables and analytical results review against QAPP requirements	Per sample delivery group	Internal	ARCADIS/ Pirnie	Jim McCann Senior Chemist ARCADIS/Pirnie	M. Elaine Walker Project Manager Test America	M. Elaine Walker Project Manager Test America	Jim McCann Senior Chemist ARCADIS/Pirnie
Validation	Per sample delivery group	Internal	ARCADIS/ Pirnie	Data Validator assigned by ARCADIS/Pirnie	M. Elaine Walker Project Manager Test America	M. Elaine Walker Project Manager Test America	Jim McCann Senior Chemist ARCADIS/Pirnie

QAPP Worksheet #32 (UFP-QAPP Manual Section 4.1.2) -- Assessment Findings and Corrective Action Responses

Assessment Type	**Nature of Deficiencies Documentation**	**Individual(s) Notified of Findings** (name, title, organization)	**Timeframe of Notification**	**Nature of Corrective Action Response Documentation**	**Individual(s) Receiving Corrective Action Response** (name, title, organization)	**Timeframe for Response**
Review of QAPP with field staff	Contained within daily QC Report	Field Team Leader, ARCADIS/Pirnie	Within 24 hours	Daily QC report will be amended with corrective action	Jim McCann Senior Chemist ARCADIS/Pirnie	Within 24 hours
Laboratory assessment for appropriate certifications and capacity and QAPP review with laboratory staff	Receipt of copies of certifications. Email traffic concerning lab capacity prior to sampling start-up. QAPP sign-off sheet received from laboratory.	Lisa Szegedi MMRP Technical Manager ARCADIS/Pirnie	Immediate	Response to email	Lisa Szegedi MMRP Technical Manager ARCADIS/Pirnie Jim McCann Senior Chemist ARCADIS/Pirnie	Within 48 hours after notification
Daily Safety Meeting	Verbal debriefing and daily sign off log. If a safety violation occurs, an incident report is completed.	Field Team Leader, ARCADIS/Pirnie	Within 24 hours	Included as part of the Incident Report	Lisa Szegedi MMRP Technical Manager ARCADIS/Pirnie	Within 24 hours
Daily Field Reporting and Field Forms	Contained within written report	Field Team Leader, ARCADIS/Pirnie	Within 24 hours	Daily QC report will be amended with corrective action	Lisa Szegedi MMRP Technical Manager ARCADIS/Pirnie	Within 24 hours
Technical System Field Audits	See report format in SOP PTA-08.	Field Team Leader, ARCADIS/Pirnie	Within a week	Documented in TSA Report	Lisa Szegedi MMRP Technical Manager ARCADIS/Pirnie Jim McCann Senior Chemist ARCADIS/Pirnie Laura Pastor, Project Manager, WESTON	Within week

QAPP Worksheet #32 (UFP-QAPP Manual Section 4.1.2) -- Assessment Findings and Corrective Action Responses (Continued)

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (name, title, organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (name, title, organization)	Timeframe for Response
Field sampling and COC review against QAPP requirements	Communication in the form of an email	Field Team Leader, ARCADIS/Pirnie Laura Pastor, Project Manager, WESTON	Within 24 hours after sampling	Response to email	Lisa Szegedi MMRP Technical Manager ARCADIS/Pirnie Jim McCann Senior Chemist ARCADIS/Pirnie Laura Pastor, Project Manager, WESTON	Within 48 hours after notification
Laboratory report deliverables and analytical results reviewed against QAPP requirements	Communication in the form of an email	Lisa Szegedi MMRP Technical Manager ARCADIS/Pirnie Jim McCann Senior Chemist ARCADIS/Pirnie Laura Pastor, Project Manager, WESTON	Within 24 hours after completion of analyses	If required laboratory reports will be amended and corrections noted in the case narrative	Lisa Szegedi MMRP Technical Manager ARCADIS/Pirnie Jim McCann Senior Chemist ARCADIS/Pirnie Laura Pastor, Project Manager, WESTON	Within 72 hours after notification
Data verification	Communication in the form of an email requesting additional laboratory forms, back up data that may be missing and/or clarification of the analytical report	QA Manager, Test America	Within 24 hours after finding deficiency	If required laboratory reports will be amended and corrections noted in the case narrative and contained with the validation report	Jim McCann Senior Chemist ARCADIS/Pirnie	Up to 7 days

QAPP Worksheet #32 (UFP-QAPP Manual Section 4.1.2) -- Assessment Findings and Corrective Action Responses (Continued)

Assessment Type	**Nature of Deficiencies Documentation**	**Individual(s) Notified of Findings** (name, title, organization)	**Timeframe of Notification**	**Nature of Corrective Action Response Documentation**	**Individual(s) Receiving Corrective Action Response** (name, title, organization)	**Timeframe for Response**
Validation	Communication in the form of an email requesting additional laboratory forms, back up data that may be missing and/or clarification of the analytical report	M. Elaine Walker Project Manager Test America	Within 24 hours after finding deficiency	If required laboratory reports will be amended and corrections noted in the case narrative and contained with the validation report	Jim McCann Senior Chemist ARCADIS/Pirnie Data Validator, assigned by ARCADIS/Pirnie	Up to 7 days

QAPP Worksheet #33 (UFP QAPP Manual Section 4.2) -- QA Management Reports Table

Type of Report	Frequency (daily, weekly monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (Title and Organizational Affiliation)	Report Recipient(s) (Title and Organizational Affiliation)
Validation Report	For each round of sampling	30 days after receipt of final analytical data from laboratory	Data validator, assigned by ARCADIS/Pirnie	Lisa Szegedi MMRP Technical Manager ARCADIS/Pirnie Jim McCann Senior Chemist ARCADIS/Pirnie Laura Pastor, Project Manager, WESTON
Corrective Action Reports	When corrective action is required	When corrective action is implemented	Lisa Szegedi MMRP Technical Manager ARCADIS/Pirnie or designee	Project Team and WESTON Project Manager
Quality Control Summary Report	After sampling is completed	30 days after completion of data validation report	Lisa Szegedi MMRP Technical Manager ARCADIS/Pirnie Jim McCann Senior Chemist ARCADIS/Pirnie	Nancy Flaherty, Project Manager, USACE JB Smith. MMRP Technical Project Manager, PTA Laura Pastor, Project Manager, WESTON Lisa Szegedi MMRP Technical Manager ARCADIS/Pirnie Jim McCann Senior Chemist ARCADIS/Pirnie
Final Report	Completed as Draft, Draft Final, and Final RI Report	120 days after completion of sampling	Lisa Szegedi MMRP Technical Manager ARCADIS/Pirnie	Laura Pastor, Project Manager. WESTON

QAPP Worksheet #34 (UFP-QAPP Manual Section 5.2.1) -- Verification (Step I) Process Table

Verification Input	Description	Internal / External	Responsible for Verification (name, organization)
Field Staff Training	Personnel assigned to the project will be qualified to perform the tasks to which they are assigned. Field personnel will have basic field investigation knowledge for multimedia sampling, including, but not limited to, basic sampling techniques, field testing methodology, task-specific sampling methods, decontamination of field sampling equipment, maintenance of environmental paperwork, and how to avoid cross contamination.	Internal	Lisa Szegedi ARCADIS/Pirnie
QAPP	A copy of the reviewed and approved QAPP will be distributed to the laboratory and be available for review for all ARCADIS/Pirnie personnel involved in this project. It is the responsibility of the ARCADIS/Pirnie Senior Chemist to ensure delivery of a copy of QAPP to the laboratory. The laboratory QA manager is responsible for review of QAPP with laboratory staff. The ARCADIS/Pirnie MMRP Technical Manager will be responsible for ensuring that all staff has reviewed the final QAPP.	Internal / External	Jim McCann ARCADIS/Pirnie M. Elaine Walker Test America
Laboratory Certifications	Test America has current DoD ELAP certifications.	Internal / External	M. Elaine Walker Test America Jim McCann ARCADIS/Pirnie
Field Logbooks	The sample number will be traceable to the site, location, and depth (where applicable). The sample identification and description will be recorded by the field team leader or representative in the sample collection logs.	Internal	Field Team Leader and SMO ARCADIS/Pirnie
Sample Location Verification	The field team leader will verify that the sample technicians have collected the samples from the proper locations and depths as described in Worksheet 18.	Internal	Field Team Leader ARCADIS/Pirnie
Chain-of-Custody – Field Level	The SMO will generate COCs prior to field sampling in accordance with the sample matrices and analytical tests required as described in Worksheet 19. Upon completion of the COCs, and prior to placement in the cooler, the field team leader will review the COCs against the field logbooks and Worksheets 18, 19 to ensure that the samples, sample volumes, and sample nomenclature match, and the required analytical tests have been requested. A review of the COC form for completeness will also be conducted.	Internal	Field Team Leader ARCADIS/Pirnie

QAPP Worksheet #34 (UFP-QAPP Manual Section 5.2.1) -- Verification (Step I) Process Table (Continued)

Verification Input	**Description**	**Internal / External**	**Responsible for Verification** (name, organization)
COC – Analytical Laboratory	All samples to be analyzed by the laboratory will be shipped via overnight delivery or will be sent via the laboratory courier service. Upon receipt, a laboratory representative will check the integrity of the custody seals and will sign and date the COC to acknowledge sample receipt. The laboratory is responsible for verifying that the COC and containers agree and that the sample containers are received in good condition. The sample receipt form will be sent to the Senior Chemist prior to preparation for analysis. The Laboratory Information Management System will provide evidence of sample custody from receipt by the laboratory until appropriate disposal.	Internal / External	Test America Sample Management Technicians
Laboratory Corrective Action and Report Procedure	Routine corrective actions apply to all analytical quality control parameters and analytical system specification as defined in the laboratory SOPs. Bench analysts have full responsibility and authority for performing routine corrective action, which are documented as part of the analytical record. Defective processes, holding time violations, systematic errors and quality defects that occur are to be reported by the bench chemist to the laboratory supervisor and a non-conformance record initiated. The Laboratory Project Manager will then notify the ARCADIS/Pirnie Senior Chemist and Project Manager. All notifications must be made in a timely manner. The non-conformance record should become part of the analytical record.	Internal / External	Test America Project Manager Jim McCann ARCADIS/Pirnie
Analytical Data Package - Laboratory	All data produced by the laboratory will be required to undergo several levels of review, which will include two levels of management review at the laboratory. The laboratory will review the data packages internally for completeness and verify that all of the required forms and raw data are included for each data package type. The Test America, QA Officer for additional audits, may also select to review randomly chosen data packages.	Internal	Test America Project Manager and QA Officer
Analytical Data Package/Laboratory Quality Control	The Senior Chemist will verify that data have been received for all samples sent to the laboratory. An evaluation of this data will be performed to determine whether the laboratory met the QC requirements for the analytical as stated in the analytical methods and laboratory SOPs. Refer to Worksheets 19 and 28.	External	Jim McCann ARCADIS/Pirnie
Laboratory EDD	The laboratory will provide EDDs in USEPA Region 2 format. The Senior Chemist or designee will review these files for correctness and completeness.	External	Jim McCann ARCADIS/Pirnie

QAPP Worksheet #35 (UFP-QAPP Manual Section 5.2.2) -- Validation (Steps IIa and IIb) Process Table

Step IIa / IIb	Validation Input	Description	Responsible for Validation (name, organization)
IIa	Field Sampling	Ensure that all sampling protocols in the SOPs were followed	Field Team Leader ARCADIS/Pirnie
IIa	Analytical SOPs	Ensure that all laboratory analytical SOPs were followed	Test America Denver Project Manager
IIa	Documentation of Method QC Results	Establish that all analytical method QC were analyzed for, and are in control as listed in the analytical SOPS. If method QC are not in control, the laboratory will contact ARCADIS/Pirnie of the non-conformant situation prior to report generation for guidance.	ARCADIS/Pirnie assigned Data Validator and Senior Chemist
IIa/IIb	Documentation of QAPP QC Samples Results	Establish that all QAPP required QC samples were collected. Establish that the collected QC samples met the required limits as established in the QAPP.	ARCADIS/Pirnie Field Team Leader or designee and the Senior Chemist
IIa/IIb	Documentation of Analytical Reports for Completeness	Ensure based on field documentation that the appropriate analytical samples have been collected, appropriate sample identifications have been used, and the correct analytical methods have been applied. Review the analytical reports to establish that all required forms, case narratives, samples, COCs, logbooks, and raw data have been included.	ARCADIS/Pirnie Field Team Leader or designee and the Senior Chemist
IIb	Project Quantitation Limits	Review laboratory analytical results to ensure they meet the project quantitation limits specified in QAPP Worksheet 15.	ARCADIS/Pirnie assigned Data Validator and Senior Chemist
IIa/IIb	Data Verification	Perform data verification on all samples to ensure that sample analysis was performed as stated in the QAPP and per the laboratory SOPs.	ARCADIS/Pirnie assigned Data Validator and Senior Chemist
IIa/IIb	Data Validation	Perform data validation on all samples as per QAPP Worksheets 12, 15, 19, and 28 and USEPA SW-846 methodology. The data validator will receive all laboratory packages and analytical results electronically. Additionally, the validator will be required to submit final validation reports via pdf format and must provide an annotated laboratory analytical result EDD with applicable data validation qualifiers and/or result value modifications.	ARCADIS/Pirnie assigned Data Validator and Senior Chemist

QAPP Worksheet #36 (UFP-QAPP Manual Section 5.2.2) -- Validation (Steps IIa and IIb) Summary Table

Step IIa / IIb	Matrix	Analytical Group	Concentration Level	Validation Criteria	Data Validator (title and organizational
IIa/IIb	Soil	Chemical parameters including explosives and metals	Low	USEPA Validation Criteria including USEPA's National Functional Guidelines, applicable Region 2 guidelines and DoD QSM Criteria.	ARCADIS/Pirnie Assigned Data Validators

Commercial Subcontractor Laboratory Data

Chemical data generated by a commercial subcontractor laboratory will be validated by ARCADIS/Pirnie or a qualified ARCADIS/Pirnie subcontractor. Parameters will be validated in accordance with the QC requirements of this QAPP, USEPA's National Functional Guidelines, and applicable USEPA Region 2 guidelines. The validator will also consider DoD QSM requirements.

The validator will conduct a 100% validation of the first Sample Data Group received for each analytical parameter from a laboratory. This full validation will include a review the raw data and logbook sheets and recalculation of at least 10 percent of the sample and QC sample results. If the full validation indicates that the laboratory is producing acceptable data, the validation may be scaled back and subsequent data packages will have a less rigorous review. The streamlined validation will consist of validation of the data based on the QC summaries submitted by the laboratory and will not include any checking of the raw data or a review of the logbook sheets. If the laboratory QC on the report forms are within limits no further review will be conducted; however, if there are QA/QC aspects not meeting criteria, the validator may then review some or all of the full data package to determine the cause or data quality impact of the non-compliance. Furthermore, if laboratory performance issues are identified during the streamlined validation, a full validation will be re-instituted until the laboratory performance issues are corrected.

Once data validation is completed, a data validation report will be generated. The report will contain information regarding the parameters that are qualified, the reason for the qualification, and the direction of the bias (only for parameters qualified as estimated), when possible. Based upon the QA review of the analytical data, specific codes (data qualifiers or 'flags') will be placed next to results to provide an indication of the quantitative and qualitative reliability of the results. The data qualifier codes in the National Function Guidelines will be used for this project. Qualifiers assigned by laboratories will be defined by each laboratory in their data package and will be superseded by the data validator's qualifiers.

QAPP Worksheet #37 (UFP-QAPP Manual Section 5.2.3) -- Usability Assessment

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used: The data validator assigned by ARCADIS/Pirnie will review the chemical data in accordance with the protocols outlined on Worksheet 35. Data validation alone does not ensure usability of the data. Other factors will be considered, including comparison of actual reporting or LOQs limits achieved by the laboratory on the samples collected to the project action or screening levels. Please refer to Worksheet 11, Project Quality Objectives, for a description of how the analytical results will be used to evaluate the project objectives. The DQIs such as precision, accuracy, completeness, representativeness, and comparability (Refer to Worksheets 12 and 28), aid in the evaluation process of the data usability and they are further discussed in Worksheet 12.
Describe the evaluative procedures used to assess overall measurement error associated with the project: As part of the data validation process, the validator identifies any qualifications, the bias, if known, of the data, applies qualifiers and comments on the usability of the data. Once the validation package is received from the validator the Senior Chemist or a designee review the data validation report. Any QA/QC problems with the validation will be discussed with the validator and laboratories and, if necessary, the validation reports will be revised.
Identify the personnel responsible for performing the usability assessment: The usability of the data is the responsibility of the project team including WESTON's Project Manager and QA/QC Manager and ARCADIS/Pirnie's MMRP Technical Manager and Senior Chemist. The data users performing the data evaluation will participate in a usability assessment to determine if the data are sufficient to meet the DQOs (see Worksheet 11) and will make recommendations if additional data are required to fill any existing data gaps.

REFERENCES:

1. DoD, 2003. DoD Quality Systems Manual for Environmental Laboratories. Version 4.1. April 2009.

2. USEPA, 2001. Requirements for Quality Assurance Project Plans. USEPA QA/R-5. March 2001.

3. USEPA, 2002. Guidance for Quality Assurance Project Plans. USEPA QA/G-5. December 2002.

4. USEPA, 2005. Intergovernmental Data Quality Task Force, Uniform Federal Policy For Quality Assurance Project Plans, Part 1: UFP-QAPP Manual, EPA-505-B-04-900A, Final Version 1, March 2005

5. USEPA, 2005. Intergovernmental Data Quality Task Force, Uniform Federal Policy For Quality Assurance Project Plans, Part 2A: UFP-QAPP Workbook, EPA-505-B-04-900C, Final Version 1, March 2005.

6. USEPA, 2005. Intergovernmental Data Quality Task Force, Uniform Federal Policy For Quality Assurance Project Plans, Part 2B: Quality Assurance/Quality Control Compendium: Minimum QA/QC Activities, EPA-505-B-04-900B, Final Version 1, March 2005.

7. USEPA, 2006. Guidance for the Data Quality Objectives Process, QA/G-4. February 2006.

8. USEPA, 2008. Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, OSWER 9240.1-48, EPA-540-R-08-01, June 2008.

9. USEPA, 2008. SW-846, "Test Methods for Evaluating Solid Waste, "including Promulgated Final Update IV. January 2008.

10. USEPA, 2010. Electronic Data EPA Region 2, Version 1.4, February 2010. see http://www.epa.gov/region02/superfund/medd.htm

11. USEPA 2010.CLP National Functional Guidelines for Inorganic Data Review, OSWER 9240.1-51, USEPA 540-R-10-011, January 2010.

Attachment 1

MC Selection Rationale

As shown in Table 2, attached, the following MC are potentially associated with munitions known to have been used and/or found at PTA. For numerous reasons, not all potential MC will be analyzed for during the RI. The rationale for the MC list selection is given in Table 1, below. For informational purposes, the background concentration for each metal, as given in the *Picatinny Arsenal Facility-Wide Background Investigation, Picatinny Arsenal Installation Restoration Program*, May 2002, is listed. Also given are the screening levels that will be used during the RI; the actions levels will be determined based on the results of the Risk Assessment. Where applicable, these screening levels were used to guide the MC parameter selection.

Table 1
Potential MC and Rationale for Exclusion/Inclusion in RI Sampling

Contaminant[1]	Rationale	Background Concentration (mg/kg)[2]	NJDEP SRS[3] (mg/kg)	Regional Screening Level[4] (mg/kg)
Contaminants to be Analyzed For				
2,4-DNT	Associated with munitions used at PTA and degradation product of TNT	NA	0.7	1.6
2,6-DNT	Associated with munitions used at PTA and degradation product of TNT	NA	0.7	61
2-AM-4,6-DNT	Degradation product of TNT	NA	None	150
4-AM-2,6-DNT	Degradation product of TNT	NA	None	150
TNT	Associated with munitions used at PTA; also stored in bulk at the installation.	NA	None	19
HMX	Associated with munitions used at PTA	NA	None	3,800
Nitroglycerin	Associated with munitions used at PTA	NA	None	6.1
RDX	Associated with munitions used at PTA	NA	None	5.5
Tetryl	Associated with munitions used at PTA	NA	None	240
2,4,6-TNP	Associated with munitions used at PTA	NA	None	None
PETN	Associated with munitions used at PTA	NA	None	None
Aluminum	Mainly associated with casings	20,000	78,000	77,000
Antimony	Mainly associated with small arms ammunition and used as indicator for antimony sulfide	1	31	31
Barium	Used as indicator for barium nitrate	160	16,000	15,000
Cadmium	Mainly used as plating component for certain bombs	0.7	78	71
Copper	Associated with munitions used at PTA	35	3,100	3,100
Lead	Associated with munitions used at PTA and used as indicator for lead azide, oxide, styphnate, sulfocyanate, and	75	400	400

Contaminant[1]	Rationale	Background Concentration (mg/kg)[2]	NJDEP SRS[3] (mg/kg)	Regional Screening Level[4] (mg/kg)
	thiocyanate			
Manganese	Present in certain mortars and may be present in steel casings	1,250	11,000	1,800
Strontium	Analyzed in place of strontium nitrate	50	None	47,000
Zinc	Associated with munitions used at PTA	77	23,000	23,000
Contaminants That Will Not Be Analyzed For				
Ammonium Nitrate	Only associated with 1 munition; 3-in HE projectile. Does not have a reliable analytical method and does not have an NJDEP SRS or an EPA RSL	NA	None	None
Antimony Sulfide	Main source is small arms ammunition; may also be found in pyrotechnics and in limited quantities in some fuzes. Does not have a reliable analytical method and does not have an NJDEP SRS or an EPA RSL. In accordance with N.J.A.C. 7:26E-2.1(9), which allows analyses for indicator parameters, antimony will be analyzed for.	NA	None	None
Barium Nitrate	Main source is flares; also found in limited quantities in some fuzes. Does not have a reliable analytical method and does not have an NJDEP SRS or an EPA RSL. In accordance with N.J.A.C. 7:26E-2.1(9), which allows analyses for indicator parameters, barium will be analyzed for.	NA	None	None
Calcium Silicate	Only found in fuzes; mass minimal. Does not have a reliable analytical method and does not have an NJDEP SRS or an EPA RSL. In addition, according to OSHA (http://www.osha.gov/SLTC/healthguidelines/calciumsilicate/recognition.html) calcium silicate is considered non-toxic.	NA	None	None
Dibutylphthalate	Only associated with smokeless powder; therefore, mass minimal.	NA	6,100	6,100
Dechlorane (aka Mirex)	Minimal amount found in illumination powder; only associated with flares.	NA	None	0.027
Diphenyl amine	Only associated with smokeless powder; therefore, mass minimal.	NA	None	1,500
Iron	High iron throughout area due to geologic formation. During time critical removal action at Tilcon Quarry and Engineering Evaluation/Cost Analysis on PTA, geophysical method had to be modified due to high iron	26,500	None	55,000
Lead Azide	Primary explosive; therefore, mass minimal. Does not have a reliable analytical method and does not have an NJDEP SRS or an EPA RSL. In accordance with N.J.A.C. 7:26E-2.1(9), which allows analyses for indicator parameters, lead will be analyzed for.	NA	None	None
Lead Oxide	Does not have a reliable analytical method and does not have an NJDEP SRS or an EPA RSL. In accordance with N.J.A.C. 7:26E-2.1(9), which allows analyses for indicator parameters, lead will be analyzed for.	NA	None	None
Lead Styphnate	Primary explosive; therefore, mass minimal. Does not have a reliable analytical method and does not have an NJDEP SRS or an EPA RSL. In accordance with N.J.A.C. 7:26E-2.1(9), which allows analyses for indicator parameters, lead will be analyzed for.	NA	None	None
Lead Sulfocyanate	Primary explosive; therefore, mass minimal. Does not have a reliable analytical method and does not have an NJDEP SRS or an EPA RSL. In accordance with N.J.A.C. 7:26E-2.1(9), which allows analyses for indicator parameters, lead will be analyzed for.	NA	None	None

Contaminant[1]	Rationale	Background Concentration (mg/kg)[2]	NJDEP SRS[3] (mg/kg)	Regional Screening Level[4] (mg/kg)
Lead Thiocyanate	Primary explosive; therefore, mass minimal. Does not have a reliable analytical method and does not have an NJDEP SRS or an EPA RSL. In accordance with N.J.A.C. 7:26E-2.1(9), which allows analyses for indicator parameters, lead will be analyzed for.	NA	None	None
Magnesium	Mainly associated with illumination powder; minimal amount may also be found in some fuzes and as a filler in certain projectiles. Does not have an NJDEP SRS or an EPA RSL.	2,400	None	None
Nitrocellulose	Toxicity data indicate compound is virtually non-toxic.	NA	None	230,000,000
Potassium Chlorate	Minimal amount found in some fuzes. Does not have a reliable analytical method and does not have an NJDEP SRS or an EPA RSL.	NA	None	None
Potassium Nitrate	Mainly found in illumination powder and in limited quantities in some fuzes. Does not have a reliable analytical method and does not have an NJDEP SRS or an EPA RSL.	NA	None	None
Potassium Perchlorate	Mass minimal. In addition, due to low soil adsorption and high solubility, not likely to be found in soil. Groundwater covered under IRP.	NA	None	55
Red Phosphorous	Does not have a reliable analytical method due to its high reactivity and does not have an NJDEP SRS or an EPA RSL.	NA	None	None
Stearic Acid	A fatty acid used as a coating to prevent oxidation. Naturally found in animal and vegetables fats. Does not have an NJDEP SRS or an EPA RSL.	NA	None	None
Strontium Nitrate	Found in illumination powder; mass minimal. Does not have a reliable analytical method and does not have an NJDEP SRS or an EPA RSL. In accordance with N.J.A.C. 7:26E-2.1(9), which allows analyses for indicator parameters, strontium will be analyzed for.	NA	None	None
Tetracene	Mass minimal. Does not have an NJDEP SRS or an EPA RSL.	NA	None	None
Titanium	Non-toxic and does not have an NJDEP SRS or an EPA RSL.	954	None	None
Triacetin	Also used as a food additive. Does not have an NJDEP SRS or an EPA RSL.	NA	None	None
White Phosphorous	Extremely unstable; ignites spontaneously when exposed to air. Does not have a reliable analytical method due to its high reactivity and does not have an NJDEP SRS or an EPA RSL.	NA	None	2
Zinc Chloride	Does not have a reliable analytical method and does not have an NJDEP SRS or an EPA RSL. In accordance with N.J.A.C. 7:26E-2.1(9), which allows analyses for indicator parameters, zinc will be analyzed for.	NA	None	None
Zirconium	Mass minimal Does not have an NJDEP SRS or an EPA RSL.	11	None	None

Notes:
1. In accordance with N.J.A.C. 7:26E-2.1(18)(4)(c)(1)(i), samples will only be analyzed for those contaminants that may be present in the sample
2. mg/kg = milligrams per kilogram
3. This is the NJDEP Residential Direct Contact Soil Remediation Standard (SRS); this value will be used as a screening level only
4. This is the EPA Resident Soil Regional Screening Level (RSL); this value will be used as a screening level only

Table 2
Summary of Potential MEC and MC at PTA

				EXPLOSIVES, PROPELLANTS, ETC.																																				METALS								
	Item	Nomenclature	Compounds Associated with Munition	2,4,6-Trinitrophenol	Ammonium Nitrate	Antimony Sulfide	Barium Nitrate	Black Powder	Calcium Silicate	Double-Base Propellant	Dibutyl phthalate	Diphenyl amine	Dinitrotoluene	HMX	Illuminant Mix	Lead Azide	Lead Oxide	Lead Styphnate	Lead Sulfocyanate	Lead Thiocyanate	Nitrocellulose	Nitroglycerin	PETN	Photoflash Powder	Potassium Chlorate	Potassium Nitrate	Potassium Perchlorate	RDX	Red Phosphorous	Stearic Acid	Tetracene	Tetryl	Titanium	TNT	Tracer	Triacetin	White Phosphorous	Zinc Chloride	Zirconium	Aluminum	Cadmium	Copper	Iron	Manganese	Lead	Antimony	Zinc	Reference
2.75 in Rocket																																																
	Rocket Motor 2.75-inch	Mk66 Mod 2								x											x	x														x				x		x	x				x	60F-02-2-01-1
3 in Projectile																																																
	Projectile, HE, 3 inch	M42A1	Amatol and Steel		x																													X								X	X					CSOIII
	Projectile, Armor-Piercing Capped, 3 inch	M62A1	Explosive D and Steel	X																																						X	X					CSOIII
	Projectile, Armor-Piercing, 3 inch	M79	Steel																																							X	X					CSOIII
	Projectile, Smoke, 3 inch	M88	Steel and Zinc Chloride																																			x				x	x					CSOIII
3.5 in Rocket																																																
	Rocket HE 3.5-inch HEAT	M28A2																			x	x						x						x						x		x	x					MIDAS
	Rocket, 3.5-inch Practice	M29A2																			x	x																		x		x						MIDAS
4 in Projectile																																																
	4-inch Special Common	Mk16 Mods 1 and 2	Explosive D and Steel	x																																						x	x					OP1664
	4-inch Common	MK 6 Mod 6	Black powder and Steel					x																										x								x	x					OP1664
	4-inch Common	Mk 10 Mods 1, 2, and 3	Black powder and Steel					x																										x								x	x					OP1664
	4-inch H.C.	Mk 15 Mod 1 and 2	Explosive D and Steel	x																																						x	x					OP1664
5 in Projectile																																																
	Projectile, 5 inch	MK 15 MODS 12-14	Black powder and Steel					X																										X								X	X					ORDATA
	Projectile, 5 inch	MK 39 MODS 1-2	Explosive D	X																																												ORDATA
6 in Projectile																																																
	Projectile, HE, 6 inch	MKIIA2	Steel																															X								X	X					CSOIII
	Projectile, Armor-Piercing, 6 inch	MK XXXIII	Explosive D and Steel	X																																						X	X					CSOIII
8 in Projectile																																																
	Projectile, HE, 8 inch	MK 24 MODS 1-5	Explosive D	X																																						x	x					ORDATA
	Projectile, HE, 8 inch	MK1A1																																X								x	x					CSOIII
	Projectile, HE, 8 inch	M106																																X								x	x					CSOIII
	Projectile, HE, 8 inch	M103																																X								x	x					CSOIII
	Projectile, AP, 8 inch	MK VI Mod 3A2, M1888, M1888M1, M1888M11	Explosive D	X																																						x	x					CSOIII
14 in Projectile																																																
	Projectile, HE, 14 inch	MK 8 MODS 3,7, 8, & 11	Explosive D and Steel	X																																						x	x					ORDATA
	Projectile, Target, 14 inch	MK 17 MODS 1-3 MK 18 MOD 1	Steel body																																							X	X					ORDATA
	Projectile, HE, 14 inch	MK 20 MOD 1	Explosive D and Steel	X																																						x	x					ORDATA
	Projectile, AP, 14 inch	Mk8 Mods 3, 7, 8, and 11; Mk 16 Mods 1-11; Mk 20 Mod 1	Explosive D and Steel	x																																						x	x					NAVSEA OP 1664, 1947
20 mm Projectile																																																
	Projectile, HE Incendiary, 20 mm	MK I	Comp A																														X									x	x					CSOIII
	Projectile, AP, 20 mm	M75	Tracer, IMR powder, and steel cartridge case																																	X						x	x					CSOIII
	Projectile, HE, 20 MM	M56 M56A1 M56A2 M56A3 M56A4	Wax																									X												X		x	x					ORDATA
	Projectile, HE, 20 MM	HEI-T	PBXN-5 and Zirconium Pellets											x																									X			x	x					ORDATA
	Projectile, Practice, TP-T, 20mm	PGU-30/B	Tracer																																	X						x	x					ORDATA
37 mm Projectile																																																
	Projectile, Armor-Piercing, 37 mm	M80	Tracer																														X			X						x	x					CSOIII
	Projectile, Armor-Piercing, 37 mm	M51B1	Tracer																														X			X						x	x					CSOIII
	Projectile, Armor-Piercing, 37 mm	M51B2	Tracer																														X			X						x	x					CSOIII
	Projectile, Armor-Piercing Capped, 37 mm	M59	Tracer																														X			X						x	x					CSOIII
	Projectile, Practice, 37, mm	M55A1	Tracer																														X			X						x	x					CSOIII
	Canister, 37 mm	M2	Steel Canister																																							X	X		X			CSOIII
40 mm Projectile																																																
	Projectile, HE, Tracer (S.D, M3), 40 mm	MkII	Tracer and M3 Steel																														X			X						x	x					CSOIII
	Projectile, HE, Tracer (S.D, No. 12), 40 mm	MkII	Tracer and No. 12 Steel																																X	X						X	X					CSOIII
	Projectile, AP, 40 mm	M81A1	Tracer and M3 Steel																																	X						X	X					CSOIII
	Projectile, HE, 40 mm	M381	Comp B, Propelling charge, M9 Percussion Primer, M42 Fuze, Detonator, Lead azide													X												X				X		X						X		x	x		X			TM 43-0001-28

Table 2
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				EXPLOSIVES, PROPELLANTS, ETC.																																		METALS								
	Item	Nomenclature	Compounds Associated with Munition	2,4,6-Trinitrophenol	Ammonium Nitrate	Antimony Sulfide	Barium Nitrate	Black Powder	Calcium Silicate	Double-Base Propellant	Dibutyl phthalate	Diphenyl amine	Dinitrotoluene	HMX	Illuminant Mix	Lead Azide	Lead Oxide	Lead Styphnate	Lead Sulfocyanate	Lead Thiocyanate	Nitrocellulose	Nitroglycerin	PETN	Photoflash Powder	Potassium Chlorate	Potassium Nitrate	Potassium Perchlorate	RDX	Red Phosphorous	Stearic Acid	Tetracene	Tetryl	Titanium	TNT	Tracer	Triacetin	White Phosphorous	Zinc Chloride	Zirconium	Aluminum	Cadmium	Copper	Iron	Manganese	Lead	Antimony	Zinc	Reference
	Projectile, HE, 40 mm	M386	Comp B, Propelling charge, M9 Percussion Primer, M42 Fuze, Detonator, Lead azide													X												X				X		X						X		x	x		X			TM 43-0001-28
	Projectile, HE, 40 mm	M406	Comp B, Propelling charge, M9 Percussion Primer, M42 Fuze, Detonator, Lead azide													X												X						X						X		x	x		X			TM 43-0001-28
	Projectile, Practice, 40 mm	M382 M407A1																									X														x	x					ORDATA
57 mm																																																
	Projectile, AP, 57 mm	M70	Tracer and Steel																																X							X	X					CSOIII
	Projectile, AP Capped, 57 mm	M86	Explosive D and Steel	X																												X										X	X					CSOIII
	Projectile, Target Practice, 57 mm	M306A1	Black Powder and Forged Steel					X																																		X	X					TM 43-0001-28
	Projectile, HE, 57 mm	M306A1	Comp B and Forged Steel																									X						X								X	X					TM 43-0001-28
	Projectile, HE, 57 mm	M306	Forged Steel																															X								X	X					TM 43-0001-28
	Projectile, HEAT, 57 mm	M307A1 M307	Comp B or 50-50 Pentolite Booster and Forged Steel																													X		X								X	X					TM 43-0001-28
	Projectile, Smoke, WP, 57 mm	M308A1 M308	Burster M21 and Forged Steel																													X					X					X	X					TM 43-0001-28
60 mm Mortar																																																
	Mortar, practice, 60mm	M50A2						X																																		x	x					CSOIII
	Mortar, HE, 60mm	M49A2	TNT																															x								x	x					CSOIII
66 mm Mortar																																																
	Rocket, HE 66mm AT	M72												x							x	x													x						x		x	x					MIDAS
	Rocket, HE 66mm AT	M72A2																			x	x													x						x		x	x					MIDAS
90 mm Projectile																																																
	Projectile, Blank, 90 mm	M394	Brass, Black Powder, and Potassium Nitrate					X																		X															X		X	x				X	TM 43-0001-28
	Projectile, Dummy, 90 mm	M12	Inert Bronze Body																																							x	x					TM 43-0001-28
	Projectile, Dummy, 90 mm	M12B1																																								x	X					TM 43-0001-28
	Projectile, Dummy, 90 mm	M12B2	Manganese Bronze Body																																							x	x					TM 43-0001-28
	Projectile, 90mm HE-T	M71, M71A1	Comp B or TNT; M1, M6, or M15 propellant								x	x	x															x						x								x	x					TM 43-0001-28
105 mm Projectile																																																
	Projectile, HE, 105 MM	M38A1	Steel																															X								X	X					CSOIII
	Projectile, HE, 105 MM	M1	Steel																															X								X	X					CSOIII
	Projectile, HE Anti Tank (HEAT), 105 mm	M67	Pentolite and Steel																				X											X								X	X					CSOIII
	Projectile, Smoke, WP, 105 mm	M60	WP Burster and Steel																													X					X					X	X					CSOIII
	Projectile, Smoke, Base Ejection, 105 mm	M84	Expelling Charge - TNT Smoke Composition and Steel																															X								X	X					CSOIII
106 mm Projectile																																																
	Projectile, HEAT, 106 mm	M344A1 M344	Comp B and Steel Body																									X						X								X	X					TM 43-0001-28
122 mm Projectile																																																
	Projectile, AGM-122A GM													x														X						X								X			x	x	x	ORAP Phase I List
152 mm Projectile																																																
	Projectile, TP-T, 152 mm	M411	Steel																															x								x	x					TM 43-0001-28
	Projectile, TP-T, 152 mm	M411A3 M411A2 M411A1	Tracer, M13 Steel body																																		x					x	x					TM 43-0001-28
	Projectile, Dummy, 152 mm	M596	Aluminum alloy body																																				x								TM 43-0001-28
155 mm Projectile																																																
	Projectile, HE, 155 mm	M107	Comp B and Forged Steel																									X						X								X	X					TM 43-0001-28; ORDATA
	Projectile, HE, 155 mm	M101																																X								x	x					CSOIII
	Projectile, HE, 155 mm	M102																																X								x	x					CSOIII
	Projectile, 155mm practice	M804																																								x	x					TM 43-0001-28
	Projectile, AP, 155 mm	M112B1	Explosive D	X																																						x	x					CSOIII
175 mm Projectile																																																
	Projectile, HE, 175 mm	M437A2 M347A1	Comp B and Forged Steel																									x							x							x	x					
Bomb																																																
	Bomb, demolition, 100 lb	MK III	Sheet Steel																															X								X	X					ORDATA
	Bomb, demolition, 100 lb	MK 1 MOD 1																																X								x	x					ORDATA
	Bomb, demolition, 100 lb	MK 4 MOD 1	Forged Steel																															X								X	X					ORDATA
	Bomb, demolition, 50 lb	MK I	Sheet Steel																															X								X	X					ORDATA
	Bomb, depth, 325-350 lb	AN-MK 41	Steel																															X								X	X					ORDATA
Fuzes																																																

Table 2
Summary of Potential MEC and MC at PTA

				EXPLOSIVES, PROPELLANTS, ETC.																																		METALS								
	Item	Nomenclature	Compounds Associated with Munition	2,4,6-Trinitrophenol	Ammonium Nitrate	Antimony Sulfide	Barium Nitrate	Black Powder	Calcium Silicate	Double-Base Propellant	Dibutyl phthalate	Diphenyl amine	Dinitrotoluene	HMX	Illuminant Mix	Lead Azide	Lead Oxide	Lead Styphnate	Lead Sulfocyanate	Lead Thiocyanate	Nitrocellulose	Nitroglycerin	PETN	Photoflash Powder	Potassium Chlorate	Potassium Nitrate	Potassium Perchlorate	RDX	Red Phosphorous	Stearic Acid	Tetracene	Tetryl	Titanium	TNT	Tracer	Triacetin	White Phosphorous	Zinc Chloride	Zirconium	Aluminum	Cadmium	Copper	Iron	Manganese	Lead	Antimony	Zinc	Reference
	Fuze, Bomb, Nose	AN-M103	Black Powder Detonator, Steel Body with some Brass components					X								X			X						X							X										X	X		X		X	CSOIII; NAVSEA OP 1664, 1947
	Fuze, Bomb, Nose	AN-M104	Black Powder Booster, Aluminum Alloy Body, Cadmium-Plated Components			X			X							X		X		X					X							X								X	X							CSOIII; NAVSEA OP 1664, 1947
	Fuze, Bomb, Nose	M108	Brass body, Cadmium-plated components			X			X							X		X		X					X							X									X	X					X	CSOIII; NAVSEA OP 1664, 1947
	Fuze, Bomb, Nose	AN-M110 Series	Aluminum body, Steel components			X			X							X		X		X					X							X								X		X	X					CSOIII; OP1664; TM 9-1904; TM 9-1980
	Fuze, Bomb, Nose	AN-M111 Series	Black Powder, Aluminum Body, Steel Components					X											X						X															X		X	X					CSOIII; NAVSEA OP 1664, 1947
	Fuze, Bomb, Nose	AN-M120 Series	Black Powder Booster, Aluminum Alloy Body, Cadmium-Plated Components			X		X	X							X		X		X					X							X									X				X			CSOIII; NAVSEA OP 1664, 1947
Grenades																																																
	Grenade, Hand, Training	MK1A1	Cast iron body																																								X					TM-43-0001-29
	Grenade, Rifle, Practice	M29	Cast iron body																																								X					TM-43-0001-29
	Grenade, Hand, Practice, Delay	M30	Cast iron body Black powder Primer, M42 Ignition mixture					X																			X												X				X					TM-43-0001-29
	Grenade, Hand, Practice, Delay	M62	Cast iron body Black powder Primer, M42 Ignition mixture					X																			X												X				X					TM-43-0001-29
	Grenade, Hand, Practice, Delay	M69	Steel body, M42, and Black Powder					X																																		X	X					TM-43-0001-29
	Grenade, Hand, Smoke, TA, Practice	M83	Sheet metal body Terephthalic acid Primer, M39A1 Ignition mixture																														x						X			x	x					TM-43-0001-29
	Grenade, HE, 40 mm	M381	Comp B and Steel Wire Ball																									x						x						x		x	x					TM-43-0001-28
	Grenade, Practice, 40 mm	M382	Yellow dye and steel ball																																					x		x	x					TM-43-0001-28
	Grenade, HE, 40 mm	M383	Comp A5 and Steel																									x		x												x	x					TM-43-0001-28
	Grenades, HE, 40 mm	M384	Comp A5 and Steel																									x		x												x	x					TM-43-0001-28
	Grenade, Practice, 40 mm	M385 M385A1																																						x								TM-43-0001-28
	Grenade, HE, 40 mm	M386	Comp A5 and Steel																									x						x						x		x	x					TM-43-0001-28
	Grenade, HE, 40 mm	M397A1 M397	Octol and Steel											x																				x						x		x	x					TM-43-0001-28
	Grenade, HE, 40 mm	M406	Comp B and Steel																									x						x						x		x	x					TM-43-0001-28
	Grenade, Practice, 40 mm	M407A1	Yellow dye																																					x								TM-43-0001-28
	Grenade, HEDP, 40 mm	M430 M430A1	Comp A5 and Steel																									x		x												x	x					TM-43-0001-28
	Grenade, HEDP, 40 mm	M433	Comp A5 and Steel																									x		x										x		x	x					TM-43-0001-28
	Grenade, HE, 40 mm	M411	Comp B and Steel																									x						x						x		x	x					TM-43-0001-28
Mines																																																
	Mine, Antitank, HE	M1	Steel																															X								X	X					CSOIII; TM 9-1940
	Mine, Antitank, HE	M1A1	Steel																															X								X	X					CSOIII; TM 9-1940
	Mine, Antitank, HE	M4	Steel																															X								X	X					CSOIII; TM 9-1940
	Mine, Antitank, HE, Non-Metallic	M5	TNT or Tetrytol																													x		X														CSOIII; TM 9-1940
	Mine, HE Antitank, Heavy	M6	Steel																															X								X	X					TM 9-1900
	Mine, HE Antitank, Heavy	M15	Comp B and Steel																									X						X								X	X					TM 9-1900; TM 43-0001-36
	Mine, HE, Antitank, Non-Metallic	M19	Comp B																									X						X														TM 9-1900; TM 43-0001-36
	Mine, HE, Antitank, Light	M7	Tetrytol and Steel																													x		x								X	X					TM 9-1900
	Mine, Anti-Personnel	M2A3	Black Powder and Cast Iron					X																										X									X					CSOIII; TM 9-1940

Table 2
Summary of Potential MEC and MC at PTA

				EXPLOSIVES, PROPELLANTS, ETC.																																				METALS								
	Item	Nomenclature	Compounds Associated with Munition	2,4,6-Trinitrophenol	Ammonium Nitrate	Antimony Sulfide	Barium Nitrate	Black Powder	Calcium Silicate	Double-Base Propellant	Dibutyl phthalate	Diphenyl amine	Dinitrotoluene	HMX	Illuminant Mix	Lead Azide	Lead Oxide	Lead Styphnate	Lead Sulfocyanate	Lead Thiocyanate	Nitrocellulose	Nitroglycerin	PETN	Photoflash Powder	Potassium Chlorate	Potassium Nitrate	Potassium Perchlorate	RDX	Red Phosphorous	Stearic Acid	Tetracene	Tetryl	Titanium	TNT	Tracer	Triacetin	White Phosphorous	Zinc Chloride	Zirconium	Aluminum	Cadmium	Copper	Iron	Manganese	Lead	Antimony	Zinc	Reference
	Mine, Anti-Personnel	M3	Cast Iron																															X									X					CSOIII; TM 9-1940
	Mine, Antitank, Practice	M1	Steel and Cast Iron																										X													X	X					CSOIII; TM 9-1940
	Mine, Antitank, Practice	M1B1	Steel																										X													X	X					CSOIII; TM 9-1940
	Mine, Anti-Personnel	M16 M16A1	Comp A5 Detonator, Black Powder, Steel and Cast Iron					X								X		X										X						X								X	X					TM 9-1900; TM 43-0001-36 ORDATA
	Mine, Anti-Personnel, Non-Metallic	M14	M46 Detonator													X												X				X																TM 9-1900; TM 43-0001-36
Mortars																																																
	Mortar, HE, 60 mm	M49A2	Cast or Forged Steel																															X								X	X					CSOIII
	Mortar, Practice, 60 mm	M50A2	Black Powder and Cast or Forged Steel					X																																		X	X					CSOIII
	Mortar, Illumination, 60 mm	M83	Illuminant Charge, Black Powder and Steel					X							X																											X	X					CSOIII
	Mortar, Smoke, WP, 60 mm	M302	Steel																													X					X					X	X					CSOIII
	Mortar, HE, 81 mm	M43A1	Comp B and Steel																									X						X								X	X					CSOIII
	Mortar, Practice, 81 mm	M43	Black Powder and Steel					X																																		X	X					CSOIII
	Mortar, HE, 81 mm	M45	Steel																															X								X	X					CSOIII
	Mortar, HE, 81 mm	M56	Steel																															X								X	X					CSOIII
	Mortar, Smoke, WP, 81 mm	M57	Steel																													X					X					X	X					CSOIII
	Mortar, Smoke, FS, 81 mm	M57	FS Smoke Mixture and Steel																													X										X	X					CSOIII
	Mortar, Illumination, 81 mm	M301A1	Illuminant Charge and Steel												X																											X	X					CSOIII
	Mortar, 120 mm inert	No listing of the 120 mm mortar in available documents.																																														
	Mortar, 4.2-inch HE	M329A2 (w/o fuze)																					x	x						x						x						x			x	x				MIDAS
	Mortar, 4.2-inch HE	M329 (w/ fuze PD M557)																					x	x												x						x		x	x				x	MIDAS
Pyrotechnics (Flares, Signals, Simulators, Obscurant Smokes)																																																
	Flare, Aircraft, Parachute	AN-M9	Black powder and Illuminant composition			X	X	X							X		X	X													X								X	X								TM 9-1981; TM 9-1370-200
	Flare, Surface, Trip	M49A1	Illuminant composition			X	X								X		X	X													X								X									TM 9-1981; TM 9-1370-200
	Signal, Ground, Parachute	M7A1	Black powder and Illuminant composition					X							X																									X								TM 9-1981; TM 9-1370-200
	Signal, Illumination, Ground, Parachutes, Red Star; white Star; & Green Star	M126A1 M127A1 M195	Black powder and Illuminant composition					X							X				X						X															X								TM 9-1981; TM 9-1370-200
	Simulator, Ground Burst	M115A2	Black powder and photoflash powder					X																X																								TM 9-1981; TM 9-1370-200
	Simulator, Hand Grenade	M116 M116A1	Black powder and photoflash powder					X																X																								TM 9-1981; TM 9-1370-200
	Simulator, Flash, Artillery	M110	Photoflash powder																					X																								TM 9-1981; TM 9-1370-200
	Smoke, Pot, HC	M1	HC-C Smoke Mixture, Starter Mixture, and Steel																																							X	X					TM 9-1981; TM 9-1370-200

Notes:
1. It is unknown if the munitions listed in this table were fuzed. If fuzed, these fuzes could contain some or all of the following: antimony sulfide, black powder, calcium silicate, barium nitrate, lead azide, lead styphnate, lead, sulfocyanate, lead thiocyanate, potassium nitrate, potassium chlorate, tetryl, RDX, HMX, PETN, aluminum, cadmium, copper, iron, lead, and zinc.
2. It should be noted that many of the munitions have steel casings, which may contain small amounts of manganese.

Definitions:
Amatol - TNT and ammonium nitrate
Black Powder - potassium nitrate, charcoal, sulfur
Brass - Zinc and Copper
Bronze - Copper and tin; may also contain phosphorous, manganese, aluminum, or silicon
Comp A - RDX and either wax or stearic acid
Comp B - RDX, TNT, and Beeswax
Explosive D - 2,4,6-TNP
FNH powder - flashless powder; contains NC
HW - High Explosive
Illumination Mix - barium nitrate, strontium nitrate, potassium nitrate, magnesium, dechlorane
IMR Powder - NC
M1 Propellant - DNT, DBP, DPA
M6 Propellant - NC, Diphenylamine, and DNT
M15 Propellant - Nitroguanidine, NC, NG, Ethyl Centralite, Sodium Aluminum Fluoride
M42 Ignition - zirconium nickel alloy, potassium perchlorate, barium chromate
Octol - HMX and TNT
PBXN-5 - HMX and fluoroelastomers
Pentolite - PETN and TNT
Steel - Iron and copper
Smoke Mixture - potassium chlorate, lactose, colored dye
Smokeless Powder - NC, DNT, dibutylphthalate, diphenylamine
Tetrytol - Tetryl and TNT
Triacetin - also known as 1,2,3-triacetoxypropane or glycerol triacetate

Attachment 2

IRP Data Summary

Attachment 2 IRP Data Summary

To determine the sampling approach for each MRS, the IRP data, where applicable, were reviewed. Data that guided the approach are summarized below.

<u>1926 Explosion Radius - On and Off-Post (PICA-003-R-01 and PICA-004-R-01, respectively)</u>

MC could be released into the environment at this MRS either through dispersion of bulk TNT through an explosion or by association with MEC found at the site. This MRS is the result of a series of explosions of storage magazines. According to a historical report, it was estimated that 2.5 million pounds of explosives detonated in the explosion, including:

- Bulk TNT
- Navy Mark I, II, III, IV, and V bombs, each loaded with TNT
- Bomb accessories (*e.g.*, fins, tails)
- Aerial bombs, TNT center section
- 14-inch Class “B”, loaded and fused
- 14-inch armor piercing (AP) rounds, loaded and fused
- 8-inch shells, loaded and fused
- 5-inch shells, loaded and fused

In addition, it was reported that Explosive D and picric acid (*i.e.*, 2,4,6-TNP), burned but did not detonate:

As a result of these explosions, it is possible that bulk TNT was dispersed across the explosion radius. To determine if TNT, and its degradation products (*i.e.*, 2,4-DNT, 2,6-DNT, 4-AM-2,6-DNT, and 2-AM-4,6-DNT), are present throughout the explosion radius, IRP data within the radius were reviewed. Although historical reports indicated that 2,4,6-TNP burned, but did not detonate, as a conservative measure IRP data were also reviewed for this compound. As shown in Table 1, and Figures 1 and 2, TNT, and its degradation products are not wide-spread throughout the on-post soil portion of this MRS. This confirms what is known about the behavior of TNT in the environment since the explosion (potential release mechanism) occurred nearly 80 years ago and TNT readily undergoes photolysis and is susceptible to both reduction and biotransformation. As shown in Table 1 2,4,6-TNP is also not wide-spread throughout the on-post soil portion of this MRS. Although the IRP samples were only collected on-post, it is assumed that they also represent off-post conditions regarding wide-spread dispersion of TNT.

Table 1
IRP TNT and Degradation Products Soil Results Within 1926 Radius

Statistics	2,4,6-TNT	2,4-DNT	2,6-DNT	2-AM-4,6-DNT	4-AM-2,6-DNT	2,4,6-TNP
No. of Samples	1332	1978	1976	664	664	281
% of Detects	7.0%	6.7%	1.5%	2.3%	3.8%	0%
No. of Detects > SL	8	62	11	0	0	0
% > SL	< 1%	3.1%	< 1%	0%	0%	0%

Notes:
1. The SL used was the lower of NJDEP Residential SRS and EPA Resident Soil RSL
2. All 2,4-DNT detections > SL are associated with IRP Sites with known prior explosives use
3. Approximately 2/3 of all soil samples were collected from less than 2 feet below ground surface

As shown in Table 2, a review of surface water and sediment samples from EOD Pond, which is located approximately 500 feet from one of the explosion centers, also did not indicate the presence of TNT and its degradation products. EOD Pond was an undeveloped marsh at the time of the explosion and was constructed as a reservoir between 1951 and 1955.

Table 2
EOD Pond IRP Surface Water and Sediment Results

Statistics	2,4,6-TNT	2,4-DNT	2,6-DNT	2-AM-4,6-DNT	4-AM-2,6-DNT
Sediment Samples					
No. of Samples	16	16	16	16	16
% of Detects	0.0%	0.0%	0.0%	0.0%	0.0%
No. of Detects > SL	0	0	0	0	0
% > SL	0.0%	0.0%	0.0%	0.0%	0.0%
Surface Water Samples					
No. of Samples	3	3	3	3	3
% of Detects	0.0%	0.0%	0.0%	0.0%	0.0%
No. of Detects > SL	0	0	0	0	0
% > SL	0.0%	0.0%	0.0%	0.0%	0.0%

Notes:
1. The SL for sediment is the lower of NJDEP Residential SRS and EPA Resident Soil RSL
2. The SL for surface water is the lower of the NJDEP SWQC and EPA Tapwater RSL

In addition to the explosion, PTA has a long history of manufacturing and R&D. To determine if explosives other than TNT and its degradation products are present throughout the radius, IRP data were reviewed. As shown in Table 3, explosives are not wide-spread throughout the on-post soil portion of this MRS.

Table 3
IRP Explosive Soil Results Within 1926 Radius

Statistics	1,3-DNB	1,3,5-TNB	NB	2-NT	3-NT	4-NT	NG	PETN	RDX	HMX	Tetryl
No. of Samples	1332	1332	1980	854	1054	843	766	746	1339	1334	1360
% of Detects	0.8%	3.4%	0.4%	0.2%	0.2%	0.6%	7.6%	3.8%	4.0%	8.0%	7.5%
No. of Detects > SL	0	0	1	2	1	0	21	No SL	18	1	27
% > SL	0.0%	0.0%	< 1%	< 1%	< 1%	0.0%	2.7%	NA	1.3%	< 1%	2.0%

Notes:
1. The SL used was the lower of NJDEP Residential SRS and EPA Resident Soil RSL
2. DNB - dinitrobenzene
3. TNB - trinitrobenzene
4. NB - nitrobenzene
5. NT - nitrotoluene
6. NG - Nitroglycerin
7. PETN - Pentaerythritol tetranitrate
8. RDX - Hexahydro-1,3,5-trinitro-1,3,5-triazine)
9. HMX - Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
10. Approximately 2/3 of all soil samples were collected from less than 2 feet below ground surface

Former Operational Areas (PICA-006-R-01)

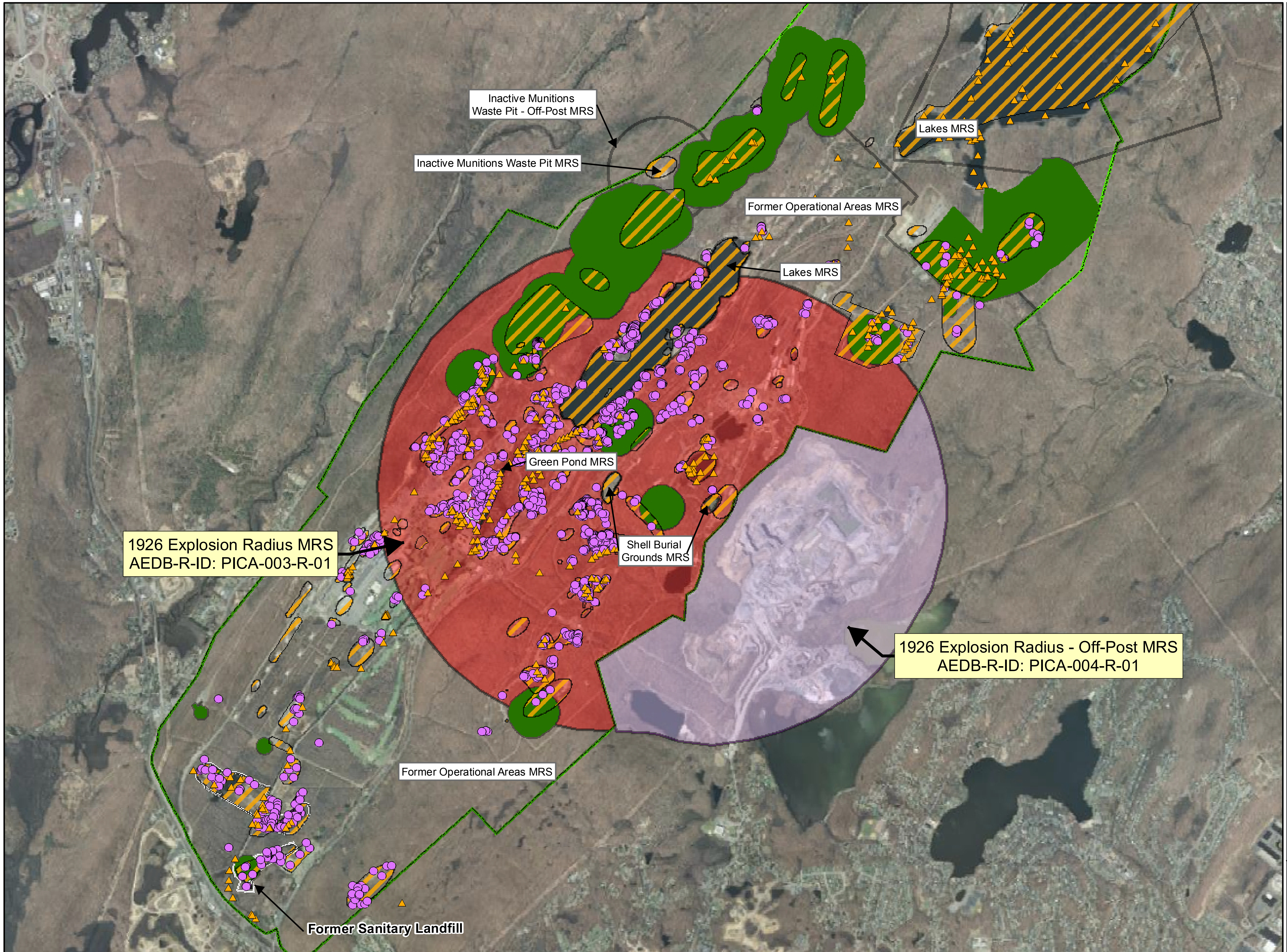
PTA has a long history of manufacturing and R&D. Several usages within this MRS include Rocket Surveillance and Static Firing and QA Inspection and Testing of Nuclear Components. As a result of these two uses, it is possible that perchlorate (associated with rockets) and depleted uranium (DU) could be present at this MRS. Neither contaminant is included in the proposed MC list for MC sampling during the RI. The rationale for the exclusion of these contaminants is given below.

Perchlorate

According to EPA Office of Solid Waste and Emergency Response, EPA-505-F-09-005 Fact Sheet, Emerging Contaminant - Perchlorate, September 2009, perchlorate is highly soluble in water and migrates quickly from soil to groundwater. Under the IRP 36 groundwater samples have been collected from the Rocket Test Area (IRP Sites PICA-007, PICA-008, and PICA-157), which is located within the Rocket Surveillance and Static Firing Area. All results were non-detect. Therefore, analysis for perchlorate is not proposed.

Depleted Uranium

Depleted uranium contains, by mass, approximately 99.8% Uranium-238 (U-238), 0.2% U-235, and 0.001% U-234. A total of 129 soil samples, excluding background samples, have been collected from across the entire installation and analyzed for U-238. Eighteen of these samples have been collected from IRP Sites that appear to lie within the QA Inspection and Nuclear Testing Area. Analyses of the samples did not indicate the presence of U-238 at a concentration above NJDEP's Unrestricted Use Standards for Radioactive Contamination, N.J.A.C. 7:28 Chapter 12, Remediation Standards for Radioactive Materials. Therefore, analysis for radionuclides is not proposed.



WESTON SOLUTIONS

Legend

- Installation Boundary
- Operational Range Areas
- Munitions Response Site Boundaries
- 1926 Explosion Radius MRS
- 1926 Explosion Radius; Off-Post MRS
- MRS Sub-Sites
- Ineligible Area - Burning Ground
- IRP Sites

TNT/DNT Samples

- Sediment
- Soil

Base Imagery: NJ 2007 Natural Color Imagery

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N W E S

2,000 1,000 0 2,000
Feet

Figure 1
All IRP TNT/DNT Soil and Sediment Samples
Picatinny Arsenal
Morris County, New Jersey

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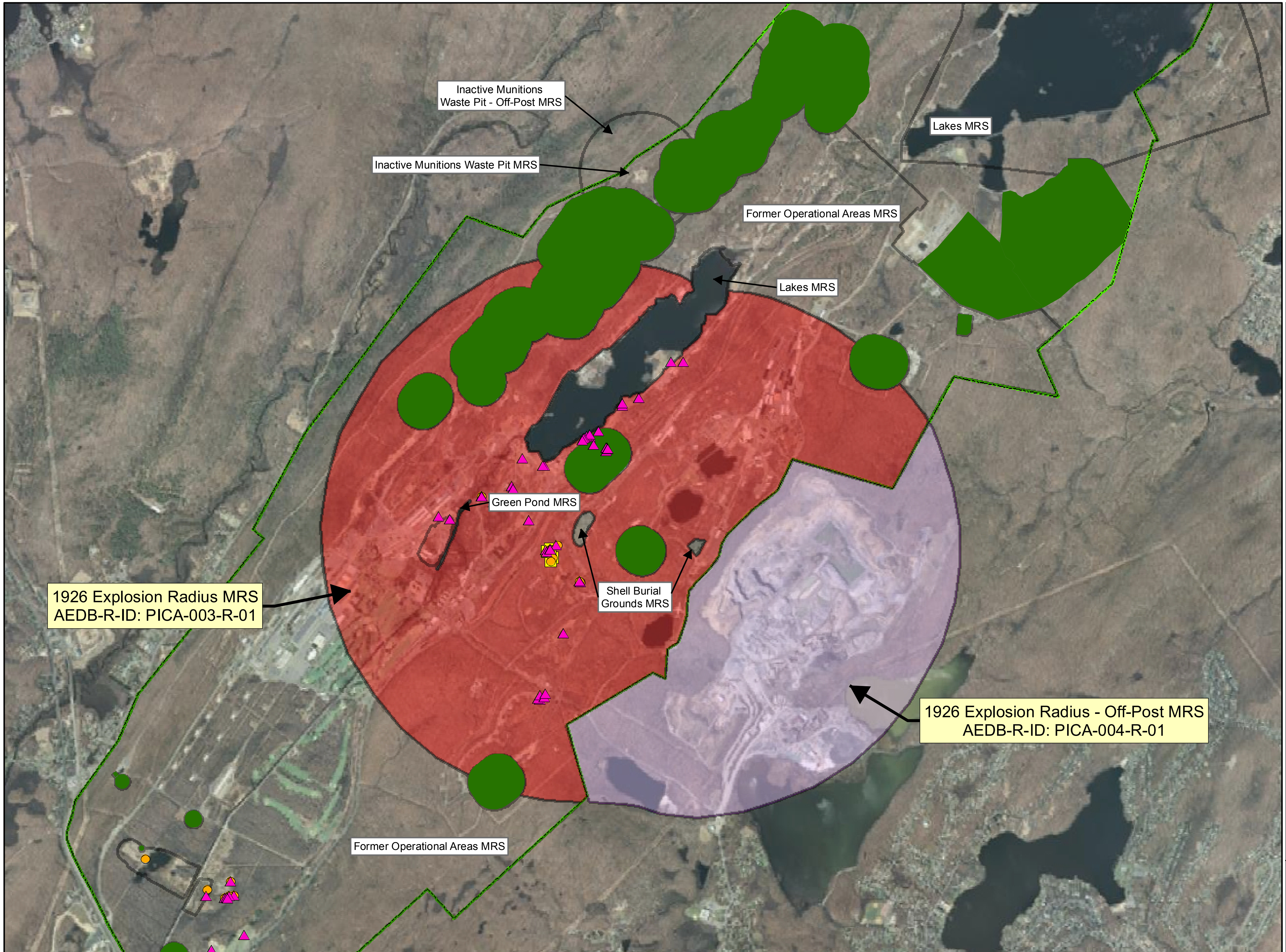

WESTON SOLUTIONS

Legend

- Installation Boundary
- Operational Range Areas
- Munitions Response Site Boundaries
- 1926 Explosion Radius MRS
- 1926 Explosion Radius; Off-Post MRS

Soil Chemical Results

- 2,4,6-Trinitrotoluene Above 19 mg/kg
- 2,4-Dinitrotoluene Above 0.7 mg/kg
- 2,6-Dinitrotoluene Above 0.7 mg/kg

Base Imagery: NJ 2007 Natural Color Imagery

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N W E S

2,000 1,000 0 2,000
Feet

Figure 2
IRP TNT/DNT Soil Samples with Concentrations Above the Residential Screening Level
Picatinny Arsenal
Morris County, New Jersey

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Attachment 3

VSP Output - Former Operational Areas

Systematic sampling locations for comparing a median with a fixed threshold (nonparametric - MARSSIM)

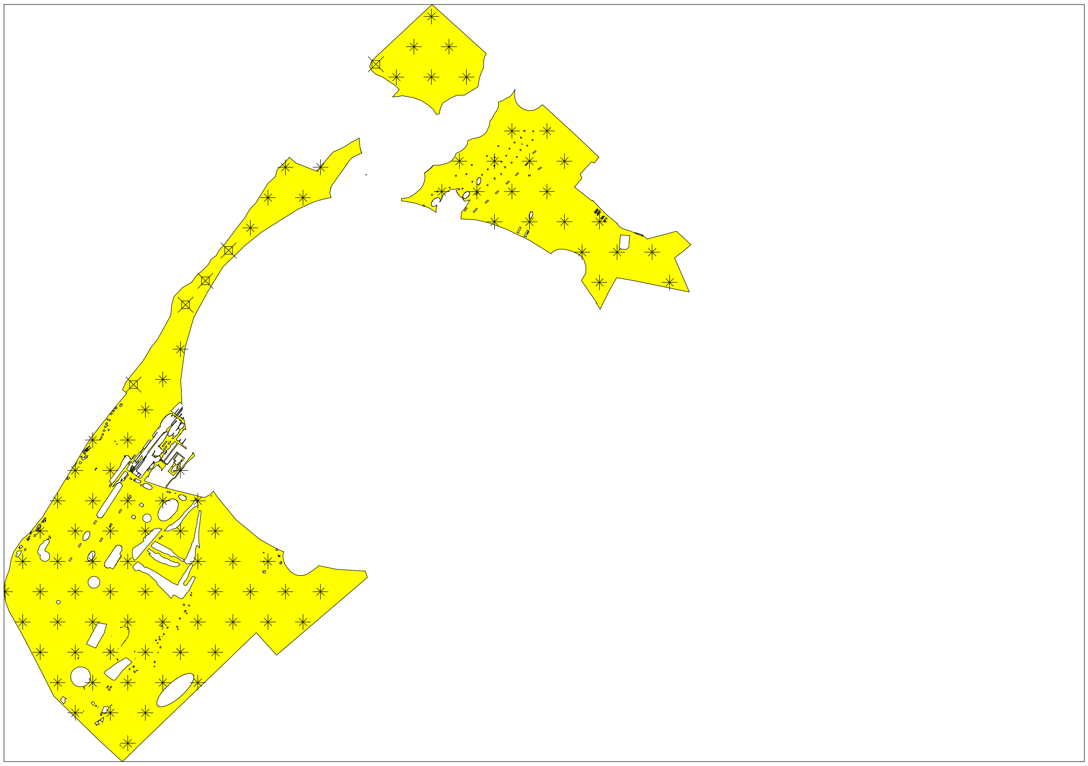
Summary

This report summarizes the sampling design used, associated statistical assumptions, as well as general guidelines for conducting post-sampling data analysis. Sampling plan components presented here include how many sampling locations to choose and where within the sampling area to collect those samples. The type of medium to sample (i.e., soil, groundwater, etc.) and how to analyze the samples (in-situ, fixed laboratory, etc.) are addressed in other sections of the sampling plan.

The following table summarizes the sampling design developed. A figure that shows sampling locations in the field and a table that lists sampling location coordinates are also provided below.

SUMMARY OF SAMPLING DESIGN	
Primary Objective of Design	Compare a site mean or median to a fixed threshold
Type of Sampling Design	Nonparametric
Sample Placement (Location) in the Field	Systematic with a random start location
Working (Null) Hypothesis	The median(mean) value at the site exceeds the threshold
Formula for calculating number of sampling locations	Sign Test - MARSSIM version
Calculated total number of samples	89
Number of samples on map [a]	94
Number of selected sample areas [b]	3
Specified sampling area [c]	7816269.58 m^2
Size of grid / Area of grid cell [d]	1044.78 feet / 945322 ft^2
Grid pattern	Triangular
Total cost of sampling [e]	$0.00

[a] This number may differ from the calculated number because of 1) grid edge effects, 2) adding judgment samples, or 3) selecting or unselecting sample areas.
[b] The number of selected sample areas is the number of colored areas on the map of the site. These sample areas contain the locations where samples are collected.
[c] The sampling area is the total surface area of the selected colored sample areas on the map of the site.
[d] Size of grid / Area of grid cell gives the linear and square dimensions of the grid used to systematically place samples.
[e] Including measurement analyses and fixed overhead costs. See the Cost of Sampling section for an explanation of the costs presented here.



Area: Area 1					
X Coord	**Y Coord**	**Label**	**Value**	**Type**	**Historical**
539849.5596	4533563.0737			Systematic	
540486.4570	4533563.0737			Systematic	
539690.3353	4533838.8583			Systematic	
540008.7839	4533838.8583			Systematic	
540327.2326	4533838.8583			Systematic	
538894.2136	4534114.6430			Systematic	
539212.6623	4534114.6430			Systematic	
539531.1109	4534114.6430			Systematic	
539849.5596	4534114.6430			Systematic	
538416.5406	4534390.4276			Systematic	
538734.9892	4534390.4276			Systematic	
539053.4379	4534390.4276			Systematic	
539371.8866	4534390.4276			Systematic	
538575.7649	4534666.2122			Systematic	
538894.2136	4534666.2122			Systematic	
539212.6623	4534666.2122			Systematic	
539531.1109	4534666.2122			Systematic	
539053.4379	4534941.9969			Systematic	
539371.8866	4534941.9969			Systematic	

Area: Area 70

X Coord	Y Coord	Label	Value	Type	Historical
538003.5102	4535431.7784			Systematic	
538321.9588	4535431.7784			Systematic	
538640.4075	4535431.7784			Systematic	
538162.7345	4535707.5630			Systematic	
538481.1832	4535707.5630			Systematic	
538321.9588	4535983.3477			Systematic	
537815.9163	4535547.8915			Manual	

Area: Area 71					
X Coord	Y Coord	Label	Value	Type	Historical
535561.8971	4529370.7972			Systematic	
535084.2241	4529646.5818			Systematic	
535402.6728	4529646.5818			Systematic	
535721.1214	4529646.5818			Systematic	
534924.9997	4529922.3665			Systematic	
535243.4484	4529922.3665			Systematic	
535561.8971	4529922.3665			Systematic	
535880.3458	4529922.3665			Systematic	
536198.7944	4529922.3665			Systematic	
534765.7754	4530198.1511			Systematic	
535084.2241	4530198.1511			Systematic	
535402.6728	4530198.1511			Systematic	
535721.1214	4530198.1511			Systematic	
536039.5701	4530198.1511			Systematic	
536358.0188	4530198.1511			Systematic	
534606.5511	4530473.9357			Systematic	
534924.9997	4530473.9357			Systematic	
535243.4484	4530473.9357			Systematic	
535561.8971	4530473.9357			Systematic	
535880.3458	4530473.9357			Systematic	
536198.7944	4530473.9357			Systematic	
536517.2431	4530473.9357			Systematic	
536835.6918	4530473.9357			Systematic	
537154.1405	4530473.9357			Systematic	
534447.3267	4530749.7204			Systematic	
534765.7754	4530749.7204			Systematic	
535084.2241	4530749.7204			Systematic	
535402.6728	4530749.7204			Systematic	
535721.1214	4530749.7204			Systematic	
536358.0188	4530749.7204			Systematic	

536676.4675	4530749.7204			Systematic	
536994.9161	4530749.7204			Systematic	
537313.3648	4530749.7204			Systematic	
534606.5511	4531025.5050			Systematic	
534924.9997	4531025.5050			Systematic	
535243.4484	4531025.5050			Systematic	
535561.8971	4531025.5050			Systematic	
536198.7944	4531025.5050			Systematic	
536517.2431	4531025.5050			Systematic	
536835.6918	4531025.5050			Systematic	
534765.7754	4531301.2897			Systematic	
535084.2241	4531301.2897			Systematic	
535402.6728	4531301.2897			Systematic	
535721.1214	4531301.2897			Systematic	
536039.5701	4531301.2897			Systematic	
536358.0188	4531301.2897			Systematic	
534924.9997	4531577.0743			Systematic	
535243.4484	4531577.0743			Systematic	
535561.8971	4531577.0743			Systematic	
535880.3458	4531577.0743			Systematic	
536198.7944	4531577.0743			Systematic	
535084.2241	4531852.8589			Systematic	
535402.6728	4531852.8589			Systematic	
536039.5701	4531852.8589			Systematic	
535243.4484	4532128.6436			Systematic	
535561.8971	4532128.6436			Systematic	
535721.1214	4532404.4282			Systematic	
535880.3458	4532680.2129			Systematic	
536039.5701	4532955.9975			Systematic	
536676.4675	4534059.1361			Systematic	
536835.6918	4534334.9207			Systematic	
537154.1405	4534334.9207			Systematic	
536994.9161	4534610.7054			Systematic	
537313.3648	4534610.7054			Systematic	
536086.1081	4533360.1928			Manual	
536267.8106	4533578.2359			Manual	
536478.5856	4533854.4237			Manual	
535613.6814	4532633.3826			Manual	

Primary Sampling Objective
The primary purpose of sampling at this site is to compare a site median or mean value with a fixed threshold. The working hypothesis (or 'null' hypothesis) is that the median(mean) value at the site is equal to or exceeds the threshold.

The alternative hypothesis is that the median(mean) value is less than the threshold. VSP calculates the number of samples required to reject the null hypothesis in favor of the alternative one, given a selected sampling approach and inputs to the associated equation.

Selected Sampling Approach
A nonparametric systematic sampling approach with a random start was used to determine the number of samples and to specify sampling locations. A nonparametric formula was chosen because the conceptual model and historical information (e.g., historical data from this site or a very similar site) indicate that typical parametric assumptions may not be true.

Both parametric and non-parametric equations rely on assumptions about the population. Typically, however, non-parametric equations require fewer assumptions and allow for more uncertainty about the statistical distribution of values at the site. The trade-off is that if the parametric assumptions are valid, the required number of samples is usually less than if a non-parametric equation was used.

Locating the sample points over a systematic grid with a random start ensures spatial coverage of the site. Statistical analyses of systematically collected data are valid if a random start to the grid is used. One disadvantage of systematically collected samples is that spatial variability or patterns may not be discovered if the grid spacing is large relative to the spatial patterns.

Number of Total Samples: Calculation Equation and Inputs
The equation used to calculate the number of samples is based on a Sign test (see PNNL 13450 for discussion). For this site, the null hypothesis is rejected in favor of the alternative one if the median(mean) is sufficiently smaller than the threshold. The number of samples to collect is calculated so that if the inputs to the equation are true, the calculated number of samples will cause the null hypothesis to be rejected.

The formula used to calculate the number of samples is:

$$n = \frac{(Z_{1-\alpha} + Z_{1-\beta})^2}{4(SignP - 0.5)^2}$$

where

$$SignP = \Phi\left(\frac{\Delta}{s_{total}}\right)$$

$\Phi(z)$ is the cumulative standard normal distribution on $(-\infty,z)$ (see PNNL-13450 for details),
n is the number of samples,
S_{total} is the estimated standard deviation of the measured values including analytical error,
Δ is the width of the gray region,
α is the acceptable probability of incorrectly concluding the site median(mean) is less than the threshold,
β is the acceptable probability of incorrectly concluding the site median(mean) exceeds the threshold,
$Z_{1-\alpha}$ is the value of the standard normal distribution such that the proportion of the distribution less than $Z_{1-\alpha}$ is $1-\alpha$,
$Z_{1-\beta}$ is the value of the standard normal distribution such that the proportion of the distribution less than $Z_{1-\beta}$ is $1-\beta$.

Note: MARSSIM suggests that the number of samples should be increased by at least 20% to account for missing or unusable data and uncertainty in the calculated value of n. VSP allows a user-supplied percent overage as discussed in MARSSIM (EPA 2000, p. 5-33).

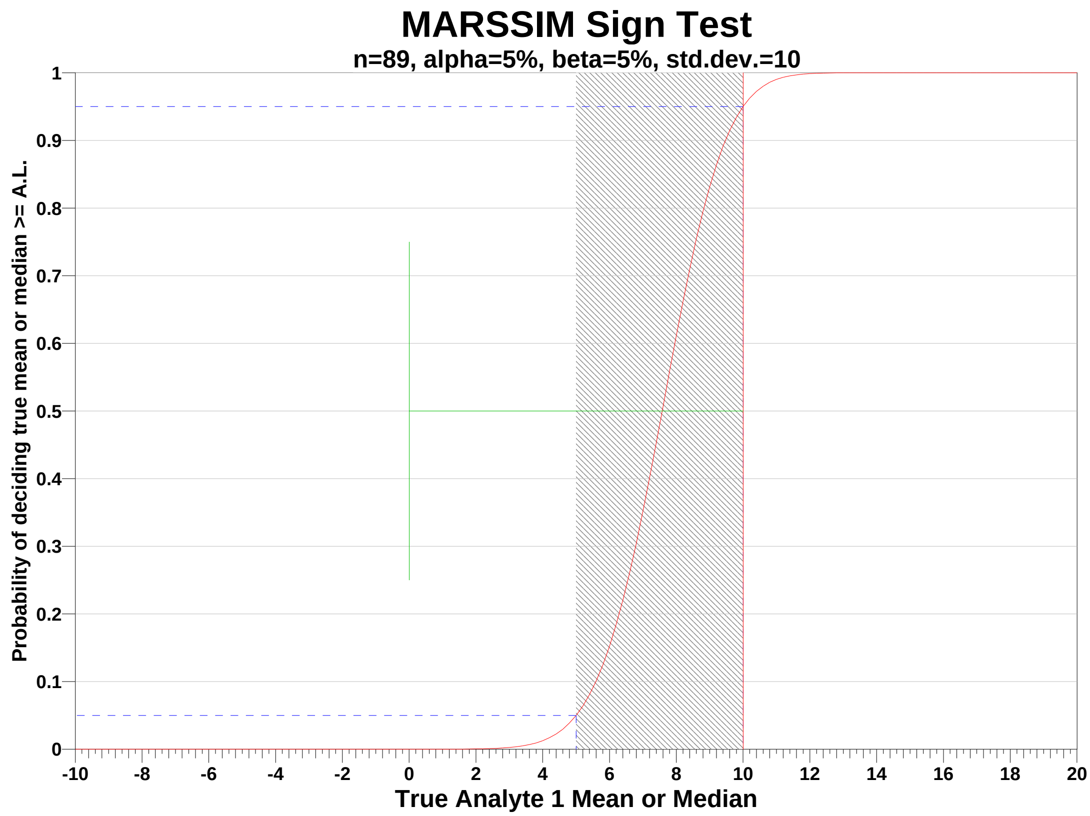
The values of these inputs that result in the calculated number of sampling locations are:

Analyte	n[a]	Parameter					
		S	Δ	α	β	$Z_{1-\alpha}$ [b]	$Z_{1-\beta}$ [c]
Analyte 1	89	10	5	0.05	0.05	1.64485	1.64485

[a] The final number of samples has been increased by the MARSSIM Overage of 20%.
[b] This value is automatically calculated by VSP based upon the user defined value of α.
[c] This value is automatically calculated by VSP based upon the user defined value of β.

The following figure is a performance goal diagram, described in EPA's QA/G-4 guidance (EPA, 2000). It shows the probability of concluding the sample area is dirty on the vertical axis versus a range of possible true median(mean) values for the site on the horizontal axis. This graph contains all of the inputs to the number of samples equation and pictorially represents the calculation.

The red vertical line is shown at the threshold (action limit) on the horizontal axis. The width of the gray shaded area is equal to Δ; the upper horizontal dashed blue line is positioned at $1-\alpha$ on the vertical axis; the lower horizontal dashed blue line is positioned at β on the vertical axis. The vertical green line is positioned at one standard deviation below the threshold. The shape of the red curve corresponds to the estimates of variability. The calculated number of samples results in the curve that passes through the lower bound of Δ at β and the upper bound of Δ at $1-\alpha$. If any of the inputs change, the number of samples that result in the correct curve changes.



Statistical Assumptions
The assumptions associated with the formulas for computing the number of samples are:
1. the computed sign test statistic is normally distributed,
2. the variance estimate, S^2, is reasonable and representative of the population being sampled,
3. the population values are not spatially or temporally correlated, and
4. the sampling locations will be selected probabilistically.

The first three assumptions will be assessed in a post data collection analysis. The last assumption is valid because the gridded sample locations were selected based on a random start.

Sensitivity Analysis
The sensitivity of the calculation of number of samples was explored by varying the standard deviation, lower bound of gray region (% of action level), beta (%), probability of mistakenly concluding that μ > action level and alpha (%), probability of mistakenly concluding that μ < action level. The following table shows the results of this analysis.

Number of Samples							
AL=10		α=5		α=10		α=15	
		s=20	s=10	s=20	s=10	s=20	s=10
LBGR=90	β=5	8168	2048	6464	1620	5426	1361

	β=10	6464	1620	4959	1244	4055	1017
	β=15	5426	1361	4055	1017	3243	814
LBGR=80	**β=5**	2048	518	1620	410	1361	345
	β=10	1620	410	1244	315	1017	257
	β=15	1361	345	1017	257	814	206
LBGR=70	**β=5**	915	234	724	185	608	156
	β=10	724	185	556	143	454	117
	β=15	608	156	454	117	364	94

s = Standard Deviation
LBGR = Lower Bound of Gray Region (% of Action Level)
β = Beta (%), Probability of mistakenly concluding that μ > action level
α = Alpha (%), Probability of mistakenly concluding that μ < action level
AL = Action Level (Threshold)

Cost of Sampling
The total cost of the completed sampling program depends on several cost inputs, some of which are fixed, and others that are based on the number of samples collected and measured. Based on the numbers of samples determined above, the estimated total cost of sampling and analysis at this site is $0.00, which averages out to a per sample cost of $0.00. The following table summarizes the inputs and resulting cost estimates.

COST INFORMATION			
Cost Details	**Per Analysis**	**Per Sample**	**89 Samples**
Field collection costs		$0.00	$0.00
Analytical costs	$0.00	$0.00	$0.00
Sum of Field & Analytical costs		**$0.00**	**$0.00**
Fixed planning and validation costs			$0.00
Total cost			**$0.00**

Recommended Data Analysis Activities
Post data collection activities generally follow those outlined in EPA's Guidance for Data Quality Assessment (EPA, 2000). The data analysts will become familiar with the context of the problem and goals for data collection and assessment. The data will be verified and validated before being subjected to statistical or other analyses. Graphical and analytical tools will be used to verify to the extent possible the assumptions of any statistical analyses that are performed as well as to achieve a general understanding of the data. The data will be assessed to determine whether they are adequate in both quality and quantity to support the primary objective of sampling.

If the sampling plan augments the VSP design detailed in this report with judgmentally collected samples, these samples cannot be used in any statistical analysis or inferential conclusions. Judgmentally collected samples invalidate the required statistical assumptions underlying the stated sampling objectives.

Because the primary objective for sampling for this site is to compare the site median(mean) value with a threshold value, the data will be assessed in this context. Assuming the data are adequate, at least one statistical test will be done to perform a comparison between the data and the threshold of interest. Results of the exploratory and quantitative assessments of the data will be reported, along with conclusions that may be supported by them.

Attachment 4

Field Sampling SOPs

Chain of Custody Record

4124 (0907)

Temperature on Receipt ______

Drinking Water? Yes ☐ No ☐

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

Client	Project Manager	Date	Chain of Custody Number 407843
Address	Telephone Number (Area Code)/Fax Number	Lab Number	**Page** ______ **of** ______
City / State / Zip Code	Site Contact / Lab Contact		
Project Name and Location (State)	Carrier/Waybill Number		
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil		Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH		Analysis (Attach list if more space is needed)												Special Instructions/ Conditions of Receipt

Possible Hazard Identification

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal

☐ Return To Client ☐ Disposal By Lab ☐ Archive For ______ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required

☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other ______

QC Requirements (Specify)

1. Relinquished By	Date	Time	1. Received By	Date	Time
2. Relinquished By	Date	Time	2. Received By	Date	Time
3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments

DISTRIBUTION: WHITE - Returned to Client with Report; CANARY - Stays with the Sample; PINK - Field Copy

Standard Operating Procedure
Sample Management

I. Introduction

The purpose of this Standard Operating Procedure (SOP) is to provide the protocols for the sample management procedures to be employed at Picatinny Arsenal for the MC soil sampling program.

II. Materials

a. Waterproof hard plastic coolers
b. Custody seals
c. Absorbent packing material
d. Sample documentation
e. Ice
f. Plastic garbage bags
g. Clear tape
h. Clear ziplock bags
i. Inert cushioning material
j. Sample labels
k. Indelible black pen ink

III. Procedure

One or more members of the field team should be designated as the sample management officer (SMO). The SMO will bear the ultimate responsibility for the documentation, packaging, and shipping of the samples. These procedures are outlined in the sections below.

Sample Identification System

A sample numbering system will be used to identify each sample; the sample numbers will be sequentially assigned to ensure there is no duplication of sample numbers. The sample identification will consist of the components described below.

- Project Code: The first component consists of a four letter designation which identifies the project site. For this project, the three letter designation will be PTA
- Sampling Year: The second component identifies the year the samples were collected in XXXX format
- MRS Identifier: Each MRS will have a unique identifier; they are shown below:

1926 Explosion Radius - On-Post - Former Projectile Range	ERFPR
1926 Explosion Radius - On-Post	ERONP

1926 Explosion Radius - Off-Post	EROFP
Former Operational Areas - Gridded Samples	FOAG
Former Operational Areas - Biased Samples	FOAB
Lakes MRS	LAKE
Lake Denmark - Off-Post	LDOP
Inactive Munitions Waste Pit - Off-Post	IMWP

- Sample Number: This is a sequential number that identifies the number of this type of sample collected from an MRS
- QA/QC Samples will be labeled with the following suffixes. Note that duplicate samples will be numbered uniquely as if they were samples. A record of identification for duplicate samples will be maintained.

FB Field Blank
MS Matrix Spike
MSD Matrix Spike Duplicate

Examples of identification numbers are given below:

PTA-2010-FOAB-0008: This is the eighth biased soil sample collected from the Former Operational Areas

PTA-2010-FB-0002: This is the second rinsate sample collected in 2010

Documentation and Chain of Custody

For documentation purposes, the field team will enter information about each sample into the field logbook as they collect the sample. The information recorded should include but not be limited to the following:

- The Malcolm Pirnie assigned sample number (sample ID)
- Method of sample collection
- Sample date and time of collection
- Preservative(s) used, if required
- Analyses required
- Sample type
- Associated quality control (QC) samples
- Sampler's initials

This information will be used to develop the sample label, which will be affixed to each sample bottle, and the chain-of-custody (COC) form. Information provided on the sample label will include the following. Clear tape will be applied over each label to maintain label integrity during decontamination procedures.

- Project name
- Sample ID and/or sample station number
- Sample matrix
- Sample preservation notes
- Analytical parameters

The COC form, which serves as the official communication to the laboratory detailing the specific analyses for each sample, will be provided by the analytical laboratory. See example COC attached. The sampler or SMO will fill out, review and sign each COC that accompanies each shipment from the field to the laboratory. The COC will accompany the samples from the time of sampling through all transfers of custody. It will be kept on file at the laboratory where samples are analyzed and archived. The form will be filled out in duplicate; one copy will be retained in the field office and the original will be sent to the laboratory. Errors will be crossed through with a single line, initialed and dated. All entries will be legible. In general, the following information will be recorded on the COC:

- Project name and/or project number
- Signature of sampler(s)
- Sampling station number
- Date and time of collection
- Grab or composite sample designation
- Sample matrix
- Sampling location description
- Sample ID
- Analyses required
- Preservation technique
- Signatures and dates for transfers of custody
- Air express/shipper's bill of lading identification numbers

Packaging and Shipping Samples

- Make sure the caps on the sample bottles are tightly sealed. Wipe down the outside of all of the sample bottles.
- Apply one custody seal around the circumference of the bottle or over the cap and onto the sides of the bottle. The custody seal will be applied to the sample bottles in such a manner as to reveal if the bottle was opened during transit.
- Wrap each bottle with protective material, preferable bubble wrap.
- Place each bottle in its own ziplock bag.
- Prepare the shipping container (*i.e.*, cooler). The cooler will be prepared so that no leakage can occur during shipping. All valves on the cooler will be securely

duct taped, both inside and outside the cooler, and the cooler will be lined with either plastic or a large garbage bag. Only coolers that conform to the general design requirements in 49 CFR § 173.410 will be used for shipment.

- Pack the coolers. Packing material will be placed below the samples and the samples will be surrounded with bags of ice. The ice will not be kept in its original bag, but will be repacked into ziplock bags. Place a temperature blank (40-ml vial filled with DI water) into the cooler. Use enough ice to ensure that the proper temperature (4-6^{o}C) is achieved and maintained during transport.
- Place packing material over and around the sample bottles. Sufficient packing material will be used so the bottles will not move or break during transport.
- The COC will be placed in a ziplock bag and taped to the inside of one of the coolers. Prior to shipment, the "relinquished by" and "received by" sections of the chain of custody form will be filled in. Generally, the shipper will not sign the chain of custody form. Therefore, the carrier's name is filled in by the sample management officer.
- Close the cooler and seal with strapping tape.
- Apply signed and dated custody seals to the cooler. Place two custody seals diagonally across from each other where the cooler lid meets the cooler. The custody seal will be applied in such a manner as to reveal if the cooler was opened during transit.
- An address label, "Non-Hazardous Environmental Sample" label, and a "This Way Up" label will be placed on the outside of each cooler. The address label will be covered with clear tape.
- If more than one cooler is being sent to one destination, each cooler will be appropriately labeled as 1 of X, 2 of X, etc.
- The Airbill will be attached to one of the coolers unless the samples are being picked up and delivered to the laboratory via courier.

QA/QC Samples

The SMO is responsible for ensuring that the appropriate types and numbers of QA/QC samples are collected. These samples include rinsate blanks, field duplicates, and matrix spike/matrix spike duplicate (MS/MSD) samples. For non-dedicated/disposable equipment, rinsate blanks are collected for each type of equipment used each day a decontamination event is carried out, with a maximum of one rinsate blank per equipment type per day. For dedicated/disposable equipment, one rinsate blank is collected from each equipment batch. MS/MSDs and field duplicates will be collected at a rate of 1 in 20 environmental samples per analytical parameter for each matrix sampled. No extra sample volume is usually required for the soil samples. MS/MSD and MS/MD samples are noted as such on the chain of custody; field duplicates are not noted on the COC, but are recorded as such in the field logbook.

Note that metals rinsate samples must be preserved with nitric acid to a pH < 2. The laboratory supplied bottles will already have the nitric acid added to the bottles. Therefore, when filling these bottles, care will be taken not to splash or spill the nitric acid.

Rinsate Blank Sample Collection

Field equipment blanks will be required from decontaminated equipment, not one-time use equipment. The subcontract laboratory will supply pre-preserved sample bottles, along with analyte-free water for rinsate blank collection. The rinsate blank should be collected with a helper and all spilled water and sample preservatives must be cleaned up immediately.

1. The rinsate blank must be collected in a designated clean area of the site. Place new plastic sheeting on the work surface to be used.
2. Minimize the handling of the decontaminated equipment to prevent the introduction of new contamination. If stainless steel bowls are part of the decontaminated equipment, use them to initially collect the rinsate water. Unwrap all other equipment (trowels, auger heads) and place them in the bowl.
3. Pour analyte-free water over the surfaces of the equipment.
4. Pour the water from the bowl into the sample bottles; collect the explosives sample prior to the metals sample.

References

USPEA 1996. *Samplers Guide to the Contract Laboratory Program*. EPA/540/P-96/032, PB96-063511, Office of Emergency and Remedial Response.

USEPA 2007, *Introduction to the Analytical Services Branch (ABS) Contract Laboratory Program*, EPA 540-R-07-02, OSWER 9240.0-42.

USEPA 2007, *Contract Laboratory Program Guidance for Field Samplers*, OSWER 9240.0-44, EPA 540-R-07-06.

Standard Operating Procedure
Field Documentation

I. Introduction

The purpose of this Standard Operating Procedure (SOP) is to provide the protocols for documenting field activities at Picatinny Arsenal for the MC soil sampling program. This SOP is based on the technical requirements contained in the New Jersey Department of Environmental Protection (NJDEP) *Field Sampling Procedures Manual*, August 2005, and N.J.A.C. 7:26E, Technical Requirements for Site Remediation.

II. Materials

a. Field logbook
b. Indelible black pen ink

III. Procedure

Documentation of an investigative team's field activities often provides the basis for technical site evaluations and other such related written reports. Field documentation must provide sufficient information and data to enable reconstruction of field activities. All pertinent information will be recorded in a bound field logbook with numbered, water resistant pages. The outside front cover of the logbook will contain the installation name and "MC Soil Sampling". Each page will be consecutively numbered and will be dated and initialed at the bottom. All entries will be made in indelible black ink and all corrections will consist of one line-out deletions that are initialed and dated.

All entries must be made in language that is objective, factual, and free of personal feelings or other terminology that might prove inappropriate and all entries must be accompanied by the appropriate military time. At a minimum, the following information will be recorded in the field logbook.

1. Name of person keeping log, along with all other Malcolm Pirnie personnel and their responsibilities
2. Names of all non-Malcolm Pirnie personnel on-site, along with their affiliation
3. Purpose of site visit
4. Weather conditions
5. Time of arrival and departure at each sample location
6. General characteristics of the sampling location that are pertinent to data evaluation (*e.g.*, topography, nearby land uses)
7. Sample locations that are inaccessible

8. Anything that is unexpected on site (*e.g.*, appearance of drums that have not been previously recorded), along with any other field observations pertinent to the sampling event
9. Sample ID and sampler name
10. Sample description, (*e.g.*, color, texture, odor, soil type) and any other important distinguishing features.
11. Identification number, volume, sample interval, sampling method, and whether or not this is a quality control sample. Any sample manipulations such as compositing, as well as preservation techniques will also be recorded.
12. Sample analyses
13. Date and time of sample collection
14. Sample location, where possible, recorded with a Global Positioning System (GPS). If the GPS will not work (*e.g.*, too many overhead barriers), the location will be established via conventional methods (*i.e.*, measuring tape).
15. An explanation for all sample locations that are different than what is contained in the sampling plan (*e.g.*, utilities, inaccessible due to equipment storage).

IV. References

NJDEP, 2005. NJDEP *Field Sampling Procedures Manual*

Standard Operating Procedure
Decontamination

I. Introduction

The purpose of this Standard Operating Procedure (SOP) is to provide the protocols for decontamination of non-disposable field equipment used at Picatinny Arsenal for the MC soil sampling program. This SOP is based on the technical requirements contained in the New Jersey Department of Environmental Protection (NJDEP) *Field Sampling Procedures Manual*, August 2005, and N.J.A.C. 7:26E, Technical Requirements for Site Remediation.

II. Materials

a. Plastic sheeting
b. Buckets
c. Demonstrated analyte-free distilled and deionized water
d. 10% nitric acid (HNO_3) solution
e. Low phosphate detergent
f. Hexane (pesticide-grade or better)
g. Methanol (optima-grade)
h. Aluminum foil
i. PPE

III. Procedure

Sample Bottle Exterior

At the completion of each sampling activity the sample bottles must be decontaminated as follows:

a. Ensure that the bottle lids are on tight.
b. Wipe the outside of the bottle with a paper towel to remove excess soil or water.

Sampling Equipment

All non-disposable sampling equipment will be decontaminated after prior to each use in accordance with the following procedures. It should be noted that all decontamination will be conducted at an off-site facility.

a. Wash and brush the equipment with pre-sampled and approved water and low phosphate detergent.

b. Rinse off detergent with pre-sampled and approved water.
c. Rinse equipment with 10% HNO_3 solution.
d. Rinse equipment with pre-sampled and approved water.
e. Rinse equipment with optima-grade methanol.
f. Rinse equipment with pesticide-grade hexane.
g. Rinse equipment with demonstrated analyte-free distilled and deionized water, using at least five times the volume of solvent used in Step f.
h. Allow equipment to air dry.
i. Wrap equipment in aluminum foil.

IV. References

NJDEP, 2005. NJDEP *Field Sampling Procedures Manual*

USEPA, 1989. *Region II CERCLA Quality Assurance Manual*, Revision 1.

Standard Operating Procedure
Soil Sample Collection

I. Introduction

The purpose of this Standard Operating Procedure (SOP) is to provide the protocols for collecting soil samples at Picatinny Arsenal for the MC soil sampling program. This SOP is based on the technical requirements contained in the New Jersey Department of Environmental Protection (NJDEP) *Field Sampling Procedures Manual*, August 2005, and N.J.A.C. 7:26E, Technical Requirements for Site Remediation.

II. Materials

a. Field logbook
b. Indelible black pen ink
c. Global positioning system (GPS)
d. One-time use or decontaminated sampling equipment including augers, bowls or trays, and trowels. All sampling equipment will be inspected to ensure they are constructed of approved materials (*e.g.*, stainless steel), as per the U.S. Environmental Protection Agency Region II *CERCLA Quality Assurance Manual*, October 1989.
e. Personal protective equipment
f. Plastic zip-lock bags
g. Plastic garbage bags
h. Measuring tapes
i. Polyethylene sheeting
j. Aluminum foil
k. 8-oz glass sample jars
l. Paper towels
m. Sample coolers
n. Ice

III. Procedure

For the MMRP MC samples will either be collected randomly along a grid developed in VSP, or will be a biased sample associated with MEC. The gridded samples will be collected from 0-62 inches below ground surface either using a trowel or auger while the biased samples will be collected with a trowel at the depth where the MEC is found.

The following general precautions should be taken when sampling:

1. A clean pair of new, disposable gloves will be worn each time a different location is sampled. Gloves will be donned immediately prior to sampling.
2. Sample collection activities will proceed as permitted by site conditions.
3. Field personnel will use either disposable equipment for one-time use or equipment that has been properly decontaminated.
4. Information will be recorded in the field logbook in accordance with SOP PTA-02.
5. Quality control/quality assurance (QA/QC) samples will be collected according to SOP PTA-01.
6. The chain of custody and sample management procedures described in SOP PTA-01 will be followed.
7. For gridded samples, if sufficient sample volume cannot be obtained from a sample location, the sample location will moved no more than 20 feet in any direction until a location can be found where sufficient volume can be obtained.
8. For biased samples, if sufficient sample volume cannot be obtained, the Senior Chemist will be contacted for further direction.

<u>Procedure for Shallow Subsurface Soil Sampling Using A Hand Auger</u>

1. Prior to sample collection, mark the sample location on a site map. A description of the sampling site will be entered into the field logbook. This description will be adequate to allow the sampling station to be revisited at some future date. If applicable, a GPS may be used to locate the sample. If the GPS will not work on the property (*e.g.*, too many overhead barriers), the location may be established by using a measuring tape
2. Attach a decontaminated auger to a drill rod extension. Attach the "T" handle to the drill rod.
3. Clear the area to be sampled; remove surface vegetation, debris, or large stones prior to augering.
4. Collect a soil sample in six-inch intervals from under the vegetative mat using a decontaminated stainless-steel bucket auger. The required sample depth is 6-12 inches bgs.
5. After augering the six inch interval to be sampled, carefully withdraw the auger from the borehole.
6. Place the auger over a decontaminated stainless steel bowl and remove the remaining soil from the auger by lightly tapping the side of the auger with a trowel.
7. Homogenize the soil in the bowl using a stainless steel trowel or spoon. After any rocks or organic matter have been removed, the soil will be homogenized using the coning and quartering method (ASTM C702-80). In this method, the soil will be thoroughly mixed by turning the entire sample over three times using a stainless-steel trowel. Following the last turning, the entire sample will be

shoveled into a conical pile in the middle of the tray. The conical pile will then be carefully flattened to a uniform thickness and diameter by pressing down the apex with the trowel. The flattened soil will be divided into four equal quarters. The sampling personnel will then make a determination as to whether the amount of soil on the tray is larger than the volume of the sample bottles. If the amount of soil is larger, one or two quarters will be discarded. If two quarters are discarded, opposite quarters will be selected. After removal of one or more quarters, the entire coning and quartering sequence will be repeated until the amount of soil on the tray is approximately equal to the volume of the sample bottles to be filled.

8. Place the required soil volumes in the sample bottles.
9. Place the sample bottles into a sample cooler with ice and preserve at 4°±2°C.
10. Restore the void created by sample collection prior to leaving the sampling location. Use the soil from the intervals not sampled. Place the soil from the intervals back into the hole in order from the deepest interval to the shallowest interval. If necessary, commercially available potting soil or topsoil can be used to fill the void. Ensure that the area has been cleaned, and all sampling material has been removed.

<u>Procedure for Shallow Subsurface Soil Sampling Using A Trowel</u>

1. Prior to sample collection, mark the sample location on a site map. A description of the sampling site will be entered into the field logbook. This description will be adequate to allow the sampling station to be revisited at some future date. If applicable, a GPS may be used to locate the sample. If the GPS will not work on the property (*e.g.*, too many overhead barriers), the location may be established by using a measuring tape
2. For biased samples, using a trowel, collect a discrete soil sample immediately under, or adjacent to MEC where contamination is likely (*e.g.*, visual staining, near crack/corrosion).
3. For gridded samples, using a trowel, collect a discrete soil sample from the required location.
4. Homogenize the soil in the bowl using a stainless steel trowel or spoon. After any rocks or organic matter have been removed, the soil will be homogenized using the coning and quartering method (ASTM C702-80). In this method, the soil will be thoroughly mixed by turning the entire sample over three times using a stainless-steel trowel. Following the last turning, the entire sample will be shoveled into a conical pile in the middle of the tray. The conical pile will then be carefully flattened to a uniform thickness and diameter by pressing down the apex with the trowel. The flattened soil will be divided into four equal quarters. The sampling personnel will then make a determination as to whether the amount of soil on the tray is larger than the volume of the sample bottles. If the amount of soil is larger, one or two quarters will be discarded. If two quarters are discarded,

opposite quarters will be selected. After removal of one or more quarters, the entire coning and quartering sequence will be repeated until the amount of soil on the tray is approximately equal to the volume of the sample bottles to be filled.

5. Place the required soil volumes in the sample bottles.
6. Place the sample bottles into a sample cooler with ice and preserve at 4°±2°C.

IV. References

ASTM Method C702-80. *Reducing Field Samples of Aggregate to Testing Size*

NJDEP, 2005. NJDEP *Field Sampling Procedures Manual*

Standard Operating Procedure
Daily Quality Control Report

I. Introduction

The purpose of this Standard Operating Procedure (SOP) is to provide the protocols for completing the data quality control report.

II. Materials

a. Blank Daily Quality Control Reports
b. Indelible black pen ink

III. Procedure

The field team leader or designee will be responsible for filling out the daily quality control report (DQCR) each day MMRP MC field activities occur. If no problems are encountered, the DQCR must be sent to the MMRP MC project manager and QA/QC Manager on a weekly basis. If a problem is encountered, the MMRP MC project manager and QA/QC manager must be notified that same day and the DQCR must be forwarded to them immediately.

DAILY QUALITY CONTROL REPORT

Site: ____________________
Project No.: ____________________
Date: ____________________
Field Team: ____________________
____

Weather (circle)

	Bright Sun	Clear	Overcast	Rain	T-Storm	Snow
Temp:	0 to 32	32 to 50	50 to 70	70 to 85	> 85	
Wind:	Still	Gusty	Moder.	High	Direction:	
Humidity:	Dry	Moder.	Humid			

Subcontractors and Equipment on Site: ______________________________

____

____

____

Health and Safety Levels: (circle)

D	Mod. D	C	B	A

Summary of Health and Safety Activities: ______________________________

____

____

____

Instrument Used: (circle)	PID	LEL	pH	Cond	Therm.	Turbidity	DO	ORP
Calibrated: (check)								

For actual calibration results, see field calibration forms.

Summary of Work Performed: ______________________________

____

____

____

____

All samples were collected according to the procedures outlined in the planning documents?

Yes ____________ No ____________

Problems encountered/corrective actions taken: ______________________________

____

____

____

Time Project Manager Contacted: ______________________________

Problems encountered/corrective actions taken: ______________________________

____

____

Name: ____________________ Signature: ____________________

Standard Operating Procedure
Documenting Sample Locations with a GPS

I. Introduction

The purpose of this Standard Operating Procedure (SOP) is to provide the protocols for documenting global positioning system (GPS) data collection at field locations at Picatinny Arsenal for the MC soil sampling program.

II. Materials

a. Field logbook
b. Indelible black pen ink
c. Trimble GeoXT or Trimble GeoXH.

III. General Guidelines

1. Prior to beginning any survey activities, verify all power sources have been properly charged.
2. Once per day, a GPS point feature will be collected at a known survey location to provide control.
3. Quality control will be conducted with all data to ensure confidence that submeter accuracy was achieved for all points.

IV. Operation of the GPS

1. Getting Started

    A. Power up the unit by pressing the green button on the key pad. Start the TerraSync application by selecting the GPS link on the bottom right corner of the screen, or by selecting Terra Sync from the Start Menu.
    B. The GPS receiver will automatically connect to satellites. Verify this by looking at the top of the screen for a picture of a satellite and an adjacent number representing the number of satellites.
    C. Typically when you start the TerraSync software, the Status screen will be the first thing you see. After verifying that the GPS is connecting to satellites, also verify that the slide bar at the bottom of the screen is set in the middle. Sliding to the left will allow GPS positions of lower accuracy than approved for this project.

2. Data Collection

A. Open the dropdown menu in the upper left hand corner, and select Data. Make sure that the dropdown menu located just below this is set to “New” and the Dictionary Name is set to "(Your Project Name)” or the default data dictionary. All other settings can remain the same. Note that the default file name is set according to date. To create a new file, click on the “Create” button.

Note: It is recommended that a new data file be created for each day of data collection. If you wish to reopen an existing file at anytime, open the drop down menu near the upper right corner and change from “New” to “Existing”. A list of existing files will appear, then select the file name you wish to add data to.

B. A dialogue box will appear asking to confirm antenna height. Enter height of the antenna as measured from the ground surface. Unless you plan to use an external antenna, this height should represent how high you will hold the handheld unit when collecting data. When finished, click “OK”.

C. Now data collection can begin. You will see the two drop down menus on the upper left hand corner of the screen. The top menu will be set to *Data*, and the menu just below it will be set to *Collect* (see below). If not, use the dropdown menus to adjust. A list of features will be provided on the screen. Highlight the name of the feature you will collect GPS data for, then click “Create”.

D. After clicking Create, enter attribute data in the spaces provided. If a keyboard does not automatically appear, click on the small keyboard icon located at the bottom of the screen.

E. A number will appear in the top of the screen to the right hand side of the battery indicator. This number represents the number of GPS positions recorded for the current point feature. The number will increase as a new GPS position is recorded every 5 seconds. After 20 positions are collected, click “OK” The point feature is then stored and you’ll return to the feature list.

Notes:

If the picture and number of satellites start blinking, no positions can be collected. This indicates that satellites are too few, or PDOP is too high. It will resume as soon as the conditions improve.

The number just above the positions in smaller font represents the predicted postprocessed accuracy of your point. You will periodically receive a message if the carrier lock is lost. This is important because subfoot accuracy requires a carrier lock for at least two minutes.

Also notice the Pause button. Toggle this button on or off if to start or stop the collection of GPS positions.

2. Close the File. When finished collecting point features, click on the "Close" button. Close the TerraSync program by clicking the X in the upper right corner of the screen. Use the power button to turn off the unit.

   Note: If the GPS unit is idle for a period of time, it will go into Suspend mode. Press the green power button at any time to toggle the suspend mode on or off.

3. Using an external antenna (Optional)

   A. The GPS unit contains an internal antenna. An external antenna (Hurricane Antenna) can be used. Its benefits include a higher powered antenna that would likely increase satellite reception under tree canopy, but make little or no difference if there is an clear view of the sky. The external antenna is mounted on a pole which also helps place the antenna above the user's head, which sometime improves the view of the sky and subsequent number of satellite signals received.

   B. To use the external antenna, assemble the range pole, bracket, antenna, and cabling. Select "Setup" from the drop down menu in the upper right hand corner of the screen. Click on the button next to Antenna Height, select Hurricane Antenna from the list, and assign the antenna height of 2 meters (or 6.56 feet) which corresponds to the height of the range pole. It is recommended that the external antenna is connected while the handheld is turned off, or while the TerraSync field software is up and running. Do not attempt to connect the antenna while TerraSync is not running or is not currently the display screen. It is also recommended that the Antenna setting be changed back to internal antenna if you suspect the next operator will not be using an external antenna. The next operator may not know that the handheld unit is set for an external antenna and may encounter confusion while waiting for satellite reception.

4. Setting the Coordinate System

A. The coordinate system can be set by selecting "Setup" from the pull down menu in the upper right hand corner of the screen, then select "Coordinate System". Units are also set from the Setup screen. This is important if you wish to view coordinate values in the field, or calculate distances in the Map screen. It is also critical if you are using a background file such as an aerial photo because your position on the aerial photo would only display correctly if the GPS coordinate system matches the aerial photo coordinate system.

   It should be noted that if you plan to collect data in the field and manage the data later in other software (*i.e.*, Pathfinder Office or ArcGIS), the coordinate system and units can be established at that time. The coordinate system set on the GPS unit will only affect display properties because the GPS collects raw data that is projected in the desired coordinate system after download.

V. <u>Quality Control</u>

Quality control will involve a review of each point using Trimble Pathfinder Office software. Data review will include the following checks:

1. Confirm that each point was real-time corrected, Differential correction by post-processing will be conducted if real time corrections were not attained during data collection.

2. Confirm that the standard deviation does not exceed one meter. If standard deviation is greater than one meter, the GPS data will be re-collected.

3. Control points will be verified to ensure they are within one meter of their true location.

VI. <u>Transferring Files from the Datalogger to the PC.</u>

1. Plug the yellow "D" 9- pin connector into the Comm port on the PC
2. Plug the yellow "D" 9-pin connector, other end, into "Data i/o on the GPS battery charger
3. Plug in the charger (this will preserve the battery in the GPS)
4. Plug round pin connector from the battery charger into the round pin connector to the bottom port on the Trimble TSC1 hand-held unit
5. Turn on GPS TSC1
6. On the GPS, from the main menu, highlight and enter "**File Ma**nager"
7. Highlight and enter "**File Transfer**"
8. On the PC go to the PATHFINDER OFFICE program on the computer by double clicking on the PATHFINDER OFFICE icon from the Windows desktop.

9. Select the correct Project Name "(Project Name)" for the data to be transferred into (This should have already been set up)
10. Set Pathfinder Office display by selecting "View" dropdown and "Map", also select "Data" dropdown and "Feature Properties" and Position Properties"
11. Under the "Utilities" dropdown select Data Transfer
    a. "wait to connect", and "Connected to Asset Surveyor" should appear
    b. At "Press ADD to select file", press "Add – data file"
    c. Select Files from "Open", click OK
    d. Click on "Transfer All"
    e. After files transfer and are converted (automatically), close the transfer dialog box. The files are now located on the PC in C:\pfdata\
    f. Open the files one at a time (or else they will be combined into one view)
    g. Using "File", "open", (Select a file) open the file
    h. View Map showing the path of the surface rate scan, just to confirm that you have the data.

VII. <u>Performing the Differential Correction (post-Processing) of the GPS Data</u>

In Pathfinder Office do the following:

1. Select "(Project Name)"
2. "File", "Open" (This should be an .ssf file)
3. Open "Utilities" dropdown
    a. Select "Differential Correction"
    b. Verify that file is listed under "Selected Files"
    c. Check "Base File" – click on "Internet Search"
    d. Click "Yes" to "Do you want to download latest?"
    e. Click "Yes" (Important the first time, but not later. Do once a month.)
    f. Select the closest CORS location
    g. Click "OK"
    h. "Provider Properties" check OK
    i. "Base file loads" – Click OK

VIII. <u>Exporting the Data</u>

1) Initially on the computer, set the attributes prior to exporting data:
    i) "Utility" dropdown
    ii) Select "Export"
    iii) Click "New"
    iv) Set up name "(Project Name)"
    v) "Create":
        (1) "New Setup"
        (2) Select "MS Access MDB" or "ESRI Shapefile"

(3) Click "OK"

vi) "Properties" dropdown
- (1) Data tab
  - (a) Features
    - (i) Export All
    - (ii) Check "Include…"
    - (iii) Check "Sensor…"
- (2) Attributes tab
  - (a) Check "PDOP"
  - (b) Check "Corr Status"
  - (c) Check "Date"
  - (d) Check "Time"
- (3) Point Features Tab
  - (a) Check "Horizontal Precision"
- (4) All checked default boxes, leave as is.

vii) Click "OK" – the setup has been saved and no longer has to be done on this computer.

2) Exporting the Differentially Corrected Data
- i) Open the Differentially Corrected File .COR
- ii) "Utilities" dropdown
- iii) Select "Export"
  - (1) Check that the selected file is a .COR and is the correct file
  - (2) Note: If the project is listed then the following **bold** should already be set up:
    - (a) Output
      - (i) Check that it is C:\pfdata\"Project Name"\export
    - (b) Export Setup
      - (i) Check that it is Sample MS Access MDB Setup or Sample ESRI Shapefile Setup
    - (c) Properties
      - (i) Verify:
        1. Data Tabs (as above)
        2. Attributes (as above)
        3. Point Features (as above)
        4. Line Features (as above)
  - (3) Click "OK"
  - (4) Verify on Export Screen
  - (5) Click OK

Note: After the EXPORT has been performed an .MDB file is created and placed in: C:\pfdata\"Project Nmae"\export.

Standard Operating Procedure
Documenting Sample Locations without a GPS

I. Introduction

The purpose of this Standard Operating Procedure (SOP) is to provide the protocols for documenting sample locations, without the use of a global positioning system (GPS), at field locations at Picatinny Arsenal for the MC soil sampling program. GPS cannot be used at all locations due to interferences (*e.g.*, near buildings, dense tree canopy) and when enough satellites are not available.

II. Operation of a Compass

In general, there are two types of compasses: a basic compass ("Boy Scout" compass) and a Brunton compass (sometimes referred to as a pocket transit). Only a basic compass will be used at this site. The compass is used to measure horizontal angles. To do this, the instrument has a magnetic needle and a horizontal circle graduated into 360 intervals or degrees. Each instrument will also have a sight from which a target or a point can be aligned with the instrument.

In general, basic compasses will have sights or a line scribed onto the glass cover of the compass circle. To read the compass, hold it level to the ground surface so that the needle may float freely. Orient the compass so that north (N) and the needle are aligned. Then rotate the compass so that the compass sights are pointed into the direction of the sampling point. The horizontal angle with respect to magnetic north can then be read from the needle. Depending on the type of compass, the geographic direction of east and west may be inverted. The reasoning behind inverting these directions is to make reading the horizontal angle a direct reading-for example, north 40° east. Compasses using the normal orientation of east and west cannot be read directly. If you rotate the compass clockwise, to the east, the needle drifts westward and you could easily read the angle as north 40° west.

Other hints for operating a compass include using the damping button and rotating the horizontal circle. Holding the damping button will stop the movement of the needle and make reading the angle/direction easier. On some compasses the graduated horizontal circle may be rotated so a particular direction is read. This makes reading that angle easier, but should only be used if that particular direction is being used for long periods of time or over long distances.

III. Guidelines and Requirements

Several conventional methods used to locate sample points are detailed below. All these methods assume that the fixed points from which measuring will originate will be known points (controls) located on a map and/or plan, or oriented to an aerial photograph.

A. Two-line Measurement Method

1. Locate two control points on the property. The control point is a known location on a map or plan, but may also include buildings or other permanent objects.

2. From each control point, measure the distance from the control point to the sample point and determine the general direction (*e.g.*, southwest).

3. Record these data in the field logbook.

4. The distance from the control points will be plotted up in arcs with the center at the control point. Where the arcs of the two control points overlap is the location of the sample point. The arcs will intersect at two locations.

B. Three-line Measurement Method

1. Locate three control points on the property. The control point is a known location on a map or plan, but may also include buildings or other permanent objects.

2. From each control point, measure the distance from the control point to the sample point and determine the general direction (*e.g.*, southwest).

3. Record these data in the field logbook.

4. The distance from the control points will be plotted up in arcs with the center at the control point. Where the arcs of the three control points overlap is the location of the sample point.

C. Angle and Distance Method

1. Locate one control point; the control point (A) is a known location on a map or plan, but may also include buildings or other permanent objects.

2. From the control point locate the sample point. Measure its azimuth or bearing using a compass.

3. Once the horizontal angle of the point has been turned, measure the distance from the control point to the sample point.

4. Record these data in the field logbook.

IV. References

EPA, 1987. A Compendium of Superfund Field Operations Methods. Section 14: Land Surveying, Aerial Photography, and Mapping, pp. 14-1 to 14-5. Office of Emergency and Remedial Response, Office of Waste Programs Enforcement. U.S. Environmental Protection Agency, Washington, D.C. EPA/540/P-87/001. December 1987.

Standard Operating Procedure
Performing a Technical System Audit

I. Introduction

The purpose of this Standard Operating Procedure (SOP) is to provide the protocol for conducting a Technical System Audit (TSA) for the MC soil sampling program at Picatinny Arsenal.

II. Guidelines

The purpose of the TSA is to ensure that the sampling team adheres to the guidelines contained in the Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP). Prior to conducting the audit, a copy of the UFP-QAPP will be reviewed by the auditor (Site Quality Control (QC) Officer/Senior Chemist or designee). During the TSA the sampling team's adherence to these guidelines will be verified and any deficiencies from the guidelines will be documented. The effect of the deficiencies will be noted, and any necessary corrective actions will be instituted.

III. Conducting the TSA

The following procedures will be used to conduct the TSA:

1) The auditor will bring the following equipment/documents into the field:

    - Copy of the UFP- QAPP, and any relevant memos, correspondence or addenda
    - TSA audit checklist
    - Digital camera

2) The following aspects of the sampling event will be audited:

    - Sampling methodologies
    - Field documentation, including photographs
    - Sample management tasks

IV. Corrective Action in the Field

Besides observing and reporting, the auditor is responsible for initiating steps for the start-up of corrective action procedures. If the auditor witnesses discrepancies in the field between the UFP-QAPP and the performance of the sampling team, then the auditor has several options available for corrective action. These options are dependent upon the type of deficiencies observed.

Deficiencies observed and the corrective action taken must be documented in the auditor's log book.

Minor Deficiencies

Minor deficiencies are problems where the impact, if any, to the data can be easily eliminated and the deficiency can be corrected or the procedure repeated to achieve the desired result. Minor deficiencies that are observed by the auditor will immediately be brought to the attention of the field team. The auditor and the field team will discuss the problem and agree upon what corrective action is necessary. This will allow for the deficiencies to be corrected immediately in the field.

Major Deficiencies

Major deficiencies are events or procedures that substantially deviate from approved work plans, will result in increased project costs not previously approved, or will significantly impact the quality of the data. Upon witnessing a major deficiency, the auditor will temporarily stop all related site work and will inform the field team of the problem. The auditor and field team will discuss the deficiency as well as what steps are necessary for corrective action. If the deficiency can be corrected in the field, the auditor may allow work to resume as long as all necessary corrective actions are taken.

If the deficiency cannot be corrected in the field, a Stop-Work Order will be issued until appropriate measures can be taken to correct the problem. A written report of the major deficiencies will be prepared by the Site QC Officer and submitted to the USACE PM, Weston PM, and the ARCADIS/Malcolm Pirnie MMRP Technical Manager. The Stop-Work Order will remain in effect until the proper corrective action(s) can be implemented.

V. Preparation of a TSA Report

The TSA report provides a means of relaying the events of a sampling episode to key personnel. These events could possibly affect the sample integrity and therefore, are important to the decisions made regarding analytical data. This report will identify any deficiencies found in the field and will outline the corrective actions that were recommended/implemented to address any minor deficiencies observed. The field audit report will also recommend appropriate corrective actions for any major deficiency noted. Follow-up reports describing completed corrective actions which addressed major deficiencies will be submitted by the Weston PM to the USACE PM.

A TSA report will usually contain the following information:

- Date and location of field audit
- Sample matrices witnessed
- Name of personnel conducting the sampling

- Summary of sample methodology
- Description of any infractions that occurred and the corrective actions taken
- Conclusions
- Recommendations
- QC field audit checklist (refer to attachment)

III. REFERENCES

U.S. EPA Region II CERCLA Quality Assurance Manual. Part II, Quality Control Handbook for CERCLA Sampling and Analysis, Section XV. October 1989, Rev. 1.

N.J. Department of Environmental Protection - Field Sampling Procedures Manual, August 2005.

TECHNICAL SYSYEM AUDIT REPORT

SUMMARY INFORMATION

1. PROJECT NAME: Picatinny Arsenal MMRP RI MC Investigation ____________________

2. MRS ID AND LOCATION:____

____

3. DATE(S) OF QC FIELD AUDIT____

4. AUDITOR'S NAME ______________________ PHONE No. ________________

5. PERSONNEL ON-SITE

NAME	REPRESENTING	PHONE
____________________	____________________	______________
____________________	____________________	______________
____________________	____________________	______________
____________________	____________________	______________
____________________	____________________	______________

6. AUDITOR'S COMMENTS

____

____

____

7. WEATHER CONDITIONS

SUNNY PARTLY SUNNY PARTLY CLOUDY CLOUDY RAIN DRIZZLE SNOW SLEET

TEMPERATURE ___________ WIND DIRECTION ______________

8. FIELD INSTRUMENTS (ONLY MARK THE INSTRUMENTS THAT WERE REQUIRED FOR THIS SAMPLING/MEASUREMENT EVENT)

INSTRUMENT	WAS RESPONSE/ CALIBRATION CHECKED AND RECORDED
A) ______	
B) ______	

COMMENTS:

______

______

FIELD MEASUREMENT REQUIREMENTS

1. WERE THE REQUIREMENTS CONTAINED IN THE UFP-QAPP, AND SOPs FOLLOWED? ______

   ______

2. WERE THE PROPER SAMPLE LOCATIONS CHOSEN? ______

3. WERE THE REQUIRED NUMBER OF QC MEASUREMENTS COLLECTED? ______

______

4. WERE THE REQUIRED FIELD NOTES TAKEN (e.g., DATA SHEETS, MAPS, ETC.)? ______

______

5. WERE THE REQUIRED PHOTOGRAPHS TAKEN? ______

6. COMMENTS: ______

______

______

SOIL SAMPLE INFORMATION

1. WHAT MATIX WAS SAMPLED?
2. WERE THE REQUIREMENTS CONTAINED IN THE UFP-QAPP, AND SOPs FOLLOWED?
3. WERE THE PROPER SAMPLE LOCATIONS CHOSEN?
4. WERE THE REQUIRED NUMBER OF QC SAMPLES COLLECTED?
5. WERE THE REQUIRED FIELD NOTES TAKEN (e.g., DATA SHEETS, MAPS, ETC.)?
6. WERE THE REQUIRED PHOTOGRAPHS TAKEN?
7. FOR THE CHEMICAL SAMPLES, WERE THE PARAMETERS HOMOGENIZED AND COLLECTED IN THE PROPER ORDER?
8. WAS THE OUTSIDE OF ALL THE SAMPLE CONTAINERS DECONNED?
9. WERE THE CHEMICAL SAMPLES PLACED ON ICE?
10. WHAT TYPE OF SAMPLING EQUIPMENT WAS USED?
11. WHAT MATERIALS WERE THE SAMPLING EQUIPMENT MADE OF?
12. WAS ALL THE SAMPLING EQUIPMENT DECONTAMINATED PRIOR TO USE?
13. WHAT DECONTAMINATION PROCEDURE WAS USED?
14. WAS A RINSATE SAMPLE COLLECTED?
15. WERE DISPOSABLE GLOVES WORN AND CHANGED BETWEEN EACH SAMPLE LOCATION?
16. COMMENTS:

LABORATORY INFORMATION

1. LABORATORIES:

   NAME______________________________________PHONE______________________

   NAME______________________________________PHONE______________________

2. WHAT QA/QC SAMPLES WERE COLLECTED?______________________________________

3. WERE THE SAMPLE CONTAINERS PROPERTY LABELED?____________________________
4. WAS THE CHAIN-OF-CUSTODY FORM PROPERLY FILLED OUT?________________________
5. WERE CUSTODY SEALS PLACED ON THE BOTTLES AND COOLERS?_____________________
6. WAS EACH SAMPLE PLACED IN ITS OWN ZIPLOCK BAG?____________________________
7. WERE THE SHIPPING COOLERS PACKED PROPERLY?_______________________________
8. WERE THE SHIPPING COOLERS SCANNED FOR RADIATION?_________________________
9. COMMENTS:____

APPENDIX C

TPP 1 AND TPP 2 MEETING MINUTES

Final Meeting Minutes
Technical Project Planning Meeting 1
Picatinny Arsenal Military Munitions Response Program Remedial Investigation
Picatinny Arsenal, New Jersey

On 10 November 2010, representatives from the stakeholder organizations listed below attended the Military Munitions Response Program (MMRP) Remedial Investigation (RI) Technical Project Planning (TPP) 1 meeting at Picatinny Arsenal, New Jersey. The purpose of this meeting was to bring all of the stakeholders together to identify and discuss project goals and data quality objectives, and ultimately agree upon the path forward for successfully completing the RI.

Points of Contact:

Picatinny Arsenal Environmental Restoration– Ted Gabel, Project Manager, 973-724-6748
U.S. Army Corps of Engineers – Baltimore District – Nancy Flaherty, Project Manager, 410-779-2796
Contractor, Weston Solutions, Inc. – Laura Pastor, Project Manager, 610-701-3445

Meeting Attendees:

Name	Organization	Title
Richard Braun	USACE – Baltimore District	Risk Assessor
Barbara Dolce	Subsurface Solutions LLC/PTA RAB	TAPP Contractor
Nancy Flaherty	USACE - Baltimore District	Project Manager
Ted Gabel	PTA Environmental Restoration	Project Manager/MMRP Program Manager
Megan G. Garrett	USACE – Baltimore District	Geologist
Michael Glaab	PTA RAB	Member/Co-Chair
Brian Guthrie	WESTON	Geophysicist
Judy Hackett	WESTON	Client Service Manager
Jim Kealy	NJDEP	Technical Coordinator
Mary Ellen Maly	USACE	Army Restoration Manager
Joseph Marchesani	NJDEP	Hydrogeologist
Deborah McKinley	USACE – Baltimore District	Project Engineer
Cliff Morris	PTA RAB/Tilcon (Mt Hope Quarry)	Community Representative/Plant Manager
Laura Pastor	WESTON	Project Manager
Jim Pastorick	UXO Pro/NJDEP	Technical Representative
Bill Roach	USEPA.	Remedial Project Manager
Tom Silecke	PTA	Environmental Affairs
J.B. Smith	PTA	UXO Safety/MMRP Project Manager
Ryan Steigerwalt	WESTON	Senior Geophysicist
Lisa Szegedi	MPI	MMRP Technical Manager
Diane Trocchio	PTA RAB /Rockaway Township Health Department	Member and Township Representative
Deb Volkmer	WESTON	Meeting Recorder
Lisa K. Voyce	PTA RAB/Mine Hill Representative	Member
Greg Zalaskus	NJDEP	Case Manager

AEC – Army Environmental Command
MPI – Malcolm Pirnie
NJDEP – New Jersey Department of Environmental Protection
TAPP – Technical Assistance for Public Participation
USEPA – U.S. Environmental Protection Agency
WESTON – Weston Solutions, Inc.

1. Overview of the TPP and Purpose of the MMRP

(Laura Pastor, WESTON)

Ms. Pastor provided an overview of the TPP process, stressing the importance of collaboration with regulators and stakeholders early in the project planning process. Ms. Pastor discussed that fact that the presentation will be more technically detailed than traditional TPP 1's since the regulators and stakeholders already had a very good understanding of Picatinny Arsenal (PTA)'s MMRP with experience gained during the MMRP Site Inspection.

2. Overview of the Picatinny MMRP Remedial Investigation (RI) Objectives (*Presentation Slides 8-18*)

(Laura Pastor, WESTON)

Ms. Pastor presented an overview of the Picatinny MMRP RI objectives. The discussion included the RI objectives including characterizing the nature and extent of munitions and explosives of concern (MEC) and munitions constituents (MC), planning documentation (work plans), field investigation (data collection), and reporting requirements (RI report with updated conceptual site models, hazard assessments, risk assessments, and Munitions Response Site Prioritization Protocol update).

Mr. Gabel, PTA, briefed the group on the status of the Picatinny MMRP and discussed several previous projects including the MMRP Site Inspection, Environmental Engineering/ Cost Analysis, time critical removal actions (TCRA) at Tilcon quarry and removal action at the Former DRMO Yard. Mr. Gabel mentioned unexploded ordnance (UXO) construction support is required at PTA and an upcoming non time-critical removal action (NTCRA) regarding Land Use Controls (LUC) at Picatinny scheduled shortly and Decision Document regarding the EE/CA.

Mr. Pastorick, UXO Pro, and Mr. Glaab, PTA RAB questioned why the TCRA was stopped. JB Smith indicated that the TCRA demolition processes were currently being investigated by the Picatinny safety department and the Picatinny Command has requested that denotation on and near Picatinny not be conducted by a contractor until this issue is resolved. [Note: The TCRA discussion is not directly related to the MMRP RI.

Ms. Pastor presented the munitions response sites (MRSs) under the MMRP RI performance work statement (PWS):

- 1926 Explosion Radius (PICA-003-R-01)
- 1926 Explosion Radius – Off-Post (PICA-004-R-01)
- Green Pond (PICA-005-R-01)
- Former Operational Area (PICA-006-R-01)
- Lakes (PICA-008-R-01)
- Shell Burial Grounds (PICA-010-R-01)
- Lake Denmark – Off-Post (PICA-012-R-01)
- Inactive Munitions Waste Pit – Off-Post (PICA-014-R-01)

- Ms. Flaherty, USACE, indicated that the Inactive Munitions Waste Pit (on-post) MRS and the Former Munitions and Propellant Test Area MRS are currently identified as optional sites under the PWS. These sites are being evaluated by the installation to determine if they will again be used as operational ranges. If these sites do not go operational they will be included in the Picatinny MMRP RI.

Mr. Kealy, DEP, asked if there were operational areas in the Inactive Munitions Waste Pit MRS. Mr. Smith, PTA responded that ranges do exist in that area and that the ranges stretch from almost the lower tip of Lake Picatinny extending to the northeast and are in the process of being redefined.

Mr. Gabel, PTA, included that the Installation Restoration Program (IRP) is also investigating sites in the MRSs and those areas are not associated with the MMRP.

Mr. Gabel noted that since LUCs (Institutional Controls and Engineering Controls) are most likely the expected outcome for most of the PTA hence the investigation of onsite PTA could be different or less that of offsite.

3. Overview of Data Quality Objectives (DQOs) and Site Wide Conceptual Site Model (CSM) (*Presentation Slides 19-23*)

(Lisa Szegedi, MPI)

Ms. Szegedi, MPI, provided an overview of the DQOs developed based on the EPA's 7 Step Process to develop characterization strategies for each MRS. The CSMs developed for each site was used to determine the primary MEC and MC release mechanism which drove the problem statement for the characterization strategy.

4. MEC and MC Characterization Strategies (*Presentation Slides 24-32*)

(Lisa Szegedi, Malcolm Pirnie and Ryan Steigerwalt, WESTON)

Ms.Szededi and Mr. Steigerwalt, WESTON, presented the details of the proposed investigative field activities. An overview of the investigation approach for MEC was discussed including the statistical applications used to determine type, coverage and location of geophysical surveys (including mag & dig surveys and digital geophysical mapping). MC sampling strategies and techniques were developed using a combination of discrete and statistically sampling designs to fully characterize potential MEC releases.

Mr. Steigerwalt provided details of the application of the statistical tools Visual Sample Plan (VSP) and UXO Estimator. In summary, the VSP is used to develop a sampling plan at MRSs with potential MEC releases where locations are unknown. UXO Estimator develops sampling plans at MRS with a homogeneous distribution of MEC to assess remaining MEC density.

Mr. Roach, EPA, asked about the standard for homogenous distribution. Mr. Steigerwalt responded that a non-homogenous area would be an impact area that was high density and the surrounding area would be a lower density. In a homogeneous area, you have the same probability of finding MEC in one area as you would another.

Mr. Steigerwalt explains that to meet performance objectives for positioning (GPS), GPS will be used first. If it fails, then a laser system (Robotic Total Station) or line and fiducial positioning would be used.

Mr. Pastorick mentioned that he has been working with Ms. Amy Walker (USACE) on a separate project where a similar geophysical system verification process to what is planned for Picatinny is being used. The industry standard objects being used for that project were not providing standard responses. Mr. Pastorick questioned how WESTON planned to address this issue. An idea was brought up to test each item before seeding them. It was also mentioned that the original GPO seeds could possibly be used.

Mr. Zalaskus, DEP questioned if enough previous work has been performed in the 1926 explosion radius to understand the site and reduce the amount of work that would need to be conducted as part of the MMRP RI. Mr. Steigerwalt responded that the team will use this information for site characterization, however the data isn't compatible with the statistical approaches we plan to use for the RI and additional data needs to be collected to achieve our objectives

Mr.Zalaskus asked how the previous MEC items recovered across the installation will be used as part of the MMRP RI. Mr. Steigerwalt responded that the MEC recovery information available will be included in a project GIS database for further evaluation.

Mr. Smith indicated that MEC recovery information from the UXO Finds map may not be completely accurate. Locations of previous MEC recovered on the installation may be generalized rather than presenting an exact location. Ms. Szegedi noted that the UXO Finds map is currently being digitalized and the metadata will indicate that these items are only approximate locations to differentiate from items that have exact GPS positions.

Ms. Voyce, PTA RAB suggested looking at a different sampling design for MC that starts with biased areas and then layer the statistical sampling on that.

The presentation listed potential MC that can be expected based on munitions that have been used at the site. These MC will be used to focus sample analysis. The list of potential MC contaminants can be expanded if different munitions types are recovered.

Mr. Gabel asked if there will be a step out process for samples that have elevated MC concentrations. Ms. Szegedi responded that it would be a phased sampling approach which includes delineation. Sampling data would be analyzed and if results are above Applicable or Relevant and Appropriate Requirements (ARARs), step out (phase II) sampling would be conducted.

Table shown on the next page is a summary of MEC/MC activities applicable to each MRS.

MRS	MEC Activities	MC Activities
1926 Explosion Radius (PICA-003-R-01)	Yes	Yes; assumed to be associated with MEC
1926 Explosion Site – Off-Post (PICA-004-R-01)	Yes	Yes; assumed to be associated with MEC
Shell Burial Grounds (PICA-010-R-01)	Yes	No; covered under IRP
Green Pond (PICA-005-R-01)	Yes	No; covered under IRP
Former Operational Areas (PICA-006-R-01)	Yes	Yes; gridded and biased (associated with MEC)
Inactive Munitions Waste Pit – Off-Post (PICA-014-R-01)	Yes	Yes; assumed to be associated with MEC
Lakes (PICA-008-R-01)	Yes	Yes; land only (assumed to be associated with MEC)
Lake Denmark – Off-Post (PICA-012-R-01)	Yes	Yes; assumed to be associated with MEC

5. MRS Specific Discussions (*Presentation Slides 33-123*)

(Lisa Szegedi, Malcolm Pirnie and Ryan Steigerwalt, WESTON)

Ms. Szegedi and Mr. Steigerwalt presented the technical approach each of the eight Picatinny MRSs, with each MRS addressed independently. The CSM (current and future land use and former military munitions-related activities, SI results and recommendations) for each MRS was presented. The details of the RI technical approach discussion including locations and quantities of geophysical surveys and MC sampling requirements for each MRS. The following sections summarize the proposed technical approaches, discussions and questions posed by the stakeholders after each MRS presentation.

1926 Explosion Radius (*Presentation Slides 33-57*)

The MEC characterization strategy for the 1926 Explosion radius is to investigate the two MRSs as one. An inner radius and an outer radius have been identified in the SI. The strategy for the Inner Radius is to perform geophysical investigations of 17, 50x50 ft grids randomly distributed in undisturbed areas to determine at a 95% confidence level MEC density is less than an average of 3MEC/acre (UXO Estimator). DGM will be performed on the grids unless areas are inaccessible to the DGM equipment. All anomalies are to be intrusively investigated. The strategy for the outer radius is to perform mag and dig on 43 (50 x 50 ft grids) and DGM on 59 (50x50 ft) grids randomly distributed in undisturbed areas to verify at a 95% confidence level MEC density of less than 0.5MEC/acre (UXO Estimator). All anomalies are to be intrusively investigated.
The MC sampling strategy is to perform biased sampling where MEC or MPPEH is found and has evidence of being breached (cracked or leaking). Samples will not be collected under intact items. Phase II step-out sampling to delineate MC, if necessary

Mr.Pastorick asked if the data from the work completed at Tilcon was included. Ms. Szegedi responded that the data from the EE/CA and TCRA was being used and provided a brief discussion of the previous work conducted and results.

Ms. Flaherty said that it appears that the Child Development Center (CDC) had some other purpose that was not associated with the 1926 explosion since munitions not associated with that time period were recovered. Mr. Zalaskus asked if the CDC location was treated differently. Ms. Flaherty said the removal at the CDC area was performed during the EE/CA because the installation needed that site.

Ms. Dolce asked if the CDC site was still considered part of the 1926 explosion, a separate site, and considered in the RI even though the EE/CA was performed there. Ms. Szegedi responded the CDC area is included in the RI as part of the 1926 Explosion Radius MRS. Ms. Maly, AEC, said that during an RI it is not uncommon to investigate a larger area with smaller areas of interest long as they are similar in nature. It is possible to find that there are other areas similar to the CDC during the investigation so it is not necessary to split out one area at this time. It is an administrative hassle on the Army side.

Mr.Glaab asked if the MEC density at the CDC was unusually high. Mr. Gabel responded that it was higher than any other area included in the EE/CA. Ms. Flaherty said the CDC location was primarily undeveloped and all the munitions were removed before building the center. Mr. Smith said the MMRP provides UXO construction support for intrusive work at areas known to have been subjected to munitions related activities.

Mr.Kealy asked if the work should include investigating the area outside the footprint of the CDC. Lisa Szegedi noted that the CDC falls into the high density division of the 1926 Explosion Radius MRS.

Mr.Pastorick asked why 3 MEC per acre within the inner circle of the 1926 radius was selected as the goal and was it adequate for future decision making. Mr. Steigerwalt responded that it was based on results of previous finds, TCRA and EE/CA information.

Mr. Pastorick asked if there was any advantage to conduct biased sampling in the inner circle that can help with decision making. Ms. Szegedi responded that sampling will be conducted in grids that are located in undisturbed areas (where most of the MEC recovered during the EE/CA were found). Additional discussion focused on the sampling design. Mr. Steigerwalt said the sampling design developed using UXO Estimator isn't to locate MEC but to confirm that there is less than a certain number of MEC per acre in a specific area.

Ms. Pastor said that it is possible and Weston is working with USACE to hold a workshop for the UXO estimator and VSP applications for anyone who would be interested. Attendees expressed interest in such a workshop. Ms. Maly said the Army has a MMRP 101 class that is 3½ days but could be focused to meet the needs of the group. Ms. Flaherty said the team will look into options.

Shell Burial Grounds (*Presentation Slides 58-62*)

The MEC characterization strategy for the shell burial grounds is to delineate buried debris at crater locations. Geophysical investigations will be performed on 0.23 acres or 3,326 linear feet. Transect surveys will be performed on 75-ft spacing using an EM31-MK2. The results of the surveys will be used to confirm/refine the MRS footprints and determine the horizontal and vertical extents. No intrusive investigations are planned. MC investigations will not be performed as it has been addressed under the IRP.

Barbara Dolce asked what the team expects to accomplish there because it is already fenced and the certain volume of material is known, why not just evaluate the perimeter. Mr. Smith said the team is trying to characterize the site and confirm if the site is larger or smaller and to ensure the proper controls are in place.

Green Pond (*Presentation Slides 63-70*)

Geophysical investigations will be performed on 2.82 acres. Mag & dig transects will be performed in accessible areas of the Former DRMO Yard (not including areas previously excavated areas), along the banks and in the water of Green Pond Brook for a total coverage of 2.5 acres or 2.08 miles. EM31-MK2 transect surveys will be performed along the banks of Green Pond Brook to identify disposal/fill areas for a total coverage of 0.26 acres or 3,800 linear feet. Mag & dig focused grids (0.06 acres) will be placed in areas identified as disposal/fill areas from the EM31-MK2 surveys. All anomalies will be intrusively investigated in the grids. MC investigations will not be performed as it has been addressed under the IRP. The 300 Marsh Area is co-located to Green Pond and will be discussed later in the presentation.

Mr.Zalaskus asked if it was possible that MEC was disposed of in EOD Pond or other ponds in the areas and if the ponds were natural or man-made. Ms.Szegedi responded that there was anecdotal evidence that they might have dumped into Picatinny Lake and Lake Denmark. Ponds were wetlands at time of explosion and historical photographs before 1926 did not show if the ponds were naturally formed or man-made.

Former Operational Areas (*Presentation Slides 71-85*)

The MEC characterization strategy for the Former Operational Areas consists of performing mag & dig or DGM transects on 250-ft spacing as determine from VSP calculations. VSP input includes using a potential size of MEC release of approximately 5-acres and applying 10 anomalies/acre with a potential MEC release area of 50 anomalies/acre. Total coverage of mag & dig surveys is 72 acres or 60 miles. A total of 5.5 acres or 15 miles of DGM transects using an EM61-MK2 will be performed. Additional transects may be required to delineate potential MEC. Additional transects may be required to delineate potential MEC. Five 100-ft x 100-ft focused grids (1.15 acres) will be placed in areas identified from transect surveys to evaluate geophysical anomalies. The MEC characterization strategy for the Former Sanitary Landfill and Waste Burial Areas will be to delineate the horizontal extents of these areas. Geophysical investigations will consist of performing EM31-MK2 transect surveys on 75-ft spacing across the landfill and burial areas. The MC characterization strategy for the MRS is to take a gridded sampling approach. Only soil samples will be collected as most water bodies are covered under the IRP. The sampling areas exclude all partially or wholly collocated IRP sites. Sample locations determined by VSP with assumptions that the site is contaminated, not normally distributed, and to collect data to reach 95% confidence level. Approximately 90 samples will be collected at 6-12 inches below ground surface. Phase II step sampling will be performed to delineate the extent of MC, if necessary.

Mr.Kealy asked if MEC items recovered during the geophysical surveys will be blow-in-place. Laura Pastor responded they will blow-in-place when they find something. Nancy Flaherty added that demolition activities may be performed by EOD.

Mr. Gabel clarified that G2 Pond, Stillwell Pond, and Hydro Pond (Presentation Slide 81) are not part of the eligible area and are not included in the MMRP.

Picatinny Lake (*Presentation Slides 86-96*)

Geophysical investigations of Picatinny Lake will consist of two phases and includes performing surveys across the lake (water investigations), and surveys of the land portions around the lake. The strategy for water investigations will be to evaluate existing geophysical data to create a dig list for the investigation. Underwater DGM transects will be perform to verify the existing geophysical data and to fill in data gaps. A total of 3 miles or 1 acre of transects will be performed across the lake. The data will be analyzed and additional targets will be added to the dig list. Prior to performing underwater intrusive investigations, DGM instrumentation will be used to refine target locations. Qualified divers will investigate 25 anomalies. Additional investigations will be performed on near shore/shoreline anomalies based on the existing data and mag & dig transect results. Land investigations will consist of performing 2.7 miles or 3.2 acres of mag & dig transect surveys along the shoreline of the lake, and across the firing point and slug butt locations. A 100-ft x 100-ft (0.25 acres) focused grid will be placed at the firing point to look for potential burial pits of DMM. An EM61-MK2 will be used to survey the grid and all anomalies will be intrusively investigated. No MC sampling.

Mr.Zalaskus asked if the water investigation was only visual or would the team dive investigate. Mr. Steigerwalt responded that first the team will locate the anomaly source and then dive team would intrusively investigate the anomaly.

Ms. Pastor stated that the underwater investigations are planned for sometime in 2012.

Lake Denmark (*Presentation Slides 97-107*)

Geophysical investigations of Lake Denmark will consist of two phases and includes performing surveys across the lake (water investigations), and surveys of the land portions around the lake. The strategy for water investigations will be to evaluate existing geophysical data to create a dig list for the investigation. Underwater DGM transects will be perform in the mortar range impact area. A total of 4.4 miles or 1.6 acres will be collected. The data will be analyzed and additional targets will be added to the dig list. Underwater intrusive investigations will be performed on 5 high density area target locations by qualified divers. Additional investigations will be performed on near shore/shoreline anomalies based on the existing data and mag & dig transect results.

Land investigations will consist of performing mag & dig transects surveys and DGM focused grids. Transect spacing on the northern side of the lake will be 120-ft, based on VSP calculations with 20-mm projectile input parameters. The southern side of the lake will consist of 225-ft transect spacing based on VSP calculations with 60-mm mortar input parameters. A total of 10.9 miles or 13.4 acres of mag & dig transect surveys and shoreline surveys will be collected. Additional transects may be performed as needed (20-mm impact area) to fully delineate MEC. One DGM focused grid (100-ft x 100-ft) will be placed at each of the firing points and surveyed with an EM61-MK2 to look for potential DMM burial areas. All anomalies will be intrusively investigated within each grid

Mr.Kealy asked what the ultimate goal at this MRS was assuming that Lake Denmark contains mortars. Mr.Smith responded that currently land use controls are in place for the lake. Recreational users must remain in boats and swimming is prohibited.

Lake Denmark – Off-Post (*Presentation Slides 108-116*)

The MEC characterization strategy for Lake Denmark-Off Post is to will consist of performing 3.25 miles or 3.9 acres of mag & dig transect surveys at a spacing of 225-ft based on VSP calculations with 60-mm mortar input parameters. The surveys will be a continuation of the Lake Denmark (On Post) surveys on the southern side of the lake. Additional transects may be performed as necessary to delineate MEC. Four focused grids (0.94 acres) will be placed in areas identified from transect surveys to evaluate geophysical anomalies. All anomalies will be intrusively investigated.
MC sampling will be performed if MEC and/or MPPEH is discovered during the mag & dig surveys. Samples collected will be biased towards MEC locations. Phase II step-out sampling to delineate MC will be performed, if needed.

Inactive Munitions Waste Pit – Off-Post (*Presentation Slides 117-123*)

The characterization strategy for the Inactive Munitions Waste Pit-Off Post will be to perform full coverage mag & dig surveys of all accessible areas. These areas are primarily located at the top and bottom of the slope. Total coverage is approximately 3 acres.

6. Technical Approach – 300 Marsh Area (*Presentation Slides 124-128*)

(Lisa Szegedi, Malcolm Pirnie)

The MEC characterization strategy for the 300 Marsh Area is to perform focused mag & dig transects spaced 50-ft apart to determine anomaly densities across the area. One EM61-MK2 DGM grid (100-ft x 100-ft) will be placed in a high density area as determined from the transect survey to determine the nature/extent of MEC. All anomalies will be investigated within the grid as well as transects.

MC sampling strategy will follow an approved PTA Work Plan for the 300 Marsh Area. Up to 15 biased MC samples will be collected adjacent to disturbed soil, MEC, and or MPPEH. If there are less than 15 biased sample locations identified, soil samples will be gridded across the area and collected at multiple depths to define the areal extent of contaminants of potential concern (COPCs). The results of the soil samples will be used to evaluate risk based on concentrations detected

The presentation summarized site information, MEC characterization, chemical sampling, and analyses required for the 300 Marsh Area, which is not a separate MRS but is included in the MMRP as part of the 1926 Explosion Radius.

7. Next Steps (*Presentation Slide 129*)

(Laura Pastor, WESTON)

Ms. Pastor provided a discussion of the next steps of the TPP process. Work plan development would continue taking into account the TPP 1 discussions. Anticipated schedule to submit draft to Army and draft final to regulators/stakeholders was presented **[Note: schedule has been revised to reflect a draft submittal to Army on February 2011. Draft final submittal to regulators sometime in April 2011].** A TPP Meeting 2 will be scheduled a few weeks after the draft final has been submitted to the regulators. This will allow the regulators/stakeholders an opportunity to digest the approaches for additional discussion. In addition, a more in-depth discussion on implementation and logistics will be included for this meeting. Field activities are scheduled to begin late in 2011.

Additional Discussions

A conversation was held to discuss Tilcon's land management plans to build a berm on their property and the potential delays in doing this due to the delays in completing the TCRA. The regulators expressed discontent about covering potential MEC. The Army will work to resolve TCRA delays so that Tilcon can proceed with their plans.

Action Items

– Complete and distribute TPP 1 meeting minutes.

As required by the TPP process, the following table lists the stakeholders who were unable to attend the TPP 1 meeting.

Name	Organization	Title
Tom Colozza	USACE – Baltimore District	QA Geophysicist
Travis McCoun	USACE – Baltimore District	MMRP Program Manager

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON, PICATINNY
PICATINNY ARSENAL, NEW JERSEY 07806-5000
September 1, 2011

REPLY TO
ATTENTION OF
Environmental Affairs Division

SUBJECT: Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)/Interagency Agreement (IAG) Administrative Docket No. II-CERCLA-FFA-001-04: Final Meeting Minutes for the July 28th Technical Project Planning Meeting Military Munitions Response Program Remedial Investigation: Review is ER-A eligible

Mr. William Roach
U.S. Environmental Protection Agency
Region 2
290 Broadway, 18th Floor
New York, NY 10007-1866

Mr. Gregory Zalaskus
New Jersey Department of Environmental Protection
Emergency Management Program
East State Street, Floor 5, P.O. Box 028
Trenton, New Jersey 08625-0028

Dear Sirs:

Enclosed for your records are the Final Meeting Minutes for the July 28th Technical Project Planning Meeting Military Munitions Response Program Remedial Investigation.

The Army-approved minutes that have been modified based on comments contained in email from Greg Zalaskus. NJDEP PM, Lisa Voyce, member of the Restoration Advisory Board (RAB) and Mike Glaab, Civilian Co Chair of RAB (see attached.) I am also providing a response to comments for clarification on how the minutes were changed. Bill Roach gave his concurrence on the minutes on 30 August.

Sincerely,

Project Manager for
Environmental Restoration

Enclosures
CC (emailed only):
Mr. Jim Kealy, NJDEP
Mr. Joe Marchesani, NJDEP (hardcopy)
Ms. Barbara Dolce, TAPP Contractor
Mike Glabb, RAB Co-Chair
Remainder of the 10 November Attendee List

Attachment:
Copies of emails providing comments or concurrence to the Army Approved Minutes

1. Copy of 29 August email from Bill Roach, EPA PM:

From: Roach.Bill@epamail.epa.gov [mailto:Roach.Bill@epamail.epa.gov]
Sent: Tuesday, August 30, 2011 10:25 AM
To: Gabel, Ted Mr CIV USA IMCOM
Cc: subsurfacesolns@earthlink.net; gzalasku@dep.state.nj.us
Subject: Re: Army Minutes from the TPP Meeting (UNCLASSIFIED)

Ted, I have no comments on these meeting minutes.

2. Copy of 25 August email from Mr. Mike Glaab, RAB CoChair:

From: Michael [mailto:michaelglaab@att.net]
Sent: Thursday, August 25, 2011 2:28 PM
To: Gabel, Ted Mr CIV USA IMCOM
Cc: P. E. William A. Roach; Gregory Zalaskus; Barbara Dolce
Subject: RE: Army Minutes from the TPP Meeting (UNCLASSIFIED)

Hello Ted:

Just a few possible typos noted. Suggestions are included in the attached file as inserted notes.

- ***"Mr. Zalaskus, NJDEP and Mr. Pastorick, UXO Pro, also indicated that stating there is a health and safety concern with intrusive investigations at this MRS is not sufficient. Additional information is required to definitively state that intrusive investigations cannot be completed. Ms. Maly, USAEC, suggested that the Army team ask USATCES and DDESB if intrusive work in the shell burial grounds would be allowed. Mr. Smith, PTA, also indicated that the evacuation distance would likely involve evacuating numerous surrounding towns and would affect several major highways."***

In addition, please note the following with regard to the record of discussion on page 5 concerning further investigation of certain locations where significant amounts of MEC may possibly exist:1. Though the word "drill" was uttered several times during the second day's meeting it was not included in the minutes. The phrase "intrusive investigation" was used instead. This seems acceptable to me since I assume that "intrusive investigation" may be presumed to be inclusive of drilling for samples as a possible option.
2. Although the possibility of having to conduct an evacuation of Jefferson was specifically mentioned during the second day's meeting the word "Jefferson" was not included in the minutes. However, since the minutes do clearly indicate discussion regarding possible evacuation of areas inside and outside the arsenal this seems acceptable.

Respectfully,
Michael Glaab

3. Copy of 26 August email from Ms. Lisa Voyce, RAB member:

From: Voyce, Lisa [mailto:Lisa.Voyce@hdrinc.com]
Sent: Friday, August 26, 2011 9:21 AM
To: Gabel, Ted Mr CIV USA IMCOM
Subject: RE: REMINDER: Army Minutes from the TPP Meeting (UNCLASSIFIED)

Mr. Gabel,

Went through briefly, very nicely done sir.

One thing – p. 3, last bullet – please delete the "there" after "However". Not needed.

4. Copy of 26 August email from Mr. Greg Zalaskus, NJDEP PM with internal memorandum from Jim Pastorick of UXOPRO:

From: njzalaskus [mailto:njzalaskus@comcast.net]
Sent: Friday, August 26, 2011 8:32 PM
To: Gabel, Ted Mr CIV USA IMCOM
Cc: Jim Kealy; Robert VanFossen
Subject: NJDEP TPP Meeting Minutes Comments

Ted: Please see NJDEP Emergency Management comments attached.

From: Jim Pastorick
To: Greg Zalaskus
Date: August 26 2011
Subject: Review of the Army Picatinny Meeting Report for July 28, 2011

Greg:

I reviewed the subject document and find that only the following item from my report are not included in the Army report:

- ***There was discussion of PICA-13, the Inactive Waste Pit. Gravel mines were unexpectedly found there. This unexpected finding caused the IRP investigation at this site to be stopped. There was discussion about whether the MR project could help restart the PICA-13 investigation since it is an MEC issue that caused it to be stopped. Ted said that it is possible that the PICA-13 investigation could be added to the MR RI list of sites to have the excavation there completed under the MR project. But, he isn't sure how this will be resolved. Lisa said they will research if it is possible to add this site to the MEC RI because of the MEC that was found. Whatever resolution is decided, there will need to be new DQOs developed for MEC at this site because of this change to the CSM. It is possible that the Shaw work plan for trenching may not be adequate due to this new hazard.***

Please contact me if you have comments or questions on this document review.

Thank you,

Final Meeting Minutes
Technical Project Planning Meeting 2
Picatinny Arsenal Military Munitions Response Program Remedial Investigation
Picatinny Arsenal, New Jersey
July 28, 2011

Attendees:

Name	Organization	Email	Phone
Richard Braun	USACE	Richard.j.braun@usace.army.mil	410-962-2842
Richard Califano	ARCADIS/Malcolm Pirnie	Richard.califano@arcadis-us.com	201-398-4307
Ramon Cintion	USAEC	Ramon.a.cintronocasso@us.army.mil	210-466-0307
Barbara Dolce	PAERAB TAPP – Subsurface Solutions	subsurfacesolns@earthlink.net	973-729-8814
Nancy Flaherty	USACE	Nancy.e.flaherty@usace.army.mil	410-962-4256
Ted Gabel	PTA	Ted.gabel@us.army.mil	973-724-6748
Megan Garrett	USACE	Megan.g.garrett@usace.army.mil	410-962-6813
Michael Glaab	PAERAB	michaelglaab@att.net	973-663-9605
Jim Kealy	NJDEP	Jim.kealy@dep.state.nj.us	609-633-1352
John Malleck	EPA	Malleck.john@epa.gov	212-634-4332
Mary Ellen Maly	USAEC	Maryellen.h.maly@us.army.mil	210-466-0384
Joseph Marchesani	NJDEP	Joe.marchesani@dep.state.nj.us	609-292-0885
Deborah McKinley	USACE	Deborah.k.mckinley@usace.army.mil	410-962-6730
Virginia Michelin	PAERAB/Morris County P&D	vmichelin@co.morris.nj.us	973-829-8120
Laura Pastor	WESTON	Laura.pastor@westonsolutions.com	610-701-3445
Jim Pastorick	UXO Pro	jim@uxopro.com	703-548-5300
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EPA – U.S. Environmental Protection Agency
NJDEP – N.J. Department of Environmental Protection
PAERAB – Picatinny Arsenal Environmental Restoration Advisory Board
PTA - Picatinny
TAPP – Technical Assistance for Public Participation
USACE – U.S. Army Corps of Engineers
USAEC – U.S. Army Environmental Command

Final Meeting Minutes
Technical Project Planning Meeting 2
Picatinny Arsenal Military Munitions Response Program Remedial Investigation
Picatinny Arsenal, New Jersey
July 28, 2011

The purpose of this meeting was to discuss the proposed technical approach for the Military Munitions Response Program (MMRP) Remedial Investigation (RI) program at Picatinny Arsenal (PTA). This approach is detailed in the *Draft Final Work Plan, Military Munitions Response Program Remedial Investigations,* Picatinny Arsenal, Morris County, New Jersey, July 2011. A copy of this document was sent to the agencies prior to this meeting. Issues/concerns discussed during the meeting are detailed below.

Operational Range Footprint – As discussed by Mr. Gabel and Mr. Smith, PTA has revised their operational range footprint. Ms. Pastor noted that this is not reflected in the current planning documents but will have the following effect on subsequent versions of the planning documents.

- The acreage of Munitions Response Site (MRS) PICA-006-R-01 (Former Operational Areas) will be increased by approximately 370 acres. While this will not change the MC and MEC approaches, as noted by Ms. Flaherty, USACE, and Laura Pastor, the planning documents will have to be modified to account for the additional acreage. This could include extending the munitions and explosives of concern (MEC) transects and using Visual Sampling Plan (VSP) to recalculate the number of gridded munitions constituents (MC) samples required.

- MRS PICA-013-R-01 (Inactive Munitions Waste Pit) will be optioned under the current CENAB contract and included in the RI. Since a portion of the Inactive Munitions Waste Pit MRS is now operational range, the acreage of this site will be decreased by approximately 42 acres. Ms. Pastor indicated this MRS will be added to the Work Plan (WP) in an addendum to be reviewed by the regulators and incorporated into the Final Work Plan.

- During discussion of the Sanitary Landfill/Dredge Piles, Mr. Gabel, PTA, indicated that the revised operational range footprint shown on the map is incorrect. The Weston team will work with Mr. Huggan, PTA, to obtain the correct Geographic Information System (GIS) layer.

MC Sampling – The following general MC sampling questions were raised during the presentation. MRS-specific questions are discussed in the MRS write-ups.

- Mr. Marchesani, NJDEP, asked if SW-846 6010B can be used to analyze for cadmium and chromium. Ms. Szegedi indicated that this analytical method can be used for both metals; however, this method cannot be used for speciation of chromium. Ms. Szegedi also noted that based on the munitions used at PTA, chromium has not been identified as a contaminant of potential concern.

- Mr. Zalaskus, NJDEP, was concerned about the use of pyrotechnics (*e.g.*, Flare Island in Picatinny Lake), and whether the list of MC of concern will cover these compounds. Ms. Szegedi explained that all areas with known pyrotechnics use are covered under the Installation Restoration Program (IRP).

- During a review of the unexploded ordnance (UXO) Find Map, Mr. Zalaskus, NJDEP, noted that several bottles of chemicals are listed including picric acid, dioxane, tetrahydrofuran, and ammonium nitrate (ANFO). Mr. Zalaskus asked if these chemicals are covered under the proposed MC sampling. As explained by Ms. Szegedi:

    - Picric acid – is an explosive compound on the current MC analytical list
    - Dioxane – is a solvent not associated with munitions
    - Tetrahydrofuran – is a solvent not associated with munitions
    - ANFO – is an explosive that is not included on the MC analytical list since there is no reliable analytical method, it is only associated with one munitions type used at PTA, and there are no NJDEP or EPA screening levels for this compound

- Mr. Marchesani, NJDEP asked what media will be included in the MC sampling. Ms. Szegedi answered that since surface water and groundwater are covered under the IRP, only soil and sediment samples will be collected under the MMRP MC sampling program.

- Ms. Dolce, TAPP, asked what happens when different screening levels have different values for the same parameter. Ms. Szegedi explained that the most stringent screening level will be used.

- Mr. Zalaskus, NJDEP, asked if the residential screening levels will be the cleanup levels. As explained by Ms. Szegedi, the screening levels are not cleanup levels and are only used to identify contaminants of potential concern. Cleanup levels are determined during the feasibility study, based on the results of the risk assessment. Mr. Gable, PTA, noted that using residential screening levels instead of industrial screening levels is a conservative approach.

- Ms. Maly, USAEC, asked how the MC characterization approach would be modified if burial pits were found. Ms. Szegedi indicated that if burial pits are found, it is likely a gridded approach would be implemented to define vertical and horizontal nature and extent. This would require a WP addendum.

<u>Risk Assessment</u> – The following questions were raised regarding the risk assessment.

- Mr. Schwartz, USACE asked what the first step is in the risk assessment. Mr. Califano explained the data will initially be evaluated to identify contaminants of potential concern.

- Ms. Voyce, PAERAB asked how surface and subsurface data would be aggregated. Ms. Szegedi explained that based on previous data from PTA, it is likely that the majority of MEC found will be from 0 to 2 feet below ground surface (bgs). All samples collected within two feet bgs will be considered surficial and all samples below two feet bgs will be considered subsurface.

- During Mr. Califano's description of the phased Risk Assessment approach proposed for PTA, Ms. Voyce, PAERAB, asked if a data evaluation report will be prepared. Mr. Califano explained that the data will be validated, and the RA process will be followed. However, a separate data evaluation report will not be developed.

<u>1926 Explosion Radius On and Off-Post MRS (PICA-003-R-01 and PICA-004-R-01)</u> – The following questions were raised regarding this MRS. Note that UXO Pro submitted written comments regarding this MRS before this meeting. Where applicable, these questions were discussed during the TPP.

- Mr. Zalaskus, NJDEP, indicated they were uncomfortable with the assumption that the Former Projectile Range only used inert rounds. Ms. Szegedi and Mr. Smith, PTA, explained that this assumption was made based on historical maps and photographs since the firing point is extremely close to the slug butt (approximately 100 feet), there is no protective cover for the firing point, and there were numerous buildings very close to the range. Mr. Smith, PTA, also indicated it was likely that the high explosive (HE) range was the range on Picatinny Lake. Ms. Szegedi noted that the slug butt is being decontaminated under another contract. Mr. Zalaskus, NJDEP, indicated they accepted this explanation.

- During the discussion of the Engineering Evaluation/Cost Analysis (EE/CA), Mr. Zalaskus, NJDEP, asked why the majority of the MEC found were at the Child Development Center (CDC). Ms. Flaherty, USACE, and Mr. Smith, PTA, explained that the majority of MEC finds on-post, as well as off-post at the Mt. Hope Quarry, have been in undisturbed areas.

- Mr. Pastorick, UXO Pro indicated that the conceptual site model (CSM) for the 1926 Explosion Radius – Off-Post indicates that use of the off-post property is not expected to change in the future. Since these properties are not under Army control this statement is unsupported and is not accurate for the WP. Ms. Szegedi indicated that while each off-post property has been contacted, and has indicated they do not have plans to change the current property use. Ms. Pastor stated that the Weston team agrees that this statement is unsupported will be revised in the WP, as appropriate. The MEC HA will also reflect that the properties are not under Army control.

  Additional discussions regarding this issue centered around the possibility of placing deed restrictions on the properties and how to avoid having the property owner change land use in the future without notifying the Army. During the Site Investigation (SI), the installation commander sent a letter to all the off-post property owners notifying them that their property is located within an MRS. Furthermore, if a zoning variance from commercial to residential would be requested for any of these properties, the zoning board would need to review the application.

- Since the Army does not have control of the off-post properties, Mr. Glaab, PAERAB, indicated that this needs to be taken into consideration in the RI approach. Ms. Szegedi explained that for the MC, residential screening levels, which are the most conservative screening levels, are being used. Mr. Pastorick, UXO Pro, explained that there is no residential guidance for MEC.

- Mr. Zalaskus, NJDEP, asked how many craters were formed during the explosion. As explained by Ms. Szegedi, three large craters, two near the south-central portion of the installation and one near the installation boundary, were created in the explosion and are considered the explosion centers. However, there are only two shell burial grounds since two of the craters are so close to each other they became one shell burial ground.

- Mr. Pastorick, UXO Pro asked if EM requires intrusive investigation. Mr. Steigerwalt indicated that all anomalies will be processed and dug.

- Mr. Pastorick, UXO Pro asked if the MEC approach will determine if there are less than 3 MEC/acre in the inner radius, and if so, is that enough information. Mr. Steigerwalt responded that since it is known that MEC are present based on the EE/CA, as well as other historical reports, this information is sufficient and will be used for cost estimating purposes. Mr. Schwartz added that this information will also be used in the MEC HA.

- Mr. Kealy, NJDEP asked why 3 MEC/acre was selected since previous data collected from the CDC during the EE/CA indicate 6 MEC/acre. Mr. Steigerwalt indicated that 3 MEC/acre was selected as a more conservative value since the CDC is very close to the explosion center and using a higher number would reduce the amount of investigation required.

- Mr. Pastorick, UXO Pro asked for more information regarding the analog transect proposed for the Code 300 Area. Mr. Steigerwalt indicated that this approach is similar to a mag and flag or mag and record and that the locations of all anomalies detected will be recorded. The purpose is to look for areas of increased anomaly density to see if there is a potential target. In addition, during the survey, the field technician will be looking for ground features that support the presence of a target area.

  Mr. Marchesani, NJDEP, asked if the anomaly locations would be recorded with enough accuracy that they could be easily re-located. Mr. Stacy explained that the GPS being used has sub-meter accuracy. In addition, as indicated by Mr. Steigerwalt, if an anomaly would need to be re-acquired in the future, a sweep of the area would be conducted to ensure the anomaly was located.

- Mr. Gabel, PTA, asked why there are grids on Mt. Hope Quarry since the quarry does not want us conducting additional work on their property. Ms. Szegedi explained that when the sampling approach was developed, a portion of off-post property was owned by Mt. Hope Hydro; this property has subsequently been purchased by Tilcon. During a discussion regarding access to Tilcon's property, Cliff Morris, the Mt. Hope Quarry manager, indicated that he would decide whether or not to grant access for the RI work based on the grid locations.

<u>Shell Burial Grounds (PICA-010-R-01)</u> – Numerous concerns were raised regarding this MRS during the meeting, and in written comments submitted by UXO Pro prior to the TPP. The concerns are listed below. Due to the volume of regulator concerns it was decided that a separate call/meeting would be held for this MRS at a future date.

- Mr. Kealy and Mr. Zalaskus, NJDEP, indicated that it is unknown exactly what was placed in the craters since the Navy used them for disposal for approximately 20 years. Therefore, quantities and types of waste cannot be documented.

- Mr. Zalaskus, NJDEP and Mr. Pastorick, UXO Pro, also indicated that stating there is a health and safety concern with intrusive investigations at this MRS is not sufficient. Additional information is required to definitively state that intrusive investigations cannot be completed. Ms. Maly, USAEC, agreed that the team will ask USATCES and DDESB if intrusive work in the shell burial grounds would be allowed. Mr. Smith, PTA, also indicated that the evacuation distance would likely involve evacuating numerous surrounding towns and would affect several major highways.

- Since the types of waste put in the shell burial grounds cannot be documented, Mr. Kealy, NJDEP, indicated that the sampling conducted under the IRP for this site may not be adequate. Mr. Pastorick, UXO Pro, agrees that since the groundwater data are 15 years old. Therefore, although groundwater sampling has been conducted, current data may be required since NJDEP considers this MRS a landfill. Therefore, while there may not be a current release, there could be a future release.

- As indicated by Mr. Pastorick, UXO Pro, the amount of fill placed over the waste in the craters is unknown. The WP indicates both 25 feet of fill is present and up to 25 feet of fill is present, which mean very different things. L. Pastor stated that the text in the WP will be checked and corrected as appropriate.

- Mr. Zalaskus, NJDEP, does not believe the WP approach for this MRS meets the criteria for an RI under the Technical Regulations since this site is a landfill.

- Mr. Marchesani, NJDEP, asked why 3D resistivity was not being considered for this MRS. Mr. Schwartz, USACE, indicated that 2D resistivity will provide adequate information or resolution to interpret burial depth. Seismic surveys will also be evaluated as part of the MRS characterization approach.

Green Pond Brook and DRMO Yard (PICA-005-R-01) – The following questions were raised regarding this MRS.

- Mr. Zalaskus, NJDEP, asked if the asphalt cover would be considered in the MEC HA. Ms. Szegedi indicated that all work conducted under the IRP would be considered. Mr. Smith, PTA, also explained that nothing found at the DRMO Yard so far has been live.

- Mr. Zalaskus, NJDEP, asked if geophysics was planned for the old burning grounds. Ms. Szegedi explained that since this site was investigated under the IRP, only the southern portion of the DRMO Yard needs to be characterized. During IRP work, there was a soil removal action for chemical contamination and geophysics was already conducted in the northern portion of the yard.

Former Operational Areas (PICA-006-R-01) – The following questions were raised regarding this MRS.

- Mr. Kealy, NJDEP, asked if IRP Site 20/24 is included in this MRS. Mr. Gabel, PTA, and Ms. Szegedi explained that it will be, but is not included in this version of the WP since Site 20/24 was formerly located in operational area. This portion of the Former Operational Areas will be included in the WP addendum (see previous discussion regarding PTA's revised operational range footprint). However, the burning ground previously located in this area is not part of the MRS since the burning ground is being closed out under RCRA.

- Mr. Roach, EPA, asked if the former burning grounds located within the Former Operational Areas was investigated for MEC when closed since the former burning grounds at the DRMO Yard were investigated for MEC. Mr. Smith, PTA, indicated that the burning grounds in the Former Operational Areas were not investigated for MEC prior to placing the cover. The only reason the DRMO Yard burning grounds were cleared prior to placing the cover was the high safety risk to workers due to the potential for ICM to be present.

- Mr. Pastorick, UXO Pro, asked if geophysical anomalies will be investigated at the sanitary landfill/dredge spoil piles and waste burial area. As indicated by Mr. Steigerwalt, EM31 transects will initially be traversed over the sites to determine extents and anomalous features extending beyond the existing soil caps. If anomalous features are present, additional delineation will be performed using an EM61. From the EM61 transect data, an anomaly list will be developed, reacquired and investigated.

- Ms. Dolce, TAPP, asked if anomalies in IRP Site 25/26 will be investigated. At this point Mr. Gabel, PTA, indicated the revised operational range footprints appear wrong on the map. Mr. Steigerwalt answered that if IRP Site 25/26 is located outside the operational range footprint it will be investigated. Refer to the previous operational range discussion.

- As explained by Ms. Szegedi, within the Former Operational Areas, gridded MC samples will not be placed on PTA's golf course at PTA's request. Ms. Dolce, TAPP, asked how many acres are included in the golf course and if excluding certain areas violates any VSP assumptions. Ms. Szegedi indicated that it is unknown how many acres are covered by the golf course; however, this area is not representative of the rest of the MRS since Mr. Smith, PTA, indicated the entire golf course has been disturbed and filled with potash. Ms. Szegedi explained that removing certain non-representative areas (*e.g.*, disturbed areas, building footprints) does not violate any VSP assumptions and the grid nodes (sample points) are still randomly distributed.

- During the MC approach discussion, Ms. Maly, USAEC, asked if samples collected from 6 to 12 inches bgs are considered surface. Ms. Szegedi indicated these samples are considered surface samples and the sampling depth was selected to be consistent with the IRP sampling.

<u>Lakes MRS (PICA-008-R-01)</u> – There are two lakes included in this MRS; Picatinny Lake and Lake Denmark. The MEC approach for each lake is different and is discussed separately below.

For Picatinny Lake, prior geophysical information is available. As part of the MEC approach for this lake approximately three miles of underwater DGM transects will be performed to fill data gaps identified in the existing geophysical data set. The existing data and data to be collected will be analyzed together to develop a composite dig list. It is estimated that approximately 25 anomaly locations will be selected for reacquisition and investigation including approximately 20% of the anomalies detected in the existing magnetic DGM data. Most of these targets are thought to be accessible from the lake shoreline. The following questions were raised regarding Picatinny Lake.

- Mr. Pastorick, UXO Pro, questioned if the prior geophysical data are sufficient to accurately locate anomalies selected for investigation. Mr. Steigerwalt indicated that all anomalies from the previous geophysical investigation will be re-mapped prior to reacquisition.

- Mr. Pastorick, UXO Pro asked how the underwater investigation will be conducted. Mr. Steigerwalt explained that an underwater EM will be used.

- Mr. Smith, PTA, noted that the bottom of Picatinny Lake is approximately three feet of mud, which would make the investigation difficult. Ms. Steigerwalt indicated that due to this, when possible, anomalies near the shoreline will be identified for investigation.

- Ms. Dolce, TAPP, asked how the number of targets (25) was selected and how the locations to be investigated will be selected. Mr. Steigerwalt explained that the number of targets was selected based on the existing locations of anomalies, as well as trends observed in the data. For groupings of anomalies, one or two anomalies within each group will be investigated to determine the nature of the anomalies.

- Mr. Pastorick, UXO Pro asked how the EM would be collected since this is the first use of underwater EM that Mr. Pastorick, UXO Pro has seen. According to Mr. Steigerwalt an EM sled will be towed on the bottom of the lake. PVC or some other method will be used to adjust the buoyancy of the sled.

- Mr. Kealy, NJDEP, asked if there was evidence of MEC use at Picnic Island. Mr. Smith explained that none of the existing historical documents indicate MEC use at this island. Mr. Steigerwalt added that anomalies identified around Picnic Island during the previous geophysical survey are assumed to be cultural debris.

- Mr. Smith, PTA, reminded the Weston team that both lakes are man-made; therefore, there are potential archaeological concerns.

- Mr. Kealy, NJDEP, asked if the entire lake is fenced. Mr. Smith responded that only sections of Picatinny Lake are fenced, with a portion of the lake accessible from off-post. However, all of the energetic storage areas are inaccessible. Mr. Gabel, PTA, pointed out that under a separate program a non-time critical EE/CA and Interim Land Use Control Plan are currently being developed to address interim actions at the MRSs on PTA.

For Lake Denmark, prior geophysical information is available. As part of the MEC approach underwater DGM transects will be performed across the northern portion of the lake to fill data gaps identified in the existing geophysical data set. Based on discussions during the MMRP training session, Mr. Steigerwalt proposed evaluating the size of a potential 60 mm target area using both range and deflection area and recalculating the VSP transect spacing. The existing data and the data to be collected will be analyzed together to develop a composite dig list. It is estimated that approximately five anomaly locations will be selected for reacquisition and investigation.

Land investigations will include approximately 10.9 miles of mag and dig transect surveys. A 100-foot by 100-foot grid will be placed at each of the three firing points to detect potential burial features. The data will be evaluated for large anomalous areas indicative of burial features. Such features, if detected, will be intrusively investigated. The following questions were raised regarding Lake Denmark.

- Mr. Smith, PTA pointed out that a white phosphorous mortar was recently found at Lake Denmark. Mr. Smith believes there's a report from 1934 that may discuss mortar delivery systems at PTA. So far, this report cannot be located.

- Mr. Gabel, PTA, indicated that the raw data from the geophysical investigation may be available. The Weston team will try to find these data.

- On the MEC characterization approach map, a large pink cone labeled firing range is present in the center of the lake. Mr. Smith, PTA, asked if that cone was large enough to represent the firing range for all the mortars used at this MRS. Mr. Steigerwalt indicated that this cone was developed based on the 4.2-inch mortar. He was unsure if all the other mortars would fall into this cone. The Weston team will confirm this.

- Mr. Smith, PTA, also asked if there would be a back end of the range, past the edge of the pink cone shown on the figure. Since this is unknown, Mr. Smith requested that three additional transects be added in Lake Denmark; one for each mortar type used in the lake (*e.g.*, 60-mm, 81-mm, and 4.2-inch) based on the average distance each mortar would fire (*e.g.*, potential impact areas).

- Based on information obtained during the geophysical discussion on July 27, 2011, Mr. Steigerwalt indicated that the transect spacing for Lake Denmark would be changed to be based on the Range Probable Error and Deflection Probable Error instead of the Hazardous Fragmentation Distance (HfD). Ms. Garrett, USACE, agreed with this approach.

- Mr. Kealy, NJDEP, asked about the location of the Lake Denmark picnic area. Mr. Smith, PTA, responded that the picnic area is accessible and is located near the 20-mm firing point.

<u>Lake Denmark Off-Post (PICA-012-R-01)</u> – The following questions were raised regarding this MRS.

- Ms. Szegedi explained that the majority of this MRS is the Radiation Technology, Inc. (RTI) Superfund Site. Currently, there is no financially solvent owner of RTI. To perform the RTI RI, the NJ court system was petitioned for access to the property. Mr. Gabel, PTA, asked if the MMRP RI could be conducted under the same court petition. We cannot; therefore, USACE is in the process of petitioning the NJ court system for MMRP RI access.

<u>Inactive Munitions Waste Pit (PICA-013-R-01)</u> – As discussed in the Operational Range Footprint section of these meeting minutes, the Inactive Munitions Waste Pit is not currently included in the WP; however, it will be optioned and included in a WP addendum. According to Mr. Smith, PTA, during an investigation for the source of a trichloroethylene (TCE) plume in the 600 Area, a burial pit was found approximately 12 to 14 feet bgs within the Inactive Munitions Waste Pit MRS. Items found in the pit include trucks, cars, inert fuzes, and granulated munitions; so far only one container of

granulated munitions has been found. Due to this, the trenching operations have stopped, but are expected to resume shortly. As part of the TCE source investigation the contractor is collecting soil samples from these trenches. The samples are being analyzed for volatile organic compounds with a subset of the samples analyzed for metals and explosives. The agencies want to ensure that the information and data currently being collected are used to refine the MEC and MC approach for this MRS once the MRS is optioned since it was not originally anticipated that a burial pit would be found (*e.g.*, vertical extent is important for burial pits). It should be noted that current trenching operations have exceeded the predicted bedrock depth (based on a well log). Information about the TCE plume investigation will be obtained from the contractor.

<u>Inactive Munitions Waste Pit – Off-Post (PICA-014-R-01)</u> – The following questions were raised regarding this MRS.

- Mr. Glaab, PAERAB asked if this MRS is located in Jefferson Township. According to Ms. Szegedi, it is, and it is owned by NJDEP, Fish & Wildlife Service (FWS). Mr. Smith, PTA, explained that PRA is in the process of trying to get a restrictive easement placed on this property.

- Since this property is owned by FWS, Mr. Kealy, NJDEP, asked if the MRS has a hiking trail. This property is very steeply sloped to the west and is nearly inaccessible. Mr. Smith, PTA, explained that FWS obtained the property since it was available, not due to the potential for recreational use.

- Due to the steep terrain, and since this MRS is only part of a safety fan, Mr. Pastorick, UXO Pro asked if there was any kick-out from the range, wouldn't the MEC have rolled down the hill. Ms. Szegedi agreed that it is likely that any kick-out would be at the bottom of the slope, which is why the MEC approach includes full coverage mag and dig surveys in accessible areas located primarily at the top of the ridge and the bottom of the slope.

<u>300 Marsh Area</u> – This is an IRP Site, not an MRS, and is located within the 1926 Explosion Radius MRS. The following questions were raised regarding this site.

- Ms. Maly, USAEC asked what the IRP site number is for the 300 Marsh Area. Ms. Flaherty, USACE, explained that originally this site was going to be characterized during the DRMO Yard investigation; however, it was ultimately decided that this site would be put into a separate contract. Therefore, the site does not have an IRP number.

- Mr. Pastorick, UXO Pro indicated that he does not remember seeing this site in the WP. As discussed by Ms. Szegedi, this site, which will be sampled in accordance with the existing site-wide IRP planning documents, has an existing Sampling and Analysis Plan (SAP) that was already reviewed and approved by the regulators. Therefore, it was not included in the WP.

However, since the analyses will be conducted by a different laboratory than is used by IRP, some of the laboratory-specific QAPP Worksheets needed to be filled out for this site. Therefore, it is included as Attachment 1 to the QAPP. It was requested that this site be pulled into the main body of the WP. Ms. Pastor responded that it would be included with the addendum so that it can be reviewed and incorporated up-front in the final WP.

Miscellaneous Items – Once the MRS-specific discussions were completed, the following additional items were discussed.

- A discussion was held regarding the exclusion zone required when anomalies are dug. As a conservative measure, the exclusion zone was based on the HFD for a 6-inch projectile. PTA indicated that if the exclusion zone can be reduced intrusive operations would be easier.

- Mr. Gabel asked why the regulator comments are due September 9th since this is 60 days after the submittal date, not 45 days. Ms. Pastor responded that the 60 day comment period was selected as more realistic, especially since EPA needs to submit a purchase order for their UXO contractor.

- Mr. Zalaskus indicated that further discussions on the Shell Burial Grounds will be required. NJDEP will be issuing a variance of the intent of an RI under the Tech Regs. Ms. Flaherty commented that the team needs NJDEP to provide the comment on the work plan. Mr. Pastorick commented that the comment in the work plan regarding the safety issues of intrusively investigating the Shell Burial Grounds needs to be supported by documentation from USATCES regarding the radius in which people would need to be evacuated. Mr. Pastorick also stated that if the cost of evacuation is too great, the Weston Team should put that in the work plan. The Weston Team agreed to discuss the safety issues with USATCES and DDESB.

- PTA indicated that a SHPO consultation will be needed for the WP. Ms. Pastor responded that the Weston team is currently working with Mr. Huggan regarding archaeological issues.

- Mr. Gabel indicated that the ESP cannot be completed until a decision is made by PTA regarding where and how demolitions activities can occur. There was no further discussion.

Action Items:

1. The Weston team will work with Mr. Huggan to obtain the correct operational range GIS layer.

2. The Weston Team will conduct a review of historical documents to determine if the amount of fill placed at the Shell Burial Grounds can be determined.

3. The Weston Team and USACE will discuss the intrusive investigation safety issues with USATCES and DDESB.

4. The Weston team will try to find the raw geophysical data for Lake Denmark.

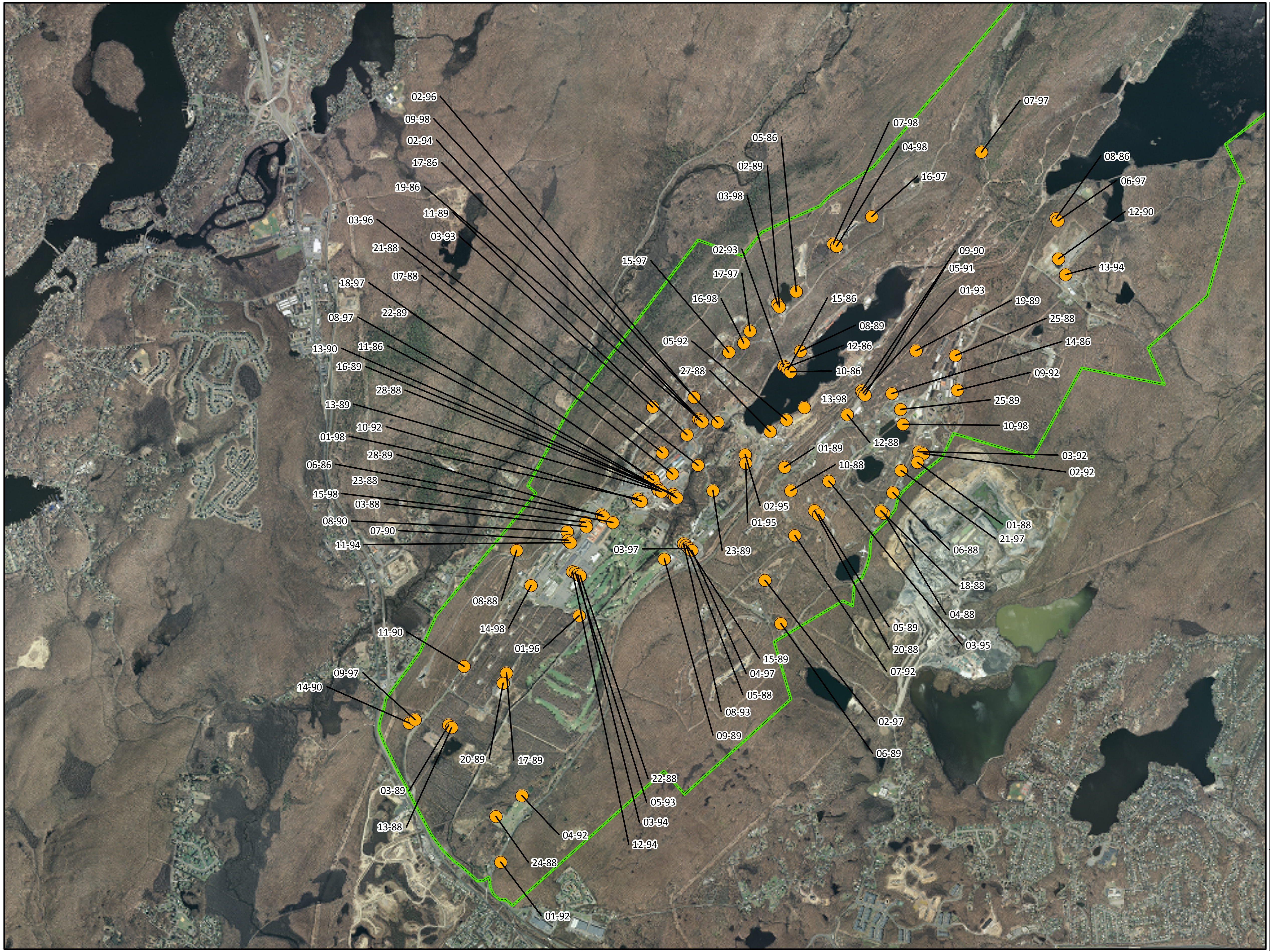
5. The Weston Team will pull the 300 March Area discussion into main body of WP.

PROJECT: MMRP REMEDIAL INVESTIGATIONS PICATINNY ARSENAL REVIEW Comments DRAFT TPP 2Meeting Minutes, Picatinny Arsenal, July 2011 DATE: 30 August 2011			
ITEM	COMMENTOR	COMMENT	ACTION
1.	Lisa Voyce, PAERAB	On p. 3, last bullet – please delete the "there" after "However".	Concur. This has been corrected.
2.	Mike Glaab, PAERAB	On pg. 4, 1st bullet, last sentence, please delete Ms. in front of Mr.	Concur. This has been corrected.
3.	Mike Glaab, PAERAB	On pg. 7, 1st bullet, first sentence, change is to if.	Concur. This has been corrected.
4.	Mike Glaab, PAERAB	On pg. 7, 3rd bullet, second sentence, change including to included.	Concur. This has been corrected.
5.	Mike Glaab, PAERAB	On pg. 9, should the heading for the Inactive Munitions Waste Pit (PICA-013-R-01) be PICA-014-R-01, as per the handout?	The handout refers to the Inactive Munitions Waste Pit – Off-Post MRS, which is PICA-014-R-01. This section discusses the on-post portion of the inactive munitions waste pit, which is PICA-013-R-01.
6.	Mike Glaab, PAERAB	For the 3rd sentence under the 1st bullet of Miscellaneous Items, change is to if.	Concur. This has been corrected.
7.	Mike Glaab, PAERAB	For the 1st sentence under the 4th bullet of Miscellaneous Items, change need to needed.	Concur. This has been corrected.
8.	Jim Pastorick, UXO Pro	There was discussion of PICA-13, the Inactive Waste Pit. Gravel mines were unexpectedly found there. This unexpected finding caused the IRP investigation at this site to be stopped. There was discussion about whether the MR project could help restart the PICA-13 investigation since it is an MEC issue that caused it to be stopped. Ted said that it is possible that the PICA-13 investigation could be added to the MR RI list of sites to have the excavation there completed under the MR project. But, he isn't sure how this will be resolved. Lisa said they will research if it is possible to add this site to the MEC RI because of the MEC that was found. Whatever resolution is decided, there will need to be new DQOs developed for MEC at this site because of this change to the CSM. It is possible that the Shaw work plan for trenching may not be adequate due to this new hazard.	Please see the discussion in the meeting minutes, starting on pg. 10 under the <u>Inactive Munitions Waste Pit (PICA-013-R-01)</u>. As discussed, this site is an MRS that was not previously optioned since it was unknown if the revised operational range footprints would encompass the entire site. Since the revised operational footprint only encompasses a portion of the site, the eligible area of MRS PICA-013-R-01 will be optioned under the current CENAB contract and included in the RI. Once the site is added to the contract, it will be added to the Work Plan in an addendum to be reviewed by the regulators. Therefore, this MRS is covered under both the IRP (for solvents) and MMRP and discussions have already been held between the MMRP and IRP contactors to ensure there is information sharing and coordination between the MMRP and IRP efforts.

ACTION CODES: A-ACCEPTED/CONCUR; D-ACTION DEFERRED; W-WITHDRAWN; N-NON-CONCUR; V-VE POTENTIAL/VEP ATTACHED

APPENDIX D

UXO FINDS MAP AND TABLE



WESTON SOLUTIONS

Legend

25-88

Installation Boundary

Base Imagery: NJ 2007 Natural Color Imagery
Data Source: PTA UXO Safety Office

Coordinate System: UTM Zone 18N
Datum: NAD 83
Units: Meters

N
W E
S

2,500 1,250 0 2,500
Feet

Appendix D-1
UXO Finds Map
Picatinny Arsenal
Morris County, New Jersey

File: \\Fsfed02\TIG\Picatinny\MXD\workplan\May2011\USGS_UXO_finds.mxd, 13-Jun-11 16:20, ricksc

Appendix D Recovered Munitions Items

Incident #	Location	Munitions	Disposition
05-86	ENCLOSURE TEST AREA	1ea, 155mm, HE 2ea, 60mm, HE	SHA/Dest SHA/Dest
06-86	Bldg 33	2ea, 57mm, Cart	SHA/Dest
08-86	Land Nav Course	1ea, 40mm, Projo	SHA/Dest
10-86	Bldg 800	1ea, Primer 2ea, 105mm, Cart	SHA/Dest SHA/Dest
11-86	Bldg 314	3ea, BLU 42 7ea, BLU 26 1ea, 40mm, Projo	SHA/Dest SHA/Dest SHA/Dest
12-86	Bldg 800	13ea, Primer	SHA/Dest
14-86	Bldg 3050	1ea, Fuze, Impact	SHA/Dest
15-86	Bldg 800	2ea, Primer	SHA/Dest
17-86	???	2ea, Bomb, 250#	SHA/Dest
19-86	BTU	615ea, Small Arms	SHA/Dest
01-88	Housing Area???	1ea, 60mm, Inert	SHA/Dest
03-88	Bldg 24	1ea, Btl, Picric Acid	SHA/Dest
04-88	Bldg 3150	1ea, Projo, MK24	SHA/Dest
05-88	Bldg 173	1ea, 105mm, Inert	SHA/Dest
06-88	Bldg 3150N	1ea, Blasting Cap	SHA/Dest
07-88	Bldg 316	1ea, Gren, Flash	SHA/Dest
08-88	Escape Trail Road	1ea, 81mm, Prac	SHA/Dest
10-88	Bldg 3100	1ea, 105mm, Igniter	SHA/Dest
12-88	Bldg 3022	3ea, HE, Azides	SHA/Dest
13-88	Pyro Range???	1ea, 8", Illum	SHA/Dest
18-88	Bldg 3150	1ea, 6", HE	SHA/Dest
20-88	Bldg 3109	1ea, 105mm, Inert	SHA/Dest
21-88	Bldg 268	1ea, Mine, Inert 3ea, Pyro, Inert	SHA/Dest SHA/Dest
22-88	Bldg 1	19ea, 105mm, Blank, Expended 123ea, Small Arms	SHA/Dest SHA/Dest
23-88	Bldg 127	1ea, 155mm, Empty	SHA/Dest
24-88	Ballfield #1	1ea, 175mm, Empty	SHA/Dest
25-88	Bldg 3342	1ea, BLU33, Inert	SHA/Dest
27-88	Bldg 506	1ea, Blasting Cap	SHA/Dest
28-88	Bldg 307	1ea, 155mm, Inert	SHA/Dest
01-89	Bldg 3002	1ea, Projo, Inert	SHA/Dest
02-89	Bldg 636	1ea, 152mm, TP-T	SHA/Dest
03-89	Pyro Range???	1ea, 81mm, Empty	SHA/Dest
05-89	Bldg 3109	3460ea, Small Arms	SHA/Dest
06-89	Mt Hope Gate	1ea, 37mm, AP	SHA/Dest
08-89	Bldg 810	3ea, HE, 15#, Shape Charge 10ea, HE, Comp B	SHA/Dest SHA/Dest
09-89	Bldg 121, Pool	1ea, 60mm, HE	SHA/Dest
11-89	Inter 9th & 11th	1ea, 2.75", HE 1ea, Projo, APHE, Empty	SHA/Dest SHA/Dest

Note: This table is a listing of MEC found, the locations of MEC found from 1986 through 1998,based on the Explosive Ordnance Disposal (EOD) incident reports. The definitions for SHA is unknown.

Appendix D Recovered Munitions Items

Incident #	Location	Munitions	Disposition
13-89	Bldg 307	1ea, 105mm, Inert	SHA/Dest
15-89	Bldg 173	6ea, 155mm, Cart	SHA/Dest
16-89	Bldg 307	1ea, 20mm, HEI, Inert	SHA/Dest
17-89	Bldg 91	29ea, 3.5", Prac	SHA/Dest
		3ea, 105mm, Empty	SHA/Dest
		1ea, 90mm, HE, Empty	SHA/Dest
		1ea, 57mm, HE, Empty	SHA/Dest
19-89	Bldg 3054	1ea, 106mm, HEAT, Empty	SHA/Dest
20-89	Bldg 91	1ea, 3.5", Prac	SHA/Dest
22-89	Bldg 350	1ea, Misc, Empty	SHA/Dest
23-89	Bldg 408	1ea, 40mm, Prac	SHA/Dest
25-89	Bldg 3220	1ea, Cart Casing	SHA/Dest
28-89	Bldg 33	3ea, 155mm, Scrap	SHA/Dest
		1ea, Fuze, M51, Inert	SHA/Dest
		4ea, Fuze, M557, Inert	SHA/Dest
		1ea, Fuze, M577, Inert	SHA/Dest
07-90	Bldg 60	1ea, 155mm, Prac	SHA/Dest
08-90	Bldg 66	4ea, 122mm, Cart	Rtn to PM
09-90	Bldg 3028	2ea, Btl, Dioxane	HAZMAT
11-90	Bldg 50 & 51	1ea, 37mm, Cart	SHA/Dest
12-90	Bldg 3801	106ea, Misc	SHA/Dest
13-90	Bldg 314	1 lb, HE	SHA/Dest
14-90	Truck Gate PICA	1ea, Gren, Inert	SHA/Dest
05-91	Bldg 3028	26ea, Small Arms	SHA/Dest
01-92	Main Gate	1ea, 90mm, Prac	SHA/Dest
		2ea, Gren, Empty	SHA/Dest
02-92	Housing Area???	5ea, 90mm, Inert	SHA/Dest
		1ea, BDU63, Inert	SHA/Dest
03-92	Housing Area???	3ea, Gren, Empty	SHA/Dest
		1ea, RKT, Scrap	SHA/Dest
		1ea, Fuze, Inert	SHA/Dest
04-92	Picatinny Farm???	1ea, 5" Scrap	SHA/Dest
		1ea, 81mm, Empty	SHA/Dest
		3ea, Gren, Empty	SHA/Dest
		7ea, Fuze, Scrap	SHA/Dest
		1ea, 105mm, Cart	SHA/Dest
		1ea, 90mm, Empty	SHA/Dest
		7ea, misc, Empty	SHA/Dest
05-92	Bldg 524	2ea, Fuze, Gren	SHA/Dest
		1ea, Fuze, Projo	SHA/Dest
		2ea, Subcal	SHA/Dest
		1ea, 4.2", HE	SHA/Dest
07-92	Bldg 1029	1ltr, ether	HAZMAT
09-92	Navy Hill Gate	1ea, 6", AP	SHA/Dest
10-92	Bldg 301	1ea, 155mm, HE	SHA/Dest

Note: This table is a listing of MEC found, the locations of MEC found from 1986 through 1998,based on the Explosive Ordnance Disposal (EOD) incident reports. The definitions for SHA is unknown.

Appendix D Recovered Munitions Items

Incident #	Location	Munitions	Disposition
01-93	Bldg 3028	1gal, tetrahydrofuran	HAZMAT/Dest
02-93	Bldg 800	1ea, Misc	SHA/Dest
03-93	Bldg 221	1ea, 40mm, Cart	SHA/Dest
05-93	Bldg 1	1ea, Pyro, Sim	SHA/Dest
06-93	Bldg 1176	1ea, 81mm, Prac	SHA/Dest
08-93	Bldg 173	1ea, 105mm, Cart	SHA/Dest
02-94	Bldg 281	50ea, Small Arms 1ea, Pyro Sim	SHA/Dest
03-94	Bldg 1	1ea, 105mm, Bl	SHA/Dest
11-94	Bldg 60S	48ea, 120mm, Inert	SHA/Dest
12-94	Bldg 1	1 ea Gren, Prac	SHA/Dest
13-94	Bldg 3501	1ea, Mine, Empty	SHA/Dest
14-94	Bldg 3028	1ea, HE, M112 1ea, Pyro, M60 1ea, HE, Blasting Cap M7 1ea, Pyro, 7' M700	SHA/Dest
01-95	Bldg 462	1ea, 60mm, Inert	SHA/Dest
02-95	Bldg 462B	50ea, 20mm, TPT 35ea, 20mm, Cart 47ea, Small Arms	SHA/Dest
03-95	Bldg 3128	1ea, 3", HE 2ea, 3", Scrap	SHA/Dest
01-96	Bldg 39	1ea, Fuze, Inert 1ea, 81mm, Illum	SHA/Dest
02-96	Bunker 602B	4ea, 40mm, HEDP 1ea, 40mm, TP	SHA/Dest
03-96	9th Street Bridge	1ea, 66mm, Empty	SHA/Dest
02-97	Bldg 1363	14ea, HE, Nitro	SHA/Dest
03-97	Bldg 173	21ea, Small Arms 2ea, Gren, Inert 1ea, Blast Cap, Inert 5ea, Misc, M5	SHA/Dest
04-97	Bldg 173	20ea, Small Arms	SHA/Dest
06-97	Area 8	2ea, BLU-7A/S	SHA/Dest
07-97	Gorge	2ea, 152mm, Prac 1ea, 20mm, HE	SHA/Dest
08-97	Bldg 314	2ea, Gren, M42	SHA/Dest
09-97	Scale House	1ea, Small Arms	SHA/Dest
15-97	Bldg 611B	1ea, 3.5", Prac 1ea, 76mm, APHE 1ea, 75mm, HE 1ea, Gren, Empty	SHA/Dest
16-97	Bldg 647	1ea, 81mm, Inert	SHA/Dest
17-97	Bldg 627	1ea, 81mm, Prac	SHA/Dest
18-97	Bldg 352N	1ea, Mine, Scrap	SHA/Dest

Note: This table is a listing of MEC found, the locations of MEC found from 1986 through 1998,based on the Explosive Ordnance Disposal (EOD) incident reports. The definitions for SHA is unknown.

Appendix D Recovered Munitions Items

Incident #	Location	Munitions	Disposition
21-97	Bldg 3152	1ea, 5" HE	SHA/Dest
01-98	Bldg 302	36ea, HE, Scrap	SHA/Dest
03-98	Bldg 636	2ea, Bomb, Prac	SHA/Dest
04-98	Bldg 642	1ea, 155mm, Prac	SHA/Dest
07-98	Bldg 642	1ea, 155mm, Empty	SHA/Dest
09-98	Bldg 329	1ea, Mine, Inert	SHA/Dest
10-98	Bldg 3231	1ea, 10", Scrap	SHA/Dest
13-98	Bldg 534	3ea, Gren, Empty	SHA/Dest
14-98	Bldg 7	1ea, 66mm, Empty	SHA/Dest
15-98	Bldg 24	2ea, Btls, ANFO	SHA/Dest
16-98	Bldg 610	81mm Mortar	SHA/Dest

Note: This table is a listing of MEC found, the locations of MEC found from 1986 through 1998,based on the Explosive Ordnance Disposal (EOD) incident reports. The definitions for SHA is unknown.

APPENDIX E

CONTRACTOR FORMS

WESTON SOLUTIONS — Restoring Resource Efficiency	DAILY SAFETY AND QC TAILGATE MEETING
Project:	
Site Name:	Date/ Time:
Weather Conditions:	Temperature:
Safety Discussion and Issues:	
QC Discussion and Issues:	
Other Discussion and Issues:	

Acknowledgement

Name	**Company**	**Signature**

Acknowledgement

Name	**Company**	**Signature**

I certify that the personnel listed on this roster received the briefing described above. Site personnel not attending this meeting will be briefed before beginning their assigned duties.

Meeting Organizer: Signature:

Daily Summary Report

Project Name Here

CONTRACT NO. / D.O. NO.:	WORK ORDER NO.:	DATE

WORK LOCATION:

WORK COMPLETED:

- ☐ Surveyor activities.
- ☐ Mag and Dig activities (List grid or location).
- ☐ DGM activities (List grids).
- ☐ Reacquisition of DGM anomaly targets (List grids).
- ☐ Grid QC List (List completed grids).
- ☐ Grid QA (CENAB-List completed grids).
- ☐ Munitions Constituents Sampling.
- ☐ UXO Technician Escort activities.
- ☐ Equipment Transport (mob/demob to/from site-List).
- ☐ Equipment Maintenance
- ☐ Equipment Issues (List below).
- ☐ Background Soil Sampling

Comments:

MATERIALS DELIVERED (Amount, Condition, and Purpose):

PROBLEMS/RESOLUTIONS:

DATA TRACKING:

Analog Survey Transects:

Items Found Today:

DGM Grids:

DGM Grids Reacquired:

Comments:

FURTHER DISCUSSION (List Topic and Comment):

PREPARED BY:	SIGNATURE:

Attach applicable logs and reports below (QC Report, photo log, etc.)

WESTON SOLUTIONS
Restoring Resource Efficiency

WORK PLAN ACKNOWLEDGEMENT

Project:

Document Name:

I understand, agree to, and will conform to the information set forth in the project work plan, attachments, appendices and discussed in the daily safety tailgate meetings.

Acknowledgement

Name	Company	Signature/ Date

Attach additional pages as necessary.

APP/SSHP ACKNOWLEDGEMENT

Project:

Document Name:

I understand, agree to, and will conform to the information set forth in the Site Safety and Health Plan and discussed in the daily safety tailgate meetings.

Acknowledgement

Name	**Company**	**Signature/ Date**

Attach additional pages as necessary.

Approved By: Approval Date:

DAILY QC REPORT

Project:

Site Location:	Date:

Describe daily QC activities:

Grid QC:

Transect QC:

Definable Feature of Work (identify control phase: preparatory, initial, follow-up, final)	**Inspection Performed**	**Result/Recommendation** (document deficiency, nonconformance, lesson learned)

Attach additional pages as necessary.

Approved By: Approval Date:

Daily SUXOS Site Report

Picatinny Arsenal Remedial Investigation

CONTRACT NO. / D.O. NO.:	Project Number	DATE;

Team 1

☐ Team check out	☐ Equipment check (instrument verification)
☐ Mag and Dig	☐ Equipment Maintenance.
☐ Administrative operations.	☐ Team tailgate safety brief (conducted by team leader)

Team Personnel:

UXO Tech:
Geo Tech:

Team location:
Worked performed:
Comments:

Team 2

☐ Team check out	☐ Equipment check (instrument verification)
☐ Mag and Dig	☐ Equipment Maintenance.
☐ Administrative operations.	☐ Team tailgate safety brief (conducted by team leader)

Team Personnel:

UXO Techs:
Geo Tech:

Team location:
Worked performed:

Comments:

Other work performed:

Comments:

PREPARED BY:	SIGNATURE:

Daily Geophysics Checklist

Date:
Team:

Instrument Configuration:
EM61-MK2 Single Unit: ☐
EM61-MK2 Underwater: ☐
EM-31 MK2: ☐

EM61-MK2:

Instrument Function Checks - AM

Filename ______________________

Instrument Warm-up ☐
Null Instrument ☐
Personnel Test ☐

	Line #	Response
Static Background		
Static Spike		
Cable Connection		

Instrument Function Checks - PM

Filename ______________________

Instrument Warm-up ☐
Null Instrument ☐
Personnel Test ☐

	Line #	Response
Static Background		
Static Spike		
Cable Connection		

Instrument Verification Strip - AM

Filename ______________________

IVS Transect	Line #
Seeded	
Offset	
Background	

Instrument Verification Strip - PM

Filename ______________________

IVS Transect	Line #
Seeded	
Offset	
Background	

EM31-MK2:

Instrument Warm-up ☐
Instrument Calibration ☐

Instrument Function Checks - AM

	Line #	Response
Static Background		
Dynamic Spike		
Cable Connection		

Instrument Function Checks - PM

	Line #	Response
Static Background		
Dynamic Spike		
Cable Connection		

Notes:

Geophysics L&F Sheet

Date:
Team:

Grid ID:
Dataset:
Repeat Dataset:
0/0 at Corner:

Line	Y-Start	Y-Stop	Comments

Line	Y-Start	Y-Stop	Comments
Repeat Lines			

GRID ID:

Dataset:

Date:

Operator:

Repeatability Dataset:

Origin (0/0) at corner:

Repeat Lines:

Notes/Comments:

DGM GRID NOTES

Weston Solutions, Inc.

Magazine Data Card

1. Project Name, Location:	2. Project Number:	3. Explosive Manufacture:	4. Marks of Identification:
Picatinny RI 2012	03886.551.002		

5. Storage Location:	6. Explosive Description:

7. Date	8. Action/Purpose	9. Qty In	10. Qty Out	11. Balance	12. Printed Name	13. Signature

Magazine Data Card Instructions:

1. Project Name, Location – Name assigned project and geographical location (For Example: TOAR Artillery Ranges, Pennsylvania).
2. Project Number – Assigned by Weston Corporate office.
3. Explosive Manufacturer – Manufacturer of item and country of origin (For example: Atlas Powder, USA; Govt).
4. Marks and Identification – Identification as specified by the Manufacturer; Lot number for US military explosives.
5. Storage Location – Proper name of storage magazine (for example: Igloo J180; Bldg. #18; COE Bunker #1; Mag 2).
6. Explosives Description – Item name (For example: blasting caps, boosters, and detonating cord).
7. Date – Date the transaction occurs.
8. Action/Purpose – Purpose for transaction. (For example: initial receipt, inventory, demolition use, return to inventory, transfer, and previous balance).
9. Quantity In – Quantity gained by the transaction; if no quantity is lost, mark column with -0-.
10. Quantity Out – Quantity lost by the transaction; if no quantity is gained, mark column with -0-.
11. Balance – Running balance of quantity on hand after the transaction.
12. Printed Name and Initials – Name of the individual performing the transaction (Print clearly).
13. Signature – Signature of the individual performing the transaction.

Additional Instructions:

1. All data entered on Magazine Data Card Form should be entered in ink.
2. Lines not used on Magazine Data Card Form should be marked through with a line and marked “not used”.
3. When a mistake is written on Magazine Data Card Form, DO NOT ERASE OR WHITE OUT – mark through data with single line, initial change, and make correct entry on new line.

SITE VISITOR LOG

Project Name, Location, Description:

Name	Company	Telephone Number	Safety Briefing Received	Date	Time In	Time Out

WESTON SOLUTIONS
Restoring Resource Efficiency

CORRECTIVE ACTION REQUEST (CAR)

PART 1: TO BE COMPLETED BY THE PERSON IDENTIFYING THE NONCONFORMANCE:

Originator: Date:

Customer Name/External Source: Contact/ID#:

Issue:

PART 2: TO BE COMPLETED BY THE UXOQCS:

CAR #: Related to CAR #: Priority (High, Med., or Low):

ASSIGNED TO: Response Due Date:

PART 3: TO BE COMPLETED BY THE PERSON RESPONSIBLE FOR ACTION:

<u>Impact:</u>

(The Impact of the nonconformance)

<u>Root Cause:</u>

Document the result of the investigation regarding what caused the nonconformance. Note: not required for Preventative action only issues.

<u>Corrective Action:</u>

Document what was done to correct the problem/nonconformance. Note: not required for Preventative Action only issues.

<u>Preventative Action:</u>

Document how the action will prevent recurrence of the issue.

PART 4: TO BE COMPLETED BY THE PROJECT MANAGER:

Verified By: Verification Date:

CAR Close Date:

DD FORM 1348-1A, JUL 91 (EG) ISSUE RELEASE/RECEIPT DOCUMENT

27. ADDITIONAL DATA

26. RIC (4-6)
UI (23-24)
QTY (25-29)
CON CODE (71)
DIST (55-56)
UP (74-80)

25 NATIONAL STOCK NO. & ADD (8-22)

24. DOCUMENT NUMBER & SUFFIX (30-44)

1 2 3	4 5 6	7	23 24	25 26 27 28 29	45	46 47 48 49 50	51	52 53	54 55 56	57 58 59	60 61	62 63 64	65 66	67 68 69	70	71	72 73	74 75 76 77 78	79 80
DOC IDENT	RI FROM	M & S	UNIT ISS	QUANTITY	SER	SUPPLEMENTARY ADDRESS	SIG	FUND	DISTRIBUTION	PROJECT	PRI	REQD DEL DATE	ADV	RI	O/P	COND	MGT	UNIT PRICE DOLLARS	CTS

1. TOTAL PRICE
DOLLARS
CTS

2. SHIP FROM

3. SHIP TO

4. MARK FOR

5. DOC DATE

6. NMFC

7. FRT RATE

8. TYPE CARGO

9. PS

10. QTY. REC'D

11. UP

12. UNIT WEIGHT

13. UNIT CUBE

14. UFC

15. SL

16. FREIGHT CLASSIFICATION NOMENCLATURE

17. ITEM NOMENCLATURE

18. TY CONT

19. NO CONT

20. TOTAL WEIGHT

21. TOTAL CUBE

22. RECEIVED BY

23. DATE RECEIVED

Adobe Designer 8.0

PREVIOUS EDITION MAY BE USED

APPENDIX F

OP FOR DEMOLITION ACTIVITIES

OPERATING PROCEDURE
DEMOLITION/DISPOSAL OPERATIONS

1. PURPOSE

The purpose of this Operating Procedure (OP) is to provide the minimum procedures and safety and health requirements applicable to conducting demolition/disposal operations of munitions and explosives of concern (MEC) on Picatinny Arsenal (PTA).

2. SCOPE

This OP applies to all Weston Solutions, Inc. (WESTON) site personnel, including contractor and subcontractor personnel, involved in conducting MEC demolition/disposal operations. This OP is not intended to contain all of the requirements needed to ensure complete compliance, and should be used in conjunction with approved project plans and applicable referenced regulations. Consult the documents listed in Section 18 of this OP for additional compliance issues.

3. RESPONSIBILITIES

3.1 PROJECT MANAGER

The Project Manager (PM) will be responsible for ensuring the availability of the resources needed to implement this OP, and will also ensure that this OP is incorporated into plans, procedures, and training for sites where this OP will be implemented.

3.2 SENIOR UXO SUPERVISOR

The Senior UXO Supervisor (SUXOS) will be responsible for assuring that adequate safety measures and housekeeping are performed during site operations, including demolition activities, and will visit site demolition locations, as deemed necessary, to ensure that demolition operations are carried out in a safe, clean, efficient, and economic manner. The demolition activities will then be conducted under the direct control of the SUXOS, who will be responsible for supervising demolition operations within the area.

The SUXOS will be responsible for training on-site UXO personnel on the nature of the materials handled, the hazards involved, and the precautions necessary. The SUXOS will also ensure that the Daily Summary Report, MEC Accountability Log, WESTON Demolition Shot Records, and inventory records are properly filled out and accurately depict the demolition events and demolition material consumption for each day's operations. The SUXOS will be present during demolition operations or designate a competent, qualified person to be in charge during any absences.

3.3 UXO SAFETY OFFICER

The UXO Safety Officer (UXOSO) for the site is responsible for ensuring that all demolition operations are being conducted in a safe manner, and is required to be present during MEC demolition operations. The UXOSO will ensure the compliance of the demolition team with the above referenced documents that are applicable to the particular task being performed. The UXOSO will be responsible for notifying the Project Manager, PTA Safety, United States Army Corps of Engineers (USACE), and PTA Emergency Management Services (EMS)/police in the event of an accident requiring medical attention or the possibility of lost time. The emergency response plan will be used, and first aid, notification, and evacuation will be accomplished as required. The accident site will then be shut down and the scene preserved/secured for the accident investigation team.

3.4 UXO QUALITY CONTROL SPECIALIST

The UXO Quality Control Specialist (UXOQCS) is responsible for ensuring the completeness of demolition operations records and for weekly inspection of the MEC Accountability Log, the Daily Summary Report, the WESTON Demolition Shot Record, and the inventory of MEC and demolition material. The UXOQCS, assisted by demolition team personnel, will inspect each demolition pit and an area of appropriate radius after each demolition shot, in accordance with the approved explosive siting plan, to ensure that there are no kick-outs, hazardous MEC components, or other hazardous items. In addition, the pit may be checked with a magnetometer, and large metal fragments and any hazardous debris will be removed on a per use basis and stored in sealed containers at the Gorge or designated project lay down area. Any MEC or material potentially presenting an explosive hazard (MPPEH) discovered during the QC check will be properly disposed of using the demolition procedures presented in Section 6 of the work Plan. Extreme caution must be exercised when handling MEC/MPPEH that has been exposed to the forces of detonation. Personnel must adhere to acceptable safe practices and procedures when determining the condition of munitions and fuzes that have not been consumed in the disposal process.

4. GENERAL OPERATIONAL AND SAFETY PROCEDURE

Personnel, including contractor and subcontractor personnel, involved in operations on MEC-contaminated sites will be familiar with the potential safety and health hazards associated with the conduct of demolition/disposal operations, and with the work practices and control techniques used to reduce or eliminate these hazards. UXO Technicians must complete the Picatinny Arsenal (PTA) site-specific training through the PTA Safety Office. This training will include radiation awareness to allow access and use (permit) of the Gorge for demolition activities.

During demolition operations, the general safety provisions listed below will be followed by demolition personnel at all times. Noncompliance with the general safety provisions listed below will result in disciplinary action, which may include termination of employment.

Safety regulations applicable to demolition range activities and demolition and MEC materials involved will be complied with.

- Demolition of any kind is prohibited without an approved Explosives Site Plan (ESP).
- Items may be moved upon approval from the SUXOS and UXOSO to the designated explosives storage magazine or the Gorge for demolition. EOD will be notified of activities. Police escort will be required. Notify the USACE OESS.
- If items are deemed unsafe-to-move, EOD will be notified and advised of the demolitions procedures to be performed.
- If a recovered item cannot be identified by the UXO Team or if the filler is unknown, the UXO Team will not perform the demolition operations. Also, if the minimum separation distances for a known item encompasses critical infrastructure (buildings and utilities) and the item cannot be moved away from the critical infrastructure, the UXO Team will not perform the demolition operations. These circumstances will require EOD support. Notify the USACE OESS.
- The quantity of MEC to be destroyed will be determined by the range limit, fragmentation and K-Factor distance calculations, as specified in the approved ESP. Additional regulations/procedures, such as PTA Range and Demolition Standard Operating Procedures (SOPs), AMC Reg 385-100, TM 60 series, and other publications will be used, as required by PTA.
- In the event of an electrical storm, dust storm, or other hazardous meteorological conditions, immediate action will be taken to cease demolition range operations and to evacuate the area.
- In the event of a fire, which does not include explosives or energetic materials, put out the fire using the firefighting equipment located at the site? If unable to do so, notify the fire department and evacuate the area. If injuries are involved, remove the victims from danger, administer first aid, and seek medical attention.
- The UXOSO is responsible for reporting all injuries and accidents that occur.
- Personnel will not tamper with any safety devices or protective equipment.
- Any defect or unusual condition noted that is not covered by this OP will be reported immediately to the SUXOS or UXOSO for evaluation and/or correction.
- Methods of demolition will be conducted in accordance with this OP and approved changes or revisions thereafter.
- Adequate fire protection and first aid equipment will be provided at all times.
- Personnel engaged in the destruction of MEC will wear clothing made of natural fiber, close-weave clothes, such as cotton. Synthetic material such as nylon is not authorized unless treated with anti-static material.
- Care will be taken to restrict exposure to the smallest number of personnel, for the shortest time, to the least amount of hazard, consistent with safe and efficient operations.
- Work locations will be maintained in a neat and orderly condition.
- Hand tools will be maintained in a good state of repair.

- Each heavy equipment and/or vehicle operator will have a valid operator's permit or license for the equipment being operated. See NJ requirements for CDL, below.
- Equipment and other lifting devices designed and used for lifting will have the load rating and date of next inspection marked on them. The load rating will not be exceeded and the equipment will not be used without a current inspection date.
- Leather or leather-palmed gloves will be worn when handling wooden boxes, munitions, or MEC.
- Eye protection will be worn when handling wooden boxes, munitions, or MEC.
- Lifting and carrying require care. Improper methods cause unnecessary strains. Observe the following preliminaries before attempting to lift or carry:
  - When lifting, keep your arms and back as straight as possible, bend your knees and lift with your leg muscles.
  - Be sure to have good footing and a firm hold on the object, and lift with a smooth, even motion.
- The demolition range will be provided with two forms of communication, capable of contacting appropriate personnel or agencies (i.e., medical response, Quick Response Force (QRF).
- Motor vehicles and material handling equipment (MHE) used for transporting MEC or demolition materials must meet the following requirements:

  NJ CDL: http://www.state.nj.us/mvc/pdf/Commercial/CDL_Manual_english.pdf

  NJ Blasters requirements: http://lwd.state.nj.us/labor/lsse/laws/Explosives_Law.html

- Exhaust systems will be kept in good mechanical repair at all times.
  - Lighting systems will be an integral part of the vehicle.
  - One Class 10B:C rated, portable fire extinguisher will, if possible, be mounted on the vehicle outside of the cab on the driver's side, and one Class 10B:C fire extinguisher will be mounted inside the cab.
  - Wheels of carriers must be chocked and brakes set during loading and unloading.
  - No demolition material or MEC will be loaded into or unloaded from motor vehicles while their motors are running.
- Motor vehicles and MHE used to transport demolition material and MEC will be inspected prior to use to determine that:
  - Fire extinguishers are filled and in good working order.
  - Electrical wiring is in good condition and properly attached.
  - Vehicles transporting energetics will have the transport area-beds lined with a non-metallic material.
  - Vehicles transporting energetics will have a clean transport area-bed free of debris or combustibles.
  - Fuel tank and piping are secure and not leaking.
  - Brakes, steering, and safety equipment are in good condition.

  - The exhaust system is not exposed to accumulations of grease, oil, gasoline, or other fuels, and has ample clearance from fuel lines and other combustible materials.
- Employees are required to wear leather, or rubber, gloves when handling demolition materials. The type of glove worn is dependent on the type of demolition material.
- Vehicles transporting energetics will stay on explosive truck routes at all times. If this is not possible, the PTA Police and Safety Office will be notified and will need to approve alternate routes prior to use.
- A red warning flag, such as an "Active Range Flag" or a wind sock, will be displayed at the entrance to the demolition range during demolition operations when required by local authority. If applicable, the entrance gate will be locked when demolition work is in process.
- Unless otherwise directed or authorized by the approved ESP, demolition shots will be tamped with an appropriate amount of earth/dirt.
- An observer will be stationed at a location where there is a good view of the air and surface approaches to the demolition range, before material is detonated. It will be the responsibility of the observer to order the SUXOS to suspend firing if any aircraft, vehicles, or personnel are sighted approaching the general demolition area.
- Two-way radios (to include cell phones) will not be operated in close proximity of the demolition range during the priming process and while the pit is primed. Radio transmissions will be kept at a minimum of 50 ft from the explosives.
- No demolition operation will be left unattended during the active portion of the operation (i.e., once any explosives or MEC are brought to the range).
- A minimum radius (approximately 50 feet) around the demolition pit will be cleared of dry grass, leaves, and other extraneous combustible materials.
- No demolition activities will be conducted if there is less than a 2,000 ft ceiling or if the wind velocity is in excess of 20 mph.
- Demolition shots must be fired during daylight hours (minimum time for sunrise and sunset is determined by the firing procedure used (i.e., electric, non-electric, shock tube 30/60/60).
- Notification of the local authorities will be made in accordance with the site requirements.
- No more than two persons will ride in a truck transporting demolition material or MEC, and no person will be allowed to ride in the trailer/bed.
- Vehicles will not be refueled when carrying demolition material or MEC, and must be 100 ft from magazines or trailers containing such items before refueling.
- Explosive vehicles will be cleaned of visible explosive and other contamination, before releasing the vehicles for other tasks.
- After handling demolition material or MEC and prior to conducting any other task, personnel will wash their faces and hands.

5. SPECIAL REQUIREMENTS FOR DEMOLITION ACTIVITIES

The following safety and operational requirements will be met during demolition range operations. Any deviations from this procedure will be allowed only after receipt of written approval from USACE and PTA. Failure to adhere to the requirements and procedures listed in the paragraphs below could result in serious injury or death; therefore, complete compliance with these requirements and procedures will be strictly enforced. Any deviations from the approved ESP will require a request for approval and a change to the ESP prior to implementation. The change will be submitted through appropriate channels—the Project Manager, client, USACE, and the PTA Safety Office.

6. GENERAL REQUIREMENTS

The general demolition range requirements listed below will be followed at all times:

- The USACE "Procedures for Demolition of Multiple Rounds (Consolidated Shots) on Munitions and Explosives of Concern (MEC) Sites," will be followed when destroying multiple munitions by detonation on site. This document will be available on-site during site operations. Department of Defense Explosives Safety Board (DDESB) TP 16 and/or the Demolition Tables will be used to calculate the required buried model and protective works.
- White phosphorus (WP) and propellant will be disposed of only in an approved manner and following the guidance for maximum temperature exposure (90 degrees Fahrenheit). Note there is no designated area for the disposal or use of WP on PTA. If suspected WP is encountered, arrangements will be made through Range Control and the PTA Safety Office to designate and document a WP demolition area.
- Material awaiting destruction will be stored at not less than intra-line distance, based on the largest quantity involved, from adjacent explosive materials and from explosives being destroyed. The material will be protected against accidental ignition or explosion from fragments, grass fires, burning embers, or detonating impulses originating in materials being destroyed.
- Requirements may be found in the explosives siting plan (ESP). TP 16 and or the Demolition Tables will be used to calculate the required buried module and protective works. The components should be placed on their sides or in a position to expose the largest area to the influence of the demolition material. The demolition material should be placed in direct contact with the item to be detonated and held in place by tape or earth packed over the material. The total quantity to be destroyed below ground at one time will not exceed the range limit.
- Detonations will be counted to ensure detonation of the pit. After each series of detonations, a search will be made of the surrounding area for explosive hazards. Items such as lumps of explosives or unfuzed ammunition may be picked up and prepared for the next shot. Fuzed ammunition, or items that may have internally damaged components, will be detonated in place, if possible.

- Prevailing weather condition information can be obtained from the local weather service, or other acceptable source and the data logged in the Demolition Shot Log before each shot or round of shots.
- All shots will be dual primed with an electrical/remote firing device (RFD) whenever possible.
- Whenever possible, during the excavation of the demolition pits, the ground should be contoured so that runoff water will be channeled away from the pits. If demolition operations are discontinued for more than 2 weeks, the pits should be backfilled until operations resume.
- Upon completion of the project, disturbed demolition areas will be thoroughly inspected for MEC. Depending upon contract requirements, the site may have to be backfilled and leveled. If necessary, this will be coordinated with the contractor representative.
- An individual who will be excavating on a range or demolition area will be trained in UXO avoidance to ensure a reduced risk of encountering UXO or residue from previous demolition operations.
- Before and after each shot, the WESTON Demolition Shot Record will be filled out by the SUXOS with all applicable information. This record will be kept with the MEC Accountability Log and will reflect each shot.

7. ELECTRIC DETONATOR USE

The following requirements are necessary when using electric detonators and blasting circuits:

- Electric detonators and electric blasting circuits may be energized to dangerous levels from outside sources such as static electricity, induced electric currents, and radio communication equipment. Safety precautions will be taken to reduce the possibility of a premature detonation of the electric detonator and the explosive charges. Radios will not be operated during the priming process or while the pit is primed.
- When uncoiling or straightening the detonator leg wires, keep the explosive end of the detonator pointing away from the body and away from other personnel. When straightening the leg wires, do not hold the detonator itself; rather, hold the detonator leg wires approximately 1 inch from the detonator body. Straighten the leg wires by hand; do not throw or wave the wires through the air to loosen them.
- Prior to use, the detonators will be tested for continuity. To conduct the test, place the detonators in a pre-bored hole in the ground or place them under a sand bag, and walk facing away from the detonators and stretch the wires to their full length, being sure not to pull the detonators from the hole or sand bag. With the leg wires stretched to their fullest length, test the continuity of the detonators one at a time by un-shunting the leg wires and attaching them to the galvanometer and checking for continuity. After the test, re-shunt the wires by twisting the two ends together. Repeat this process for each detonator until all detonators have been tested. This process will be accomplished at least 50 ft from and downwind of any MEC or demolition materials and out of the demolition range personnel and vehicle traffic flow pattern. In addition, all personnel on the demolition range will be alerted prior to the test being conducted.

NOTE: When testing the detonator, prior to connecting the detonator to the firing circuit, the leg wires of the detonator must be shunted by twisting the bare ends of the wires together immediately after testing. The wires will remain short circuited until time to connect them to the firing line or RFD receiver.

- At the power source end of the blasting circuit, the ends of the wires will be shorted or twisted together (shunted) at all times, except when actually testing the circuit or firing the charge. The connection between the detonator and the circuit firing wires must not be made, unless the power ends of the firing wires are shorted and grounded or the firing panel is off and locked.
- The firing line will be checked using pre-arranged hand signals. If the demolition pit is not visible from the firing point, two-way radios will be used. If radios are used, communication will be accomplished a minimum of 50 ft from the demolition pit and detonators. The firing line will be checked for electrical continuity in both the open and closed positions, and will be closed/shunted after the check is completed.
- MEC to be detonated will be placed in the demolition pit and the demolition material placed/attached in such a manner as to ensure the total detonation of the MEC. Once the MEC and demolition material are in place and the shot has been tamped, the detonators will be connected to the det cord. Prior to handling any detonators that are connected to the firing line or RFD, personnel will ensure that they are grounded. The detonators will then be carried to the demolition pit with the end of the detonators pointed away from the individual. The detonators will then be connected to the detonation cord, NON-EL, etc., ensuring that the detonator is not covered with tamping material to allow for ease of recovery/investigation in the event of a misfire.
- Prior to making connections to the blasting machine or RFD transmitter, the firing circuit will be tested for electrical continuity and ohms resistance, or transmitting power (as applicable), to ensure the blasting machine or RFD transmitter (distance) has the capacity to initiate the shot.
- The individual assigned to make the connections at the blasting machine or panel will not complete the circuit at the blasting machine or panel, and will not give the signal for detonation, until satisfied that all personnel in the vicinity have been evacuated to a safe distance. When in use, the blasting machine, or its actuating device, will be in the blaster's possession at all times. When using the panel, the switch must be locked in the open position until ready to fire, and the single key must be in the blaster's possession.
- Prior to initiating a demolition shot(s), a warning will be given. The type and duration of such warning will be determined by the prevailing conditions at the demolition range and PTA Range Control will be notified. At a minimum, this should be an audible signal using a siren, air horn, or megaphone, which is sounded for duration of 1 minute, 5 minutes prior to the shot and again 1 minute prior to the shot.

8. NON-EL USE (SHOCK TUBE)

The following requirements are necessary when using NON-EL (shock tube) systems:

- After cutting a piece of shock tube, either immediately tie a tight overhand knot in one or both cut ends or splice one exposed end and tie the other.
- Always use a sharp knife or razor blade to cut shock tube to prevent the tube from being pinched or otherwise obstructed.
- Always cut shock tube squarely across and make sure the cut is clean.
- Use only the splicing tubes provided by the manufacturer to make splices.
- Every splice in the shock tube reduces the reliability of the priming system; therefore, keep the number of splices to a minimum.
- Always dispose of short, cut-off pieces in accordance with local laws as they relate to flammable material.

The shock tube system is a thin plastic tube of extruded polymer with a layer of pentaerythritol tetranitrate (PETN) coated on its interior surface. The PETN propagates a shock wave, which is normally contained within the plastic tubing. The shock tube offers the controlled instantaneous action of electric initiation without the risk of premature initiation of the detonator by radio transmissions, high-tension power lines, or static electricity discharge. The NON-EL system uses detonators in the bunch blocks and in the detonator assembly, which will be handled in accordance with approved procedures.

The shock tube initiating system is highly reliable because all of the components are sealed and, unlike standard non-electric priming components, cannot be easily degraded by moisture. Cutting the shock tube makes the open end vulnerable to moisture and foreign contamination; therefore, care must be taken to prevent moisture and foreign matter from getting into the exposed ends of the shock tubes.

8.1 SHOCK TUBE DEMOLITION PROCEDURES

> **WARNING**
>
> Although the detonation along the shock tube is normally contained within the plastic tubing, burns may occur if the shock tube is held.

8.1.1 Shock Tube Assembly

- Spool out the desired length of shock tube from the firing point to the demolition site and cut it off with a sharp knife or razor blade. Weight down the loose end of the trunk line.
- Immediately seal the shock tube remaining on the spool by tying a tight overhand knot on the cut-off end or use a push-over sealer.
- Using a sharp knife or razor, cut the sealed end off the detonator assembly.
- Push one of the shock tube ends to be spliced firmly into one of the pre-cut splicing tubes provided by the manufacturer at least ¼ inch. Push the other shock tube end firmly into the other end of the splicing tube at least ¼ inch. Secure splice with tape if needed.

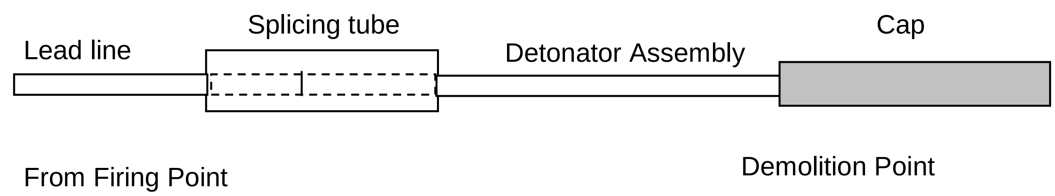


Figure 1

8.1.2 Firing Assembly Setup

1. If there are multiple items to be destroyed using bunch block(s) supplied by the manufacturer, lay out lead lines at the demolition site to the shot(s) and secure the bunch block with a sandbag, or some other item which will keep it from moving.

NOTE: No more than six leads may be used from any one bunch block.

2. If the detonator assembly has not been attached yet, use the splicing tube to splice the detonator assembly to the shock tube branch line as explained in the splicing instructions above.
3. If this is a non-tamped shot, place the detonator assembly into the demolition material. If the shot is to be tamped, prepare the demolition material with a detonating cord lead long enough to stick out of the tamping at least 1 ft.
4. Tape the detonator assembly with the cap to the detonating cord lead as shown in Figure 2.

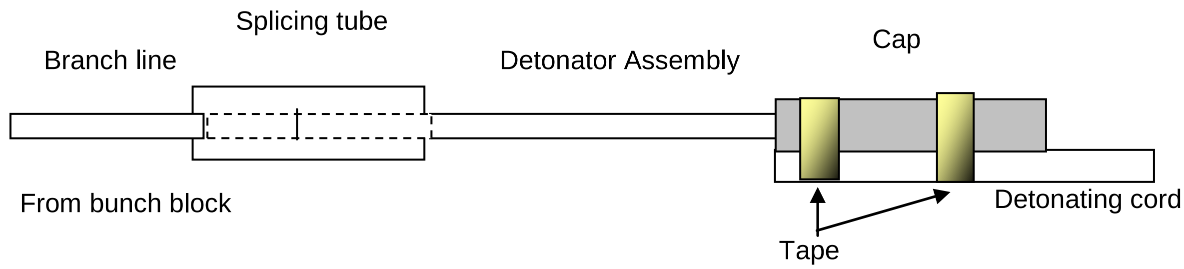


Figure 2

5. Return to the firing position.
6. Cut off the sealed end of the shock tube and proceed to the directions listed in Step 7. If you are using a previously cut piece of shock tube, use a sharp knife or razor blade to cut approximately 18 inches from the previously cut end, whether or not it was knotted in accordance with the above guidance.

7. Insert a primer into the firing device and connect the shock tube lead line to the firing device ensuring that the shock tube is properly seated in the firing device.
8. Take cover.
9. Signal **"fire in the hole"** three times and initiate charge.
10. Observe a 5-minute wait time after the detonation.
11. Remain in designated safe area until Demolition Supervisor announces **"All Clear."**

9. DETONATING CORD USE

The following procedures are required when using detonating cord (det cord):

- The det cord should be cut using approved crimpers, and only the amount required should be removed from inventory.
- The det cord should be cut outside the magazine.
- For ease of inventory control, remove the det cord only in 1 ft increments.
- The det cord should not be placed in clothing pockets or around the neck, arm, or waist, and should be transported to the demolition location in either an approved "day box," original container, or a cloth satchel, depending upon the magazine location and proximity to the demolition area.
- The det cord should be placed at least 50 ft away from the detonators and the demolition materials until the det cord is ready to use. To ensure consistent safe handling, each classification of demolition material will be separated by at least 25 ft until ready to use.
- When the det cord is ready to be connected to the demolition materials or the detonator, the det cord will be secured to the item. The cord is then strung out of the hole and secured in place with soil, or filled sandbags, leaving a minimum of 6 ft of det cord exposed outside the hole.
- Once the hole is filled, make a loop in the det cord large enough to accommodate the detonator, place the detonator in the loop, and secure it with tape. The detonator's explosive end will face down the det cord toward the demolition material or parallel to the main line.
- Always ensure that there is a minimum of 6 ft of det cord extending out of the hole to make it easier to attach and inspect the detonator and replace it should a misfire occur.
- If the det cord detonators are electric, they will be checked, tied in to the firing line, and shunted prior to being taped to the loop. If the det cord detonators are non-electric, the time/safety fuse will be prepared with the igniter in place prior to taping the detonators to the det cord loop. If the det cord detonators are NON-EL, tape the detonators into the loop as described above.
- In the event that a time/safety fuse is used, an igniter is not available, and a field expedient initiation system is used (i.e., matches), do not split the safety fuse until the detonator is taped into the det cord loop.

10. TIME/SAFETY FUSE USE

The following procedures are required when using a time/safety fuse:

- Prior to each daily use, the burn rate for the time/safety fuse must be tested to ensure the accurate determination of the length of time/safety fuse needed to achieve the minimum burn time of 5 minutes needed to conduct demolition operations.
- To ensure both ends of the time/safety fuse are moisture free, use approved crimpers to cut 6 inches off the end of the time/safety fuse roll, and place the 6-inch piece in the time/safety fuse container.
- If quantity allows, accurately measure and cut off a 6-ft-long piece of the time/safety fuse from the roll.
- Take the 6-ft section out of the magazine, and attach a fuse igniter.
- In a safe location, removed from demolition materials and MEC, ignite the time/safety fuse, measure the burn time from the point of initiation to the "spit" at the end, and record the burn time in the SUXOS's Log.
- To measure the burn time, use a watch with a second hand or chronograph.
- To calculate the burn rate in seconds per foot, divide the total burn time (in seconds) by the length (in feet) of the test fuse.
- When using a time/safety fuse for demolition operations, the minimum amount of fuse to be used for each shot will be the amount needed to permit a minimum burn time of 5 minutes.

11. DEMOLITION RANGE INSPECTION SCHEDULE

The schedule for the demolition range inspection will be followed when demolition operations are being conducted. This inspection will be conducted by the UXOSO or UXOQCS and will be documented in the Site Safety or QC Log. If any deficiencies are noted, demolition operations will be suspended and the deficiency will be reported to the SUXOS. Once the deficiencies are corrected, demolition operations may be resumed.

12. METEOROLOGICAL CONDITIONS

To control the effects of demolition operations and to ensure the safety of site personnel, the following meteorological limitations and requirements will apply to demolition operations:

- Demolition operations will not be conducted during electrical storms or thunderstorms.
- No demolition operations will be conducted if the surface wind speed is greater than 20 miles per hour.
- Demolition operations will not be conducted during periods of visibility of less than 1 mile caused by, but not limited to, dense fog, blowing snow, rain, sand storms, or dust storms.
- Demolition will not be carried out on extremely overcast days with more than 80% cloud cover, with a ceiling of less than 2,000 ft.
- Demolition operations will not be initiated until an appropriate time after sunrise, and will be secured at an appropriate time prior to sunset (see Section 4).

13. PRE-DEMOLITION/DISPOSAL PROCEDURES

13.1 PRE-DEMO/DISPOSAL OPERATIONAL BRIEFING

WESTON'S philosophy is that a successful operation is dependent upon a thorough briefing, covering all phases of the task, which is presented to all affected personnel. The SUXOS will brief personnel involved in range operations in the following areas:

- Type of MEC being destroyed.
- Type, placement, and quantity of demolition material being used.
- Method of initiation (electric, non-electric, or NON-EL).
- Means of transporting and packaging MEC.
- Route to the disposal site.
- Equipment being used (i.e., galvanometer, blasting machine, firing wire).
- Misfire procedures.
- Post-shot clean-up of range.

13.2 PRE-DEMO/DISPOSAL SAFETY BRIEFING

The WESTON SUXOS, Team Leader, or UXOSO will conduct a safety brief for personnel involved in range operations in the following areas:

- Care and handling of explosive materials.
- Personal hygiene.
- Two man rule and approved exceptions.
- Personnel roles and responsibilities.
- Potential trip/fall hazards.
- Horseplay on the range.
- Staying alert for any explosive hazards on the range.
- Calling a safety stop for hazardous conditions.
- Location of emergency shelter, if available.
- Parking area for vehicles (vehicles must be positioned for immediate departure, with the keys in the ignition).
- Location of range emergency vehicle.
- Wind direction (to assess potential toxic fumes).
- Locations of first aid kit and fire extinguisher.
- Route to nearest hospital or emergency aid station.
- Type of communications in the event of an emergency.
- Storage location of demolition materials and MEC awaiting disposal.
- Demolition schedule.

13.3 TASK ASSIGNMENTS

Individuals with assigned tasks will report the completion of the task to the SUXOS. The types of tasks that may be required are:

- Contact local military authorities and fire response personnel, and get air clearance, as required.
- Contact hospital/emergency response/medevac personnel, if applicable.
- Secure all access roads to the range area.
- Visually check range for any unauthorized personnel.
- Check firing wire for continuity and shunt.
- Prepare designated pits as required.
- Check continuity of detonators.
- Check time/safety fuse and its burn rate.
- Designate a custodian of the blasting machine, RFD, fuse igniters, or NON-EL initiator.
- Secure detonators in a safe location.
- Place MEC in pit, and place charge in desired location.

13.4 PREPARING EXPLOSIVE CHARGE FOR INITIATION

To prepare the explosive charge for initiation, the procedures listed below will be followed:

- Ensure firing wire is shunted.
- Connect detonator to the firing wire.
- Isolate or insulate all connections.
- Prime the demolition charge.
- Place demolition charge on MEC.
- Depart to firing point (if using non-electric firing system, obtain head count, pull igniters, and depart to designated safe area).
- Obtain a head count.
- Give the 1 minute warning signal, using a bullhorn or siren, 5 minutes prior to detonation, and again at 1 minute prior to detonation.
- Check the firing circuit.
- Take cover.

  Signal “**fire in the hole**” three times (or an equivalent warning).

- If using electric firing system, connect firing wires to blasting machine, and initiate charge.
- Remove firing wires from blasting machine and shunt or turn off RFD transmitter.

- Remain in designated safe area until SUXOS announces **“All Clear.”** This will occur after a post-shot waiting period of 5 minutes and the SUXOS has inspected the pit(s). PTA Range Control will be notified.

14. POST DEMOLITION/DISPOSAL PROCEDURES

Do not approach a smoking hole or allow personnel out of the designated safe area until cleared to do so, and follow the procedures listed below:

- After the **“All Clear”** signal, check pit for low orders or kick-outs.
- Examine pit, and remove any large fragmentation, as needed.
- Back fill hole, as necessary.
- Police all equipment.
- Notify military authorities, fire department, etc., that the operation is complete.

15. MISFIRE PROCEDURES

A thorough check of all equipment, firing wire, and detonators will prevent most misfires. However, if a misfire does occur, the procedures outlined below will be followed.

15.1 ELECTRIC MISFIRES

To prevent electric misfires, one technician will be responsible for all electrical wiring in the circuit. If a misfire does occur, it must be cleared with extreme caution, and the responsible technician will investigate and correct the situation, using the steps outlined below:

- Check firing line and blasting machine connections, and make a second initiation attempt.
- If unsuccessful, disconnect and connect to another blasting machine (if available), and attempt to initiate a charge.
- If unsuccessful, commence a 30-minute wait period.
- After the maximum delay predicted for any part of the shot has passed, the designated technician will proceed down range to inspect the firing system, and a safety observer must watch from a protected area.
- Disconnect and shunt the detonator wires, connect a new detonator to the firing circuit, check the replacement detonator for continuity, and prime the charge without disturbing the original detonator.
- Follow normal procedures for effecting initiation of the charge.

15.2 NON-ELECTRIC MISFIRES

Working on a non-electric misfire is the most hazardous of all operations. Occasionally, despite all painstaking efforts, a misfire will occur. Investigation and corrective action should be undertaken only by the technician who placed the charge, using the following procedure:

- If the charge fails to detonate at the determined time, initiate a 60-minute wait period plus the time of the safety fuse, i.e., 5-minute safety fuse plus 60 minutes for a total of 65 minutes.
- After the wait period has expired, a designated technician will proceed down range to inspect the firing system. A safety observer must watch from a protected area.
- Prime the shot with a new non-electric firing system, and install a new fuse igniter.
- Follow normal procedures for initiation of the charge.

15.3 NON-EL MISFIRE

The use of a shock tube for blast initiation can result in misfires, which require the following actions:

- If the charge fails to detonate, it could be the result of the shock tube not firing. Visually inspect the shock tube. If it is not discolored (i.e., slightly black), it has not fired.
- If it has not fired, cut a 1 ft piece off the end of the tube, re-insert the tube into the firing device, and attempt to fire again.
- If the device still does not fire, wait 60 minutes and proceed down range to replace the shock tube in accordance with the instructions outlined below.
- If the tube is slightly black, then a "Black Tube" misfire has occurred, and the shock tube will have to be replaced, after observing a 60-minute wait time. When replacing the shock tube, be sure to remove the tube with the detonator in place. Without removing the detonator from the end of the tube, dispose of by demolition.

15.4 DETONATING CORD MISFIRE

WESTON uses det cord to tie in multiple demolition shots, and to ensure that electric detonators are not buried. Since det cord initiation will be either electrical or non-electrical, the procedures presented in Sections 15.1, 15.2, or 15.3, as appropriate to the type of detonator used, will be used to clear a det cord misfire. In addition, the following will be conducted:

- If there is no problem with the initiating system, wait the prescribed amount of time, and inspect the connection between the initiator and the cord to ensure that it is properly connected. If the connection was faulty, attach a new initiator, and follow the appropriate procedures for the type of initiator.
- If the initiator detonated but the cord did not, inspect the cord to determine if the problem is with the det cord and not time fuze. Also, check to ensure that there is PETN in the cord at the connection to the initiator.
- It may be necessary to uncover the det cord and replace it. This must be accomplished carefully, to ensure that the demolition charge and the MEC item are not disturbed.

16. RECORD-KEEPING REQUIREMENT

To document the demolition operation procedures and the completeness of the demolition of MEC, the following recordkeeping requirements will be met:

- WESTON (as directed) will obtain and maintain all required permits.
- The SUXOS will ensure that logs are completed accurately, and the SUXOS and UXOQCS will monitor the entries in the log for completeness, accuracy, and compliance with meteorological conditions.
- The SUXOS will enter the appropriate data on the Ordnance Accountability Log and the Demolition Shot Record, to reflect the MEC destroyed, and will complete the appropriate information on the Explosives Accountability Log (the Magazine Data Card), which indicates the demolition materials used to destroy the MEC.
- The quantities of MEC recovered must match the quantities of MEC destroyed or disposed.
- WESTON will retain a permanent file of demolition records, including permits, magazine data cards, training and inspection records, waste manifests if applicable, and operating logs.
- Copies of the ATF License and required permits must be made available on site.

17. SAFETY AND PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

The following safety measures and personal protective equipment (PPE) will be used in preventing or reducing exposure to the hazards associated with MEC demolition/disposal operations. These requirements will be implemented unless superseded by site-specific requirements stated in the SSHP.

- Hard hats are required only when working around heavy equipment or when an overhead or head impact hazard exists.
- Composite toe/shank boots in accordance with EM 385-1-1 are required during surface/subsurface location of anomalies.
- Safety glasses will be required whenever an eye hazard exists, for example, when working around flying dirt/debris and using hand tools. Safety glasses will provide protection from impact hazards and, if necessary, ultraviolet radiation (i.e., sunlight).
- Positive means will be required to secure the PPE and prevent it from falling and causing an accidental detonation.
- Reflective vests will be worn when in proximity to roads or construction equipment (e.g., excavators)

18. REGULATORY GUIDANCE AND REFERENCES

Applicable sections and paragraphs in the documents listed below will be used as references for the conduct of UXO demolition/disposal operations:

- WESTON Corporate Safety and Health Program.
- OSHA General Industry Standards, 29 CFR 1910.
- OSHA Construction Standards, 29 CFR 1926.
- DDESB TP-16, Methodology for Calculation of Fragmentation Characteristics.
- HNC-ED-CS-S-98-7, Use of Sandbags for Mitigation of Fragmentation and Blast Effects Due to Intentional Detonation of Munitions.
- DoD 4160.21-M, Defense Reutilization and Marketing Manual.
- DoD Manual 6055.09-M, DoD Ammunition and Explosives Safety Standards.
- AR 385-64, U.S. Army Explosives Safety Program.
- AR 385-10, Army Safety Program.
- DA PAM 385-64, U.S. Army Explosives Safety Program.
- TM 9-1300-200, Ammunition General.
- TM 9-1300-214, Military Explosives.
- Applicable TM 60 Series Publications.
- AR 190-11, Physical Security of Arms, Ammunition, and Explosives.
- ATF 5400.7, Alcohol, Tobacco, and Firearms Explosives Laws and Regulations.
- DOT, 49 CFR, Parts 100 to 199, Transportation (applicable sections).
- EPA, 40 CFR Parts 260 to 299, Protection of Environment (applicable sections).
- AR 385-40 w/ USACE Supplement 1, Accident Reporting & Records.
- USACE EM 385-1-1, Safety and Health Requirements Manual.
- USACE 385-1-91, Explosives Safety and Health Requirements.
- AMC Regulation 385-100.
- PTA Range Demolition Requirements.

APPENDIX G

ACCIDENT PREVENTION PLAN/SITE SAFETY AND HEALTH PLAN

ACCIDENT PREVENTION PLAN

MILITARY MUNITIONS RESPONSE PROGRAM
REMEDIAL INVESTIGATION

PICATINNY ARSENAL
Morris County, NJ

Contract No.: W912DR-09-D-0006
Delivery Order No.: 0002

Prepared by

Weston Solutions, Inc.
1400 Weston Way
West Chester, PA 19380

November 2011

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LIST OF ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
AHA	activity hazard analysis
APP	Accident Prevention Plan
BBP	Bloodborne Pathogens
BBS	Behavior-Based Safety
CDL	Commercial Drivers License
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
COR	Contracting Officer’s Representative
CPR	cardiopulmonary resuscitation
CSP	Certified Safety Professional
CTT	Closed, Transferring, and Transferred
DDESB	Department of Defense Explosives Safety Board
DGM	digital geophysical mapping
DMM	discarded military munitions
DoD	Department of Defense
DOT	Department of Transportation
EHS	Environmental Health and Safety
EMR	Experience Modification Rate
EMS	emergency management services
EPA	U.S. Environmental Protection Agency
ESP	Explosives Site Plan
ESS	Explosives Safety Submission
FAR	Federal Acquisition Regulations
GFCI	ground fault circuit interrupter
HAZCOM	Hazard Communication
HAZWOPER	Hazardous Waste Operations and Emergency Response
HRR	Historical Records Review
HTRW	hazardous, toxic, and radioactive waste
IATA	International Air Transport Association
KO	Contracting Officer
MC	munitions constituents
MD	munitions debris
MDAS	material documented as safe

LIST OF ACRONYMS (Continued)

MEC	munitions and explosives of concern
MMR	military munitions response
MMRP	Military Munitions Response Program
MPPEH	material potentially presenting an explosive hazard
MRS	munitions response site
MSD	minimum separation distance
NIOSH	National Institute for Occupational Safety and Health
NJDEP	New Jersey Department of Environmental Protection
NOITrack	WESTON electronic incident reporting and notification process
OHP	Occupational Health Program
OSWER	Office of Solid Waste and Emergency Response
PA	Preliminary Assessment
PAN	Preliminary Accident Notification
PFD	personal flotation device
PPE	personal protective equipment
PTA	Picatinny Arsenal
QC	quality control
RAC	Risk Assessment Code
RCRA	Resource Conservation and Recovery Act of 1976
RI	Remedial Investigation
SI	Site Inspection
SOH	safety and occupational health
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
SUXOS	Senior UXO Supervisor
TLV	threshold limit value
TP	Technical Paper
UFGS	Unified Facilities Guide Specifications
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
UXO	unexploded ordnance
UXOQCS	UXO Quality Control Specialist
UXOSO	unexploded ordnance safety officer
WESTON	Weston Solutions, Inc.

1. SIGNATURE PAGE

ACCIDENT PREVENTION PLAN
MILITARY MUNITIONS RESPONSE PROGRAM
REMEDIAL INVESTIGATION

PICATINNY ARSENAL
MORRIS COUNTY, NJ

Plan Prepared by:

______________________________ 11/7/11
Louise Kritzberger Date
WESTON – Mid-Atlantic Federal Team -Safety Officer
610-701-3618

Plan Approved by:

______________________________ 11/7/11
Matthew Beatty, VP, PMP Date
WESTON – Mid-Atlantic Federal Team Manager
610-701-3730

Plan Review and Concurrence by:

______________________________ CIH 11/7/11
Sharon Sperber, CIH Date
WESTON – Federal Team Health and Safety Officer
610-710-3923

______________________________ 11/7/11
Laura Pastor Date
WESTON – Project Manager
610-701-3445

2. BACKGROUND INFORMATION

Contractor Name: Weston Solutions, Inc. (WESTON®)
Contract Number: W912DR-09-D-0006, Delivery Order 0002
Project Name: Military Munitions Response Program Remedial Investigation, Picatinny Arsenal, Morris County, New Jersey

2.1 INTRODUCTION

This Accident Prevention Plan (APP) presents the minimum requirements for safety and health that must be met by site personnel engaged in the Picatinny Arsenal (PTA) Remedial Investigation (RI) site operations. The APP does not in any way relieve site personnel, contractors, or subcontractors from responsibility for the safety and health of their personnel. Contractors are required to review project site conditions and the work to be performed and determine specific safety and health requirements for their personnel. Visitors to the site will receive a safety briefing by the Site Safety and Health Officer (SSHO)/unexploded ordnance safety officer (UXOSO) prior to gaining entry to the work area. The Senior UXO Supervisor (SUXOS)/Site Manager will provide all visitors appropriate PPE and an escort while on-site and maintain an on-site visitor log.

The APP is the interface with WESTON's Corporate Environmental Health and Safety (EHS) manual and is prepared to be consistent with all applicable Army, federal, state, and local health and safety requirements, which include the following:

- 29 Code of Federal Regulations (CFR) 1904, 1910, and 1926 (Occupational Safety and Health Administration [OSHA] General Industry and Construction Standards, respectively).
- U.S. Environmental Protection Agency (EPA) Standard Operating Safety Guides, Office of Solid Waste and Emergency Response (OSWER), June 1992.
- Resource Conservation and Recovery Act of 1976 (RCRA) Transport/Disposal.
- 49 CFR – Department of Transportation (DOT) Commercial Drivers License (CDL) and Shipping.
- EM 385-1-1 U.S. Army Corps of Engineers (USACE) Health and Safety Requirements Manual, 15 September 2008.
- EM 385-1-97 Explosives Safety and Health Requirements Manual.

- Federal Acquisition Regulations (FAR) 52.236-13.
- Unified Facilities Guide Specifications (UFGS), 01 35 26, Safety and Occupational Health requirements.

2.2 PROJECT AND WORK DESCRIPTION

The purpose of this MMRP RI at PTA is to perform an investigation to determine the nature and extent of munitions and explosives of concern (MEC) and munitions constituents (MC) on the ground surface and subsurface at nine (9) munitions response sites (MRSs), if present. To determine the nature and extent of MEC at these MRSs, analog and digital geophysical surveys will be performed at each MRS. Selected anomalies detected during the geophysical surveys will be investigated to determine whether potential MEC is present at that location. MC sampling will be performed where MEC is recovered during the geophysical surveys and at locations where MC may be present without a MEC release.

Previous studies conducted at PTA under the MMRP included the U.S. Army Closed, Transferred and Transferring Range/Site Inventory for Picatinny Arsenal (Malcolm Pirnie, 2003), which marked the completion of the Preliminary Assessment (PA) phase of work under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA); the Historical Records Review (HRR) (Malcolm Pirnie, 2006), and the Site Inspection (SI) (Malcolm Pirnie, 2008), which complete the PA/SI requirement for the MMRP eligible sites under the MMRP.

2.3 LOCATION OF THE PROJECT

PTA is located in Morris County, NJ, approximately 45 miles west of New York City and approximately 4 miles north of Dover, NJ. Interstate 80 and State Route 15 highways border the southern portion of PTA. **Figure 2-1** shows the location of PTA.

2.4 ANTICIPATED PHASES OF WORK

Table 2-1 Anticipated Phases of Work

Work Phase	Work Description
Activity 1: Mobilization	– Mobilize equipment and personnel to the project site. – Establish an office trailer with utilities including electricity and communication services through the PTA provider.
Activity 2: Geophysical Survey Activities	– Construct instrument verification strip for geophysical instrument testing which includes intrusive work to bury "seed" items. – Use a licensed surveyor to locate and establish site survey control points and mark grid corners with wooden stakes and steel pins. – Perform MEC avoidance using an UXO Technician II or higher. – Perform digital geophysical mapping (DGM) and/or mag and dig transect and grid surveys to detect geophysical anomalies and potential MEC within the designated MRSs.
Activity 3: MEC Intrusive Activities	– Use UXO technicians to perform surface and subsurface MEC removal activities at anomaly locations. – Recover potential MEC (UXO and discarded military munitions [DMM]), material potentially presenting an explosive hazard (MPPEH), munitions debris (MD), and/or other non-munitions-related metal debris. – Perform subsurface removal activities by the excavation of detected anomalies using hand tools, demolition activities of recovered MEC and MPPEH, and MD and non-munitions-debris inspection and transport to a certified recycling program. – Perform demolition of MEC/MPPEH.
Activity 4: MEC/MPPEH Inspection	– Dispose of the recovered MEC and MPPEH. – Designate and segregate material documented as safe (MDAS) and scrap metal for PTA turn-in and/or local recycling.
Activity 5: Drum Handling	– Drum MDAS and scrap metal for PTA turn-in and/or local recycling.
Activity 6: Media Sampling	– Perform MEC avoidance using an UXO Technician II or higher. – Collect soil/sediment MC samples in locations potentially impacted by an MEC release using hand tools. – Sampling performed according to sampling plan to characterize the survey areas.
Activity 7: Test Pit Activities	– Perform test pit excavation activities, where necessary utilizing heavy equipment (i.e., backhoe).
Activity 8: Underwater Investigations[1]	– Perform DGM transect and grid surveys to detect anomalies in Picatinny Lake and Lake Denmark sediments utilizing underwater geophysical tools towed by a boat.
Activity 9: Demobilization	– Demobilize equipment, personnel, and site infrastructure.

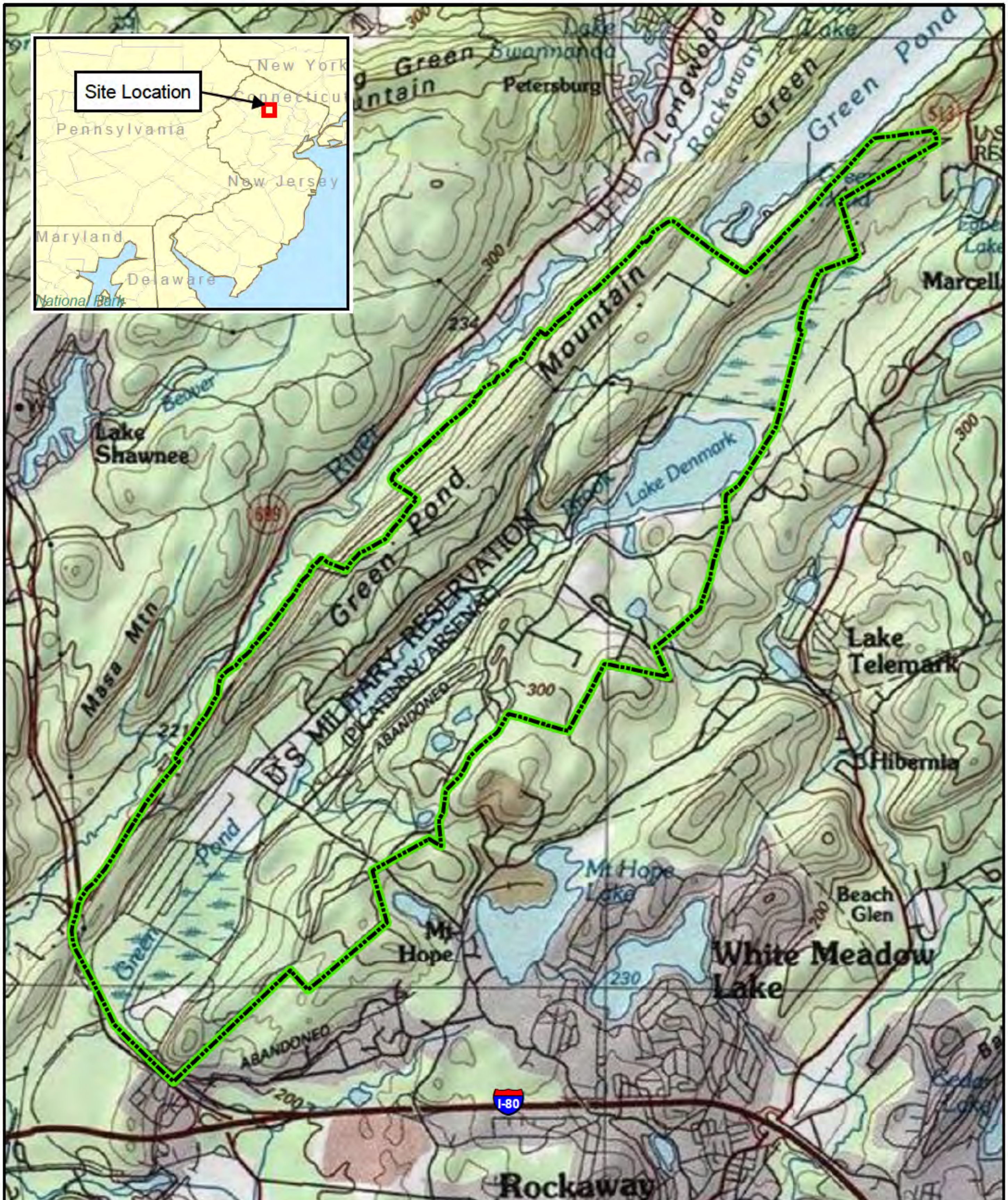
[1] Intrusive investigation of underwater anomalies/removal of underwater MEC will be addressed with required Diving Plan under a separate Addendum to this APP.

2.5 CONTRACTOR ACCIDENT EXPERIENCE MODIFICATION RATE (EMR)

Table 2-2 WESTON's Intrastate EMR since 2007*

Year	EMR
2011	.54
2010	.52
2009	.44
2008	.38
2007	.32

* Calculated by measuring the difference between a company's actual past workers' compensation claims as compared to the average expected claims experience for companies performing the same type of work. An EMR is calculated using a rolling 3-year period.



Legend

Installation Boundary

Data Source: ESRI, USGS Map Service
Coordinate System: UTM Zone 18N
Datum: NAD 83
Units: Meters

Miles
0 0.5 1

WESTON SOLUTIONS

Figure 2-1
Picatinny Arsenal Location
Morris County, New Jersey

File: \\Fsfed02\TIG\Picatinny\MXD\workplan\May2011\Site_loc.mxd, 06-Jun-11 11:27, ricksc

3. HEALTH AND SAFETY POLICY

3.1 HEALTH AND SAFETY POLICY

WESTON personnel operate in a culture where safety, health, and protection of personnel and the environment take precedence over expediency. A fundamental premise of our Behavior-Based Safety (BBS) culture is that accidents are preventable through choosing safe proactive behaviors. WESTON's policy on Health and Safety emphasizes several important points:

- WESTON has established a goal of working safely 100% of the time (employees and contractors) with the expected outcome being zero incidents that result in injuries, illnesses, property damage, or environmental damage or contamination.
- All managers and workers accept as their responsibility a concerted and sustained effort to achieve a goal of Safety Every Minute of Every Day.
- All managers and workers assume a safety leadership role.
- All managers and workers take action for safety, coach peers in safe practices, and share experiences, successes, and failures.
- Workers are involved in the identification and control of workplace hazards during work planning, work execution, and feedback activities.
- Management is committed to a work environment that allows free and open expression of safety concerns, and where workers fear no reprisals or retaliation.
- Workers are our most important assets to WESTON and critical resources for establishing, implementing, and observing safe work practices.

3.1.1 100% Safe Work and Stop Work Policy Statement

For each activity and contract under which WESTON performs work, a policy is implemented clearly stating that WESTON employees have the responsibility and right to stop or curtail any work they perceive to be unsafe (a threat to public health, the safety and health of workers, or the environment). Employees must be free to voice concerns about safety and health without fear of reprisal, retaliation, or harassment. This policy is implemented by a clear, straightforward, contract-specific procedure as part of the WESTON Integrated Safety Management System.

To support the WESTON goal of all employees and subcontractors working safely 100% of the time, all managers will utilize every available resource to maintain safe, hazard-controlled work environments characterized by a vigorous emphasis on accident prevention. Standards, requirements, and best practices will be implemented in a manner that maximizes the prevention of accidents. Managers will ensure that all employees are knowledgeable of those standards, requirements, and best practices that pertain to their safety.

WESTON managers and supervisors are held directly accountable for the health and safety of their employees, subcontractor activities, and other resources employed to maintain employee health and safety, and the continual communication of hazards and hazard controls to the workforce.

3.2 PROGRAM GOALS

WESTON has implemented a BBS program where employees assume a safety leadership role and are responsible for the safety of coworkers, team members, and stakeholders. Employees focus on behaviors and intervention techniques to improve behavioral processes. As part of WESTON's BBS program, employees create high-quality connections with one another, team members, and stakeholders to foster an active, caring culture. Commitment is high, and employees help each other be Safe Every Minute of Every Day to achieve the corporate goal of *Zero Accidents* involving personnel and the environment.

3.3 PROGRAM OBJECTIVES

1. EHS staff, resources, and procedures are provided as necessary and used in an efficient and cost-effective manner to establish a safe work environment for WESTON employees, subcontractors, clients, and the general public.

2. Compliance with environmental, health, and safety regulations is assured, and risk is managed and minimized for all employees, as well as the corporation.

3. Management involvement is established and maintained within the EHS Program.

4. Clear lines of reporting, authorities, responsibilities, and performance expectations are established.

5. World-class EHS culture is attained at our places of employment, in our homes, and in our communities through the elimination of at-risk behavior.

3.4 ACCIDENT EXPERIENCE GOAL

The accident experience goal for this project, as well as for every WESTON project, is zero. Work will not be performed in a manner that conflicts with the safety, health, or environmental precautions outlined in the APP or with the Site Safety and Health Plan (SSHP) (**Attachment A**). Site personnel, including any WESTON subcontractors, who have the potential for exposure to site hazards, are subject to the requirements of the APP and SSHP. Personnel violating safety procedures are subject to dismissal/removal from the project site.

WESTON gathers information on all incidents in an electronic database that allows assessment of trends and causes of incidents. By learning from our past experience, we can plan to avoid the recurrence of incidents. This information is available to every WESTON employee and is used in training as well as in the development of APPs, SSHPs, and AHAs. This is in keeping with WESTON's goal of working safely 100% of the time and continuous improvement.

4. RESPONSIBILITIES AND LINES OF AUTHORITIES

4.1 STATEMENT OF EMPLOYER'S RESPONSIBILITY

As the employer, WESTON is ultimately responsible for the implementation of the EHS Program through enforcing the safety and occupational health (SOH) for this project as stated in the APP and SSHP (See Appendix A). WESTON's senior and corporate management is committed to operating projects in a manner consistent with controlling EHS, legislative, regulatory, and client requirements, and other applicable requirements administered by federal agencies.

4.2 IDENTIFICATION OF PERSONNEL RESPONSIBLE FOR SAFETY

Table 4-1 presents the key project personnel responsible for the EHS Program implementation at PTA. Resumes for key WESTON safety personnel are included in **Attachment B**. Key responsibilities of each position are provided in **Table 4-2**. Accountability for health and safety at all levels flows from the WESTON CEO through a matrix system, as indicated in organizational chart presented in **Figure 4-1**.

Table 4-1 Project Safety Team

Name	Title	Phone No. *
Laura Pastor	Project Manager	(610) 701-3445 - office (484) 467-9466 - cell
George Crawford, CIH	Corporate Environmental, Health and Safety Manager	(610) 701-3771 - office (484) 437-5976 - cell
Larry Werts	Mid-Atlantic Division Environmental Health and Safety Officer	(610) 701-3912 - office (215) 815-6237 - cell
Sharon Sperber, CIH	Mid-Atlantic Federal Team Safety Manager	(610) 701-3923 - office (302) 743-5048 - cell
Joe Kendall	SSHO/ UXOSO	410-612-5927 - office 443-845-7690 - cell
Steve Bebow	Site Manager/SUXOS	(731) 435-0191- cell

Notes:
CIH = Certified Industrial Hygienist
*Phone numbers will be confirmed/revised prior to field mobilization and revised during the project, as necessary.

Table 4-2 Position Descriptions

Position	Description of Key Responsibilities
PM Laura Pastor	• Overall responsibility for the management and completion of the project. • Responsible and accountable for project safety. • Overall responsibility for ensuring that project personnel (including subcontractor personnel) comply with EHS regulations, program requirements, and procedures. • Ensure development and implementation of project SSHPs and indicate concurrence with final plans after required EHS reviews. • Ensure project personnel meet applicable safety certification requirements. • Ensure project support is acquired from appropriately qualified safety personnel such as the Corporate EHS Manager, Division H&S Officer and SSHO/UXOSO. • Ensure project personnel comply with applicable EHS requirements and corporate or client procedures. • Halt any project work activities that represent an imminent hazard. • Ensure appropriate safety equipment and materials are provided to the project. • Ensure timely and accurate reporting and investigation of incidents, accident, or injuries involving project personnel, with support from the risk management department. Ensure corrective actions are implemented completely. • Ensure proper response and internal notification regarding inspections by regulatory agencies. • Ensure all project personnel have met the site-specific experience and training requirements.
Corporate EHS Manager George Crawford, CIH	• Approve and ensure the implementation of the WESTON Corporate EHS Program, the APP, SSHP and any amendments. • Conduct field audits to assess the effectiveness and implementation of the APP and SSHP. • Evaluate and authorize changes to the APP and SSHP based on field and occupational exposure, as necessary. • Function as a quality control (QC) staff member.
Division H&S Officer Larry Werts	• Oversee and maintain the WESTON Corporate EHS Program, the APP and SSHP. • Conduct site visits, as necessary, to audit the effectiveness of the APP and SSHP. • Serve as a technical safety advisor and provides technical assistance and support. • Receive all reports of incidents that occur on site.
Mid-Atlantic Federal Team Safety Manager Sharon Sperber, CIH	• Oversee and maintain the WESTON Corporate EHS program, the APP and SSHP. • Develop the APP and SSHP. • Develop modifications to the APP and SSHP, as necessary.

Table 4-2 Position Descriptions

Position	Description of Key Responsibilities
SSHO/UXOSO Joe Kendall *	• Responsible for implementing the APP and SSHP by ensuring that all project personnel follow the requirements of the APP and SSHP. • Be present during UXO operations and ensure the implementation of the Explosives Safety Submission (ESS). • Ensure the specific procedures and responsibilities for processing MPPEH for certification as MDAS are being followed. • All procedures for processing MPPEH are being performed safety and consistent with applicable regulations. • Conduct daily safety meetings for site personnel to discuss the day's activities, associated hazards, and UXO safety. • Review site personnel training and experience documentation to ensure compliance with the APP and SSHP. • Coordinate changes/modifications to the APP with the appropriate site personnel. Conduct or coordinate project-specific training. • Report any incidents that occur on-site to the SUXOS/Site Manager, PM and Mid Atlantic Federal Team Safety Manager and Division H&S Officer. • Implement safety corrective actions through training and reinforced awareness. • Maintain exposure data. • Has stop-work authority for all safety issues. • Directly communicates with the Site Manager/SUXOS and PM. • Reports to the EHS Manager.
Site Manager/SUXOS Steve Bebow	• Responsible for planning, coordinating and supervising on-site activities. • Supervises multiple project teams during the on-site RI activities. • Ensures implementation of procedures and guidance for MEC operations and ensuring compliance with Department of Defense (DoD) directives and federal, state, and local statutes and codes). • Certifies MPPEH and or range-related debris as free from explosive hazards and ready for turn-in or disposal (completion of Form, DD 1348-1A) • Maintains field records for the project. • Has stop-work authority for all safety issues. • Directly communicates with the UXOSO. • Reports to the PM.

* During non-intrusive, non-construction, geophysical activities, alternate SSHOs will be designated. These SSHOs will have the necessary qualifications to serve as a SSHO during geophysical activities. Brian Junck will serve in this role.

4.3 COMPETENT PERSON

According to OSHA Regulation 29 CFR 1926.32, site personnel will include a Competent Person. Specific OSHA and USACE regulations identify the need for involvement of competent persons. A list of competent person requirements and regulatory references is presented in **Table 4-2**. Mr. Kendall, the UXOSO, meets the Competent Person requirements applicable to this scope of work and has been approved by WESTON's Corporate Environmental Health and Safety Management. No work will be performed without a Competent Person on-site.

Mr. Kendall is a Competent Person as stated in OSHA 29 CFR 1926.32. As required by EM 385-1-1, Mr. Kendall has at least 5 years of applicable safety experience and has successfully completed the OSHA 30-hour construction safety course. Mr. Kendall has performed work on a site(s) of similar hazard, risk, and complexity to the task assignment. Mr. Kendall also has 5 years of experience implementing safety and occupational health procedures and experience conducting exposure monitoring to select and adjust personal protective equipment (PPE); however, it is unlikely that such adjustments will be needed.

The qualifications of site personnel will be maintained on-site. The certifications and overall qualifications of all WESTON personnel are maintained in a database supported by WESTON (see **Attachment B)**.

Table 4-3 Competent Person Requirements

Competent Person Requirement	Regulatory Reference	Person Designated
SSHO/UXOSO Identification	EM 385-1-1 Sec. 01.A.17	Joe Kendall
Hazardous Waste Operations and Emergency Response	EM 385-1-1 Sec. 28 29 CFR 1926.65	Joe Kendall
General Inspections of Construction Sites	EM 385-1-1 Sec. 01.A.12 29 CFR 1926.20	Joe Kendall
Unsanitary Conditions	EM 385-1 Sec. 02 29 CFR 1926.27	Joe Kendall
Hearing Protection	EM 385-1-1 Sec.05.C 29 CFR 1926.101	Joe Kendall
Excavation/Trenching	EM385-1-1 Sec. 25 29 CFR 1926.651 Subpart P	Joe Kendall

Note: EM 385-1-1 is USACE Health and Safety Requirements Manual; CFR is OSHA Code of Federal Regulations.

4.3.1 Qualified Person

Site personnel will also include a Qualified Person. WESTON will permit only those employees qualified by training or experience to conduct MEC operations, and operate equipment and machinery in compliance with OSHA 29 CFR 1926.20(b)(4). According to OSHA 29 CFR 1926.32, “qualified” means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter, the work, or the project. **Table 4-4** presents a Qualified Person's requirements list.

The SUXOS, UXOSO, UXO Quality Control Specialist (UXOQCS), and UXO Technicians III, II, and I will meet the requirements of the DDESB Technical Paper (TP) 18 for the positions assigned.

Table 4-4 Qualified Person Requirements

Qualified Person Requirement	Designated Person(s)
Brief Visitors on Site Hazards and PPE	Joe Kendall
Boating Safety	Paul Novak
Chain Saw Operations	Joe Kendall

The qualifications of all site-specific personnel will be maintained on-site. The certifications and overall qualifications of all WESTON personnel are maintained in a database supported by WESTON. Documentation will be reviewed and maintained by the SSHO/UXOSO.

4.4 PRE-TASK HEALTH AND SAFETY ANALYSIS

Pre-Task Safety and Health Analysis begins for WESTON at the proposal phase by utilizing available documentation, prior sampling results and site visits. The process continues through development of the APP, Activity Hazard Analysis (AHAs), and the SSHP.

Project Managers or designated SSHO/UXOSOs will ensure that a survey is conducted for each work area during mobilization to identify the sources of all types of hazards and to confirm that the APP, AHAs, and SSHP address these hazards. This phase of the Pre-Task Safety and Health Analysis is used to update the AHAs provided in Section 12 of the APP. The Hazard Assessment Certification Form is provided as **Attachment C**.

During the walk-through survey, the Project Manager or the Site Manager/SUXOS and SSHO/UXOSO will determine the level of PPE required for the work areas and specific activities. They will evaluate potential physical hazards associated with the work areas and specific work activities (e.g., walking/working surfaces, electrical installations/lines, and noise exposure) and select PPE to mitigate identified hazards. Consideration will be given to biological and climatic conditions and selection of PPE to accommodate the conditions (e.g., cooling units, insulated clothing/footwear, snake chaps).

4.5 LINES OF AUTHORITY

Lines of authority are provided in **Figure 4-1.**

4.6 NONCOMPLIANCE, DISCIPLINARY ACTIONS, AND COMPANY'S SAFETY INCENTIVE PROGRAMS

4.6.1 Noncompliance

Although noncompliance is not expected, safety and health program violations can and will result in disciplinary action up to and including dismissal. All employees understand that safety is of the utmost importance at WESTON. All personnel understand the importance of compliance with all applicable regulations and project requirements.

4.6.2 Disciplinary Actions

Personnel violating safety procedures are subject to dismissal/removal from the project site.

4.6.3 Incentive Programs

Project-specific financial and other incentive plans are developed and integrated with safety and health goals as an overriding component.

4.6.3.1 Safety Solutions Program

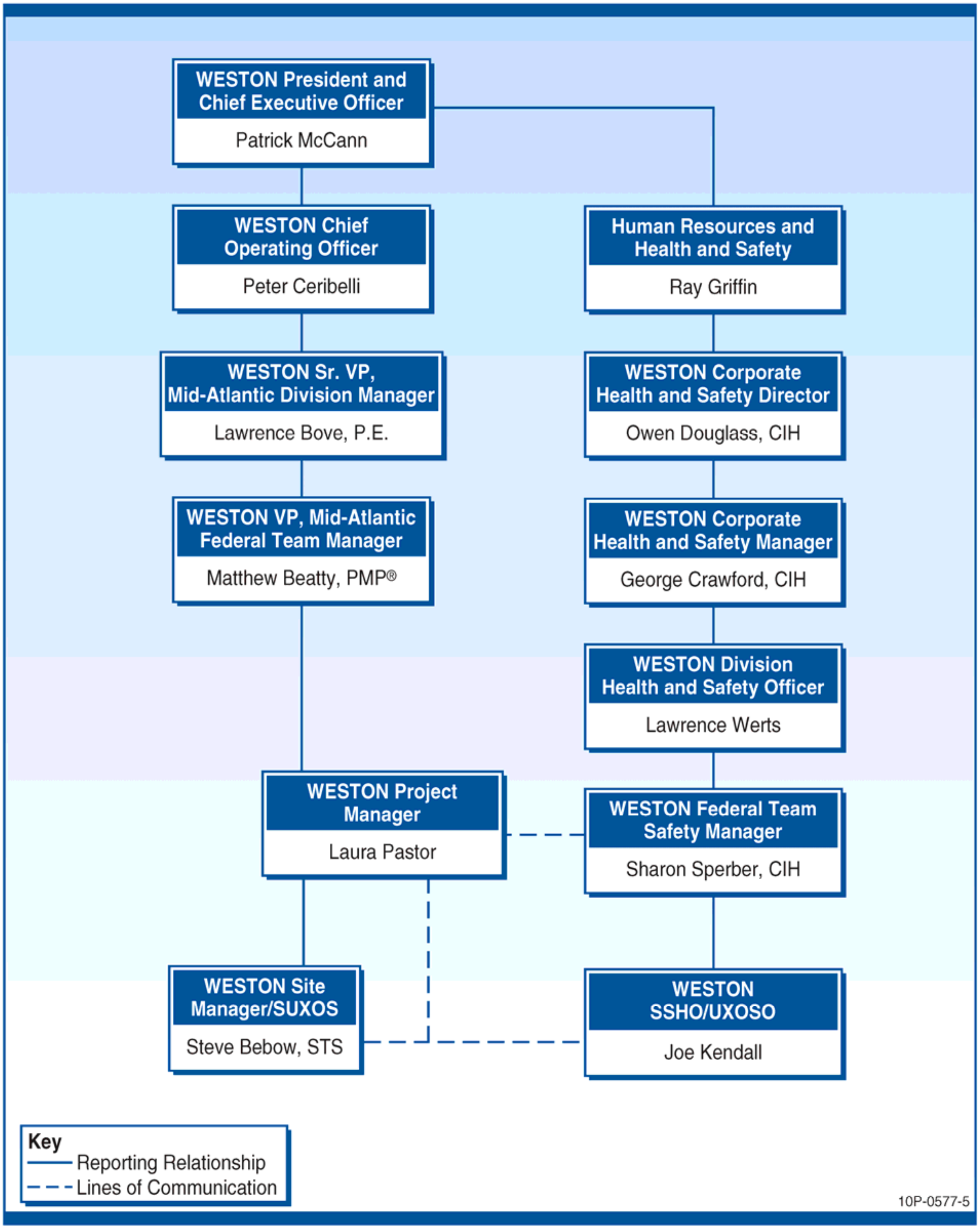
Safety Solutions is a program that provides WESTON's employees with positive opportunities to become engaged in the Safety and Health Program. Employees are encouraged to utilize the Safety Solutions Program to report near incidents or to identify workplace hazards and their proposed solutions. The submitted Safety Solutions are evaluated, and the authors of the most highly regarded solutions are eligible for a financial bonus and other rewards.

4.7 MANAGEMENT ACCOUNTABILITY FOR SAFETY

WESTON managers and supervisors are held directly accountable for the health and safety of their employees, for subcontractor activities, and for the continual communication of hazards and hazard controls to the workforce. The SSHO/UXOSO, Federal Team Safety Officer, and the Division Environmental Health and Safety Officer assess the health and safety performance of employees.

The accountability of supervisors and managers for the implementation of the health and safety program is ensured through monthly project life cycle reviews with senior management and through annual employee performance reviews.

Figure 4-1 Health and Safety Organization Chart and Lines of Authority



5. SUBCONTRACTORS AND SUPPLIERS

5.1 IDENTIFICATION OF SUBCONTRACTORS AND SUPPLIERS

Table 5-1 List of Subcontractors

Subcontractor	Activity	EMR Rating
ARCADIS/Malcolm Pirnie	▪ Team members – conducting geophysical surveys, intrusive investigation, demolition operations and MC sampling.	.62
Surveyor – TBD	▪ Survey control monuments, grid corners, etc.	TBD

5.2 CONTROL AND COORDINATION OF SUBCONTRACTORS AND SUPPLIERS

The subcontractor will assign a Site Safety Representative who will be responsible for coordinating projects and safety responsibilities for their personnel as designated and directed by the WESTON SSHO/UXOSO. WESTON is ultimately responsible for ensuring subcontractor compliance with the APP and SSHP for PTA. Non-compliance with this plan will result in a stop work order, as determined by the SSHO/UXOSO.

5.3 SAFETY RESPONSIBILITIES OF SUBCONTRACTORS AND SUPPLIERS

The Site Safety Representative will interact with the SSHO/UXOSO to ensure compliance with this APP. Subcontractor employees are expected to comply with this APP, USACE EM 385-1-1, and other applicable regulations governing their safety while on the project. In the event of a conflict, the more stringent requirements will apply.

The Site Safety Representative will:

- Attend all health and safety briefings.
- Address worker issues and immediately stop work if unsafe acts/conditions exist or if uncertainty associated with how a task is to be performed exists.
- Coordinate corrective action with the SSHO/UXOSO prior to resuming operations.
- Participate in any incident investigations.
- Inspect operations and work areas daily, in conjunction with the SSHO/UXOSO.
- Ensure subcontract workers have the proper PPE.
- Control all hazardous material brought on-site.

5.4 SUBCONTRACTOR SAFETY PLANS

WESTON subcontractor employees are covered by this APP and will be required to sign the Acknowledgement Form in the SSHP indicating that they have read and understand both the APP and SSHP and agree to follow the requirements in these documents.

WESTON will obtain and verify the subcontractor personnel training records prior to subcontract work commencing.

6. TRAINING

6.1 GENERAL

Personnel assigned to the PTA MMRP RI project have received the required training. Records of the required training are maintained in the WESTON Corporate Environmental Health and Safety database, and records of required training will be available on-site at all times.

6.2 SAFETY INDOCTRINATION

When hired, WESTON staff is required to complete EHS training appropriate to their role and responsibility level, which often involves hazardous, toxic, and radioactive waste (HTRW) and military munitions response (MMR). New hires that have previously completed such training are required to provide documentation of training. All training, including refresher training, is documented in WESTON's corporate recordkeeping software, EHSTrack.

New employees also participate in WESTON's orientation training program. Personnel receive training on WESTON's EHS policies, including environmental aspects, emergency action plans, security plans, ergonomics, and incident reporting procedures software, BBS, and site-/job-specific training. Site-specific topics will include:

- Accident prevention.
- Accident reporting (how and to whom).
- Medical facilities for emergency treatment and/or assistance.
- Reporting and correcting unsafe conditions.
- Job hazards/hazard control.
- Site-specific biological, physical, chemical, and/or ionizing/nonionizing radiation hazards as listed in the Activity Hazard Analyses.
- Company safety policies.
- Site briefings conducted prior to being granted site access.
- Site layout.
- Hazard control.
- Emergency response and notification.
- Hearing conservation.

- PPE.
- Buddy system.
- Spill prevention.
- Fire prevention.
- Hazard communication.
- Visitor access.
- Public communication guidelines.
- Any specific training required by regulations.

6.3 MANDATORY TRAINING AND CERTIFICATIONS

Listed below are the training and certifications required for the PTA MMRP RI project. Additional details of this site-specific training are presented in Section 5 of the SSHP (**Appendix A**).

- 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER).
- 8-hour HAZWOPER Refresher.
- OSHA 30-hour Construction Safety Training – At a minimum the SSHO/UXOSO.
- Certification for UXO Technicians as documented in DDESB TP-18.
- NJ Blasters License – A minimum of one person if conducting demolition operations.
- First-Aid/CPR/Bloodborne Pathogens (BBP) – At a minimum two people.
- U.S. Coast Guard (USCG) Boating Skills and Seamanship course – A minimum of one person when using a boat.

A copy of applicable training records for project personnel will be available on-site and maintained by the SSHO/UXOSO.

6.4 PERIODIC SAFETY AND HEALTH TRAINING

The SSHO/UXOSO will present daily site safety briefings (i.e., tailgate meetings) to on-site personnel prior to the start of the work shift. The purpose of the briefings is to assist personnel in safely conducting the scheduled work activities. The briefings will include the following:

- Tasks to be performed and work method and general description of job scope.
- Work location.

- Equipment usage.
- Control of hazards.
- Weather conditions.
- Emergency response review.

The briefings will provide an opportunity for individuals to share observed safety deficiencies and recognitions. Documented attendance at these daily safety briefings will be maintained by the SSHO/UXOSO.

In addition to the daily site safety briefings, a formal safety meeting will be conducted at least monthly for all SSHO/UXOSO's within their respective divisions. A safety manager or designee will be invited to attend this monthly meeting.

6.5 REQUIREMENTS FOR EMERGENCY RESPONSE TRAINING

At least two site personnel will have current training in first aid and cardiopulmonary resuscitation (CPR). Site personnel will be trained in the use of fire extinguishers to provide emergency response. In the event specialized/elevated care is necessary, either WESTON or the local on-call emergency management service (EMS)/ambulance service will transport the injured person to the appropriate medical facility. Outside assistance will be requested as detailed in the Emergency Response Plans included in the SSHP.

WESTON personnel involved with responding to an on-site emergency will be briefed in their roles and responsibilities as part of the initial indoctrination training discussed above. During this training, personnel will be briefed on the Hazard Communication (HAZCOM) Program, emergency equipment, and first-aid procedures, as described in the SSHP. Personnel will also be briefed on emergency response and contingency procedures presented in Section 10 of the SSHP, which include:

- Procedures and tests.
- Spill prevention.
- Firefighting.
- Posting of emergency telephone numbers.
- Medical support.

This training will be documented and will also involve a drill of the emergency response procedures prior to the start of site activities. During this training, the route to and location of the evacuation point and the location of medical support will be discussed with each staff member.

7. SAFETY AND HEALTH INSPECTIONS

7.1 SPECIFIC ASSIGNMENTS OF RESPONSIBILITIES

The SSHO/UXOSO will conduct and document daily safety and health observations on the project log. Weekly inspections will be conducted by the SSHO/UXOSO utilizing the Environmental Health, Safety Inspection Checklist presented in **Attachment D**. The qualifications and certifications of the inspector (e.g., the SSHO or CIH) are provided in **Attachment B** of this APP. In addition, the UXOQCS, as part of QC responsibilities, will conduct and document daily safety and occupational health inspections in daily QC logs.

7.2 INSPECTIONS/AUDIT FREQUENCY

Inspected by	Daily	Weekly	Monthly	Quarterly
SSHO/UXOSO	X	X		
CIH or designee			X	X

7.3 DEFICIENCY TRACKING

A deficiency tracking form, presented in **Attachment E,** will be used to document unacceptable work practices. The deficiency tracking form lists and monitors the status of safety and health deficiencies in chronological order; displays the type and description of the deficiency; the risk rating; code reference; the corrective action taken and the projected resolution date; date resolved; and the person responsible for the corrective action. The deficiency tracking system will be posted on the safety bulletin board and will be updated daily. In most cases, discrepancies of greater severity are corrected immediately, or within 24 hours if they are of lower severity.

When a deficiency is identified, the SSHO/UXOSO will follow up by updating the deficiency tracking form to indicate the specific corrective action, the person(s) responsible for the corrections, and the date by which the action needs to be accomplished. The SSHO/UXOSO will also follow up by ensuring that the corrective action is accomplished in the timeframe indicated. During health and safety audits, the deficiency log is reviewed to ensure that the corrective action process has been implemented. The information from the deficiency tracking form is presented in daily safety meetings and monthly supervisor meetings so that lessons learned are disseminated.

7.4 EXTERNAL INSPECTIONS/CERTIFICATIONS

Although no external inspection is expected, regulatory agencies do conduct inspections from time to time. An inspector should be treated as a professional and with courtesy. The regulatory agency inspector should introduce himself/herself to the manager in charge of the operation and present credentials to verify that he/she is representing a recognized regulatory agency, such as OSHA or DOT/International Air Transport Association (IATA), New Jersey Department of Environmental Protection (NJDEP), or United States Environmental Protection Agency (EPA). Personnel who cannot demonstrate their affiliation with a recognized regulatory agency should not be allowed access to the project site or site office.

Any pre-inspection conference will be attended by the SUXOS and SSHO/UXOSO, at a minimum. At that time, the scope of the inspection should clearly be described by the inspector. If the inspector has not described the scope of the inspection during the pre-inspection conference, ask the inspector to provide such a description.

Prior to taking the inspector on-site or into the office, it is necessary to contact the Project Manager, USACE, PTA, and either the Federal Team Safety Manager, Division Environmental Health and Safety Officer, or Corporate Environmental Health and Safety Manager. The inspector will perform the inspection, which may include a walk-through inspection of the work site or a targeted file/records review. The site or office inspection typically ends with a close-out conference during which the inspector may provide tentative findings. In some cases the inspector may forego the close-out conference and issue a written citation after leaving the Picatinny site. On occasion, inspections may require more than one day.

Regulatory agency inspectors seldom issue citations during the inspection; however, if an OSHA or EPA inspector observes an imminent hazard, he/she can order a work stoppage. It is WESTON's practice to cooperate with investigations. Information that is requested should be provided; however, requests for copies of documents, safety and health plans, and training records should not be provided without first obtaining approval from WESTON's Law Department. Under no circumstances should any attempt be made to mislead the inspector. Coordination of any regulatory agency inspection is the responsibility of the SSHO/UXOSO who will accompany the inspector during all stages of the inspection.

8. ACCIDENT REPORTING

The SSHO/UXOSO will report all incidents, near incidents, all injuries or occupationally related illness, spills, thefts, or other site issues to the Division Health and Safety Officer within 1 hour of the occurrence, or as soon as physically possible. The necessity for prompt notification is to ensure appropriate and adequate assistance to the site personnel. The USACE ENG Form 3394 Accident Investigation Report (see **Attachment F**) and the WESTON electronic incident reporting and notification process (NOITrack) must be submitted to the Federal Team Safety Manager, Division Environmental H&S Officer and Corporate EHS Manager within 24 hours of the incident. All incidents will be reported to the Contracting Officer (KO)/ Contracting Officer's Representative (COR) by using USACE ENG Form 3394 as soon as possible, but not more than 24 hours after the incident.

8.1 EXPOSURE DATA (MAN-HOURS WORKED)

The SSHO/UXOSO and PM will track exposure hours on a spreadsheet-type form. The hours will be presented as a spreadsheet compilation of on-site WESTON personnel hours (including subcontractor hours) worked and any reportable accidents that occurred during the month and also those that have occurred since the start of the project. The spreadsheet would be used to calculate the OSHA Recordable Incident Rate.

For this project, this monthly spreadsheet record will be sent electronically by the 5th of the following month by the WESTON PM to EMDC.Admin@usace.army.mil with a copy submitted to the USACE COR and USACE PM.

8.2 ACCIDENT INVESTIGATIONS, REPORTS, AND LOGS

The reporting requirements following all incidents, near incidents, spills, thefts, or other site issues is as follows:

- Within 1 hour – call Federal Team Safety Manager/Division Environmental H&S Officer
- Within 24 hours – complete NOITrack

- Within 24 hours – Preliminary Accident Notification (PAN) submitted to KO/COR [per UFGS-01 35 26 (February 2010)]
- Within 45 days – ENG 3394

All incidents, near incidents, injuries or occupationally related illness, spills, thefts, or other site issues will be reported to the WESTON Federal Team Safety Manager or Division Environmental H&S Officer within 1 hour of the occurrence, or as soon as physically possible. WESTON investigates all incidents, including near incidents or "near misses." No supervisor will decline to accept a report of injury from a subordinate. Investigation findings, along with appropriate corrective actions, will be reported to the KO/COR in the prescribed format as soon as possible but no later than 5 working days following the injury/accident. Corrective actions will be implemented as soon as reasonably possible.

Incidents meeting the OSHA definitions of recordable incidents are logged on the WESTON 300 logs, and the SSHO/UXOSO also logs these incidents on the on-site OSHA 300 log.

8.2.1 NOITrack

WESTON's NOITrack is used to document all incidents, near incidents/misses, corrective action plans, and investigations involving WESTON-managed work. Incidents include the following: employee accidents, injuries, auto accidents, property damage/loss, utility damage, information/data breaches, security concerns/breaches, break-ins, subcontractor injuries/accidents/events, OR any other liability situation or circumstance that could give rise to a claim. For example, spills/discharges resulting from the installation of equipment or systems by WESTON or our subcontractors should be reported using the NOITrack system. Basically, an NOI must be submitted if something happens on a project that was not intended and could result in liability for WESTON.

The WESTON NOITrack must be completed within 24 hours of the incident occurrence. NOITrack can be accessed on the WESTON Portal, EHS homepage.

8.2.2 USACE ENG Form 3394

A USACE accident in which the resulting total amount of property damage is $2,000 or more, but less than $50,000; a non-fatal injury or occupational illness to contractor personnel resulting in restricted work, transfer to another job, medical treatment greater than first aid, needle stick injuries and cuts from sharps that are contaminated from another person's blood or other potentially infectious material, medical removal under medical surveillance requirements of an OSHA standard, occupational hearing loss that meets OSHA recordability criteria, or a work-related tuberculosis case.

All incidents will be reported to the KO/COR by using Preliminary Accident Notification (PAN) (see **Attachment F**) as soon as possible, but not more than 24 hours after the incident. The USACE ENG Form 3394 Accident Investigation Report (see **Attachment F**) must first be submitted to the Division H&S Officer and Corporate Environmental Health and Safety Manager to be forwarded on to the KO/COR within 45 days.

8.2.3 First Aid Form

Utilized for any injury that is considered to be non-reportable through means of basic first aid treatment (i.e., paper cut/ non-allergy bug bite). The form is presented in **Appendix G**. A copy should be sent monthly to the Division Environmental Health and Safety Officer or designee for follow-up on safety trends.

8.3 IMMEDIATE ACCIDENT NOTIFICATION

The following incidents require immediate notification, no later than 1 hour, to the KO/COR, or designee.

- Fatalities.
- Permanent total disability.
- Permanent partial disability.
- Hospitalization of three or more people resulting from a single occurrence.
- Property damage of $500,000 or more.

The written follow-up will utilize USACE ENG Form 3394 Accident Investigation Report (see Subsection 8.2.2 and **Attachment F)**.

8.4 OSHA NOTIFICATION

WESTON will notify OSHA within 8 hours of any fatality or single incident that results in hospitalization of three or more persons.

8.5 ACCIDENT REVIEW

Any accident that occurs while an employee is driving on Company business, or operating a WESTON-owned, leased, rental or allowance vehicle at any time will be reviewed and investigated. Drug and/or alcohol testing will be conducted in a timely manner in accordance with WESTON Drug and Alcohol Operating Practice (05-01-010). The accident review is intended to determine whether the accident was "preventable" as defined by the National Safety Council. The investigation will also include consideration of citations issued, if any, and the specifics of the accident to determine appropriate consequences, if any. Investigation may result in outcomes such as recommendation for driver training programs, changes or modifications to vehicle/equipment, suspension of driving privileges, or employee termination. Typically, auto accident investigations will be coordinated on a divisional level, similar to protocols established by Corporate EHS and divisions for other root-cause investigations. Risk Management will provide input and guidance and serve as a liaison with insurance carriers, as needed.

9. MEDICAL SUPPORT

9.1 ON-SITE MEDICAL SUPPORT

In the event specialized/elevated care is necessary, either WESTON or the on-call EMS/ambulance service will transport the injured person to the St. Clare's Hospital. The Picatinny Fire and EMS Departments can be notified of emergency situations by using the telephone numbers listed in **Table 9-1**.

A first-aid kit will be provided on-site, and will be in compliance with the criteria contained in ANSI Z308.1-2009.

In case of injury, the following procedures apply:

- For minor injuries, routine first-aid procedures will be used.
- For major injuries, an ambulance will be called immediately and the appropriate first aid administered while awaiting the arrival of the ambulance.
- Trained personnel will use approved measures for treatment based on the training they have received.

9.2 OFF-SITE MEDICAL SUPPORT

Table 9-1 Emergency Contact Numbers

Organization/Point of Contact	Telephone Number
Emergency Service (Ambulance, Fire, Police)	911
Police (non-emergency) Picatinny Arsenal, NJ 07806-5000 Police Chief	(973) 724-7273 (973) 724-4161
Rockaway Township Police Department 65 Mount Hope Road, Rockaway, NJ 07866	(973) 625-4000
Picatinny Fire Department (non-emergency) Picatinny Arsenal, NJ 07806-5000 Fire Chief	(973) 724-3097 (973)724-3842
Rockaway Township Fire Department 65 Mount Hope Road, Rockaway, NJ 07866	(973) 983-2865
NJ State Police	911

Table 9-1 Emergency Contact Numbers (Continued)

Organization/Point of Contact	Telephone Number
Spill Response - CHEMTREC	(800) 424-9300
National Response Center	(800) 424-8802
Hospital: Saint Clare's Hospital - Dover 400 W Blackwell St, Dover, NJ 07801	(973) 989-3200
Non-Emergency Medical: Morristown Medical Center 100 Madison Avenue Morristown, NJ 07960	(973) 971-5000

*See **Attachment H** for EMS/Rescue Confirmation and Evaluation.

Table 9-2 WESTON and USACE Emergency Contact Numbers

Organization/Point of Contact	Telephone Number
Picatinny POC	
USACE – PM: Nancy Flaherty	(410) 779-2796 (office)
USACE- Ordnance and Explosives Safety Specialist (OESS) Manager: Paul Green	(410) 336-7115 (cell)
WESTON Project Manager : Laura Pastor	(610) 701-3445 (office) (484) 467-9466 (cell)
WESTON CIH and Corporate EHS Manager : George Crawford	(610) 701-3771 (office) (484) 437-5976 (cell)
WESTON Mid-Atlantic Division EHS Officer Larry Werts	(610) 701-3912 (office) (215) 815-6237 cell
WESTON Mid-Atlantic Federal Team Safety Manager: Sharon Sperber, CIH	(610) 701-3923 (302) 743-5048 (cell)
WESTON Corporate EHS Director: Owen B. Douglass, Jr.	(610) 701-3065 (610) 506-5392 cell
WESTON Medical Programs Manager: Owen B. Douglass, Jr.	(610) 701-3065 (office) (610) 506-5392 (cell)

Table 9-3 Other Emergency Contact Numbers

Organization/Point of Contact	Telephone Number
Poison Control Center	(800) 962-1253
WorkCare WESTON Medical Director Dr. Peter Greaney WorkCare WESTON Program Administrator Heather Lind	From 06:00 to 16:30 Pacific Time call (800) 455-6155 dial 0 or extension 175, Heather Lind to request the on-call clinician
After-Business Hours Contact (Emergency Only)	16:31 to 05:59 Pacific Time and weekends and Holidays call (800) 455-6155 and dial 3 to reach the after-hours answering service. Request that the service connect you with the on-call clinician or the on-call clinician will return your call within 30 minutes.
WESTON Emergency (24 hour) (West Chester)	(610) 701-3720
Centers for Disease Control and Prevention (CDC)	1-800-CDC-INFO (1-800-232-4636)

9.3 DIRECTIONS AND MAP TO NEAREST HOSPITAL

9.3.1 Hospital Route

For emergencies, the appropriate emergency vehicle will travel to the **Saint Clare's Hospital** located at 400 W Blackwell St, Dover, NJ 07801 as shown on **Figure 9-1**. For non-emergencies, the route to Morristown Medical Center located at 100 Madison Avenue, Morristown, NJ 07960 is shown on **Figure 9-2**. A map showing the route to the hospital will be posted near the site telephone, and in each site vehicle, and a written description of the route will be attached to the map. The hospital route will be verified prior to work initiation.

9.4 FIRST AID AND CPR TRAINING

Table 9-4 First Aid and CPR Training

Name	First Aid (Expiration Date)	CPR (Expiration Date)
Steve Bebow	3/2013	3/2013
Brian Junck	3/2013	3/2013
Paul Novak	6/2013	6/2013

Note: Expiration dates will be updated prior to beginning field work or upon completion of annual first-aid/CPR training.

Figure 9-1 Route to Saint Clare's Hospital

bing Maps

Picatinny Arsenal, NJ

400 W Blackwell St # 1, Dover, NJ
St Clare's Hospital (973) 989-3000

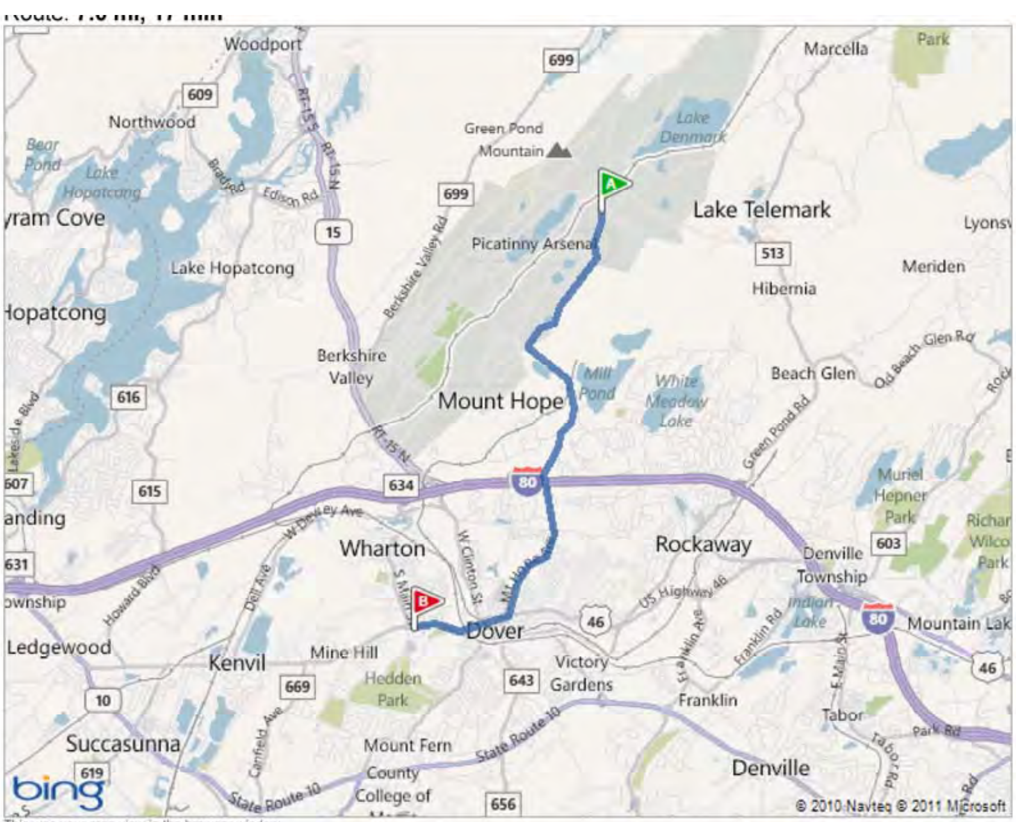
Route: **7.0 mi, 17 min**

My Notes

On the go? Use **m.bing.com** to find maps, directions, businesses, and more

	Picatinny Arsenal, NJ	**A–B: 7.0 mi** 17 min
1.	Depart from **Picatinny Arsenal, NJ** *Private Road*	0.2 mi
2.	Turn **right** onto **Lake Denmark Rd / CR-666** *Private Road*	1.9 mi
3.	Turn **left** to stay on **CR-666**	1.0 mi
4.	Turn **right** onto **Mt Hope Ave / CR-661** *Pass Fatburger in 1.4 mi*	2.8 mi
5.	Turn **right** onto **US-46 / E McFarlan St**	1.2 mi
6.	Arrive at **400 W Blackwell St # 1, Dover, NJ** *The last intersection is Grover Rd* *If you reach Ford Ave, you've gone too far*	

These directions are subject to the Microsoft® Service Agreement and for informational purposes only. No guarantee is made regarding their completeness or accuracy. Construction projects, traffic, or other events may cause actual conditions to differ from these results. Map and traffic data © 2010 NAVTEQ™.



This was your map view in the browser window.

Figure 9-2 Route to Morristown Medical Center

bing Maps

Picatinny Arsenal, NJ

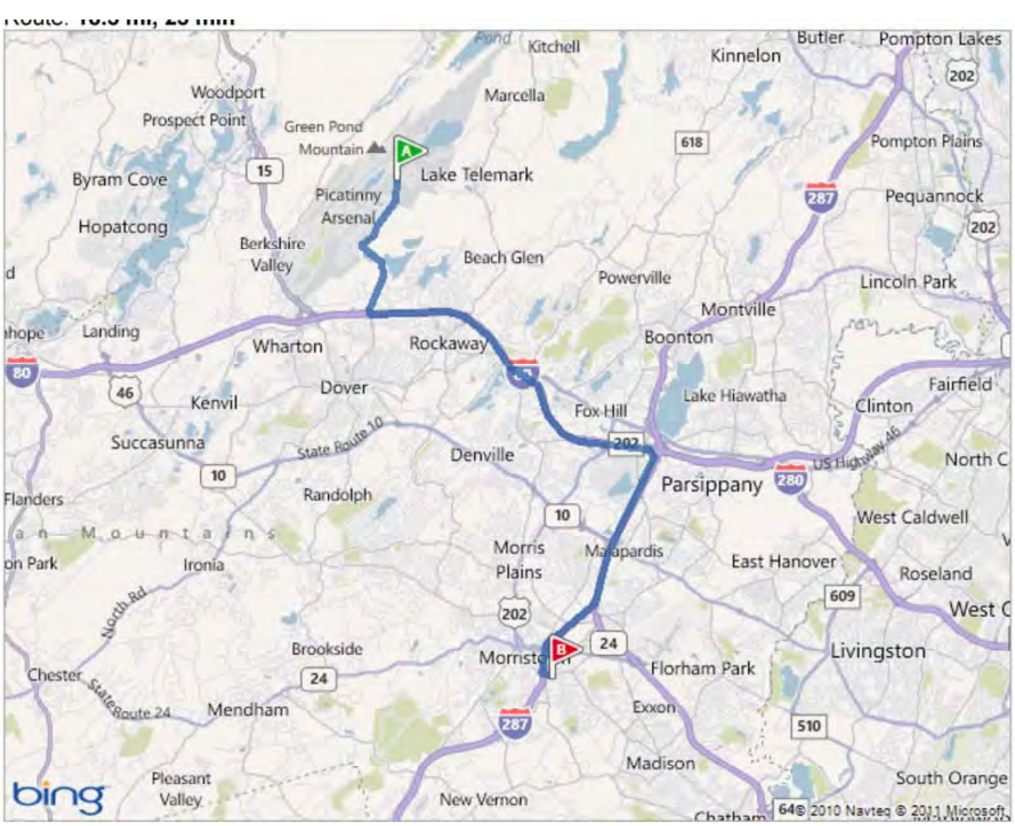
100 Madison Ave, Morristown, NJ 07960

Route: **18.5 mi, 25 min**

My Notes

On the go? Use **m.bing.com** to find maps, directions, businesses, and more

		Picatinny Arsenal, NJ	**A–B: 18.5 mi** 25 min
	1.	Depart from **Picatinny Arsenal, NJ** *Private Road*	0.2 mi
	2.	Turn **right** onto **Lake Denmark Rd / CR-666** *Private Road*	1.9 mi
	3.	Turn **left** to stay on **CR-666**	1.0 mi
	4.	Turn **right** onto **Mt Hope Ave / CR-661**	1.0 mi
	5.	Take ramp **left** for **I-80 East**	8.0 mi
	6.	At exit **43**, take ramp **right** for **I-287 South** toward **Morristown / Somerville / New Jersey Turnpike**	6.0 mi
	7.	At exit **35**, take ramp **right** and follow signs for **RT-124**	0.2 mi
	8.	Turn **left** onto **RT-124 / Madison Ave**	0.2 mi
	9.	Arrive at **100 Madison Ave, Morristown, NJ 07960** *The last intersection is Gagnon Dr* *If you reach Morristown Memorial Hosp Ent, you've gone too far*	



9.5 MEDICAL SURVEILLANCE

Since 1980, WESTON has utilized a comprehensive Occupational Health Program (OHP) that complies with OSHA and USACE requirements. Site personnel and subcontractors who enter the site during operations that are being conducted must comply with a comparable OHP. Personnel will be required to provide their certifications to the SSHO/UXOSO for review and approval prior to being granted authorization to work. Certifications will be stored and maintained at the project trailer office.

9.5.1 Occupational Health Program

To comply with OSHA requirements, WESTON has designated Dr. Peter Greaney of WorkCare to oversee the site-specific medical surveillance and OHP. Dr. Greaney is a board-certified physician in internal and occupational medicine**. Dr. Greaney can be reached during regular business hours at (800) 455-6155.**

The purpose of the OHP is to ensure suitable job placement of employees, to monitor the health effects of hazards encountered in the workplace, and to maintain and promote good health through preventive measures. Medical examination criteria are established by WorkCare in compliance with 29 CFR 1910.120.

10. PERSONAL PROTECTIVE EQUIPMENT (PPE)

Personnel performing operations on-site will be required to use the appropriate level of protection. This APP makes provisions for use of level D, as required for the hazards associated with a given task, operation, or expected contaminant level. PPE requirements for site operations, activities, or zones are based upon available historical site characterization data provided to WESTON. Changes in levels of PPE will be made and upgraded or downgraded based on data derived from site-specific Monitoring Plans. The levels of PPE will also need to be reassessed if any of the following occur:

- Presence of or potential for previously unidentified chemicals or conditions.
- Airborne concentrations of known chemicals exceed the action levels.
- Changes in ambient weather conditions.
- Assignment of new tasks or expansion in the scope of a previously evaluated task.

The selection of monitoring equipment will be determined by site-specific contaminants, as described in the SSHP.

10.1 HAZARD ASSESSMENTS

For the PTA MMRP RI project, the Corporate EHS Manager and the SSHO/UXOSO are responsible for overseeing development and implementation of the PPE Program. Once on-site, the SSHO/UXOSO is responsible for ensuring that a survey is conducted for each work area to identify the sources of hazards, including impact, penetration, compression, chemicals, heat, dust, electrical sources, material handling, and light radiation. To assist with this survey, the Hazard Assessment Certification Form is provided in **Attachment C.**

10.2 IDENTIFYING WHEN HAZARD ASSESSMENTS WILL BE CONDUCTED

Hazard assessments are conducted during the site walk and document review. During the initial PPE decision-making process, the APP/SSHP preparer reviewed available site information and established the level of protection to be worn by site personnel for each task. Additional hazard assessments will be conducted periodically and when field activities or site conditions change.

10.3 IDENTIFYING HOW HAZARD ASSESSMENTS WILL BE CONDUCTED

The selection of the most appropriate level of protection depends on the following:

- Hazards, known or potential.
- Properties such as toxicity, radioactivity, route of exposure, and matrix (i.e., air, soil, water) in which the contaminants are known or suspected.
- Type and measured concentrations of contaminants.
- Potential for exposure based upon task.
- Physical hazards.
- Biological hazards.
- Chemical hazards.

Once the hazards of a workplace have been identified, the SSHO/UXOSO (in consultation with the appropriate safety professionals) will evaluate the suitability of the PPE that was initially selected. New or additional PPE will be selected as conditions change to ensure a level of protection that will protect employees from hazards. Care will be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards.

The levels of personal protection and the procedures specified in this plan are based on the best information available from reference documents and current site data. Therefore, these recommendations represent the minimum safety and health requirements to be observed by personnel engaged in this project. Unforeseeable site conditions or changes may warrant a reassessment of protection levels and controls stated. Adjustments to the APP must have prior approval by the Corporate EHS Manager and USACE.

10.4 PERSONAL PROTECTIVE EQUIPMENT TRAINING

In accordance with OSHA 29 CFR 1910, Subpart I (Personal Protective Equipment), PPE will be provided, used, and maintained in a sanitary and reliable condition. PPE will be of the construction, design, and material to provide employees protection against known or anticipated hazards. PPE will be selected that properly and appropriately fits the employee. WESTON employees have been provided training in accordance with OSHA. Any concerns regarding the use of appropriate PPE will be brought to the attention of the SSHO/UXOSO, who is directed to contact the Corporate Environmental Health and Safety Manager for assistance in evaluation of PPE as necessary.

Work activities for the PTA MMRP RI will be completed in Level D or modified Level D PPE. If higher levels of protection are required, an addendum to the APP and SSHP will be drafted and approved by the Corporate EHS Manager and USACE.

Any worker required to wear PPE will receive training in the proper use and care of PPE. Periodic retraining will be offered by the Corporate Environmental Health and Safety Manager or designees to both the employees and the supervisors, as needed. The training will include, but not necessarily be limited to, the following subjects:

- When PPE is necessary to be worn.
- Type of PPE that is necessary.
- How to properly don, doff, adjust, and wear PPE.
- The limitations of PPE.
- The proper care, maintenance, useful life, and disposal of PPE.

Typical delivery of training is through formal programs such as HAZWOPER training, refresher training, or specific hazard training. Additional training is offered through routine site training and site-specific training. After the training, the employees will demonstrate that they understand the components of the PPE Program and how to use PPE properly, or they will be retrained.

10.5 PPE RETRAINING

Typical delivery of re-training is through formal programs such as HAZWOPER training, refresher training, or specific hazard training. Additional training is offered through routine site training and site-specific training.

10.6 WRITTEN CERTIFICATION OF EMPLOYEE PPE TRAINING

Project personnel will have appropriate training as determined by the Corporate EHS Manager. Required training and certifications are reviewed as part of the APP and SSHP development internally prior to project commencement. WESTON has an on-line system, EHSTrack, to allow rapid access to personnel training records. WESTON can track current certification status of

WESTON personnel assigned to each project. SSHO/UXOSOs use EHSTrack to update contact information, view EHS personnel training certifications, and view medical clearances. The SSHO/UXOSO will verify each person's training certification and medical clearance status prior to the start of work and will periodically perform reviews for updates. Key site personnel training/certifications are provided in **Table 10-1**.

Table 10-1 Current Key Site Personnel Training/Certifications

Personnel Name	Position	EOD Certificate	Medical Clearance (expires)	40-Hour HAZWOPER	8-Hour HAZWOPER Refresher (expires)	30-Hour Construction Safety	Supervisors Health and Safety
Steve Bebow	SUXOS	Yes	6/3/2012	4/22/2005	4/4/2012	12/19/2008	1/13/2009
Joe Kendall	SSHO/UXOSO	Yes	4/29/2012	8/26/1994	8/20/12	2/28/2008	8/12/1999
Troy Phelps	UXOQCS	Yes	9/9/2012	10/24/1997	10/04/2012	4/10/2009	4/2/2009
Paul Novak	Geophysicist	No	6/30/2012	7/15/2005	2/8/2012	9/19/2008	11/15/2007
Brian Junck	Geophysicist	No	10/28/2012	5/2/2003	10/17/2012	8/17/2007	5/18/2009

11. PLANS REQUIRED BY EM 385-1-1

Plans, programs, and procedures required by EM 385-1-1 and their disposition in the APP or SSHP are shown in **Table 11-1**.

Table 11-1 Plans Required by EM 385-1-1

Plan, Program or Procedure	Document Location
a. Layout plans (04.A.01)	APP Section 11.1
b. Emergency Response Plans	
(1) Procedures and tests (01.E.01)	SSHP Section 15
(2) Spill plans (01.E.01, 06.A.02)	SSHP Section 10.4
(3) Fire-fighting Plan (01.E.01, 19.A.04)	SSHP Section 15.8
(4) Posting of Emergency Telephone numbers (01.E.05)	SSHP Section 15.6: Tables 15-1, 15-2, and 15-3
(5) Man overboard/abandon ship (19.A.04)	SSHP Section 11.3.
(6) Medical Support (Section 03.A.02; 03.D)	APP Section 9
c. Plan for prevention of alcohol and drug abuse (01.C.02)	SSHP Section 10.7
d. Site Sanitation Plan (Section 02)	SSHP Section 10.12
e. Access and Haul Road Plan (4.B)	This plan is not required because no haul road activities are anticipated.
f. Respiratory Protection Plan (05.G)	This plan is not required because no activities requiring respiratory protection are anticipated.
g. Health Hazard Control Program (06.A)	Health Hazard Control is addressed in the AHAs in Section 12 of APP and Section 3 of SSHP
h. Hazard Communication Program (01.B.01) Provide the location of the Material Safety Data Sheet (MSDS), records of contractor employee training, and inventory of hazardous materials (including approximate quantities and a site map) that will be brought onto government project by the contractor and subcontractor.	Will be maintained at the site by the SSHO. SSHP Section 5.6 and Attachment 1.
i. Process Safety Management Plan (06.B.04)	This plan is not required because no highly hazardous chemicals are associated with the work plan.
j. Lead Abatement Plan (06.B.05 and specifications)	This plan is not required because no lead abatement activities are anticipated.
k. Asbestos Abatement Plan (06.B.05 and specifications)	This plan is not required because no asbestos abatement activities are anticipated.

Table 11-1 Plans Required by EM 385-1-1 (Continued)

Plan, Program or Procedure	Document Location
l. Radiation Safety Program (06.E.03.a)	Encountering ionizing radiation above background or use of radiation producing devices is not anticipated. A Radiation Safety Program is not required. Non-ionizing radiation is addressed in SSHP Section 2.4.5.1.
m. Abrasive blasting (06.H.01)	This plan is not required because no abrasive-blasting activities are anticipated.
n. Heat/Cold Stress Monitoring Plan (06.I.02)	SSHP Section 9
o. Crystalline Silica Monitoring Plan (Assessment) (06.M)	This plan is not required because no work is anticipated to result in exposure to silica.
p. Night Operations Lighting Plan (07.A.08)	This plan is not required because no night operations will occur.
q. Fire Prevention Plan (09.A)	SSHP Section 15.8
r. Wildland Fire Management Plan (09.K.01)	SSHP Section 15.8.1
s. Hazardous Energy Control Plan (12.A.01)	This plan is not required because no stored hazardous energy activities are anticipated.
t. Critical lift procedures (16.H)	This plan is not required because no critical lift is required.
u. Contingency plan for severe weather (19.A.03)	SSHP Section 9.1
v. Float Plan (19.F.04)	APP Section 11.2
w. Fall Protection Plan (Section 21.C)	This plan is not required because no work at elevation requiring a fall protection plan is anticipated.
x. Demolition Plan (engineering surveys) (23.A.01)	This plan is not required because no building demolition activities are anticipated.
y. Excavation/Trenching Plan (25.A.01)	This plan is not required because no excavation or trenching is anticipated.
z. Emergency rescue (tunneling) (26.A)	This plan is not required because no tunneling activities are anticipated.
aa. Underground Construction Fire Prevention and Protection Plan (26.D.01)	This plan is not required because no underground construction work will be done.
bb. Compressed Air Plan (26.I.01)	This plan is not required because no work under compressed air is anticipated.
cc. Formwork and Shoring Erection and Removal Plans (27.C)	This plan is not required because no shoring activities are anticipated.
dd. Pre-Cast Concrete Plan (27.D)	This plan is not required because no pre-cast concrete work is anticipated.
ee. Lift Slab Plans (27.E)	This plan is not required because no lift slab activities are anticipated.
ff. Steel Erection Plan (27.E.01)	This plan is not required because no steel erection activities are anticipated.

Table 11-1 Plans Required by EM 385-1-1 (Continued)

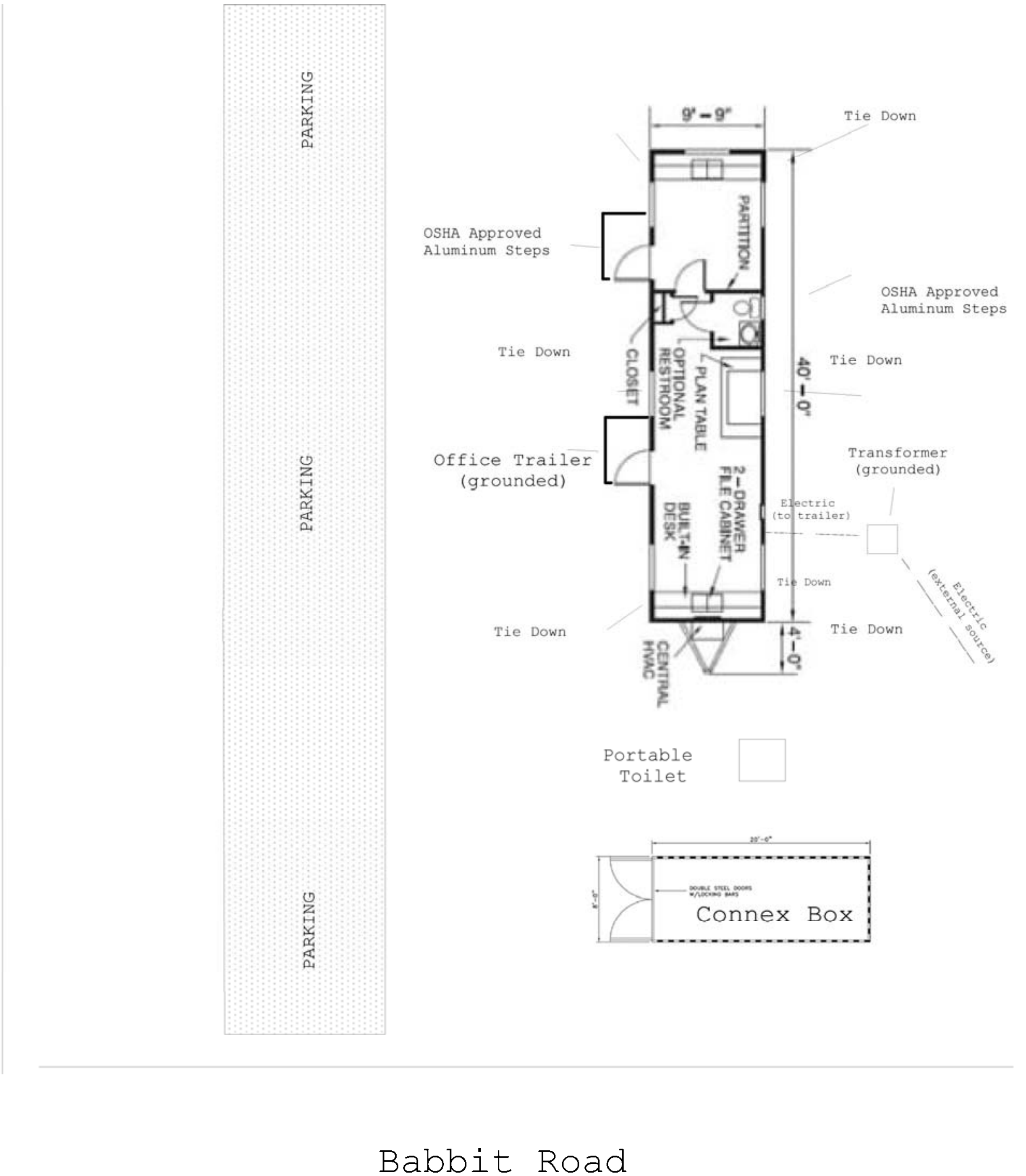
Plan, Program or Procedure	Document Location
gg. Safety and Health Plan	**Attachment A** of the APP.
hh. Blasting Plan (29.A.01)	No blasting as covered by Section 29 EM385-1-1. Demolition of UXO is addressed in the Work and Explosives Site Plans.
ii. Diving Plan (30.A.13)	An addendum will be submitted to address anticipated diving activities.
jj. Confined space (34.A)	This plan is not required because no confined space work will be conducted.

11.1 LAYOUT PLANS

As defined in EM 385-1-1 04.A.01, no temporary construction buildings, facilities, fencing, and access routes for temporary structures will be required for this project. However, a temporary trailer used as a field office will be placed on PTA off of Babbit Road (area designated for contractor trailers). A mobile trailer vendor will be used for delivery and installation of the trailer. Two sets of OSHA-approved aluminum steps will be installed for trailer access. The trailer will be anchored with steel straps to ground anchors (as shown in Figure 11-1) and will meet applicable state or local standards. Sections 04.A and 11 (temporary power distribution) of EM 385.1-1 will also be applicable, and a qualified electrician will be used to hook up the electricity.

The site layout showing the field office trailer for the PTA MMRP RI project is provided in **Figure 11-1**.

Figure 11-1 Site Layout



11.2 FLOAT PLAN

In accordance with EM 385-1-1 19F.04, a daily float plan will be completed by the operator of a launch or motorboat when engaged in surveying, patrolling, or inspection activities that are remote and are expected to take longer than 4 hours, or when the operator is traveling alone. The Float Plan form provided in Figure 11-3 must be completed in its entirety and filed with the Site Manager and Division Environmental Health and Safety Officer.

Figure 11-2 Float Plan Form

FLOAT PLAN

Complete this form before going boating and leave it with a reliable person who can be depended upon to notify the Coast Guard or other rescue organization, should you not return as scheduled. Do not file this plan with the Coast Guard.

1. Person Reporting Overdue

Name: ______________________ Phone: ______________

Address: ______________________________________

____

2. Description of Boat

Registration/Documentation No.: ______________________

Length: __________ Make: ______________ Type: __________

Hull Color: ______________ Trim Color: ______________

Fuel Capacity: ________ Engine Type: __________ No. of Engines: ________

Distinguishing Features: ______________________________

3. Operator of Boat

Name: ______________________ Age: ______________

Health: ______________________ Phone: ______________

Address:

____

Operator's Experience: ______________________________

____

4. Survival Equipment (Check as Appropriate)

☐ # PFDs: _____ ☐ Flares ☐ Mirror

☐ Smoke Signals ☐ Water ☐ Anchor

☐ Raft or Dinghy ☐ EPIRB ☐ **Horn** ☐ **Whistle**

☐ Others ______________________________

____

5. Marine Radio

☐ Yes ☐ No

Type: ______________________ Freqs.: ______________

6. Trip Expectations

Depart From: ______________________________

Departure Date: ______________ Time: ______________

Going To: ______________________________

Arrival Date: ______________ Time: ______________

If Operator has not arrived/returned by: Date: __________ Time: __________

Call the Coast Guard or Local Authority at the following number:

____

____

7. Vehicle Description

License No.: ______________ Make: ______________

Model: ______________ Color: ______________

Where is vehicle parked? ______________________________

8. Persons on Board

Name	Age	Phone	Medical Conditions

9. Remarks

____

____

____

____

11.3 MAN OVERBOARD/ABANDON SHIP PLAN

Hazards associated with working around water include drowning, frostbite, hypothermia, and/or injury from falling into the water. Heat stress hazards may also be present. Carelessness, horseplay, or other unsafe acts could cause injury to personnel working over or near water. There are also hazards associated with untrained personnel operating equipment. Lack of PPE or misuse of PPE could result in injury or death. One of the most serious and often neglected hazards associated with boating safety is weather, and weather forecasts need to be reviewed prior to departure and while boating. Changes in weather conditions can happen quickly and can create serious problems if caught unaware. If a storm appears on the horizon, personnel will immediately return to the "dock" to seek shelter.

Proper precautions should be taken at all times when personnel are working over or near water. Whenever there is a body of water in close proximity to a work location, the proper safety procedures should be implemented. Requirements for equipment or procedures will be based on an evaluation of work tasks, drowning, and injury potential. New field team members should be thoroughly indoctrinated in safe work practices pertinent to the work to which they are assigned.

A minimum of one on-site person will have completed a current boating safety course acceptable in the State of New Jersey, prior to any boating activities. Boating activities will be conducted only during daylight hours.

The maximum number of passengers and weight that can safely be transported shall be posted on all launches, motorboats, and skiffs. This number shall not be exceeded, and in no case shall the number of passengers (including crew) exceed the number of personal flotation devices (PFDs) aboard. Outboard motors and skiffs shall meet the minimum flotation requirements of the U.S. Coast Guard (USCG). An efficient whistle or signal device, which can be heard for at least 1 mile, shall be provided on all powered vessels to give signals required by the navigation rules applicable to the waters on which the vessel is operated.

11.3.2 Life-Saving Equipment

Equipment and procedures will conform to USCG and/or OSHA requirements and applicable local regulations. Personnel working over or near water shall be provided with USCG-approved

PFDs (life jackets or buoyant work vests), which shall be worn whenever there is potential drowning hazard. PFDs should be designed to float unconscious or helpless persons face up.

Prior to and after each use, PFDs and life preservers shall be inspected for defects that would alter their strength or buoyancy (e.g., rips, tears, holes). All defective units shall be removed from the site and replaced. At no times will defective units be used.

11.3.1 Man Overboard

If someone falls overboard, maneuver the boat's stern away from him. Shift into neutral immediately (kill the motor if you do not have a gearshift). Make sure you are well clear of the person in the water before shifting into gear again.

Circle around quickly, selecting a course that will allow you to approach the person with the boat headed into the wind or waves. Approach him slowly, taking care to come alongside and not over him. Stop the motor before attempting to get the victim aboard. When alongside, extend a paddle or boathook to him, or one end of a line. With the motor stopped, lead him around to the stern, where the freeboard is the lowest, if there is enough space at the transom for him to get aboard without contacting the motor. If this is not feasible, help the victim aboard over the side as far aft as possible. In either case, the use of a boarding ladder will be of help. To avoid capsizing while the victim is coming aboard, other passengers should shift their weight to the opposite side to maintain trim as much as possible. When helping a person aboard, hold him under the armpits and lift gently.

11.3.2 Pre-Trip Hazard Assessment and Boating Checklist

The SSHO shall be responsible for completing a Daily Boating Pre-Trip Inspection Checklist (Figure 11-3) prior to each day's operations. Any deficiencies noted shall be resolved prior to leaving the dock, boat ramp, or shoreline.

Figure 11-3 Boat Pre-Trip Inspection Checklist

Boat Pre-trip Inspection Checklist

Date:
Name of inspector:
Type of vessel:
Type of engine(s):
Rated boat weight capacity:
Captain of the boat:
List of personnel who will be part of the trip:

BASICS			
Is there a fire extinguisher on board (Type ABC)?	☐ YES	☐ NO*	
Is the fire extinguisher inspected?	☐ YES Date of inspection ___/___/_____	☐ NO*	☐ Not Applicable
Are lifejackets available for each person on board?	☐ YES Specify Type: ______	☐ NO*	
Has the first aid kit been inspected?	☐ YES Date of inspection ___/___/_____	☐ NO	
Is the first aid kit in a waterproof container?	☐ YES	☐ NO	
Indicate the emergency signaling devices on board (e.g., flares, mirrors, flags, etc.).	List:		
What electronics/navigational devices are you planning to use (e.g., radar, GPS, depth finder, compass, communications [e.g., 2-way radio, _________, marine radio, etc.], etc.)?	List:		
What body of water will the boat be operating in?	☐ river ☐ stream ☐ lake ☐ ocean ☐ pond	Name: ________________ Location: ________________	
Are there any special conditions present (barge traffic, dam, adverse weather, operation near shipping lanes, near sand bars, etc…)	☐ YES	☐ NO	List:

BOAT			
Is the boat registration inspection updated for the current year?	YES ☐	NO* ☐	
Are the fuel levels adequate?	YES ☐ Fuel levels________	NO* ☐	
Are bail plugs (upper and lower) present on boat?	YES ☐	NO* ☐	
Is the motor size adequate for the boat (see boat specifications)?	YES ☐	NO* ☐	
Are there holes or cracks in the hull?	YES* ☐	NO ☐	
Is the bilge pump operational?	YES ☐	NO* ☐	
Do all engine(s) operate properly?	YES ☐	NO* ☐	
Are spare fuses available on board? (if req'd)	YES ☐	NO ☐	
Does the boat need to have an anchor?	YES ☐	NO ☐	
Is an anchor present?	YES ☐	NO ☐	
Is there enough rope on the anchor for the location, depth, and scope?	YES ☐ Length of rope______	NO ☐	
If operating at night, are the navigational lights working?	YES ☐	NO* ☐	Not Applicable ☐
If operating at night, does the pilot, helmsman, or captain have prior experience operating in such conditions?	YES ☐	NO* ☐	
Overall, is the vessel sea-worthy? (If possible this determination should be made by Coast Guard personnel, prior to the trip.)	YES ☐	NO* ☐	
Will the dead weight (people + equipment) exceed the maximum weight requirements for the boat?	YES* ☐	NO ☐	
TRAILER			
Is trailer in good condition?	YES ☐	NO ☐	Not Applicable ☐
Are the trailer lights working properly?	YES ☐	NO ☐	
Is the winch operating properly?	YES ☐	NO ☐	
Is the winch strap in good condition?	YES ☐	NO ☐	
Are the trailer rollers cracked?	YES ☐	NO ☐	
Are the trailer boat guides straight and in good condition?	YES ☐	NO ☐	
Do the tires have appropriate air pressure?	YES ☐	NO ☐	
Are the tires in good condition?	YES ☐	NO ☐	
Are the engines secured to or removed from the transom during transportation?	YES ☐	NO ☐	

SUPPLEMENTAL INFORMATION			
WEATHER FORECAST			
How will the pilot, helmsman, or captain and crew keep track of changing weather conditions?			
Will someone onshore track weather conditions also?	YES ☐	NO ☐	
How will that person remain in contact with the boat?			
For a small boat (under 21'), are the waves equal or greater than 2 feet (1' wave)?	YES* ☐	NO ☐	Not Applicable ☐
For a larger boat, are the waves equal or greater to 4 feet (2' wave)?	YES* ☐	NO ☐	Not Applicable ☐
For any boat, is the wind speed equal or greater than 15 knots?	YES* ☐	NO ☐	Not Applicable ☐
OTHER			
Has a float plan been filed with the Project PM?	YES ☐ Plan filed with ___		NO ☐
Is the operator licensed (with the State or with Coast Guard)?	YES ☐		NO* ☐
Are any members of the crew capable of operating the boat if the pilot, helmsman, or captain is incapacitated?	YES ☐		NO* ☐
Does the HASP describe the task(s) involved with the operation of boats?	YES ☐		NO* ☐

*If any answer followed by an asterisk is checked, justify task continuation if a "No" is checked.

I certify that I have inspected all the items on this checklist and that the information is accurate to the best of my knowledge.

Reviewer's Signature: ______________________ Date: ______________

NOTE: Copy of checklist to be placed in Project file.

12. RISK MANAGEMENT PROCESSES

The AHAs presented in **Table 12-1** define the activities to be performed at the Picatinny Arsenal and identify the sequence of work, the specific hazards anticipated, site-specific conditions, equipment and materials, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level of risk. Reviews of the project-associated hazards will occur periodically and when field activities change.

Table 12-1 Activity Hazard Analysis

Date Prepared: September 2011

Prepared By: L. Kritzberger

Reviewed By: S. Sperber

Activity 1: **Mobilization**

***Overall Risk Assessment Code (RAC):**

RAC Matrix

Hazard Severity	Accident Probability				
	A	B	C	D	E
I	E	E	H	H	M
II	E	H	H	M	L
III	H	M	M	L	L
IV	M	L	L	L	L

Task	Hazards	Hazard Control	RAC*
Mobilization of manpower and equipment, establishment of work zone	**Chemical Hazards:**	No chemical hazards are associated with this activity.	L
	Biological Hazards: Possibility of stinging and biting insects. Encountering animals, and reptiles.	Use appropriate insect repellents. Training to avoid poisonous plants and avoid contact. A poster indicating various types of hazardous plants and reptiles to avoid will be displayed in the site trailer. Training on symptoms of rabies and avoidance of animals.	L
	Radiation Hazards: Sun	Use sunblock as appropriate. Avoid extended periods of direct exposure to sun.	L
	Physical Hazards: Slips, trips, falls, tools, terrain, or vegetation; uneven walking surfaces; weather hazards, such as snow and ice; and poor visibility.	Housekeeping – Initial inspection of the work area. Slip, trip, and fall hazards will be either removed or marked and barricaded. Materials will be stored to prevent intrusion into the work areas. Work areas will be kept organized; ice, snow, and mud will be cleared from steps to reduce slip hazards. Work will be completed in adequate natural light or sufficient artificial illumination will be maintained. Site personnel will conduct an initial walkthrough to assess site conditions, and the "buddy system" will be implemented.	M

Table 12-1 Activity Hazard Analysis (Continued)

Activity 1:Mobilization (Continued)

Task	Hazards	Hazard Control	RAC*
	Inclement weather, heat and cold stress	Personnel will be dressed according to weather conditions. Local weather will be monitored on a daily basis at a minimum or more frequently if storms threaten. Workers will be briefed and cognizant of heat and cold stress symptoms. Electrolyte/fluids replacement will be available to workers as needed. Work/rest periods will be established according to American Conference of Governmental Industrial Hygienists (ACGIH) and National Institute for Occupational Safety and Health (NIOSH) guidelines. Personnel will be monitored.	L
	Manual lifting	Use proper lifting techniques—keep back straight, lift with legs, avoid twisting back, use mechanical equipment, or get help from others whenever possible. Split heavy loads into smaller loads and/or seek assistance. Verify the path of travel is clear prior to the lift.	M
	Hands or fingers caught between objects; abrasions and lacerations	Personnel will be made aware of the hazard and asked to coordinate carefully the handling and placement of heavy objects. Materials and objects being handled will be inspected for rough or sharp edges and appropriate precautions will be taken to avoid contact with rough or sharp edges. Personnel will wear work gloves and avoid placing hands between objects.	L
	Hand tools, manual and power	Tools will be inspected prior to use. Damaged tools will be tagged out of service until repair can be performed by a qualified person. Tools will be used properly and for their intended purpose. Power circuits used for hand tools will be protected by a ground fault circuit interrupter (GFCI). Site personnel will be trained on the proper use of power tools.	L
	Fire	Fire prevention will be a priority through awareness. In the event of a fire, areas where MEC is known to exist will be vacated. Any small fire (non-MEC) may be extinguished using a properly rated extinguisher. Storage, handling and use of flammables and combustible liquids will be in accordance with NFPA 30, 30A. Only labeled/listed containers will be used to store flammables and/or combustibles. Properly rated fire extinguishers will be strategically placed in the work area.	L
	Electrical	Electrical installations for the trailer will be made by qualified electricians. The office trailer will be properly grounded.	L

Table 12-1 Activity Hazard Analysis (Continued)

Activity 1:Mobilization (Continued)

Equipment	PPE	Inspection	Training
Hand tools Vehicles	Safety boots High-visibility safety vest Gloves Safety glasses	Equipment will be properly stored, inspected, and/or maintained on a daily basis, or according to manufacturer's recommendations. Records of inspection will be maintained on-site. Fire extinguishers and first-aid kits will be inspected by the SSHO/UXOSO.	First aid/CPR (at least two personnel) and vehicle training.

Table 12-1 Activity Hazard Analysis (Continued)

Date Prepared: September 2011

Prepared By: L. Kritzberger

Reviewed By: S. Sperber

Activity 2: **Geophysical Survey Activities**

***Overall Risk Assessment Code (RAC):**

RAC Matrix

Hazard Severity	Accident Probability A	B	C	D	E
I	E	E	H	H	M
II	E	H	H	M	L
III	H	M	M	L	L
IV	M	L	L	L	L

Task	Hazards	Hazard Control	RAC*
This task will include site surveying to delineate work areas, set control points, and set grid corners. Setting a Geophysical surveys using digital and analog equipment will be performed in designated areas. An instrument verification strip will be constructed.	**Chemical Hazards:**	No chemical hazards are associated with this activity.	L
	Explosive Hazards: Unintentional detonation of MEC.	A UXO Technician II or higher will escort the survey crew(s) and perform surface MEC avoidance by conducting a magnetometer-assisted visual survey for metallic anomalies. Any surface munitions items found will be positively identified. GPS coordinates will be taken of the item and it will be left in place.	M
	Biological Hazards: Possibility of stinging and biting insects. Encountering large animals, reptiles and rabid animals.	Use appropriate insect repellents. Training to avoid poisonous plants and avoid contact. A poster indicating various types of hazardous plants and reptiles to avoid will be displayed in the site trailer. Training on symptoms of rabies and avoidance of animals.	L
	Radiation Hazards: Sun	Use sunblock as appropriate. Avoid extended periods of direct exposure to sun.	L
	Physical Hazards: Slips, trips, falls, tools, terrain, or vegetation; uneven walking surfaces; weather hazards, such as snow and ice; and poor visibility.	Slip, trip, and fall hazards will be either removed or marked and barricaded. Materials will be stored to prevent intrusion into the work areas. Work areas will be kept organized; ice, snow, and mud will be cleared to reduce slip hazards. Work will be completed in adequate natural light or sufficient artificial illumination will be maintained. Site personnel will conduct an initial walkthrough, and the "buddy system" will be implemented.	M

Table 12-1 Activity Hazard Analysis (Continued)

Activity 2: Geophysical Survey Activities (Continued)

Task	Hazards	Hazard Control	RAC*
	Inclement weather, heat and cold stress	Personnel will be dressed according to weather conditions. Local weather will be monitored on a daily basis at a minimum or more frequently if storms threaten. Workers will be briefed and cognizant of heat and cold stress symptoms. Electrolyte/fluids replacement will be available to workers as needed. Work/rest periods will be established according to ACGIH and NIOSH guidelines. Personnel will be monitored.	L
	Hunting	Use high-visibility vests, avoid areas where hunting is being conducted, and stop work if hunting is conducted within the work area.	M
	Manual lifting	Use proper lifting techniques—keep back straight, lift with legs, avoid twisting back, use mechanical equipment, or get help from others whenever possible. Split heavy loads into smaller loads and/or seek assistance. Verify the path of travel is clear prior to the lift.	M
	Hands or fingers caught between objects; abrasions and lacerations	Personnel will be made aware of the hazard and asked to coordinate carefully the handling and placement of heavy objects. Materials and objects being handled will be inspected for rough or sharp edges and appropriate precautions will be taken to avoid contact with rough or sharp edges. Personnel will wear work gloves and avoid placing hands between objects.	L
	Fire	Fire prevention will be a priority through awareness. In the event of a fire, areas where MEC is known to exist will be vacated. Any small fire (non-MEC) may be extinguished using a properly rated extinguisher. Storage, handling and use of flammables and combustible liquids will be in accordance with NFPA 30, 30A. Only labeled/listed containers will be used to store flammables and/or combustibles. Properly rated fire extinguishers will be strategically placed in the work area.	L
	Hand tools, manual and power.	Tools will be inspected prior to use. Damaged tools will be tagged out of service until repair can be performed by a qualified person. Tools will be used properly and for their intended purpose. Power circuits used for hand tools will be protected by a GFCI. Personnel will be trained on the proper use of power tools.	L
	Brush Clearing	Most brush clearing will be completed using pruners and loppers. It is expected that only vegetation of 2-inch diameter or less will be cleared. Personnel will wear hardhats and face shields when overhead work is being conducted. A chainsaw may be used to cut-up an already downed tree into manageable pieces to move. If it becomes necessary to operate a chainsaw, personnel will also use hand, eye and hearing protection along with ballistic nylon chaps.	M

Table 12-1 Activity Hazard Analysis (Continued)

Activity 2: Geophysical Survey Activities (Continued)

Equipment	PPE	Inspection	Training
Hand tools Four-wheel-drive vehicles Pruning sheers Chain saw	Safety boots High-visibility vests Gloves Safety glasses Cold-weather clothing Face shield (Brush removal & Chainsaw) Hardhat (Brush removal) Hearing Protection (Chainsaw) Ballistic Chaps (Chainsaw)	Equipment will be properly stored, inspected, and/or maintained on a daily basis, or according to the manufacturer’s recommendations. Records of inspection will be maintained on-site. Fire extinguishers, first- aid kits, and vehicles will be inspected by the SSHO/UXOSO.	First-aid/CPR (at least two personnel); chainsaw training; and vehicle training. A minimum of a UXO Technician II or higher will provide anomaly avoidance during survey operations and MEC awareness training to surveyors.

Table 12-1 Activity Hazard Analysis (Continued)

Date Prepared: September 2011

Prepared By: L. Kritzberger

Reviewed By: S. Sperber

Activity 3: **MEC Intrusive Activities**

***Overall Risk Assessment Code (RAC):**

RAC Matrix

Hazard Severity	Accident Probability A	B	C	D	E
I	E	E	H	H	M
II	E	H	H	M	L
III	H	M	M	L	L
IV	M	L	L	L	L

Task	Hazards	Hazard Control	RAC*
UXO technicians will intrusively investigate anomalies, identify MEC and MPPEH, and inspect/certify MDAS and non-munitions- related debris.	**Chemical Hazards:**	No chemical hazards are associated with this activity.	L
	Explosives Hazards: Unintentional detonation of MEC.	Establish exclusion zones around intrusive work for nonessential personnel based on minimum separation distances identified in the approved Explosives Site Plan (ESP). Maintain exclusion zones during intrusive activities at geophysical anomaly locations. MEC operations will be conducted during daylight hours only. If an unknown munitions item is recovered, the USACE OESS will be notified. If potential recovered chemical warfare materiel are found, all work will cease and teams will leave the area and notify the USACE OESS. The approved ESP and EM 385-1-97 will be adhered to at all times.	H
	Demolition Operations: Detonation of MEC	Before any disposal operations commence, personnel assigned to or working with disposal teams will attend a site-specific orientation. The purpose of the orientation will be to review MEC disposal and emergency response procedures. The topics to be covered during the orientation will include, but are not limited to review of the ESP, APP, and SSHP (as applicable), engineering control/sandbag enclosure requirements, review of demolition firing systems and components, review of donor charge placement, review of explosives, transportation, site munitions brief, type and condition of MEC, exclusion zone requirements and control, emergency response equipment, emergency procedures, two-person rule, and team assignments. A minimum of one person will have current NJ Blasters License for any demolition activities. Demolition notifications will be made in accordance with the work plan. The approved ESP and EM 385-1-97 will be adhered to at all times.	H

Table 12-1 Activity Hazard Analysis (Continued)

Activity 3: MEC Intrusive Activities (Continued)

Task	Hazards	Hazard Control	RAC*
	Biological Hazards: Possibility of stinging and biting insects. Encountering animals, and reptiles.	Use appropriate insect repellents. Training to avoid poisonous plants and avoid contact. A poster indicating various types of hazardous plants and reptiles to avoid will be displayed in the site trailer. Training on symptoms of rabies and avoidance of animals.	L
	Radiation Hazards: Sun	Use sunblock as appropriate. Avoid extended periods of direct exposure to sun.	L
	Physical Hazards: Slips, trips, falls, tools, terrain, or vegetation; uneven walking surfaces; weather hazards, such as snow and ice; and poor visibility.	Slip, trip, and fall hazards will be either removed or marked and barricaded. Materials will be stored to prevent intrusion into the work areas. Work areas will be kept organized; ice, snow, and mud will be cleared from steps to reduce slip hazards. Work will be completed in adequate natural light or sufficient artificial illumination will be maintained. Site personnel will conduct an initial walkthrough, and the “buddy system” will be implemented.	M
	Hunting	Use high-visibility vests, avoid areas where hunting is being conducted, and stop work if hunting is being conducted within the work area.	M
	Manual lifting	Use proper lifting techniques—keep back straight, lift with legs, avoid twisting back, use mechanical equipment, or get help from others whenever possible. Split heavy loads into smaller loads and/or seek assistance. Verify the path of travel is clear prior to the lift.	M
	Hands or fingers caught between objects; abrasions and lacerations	Personnel will be made aware of the hazard and asked to coordinate carefully the handling and placement of heavy objects. Materials and objects being handled will be inspected for rough or sharp edges and appropriate precautions will be taken to avoid contact with rough or sharp edges. Personnel will wear work gloves and avoid placing hands between objects.	L
	Inclement weather, heat/cold stress	Personnel will dress appropriately for the weather. Local weather will be monitored on a daily basis at a minimum or more frequently if storms threaten. Workers will be briefed and cognizant of heat and cold stress symptoms. Electrolyte/fluids replacement will be available to workers as needed. Work/rest periods will be established according to ACGIH and NIOSH guidelines. Personnel will be monitored.	L

Table 12-1 Activity Hazard Analysis (Continued)

Activity 3: MEC Intrusive Activities (Continued)

Task	Hazards	Hazard Control	RAC*
	Noise exposure	High-noise activities will be identified. Hearing protection will be provided as appropriate. The latest ACGIH threshold limit values (TLVs) will be used. Personnel operating chainsaws will use hearing protection. Hearing control program consists of audiometric examination, training, use of hearing protection, and sound-level pressure monitoring when and where necessary.	L
	Fire	Fire prevention will be a priority through awareness. In the event of a fire, areas where MEC is known to exist will be vacated. Any small fire (non-MEC) may be extinguished using a properly rated extinguisher. Storage, handling and use of flammables and combustible liquids will be in accordance with NFPA 30, 30A. Only labeled/listed containers will be used to store flammables and/or combustibles. Properly rated fire extinguishers will be strategically placed in the work area.	L
	Brush Clearing	Most brush clearing will be completed using pruners and loppers. It is expected that only vegetation of 2-inch diameter or less will be cleared. Personnel will wear hardhats and face shields when overhead work is being conducted. A chainsaw may be used to cut-up an already downed tree into manageable pieces to move. If it becomes necessary to operate a chainsaw personnel will also use hearing protection and ballistic chaps.	M

Equipment	PPE	Inspection	Training
Hand tools Pruning sheers Chain saw Four-wheel-drive vehicles	Safety boots High-visibility vests Gloves Safety glasses Cold-weather clothing Face shield (Brush removal) Hardhat (Brush removal) Hearing Protection (Chainsaw) Ballistic Chaps (Chainsaw)	Equipment will be properly stored, inspected, and/or maintained on a daily basis, or according to manufacturer's recommended schedule. Records of inspection will be maintained on-site. Fire extinguishers, first-aid kits, and vehicles will be inspected by the SSHO/UXOSO.	UXO/EOD certification, qualified in accordance with DDESB TP-18, 40 hr-OSHA, 8-hr refresher, first aid/CPR (at least two personnel); chainsaw training for operators; and vehicle training.

Table 12-1 Activity Hazard Analysis (Continued)

Date Prepared: September 2011

Prepared By: L. Kritzberger

Reviewed By: S. Sperber

Activity 4: **MEC/MPPEH Inspection**

***Overall Risk Assessment Code (RAC):**

RAC Matrix

Hazard Severity	Accident Probability A	B	C	D	E
I	E	E	H	H	M
II	E	H	H	M	L
III	H	M	M	L	L
IV	M	L	L	L	L

Task	Hazards	Hazard Control	RAC*
Inspection and segregation for disposal or recycling of munition debris	**Chemical Hazards:**	No chemical hazards are associated with this activity.	L
	Biological Hazards: Possibility of stinging and biting insects. Encountering rabid animals.	Use appropriate insect repellents. Training to avoid poisonous plants and avoid contact. A poster indicating various types of hazardous plants and reptiles to avoid will be displayed in the site trailer. Training on symptoms of rabies, use of repellent sprays, and avoidance of animals.	L
	Radiation Hazards: Sun	Use sunblock as appropriate. Avoid extended periods of direct exposure to sun.	L
	Physical Hazards: Slips, trips, falls, tools, terrain, or vegetation; uneven walking surfaces; weather hazards, such as snow and ice; and poor visibility	Slip, trip, and fall hazards will be either removed or marked and barricaded. Materials will be properly stored. Work areas will be kept organized; ice, snow, and mud will be cleared from steps to reduce slip hazards. Work will be completed in adequate natural light or sufficient artificial illumination will be maintained. Site personnel will conduct an initial walkthrough, and the "buddy system" will be implemented. To prevent physical injuries personnel will use proper eye and hand protection and utilize proper hygiene procedures.	M
	Manual lifting	Use proper lifting techniques—keep back straight, lift with legs, avoid twisting back, use mechanical equipment, or get help from others whenever possible. Split heavy loads into smaller loads and/or seek assistance. Verify the path of travel is clear prior to the lift.	M

Table 12-1 Activity Hazard Analysis (Continued)

Activity 4: MEC/MPPEH Inspection (Continued)

Task	Hazards	Hazard Control	RAC*
	Abrasions and lacerations	Personnel will be made aware of the hazard and asked to coordinate carefully the handling and placement of heavy objects. Personnel will wear work gloves and avoid placing hands between objects.	L
	Heavy Lifting	Mechanical equipment will be utilized to move heavy drums of debris.	M
	Fire	Fire prevention will be a priority through awareness. In the event of a fire, areas where MEC is known to exist will be vacated. Any small fire (non-MEC) may be extinguished using a properly rated extinguisher. Storage, handling and use of flammables and combustible liquids will be in accordance with NFPA 30, 30A. Only labeled/listed containers will be used to store flammables and/or combustibles. Properly rated fire extinguishers will be strategically placed in the work area.	L
	Inclement weather, heat and cold stress	Personnel will be dressed according to weather conditions. Local weather will be monitored on a daily basis at a minimum or more frequently if storms threaten. Workers will be briefed and cognizant of heat and cold stress symptoms. Electrolyte/fluids replacement will be available to workers as needed. Work/rest periods will be established according to ACGIH and NIOSH guidelines. Personnel will be monitored.	L
	Hand tools, manual and power	Tools will be inspected prior to use. Damaged tools will be tagged out of service until repair can be performed by a qualified person. Tools will be used properly and for their intended purpose. Power circuits used for hand tools will be protected by a GFCI. Personnel will be trained on the proper use of power tools.	L

Equipment	PPE	Inspection	Training
Drum Dolly	Safety boots Gloves Safety glasses	Equipment will be properly stored, inspected, and/or maintained on a daily basis, or according to manufacturer's recommendations. Records of inspection will be maintained on-site. Fire extinguishers, first-aid kits, and vehicles will be inspected by the SSHO/UXOSO.	First aid/CPR (at least two personnel).

Table 12-1 Activity Hazard Analysis (Continued)

Date Prepared: September 2011

Prepared By: L. Kritzberger

Reviewed By: S. Sperber

Activity 5: **Drum Handling**

***Overall Risk Assessment Code (RAC):**

RAC Matrix

Hazard Severity	Accident Probability A	B	C	D	E
I	E	E	H	H	M
II	E	H	H	M	L
III	H	M	M	L	L
IV	M	L	L	L	L

Task	Hazards	Hazard Control	RAC*
Collection of scrap metal into an open-top, 55-gallon reconditioned drums (UN approved 1A2/X425/S/02) for recycling at the end of the project.	**Chemical Hazards:**	No chemical hazards are associated with this activity.	L
	Biological Hazards: Possibility of stinging and biting insects. Encountering large and rabid animals.	Use appropriate insect repellents. Training to avoid poisonous plants and avoid contact. A poster indicating various types of hazardous plants and reptiles to avoid will be displayed in the site trailer. Training on symptoms of rabies, use of repellent sprays, and avoidance of animals.	L
	Radiation Hazards: Sun	Use sunblock as appropriate. Avoid extended periods of direct exposure to sun.	L
	Physical Hazards: Slips, trips, falls, tools, terrain, or vegetation; uneven walking surfaces; weather hazards, such as snow and ice; and poor visibility	Slip, trip, and fall hazards will be either removed or marked and barricaded. Materials will be stored to prevent intrusion into the work areas. Work areas will be kept organized; ice, snow, and mud will be cleared to reduce slip hazards. Work will be completed in adequate natural light or sufficient artificial illumination will be maintained. Site personnel will conduct an initial walkthrough, and the "buddy system" will be implemented. To prevent physical injuries personnel will use proper eye and hand protection and utilize proper hygiene procedures.	M
	Manual lifting	Use proper lifting techniques—keep back straight, lift with legs, avoid twisting back, use mechanical equipment, or get help from others whenever possible. Split heavy loads into smaller loads and/or seek assistance. Verify the path of travel is clear prior to the lift.	M
	Heavy Lifting	Mechanical equipment (i.e., drum dolly) will be utilized to move heavy drums of debris.	M

Table 12-1 Activity Hazard Analysis (Continued)

Activity 5: Drum Handling (Continued)

Task	Hazards	Hazard Control	RAC*
	Abrasions and lacerations	Personnel will be made aware of the hazard and asked to coordinate carefully the handling and placement of heavy objects. Personnel will wear work gloves and avoid placing hands between objects.	L
	Inclement weather, heat and cold stress	Personnel will be dressed according to weather conditions. Local weather will be monitored on a daily basis at a minimum or more frequently if storms threaten. Workers will be briefed and cognizant of heat and cold stress symptoms. Electrolyte/fluids replacement will be available to workers as needed. Work/rest periods will be established according to ACGIH and NIOSH guidelines. Personnel will be monitored.	L
	Hand tools, manual and power	Tools will be inspected prior to use. Damaged tools will be tagged out of service until repair can be performed by a qualified person. Tools will be used properly and for their intended purpose. Power circuits used for hand tools will be protected by a GFCI. Personnel will be trained on the proper use of power tools.	L

Equipment	PPE	Inspection	Training
Hand tools Drum Dolly	Safety boots Gloves Safety glasses Cold-weather clothing	Equipment will be properly stored, inspected, and/or maintained on a daily basis, or according to manufacturer's recommendations. Records of inspection will be maintained on-site. Fire extinguishers, first-aid kits, and vehicles will be inspected by the SSHO/UXOSO.	First aid/CPR (at least two personnel) and vehicle training.

Table 12-1 Activity Hazard Analysis (Continued)

Date Prepared: September 2011

Prepared By: L. Kritzberger

Reviewed By: S. Sperber

Activity 6: **Media Sampling**

***Overall Risk Assessment Code (RAC):**

RAC Matrix

Hazard Severity	Accident Probability A	B	C	D	E
I	E	E	H	H	M
II	E	H	H	M	L
III	H	M	M	L	L
IV	M	L	L	L	L

Task	Hazards	Hazard Control	RAC*
Collection of MC samples. Samples will be collected by hand using scoop and trowel following anomaly avoidance surveys.	**Chemical Hazards:**	Sample collection in discrete locations only if visual evidence of cracked MEC item. Random samples will be collected in larger areas with no known or anticipated concentration of chemicals in media. Based on previous MC sampling and experience, only residual explosives and/or metals in media in very low concentrations would be anticipated. It has been our experience that no chemicals have been detected representing a toxic hazard to the environment or workers. However, Modified Level D PPE including nitrile, chemical-resistant gloves will be used during sampling as a precaution to preserve sample integrity and minimize contact.	L
	Biological Hazards: Possibility of stinging and biting insects. Encountering large and rabid animals.	Use appropriate insect repellents. Training to avoid poisonous plants and avoid contact. A poster indicating various types of hazardous plants and reptiles to avoid will be displayed in the site trailer. Training on symptoms of rabies, use of repellent sprays, and avoidance of animals.	L
	Radiation Hazards: Sun	Use sunblock as appropriate. Avoid extended periods of direct exposure to sun.	L
	Physical Hazards: Slips, trips, falls, tools, terrain, or vegetation; uneven walking surfaces; weather hazards, such as snow and ice; and poor visibility	Slip, trip, and fall hazards will be either removed or marked and barricaded. Materials will be stored to prevent intrusion into the work areas. Work areas will be kept organized; ice, snow, and mud will be cleared to reduce slip hazards. Work will be completed in adequate natural light or sufficient artificial illumination will be maintained. Site personnel will conduct an initial walkthrough, and the "buddy system" will be implemented.	M

Table 12-1 Activity Hazard Analysis (Continued)

Activity 6: Media Sampling (Continued)

Task	Hazards	Hazard Control	RAC*
	Manual lifting	Use proper lifting techniques—keep back straight, lift with legs, avoid twisting back, use mechanical equipment, or get help from others whenever possible. Split heavy loads into smaller loads and/or seek assistance. Verify the path of travel is clear prior to the lift.	M
	Abrasions and lacerations	Personnel will be made aware of the hazard and asked to coordinate carefully the handling and placement of heavy objects. Personnel will wear work gloves and avoid placing hands between objects.	L
	Fire	Fire prevention will be a priority through awareness. In the event of a fire, areas where MEC is known to exist will be vacated. Any small fire (non-MEC) may be extinguished using a properly rated extinguisher. Storage, handling and use of flammables and combustible liquids will be in accordance with NFPA 30, 30A. Only labeled/listed containers will be used to store flammables and/or combustibles. Properly rated fire extinguishers will be strategically placed in the work area.	L
	Inclement weather, heat and cold stress	Personnel will be dressed according to weather conditions. Local weather will be monitored on a daily basis at a minimum or more frequently if storms threaten. Workers will be briefed and cognizant of heat and cold stress symptoms. Electrolyte/fluids replacement will be available to workers as needed. Work/rest periods will be established according to ACGIH and NIOSH guidelines. Personnel will be monitored.	L
	Hand tools, manual and power	Tools will be inspected prior to use. Damaged tools will be tagged out of service until repair can be performed by a qualified person. Tools will be used properly and for their intended purpose. Power circuits used for hand tools will be protected by a GFCI. Personnel will be trained on the proper use of power tools.	L

Equipment	PPE	Inspection	Training
Hand tools Four-wheel drive vehicles	Safety boots Nitrile chemical resistant gloves Safety glasses	Equipment will be properly stored, inspected, and/or maintained on a daily basis, or according to manufacturer's recommendations. Records of inspection will be maintained on-site. Fire extinguishers, first-aid kits, and vehicles will be inspected by the SSHO/UXOSO.	First aid/CPR (at least two personnel) and vehicle training.

Table 12-1 Activity Hazard Analysis (Continued)

Date Prepared: September 2011

Prepared By: L. Kritzberger

Reviewed By: S. Sperber

Activity 7: **Test Pit Activities**

***Overall Risk Assessment Code (RAC):**

RAC Matrix

Hazard Severity	Accident Probability A	B	C	D	E
I	E	E	H	H	M
II	E	H	H	M	L
III	H	M	M	L	L
IV	M	L	L	L	L

Task	Hazards	Hazard Control	RAC*
Test pit excavation of less than 4 ft.	**Chemical Hazards:**	No known chemical hazards are associated with this activity.	L
	Biological Hazards: Possibility of stinging and biting insects. Encountering animals, and reptiles.	Use appropriate insect repellents. Training to avoid poisonous plants and avoid contact. A poster indicating various types of hazardous plants and reptiles to avoid will be displayed in the site trailer. Training on symptoms of rabies and avoidance of animals.	L
	Radiation Hazards: Sun	Use sunblock as appropriate. Avoid extended periods of direct exposure to sun.	L
	Physical Hazards: Heavy equipment operations	Only trained, qualified operators will operate equipment. Equipment will be inspected daily and documented in accordance to manufacturer's requirements. Personnel will be made aware of hazards and will coordinate carefully during equipment operations. Personnel access will be restricted in the area of operation. Back up alarms will be functional. Stay out of the swing area of all equipment and from under loads. No personnel will ride on the equipment unless seats are provided. Guards will be kept in place during operation. Maintain safe distance from moving mechanical parts. Ground personnel near operating heavy equipment will wear hard hats and high visibility (reflective) vests. Always use appropriate PPE.	M
	Slips, trips, falls, tools, terrain, or vegetation; uneven walking surfaces; weather hazards and poor visibility.	Slip, trip, and fall hazards will be either removed or marked and barricaded. Materials will be stored to prevent intrusion into the work areas. Work areas will be kept organized; ice, snow, and mud will be cleared from steps to reduce slip hazards. Work will be completed in adequate natural light. Site personnel will conduct an initial walkthrough, and the "buddy system" will be implemented.	M

Table 12-1 Activity Hazard Analysis (Continued)

Activity 7: Test Pit (Continued)

Task	Hazards	Hazard Control	RAC*
	Manual lifting	Use proper lifting techniques—keep back straight, lift with legs, avoid twisting back, use mechanical equipment, or get help from others whenever possible. Split heavy loads into smaller loads and/or seek assistance. Verify the path of travel is clear prior to the lift.	M
	Hands or fingers caught between objects; abrasions and lacerations	Personnel will be made aware of the hazard and asked to coordinate carefully the handling and placement of heavy objects. Materials and objects being handled will be inspected for rough or sharp edges and appropriate precautions will be taken to avoid contact with rough or sharp edges. Personnel will wear work gloves and avoid placing hands between objects.	L
	Fire	Fire prevention will be a priority through awareness. In the event of a fire, areas where MEC is known to exist will be vacated. Any small fire (non-MEC) may be extinguished using a properly rated extinguisher. All storage, handling and use of flammables and combustible liquids will be in accordance with NFPA 30, 30A. Only labeled/listed containers will be used to store flammables and/or combustibles. Properly rated fire extinguishers will be strategically placed in the work area.	L
	Inclement weather, heat and cold stress	Personnel will be dressed according to weather conditions. Local weather will be monitored on a daily basis at a minimum or more frequently if storms threaten. Workers will be briefed and cognizant of heat and cold stress symptoms. Electrolyte/fluids replacement will be available to workers as needed. Work/rest periods will be established according to ACGIH and NIOSH guidelines. Personnel will be monitored.	L
	Hand tools, manual and power	Tools will be inspected prior to use. Damaged tools will be tagged out of service until repair can be performed by a qualified person. Tools will be used properly and for their intended purpose. Power circuits used for hand tools will be protected by a GFCI. Personnel will be trained on the proper use of power tools.	L

Equipment	PPE	Inspection	Training
Hand tools Backhoe	Safety boots Gloves Safety glasses Hard hats Hearing Protection	Equipment will be properly stored, inspected, and/or maintained on a daily basis, or according to manufacturer's recommendations. Records of inspection will be maintained on-site. Fire extinguishers, first-aid kits, and vehicles will be inspected by the SSHO/UXOSO.	30-Hour Construction Safety, First aid/CPR (at least two personnel); Equipment operation.

Table 12-1 Activity Hazard Analysis (Continued)

Date Prepared: September 2011

Prepared By: L. Kritzberger

Reviewed By: S. Sperber

Activity 8: **Underwater Investigations**

***Overall Risk Assessment Code (RAC):**

RAC Matrix

Hazard Severity	Accident Probability A	B	C	D	E
I	E	E	H	H	M
II	E	H	H	M	L
III	H	M	M	L	L
IV	M	L	L	L	L

Task	Hazards	Hazard Control	RAC*
Perform digital geophysical mapping transect and grid surveys to detect geophysical anomalies and investigation of anomalies.	**Chemical Hazards:**		
	Marine Battery – Lead Acid	Keep containers tightly closed when not in use. If battery case is broken, avoid contact with internal components. Do not handle near heat, sparks, or open flames. Protect containers from physical damage to avoid leaks and spills. Place cardboard between layers of batteries to avoid damage and short circuits. Do not allow conductive material to touch the battery terminals. A dangerous short-circuit may occur and cause battery failure and fire.	L
	Biological Hazards: Possibility of stinging and biting insects. Encountering animals and reptiles.	Use appropriate insect repellents. Training to avoid poisonous plants and avoid contact. A poster indicating various types of hazardous plants and reptiles to avoid will be displayed in the site trailer. Training on symptoms of rabies and avoidance of animals.	L
	Radiation Hazards: Sun	Use sunblock as appropriate. Avoid extended periods of direct exposure to sun.	L
	Physical Hazards: Boating	Personnel on the boat will have completed a boating safety course that meets the criteria of the USCG. All personnel on the boat will wear personal flotation devices (PFDs) that meet the requirements of EM385-1-1 Section 19.A.03 (d). A Float Plan will be filed with the Site Manager and the Division Environmental Health and Safety Officer immediately prior to boating activities. The Float Plan will contain the make/model of boat, personnel on board, the activity, time of departure and return, and the boating route.	M

Table 12-1 Activity Hazard Analysis (Continued)

Activity 8: Underwater Investigations (Continued)

Task	Hazards	Hazard Control	RAC*
	Slips, trips, falls, terrain, or vegetation; uneven walking surfaces; weather hazards, such as snow and ice; and poor visibility.	Care will be exercised during off-loading and loading of boats to reduce slip, trip or fall hazards associated with the landing or docking area. Work areas will be kept organized; ice, snow, and mud will be cleared to reduce hazards. Work will be completed in adequate natural light or sufficient artificial illumination will be maintained. Site personnel will use the "buddy system" at all times.	M
	Manual lifting	Use proper lifting techniques—keep back straight, lift with legs, avoid twisting back, use mechanical equipment, or get help from others whenever possible. Heavy loads will be carried with assistance. Verify the path of travel is clear prior to the lift.	M
	Hands or fingers caught between objects; abrasions and lacerations	Personnel will be made aware of the hazard and asked to coordinate carefully the handling and placement of heavy objects. Materials and objects being handled will be inspected for rough or sharp edges and appropriate precautions will be taken to avoid contact with rough or sharp edges. Personnel will wear work gloves and avoid placing hands between objects.	L
	Fire	Fire prevention will be a priority through awareness. A 1A:10BC extinguisher will be required to be on the boat during water activities.	L
	Inclement weather, heat and cold stress	Personnel will be dressed according to weather conditions. Local weather will be monitored on a daily basis at a minimum or more frequently if storms threaten. Workers will be briefed and cognizant of heat and cold stress symptoms. Electrolyte/fluids replacement will be available to workers as needed. Work/rest periods will be established according to ACGIH and NIOSH guidelines. Personnel will be monitored.	L
	Hand tools, manual	Tools will be inspected prior to use. Damaged tools will be tagged out of service until repair can be performed by a qualified person. Tools will be used properly and for their intended purpose.	L

Table 12-1 Activity Hazard Analysis (Continued)

Activity 8: Underwater Investigations (Continued)

Equipment	PPE	Inspection	Training
Hand tools Motorized vessel	Safety boots Gloves PFDs Fire Extinguisher (1A:10BC)	All equipment will be properly stored, inspected, and/or maintained on a daily basis, or according to manufacturer's recommendations. Records of inspection will be maintained on-site. Fire extinguishers, first-aid kits, and vehicles will be inspected by the SSHO. Daily boat inspection will be performed using the form presented in Figure 11-2.	First aid/CPR (at least two personnel) and vehicle training. USCG Safe Boating

Table 12-1 Activity Hazard Analysis (Continued)

Date Prepared: September 2011

Prepared By: L. Kritzberger

Reviewed By: S. Sperber

Activity 9: **Demobilization**

***Overall Risk Assessment Code (RAC):**

RAC Matrix

Hazard Severity	Accident Probability A	B	C	D	E
I	E	E	H	H	M
II	E	H	H	M	L
III	H	M	M	L	L
IV	M	L	L	L	L

Task	Hazards	Hazard Control	RAC*
All equipment, materials, and personnel and temporary facilities will be removed from the site.	**Chemical Hazards:**	No chemical hazards are associated with this activity.	L
	Biological Hazards: Possibility of stinging and biting insects. Encountering animals and reptiles.	Use appropriate insect repellents. Training to avoid poisonous plants and avoid contact. A poster indicating various types of hazardous plants and reptiles to avoid will be displayed in the site trailer. Training on symptoms of rabies and avoidance of animals.	L
	Radiation Hazards: Sun	Use sunblock as appropriate. Avoid extended periods of direct exposure to sun.	L
	Physical Hazards: Slips, trips, falls, tools, terrain, or vegetation; uneven walking surfaces; weather hazards, such as snow and ice; and poor visibility.	Housekeeping. Slip, trip, and fall hazards will be either removed or marked and barricaded. Materials will be stored to prevent intrusion into the work areas. Work areas will be kept organized; ice, snow, and mud will be cleared to reduce slip hazards. Work will be completed in adequate natural light or sufficient artificial illumination will be maintained. Site personnel will conduct an initial walkthrough, and the "buddy system" will be implemented.	M
	Manual lifting	Use proper lifting techniques—keep back straight, lift with legs, avoid twisting back, use mechanical equipment, or get help from others whenever possible. Split heavy loads into smaller loads and/or seek assistance. Verify the path of travel is clear prior to the lift.	M

Table 12-1 Activity Hazard Analysis (Continued)

Activity 9: Demobilization (Continued)

Task	Hazards	Hazard Control	RAC*
	Hands or fingers caught between objects; abrasions and lacerations	Personnel will be made aware of the hazard and asked to coordinate carefully the handling and placement of heavy objects. Materials and objects being handled will be inspected for rough or sharp edges and appropriate precautions will be taken to avoid contact with rough or sharp edges. Personnel will wear work gloves and avoid placing hands between objects.	L
	Fire	Fire prevention will be a priority through awareness. In the event of a fire, areas where MEC is known to exist will be vacated. Any small fire (non-MEC) may be extinguished using a properly rated extinguisher. All storage, handling and use of flammables and combustible liquids will be in accordance with NFPA 30, 30A. Only labeled/listed containers will be used to store flammables and/or combustibles. Properly rated fire extinguishers will be strategically placed in the work area.	L
	Inclement weather, heat and cold stress	Personnel will be dressed according to weather conditions. Local weather will be monitored on a daily basis at a minimum or more frequently if storms threaten. Workers will be briefed and cognizant of heat and cold stress symptoms. Electrolyte/fluids replacement will be available to workers as needed. Work/rest periods will be established according to ACGIH and NIOSH guidelines. Personnel will be monitored.	L
	Hand tools, manual and power	Tools will be inspected prior to use. Damaged tools will be tagged out of service until repair can be performed by a qualified person. Tools will be used properly and for their intended purpose. All power circuits used for hand tools will be protected by a GFCI. Personnel will be trained on the proper use of power tools.	L

Equipment	PPE	Inspection	Training
Hand tools	Safety boots Gloves Safety glasses	Equipment will be properly stored, inspected, and/or maintained on a daily basis, or according to manufacturer's recommendations. Records of inspection will be maintained on-site. Fire extinguishers, first-aid kits, and vehicles will be inspected by the SSHO/UXOSO.	First aid/CPR (at least two personnel).

ATTACHMENT A

SITE SAFETY AND HEALTH PLAN

Attachment A

SITE SAFETY AND HEALTH PLAN

MILITARY MUNITIONS RESPONSE PROGRAM
REMEDIAL INVESTIGATION

PICATINNY ARSENAL
MORRISON COUNTY, NJ

Contract No.: W912DR-09-D-0006
Delivery Order No. 0002

Prepared By

Weston Solutions, Inc.
1400 Weston Way
West Chester, PA 19380

October 2011

SITE SAFETY AND HEALTH PLAN CONCURRENCE/SIGNOFF

Site Name: Picatinny Arsenal (PTA)
Military Munitions Response Program (MMRP) Remedial Investigation (RI)

Work Location Address: Morris County, New Jersey

WORKER'S STATEMENT

I have read, understood, and agree to abide by the information set forth in the Accident Prevention Plan (APP), Site Safety and Health Plan (SSHP), and any discussions presented in the personnel health and safety briefing. I have received adequate training to perform the procedures addressed in these plans. If I identify a hazard not addressed in the APP or SSHP, or encounter an operation I cannot perform in accordance with the APP or SSHP, I will stop the process and notify my immediate supervisor.

Name	**Signature**	**Date**
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LIST OF ACRONYMS

°F	Fahrenheit
AHA	Activity Hazard Analysis
ANSI	American National Standards Institute
APP	Accident Prevention Plan
BBP	bloodborne pathogens
BIP	blown-in-place
CDL	Commercial Driver’s License
CEHS	Corporate Environmental Health and Safety
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
COR	Contracting Officer’s Representative
CPR	cardiopulmonary resuscitation
dBA	A-weighted decibel
DDESB	Department of Defense Explosives Safety Board
DMM	discarded military munitions
DoD	Department of Defense
DOT	U.S. Department of Transportation
EC	Emergency Coordinator
ECT	equivalent chill temperature
EHS	Environmental Health and Safety
EMS	Emergency Medical Services
ESP	Explosives Site Plan
FAR	Federal Acquisition Regulations
HAZWOPER	Hazardous Waste Operations and Emergency Response
MC	munitions constituents
MD	munitions debris
MEC	munitions and explosives of concern
mm	millimeter
MMRP	Military Munitions Response Program
MPPEH	material potential presenting an explosive hazard
MSDS	Material Safety Data Sheet
NIOSH	National Institute for Occupational Safety and Health
OESS	Ordnance and Explosives Safety Specialist
OE	ordnance and explosives
OHP	Occupational Health Program

LIST OF ACRONYMS (CONTINUED)

OSHA	Occupational Safety and Health Administration
PPE	personal protective equipment
POC	Point of Contact
PWS	Performance Work Statement
RI	Remedial Investigation
SI	Site Inspection
SSHO/UXOSO	Site Safety and Health Officer
SSHP	Safety and Health Plan
SUXOS	Senior UXO Supervisor
TLV	threshold limit value
TWA	time-weighted average
USACE	U.S. Army Corps of Engineers
UXO	unexploded ordnance
UXOSO	Unexploded Ordnance Safety Officer
WESTON	Weston Solutions, Inc.

1. INTRODUCTION

This Site Safety and Health Plan (SSHP) provides detailed project-specific health and safety information for the Military Munitions Response Program (MMRP) Remedial Investigations (RI) being performed at the Picatinny Arsenal (PTA).

The SSHP is written in accordance with applicable Army, federal, state, and local health and safety requirements and presents the minimum requirements for safety and health that must be met by site personnel engaged in site operations. The SSHP does not in any way relieve Weston Solutions, Inc. (WESTON) site personnel or WESTON subcontractors from responsibility for the safety and health of their personnel. Visitors to the site will receive a safety briefing by the Site Safety and Health Officer (SSHO)/unexploded ordnance safety officer (UXOSO) prior to gaining entry to the work area. The Site Manager/Senior UXO Supervisor (SUXOS) will provide all visitors appropriate PPE and an escort while on-site and maintain an on-site visitor log.

Changes and modifications to the SSHP are permitted and will be made in writing with the knowledge and concurrence of the Corporate Environmental Health and Safety (EHS) Manager and accepted by the United States Army Corps of Engineers (USACE) Project Manager.

1.1 PROJECT DESCRIPTION

The purpose of this MMRP RI at PTA is to perform an investigation to determine the nature and extent of munitions and explosives of concern (MEC) and munitions constituents (MC) on the ground surface and subsurface at nine (9) munitions response sites (MRSs), if present. To determine the nature and extent of MEC at these MRSs, analog and digital geophysical surveys will be performed at each MRS. Selected anomalies detected during the geophysical surveys will be investigated to determine whether potential MEC is present at that location. MC sampling will be performed where MEC is recovered during the geophysical surveys and at locations where MC may be present without a MEC release.

2. SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

2.1 SITE LOCATION AND DESCRIPTION

PTA is located in Morris County, NJ, approximately 45 miles west of New York City and approximately 4 miles north of Dover, NJ. Interstate 80 and State Route 15 highways border the southern portion of Picatinny as shown in **Figure 1-1** of the Accident Prevention Plan (APP).

2.2 SITE BACKGROUND/HISTORY

- 1880 – Established as Picatinny Powder Depot.
- 1890s – Began assembly of powder charges for cannons to support the Spanish-American War. The Navy established the Lake Denmark Powder Depot, later known as Lake Denmark Naval Ammunition Depot, adjacent to the Picatinny Powder Depot. The property was used for storage of explosives, powder, and projectiles from the 1880s to 1960.
- 1907 – The Army changed the name of Powder Depot to Picatinny Arsenal and began expanding its role as a storage facility to include manufacturing of smokeless powder and propellants. Manufacturing continued during World War I (WWI).
- During WWI, the arsenal added storage and manufacturing facilities and began production of melt-loading projectiles, loading TNT into bombs, and experimental manufacturing of high explosive (HE), fuzes, and metal components.
- 1926 – Lightning set off a series of storage magazine explosions at the Lake Denmark Naval Ammunition Depot that destroyed most of the arsenal and killed 18 people. Approximately 2.4 million pounds of explosives were detonated or burned. Unexploded shells and shell fragments were recovered up to three-quarters of a mile to a mile away from the explosion centers, respectively.
- The arsenal was rebuilt, and by World War II (WWII), manufacturing and loading of pyrotechnics and smokeless powder, loading bombs and projectiles, and assembling fixed ammunition larger than .50 caliber was conducted. During WWII, the arsenal was the only facility in the United States capable of producing large amounts of explosives, bombs, and ammunition for the war.
- After WWII, the arsenal focused primarily on research and engineering of new munitions; however, production of munitions and explosives continued through the Korean and Vietnam Wars. Between the Korean and Vietnam Wars, the arsenal contributed to the development of some nuclear weapons, including artillery shells and the Davy Crockett. The arsenal was also involved in the design of several different warheads.
- 1960 – The Army reacquired the Lake Denmark Naval Ammunition Depot land from the Navy, adding the land back into the arsenal's boundary.

- 1970s – Following the Vietnam War, research and development (R&D) work on nuclear and non-nuclear weapons continued at the arsenal. R&D applications included artillery, infantry, vehicle and aircraft weapons; demolition munitions; mines; bombs; grenades; pyrotechnic systems; rocket-assisted projectiles; flares; chemical systems/materials; and fuzes.
- 2005 –The Department of Defense (DoD) recommended that the arsenal should grow in size under Base Realignment and Closure (BRAC) and be realigned with seven other DoD facilities and to gain new missions.
- 2005 to present – The Arsenal is the home of the Army's Armaments Research, Development and Engineering Center (ARDEC), whose mission is conducting and managing R&D for all assigned weapons systems. There are several established partnerships with academia and industry throughout the R&D process at the arsenal.

Prior to the initiation of this RI, the previous studies conducted at PTA under the MMRP included the U.S. Army Closed, Transferred and Transferring Range/Site Inventory for Picatinny Arsenal (Malcolm Pirnie, 2003), which marked the completion of the Preliminary Assessment (PA) phase of work under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA); the Historical Records Review (HRR) (Malcolm Pirnie, 2006), and the Site Inspection (SI) (Malcolm Pirnie, 2008), which complete the PA/SI requirement for the MMRP eligible sites under the MMRP.

2.3 SITE PHYSICAL CHARACTERIZATION

The site is characterized as heavily forested with dense brush, wetlands, and large bodies of water (lakes and ponds). The terrain slope ranges from 0 to 30% across the site.

Field activities are anticipated to take approximately 5 to 7 months, beginning in the fall to complete geophysical activities and return in the spring for additional intrusive activities. During the summer months, the temperature ranges from 79 to 84 degrees Fahrenheit (°F) in the afternoon, with nighttime lows ranging from 55 to 59 °F. Thunderstorms occur on an average of 9 to 12 days per month with measurable precipitation. The prevailing wind is from the west. The last freeze in spring usually occurs in May and the first freeze in October.

Winter-type weather normally begins by mid-October and extends through end of April. The season is rather cloudy, and high temperatures remain around the freezing mark. The average low temperature recorded at Picatinny is 16°F. Snowfall averages approximately 6 inches per storm, with 50 to 60 inches of snow in a normal snow season. During the winter, snow covers the ground about 60% of the time.

2.4 CONTAMINATION AND EXPOSURE POTENTIAL

2.4.1 Physical Hazards

Exposure to physical hazards may include manual lifting; slips, trips, falls; heat/cold stress; hand tools (manual and power); terrain or vegetation; uneven walking surfaces; weather hazards, such as snow and ice; and poor visibility. Additional physical hazards common while performing brush removal activities include hands or fingers caught between objects; electric hazards; caught in/between/struck by or against an object; and traffic.

2.4.2 MEC Hazards

Every effort will be made to identify a suspect MEC item. The MEC item will be visually examined for markings and other external features such as shape, size, and external fittings. If an unknown UXO item is encountered, the USACE representative will be notified immediately. Under no circumstances will any fused MEC be moved in an attempt to make a definitive identification.

As a general rule, all fused UXO will be detonated in the original position found [blown in place (BIP)]. This is the safest method to effect final disposition of munitions. Any item to be BIP will be sandbagged to mitigate blast effects and fragmentation projection.

Only UXO personnel will handle MEC items, and only during daylight hours. Personnel who will be handling MEC items will not wear outer or inner garments having static-electricity-generating characteristics such as nylon.

WESTON and subcontractor personnel engaged in field operations will be thoroughly trained and capable of recognizing the specific hazards associated with MEC items. Field personnel will be under the direct supervision of a UXO Technician III or higher.

General UXO safety guidelines are listed below:

- Consider projectiles containing base-detonating fuses to be armed if the round is fired.
- Secure arming wires and pop out pins on unarmed fuses prior to moving UXO items.

- Do not depress plungers, turn vanes, or rotate spindles, levers, setting rings, or other external fittings on UXO items.
- Do not attempt to remove or dismantle any components of UXO items.
- UXO personnel are not authorized to render inert any UXO items found on-site.
- UXO items will not be taken from the site.
- Consider UXO items, which may have been exposed to fire and detonation, as extremely hazardous.
- Do not rely on the color-coding of UXO items for definitive identification.
- Assume that a practice UXO item contains a live charge until investigation proves otherwise.
- Do not approach a smoking munition.

2.4.3 Chemical Hazards

The chemicals of concern (COCs) at the project site include explosives and metals. The main routes of exposure for field personnel include ingestion, skin or eye contact, and dermal absorption from soil. Due to the nature of the contaminants and the types of activities planned, it is expected that there is a low potential for exposure to site personnel. Results indicate that levels of chemicals of concern were slightly above the screening criteria. To protect personnel from hazards associated with site chemicals of concern, a personal protection plan will be implemented to control potential chemical exposures.

Table 2-1 lists chemicals of concern, with exposure limits, exposure routes, and symptoms associated with exposure.

Table 2-1 Chemicals of Concern

Chemical Name	CAS No.	Preliminary Remediation Goal	Exposure Limits	Characteristics	Routes of Exposur e	Symptoms and Effects of Exposure
1,3 Dinitrobenzene	99-65-0	6.1 mg/kg	REL: TWA 1 mg/m^3(skin) IDLH: 50 mg/m^3 PEL: TWA 1 mg/m^3(skin) TLV: TWA 0.15 ppm	Pale-white or yellow solid MW: 168.1 VP: FL P: 302F BP: 572F IP: 10.43 eV Sp Gr: 1.58	INH ABS ING CON	Anoxia, cyanotic, vision, dist, central scotomas, bad taste, burning mouth, dry throat, thirst, yellowing hair, eyes, skin, anemia, liver damage
1,3,5-Trinitrobenzene	99-35-4	1,800 mg/kg	OSHA: 1 mg/m^3 NIOSH: 1 mg/m^3	MP: 123.2C BP: 315C Sol: 330 Mg/L	ING CON	Anemia;headache, nausea, dizziness
2-Amino-4,6-dinitrotoluene	75-05-8	12 mg/kg	OSHA PEL: 70mg/m^3 NIOSH: 34 mg/m^3	Colorless liquid with an aromatic odor MW 4.1 BP 179F IP 12.20e.V VP 73mmHg	INH ABS ING CON	Irritant to nose, throat, nausea, vomiting and chest pains.
2,4-Dinitrotoluene	121-14-2	120 mg/kg	OSHA PEL: TWA 1.5 mg/m^3 (skin) NIOSH REL:TWA 0.2 mg/m^3 (skin)	Orange yellow crystalline solid with a characteristic odor BP: 572F VP: 1 mmHg	INH ABS ING CON	Anoxia, cyanosis; anemia, jaundice

Table 2-1 Chemicals of Concern (Continued)

Chemical Name	CAS No.	Preliminary Remediation Goal	Exposure Limits	Characteristics	Routes of Exposure	Symptoms and Effects of Exposure
2,4,6-Trinitrotoluene	118-96-7	16.2 mg/kg	OSHA: 1.5 mg/m^3 NIOSH: 0.5 mg/m^3	Pale yellow (loose); solid black after casting DEN: 1.654 g/cm3 MP: 80.35C BP: 295C SOL: 0.13 g/L Sp Gr: 1.65 VP: 0.0002 mm/Hg	INH ABS ING CON	Irritation to skin, mucus membrane, jaundice, cyanosis, sneezing cough, sore throat
2,6-Dinitrotoluene	606-20-2	61 mg/kg	OSHA: 1.5 mg/m^3(skin) NIOSH: 1.5 mg/m^3(skin)	Orange-yellow crystalline solid with a characteristic odor. MW: 182.2 VP: 1 mmHg BP: 572F	INH ABS ING CON	Anoxia, cyanosis, jaundice
3-Nitrotoluene	99-08-1	730 mg/kg	REL: TWA 2 ppm IDLH: 200 ppm PEL: TWA 5 ppm TLV: TWA 2 ppm	Yellow liquid with a weak aromatic odor MW: 137.1 VP: 0.1mmHg Fl P: 223F BP: 450F IP: 9.48eV LEL: 1.6% Sp Gr: 1.16	INH ABS ING CON	Anoxia, cyanotic, headache, weakness, dizzy, ataxia, dysp, tacar, nausea, vomit
4-Amino-2,6-dinitrotoluene	19406-51-0	12 mg/kg	OSHA 1.5 mg/m^3(skin) NIOSH 1.5 mg/m^3(skin)	MW: 197.17 BP: 382.6C FP: 185.2C	ING	Anoxia, cyanosis, anemia, jaundice

Table 2-1 Chemicals of Concern (Continued)

Chemical Name	CAS No.	Preliminary Remediation Goal	Exposure Limits	Characteristics	Routes of Exposure	Symptoms and Effects of Exposure
4-Nitrotoluene	99-99-0	12 mg/kg	REL: TWA 2 ppm (11mg/m^3 skin) PEL: TWA 5 ppm (30 mg/m^3 skin) IDLH: 200 ppm TLV: TWA 2 ppm	Crystalline solid with a weak, aromatic odor MW: 137.1 VP: 0.1 mmHg Fl P: 223F BP: 460F IP: 9.50 eV MLT: 126F LEL: 1.6% Sol: 0.04% Sp. Gr 1.12	INH ABS ING CON	Anoxia, cyan; head, weak, dizz; ataxia; dysp; tacar; nau, vomit
Methyl-2,4,6-trinitrophenylnitramine	479-45-8	611 mg/kg	NIOSH: TWA: 1.5 mg/m^3 (skin) OSHA PEL: 1.5 mg/m^3(skin)	Odorless, colorless yellow crystal-like; solid at room temperature MW: 287.2 BP: 356-374F MP: 268 Sol: 0.02 VP @ 20C: less than 1	INH ING ABS	Eye and mucus membrane irritation
Cyclotrimethylenetrinitramine	121-82-4	40 mg/kg	REL: TWA 1.5 mg/m^3 ST 3 mg/m^3	White, crystalline powder MW: 222.2 VP: 0.0004 mmHg Fl P: Explodes Sol: Insoluble SpGr: 1.82	INH ABS ING CON	Irrit eyes, skin; head, irrity, ftg, weak, tremor, nau, dizz, vomit, insom, convuls

Table 2-1 Chemicals of Concern (Continued)

Chemical Name	CAS No.	Preliminary Remediation Goal	Exposure Limits	Characteristics	Routes of Exposur e	Symptoms and Effects of Exposure
Antimony	7440-36-0		REL: TWA 0.5 mg/m^3 PEL: TWA 0.5 mg/m^3 IDLH: 50 mg/m^3 TLV: TWA 0.5 mg/m^3	Silver-white lustrous, hard, brittle solid, scale-like crystals, or a dark-gray lustrous powder MW: 121.8 VP: 0 mmHg FL P: NA BP: 2975F IP: NA MLT: 1166F Sol: Insoluble Sp. Gr: 6.69	INH ING CON ABS	Irrit eyes, skin, nose, throat, mouth; cough; dizziness, headache; nausea; vomiting; diarrhea; stomach cramps; insomnia; anor; unable to smell properly
Copper	7440-50-8		REL: TWA 1 $mg/^{m3}$ PEL: 1 mg/m^3 IDLH: 100 mg/m^3 TLV: TWA Fume 0.2 mg/m^3 TLV: TWA Dust 1 mg/m^3	Reddish, lustrous, malleable, odorless solid MW: 63.5 VP: 0 mmHg FL P: NA BP 4703F IP: NA MLT: 1981 F Sol: Insoluble Sp Gr: 8.94	INH ING CON	Irrit eyes, nose, pharynx, nasal septum perf; metallic taste; derm
Iron	7436-89-6	23,000 mg/kg	N/A	Silvery granular, odorless MP: 2700 Sp Gr: 6.7 Sol: Insoluble	INH	May cause coughing(dust)

Table 2-1 Chemicals of Concern (Continued)

Chemical Name	CAS No.	Preliminary Remediation Goal	Exposure Limits	Characteristics	Routes of Exposure	Symptoms and Effects of Exposure
Lead	7439-92-1		REL: TWA 0.050 mg/m^3 PEL: TWA 0.050 mg/m^3 IDLH: 100 mg/m^3 TLV: TWA 0.05 mg/m^3	A heavy, ductile, soft, gray solid MW: 207.2 VP: 0 mmHg Fl P NA BP: 3164F IP: NA MLT: 621F Sol: Insoluble Sp Gr 11.34	INH ING CON	Weak, lass, insom; facial pallor; anor, low-wgt, malnut; constip, abdom pain, colic; anemia; gingival lead line; tremor; para wrist, ankles; encephalopathy, kidney disease, irrit eyes; hypotension
Mercury	7439-97-6		REL: TWA 0.05mg/m^3 (vapor); C 0.1mg/m^3 (other) PEL: C 0.1mg/m^3 IDLH: 10 mg/m^3 TLV: TWA (elemental) 0.025 mg/m^3 (Alkyl) 0.01 mg/m^3 (Aryl) 0.1 mg/m^3	Silver-white, heavy, odorless liquid MW: 200.6 VP: 0.0012 mmHg Fl P: NA BP: 674F IP: NA Sol: Insoluble Sp. Gr: 13.6	INH ABS ING CON	Irrit eyes, skin; cough, chest pain, dysp, bron pneuitis; tremor, insom, irrity, indecision, head, ftg, weak; stomatitis, salv; gi dist, anor, low-wgt; prot
Potassium	7440-09-7		N/A	Water reactive; Soft silvery metal; tarnish upon exposure to air. MP: 63C BP: 765C VP: 1.4 Sp. Gr: 0.862 MW: 39.0983	INH	Eye and skin burns; gi burns; inh or con with vapors, substance or decomposition may cause severe injury or death

Table 2-1 Chemicals of Concern (Continued)

Chemical Name	CAS No.	Preliminary Remediation Goal	Exposure Limits	Characteristics	Routes of Exposure	Symptoms and Effects of Exposure
Zinc	7440-66-6		N/A	Gray blue granular or shiny MW: 63.37 BP: 907C MP: Sp. Gr: 7.14 Sol: Insoluble	INH	Dust may cause skin or eye irr or cough

Notes: OSHA PEL: Occupational Safety and Health Administration, Permissible Exposure Limit for an eight-hour, time-weighted average.
NIOSH REL: National Institute for Occupational Safety and Health, Recommended Exposure Limit for a 10-hour, time-weighted average.
IDLH: Immediately dangerous to life and health.
TWA: Time-weighted average.
ppm: Parts per million of vapor/gas at normal temperature and pressure .
INH: Inhalation.
ING: Ingestion.
ABS: Skin absorption.
CON: Skin and/or eye contact.
TLV: Threshold limit value.

Hazardous chemicals brought on-site by WESTON personnel or subcontractors will be managed in accordance with 29 Code of Federal Regulations (CFR) 1910.1200, WESTON's Hazard Communication Program and Section 01.B.04 of USACE EM 385-1-1. Employees will be informed of how the materials will be used on-site. A chemical inventory will be developed, including information on approximate quantities and storage locations for emergency response purposes. This inventory will be updated as necessary to ensure accuracy.

Site personnel will comply with the storage, handling, and use requirements stated on the Material Safety Data Sheet (MSDS) for each chemical brought on-site by WESTON or its subcontractors. An inventory of all chemicals brought on-site and an MSDS for each will be maintained at the site. Project subcontractors shall inform WESTON of any chemical materials brought on-site, and the location of their MSDSs. A site-specific Hazard Communication Plan is presented in Attachment 1. Chemical products will be properly labeled, including contents, health, flammability, reactivity, personal protective equipment (PPE) requirements, and any special instructions. If products are contained in secondary containers, they will have the appropriate hazardous material identification system labeling affixed.

2.4.4 Biological Hazards

Biological hazards include wild animals (raccoons, foxes, snakes, rats, mice, and bats), insect bites and stings (ticks, bees, mosquitoes), and poisonous plants. Site personnel will be instructed to be alert for and avoid wild animals, to wear long pants and shirts while working in brush, and to use insect repellent as well as poison-ivy block and cleanser. Any site worker who is knowingly allergic to insect bites will be required to inform the SSHO/UXOSO, and to carry an allergy response kit. First-aid providers will also be required to know how to use the response kit.

2.4.5 Radiation

Based on the review of existing information, exposure to sources or contamination of ionizing radiation is not expected to be encountered.

2.4.5.1 Nonionizing Radiation

The most likely exposure to nonionizing radiation is the sun. Personnel will receive instruction in using appropriate PPE and/or procedures to follow in the event that nonionizing radiation creates a concern and requires the use of sunscreen and hats.

3. HAZARD AND RISK ASSESSMENT

Field work is planned to be executive mainly during the fall through spring months of 2011 – 2013 and consists of the following project work phases/activities:

Work Phase	Work Description
Activity 1: Mobilization	– Mobilize equipment and personnel to the project site. – Establish an office trailer with utilities including electricity and communication services through the PTA provider.
Activity 2: Geophysical Survey Activities	– Construct instrument verification strip for geophysical instrument testing which includes intrusive work to bury "seed" items. – Use a licensed surveyor to locate and establish site survey control points and mark grid corners with wooden stakes and steel pins. – Perform MEC avoidance using an UXO Technician II or higher. – Perform digital geophysical mapping (DGM) and/or mag and dig transect and grid surveys to detect geophysical anomalies and potential MEC within the designated MRSs.
Activity 3: MEC Intrusive Activities	– Use UXO technicians to perform surface and subsurface MEC removal activities at anomaly locations. – Recover potential MEC (UXO and discarded military munitions [DMM]), material potentially presenting an explosive hazard (MPPEH), munitions debris (MD), and/or other non-munitions-related metal debris. – Perform subsurface removal activities by the excavation of detected anomalies using hand tools, demolition activities of recovered MEC and MPPEH, and MD and non-munitions-debris inspection and transport to a certified recycling program. – Perform demolition of MEC/MPPEH.
Activity 4: MEC/MPPEH Inspection	– Dispose of the recovered MEC and MPPEH. – Designate and segregate material documented as safe (MDAS) and scrap metal for PTA turn-in and/or local recycling.
Activity 5: Drum Handling	– Drum MDAS and scrap metal for PTA turn-in and/or local recycling.
Activity 6: Media Sampling	– Perform MEC avoidance using an UXO Technician II or higher. – Collect soil/sediment MC samples in locations potentially impacted by an MEC release using hand tools.
Activity 7: Test Pit Activities	– Perform test pit excavation activities, where necessary utilizing heavy equipment (i.e. backhoe).
Activity 8: Underwater Investigations[1]	– Perform DGM transect and grid surveys to detect anomalies in Picatinny Lake and Lake Denmark sediments utilizing underwater geophysical tools towed by a boat.
Activity 9: Demobilization	– Demobilize equipment, personnel, and site infrastructure.

[1] Intrusive investigation of underwater anomalies/removal of underwater MEC will be addressed with required Diving Plan under a separate Addendum to this APP.

3.1 ACTIVITY HAZARD ANALYSIS

Hazard analysis tables provide a task-specific evaluation of the known or potential hazards associated with performing individual work phases associated with this project. Each analysis also contains task-specific information related to hazard control and mitigation, including the use of specific engineering control measures, specific standard operating procedures to be implemented, and personal protective equipment (PPE) to be used as required. Activity hazard analyses (AHA) are presented in Section 12 of the APP for each phase/activity associated with the project. Health and safety equipment such as PPE is described in Section 6 of this plan.

If site conditions or tasks change, the Site Safety and Health Officer (SSHO)/UXO Safety Officer (UXOSO) will evaluate the new conditions or task, and will contact the Federal Team Safety Manager for assistance in developing amendments to the SSHP. Amendments made to the SSHP will be submitted to the USACE for concurrence, and all field personnel will be made aware of any changes.

4. STAFF ORGANIZATION, QUALIFICATIONS AND RESPONSIBILITIES

WESTON is ultimately responsible for the implementation of the health and safety program, APP and SSHP. Personnel having the potential for exposure to site hazards are subject to the requirements of this SSHP. Work shall not be performed in a manner that conflicts with the health, safety, or environmental precautions outlined in the APP or this SSHP. Personnel violating safety procedures are subject to dismissal from the project site.

Roles and responsibilities for key project safety personnel are detailed in **Section 4** of the APP. Copies of resumes and certifications are presented in **Attachment B** of the APP.

4.1 ROLES AND RESPONSIBILITIES FOR KEY PERSONNEL

Roles and responsibilities for key safety and project personnel are presented in **Table 4-1.** The roles and responsibilities for key safety and project personnel are presented in **Table 4-2**. Copies of resumes and certifications for key safety and project personnel are presented in **Attachment B** of the APP**.**

Table 4-1 Roles and Responsibilities for Key Safety and Project Personnel

Position	Description of Key Responsibilities
PM Laura Pastor	• Overall responsibility for the management and completion of the project. • Responsible and accountable for project safety. • Overall responsibility for ensuring that project personnel (including subcontractor personnel) comply with EHS regulations, program requirements, and procedures. • Ensure development and implementation of project SSHPs and indicate concurrence with final plans after required EHS reviews. • Ensure project personnel meet applicable safety certification requirements. • Ensure project support is acquired from appropriately qualified safety personnel such as the Corporate EHS Manager, Division H&S Officer and SSHO/UXOSO. • Ensure project personnel comply with applicable EHS requirements and corporate or client procedures. • Halt any project work activities that represent an imminent hazard. • Ensure appropriate safety equipment and materials are provided to the project. • Ensure timely and accurate reporting and investigation of incidents, accident, or injuries involving project personnel, with support from the risk management department. Ensure corrective actions are implemented completely. • Ensure proper response and internal notification regarding inspections by regulatory agencies. • Ensure all project personnel have met the site-specific experience and training requirements.

Table 4-1 Roles and Responsibilities for Key Safety and Project Personnel (Continued)

Position	Description of Key Responsibilities
Corporate EHS Manager George Crawford, CIH	• Approve and ensure the implementation of the WESTON Corporate EHS Program, the APP, SSHP and any amendments. • Conduct field audits to assess the effectiveness and implementation of the APP and SSHP. • Evaluate and authorize changes to the APP and SSHP based on field and occupational exposure, as necessary. • Function as a quality control (QC) staff member.
Division H&S Officer Larry Werts	• Oversee and maintain the WESTON Corporate EHS Program, the APP and SSHP. • Conduct site visits, as necessary, to audit the effectiveness of the APP and SSHP. • Serve as a technical safety advisor and provides technical assistance and support. • Receive all reports of incidents that occur on site.
Mid-Atlantic Federal Team Safety Manager Sharon Sperber, CIH	• Oversee and maintain the WESTON Corporate EHS program, the APP and SSHP. • Develop the APP and SSHP. • Develop modifications to the APP and SSHP, as necessary.

Table 4-2 Roles and Responsibilities of Key Site-Specific Personnel

Position	Description of Key Responsibilities
SSHO/UXOSO Joe Kendall	▪ Responsible for implementing the APP and SSHP by ensuring that all project personnel follow the requirements of the APP and SSHP. ▪ Competent person as stated in OSHA 29 CFR 1926.32. ▪ Be present during UXO operations and ensure the implementation of the Explosives Safety Submission (ESS). ▪ Directly communicates with the SUXOS/Site Manager, PM and EHS Manager. ▪ Conduct daily safety meetings for site personnel to discuss the day’s activities, associated hazards, and UXO safety. ▪ Review site personnel training and experience documentation to ensure compliance with the APP and SSHP. ▪ Coordinate changes/modifications to the APP with the appropriate site personnel. Conduct or coordinate project-specific training. ▪ Report any incidents that occur on-site to the SUXOS/Site Manager, PM and Division H&S Officer. ▪ Implement safety corrective actions through training and reinforced awareness. ▪ Maintain exposure data. ▪ Has stop-work authority for all safety issues.
SUXOS/Site Manager Steve Bebow	▪ Plan, coordinate, and supervise field activities and UXO operations. ▪ Supervise multiple teams. ▪ Maintain project documentation. ▪ Preparing the Daily SUXOS Site Report. ▪ Report any incidents that occur on-site to the PM. ▪ Fully perform all of the UXO Technician III, II and I functions.
UXO Quality Control Specialist (UXOQCS) Troy Phelps	▪ Monitoring all activities during removal activities. ▪ Ensuring that procedures are being carried out in accordance with established requirements and protocols. ▪ Understanding the project’s quality-related requirements and the plans and procedures for implementing them. ▪ Performing a QC check of all grids completed by the UXO Teams. ▪ Preparing the Daily Quality Control Report (DQCR). ▪ Directly communicates with the Corporate MEC Operations Manager on UXO operations and QC issues.

Table 4-2 Roles and Responsibilities for Key Site Specific Personnel (Continued)

Position	Description of Key Responsibilities
UXO Technician III	▪ Supervises the team to which he/she is assigned. ▪ Ensures the team's actions are accomplished safely and efficiently. ▪ Maintains field records related to the team's operations. ▪ Implements the work, safety, and quality plans for this project. ▪ Supervises the conduct of on-site evaluations related to UXO operations. ▪ Is familiar with the duties of all assigned personnel and is able to perform the functions enumerated for UXO Technicians I and II. ▪ Provides subject matter expertise and leadership to ensure the team's safety and the project's quality. ▪ If assigned as Demolition Supervisor, additional responsibilities include: ▪ Trains personnel regarding the nature of the materials, hazards, and precautions. ▪ Coordinates with the /Site Manager and UXOSO to ensure required notifications are completed prior to demolition. ▪ Is present and in direct control during on-site disposal operations.
UXO Technicians II and I	▪ Primary workers on-site and report directly to the UXO Technician III. ▪ Perform MEC operations, mag and dig, reacquisition, removal, and disposal operations. ▪ Will meet the qualifications of a UXO Technician I at a minimum and be under the direct supervision of a UXO Technician III.

4.2 PERSONNEL ASSIGNED TO THE PROJECT

WESTON and subcontractor personnel, including UXO Technicians I, II, and III, who will perform work on-site, are responsible for the following:

- Taking all reasonable precautions to prevent injury to themselves and to their fellow employees, and being alert to potentially harmful situations.
- Performing only those tasks that they believe they can do safely and have been trained to do.
- Notifying the SSHO/UXOSO of any special medical conditions (i.e., allergies, contact lenses, diabetes).
- Notifying the SSHO/UXOSO of any prescription and/or nonprescription medication, which the worker may be taking, that might cause drowsiness, anxiety, or other unfavorable side effects.
- Preventing spillage and splashing of materials to the greatest extent possible.
- Practicing good housekeeping by keeping the work area neat, clean, and orderly.
- Immediately reporting all injuries to the SSHO/UXOSO.
- Complying with the SSHP and all safety and health recommendations and precautions, and properly using PPE as determined by the SSHP and/or the SSHO/UXOSO.

4.3 COMPETENT PERSON

According to OSHA Regulation 29 CFR 1926.32, site personnel will include a Competent Person. Specific OSHA and USACE regulations identify the need for involvement of competent persons. A list of competent person requirements and regulatory references is presented in

Table 4-3. Mr. Kendall, the UXOSO, meets the competent person requirement applicable to this scope of work and has been approved by WESTON's Corporate Environmental Health and Safety Management. **No work shall be performed without a Competent Person on-site.**

Mr. Kendall is a Competent Person as stated in OSHA 29 CFR 1926.32. As required by EM 385-1-1, Mr. Kendall has at least 5 years of applicable safety experience and has successfully completed the OSHA 30-hour construction safety course. Mr. Kendall has performed work on a site(s) of similar hazard, risk, and complexity to the task assignment. Mr. Kendall also has 5 years of experience implementing safety and occupational health procedures and experience conducting exposure monitoring to select and adjust personal protective equipment (PPE); however, it is unlikely that such adjustments will be needed.

The qualifications of all site-specific personnel will be maintained at the Picatinny project trailer office. The certifications and overall qualifications of all WESTON personnel are maintained in a database supported by WESTON.

Table 4-3 Competent Person Requirements

Competent Person Requirement	Regulatory Reference or Applicable WESTON Field Operating Procedure	Person Designated
SSHO/UXOSO Identification	EM 385-1-1 Sec. 01.A.17	Joe Kendall
Hazardous Waste Operations and Emergency Response	EM 385-1-1 Sec. 28 29 CFR 1926.65	Joe Kendall
General Inspections of Construction Sites	EM 385-1-1 Sec. 01.A.12 29 CFR 1926.20	Joe Kendall
Unsanitary Conditions	EM 385-1 Sec. 02 29 CFR 1926.27	Joe Kendall
Hearing Protection	EM 385-1-1 Sec.05.C 29 CFR 1926.101	Joe Kendall
Excavation/Trenching	29 CFR 1926.651 Subpart P	Joe Kendall

Note: EM 385-1-1 is USACE Health and Safety Requirements Manual; CFR is OSHA Code of Federal Regulations.

4.4 QUALIFIED PERSON

Site personnel will also include a Qualified Person. WESTON will permit only those employees qualified by training or experience to operate equipment and machinery in compliance with

OSHA 29 CFR 1926.20(b)(4). According to OSHA 29 CFR 1926.32, “qualified” means one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter, the work, or the project. **Table 4-4** contains a qualified person’s requirement list.

Table 4-4 Qualified Person Requirement

Qualified Person Requirement	Designated Person(s)
Brief Visitors on Site Hazards and PPE	Joe Kendall
Boating Safety	Paul Novak
Chain Saw Operations	Joe Kendall

The qualifications of all site-specific personnel will be maintained at the project trailer office. The certifications and overall qualifications of all WESTON personnel are maintained in a database supported by WESTON. Records will be maintained and reviewed by the SSHO/UXOSO.

4.5 WESTON SUBCONTRACTORS

Table 4-5 List of Subcontractors

Subcontractor	Activity	EMR Rating
ARCADIS/Malcolm Pirnie	▪ Team members – conducting geophysical surveys, intrusive investigation, demolition operations and MC sampling.	.62
Surveyor – TBD	▪ Survey control monuments, grid corners, etc.	-

4.5.1 Controlling and Coordination of Subcontractors and Suppliers

WESTON is ultimately responsible for assuring subcontractor compliance with the health and safety requirements as outlined in the APP and SSHP for Picatinny. Non-compliance with this plan will result in a stop work order, as determined by the SSHO/UXOSO.

4.5.2 Safety and Responsibilities of Subcontractors and Suppliers

The Site Safety Representative will interact with the SSHO/UXOSO to ensure compliance with this SSHP. Subcontractor employees are expected to comply with this SSHP, the APP, USACE

EM 385-1-1, and other applicable regulations governing their safety while on the project. In the event of a conflict, the more stringent requirements will apply.

The Site Safety Representative will:

- Attend all health and safety briefings.
- Address worker issues and immediately stop work if unsafe acts/conditions exist or if uncertainty associated with how a task is to be performed exists.
- Coordinate corrective action with the SSHO/UXOSO prior to resuming operations.
- Participate in any incident investigations.
- Inspect operations and work areas daily, in conjunction with the SSHO/UXOSO.
- Ensure subcontract workers have the proper PPE.
- Control all hazardous material brought on-site.

4.5.3 Subcontractor Safety Plans

WESTON subcontractors are covered by this APP and SSHP and will be required to sign the Acknowledgement Form in the SSHP indicating that they have read and understand both the APP and the SSHP, and agree to follow all of its requirements.

WESTON will obtain and verify the subcontractor personnel training records prior to work commencing.

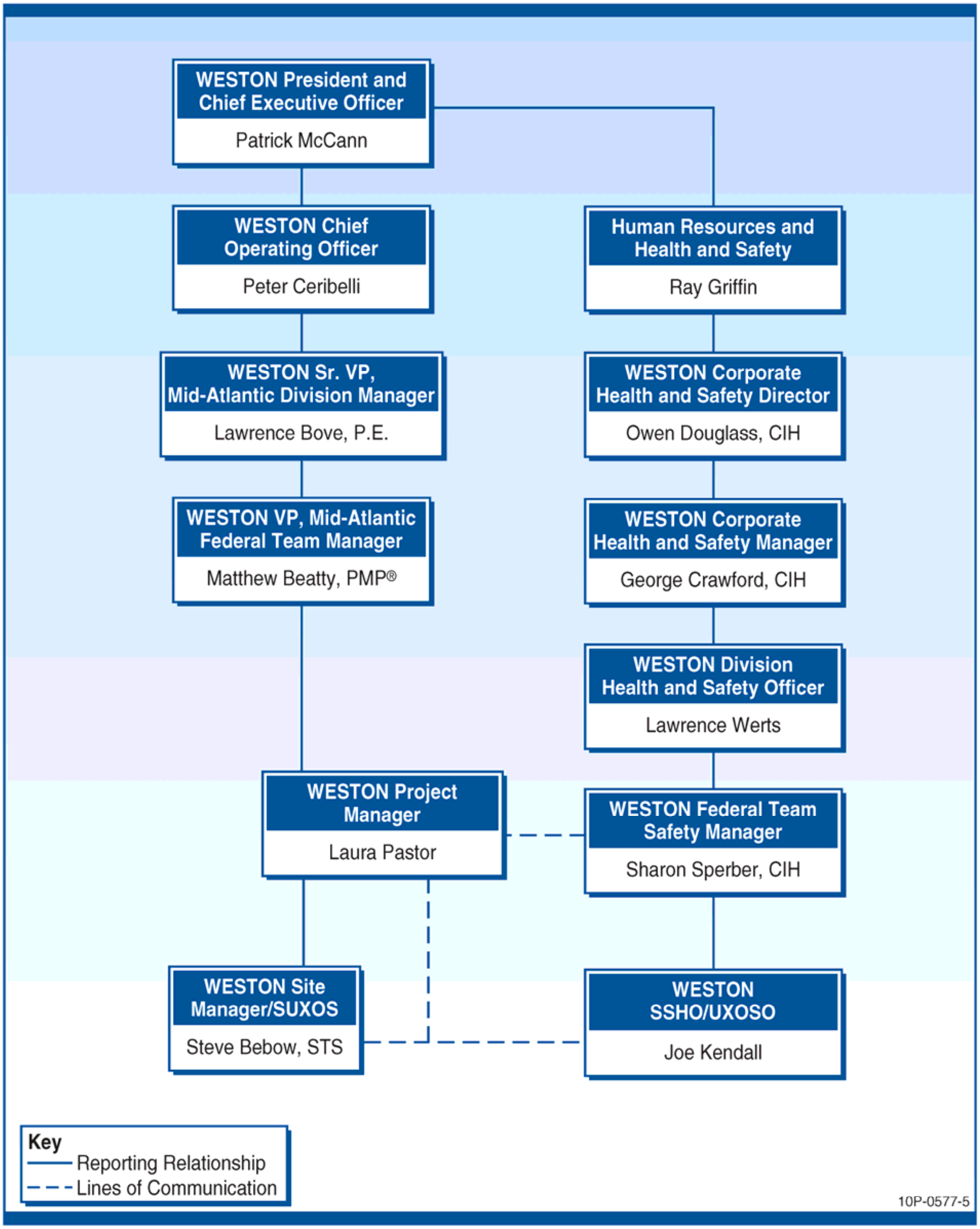

Figure 4-1 Picatinny Health and Safety Organization Chart and Lines of Authority

5. TRAINING

5.1 GENERAL

All personnel assigned to or regularly entering the Picatinny site will have received the required training. A record of this training is maintained in the WESTON Corporate Environmental Health and Safety (CEHS) database. Training certificates for key WESTON safety personnel are included in **Attachment B** of the APP. If training is not current, employees will not be allowed to work or supervise at the site until they have successfully completed training requirements.

A daily discussion will be conducted to review activities associated with daily tasks. All field personnel will participate in these documented discussions.

5.2 NEW HIRE SAFETY ORIENTATION AND INDOCTRINATION

When hired, WESTON staff complete EHS training appropriate to their roles and responsibilities. All personnel receive training on WESTON's EHS policy, including environmental aspects, emergency action plans, security plans, ergonomics, incident reporting, Behavior-Based Safety, and site-specific/job-specific training. Personnel are given a minimum of 3 days of field experience under the direction of a trained, experienced supervisor, in addition to the 40 hours of instructional training. Training will include the following site-specific topics:

- Accident prevention.
- Accident reporting (how and to whom).
- Medical facilities for emergency treatment and/or assistance.
- Reporting and correcting unsafe conditions.
- Job hazards/hazard control.
- Site-specific biological, physical, chemical, and or ionizing/nonionizing radiation hazards as listed in the Activity Hazard Analyses.
- Company safety policies.
- Site briefings conducted prior to being granted site access.
- Site layout.
- Hazard control.
- Emergency response and notification.
- Hearing conservation.
- PPE.
- Buddy system.
- Spills.

- Fires.
- Hazard communication.
- Visitor access.
- Public communication guidelines.
- Any specific training required by regulations.

5.3 MANDATORY TRAINING AND CERTIFICATIONS

Table 5-1 Personnel Training and Certifications

Personnel	UXO Training	Medical Clearance (expires)	40-Hour HAZWOPER	8-Hour HAZWOPER Refresher (expires)	Bloodborne Pathogens (BBP) (expires)	8-Hour Site Safety Supervisor
Steve Bebow	11/1985	6/2012	4/2005	4/2012	4/2012	1/2009
Joe Kendall	10/1995	4/2012	8/1994	8/2012	1/2011	8/1999
Troy Phelps	7/1997	9/2012	10/1997	10/2012	9/2010	4/2009
Paul Novak	N/A	6/2012	7/2005	2/2012	2/2012	11/2007
Brian Junck	N/A	10/2012	5/2003	10/2012	10/2012	5/2009

Note: APP Table 9-4 provides personnel with First/Aid CPR certification.

5.3.1 OSHA HAZWOPER Training

All general site workers are required to have 40-hour HAZWOPER training course and will have had 3 days of field experience under the direct supervision of a trained, experienced supervisor. On-site management personnel (SUXOS and/or SSHO/UXOSO) will have an additional 8 hours of specialized supervisory training. Workers must have completed the initial OSHA 40-hour HAZWOPER training. Where applicable, workers will have also received the mandatory 8-hour refresher training within the past 12 months. All training, including project-specific training, is documented and will be maintained at the Picatinny project office trailer.

5.3.2 OSHA 30-Hour Construction Training

In compliance with USACE Health and Safety Requirements Manual (EM 385-1-1), 15 September 2008, the SSHO/UXOSO, at a minimum, will have completed the 30-hour OSHA construction safety class or equivalent training, and complete a minimum of 24 hours of formal safety coursework every 4 years.

5.3.3 First Aid and CPR Training

At least two employees or subcontractors at the site will be currently certified in first aid and CPR. The training shall be equivalent to that provided by the American Red Cross.

5.3.4 Bloodborne Pathogen Training

Personnel trained in first aid and expected to administer first aid will receive training in controlling exposures to bloodborne pathogens (BBP). This training will address the following topics:

- The bloodborne pathogen standards.
- Requirements of the Exposure Control Plan.
- Description of the risks of exposure and how BBP are transmitted.
- Management and employee responsibilities.
- Protection methods against exposure and decontamination procedures.
- Post-exposure procedures.
- Labeling and color-coding of infectious waste.

5.4 PERIODIC SAFETY AND HEALTH TRAINING

The SSHO/UXOSO will present daily site safety briefings (i.e., tailgate meetings) to on-site personnel prior to the start of the work shift. The purpose of the briefings is to assist personnel in safely conducting the scheduled work activities. The briefings will include the following:

- Tasks to be performed, work method and general description of job scope.
- Work location.
- Equipment usage.
- Control of hazards.
- Weather conditions.
- Emergency response review.

The briefings provide an opportunity for individuals to share observed safety deficiencies and recognitions. Attendance at these daily safety briefings is mandatory and will be documented by the SSHO/UXOSO.

In addition to the daily site safety briefing, a formal safety meeting will be conducted at least monthly for all SSHO/UXOSO within their respective divisions. A safety manager or designee will be invited to lead this monthly meeting.

5.5 EMERGENCY RESPONSE TRAINING

WESTON provides training by the American Red Cross, or equivalent organization in both Standard First Aid and Adult CPR for all the field staff. At least two WESTON personnel with such training, and also trained in the use of fire extinguishers, will be on-site to provide emergency response. In the event specialized/elevated care is necessary, either WESTON or the on-call emergency medical technician (EMT)/ambulance service will transport the injured person to the appropriate medical facility.

Outside assistance will be requested as detailed in the Emergency Response Plans included in the SSHP.

All WESTON personnel involved with responding to an on-site emergency will be briefed in their roles and responsibilities as part of the initial indoctrination training discussed above. During this training, personnel will be briefed on the Hazard Communication (HAZCOM) Program, emergency equipment, and first-aid procedures, as described in the SSHP. Personnel will also be briefed on emergency response and contingency procedures presented in Section 10 of the SSHP, which include the following:

- Procedures and tests.
- Spill prevention.
- Firefighting.
- Posting of emergency telephone numbers.
- Medical support.

5.6 HAZARD COMMUNICATION

Personnel will be briefed on the Hazard Communication (HAZCOM) Program. This discussion will include the following topics:

- Potential safety/health effects of exposure to chemicals used (e.g., gasoline/diesel).
- Labeling of containers.
- Current inventory of hazardous chemicals.
- Location/use of MSDS.
- Procedures to inform employee when new chemical is brought on-site.

- Current quantities of hazardous chemicals.
- Location of chemical on-site.
- Explosive hazards.

5.7 PROJECT-SPECIFIC TRAINING

Project site-specific training will be provided to workers prior to on-site operations. This training will include the following:

- Training specific to other sections of EM 385-1-1 or OSHA standards in 29 CFR 1910 and 29 CFR 1926 that are applicable to site operations.
- Training covering each element in the SSHP, including the items listed in the following subsections:
  - Site-Specific Chemical and Physical Hazards
  - Hearing Conservation
  - Personal Protective Equipment
  - Buddy System
  - Visitor Access

5.7.1 Chemical and Physical Hazards

Site-specific health and safety training will be conducted prior to field activities at each site. In particular, the training will stress emergency response procedures and will cover the chemical and physical hazards of the site and site operations.

The SSHO/UXOSO will be required to document that personnel have read and thoroughly understand the information contained in the AHA.

5.7.2 Hearing Conservation Training

All site personnel exposed to noise levels exceeding 85 A-weighted decibels (dBA) over an 8-hour time-weighted average (TWA) will be provided with training, which addresses the following topics:

- Physical and psychological effects of high noise exposure.
- Noise exposure limits.
- Elements of the Hearing Conservation Program.
- Selection, use, and limitations of hearing protection devices.

Sources of noise potentially above 85 dBA at the site include chainsaw operations.

5.7.3 Buddy System Training

All work will be performed using the buddy system. Team members will keep in visual contact with each other at all times. Team members will be made aware of any slip, trip, and lifting hazards along with heat or cold stress and general hazards within their work area.

5.7.4 Visitor Training

Visitors will receive site-specific training to ensure that potential hazards and risks are identified. This training will consist of a safety briefing by the SSHO/UXOSO that will include the following:

- Location and description of potential hazards and risks.
- Required PPE.
- Areas of the site that are closed to visitors.
- The site evacuation plan and emergency procedures.
- Other topics as deemed appropriate.

6. PERSONAL PROTECTIVE EQUIPMENT

PPE to be used for this work is described below. Personnel performing operations on-site shall be required to use the appropriate level of protection. The minimum level of protection required to begin each activity of this project is shown in **Table 6-1**.

Table 6-1 Minimum Level of Protection Requirements

Activity	Level of Protection
Mobilization/Demobilization	Level D
Geophysical Survey Activities	Level D
MEC Intrusive Activities	Level D
MC Sampling	Modified Level D

The effectiveness of the PPE program will be evaluated by the SSHO/UXOSO. If additional hazards are identified requiring a higher level of protection and changes to the program are necessary, the SSHO/UXOSO will inform the Corporate Health and Safety Manager and amend the PPE requirements.

In accordance with OSHA 29 CFR 1910, Subpart I (Personal Protective Equipment), all PPE will be provided, used, and maintained in a sanitary and reliable condition. All PPE will be of the construction, design, and material to provide employees with protection against known or anticipated hazards. PPE will be selected that properly and appropriately fits the employee. WESTON employees have received OSHA-compliant training. Any concerns regarding the use of appropriate PPE will be brought to the attention of the SSHO/UXOSO, who will contact the Corporate Health and Safety Manager for assistance in evaluation of PPE as necessary.

Level D or Modified Level D PPE is required for this project. The SSHO/UXOSO will review the following criteria with employees:

- Proper selection.
- When PPE is anticipated for use.
- Proper uses and limitations of equipment during temperature extremes, heat/cold stress, and employee medical limitations.
- Proper donning and doffing, and adjusting.
- Maintenance, cleaning, and storage.
- Inspection procedures.

6.1 LEVEL D PERSONAL PROTECTIVE EQUIPMENT

Level D PPE consists of:

- Work clothes such as coveralls, long pants, and shirts with sleeves.
- Clothing under coveralls.
- Work gloves—leather or cotton as necessary for physical hazards.
- American National Standards Institute (ANSI)-compliant safety boots.
- High visibility safety vests.
- ANSI-compliant safety glasses or safety goggles (as necessary).
- ANSI-compliant hard hat (as necessary).
- Hearing protection, as necessary.
- ANSI-compliant face shields.

6.2 MODIFIED LEVEL D PERSONAL PROTECTION EQUIPMENT

Modified Level D PPE consists of:

- Work clothes such as coveralls, long pants, and shirts with sleeves.
- Gloves, nitrile chemical-resistant.
- Safety boots, ANSI-compliant.
- Safety glasses, ANSI-compliant or safety goggles (as necessary).

7. MEDICAL SURVEILLANCE

7.1 MEDICAL SUPPORT FUNCTIONS

Since 1980, WESTON has utilized a comprehensive Occupational Health Program (OHP) that complies with all OSHA and USACE requirements. All site personnel and subcontractors who enter the site while operations are being conducted must comply with a comparable OHP. All medical records are maintained in accordance with 29 CFR 1910.1020. If an unforeseen hazard becomes evident during the performance of work, the SSHO/UXOSO will bring such hazard information to the attention of the Corporate Health and Safety Manager and the Government-Designated Authority (GDA) both verbally and in writing for resolution as soon as possible. In the interim, the necessary action will be taken to reestablish and maintain safe working conditions.

Medical certifications for site personnel are summarized in **Table 7-1** and are included in **Attachment B** of the APP. Additional personnel certifications will be maintained on-site and available for review.

Table 7-1 Medical Surveillance

Employee Name	Medical Expiration
Steve Bebow	6/2012
Joe Kendall	4/2012
Troy Phelps	9/2012
Paul Novak	6/2012

7.1.1 Occupational Health Program

To comply with OSHA requirements, WESTON has designated Dr. Peter Greaney of WorkCare to oversee the site-specific medical surveillance and OHP. Dr. Greaney is a board-certified physician in internal and occupational medicine. Dr. Greaney can be reached during regular business hours at (800) 455-6155.

The purpose of the OHP is to ensure suitable job placement of employees, to monitor the health effects of hazards encountered in the workplace, and to maintain and promote good health through preventive measures. Medical examination criteria are established by WorkCare in compliance with 29 CFR 1910.120.

8. EXPOSURE MONITORING/AIR MONITORING

Based on our hazard/risk assessment of the site, the nature of the work, and previous experience at Picatinny Arsenal, it is not expected that any airborne contaminants exposure limits will be exceeded. As a result, no air monitoring will be performed. If conditions change, the AHAs and SSHP will be amended. Subsequently, WESTON would perform required monitoring to evaluate the effectiveness of prescribed PPE and evaluate potential work exposure. Any amendment to the plan will be reviewed and approved by the Corporate Health and Safety Manager.

9. HEAT AND COLD STRESS/WEATHER

9.1 WEATHER HAZARDS

In the event of unseasonably warm weather, personnel should be closely monitored for signs of heat stress or heat stroke, particularly whether PPE is required. During cold weather, it may be necessary to protect personnel from the effects of cold temperatures and wind, as well as wetting from precipitation. The SSHO/UXOSO is responsible for evaluating the conditions, work tasks, and requirements for PPE, and for implementing the emergency response procedures.

9.1.1 Lightning

Prior to working in areas or beginning projects when or where there is an increased potential for lightning striking personnel, steps must be taken to predict the occurrence of lightning strikes.

Recommendations include the following:

- Check with Picatinny Department of Public Works (DPW) management to determine whether there are any patterns or noted conditions that can help predict lightning or whether there are structures that are prone to lightning strikes.
- Arrange for Picatinny DPW notification when there is the increased potential for lightning activities.
- Ensure that Picatinny DPW includes WESTON workers in lightning contingency plans.
- Monitor weather reports.
- Note weather changes and conditions that produce lightning.
- Stop work in open areas, around structures that may attract lightning, on or in water and in elevated work places when lightning strikes are sighted or thunder is heard near a work site.
- Ensure all personnel are provided with safe areas of refuge. Prevent personnel from standing in open areas or under lone trees.
- Observe the “30-30” Rule. If you see lightning and thunder is heard within 30 seconds (approximately 6 miles), seek shelter. If you hear thunder, but do not see lightning, you can assume that lightning is within 6 miles and you should seek shelter. Remain in the sheltered location for 30 minutes following the last lightning strike.

9.1.2 High Winds

- Stay Informed: Keep up-to-date with the latest local weather reports. Visit weatherbug.com or weather.gov to stay informed in case of wind warnings, watches, and advisories. Use daily hazard assessments to determine whether working conditions have changed or will change throughout the day.

- Be Prepared: When you know the weather will be windy, secure loose supplies that could be picked up or torn loose by strong winds and thrown onto surrounding streets, structures, vehicles, or bystanders.
- Know the Limits of Your Equipment: When operating equipment, take time to read the operator's manual and become familiar with the wind specifications. Many manufacturers have high-wind guidelines to prevent you from operating in unsafe weather. You should also check safety equipment to determine whether it is adequate for windy conditions.
- Work Safely: If you will be working on a windy day, you should be alert and protected. Wear eye protection to prevent dust and other particles from entering or striking your eyes.
- To avoid flying debris and to minimize damage during high winds, do the following:
  - Shut down outdoor activities when wind speeds exceed 40 mph or as indicated by Equipment Manufacturer's Instructions; including work with toxic materials that could be dispersed by the winds. Move mobile items stored outside to indoor storage.
  - Secure any items that cannot be moved inside.
  - Be careful opening exterior doors.
  - Increase separation distance from overhead power lines.
  - Be cautious about downed power lines, tree limbs, and debris on roads.

9.2 HEAT STRESS

One of the most common types of stress that can affect field personnel is heat stress. In addition, heat stress can be a serious hazard to workers at waste sites because of the PPE required. Signs and symptoms, monitoring requirements, and prevention and treatment procedures for heat rash, heat cramps, heat exhaustion, and heat stroke are presented below. Monitoring requirements and prevention and treatment procedures will be followed at all times. The SSHO/UXOSO will conduct heat stress monitoring. Workers shall be briefed and cognizant of heat and cold stress symptoms. Electrolyte/fluids replacement will be available to workers as needed. Work/rest periods will be established according to American Conference of Governmental Industrial Hygienists (ACGIH) and National Institute for Occupational Safety and Health (NIOSH) guidelines.

9.2.1 Heat Stress Symptoms and Treatment

9.2.1.1 Heat Rash

Heat rash, also known as prickly heat, may occur in hot and humid environments where sweat is not easily removed from the surface of the skin by evaporation and is aggravated by chafing clothes. When extensive or complicated by infection, heat rash can be so uncomfortable that it inhibits sleep and impairs a worker's performance.

Symptoms – Mild red rash, especially in areas of the body that come into contact with protective gear.

Treatment – Decrease amount of time spent working in protective gear and provide body powder to help absorb moisture and decrease chafing. Heat rash can be prevented by showering, resting in a cool place, and allowing the skin to dry.

9.2.1.2 Heat Cramps

Heat cramps are caused by inadequate electrolyte intake. The individual may be receiving adequate water; however, if not combined with an adequate supply of electrolytes, the blood can thin to the point where it seeps into active muscle tissue, causing cramping.

Symptoms – Acute painful spasms of voluntary muscles, most notably the abdomen and extremities.

Treatment – Move the victim to a cool area and loosen clothing. Have the victim drink 1 to 2 cups of cool potable water or of a diluted electrolyte replenishment solution (e.g., Gatorade, Quench) immediately, and then every 20 minutes thereafter until symptoms subside. Electrolyte supplements can enhance recovery. It is best to use more than the amount of water called for by the package directions. For the power/dry-mix form of electrolyte replenishment, double the amount of water called for by the package directions. Add water, in a one-to-one ratio, to the liquid form of an electrolyte-replenishment product.

9.2.1.3 Heat Exhaustion

Heat exhaustion is a state of weakness or exhaustion caused by the loss of fluids from the body. Heat exhaustion is not as dangerous as heat stroke, but if it is not properly managed in the field, it may lead to heat stroke.

Symptoms – Pale, clammy, and moist skin, profuse perspiring, and extreme weakness. Body temperature is normal, pulse is weak and rapid, and breathing is shallow. The person may have a headache, may vomit, may feel dizzy, and may be irritable or confused.

Treatment – Move the affected person to a cool, air-conditioned or temperature-controlled area, loosen clothing, place in a position with the head lower than the feet (shock prevention), and allow the person to rest. Consult a physician. Ensure that the person is not nauseated or vomiting. If the person is not nauseated or vomiting, give the person small sips of cool water or diluted electrolyte replenishment solution (one-to-one dilution with water, or if using powder/dry mix, double the amount of water called for by the package directions). If this is tolerated, have the injured person drink 1 to 2 cups of fluid immediately, and every 20 minutes thereafter until symptoms subside. Seek medical attention at the advice of the consulting physician.

9.2.1.4 Heat Stroke

Heat stroke is an acute and dangerous reaction to heat stress caused by a failure of the body's heat-regulating mechanisms, i.e., the individual's temperature control system (sweating) stops working correctly. Body temperature rises so high that brain damage and death may result if the person is not cooled quickly.

Symptoms – Red, hot, dry skin (although the person may have been sweating earlier); nausea, dizziness, confusion, extremely high body temperature (i.e., 104 °F or greater as measured with an oral thermometer), rapid respiratory and pulse rate, seizures or convulsions, unconsciousness or coma.

Treatment – Immediately call for emergency medical assistance. Remove the affected person from the source of heat and cool the person quickly. If the body temperature is not brought down quickly, permanent brain damage or death may result. Remove all PPE and as much clothing as decency permits. Fan the person while sponging or spraying with cool or tepid water. Apply ice packs (if available) to the back of the neck, armpits, groin area, or behind the knees. Place the person flat on his/her back or with head and shoulders slightly elevated. If the person is conscious, and not nauseated or vomiting, provide sips of cool water. Do not give the person coffee, tea, or alcoholic beverages. Emergency medical personnel will assume responsibility for treatment when they arrive.

9.2.2 Heat Stress Prevention and Protection

The following measures should be followed to prevent heat stress:

- The most important measure to prevent heat-related illness is adequate fluid intake.
- Workers should drink 1/2 to 1 quart of liquids per hour in high heat conditions. Most of this liquid should be water.
- Provide a shaded area for rest breaks.
- Ensure that adequate shelter is available to protect personnel against heat and direct sunlight. When possible, shade the work area.
- Discourage the intake of caffeinated drinks during working hours.
- Monitor for signs of heat stress.
- Encourage workers to maintain a good diet during these periods. In most cases, a balanced diet and lightly salted foods should help maintain the body’s electrolyte balance. Bananas are especially good for maintaining the body’s potassium level.
- If utilizing commercial electrolyte mixes, double the amount of water called for in the package directions. Indications are that “full-strength” preparations taken under high heat stress conditions may actually decrease the body’s electrolytes.
- Acclimate workers to site work conditions by slowly increasing workloads (i.e., do not begin work activities with extremely demanding tasks).
- Encourage workers to wear lightweight, light-colored, loose-fitting clothing.
- In extremely hot weather, conduct field activities in the early morning and evening.
- Good hygienic standards must be maintained by frequent showering and changes of clothing.
- Clothing should be permitted to dry during rest periods.

9.2.3 Heat Stress Monitoring and Work Cycle Management

When strenuous field activities are part of ongoing site work conducted in hot weather, the following guidelines should be used to monitor the body’s physiological response to heat, and to manage the work cycle, even if workers are not wearing impervious clothing. These procedures should be instituted when the temperature exceeds 70 ^{O}F and the tasks/risk analysis indicate an increased risk of heat stress problems. Consult the safety professional (e.g., Division Health and Safety Officer) if questions arise as to the need for specific heat stress monitoring. In all cases, the site personnel must be aware of the signs and symptoms of heat stress and provide adequate rest breaks and proper aid as necessary.

NOTE: For purposes of this operating practice, a break is defined as a 15-minute period.

A physiological monitoring schedule is determined by following the steps below:

- Measure the air temperature with a standard thermometer.
- Estimate the fraction of sunshine by judging what percent the sun is out (refer to **Table 9-1**).
- Calculate the adjusted temperature based on the following formula:

  Adjusted Temperature = Actual Temperature + 13 X

  (where X = sunshine fraction from Table 9-1)

Using **Table 9-2**, determine the physiological monitoring schedule for fit and acclimated workers for the calculated adjusted temperature.

The length of work period is governed by frequency of physiological monitoring (**Table 9-2**). The length of the rest period is governed by physiological parameters (heart rate and oral temperature).

Table 9-1 Percent Sunshine Factors: Heat Stress Prevention and Monitoring

Percent Sunshine (%)	Cloud Cover	Sunshine Fraction
100	No cloud cover	1.0
50	50% cloud cover	0.5
0	Full cloud cover	0.0

Table 9-2 Physiological Monitoring Schedule: Heat Stress Prevention and Monitoring

Adjusted Temperature	Level D (Permeable Clothing)
90 °F (32.2 °C) or above	After each 45 minutes of work
87.5 °F (30.8 - 32.2 °C)	After each 60 minutes of work
82.5 - 87.5 °F (28.1 - 32.2 °C)	After each 90 minutes of work
77.5 - 82.5 °F (25.3- 28.1 °C)	After each 120 minutes of work
72.5 - 77.5 °F (22.5 - 25.3 °C)	After each 150 minutes of work

9.3 COLD STRESS

In the planning stages of a project, the potential for cold-related hazards must be considered in the site-specific SSHP and during risk assessment. The SSHO/UXOSO must make decisions on the proper safety procedures and recommend them to the Site Manager. Each worker must evaluate the risk associated with his or her work and be actively alert to these hazards. Any site worker may stop work if safety procedures are not followed or the risk is too great.

Personnel working outdoors are subject to cold stress at temperatures below 40 °F. Exposure to extreme cold can cause skin injury or death if the core body temperature is unchecked and permitted to drop. Chemical-protective clothing does not provide protection against cold stress and may increase susceptibility. Signs and symptoms, monitoring requirements, and prevention and treatment procedures for cold stress are presented below. Monitoring requirements and prevention and treatment procedures will be followed at all times.

9.3.1 Cold Stress Symptoms and Treatment

The SSHO/UXOSO must make decisions on the proper clothing for the weather. Each worker must evaluate the risk associated with his or her work activity in relation to the weather. Any site worker may stop work if safety procedures are not followed or severe conditions warrant.

Personnel working outdoors are subject to cold stress at temperatures below 40 °F. Exposure to extreme cold can cause skin injury or death if the core body temperature is unchecked and permitted to drop. Chemical-protective clothing does not provide protection against cold stress and may increase susceptibility. The following subsections describe the signs and symptoms, monitoring requirements, prevention and treatment procedures for cold stress. These requirements and procedures will be followed at all times.

9.3.1.1 Frostbite

Frostbite is the freezing of tissue and most commonly affects the toes, ears, fingers, and face. Frostbite occurs when an extremity loses heat faster than it can be replaced by the circulating blood. Frostbite may result from direct exposure to extreme cold or cool, high wind. Damp socks and shoes may contribute to frostbite of the toes.

Symptoms – Cold, tingling, aching, or stinging feeling followed by numbness; skin color is red, purple, white, or very pale and is cold to the touch; blisters may be present (in severe cases).

Treatment – Call for emergency medical assistance; move the affected person indoors and/or away from additional exposure to cold, wet, and wind. Wrap the affected area in a soft, clean cloth (sterile, if available). Provide a warm beverage such as water or juices (not coffee, tea, or alcohol). Do not allow the person to smoke. Do not rub the frostbitten part (this may cause gangrene). Do not use ice, snow, gasoline, or anything cold on the frostbitten area. Do not use heat lamps or hot water bottles to rewarm the frostbitten area. Do not place the frostbitten area near a hot stove. Do not break blisters. After rewarming, elevate the area and protect it from further injury.

9.3.1.2 Hypothermia

Hypothermia means "low heat" and is a potentially serious condition. Systemic hypothermia occurs when body heat loss exceeds body heat gain and the body core temperature falls below the normal 98.6 °F. Although some hypothermia cases are caused by extremely cold temperatures, most cases develop in air temperatures between 30 and 50 °F, especially when compounded with water immersion and/or windy conditions. The victim of hypothermia may not know, or refuse to admit, that he or she is experiencing hypothermia. All personnel must be observant for these signs for themselves and for other team members.

Symptoms – Cool, bluish skin; uncontrollable shivering; vague, slow, slurred speech; irritable, irrational, or confused behavior; memory lapses; clumsy movements, fumbling hands; fatigue or drowsiness.

Below the critical body core temperature of 95 °F, the body cannot produce enough heat by itself to recover. At this point, emergency measures must be taken to reverse the drop in core temperature. The victim may slip into unconsciousness and can die in less than 2 hours after the first signs of hypothermia are detected. Treatment and medical assistance are critical.

Treatment – Call for emergency medical assistance. Do not leave the victim unattended. Prevent further heat loss by moving the person to a warmer location out of the wind, wet, and cold. Remove cold, wet clothing and replace with warm, dry clothing or wrap the victim in blankets. If the victim is conscious, provide warm liquids, candy, or sweetened foods. Carbohydrates are the food most quickly transformed into heat and energy. Do not give the victim alcohol or caffeine. Have the person move his/her arms and legs to create muscle heat. If the person is unable to move, place warm bottles or hot packs in the armpits, groin, neck, and head. Do not rub the arms and legs, and do not place the person in warm water.

9.3.2 Prevention and Protection

The following general guidelines are recommended for preventing or minimizing cold stress:

- Wear loose, layered clothing, masks, woolen scarves, and hats. Wear liners under hard hats (if required).
- Protect hands with gloves or mittens.
- Never touch cold metal with bare hands.
- Wear waterproof, slip-resistant, insulated boots.
- Use chemical foot and hand warmers (commercially available) inside boots and gloves.
- In extreme cold, cover the mouth and nose with wool or fur to “pre-warm” the air you breathe.
- If you are wearing a face protector, remove it periodically to check for frostbite.
- Ensure that clothing remains secure around the body, especially at the neck and waist.
- If required to wear chemical-protective clothing, remember that it generally does not afford protection against cold stress. In many instances, chemical-protective clothing increases susceptibility. Dress carefully if both chemical protection and thermal insulation are required.
- Remove outer layers to avoid overheating and soaking clothing with perspiration; replace layers to avoid becoming chilled.
- Keep clothes dry by wearing water-resistant and wind-resistant clothing and outerwear.
- Wear clothing that will “breathe” or allow water vapor to escape.
- Eat well-balanced meals, ensure adequate intake of liquids, and avoid alcoholic beverages. Eat soup and drink warm, sweetened beverages. Because of their diuretic and circulatory effects, limit beverages containing caffeine.
- Utilize available warm shelters and implement work-rest schedules.
- If warm shelters are not available, use cars/vehicles as shelter from the cold. (Ensure that tailpipes are not covered by heavy snowfall).

- Use radiant heaters to provide warmth (if using propane heaters ensure adequate ventilation to avoid carbon monoxide poisoning).
- Monitor yourself and others for changes in physical and mental condition.
- Use the buddy system or supervision to ensure constant protective observation.
- If heavy work must be done, resulting in sweating/wet clothing, take rest periods in heated shelters and change into dry clothing as necessary.
- New employees should not work full-time in the cold during the first days of employment until they become accustomed to the working conditions and the use of required protective clothing.
- Include the weight and bulkiness of clothing in estimating the required work performance and weights to be lifted by the worker.
- Arrange the work in such a way that sitting or standing still for long periods is minimized.
- Perform work protected from drafts to the greatest extent possible. If possible, shield the work area from wind.

Tables 9-3 and 9-4 should be consulted to adjust working schedules for wind chill conditions based on equivalent chill temperature (ECT). These tables are guidelines only; ambient temperatures and wind conditions should be monitored frequently and work schedules adjusted as required. If workers show signs or symptoms of cold stress, the work schedule must be adjusted, as required.

9.3.3 Work/Warming Regimen

Work should be performed in the warmest part of the day. If work is performed continuously in the cold or winter conditions or where rain or cool winds are expected, provide heated warming shelters, tents, cabins, or break rooms nearby. Encourage workers to use the shelter at regular intervals depending on the severity of the cold exposure. **Table 9-4**, Cold Work/Warmup Schedule for 4-Hour Shifts, provides guidance for working in severe cold weather. The onset of heavy shivering, the feeling of excessive fatigue, drowsiness, irritability, or euphoria are indications to immediately return to the shelter. Pain, numbness, or tingling in the extremities are indications to return immediately to the shelter. When entering the heated shelter, the outer layer of clothing should be removed and the remainder of the clothing loosened to permit sweat evaporation, or the worker should change into dry clothing. Never return to work in wet clothing.

Table 9-3 Wind Chill Chart

Wind (mph)	Temperature (°F) Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5		36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10		34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15		32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20		30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25		29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30		28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35		28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40		27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45		26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50		26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55		25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60		25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times: 30 minutes; 10 minutes; 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

Table 9-4 Cold Work/Warmup Schedule for 4-Hour Shifts

Equivalent Chill Temperature	Maximum Work Period	No. of Breaks
≥-24 °F	Normal	1
-25 to –30 °F	75 minutes	2
-31 to –35 °F	55 minutes	3
-36 to –40 °F	40 minutes	4
-41 to –45 °F	30 minutes	5
≤-46 °F	Stop work	Stop work

10. STANDARD OPERATING SAFETY PROCEDURES, ENGINEERING CONTROLS, AND WORK PRACTICES

Using common sense, operating under the "buddy system" (or two-person rule), and following safe practices can reduce hazards due to normal project activities.

In addition to the general site safety procedures contained in the WESTON Corporate EHS Program field operating procedures guide (which will be on-site), the following procedures will be used:

- No running or horseplay will be allowed.
- Hot work will be restricted in the work zone without the proper hot-work permit. Equipment will be bonded, grounded, and explosion-resistant, as appropriate.
- UXO technicians will make every effort to identify a suspect UXO item. UXO will be visually examined for markings and other external features such as shape, size, and external fittings. If an unknown UXO item is encountered, the on-site USACE representative will be notified immediately. Under no circumstances will any fuzed UXO be moved in an attempt to make a definitive identification.
- As a general rule, all fuzed UXO will be detonated in the original position found (blown-in-place [BIP]). This is the safest method to effect final disposition of munitions. Any item to be BIP will be sandbagged to mitigate blast effects and fragmentation projection.
- Only UXO technicians will handle UXO, and only during daylight hours. Personnel who will be handling UXO will not wear outer or inner garments having static-electricity-generating characteristics such as nylon.
- WESTON and subcontractor personnel engaged in field operations will be thoroughly trained and capable of recognizing the specific hazards associated with UXO. All field personnel will be under the supervision of a UXO Technician III or higher.
- General UXO safety guidelines are included below:
  - Projectiles containing base-detonating fuses are to be considered armed if the round is fired.
  - Arming wires and pop-out pins on unarmed fuses should be secured prior to moving UXO.
  - Do not depress plungers, turn vanes, or rotate spindles, levers, setting rings, or other external fittings on UXO.
  - Do not attempt to remove or dismantle any components of UXO.
  - UXO personnel are not authorized to render inert any UXO found on-site.
  - UXO will not be taken from the site.

- Consider UXO, which may have been exposed to fire and detonation, as extremely hazardous.
- Do not rely on the color-coding of munitions for definitive identification.
- Assume that a practice munitions contains a live charge until investigation proves otherwise.
- Do not approach smoking munitions.

10.1 SITE RULES/PROHIBITIONS

10.1.1 Buddy System

All work at Picatinny will be performed using the buddy system. Team members will keep in visual contact with each other at all times. Team members will be made aware of any slip, trip, and lifting hazards along with any potential exposure to chemical substances, heat or cold stress, and general hazards within their work area.

10.1.2 Designated Eating/Break Areas

All eating/break areas will be located away from the active work area. No food or beverages will be allowed in any work environments.

10.1.3 Designated Smoking Areas

All regulations governing approved areas for smoking and spark generation will be strictly followed. Smoking is prohibited except in designated smoking areas. The SSHO/UXOSO will identify designated smoking areas. Discarding tobacco materials other than into designated tobacco receptacles is considered littering and is subject to fines.

10.2 WORK PERMITS

No work permits are associated with this project.

10.3 MATERIAL HANDLING PROCEDURES

Employees will utilize proper PPE when handling soils as part of the scope of this project. Spill contingency procedures for chemicals brought on-site are identified below.

10.4 SPILLS

The following procedures comprise the spill containment program in place for activities at the site. Spill procedures will be reviewed by the SSHO/UXOSO with team members.

10.4.1 Spill Control and Prevention

WESTON anticipates that unleaded gasoline, diesel fuel No. 2, and motor oil will be the only substances with hazardous constituents that may be stored on-site and in quantities less than 5 gallons. To decrease the amount of pollutants to be stored on-site, WESTON plans, to the greatest extent possible, to conduct all fueling and repair of vehicles off-site.

Hazardous liquids that are necessary to conduct the Performance Work Statement (PWS) will be stored in the smallest quantities possible. Should the storage of hazardous waste, or materials with hazardous constituents be necessary, a storage tank constructed primarily of non-earthen materials, or a stationary device designed to contain an accumulation of hazardous waste would be placed within an approved secondary containment of adequate size to contain a spill (110% of storage tank size). The tank would be managed in accordance with the APP, Picatinny’s Spill Prevention, Control, and Countermeasures (SPCC) Plan, and 40 CFR Subpart I.

10.4.1.1 Spill Response

Because of the nature of the operations, the potential for a spill of pollutants during operations is low. The highest probability for a spill will occur during re-fueling operations of equipment (e.g., filling a chainsaw’s gas and oil tanks). In the event of a spill, WESTON will notify appropriate emergency responders and Ted Gable, Project Manager for Environmental Restoration at Picatinny Arsenal. The Environmental Management Division would complete any required notifications to the New Jersey Department of Environmental Protection (NJDEP). Additionally, WESTON will be equipped with spill kits on-site for immediate cleanup if a petroleum product is inadvertently spilled. Any spills originating from small containers (e.g., gasoline cans) would be contained using absorbent materials.

If fuel or oil is spilled, the following measures will be taken:

- The spill area will be isolated and contained.

- Picatinny Environmental Management Division, Picatinny Fire Department spill response team, NJDEP Emergency Response will be notified during a spill response.
- The liquid and affected soil will be shoveled into a plastic bag and subsequently placed into a U.S. Department of Transportation (DOT)-approved shipping container.
- Each container will be labeled to identify its contents.
- The container(s) will be shipped off-site and disposed of at a permitted facility in accordance with the Code of Federal Regulations 260 – 270.
- Fire-extinguishing equipment meeting 29 CFR Part 1926, Subpart F, shall be on hand and ready for use to control fires.

10.4.2 Notification

In the event of a spill or release, WESTON personnel will immediately dial 911, and will then notify the SSHO/UXOSO or his designee. The SSHO/UXOSO or designee will respond in accordance with the seriousness of the injury. The WESTON Project Manager and Corporate EHS will be informed of any injuries, minor or serious. The WESTON SSHO/UXOSO will file an incident report within 24 hours of the accident.

10.5 DRUM/CONTAINER TANK HANDLING

Drums used for scrap metal containment will be UN approved open-top 55-gallon reconditioned drums. The drums will not be filled beyond the 800 pound weight capacity specific to the drum (1A2/X425/S/02). Personnel will use proper tools, lifting techniques, and mechanical equipment (i.e., drum dolly) while using/moving drums to containerize debris.

10.6 MEC OPERATIONS

The requirements of the approved Explosives Site Plan will be followed.

10.7 DRUG AWARENESS AND DRUG-FREE WORKPLACE

WESTON fully supports all aspects of the Drug-Free Workplace Act of 1988. As such, WESTON has implemented Operating Practice 05-01-010, Drug-Free Workplace. This practice is in accordance with Federal Acquisition Regulations (FARS) subpart 23.500. Strict disciplinary actions are enforced for any violation of WESTON’s Drug-Free Workplace policy. All WESTON employees, as a condition of employment, have documented understanding and receipt of this policy.

While on duty, employees will not use or be under the influence of alcohol, narcotics, intoxicants, or similar mind-altering substances. Employees found to be under the influence of or consuming such substances will be immediately removed from the job site. Contractors will enforce WESTON's drug-free workplace requirements.

Any employee under a physician's treatment and taking prescribed narcotics or any medication, including over the counter, that may prevent a person from being ready, willing, and able to safely perform his/her duties will provide a medical clearance statement to their supervisor from the attending physician.

WESTON's Operating Practice emphasizes supervisor training, a provision for self-referral to treatment, and maximum respect for individual confidentiality as well as a provision for identifying and dealing with illegal drug users, including testing. WESTON's practice also provides for education, counseling, rehabilitation, and coordination with available community resources.

10.8 EMPLOYEE DUTY SCHEDULE/BASIC FATIGUE MANAGEMENT PLAN

Personnel will follow WESTON's Employee Schedule. If extended periods of working long hours are required, the SSHO/UXOSO and/or SUXOS will monitor employees for outward signs of fatigue. Employee rotations may need to be adjusted to allow for individual differences in how fatigue-related stress is handled and for employee-specific role on the project.

While working extended hours, employee travel time to and from work will be minimized to allow for sufficient rest and should be taken into account in determining hours per day and per week limits. Group transportation to and from the work location and lodging will be used to address this situation. Consideration should be given to "awake" time and not just the hours logged on a time sheet.

10.8.1 Fatigue Symptoms

Intrinsic Symptoms

- **Physical** – Frequent, unexplainable headaches, muscle aches and pains, breathing difficulties, blurred/double vision, burning urination.

- **Mental –** Difficulty focusing attention, distracted easily, depression, impaired judgment, and/or poor visual perception.

Extrinsic Symptoms

- **Physical –** Degraded motor skills, tenseness and tremors, intolerant/irritable, increased reaction time, social withdrawal.
- **Mental –** Absentmindedness, poor short-term memory, lack of interest and drive, confusion and fearfulness, slow startle response, worry, anxiety.

10.9 SECURITY PLAN

10.9.1 Site Access

Visitors to the project are required to sign in at the site office trailer. Visitors will be escorted by qualified personnel, such as a UXO Technician level II or above for access to the MRSs. Minimum separation distances in the approved Explosives Site Plan (ESP) will be maintained during all intrusive work. Access within the minimum separation distance will be limited to essential personnel only. Intrusive operations will immediately stop if non-essential personnel enter the exclusion zone. UXO Teams will maintain the approved team separation distance in accordance with the Explosives Site Plan (ESP). Exclusion zones during demolition operations will be based on the recovered MEC item and approved engineering controls. In the event this cannot be accomplished due to weather (lightning) or delivery of explosives, then items will be guarded until disposal.

10.9.2 Site Control

The work area is located within an active military reservation/military academy that is not open to general public. Once on the facility, access is not limited. Military personnel patrol the facility regularly and also conduct spot checks for unusual activity.

10.9.3 Theft

On-site theft of equipment is not expected. No equipment or valuable items will be kept inside vehicles. If it is necessary that equipment remain inside a vehicle, it will be kept out of obvious sight, and the vehicle will be secured (all vehicle doors locked and all windows closed). Personnel will secure vehicles, even if parking for only brief periods, and will carry vehicle keys with them at all times. Vehicles will be parked in well-lit areas.

In the event a theft does occur, local authorities will be promptly notified and appropriate WESTON personnel will be notified. NOITrack information will be completed within 24 hours.

10.9.4 Confrontation

Personnel will be observant of their surroundings. They should ensure their own safety, the safety of their co-workers, and the safety of the public by not confronting or challenging aggressive perpetrators. Authorities should be contacted if they observe any unusual circumstances.

10.10 MOTOR VEHICLE SAFETY

Safety is of utmost importance at WESTON. Employees must act responsibly every day to ensure the safety of themselves and others. This safety commitment also applies when driving vehicles. All employee drivers are required to operate vehicles safely, obeying federal, state, and local laws, and company policies. Driving is a privilege, not a right.

10.11 TRAFFIC

Care must be taken to avoid motor vehicle accidents at all times. Whether on Picatinny Arsenal or off-post, posted speed limits will be obeyed at all times, and seat belts will be worn when driving. Daily review of traffic hazards and work patterns will be discussed. All drivers will be licensed. While on-post, drivers must slow to 15 miles per hour when approaching a pedestrian.

10.11.1 Employee Requirements/Responsibilities

Drivers of WESTON vehicles must possess a current, valid driver’s license of the appropriate class required for their driving needs, e.g., class C, Commercial Driver’s License (CDL).

All driving duties and functions are to be performed in a safe, legal, and professional manner.

Employee drivers are to attend periodic defensive driving training and other driver safety meetings as scheduled through their local Safety Officers.

Driving requires a high level of skill and alertness. When fatigue, illness, or medication impact alertness, reflexes, and decision-making capabilities, an employee driver should cease driving until the situation improves or is corrected and contact his/her manager to discuss the situation.

Compliance with all federal, state, and local laws is expected.

Unsafe vehicles and related equipment will be reported and repaired. Unsafe vehicles are not to be driven on WESTON business.

NOITrack will be used to report any vehicle accident while on the job, or any accident occurring at any time if a company-owned or insured “allowance” vehicle is involved.

Driver orientation program and/or driving evaluation tests may be required of drivers to assess overall driving skills.

10.11.2 Compliance Issues/Driving Practices

10.11.2.1 Speed Limits

Drivers are required to obey posted speed limits and other traffic laws. Fines for any traffic violations are the employee’s responsibility.

10.11.2.2 Seat Belts

WESTON drivers and their passengers are required to wear seat belts at all times while the vehicle is in operation.

10.11.2.3 Distracted Driving

It is recognized that distracted driving can contribute to accidents. Accordingly, WESTON employees are to exercise caution and good judgment when driving. Reading maps, eating, placing or receiving a call on a cell phone, and other activities may contribute to an accident. Cell phone use while driving, including the use of hands-free devices, creates a distraction and driver inattention. The following basic guidelines should always be observed:

- Make outgoing calls after you have pulled over to a safe area.
- Let incoming calls go to voice mail, or if answering the phone is necessary, make sure the caller knows you are driving and keep the call short.
- At all times, drivers are to operate vehicles in a safe, legal, and professional manner.

10.11.2.4 Transporting Weapons

Transporting weapons (such as firearms, large knives) or dangerous property (significant or placardable quantities of regulated hazardous materials or substances) is prohibited, unless specifically authorized.

10.11.3 Other Issues

Additional safety procedures may be established at a particular job site or within a Division. WESTON employees are responsible for compliance with any additional safety procedures and safety solutions that apply, or that may be identified.

10.12 SANITATION

Employers shall establish and maintain hygienic sanitation provisions for all employees in all places of employment. General housekeeping activities will occur daily.

10.12.1 Drinking Water

An adequate supply of potable water shall be provided in all places of employment, for both drinking and personal cleansing. Nonpotable water shall be identified with markings and be kept separate from potable water.

Cool drinking water shall be provided during hot weather. Only approved potable water systems may be used for the distribution of drinking water. Construction trailers and other temporary or semi-permanent facilities shall be properly connected to the local municipal water supply unless the remoteness of the location makes this prohibitive. If connection to the municipal supply is not possible, temporary potable water systems shall be utilized, with the services provided by a licensed potable water contractor. “Reclaimed water” (treated wastewater) use in potable systems is strictly prohibited.

10.12.2 Toilets

Toilets are required to be present in all places of employment. Where sanitary sewers are not available, job sites shall be provided with chemical toilets, recirculating toilets, or combustion toilets unless prohibited by state/local codes. Hand soap or similar cleansing agents shall be provided. The requirements do not apply to mobile crews or to normally unattended work locations if employees working at these locations have transportation readily available to nearby toilet and/or washing facilities. At Picatinny, the toilets (port-a-potties) and washing facilities are located adjacent to the project site trailer.

10.12.3 Procedures for Vermin Control

The site will be kept clean and organized. Organics such as foods will be wrapped and then discarded to avoid attracting pests.

10.12.4 Waste Disposal

All sweepings, solid or liquid wastes, refuse, and garbage shall be removed in a manner that avoids creating a menace to health and should be discarded as often as necessary or appropriate to maintain sanitary conditions in the place of employment. A dumpster for garbage will be made available.

11. SITE CONTROL

The SSHO/UXOSO coordinates access control and security on-site. Because of the hazardous nature of UXO, only essential personnel are allowed in the work zone. Authorized personnel are those who have completed the required training and meet medical requirements. The work zone is the work site, encompassing an area large enough to prevent personnel injuries from fragmentation resulting from unintentional or intentional detonations. The potential of cross contamination is not applicable to this project based on the project characterization.

During on-site operations, the SUXOS will order operations to cease if nonessential personnel are observed within the operating area. To ensure safety, site controls include the following:

- Eating, drinking, and smoking are prohibited except in designated areas.
- UXO operations cease if nonessential personnel are present.
- The SUXOS, SSHO/UXOSO, or their designee, will escort authorized site visitors.
- All personnel entering the site, including visitors, shall wear the proper PPE and sign in and out on the site visitors' log.
- The SSHO/UXOSO maintains the Site Control Log to ensure accurate accountability of personnel on-site.
- The SSHO/UXOSO provides a SSHP/MEC safety briefing to all personnel entering the site to inform them of potential site hazards. All personnel must acknowledge this briefing by signing the SSHP Review Form.
- In case of an emergency, personnel will exit the site and move to a designated safe area. The SSHO/UXOSO will determine the designated safe area that is located upwind of the site outside of the fragmentation area. The SUXOS will notify the USACE Ordnance and Explosives Safety Specialist (OESS) and Project Manager if an emergency warrants site evacuation.

12. PERSONAL HYGIENE AND DECONTAMINATION

12.1 PERSONAL HYGIENE

Employees will practice sound hygiene practices, washing hands, face, and arms at the hygiene station after operations have concluded. Appropriate hand-washing facilities with soap will be available at the facility. In addition, hand sanitizer will be available inside the office trailer. Following Centers for Disease Control (CDC) guidelines, personnel should wet their hands with clean running water and apply soap. A hygiene station will be located adjacent to the site trailer. Use warm water if it is available. Rub hands together to form lather and scrub all surfaces. Continue rubbing hands for 20 seconds. Rinse hands well under running water. Dry your hands using a paper towel. If possible, use that same paper towel to turn off the faucet.

12.2 SAMPLE CONTAINERS

Sample containers shall be laboratory-cleaned prior to use. Following sample collection and closure of the container, the outside of the container shall be wiped clean. The sample container shall then be placed into the appropriate shipping container.

13. EQUIPMENT DECONTAMINATION

Chemical contamination that exists in the work area is expected to be of low concentrations based on historical data and past activities conducted on-site. Therefore, materials and equipment will not need to be brought through a contamination reduction zone. However, instruments and tools will be routinely wiped down with a clean, damp rag or towel to prevent contaminants from being taken to clean areas and from accumulating dirt. Such accumulations can adversely affect equipment operation. Rags will be properly disposed of.

During MC sampling, equipment decontamination will not be conducted on-site. Rather all sampling equipment and materials are taken to an off-site decontamination facility.

14. EMERGENCY EQUIPMENT AND FIRST AID

14.1 FIRST AID

Two appropriately trained WESTON or subcontractor personnel will provide on-site first aid/CPR support. In the event specialized/elevated care is necessary, either WESTON or the on-call emergency management service (EMS)/ambulance service will transport the injured person to the appropriate medical facility.

Name	First Aid (Expiration Date)	CPR (Expiration Date)
Steve Bebow	3/2013	3/2013
Paul Novak	6/2013	6/2013

14.1.1 Medical Supplies

Medical supplies required to be on-site are listed in **Table 14-1**. The minimum requirements of ANSI Z308.1-1998 and EM 385-1-1, November 2008, Section 03.B, (**Table 14-2**), will be met.

14.2 EMERGENCY EQUIPMENT

The emergency equipment listed in **Table 14-1** will be maintained in proper working order and frequently inspected for completeness during site operations. **Table 14-1** lists the minimum equipment necessary.

Table 14-1 Emergency Equipment

Equipment	Location	Operation
First-aid kit	Support vehicle(s)	All operations
BBP kit	Support vehicle(s)	All operations
Eye wash	Support vehicle(s)	All operations
Air horn	Support vehicle(s)	All operations
Spill kit	Support vehicle(s)	All operations
10-lb fire extinguisher	Support vehicle(s)	All operations
Allergy response kit	Support vehicle(s)	All operations

Each team vehicle will contain a first-aid kit that will be sufficient to accommodate the maximum number of people (including visitors) on-site at any given time. The kits will be located at each work site, and all personnel will be informed of their locations. All kit locations will be equipped with adequate water and other supplies necessary to cleanse and decontaminate wounds. The contents of First Responder kits (6626) are presented in **Table 14-2**.

14.3 FIRE EXTINGUISHERS

The site office and each work site will be equipped with a dry-chemical fire extinguisher. Dry-chemical fire extinguishers will be provided at any other site location where flammable materials may present a fire risk. The SUXOS, Project Manager, Picatinny and USACE Points of Contact (POCs) will be notified immediately after any fire incident occurring during site activities. All regulations governing approved areas for smoking and spark generation will be strictly followed.

Table 14-2 Contents for First Responder Kit 6626

Description	Qty	Description	Qty Max/ Min
Ammonia Inhalants 10/Un	1 ea	Adhesive Strip, 7/8”x 3”	50/20
Bandage, Elastic, 3” x 5 yds	2 ea	Adhesive Strip, 7/8”x 1-1/2”	50/10
Bandage, Kerlix, Sterile, 4-1/2” x 4-1/2 yds	4 ea	Adhesive 1”	2/1
Bandage, Triangular 40” N/S 1/Un	3 ea	Gauze (Roll type - Kerlix), 2” and 4”	2/1
Clean Wipes, Alcohol Swabs 10/Un	1 ea	ACE Bandage	2/1
Cmprs, Multi Trauma Ster 10”x 30”	2 ea	3”x 3”	20/10
Disposable Plastic Emergency Blanket	1 ea	Goggles (Uvex Ultraspec 1000 or similar) pair	1/1
Elastic Roller Gauze N/S 3” x 4.5 Yd	3 ea	Antiseptic Swabs and/or Betadine Swabs, Box/10	2/1
Emergency First-Aid Pocket Guide	1 ea	Sterile Eyewash Solution	1/0
Eye Pads w/Adhesive Strips, 4/Unit	2 ea	Eye	20/10
Gauze Pads 4” x 4”, 10/Bx (Zee)	2 bx	Burn Gel	10/5
Ice Pack, Deluxe, Small (Zee)	2 ea	Water-Jel Burn Jel 6/Bx	1 ea
Nitrile Gloves, Large, 2 pairs	1 ea	Ammonia Ampules	5/2
PAM (Protective Airway Mask)	1 ea	Gloves, Surgical (Pr.)	5/2
Penlight, Medical Disposable	1 ea	CPR Shield	2/1
Scissors, Emergency	1 ea	Non-Aspirin	25/10
Sheer Strip 1”, 100/Box	1 bx	Insect Sting Kit (crushable ampules)	2/1
Sheer Strip Bandages XLG, 25/Box	1 bx	Alcohol-Foam Scrub - can	1/1
Sterile Dressing 5” x 9”	5 ea	Tape, 1” x 10 Yd. Spool (Zee)	2 ea
Tape, 2” x 5 Yd. 3 Cut Spool (Zee)	2 ea		

15. EMERGENCY RESPONSE AND CONTINGENCY PROCEDURES

The SSHO/UXOSO will respond to all emergencies. Emergency response procedures will be rehearsed to permit evaluating the effectiveness of the planned response capabilities. In the event that the SSHO/UXOSO is involved in the emergency, a designee will assume responsibility. Specific reporting responsibilities are as follows:

- Notify appropriate individuals, authorities, and/or health-care facilities of the activities and hazards of the emergency.
- To prepare for an emergency and to minimize the impacts, the SSHO/UXOSO will:
  - Ensure that the following safety equipment is available at the site: eyewash station, first aid supplies and fire extinguishers.
  - Have working knowledge of all safety equipment available at the site.
  - Ensure that a map detailing the most direct route to the hospital is prominently posted, complete with all necessary telephone numbers.
  - Employees will be trained on the basic protocol to be followed in the event of an emergency. The employees will first stop work, then warn affected employees, and/or subcontractors in the area. The area will then be isolated and pertinent notifications made.
  - Verify contact numbers for emergency resources prior to work beginning.
  - Ensure the daily log has employee names and sub-contractors on-site so that all individuals can be accounted for in the event of an emergency.
  - Conduct a test of the emergency plan in the form of a drill to ensure effectiveness.
  - Discuss emergency procedures and emergency equipment location with all site personnel including visitors to the site.

15.1 PRE-EMERGENCY PLANNING

St. Clare's Hospital, located at 400 W. Blackwell Street in Dover, New Jersey, is the closest hospital to the site. Travel distance and driving time to both hospitals will be confirmed during initial start-up. A map showing the route to the hospital (see **Figure 15-1**) will be posted near the site telephone, and in each site vehicle, and a written description of the route will be attached to the map. The hospital route will be verified prior to work initiation.

An emergency evacuation drill will be performed prior to work initiation. WESTON has evaluated the emergency medical services. WESTON's form for evaluation and confirmation of these services is presented in **Attachment G** of the APP.

The SSHO/UXOSO will have a roster of individuals on-site so that they can be accounted for in the event of an emergency.

15.2 PERSONNEL AND LINES OF AUTHORITY FOR EMERGENCY SITUATIONS

Because the site is located at a federal facility, the facility Fire and Emergency Medical Services (EMS) will provide support as necessary. While conducting investigations outside of the Picatinny facility, local emergency service support will be utilized if necessary. The SSHO/UXOSO will be appointed as an Emergency Coordinator (EC) and a system implemented to provide a common framework within which people can work together effectively.

15.3 CRITERIA AND PROCEDURES FOR EMERGENCY RECOGNITION AND SITE EVACUATION

15.3.1 Medical Emergency and Personal Injury

The first worker who notices that a medical emergency or personal injury has occurred shall immediately make a subjective decision whether the emergency is life-threatening and/or otherwise serious and will then proceed as described in the following subsections. Because no contaminants of concern exist on-site, emergency decontamination of personnel will not be required.

15.3.1.1 Life-Threatening and/or Otherwise Serious Incident

If a life-threatening incident occurs, emergency medical assistance will be immediately requested. If an apparent life-threatening and/or otherwise serious incident has occurred, the first person who identifies the situation will summon the SSHO/UXOSO or Site Manager. The SSHO/UXOSO or the Site Supervisor, whoever arrives first, will assume the role of EC. The EC shall be apprised of the situation and told where the injured person(s) is/are located. As the EC proceeds to the accident scene, communications channels shall be opened and kept on standby until the EC has surveyed the scene and performed a primary survey of the injured person.

The EC shall then determine whether emergency assistance should be summoned and the information that must be relayed and shall provide emergency action principles that are consistent with the injury. The EC shall appoint a staff person or persons who will meet the emergency responders and take them quickly to the injured person. If necessary, decontamination of the individual shall be performed at the direction of the EC.

15.3.1.2 Non-Life-Threatening Incident

If it is determined that no threat to life is present, the worker shall assist the injured person to a safe location and contact the SSHO/UXOSO. The injured person will then be treated and monitored in accordance with standard first-aid procedures and this SSHP.

15.3.2 First-Aid Procedures

First-aid kits on-site will comply with the criteria contained in ANSI Z308.1-1990. A list of items contained in the kit is presented in **Table 14-2**. In case of injury, the following procedures apply:

- Trained personnel will use approved measures for treatment.
- For minor injuries, routine first-aid procedures will be used.
- For major injuries, an ambulance will be called immediately and the appropriate first aid administered while awaiting the arrival of the ambulance.

15.3.3 Worker Injury or Illness

The SSHO/UXOSO will be responsible for monitoring the general health of site workers. Site illnesses, conditions, or injuries that can be expected given the working conditions include hypothermia, frostbite, exposure to chemicals found at the site, construction-related injuries, insect bites, and injuries caused by slips, trips, and falls.

These conditions will be prevented by properly training site workers in the appropriate use of health and safety equipment, dressing appropriately, monitoring the breathing zone atmosphere, and maintaining good housekeeping procedures. These activities are discussed in more detail throughout this SSHP.

The specific response to an injury or illness will depend on its type and severity, but in general, first aid will be administered in the field by personnel who are trained in first aid and CPR. The worker may then be transported to the hospital designated in this SSHP. General guidelines for first aid are as follows:

- For minor injuries, routine first-aid procedures will be used.
- For major injuries, an ambulance will be called immediately and the appropriate first-aid administered while awaiting arrival of the ambulance.
- Trained personnel will use approved measures to administer treatment.

15.3.4 Emergency Response

During an emergency, the following actions will be taken, with some actions conducted concurrently. No one will attempt emergency response/rescue until the situation has been assessed and the appropriate response outlined. Field activities will cease, personnel will be warned, and the area isolated. The following procedures are for any emergency response:

- Fire or explosion and prevention.
- Spills and spill prevention.
- Inclement weather.
- Evacuation planning.

The minimum actions taken will be as follows:

- All work will cease.
- All affected employees and subcontractors will be warned/notified of the emergency.
- The area will be isolated.
- Appropriate notifications will be made.

Rescue/response may include the following:

Assessment: Assess existing and potential hazards to site personnel and the off-site population.

Determine:

- Whether and how to respond.
- The need for evacuation of site personnel and off-site population.
- The resources needed for evacuation and response.

Survey Casualties:

- Locate all injured persons and assess their condition.
- Determine resources needed for stabilization and transport.

Request Aid: Contact the required off-site/on-site personnel or facilities, such as the ambulance, fire department, and/or police.

Allocate Resources: Allocate on-site personnel and equipment to rescue and initiate incident response operations.

Extricate: Remove or assist injured persons from the area, using appropriate PPE equipment and procedures.

Control: As trained, and as determined safe, assist in bringing the hazardous situation under complete or temporary control and use measures to prevent the spread of the emergency.

Decontaminate: Not necessary.

Stabilize: Administer any medical procedures that are necessary before the injured person(s) can be moved. Stabilize or permanently fix the hazardous condition. Attend to what caused the emergency and anything damaged or endangered by the emergency.

Transport: No one will be transported without being decontaminated or protected from contaminating others. Take measures to minimize chemical contamination of the transport vehicle, ambulance, and hospital personnel.

Casualty Logging: Record who, time, destination, and condition upon transport.

Evacuate:

- Move site personnel to a safe distance upwind of the incident.
- Monitor the incident for significant changes. The hazards may diminish, permitting personnel to reenter the site, or hazards may increase and require public evacuation.

Casualty Tracking: Record disposition, condition, and location.

Notification: Notify appropriate individuals/entities.

15.3.4.1 Evacuation Routes and Procedures

Personnel shall exit the site by the nearest means of egress during accidents requiring evacuation. Once off-site, personnel shall assemble at the location designated by the SSHO/UXOSO and be accounted for. Any missing personnel shall be brought to the attention of the responders.

15.3.4.2 Emergency Alarm Systems

Portable telephones and/or two-way radios will be available for site and emergency communications (WESTON project office, Project Manager, SUXOS, SSHO/UXOSO, and field staff). Emergency communications and signals are described in the tables below. All field personnel will be trained regarding site emergency signals.

Emergency service personnel (police/fire/ambulance) will be summoned contacting 911.

15.3.4.3 Hand and Emergency Signals Communications

It is essential that workers have a means of communicating rapidly and effectively during heavy equipment operations, construction, hazardous waste operations, and other types of activities. Communication while wearing PPE can be extremely difficult. This establishes guidance for uniform communication protocols to be used, as needed, in field operations.

General Hand Signals

Signal	Meaning
Point index finger toward self	I; me
Point index finger toward object	It; them
Point index finger toward person	You; them
Circle index finger at group	We; us; all of us
Pointed finger on extended arm	Look in that direction
Beckon with index finger	Come here
Point with thumb in a particular direction	Move this way; go this way
Hold index finger up near head	Wait
Slowly ease palm face down	Relax; slow down
Put palm over brow	Scout it out; check it out
Move hand far away from body	Stay away
Hands on top of head	Need assistance
Grip partner’s wrist or place both hands around partner’s arm	Leave area immediately
Thumbs up	OK; I’m all right
Thumbs down	No; negative; bad; not OK
Hand gripping throat	Cannot breathe; out of air
Wave hands over head from side-to-side	Attention; stand-by for the next signal
Swing hand from direction of person receiving signal to directly overhead and through in circle	Come here
Clenched fist of extended arm	Stop motion/hold position
Draw index finger across front of throat	Shut off engine; cut off power; quit
Place palm face down and rotate from side to side	Unsure; can’t decide
Form a circle with thumb and index finger	OK; I understand; agree
Military salute	I understand and will comply

Emergency Signals

Emergency signals are critical for alerting workers of danger and to maintain site control during an emergency. Bullhorns, radios, air horns, and similar devices will be used as described above for emergency communications. Emergency hand signals should be used as a secondary means of communication.

Signal	Meaning
One long sound/blast of the emergency alarm signal, air horn, siren, whistle	Emergency situation, face safety watch and watch or listen for directions
Pause; followed by a number of short sounds, 1, 2, 3, or 4	Evacuate to the predesignated emergency meeting place indicated by the number of sounds
Two long blasts of the emergency alarm signal, air horn, siren, whistle	All clear
Point one arm in direction of evacuation, make a large circling motion with the other arm in direction of evacuation	Evacuate the area
Hand clutching throat	Cannot breathe; out of air
Grip partner's wrist or place both hands around partner's arm	Leave area immediately

15.3.4.4 Radio Communications

When radio communication is used, personnel will be instructed in the use of the radio, which channel should be used, and in the following radio guidelines. Personnel will use the radio only for necessary work-related communication.

- Speak clearly.
- Call the name or call sign of the individual or unit you are trying to reach and identify yourself (e.g., "Unit One; this is Safety").
- Wait for acknowledgement (e.g., "Safety, this is Unit One") before you continue transmission.
- Proceed with your transmission. When finished, say "Over" when you expect a response. When transmission is complete and no response is expected, say "Out."
- When receiving a radio call, acknowledge the call immediately unless doing so would interfere with safety.
- If a transmission is incomplete or not understood, request clarification.

- Emergency calls should begin with the words "Emergency, Emergency, Emergency." Give absolute priority to emergency communication. Unless answering or aiding the emergency call, do not use the radio until certain it will not interfere with further emergency communication.
- Ensure that radios are charged and tested prior to each work shift and as necessary thereafter.
- Malfunctioning radios must not be used and must be replaced immediately.
- Do not transmit false information or unidentified communication.
- Profanity and indecent language are prohibited. Transmittal of sensitive information over the radio is prohibited.

15.4 DECONTAMINATION AND MEDICAL TREATMENT OF INJURED PERSONNEL

Because the known level of contamination on-site is low, decontamination of site personnel will not be required.

15.5 EMERGENCY MEDICAL FACILITIES AND PHONE NUMBERS FOR RESPONDERS

St. Clare's Hospital is the closest hospital to most of the site activities, and is located at 400 Blackwell Street in Dover, New Jersey (see **Figure 15-1**). The non-emergency hospital route to Morristown Medical Centre is shown in **Figure 15-2**.

The emergency telephone numbers listed in **Tables 15-1 and 15-2** shall be prominently posted in WESTON's field office and vehicles. The emergency telephone numbers, along with the APP, OSHA 300 Log, deficiency tracking system documents, safety and health promotional posters, date of last work day injury, and OSHA Safety and Health poster, will be kept unobstructed and readily available to the workers.

15.6 CRITERIA FOR ALERTING LOCAL COMMUNITY RESPONDERS

In the event of an emergency requiring outside emergency services, WESTON personnel will immediately dial 911 to contact the appropriate organization. Following the phone call, WESTON personnel will contact on-site personnel to inform them that emergency service personnel and equipment will be entering the work area. Subsequent to these notifications, appropriate WESTON personnel will be contacted and informed regarding the situation.

Table 15-1 Emergency Contact Numbers

Organization/Point of Contact	Telephone Number
Emergency Service (Ambulance, Fire, Police)	911
Police (non-emergency) Picatinny Arsenal, NJ 07806-5000 Police Chief	 (973) 724-7273 (973) 724-4161
Rockaway Township Police Department 65 Mount Hope Road, Rockaway, NJ 07866	 (973) 625-4000
Picatinny Fire Department (non-emergency) Picatinny Arsenal, NJ 07806-5000 Fire Chief	 (973) 724-3097 (973) 724-3842
Rockaway Township Fire Department 65 Mount Hope Road, Rockaway, NJ 07866	 (973) 983-2865
NJ State Police	911
Spill Response - CHEMTREC	(800) 424-9300
National Response Center	(800) 424-8802
Hospital: Saint Clare's Hospital - Dover 400 W Blackwell St, Dover, NJ 07801	 (973) 989-3000
Non-Emergency Medical: Morristown Medical Center 100 Madison Avenue Morristown, NJ 07960	 (973) 971-5000

*See Attachment H for EMS/Rescue Confirmation and Evaluation.

Table 15-2 WESTON and USACE Emergency Contact Numbers

Organization/Point of Contact	Telephone Number
Picatinny POC:	
USACE – PM: Nancy Flaherty	(410) 779-2796 (office)
USACE- Ordnance and Explosives Safety Specialist (OESS) Manager: Paul Green	(410) 336-7115 (mobile)
WESTON Project Manager : Laura Pastor	(610) 701-3445 (office) (484) 467-9466 (cell)
WESTON CIH and Corporate EHS Manager : George Crawford	(610) 701-3771 (office) (484) 437-5976 (cell)

Table 15-2 WESTON and USACE Emergency Contact Numbers (Continued)

Organization/Point of Contact	Telephone Number
WESTON Mid-Atlantic Division EHS Officer Larry Werts	(610) 701-3912 (office) (215) 815-6237 cell
WESTON Mid-Atlantic Federal Team Safety Officer: Sharon Sperber, CIH Louise Kritzberger	(610) 701-3923 (302) 743-5048 (cell) (610) 701-3618 (484) 571-9441 (cell)
WESTON Corporate EHS Director: Owen B. Douglass, Jr.	(610) 701-3065 (610) 506-5392 cell
WESTON Medical Programs Manager: Owen B. Douglass, Jr.	(610) 701-3065 (office) (610) 506-5392 (cell)

Table 15-3 Other Emergency Contact Numbers

Organization/Point of Contact	Telephone Number
Poison Control Center	(800) 962-1253
WorkCare WESTON Medical Director Dr. Peter Greaney WorkCare WESTON Program Administrator Heather Lind	From 06:00 to 16:30 Pacific Time call 800-455-6155 dial 0 or extension 175, Heather Lind to request the on-call clinician
After-Business Hours Contact (Emergency Only)	16:31 to 05:59 Pacific Time and weekends and Holidays call 800-455-6155 and dial 3 to reach the after-hours answering service. Request that the service connect you with the on-call clinician or the on-call clinician will return your call within 30 minutes.
WESTON Emergency (24 hour) (West Chester)	(610) 701-3720

The majority of the site activities will be serviced by the Picatinny fire company, which has training in a variety of emergency services. Basic and advanced emergency medical services are also provided by the Picatinny facility EMS. Information provided by the servicing agency is provided in **Attachment H** of the APP.

15.7 PPE AND EMERGENCY EQUIPMENT

Level D PPE will be worn on-site. The emergency equipment listed in **Table 14-1** will be maintained in proper working order and frequently inspected for completeness during site operations. This list identifies the minimum equipment necessary.

Each team will have a first-aid kit sufficient to accommodate the maximum number of people (including visitors) on-site at any given time. The kits will be located at each work site, and all personnel will be informed of their location(s). Kit locations will be equipped with adequate water and other supplies necessary to cleanse and decontaminate burns and other wounds.

15.8 FIRE PREVENTION, PROTECTION, AND RESPONSE

Potential sources of fuel include diesel, gasoline, and combustible loads such as paper and leaves. Sources of ignition include combustion engines and electrical sources. Flammable liquids will be properly stored in safety cans and/or flammable cabinets. Housekeeping will be performed daily to limit fuel loads. Types of fire suppression systems include multipurpose ABC portable fire extinguishers. In case of fire, evacuate the building or area immediately. Activate fire alarms and/or dial 911 or the established Fire Emergency Number from a safe location. Indicate what is happening, the location of the fire, and whether there are injuries. Comply with requests from the 911 operator for information. Do not hang up until told to do so by the operator, or allow the operator to hang up first. Upon completion of the emergency phase, comply with incident notification procedures.

NOTE: No attempt will be made to fight a fire if UXO may be present. If this occurs, all personnel will evacuate and call the local fire department listed in **Table 15-1.**

If the fire is small and manageable with fire-extinguishing equipment at hand, and you are trained in the use of this equipment, you may make the decision to use this equipment while waiting for advanced assistance. Never place yourself in danger, always have a plan for escape, and never attempt to fight a fire if there are any doubts about the type of fire or your ability to successfully fight the fire. Never allow the fire to get between you and your escape route.

15.8.1 Wild Fires

15.8.1.1 Prevention

Site personnel should practice smart fire safety habits and watch out for hazardous conditions. If conditions are dry, wildfires can pose a threat—not only because there is plenty of fuel to burn, but also because rural areas and remote locations often do not have easy access for firefighters.

There also is a chance that embers from a fire a mile or more away may fall onto nearby vegetation and cause them to catch fire. The following preventive measures will be observed:

- Smoke only in designated areas.
- Avoid driving through high grass or areas where vehicle exhaust or hot engine surfaces could cause fires.
- Keep a fire extinguisher handy.
- Be extra cautious during the dry season and observe warnings and prohibitions established by the Forestry Service or other agencies.
- Be aware of wild fires in neighboring areas.

15.8.1.2 Awareness and Response

Wildfires can spread quickly and without warning. A subtle shift in the wind could send the flames in your direction even though authorities may have deemed your area safe. Make sure you have a plan in place:

- Be aware of wildfires in neighboring areas.
- Do not attempt to fight forest fires. If a fire or smoke is observed, notify all site personnel, initiate evacuation, and report the fire to the designated emergency agencies.
- Designate a place to meet if there is a fire.
- Identify multiple places you could evacuate to, like a motel outside the danger zone.

It is very easy to panic, but if you remain calm and prepare for emergency situations, you will increase your chances of making a safe evacuation. If you are driving:

- Roll up your windows and close your air vents.
- Drive slowly and turn on your headlights.
- Don't drive through heavy smoke.

15.8.2 Fire Extinguishing Equipment

Fire extinguishing equipment meeting 29 CFR Part 1926, Subpart F, shall be on hand and ready for use to control fires.

1. Flammable and Combustible Materials (liquids, gases)

    - Flammable materials must be properly labeled, stored, handled, and used.

- No smoking or use of open flame-producing devices within 50 feet of flammable and combustible materials.
- Obtain Material Safety Data Sheets (MSDS) for all flammable materials in use and ensure all personnel are aware of hazards.
- All containers are to be properly labeled with contents, the word "Flammable", and in accordance with hazard communication requirements.
- Store materials in well ventilated areas that are free of ignition sources and flame or sparks.
- Ensure that incompatible materials are stored in remote locations from each other (e.g., keep flammables from oxidizers).
- Limit quantities to minimum required.
- Store cylinders in upright and secure positions.
- Bond and ground containers as (and where) necessary.
- Use proper storage cabinets for flammable and combustible materials. Contact EHS Staff for assistance.
- Use only approved containers.
- Use and dispense only in well-ventilated areas.

2. Combustible Materials (solids)

   - Solid combustible materials include wood, paper, and cloth. Proper housekeeping reduces concerns for combustion of these materials. Use proper receptacles for disposal and dispose of routinely.

3. Oxidizers

   - An oxidizer is a substance that increases the flammability of materials, allowing them to burn easier. Examples include pure oxygen, chlorine, ammonium nitrate. Store oxidizers in a remote location from flammable and combustible materials.

4. Electric Appliances

   - Do not use electric appliances near flammable or combustible materials. Never place an appliance on an unstable surface. Use only UL- or FM-approved appliances. Follow the manufacturer's recommendations or requirements for use and maintenance. Obtain approval from EHS staff prior to purchase and use of portable heater units in office settings. Do not leave portable heaters on and unattended.

5. Smoking

   - Smoking is prohibited indoors. Smoking is allowed only in outdoor, designated areas. Smokers are to maintain smoking areas in a clean and safe condition. Ensure that receptacles for disposal of cigarettes and other smoking materials are appropriately constructed, free of combustible debris, and when necessary, are cool before emptying into waste receptacles.

6. Housekeeping

   - All personnel are responsible for keeping work areas free of combustible materials and debris.
   - Weeds and grass must be properly maintained to limit potential fire hazard.

Figure 15-1 Hospital Route to Saint Clare's Community Hospital

bing Maps

Picatinny Arsenal, NJ

400 W Blackwell St # 1, Dover, NJ
St Clare's Hospital (973) 989-3000

Route: **7.0 mi, 17 min**

My Notes

On the go? Use **m.bing.com** to find maps, directions, businesses, and more

	Picatinny Arsenal, NJ	**A–B: 7.0 mi** 17 min
1.	Depart from **Picatinny Arsenal, NJ** *Private Road*	0.2 mi
2.	Turn **right** onto **Lake Denmark Rd / CR-666** *Private Road*	1.9 mi
3.	Turn **left** to stay on **CR-666**	1.0 mi
4.	Turn **right** onto **Mt Hope Ave / CR-661** *Pass Fatburger in 1.4 mi*	2.8 mi
5.	Turn **right** onto **US-46 / E McFarlan St**	1.2 mi
6.	Arrive at **400 W Blackwell St # 1, Dover, NJ** *The last intersection is Grover Rd* *If you reach Ford Ave, you've gone too far*	

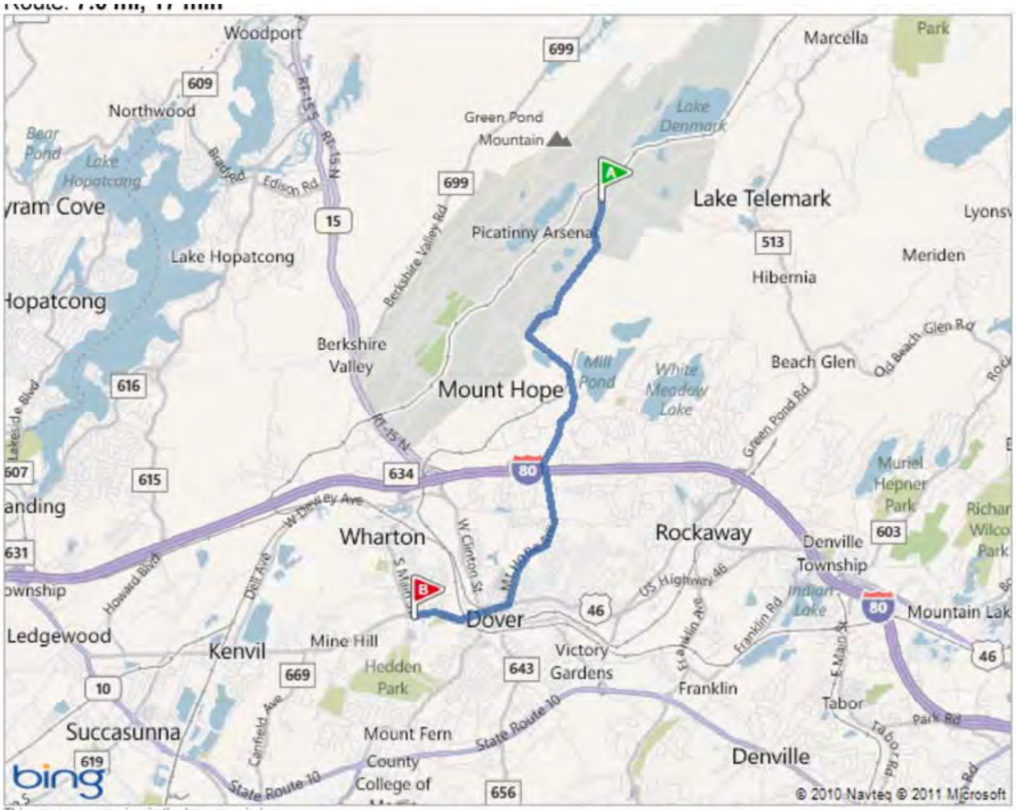

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Figure 15-2 Route to Morristown Medical Center

bing Maps

Picatinny Arsenal, NJ

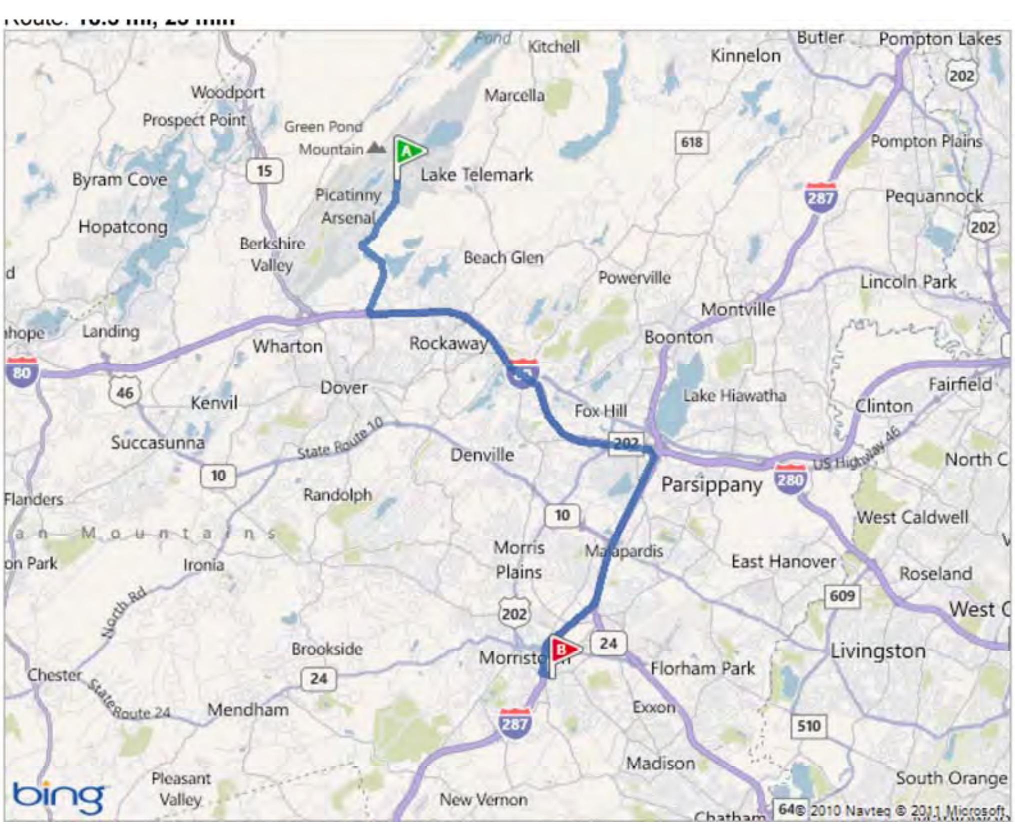
100 Madison Ave, Morristown, NJ 07960

Route: **18.5 mi, 25 min**

My Notes

On the go? Use **m.bing.com** to find maps, directions, businesses, and more

Picatinny Arsenal, NJ	**A–B: 18.5 mi** 25 min
1. Depart from **Picatinny Arsenal, NJ** *Private Road*	0.2 mi
2. Turn **right** onto **Lake Denmark Rd / CR-666** *Private Road*	1.9 mi
3. Turn **left** to stay on **CR-666**	1.0 mi
4. Turn **right** onto **Mt Hope Ave / CR-661**	1.0 mi
5. Take ramp **left** for **I-80 East**	8.0 mi
6. At exit **43**, take ramp **right** for **I-287 South** toward **Morristown / Somerville / New Jersey Turnpike**	6.0 mi
7. At exit **35**, take ramp **right** and follow signs for **RT-124**	0.2 mi
8. Turn **left** onto **RT-124 / Madison Ave**	0.2 mi
9. Arrive at **100 Madison Ave, Morristown, NJ 07960** *The last intersection is Gagnon Dr* *If you reach Morristown Memorial Hosp Ent, you've gone too far*	



16. LOGS, REPORTS, AUDITS, INSPECTIONS, AND RECORDKEEPING

16.1 SAFETY LOG

The SSHO/UXOSO will maintain a safety log of all safety-related activities. The SSHO/UXOSO is responsible for ensuring that health and safety activities for the day, as well as safety meeting minutes, are documented in the safety log or filed appropriately. In addition, the SSHO/UXOSO will maintain a site OSHA 300 log.

16.2 TRAINING LOG

The SSHO/UXOSO is responsible for ensuring that all training conducted relative to job site activities is documented appropriately.

16.3 SITE CONTROL LOG

A log of all personnel visiting, entering, or working on the site will be maintained. The log will include the following: date, name, agency or company, and the time entering and exiting the site. This information, including dates, will be recorded in the site control log.

16.4 INSPECTION FORMS

Daily safety and health inspections will be conducted by the SSHO/UXOSO with the results recorded in the safety log. The SSHO/UXOSO will conduct periodic safety and health audits to ensure site personnel are performing the tasks in accordance with the work plan and this SSHP.

ATTACHMENT 1

SITE-SPECIFIC HAZARD COMMUNICATION PLAN/CHECKLIST

SITE-SPECIFIC HAZARD COMMUNICATION PLAN/CHECKLIST

To ensure an understanding of and compliance with the Hazard Communication Standard, WESTON will utilize this checklist/document (or similar document) in conjunction with the WESTON Written Hazard Communication Program as a means of meeting site- or location-specific requirements.

Although responsibilities for activities within this document are the primary responsibility of the WESTON Site Safety and Health Officer (SSHO/UXOSO), it is the responsibility of all WESTON and subcontractor personnel to ensure compliance. Responsibilities under various conditions can be found within the WESTON Written Hazard Communication Program.

To ensure that information about the dangers of all hazardous chemicals used by WESTON are known by all affected employees, the following hazard communication program has been established. All affected personnel will participate in the hazard communication program. This written program, as well as WESTON's Corporate Hazard Communication Program, will be available for review by any employee, employee representative, representative of Occupational Safety and Health Administration (OSHA), National Institute for Occupational Safety and Health (NIOSH), or any affected employer/employee on a multi-employer site.

- ☐ Site or other location name/address: Picatinny Arsenal Morris County, NJ
- ☐ Project Manager: Laura Pastor
- ☐ Site/Location Safety Officer: Joe Kendall
- ☐ List of chemicals compiled, format: HASP: ⊗ Other: ____
- ☐ Location of MSDS Files: Site trailer
- ☐ Training Conducted by: Name: ____ Date: ____
- ☐ Indicate format of training documentation: Field Log: ☒ Other: Follow-up meetings
- ☐ Client briefing conducted regarding hazard communication: Entry
- ☐ If multi-employer site (client, subcontractor, agency, etc.), indicate name of affected companies: Multiple subcontractors, trades, and vendors
- ☐ Other employer(s) notified of chemicals, labeling, and MSDS information: All subs and vendors:
- ☐ Has WESTON been notified of other employer's or client's hazard communication program(s) as necessary?

List of Hazardous Chemicals

A list of known hazardous chemicals used by WESTON personnel must be prepared and available in a centrally identified location with the Material Safety Data Sheets (MSDSs).

Further information on each chemical may be obtained by reviewing the appropriate MSDSs. The list will be arranged to enable cross-reference with the MSDS file and the label on the container. Current chemicals that will be used by WESTON include diesel fuel gasoline, chainsaw bar oil, propane, and oils and greases.

Container Labeling

The SSHO/UXOXO will verify that all containers received from the chemical manufacturer, importer, or distributor for uses on-site are clearly labeled.

The SSHO/UXOSO is responsible for ensuring that labels are placed where required and for comparing MSDS and other information with label information to ensure correctness.

Material Safety Data Sheets (MSDSs)

MSDSs will be obtained for all hazardous materials to be used in performance of this contract in accordance with Federal Acquisition Regulation (FAR) 52.223-3. These MSDSs and an inventory of hazardous material will be compiled prior to bringing the material on-site. MSDSs will be maintained at the job site and available to all employees and inspectors. The subcontractor must have an active Hazardous Communication Program in place for all employees as required by Code of Federal Regulations (CFR) 29 CFR 1910.1200. To assist this effort, the SSHO/UXOSO is responsible for establishing and monitoring WESTON's MSDS program for the location. The SSHO/UXOSO will ensure procedures are developed to obtain the necessary MSDSs and will review incoming MSDSs for new or significant health and safety information. He/she will inform affected employees of any new information. If an MSDS is not received at the time of initial shipment, the SSHO/UXOSO will contact the manufacturer and request delivery of an MSDS for that product, in accordance with the requirements of WESTON's Written Hazard Communication Program.

The SSHO/UXOSO will maintain an MSDS file that contains a log of, and copies of, MSDSs for all hazardous chemicals in use at the site, and inform all site workers of the file's location. MSDSs will be readily available to all employees during each work shift. If an MSDS is not available, immediately contact the WESTON SSHO/UXOSO or designated alternate. When a revised MSDS is received, the SSHO/UXOSO will immediately replace the old MSDS.

Employee Training and Information

The SSHO/UXOSO is responsible for the WESTON site-specific personnel training program. The SSHO/UXOSO will ensure that the following program information is supplied to all affected employees.

At the time of initial assignment for employees to the work site or whenever a new hazard is introduced into the work area, employees will attend a health and safety meeting or briefing that includes the information indicated below:

- Hazardous chemicals present at the work site.
- Physical and health risks of the hazardous chemicals.
- Signs and symptoms of overexposure.
- Procedures to follow if employees are overexposed to hazardous chemicals.
- Location of the MSDS file and written hazard communication program.
- How to determine the presence or release of hazardous chemicals in the employee's work area.
- How to read labels and review MSDSs to obtain hazard information.
- Steps WESTON has taken to reduce or prevent exposure to hazardous chemicals.
- How to reduce or prevent exposure to hazardous chemicals through use of control procedures, work practices, and personal protective equipment (PPE).
- Hazardous, nonroutine tasks to be performed (if any).
- Chemicals within unlabeled piping (if any).

Hazardous Nonroutine Tasks

When employees are required to perform hazardous nonroutine tasks, the SSHO/UXOSO will provide affected employee(s) with information about the hazardous chemicals he or she may be using during such activity. This information will include specific chemical hazards, protective and safety measures the employee can use, and steps WESTON is using to reduce the hazards. These steps include, but are not limited to, ventilation, respirators, presence of another employee, and emergency procedures.

Multi-Employer Worksites

The SSHO/UXOSO is responsible for providing other employers with information about hazardous chemicals imported by WESTON to which their employees may be exposed, along with suggested safety precautions. The SSHO/UXOSO and the Site Manager are responsible for obtaining information about hazardous chemicals used by other employers and that WESTON employees may be exposed to. WESTON's chemical list will be made available to other employers upon request. MSDSs will be provided as necessary.

The location, format, and/or procedures for accessing MSDS information must be relayed to affected employees.

ATTACHMENT 2

HAZARDOUS CHEMICAL LIST/MATERIAL SAFETY DATA SHEETS

Hazardous Chemicals

Potentially Brought to Site

The hazardous materials that may be used on-site are presented in the following list, and Material Safety Data Sheets (MSDSs) for all reagent type chemicals, solutions, or other identified materials will be available on-site. All subcontractors and other parties working nearby will be informed of the presence of these chemicals and the location of the MSDSs.

Chemical Name	Quantity
Hand Sanitizer	24 16-oz bottles
Gasoline	2 gallons
Lubricating oil	1 bottle
Lead Acid Marine Battery	1 Battery
Air Horn	1 each

MATERIAL SAFETY DATA SHEETS

MATERIAL SAFETY DATA SHEET
LEAD ACID BATTERY WET, FILLED WITH ACID
(US, CN, EU Version for International Trade)

SECTION 1: PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: **Lead Acid Battery Wet, Filled With Acid**
OTHER PRODUCT NAMES: Electric Storage Battery, SLI or Industrial Battery, UN2794

MANUFACTURER: East Penn Manufacturing Company, Inc.
DIVISION: Deka Road
ADDRESS: Lyon Station, PA 19536 USA

EMERGENCY TELEPHONE NUMBERS: US: CHEMTREC 1-800-424-9300
CN: CHEMTREC 1-800-424-9300
Outside US: 1-703-527-3887

NON-EMERGENCY HEALTH/SAFETY INFORMATION: 1-610-682-6361

CHEMICAL FAMILY: This product is a wet lead acid storage battery. May also include gel/absorbed electrolyte type lead acid battery types.

PRODUCT USE: Industrial/Commercial electrical storage batteries.

This product is considered a Hazardous Substance, Preparation or Article that is regulated under US-OSHA; CAN-WHMIS; IOSH; ISO; UK-CHIP; or EU Directives (67/548/EEC-Dangerous Substance Labelling, 98/24/EC-Chemical Agents at Work, 99/45/EC-Preparation Labelling, 2001/58/EC-MSDS Content, and 1907/2006/EC-REACH), and an MSDS/SDS is required for this product considering that when used as recommended or intended, or under ordinary conditions, it may present a health and safety exposure or other hazard.

Additional Information
This product may not be compatible with all environments, such as those containing liquid solvents or extreme temperature or pressure. Please request information if considering use under extreme conditions or use beyond current product labelling.

SECTION 2: HAZARDS IDENTIFICATION

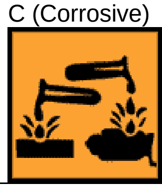
GHS Classification:

Health	Environmental	Physical
Acute Toxicity – Not listed (NL) Eye Corrosion – Corrosive* Skin Corrosion – Corrosive* Skin Sensitization – NL Mutagenicity/Carcinogenicity – NL Reproductive/Developmental – NL Target Organ Toxicity (Repeated) – NL	Aquatic Toxicity – NL	NFPA – Flammable gas, hydrogen (during charging) CN - NL EU - NL

*as sulfuric acid

GHS Label: Lead Acid Battery, Wet

Symbols: C (Corrosive)



Hazard Statements	Precautionary Statements
Contact with internal components may cause irritation of severe burns. Irritating to eyes, respiratory system, and skin.	Keep out of reach of children. Keep containers tightly closed. Avoid heat, sparks, and open flame while charging batteries. Avoid contact with internal acid.

EMERGENCY OVERVIEW: May form explosive air/gas mixture during charging. Contact with internal components may cause irritation or severe burns. Irritating to eyes, respiratory system, and skin. Prolonged inhalation or ingestion may result in serious damage to health. Pregnant women exposed to internal components may experience reproductive/developmental effects.

POTENTIAL HEALTH EFFECTS:

EYES: Direct contact of internal electrolyte liquid with eyes may cause severe burns or blindness.
SKIN: Direct contact of internal electrolyte liquid with the skin may cause skin irritation or damaging burns.
INGESTION: Swallowing this product may cause severe burns to the esophagus and digestive tract and harmful or fatal lead poisoning. Lead ingestion may cause nausea, vomiting, weight loss, abdominal spasms, fatigue, and pain in the arms, legs and joints.
INHALATION: Respiratory tract irritation and possible long-term effects.

ACUTE HEALTH HAZARDS:
Repeated or prolonged contact may cause mild skin irritation.
CHRONIC HEALTH HAZARDS:
Lead poisoning if persons are exposed to internal components of the batteries. Lead absorption may cause nausea, vomiting, weight loss, abdominal spasms, fatigue, and pain in the arms, legs and joints. Other effects may include central nervous system damage, kidney dysfunction, and potential reproductive effects. Chronic inhalation of sulfuric acid mist may increase the risk of lung cancer.
MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE:
Respiratory and skin diseases may predispose the user to acute and chronic effects of sulfuric acid and/or lead. Children and pregnant women must be protected from lead exposure. Persons with kidney disease may be at increased risk of kidney failure.

Additional Information
No health effects are expected related to normal use of this product as sold.

SECTION 3: COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENTS (Chemical/Common Names):	CAS No.:	% by Wt:	EC No.:
Lead, inorganic	7439-92-1	43–70 (average: 65)	231-100-4
Sulfuric acid	7664-93-9	20–44 (average: 25)	231-639-5
Antimony	7440-36-0	0-–4 (average: 1)	231-146-5
Arsenic	7440-38-2	<0.01	231-148-6
Polypropylene	9003-07-0	5–10 (average: 8)	NA

NA: Not applicable; ND: Not determined

Additional Information
These ingredients reflect components of the finished product related to performance of the product as distributed into commerce.

SECTION 4: FIRST AID MEASURES

EYE CONTACT: Flush eyes with large amounts of water for at least 15 minutes. Seek immediate medical attention if eyes have been exposed directly to acid.
SKIN CONTACT: Flush affected area(s) with large amounts of water using deluge emergency shower, if available, shower for at least 15 minutes. Remove contaminated clothing. If symptoms persist, seek medical attention.
INGESTION: If swallowed, give large amounts of water. Do NOT induce vomiting or aspiration into the lungs may occur and can cause permanent injury or death.
INHALATION: If breathing difficulties develop, remove person to fresh air. If symptoms persist, seek medical attention.

SECTION 5: FIRE-FIGHTING MEASURES

SUITABLE/UNSUITABLE EXTINGUISHING MEDIA:
Dry chemical, carbon dioxide, water, foam. Do not use water on live electrical circuits.

SPECIAL FIREFIGHTING PROCEDURES & PROTECTIVE EQUIPMENT:
Use appropriate media for surrounding fire. Do not use carbon dioxide directly on cells. Avoid breathing vapours. Use full protective equipment (bunker gear) and self-contained breathing apparatus.
UNUSUAL FIRE AND EXPLOSION HAZARDS:
Batteries evolve flammable hydrogen gas during charging and may increase fire risk in poorly ventilated areas near sparks, excessive heat or open flames.
SPECIFIC HAZARDS IN CASE OF FIRE:
Thermal shock may cause battery case to crack open. Containers may explode when heated.

Additional Information
Firefighting water runoff and dilution water may be toxic and corrosive and may cause adverse environmental impacts.

SECTION 6: ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS:
Avoid Contact with Skin. Neutralize any spilled electrolyte with neutralizing agents, such as soda ash, sodium bicarbonate, or very dilute sodium hydroxide solutions.
ENVIRONMENTAL PRECAUTIONS:
Prevent spilled material from entering sewers and waterways.
SPILL CONTAINMENT & CLEANUP METHODS/MATERIALS:
Add neutralizer/absorbent to spill area. Sweep or shovel spilled material and absorbent and place in approved container. Dispose of any non-recyclable materials in accordance with local, state, provincial or federal regulations.

Additional Information
Lead acid batteries and their plastic cases are recyclable. Contact your East Penn representative for recycling information.

SECTION 7: HANDLING AND STORAGE

PRECAUTIONS FOR SAFE HANDLING AND STORAGE:
- Keep containers tightly closed when not in use.
- If battery case is broken, avoid contact with internal components.
- Do not handle near heat, sparks, or open flames.
- Protect containers from physical damage to avoid leaks and spills.
- Place cardboard between layers of stacked batteries to avoid damage and short circuits.
- Do not allow conductive material to touch the battery terminals. A dangerous short-circuit may occur and cause battery failure and fire.

OTHER PRECAUTIONS (e.g.; Incompatibilities):
Keep away from combustible materials, organic chemicals, reducing substances, metals, strong oxidizers and water.

SECTION 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS/SYSTEM DESIGN INFORMATION:
Charge in areas with adequate ventilation.
VENTILATION:
General dilution ventilation is acceptable.
RESPIRATORY PROTECTION:
Not required for normal conditions of use. See also special firefighting procedures (Section 5).
EYE PROTECTION:
Wear protective glasses with side shields or goggles.
SKIN PROTECTION:
Wear chemical resistant gloves as a standard procedure to prevent skin contact.
OTHER PROTECTIVE CLOTHING OR EQUIPMENT: Chemically impervious apron and face shield recommended when adding water or electrolyte to batteries.
Wash Hands after handling.
EXPOSURE GUIDELINES & LIMITS:

EXPOSURE GUIDELINES & LIMITS:

OSHA	Permissible Exposure Limit (PEL/TWA)	Lead, inorganic (as Pb)	0.05 mg/m^3
		Sulfuric acid	1.00 mg/m^3
		Antimony	0.50 mg/m^3
		Arsenic	0.01 mg/m^3
ACGIH	2007 Threshold Limit Value (TLV)	Lead, inorganic (as Pb)	0.05 mg/m^3
		Sulfuric acid	0.20 mg/m^3
		Antimony	0.50 mg/m^3
		Arsenic	0.01 mg/m^3
Quebec	Permissible Exposure Value (PEV)	Lead, inorganic (as Pb)	0.15 mg/m^3
		Sulfuric acid	1.00 mg/m^3 TWA
			3.00 mg/m^3 STEV
		Antimony	0.50 mg/m^3
		Arsenic	0.10 mg/m^3
Ontario	Occupational Exposure Level (OEL)	Lead (designated substance)	0.10 mg/m^3
		Sulfuric acid	1.00 mg/m^3 TWAEV
			3.00 mg/m^3 STEV
		Antimony	0.50 mg/m^3
		Arsenic (designated substance)	0.01 mg/m^3
Netherlands	Maximaal Aanvaarde Concentratie (MAC)	Lead, inorganic (as Pb)	0.15 mg/m^3
		Sulfuric acid	1.00 mg/m^3
Germany	Maximale Arbeitsplatzkonzentrationen (MAK)	Lead, inorganic (as Pb)	0.10 mg/m^3
		Sulfuric acid	1.00 mg/m^3 TWA
			2.00 mg/m^3 STEL
		Antimony	0.50 mg/m^3
United Kingdom	Occupational Exposure Standard (OES)	Lead	0.15 mg/m^3
		Antimony	0.50 mg/m^3
		Arsenic	0.10 mg/m^3

TWA: 8-Hour Time-Weighted Average; STE: Short-Term Exposure; mg/m^3: milligrams per cubic meter of air; NE: Not Established; STEV: Short-Term Exposure Value; TWAEV: Time-Weighted Average Exposure Value; STEL: Short-Term Exposure Limit

Additional Information

- Batteries are housed in polypropylene cases which are regulated as total dust or respirable dust only when they are ground up during recycling. The OSHA PEL for dust is 15 mg/m^3 as total dust or 5 mg/m^3 as respirable dust.
- May be required to meet Domestic Requirements for a Specific Destination(s).

SECTION 9: PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Industrial/commercial lead acid battery
ODOUR:	Odourless
ODOUR THRESHOLD:	NA
PHYSICAL STATE:	Sulfuric Acid: Liquid; Lead: solid
pH:	<1
BOILING POINT:	235-240° F (113-116° C) (as sulfuric acid)
MELTING POINT:	NA
FREEZING POINT:	NA
VAPOUR PRESSURE:	10 mmHg
VAPOUR DENSITY (AIR = 1):	> 1
SPECIFIC GRAVITY (H_2O = 1):	1.27–1.33
EVAPORATION RATE (n-BuAc=1):	< 1
SOLUBILITY IN WATER:	100% (as sulfuric acid)
FLASH POINT:	Below room temperature (as hydrogen gas)
AUTO-IGNITION TEMPERATURE:	NA
LOWER EXPLOSIVE LIMIT (LEL):	4% (as hydrogen gas)
UPPER EXPLOSIVE LIMIT (UEL):	74% (as hydrogen gas)

PARTITION COEFFICIENT: NA
VISCOSITY (poise @ 25° C): Not Available
DECOMPOSITION TEMPERATURE: Not Available

FLAMMABILITY/HMIS HAZARD CLASSIFICATIONS (US/CN/EU): As sulfuric acid
HEALTH: 3 FLAMMABILITY: 0 REACTIVITY: 2

SECTION 10: STABILITY AND REACTIVITY

STABILITY:	This product is stable under normal conditions at ambient temperature.
INCOMPATIBILITY (MATERIAL TO AVOID):	Strong bases, combustible organic materials, reducing agents, finely divided metals, strong oxidizers, and water.
HAZARDOUS DECOMPOSITION BY-PRODUCTS:	Thermal decomposition will produce sulfur dioxide, sulfur trioxide, carbon monoxide, sulfuric acid mist, and hydrogen.
HAZARDOUS POLYMERIZATION:	Will not occur
CONDITIONS TO AVOID:	Overcharging, sources of ignition

SECTION 11: TOXICOLOGICAL INFORMATION

ACUTE TOXICITY (Test Results Basis and Comments):

Sulfuric acid:	LD50, Rat: 2140 mg/kg
	LC50, Guinea pig: 510 mg/m^3
Lead:	No data available for elemental lead

SUBCHRONIC/CHRONIC TOXICITY (Test Results and Comments):
Repeated exposure to lead and lead compounds in the workplace may result in nervous system toxicity. Some toxicologists report abnormal conduction velocities in persons with blood lead levels of 50 µg/100 ml or higher. Heavy lead exposure may result in central nervous system damage, encephalopathy and damage to the blood-forming (hematopoietic) tissues.

<u>Additional Information</u>
- Very little chronic toxicity data available for elemental lead.
- Lead is listed by IARC as a 2B carcinogen: possible carcinogen in humans. Arsenic is listed by IARC, ACGIH, and NTP as a carcinogen, based on studies with high doses over long periods of time. The other ingredients in this product, present at equal to or greater than 0,1% of the product, are not listed by OSHA, NTP, or IARC as suspect carcinogens.
- The 19^{th} Amendment to EC Directive 67/548/EEC classified lead compounds, but not lead in metal form, as possibly toxic to reproduction. Risk phrase 61: May cause harm to the unborn child, applies to lead compounds, especially soluble forms.

SECTION 12: ECOLOGICAL INFORMATION

PERSISTENCE & DEGRADABILITY:
Lead is very persistent in soils and sediments. No data available on biodegradation.
BIOACCUMULATIVE POTENTIAL (Including Mobility):
Mobility of metallic lead between ecological compartments is low. Bioaccumulation of lead occurs in aquatic and terrestrial animals and plants, but very little bioaccumulation occurs through the food chain. Most studies have included lead compounds, not solid inorganic lead.
AQUATIC TOXICITY (Test Results & Comments):

Sulfuric acid:	24-hour LC50, fresh water fish *(Brachydanio rerio)*: 82 mg/l
	96-hour LOEC, fresh water fish *(Cyprinus carpio)*: 22 mg/l (lowest observable effect concentration)
Lead (metal):	No data available

<u>Additional Information</u>
- No known effects on stratospheric ozone depletion.
- Volatile organic compounds: 0% (by Volume)
- Water Endangering Class (WGK): NA

SECTION 13: DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD:	Following local, State/Provincial, and Federal/National regulations applicable to end-of-life characteristics will be the responsibility of the end-user.
HAZARDOUS WASTE CLASS/CODE:	US - Not applicable to finished product as manufactured for distribution into commerce. CN – Not applicable to finished product as manufactured for distribution into commerce. EWC – Not applicable to finished product as manufactured for distribution into commerce.

Additional Information
Not Included – **Recycle** or dispose as allowed by local jurisdiction for the end-of-life characteristics as-disposed.

SECTION 14: TRANSPORT INFORMATION

GROUND – US-DOT/CAN-TDG/EU-ADR/APEC-ADR:

Proper Shipping Name	Batteries, Wet, Filled with Acid		
Hazard Class	8	ID Number	UN2794
Packing Group	III	Labels	Corrosive

AIRCRAFT – ICAO-IATA:

Proper Shipping Name	Batteries, Wet, Filled with Acid		
Hazard Class	8	ID Number	UN2794
Packing Group	II	Labels	Corrosive

Reference IATA packing instructions 800

VESSEL – IMO-IMDG:

Proper Shipping Name	Batteries, Wet, Filled with Acid		
Hazard Class	8	ID Number	UN2794
Packing Group	III	Labels	Corrosive

Reference IMDG packing instructions P801

Additional Information

Transport requires proper packaging and paperwork, including the Nature and Quantity of goods, per applicable origin/destination/customs points as-shipped.

SECTION 15: REGULATORY INFORMATION

INVENTORY STATUS:
All components are listed on the TSCA; EINECS/ELINCS; and DSL, unless noted otherwise below.

U.S. FEDERAL REGULATIONS:

TSCA Section 8b – Inventory Status: All chemicals comprising this product are either exempt or listed on the TSCA Inventory.

TSCA Section 12b – Export Notification: If the finished product contains chemicals subject to TSCA Section 12b export notification, they are listed below:

Chemical	CAS #
None	NA

CERCLA (COMPREHENSIVE RESPONSE COMPENSATION, AND LIABILITY ACT)

Chemicals present in the product which could require reporting under the statute:

Chemical	CAS #
Lead	7439-92-1
Sulfuric acid	7664-93-9

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)

The finished product contains chemicals subject to the reporting requirements of Section 313 of SARA Title III.

Chemical	CAS #	% wt
Lead	7439-92-1	65
Sulfuric acid	7664-93-9	25

CERCLA SECTION 311/312 HAZARD CATEGORIES: Note that the finished product is exempt from these regulations, but lead and sulfuric acid above the thresholds are reportable on Tier II reports.

Fire Hazard	No
Pressure Hazard	No

Reactivity Hazard	No
Immediate Hazard	Yes (Sulfuric acid is Corrosive)
Delayed Hazard	No

Note: Sulfuric acid is listed as an Extremely Hazardous Substance.

STATE REGULATIONS (US):

California Proposition 65

The following chemicals identified to exist in the finished product as distributed into commerce are known to the State of California to cause cancer, birth defects, or other reproductive harm:

Chemical	CAS #	% Wt
Arsenic (as arsenic oxides)	7440-38-2	<0.1
Strong inorganic acid mists including sulfuric acid	NA	25
Lead	7439-92-1	65

California Consumer Product Volatile Organic Compound Emissions
This Product is not regulated as a Consumer Product for purposes of CARB/OTC VOC Regulations, as-sold for the intended purpose and into the industrial/Commercial supply chain.

INTERNATIONAL REGULATIONS (Non-US):

Canadian Domestic Substance List (DSL)

All ingredients remaining in the finished product as distributed into commerce are included on the Domestic Substances List.

WHMIS Classifications

Class E: Corrosive materials present at greater than 1%

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all the information required by the Controlled Products Regulations.

NPRI and Ontario Regulation 127/01

This product contains the following chemicals subject to the reporting requirements of Canada NPRI +/or Ont. Reg. 127/01:

Chemical	CAS #	% Wt
Lead	7439-92-1	65
Sulfuric acid	7664-93-9	25

European Inventory of Existing Commercial Chemical Substances (EINECS)

All ingredients remaining in the finished product as distributed into commerce are exempt from, or included on, the European Inventory of Existing Commercial Chemical Substances.

European Communities (EC) Hazard Classification according to directives 67/548/EEC and 1999/45/EC.

R-Phrases	S-Phrases
35, 36, 38	1/2, 26, 30, 45

Additional Information
This product may be subject to Restriction of Hazardous Substances (RoHS) regulations in Europe and China, or may be regulated under additional regulations and laws not identified above, such as for uses other than described or as-designed/as-intended by the manufacturer, or for distribution into specific domestic destinations.

SECTION 16: OTHER INFORMATION

OTHER INFORMATION:

Distribution into Quebec to follow Canadian Controlled Product Regulations (CPR) 24(1) and 24(2).
Distribution into the EU to follow applicable Directives to the Use, Import/Export of the product as-sold.

Sources of Information:

International Agency for Research on Cancer (1987), *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans: Overall Evaluations of Carcinogenicity: An updating of IARC Monographs Volumes 1-42, Supplement 7, Lyon,* France.
Ontario Ministry of Labour Regulation 654/86. Regulations Respecting Exposure to Chemical or Biological Agents.
RTECS – Registry of Toxic Effects of Chemical Substances, National institute for Occupational Safety and Health.

MSDS/SDS PREPARATION INFORMATION:

DATE OF ISSUE: ***29 November 2010*** SUPERCEDES: ***10 July 2010***

DISCLAIMER:

This Material Safety Data Sheet is based upon information and sources available at the time of preparation or revision date.

The information in the MSDS was obtained from sources which we believe are reliable, but are beyond our direct supervision or control. We make no Warranty of Merchantability, Fitness for any particular purpose or any other Warranty, Expressed or Implied, with respect to such information and we assume no liability resulting from its use. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product. It is the obligation of each user of this product to determine the suitability of this product and comply with the requirements of all applicable laws regarding use and disposal of this product. For additional information concerning East Penn Manufacturing Co., Inc. products or questions concerning the content of this MSDS please contact your East Penn representative.

END

EMERGENCY OVERVIEW
DANGER!
EXTREMELY FLAMMABLE - EYE AND MUCOUS MEMBRANE IRRITANT - EFFECTS CENTRAL NERVOUS SYSTEM - HARMFUL OR FATAL IF SWALLOWED - ASPIRATION HAZARD

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1 0

NFPA 704 (Section 16)

High fire hazard. Keep away from heat, spark, open flame, and other ignition sources.

If ingested, do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs). Contact may cause eye, skin and mucous membrane irritation. Harmful if absorbed through the skin. Avoid prolonged breathing of vapors or mists. Inhalation may cause irritation, anesthetic effects (dizziness, nausea, headache, intoxication), and respiratory system effects.

Long-term exposure may cause effects to specific organs, such as to the liver, kidneys, blood, nervous system, and skin. Contains benzene, which can cause blood disease, including anemia and leukemia.

1. CHEMICAL PRODUCT and COMPANY INFORMATION

Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

EMERGENCY TELEPHONE NUMBER (24 hrs): **CHEMTREC (800)424-9300**
COMPANY CONTACT (business hours): Corporate Safety (732)750-6000
MSDS (Environment, Health, Safety) Internet Website www.hess.com

SYNONYMS: Hess Conventional (Oxygenated and Non-oxygenated) Gasoline; Reformulated Gasoline (RFG); Reformulated Gasoline Blendstock for Oxygenate Blending (RBOB); Unleaded Motor or Automotive Gasoline

See Section 16 for abbreviations and acronyms.

2. COMPOSITION and INFORMATION ON INGREDIENTS *

INGREDIENT NAME (CAS No.)	CONCENTRATION PERCENT BY WEIGHT
Gasoline (86290-81-5)	100
Benzene (71-43-2)	0.1 - 4.9 (0.1 - 1.3 reformulated gasoline)
n-Butane (106-97-8)	< 10
Ethyl Alcohol (Ethanol) (64-17-5)	0 - 10
Ethyl benzene (100-41-4)	< 3
n-Hexane (110-54-3)	0.5 to 4
Methyl-tertiary butyl ether (MTBE) (1634-04-4)	0 to 15.0
Tertiary-amyl methyl ether (TAME) (994-05-8)	0 to 17.2
Toluene (108-88-3)	1 - 25
1,2,4- Trimethylbenzene (95-63-6)	< 6
Xylene, mixed isomers (1330-20-7)	1 - 15

A complex blend of petroleum-derived normal and branched-chain alkane, cycloalkane, alkene, and aromatic hydrocarbons. May contain antioxidant and multifunctional additives. Non-oxygenated Conventional Gasoline and RBOB do not have oxygenates (Ethanol or MTBE and/or TAME).

Oxygenated Conventional and Reformulated Gasoline will have oxygenates for octane enhancement or as legally required.

3. HAZARDS IDENTIFICATION

EYES
Moderate irritant. Contact with liquid or vapor may cause irritation.

SKIN
Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are exposed repeatedly.

INGESTION
The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest, and death may occur.

INHALATION
Excessive exposure may cause irritations to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

CHRONIC EFFECTS and CARCINOGENICITY
Contains benzene, a regulated human carcinogen. Benzene has the potential to cause anemia and other blood diseases, including leukemia, after repeated and prolonged exposure. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with systemic toxicity. See also Section 11 - Toxicological Information.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash). Chronic respiratory disease, liver or kidney dysfunction, or pre-existing central nervous system disorders may be aggravated by exposure.

4. FIRST AID MEASURES

EYES
In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

SKIN
Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops.

INGESTION

DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

INHALATION
Remove person to fresh air. If person is not breathing, ensure an open airway and provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES:

FLASH POINT:	-45 ^oF (-43^oC)
AUTOIGNITION TEMPERATURE:	highly variable; > 530 ^oF (>280 ^oC)
OSHA/NFPA FLAMMABILITY CLASS:	1A (flammable liquid)
LOWER EXPLOSIVE LIMIT (%):	1.4%
UPPER EXPLOSIVE LIMIT (%):	7.6%

FIRE AND EXPLOSION HAZARDS
Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. Flowing product may be ignited by self-generated static electricity. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

EXTINGUISHING MEDIA
SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO2, water spray, fire fighting foam, or Halon.

LARGE FIRES: Water spray, fog or fire fighting foam. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

During certain times of the year and/or in certain geographical locations, gasoline may contain MTBE and/or TAME. Firefighting foam suitable for polar solvents is recommended for fuel with greater than 10% oxygenate concentration - refer to NFPA 11 “Low Expansion Foam - 1994 Edition.”

FIRE FIGHTING INSTRUCTIONS
Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

See Section 16 for the NFPA 704 Hazard Rating.

6. ACCIDENTAL RELEASE MEASURES

ACTIVATE FACILITY SPILL CONTINGENCY or EMERGENCY PLAN.

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

7. HANDLING and STORAGE

HANDLING PRECAUTIONS

******USE ONLY AS A MOTOR FUEL******
******DO NOT SIPHON BY MOUTH******

Handle as a flammable liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents.

STORAGE PRECAUTIONS

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

WORK/HYGIENIC PRACTICES

Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

8. EXPOSURE CONTROLS and PERSONAL PROTECTION

EXPOSURE LIMITS

Component (CAS No.)	Source	TWA (ppm)	STEL (ppm)	Exposure Limits Note
Gasoline (86290-81-5)	ACGIH	300	500	A3
Benzene (71-43-2)	OSHA	1	5	Carcinogen
	ACGIH	0.5	2.5	A1, skin
	USCG	1	5	
n-Butane (106-97-8)	ACGIH	1000	--	Aliphatic Hydrocarbon Gases Alkane (C1-C4)
Ethyl Alcohol (ethanol) (64-17-5)	OSHA	1000	--	
	ACGIH	1000	--	A4
Ethyl benzene (100-41-4)	OSHA	100	--	
	ACGIH	100	125	A3
n-Hexane (110-54-3)	OSHA	500	--	
	ACGIH	50	--	Skin
Methyl-tertiary butyl ether [MTBE] (1634-04-4)	ACGIH	50		A3
Tertiary-amyl methyl ether [TAME] (994-05-8)				None established
Toluene (108-88-3)	OSHA	200		Ceiling: 300 ppm; Peak: 500 ppm (10 min.)
	ACGIH	20	--	A4
1,2,4- Trimethy benzene (95-63-6)	ACGIH	25	--	
Xylene, mixed isomers (1330-20-7)	OSHA	100	--	
	ACGIH	100	150	A4

ENGINEERING CONTROLS
Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

EYE/FACE PROTECTION
Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

SKIN PROTECTION
Gloves constructed of nitrile or neoprene are recommended. Chemical protective clothing such as that made of of E.I. DuPont Tychem ®, products or equivalent is recommended based on degree of exposure.

Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

RESPIRATORY PROTECTION
A NIOSH-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Refer to OSHA 29 CFR 1910.134, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection and limitations.

Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

9. PHYSICAL and CHEMICAL PROPERTIES

APPEARANCE
A translucent, straw-colored or light yellow liquid

ODOR

A strong, characteristic aromatic hydrocarbon odor. Oxygenated gasoline with MTBE and/or TAME may have a sweet, ether-like odor and is detectable at a lower concentration than non-oxygenated gasoline.

ODOR THRESHOLD

	Odor Detection	Odor Recognition
Non-oxygenated gasoline:	0.5 - 0.6 ppm	0.8 - 1.1 ppm
Gasoline with 15% MTBE:	0.2 - 0.3 ppm	0.4 - 0.7 ppm
Gasoline with 15% TAME:	0.1 ppm	0.2 ppm

BASIC PHYSICAL PROPERTIES

BOILING RANGE:	85 to 437 ^oF (39 to 200 ^oC)
VAPOR PRESSURE:	6.4 - 15 RVP @ 100 ^oF (38 ^oC) (275-475 mm Hg @ 68 ^oF (20 ^oC)
VAPOR DENSITY (air = 1):	AP 3 to 4
SPECIFIC GRAVITY (H_2O = 1):	0.70 – 0.78
EVAPORATION RATE:	10-11 (n-butyl acetate = 1)
PERCENT VOLATILES:	100 %
SOLUBILITY (H_2O):	Non-oxygenated gasoline - negligible (< 0.1% @ 77 ^oF). Gasoline with 15% MTBE - slight (0.1 - 3% @ 77 ^oF); ethanol is readily soluble in water

10. STABILITY and REACTIVITY)

STABILITY: Stable. Hazardous polymerization will not occur.

CONDITIONS TO AVOID

Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources

INCOMPATIBLE MATERIALS

Keep away from strong oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS

Carbon monoxide, carbon dioxide and non-combusted hydrocarbons (smoke). Contact with nitric and sulfuric acids will form nitrocresols that can decompose violently.

11. TOXICOLOGICAL PROPERTIES

ACUTE TOXICITY

Acute Dermal LD50 (rabbits): > 5 ml/kg
Acute Oral LD50 (rat): 18.75 ml/kg
Primary dermal irritation (rabbits): slightly irritating
Draize eye irritation (rabbits): non-irritating
Guinea pig sensitization: negative

CHRONIC EFFECTS AND CARCINOGENICITY

Carcinogenicity: OSHA: NO IARC: YES - 2B NTP: NO ACGIH: YES (A3)

IARC has determined that gasoline and gasoline exhaust are possibly carcinogenic in humans. Inhalation exposure to completely vaporized unleaded gasoline caused kidney cancers in male rats and liver tumors in female mice. The U.S. EPA has determined that the male kidney tumors are species-specific and are irrelevant for human health risk assessment. The significance of the tumors seen in female mice is not known. Exposure to light hydrocarbons in the same boiling range as this product has been associated in animal studies with effects to the central and peripheral nervous systems, liver, and kidneys. The significance of these animal models to predict similar human response to gasoline is uncertain.

This product contains benzene. Human health studies indicate that prolonged and/or repeated overexposure to benzene may cause damage to the blood-forming system (particularly bone marrow), and serious blood disorders such as aplastic anemia and leukemia. Benzene is listed as a human carcinogen by the NTP, IARC, OSHA and ACGIH.

This product may contain methyl tertiary butyl ether (MTBE): animal and human health effects studies indicate that MTBE may cause eye, skin, and respiratory tract irritation, central nervous system depression and neurotoxicity. MTBE is classified as an animal carcinogen (A3) by the ACGIH.

12. ECOLOGICAL INFORMATION

Keep out of sewers, drainage areas and waterways. Report spills and releases, as applicable, under Federal and State regulations. If released, oxygenates such as ethers and alcohols will be expected to exhibit fairly high mobility in soil, and therefore may leach into groundwater. The API (www.api.org) provides a number of useful references addressing petroleum and oxygenate contamination of groundwater.

13. DISPOSAL CONSIDERATIONS

Consult federal, state and local waste regulations to determine appropriate disposal options.

14. TRANSPORTATION INFORMATION

DOT PROPER SHIPPING NAME:	Gasoline
DOT HAZARD CLASS and PACKING GROUP:	3, PG II
DOT IDENTIFICATION NUMBER:	UN 1203
DOT SHIPPING LABEL:	FLAMMABLE LIQUID

PLACARD:

15. REGULATORY INFORMATION

U.S. FEDERAL, STATE, and LOCAL REGULATORY INFORMATION

This product and its constituents listed herein are on the EPA TSCA Inventory. Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, state and/or local reporting requirements. This product and/or its constituents may also be subject to other federal, state, or local regulations; consult those regulations applicable to your facility/operation.

CLEAN WATER ACT (OIL SPILLS)

Any spill or release of this product to "navigable waters" (essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIRONMENT)

The CERCLA definition of hazardous substances contains a “petroleum exclusion” clause which exempts crude oil, refined, and unrefined petroleum products and any indigenous components of such. However, other federal reporting requirements (e.g., SARA Section 304 as well as the Clean Water Act if the spill occurs on navigable waters) may still apply.

SARA SECTION 311/312 - HAZARD CLASSES

ACUTE HEALTH	CHRONIC HEALTH	FIRE	SUDDEN RELEASE OF PRESSURE	REACTIVE
X	X	X	--	--

SARA SECTION 313 - SUPPLIER NOTIFICATION

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

INGREDIENT NAME (CAS NUMBER)	CONCENTRATION WT. PERCENT
Benzene (71-43-2)	0.1 to 4.9 (0.1 to 1.3 for reformulated gasoline)
Ethyl benzene (100-41-4)	< 3

n-Hexane (110-54-3)	0.5 to 4
Methyl-tertiary butyl ether (MTBE) (1634-04-4)	0 to 15.0
Toluene (108-88-3)	1 to 15
1,2,4- Trimethylbenzene (95-63-6)	< 6
Xylene, mixed isomers (1330-20-7)	1 to 15

US EPA guidance documents (www.epa.gov/tri) for reporting Persistent Bioaccumulating Toxics (PBTs) indicate this product may contain the following deminimis levels of toxic chemicals subject to Section 313 reporting:

INGREDIENT NAME (CAS NUMBER)	CONCENTRATION - Parts per million (ppm) by weight
Polycyclic aromatic compounds (PACs)	17
Benzo (g,h,i) perylene (191-24-2)	2.55
Lead (7439-92-1)	0.079

CALIFORNIA PROPOSITION 65 LIST OF CHEMICALS

This product contains the following chemicals that are included on the Proposition 65 "List of Chemicals" required by the California Safe Drinking Water and Toxic Enforcement Act of 1986:

INGREDIENT NAME (CAS NUMBER)	Date Listed
Benzene	2/27/1987
Ethyl benzene	6/11/2004
Toluene	1/1/1991

CANADIAN REGULATORY INFORMATION (WHMIS)

Class B, Division 2 (Flammable Liquid)
Class D, Division 2A (Very toxic by other means) and Class D, Division 2B (Toxic by other means)

16. OTHER INFORMATION

NFPA® HAZARD RATING	HEALTH:	1	Slight
	FIRE:	3	Serious
	REACTIVITY:	0	Minimal
HMIS® HAZARD RATING	HEALTH:	1 *	Slight
	FIRE:	3	Serious
	PHYSICAL:	0	Minimal
			* CHRONIC

SUPERSEDES MSDS DATED: 07/01/06

ABBREVIATIONS:

AP = Approximately	< = Less than	> = Greater than
N/A = Not Applicable	N/D = Not Determined	ppm = parts per million

ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists	CERCLA	Comprehensive Emergency Response, Compensation, and Liability Act
AIHA	American Industrial Hygiene Association	DOT	U.S. Department of Transportation [General Info: (800)467-4922]
ANSI	American National Standards Institute (212)642-4900	EPA	U.S. Environmental Protection Agency
API	American Petroleum Institute (202)682-8000	HMIS	Hazardous Materials Information System

IARC	International Agency For Research On Cancer
MSHA	Mine Safety and Health Administration
NFPA	National Fire Protection Association (617)770-3000
NIOSH	National Institute of Occupational Safety and Health
NOIC	Notice of Intended Change (proposed change to ACGIH TLV)
NTP	National Toxicology Program
OPA	Oil Pollution Act of 1990
OSHA	U.S. Occupational Safety & Health Administration
PEL	Permissible Exposure Limit (OSHA)
RCRA	Resource Conservation and Recovery Act
REL	Recommended Exposure Limit (NIOSH)
SARA	Superfund Amendments and Reauthorization Act of 1986 Title III
SCBA	Self-Contained Breathing Apparatus
SPCC	Spill Prevention, Control, and Countermeasures
STEL	Short-Term Exposure Limit (generally 15 minutes)
TLV	Threshold Limit Value (ACGIH)
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average (8 hr.)
WEEL	Workplace Environmental Exposure Level (AIHA)
WHMIS	Workplace Hazardous Materials Information System (Canada)

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

Information presented herein has been compiled from sources considered to be dependable, and is accurate and reliable to the best of our knowledge and belief, but is not guaranteed to be so. Since conditions of use are beyond our control, we make no warranties, expressed or implied, except those that may be contained in our written contract of sale or acknowledgment.

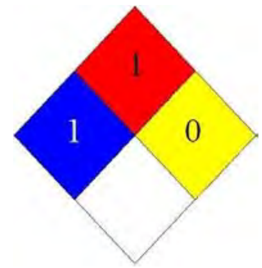
Vendor assumes no respons bility for injury to vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, vendor assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material, even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in their use of the material.

MATERIAL SAFETY DATA SHEET

PRODUCT RELATED HEALTH DATA SHEET

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: LUBRICATING OIL
Binks Part No. 17611-102
MSDS #: MSDS-22
REVISION #: 2.3
DATE REVISED: 03/14/2007 DATE PREPARED: 01/01/2003



ITW Industrial Finishing - Binks
195 Internationale Blvd.
Glendale Heights, IL 60139
Emergency Number - INFOTRAC
EMERGENCY PHONE (24 HOURS):
1-8OO-535-5053
630-237-5000
GENERAL USE: LUBRICATING OIL

2. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENTS

CAS REG NO.	WGT . %	ACGIH TLV	ACGIH STEL	OSHA PEL	OSHA STEL	UNITS
Oil Mist in Air (Not encountered in Normal Use)		5 mg/cubic meter		5 mg/cubic meter		

3. HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS
PRIMARY EXPOSURE ROUTES: Skin – Eyes – Inhalation – Ingestion
ACUTE EFFECTS
Eye: Eye contact may result in irritation.
Skin: Prolonged or repeated skin contact may cause skin irritation.
Ingestion: Minute amounts aspirated into the lungs during ingestion may cause mild to severe pulmonary injury.
Inhalation: Vapor pressure is very low and inhalation at room temperature is not a problem. If overcome by vapor from a hot product mild to severe pulmonary injury may occur.
CHRONIC EFFECTS
Eye: No long-term adverse effects are known.
Skin: No long-term adverse effects are known.
Ingestion: This product has a low order of acute oral toxicity, but minute amounts aspirated into the lungs during ingestion may cause mild to severe pulmonary injury.
Inhalation: If overcome by vapor from a hot product mild to severe pulmonary injury may occur.
CARCINOGENICITY: Not listed as a carcinogen or potential carcinogen by the NTP, IARC, and OSHA.
TARGET ORGAN EFFECTS: None known.
MEDICAL CONDITIONS AGGRAVATED by LONG-TERM EXPOSURE: No known medical conditions are aggravated by exposure to solution.

4. FIRST AID MEASURES

EYE CONTACT: In case of contact, flush eyes with plenty of water for at least 15 minutes or until irritation subsides. Physician should be contacted should irritation persist.
SKIN CONTACT: Remove any contaminated clothing and wash skin with soap and warm water.
HIGH-PRESSURE INJECTION UNDER SKIN: If injected by high pressure under skin, regardless of the appearance or its size, contact a physician IMMEDIATELY. Delay may cause loss of affected part of the body. **NOTE TO PHYSICIANS: In an accident involving high-pressure equipment, this product may be injected under the skin. Such an accident may result in a small somewhat bloodless, puncture wound. However, because of its driving force, material injected into a fingertip can be deposited into the palm of the hand. Within 24 hours, there is usually a great deal of swelling, discoloration and intense throbbing pain. Immediate treatment at a Surgical Emergency Center is recommended.**
INGESTION: If ingested call a physician immediately. Do not induce vomiting.
INHALATION: Vapor pressure is very low and inhalation at room temperature is not a problem. If overcome by vapor from hot product, immediately remove from exposure and call a physician.

5. FIRE FIGHTING MEASURES

FLASH POINT (method): 415 - 475° F (COC)
FLAMMABLE LIMITS
LOWER EXPLOSION LIMIT: 0.9 %
UPPER EXPLOSION LIMIT: 7.0 %
FLAMMABILITY CLASS: None
EXTINGUISHING MEDIA: Foam, Dry Chemical, Carbon Dioxide or Water Spray (Fog)
HAZARDOUS COMBUSTION PRODUCTS: Sulfur Dioxide and Carbon Monoxide.
UNUSUAL FIRE AND EXPLOSION HAZARDS: Do not mix with strong oxidants. Empty containers retain residue. Do not cut, drill, grind, or weld, as they may explode.
FIRE-FIGHTING INSTRUCTIONS/EQUIPMENT: Cool exposed containers with water. Firefighters are to wear Full Bunker Gear and Self Contained Breathing Apparatus (SCBA).
HMIS RATING: See Section 15.

6. ACCIDENTAL RELEASE MEASURES

Steps to be taken in case material is released or spilled: Scrape up grease, wash remainder with suitable petroleum solvent or add absorbent. Keep petroleum products out of sewers and water courses. Advise authorities if product has entered or may enter sewers and water courses.

7. HANDLING AND STORAGE

HANDLING PRECAUTIONS: Keep containers closed when not in use.
STORAGE REQUIREMENTS: Do not handle or store near heat, sparks, flame, or strong oxidants. Store in cool dry place.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

EYE and FACE PROTECTION: Safety Glasses with Side Shields as good industrial practice. If chance of eye contact, wear goggles.
SKIN and HAND PROTECTION: Use oil-resistant gloves, if needed. Use oil-resistant apron if needed.
RESPIRATORY PROTECTION: Normally not needed.
OTHER PERSONAL PROTECTIVE EQUIPMENT: Not required.
ENGINEERING CONTROLS: Local exhaust (Mechanical) should be used to capture fumes and vapors.
ADMINISTRATIVE CONTROLS: Keep this and other chemicals out of reach of

children: minimize body contact with this product as well as all chemicals in general.
OTHER INFORMATION: Remove oil-soaked clothing and launder before use. Use normal hygiene practice. Wash hands thoroughly before eating, drinking, smoking and using restroom after contact. Keep away from children.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Transparent amber oil.
PHYSICAL STATE: Liquid/Oil.
ODOR: Mineral oil odor
ODOR THRESHOLD (PPM): Not established
SPECIFIC GRAVITY (H2O=1): 0.87 – 0.90
SOLUBILITY IN WATER (20ºC) : Negligible
SOLUBILITY IN FAT: Not Determined.
COEFFICIENT of WATER/OIL SOLUBILITY: Not Determined.
PARTITION COEFFICIENT (n-octanol/water): Not Determined.
pH: No data.
MELTING POINT: Liquid.
BOILING POINT: > 550°F.
EVAPORATION RATE (Butyl Acetate=1): < 0.01
V.O.C.: No Data.
Vapor Density (Air=1): > 5
Vapor Pressure (mm Hg): < 0.01
FLASH POINT: / AUTOIGNITION TEMPERATURE: / FLAMMABILITY CLASSIFICATION: /
UNUSUAL FIRE or EXPLOSION HAZARDS: See Section 5
OXIDIZING PROPERTIES: None Known.

10. STABILITY AND REACTIVITY

CHEMICAL STABILITY: Stable.
HAZARDOUS POLYMERIZATION: Will Not Occur.
CONDITIONS TO AVOID: High Temperatures.
CHEMICALS TO AVOID: Avoid contact with strong oxidants like liquid chlorine, concentrated oxygen.
HAZARDOUS DECOMPOSITION PRODUCTS (non-thermal): None known.

11. TOXICOLOGICAL INFORMATION

SENSITIZATION TO PRODUCT: Not known.
IRRITANCY OF PRODUCT: Not Known.
REPRODUCTIVE TOXICITY: Not known.
TERATOGENICITY: Not known.
MUTAGENICITY: Not known.

12. ECOLOGICAL INFORMATION

MOBILITY: Not Determined.
DEGRADABILITY: Not Determined.
ACCUMULATION: Not Determined.
ECOTOXICITY: Not Determined.
OTHER ADVERSE EFFECTS: Not Determined.

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: Dispose of absorbed material at an approved waste disposal facility or site. Disposal should be made in accordance with federal, state and local regulations.

14. TRANSPORT INFORMATION

U.S. D.O.T. PROPER SHIPPING NAME: Not Regulated.
HAZARD CLASS or DIVISION: NONE
I.D. NUMBER: None

15. REGULATORY INFORMATION

OSHA HAZARD STATUS: None.
EPA SARA Sec. 311/ 312 HAZARD CATEGORIES: None.
WHMIS – Canada: Not a controlled product.
TOXIC SUBSTANCES CONTROL ACT (TSCA): All ingredients are on the TSCA inventory or are not required to be listed on the TSCA inventory.
SARA Title III, Section 313, CHEMICALS: Zinc Compounds < 2%
CALIFORNIA Proposition 65 List: Not on List.
NEW JERSEY RIGHT-TO-KNOW HAZARDOUS SUBSTANCES LIST: Not on List.
MASSACHUSETTS RIGHT-TO-KNOW SUBSTANCE LIST: Not on List.
PENNSYLVANIA HAZARDOUS SUBSTANCES LIST: Not on List.
HMIS RATING: HEALTH 1, FLAMMABILITY 1, REACTIVITY 0
NFPA RATING: HEALTH 1, FLAMMABILITY 1, REACTIVITY 0

16. OTHER INFORMATION

MSDS PREPARED BY: Director of Chemical Safety
The information contained herein is based on data available to us and is accurate and reliable to the best of our knowledge and belief. However, ITW Industrial Finishing Binks makes no representations as to its completeness or accuracy. Information is supplied on condition that persons receiving such information will make their own determination as to its suitability for their purposes prior to use. In no event will ITW Industrial Finishing – Binks be responsible for damages of any nature whatsoever resulting from the use of or reliance upon the information contained herein.

*** END OF MSDS ***

Date: 15 October 2007
Supercedes: 15 November 2004

MATERIAL SAFETY DATA SHEET

IN CASE OF EMERGENCY CALL CHEMTREC AT 1-800-424-9300

1. PRODUCT IDENTIFICATION AND COMPANY IDENTIFICATION:

Product Name: **PURELL® INSTANT HAND SANITIZER**

Company Name & Address: GOJO Industries, Inc.
One GOJO Plaza, Suite 500
Akron, OH 44311

Emergency Phone: **1-800-424-9300 CHEMTREC**
Non-Emergency Phone: (330) 255-6000
MSDS Request Phone: (330) 255-6000 x8804

2. INFORMATION ON INGREDIENTS:

HAZARDOUS INGREDIENTS	CAS NUMBER	OSHA PEL	ACGIH TLV	% RANGE
Ethyl Alcohol	64-17-5	1000 ppm	1000 ppm	62
Isopropanol	67-63-0	400 ppm	400 ppm	<5

Other ingredient(s) with notification requirements:	CAS NUMBER	List
Ethyl Alcohol	64-17-5	MA 1; NJ 1S; PA 1; CN 2
Isopropanol	67-63-0	MA 1; NJ 1S; CN 1

3. HAZARDS IDENTIFICATION:

EMERGENCY OVERVIEW
When used according to instructions, the product applicable to this MSDS is safe and presents no immediate or long-term health hazard. However, abnormal entry routes, such as gross ingestion, may require immediate medical attention.

Potential Health Effects:

HMIS: Health 1 Flammability 3 Reactivity 0 Personal Protection None

Eye Contact: May cause eye irritation.
Skin Contact: No irritation or reaction expected.
Inhalation: Not applicable.
Ingestion: May cause upset stomach, nausea (Abnormal entry route).
Carcinogenicity: Not listed as a carcinogen by NTP, IARC, OSHA or ACGIH.

4. FIRST AID MEASURES:

Eye Contact: Do not rub eyes. Flush eyes thoroughly with water for 15 minutes. If condition worsens or irritation persists, contact physician.
Skin Contact: Not applicable.
Inhalation: Not applicable.
Ingestion: Do not induce vomiting. Contact a physician or Poison Control Center.

5. FIRE FIGHTING MEASURES:

NFPA:	Health __0__ Fire __3__ Reactivity __0__
Flashpoint °F/°C (PMCC method):	86.36°F/30.2°C
Unusual Fire and Explosion Hazards:	Product is flammable due to alcohol content.
Special Fire Fighting Procedures:	None known.

Extinguishing Media: __X__ Water Fog __X__ Alcohol Foam __X__ CO_2 __X__ Dry Chemical ____ Other

6. ACCIDENTAL RELEASE MEASURES:

Avoid contact with ignition sources since product is flammable. Absorb onto inert material and dispose in appropriate manner. Water clean up and rinse. CAUTION – WILL CAUSE SLIPPERY SURFACES.

7. HANDLING AND STORAGE:

Keep away from fire or flame. Store at normal room temperature away from reach of small children. Keep containers sealed. Use older containers first. Avoid freezing conditions.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION:

Eye Protection:	None required under normal conditions.
Skin Protection:	None required under normal conditions.
Respiratory Protection:	None required under normal conditions.
Ventilation:	None required under normal conditions.
Protective Equipment or Clothing:	None required under normal conditions.

9. PHYSICAL AND CHEMICAL PROPERTIES:

Appearance and Odor	Clear liquid, citrus fragrance
pH (undiluted):	4.5 – 9.5
VOC , %:	65

10. STABILITY AND REACTIVITY:

Stable/Non reactive product. Avoid ignition sources.

11. TOXICOLOGICAL INFORMATION:

No acute or chronic toxic effects expected when used according to directions.

12. ECOLOGICAL CONSIDERATIONS:

No ecological or special considerations when used according to directions. Not considered environmentally harmful from normal dilution, expected usage and typical drainage to sewers, septic systems and treatment plants.

13. DISPOSAL CONSIDERATIONS:

Characteristic hazardous waste-flammable liquid. Dispose according to local, state and Federal regulations.

14. TRANSPORT INFORMATION:

Hazardous by transport regulations. When transported by Ground and Rail, this product typically is shipped as Consumer Commodity ORM-D. When transported by air, this product is typically shipped as Consumer Commodity or Alcohols N.O.S. depending on package size. When transported by ocean, this product is typically shipped as Limited Quantities. Refer to current regulations for exact requirements.

15. REGULATORY AND OTHER INFORMATION:

TSCA: All ingredients are listed or exempt per reference 15 USC 2602 (2)(B)(iv).

Complies with current FDA regulations for cosmetic and/or over-the-counter drug products.

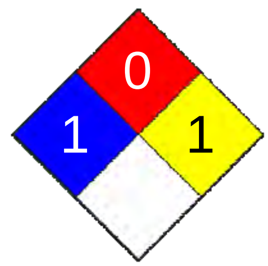
MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

Product Names	Product code: **Sound 911 Horn**: 911PSH, 911PSHR, 911, 9112R, 911C **Mighty Sonic Horn**: MSN, MSNR, **Super Sonic**: SSCN, SSN, SSNR **Push Button**: PBSHN, PBSHNCSH, PBSHNR **Push Button Jr**: PBNJC, PBNJR, **Commander-4**: FC4N, FNR **Super Sound**: SH3, SH3R, **Aqua Blast**: PWH, PWHR
CAS #	Mixture
Product use	Personal Safety – Hand Held Signaling Device
Manufacturer	Falcon Safety Products, Inc. 25 Imclone Drive Branchburg, NJ 08876 US Phone: 1-908-707-4900
Supplier	Falcon Safety Products, Inc. 25 Imclone Drive Branchburg, NJ 08876 US Phone 1-908-707-4900

LEGEND HMIS/NFPA	
Severe	4
Serious	3
Moderate	2
Slight	1
Minimal	0

Health	/ 1
Flammability	0
Physical Hazard	1
Personal Protection	X



2. Hazards Identification

Emergency overview
CAUTION
Contents under pressure. Containers may explode when heated.

Potential short term health effects

- **Routes of exposure**: Eye, Skin contact, Inhalation.
- **Eyes**: Contact with liquid may cause frostbite.
- **Skin**: Contact with liquid may cause frostbite.
- **Inhalation**: Excessive intentional inhalation may cause respiratory tract irritation and central nervous system effects (headache, dizziness). Vapors may cause dizziness or suffocation.
- **Ingestion**: Not a normal route of exposure.

Target organs: Eyes. Skin. Respiratory system.

Chronic effects: Prolonged or repeated exposure can cause drying, defatting and dermatitis.

Signs and symptoms: Symptoms may include redness, edema, drying, defatting and cracking of the skin.

3. Composition / Information on Ingredients

Ingredient(s)	CAS #	Percent
Ethane, 1,1,1,2-tetrafluoro-	811-97-2	60 - 100

4. First Aid Measures

First aid procedures

- **Eye contact**: Immediately flush with cool water. Remove contact lenses, if applicable, and continue flushing for 15 minutes. Obtain medical attention immediately.
- **Skin contact**: Flush with cool water. Wash with soap and water. Obtain medical attention if irritation persists.

Inhalation	If symptoms develop, move victim to fresh air. If symptoms persist, obtain medical attention. If breathing has stopped, trained personnel should administer CPR immediately.
Ingestion	Do not induce vomiting. Never give anything by mouth if victim is unconscious, or is convulsing. Obtain medical attention.
General advice	Do not puncture or incinerate container. If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance. Avoid contact with eyes and skin. Keep out of reach of children.

5. Fire Fighting Measures

Flammable properties	Not flammable by WHMIS/OSHA criteria. Containers may explode when heated.
Extinguishing media	
Suitable extinguishing media	Small Fires: Carbon dioxide. Dry chemical. Large Fires: Water spray. Fog. Foam.
Unsuitable extinguishing media	Not available
Protection of firefighters	
Specific hazards arising from the chemical	Contents under pressure. Pressurized container may explode when exposed to heat or flame. Cool containers with flooding quantities of water until well after fire is out.
Protective equipment for firefighters	Firefighters should wear full protective clothing including self contained breathing apparatus.
Hazardous combustion products	May include and are not limited to: Oxides of carbon. Fluoride gases.
Explosion data	
Sensitivity to mechanical impact	Not available
Sensitivity to static discharge	Not available

6. Accidental Release Measures

Personal precautions	Keep unnecessary personnel away. Do not touch or walk through spilled material. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Keep people away from and upwind of spill/leak.
Methods for containment	Eliminate all ignition sources (no smoking, flares, sparks, or flames in immediate area). Stop leak if you can do so without risk. Prevent entry into waterways, sewers, basements or confined areas.
Methods for cleaning up	Before attempting clean up, refer to hazard data given above. Remove sources of ignition. Although the chance of a significant spill or leak is unlikely in aerosol containers, in the event of such an occurrence, absorb spilled material with a non-flammable absorbent such as sand or vermiculite.

7. Handling and Storage

Handling	Avoid breathing mists or aerosols of this product. Use good industrial hygiene practices in handling this material.
Storage	Keep out of reach of children. Do not store at temperatures above 49 °C (120.2°F). Keep away from heat, open flames or other sources of ignition.

8. Exposure Controls / Personal Protection

Exposure limits

Ingredient(s)	**Exposure Limits**
Ethane, 1,1,1,2-tetrafluoro-	**ACGIH-TLV** Not established **OSHA-PEL** Not established

Engineering controls	Use only under good ventilation conditions or with respiratory protection.
Personal protective equipment	
Eye / face protection	Wear safety glasses with side shields.

Hand protection	If there is constant skin contact, rubber gloves are recommended.
Skin and body protection	As required by employer code.
Respiratory protection	Where exposure guideline levels may be exceeded, use an approved NIOSH respirator.
General hygiene considerations	Handle in accordance with good industrial hygiene and safety practice. When using do not eat or drink. Wash hands and face before breaks and immediately after handling the product.

9. Physical and Chemical Properties

Appearance	Clear.
Color	Colorless
Form	Liquefied gas
Odor	Slight ethereal.
Odor threshold	Not available
Physical state	Gas
pH	Not applicable
Melting point	Not available
Freezing point	Not available
Boiling point	-26.5 °C (-15.70 °F)
Flash point	None
Pour point	Not available
Evaporation rate	Not available
Flammability limits in air, lower, % by volume	Not available
Flammability limits in air, upper, % by volume	Not available
Vapor pressure	662 kPa
Vapor density	3.6 @25°C (air=1)
Specific gravity	1.21 @25°C
Octanol/water coefficient	Not available
Solubility (H2O)	Slightly
Auto-ignition temperature	> 750 °C (> 1382.00 °F)
Percent volatile	100

10. Stability and Reactivity

Chemical stability	Stable under recommended storage conditions.
Conditions to avoid	Aerosol containers are unstable at temperatures above 49°C (120.2°F).
Incompatible materials	Alkaline materials. Alkaline earth metals.
Hazardous decomposition products	May include and are not limited to: Oxides of carbon. Fluoride gases.
Possibility of hazardous reactions	Hazardous polymerization does not occur.

11. Toxicological Information

Component analysis - LC50

Ingredient(s)	**LC50**
Ethane, 1,1,1,2-tetrafluoro-	Not available

Component analysis - Oral LD50

Ingredient(s)	**LD50**
Ethane, 1,1,1,2-tetrafluoro-	Not available

Effects of acute exposure

Eye	Contact with liquid may cause frostbite.
Skin	Contact with liquid may cause frostbite.

Inhalation	Excessive intentional inhalation may cause respiratory tract irritation and central nervous system effects (headache, dizziness). Vapors may cause dizziness or suffocation.
Ingestion	Not a normal route of exposure.
Sensitization	Non-hazardous by WHMIS/OSHA criteria.
Chronic effects	Non-hazardous by WHMIS/OSHA criteria.
Carcinogenicity	Non-hazardous by WHMIS/OSHA criteria.
Mutagenicity	Non-hazardous by WHMIS/OSHA criteria.
Reproductive effects	Non-hazardous by WHMIS/OSHA criteria.
Teratogenicity	Non-hazardous by WHMIS/OSHA criteria.
Synergistic Materials	Not available

12. Ecological Information

Ecotoxicity	Not available
Environmental effects	Not available
Aquatic toxicity	Not available
Persistence / degradability	Not available
Bioaccumulation / accumulation	Not available
Partition coefficient	Not available
Mobility in environmental media	Not available
Chemical fate information	Not available
Other adverse effects	Not available

13. Disposal Considerations

Waste codes	Not available
Disposal instructions	Review federal, state/provincial, and local government requirements prior to disposal.
Waste from residues / unused products	Not available
Contaminated packaging	Not available

14. Transport Information

U.S. Department of Transportation (DOT)

Basic shipping requirements:

Proper shipping name	Refrigerant gas R 134a, mixture
Hazard class	2.2
UN number	3159

Additional information:

Packaging exceptions	ORM-D (applicable to containers up to 1 L)

Transportation of Dangerous Goods (TDG - Canada)

Basic shipping requirements:

Proper shipping name	Refrigerant gas R 134a
Hazard class	2.2
UN number	3159

Additional information:

Packaging exceptions	Limited quantity (containers up to 125mL)

IATA/ICAO (Air)

Basic shipping requirements:

Proper shipping name	Refrigerant gas R 134a mixture
Hazard class	2.2
UN number	3159

Additional information:

Maximum net quantity packaging	75 kg

15. Regulatory Information

Canadian federal regulations	This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.
US Federal regulations	This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200. All components are on the U.S. EPA TSCA Inventory List. CERCLA/SARA Hazardous Substances - Not applicable.

Occupational Safety and Health Administration (OSHA)

29 CFR 1910.1200 hazardous chemical	Yes

CERCLA (Superfund) reportable quantity

None

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories	Immediate Hazard - Yes Delayed Hazard - No Fire Hazard - No Pressure Hazard - Yes Reactivity Hazard - No
Section 302 extremely hazardous substance	No
Section 311 hazardous chemical	Yes

Clean Air Act (CAA)	Not available
Clean Water Act (CWA)	Not available
WHMIS status	Controlled
WHMIS classification	Class A - Compressed Gas

WHMIS labeling

State regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

U.S. - Minnesota - Hazardous Substance List

Ethane, 1,1,1,2-tetrafluoro-	811-97-2	Present

U.S. - New Jersey - Right to Know Hazardous Substance List

Ethane, 1,1,1,2-tetrafluoro-	811-97-2	sn 2744; sn 2745 (flammable)

Inventory name

Country(s) or region	Inventory name	On inventory (yes/no)*
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

16. Other Information

Disclaimer Information contained herein was obtained from sources considered technically accurate and reliable. While every effort has been made to ensure full disclosure of product hazards, in some cases data is not available and is so stated. Since conditions of actual product use are beyond control of the supplier, it is assumed that users of this material have been fully trained according to the requirements of all applicable legislation and regulatory instruments. No warranty, expressed or implied, is made and supplier will not be liable for any losses, injuries or consequential damages which may result from the use of or reliance on any information contained in this document.

Issue date 28-Oct-2009

Effective date 15-Oct-2009

Expiry date 15-Oct-2012

Prepared by Dell Tech Laboratories Ltd. (519) 858-5021

Other information For an updated MSDS, please contact the supplier/manufacturer listed on the first page of the document.

ATTACHMENT B

RESUMES AND CERTIFICATIONS FOR IDENTIFIED SAFETY PERSONNEL

GEORGE M. CRAWFORD, JR., CIH

Registration

Certified in the Comprehensive Practice of Industrial Hygiene, American Board of Industrial Hygiene (#4207; 1989); Recertified (1996; 2002)

Fields of Competence

Environmental health and safety (EHS) management; industrial hygiene (IH); occupational disease assessment; hazardous material site and emergency response training; hazardous materials site emergency response and remediation management; spill prevention and emergency response; and environmental risk assessment. Health and safety, emergency response plans review, development, and implementation. Management of high hazard projects involving hazardous, toxic, and radioactive wastes (HTRW); unexploded ordnance (UXO); and chemical warfare materials (CWM). Extensive knowledge/ application of U.S. Army Corps of Engineers (USACE), Occupational Safety and Health Administration (OSHA), and U.S. Department of Defense (DOD) regulations. Development of Site Safety and Health Plans (SSHPs) and oversight of their implementation.

Education

B.S., Biology—Juniata College (1967)

Credentials

40-Hour Hazardous Waste Site Training Course, OSHA 29 CFR 1910.120(e)(3), WESTON (1987)
8-Hour Hazardous Waste Refresher Course, OSHA 29 CFR 1910.120(e)(8), WESTON (1999)
8-Hour Managers and Supervisors Course (SHSC), OSHA 29 CFR 1910.120(e)(4), WESTON (1999)
10-Hour Construction Safety Training, OSHA 29 CFR 1926, WESTON (1997)
Bloodborne Pathogens Training, OSHA 29 CFR 1910.1030, WESTON (1993)
Bloodborne Pathogens Refresher Training, OSHA 29 CFR 1910.1030, WESTON (2002)
Confined Space Entry Rescue Training, OSHA 29 CFR 1910.146, WESTON (1995)
OSHA Competent Person Training, Fall Protection and Excavation, Miller Troll

Qualifications Summary

- More than 33 years of experience in environmental and industrial health, safety, hygiene, hazardous materials response, and occupational health management.
- Technical manager for construction, remediation, and renovation practice; and high-hazard projects involving UXO, CWM, reactives/explosives, and thermal treatment technologies. Direct oversight of projects with unique hazards, e.g., military chemical agents; UXO; explosives residues in soil; dioxin, asbestos, lead, arsenic, PCBs, MOCA, and mercury; and ionizing radiation. Industrial hygiene projects involving incineration, construction, and reconstruction and demobilization.
- WESTON's Corporate Health and Safety Director for 10 years, responsible for developing/managing/updating the corporate health and safety program. Instructor in HTRW safety and health, and emergency response. Presented more than 80 OSHA 40-hour hazardous waste site training courses, and 200 refresher and site supervisor courses.
- Certified CIH of Record on more than 165 USACE/Army, 45 USAF, and 13 DON TOs involving HTRW investigation, study, design, and remedial action activities. Responsible for WESTON's receipt of 8 USACE safety awards and Army safety award. Directly responsible for more than 1,300,000 hours for USACE with no lost time. Prepared SHERPs and PPE plans ranging from routine to innovative.
- Extensive knowledge of USACE, OSHA, DOD, CWM, and UXO safety regulations.
- Developed WESTON's internal Construction Safety Guidance Document and associated employee safety handbook (distributed to all new construction site employees).

Credentials (Continued)

2-Day DOT Shipping Course, 49 CFR 172 Subpart H, WESTON (2002)
Lead/Asbestos Training, WESTON (1998)
First Aid/CPR Certification, American Red Cross, WESTON (1999)
UXO/CWM Awareness Training (1995)
Managing Ionizing Radiation Programs for Industrial Hygienists (1991)
Biological Monitoring Fundamentals of Industrial Hygiene (1991)
OSHA Site Health and Safety Coordinator (1987)
(Instructed more than 50 40-hour and 50 8-hour refresher and site manager courses on hazardous materials, site activity, and emergency response)
American Industrial Hygienists Association (AIHA)
Special Interest Group, Engineering Industry, AIHA
AIHA Confined Space Entry Committee
OSWER and Labor, Health, and Safety Joint Task Force

Employment History

1983-Present	WESTON
1980-1983	Rollins Environmental Services
1969-1980	Pennsylvania Department of Environmental Resources
1967-1969	Columbia University Medical Center

Key Projects

Health and Safety Management, West Chester, PA, Weston Solutions, Inc., East Division Environmental Health and Safety (EHS) Manager. Served as WESTON's Corporate Health and Safety Director for 8 years; as Construction Safety Manager for 2 years; and currently is East Division Environmental Safety and Health Manager. Develops, manages, and updates the H&S Program to comply with OSHA general industry and construction standards, hazard communication, laboratory hygiene standards, asbestos abatement health and safety requirements, and USACE EM-385-1-1 General Safety Requirements. Achieved OSHA recordable incident rate of 1.5 over past 2 years in the East Division. Received Liberty Mutual Award for Safety Excellence in 2001. In this capacity, developed innovative approaches to implementing employee-based safety and health programs including an Employee Safety Handbook, a blue card system, which is a daily safety planning tool designed to manage changing assignments, and a weekly report card system. Manages corporate health and safety, industrial hygiene, hazardous materials response, and occupational health management for HTRW federal programs. Develops and implements health and safety programs, and personal protective equipment (PPE) at hazardous waste sites. Serves as technical manager for high-hazard projects involving UXO, CWM, reactives, explosives, military chemical agents, and thermal treatment technologies. Direct oversight experience for projects with unique hazards, e.g., military chemical agents, UXO, explosives residue in soil, dioxin, asbestos, lead, arsenic, PCBs, MOCA, mercury, and ionizing radiation. Prepares and/or reviews SSHPs, conducts initial site-specific training for projects requiring Levels A and B PPE, directs air monitoring, and assists project/remediation managers in implementing and complying with safety and health

Key Projects (Continued)

requirements. Conducts monthly construction safety audits, and reviews air monitoring data and accident reports weekly. Provided training for 100 internal/external 40-hour and over 200 refresher and site supervisor courses. Presented 11 emergency response training sessions at U.S. Navy, Marine, and U.S. Department of Energy (DOE) facilities nationwide.

Improvement Program, Barracks Triage, Fort Bragg, NC, CIH. Responsible for ongoing renovation and repair of 7 barracks at Fort Bragg. Activities included removing fan coil units for improved heating, ventilation, air conditioning (HVAC) ambient temperature ranges. Upgrading mechanical room equipment for better HVAC system operations. Converting existing flush valve units to bowl/tank type units for better maintenance of the plumbing systems. Replacing architectural items such as doors, ceiling tile and floor tiles, and windows, and minor painting of hallways and entranceways. Responsibilities include site Health and Safety Plan (HASP) review technical advisor.

West End Airfield Lighting Upgrades, Marietta, GA, Dobbins ARB, GA, CIH. Work involves ongoing renovation of lighting for runway. Responsibilities include site HASP review and approval oversight and technical advisor. Project includes the replacement of West End approach lights and vault electrical upgrade from existing 2,400-Volt system to a standard 480-Volt system.

Miami River Dredging, Miami, FL, USACE Jacksonville District, CIH. Project involved dredging of the Miami River, Miami, FL, dewatering of dredged materials, and transportation of materials. Supervised development of the site HASP and approved plan. Served as Program Safety and Health Manager performing both oversight and on-site safety officer functions, including training, air monitoring, and plan enforcement.

High-Temperature Indirect Thermal Desorption Treatment of Contaminated Soils, Coleman-Evans Superfund Site, Whitehouse, FL, CIH. Project involved the excavation of pentachlorophenol/dioxin contaminated soils and thermally treating the soil to remove the contaminants. Supervised development of the site HASP and approved plan. Served as Program Health and Safety Manager performing both oversight and on-site safety officer functions including training, air monitoring, and plan enforcement.

Coffey County Landfill Gas Collection System Installation, Arnold AFB, Tullahoma, TN, CIH. Project involved the installation of a gas collection system on an existing landfill where medical waste, UXO, and methane gas were known or anticipated hazards. Supervised development of the site HASP and approved plan. Served as Program Health and Safety Manager performing both oversight and on-site safety officer functions including training, air monitoring, and plan enforcement.

Remediation and Restoration for Early Transfer of Former Mare Island Naval Shipyard, Vallejo, CA, NAVSEA and NAVFAC, CIH. Developed transition EHS Program, reviewed Safety Plans, assisted in developing Asbestos Contractor Plans and submittals approved by CAL-OSHA, and provided industrial hygiene support services during program implementation. Services were provided under various firm fixed price (FFP) TOs issued through the $12 million NAVSEA Quick Response contract and the $54.9 million guaranteed fixed price remediation (GFPR) NAVFAC SW contract.

Key Projects (Continued)

Rapid Response/Immediate Response, Nationwide, U.S. Army Corps of Engineers (USACE), Omaha District, CIH. Developed template for plans preapproved by USACE and used to expedite preparation of site-specific HASPs. Approved all Work Plans, Site Safety and Health Plans (SSHPs), Construction Sampling and Analysis Plans (CSAPs), and Site-Specific Construction Management Plans (SSCMPs) to address health and safety factors, including chemical, physical, and biological hazards for all 65 task orders (TOs). At Fort Greely, AK, served as technical resource in conferring with regulatory agencies and other USACE districts. Acted as technical resource during all aspects of sampling for immediate response, bio-terror attacks, and postal facilities nationwide. The WESTON Rapid Team has successfully achieved 250,000 work hours without a lost time incident on this $65 million contract. Provided oversight during all sampling activities for emergency response anthrax sampling and testing. At Eastland Woolen Mill Superfund site remedial activities, conducted quarterly site audits to review implementation of the EHS program.

Base Environmental Support Services, Aberdeen Proving Ground (APG), MD, Directorate of Safety, Health, and Environment (DSHE), Health and Safety Manager. For this $100 million restoration, compliance, conservation, and pollution prevention (P2) TO cost reimbursable contract, has overall responsibility for health and safety, and develops and implements the programmatic HASP. Supervised 10 site safety personnel on 85 projects under this contract. Responsible for overall site health and safety on all DSHE/WESTON projects. Ensures all operations are in compliance with plan. Reviews all TO HASPs, Safety, Health, and Emergency Response Plans (SHERPs), and SSHPs to ensure compliance with program plan, and performs health and safety performance audits on individual TOs. To date, the contract has achieved 40,000 hours of work without a lost time incident, on projects including Levels A, B, C, and D personal protective equipment (PPE), and self-perform UXO location and identification projects.

- Used template for HASPs that have been preapproved to ensure better quality HASPs are provided more efficiently.
- Use of cooling suits for hot weather and thermal protection for cold weather work resulted in maintenance of productivity, even when working in Level B protection.

Key projects under this contract include:

- J-Field Burn Pit and Push Out Area—Hand and machine excavation of soil potentially containing UXO and CWM in non-metal containers as well as metals. Provided SSHP review and approval, training in Level A and Level B PPE, and assisted with development of methodology to allow machine excavation.
- J-Field Shoreline—Place stabilizing media along J-Field shoreline working in cold weather and, in many cases, in water.
- Phillips Landfill—Capping 5- and 10-acre segments of landfill.
- Canal Creek Water Treatment Plant—Design and manage construction of groundwater treatment plant to be constructed in existing facility. Project involved asbestos and lead abatement, and demolition prior to the construction management.

Key Projects (Continued)

Time-Critical Removal, U.S. Patent and Trade Office Site, Alexandria, VA, Project Safety Manager. Project involved the surgical excavation and removal of 750,000 cubic yards of soil contaminated with petroleum hydrocarbons, lead, arsenic, and PCBs. The job involved heavy construction and hauling of soils in a restricted space within a heavily populated and congested area. An aggressive perimeter air monitoring program was developed as well as a noise reduction process. Traffic to and from the site was restricted to certain streets and times. One portion of the site had been used as a landfill and later as a salvage yard. Previous work on-site had encountered military items and unknown cylinders. Contingency plans were developed and coordinated with local emergency responders for finding UXO and cylinders. The SSHP was designed to anticipate the encounter of these objects as well as asbestos, medical waste, and USTs. Developed health and safety program incorporating an automated perimeter air monitoring system with six measuring stations and a meteorological tower to measure, record, and warn against migration of VOCs and dusts. Audited construction activities biweekly during this $23 million excavation/contaminated soil removal project.

HTRW and A&E Contracts, Various Locations, USACE New England District (CENAE), CIH. Devised a safety planning process for HTRW contracts including development of an overall safety program and site-specific HASPs to be utilized for individual TOs under this $49 million contract. Reviews all HASPs; conducts field audits to ensure compliance with CENAE and WESTON Health and Safety Program, as well as OSHA regulations. Served as CIH for 6 CENAE projects that received outstanding CCASS ratings. Served as on-site safety and health manager for major portions of the $10 million Watertown U.S. Army Materials Testing Laboratory (AMTL) site. Played a key role in WESTON receiving CENAE's Safety Contractor of the Year Award in 1997.

HASPs, Various Locations Worldwide, U.S. Air Force Programs, AFCEE RAC/ENRAC/ WERC Contracts, Health and Safety Manager. Reviewed and approved HASPs for 60+ U.S. Air Force multimillion dollar programs including $61.5 million Remedial Action Contract (RAC), $114 million Environmental Remedial Action Contract (ENRAC), and $174 million Worldwide Environmental Restoration and Construction (WERC) Contract. Locations included Hachinohe Terminal, Yokosuka, Japan; and Pease, Kelly, Barksdale, and McConnell Air Force Bases (AFBs). Work involved asbestos, pesticides, heavy metals, polychlorinated biphenyls (PCBs), solvents, and petroleum, oil, and lubricants (POL). Ensured compliance with Occupational Safety and Health Administration (OSHA) and other regulations, conducted incident investigations and field site inspections, managed Material Safety Data Sheet (MSDS) programs, and developed and monitored routine medical examination and emergency medical care.

- Used template for HASPs that have been preapproved by AFCEE to ensure better quality HASPs are provided more efficiently.

HTRW Contract, USACE, Baltimore District, Health and Safety Manager. Directed and approved the implementation of field activities for adherence to safety, health, and emergency response plans (SHERPs); compliance with USACE safety requirements; OSHA; and other requirements. Responsible for medical monitoring, respirator fit testing, and training required by

Key Projects (Continued)

29 CFR 1910.120. Ensured appropriate health and safety measures were followed by subcontractors on this $15 million, 3-year contract.

Remedial Action Contract (RAC) Multiple Delivery Orders, CENAE, Certified Industrial Hygienist (CIH). Reviewed safety plans, and provided training and auditing of projects ranging from demolition to asbestos, to facility decontamination, to UXO. Recognized for Safety Achievement by CENAE in 1997.

Facility Decommissioning, Babcock and Wilcox, Mound, OH, DOE, CIH. Revised safety plans and monitored radiation for decontamination and turnover of government-owned, contractor-operated DOE facility structures for commercial development.

- Evaluation of on-site medical facilities resulted in recommendation of outsourcing, thereby reducing costs for the overall contract.

Housatonic River Project, Pittsfield, MA, U.S. Environmental Protection Agency (EPA) and USACE, CIH. As the CIH for the Housatonic River project (a 5-year $150 million PCB removal action), developed and implemented the health and safety program; performed initial site-specific training; directed air monitoring program; assists project superintendents in implementing the health and safety program. As CIH, visits the site monthly during sampling and construction activities, and is available for emergencies as needed. Oversees the activities of the SSHO, who reports directly to him. Reviewed and approved all safety and health plans and amendments. Performed reviews of safety program with Program Manager. Instituted self-safety audits with no safety incidents recorded. Under his direction, WESTON received the USACE's Safety Contractor of the Year Award.

Incineration of Contaminated Soils, Alabama Army Ammunition Plant, AL, USACE, Mobile District, CIH. Supervised safety and health during assembly and operation of high-temperature incinerator and feed stock excavation and preparation. Work was performed in Levels B-D PPE. Contaminants of concern were TNT, lead, and asbestos. Reviewed and approved SHERP and amendments. Visited site monthly for safety and health training and inspection. Supervised 3 S&H Officers and 4 Safety Monitors. Earned 7 safety awards over 4 years.

Submerged Quench Incinerator (SQI) Design/Construction/Operation, Hazardous Waste Management, Rocky Mountain Arsenal (RMA), USACE, CIH, Program Safety Officer. Reviewed/approved the SHERP for the CPFF SQI project designed to treat 11 million gallons of highly toxic liquid wastes. Provided initial training, established PPE levels of B-D, and audited safety program implementation. Supervised 2 Site Health and Safety Officers, and 2 Safety Technicians for 3 years. Project was completed on time with no OSHA-recordable accidents in more than 200,000 hours of work. Project received 2 Safety Awards from the Secretary, Department of the Army. Surveyed drums with potential CWM contamination, and managed drum handling and storage after characterization. Maintained hazardous waste containment facility and surveyed decontaminated buildings for asbestos-containing materials (ACM). Reviewed and determined levels of protection B-D and risk analysis.

Key Projects (Continued)

SQI Operation, RMA, Shell Oil/Morrison-Knudson, Program Safety Officer/CIH. Reviewed and approved the SHERP, provided technical guidance to the Site Safety Officer, and audited the project three times annually during the 3 years of operation. WESTON provided the maintenance and health and safety management during the management phase of the SQI. The SQI treated liquid with very high salt content in a high-temperature process. Operations hazards included hot surfaces and liquids, corrosives, 50% and 35% caustic solutions, acid treatment systems, and operation and maintenance (O&M) of the five-story complex. This phase of work also was completed without a lost time accident.

Groundwater Treatment Plant (GWTP), Construction and Operation, Old O-Field, Aberdeen Proving Ground, MD, USACE, Omaha District, Health and Safety Manager and CIH. Managed all health and safety activities during construction startup and initial phase of operation of the GWTP. Field crews performed work in PPE Levels A-D. Contaminants included CWM decomposition products, metals, and hydrocarbons. Periodically performed safety and health inspections and training. This project involved preparing and constructing a permeable infiltration unit (PIU) or cap over a 5-acre site contaminated with CWM, UXO, industrial chemicals, explosives, and reactive chemicals. Site preparation included UXO surveys and clearance, construction of roadways, and erosion control measures. PIU placement involved use of remotely operated, low-ground-pressure construction equipment protection. Supervised Site Safety and Health Officer for 2 years.

Old O-Field Permeable Infiltration Unit (PIU), APG, Aberdeen, MD, USACE, CIH and Health and Safety Manager. Responsibilities include overall management of the Health and Safety Program for this extremely sensitive and high-hazard project including safety plan development, air monitoring strategy development, risk assessment, Levels A and B PPE and emergency response training, and supervision of five Site Safety and Health Officers and technicians. This project involves preparation for and construction of a PIU or cap over a 5-acre site contaminated with CWM, UXO, industrial chemicals, explosives, and reactive chemicals. Site preparation included UXO surveys and clearance, construction of roadways, and erosion control measures. PIU placement involves use of remotely operated, low-ground-pressure construction equipment; operation of equipment in Level B protection; EPA Level A entries for UXO and container evaluations and response; fire contingency planning; and fire suppression system installation and management. The project proceeded with no lost time accidents in over 200,000 labor-hours of work. This achievement was recognized through a commendation from USACE.

Interim Remedial Measures (IRMs), APG, Aberdeen, MD, USACE, CIH. Reviewed all SHERPs, SSHPs, and plan amendments, and addenda for 15 cradle-to-grave delivery orders (DOs). Served as consultant to the Project Safety Officer and audited project for health and safety concerns. Reviewed and determined levels of protection, risk analysis process and CWM monitoring procedures, and quality assurance (QA) programs. Worked with military agencies and chemical protective clothing manufacturers to review PPE requirements and determine an effective approach. Approved final level of protection selection for sites involving potential military chemical agent contact.

Key Projects (Continued)

All DOs had high-hazard aspects, including potential encounter with UXO hazards and CWM, requiring UXO surveys and clearance for all DOs.

Unique hazards required development of additional special health and safety protocols such as:

- The first DO involving field work included decontaminating an underground tank containing a tearing agent. Level B protection was used, and a negative pressure containment cell was constructed around the work area.
- At Graces Quarters, disposal pits were excavated, which included potential UXO and CWM encounters that required close coordination with equipment operators, UXO contractors, and base Technical Escort Units (TEUs). Work also involved CWM monitoring, Level B PPE, operation of boats, and implementation of heat stress prevention protocols.
- At the Adamsite area, developed confined-space entry procedures for conducting sampling and instituted arsenic monitoring. A demolition plan was developed, but not implemented.
- At the Nike Missile site, confined-space entry protocols were implemented to enter and survey six underground missile vaults, remove lead paint and asbestos-containing materials (ACMs), and sample for PCBs prior to filling the vaults with a flowable fill. This task required rigid traffic control of 50 to 60 cement mixers traveling from Aberdeen to Edgewood.
- At the 26th Street site, where the excavation was similar to that at Graces Quarters, radiation contamination was encountered. Health physics resources were mobilized, and work continued safely. The health physics support was instrumental in assisting the base in dealing with regulatory issues and agencies.
- At Old O-Field, a groundwater assessment and containment well system was installed. Work was conducted in Level B PPE, and CWM monitoring was conducted. Following completion of this phase, a groundwater treatment facility (GWTF) was constructed.
- Used innovative technology, i.e., remotely operated equipment, to minimize time spent in Level A PPE, thereby reducing risks to individuals.

The achievement of more than 200,000 labor-hours without a lost time accident was formally recognized by USACE. Achieved significant cost savings by demonstrating that the Old O-Field GWTP did not have to meet “maximum credible event” criteria, and was commended by USACE for completing 4 years on the project without a lost-time incident.

The Old O-Field GWTF was designed by WESTON and built under the direction of WESTON. The GWTF is designed to treat the contaminated groundwater from Old O-Field. Contaminants included volatile hydrocarbons, metals, acids, and CWM breakdown products. The construction phase lasted almost 9 months and involved contracting with numerous tradespersons such as masons, concrete workers, pipefitters, electricians, and heavy equipment operators. This phase of the project was completed without a lost time injury.

Once construction was completed, WESTON assumed responsibility for operating the GWTF. The GWTF has treatment processes for acids, volatile organics, and CWM breakdown products.

Key Projects (Continued)

Treatment chemicals included sulfuric acid, caustics, hydrogen peroxide, sodium hypochlorite, lime, and polymer. Treatment technologies included filtration, neutralization, and ultraviolet light (UV) oxidation. This phase of work was completed without a lost time accident.

Multiple Projects, Picatinny Arsenal, NJ, USACE, CIH. Responsible for the review of all SHERPs, amendments, and addenda under this multiple, concurrent DO. Served as consultant to the Project Safety Officer, and audited the project for health and safety concerns. A key project included assessment of an explosives production process contaminated with explosive and reactive chemical residues. This involved use of remotely operated cameras to enter piping and assess crystalline deposits. Once contamination had been mapped, the piping was neutralized, decontaminated, and opened. The building housing the process was decontaminated, and asbestos and lead paint were removed following OSHA and EPA requirements. The building was successfully flashed to remove any traces of reactive contaminants.

Preplaced Remedial Action Contract (PRAC), Colorado, RMA, USACE, Program Safety Director, CIH. Responsible for surveying drums with the potential for chemical surety material (CSM) contamination, managing drums after characterization, maintaining a hazardous waste containment facility, and decontamination and surveying a building on the facility for ACM. Many buildings surveyed had been used in CSM production. Instrumental in review and determination of levels of protection (LOPs) and the risk analysis process.

Milan Army Ammunition Plant, Milan, TN, USACE, CIH. Provided CIH oversight, safety plan review, support of Site Safety Officer, and monthly auditing. Project involved extension of a landfill cap at Milan AAP. Project was principally a construction project and involved concrete work, excavation, and application of a clay and synthetic cap tied into the existing cap. Project was completed without a lost time accident.

HASPs and Field Operations Monitoring for Investigations and Remediation of U.S. Army Installations, Nationwide, USACE (Various Divisions), CIH. Provided oversight of preparation of HASPs and field work involving drilling and sampling at Volunteer AAP, Louisiana AAP, Umatilla AD, and Tooele AD (ordnance and explosive waste [OEW] and CWM were present). Worked with military agencies and chemical protective clothing manufacturers to review PPE requirements and to determine an effective approach acceptable to all parties. Approved final level of protection selected for sites involving potential military chemical agent contact. Performed similar work on remediation activities involving UXO and CSM at APG and Picatinny Arsenal.

Development of Health and Safety Program, Rocky Flats, CO, Rockwell International, Health and Safety Manager. Provided oversight of initial development of the health and safety program for the work performed by WESTON beginning in 1984. Reviewed and recommended training materials and programs for Rockwell, and provided training to WESTON personnel. Made regular visits to site to review conformance with the health and safety program, and reviewed and approved site-specific HASPs throughout the duration of the project.

Health and Safety Management, Pennsylvania, WESTON, Corporate Health and Safety Director. Developed, managed, and updated the health and safety program, as well as conducted training in and monitoring of conformance with the provisions of the health and safety program.

Key Projects (Continued)

Managed a staff of up to 15 persons and maintained an indirect management role with 50 Safety Officers. Instituted a practice of annual Safety Officer meetings, providing technical skill development.

Health and Safety Management, Spill Prevention and Emergency Response Technical Assistance Team (TAT) Multimillion Dollar Contract, New Jersey, EPA, Division Safety Officer. As the CIH for the cost-reimbursable, cradle-to-grave TAT contract, implemented the health and safety program, trained personnel for emergency response and hazardous materials site safety, audited conformance with the program, and assisted with management of the Corporate Health and Safety Program. Supervised 17 Safety Officers at various offices nationwide for 3 years (Safety Levels A, B, C, D).

Emergency Response Training, Various Locations, U.S. Navy, Naval Energy and Environmental Support Activity (NEESA), Training Manager. Developed, managed, and presented 11 emergency response training sessions at U.S. Navy and Marine facilities throughout the United States. In this same period, provided similar courses at U.S. Department of Energy (DOE) facilities at Rocky Flats, Fernald, and Los Alamos National Laboratory.

Hazardous Waste Site Training, Various Locations, Multiple Clients, Project Manager. Developed, managed, and provided training in more than 100 internal and external 40-hour training courses.

PCB Site Assessment and Emergency Action, Various Locations, EPA, TAT Contract, Industrial Hygienist/Toxicologist. Provided management and safety monitoring of assessments, sampling programs, and removal actions at PCB sites. Activities included safety protocol development, environmental assessment, and supervision of safety activities at PCB disposal and incineration sites.

Dioxin Site Assessments and Emergency Response Actions, New Jersey and Virginia, EPA, TAT Contract, Industrial Hygienist/Toxicologist. Managed the assessment and cleanup of dioxin-contaminated sites. Activities included sampling; developing cleanup, stabilization, and treatment processes; and safety management of cleanup contractors.

General Hazardous Waste Site Assessments and Emergency Response Actions, Various Locations, EPA, TAT Contract, Industrial Hygienist/Toxicologist. Provided management and safety monitoring of assessments, sampling programs, and removal actions at asbestos, pesticide, and volatile organics hazardous waste sites.

Dioxin Disposal Technology Assessment, Times Beach, MO, Confidential Client, Project Safety Manager. Provided safety management of a high-temperature dioxin decontamination testing process. Project included developing air-sampling strategies, as well as worker protection procedures, providing site-specific training, and implementing the air monitoring and decontamination sampling schemes.

Hazardous Waste Incinerator, New Jersey, Rollins Environmental Services, Safety Supervisor. Designed, managed, and implemented a health, safety, and emergency response program at a hazardous waste incinerator. Duties included training, emergency response team development, waste stream safety plan development, air sampling protocol development and

Key Projects (Continued)

implementation, safety plan development and audits of field services unit, medical program development, and management of a $1.2-million health and safety program and equipment budget. Reduced injury rate by 50% and lowered Workers' Compensation Experience Modification Rate to less than 1.0.

Industrial Hygiene, Pennsylvania, Pennsylvania Department of Environmental Resources (PADER), Industrial Hygiene Supervisor. Provided management and enforcement of industrial hygiene programs in two regional offices of PADER. Included conducting industrial hygiene surveys, authoring citations, and assisting with compliance plan preparation.

Occupational Health Assessment, Pennsylvania, Pennsylvania Department of Health, Technician. Managed occupational health mobile laboratory studies of coal miners and other occupations at risk from exposure to pneumoconiosis-producing dusts. Other projects included monitoring occupational health data from key Pennsylvania industries, reporting findings to occupational physician staff, and coordinating relevant industrial hygiene studies.

Publications and Presentations

Crawford, G.M., Jr. 1990. "Health and Safety at Hazardous Waste Sites." Presented at American Industrial Hygiene Association, Delaware Valley Section Meeting, Philadelphia, PA.

Crawford, G.M., Jr. 1990. "Hazardous and Radioactive Laboratory Materials Handling, Storage and Disposal." Presented at International Society of Pharmaceutical Engineers, North Carolina Seminars, Raleigh, NC.

Crawford, G.M., Jr. 1985. "Health and Safety Training at Hazardous Waste Sites." Presented at HazPro Workshop, Baltimore, MD.

Crawford, G.M., Jr. 1971. "Life Expectancy of Pennsylvania Coal Miners." *Archives of Environmental Health*.

Crawford, G.M., Jr. 1969. "Development of Patterns of Coal Workers' Pneumoconiosis." Proceedings of the National Academy of Sciences Conference on Coal Workers' Pneumoconiosis.

LAWRENCE J. WERTS, III

Qualifications Summary

- Twenty-two years of professional experience.
- Eleven years of experience as a sampling/process technician. Duties include sampling soils, groundwater, surface water, and building surfaces; and pilot studies involving activated carbon, ion exchange, and activated aluminum technologies.
- Three years of experience coordinating reviews of aboveground storage tank (AST) compliance with federal regulations.
- One year of experience sampling asbestos for use in risk analyses and real estate assessments.
- Four years of experience coordinating training activities for an Army Reserve Unit.
- Three years of experience as an operator of a radioactive waste processing unit. Duties include personnel monitoring.
- Two years of experience providing training and inspections in hazardous waste management requirements.

Fields of Competence

Construction and operation of pilot systems; environmental sampling; soil, groundwater, lagoon, destructive, and wastewater sampling; management and preparation of wastestream profiles for an environmental laboratory; and coordination of movement of hazardous materials over public highways.

Credentials

8-Hour Hazardous Waste Refresher Course, OSHA 29 CFR 1910.120(e)(8), WESTON (2011)
30-Hour Construction Safety and Health Training Course, OSHA 29 CFR 1926 Subparts C, E, M, P, & X, WESTON (2007)
40-Hour Hazardous Waste Site Training Course, OSHA 29 CFR 1910.120(e)(3), WESTON (1988)
Dangerous Goods Shipping Procedures, 49 CFR 172 Subpart H, FedEx (2000)
Dangerous Goods Shipping Waste, 49 CFR 172 Subpart H, PADEP (2002)
CPR/First Aid Training, Medic First Aid(2009)
The Emergency Program Manager, Federal Emergency Management Agency (FEMA) (1990)
Emergency Management U.S.A., FEMA (1991)
Hazardous Materials: A Citizens Orientation, FEMA (1991)
Radiological Emergency Management, FEMA (1991)
Preparedness Planning In Nuclear Crisis, FEMA (1991)
Fundamentals Course for Radiological Monitors (1992)

Employment History

1988-Present WESTON
1990-Present U.S. Army Reserve:
  1997-Pres U.S. Army Intelligence Operation Detachment, Washington, DC.
  1995-1996 U.S. Army Corps of Engineers (Philadelphia District)
  1990-1995 FEMA
1987-1988 Alternative Ways, Inc.
1983-1987 New Jersey Department of Defense
1980-1983 Hydro Nuclear Services
1977-1980 Philadelphia Inquirer

Key Projects

Technical Operations and Maintenance, Pennsylvania, Confidential Client, Technician. Oversee the operation of six groundwater remediation systems. Responsibilities include minor electrical repairs and the rehabilitation of groundwater pumps and managing the overall sampling of the six remediation systems.

Technical Operations and Maintenance, Gibbsboro, NJ, Confidential Client, Technician. Oversee the operation of a Thermal Oxidizer and Product Recovery System and perform minor adjustments on both.

Hazardous Waste Management Training and Inspections, Philadelphia, PA, Philadelphia International Airport, Division of Aviation, Technician. Co-authored a training manual and presented training on hazardous waste management, and provide airport facilities personnel with technical advice on management of hazardous and non-hazardous waste by way of monthly inspections.

Air Monitoring for Abandoned Pipeline Removal, Philadelphia, PA, Philadelphia International Airport, Division of Aviation, Technician. Provided emergency air monitoring immediately after a 10-foot, 18-inch-diameter pipe was encountered during construction activities at the airport. This was followed by additional air monitoring and construction oversight during the safe removal of the pipe.

Hazardous Waste Removal, Philadelphia, PA, Philadelphia International Airport, Division of Aviation, Technician. Provided sampling and oversight for the removal of numerous waste drums from airport property. Also made arrangements with a subcontractor for the safe disposal of the drums.

Soil Sampling, Philadelphia, PA, Philadelphia International Airport, Division of Aviation, Technician. Collected more than 150 soil samples to determine levels of total petroleum hydrocarbons. Using a field screening kit, determined areas needing further characterization.

Absorption Pilot System Installation and Operations Project, Various Locations, U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), Senior Crew Chief. Installed and operated a granular-activated carbon (GAC) alumina and ion exchange resin adsorption pilot system for the removal of explosives, arsenic, and volatile organic compounds (VOCs) from groundwater. Sampling, plumbing of columns, pumps, air stripper, tanks, and laboratory data management.

Soils Characterization, Various Locations, Confidential Client, Senior Technician. Characterized petroleum- and polychlorinated biphenyl (PCB)-contaminated soils from natural gas compressor stations. Project included the mapping and collection of soil, water, destructive, wipe, and groundwater samples.

Water Characterization, Industrial Manufacturing Facility, AVTEX Fibers, Senior Technician. Characterized water contaminated with zinc from unknown sources at a large industrial manufacturing facility. The project included remote sampler setup, lithium chloride testing, and stormwater system mapping.

Key Projects (Continued)

Groundwater Characterization, Tooele Army Depot, Tooele, UT, Senior Technician. The project included installation and operation of a small scale air stripper collecting samples of Trichloroethylene (TCE) to evaluate the effectiveness of removing TCE from groundwater.

Groundwater Sampling, Chattanooga, TN, U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), Senior Crew Chief. Conducted groundwater monitor well sampling, both on-site and domestic.

Weir Construction, Iron Mountain, CA, ICI, Senior Crew Chief. Assisted in the construction of weirs in remote locations. In addition, assisted in the installation of measurement devices.

Planning and Coordination, Pennsylvania, Chester County, FEMA, Plans/Operations NCO. Duties include the review and production of plans and the implementation of procedures relating to attack preparedness, radiological defense, and shelter. Review of nuclear power plant emergency procedures and emergency plans. Review of Nuclear Material License in Chester County. In addition, participates in the review of Part B applications regarding public safety and radiological exercises at nuclear power plants.

Sludge Dewatering Study, Delaware, Star Refinery, Senior Technician. Monitored sludge dewatering unit operations and conducted sludge sampling for process control/monitoring purposes.

Drum Removal, Lanchester Landfill, Chester County, Senior Technician. Oversaw the removal and overpacking of buried drums in Level B protection.

Remedial Investigation/Feasibility Study (RI/FS), Massachusetts, U.S. Army, Senior Technician. Sampling and data evaluation for a U.S. Army site whose mission involved the production and handling of depleted uranium, beryllium, heavy metals, organics, and radionuclides associated with the operation of a nuclear reactor on-site. Assisted the field team leader in scheduling and overseeing field operations, attended public meetings, and assisted in data interpretation. In addition, involved in the radiological surveys of buildings, including reactor building survey, and sanitary and stormwater pipes. Team leader providing health physics support for a mixed waste study, including drum sampling, equipment, contractor, and environmental sampling.

Decontamination Support and Health Physics Support, Various Locations, Public Service Electric and Gas Company (PSE&G), Salem Nuclear Generating Station, Indiana and Michigan Electric Company, Donald C. Cook Nuclear Power Plant, Decontamination Technician, Respirator Fit Test Technician, Whole Body Count Technician, Health Physics Technician, and Radwaste Technician. Operator of a mobile counting laboratory and a radioactive waste processing unit involved in all type of decontamination motion work (floors, tools, walls, tanks, pumps, steam generators, reactor cavities, reactor parts, sump, and all other equipment associated with a nuclear power plant). Involved in health physics support (including radiation surveys, air monitoring, as low as reasonably achievable (ALARA) planning in high-radiation areas, to routine surveys of all types of equipment).

Key Projects (Continued)

Lead-Based Paint Sampling, Fort Drum, NY, U.S. Army Corps of Engineers (USACE), Senior Technician. Involved in the development of a sampling procedure to obtain representative samples of building debris on a weight basis. Acts as a Team Leader in the sampling of 253 buildings slated for demolition.

SHARON R. SPERBER, CIH

Qualifications Summary

- More than 20 years experience in environmental safety for industry-leading organizations.
- Ability to react calmly and effectively in emergency situations.
- Sound knowledge of federal, state and local safety regulations, protocols, and/or procedures.
- Ability to develop, implement, and enforce safety programs and protocols.
- Ability to investigate and analyze information and to draw conclusions.
- Build credibility, establish rapport, and maintain communications with stakeholders at multiple levels, including those external to the organization.
- Solid ability to work effectively with diverse populations.
- Strong communication skills and able to convey technical information to non-technical personnel.

Registration

Certified in the Comprehensive Practice of Industrial Hygiene, American Board of Industrial Hygiene (#3061; 1989); Recertified (2008)

Education

Wilmington University, DE, Masters of Science in Management (2008)
Hunter College, NY, Masters of Science in Environmental Health (1982)
City College of New York, NY, Bachelor's of Art in History, minor Education (1972)

Credentials

40 Hour HAZWOPER Training (2011)
OSHA 510 Construction Safety (2008)
OSHA 1910 General Industry (2007)
Operation Lifesaver, Inc. (www.oli.org) Presenter (2009)
TSI – Intermediate Bus Accident Investigation (2008)
TSI – Managing Transit Emergencies (2010)
TSI- Transit System Security (2010)
Track Safety (2010)
CPR/AED (2011)

Employment History

2011-Present WESTON [9-11 to Present; West Chester, PA; Safety Office Manager]
2011-2011 Southeastern Pennsylvania Transit Authority (SEPTA) [6-06 to 8-11; Philadelphia, PA; Safety Officer]
2002-2005 University of Delaware, Newark, DE [1-89 to 2002; Wilmington, DE; Occupational Health & Safety Specialist]
1987-2002, 2006 SRS Environmental Consultants, Wilmington, DE [Wilmington, DE; President]

Key Projects

BCM Engineers, Inc., Plymouth Meeting, PA, Section Manager. Marketed Industrial Hygiene Services in the Delaware Valley, expanded operations to include NYC and Boston, MA office. Prepared proposals and qualification

Key Projects (Continued)

packages for prospective clients. Managed Asbestos Abatement Group. Prepared bid specifications and attend pre-bid and construction meetings. Organized and lectured seminars on Industrial Hygiene/Asbestos. Prepared Health and Safety Plans for Hazardous Waste Sites Evaluated and prepared Operations and Maintenance Programs. Provided QA/QC to Industrial Hygiene and Safety Group for OSHA and State regulations. [1986-1990]

Phoenix Safety Associates, Ltd, Phoenixville, PA, Manager, Industrial Hygiene Services. Managed occupational health and safety surveys performed by the company. Managed abatement projects and prepared asbestos specifications. Implemented and developed hazard communication, asbestos and health and safety plan programs and related training for private clients. Supervised environmental risk assessments at hazardous waste sites locally and Rocky Mountain Arsenal. Prepared SARA reports for clients. [1985-1986]

Hygienetics, Inc., Jersey City, NJ, Senior Industrial Hygienist. Evaluated and designed practical and effective solutions for all asbestos exposure concerns. Surveyed buildings to locate friable asbestos designed and prepared bid documents for appropriate corrective actions and provided clearance monitoring. Supervised all required corrective actions and compliance air monitoring services. Provided industrial hygiene and environmental health consulting services ranging from one-day surveys to multi-year projects for both government and private clients. [1984-1985]

American Insurance Services Group, Inc. NYC, Environmental Health Specialist, Engineering Department. Developed analytical method to assess safety, health and environmental control strategy, cost effectiveness. Developed and conducted syllabus for the training of loss control personnel in industrial hygiene. Researched and prepared bulletins for use by field personnel on safety, environmental health and industrial hygiene-health effects of toxic substances. Prepared training and directives for interpretation of the Resource Conservation and Recovery Act and the Hazard Communications Act. Conducted field surveys and prepared reports with recommendations for accounts. [1980-1984]

Publications and Presentations

Sandblasting Lead Based Paint in the Interior of a Historic Building – (AIHCE) – Atlanta, GA 2004 (CHEMA) Philadelphia, PA 2005
Training requirements for Right-to-Know, RECRA, CERCLA, State College, PA.
Insurance Industrial Hygiene Forums: Detroit, MI, Philadelphia, PA, Cincinnati, OH, Portland, OR, Houston, TX.
Evaluation of Hazardous Chemical Wastes - Chicago, IL; Dallas, TX.
Northeastern Industrial Hygiene Conference - Secaucus, NJ, Princeton, NJ.
Evaluation of Environmental Exposures: A Team Approach -San Francisco, CA; Cherry Hill, NJ.
Risk Assessment of Hazardous Materials - Dallas, TX
AIHA Tri-Section Meeting - New York, NY
NIOSH 501 Training Course - New York, NY

Honors and Activities:

American Board of Industrial Hygiene - Certification in the Comprehensive Practice of Industrial Hygiene

Featured in Solving Noise Hazards of Railroads, (June 1, 2008) *Occupational Health & Safety*

Environmental Tobacco Smoke - Position Paper for AIHA, adopted by American Medical Association Task Force

"Loss Control in China: Mirror of an Earlier Time", National Underwriter, August 3, 1984

China Association of Science and Technology, Delegate Member, People's Republic of China, October, 1983

Affiliations:

American Academy of Industrial Hygiene

American Industrial Hygiene Association: Past Chair Membership Committee, commended as an Outstanding Committee Chair, Chari, Employment Services Committee.

Former Activities: Board of Directors; President Local Sections Council; Oversight Committee; Public New York, AIHA Relations Committee; Hazardous Waste Committee; Ionizing Radiation Committee; Journal Review Outreach Committee

Metropolitan - Past Chairman, Professional Development Committee

Delaware Valley, AIHA - Past Chairman

JOSEPH R. KENDALL

Qualifications Summary

- More than 26 years of experience managing all U.S. Army Technical Escort Unit EOD personnel; expert in proper recovery, security, safety, and disposal techniques for all nuclear, biological, and chemical materials according to all military, local, state, and federal rules/regulations.
- Five years of construction experience using and overseeing the operation of heavy equipment.
- Eastern Division 4th Quarter 1999 Safety Award for the emergency recovery work of over 3,100 UXO items at Westover Air Reserve Base.
- Awarded U.S. Meritorious Service Medal in 1998 for "unparalleled knowledge and expertise in the field of nuclear, chemical, biological weapons…" and the "…safe recovery, packaging, sampling, identification, and transportation of hazardous munitions and material."
- Senior Explosives Forensics Investigation Instructor for the FBI and Secret Service.
- Primary point of contact for all U.S. and foreign historical nuclear, biological, and chemical ordnance munitions.
- Worldwide chemical, biological, and radiological emergency response supervisor.
- Foreign munitions advisor for the State Department.
- Land mine warfare clearance supervisor.
- Improvised/special weapons disablement supervisor.
- Designed/implemented only Ordnance Recognition publication system authorized by USATEU, EOD personnel.

Registration

Certified Level I/II Munitions X-Ray Identification, U.S. Navy (1997), Update by U.S. Army Technical Escort Unit (2002)
Mine Field Clearance Certified, On-the-Job-Training with U.S. Army (1988-1999)
UXO Certification, USACE Huntsville Center (No. 0682; 1977)

Education

A.A., Criminal Justice—Columbia College (1993)
B.S., Criminal Justice—Columbia College (In Progress)

Credentials

30-Hour Construction Safety and Health Training Course, OSHA 29 CFR 1926, WESTON (2008)
Bloodborne Pathogens Training – Initial, OSHA 29 CFR 1910.1030, (2004); Refresher, WESTON (2010)
Confined Space Training – Entrant, Attendant, Non-Entry Rescue, OSHA 29 CFR 1910.146, (1994)
Trenching/Excavation Competent Person Training Course, OSHA 29 CFR 1026 Subpart P, WESTON (2008)
Fall Protection Competent Person Training Course – Initial, OSHA 29 CFR 1926 Subpart M, WESTON (2008)
Shipping and Transporting Dangerous Goods – Administrative/Field Personnel – Initial, Weston Solutions, Inc., Manual of Procedures for Shipping and Transporting Dangerous Goods Training Course, 49 CFR 172 Subpart H, WESTON (2008)
Explosive Ordnance Disposal (EOD) Training, (1989)
Advanced EOD Management and Technology, U.S. Navy (1995)
EOD School, U.S. Navy (1984)
U.S. Army Advanced Non-Commissioned Officer EOD Course (ANCOC) (1997)
NATO/Joint Service EOD (IEDD) School (1996)
U.S. Army Ordnance, Technical Escort, J-5 Course (2002)
Master EOD Badge, U.S. Navy (1991)
Hazardous Materials Incident Response Operations, EPA (1994)
Toxic Live Agent Training, U.S. Army (1994)
Map Reading and Land Navigation, U.S. Army (1985)
40-Hour HAZWOPER Training, OSHA 29 CFR 1910.120(e)(3), HazTrain, Inc. (1994)
8-Hour Hazardous Waste Refresher Course, OSHA 29 CFR 1910.120(e)(8), WESTON (2011)

Credentials (Continued)

8-Hour Managers and Supervisors Course (SHSC), OSHA 29 CFR 1910.120(e)(4), WESTON (1999)
First Aid/CPR Training, Medic First Aid (2010)
U.S. Marine Corps Basic Officer Candidate School (1986)
Environmental Sampling Workshop Course, U.S. Army (1994)
Biological Sampling Techniques, U.S. Army (1996)

Employment History

1998-Present	WESTON [5-98 to Present; Belcamp, MD; Technical Manager]
1987-1998	U.S. Army, Active Duty [9-87 to 9-98; Abingdon, MD; Senior UXO Supervisor for Chemical, Biological, Radiological Warfare, Munitions and Materials (CBRWM)]
1977-1987	U.S. Marine Corps, Active Duty [12-77 to 5-87; Kaneohe Bay, HI; UXO Specialist]

Key Projects

Performance-Based Remedial Actions at G-Street Salvage Yard, APG, MD, UXO Safety Officer. Supervised and oversaw all Phases of Level A operations in the removal, identification, and disposal of recovered chemical, biological, and radioactive hazardous munitions and materials in accordance with all federal, state, and local requirements. Removal activities included heavy equipment operation (e.g., backhoe) for excavation/trenching. [2006 to 2009; WESTON]

Time-Critical-Removal Actions (TCRAs), Mare Island Naval Shipyard, Vallejo, CA, U.S. Navy, Senior UXO Supervisor/Site Safety, QA/QC/ Safety Officer. TCRAs were conducted at the Mare Island Naval Shipyard (MINS) site. Shipyard was established by the Department of the Navy in 1854, and operated until 1996 when it was closed under the Base Realignment and Closure (BRAC) Program.

Oversaw heavy equipment operation for excavation and sifting operations, clearance and removal of chemical-contaminated soil; radiological- contaminated soil; discarded military munitions (DMM) and munitions debris (MD) hazardous explosive waste; and outfall mass hand-disassembly. Monitored and supervised 225 specialists working on-site including BERS personnel.

Recovered items included: 550,000 cubic yards (yd^3) of contaminated soil; 5-total outfall masses; 5,000+ radioactive items; 10,000+ DMM/MD items; and 50,000+ pounds (lb) of scrap metal. [3-05 to 7-07 and 7-07 to 6-11; WESTON]

Radioactive Waste Management Facility (Rad Yard), Maryland, Bush River Study Area (BRSA), Aberdeen Proving Ground (APG) Edgewood Arsenal, Technical Expert. Provided technical expertise and managed staff associated with the removal of over 5,000 tons of soil contaminated with radioactive materials and arsenic compounds. Was also responsible for the demolition and removal of seven buildings, fencing, concrete slabs, and a wastewater system (i.e., pits, tanks, sewer lines, sumps, and impacted soils) that were associated with radiological

Key Projects (Continued)

materials and chemical warfare agent handling. The Rad Yard was a Nuclear Regulatory Commission (NRC)-licensed facility. This removal action included considerations for the NRC license termination process required for a decommissioning project. [10-06 to 3-07; WESTON]

D-Field Time-Critical UXO Removal Action, APG, MD, Directorate of Safety, Health, and Environment (DSHE), UXO Manager. Responsible for identifying and removing munitions from disposal pits adjacent to the shoreline. Removed UXO items directly from the exposed banks of the Bush River and Chesapeake Bay at D-Field perimeter. Supervised and conducted underwater UXO removal in waist-deep waters. Managed and conducted subsurface ordnance location and removal actions to 6 inches along the beach. Completed shoreline ordnance removal within 24 hours, 24 hours ahead of schedule. Removed a total of 398 conventional UXO-related items and 8 chemical warfare material (CWM) items to date, recovering 2,600 lb of UXO-related scrap metal. Project grew in scope to include the upper reaches of D-Field. Supported DSHE at Restoration Advisory Board (RAB) meetings to address local concerns involving a suspected CWM injury sustained by another contractor's employee. Developed site safety and work plan for UXO excavation and evaluation. [3-01 to 7-02; WESTON]

J-Field TCRA, APG, MD, DSHE, UXO Manager. Conducted site walk with WESTON Project Manager and developed bid number for client within 24 hours. Proposed to DSHE that all site work be conducted in Modified Level D personal protective equipment (PPE), with respirators, reducing project costs. Prepared site personnel for immediate Level A PPE upgrade if conditions warranted. Dealt directly with APG safety representatives to ensure work was appropriately scoped.

Removed a total of 301 conventional UXO-related items, 1 biological, and 3 CWM items, recovering 119,140 lb of UXO-related scrap metal. Supervised all excavation activities once removal of munitions by hand had been completed. Modified an existing work plan from work previously conducted at J-Field, enabling rapid project startup to satisfy DSHE's time-critical requirements.

Managed site safety and environmental control for project duration. Deployed HAZMATCAD NO and individual chemical agent detectors (ICADs) on-site to detect potential chemical releases. Positioned an evacuation truck on-site. Conducted radioactivity monitoring prior to removal activities to locate potential radiological "hot spots." Completed multiphase UXO excavation and removal project in 7 weeks, 10 weeks ahead of schedule.

Supervised 6 UXO workers, 7 equipment operators, 7 removal personnel, and 14 ATC Associates, Inc. personnel. Completed 11,900 manhours in a hazardous UXO/CWM environment without an Occupational Safety and Health Administration (OSHA)-recordable or lost-time incident. Project was time-critical after an accidental fire exposed munitions within the tree line. [8-00 to 11-00; WESTON]

Immediate Response, National Missile Defense Site, Fort Greely, AK, USACE, Omaha District, Rapid Response, CWM Manager. Provided remote expertise to identify, isolate, and remove drums suspected of containing CWM. Communicated directly with site personnel, establishing procedures required to ensure site safety. Coordinated the transfer of samples to APG testing facilities to confirm drum contents. Made arrangements with Edgewood Chemical

Key Projects (Continued)

Biological Center (ECBC) on type, quantity, and shipping requirements. Facilitated sample turnaround within 24 hours (12 hours), reducing work delays on the $350 million federal project.

Dictated safety setup procedures, and Site Safety and Health Plan (SSHP) and Work Plan (WP) changes to WESTON personnel on a time-critical response request by the Commander within 4 hours. Dictated initial policy and procedures to the State of Alaska, EPA, USACE, and post personnel, while awaiting soil sampling analysis. Viewed photographs of items, work area, and soil composition to verbally instruct safety procedures and soil sampling; analysis results were obtained within 12 hours. Soil sample analysis confirmed initial suspect materials, allowing initial SSHP and WP to be enforced with a work stoppage of less than 48 hours. [4-02 to Present; WESTON]

Westwood Cluster 2 Burn Pits, Time-Critical UXO/CWM Removal Action, APG, MD, DSHE, UXO, Safety, and Environmental Controls Manager. Supervised the excavation of three disposal pits. Completed UXO removal in 11 days, nearly 2 months ahead of schedule. Designed and supervised the installation of silt fences and cofferdams to prevent contaminants from seeping into the adjacent wetlands. Developed controls to protect active Amtrak lines 170 ft from site from the blast wave or fragmentation from a potential accidental explosion. Completed 990 manhours of work without an OSHA recordable or lost-time incident. [2-00 to 3-00; WESTON]

Subject Matter Expert, Various Locations, U.S. Army TEU, Senior EOD Operations, Non-Commissioned Officer-in-Charge (NCOIC). Supervised all EOD NBC incident operations worldwide. Responsible for identifying all standard and experimental ordnance items recovered. Primary point-of-contact (POC) for United States and foreign ordnance found or recovered worldwide. Enforced SSHPs, reviewed risk hazard analyses, and monitored contractor's safety program. Ensured all unit EOD procedures complied with federal, state, and local environmental laws. [11-90 to 6-98; U.S. Army]

- Managed, facilitated, and informed the Munitions Assessment Review Board (MARB), acting on behalf of the Commander for the U.S. Army TEU.
- Responsible for positive identification, safe handling, and disposal of all 6,311 NBC military munitions items destroyed.
- Designed, modified, and implemented an Ordnance Recognition publication set that allowed the U.S. Army TEU and EOD personnel to reduce the time spent identifying military ordnance from days to minutes. This publication system is the only one authorized for use by U.S. Army TEU EOD personnel.
- Designed, developed, and performed specialized emergency render-safe procedures (RSPs) for unknown military munitions and improvised explosive devices in emergency time-critical operations.
- Key advisor for redesign of the Sweep Frequency Acoustic Integration (SFAI) chemical/biological detection equipment.
- Key advisor for the implementation of updating the Idaho National Engineering and Environmental Laboratory (INEEL) portable isotopic neutron spectroscopy (PINS)

Key Projects (Continued)

equipment to identify V-Series nerve agents faster with a positive result.

- Key advisor for the design and operational phase of the Munitions Assessment and Processing System (MAPS) facility for the disassembly and decontamination of chemical, biological, and radiological explosively configured munitions in a controlled environment.
- Monitored testing and authorization phase of the explosive disassembly system (EDS), to be incorporated in the MAPS facility under an explosively controlled environment.
- Key advisor for the redesign of the 5-lb Emergency Explosive Portable Explosive Containment System (EEPECS) designed and used by the Federal Aviation Administration (FAA), now enabling chemical, biological, and radiological items to be contained without a release to the atmosphere.

Averaged more than 1,000 responses per year to explosive items requiring hands-on work for safe removal, with 67% of personnel in a temporary duty status. Worked with the Fort Irwin Special Group OP4 and instructed its engineers on explosives safety. Safely disposed of more than 80 metric tons of hazardous explosives, munitions, propellants, and training devices with no accidents or incidents in a 4-year period. [5-87 to 6-98; U.S. Army]

Naval School
Explosive Ordnance Disposal

Certificate of Completion

Presented To

SSG JOSEPH R. KENDALL, USA

For having successfully completed the prescribed course of study for
ADVANCED EOD MANAGEMENT AND TECHNOLOGY
(CIN: A-431-0015, 80 HOURS)

27 OCTOBER 1995

Date

J. R. LAKE, CDR, USN

Commanding Officer

WESTON SOLUTIONS®
Restoring Resource Efficiency

This Certifies That

JOSEPH KENDALL

Has Completed the

30-Hour Construction Safety and Health Training Course

In accordance with OSHA Outreach Training Program (Includes Competent Person Instruction as indicated in 29 CFR 1926 Subparts C, E, M, P, & X) completed on 02/22/2008 in West Chester, PA

Conrad W. Lehr, CET

TRAINING MANAGER
Conrad W. Lehr, CET, CIT

Conrad W. Lehr, CET

INSTRUCTOR
Conrad W. Lehr CET

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Weston Solutions, Inc • 1400 Weston Way • West Chester, PA • 19380

06P-0910-2

INPUT 1-5-99 RHK

Certificate of Training

HazTrain, Incorporated

proudly presents this award for

educational achievement to

JOSEPH R. KENDALL (151-52-8293)

for satisfactorily completing the course of

40-Hour Health and Safety Training for
Hazardous Waste Operations and Emergency Response

August 26, 1994

John Marsh
Instructor

Jerry L. Smith
President

HazTrain, Inc.

P.O. BOX 2206 LA PLATA, MARYLAND 20646

input 8.26.99
BK

ROY F. WESTON, INC.

THIS CERTIFIES THAT

Joeseph R Kendall

HAS COMPLETED THE

8 Hour Site Managers and Supervisors Training Course

in accordance with 29 CFR 1910.120 (e)(4) completed on 8/12/99 at West Chester, PA

Conrad W Lehr, CET
TRAINING MANAGER

WESTON
MANAGERS DESIGNERS/CONSULTANTS

Conrad W Lehr, CET
INSTRUCTOR
Conrad W. Lehr CET

Cert. No. 1719993

ROY F. WESTON, INC · 1400 WESTON WAY · WEST CHESTER, PA · 19380

WESTON SOLUTIONS®
Restoring Resource Efficiency

This Certifies That

JOSEPH KENDALL

Has Completed the

Excavation & Trenching Competent Person

completed on 02/22/2008 in West Chester, PA

TRAINING MANAGER
Conrad W. Lehr, CET, CIT

INSTRUCTOR
Conrad W. Lehr CET

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06P-0910-2

CERTIFICATE OF COMPLETION

This certificate awarded to

Joseph Kendall

for satisfactory participation in

OSHA 8 Hour Hazwoper Refresher

29 CFR Part 1910.120 - 8 Contact Hour(s)

Awarded on August 20, 2011.

Eduwhere
Your compliance connection

Toni J White

Eduwhere

Eduwhere · PO Box 4704 · Chapel Hill, NC 27515 · www.eduwhere.com

WORKCARE™
Making Health Count

WORK STATUS REPORT

Employer Copy

TYPE OF EXAMINATION: Periodic Examination
PLACE OF EXAMINATION: 3423 - TOTAL URGENT CARE

EMPLOYEE:	Kendall, Joseph	**COMPANY:**	Weston Solutions, Inc
ID:	014680	**POSITION:**	Bomb Tech II
DATE OF EXAM:	04/29/2010	**LOCATION:**	Weston-Abingdon (AMD)
EXPIRATION DATE:	04/29/2012	**SITE:**	Not Indicated

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☒	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☒	☐

STATUS

1. ☒ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.

2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:

3. ☐ **NOT QUALIFIED**

4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Peter P. Greaney, M.D. Date: 05/06/10

Signature: Peter P Greaney MD

STEVEN BEBOW

Registration

UXO Certification, USACE Huntsville Center (No. 1747)
Certified Safety Trained Supervisor (STS), Board of Certified Safety Professionals (2010)

Fields of Competence

Munitions and explosives of concern (MEC) removal action; time-critical removal action; burn pit clearance; unexploded ordnance (UXO) site investigations; safety inspections.

Education

Basic EOD School (1985)

Credentials

Field Safety Officer (FSO) Certification, WESTON (2009)
40-Hour Hazardous Waste Site Training Course, OSHA 29 CFR 1910.120(e)(3), Tricon Environmental, Inc. (2005)
8-Hour Hazardous Waste Refresher On-Line Course (2011)
8-Hour Managers and Supervisors Course (SHSC), OSHA 29 CFR 1910.120(e)(4), WESTON (2009)
Bloodborne Pathogens Training, OSHA 29 CFR 1910.1030, WESTON (2009)
Behavior Based Safety, Phase 1 Training, WESTON (2009)
Explosives Ordnance Disposal Training, U.S. Naval School (1985)
Navy/Marine Advanced EOD Training, Sandia National Laboratories (1991)
24-Hour Hazardous Waste Site Training Course, OSHA 29 CFR 1910.120(e)(3), (1993)
Advanced EOD Management and Technology, (1997)
10-Hour Construction Safety Training, OSHA 29 CFR 1926, (2007)
30-Hour Construction Safety and Health Training Course, OSHA 29 CFR 1926, WESTON (2008)
Trenching/Excavation Competent Person Training Course, OSHA 29 CFR 1026 Subpart P, WESTON (2008)
Fall Protection Competent Person Training Course – Initial, OSHA 29 CFR 1926 Subpart M, WESTON (2008)
Competent Person for Excavations, (2008)
First Aid/CPR, American Red Cross (2011)

Qualifications Summary

- 35 years of UXO and ordnance experience, including removal actions at BMGR, TYAD, and Surf City.
- Develop and implement approved UXO and explosives safety in compliance with all DOD, federal, state, and local statutes and codes.
- Experienced analyzing UXO and explosives operational risks, hazards, and safety requirements.
- Establishes and ensures compliance with site-specific safety requirements for UXO and explosives operations.
- Conducts safety inspections to ensure compliance with UXO and safety codes.
- 25 years of EOD expertise garnered through active military duty and UXO clearance operations.

Credentials (Continued)

AED Training, Medic First Aid (2009)

Employment History

2007-Present WESTON
2005-2006 Zapata Engineering
1975-2004 U.S. Navy, Active Duty

Key Projects

Remedial Investigation, Stennis, MS, Mississippi Army Ammunition Plant, Stennis Space Center, Senior Unexploded Ordnance (UXO) Supervisor. UXO construction site supervisor during munitions and explosives of concern (MEC) surface clearance of transects utilizing heavy equipment prior to subsurface intrusive investigation.

Red Devil Mine Investigation/Powder House Destruction, Red Devil, AK, UXO Construction Site Safety Supervisor. Conducted an investigation of the Red Devil Mine Powder House to ensure the powder house was emptied of dynamite prior to destruction with heavy equipment. Worked with Alaska Natural Resources and Alaska Environmental while conducting destruction of the mine powder house.

Remedial Investigation/Feasibility Study, Seaside Munitions Response Area and Parker Flats Munitions Response Area Phase II, Monterey, CA, Former Fort Ord, Quality Assurance/Safety Auditor. Conducted quality assurance/safety audit of WESTON's ongoing project, inspecting all facets of project execution to ensure work plan, contract, and federal/state regulations compliance.

Hawaii Phase II Military Munitions Response Program (MMRP) Remedial Investigation, Wheeler Army Airfield and Schofield Barracks Munitions Response Sites, Oahu, HI, Quality Assurance/Safety Auditor. Conducted quality assurance/safety audit of WESTON's subcontractor (TLI), inspecting all facets of execution to secure work plan, contract, and federal/state regulations compliance.

Canister Evaluation, Alaska, Confidential Client, UXO Safety Consultant. Evaluated hazardous items (21 nitro carbo nitrate canisters) for disposition. Removed canisters, cleaned up site, and disassembled/packaged hazardous items for shipment.

MEC Removal Action, BMGR, Gila Bend, AZ, Air Education and Training Center (AETC), Luke Air Force Base (AFB), Quality Control/Safety Officer. Provided project quality control and overall site safety during removal actions, and burn and demolition operations.

MEC Removal Action, Tobyhanna, PA, U.S. Army Corps of Engineers (USACE), Quality Control/Safety Officer. Provided project quality control and overall site safety during removal action.

Non-Time Critical Removal Action, Surf City, NJ, USACE, Site Safety Officer. Provided overall site safety supervision during multiple sifting operations involving 5 separate sift plants and over 65 pieces of heavy equipment, survey mapping and intrusive investigations, conducting

Key Projects (Continued)

site orientation briefings to over 75 subcontracted employees, daily safety briefings, ordnance identification, ordnance transfer, and safety supervision of intrusive heavy equipment operations. Supervised the safe recovery, handling, and turnover for disposal of over 1,900 WWI ordnance items without incident.

Range/Burn Pit Clearance and Area A Roads/Targets Clearance at BMGR, AETC, Luke AFB, AZ, Safety Officer/Quality Control Officer. Monitored the excavation and clearance of burn pit debris while at Sentinel Ranch. Safety/Quality Control Officer for clearance of 33 miles of Area A desert roads and nine target areas. Filled in as Senior UXO Supervisor (SUXOS) during periods of this project. Project completed without incident.

UXO Site Investigation/Intrusive Operations at Blue Grass Army Depot, Richmond, KY, USACE, Senior UXO Supervisor. Conducted site investigation to determine if site clearance areas meet MMRP requirements. Supervised site intrusive investigations at various site locations without incident.

Range Clearance Operations, Fort Bragg, NC, USACE, Senior UXO Supervisor. Supervised the clearance and cleanup of demolition ranges without incident.

MEC Time Critical Removal Action (TCRA), Surf City, NJ, USACE, Site Safety Officer. Provided overall site safety supervision during digital mapping and intrusive investigations. Conducted daily safety briefings, ordnance identification, ordnance transfer, and safety supervision of intrusive heavy equipment operations. Supervised the safe recovery, handling, and turnover for disposal of over 1,100 WWI ordnance items without incident.

UXO Clearance Operations, Naval Weapons Station Earle, NJ, Senior UXO Supervisor. Conducted site supervision for clearing dredged material of discarded military munitions (DMM).

UXO Clearance Operations, Tullahoma, TN, Motlow College, Senior UXO Supervisor. Conducted site supervision of brush clearing, area survey, UXO surface/subsurface clearance, and intrusive investigations to locate, identify, remove, and dispose of ordnance and explosives (OE)/UXO from designated areas.

UXO Clearance Operations, Tullahoma, TN, Motlow College, UXO Safety Officer/ Supervisor/Specialist. Conducted UXO surface/subsurface clearance and intrusive investigations to locate, identify, remove, and dispose of OE/UXO from designated areas. Conducted disposal of all hazardous OE found. Assigned as Safety Officer supervising 4 personnel during initial brush clearing operations. Assigned as Tech III supervising backhoe operations during intrusive excavations of selected site areas. Assigned as Tech III to supervise a UXO team in mag/flag/dig operations to recover and dispose of 37 mm projectiles and 75 mm shrapnel rounds. Responsible for completing grid sheets and team log books. Assigned as Tech II during survey team escort operations. Assigned as Tech II during intrusive investigation, recovery, and disposal of 37 mm projectiles and 75 mm shrapnel rounds.

Explosive Ordnance Disposal Training and Evaluation Unit TWO, Fort Story, VA, Department Head/EODGRU TWO Air Operations Officer/Master Explosive Ordnance Disposal Technician. Directly responsible for the management of EODGRU TWO's

Key Projects (Continued)

parachuting program. Provided advanced training in parachuting and Helicopter Rope Suspension Techniques to special operations personnel, federal agencies, and civilian law enforcement personnel. Directly responsible for ensuring compliance of all parachuting regulations, safety requirements, aircraft requirements, and administrative requirements pertaining to military parachuting throughout the eastern United States and the European theatres of operations.

Naval School Explosive Ordnance Disposal, Eglin AFB, FL, Division Officer/Training Aids Acquisition Officer/Inert Ordnance Manager/Master Explosive Ordnance Disposal Technician. Provided training to explosive ordnance disposal (EOD) basic students in Air Ordnance. Conducted transfer of all training aids and training curriculum from Indian Head, Maryland to Eglin AFB, Florida. Managed NAVSCOLEOD's extensive inert ordnance training aids inventory. Acquisition Officer for NAVSCOLEOD's continuous updating of worldwide ordnance student training aids. Directly responsible for ensuring all training aids received from around the world and in use by NAVSCOLEOD had proper documentation and were certified inert.

Explosive Ordnance Disposal Mobile Unit SIX Detachment, Mayport, FL, Officer in Charge/Department Head/Master Explosive Ordnance Disposal Technician. Supervised and conducted numerous EOD responses throughout the east coast of Florida. Senior Navy Representative during Army Corps of Engineers clearance operation of Formerly Used Defense Site located at Fort Pierce, Florida. Supervised clearance and demolition of WWII ordnance over 18-month period while working directly with the Army Corps of Engineers and Vero Beach Emergency Management personnel. Directly responsible for ensuring compliance with DOD directives, as well as local, state, and federal statutes and codes while supervising OE clearance operations in general public arena. Supervised and conducted Pinecastle Bombing Range clearance operations. Supervised UXO clearance operations during NAS Cecil Field, FL, and NTC Orlando base closures.

Explosive Ordnance Disposal Mobile Unit TWO, Norfolk, VA, Detachment Officer-in-Charge/Master Explosive Ordnance Disposal Technician. Supervised and conducted chemical and conventional ordnance clearance operations at U.S. Army Aberdeen Proving Ground. Conducted numerous EOD deployments performing EOD parachute insertions, helicopter rope suspension techniques, underwater OE clearance operations, OE demolition operations, and surface and improvised explosive device clearance operations.

Naval School Explosive Ordnance Disposal, Indian Head, MD, Division Officer/Master Explosive Ordnance Disposal Technician/Instructor. Provided training to EOD basic students in MK 16 Underwater Breathing Apparatus, Underwater Operations, and Underwater Tools and Techniques. Directly responsible for ensuring compliance of all standard operating procedures (SOPs), specific Site Safety and Health Plans, and the direct supervision of OE transportation, storage, and use of underwater explosive procedures conducted during training.

Explosive Ordnance Disposal Group TWO Detachment, Mayport, FL, Senior/Master Explosive Ordnance Disposal Technician. Supervised/conducted numerous EOD response operations throughout the eastern Florida coast. Supervised/conducted bombing range clearance

Key Projects (Continued)

operations at Pinecastle Bombing Range. Directly responsible for authoring, implementing, and supervision of all SOPs, specific Site Safety and Health Plans, and all requirements for OE transportation, storage, and disposal.

Explosive Ordnance Disposal Unit TWO, Fort Story, VA, Basic/Senior Explosive Ordnance Disposal Technician. Supervised and conducted numerous ordnance clearance operations at Camp Lejuene, SC; Naval Station Roosevelt Roads, PR; and the northern Arabian Gulf during "Earnest Will" mine clearing operations.

Naval School
Explosive Ordnance Disposal

ORDNANCE
EXPLOSIVE
DISPOSAL
U.S. NAVAL
SCHOOL
PER SCIENTIAM SERVITIA

This certifies that

Aviation Ordnanceman First Class
Steven W. Bebow, USN

having successfully completed
the prescribed course of study for

NAVY BASIC EXPLOSIVE ORDNANCE DISPOSAL

is awarded this
Certificate

this 25th day of November A.D. 1985

J. Sedlak Jr.
J. SEDLAK, JR., CDR, USN
COMMANDING OFFICER

Association of Bay Area Governments

ABAG Training Center
www.hazmatschool.com

CERTIFICATE OF COMPLETION

Steven Bebow

has successfully completed the course titled

OSHA 8-hr Training for Supervisors

Satisfies 29 CFR 1910.120(e)(4)

on

May 10, 2007

and has earned

IACET authorized 0.8 CEUs (Continuing Education Units) from the program

Certificate No 57221
(verify at www.hazmatschool.com)

Brian Kirking, Training Director
Sharon McCreadie, Training Coordinator
www.abag.ca.gov; (510) 464-7964

Paul W Gantt

Paul W. Gantt, REA
Safety Compliance Management, Inc.

Restoring Resource Efficiency

This Certifies That

STEVEN BEBOW

Has Completed the

8-Hour HAZWOPER Refresher Training Course

In accordance with 29 CFR 1910.120(e)(8) completed on 04/04/2011 in Tobyhanna Site, PA

Owen B. Douglass, Jr., PhD, CIH

TRAINING MANAGER

Owen B. Douglass, Jr., PhD, CIH

George M Crawford Jr CIH

INSTRUCTOR

George M. Crawford Jr CIH

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06P-0910-2

American Red Cross

This recognizes that

Steven Bebow

has completed the requirements for

Standard First Aid

conducted by

Jackson Area Chapter

Date completed: 03/03/2011

Valid for 2 year(s)

American Red Cross

This recognizes that

Steven Bebow

has completed the requirements for

CPR -Adult

conducted by

Jackson Area Chapter

Date completed:**03/03/2011**

Valid for 2 year(s)

---

redcross.org

Instructor's Signature

Ron Perkin

Chapter

Jackson Area Chapter

Jackson, Tennessee

Holder's Signature

Stock No. 656798

redcross.org

Instructor's Signature

Ron Perkin

Chapter

Jackson Area Chapter

Jackson, Tennessee

Holder's Signature

Stock No. 656798

Restoring Resource Efficiency

This Certifies That

STEVEN BEBOW

Has Completed the

30-Hour Construction Safety and Health Training Course

In accordance with OSHA Outreach Training Program (Includes Competent Person Instruction as indicated in 29 CFR 1926 Subparts C, E, M, P, & X) completed on 12/19/2008 in San Antonio, TX

TRAINING MANAGER
Conrad W. Lehr, CET, CIT

INSTRUCTOR
Conrad W. Lehr

82_15380_12192008

Weston Solutions, Inc • 1400 Weston Way • West Chester, PA • 19380

06P-0910-2

CERTIFICATE OF COMPLETION

This Certifies That

Steven W. Bebow

has successfully completed and passed an examination covering the contents of a forty-hour continuing education course entitled

Hazardous Waste Operations & Emergency Response

Initial Forty-Hour Training In Compliance With 29 CFR 1910.120(e)(3)(i) & 1926.65(e)(3)(i)

In Witness Hereof: Dan E. Schrimsher

Dan E. Schrimsher, CHMM, CPEA, BCFE, CET, REP, RS, JD

Date: April 18-22, 2005

Certificate No. GW-8579

TEI

TriCon Environmental, Inc.

Environmental, Safety and Health Services

ACHIEVEMENT

WESTON SOLUTIONS®
Restoring Resource Efficiency

This Certifies That

STEVEN BEBOW

Has Completed the

8-Hour Site Manager and Supervisor Training Course

In accordance with 29 CFR 1910.120(e)(4) completed on 01/13/2009 in West Chester, PA

TRAINING MANAGER
Conrad W. Lehr, CET, CIT

INSTRUCTOR
Conrad W. Lehr

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06P-0910-2

WESTON SOLUTIONS®
Restoring Resource Efficiency

This Certifies That

STEVEN W. BEBOW

Has Completed the

Bloodborne Pathogens Training Course Initial

In Accordance With 29 CFR 1910.1030 completed on 01/12/2009 in West Chester, PA

Conrad W Lehr, CET

TRAINING MANAGER
Conrad W. Lehr, CET, CIT

Conrad W Lehr, CET

INSTRUCTOR
Conrad W. Lehr

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BCSP | BOARD OF CERTIFIED SAFETY PROFESSIONALS

208 Burwash Ave., Savoy, IL 61874 | P: +1 217-359-9263 | F: +1 217-359-0055
E: bcsp@bcsp.org | W: bcsp.org

Having met the applicable requirements defined by its bylaws,
BCSP hereby authorizes the use of

Safety Trained Supervisor (STS)
to
Steven William Bebow

Valid Until	Certificate #	Recertification Due
12/31/2011	IEX06146	12/31/2015

SECRETARY

A DIVISION OF THE BOARD OF

CERTIFIED SAFETY PROFESSIONALS

Upon the recommendation of the Council on Certification of Health, Environmental and Safety Technologists, Board of Certified Safety Professionals and the Board of Directors, by virtue of the authority vested in it, has conferred on

Steven W Bebow

the certification of

Safety Trained Supervisor

with all the honors, rights and priviliges thereto pertaining as long as qualifications are renewed annually and not revoked.

Samuel J Gualardo

President, Board of Directors

Secretary, Board of Directors

Certification Date: March 12, 2010
Certification Number: IEX06146

COUNCIL ON CERTIFICATION OF HEALTH, ENVIRONMENTAL AND SAFETY TECHNOLOGISTS

WESTON SOLUTIONS®
Restoring Resource Efficiency

This Certifies That

STEVEN BEBOW

Has Completed the

Excavation & Trenching Competent Person

completed on 12/19/2008 in San Antonio, TX

TRAINING MANAGER
Conrad W. Lehr, CET, CIT

INSTRUCTOR
Conrad W. Lehr

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Making Health Count

WORK STATUS REPORT

Employer Copy

TYPE OF EXAMINATION: Periodic Examination
PLACE OF EXAMINATION: 2857 - Workcare Resources

UPDATE

EMPLOYEE:	Bebow, Steven W.	**COMPANY:**	Weston Solutions, Inc
ID:	019175	**POSITION:**	UXO Safety Officer
DATE OF EXAM:	06/03/2010	**LOCATION:**	Weston-West Chester (Federal)
EXPIRATION DATE:	06/03/2012	**SITE:**	West Chester

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	X	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	X	☐

STATUS

1. [X] **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.

2. [ ] **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:

3. [ ] **NOT QUALIFIED**

4. [ ] **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Peter P. Greaney, M.D. Date: 06/14/10

Signature: Peter P Greaney MD

WILLIAM TROY PHELPS

Qualifications Summary

- More than 12 years of experience in the UXO/EOD field.
- More than 7 years of supervisory experience including demolition operations.
- UXO location and clearance on civilian locations and military installations.
- Extensive use of Schonstedt, MK-26, and EM-61 locators.
- Heavy equipment operator including backhoe and mini excavator.

Registration

UXO Certification, USACE Huntsville Center (No. 0460)
Licensed Blaster (unrestricted) in the Commonwealth of Virginia, and Licensed Blaster (limited) in the Commonwealth of Pennsylvania

Education

U.S. Naval School for Explosive Ordnance Disposal (1997)
U.S. Air Force Fire Fighter Specialist

Credentials

30-Hour Construction Safety Training, OSHA 29 CFR 1926 (2009)
10-Hour Construction Safety Training, OSHA 29 CFR 1926 (2007)
8-Hour Managers and Supervisors Course (SHSC), OSHA 29 CFR 1910.120(e)(4) (2009)
40-Hour HAZWOPER Training, OSHA 29 CFR 1910.120(e)(3) (1997)
8-Hour HAZWOPER Supervisor Course, (2007)
8-Hour HAZWOPER Refresher Course, OSHA 29 CFR 1910.120(e)(8), (2011)

Employment History

2007-Present WESTON [10-07 to Present; West Chester, PA; UXO Technician 3]
2003-2007 Zapata Engineering [1-03 to 9-07; Charlotte, NC; UXO Technician 2/3]
2000-2002 UXB International [4-00 to 12-02; Ashburn, VA; UXO Technician 2]
1999 EOD Technologies [1-99 to 9-99; Republic of Panama; UXO Technician 2]
1997-1998 Human Factors Applications [10-97 to 12-97; 4-98 to 12-98; Tobyhanna State Park; UXO Technician 2]
1991-2002 U.S. Air Force Reserves [5-91 to 7-02; Dover, AFB, DE]

Key Projects

Unexploded Ordnance (UXO) Munitions and Explosives of Concern (MEC) Removal Action at Munitions Response Site

Key Projects (Continued)

(MRS)-R02D and MRS-R02B, Tobyhanna State Park, PA, Pennsylvania Department of Environmental Protection (PADEP), Senior UXO Supervisor (SUXOS). Duties include managing, overseeing, and guiding all MEC operations and all UXO teams. Extensive knowledge of all Technician (1, 2, and 3) duties and requirements as stated in Work Plan and in accordance with all state and federal regulations. Responsible for everyday planning of clearance activities, including surveying with the recognition of areas of concern and order of clearance, teams composition and their placement in coordination with other teams. Also responsible for all explosive operations as well as certification of all types of munitions-related scrap and its final disposition. [4-09 to Present; WESTON; Proj. No. 00739.055.020]

UXO Beach Clearance, Surf City, NJ, U.S. Army Corps of Engineers (USACE) Philadelphia District (CENAP), Technician 3, Team Leader. Duties included Technician 3 and team leader of team 5 also known as “surf team.” Team was responsible for sweeping areas from low tide markers out to a distance of 150 feet or a depth of 4 feet. The team utilized the MK-26 ferrous metal locator and required dry suits and life vests. The water was a crisp 40 degrees and the tides were rough. [2-09 to 4-09; WESTON; Proj. No. 03886.532.003]

Reacquisition of Anomalies, Chino Hills, CA, Aerojet, Technician 3, Site Safety Officer (SSO), Quality Control (QC) Officer. Schonstedts were utilized in a grid-type setting, but also warranted reacquiring anomalies established by using an EM-61. The data taken met criteria determined by both client and WESTON geographic information system (GIS) and allowed reacquisition. The areas inaccessible to the EM-61 were then swept and numerous items were recovered and also passed all QC by both client and WESTON. [1-09 to 2-09; WESTON; Proj. No. 02151.014.001]

Sweep and Clearance of Beachfront, Former Nansemond Ordnance Depot, Virginia, USACE Baltimore District (CENAB), Technician 3, Team Leader, Demolition Supervisor, Alternate Site UXO Supervisor. Responsibilities included Technician 3, team leader, demolition supervisor, Alternate Site UXO Supervisor. Five-man team used Schonstedts to sweep grids along the known areas of concern (AOCs). Closer to the actual beachfront area team began finding MEC. In those areas team began a manual sift operation that produced over 1,100 pounds of raw explosives and several MEC items that needed to be detonated. The team sifted until CENAB was satisfied that there were no more explosive hazards present. [3-08 to 1-09; WESTON; Proj. No. 03886.533.003]

Sweep and Clearance of Munitions Debris, Main Burning Grounds, Former Nansemond Ordnance Depot, Virginia, CENAB, Technician 2/3, Team Leader, Demolition Supervisor. Responsibilities included Technician 2/3, team leader, and demolition supervisor. Working with USACE Baltimore District and Norfolk District, five-man team utilized Schonstedts to “mag and dig,” which involved laying lanes in a 100-foot x 100-foot grid and sweeping north to south, then rotating 180 degrees and sweeping east to west. There was a large amount of munitions debris and cultural debris, which required team to manually sift certain areas until CENAB was satisfied that there were no more hazards. [10-07 to 3-08; WESTON; Proj. No. 03886.533]

Explosive Operations, Various Locations, Multiple Clients, Technician 2/3. Carried out Technician 2 responsibilities according to Work Plan and served as Technician 3 for explosives

Key Projects (Continued)

operations, including blasting work. Operated a number of types of heavy equipment. [1-03 to 9-07; Zapata Engineering]

UXO Clearance, Former Nansemond Ordnance Depot, VA, UXO Technician 2. Performed Technician 2 responsibilities according to Work Plan. Operated heavy equipment, including backhoe and mini-excavator. [4-00 to 12-02; UXB International]

UXO Services, Empire Ranges, Republic of Panama, UXO Technician 2. Performed UXO Technician 2 responsibilities according to Work Plan. [1-99 to 9-99; EOD Technologies]

UXO Services, Tobyhanna State Park, PA, UXO Technician 2. Performed Technician 2 responsibilities according to Work Plan. [10-97 to 12-97; 4-98 to 12-98; Human Factors Applications]

WESTON SOLUTIONS®

Restoring Resource Efficiency

This Certifies That

WILLIAM PHELPS

Has Completed the

8-Hour Site Manager and Supervisor Training Course

In accordance with 29 CFR 1910.120(e)(4) completed on 04/02/2009 in West Chester, PA

TRAINING MANAGER

Conrad W. Lehr, CET, CIT

INSTRUCTOR

Conrad W. Lehr

195_15612_04022009

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WESTON SOLUTIONS®
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This Certifies That

WILLIAM PHELPS

Has Completed the

30-Hour Construction Safety and Health Training Course

In accordance with OSHA Outreach Training Program (Includes Competent Person Instruction as indicated in 29 CFR 1926 Subparts C, E, M, P, & X) completed on 04/10/2009 in Vernon Hills, IL

Conrad W Lehr, CET

TRAINING MANAGER

Conrad W. Lehr, CET, CIT

T.L. Blackburn CSP, CET

INSTRUCTOR

Theodore L. Blackburn CSP, CET

82_15612_04102009

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HFA

CERTIFICATE OF TRAINING

This Certifies That

WILLIAM T. PHELPS

Satisfactorily Completed the

OSHA 40 - Hour Hazardous Waste Site Worker
& Emergency Response Course

Hazardous Waste Operations
29 CFR 1910.120(e)(1)&(9)

PRESENTED BY HUMAN FACTORS APPLICATIONS, INC.

Dated this 24th Day of October 19 97

INSTRUCTOR

CERTIFICATE OF COMPLETION

This certificate awarded to

William Phelps

for satisfactory participation in

OSHA 8 Hour Hazwoper Refresher

29 CFR Part 1910.120 - 8 Contact Hour(s)

Awarded on October 4, 2011.

Eduwhere
Your compliance connection

Toni White

Eduwhere

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WORK STATUS REPORT

Employer Copy

TYPE OF EXAMINATION: Periodic Examination
PLACE OF EXAMINATION: 2294 - Now Care Medical Center

EMPLOYEE:	Phelps, William T.	**COMPANY:**	Weston Solutions, Inc
ID:	019324	**POSITION:**	UXO Supervisor
DATE OF EXAM:	09/09/2010	**LOCATION:**	Weston-West Chester (Federal)
EXPIRATION DATE:	09/09/2012	**SITE:**	Springfield

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☒	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☒	☐

STATUS

1. ☒ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.

2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:

3. ☐ **NOT QUALIFIED**

4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Peter P. Greaney, M.D. Date: 09/22/10

Signature: Peter P Greaney MD

M. BRIAN JUNCK

Qualifications Summary

- More than 8 years of related experience in geophysical surveying.
- Primary experience in electromagnetic, magnetic, GPR, and electrical imaging/resistivity fields.
- Served as lead geophysicist on numerous projects.
- Performed magnetics and electromagnetics to search for potential UXO.
- Experienced with several navigation systems (RTK, RTS, USRADS) for location and survey control.
- Performed seismic reflection and refraction surveys to locate bedrock and overburden stratigraphy.
- Skilled in many computer software programs and applications: OASIS Montaj, ArcView, AutoCAD, Adobe graphic design applications, and numerous other geophysical data processing programs.

Education

M.Sc., Fluvial Geomorphology/Geophysics—University of Calgary (2009)
B.Sc., Cartography—University of Wisconsin – Eau Claire (2000)

Credentials

40-Hour Hazardous Waste Site Training Course, OSHA 29 CFR 1910.120(e)(3), Compliance Solutions (2003)
8-Hour Hazardous Waste Refresher Course, OSHA 29 CFR 1910.120(e)(8), WESTON (2011)
10-Hour Construction Safety Training, OSHA 29 CFR 1926, WESTON (2004)
30-Hour Construction Safety and Health Training Course, OSHA 29 CFR 1926, WESTON (2007)
8-Hour Managers and Supervisors Course (SHSC), OSHA 29 CFR 1910.120(e)(4), WESTON (2009)
Behavior Based Safety, Phase 1 Training, WESTON (2009)
Bloodborne Pathogens Training, OSHA 29 CFR 1910.1030, (2005)
Bloodborne Pathogens Refresher Training, OSHA 29 CFR 1910.1030, WESTON (2011)
Fall Protection Competent Person Training Course – Refresher, OSHA 29 CFR 1926 Subpart M, WESTON (2007)
First Aid/CPR/AED Training, WESTON (2011)

Employment History

2006-Present	WESTON
2005-2006	Enviroscan, Inc.
2003-2005	WESTON
2000-2002	University of Calgary (Research Assistant)
1997-2000	University of Eau Claire (Research Assistant)

Key Projects

Geophysical Investigation, Spring Valley Formerly Used Defense Site (FUDS), Washington, DC, U.S. Army Corps of Engineers (USACE), Project Geophysicist. Performed electromagnetic (EM-61 MK2) and magnetic (G-858) geophysical surveys to map subsurface conditions at multiple properties indicative of suspected ordnance and explosives/chemical warfare material (OE/CWM). Responsible

Key Projects (Continued)

for all processing and quality control (QC) of daily data, as well as generation of site-specific final reports. [9-07 to 8-08; WESTON]

Munitions Response Action at Fort Miles Military Reservation FUDS, Lewes, DE, USACE, Baltimore District, Project Geophysicist. Responsible for all processing and QC of daily data collected by field teams. Processed data and selected targets potentially representing munitions and explosives of concern (MEC) for reacquisition by unexploded ordnance (UXO) technicians over approximately 70 acres of beach. Managed all aspects of daily geophysical activities and planning. [11-07 to 4-08; WESTON]

Time-Critical-Removal Action (TCRA), Full-Scale Digital Geophysical Mapping for MEC, Surf City and Ship Bottom, Ocean County, NJ, USACE, Project Geophysicist. Responsible for all processing and QC of daily data collected by field teams. Processed data and selected targets potentially representing MEC for reacquisition by UXO technicians over 1.5 miles of beach. Managed all aspects of daily geophysical activities and planning. [3-07 to 6-07; WESTON]

Full-Scale Digital Geophysical Mapping for MEC, Nevada Test Site (NTS), Nye County, NV, Stoller-Navarro, Site Geophysicist. Responsible for all processing and QC of daily data collected by field teams. Processed data and selected targets potentially representing MEC for reacquisition by UXO technicians over an approximately 60-acre site. Managed all aspects of daily geophysical activities and planning. [1-05 to 4-05]

Full-Scale Digital Geophysical Mapping for MEC, Former Tobyhanna Artillery Range (TOAR), Tobyhanna, PA, USACE, Geophysicist. Responsible for data collection and target reacquisition throughout Tobyhanna State Park and adjacent State Game Lands.

QC Geophysical Surveys, Seneca Army Depot, Romulus, NY, USACE, Geophysicist. The objective was to ensure high quality data and accurate target picks for the reacquisition of potential UXO. QC was performed on geophysical data (EM-61 MK2) collected by the site subcontractor. Examined data and checked to ensure all USACE standards were met for the project. [8-03 to 2-04; WESTON]

OE Materials Rapid Response, Quonset Point Former Naval Yard, Quonset, RI, Geophysicist. Performed an electromagnetic (EM-31) geophysical survey to map the subsurface of the Former Quonset Point Naval Air Station. The survey was performed to provide confirmatory data associated with the removal of bulk OE materials present before excavation. [11-03 to 12-03; WESTON]

WESTON SOLUTIONS
Restoring Resource Efficiency

This Certifies That

BRIAN JUNCK

Has Completed the

30-Hour Construction Safety and Health Training Course

In accordance with OSHA Outreach Training Program (Includes Competent Person Instruction as indicated in 29 CFR 1926 Subparts C, E, M, P, & X) completed on 08/17/2007 in West Chester, PA

TRAINING MANAGER
Conrad W. Lehr, CET, CIT

INSTRUCTOR
Conrad W. Lehr CET

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This Certifies That

BRIAN JUNCK

Has Completed the

8-Hour Site Manager and Supervisor Training Course

In accordance with 29 CFR 1910.120(e)(4) completed on 05/18/2009 in West Chester, PA

Conrad W. Lehr, CET

TRAINING MANAGER

Conrad W. Lehr, CET, CIT

Conrad W. Lehr, CET

INSTRUCTOR

Conrad W. Lehr

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Compliance Solutions

"Today's Training... Tomorrow's Solution"

10515 E 40th Ave, Suite 116, Denver Colorado 80239   800-711-2706

Student Affiliation:
Weston Solutions, Inc.
31719

Certificate of Completion

This is to certify that

Brian Junck

has successfully completed the classroom requirements for

40 Hour HAZWOPER

29 CFR 1910.120(e)

Presented

Friday, May 02, 2003

Compliance Solutions Occupational Trainers, Inc.

Certificate Number: *50160*

Neval Gupta
Vice President

Paul Hirsh
Instructor

WESTON SOLUTIONS®
Restoring Resource Efficiency

This Certifies That

BRIAN JUNCK

Has Completed the

8-Hour HAZWOPER Refresher Training Course

In accordance with 29 CFR 1910.120(e)(8) completed on 10/17/2011 in West Chester, PA

Owen B Douglass Jr. PhD, CIH

TRAINING MANAGER
Owen B. Douglass, Jr., PhD, CIH

George M Crawford Jr CIH

INSTRUCTOR
George M. Crawford Jr CIH

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06P-0910-2

Successful Completion Card

Basic TRAINING PROGRAMS

BRIAN JUNCK
Name

03/24/11
Issued

3/24/13
Expires

This certifies that the individual named above has successfully demonstrated the knowledge and skill objectives for:

☒ BasicPlus CPR, AED, and First Aid for Adults

☐ Basic CPR and First Aid for Adults

Card not valid if more than one box is checked.

MEDIC First Aid INTERNATIONAL

Instructor James Shuman

Registry Number 38154

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 medicfirstaid.com

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WORK STATUS REPORT

Employer Copy

TYPE OF EXAMINATION: Periodic Examination
PLACE OF EXAMINATION: 2608 - MedCenter 100

EMPLOYEE:	Junck, Brian	**COMPANY:**	Weston Solutions, Inc
ID:	017585	**POSITION:**	Geophysicist
DATE OF EXAM:	10/28/2010	**LOCATION:**	Weston-West Chester (Federal)
EXPIRATION DATE:	10/28/2012	**SITE:**	West Chester

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☒	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☒	☐

STATUS

1. ☒ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.

2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:

3. ☐ **NOT QUALIFIED**

4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Peter P. Greaney, M.D. Date: 11/06/10

Signature: Peter P Greaney MD

PAUL A. NOVAK

Qualifications Summary

- More than 3 years of experience in the fields of environmental hydrogeology, environmental emergency response, and geophysical investigations.
- Primary responder for environmental emergency response team, whose clients included the Florida Turnpike Authority. Spills varied in size from several gallons to 7,000+ gallons. Coordinated with HAZMAT and fire/rescue as necessary.
- Performed numerous geophysical investigations for UXO/OE or MEC, USTs, and subsurface geology at military and industrial complexes. Additional experience includes field assistance for surface and groundwater sampling, soil characterization and sampling, and monitoring well and vapor point installations.

Education

B.A., Geology—Franklin and Marshall College (2005)

Credentials

8-Hour Managers and Supervisors Course (SHSC), OSHA 29 CFR 1910.120(e)(4), WESTON (2007)
Behavior-Based Safety, Phase I Training, WESTON (2008)
Bloodborne Pathogens Training – Initial, OSHA 29 CFR 1910.1030, WESTON (2009)
Bloodborne Pathogens Refresher Training, OSHA 29 CFR 1910.1030, WESTON (2011)
First Aid/CPR/AED Training, Medic First Aid (2009)
40-Hour Hazardous Waste Site Training Course, OSHA 29 CFR 1910.120(e)(3), Compliance Solutions (2005)
8-Hour Hazardous Waste Refresher Course, OSHA 29 CFR 1910.120(e)(8), AdvanceOnline Solutions, Inc. (2010)
30-Hour Construction Safety and Health Training Course, OSHA 29 CFR 1926, Subparts C, E, M, P, and X, WESTON (2008)
Shipping and Transporting Dangerous Goods – Administrative/ Field Personnel – Initial, Weston Solutions, Inc., Manual of Procedures for Shipping and Transporting Dangerous Goods Training Course, 49 CFR 172 Subpart H, WESTON (2008)
Fall Protection Competent Person – Initial, OSHA 29 CFR 1926.500 Subpart M, 29 CFR 1926.651, WESTON (2008)
Trenching/Excavation Competent Person Training Course, OSHA 29 CFR 1026 Subpart P, WESTON (2008)

Employment History

2007-Present WESTON [11-07 to Present; West Chester, PA; Assistant Geoscientist 2]
2007 Handex Consulting & Remediation, LLC [1-07 to 11-07; Delray Beach, FL; Staff Hydrogeologist]
2005-2007 Sovereign Consulting, Inc. [6-05 to 1-07; Robbinsville, NJ; Field Geologist]
2001-2005 Franklin & Marshall College [9-01 to 5-05; Lancaster, PA; Student and Laboratory Teaching Assistant]

Key Projects

Geophysical Investigations, Ft. Ord, Monterey, CA, Ft. Ord Reuse Authority (FORA), Assistant Geoscientist. Assisted in the collection of geophysical data using Geonics EM-61 MKII, EM-61 MK II Towed Array, Geometrics 856 base station and the G-858 MagMapper in combination with Trimble real-time kinematic (RTK) global positioning system (GPS) for unexploded ordnance (UXO)/ordnance and explosives (OE); field documentation; use of digital cameras; utility vehicles; daily Personal Digital Assistant (PDA) data uploads and downloads from corporate server using ActiveSync; daily summary reports submitted to the client and Project Manager. Next phase of project to begin in early 2009. [5-08 to 8-08; WESTON; Proj. No. 13135.004.001]

Landfill Closure, West Point Academy, West Point, NY, Ewing-Cole, Assistant Geoscientist. Provided field oversight of drilling, sampling, and vapor point installations; classified and sampled soils, groundwater, and underground vapors; field documentation; use of Trimble GeoXT differential global positioning system (DGPS) to identify boring locations in field, coordination with on-site environmental team for access to site and scheduling; and disposal of nonhazardous drums. [4-08 to 5-08; WESTON; Proj. No. 10281.022.001]

Geophysical Investigations, Luke Air Force Base (AFB), Gila Bend, AZ, Air Education and Training Command (AETC), Assistant Geoscientist. Performed reacquisition of targets using Trimble RTK GPS; field documentation; use of iridium satellite phones; and daily PDA data uploads and downloads from corporate server using ActiveSync. [2-08 to 03-08; WESTON; Proj. No. 12832.001.159]

Geophysical Investigations, Ft. Miles, Cape Henlopen State Park, DE, U.S. Army Corps of Engineers (USACE), Assistant Geoscientist. Assisted in the collection of geophysical data using Geonics EM-61 MKII with Trimble RTK GPS; performed reacquisition of targets. [11-07 to 2-08; WESTON; Proj. No. 03886.530.001]

Spill Containment and Remediation, Multiple Sites, Delray Beach, FL, Florida Turnpike Authority, Primary Responder and Hydrogeologist. Was 24-hour on-call responder to spills along the Florida Turnpike between Miami and Port St.Lucie. Was responsible for initial response and spill containment; follow-up site assessment and remedial activities; ordering sample ware, sampling, data interpretation, scheduling of remedial activities, which typically involved excavation and disposal; oversight of remedial activity; and completion of initial spill documentation and final report. Spills varied in location, volume, and composition. [1-07 to 11-07; Handex Consulting & Remediation, LLC]

WESTON SOLUTIONS
Restoring Resource Efficiency

This Certifies That

PAUL NOVAK

Has Completed the

8-Hour Site Manager and Supervisor Training Course

In accordance with 29 CFR 1910.120(e)(4) completed on 11/15/2007 in West Chester, PA

TRAINING MANAGER
Conrad W. Lehr, CET, CIT

INSTRUCTOR
Conrad W. Lehr CET

195_15636_11152007

Weston Solutions, Inc • 1400 Weston Way • West Chester, PA • 19380

06P-0910-2

WESTON SOLUTIONS®
Restoring Resource Efficiency

This Certifies That

PAUL NOVAK

Has Completed the

30-Hour Construction Safety and Health Training Course

In accordance with OSHA Outreach Training Program (Includes Competent Person Instruction as indicated in 29 CFR 1926 Subparts C, E, M, P, & X) completed on 09/19/2008 in West Chester, PA

Conrad W. Lehr, CET

TRAINING MANAGER
Conrad W. Lehr, CET, CIT

T. L. Blackburn CSP, CET

INSTRUCTOR
Theodore L. Blackburn CSP, CET

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06P-0910-2

WESTON SOLUTIONS
Restoring Resource Efficiency

This Certifies That

PAUL NOVAK

Has Completed the

8-Hour HAZWOPER Refresher Training Course

In accordance with 29 CFR 1910.120(e)(8) completed on 02/08/2011 in West Chester, PA

Owen B Douglass Jr PhD, CIH

TRAINING MANAGER
Owen B. Douglass, Jr., PhD, CIH

George M Crawford Jr CIH

INSTRUCTOR
George M. Crawford Jr CIH

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06P-0910-2

Compliance Solutions

"Today's Training... Tomorrow's Solution"

10515 E 40th Ave, Suite 116, Denver Colorado 80239 800-711-2706

Student Affiliation:
Sovereign Consulting, Inc.
99002154

Certificate of Completion

This is to certify that

Paul Novak

has successfully completed the classroom requirements for

40 Hour HAZWOPER

29 CFR 1910.120(e)

Presented

Friday, July 15, 2005

Compliance Solutions Occupational Trainers, Inc.

Certificate Number: 70758

Neval Gupta
Vice President

Jeffrey Kline
President/CEO

TEMPORARY PENNSYLVANIA BOATER EDUCATION CERTIFICATE

DATE/TIME OF ISSUE:
October 27, 2011 8:46 PM CDT
EXPIRATION DATE: December 26, 2011

TEMPORARY CERTIFICATE #	PA784936		
NAME (Last, First, MI)	NOVAK	PAUL	A
STREET ADDRESS	1400 WESTON WAY		
CITY/STATE/ZIP	WEST CHESTER	PA	19380
TYPE OF COURSE	Boat Pennsylvania Course		

PHYSICAL CHARACTERISTICS			DATE OF BIRTH
HAIR COLOR	EYE COLOR	GENDER	YEAR-MONTH-DAY
Brown	Brown	M	1983-05-02

I hereby certify that I completed the Boat Pennsylvania Course on my own.	UIUONEA1BBDM
Signature	Date 10/27/11

American Red Cross

This recognizes that

Paul Novak

has completed the requirements for

First Aid with CPR/AED Adult

conducted by

Christian St. YMCA

Date completed: 6/11/11

Valid for **2** year(s)

redcross.org

Instructor's Signature

Steve Snellen

Chapter

Southeastern Pennsylvania

Holder's Signature

Stock No. 656798

WORKCARE™
Making Health Count

WORK STATUS REPORT

Employer Copy

TYPE OF EXAMINATION: **Periodic Examination**
PLACE OF EXAMINATION: **1851 - Middletown Medical**

UPDATE

EMPLOYEE:	**Novak, Paul A.**	**COMPANY:**	**Weston Solutions, Inc**
ID:	**019343**	**POSITION:**	**Geoscientist**
DATE OF EXAM:	**06/30/2011**	**LOCATION:**	**Weston-West Chester (Federal)**
EXPIRATION DATE:	**06/30/2012**	**SITE:**	

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

The following recommendations includes review of the following exam components:

- *Blood Lead/ZPP*
- *Urine Heavy Metals Screen 12004* — This panel includes Urine Cadmium, Urine Mercury, and Urine Arsenic tests.

	Yes	No	Undecided
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	☐	☒	☐
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	☐	☒	☐

STATUS

1. ☒ **QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.

2. ☐ **QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:

3. ☐ **NOT QUALIFIED**

4. ☐ **DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

COMMENTS: ***Able to participate in biomedical collection and response activity.***

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Peter P. Greaney, M.D. Date: 07/19/11

Signature: Peter P Greaney MD

ATTACHMENT C

HAZARD ASSESSMENT CERTIFICATION FORM

HAZARD ASSESSMENT CERTIFICATION FORM

Date: **Location:**

Assessment Conducted By:

Specific Tasks Performed at this Location:

I. Overhead Hazards Identified (Check all that apply):

☐Suspended loads that could fall
☐Overhead beams or loads that could be hit against
☐Energized wires or equipment that could be near enough to arc or hit against
☐Employees work at elevated site who could drop objects on others below
☐Sharp objects or corners at head level
☐Other (Describe/List) ____________________________________

Head Protection

Hard Hat: ☐Yes ☐No

II. Eye and Face Hazards Identified (Check all that apply):

☐Chemical splashes
☐Dust
☐Smoke and fumes
☐Welding operations
☐Lasers/optical radiation
☐Projectiles
☐Other (Describe/List) ____________________________________

Eye Protection

Safety glasses: ☐Yes ☐No
Goggles: ☐Yes ☐No
Face Shield: ☐Yes ☐No
Tinted Lens: ☐Yes ☐No
(If yes, Degree of Filtering: ______)

III. Hand Hazards Identified (Check all that apply):

☐Chemicals
☐Sharp edges, splinters, etc.
☐Temperature extremes
☐Biological agents
☐Exposed electrical wires
☐Sharp tools, machine parts, etc.
☐Other (Describe/List) ____________________________________

Hand Protection

Gloves: ☐Yes ☐No
☐Chemical resistant
☐Temperature resistant
☐Abrasion resistant
☐Electrical protective
☐Other (Describe/List)

IV. Foot Hazards Identified (Check all that apply):

☐Heavy materials handled by employees
☐Sharp edges or points (puncture risk)
☐Exposed electrical wires
☐Unusually slippery conditions
☐Wet conditions
☐Construction/demolition
☐Other (Describe/List) ____________________________________

Foot Protection

Safety Shoes: ☐Yes ☐No
Types: **☐Toe protection**
☐Metatarsal protection
☐Puncture resistant
☐Electrical insulation
☐Non-static
Other (Describe/List)

V. Hazards to Body Identified (Check all that apply):

☐Chemical contact
☐Fire or flash
☐Temperature extremes
☐UXO
☐Radiation (Ionizing)
☐Radiation (Non-Ionizing)
☐Other (Describe/List) ___________________________________

Body Protection

☐Chemical-resistant coveralls
☐Thermal protection
☐Welding —Leathers‖
☐Ballistic shields for UXO operations
☐Flash protection (e.g., Nomex or equivalent)
☐Ballistic or cut-resistant chaps

VI. Noise Hazards Identified: Noise Source(s):

Noise Protection (List):

VII. Other Identified Safety and/or Health Hazards (list):

Recommended Protection (List):

I certify that the above inspection was performed to the best of my knowledge and ability, based on the hazards present on (date)______________________ .

____

Signature

ATTACHMENT D

ENVIRONMENTAL HEALTH AND SAFETY INSPECTION CHECKLIST

ENVIRONMENTAL HEALTH AND SAFETY INSPECTION CHECKLIST

Project Name: ____

Inspector: ____

Submit to: ____

Date: ____________________

THE WESTON SITE APPEARANCE

YES	NO		COMMENT
		Is the site secured to prevent inadvertent, unnecessary, or unauthorized access? Are gates closed and locked at any time that the access point is not occupied or visible to site workers?	
		Are access points posted with signs to indicate client and end-user client name, WESTON's name and logo, names of other contractors and sub-contractors, project name and location, and appropriate safety messages?	
		Are required postings in place (e.g., Labor Poster, Emergency Phone Numbers, Site Map, etc.)?	
		Are site trailers tied down per local code and provided with stairs that have a landing platform with guard and stair railings?	
		Is a Site Safety file system established in the office to maintain records required by applicable safety regulations	
		Is the Health and Safety Plan (HASP) or Accident Prevention Plan (APP) amended as scope of work changes, hazards are discovered or eliminated or if risk change?	
		Is the Site Safety Plan and the Safety Officers Field Manual on site?	
		Is new employee indoctrination provided?	
		Have site Rules been provided, discussed and signed off on by all employees	
		Incident Reporting procedure explained to all?	
		Is site management trained in the WESTON (and client as applicable) Incident Reporting system?	
		Are NOI and Supplemental Report forms and OSHA 300 Log available on site?	
		Is Site Management aware of the Case Management and Incident Investigation Procedures?	
		Is there a list of preferred provider medical facilities available?	
		Has the "Inspection By A Regulatory Agency" procedure been reviewed by all site management?	
		Will Competent Persons be required because of activities to be performed, equipment to be used or hazards to be encountered?	

POLICIES

YES	NO		COMMENT
		Each individual employee is aware that he or she responsible for complying with applicable safety requirements, wearing prescribed safety equipment and preventing avoidable accidents.	
		Do employees understand that they will wear clothing suitable for existing weather and work conditions and the minimum work uniform will include long pants, sleeved work shirts, protective footwear, hard hat, and safety glasses unless otherwise specified via the HASP.	
		Are employees provided safety and health training to enable them to perform their work safely ? Is all training documented to indicate the date of the session, topics covered, and names of participants?	
		Safety meetings are conducted daily. The purpose of the meetings are to review past activities, review pertinent tailgate safety topics and establish safe working procedures for anticipated hazards encountered during the day.	
		Training has been provided to all personnel regarding handling of emergency situations that may arise from the activity or use of equipment on the project.	
		Employees/contractors are informed and understand that they may not be under the influence of alcohol, narcotics, intoxicants or similar mind-altering substances at any time. Employees found under the influence of or consuming such substances will be immediately removed from the job site.	
		Site workers and operators of any equipment or vehicles are able to read and understand the signs, signals and operating instructions of their use.	
		Have contractors performing work provided copies of relevant documentation (such as medical fit-for-duty, training certificates, fit-tests, etc.) prior to initiation of the project?	

SANITATION
29 CFR 1926 Subparts C, D. EM 385-1-1, Section 2

YES	NO		COMMENT
		Is an adequate supply of drinking water provided. Is potable/drinking water labeled as such? Are there sufficient drinking cups provided?	
		Is there a sufficient number of toilets?	
		Are washing facilities readily available and appropriate for the cleaning needs?	
		Are washing facilities kept sanitary with adequate cleansing and drying materials?	
		Waste is secured so as not to attract rodents, insects or other vermin?	
		Is an effective housekeeping program established and implemented?	

ACCIDENT PREVENTION SIGNS, TAGS, LABELS, SIGNALS, AND PIPING SYSTEM IDENTIFICATION
29 CFR 1926 Subpart G. EM 385-1-1, Section 8

YES	NO		COMMENT
		Are signs, tags, and labels provided to give adequate warning and caution of hazards and instruction/directions to workers and the public?	
		Are all employees informed as to the meaning of the various signs, tags and labels used in the workplace and what special precautions are required?.	
		Are construction areas posted with legible traffic signs at points of hazard?	
		Are signs required to be seen at night lighted or reflectorized?	
		Tags contain a signal word (“danger” or “caution”) and a major message to indicate the specific hazardous condition or the instruction to be communicated to the employee. Tags follow requirements as outlined in 29 CFR 1926.200.	

MEDICAL SERVICES AND FIRST AID
29 CFR 1926 Subparts C, D. EM 385-1-1, Section 3

YES	NO		COMMENT
		Is a local medical emergency facility (LMEF) identified in the HASP or APP?	
		Has the LMEF been visited to verify the directions and establish contacts?	
		Has site management reviewed WESTON’s incident management procedures?	
		Have clinics and specialists that will help WESTON manage injuries and illnesses been identified?	
		Is there at least two (2) people certified in First Aid and CPR?	
		Are first aid kits available at the command post and appropriate remote locations?	
		Are first Aid Kits and Eyewash/Safety Showers inspected weekly?	
		Are 15 minute eyewash/safety showers in place if required.	

FIRE PREVENTION AND PROTECTION
29 CFR 1926 Subpart F. EM 385-1-1, Section 9

YES	NO		COMMENT
		Is an Emergency Response and Contingency Plan in place?	
		Are emergency phone numbers posted?	
		Are fire extinguishers selected and provided based on the types of materials and potential fire classes in each area.	
		Are fire extinguishers provided in each administrative and storage trailer, within 50 ft but no closer than 25 ft of any fuel or flammable liquids storage, on welding and cutting equipment, on mechanical equipment?	
		Are fire extinguishers checked daily and inspected monthly?	
		Do site personnel know the location of fire extinguishers and how to use them?	
		Are flammable and combust ble liquids stored in approved containers?	
		Safety cans are used for dispensing flammable or combustible liquids in 5 gallon or less volumes.	
		Are flammable and combust ble liquids stored in flammable storage cabinets or appropriate storage areas?	
		Are flammable materials separated from oxidizers by at least 20 feet (or 5 foot tall, ½ -hour rated fire wall) when in storage?	
		Are fuel storage tanks double walled or placed in a lined berm?	
		Spills are cleaned up immediately and wastes are disposed of properly.	
		Combustible scrap, debris and waste material (oily rags) are stored in closed metal containers and disposed of promptly.	
		Vehicle fueling tanks are grounded and bonding between the tank and vehicle being fueled is provided?	
		LPG is stored, handled and used according to OSHA regulations 29 CFR 1926.	
		LPG cylinders are not stored indoors.	
		Is a hot work permit program in place? See WESTON FLD-36	
		Is smoking limited to specific areas, prohibited in flammable storage areas and are signs posted to this effect?	

HAZARDOUS SUBSTANCES, AGENTS AND ENVIRONMENTS
29 CFR 1926 Subparts D, Z. EM 385-1-1, Sections 6, 28

YES	NO		COMMENT
		Are operations, materials and equipment evaluated to determine the presence of hazardous contaminants or if hazardous agents could be released in the work environment?	
		Are MSDS for substances made available at the work-site when any hazardous substance is procured, used, or stored?.	
		Are all containers and piping containing hazardous substances labeled appropriately?	
		Is there an inventory of hazardous substances?	
		Is there a site Specific Hazard Communication Program?	
		Spill kits appropriate for the hazardous materials present are on site and their location is known to spill responders.	
		Is disposal of excess hazardous chemicals performed according to WESTON's guidelines and RCRA regulations.	
		Before initiation of activities where there is an identified asbestos or lead hazard, is there a written plan detailing compliance with OSHA and EPA asbestos or lead abatement requirements? Does the plan comply with state and local authority, and USACE requirements, as applicable?	
		Are personnel trained and provided with protection against hazards from animals, poisonous plants and insects?	

PERSONAL PROTECTIVE AND SAFETY EQUIPMENT, RESPIRATORY AND FALL PROTECTION
29 CFR 1926 Subparts D, E, M. EM 385-1-1, Section 5

YES	NO		COMMENT
		Do employees understand that the minimum PPE is hard hat, safety glasses with side shields and safety shoes or boots and that long pants and a sleeved shirt are required?	
		Has the SSHC reviewed the PPE requirements in the HASP against actual site conditions and certified that the PPE is appropriate? (see Field Manual, PPE Program)	
		PPE is inspected, tested and maintained in serviceable and sanitary condition as recommended by the manufacturer. Is defective or damaged equipment taken out of service and repaired or replaced?	
		Are workers trained in the use of the PPE required?	
		Are personnel exposed to vehicular or equipment traffic, including signal persons, spotters or inspectors required to vests or apparel marked with a reflective or high visibility material?	
		Is there a noise hazard? If yes, hearing protection will be required.	
		Is there a splash or splatter hazard? Face shields or goggles will be required.	
		Will personnel be working in or over water? Personnel Floatation devices will be required.	
		Is there a welding hazard? Welding helmet and leathers will be required. Is there a cutting torch hazard? Goggles and protective clothing will be required.	
		Is each person on a wa king/working surface with an unprotected side or edge which is 6 feet (1.8 m) or more above a lower level protected from falling by the use of guardrail systems, safety net systems or personal fall arrest systems? See WESTON FLD 25 (Note General Industry standard is four feet).	
		Guardrail systems are used as primary protection whenever feasible. Guardrail construction meets criteria in 29 CFR 1926.502(b).	
		Personal fall arrest systems (PFAS) are inspected and appropriate for use.	
		Ropes and straps (webbing) used in lanyards, lifelines, and strength components of body belts and body harnesses are from synthetic fibers.	
		Safety nets and safety net installations are constructed, tested and used according to 29 CFR 1926.502.c	
		Is respirator use required? See WESTON Respiratory Protection Program	
		Persons using respiratory protection have been successfully medically cleared, trained and fit tested.	
		Respirators are used according to the manufacturer's instructions, regulatory requirements, selection criteria and health and safety plan provisions.	
		For Level C operations with organic vapor contamination, is the cartridge change-out schedule documented?	
		Is breathing certified as Grade D, or better, and certification available on-site?	

MACHINERY AND MECHANIZED EQUIPMENT
29 CFR 1926 Subparts N, O. EM 385-1-1, Sections 16, 17, 18

YES	NO		COMMENT
		Are inspections of machinery by a competent person established?	
		Is equipment inspected daily before its next use?	
		Equipment inspection reports are reviewed, followed-up on negative findings and records of inspections are maintained?	
		Machinery or equipment found to be unsafe is taken out of service until the unsafe condition has been corrected.	
		Is there a preventive maintenance program established?	
		Are operators of equipment qualified and authorized to operate?	
		Is all self-propelled construction and industrial equipment equipped with a reverse signal alarm?	
		Are seats or equal protection provided for each person required to ride on equipment. Are seatbelts installed and worn on motor vehicles, as appropriate.	
		All equipment with windshields is equipped with powered wipers. If fogging or frosting is possible, operable defogging or defrosting devices are required.	
		Internal combustion engines are not operated in enclosed areas unless adequate ventilation are made. Air monitoring is conducted to assure safe working conditions.	
		Is each bulldozer, scraper, dragline, crane, motor grader, front-end loader, mechanical shovel, backhoe, or similar equipment equipped with at least one dry chemical or carbon dioxide fire extinguisher with a minimum rating of 5-B:C?	
		Will cranes or other lifting devices be used? If so, are the following documents available on site: 1) a copy of the operating manual, 2) load rating chart, 3) log book, 4) a copy of the last annual inspection and 5) the initial on-site inspection?	
		Do operators have certificates of training to operate the type of crane(s) to be used?	
		Is a signal person provided when the point of operation is not in full view of the vehicle, machine or equipment operator? When manual (hand) signals are used, is only one person designated to give signals to the operator?	
		Signal persons back one vehicle at a time. While under the control of a signal person, drivers do not back or maneuver until directed. Drivers stop if contact with the signal person is lost.	
		Is a critical lift plan prepared by a competent person whenever: a lift is not routine, or a lift exceeds 75% of a crane's capacity, a lift results in the load being out of the operator's line of sight, or a lift involves more than one crane, a man basket is used, or the operator believes there is a need for a critical lift plan.	
		Fork Lifts (Powered Industrial Trucks) - Will forklifts be used on site?	
		All fork lifts meet the requirements of design, construction, stability, inspection, testing, maintenance and operation as indicated in ANSI/ASME B56.1 Safety Standards for Low Lift and High Lift Trucks.	
		Do forklift operators have certificates of training?	
		Are pile driving operations conducted according to EM 385-1-1, Section 16.L?	
		Is drilling equipment operated, inspected, and maintained as specified in the manufacturer's operating manual? Is a copy of the manual available at the work-site? See also the Drilling Safety Guide in the Safety Officers Field Manual.	
		Are flag persons provided when operations or equipment on or near a highway expose workers to traffic hazards? Do flag persons and persons working in proximity to a road wear high visibility vests? Are persons exposed to highway vehicle traffic protected by signs in all directions warning of the presence of the flag persons and the work? Do signs and distances from the work zone conform to federal and local regulations?	

MOTOR VEHICLES
29 CFR 1926 Subpart O. EM 385-1-1, Section 18

YES	NO		COMMENT
		Motor vehicle operators have a valid permit, license, or certification of ability for the equipment being operated.	
		Inspection, maintenance and repair is according to manufacturer's requirements by qualified persons.	
		Vehicles are inspected on a scheduled maintenance program.	
		Vehicles not in safe operating condition are removed from service until defects are corrected.	
		Glass in windshields, windows, and doors is safety glass. Any cracked or broken glass is replaced.	
		Seatbelts are installed and worn.	
		The number of passengers in passenger-type vehicles does not exceed the number which can be seated.	
		Trucks used to transport personnel have securely anchored seating, a rear endgate, and a guardrail.	
		No person is permitted to ride with arms or legs outside of a vehicle body; in a standing position on the body; on running boards; seated on side fenders, cabs, cab shields, rear of the truck or on the load.	
		ATV operators possess valid state drivers license, have completed an ATV training course prior to operation of the vehicle, and wear appropriate protective equipment such as helmets, boots, and gloves.	

EXCAVATING AND TRENCHING
29 CFR 1926 Subpart P. EM 385-1-1, Section 25

YES	NO		COMMENT
		Has the known or estimated location of utility installations such as sewer, telephone, fuel, electric, water lines, or any other underground installations that may be expected to be encountered during excavation been determined before excavation? Have utility locations been verified by designated state services according to state regulations? Has the client provided clearance where state jurisdiction doesn't apply?	
		Have overhead utilities in excavation areas been identified and either de-energized, shielded or barricaded so excavating equipment will not come within 10 feet?	
		Are inspections of the excavation, the adjacent areas, and protective systems made daily and as necessary by a competent person?	
		Are Protective systems in place as prescr bed by the competent person?	
		Is material removed from excavations managed so it will not overwhelm the protective systems?	
		Are barriers provided between excavations and walkways?	
		Are excavations by roadways barricaded to warn vehicles of presence or to prevent them from falling in?	
		Is there a means of exit from the excavation every 25 feet?	
		Is air monitoring required? If yes, Is it performed?	

CONFINED SPACES
29 CFR 1910 Subpart J. EM 385-1-1, Section 6

YES	NO		COMMENT
		Is there a Confined Space Entry Program in place?	
		Are the confined Spaces identified and labeled?	
		Will the Confined Spaces be entered?	
		Is appropriate entry documentation used and on-file?	

ELECTRICAL
29 CFR 1926 Subpart K. EM 385-1-1, Section 11

YES	NO		COMMENT
		Are electrical installations made according to the National Electrical Code and applicable local codes?	
		Qualified electricians make all connections and perform all work within 10 feet of live electric equipment.	
		Location of underground, overhead, under floor, behind wall electrical lines is known and communicated. Lines are documented by qualified person as de-energized where necessary.	
		Workers understand they must not work near live parts of electric circuits, unless they are qualified as required by OSHA or are protected by de-energizing and grounding the parts, guarding the parts by insulation, or other effective means?	
		Employees who regularly work on or around energized electrical equipment or lines are instructed in the cardiopulmonary resuscitation (CPR) methods.	
		Workers are proh bited from working alone on energized lines or equipment over 600 volts.	
		Are Ground-fault circuit interrupters (GFCI's) or is ground fault circuit protection provided to protect employees from ground-fault hazards for all 115 – 120 Volt, 15 and 20 amp receptacle outlets which are not a part of the permanent wiring of a building or structure at construction sites?	
		Circuit breakers are labeled.	
		Circuit breaker and all cabinets with exposed electric conductors are kept tightly closed.	
		Unused openings (including conduit knockouts) in electrical enclosures and fittings are closed with appropriate covers, plugs or plates.	
		Sufficient access and working space is provided and maintained about all electrical equipment to permit ready and safe operations and maintenance.	
		Motors are located within sight of their controllers or controller disconnecting means are capable of being locked in the pen position or is a separate disconnecting means installed in the circuit within sight of the motor.	
		Are visual inspections of extension cords and cord-and plug-connected equipment conducted daily? Is equipment found damaged or defective tagged and removed from service, and not used until repaired?	
		Wet Areas - Is portable lighting used in wet or conductive locations, such as tanks or boilers operated at no more than 12 volts and protected by GFCIs.	
		Are electrical installations in hazardous areas to NEC?	
		Metal ladders and tools including tape measures or fabric with metal thread are proh bited where contact with energized electrically parts is possible.	
		All extension cords are the three-wire type, designed and rated for hard or extra hard usage?	
		Worn or frayed electrical cords or cables are taken out of service. Fastening with staples, hanging from nails or suspending extension cords by wire is proh bited.	
		Electric wire/flex ble cord passing through work areas is protected from damage such as foot traffic, vehicles, sharp corners, projections and pinching? Flexible cords and cables passing through holes are protected by bushings or fittings?	
		Before an employee or contractor performs any service or maintenance on a system where the unexpected energizing, start up, or release of kinetic or stored energy could occur and cause injury or damage, the system is to be isolated. Only authorized persons may apply and remove lockouts and tags.	
		Contractors planning to use hazardous energy control procedures submit their hazardous energy control plan to the WESTON site safety officer or designee before implementing lockout/tagout procedures.	
		There is a site specific hazardous energy control plan that clearly and specifically outlines the scope, purpose, authorization, rules and techniques to be used for the control of hazardous energy.	
		Workers possess the knowledge and skills required for the safe application, usage and removal of energy controls.	

WELDING AND CUTTING
29 CFR 1926 Subpart J. EM 385-1-1, Section 10

YES	NO		COMMENT
		Prior to performing welding, cutting or any other heat or spark producing activity, an assessment of the area is made by a competent person to identify combustible materials and potential sources of flammable atmospheres.	
		Welders, cutters and their supervisors are trained in the safe operation of their equipment, safe welding and cutting practices, hot work permit requirements, and fire protection.	
		Welding and cutting equipment is inspected daily before use. Unsafe equipment is taken out of use, replaced or repaired.	
		Workers and the public is shielded from welding rays, flashes, sparks, molten metal and slag.	
		Employees performing welding, cutting or heating are protected by PPE appropriate for the hazards (e.g., respiratory, vision and skin protection).	
		Compatible fire extinguishing equipment is provided in the immediate vicinity of welding or cutting operations.	
		Drums, tanks, or other containers and equipment which have contained hazardous materials shall be thoroughly cleaned before welding or cutting. Cleaning shall be performed in accordance with NFPA 327, Cleaning or Safeguarding Small Tanks and Containers, ANSI/AWS F4.1, Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, and applicable health and safety plan requirements.	

HAND AND POWER TOOL SAFETY
29 CFR 1926 Subpart I. EM 385-1-1, Section 13

YES	NO		COMMENT
		Power tools are from a manufacturer listed by a nationally recognized testing laboratory for the specific application for which they are to be used.	
		Hand & power tools are inspected, maintained, tested and determined to be in safe operating condition before use.	
		Tools found to be unsafe are not used, tagged and repaired or destroyed.	
		Users of tools are trained in safe use.	
		Electrical tools have cords and plug connections in good repair.	
		Electrical tools are effectively grounded or approved double insulated.	
		Reciprocating, rotating, and moving parts of equipment are guarded if they may be accessed by employees or they otherwise create a hazard.	
		Safety clips/retainers are installed and maintained on pneumatic impact tool connections.	
		Chain saws have an automatic chain brake or anti-kickback device.	
		Pneumatic and hydraulic hoses and fittings are inspected regularly.	
		Employees who operate powder actuated tools are trained and carry valid operators cards.	
		Powder activated tools are stored in individual locked containers, when not in use and are not loaded until ready to use.	
		Powder actuated tools are inspected for obstructions or defects daily before use.	
		Powder actuated tool operators have appropriate PPE.	

RIGGING
29 CFR 1926 Subpart H. EM 385-1-1, Section 15

YES	NO		COMMENT
		Rigging equipment is inspected as specified by the manufacturer, by a qualified person, before use on each shift and as necessary to assure that it is safe.	
		Defective equipment is removed from service.	
		Rigging not in use is removed from the work area, properly stored, and maintained in good condition.	
		Wire rope removed from service for defects is cut up or plainly marked as unfit for use as rigging.	
		The number of saddle clips used to form eyes in wire rope conforms with Table H-20, are spaced evenly and the saddles are on the live side.	
		Chain rigging has a tag clearly indicating load limits, is inspected before initial use, then weekly, and is of alloyed metal.	
		Fiber rope rigging is not used if it is frozen or has been subject to acids or excessive heat.	
		Slings and their fittings and fastenings are inspected before use on each shift and as needed during use.	
		Drums, sheaves, and pulleys on rigging hardware are smooth and free of surface defects that can damage rigging.	

MATERIAL HANDLING, STORAGE, AND DISPOSAL
29 CFR 1926 Subpart H. EM 385-1-1, Section 14

YES	NO		COMMENT
		Employees are trained in and use safe lifting techniques.	
		Materials are not moved or suspended over workers unless positive precautions have been taken to protect workers.	
		Conveyors are constructed, inspected, & maintained by qualified persons according to manufacturer's recommendations.	
		All conveyors are to be equipped with emergency stopping devices.	
		Hazardous exposed moving machine parts are guarded mechanically, electrically or by location.	
		Controls are clearly marked and/or labeled to indicate the function controlled.	
		Taglines are used for suspended loads where the movement may be hazardous to persons.	
		Material in storage is protected from falling or collapse by effective stacking, blocking, cr bbing, etc.	
		Walkways and aisles are to be kept clear.	
		Materials are not stored on scaffolds or runways in excess of normal placement or in excess of safe load limits.	
		Work areas and means of access are maintained safe and orderly.	
		Tools, materials, extension cords, hoses or debris do not cause tripping or other hazards.	
		Storage and construction sites are kept free from the accumulation of combustible materials.	
		Waste materials and rubbish are placed in containers or, if appropriate, in piles. Waste materials are disposed of in accord with applicable local, state, or federal requirements.	

FLOATING PLANT AND MARINE ACTIVITIES
29 CFR 1926 Subpart O. EM 385-1-1 Section 19

YES	NO		COMMENT
		Floating plants that are regulated by the USCG have current inspections and certificates.	
		Before any floating plant is brought to the job site and placed in service it is inspected and determined to be in safe operating condition	
		Periodic inspections are made such that safe operating conditions are maintained. Strict compliance with EM 385-1-1, Section 19 is expected.	
		Plans are in place for removing or securing the plant and evacuation of personnel endangered by severe weather and other marine emergencies such as; fire, flooding, man overboard, hazardous materials incidents, etc..	
		Means of access are properly secured, guarded, and maintained free of slipping and tripping hazards.	
		Dredging operations follow guidelines as established in EM 385-1-1, Section 19.D.	

PRESSURIZED EQUIPMENT AND SYSTEMS
29 CFR 1926 Subparts I, F. EM 385-1-1, Section 20

YES	NO		COMMENT
		Pressurized equipment and systems are inspected before being placed into service.	
		Pressurized equipment or systems found to be unsafe are tagged “Out of Service-Do Not Use”.	
		Systems and equipment are operated, inspected and maintained by qualified, designated personnel.	
		Safe clearance, lockout/tagout procedures are followed as appropriate during maintenance or repair.	
		Air hose, pipes, fittings are pressure-rated for the activity. Defective hoses are removed from service.	
		Hoses aren’t laid over ladders, steps, scaffolds, or walkways in a manner that creates a tripping hazard.	
		The use of compressed air for personal cleaning is prohibited. The use of compressed air for other cleaning is restricted to less than 30 psig.	
		Compressed gas cylinders are stored in well-ventilated locations.	
		Cylinders in storage are separated from flammable or combustible liquids and from easily ignitable materials by at least 40 feet or by a minimum five feet tall, ½ -hour fire resistive partition.	
		Stored cylinders containing oxidizing gases are separated from fuel gas cylinders by at least 20 feet or by a minimum five feet tall, ½ -hour fire resistive partition.	
		Cylinder valve caps are in place when cylinders are in storage, in transit, or a regulator is not in place.	
		Compressed gas cylinders in service are secured in substantial fixed or portable racks or hand trucks.	
		Oxygen cylinders and fittings are kept away from, and free from oil and grease.	
		Cylinder Storage areas are posted with the names of the gases in storage and with signs indicating "No Smoking or Open Flame".	
		Cylinders are to be stored such that mechanical and corriosion damage is avoided. Cylinders are not to be stored in areas required as an egress path.	
		Cylinders may be stored in the open outdoors, however, they must be protected from the ground to prevent corrosion and must be protected from temperatures that may exceed 125 degrees F.	

WORK PLATFORMS/SCAFFOLDS
29 CFR 1926 Subparts L, M, N. EM 385-1-1 Sections 21, 22

YES	NO		COMMENT
		Work platforms are erected, used, inspected, tested, maintained and repaired according to manufacturer's requirements.	
		Construction, inspection, and disassembly of scaffolds is under the direction of a competent person.	
		Workers on scaffolding have been trained by a qualified person.	
		Scaffolds are erected on a firm and level surface and are square and plumb.	
		Scaffolds are not loaded in excess of rated capacity.	
		Working levels of work platforms are fully planked or decked.	
		Planks are in good condition and free from obvious defects.	
		Fabricated frame scaffolding four times higher than the base width is secured to building/structure according to manufacturer's instruction and/or OSHA requirements.	
		Working platforms of scaffolding over ten feet in height have guard rails meeting OSHA specifications. Fall protection is suggested at four feet or greater.	
		Scaffolding/work platforms are accessed by means of a properly secured ladder or equivalent. Built on ladders conform to scaffold ladder requirements. Climbing of braces is not allowed.	
		Crane supported work platforms are designed and used in accordance with OSHA standards.	
		Elevating work platforms are operated, inspected and maintained according to the equipment operations manual.	
		Employees working in aerial lifts remain firmly on the floor of the basket. Employees use fall protection while in an aerial lift basket.	

WALKING AND WORKING SURFACES AND STAIRS
29 CFR 1926 Subparts L, M, X. EM 385-1-1, Sections 21, 22, 24

YES	NO		COMMENT
		Work areas are clean, sanitary, and orderly	
		Work surfaces are kept dry or appropriate means are taken to assure the surfaces are slip-resistant	
		Accumulations of combustible dust are routinely removed.	
		Aisles and passageways are kept clear and marked as appropriate.	
		There is safe clearance for walking in aisles where motorized or mechanical handling equipment is operating.	
		Materials or equipment is stored in such a way that sharp projections will not interfere with the walkway.	
		Changes of direction or elevation are readily identifiable.	
		Aisles or walkways that pass near moving or operating machinery, welding operations or similar operations are arranged so employees will not be subjected to potential hazards.	
		Standard guardrails are provided wherever aisle or wa kway surfaces are elevated more than 30 inches above any adjacent floor or the ground and bridges provided where workers must cross over conveyors and similar hazards.	
		There are standard stair rails or handrails on all stairways having four or more risers or with an elevation of 30 or more inches.	
		Stairways are at least 22 inches wide. (General Industry Standard)	
		Stairs angle no more than 50 and no less than 30 degrees, risers are uniform from top to bottom (plus or minus 1/4 inch) and are provided with a surface that renders them slip resistant.	
		Stairway handrails are not less than 36 inches above the leading edge of stair treads and have at least 3 inches of clearance between the handrails and the wall or surface they are mounted on.	
		Where doors or gates open directly on a stairway, there is a platform provided so the swing of the door does not reduce the width of the platform to less than 20 inches.	
		Where stairs or stairways exit directly into any area where vehicles may be operated, there are adequate barriers and warnings provided to prevent employees stepping into the path of traffic.	
		Signs are posted showing the load capacity of elevated storage areas.	
		An appropriate means of access and egress is provided for surfaces with 19 or more inches of elevation change.	
		Material on elevated surfaces is minimized, with that necessary for immediate work requriements piled, stacked or racked in a manner to prevent it from tipping, falling, collapsing, rolling or spreading.	

FLOOR AND WALL HOLES AND OPENINGS
29 CFR 1926 Subpart M. EM 385-1-1, Section 24

YES	NO		COMMENT
		Floor and roof openings that persons can walk into or fall through are guarded by a physical barrier or covered.	
		Holes (defined as equal to or greater than 2 inches in least dimension) where person could trip must be covered/protected.	
		Unprotected sides and edges on a walking/working surface six feet or more (note four feet in General Industry) are protected by guardrail system, safety net or Personal Fall Arrest System (PFAS).	
		Unused portions of service pits and pits not actually in use are either covered or protected by guardrails or equivalent.	
		Coverings for holes or other openings must be constructed of sufficient strength to support any anticipated load, must be secured in place to prevent accidental removal or displacement and must be marked indicating purpose (e.g., stenciled "Hole" or painted contrasting color to surroundings).	

LADDERS
29 CFR 1926 Subpart X. EM 385-1-1, Section 21

YES	NO		COMMENT
		Portable ladders are used for their designed purpose only.	
		Portable ladders are examined for defects prior to, and after use.	
		Ladders found to be defective are clearly tagged to indicate "DO NOT USE" if repairable, or destroyed immediately if no repair is possible.	
		Workers are trained in hazards associated with ladder use and how to inspect ladders.	
		Ladders have secure footing provided by a combination of safety feet, top of ladder tie-offs and mud cills or a person holding the ladder to prevent slipping.	
		The handrails of a straight ladder used to get from one level to another extend at least 36 inches above the landing.	
		Ladders conform to construction criteria of ANSI Standards A-14.1 and A-14.2.	
		Wooden ladders are not painted with an opaque covering such that signs of flaws, cracks or drying are obscured.	
		Fixed ladders are constructed and used according to OSHA Standards, 29 CFR 1910.27 and ANSI A-14.3.	
		Rungs, cleats or steps, and side rails that may be used for handholds when climbing, offer adequate gripping surface and are free of splinters, slivers or burrs, and substances that could cause slipping.	
		Fixed ladders of greater than 24 feet have cages or other approved fall protection devices. (note General Industry is 20 feet).	
		Where fall protection is provided by ladder safety systems (body belts or harnesses, lanyards and braking devices with safety lines or rails), systems meet the requirements of and are used in accordance with WESTON Fall Protection Standard Practices and are compatible with construction of the ladder system.	

DEMOLITION
29 CFR 1926 Subpart T. EM 385-1-1, Section 23

YES	NO		COMMENT
		Prior to initiating demolition activities an engineering survey (by a competent person) and a demolition plan (by a competent person) is completed.	
		All employees engaged in demolition activities are instructed in the demolition plan.	
		It has been determined through the engineering survey and outlined in the plan, if any hazardous materials, or conditions (e.g., asbestos, lead, utility connections, etc.) exist. Such hazards are controlled or eliminated before demolition is started.	
		Continued inspections, by a competent person, are conducted to ensure safe employee working conditions.	

TREE MAINTENANCE AND REMOVAL
29 CFR 1910 Subpart R. EM 385-1-1, Section 31

YES	NO		COMMENT
		Tree maintenance or removal is done is under the direction of a qualified person.	
		Tree work, in the vicinity of charged electric lines, is by trained persons qualified to work with electricity and tree work. Appropriate distances are maintained for all workers who are not qualified.	
		Equipment is inspected, maintained, repaired and used in accordance with the manufacture's directions.	
		Prior to felling actions are planned to include clearing of the area to permit safe working conditions and escape.	
		Employees must be trained in the safe operation of all equipment.	
		All equipment and machinery is inspected and determined safe prior to use.	
		Work is performed under requirements of FLD 43.	

BLASTING
29 CFR 1926 Subpart U. EM 385-1-1, Section 29

YES	NO		COMMENT
		A blasting safety plan is developed prior to bringing explosives on-site.	
		The transportation, handling, storage, and use of explosives, blasting agents, and blasting equipment must be directed and supervised by a person with proven experience and ability in blasting operations. Licensing of person is verified.	
		Blasting operations in or adjacent to cofferdams, piers, underwater structures, buildings, structures, or other facilities must be carefully planned with full consideration to potential vibration and damage.	

HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE AND UNDERGROUND STORAGE TANK (UST) ACTIVITIES
29 CFR 1926 Subpart D. EM 385-1-1, Section 28

YES	NO		COMMENT
		All construction activities performed with known or potential exposure to hazardous waste are conducted in accordance with Hazardous Waste Operations and Emergency Response requirements.	

CONCRETE and MASONRY CONSTRUCTION
29 CFR 1926 Subpart Q. EM 385-1-1, Section 27

YES	NO		COMMENT
		Construction loads are not placed on a concrete or masonry structure or portion of a concrete or masonry structure unless the employer determines, based on information from a person who is qualified in structural design, that the structure or portion of the structure is capable of supporting the loads.	
		Employees are not permitted to work above or in positions exposed to protruding reinforcing steel or other impalement hazards unless provisions have been made to control the hazard.	
		Sections of concrete conveyances and airlines under pressure are secured with wire rope (or equivalent material) in addition to the regular couplings or connections.	
		Structural and reinforcing steel for walls, piers, columns, and similar vertical structures is supported and/or guyed to prevent overturning or collapse	
		All form-work, shoring, and bracing is designed, fabricated, erected, supported, braced, and maintained so it will safely support all vertical and lateral loads that may be applied until the loads can be supported by the structure.	
		Shoring equipment is inspected prior to erection to determine that it is specified in the shoring design. Any equipment found to be damaged is not used.	
		Erected shoring equipment is inspected immediately prior to, during, and immediately after the placement of concrete. Any shoring equipment that is found to be damaged, displaced, or weakened is immediately reinforced or re-shored.	
		Shoring, vertical slip forms and jacks conform with requirements of Section 27.B.08-13 of USACE EM 385-1-1.	
		Forms and shores (except those on slab or grade and slip forms) are not removed until the individual responsible for forming and/or shoring determines that the concrete has gained sufficient strength to support its weight and all superimposed loads.	
		Precast concrete members are adequately supported to prevent overturning or collapse until permanent connections are complete	
		No one is permitted under pre-cast concrete members being lifted or tilted into position except employees required for the erection of those members.	
		Lift slab operations are planned and designed by a registered engineer or architect.	
		Hydraulic jacks used in lift slab construction have a safety device that causes the jacks to support the load in any position if the jack malfunctions	
		No one is permitted under the slab during jacking operations.	
		A limited access zone is established whenever a masonry wall is being constructed.	
		Fall protection is provided to masonry workers exposed to falls of 6 feet or more.	

STEEL ERECTION
29 CFR 1926 Subpart R. EM 385-1-1, Section 27

YES	NO		COMMENT
		Impact wrenches have a locking device for retaining the socket. Containers shall be provided for storing or carrying rivets, bolts, and drift pins, and secured against accidental displacement when aloft.	
		Structural and reinforcing steel for walls, piers, columns, and similar vertical structures shall be guyed and supported to prevent collapse	
		No loading is placed upon steel joists until all bridging is completely and permanently installed**.**	
		Workers are provided fall protection whenever they are exposed to falls of 1.8 m (6 ft) or more (EM 385-1-1).	
		Temporary flooring in skeleton steel erection conforms with Section 27.F of USACE 385-1-1	

ROOFING
29 CFR 1926 Subpart M. EM 385-1-1, Sections 21, 22, 24, 27

Yes	No		Comments
		In the construction, maintenance, repair, and demolition, of roofs, fall protection systems is provided that will prevent personnel from slipping and failing from the roof and prevent personnel on lower levels from being struck by falling objects	
		On all roofs greater than 4.8 m (16 ft) in height, a hoisting device, stairways, or progressive platforms are furnished for supplying materials and equipment.	
		Roofing materials and accessories that could be moved by the wind, including metal roofing panels, that are on the roof and unattached are secured when wind speeds are greater than, or are anticipated to exceed, 10 mph.	
		Level, guarded platforms are provided at the landing area on the roof**.**	
		When their use is permitted, warning line systems comply with USACE Section 27.07 of EM 385-1-1.	
		Workers involved in roof-edge materials handling or working in a storage area located on a roof with a slope -/= to four vertical to twelve horizontal and with edges 6 ft or more above lower levels are protected by the use of a guardrail, safety net, or personal fall arrest system along all unprotected roof sides and edges of the area.	

ENVIRONMENTAL COMPLIANCE

Yes	No		Comments
		Environmental Compliance and Waste Management Plan on file.	
		Waste Determination Made.	
		Manifest and/or Shipping Papers prepared and filed.	
		Manifest Exception Reports Prepared, as necessary. Procedures to track manifests in place.	
		State Annual and EPA Biennial Reporting Information Available.	
		RCRA Personnel Training Records on file.	
		CAA Permits on file.	
		CWA Permits on file.	
		RCRA Permits on file.	
		State and/or Local Permits on file.	
		RCRA Inspections conducted and Documentation on file.	
		Transporter and TSD compliance information on file.	
		Waste Accumulation Areas Managed Properly.	
		Wetlands Areas Identified and Protected.	
		Endangered, Threatened or Special Concern Species or Areas Identified and Protective Methods Determined.	
		Runon and Runoff Concerns Identified and Managed.	
		Adjacent Land Areas Protected as Necessary.	
		Non-Hazardous Solid Wastes Managed Properly.	

MISCELLANEOUS REGULATORY and POLICY COMPLIANCE

Yes	No		Comments
		Personnel Training Records for DOT Materials Handling on file.	
		Noise Control Issues Addressed and Managed.	
		Site Security Issues Identified and Managed.	
		Known Historical, Archeological and Cultural Resources Identified and Managed.	
		WESTON EHS Analysis Checklist In Use.	
		Safety Observation and Recognition Program in place.	
		Weekly EHS Report Card System in place.	
		Federal, State and Local Required Postings in place.	
		Site specific Lockout/Tagout Program is in place.	
		Site-specific Confined Space Program is in place.	
		Site Safety Officer filing system is in place and up to date.	

ATTACHMENT E

DEFICIENCY TRACKING FORM

SAMPLE DISCREPANCY TRACKING FORM
Site Information and Date

No.	Description	Risk Rating	Date Identified	Status/Date	Reference	Comments	Corrective Action/ Date to be Completed	Responsible Party
EX	PPE	IV	1/2010		EM385-1-1.05.B	Several individuals not using glasses - forgotten, left on hardhat, or dangling from neck strap	Develop program to ensure PPE items specified are worn. Have supervisors lead by example.	
1								
2								
3								
4								
5								
6								
7								
8								

Notes:
Risk Ratings:
I – Catastrophic
II – Serious
III – Severe
IV – Moderate
V – Minor

BMP – Best Management Practice

Requirement of EM 385-1-1, Section 01.A.06 (e)

ATTACHMENT F

USACE FORM 3394 ACCIDENT INVESTIGATION REPORT/ PRELIMINARY ACCIDENT NOTIFICATION (PAN)

(For Safety Staff only)	REPORT NO.	EROC CODE GO	**UNITED STATES ARMY CORPS OF ENGINEERS** **ACCIDENT INVESTIGATION REPORT** *(For Use of this Form See Attached Instructions and USACE Suppl to AR 385-40)*	REQU REMENT CONTROL SYMBOL: CEEC-S-8(R2)

1. ACCIDENT CLASSIFICATION

PERSONNEL CLASSIFICATION	INJURY/ LLNESS/FATAL	PROPERTY DAMAGE	MOTOR VEHICLE INVOLVED	DIVING
GOVERNMENT ☐ CIVILIAN ☐ MILITARY	☐	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ CONTRACTOR	☐	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ PUBLIC	☐ FATAL ☐ OTHER		☐	

2. PERSONAL DATA

a. NAME (Last, First, MI)	b. AGE	c. SEX ☐ MALE ☐ FEMALE	d. SOCIAL SECURITY NUMBER	e. GRADE

f. JOB SERIES/TITLE	g. DUTY STATUS	h. EMPLOYMENT STATUS AT TIME OF ACC DENT
	☐ ON DUTY ☐ TDY ☐ OFF DUTY	☐ ARMY ACTIVE ☐ ARMY RESERVE ☐ VOLUNTEER ☐ PERMANENT ☐ FOREIGN NATIONAL ☐ SEASONAL ☐ TEMPORARY ☐ STUDENT ☐ OTHER (Specify) Contractor

3. GENERAL INFORMATION

a. DATE OF ACCIDENT *(month/day/year)*	b. TIME OF ACCIDENT *(military time)*	c. EXACT LOCATION OF ACC DENT	d. CONTRACTOR'S NAME GOEL Services (1) PRIME: GOEL Services

e. CONTRACT NUMBER	f. TYPE OF CONTRACT	g. HAZARDOUS/TOXIC WASTE	(2) SUBCONTRACTOR
☐ CIVIL WORKS ☐ MILITARY ☐ OTHER (SPECIFY)	☐ CONSTRUCTION ☐ SERVICE ☐ A/E ☐ DREDGE ☐ OTHER (SPECIFY)	☐ SUPERFUND ☐ DERP ☐ IRP ☐ OTHER (SPECIFY) FUDS	

4. CONSTRUCTION ACTIVITIES *(Fill in line and corresponding code number in box from list - see instructions)*

a. CONSTRUCTION ACTIVITY	(CODE)	b. TYPE OF CONSTRUCTION EQU PMENT	(CODE)
	#		#

5. INJURY/ILLNESS INFORMATION *(Include name on line and corresponding code number in box for items e, f & g - see instructions)*

a. SEVERITY OF ILLNESS/INJURY	(CODE)	b. ESTIMATED DAYS LOST	c. ESTIMATED DAYS HOSPITALIZED	d. ESTIMATED DAYS REST. DUTY
	#	None	None	

e. BODY PART AFFECTED	(CODE)	g. TYPE AND SOURCE OF INJURY/ LLNESS	(CODE)
PRIMARY	#		
	(CODE) #	TYPE	#
f. NATURE OF ILLNESS/INJURY	(CODE) #	SOURCE	(CODE) #

6. PUBLIC FATALITY *(Fill in line and correspondence code number in box - see instructions)*

a. ACTIVITY AT TIME OF ACCIDENT	(CODE)	b. PERSONAL FLOATATION DEVICE USED?
	#	☐ YES ☐ NO ☐ N/A

7. MOTOR VEHICLE ACCIDENT

a. TYPE OF VEHICLE	b. TYPE OF COLLISION	c. SEAT BELTS	USED	NOT USED	NOT AVAILABLE
☐ PICKUP/VAN ☐ AUTOMOBILE ☐ TRUCK ☐ OTHER (Specify)	☐ SIDE SWIPE ☐ HEAD ON ☐ REAR END ☐ BROADSIDE ☐ ROLL OVER ☐ BACKING ☐ OTHER (Specify)	(1) FRONT SEAT (2) REAR SEAT			

8. PROPERTY/MATERIAL INVOLVED

a. NAME OF ITEM	b. OWNERSH P	c. $ AMOUNT OF DAMAGE
(1)		
(2)		
(3)		

9. VESSEL/FLOATING PLANT ACCIDENT *(Fill in line and correspondence code number in box from list - see instructions)*

a. TYPE OF VESSEL/FLOATING PLANT	(CODE)	b. TYPE OF COLLISION/MISHAP	(CODE)
	#		#

10. ACCIDENT DESCRIPTION (Use Additional paper, if necessary)

See attached page.

11. CASUAL FACTORS *(Read Instructions Before Completing)*

a. (Explain YES answers in item 13	YES	NO	a. (CONTINUED)	YES	NO
DESIGN: Was design of facility, workplace or equipment a factor?	☐	☐	CHEMICAL AND PHYSICAL AGENT FACTORS: Did exposure to chemical agents, such as dust, fumes, mists, vapors, or physical agents such as noice, radiation, etc. contribute to accident?	☐	☐
NSPECTION/MAINTENANCE: Were inspection & maintenance procedures a factor?	☐	☐	OFFICE FACTORS: Did office setting such as, lifting office furniture, carrying, stooping, etc. contribute to the accident?	☐	☐
PERSON'S PHYSICAL CONDITION: In your opinion, was the physical condition of the person a factor?	☐	☐	SUPPORT FACTORS: Were inappropriate tools/resources provided to properly perform the activity/task?	☐	☐
OPERAT NG PROCEDURES: Were operating procedures a factor?	☐	☐	PERSONAL PROTECTIVE EQPT: Did the improper selection, use or maintenance of personal protective eqpt contribute to the accident?	☐	☐
JOB PRACTICES: Were any job safety/health practices not followed when the accident occurred?	☐	☐	DRUGS/ALCOHOL: In your opinion, was deugs or alcohol factor to the accident?	☐	☐
HU MAN FACTORS: Did any human factors such as size or strength of person, etc., contribute to accident?	☐	☐	b. WAS A WRITTEN JOB/ACTIVITY HAZARD ANALYSIS COMPLETED FOR TASK BEING PERFORMED AT TIME OF ACCIDENT?		
ENV RONMENTAL FACTORS: Did heat, cold, dust, sun, glare, etc. contribute to the accident?	☐	☐	☐ YES (If yes, attach a copy) ☐ NO		

12. TRAINING

a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK?	b. TYPE OF TRAINING	c. DATE OF MOST RECENT FORMAL TRAINING
☐ YES ☐ NO	☐ CLASSROOM ☐ ON JOB	Month/Day/Year

13. FULLY EXPLAIN WHAT ALLOWED OR CAUSED THE ACCIDENT INCLUDE DIRECT AND INDIRECT CAUSES (See instruction for definition of direct and indirect causes.) (Use additional paper, if necessary)

a. DIRECT CAUSE

b. ND RECT CAUSE(S)

14. ACTION(S) TAKEN, ANTICIPATED OR RECOMMENDED TO ELIMINATE CAUSE(S)

DESCR BE FULLY:

15. DATES FOR [illegible] IDENTIFIED IN BLOCK 14

a. BEGINNING (Month/Day/Year)	b. ANTICIPATED COMPLETION (Month/Day/Year)		
c. SIGNATURE AND TITLE OF SUPERVISOR CORPS CONTRACTOR	d. DATE (Month/Day/Year)	e. ORGANIZATION IDENTIFIER (Div,Br,Sect) **Weston Solutions, Inc**	f. OFFICE SYMBOL

16. MANAGEMENT REVIEW (1st)

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE

17. MANAGEMENT REVIEW (2nd - Chief Operations, Construction, Engineering, etc.)

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE

18. SAFETY AND OCCUPATIONAL HEALTH OFFICE REVIEW

a. ☐ CONCUR b. ☐ NON CONCUR c. ADDITIONAL ACTIONS/COMMENTS

SIGNATURE	TITLE	DATE

19. COMMAND APPROVAL

COMMENTS

COMMANDER SIGNATURE DATE

* U.S. GOVERNMENT PRINTING OFFICE 1993-0-791-757

10. ACCIDENT DESCRIPTION (Continuation)

13a. DIRECT CAUSE (Continuation)

13b. INDIRECT CAUSES (Continuation)

14. ACTION(S) TAKEN, ANTICIPATED, OR RECOMMENDED TO ELIMINATE CAUSE(S) (Continuation)

WORK SHEET FOR PRELIMINARY ACCIDENT NOTIFICATION

This work sheet is a field tool to assist the collection of information about an accident and facilitate the completion of a Preliminary Accident Notification. For Member of the Public Recreation Visitor accidents use the Initial Notification of Public Recreation Accident Work Sheet

Project Name: ________________________________ Project Office Symbol: _______ Date Worksheet Completed: _________
Date of Accident: _______ Time of Accident: ______ Person Completing Worksheet: _______________ Phone #: ____________

Location and Incident Information
Exact Location of Accident: ____
Number of Persons Involved: ____ Number of Properties Involved: ____
Personnel Classification
Government: Civilian [ ] Military [ ] Government Direct Contractor [ ] Foreign National [ ] Volunteer [ ]
Contractor [ ] Member of the Public [ ]
Type of Accident (Mark all that are applicable)
Injury/Illness [ ] Fatality [ ] Motor Vehicle [ ] Property Damage [ ] Fire [ ] Diving [ ]
Personal Data (If more than 2 persons involved provide their personal data on a separate sheet)
Person 1 - Name: Last __________________ First ____________ Middle Initial ___ Age: ___Gender: Male [ ] Female [ ]
Date of Birth: ________ Address: ____
Job Series/Title: ____________________ Grade: ___ Duty Status: On Duty [ ] Off Duty [ ] TDY [ ] Time Began Work _______
Unit and Station Assignment: ______________________________ Office Symbol: _________ Date Hired: _________
Nature of Injury: _________________________ Body Part(s) Affected Primary ________________ Secondary __________________
Type of Injury ____Source of Injury ____
Severity of Injury: (See definitions on reverse side) Fatality: **Yes/No** Permanent Total Disability: **Yes/No**
Permanent Partial Disability: **Yes/No** Other Serious Injury: **Yes/No**
Estimated Days away from Work: ______ Estimated Days Restricted Duty/Job Transfer: _______
Primary Language Spoken: __________________________________ English Literate: **Yes/No**
Does this person wish to remain anonymous **Yes/No**
What was employee worker doing before the accident occurred? ____
Name of Physician/Health Care Professional: _____________________________________
Medical Treatment Facility: ____
Address: ____ Phone # ______________________
Person 2 - Name: Last __________________ First ____________ Middle Initial ___ Age: ___Gender: Male [ ] Female [ ]
Date of Birth: ________ Address: ____
Job Series/Title: ____________________ Grade: ___ Duty Status: On Duty [ ] Off Duty [ ] TDY [ ] Time Began Work _______
Unit and Station Assignment: ________________________________ Office Symbol: _________ Date Hired: _________
Nature of Injury: _________________________ Body Part(s) Affected Primary ________________ Secondary __________________
Type of Injury ____Source of Injury ____
Severity of Injury: (See definitions on reverse side) Fatality: **Yes/No** Permanent Total Disability: **Yes/No**
Permanent Partial Disability: **Yes/No** Other Serious Injury: **Yes/No**
Estimated Days away from Work: ______ Estimated Days Restricted Duty/Job Transfer: _______
Primary Language Spoken: __________________________________ English Literate: **Yes/No**
Does this person wish to remain anonymous **Yes/No**
What was employee worker doing before the accident occurred? ____

Name of Physician/Health Care Professional: _____________________________________
Medical Treatment Facility: ____
Address: ____ Phone # ______________________

Summary of Accident:(Use additional sheet if needed)

Remarks:

Describe Any Information Released to the Public:

Nature of Injury

Amputation	Drowning	Stroke	Tuberculosis
Abrasion	Fracture	Traumatic Food Poisoning	Traumatic Virological/Infective
Back Strain	Hearing Loss	Traumatic Heart Condition	Parasitic Disease
Burn	Hernia	Traumatic Mental Disorder	Traumatic Injury Other(list)
Contusion/Bruise	Laceration/Cut	Traumatic Respiratory	
Concussion	Puncture	(Carbon Monoxide)	
Dislocation of joint	Strain	Traumatic Skin Disease	

Type of Injury

Struck by/against	Punctured/lacerated	Exerted	Ingested
Fell/slipped/tripped	Stung/bit by	Exposed	Absorbed
Caught on/in/between	Contact with/by	Inhaled	Traveling In

Severity of Injury

Injury	Illness	Fatality	Permanent Disability

Source of Injury

Environmental Condition	Mechanical Equipment	Noise	
Building or other Area	Guard/Shield	Radiation	Inanimate Object
Walking surface	Video Display Terminal	Light	Animal Insect
Electricity	Heating	Ventilation	Human (Violence)
Temperature Extreme	Motor Vehicle/Cycle	Smoke	Diving Equipment
Weather	Boat	Stress	Parachute
Fire	Bicycle/Other non-	Confined Space	
Water	motorized vehicle	Carbon Monoxide	

Body Parts

Arm or Wrist	Brain	Face	Vertebrae
Breast	Cranial Bones	Scalp	Trunk Bones other
Testicle	Teeth	Knee	Shoulder
Abdomen	Jaw	Leg	Lung
Chest	Throat/Larynx	Hip	Kidney
Lower Back	Mouth	Ankle	Heart
Penis	Nose	Buttock	Liver
Side	Tongue	Hand	Reproductive Organs
Upper Back	Head Other External	Feet	Stomach
Waist	Elbow	Collar Bone	Intestines
Trunk Other	Finger	Shoulder Blade	Trunk/internal
Ear	Thumb	Rib	
Eye	Toe	Sternum	

ATTACHMENT G

FIRST AID FORM

First Aid Treatments Not Otherwise Reportable

Date of Injury	Person Name	Type of injury (include description - left, right, top, bottom)	Treatment

ATTACHMENT H

EMS/RESCUE CONFIRMATION AND EVALUATIONS

EVALUATION OF EMS PROVIDERS **Date: _8/23/11___**

Name of Responding Group or Agency: _Picatinny EMS_______________

Name of Individual(s) Contacted: __Duty Officer________________

Confirmation of Authority to commit to supporting Weston:

Contact information: Non Emergency Phone Number: __(973)724-3842___

Emergency Phone Number: 911 or (973) 724-3097

Address : __Picatinny Arsenal, NJ____________
___________07806-5000__________________
____

Distance in miles and time from EMS provider to site(s): Miles: _>2__ Time: _5 minutes____

Note: Time to be able to institute rescue operation must be determined and documented based on known or perceived hazards. In the event of hazardous atmospheres typical response times should be 5 minutes or less.

Hours of availability: ___ AM to _____ PM or 24 Hours _X__

Staffing: Volunteer _____ Full-time__X___

Confirmation of services and other specialized rescues that may be associated with field work such as:

Type of service: BLS ____ ALS _X___

High Angle Rescue (Rescue at elevation): Yes ___; NO ___; N/A _X_

Excavation Rescue: Yes___; NO ___; N/A _X __

Fall Arrest System Rescue: Yes ___; NO ___; N/A _X_

Confined Space Rescue: Yes ___; NO ____; N/A _X_

Ability to respond to more than one emergency at a time: Yes _X_____; NO______

If "NO", provisions must be made for other rescue options or entry operations must cease until responders are available again.

If "NO" what mechanism(s) will be in place to verify when responders are both unavailable and when they are available to respond again (e.g., phone call, radio to responder channel, etc.).

EVALUATION OF FIRE/RESCUE PROVIDERS **Date: _8/23/11______**

Name of Responding Group or Agency: _Picatinny Fire Department____

Name of Individual(s) Contacted: __Duty Officer____________________

Confirmation of Authority to commit to supporting Weston:

Contact information: Non Emergency Phone Number: __(973)724-3842___

Emergency Phone Number: 911 or (973) 724-3097

Address : __Picatinny Arsenal, NJ____________
___________07806-5000__________________
____

Distance in miles and time from EMS provider to site(s): Miles: _>2__ Time: _5 minutes____

Note: Time to be able to institute rescue operation must be determined and documented based on known or perceived hazards. In the event of hazardous atmospheres typical response times should be 5 minutes or less.

Hours of availability: ___ AM to _____ PM or 24 Hours _X__

Staffing: Volunteer _____ Full-time__X___

Confirmation of services and other specialized rescues that may be associated with field work such as:

Type of service: BLS ____ ALS _X___

High Angle Rescue (Rescue at elevation): Yes ___; NO ___; N/A _X_

Excavation Rescue: Yes _X_; NO ___; N/A ____

Fall Arrest System Rescue: Yes ___; NO ___; N/A _X_

Confined Space Rescue: Yes ___; NO ____; N/A _X_

Ability to respond to more than one emergency at a time: Yes _X_____; NO______

If "NO", provisions must be made for other rescue options or entry operations must cease until responders are available again.

If "NO" what mechanism(s) will be in place to verify when responders are both unavailable and when they are available to respond again (e.g., phone call, radio to responder channel, etc.).

Medical Facility **Date:** _8/23/11__

Name of Responding Group or Agency: _Saint Claire Hospital_______________

Name of Individual(s) Contacted: __Emergency Room Nurse________________

Confirmation of Authority to commit to supporting Weston:

Contact information: Non Emergency Phone Number: _973-989-3000__

Emergency Phone Number: 911 or 973-989-3200

Address : __400 West Blackwell Street_________
____________Dover, NJ 07801_________________
____

Distance in miles and time to Medical Facility from site(s): Miles: _8.3_ Time: _17 minutes___

Hours of availability: ___ AM to _____ PM or 24 Hours _X___

Does the Facility have capabilities to deal with:

Chemical Exposure Yes _X___ No _____

Trauma: Yes _____ No __X__ If yes, Level: ___ ____

If no, nearest Trauma Center: _Morristown Memorial - Level II______

APPENDIX H

EXPLOSIVES SITE PLAN

DEPARTMENT OF THE ARMY
US ARMY DEFENSE AMMUNITION CENTER
1 C TREE ROAD
MCALESTER OK 74501-9053

REPLY TO
ATTENTION OF

JMAC-ESM 12 March 2012

MEMORANDUM FOR US Army Corps of Engineers, Environmental and Munitions Center of Expertise, CEHNC-CX-MM, P.O. Box 1600, Huntsville, AL 35807-4301

SUBJECT: DDESB Approval Explosives Site Plan, Remedial Investigation, Nine Munition Response Sites, Picatinny Arsenal, NJ

1. References:

a. Memorandum, CEHNC-EMM, 21 March 2012, subject: Explosives Site Plan (ESP) for Munitions Response Sites (MRS) PICA-003-R-01 – 1926 Explosion Radius, RICA-004-R-01 – 1926 Explosion Radius Off-Post, PICA-005-R-01 – Green Pond, PICA-006-R-01 – Former Operational Area, PICA-008-R-01 – Lakes, PICA-010-R-01 – Shell Burial Grounds, PICA-012-R-01 – Lake Denmark Off-Post, PICA-013-R-01 – Inactive Munitions Waste Pit, and PICA-014-R-01 – Inactive Munitions Waste Pit Off-Post at Picatinny Arsenal, NJ, February 2012.

b. DOD Manual 6055.09-M, Ammunition and Explosives Safety Standards, 29 Feb 08, administratively reissued August 4, 2010.

c. Memorandum, DDESB-PE, dated 12 March 2012, subject: DDESB Approval of Explosives Site Plan, Remedial Investigation of Nine Munitions Response Sites, Picatinny Arsenal, Morris County, NJ (Encl).

2. This ESP, transmitted by reference 1.a, has been reviewed in accordance with reference 1.b. Reference 1.c provides Department of Defense Explosives Safety Board (DDESB) final approval. This approval will be made part of the administrative record for the site.

3. The POC is Charlotte Curtis, JMAC-ESM, DSN 956-8742, commercial (918) 420-8742, email charlotte.g.curtis.civ@mail.mil.

CHARLOTTE G. CURTIS
MEC Team Action Officer
Explosives Safety Knowledge, MEC and Chemical Division
US Army Technical Center for Explosives Safety

JMAC-ESM
SUBJECT: DDESB Approval Explosives Site Plan, Remedial Investigation, Nine Munition Response Sites, Picatinny Arsenal, NJ

CF (w/encl):
Office of the Director of Army Safety (DACS-SF/Mr. Patton and Mr. Walker), 223 23rd Street, Crystal Plaza 5, Suite 980, Arlington, VA 22202
Office of the Deputy Assistant Secretary of the Army for Environment, Safety, and Occupational Health, Special Assistant for Munitions, (DASA-DESOH/Mr. King), 110 Army Pentagon, Washington, DC 20310-0110
U.S. Army Corps of Engineers (CESO/Ms. Roberts), 20 Massachusetts Avenue, NW, Washington, DC 20314-1000

DEPARTMENT OF DEFENSE EXPLOSIVES SAFETY BOARD
4800 MARK CENTER DRIVE, SUITE 16E12
ALEXANDRIA, VIRGINIA 22350-3606

DDESB-PE

MAR 12 2012

MEMORANDUM FOR DIRECTOR, U.S. ARMY DEFENSE AMMUNITION CENTER
ATTENTION: JMAC-ESM

SUBJECT: DDESB Approval of Explosives Site Plan, Remedial Investigation of Nine Munitions Response Sites, Picatinny Arsenal, Morris County, NJ

References: (a) DAC JMAC-ESM Memorandum of 21 February 2012, Subject: Explosives Site Plan, Remedial Investigation, Nine Munitions Response Sites, Picatinny Arsenal, NJ

(b) DoDM 6055.09-M, DoD Ammunition and Explosives Safety Standards, 29 February 2008, Administratively Reissued 4 August 2010

(c) DDESB TP-15, Approved Protective Construction, Revision 3, May 2010

The Department of Defense Explosives Safety Board (DDESB) Staff has reviewed the subject explosives site plan (ESP) forwarded by reference (a) against the requirements of reference (b). Based on the information provided, approval is granted for removal and treatment of material potentially presenting an explosive hazard (MPPEH) and munitions and explosives of concern (MEC) at Picatinny Arsenal, Morris County, NJ. This approval is based on the following:

a. The efforts addressed in this ESP involve manual unintentional detonation operations and intentional detonations supporting munitions response actions within Munitions Response Site (MRS) 1926 Explosion Radius (PICA-003-R-01), MRS 1926 Explosion Radius-Off Post (PICA-004-R-01), MRS Green Pond (PICA-005-R-01), MRS Former Operational Area (PICA-006-R-01), MRS Lakes MRS – Lake Denmark and Picatinny Lake (PICA-008-R-01), MRS Shell Burial Grounds (PICA-010-R-01), MRS Lake Denmark-Off-Post (PICA-012-R-01), MRS Inactive Munitions Waste Pit (PICA-013-R-01), and MRS Inactive Munitions Waste Pit-Off-Post (PICA-014-R-01).

b. The DDESB acknowledges that reference (b) currently does not provide criteria to establish the minimum separation distance (MSD) for personnel in/under the water from intrusive (i.e., unintentional and intentional detonation) explosive operations conducted underwater. Consequently the DDESB is unable to approve intrusive underwater explosive operations. The Army, per reference (a), will establish criteria addressing intrusive underwater explosive operations within MRSs PICA-005-R-01 and PICA-008-R-01 and will accept the consequences of those operations per Army policy.

c. The DDESB acknowledges, as noted in reference (a), that munitions response actions have occurred at MRSs PICA-003-R-01, PICA-006-R-01, and PICA-008-R-01 with DDESB approval. Consequently this ESP serves to zero base all previous actions and the DDESB waives the requirement to submit after action reports for DDESB approved ESS noted in references (a) and (b) and considers those actions closed.

d. The results of this ESP will be used to prepare an explosives safety submission per reference (a).

e. The attached Table lists the munition with the greatest fragmentation distance (MGFD) for each of the nine MRSs; the team separation distance (TSD); the MSD for unintentional detonations for nonessential personnel; and the MSD for intentional single in-grid detonations for all personnel.

f. The intentional detonation site, Range 1222, is site approved for demolition shots ~~up~~ with a maximum fragment and blast distance up to 220 feet (ft), provided the Army ensures usage of reference (c), paragraph C6.2.7.5.

g. The use of sandbags and earth tamping is authorized as engineering controls for intentional detonations involving the MEC identified in reference (a) provided the Army ensures usage per reference (c), paragraph C6.2.7.5.

h. One BATF Type II aboveground magazine is approved to store demolition materials up to 100 pounds (lbs) net explosive weight (NEW) of hazard division (HD) 1.1 and mission essential quantities of HD 1.4. The applicable inhabited building distance is 658 ft and the public transportation route distance is 395 ft.

i. One BATF Type II aboveground magazine is approved for storage of MEC/MPPEH with a maximum credible event of 100 lbs NEW of HD 1.1. The MSD for nonessential personnel is 658 ft based on the HFD.

j. Prior to initiation and through completion of on-site explosives operations, all nonessential personnel will be evacuated and prevented from entering any area/facility encumbered by the MSD required for the operation being conducted, or explosives operations will be suspended if nonessential personnel enter the MSD.

k. MPPEH will be inspected and classified as material documented as safe prior to release to the public.

If changes occur during or after completion of this effort that could increase explosive hazards to site workers or the public due to the presence of military munitions at the site, an amendment to this ESP must be submitted to DDESB for review and approval.

The point of contact for this action is Ms. Kristene Bigej, (571) 372-6705, DSN 372-6705, E-mail address: kristene.a.bigej.civ@mail.mil.

FOR David M Christian COL, USA
CURTIS M. BOWLING
Chairman
DDESB

Attachment
As stated

TABLE

MRS	MGFD	TSD[1] (ft)	MSD[2] (ft) unintentional detonation	MSD[3] (ft) intentional detonation
1926 Explosion Radius; 1926 Explosion Radius-Off Post; Green Pond; Former Operational Area; Lakes – Picatinny Lake; Shell Burial Grounds; Inactive Munitions Waste Pit; & Inactive Munitions Waste Pit-Off-Post	6 inch Mk 20 Mod 0-4 Projectile	73	324	2,703
Lakes – Lake Denmark & Lake Denmark – Off Post	4.2 in M329 (With Supplementary Charge) Mortar	81	313	1,641

[1] For essential personnel for manual operations based on K40 of MGFD
[2] For nonessential personnel for manual operations based on the HFD of the MGFD
[3] For all personnel for intentional single in-grid detonations based on the MFD of the MGFD

Attachment

DEPARTMENT OF THE ARMY
HUNTSVILLE CENTER, CORPS OF ENGINEERS
P.O. BOX 1600
HUNTSVILLE, ALABAMA 35807-4301

REPLY TO
ATTENTION OF:

CEHNC-EMM

21 February 2012

MEMORANDUM FOR US Army Technical Center for Explosives Safety, Explosives Safety Knowledge, OE and Chemical Division, (JMAC-ESM/Charlotte Curtis), Building 35, 1C Tree Road, McAlester, OK 74501-9053

SUBJECT: Explosives Site Plan (ESP) for Munitions Response Sites (MRS) PICA-003-R-01 – 1926 Explosion Radius, PICA-004-R-01 – 1926 Explosion Radius Off-Post, PICA-005-R-01 – Green Pond, PICA-006-R-01 – Former Operational Areas, PICA-008-R-01 – Lakes, PICA-010-R-01 – Shell Burial Grounds, PICA-012-R-01 – Lake Denmark Off-Post, PICA-013-R-01 – Inactive Munitions Waste Pit and PICA-014-R-01 – Inactive Munitions Waste Pit Off-Post at Picatinny Arsenal, NJ, February 2012

1. References:

a. ER 385-1-95, Safety and Health Concerns for Munitions and Explosives of Concern (MEC) Projects, March 2007.

b. DOD 6055.09-M, Ammunition and Explosives Safety Standards, February 2008.

c. Memorandum, (LTC Herb Koehler/Picatinny Garrison Commander), subject: Lead for submittal of reference Explosives Site Plan through the United States Army Technical Center of Explosives Safety, 06 February 2012.

2. This ESP is submitted for review and approval at the request of the installation per reference 1c. They have requested the US Army Corps of Engineers (USACE) submit this up through the review and approval chain on their behalf.

3. This ESP is for the investigation at MRSs PICA-003-R-01 – 1926 Explosion Radius, PICA-004-R-01 – 1926 Explosion Radius Off-Post, PICA-005-R-01 – Green Pond, PICA-006-R-01 – Former Operational Areas, PICA-008-R-01 – Lakes, PICA-010-R-01 – Shell Burial Grounds, PICA-012-R-01 – Lake Denmark Off-Post, PICA-013-R-01 – Inactive Munitions Waste Pit, and PICA-014-R-01 – Inactive Munitions Waste Pit Off-Post at Picatinny Arsenal, New Jersey.

4. This ESP has been reviewed for technical adequacy and to insure compliance with USACE, Department of the Army and Department of Defense requirements. USACE participation is approved.

5. If you have any questions, please contact Mr. Walt Zange at (256) 895-1586 or Mr. Dave Becker at (256) 895-1513.

Encl

SANDRA M. ZEBROWSKI, P.E.
Director, Environmental and
Munitions Center of Expertise

CF: (w/o encls) electronically
HQUSACE, (CESO/SWD/Ms. Blanca Roberts)
USACE, (CENAB-EN-HI /Mr. Jeff Brewer)

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, UNITED STATES ARMY GARRISON
PICATINNY ARSENAL, NEW JERSEY 07806-5000

REPLY TO ATTENTION OF

IMCOM
SOLDIERS • FAMILIES • CIVILIANS

IMPI-ZA

FEB 06 2012

MEMORANDUM FOR Commander, US Army Corps of Engineers Baltimore District, City Crescent Building, 10 South Howard Street, Baltimore, MD 21201

SUBJECT: Lead action for submittal of reference Explosive Site Plan through the United States Army Technical Center for Explosives Safety (USATCES)

1. Reference: Remedial Investigation (RI) Explosives Safety Site Plan Military Munitions Response Program

2. . Request that the US Army Corps of Engineers take lead action for the submittal of reference through the United States Army Technical Center for Explosives Safety (USATCES) to the Department of Defense Explosive Safety Board (DDESB) for review and approval.

3. This course of action was recommended by my staff and Mr. Jeff Brewer of your office to save time in the approval process.

4. This ESP is accepted as written not withstanding minor corrections that will be addressed by your staff and/or the contractor, WESTON.

5. The point of contact for this subject is Mr. Ted Gabel, telephone number 973-724-6748, email ted.gabel@us.army.mil.

Encl: as

Herb Koehler

HERB KOEHLER
LTC, LG
Garrison Commander

REMEDIAL INVESTIGATION (RI)
EXPLOSIVES SITE PLAN (ESP)

PICA-003-R-01 – 1926 Explosion Radius
PICA-004-R-01 – 1926 Explosion Radius – Off-Post
PICA-005-R-01 – Green Pond
PICA-006-R-01 – Former Operational Areas
PICA-008-R-01 – Lakes
PICA-010-R-01 – Shell Burial Grounds
PICA-012-R-01 – Lake Denmark – Off-Post
PICA-013-R-01 – Inactive Munitions Waste Pit
PICA-014-R-01 – Inactive Munitions Waste Pit – Off-Post

MILITARY MUNITIONS RESPONSE Program (MMRP)

PICATINNY ARSENAL (PTA)
MORRIS COUNTY, NJ

February 2012

Prepared By:
Weston Solutions, Inc.

Prepared For:
Baltimore District USACE

TABLE OF CONTENTS

Section **Page**

1. **Site Location**

   a. Name: PICATINNY ARSENAL
   b. State: New Jersey

2. **Anticipated Dates**

   a. Start: March 2012

3. **Purpose**

   a. A Remedial Investigation (RI) is required for nine (9) munitions response sites (MRSs) at this location based on their historical munitions related activities and the Site Investigation (SI) findings. The following MRSs will be characterized as part of the RI:

      - PICA-003-R-01 – 1926 Explosion Radius
      - PICA-004-R-01 – 1926 Explosion Radius-Off Post
      - PICA-005-R-01 – Green Pond
      - PICA-006-R-01 – Former Operational Area
      - PICA-008-R-01 – Lakes MRS
      - PICA-010-R-01 – Shell Burial Grounds
      - PICA-012-R-01 – Lake Denmark-Off-Post
      - PICA-013-R-01 – Inactive Munitions Waste Pit
      - PICA-014-R-01 – Inactive Munitions Waste Pit-Off-Post

The original Picatinny ESS (November 2008) and Amendment 1 (March 2009) were established to support Low Probability construction sites around Picatinny (section 5 of November 2008 ESS). None of the sites produced any MEC/MPPEH during the construction and therefore the ESS was never active. No AAR will be submitted and this ESS should be considered closed out. No remediation was performed on any of the locations from the original Picatinny ESS or Amendment 1. This ESP is to support a Remedial Investigation on the above listed locations that encompass sites from the original Picatinny ESS or Amendment 1. Below identifies the current ESP RI locations that include sites from the original Picatinny ESS and Amendment 1.

4. **Site Background and Current Conditions**

   a. <u>1926 Explosion Radius (PICA-003-R-01) – 1,644 acres.</u> This MRS includes the on-post area affected by the explosion of the Lake Denmark Naval Ammunition Depot in 1926. The MRS consists of the explosion center and the on-post area within a 1-mile radius. This MRS also includes a former DRMO and burning ground which covers approximately 9.5-acres as well as former projectile range with an existing covered firing point that slug butt is adjacent to Building 646.

Numerous munitions and explosives of concern (MEC) have been recovered within the MRS, including high explosive (HE) and armor piercing (AP) projectiles, small- to large caliber ammunition, submunitions, and munitions debris (MD).

b. 1926 Explosion Radius-Off Post (PICA-004-R-01) – 833 acres. This MRS consists of all off-post properties that fall within a 1-mile radius of the Lake Denmark Naval Ammunition Depot explosion center. The MRS includes vacant land, commercial property, and the Mt. Hope Quarry located adjacent to the eastern boundary of PTA. Numerous MEC have been recovered at the Mt Hope Quarry. Sixteen MEC were recovered between 2001 and 2009 during quarry operations, either on the conveyor belt or at undocumented locations. Three time critical removal actions (TCRAs) have been conducted between 2006 and 2011. Sixty-four MEC were recovered from two of the three TCRAs conducted. Only MD was recovered during the second TCRA conducted. No MEC or MD was observed outside of quarry boundaries during the SI visual survey. This area was not covered by the original Picatinny ESS.

c. Green Pond (PICA-005-R-01) – 1.1 acres. The site is a stream channel that runs from 9th Street Bridge to the southern boundary of the DRMO Yard approximately 1,590 feet that lies within the 1926 Explosion Radius MRS. Green Pond MRS extends from bank to bank with a 15-ft buffer on each side. The MRS lies adjacent to the DRMO Yard and 300 Marsh Area. Munitions were observed protruding from and buried alongside the banks of the brook. The PTA Safety Office reports that an 66mm shell of unknown type was recovered in Green Pond Brook near the 9th Street Bridge. The source of MEC is unknown.

d. Former Operational Area (PICA-006-R-01) – 2,241 acres. This MRS contains all areas south of Shinkle Road, excluding other MRSs and surface danger zone (SDZs) for operational ranges. A disposal area, dredge spoil pile, waste burial area, and former sanitary landfill is located in the southern portion. The southern portion of the MRS also contains a former pyrotechnic range. A large portion of the MRS has been developed. A Picatinny safety office map indicated the locations and types of MEC recovered across PTA, including HE projectiles, small- to large-caliber ammunition, and practice submunitions.

e. Lakes (PICA-008-R-01) – 758 acres. Two large lakes comprise this MRS: Picatinny Lake and Lake Denmark. Picatinny Lake MRS is an approximately 108-acre man-made lake and is located in the central portion of PTA. Maximum depth is 20 feet at its center. A small island and peninsula exist within the lake. Lake

Denmark area is located in the northeastern portion of PTA and is approximately 633 acres. The lake's surface area of the lake is approximately 263 acres with an average depth of 6.5 ft. Lake Denmark was used as former mortar impact area. Both lakes are used for recreational boating and fishing, swimming is banned. 60mm, 81mm and 4.2-inch mortar ranges, a 20mm cannon range, and a 3-inch Barbette gun firing range were located at this MRS. During a previous underwater geophysical investigation conducted at the MRS 125 anomalies were identified.

f. Shell Burial Grounds (PICA-010-R-01) – 5.7 acres. During the explosion in 1926, three craters, two which are adjacent to one another, were formed. The craters were used for the disposal of approximately 25 tons of explosives from the explosion. One burial ground is located near the southeastern installation boundary near Building 3150 and is approximately 1.5 acres. The second burial ground is located near Building 3100 in the southern half of the installation. Both locations are fenced. After the 1926 explosion occurred, approximately 25 tons of explosives and materials, including projectiles, mines, depth charges, fuzes, and small arms ammunition were disposed of in the MRS. This MRS was also used by the Navy for explosives disposal until 1945.

g. Lake Denmark-Off-Post (PICA-012-R-01) – 96 acres. Off-post property that falls within the safety fan of the former Lake Denmark 60mm, 81mm, and 4.2 inch mortar ranges. Currently the site contains commercial/light industrial properties, vacant land and Radiation Technologies, Inc (RTI) Superfund Site. The MRS is located where a portion of a mortar range safety fan extended. The range and the majority of the safety fan are included in the Lakes MRS.

h. Inactive Munitions Waste Pit (PICA-013-R-01) – 21 acres. This MRS contains a potential former testing range and associated 1,250 ft SDZ. Types of munitions used at this MRS are unknown. The SDZ was drawn to not include buildings which were present at the time this range would have been in use. Currently, up to 12 feet of fill may be present at this MRS.

i. Inactive Munitions Waste Pit-Off-Post (PICA-014-R-01) – 39 acres. This MRS is the off-post property that falls within the SDZ of the Inactive Munitions Waste Pit MRS. This MRS falls potentially within a SDZ for a historical on-post range, where testing and storage of munitions and explosives may have occurred. No MEC or MD was observed during SI visual survey.

5. Executing Agencies

- **a.** U.S. Army Environmental Command
- **b.** Picatinny Arsenal
- **c.** U.S. Army Corps of Engineers, Baltimore District

6. Scope of Investigation

- **a.** Land - A manual surface and subsurface investigation to depth of detection is required for this RI.
- **b.** Water – Underwater investigation to identify source of anomalies to depth of detection is required for this RI.

7. Safety Criteria

- **a.** The munition with the greatest fragmentation distance (MGFD) at each MRS is identified in Table 7-1. During the course of this investigation if MEC with a greater fragmentation distance is encountered, the minimum separation distance (MSD) will be adjusted in accordance with Department of Defense Explosive Safety Board (DDESB) Technical Paper 16 and the Fragmentation Database, work will continue and an amendment to this ESP submitted. Quantity Distance (Q-D) Arcs will be adjusted accordingly.
- **b.** See Appendix B for Fragmentation Data Sheets.
- **c.** See Table 7-1 for Minimum Separation Distances.
- **d.** Any occupied building or public roadways/waterways in the MSD areas during MEC operations will be evacuated and/or roadways/waterways blocked to prevent non-essential personnel from entering during the conduct of MEC operations. In the event roadways/waterways cannot be blocked, guards will be posted and work will halt if non-essential personnel enter the MSD. MEC operations will not continue until non-essential personnel have exited the area.
- **e.** The Army will establish criteria addressing intrusive underwater explosive operations.

Table 7-1 Minimum Separation Distances

Minimum Separation Distances [1]						
Area	Munition with the Greatest Fragmentation Distance (MGFD)	Feet (ft)				
Munitions Response Site (MRS)		Unintentional Detonations		Intentional Detonations		
		Hazardous Fragment Distance (HFD)	Team Separation Distance (K40)	Without Engineering Controls (MFD-H)	Using Sandbag Mitigation	Buried Explosion Module (BEM)
1926 Explosion Radius	6 inch Mk 20 Mod 0-4	324	73	2703	N/A	220[1]
1926 Explosion Radius-Off Post	6 inch Mk 20 Mod 0-4	324	73	2703	N/A	220[1]
Green Pond	6 inch Mk 20 Mod 0-4	324	73	2703	N/A	220[1,2]
Former Operational Area	6 inch Mk 20 Mod 0-4	324	73	2703	N/A	220[1]
Lakes – Picatinny Lake	6 inch Mk 20 Mod 0-4	324	73	2703	N/A	220[1,2]
Lakes – Lake Denmark	4.2 in M329 (With Supplementary Charge)	313	81	1,641	220[2]	N/A
Shell Burial Grounds	6 inch Mk 20 Mod 0-4	324	73	2703	N/A	220[1]
Lake Denmark – Off Post	4.2 in M329 (With Supplementary Charge)	313	81	1,641	220[2]	N/A
Inactive Munitions Waste Pit	6 inch Mk 20 Mod 0-4	324	73	2703	N/A	220[1]
Inactive Munitions Waste Pit-Off-Post	6 inch Mk 20 Mod 0-4	324	73	2703	N/A	220[1]

Notes:
1. BEM calculations result in a MSD of 0; however, a 220 foot MSD will be enforced during all intentional detonation operations.
2. Distance is for acceptable to move items which will be detonated on shore.

8. Methods of Disposal

a. All recovered UXO and material documented as an explosive hazard (MDEH) that is unsafe to move will be destroyed by the contractor on site. If the item is unidentifiable or demolition operations create an abnormal hazard to the area, military support (EOD) will be called to assess the situation. In the event an unforeseen delay occurs in disposal operations due to a lightning storm, the contractor will ensure that the item is guarded until the delay is resolved.

b. MEC/MPPEH (other than UXO) that have been determined to be acceptable-to-move by the SUXOS and UXOSO will be transported to the established storage magazine area, See Figure A-13, located on Picatinny Arsenal, for later disposal operations at a established demolition area, see figure A-3, using the sandbag mitigation or BEM. The SUXOS and UXOSO are authorized to determine that movement of certain items is acceptable for the purpose of efficiency of activity being conducted or protection of personnel, property or critical assets.

A demolition area will be used to disposed of acceptable-to-move MEC (other than UXO) items. See Figure A-3 for associated ESQD arcs for disposal shots. All demolition shots by USACE contractors will be made using BEM or Sandbag mitigation to limit the blast and fragmentation to no more than 220 feet. There will be no consolidated demolition shots.

c. Two ATF Type II magazines (see Figure A-13), located within Picatinny Arsenal Magazine Storage area will be used for this project. One magazine will be used to store donor explosives; the net explosive weight (NEW) limit will be 100 pounds of HD 1.1 explosives. All explosives stored in the magazine will be compatible per DOD 6055.09-M and DA Pamphlet 385-64. The magazine will have an externally mounted box to store the initiating explosives. The total NEW of 100 pounds will include the NEW of the initiating explosives.

A second ATF Type II magazine will be used to store acceptable-to-move recovered MEC/MPPEH (other than UXO) items pending disposal after coordination with Picatinny Range Control. The NEW for this magazine will be 100 pounds. All recovered MEC is HD 1.1. Table C9.T2, Open column.

d. Engineering Controls: Sandbag Mitigation may be used for intentional detonations as delineated in the "Use of Sand Bags for Mitigation of

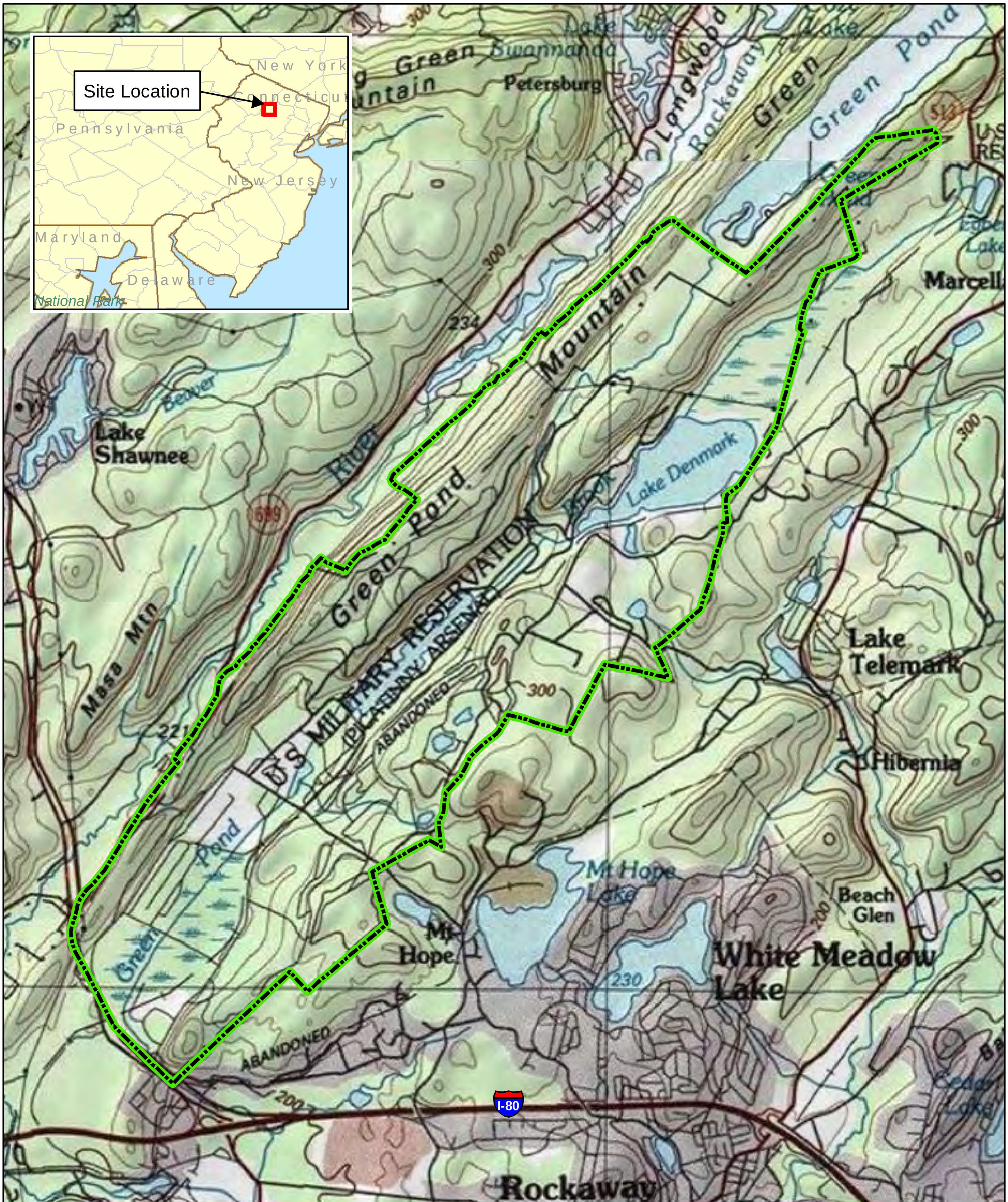
Fragmentation and Blast Effects due to Intentional Detonation of Munitions," HNC-ED-CS-S 98-7, Amendment 1 dated February 2011 and EM-CX safety advisory dated 7 November 2011 and DDESB Memo of 29 November 2010 "Clarifications Regarding Use of Sandbags for Mitigation of Fragmentation and Blast Effects due to Intentional Detonation of Munitions". This EC may be applied to mitigate fragmentation and blast hazards to the MSD identified in table 7-1. A copy of HNC-ED-CSS-98-7, Amendment 1 and the DDESB Memo will be available on site if this EC is applied. Only one MEC item will be destroyed at a time using this technique. The Buried Explosive Module (BEM) will be utilized during disposal operations as referenced in Table 7-1. Please see Appendix B to access the BEM calculation sheet.

e. MPPEH procedures will be IAW DoDI 4140.62 and EM 1110-1-4009.

All Material Potentially Presenting an Explosive Hazard (MPPEH) will be assessed and its explosives safety status determined and documented prior to transfer within the DoD or released from DoD control. Prior to release to the public, MPPEH will be documented by authorized and technically qualified personnel as Material Documented as Safe (MDAS) after 100% inspection and an independent 100% re-inspection to determine that it is safe from explosives safety perspective.

APPENDIX A

FIGURES



Legend

Installation Boundary

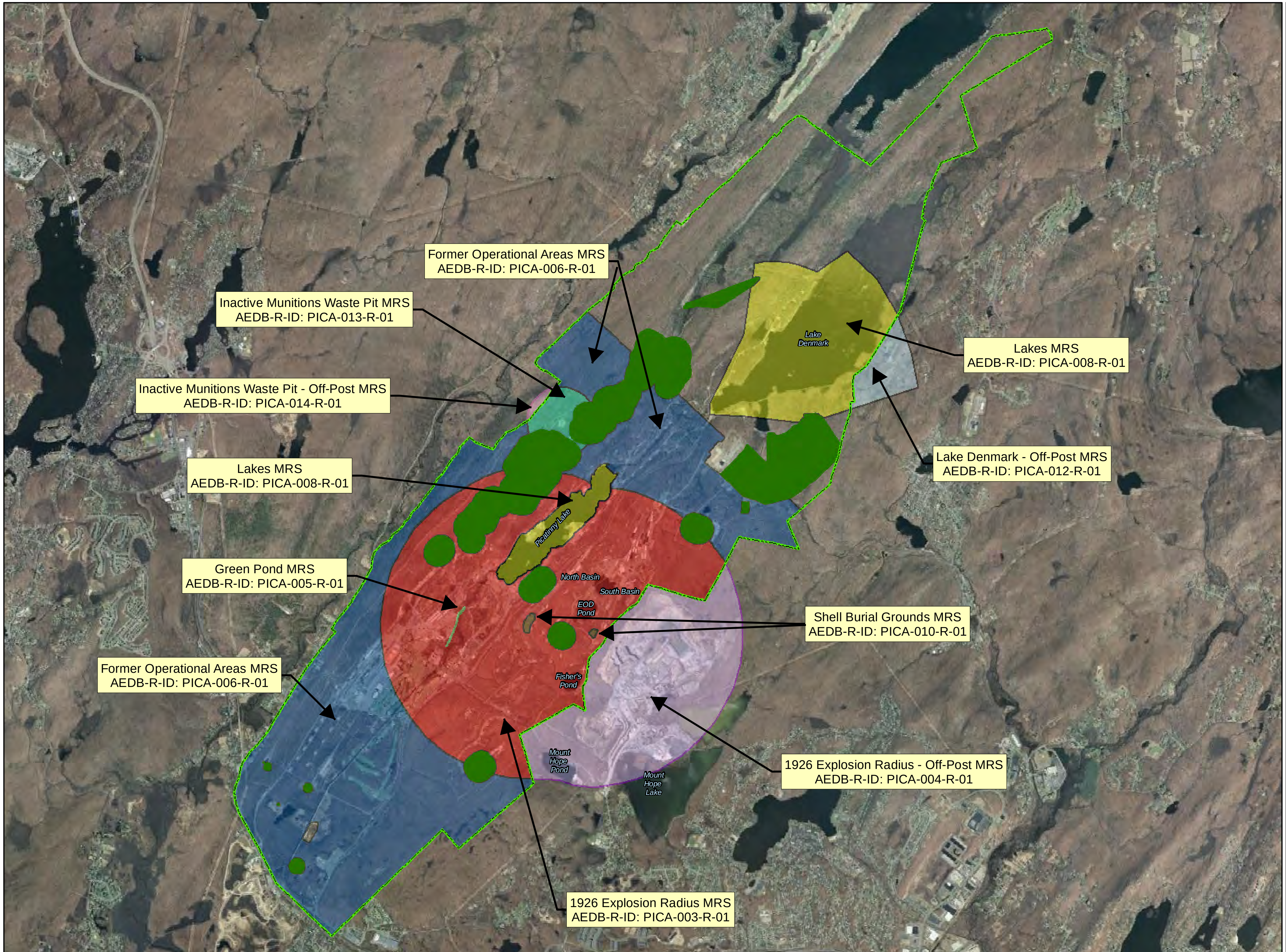
Data Source: ESRI, USGS Map Service
Coordinate System: UTM Zone 18N
Datum: NAD 83
Units: Meters

0 0.5 1 Miles

WESTON SOLUTIONS

Figure A-1
Regional Location Map
Picatinny Arsenal
Morris County, New Jersey

File: Y:\Picatinny\MXD\ESP\Site_loc.mxd, 11/2/2011 10:31:24 AM, ricksc



Legend

- Installation Boundary
- Operational Range Areas

Munitions Response Sites Locations

- 1926 Explosion Radius
- 1926 Explosion Radius - Off-Post
- Former Operational Areas
- Green Pond
- Inactive Munitions Waste Pit
- Inactive Munitions Waste Pit - Off-Post
- Lake Denmark - Off-Post
- Lakes
- Shell Burial Grounds

Base Imagery: NJ 2007 Natural Color Imagery
Data Source: Army GIS Layers (August 2011)

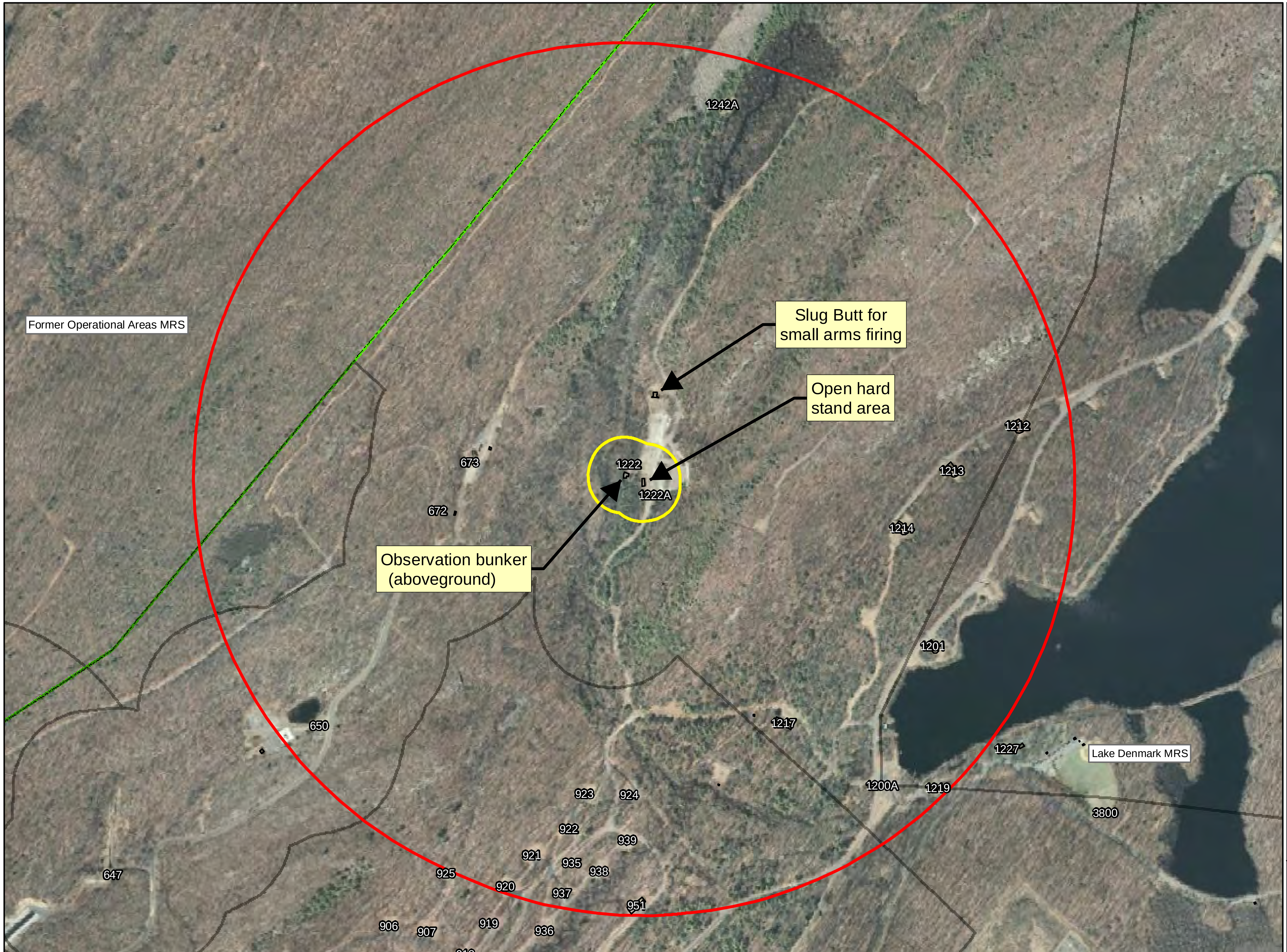
Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N
W E
S

3,500 1,750 0 3,500
Feet

Figure A-2
Location of Munitions Response Sites
Picatinny Arsenal
Morris County, New Jersey

File: Y:\Picatinny\MXD\ESP\MRS_all.mxd, 11/2/2011 10:53:31 AM, ricksc



Legend

- Munitions Response Site Boundaries
- Installation Boundary
- Buildings
- 220' Intentional Detonation with BEM
- 2,446' Intentional Detonation without Engineering Controls

There are no public traffic routes in this area

Base Imagery: NJ 2007 Natural Color Imagery
Data Source: Army GIS Layers (August 2011)

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N W E S

550 275 0 550
Feet

Figure A-3
Demo Area
Picatinny Arsenal
Morris County, New Jersey

File: Y:\Picatinny\MXD\ESP\Demo_Area.mxd, 2/14/2012 2:40:04 PM, ricksc

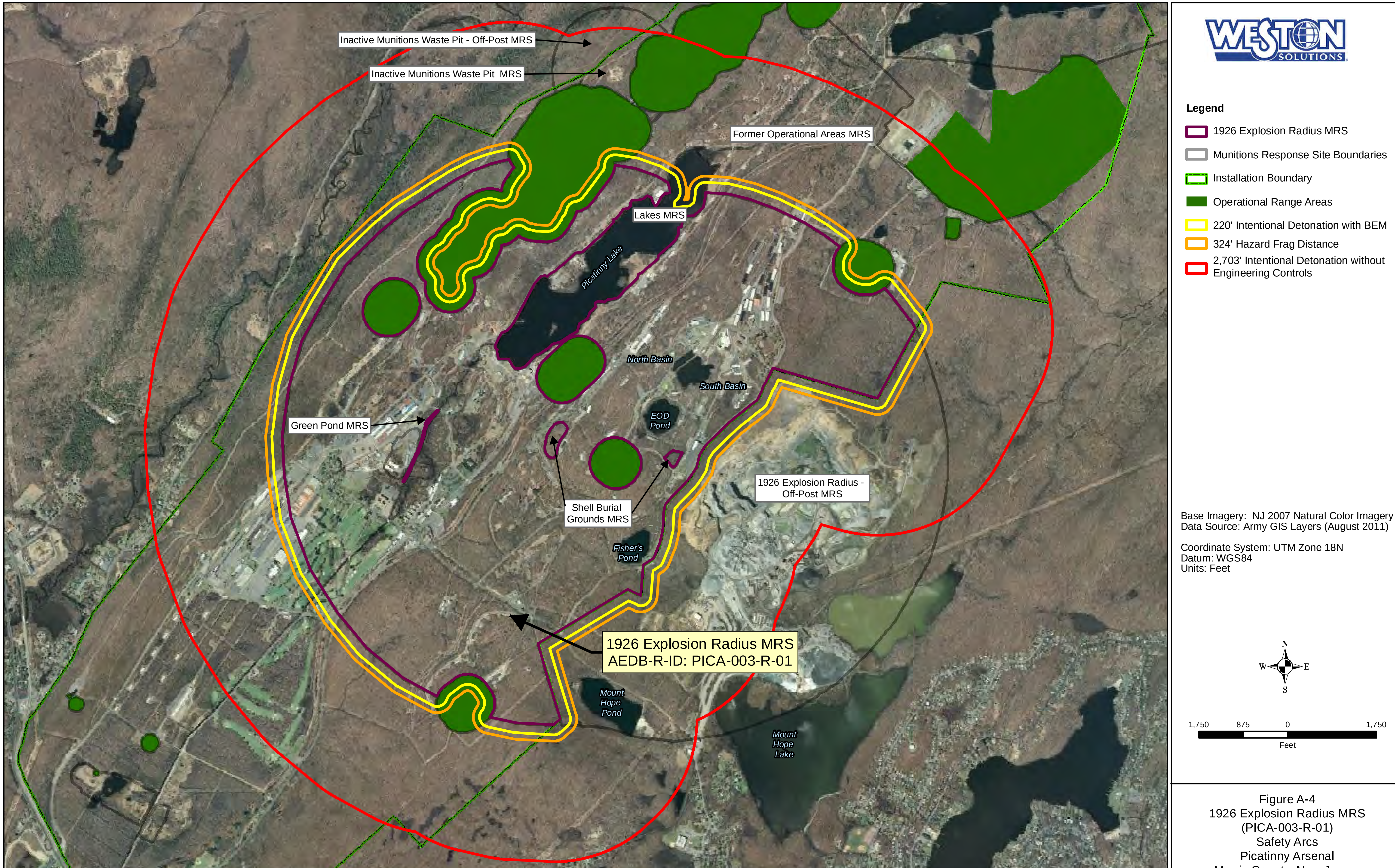
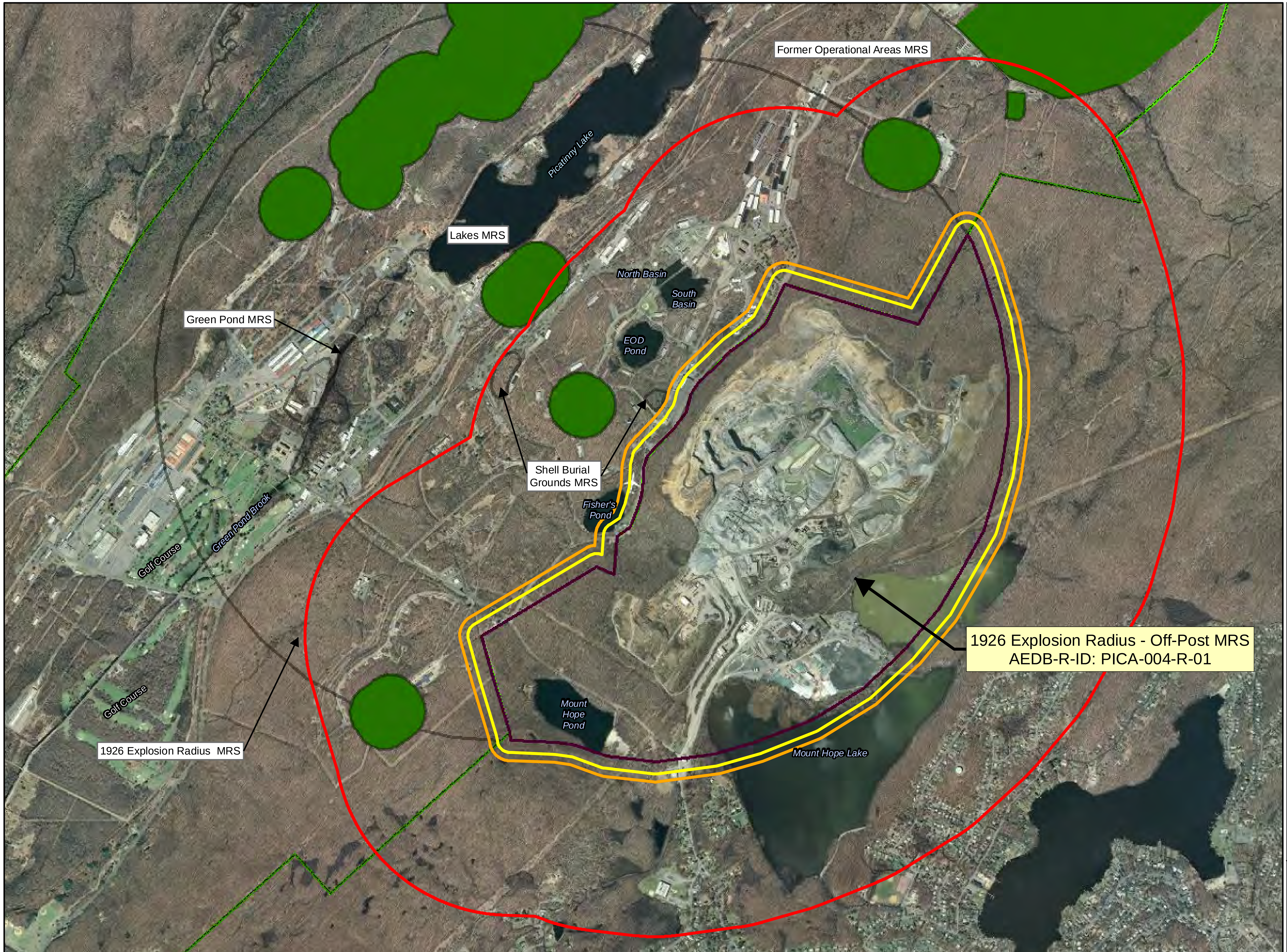


Figure A-4
1926 Explosion Radius MRS
(PICA-003-R-01)
Safety Arcs
Picatinny Arsenal
Morris County, New Jersey

File: Y:\Picatinny\MXD\ESP\Safety_Arcs_1926_Explosion_Radius.mxd, 2/14/2012 2:54:33 PM, ricksc



Legend

- 1926 Explosion Radius - Off-Post MRS
- Munitions Response Site Boundaries
- Installation Boundary
- Operational Range Areas
- 220' Intentional Detonation with BEM
- 324' Hazard Frag Distance
- 2,703' Intentional Detonation without Engineering Controls

Base Imagery: NJ 2007 Natural Color Imagery
Data Source: Army GIS Layers (August 2011)

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N W E S

1,500 750 0 1,500
Feet

Figure A-5
1926 Explosion Radius Off-Post MRS
(PICA-004-R-01)
Safety Arcs
Picatinny Arsenal
Morris County, New Jersey

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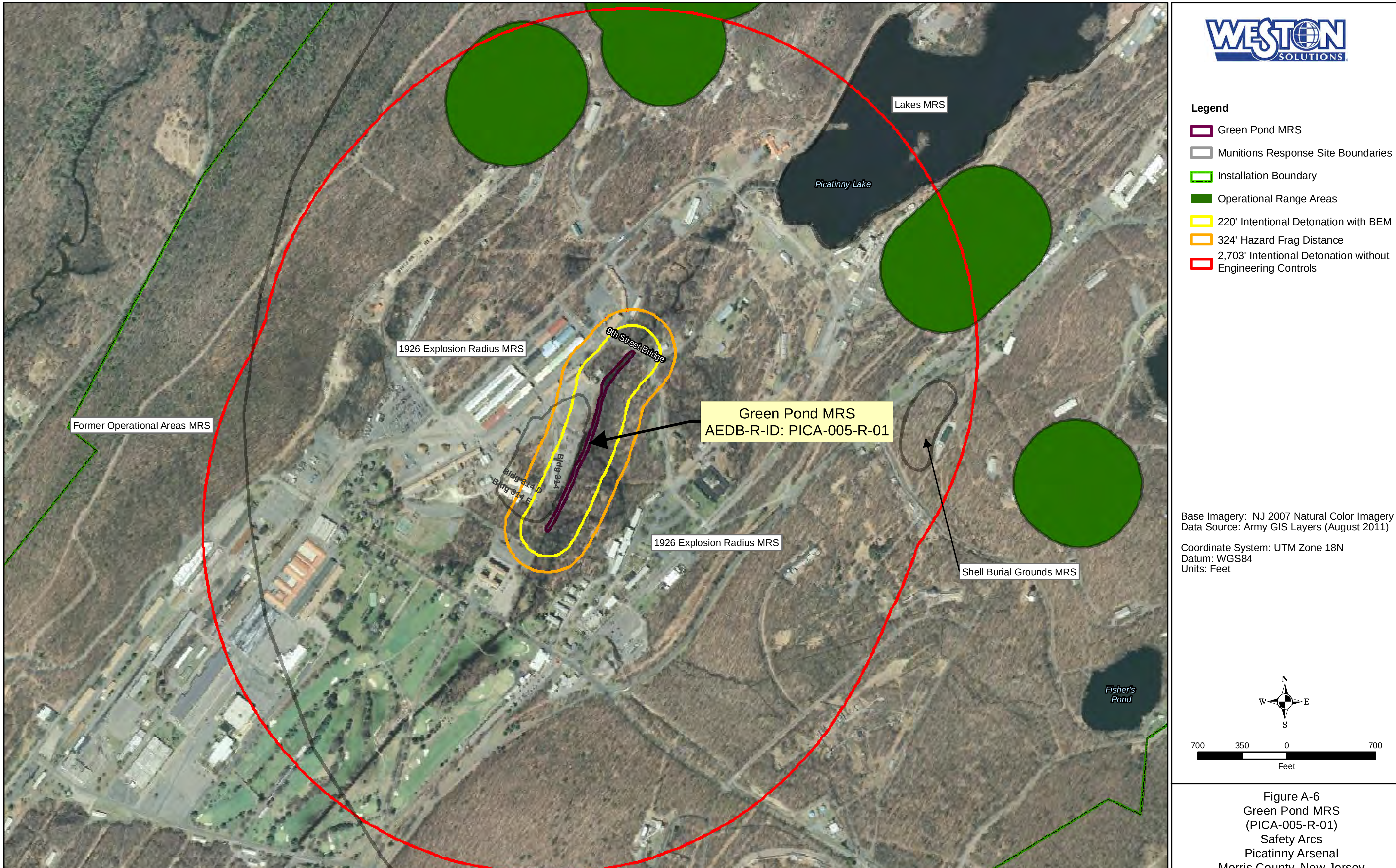

Figure A-6
Green Pond MRS
(PICA-005-R-01)
Safety Arcs
Picatinny Arsenal
Morris County, New Jersey

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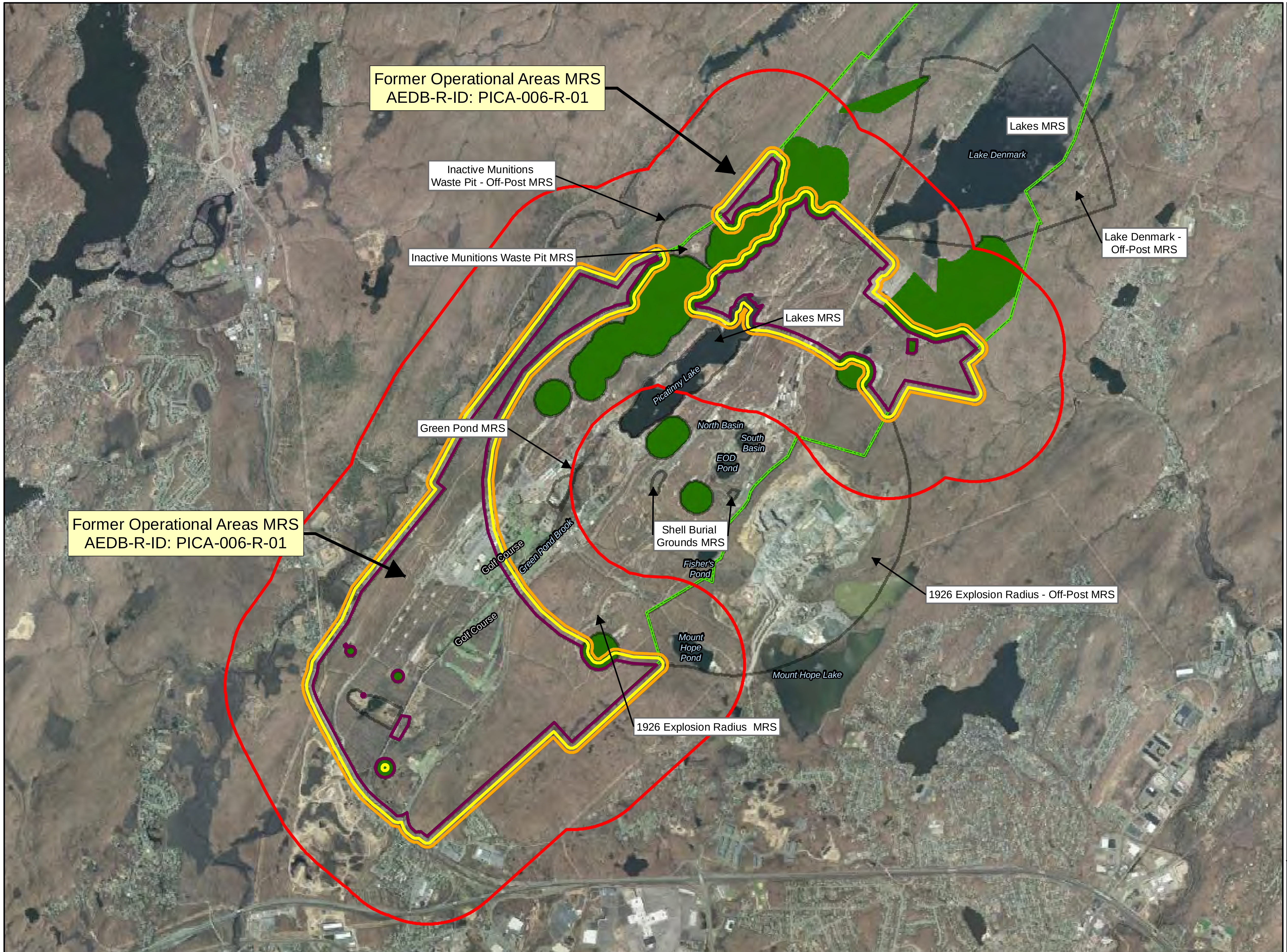

WESTON SOLUTIONS

Legend

- Former Operational Areas MRS
- Munitions Response Site Boundaries
- Installation Boundary
- Operational Range Areas
- 220' Intentional Detonation with BEM
- 324' Hazard Frag Distance
- 2,703' Intentional Detonation without Engineering Controls

Base Imagery: NJ 2007 Natural Color Imagery
Data Source: Army GIS Layers (August 2011)

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N W E S

3,000 1,500 0 3,000
Feet

Figure A-7
Former Operational Area MRS
(PICA-006-R-01)
Safety Arcs
Picatinny Arsenal
Morris County, New Jersey

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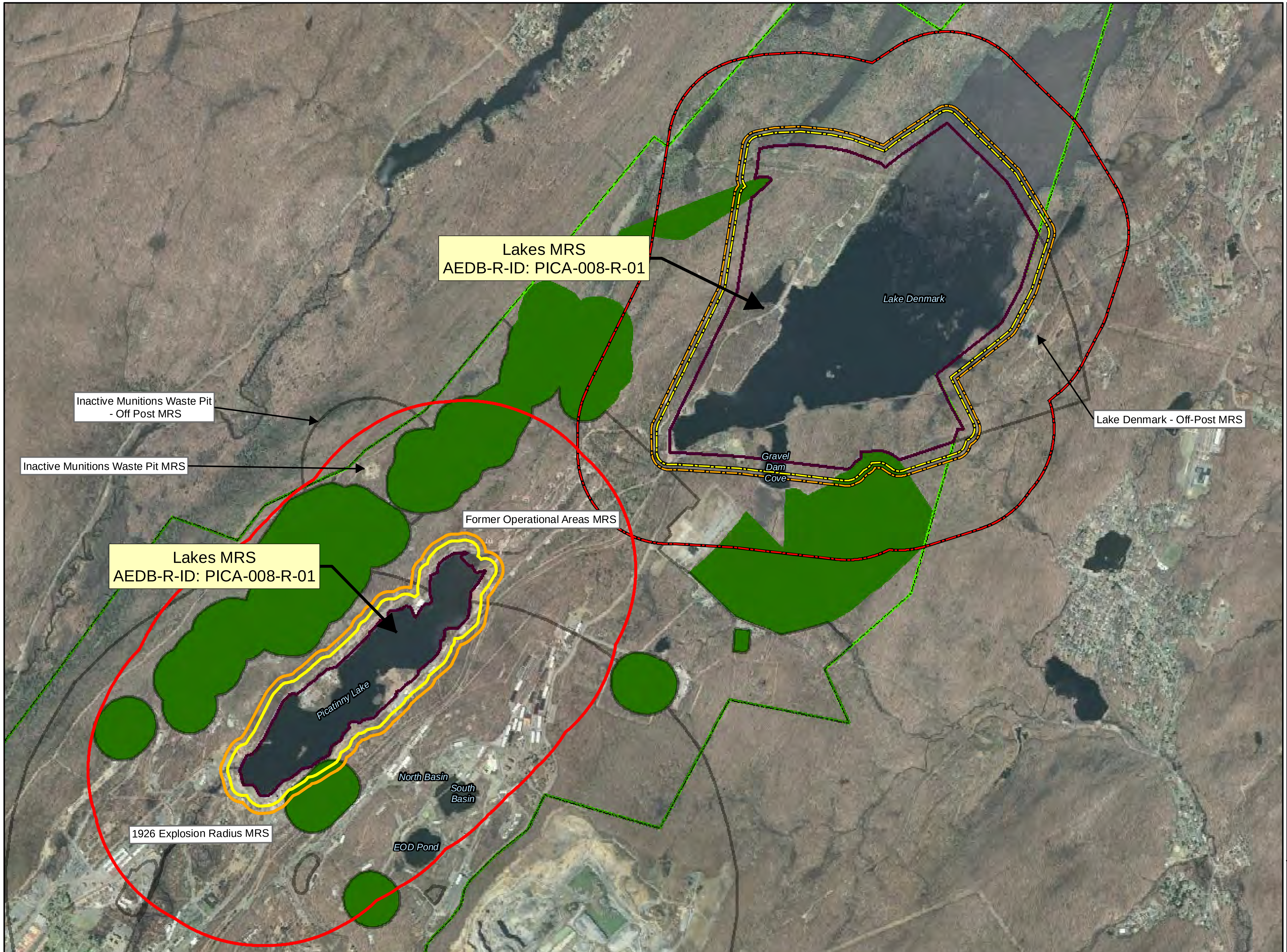

Legend

- Lakes MRS
- Munitions Response Site Boundaries
- Installation Boundary
- Operational Range Areas

Lake Picatinny Safety Arcs

- 220' Intentional Detonation with BEM
- 324' Hazard Frag Distance
- 2,703' Intentional Detonation without Engineering Controls

Lake Denmark Safety Arcs

- 220' Intentional Detonation without Engineering Controls
- 313' Hazard Frag Distance
- 1,641' Intentional Detonation without Engineering Controls

Base Imagery: NJ 2007 Natural Color Imagery
Data Source: Army GIS Layers (August 2011)

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N W E S

1,750 875 0 1,750
Feet

Figure A-8
Lakes MRS
(PICA-008-R-01)
Safety Arcs
Picatinny Arsenal
Morris County, New Jersey

File: Y:\Picatinny\MXD\ESP\Safety_Arcs_Lakes.mxd, 2/14/2012 2:59:14 PM, ricksc

Legend

- Shell Burial Grounds MRS
- Munitions Response Site Boundaries
- Installation Boundary
- Operational Range Areas
- 220' Intentional Detonation with BEM
- 324' Hazard Frag Distance
- 2,703' Intentional Detonation without Engineering Controls

Base Imagery: NJ 2007 Natural Color Imagery
Data Source: Army GIS Layers (August 2011)

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N W E S

650 325 0 650
Feet

Figure A-9
Shell Burial Grounds MRS
(PICA-010-R-01)
Safety Arcs
Picatinny Arsenal
Morris County, New Jersey

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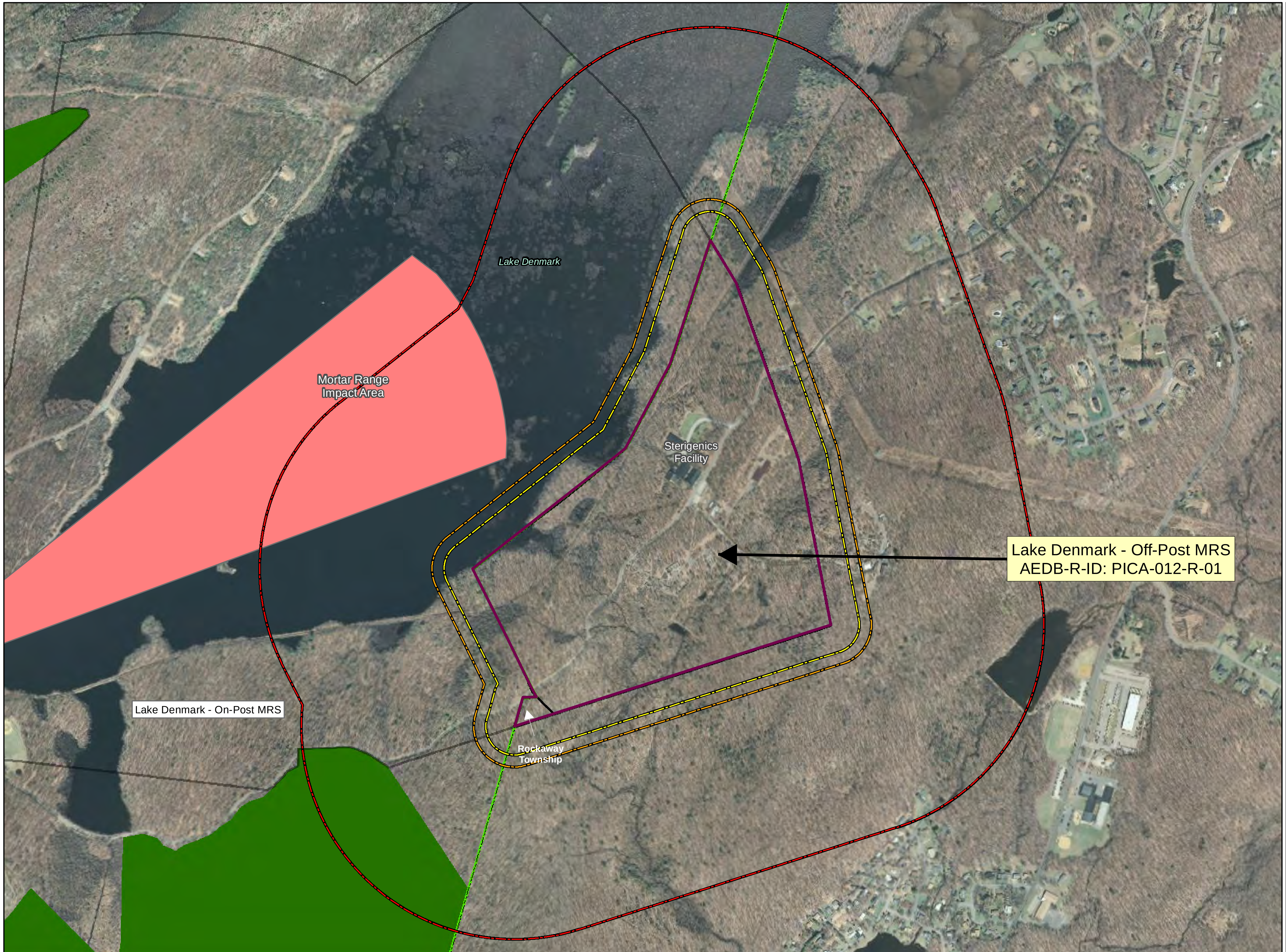

WESTON SOLUTIONS

Legend

- Lake Denmark, Off-Post MRS
- Munitions Response Site Boundaries
- Installation Boundary
- Operational Range Areas
- Former Mortar Range Impact Area (Lakes MRS)
- 220' Intentional Detonation without Engineering Controls
- 313' Hazard Frag Distance
- 1,641' Intentional Detonation without Engineering Controls

Base Imagery: NJ 2007 Natural Color Imagery
Data Source: Army GIS Layers (August 2011)

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N W E S

750 375 0 750
Feet

Figure A-10
Lake Denmark - Off-Post MRS
(PICA-012-R-01)
Safety Arcs
Picatinny Arsenal
Morris County, New Jersey

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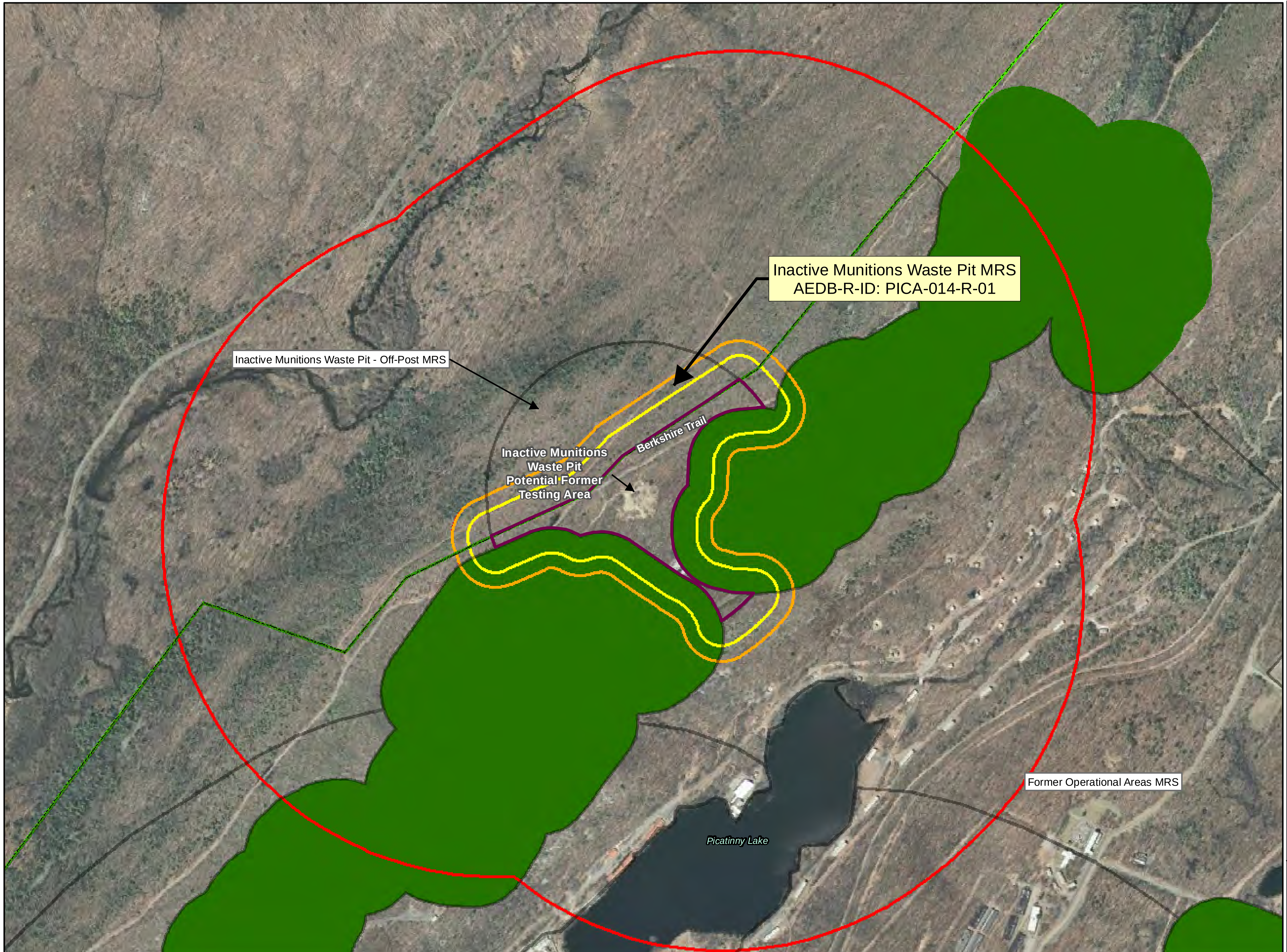


WESTON SOLUTIONS

Legend

- Inactive Munitions Waste Pit MRS
- Munitions Response Site Boundaries
- Installation Boundary
- 220' Intentional Detonation with BEM
- 324' Hazard Frag Distance
- 2,703' Intentional Detonation without Engineering Controls
- Operational Range Areas

Base Imagery: NJ 2007 Natural Color Imagery
Data Source: Army GIS Layers (August 2011)

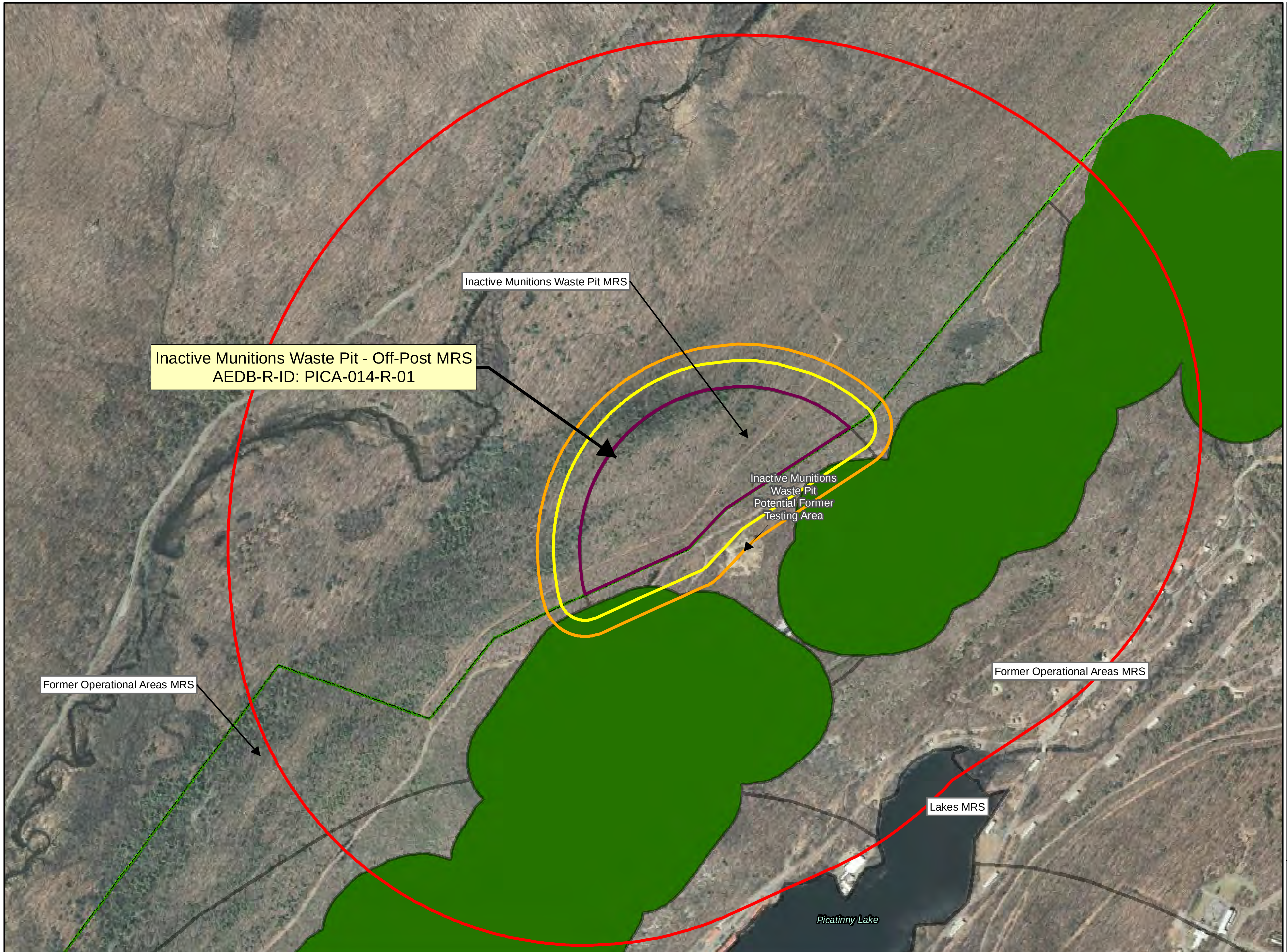
Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N W E S

800 400 0 800
Feet

Figure A-11
Inactive Munitions Waste Pit MRS
(PICA-013-R-01)
Safety Arcs
Picatinny Arsenal
Morris County, New Jersey

File: Y:\Picatinny\MXD\ESP\Safety_Arcs_Inactive_munitions.mxd, 1/11/2012 8:26:57 AM, ricksc



WESTON SOLUTIONS

Legend

- Inactive Munitions Waste Pit, Off-Post MRS
- Munitions Response Site Boundaries
- Installation Boundary
- Operational Range Areas
- 220' Intentional Detonation with BEM
- 324' Hazard Frag Distance
- 2,703' Intentional Detonation without Engineering Controls

Base Imagery: NJ 2007 Natural Color Imagery
Data Source: Army GIS Layers (August 2011)

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N W E S

750 375 0 750
Feet

Figure A-12
Inactive Munitions Waste Pit Off-Post MRS
(PICA-014-R-01)
Safety Arcs
Picatinny Arsenal
Morris County, New Jersey

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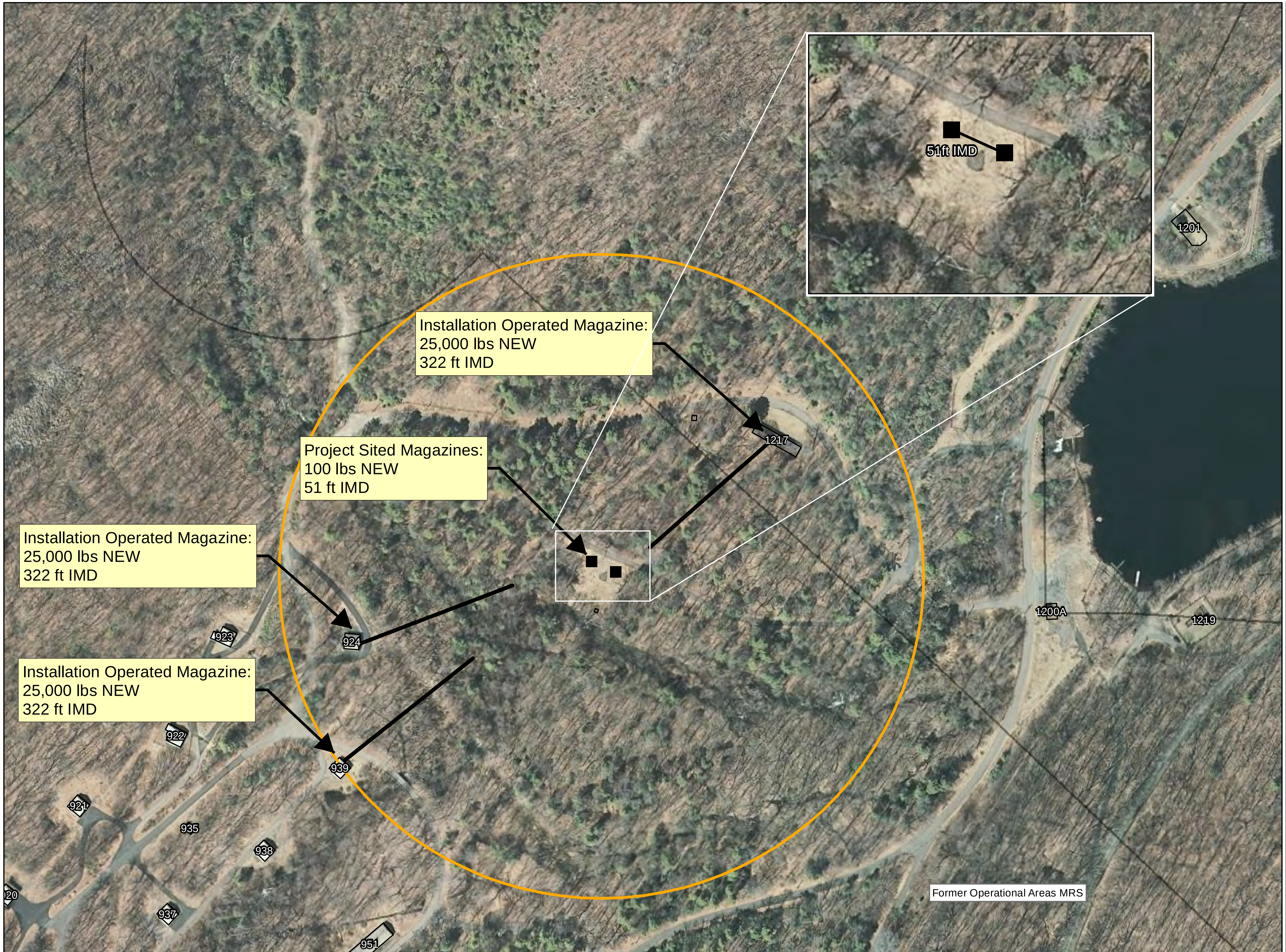


Legend

- Munitions Response Site Boundaries
- 658' Hazardous Fragment Distance
- Buildings
- Magazine

Each magazine will be sited for 100 lbs NEW HC 1.1.

The magazines have a 51 foot Inter-Magazine Distance (IMD).

There are no public traffic routes in this area

Base Imagery: NJ 2007 Natural Color Imagery
Data Source: Army GIS Layers (August 2011)

Coordinate System: UTM Zone 18N
Datum: WGS84
Units: Feet

N W E S

200 100 0 200
Feet

Figure A-13
Location of Magazine
Picatinny Arsenal
Morris County, New Jersey

File: Y:\Picatinny\MXD\ESP\Loc_of_magazine.mxd, 1/11/2012 11:03:39 AM, ricksc

APPENDIX B

FRAGMENTATION CALCULATION DATA SHEETS

Fragmentation Data Review Form

Database Revision Date 10/18/2011

Category:	Surface-Launched HE Rounds
Munition:	4.2 in M329 (With Supplementary Charge)
Case Material:	Steel, Mild
Fragmentation Method:	Naturally Fragmenting
Secondary Database Category:	Mortar
Munition Case Classification:	Robust
DODIC:	C704
Date Record Created:	9/21/2004
Record Created By:	MC
Last Date Record Updated:	7/6/2010
Individual Last Updated Record:	SDH
Date Record Retired:	

Munition Information and Fragmentation Characteristics

Explosive Type:	TNT
Explosive Weight (lb):	8.3
Diameter (in):	4.2000
Cylindrical Case Weight (lb):	10.26500
Maximum Fragment Weight (Intentional) (lb):	0.0808
Design Fragment Weight (95%) (Unintentional) (lb):	0.0136
Critical Fragment Velocity (fps):	6583

Required Sandbag Thickness

TNT Equivalent (Impulse):	1
TNT Equivalent Weight - Impulse (lbs):	8.300
Kinetic Energy 10^6 (lb-ft²/s²):	1.7516

Single Sandbag Mitigation

Required Wall & Roof Thickness (in)	36
Expected Max. Throw Distance (ft):	220
Minimum Separation Distance (ft):	220

Double Sandbag Mitigation

Required Wall & Roof Thickness (in)	Not Permitted
Expected Max. Throw Distance (ft):	Not Permitted
Minimum Separation Distance (ft):	Not Permitted

Water Containment System and Minimum Separation Distance:

TNT Equivalent (Impulse):	1
TNT Equivalent Weight - Impulse (lbs):	8.300
Kinetic Energy 106 (lb-ft²/s²):	1.7516
Minimum Separation Distance (ft):	275.000
Water Containment System:	1100 gal tank

Theoretical Calculated Fragment Distances

HFD [Hazardous Fragment Distance: distance to no more than 1 hazardous fragment per 600 square feet] (ft):	313
MFD-H [Maximum Fragment Distance, Horizontal] (ft):	1641
MFD-V [Maximum Fragment Distance, Vertical] (ft):	1302

Overpressure Distances

TNT Equivalent (Pressure):	1
TNT Equivalent Weight - Pressure (lbs):	8.300
Unbarricaded Intraline Distance (3.5 psi), K18 Distance:	36
Public Traffic Route Distance (2.3 psi); K24 Distance:	49
Inhabited Building Distance (1.2 psi), K40 Distance:	81
Intentional MSD (0.0655 psi), K328 Distance:	664

Minimum Thickness to Prevent Perforation

	Intentional	Unintentional
4000 psi Concrete (Prevent Spall):	10.84	4.79
Mild Steel:	1.93	0.88
Hard Steel:	1.59	0.73
Aluminum:	3.91	1.88
LEXAN:	8.26	5.12
Plexi-glass:	6.68	3.54
Bullet Resist Glass:	5.76	2.85

Item Notes

Fragmentation Data Review Form

Database Revision Date 10/18/2011

Category:	Surface-Launched HE Rounds
Munition:	6 in Mk 20 Mod 0-4 Naval Round
Case Material:	Steel, Mild
Fragmentation Method:	Naturally Fragmenting
Secondary Database Category:	Projectile
Munition Case Classification:	Extremely Heavy Case

DODIC:	
Date Record Created:	6/9/2010
Record Created By:	SDH
Last Date Record Updated:	9/14/2011
Individual Last Updated Record:	SDH
Date Record Retired:	

Munition Information and Fragmentation Characteristics

Explosive Type:	Explosive D
Explosive Weight (lb):	7.08
Diameter (in):	6.0000
Cylindrical Case Weight (lb):	65.06500
Maximum Fragment Weight (Intentional) (lb):	1.4952
Design Fragment Weight (95%) (Unintentional) (lb):	0.4873
Critical Fragment Velocity (fps):	2844

Required Sandbag Thickness

TNT Equivalent (Impulse):	0.81
TNT Equivalent Weight - Impulse (lbs):	5.735
Kinetic Energy 10^6 (lb-ft²/s²):	3.7788

Single Sandbag Mitigation

Required Wall & Roof Thickness (in)	36
Expected Max. Throw Distance (ft):	220
Minimum Separation Distance (ft):	220

Double Sandbag Mitigation

Required Wall & Roof Thickness (in)	Not Permitted
Expected Max. Throw Distance (ft):	Not Permitted
Minimum Separation Distance (ft):	Not Permitted

Water Containment System and Minimum Separation Distance:

TNT Equivalent (Impulse):	0.81
TNT Equivalent Weight - Impulse (lbs):	5.735
Kinetic Energy 106 (lb-ft²/s²):	3.7788
Minimum Separation Distance (ft):	275.000
Water Containment System:	1100 gal tank

Theoretical Calculated Fragment Distances

HFD [Hazardous Fragment Distance: distance to no more than 1 hazardous fragment per 600 square feet] (ft):	324
MFD-H [Maximum Fragment Distance, Horizontal] (ft):	2703
MFD-V [Maximum Fragment Distance, Vertical] (ft):	2001

Overpressure Distances

TNT Equivalent (Pressure):	0.85
TNT Equivalent Weight - Pressure (lbs):	6.018
Unbarricaded Intraline Distance (3.5 psi), K18 Distance:	33
Public Traffic Route Distance (2.3 psi); K24 Distance:	44
Inhabited Building Distance (1.2 psi), K40 Distance:	73
Intentional MSD (0.0655 psi), K328 Distance:	597

Minimum Thickness to Prevent Perforation

	Intentional	Unintentional
4000 psi Concrete (Prevent Spall):	10.60	5.44
Mild Steel:	2.02	1.02
Hard Steel:	1.66	0.84
Aluminum:	3.85	2.03
LEXAN:	9.45	6.21
Plexi-glass:	8.03	4.60
Bullet Resist Glass:	7.35	3.96

Item Notes

BURIED EXPLOSION MODULE

(Version 6.2)

Based on DDESB Technical Paper 16 Revision 3, EARTHEX software, and NSWCDD/TR-92/196

(ENGLISH UNITS)

SELECT BURIAL MEDIUM

SELECT SOIL TYPE

(See TP 16, Revision 3 for soil details)

SELECT ITEM DESCRIPTION

6 in Mk 20 Mod 0-4 Naval Round

OTHER (User Defined)

USER DEFINED FRAGMENT CHARACTERISTICS

ENTER	**FRAGMENT WEIGHT (lbs)**	1.490
	FRAGMENT VELOCITY (ft/s)	2,844.00
	SINGLE ITEM TNT EQUIVALENT WEIGHT (lbs)	6.02

ENTER TOTAL NUMBER OF ITEMS	**1**
ENTER TOTAL WEIGHT OF ALL DONOR CHARGES (lbs)	**1.00**
SINGLE ITEM NEW (lbs)	**6.02**
SINGLE ITEM MAXIMUM FRAGMENT WEIGHT (lbs)	**1.4900**
FRAGMENT WEIGHT USED IN CALCULATIONS (lbs)	**1.4900**
SINGLE ITEM MAXIMUM FRAGMENT VELOCITY (ft/s)	**2,844**
FRAGMENT VELOCITY USED IN CALCULATIONS (ft/s)	**2,844**
TOTAL TNT WEIGHT USED (lbs)	**7.32**
ENTER DEPTH OF BURIAL (ft)	**6.00**
ENTER HORIZONTAL RANGE (for pressure calculation) (ft)	**600**

CRATER OR CAMOUFLET?

CAMOUFLET

CAMOUFLET CAVITY RADIUS (ft) **2.32**

FRAGMENT EXIT VELOCITY (ft/s)	**0.0**	**FRAGMENT LAUNCH ANGLE (°)**	**0.0**

MAXIMUM FRAGMENT DISTANCE (ft)	**0.0**

***Distance at which pressure is 0.066 psi=**

Open Air Withdrawal Distance, K328 (ft)	**636.8**

Blast Withdrawal Distance (buried/undex) (ft)*		**N/A***
Fragment Hazard Distance (ft) ******		**0.0**
Pressure at Fragment Hazard Distance	**(psi)**	**N/A***
	(dB)	**N/A***
Pressure at Range Entered	**(psi)**	**N/A***
	(dB)	**N/A***

***Airblast methodology not applicable (N/A) for Camouflet conditions!**

****Depth too great--no fragments expected**

APPENDIX I

NEW JERSEY NATURAL HERITAGE PROGRAM REPORT

State of New Jersey

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Parks and Forestry
Mail Code 501-04
ONLM -Natural Heritage Program
P.O. Box 420
Trenton, NJ 08625-0420
Tel. #609-984-1339
Fax. #609-984-1427

BOB MARTIN
Commissioner

January 31, 2011

Brian Guthrie
Weston Solutions, Inc.
1400 Weston Way
West Chester, PA 19380

Re: MMRP Remedial Investigations at Picatinny Arsenal

Dear Mr. Guthrie:

Thank you for your data request regarding rare species information for the above referenced project site in Rockaway and Jefferson Townships, Morris County.

Searches of the Natural Heritage Database and the Landscape Project (Version 3 for the highlands region, Version 2.1 elsewhere) are based on a representation of the boundaries of your project site in our Geographic Information System (GIS). We make every effort to accurately transfer your project bounds from the topographic map(s) submitted with the Request for Data into our Geographic Information System. We do not typically verify that your project bounds are accurate, or check them against other sources.

We have checked the Natural Heritage Database and the Landscape Project habitat mapping for occurrences of any rare wildlife species or wildlife habitat on the referenced site. Please see Table 1 for species list and conservation status.

Table 1 (on referenced site).

Common Name	Scientific Name	Federal Status	State Status	Grank	Srank
arrowhead spiketail	*Cordulegaster obliqua*		SC	G4	S3
barred owl	*Strix varia*		T/T	G5	S2B,S2N
bobcat	*Lynx rufus*		E	G5	S1
bog turtle	*Glyptemys muhlenbergii*	LT	E	G3	S1
Cooper's hawk	*Accipiter cooperii*		T/S	G5	S2B,S4N
eastern small-footed myotis	*Myotis leibii*		SC	G3	S3
golden-winged warbler	*Vermivora chrysoptera*		SC/SC	G4	S3B,S3N
great blue heron forage	*Ardea herodias*		SC/S	G5	S3B,S4N
Indiana bat	*Myotis sodalis*	LE	E	G2	S1
least bittern	*Ixobrychus exilis*		SC/SC	G5	S3B,S3N
New England bluet	*Enallagma laterale*		SC	G3	S3
northern copperhead snake	*Agkistrodon contortrix contortrix*		SC	G5T5	S3
northern goshawk	*Accipiter gentilis*		E/SC	G5	S1B,S3N
red-headed woodpecker	*Melanerpes erythrocephalus*		T/T	G5	S2B,S2N
red-shouldered hawk	*Buteo lineatus*		E/T	G5	S1B,S2N
sable clubtail	*Gomphus rogersi*		SC	G4	S3
ski-tailed emerald	*Somatochlora elongata*		SC	G5	S3
spatterdock darner	*Rhionaeschna mutata*		SC	G3G4	S3
timber rattlesnake	*Crotalus horridus horridus*		E	G4T4	S1
vernal habitat area					
Williamson's emerald	*Somatochlora williamsoni*		SC	G5	S3
wood turtle	*Glyptemys insculpta*		T	G4	S2

We have also checked the Natural Heritage Database and the Landscape Project habitat mapping for occurrences of any rare wildlife species or wildlife habitat within 1/4 mile of the referenced site. Please see Table 2 for species list and conservation status. This table excludes any species listed in Table 1.

Table 2 (additional species within 1/4 mile of referenced site).

Common Name	*Scientific Name*	Federal Status	State Status	Grank	Srank
American bittern	*Botaurus lentiginosus*		E/SC	G4	S1B,S3N
creeper	*Strophitus undulatus*			G5	S3

We have also checked the Natural Heritage Database for occurrences of rare plant species or ecological communities. The Natural Heritage Database has records for occurrences of *Adlumia fungosa, Utricularia intermedia, Ilex montana, Nymphoides cordata, Potamogeton robbinsii, Carex leptonervia, Lilium philadelphicum var. philadelphicum, Sparganium minimum* and *Lycopodium annotinum* that may be on the site and for *Lysimachia hybrida* that may be on or in the immediate vicinity of the site and for *Aristolochia serpentaria, Adlumia fungosa, Hottonia inflata, Platanthera psycodes* and *Asplenium montanum* that may be in the immediate vicinity of the site. The attached lists provide more information about these occurrences. **Because some species are sensitive to disturbance or sought by collectors, this information is provided to you on the condition that no specific locational data are released to the general public. This is not intended to preclude your submission of this information to regulatory agencies from which you are seeking permits.**

A list of rare plant species and ecological communities that have been documented from Morris County can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/countylist.html. If suitable habitat is present at the project site, the species in that list have potential to be present.

Status and rank codes used in the tables and lists are defined in EXPLANATION OF CODES USED IN NATURAL HERITAGE REPORTS, which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/nhpcodes_2008.pdf.

The Natural Heritage Program reviews its data periodically to identify priority sites for natural diversity in the State. Included as priority sites are some of the State's best habitats for rare and endangered species and ecological communities. Three of these sites are located within or near the areas you have outlined. Please refer to the enclosed Natural Heritage Priority Site Maps for the locations and boundaries of these sites. On the back of each Priority Site Map is a report describing the significance of the site. You may find the site biodiversity significance rating to be useful if you need to prioritize among the sites in your environmental assessment.

If you have questions concerning the wildlife records or wildlife species mentioned in this response, we recommend that you visit the interactive I-Map-NJ website at the following URL, http://www.state.nj.us/dep/gis/depsplash.htm or contact the Division of Fish and Wildlife, Endangered and Nongame Species Program at (609) 292 9400.

PLEASE SEE 'CAUTIONS AND RESTRICTIONS ON NHP DATA', which can be downloaded from http://www.state.nj.us/dep/parksandforests/natural/heritage/newcaution2008.pdf.

Thank you for consulting the Natural Heritage Program. The attached invoice details the payment due for processing this data request. Feel free to contact us again regarding any future data requests.

Sincerely,

Robert J. Cartica
Administrator

c: NHP File No. 11-4007485-6606

January 31, 2011
Page: 1

Possibly on Project Site
Based on Search of Natural Heritage Database
Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database

Scientific Name	Common Name	Federal Status	State Status	Regional Status	G Rank	S Rank	Last Obs	Ident
Vascular Plant								
Adlumia fungosa	Climbing Fumitory			HL	G4	S2	1993-07-06	Y
Carex leptonervia	Fine-nerve Sedge		E	LP, HL	G4	S1	1994-06-23	Y
Hottonia inflata	Featherfoil		E	LP, HL	G4	S1	1994-06-11	Y
Ilex montana	Large-leaf Holly		E	LP, HL	G5	S1	1994-06-10	Y
Lilium philadelphicum var. philadelphicum	Wood Lily			HL	G5T4T5	S2	1993-07-06	Y
Lycopodium annotinum	Stiff Club-moss		E	LP, HL	G5	S1	1933-07-23	Y
Nymphoides cordata	Floatingheart			LP, HL	G5	S3	1993-08-20	Y
Nymphoides cordata	Floatingheart			LP, HL	G5	S3	1994-06-11	Y
Potamogeton robbinsii	Robbin's Pondweed		E	LP, HL	G5	S2	1994-06-07	Y
Sparganium minimum	Small Burr-reed		E	LP, HL	G5	S1	1993-09-30	Y

Possibly on Project Site
Based on Search of Natural Heritage Database
Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database

Scientific Name	Common Name	Federal Status	State Status	Regional Status	G Rank	S Rank	Last Obs	Ident
Sparganium minimum	Small Burr-reed		E	LP, HL	G5	S1	1993-09-30	Y
Utricularia intermedia	Flat-leaf Bladderwort			HL	G5	S3	1993-06-22	Y
Utricularia purpurea	Purple Bladderwort			LP, HL	G5	S3	1993-07-06	Y
Utricularia purpurea	Purple Bladderwort			LP, HL	G5	S3	1993-07-23	Y

14 Records Selected

**Immediate Vicinity of Project Site
Based on Search of Natural Heritage Database
Rare Plant Species and Ecological Communities Currently Recorded in
the New Jersey Natural Heritage Database**

Scientific Name	Common Name	Federal Status	State Status	Regional Status	G Rank	S Rank	Last Obs	Ident
Vascular Plant								
Adlumia fungosa	Climbing Fumitory			HL	G4	S2	early 1980's	Y
Aristolochia serpentaria	Virginia Snakeroot			HL	G4	S3	1993-07-06	Y
Asplenium montanum	Mountain Spleenwort			HL	G5	S2	1993-08-17	Y
Hottonia inflata	Featherfoil		E	LP, HL	G4	S1	1994-06-10	Y
Platanthera psycodes	Purple Fringed Orchid			HL	G5	S2	1993-08-17	Y

5 Records Selected

On or in Immediate Vicinity of Project Site
Based on Search of Natural Heritage Database
Rare Plant Species and Ecological Communities Currently Recorded in the New Jersey Natural Heritage Database

Scientific Name	Common Name	Federal Status	State Status	Regional Status	G Rank	S Rank	Last Obs	Ident
Vascular Plant								
Lysimachia hybrida	Lowland Loosestrife			HL	G5	S3	1914-09-13	Y

1 Records Selected

Frequently Asked Questions About Natural Heritage Priority Sites

What are Natural Heritage Priority Sites?
Through its Natural Heritage Database, the Office of Natural Lands Management (ONLM) identifies critically important areas to conserve New Jersey's biological diversity. The database provides detailed information on rare species and ecological communities to planners, developers, and conservation agencies for use in resource management, environmental impact assessment, and both public and private land protection efforts.

Using the database, ONLM has identified 414 Natural Heritage Priority Sites, representing some of the best remaining habitat for rare species and exemplary ecological communities in the state. The DEP Endangered and Nongame Species Program provided key information and assisted with the delineation of a number of the sites. These areas should be considered to be top priorities for the preservation of biological diversity in New Jersey. If these sites become degraded or destroyed, we may lose some of the unique components of our natural heritage.

How are Natural Heritage Priority Site maps used in conservation of biological diversity?
Natural Heritage Priority Site maps are used by individuals and agencies concerned with the protection and management of land. The maps have been used by municipalities preparing natural resource inventories; public and private conservation organizations preparing open space acquisition goals; land developers and consultants identifying environmentally sensitive lands; and public and private landowners developing land management plans.

Natural Heritage Priority Sites contain some of the best and most viable occurrences of endangered and threatened species and ecological communities, but they do not cover all known habitat for endangered and threatened species in New Jersey. If information is needed on whether or not endangered or threatened species have been documented from a particular piece of land, a Natural Heritage Database search can be requested by contacting the Office of Natural Lands Management at the address below.

What do the boundaries of the sites contain?
The boundaries of each Natural Heritage Priority Site are drawn to encompass critical habitat for rare species or ecological communities. Often the boundaries extend to include additional buffer lands that should be managed to protect the habitat. A justification for the boundary is provided for each site. The term "primary bounds" is sometimes used to refer to boundaries enclosing critical habitat. The term "secondary bounds" is sometimes used to refer to boundaries enclosing additional buffer. In maps where both primary and secondary boundaries are described, only the outermost boundary is provided in the mapping.

What is the background map that the sites are drawn upon?
The sites are portrayed on background maps produced from a digital copy of the U.S. Geological Survey 7.5 minute topographic maps. The background maps contain topographic lines as well as streams, lakes, roads, towns and place names. These background maps do not always reflect recent changes in land development. Some may be more than 20 years old. Some sites appear to be shifted in position against this topo map. This shift is due to the fact that most sites have been digitized using rectified aerial photography, and some of the digitized USGS topo maps do not align with this photography.

What do "public lands" depict on the maps?
The "public lands" shaded on these maps are state-owned open space lands that have been digitized as a GIS coverage by the state Green Acres Program. This information is provided to show patterns of State land ownership in the vicinity of the Priority Site. The public lands are areas such as State Parks and Forests, Wildlife Management Areas, and Natural Lands Trust preserves. They do not currently include lands owned by other state agencies, federal, county or municipal governments or nonprofit conservation organizations. This GIS coverage is constantly being updated, and therefore future editions of the maps will likely contain additional public lands that are not currently mapped as such.

What is the biodiversity significance rank and how is it used?
Each site is ranked according to its significance for biological diversity using a scale developed by The Nature Conservancy, the network of Natural Heritage Programs, and the New Jersey Natural Heritage Program. The ranks can be used to distinguish between sites that are of global significance for conservation of biological diversity vs. those that are of state significance. The global biodiversity significance ranks range from B1 to B5. In some cases the global biodiversity significance rank is then combined with a state biodiversity significance rank which provides information about the significance of the site on a state level. The state biodiversity significance rank ranges from V1 to V5. The specific definitions for each rank are as follows:

B1 - Outstanding significance on a global level, generally the "last of the least" in the world, such as the only known occurrence of any element (species or ecological community), the best or an excellent occurrence of an element ranked critically imperiled globally, or a concentration (4+) of good or excellent occurrences of elements that are imperiled or critically imperiled globally. The site should be viable and defensible for the elements or ecological processes contained.

B2 - Very high significance on a global level, such as the most outstanding occurrence of any ecological community. Also includes areas containing other occurrences of elements that are critically imperiled globally, a good or excellent occurrence of an element that is imperiled globally, an excellent occurrence of an element that is rare globally, or a concentration (4+) of good occurrences of globally rare elements or viable occurrences of globally imperiled elements.

B3 - High significance on a global level, such as any other viable occurrence of an element that is globally imperiled, a good occurrence of a globally rare element, an excellent occurrence of any ecological community, or a concentration (4+) of good or excellent occurrences of elements that are critically imperiled in the State.

B4 - Moderate significance on a global level, such as a viable occurrence of a globally rare element, a good occurrence of any ecological community, a good or excellent occurrence or only viable state occurrence of an element that is critically imperiled in the State, an excellent occurrence of an element that is imperiled in the State, or a concentration (4+) of good occurrences of elements that are imperiled in the State or excellent occurrences of elements that are rare in the State.

B5 - Of general biodiversity interest on a global level.

V1 - Outstanding significance on a state level. Only known occurrence in the state for an element **or** Site with an excellent occurrence or the best occurrence in the state for an element ranked critically imperiled in the state **or** a concentration (4+) of good or excellent occurrences of elements that are imperiled or critically imperiled in the state.

V2 - Very high significance on a state level. Includes sites containing other occurrences of elements that are critically imperiled in the state **or** a concentration (4+) of other occurrences of state imperiled elements and/or good or excellent occurrences of state rare elements.

V3 - High significance on a state level. Includes sites containing the best occurrence in the state or an excellent occurrence of a state imperiled element **or** multiple (2+) other occurrences for state imperiled elements and/or excellent, good or moderate quality occurrences of state rare elements.

V4 - Moderate significance on a state level. Includes sites containing the best occurrence in the state or an excellent occurrence of a state rare element **or** any site with other occurrences of a state imperiled element **or** multiple (2+) other occurrences of state rare elements.

V5 - Any site with any other occurrence of a state rare element.

Note: All sites have been assigned a global biodiversity significance rank (B rank), but not all sites have been assigned a state biodiversity rank (V rank).

How can I obtain Natural Heritage Priority Site maps for an area of interest to me?

Natural Heritage Priority Site hard copy maps can be obtained by submitting a written request accompanied by a check or money order made payable to the Office of Natural Lands Management at the following address:

Office of Natural Lands Management
P.O. Box 404
Trenton, NJ 08625-0404
Phone: 609-984-1339; Fax: 609-984-1427

Individual 8.5" X 11" maps are available at the following rate:

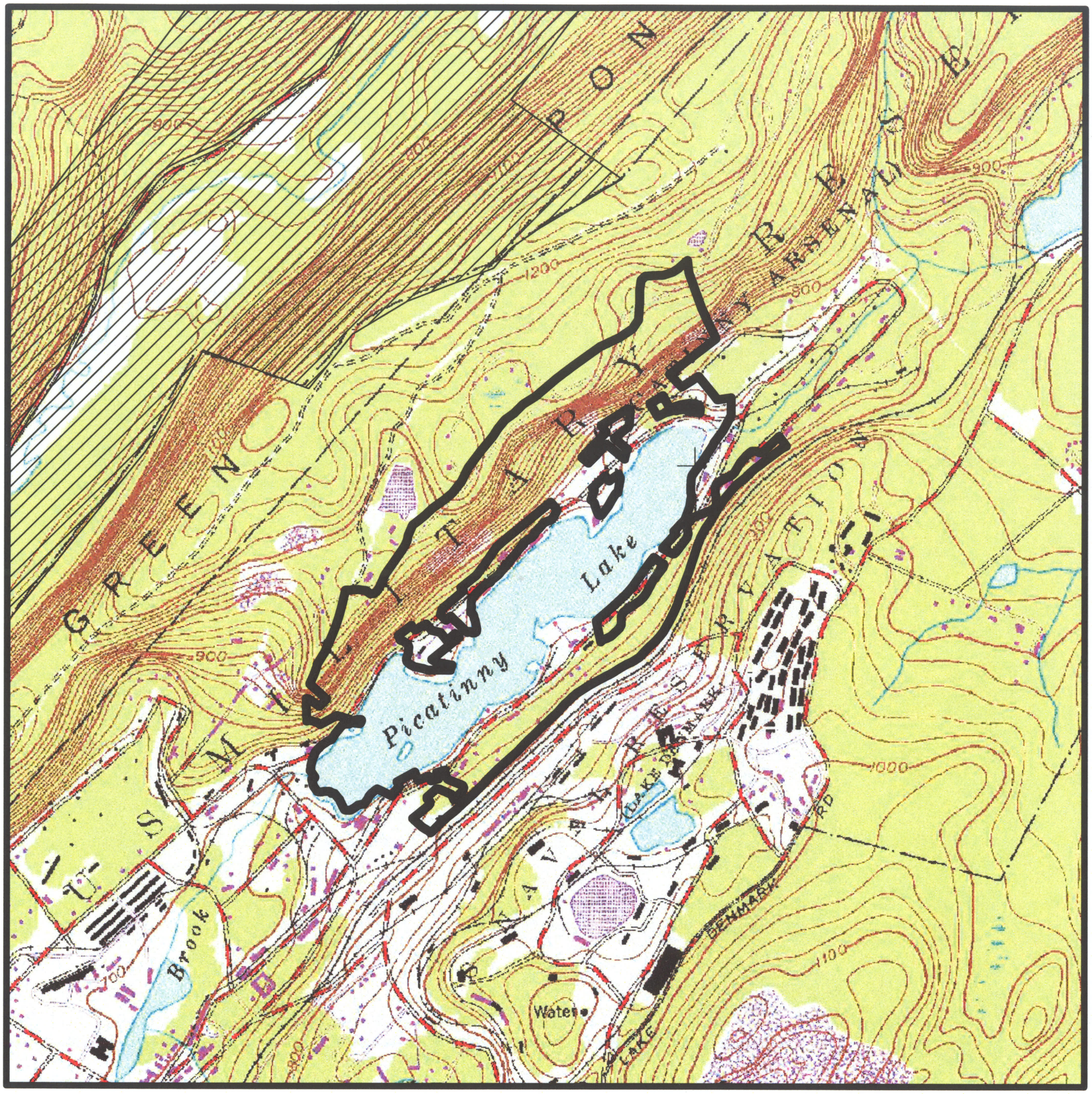
1 - 10 site maps & reports:	$1.50/site
11 - 20 site maps & reports:	$1.00/site
> 20 sites:	$0.50/site

How often are the maps updated?

The Natural Heritage Priority Site information is constantly being updated in the Natural Heritage Database. A new edition of the maps will be made available after significant revisions or additions to the Database.

April 5, 2006

NJ Department of Environmental Protection
Division of Parks and Forestry
Natural Lands Management



Natural Heritage Priority Site

Picatinny Lake

Morris County

NJ Department of Environmental Protection
Division of Parks and Forestry
Natural Lands Management

Miles
0.4 0.2 0 0.4

Priority Sites
Public Land

4

Natural Heritage Priority Site

Picatinny Lake

Locational Information

Quad Name: Dover
County: Morris
Municipality: Rockaway Twp

Description of Site

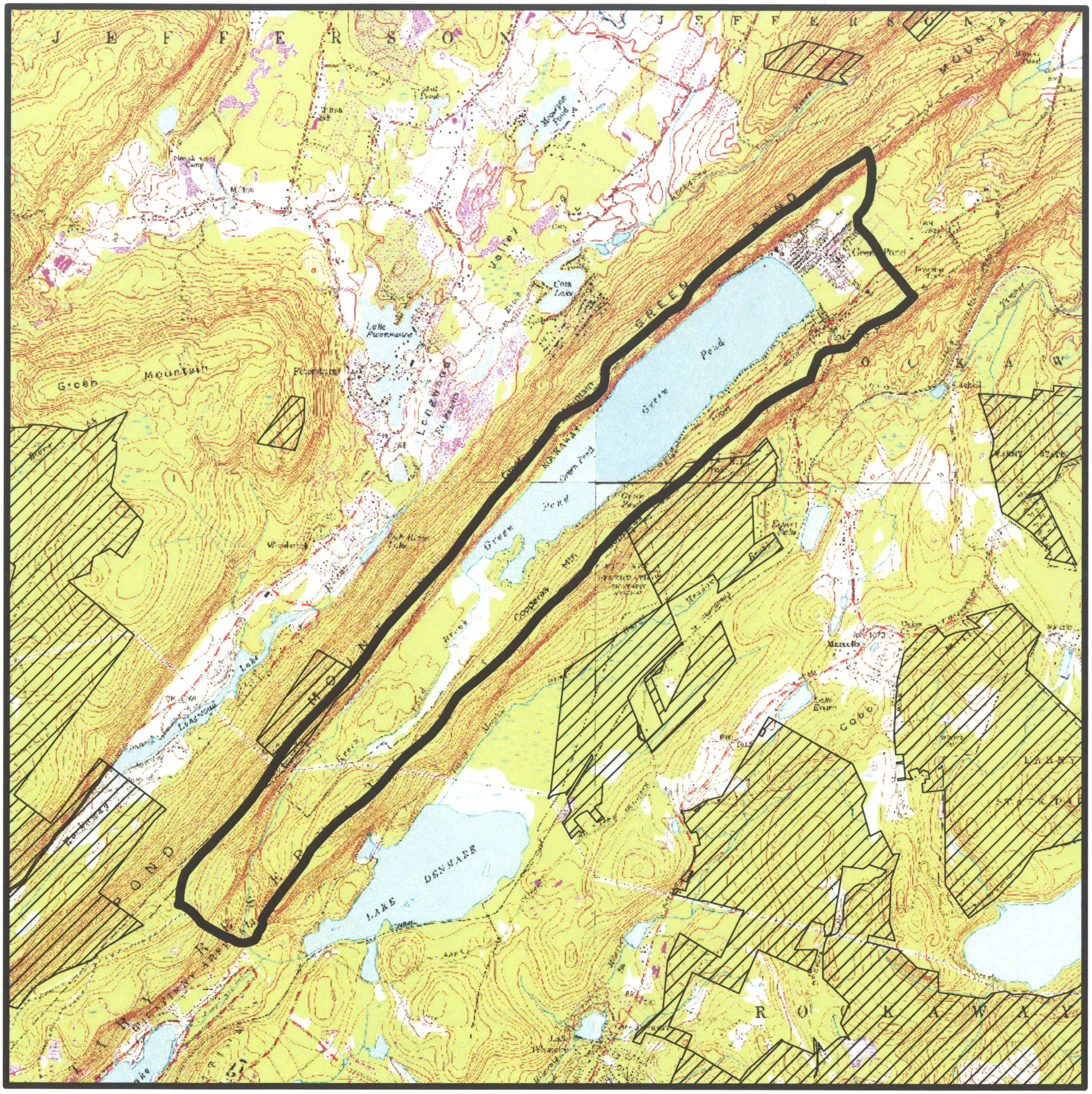
Freshwater lake at the Picatinny Arsenal.

Boundary Justification

Boundaries drawn to include Picatinny Lake and its adjacent, undeveloped upland habitats that drain into the lake.

Biodiversity Rank *B5V5*

Contains two good occurrences of state rare plant species.



Natural Heritage Priority Site

Green Pond Mountain

Morris County

Natural Heritage Priority Site

Green Pond Mountain

Locational Information

Quad Name: Dover ; Newfoundland ; Boonton ; Franklin
County: Morris
Municipality: Rockaway Twp ; Jefferson Twp

Description of Site

An extensive matrix of forests, talus slopes, wooded wetlands and aquatic plant communities on Green Pond Mountain.

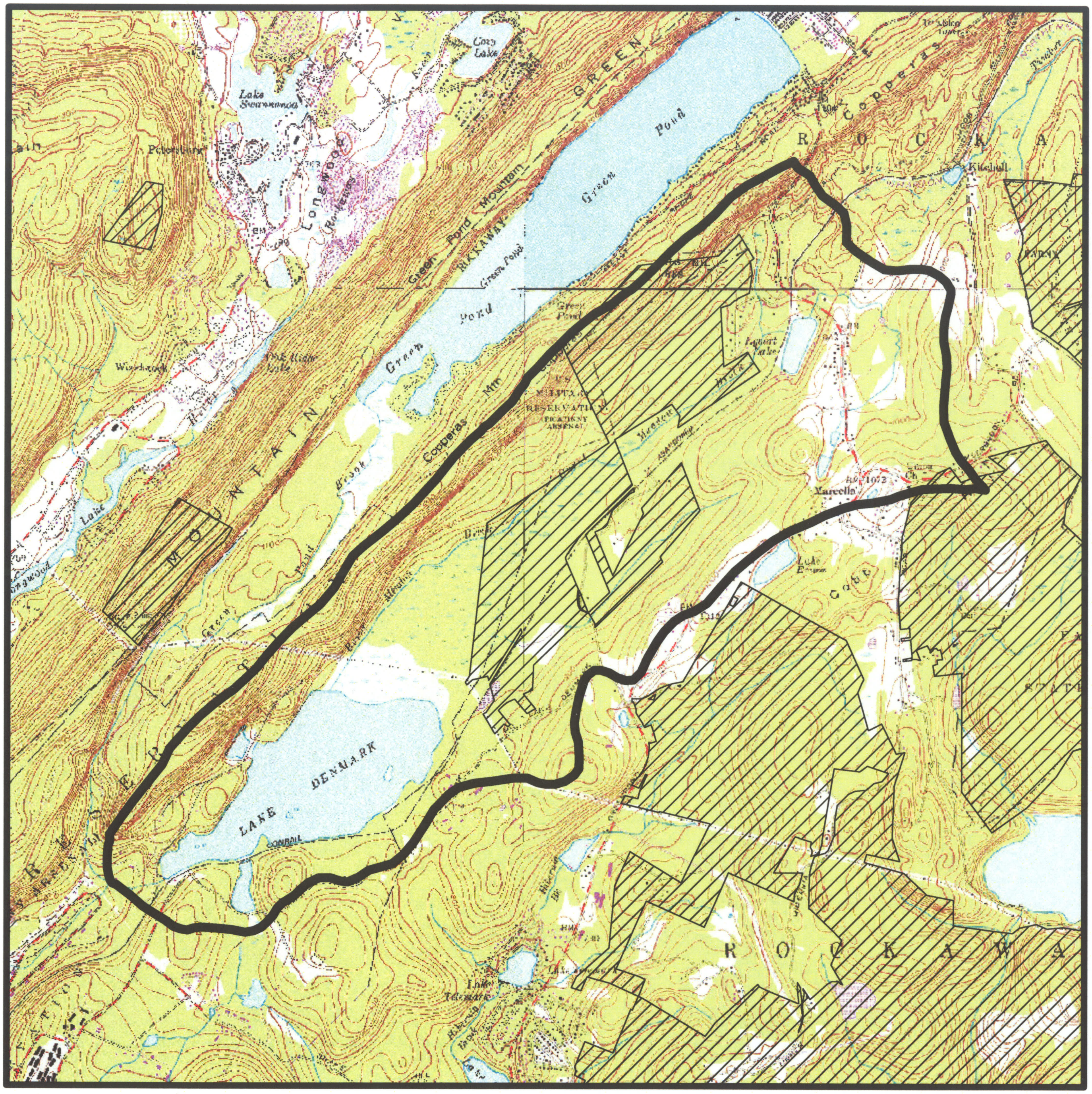
Boundary Justification

Boundaries drawn to include the watersheds on Green Pond Mountain which drain into Green Pond and Green Pond Brook.

Biodiversity Rank *B4V1*

Contains habitat for a concentration of state critically imperiled, imperiled and rare plant species.

March, 2007
Site Code: **S.USNJHP*244**



Natural Heritage Priority Site

Lake Denmark

Morris County

NJ Department of Environmental Protection
Division of Parks and Forestry
Natural Lands Management

Miles
0.8 0.4 0 0.8

Priority Sites
Public Land

Natural Heritage Priority Site

Lake Denmark

Locational Information

Quad Name: Dover ; Boonton ; Newfoundland
County: Morris
Municipality: Rockaway Twp

Description of Site

A large glaciated lake and adjacent herbaceous, shrubby and forested wetlands.

Boundary Justification

Boundary matches that of the watershed basin. It includes the lake and adjacent wetland habitats and lands draining toward the wetlands.

Biodiversity Rank *B4V1*

The site contains excellent populations of state-imperiled and other rare species.

APPENDIX J

PROTECTION PROCEDURES FOR ARCHAEOLOGICAL AND HISTORICAL ARTIFACTS

STANDARD OPERATING PROCEDURES
FOR
ADDRESSING CULTURAL RESOURCES CONCERNS
AT PICATINNY ARSENAL

The following SOPs were developed to address cultural resources concerns, including the recovery of Native American remains, for ongoing, proposed or planned installation activities, or short term projects. These SOPs are to only be used and conformed to during projects that affect a small Area of Potential Effects (APE), such as UXO Avoidance, Geotechnical sampling projects, and small-scale backhoe monitoring for minor development and impact. This APE will be determined by the Picatinny Cultural Resource Manager (CRM). Typically, projects like this occur quickly and need full cooperation from installation personnel due to mission essential time constraints, project deadlines, and the projects themselves occurring for more dominant regulations like hazardous material and CERCLA-related sites. Due to the potential for cultural resource impacts, and the nature and scope of these, the Picatinny Environmental Affairs Office handles the review of these projects in-house through consultation with the CRM. All scope designs, work and/or construction plans, and/or photos related to the project must be submitted to the CRM for their review. Similar projects that cover a larger APE and scope, to be determined by the CRM, require full SHPO consultation with a 30-day waiting period. A full list of SOPs for all NEPA related activities and undertakings are provided within the 2003-2008 Integrated Cultural Resources Management Plan (ICRMP). The Point of Contact for these SOPs is the Picatinny CRM, Mr. Jason Huggan, Tel. (973) 724-3664, fax (973) 724-8020, and email: jason.j.huggan@us.army.mil.

SOP #2- Unexpected Cultural Resources Discoveries during Construction

Unanticipated discoveries happen most often with projects that involve ground disturbance activities, although sometimes they involve unforeseen effects on a known historic property. In all cases of unanticipated discovery, the CRM should initiate consultation in accordance with 36 CFR Part 800.13. If the unexpected discovery involves a Native American cultural item as defined by the Native American Graves Protection and Repatriation Act (NAGPRA), SOP #5 should be sought. The accidental discoveries of cultural resources during an undertaking can include but are not limited to: undiscovered/undocumented structural and engineering features; and undiscovered/undocumented archaeological resources such as foundation remains, burials, artifacts, or other evidence of human occupation or activity. This includes cultural resources that are identified or have not been previously identified.

When such cultural resources are discovered during an undertaking, the CRM will proceed with the treatment of such properties in accordance with the following Discovery Plan (Note: Abiding by these steps ensures adequate protection and compliance with Sections 106 and 110 of the NHPA, among other SOPs discussed below):

- The contractor or project manager shall notify the CRM immediately of the discovery, who will then notify the NJ HPO (and the ACHP) within 48 hours. The CRM will provide assessments of NRHP eligibility and actions to resolve adverse effects. The NJ HPO and ACHP shall respond with comments within 48 hours;
- All work shall cease in the area of the discovery;
- The historic property is to be treated as NRHP eligible and avoided until an eligibility determination is made. The CRM will continue to make reasonable efforts to avoid or minimize

harm to the historic property until the NHPA, Archeological Resources Protection Act (ARPA and including Section 110 of the NHPA, or NAGPRA requirements are met (see SOPs #4, 5 and 6 below for ARPA and NAGPRA requirements); and

- The CRM will develop and implement actions that take into account the adverse effects of the undertaking on the historic property to the extent feasible and any comments provided by the NJ HPO (and ACHP) pursuant to 36 CFR Part 800.13(b).

In the event that unintentional partial damage occurs to an NRHP eligible archaeological site or previously unidentified/unknown eligibility archaeological site, the project manager or construction supervisor will notify the CRM of any damage immediately.

1. The CRM will document any damage both photographically and in a written summary report;
2. The CRM, will determine if limited excavation should be conducted to collect available data or if the site context may be stabilized. If disturbance was the result of construction plans that did not account for a known site and such construction will further damage the site, the CRM will ensure that no further damage occurs until consultation with the NJ HPO is completed concerning appropriate mitigation actions;
3. The CRM will develop a treatment plan for the limited data recovery stabilization;
4. The CRM shall submit the treatment plan for review and concurrence by the NJ HPO and to ensure that it meets the Secretary of the Interior's Standards. If the NJ HPO agrees, then the treatment plan may be implemented. If the NJ HPO does not concur, then the Section 106 compliance procedures described in SOP #1 should be followed;
5. If stabilization only is planned, then the CRM will inform the project manager and contracting officer of the appropriate specifications that must be included within the contract;
6. If data recovery is recommended, then the CRM will implement a data recovery plan. All work in the immediate area of the discovery shall cease until the archaeological investigations are completed.
7. The project manager will familiarize the contractor with significant archaeological features (both above ground and below ground) for necessary protective measures;
8. The project manager and/or the CRM will monitor the contractor's activities to ensure the integrity of the historic property;
9. The CRM should make sure the artifact collection is retained and properly curated in accordance with 36 CFR Part 79 (SOP #8);
10. The CRM will submit a thorough report with photographs of the investigation taken upon completion of the fieldwork and the project to the NJ HPO to document compliance; and
11. The CRM shall retain all documentation of the project, including work write-ups, field reports, and photographs, as part of the permanent project records.

All cultural materials that have been collected during archaeological inventory within Picatinny Arsenal should be curated in compliance with 36 CFR Part 79 (Curation of Federally Owned and Administered Archaeological Collections; SOP #8).

SOP #4- Procedures for the Recovery of Human Remains

In the event that human remains are encountered, the project manager, construction supervisor or project archaeologist will cease activities in the immediate area of discovery and make an effort to protect the resources while notifying the CRM. The CRM will then inform the security office of the discovery.

The CRM, with the help of a coroner or physical or forensic anthropologist will determine if the remains are human, and whether or not they are associated with an archaeological deposit. If the remains are not human and are not associated with an archaeological deposit, the work may continue. If the remains are human, the appropriate law enforcement officials should be notified. These officials will visit the site with the CRM and determine, with the aid of a coroner or physical/forensic anthropologist, if the remains are recent or ancient. If the remains are recent, then the matter becomes the responsibility of law enforcement officials who will determine when project activities will resume. If the remains are not modern and not Native American, then the provisions described above for inadvertently discovered archaeological remains are to be followed (SOP #2).

If the remains are determined to be of Native American origin, specific NAGPRA regulations must be followed pursuant to 43 CFR 10.4 (SOP #5). NAGPRA requires that, upon an unexpected discovery of Native American human remains, funerary objects, sacred objects, or objects of cultural patrimony, further construction or archaeological activities in the area of discovery should cease for 30 days after the appropriate Federally recognized tribes and/or lineal descendants have been officially notified.

The removal of the Native American human remains may proceed when:

1. The consent of the appropriate Federally recognized tribal group is obtained;
2. Ownership and right-of-control of such items is not in dispute; and
3. Proof of consultation and notification is documented.

The CRM will be responsible for the security of the site pending resumption of the testing operations or resolution of site mitigation.

SOP #5- Native American Graves Protection and Repatriation Act (NAGPRA)

This procedure implements the provisions of the NAGPRA (PL 101-601; 25 USC 3013); U.S. Army Guidelines for Consultation with Native Americans, Native Alaskans, and Native Hawaiians; and as amended, 43 CFR Part 10, NAGPRA Regulations. NAGPRA mandates that Federal land managers must consult with federally recognized Indian tribes regarding planned excavations on Federal lands, and establishes procedures that Federal agencies must follow in the event of inadvertent discovery of Native American human remains and cultural items. It is important to note that NAGPRA applies only to human remains that can be culturally associated with a modern Native American group, and that are not identified as the remains of a historic settler, murder victim, or like individual. The statute provides a mechanism for determining the disposition for such human remains or cultural items. NAGPRA also forbids the sale of Native American human remains or of cultural items obtained in violations of the statute.

In the past, Picatinny Arsenal has sent consultation letters three federally recognized tribes: Delaware Tribe of Indians of Oklahoma, Delaware Tribe of Western Oklahoma, and the Stockbridge-Munsee Community of Mohican Indians of Wisconsin. Additional tribes may be added to this list in the future as they apply for

Federal recognition. Currently, none of these tribes have responded to Picatinny to notify the installation that they may be possible descendants of aboriginal people culturally affiliated with the lands now occupied by the installation. If a Federally recognized Native American tribe is identified that will have an on-going interest in installation activities that may affect possible descendant remains, funerary objects, sacred objects, or objects of cultural patrimony, then Picatinny may choose to execute a Comprehensive Agreement (CA) with the tribe.

Some prehistoric materials have been identified at Picatinny but the likelihood of uncovering Native American burials at the installation is low. However, if burials are uncovered, AR 200-4 states that the Installation Commander must ensure that intentional excavation and response to any inadvertent discovery of NAGPRA-related cultural items be carried out in compliance with all applicable statutory and regulatory requirements of NAGPRA, ARPA, and the NHPA. Compliance with one statutory requirement, therefore, may not satisfy other applicable requirements. All Picatinny Arsenal activities will strictly avoid the disturbance of human burials, whether marked or unmarked. In all instances where avoidance is not possible, the installation shall consult, as outlined by NAGPRA, with the Native American tribes that may be culturally affiliated with the remains or items on a case-by-case basis. Under no circumstances will any Arsenal activity be allowed to proceed if it will intentionally disturb a known burial and/or sacred site until such time as consultation between the installation and the involved Native American tribes is completed in accordance with 25 USC 3002(d), Sec. 3.

In accordance with 43 CFR Part 10.3 and AR 200-4, the Installation Commander shall take reasonable steps to determine whether a planned activity may result in the intentional excavation or inadvertent discovery of cultural items from the installation. When it is determined that these cultural items, which are covered under NAGPRA as determined by Picatinny Arsenal in consultation with Native American representatives, may be encountered, and, prior to issuing approval to proceed with the activity, the Commander shall carry out the consultation procedures and planning requirements at 43 CFR Parts 10.3, 10.4, and 10.5 as part of the intentional excavation or inadvertent discovery of cultural items, a written Plan of Action must be prepared in accordance with 43 CFR Part 10.5(e).

In accordance with 43 CFR Part 10.5(e), the intentional excavation of human remains, funerary objects, sacred objects, or objects of cultural patrimony from Federal or tribal lands (after November 16, 1990) is permitted only if:

1. The objects are excavated or removed following the requirements of ARPA and its implementing regulations; and
2. The objects are excavated after consultation with, or in the case of tribal lands, with the consent of, the appropriate Native American tribe(s) or Native Hawaiian organization pursuant to 43 CFR Part 10. The disposition of the objects is consistent with their custody as described in 43 CFR Part 10.6. Proof of the consultation or consent is shown to the Federal agency Installation Commander or other official (the CRM) responsible for the issuance of the required permit.

The Picatinny Arsenal employee or contractor who inadvertently discovers human remains must notify the responsible Federal official (i.e. the Installation Commander or CRM, in accordance with 43 CFR Part 10.4[b]; SOP #4). Certification of receipt of notification by the Installation Commander or designated representative (the CRM) initiates the 30-day waiting period.

If the inadvertent discovery occurred in connection with an ongoing activity at the installation, the person providing the initial notice described above must stop the activity in the area of the inadvertent discovery and make a reasonable effort to protect the human remains, funerary objects, or objects of cultural patrimony.

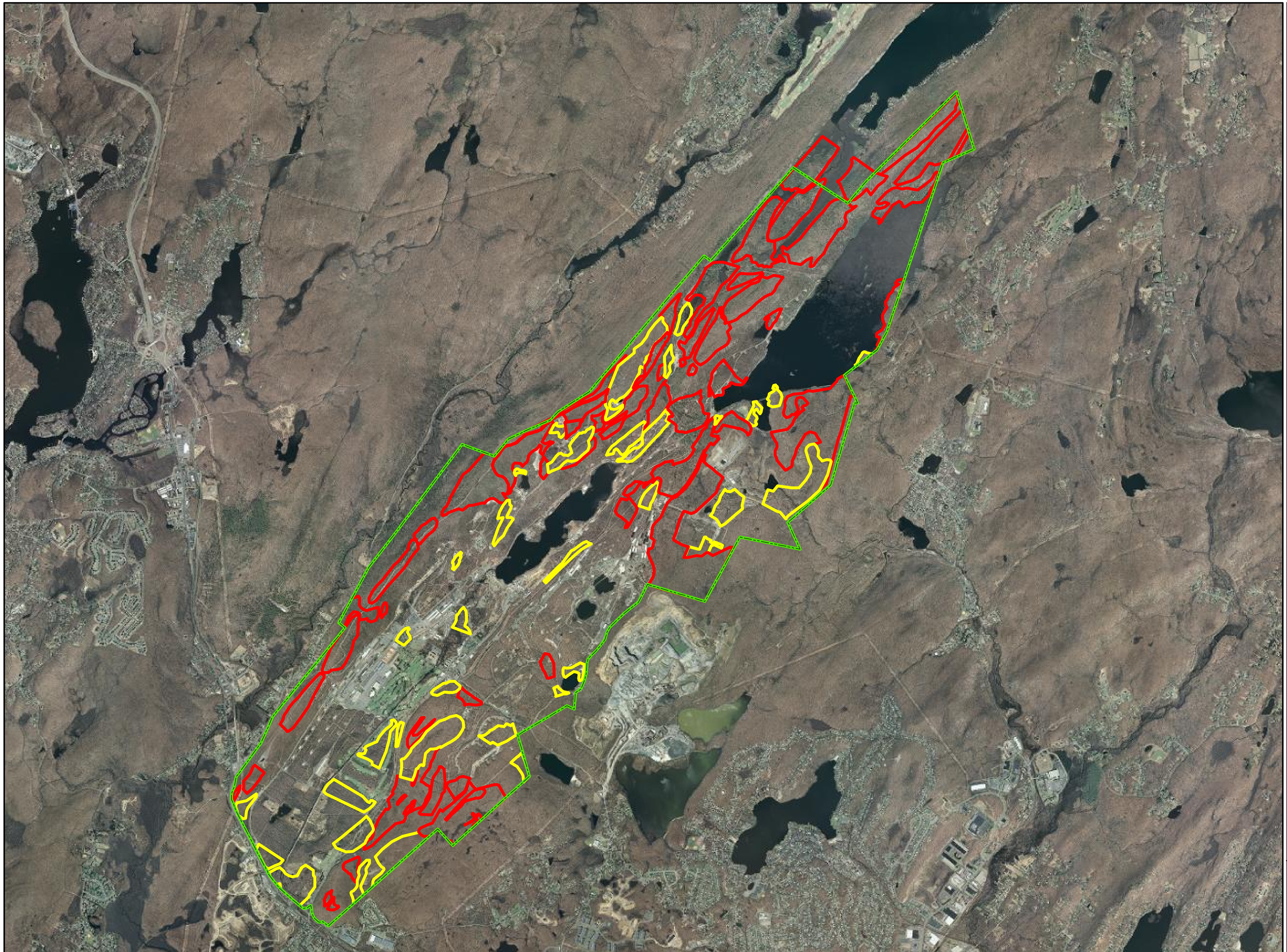
Upon having received notification of the actual or potential disturbance or the discovery of a human burial site, human remains, or burial/sacred goods, Picatinny shall, as soon as possible, but no later than three (3) working days after receipt of the notification report the receipt of such notification by telephone, with written confirmation, to the appropriate Native American tribal contact and the HPO. The notification shall include pertinent information as to the kinds of human remains, funerary objects, sacred objects, or objects of cultural patrimony inadvertently discovered, their condition, and the circumstances of their inadvertent discovery.

Repatriation

In accordance with NAGPRA, Sections 5, 6, and 7

- If the cultural affiliation of Native American human remains and associated funerary objects with a particular Native American tribe is established Picatinny shall upon the request of a known lineal descendant of the Native American, or of the tribe or organization expeditiously return such remains and associated funerary objects and materials; and
- If the cultural affiliation with a particular Native American tribe is shown with respect to unassociated funerary objects, sacred objects or objects, of cultural patrimony Picatinny shall upon the request of the Native American tribe expeditiously return such objects.

In the event that Picatinny Arsenal or the coroner's duly designated representative has reason to suspect that the burial contains a victim of a recent prosecutable crime or accidental death, the proper military authorities (Security Police) and the Arsenal TJAG office will be notified.



Legend

Installation Boundary

Cultural Survey Area

Sensitive

Sensitive - Possibly Disturbed

Base Imagery: NJ 2007 Natural Color Imagery
Data Source: PTA GIS Layer

Coordinate System: UTM Zone 18N
Datum: NAD 83
Units: Feet

Cultural Survey Area
Picatinny Arsenal
New Jersey

File: \\fsfed01\tig\Picatinny\MXD\workplan\Cultural_resources.mxd, 17-Feb-11 17:17, ricksc