ENGINEERING EVALUATION/COST ANALYSIS
MILITARY MUNITIONS RESPONSE PROGRAM

Volk Field Combat Readiness Training Center
Camp Douglas, Wisconsin

FINAL

Prepared for:

Volk Field Combat Readiness Training Center
100 Independence Drive
Camp Douglas, WI 54618-5001

&

Air National Guard
Sheppard Hall, 3501 Fetchet Ave
Joint Base Andrews, MD 20762-5157

Prepared by:
U.S. Army Corps of Engineers – Omaha District
1616 Capitol Ave, Suite 9000
Omaha, NE 68102

February 2015

This page intentionally left blank.

TABLE OF CONTENTS

EXECUTIVE SUMMARY ES-1

1. SITE CHARACTERIZATION 1-1
   - 1.1 Introduction 1-1
     - 1.1.1 Background 1-2
     - 1.1.2 Purpose and Stakeholders 1-2
   - 1.2 Site Description and Background 1-4
     - 1.2.1 Site Location 1-4
     - 1.2.2 Installation Mission and Operational History 1-4
     - 1.2.3 Regional Climate 1-5
     - 1.2.4 Topography 1-5
     - 1.2.5 Geology and Hydrogeology 1-5
     - 1.2.6 Surface Water Hydrology 1-6
     - 1.2.7 Current and Future Land Use 1-6
     - 1.2.8 Summary of Historical Military Munitions Related Activities 1-7
   - 1.3 Previous Removal Actions 1-25
   - 1.4 Source, Nature, and Extent of Contamination 1-25
   - 1.5 Analytical Data 1-27
   - 1.6 Streamlined Risk Evaluation 1-27
     - 1.6.1 MEC Exposure Pathway Analysis Conclusions 1-27
     - 1.6.2 MC Exposure Pathway Analysis Conclusions 1-30

2. IDENTIFICATION OF REMOVAL ACTION OBJECTIVES 2-1
   - 2.1 Removal Action Scope and Goals 2-1
   - 2.2 Removal Schedule 2-2
   - 2.3 Planned Removal Activities 2-2
   - 2.4 Applicable or Relevant and Appropriate Requirements 2-2
     - 2.4.1 Chemical-Specific ARARs 2-3
     - 2.4.2 Location-Specific ARARs 2-3
     - 2.4.3 Action-Specific ARARs 2-3

3. IDENTIFICATION AND ANALYSIS OF REMOVAL ACTION ALTERNATIVES 3-1
   - 3.1 Description of Removal Alternatives 3-1
     - 3.1.1 Alternative One: No Action 3-1
     - 3.1.2 Alternative Two: Land Use Controls 3-1
     - 3.1.3 Alternative Three: MEC/MD Removal, Lead Contaminated Soil Removal and Disposal for Residential Land Use 3-1
     - 3.1.4 Analysis of Removal Alternatives 3-12
     - 3.1.5 Effectiveness 3-12
     - 3.1.6 Implementability 3-14
     - 3.1.7 Cost 3-15

4. COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES 4-1

5. RECOMMENDED REMOVAL ACTION ALTERNATIVE 5-1

6. REFERENCES 6-1

LIST OF TABLES

Table 1-1: Potential MEC/MD Contamination

Table 1-2: Potential MC Contamination

Table 2-1: Removal Action Objectives

Table 2-2: Potential ARARs

Table 4-1: Comparative Analysis Summary by Alternative

LIST OF FIGURES

Figure 1-1: Interim Removal Action MRS Location Map

Figure 1-2: Former Firing-In-Buttress #1 (FR501) – Geophysical Survey Results

Figure 1-3: Former Firing-In-Buttress #1 (FR501) – Analog Survey Results

Figure 1-4: Former Firing-In-Buttress #1 (FR501) – Summary of RI Results

Figure 1-5: Former Rifle Range #1/Machine Gun Range (SR503) – Summary of RI Results

Figure 1-6: Former Rifle Range #5/Range #250 (SR503c) – Summary of RI Results

Figure 1-7: Former Small Arms Range #251 (SR504) – Summary of RI Results

Figure 1-8: Former Mortar/Artillery Range (MU505) – Summary of RI Results

Figure 1-9: Former Small Arms Debris Area (SR506) – Summary of RI Results

Figure 1-10: Potential Civil War Era Impact Area (MU507) – Summary of RI Results

Figure 1-11: MEC Conceptual Site Model – Confirmed or Potential Exposure Pathways

Figure 1-12: MEC Conceptual Site Model – Incomplete Exposure Pathways

Figure 1-13: MC Conceptual Site Model – No MC Hazard Identified

Figure 1-14: MC Conceptual Site Model – Potential MC Hazard Identified – Human and Ecological

Figure 3-1: Former Firing-In-Buttress #1 (FR501) – Interim Removal Action

Figure 3-2: Former Rifle Range #1/Machine Gun Range (SR503) – Interim Removal Action

Figure 3-3: Former Rifle Range #5/Range #250 (SR503c) – Interim Removal Action

Figure 3-4: Former Small Arms Range #251 (SR504) – Interim Removal Action

Figure 3-5: Former Mortar/Artillery Range (MU505) – Interim Removal Action

Figure 3-6: Former Small Arms Debris Area (SR506) – Interim Removal Action

Figure 3-7: Potential Civil War Era Impact Area (MU507) – Interim Removal Action

APPENDICES

Appendix A: Interim Removal Action Schedule

Appendix B: Interim Removal Action Cost Estimate Summary – Present Value

Appendix C: RACER Cost Backup

This page intentionally left blank.

ACRONYMS AND ABBREVIATIONS

°F	Degrees Fahrenheit
AOC	Area of Contamination
ARAR	Applicable or Relevant and Appropriate Requirement
AM	Action Memorandum
ANG	Air National Guard
bgs	below ground surface
BIP	Blow In Place
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CRTC	Combat Readiness Training Center
CSE	Comprehensive Site Evaluation
CSM	Conceptual Site Model
CWM	Chemical Warfare Materiel
cy	cubic yards
DERP	Defense Environmental Restoration Program
DC	Direct Contact
DGM	Digital Geophysical Mapping
DMM	Discarded Military Munition
DoD	Department of Defense
DPT	Direct Push Technology
EA	EA Engineering, Science, and Technology, Inc., PBC
EBS	Environmental Baseline Study
EE/CA	Engineering Evaluation/Cost Analysis
EOD	Explosive Ordnance Disposal
EP	Engineering Pamphlet
EPA	United States Environmental Protection Agency
FIB #1	Former Firing-In-Buttress #1 (FR501)
FOB	Forward Operating Base
Ft	feet or foot
HE	High Explosive

ACRONYMS AND ABBREVIATIONS (Continued)

GPS	Global Positioning System
HRR	Historical Records Review
IRA	Interim Removal Action
LUCs	Land Use Controls
MC	Munitions Constituents
MCL	Maximum Contaminant Level
MD	Munitions Debris
MDAS	Material Documented as Safe
MEC	Munitions and Explosives of Concern
mg/kg	milligrams per kilogram
mm	millimeter
MMRP	Military Munitions Response Program
MPPEH	Material Potentially Presenting an Explosive Hazard
MRA	Munitions Response Area
MRS	Munitions Response Site
msl	mean sea level
NA	Not Applicable
NCP	National Oil and Hazardous Substance Pollution Contingency Plan
NMRD	Non-munitions Related Debris
NTCRA	Non-Time Critical Removal Action
PBC	Public Benefit Corporation
RAA	Removal Action Alternative
RACER	Remedial Action Cost Engineering and Requirements
RAO	Removal Action Objective
RCL	Residual Contaminant Level
RI	Remedial Investigation
RSL	Regional Screening Level
SAA	Small Arms Ammunition
SARA	Superfund Amendments and Reauthorization Act
SPLP	Synthetic Precipitation Leaching Procedure

ACRONYMS AND ABBREVIATIONS (Continued)

sqft	square feet
TBC	To Be Considered
TCLP	Toxicity Characteristic Leaching Procedure
TMV	Toxicity, Mobility or Volume through Treatment
USACE	United States Army Corps of Engineers
USC	United States Code
UXO	Unexploded Ordnance
Volk Field	Volk Field Combat Readiness Training Center, Camp Douglas, Wisconsin
WARNG	Wisconsin Army National Guard
WDNR	Wisconsin Department of Natural Resources
WI	Wisconsin
WIANG	Wisconsin Air National Guard
WWII	World War II
XRF	X-Ray Fluorescence

This page intentionally left blank.

EXECUTIVE SUMMARY

The United States Army Corps of Engineers (USACE) Omaha District has contracted EA Engineering, Science, and Technology, Inc., PBC (EA) to perform this Engineering Evaluation/Cost Analysis (EE/CA) for Volk Field Combat Readiness Training Center (CRTC), Camp Douglas, Wisconsin (Volk Field) as the first step for a Non-Time-Critical-Removal-Action (NTCRA) in order to implement an Interim Removal Action (IRA). The next step in the process is the Action Memorandum (AM) and then implementation of the IRA.

The scope of this IRA is: 1) Removal and off-site disposal of lead contaminated soil exceeding the United States Environmental Protection Agency (EPA) and State of Wisconsin regional screening levels (RSLs) for residential soil; and 2) Removal of Munitions and Explosives of Concern (MEC) and Munitions Debris (MD) (including Small Arms Ammunition [SAA]).

This EE/CA is being performed in support of the Military Munitions Response Program (MMRP) at Volk Field. The purpose of this EE/CA is to evaluate technical aspects of cleanup alternatives and associated costs to mitigate risks associated with MEC, MD, and lead contaminated soil that may be present at multiple munitions response sites (MRSs) at Volk Field. The recommended IRA, presented as Alternative 3, is: 1) Removal and off-site disposal of lead contaminated soil exceeding the EPA and State of Wisconsin RSLs for residential soil; and 2) Removal of MEC and MD.

This EE/CA addresses the following seven MRSs at Volk Field.

- Former Firing-In-Buttress #1 (FIB #1) (FR501)
- Former Rifle Range #1/Machine Gun Range (SR503)
- Former Rifle Range #5/Range #250 (SR503c)
- Former Small Arms Range #251 (SR504)
- Former Mortar/Artillery Range (MU505) (Excluding inaccessible areas)
- Former Small Arms Debris Area (SR506) (Excluding inaccessible areas)
- Potential Civil War Era Impact Area (MU507) (Excluding inaccessible areas).

During the Comprehensive Site Evaluation (CSE) Phase I and Phase II investigations, it was confirmed that significant munitions use occurred at Volk Field. In particular, the sandstone bluff located in the southeastern portion of the installation was subjected to concentrated target impacts from various ranges that existed throughout the installation's history. Additionally, seven sites investigated under the Installation Restoration Program (IRP) had a history of potentially receiving munitions for disposal (Sky Research 2011). Due to these previous activities, potential source areas of MEC, MD, and lead contaminated soil have been identified at these seven MRSs.

In support of the United States Air National Guard (ANG) MMRP at Volk Field, a CSE Phase I Investigation, a CSE Phase II Report, and a Remedial Investigation (RI) were performed at the Volk Field MRSs. The Phase I and II activities were completed in 2010 and 2011 respectively

(Sky Research 2011). The Final RI Report recommended that RAs be conducted at these seven MRSs to mitigate hazards associated with the presence of MEC, MD, and elevated lead concentrations in soil (Bay West 2015).

A threat (from MEC, MD, and munitions constituents [MC]) to public health and the environment has been identified at Volk Field. However, a planning period of six months is available before on-site activities need to be initiated, and consequently, an IRA is appropriate. Therefore, a NTCRA will be conducted under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and an EE/CA is required.

For the purpose of this EE/CA, the duration of the IRA field work has been identified as three to four months from the start of remedy implementation. Three removal action alternatives (RAAs) were evaluated as part of this EE/CA to achieve the IRA goals of mitigating hazards associated with the presence of MEC, MD, and human health risks associated with elevated lead concentrations in soil to allow for future residential use. These alternatives are:

- Alternative One: No Action
- Alternative Two: Land Use Controls
- Alternative Three: MEC/MD Removal and Lead Contaminated Soil Removal and Disposal for Residential Land Use.

The three alternatives were evaluated using the remedial alternative technology selection criteria established by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) for evaluating alternatives: effectiveness, implementability, state acceptance, community acceptance, and cost. State and community acceptance will be evaluated after the public comment period in the Action Memorandum (AM).

Based on this evaluation, it was determined that Alternative Three: MEC/MD Removal and Lead Contaminated Soil Removal and Disposal for Residential Land Use could meet the complete IRA goals for Volk Field. This alternative will provide overall protection to human health, comply with Applicable or Relevant and Appropriate Requirements (ARARs), reduce the toxicity, mobility, and volume of contamination, is implementable, and is effective in both the short- and long-term. The lead regulatory agency concurs with the ANG's selection of Alternative 3 as the preferred alternative for the Volk Field MRSs. Comments from the public on the ANG's selection of the preferred alternative will be incorporated into the AM identifying the final preferred alternative for the site.

1. SITE CHARACTERIZATION

1.1 Introduction

The United States Army Corps of Engineers (USACE) Omaha District has contracted EA Engineering, Science, and Technology, Inc. (EA) to perform this Engineering Evaluation/Cost Analysis (EE/CA) for Volk Field Combat Readiness Training Center (CRTC), Camp Douglas, Wisconsin (Volk Field). EA is also contracted to complete the Action Memorandum (AM) and Interim Removal Action (IRA).

The scope of this IRA is: 1) Removal and off-site disposal of lead contaminated soil exceeding the United States Environmental Protection Agency (EPA) and State of Wisconsin regional screening levels (RSLs) for residential soil; and 2) Removal of Munitions and Explosives of Concern (MEC) and Munitions Debris (MD) (including Small Arms Ammunition [SAA]). The objectives of this IRA do not include mitigating ecological and groundwater risk, therefore this EE/CA does not discuss ecological and groundwater risks. Information on the ecological and groundwater risk can be found in the Final RI Report (Bay West 2015).

This EE/CA is being performed in support of the Air National Guard (ANG) Military Munitions Response Program (MMRP) at Volk Field. The goal of the ANG MMRP is to make munitions response areas (MRAs) and munitions response sites (MRSs) safe for reuse and to protect human health and the environment in the process. The MMRP addresses issues related to MEC, chemical warfare materiel (CWM), and munitions constituents (MC) associated with MRAs, as well as related hazardous substances, pollutants, and potential contaminants of concern on other operational ranges. This EE/CA addresses the following seven MRSs at Volk Field:

- Former Firing-in-Buttress #1 (FIB #1) (MRS FR501)
- Former Rifle Range #1/Machine Gun Range (SR503)
- Former Rifle Range #5/Range #250 (SR503c)
- Former Small Arms Range #251 (SR504)
- Former Mortar/Artillery Range (MU505) (Excluding inaccessible areas)
- Former Small Arms Debris Area (SR506) (Excluding inaccessible areas)
- Potential Civil War Era Impact Area (MU507) (Excluding inaccessible areas).

Much of the information presented in this EE/CA is based on the remedial investigation (RI) conducted by Bay West (Bay West 2015). The three removal action alternatives (RAAs) evaluated in this EE/CA are:

- Alternative One: No Action
- Alternative Two: Land Use Controls
- Alternative Three: MEC/MD Removal and Lead Contaminated Soil Removal and Disposal for Residential Land Use.

These alternatives are evaluated in an effort to determine the preferred alternative for completion of the IRA.

This EE/CA represents ANG compliance with the Defense Environmental Restoration Program (DERP), which requires that environmental responses be performed by the Department of Defense (DoD) consistent with provisions of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA; 42 United States Code [USC] 9601) requirements for investigation and cleanup. Although Volk Field is not a National Priorities List site, work performed is to be consistent with EPA guidance (EPA 1993) under CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP; 40 Code of Federal Regulations [CFR], Part 300). CERCLA has no special provisions for dealing with explosive safety, and therefore, the provisions in the DoD's Ammunition and Explosives Safety Standards (DoD 6055.09-M) and USACE EM385-1-97 must be adhered to.

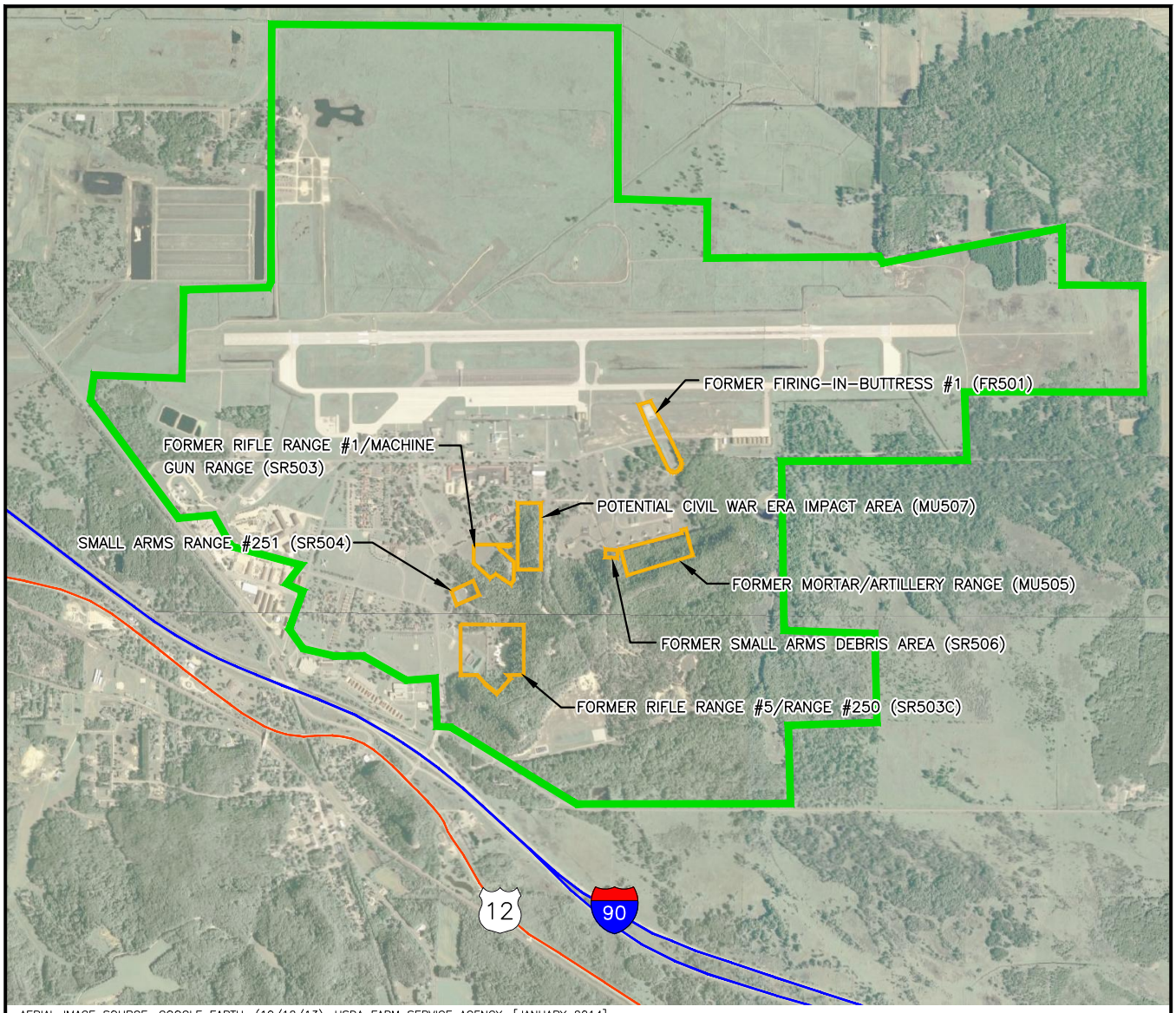
1.1.1 Background

In support of the ANG MMRP at Volk Field, Phase I and II Comprehensive Site Evaluation (CSE) and RI activities were performed. The CSE Phase I Investigation was completed in 2010 and the CSE Phase II Desktop Report was completed in 2011 (Sky Research 2011). The CSE Phase I investigation identified MRSs at Volk Field where potential MEC, MD, and/or MC are present and required further evaluation and/or response. The CSE Phase II Report recommended that a RI be performed to address the potential presence of MEC at six of the MRSs and to address the potential presence of MC at the MRSs. The RI Report was completed in January 2015 (Bay West 2015). The RI identified seven MRSs where potential MEC, MD, and/or MC are present, and recommended completion of a non-time critical removal action rather than a remedial action. The seven MRSs are shown in Figure 1-1.

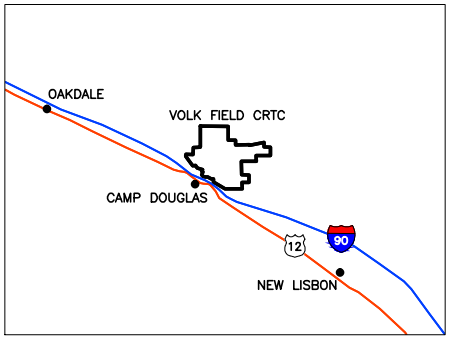
1.1.2 Purpose and Stakeholders

The purpose of this EE/CA is to evaluate cleanup alternatives and associated costs to reduce the threat to human health associated with MEC, MD, and MC in soil at Volk Field. If not addressed by the implementation of the recommended response action, MEC, MD, and MC in soil may present an unnecessary, yet avoidable risk to public health in the future. When implemented, the recommended IRA (Alternative 3) will facilitate the quick and effective removal of the MEC, MD and MC that drive potential human health risk at Volk Field.

The ANG is the lead agency for this EE/CA. The Wisconsin Department of Natural Resources (WDNR) is the lead regulatory agency for this EE/CA. Participation of and cooperation with federal, state, and local authorities and the local public will be solicited for the duration of this activity and for environmental restoration activities at Volk Field. Participation of these entities is required for the environmental restoration process and aids in ensuring the protection of human health and the environment. Federal, state, and local authorities will have input into the actions implemented at Volk Field through pre-planning meetings, plan review, and the public comment process. Concerns of the federal, state, and local authorities and area residents will be solicited, and provisions of federal, state, and local regulations will be given full consideration for actions taken at Volk Field.



AERIAL IMAGE SOURCE: GOOGLE EARTH. (10/12/13). USDA FARM SERVICE AGENCY. [JANUARY 2014]



2500 1250 0 2500

GRAPHIC SCALE IN FEET

N

LEGEND

INSTALLATION BOUNDARY

MRS BOUNDARY

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC	VOLK FIELD CRTC JUNEAU COUNTY, WISCONSIN	INTERIM REMOVAL ACTION MRS LOCATION MAP

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
JMR	JRB	NDD	RT	AS SHOWN	FEB. 2015	6246608	1-1

DRAWING NAME: F:\Federal\DOD\USACE\PROJECTS\6246608 Volk Field IRA\C - Figures\CAD\EECA FIGURES.dwg
DATE:02/17/2015 TIME:15:24 DRAWN BY: jmather

This EE/CA complies with the requirements of the EPA Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA (EPA540-R-93-057) and the USACE Ordnance and Explosives Response Engineering Pamphlet (EP) 1110-1-18 (EPA 1993 and USACE 2000).

1.2 Site Description and Background

1.2.1 Site Location

Volk Field is located approximately one mile northeast of the village of Camp Douglas (population 580) along Interstate 90/94 in Juneau County, Wisconsin (Figure 1-1), approximately 90 miles northwest of Madison, Wisconsin.

1.2.2 Installation Mission and Operational History

1.2.2.1 Installation Mission

Volk Field is a joint facility with the Wisconsin Air National Guard (WIANG) supporting the CRTC, 128th Air Control Squadron, and 126th Weather Flight. The mission of the CRTC is to provide a training environment for ANG units to enhance combat capabilities by allowing training that isn't possible at the unit's home station. The CRTC facilities approximate a Forward Operating Base (FOB) location and provide a realistic setting for the performance of unit Operational Readiness Exercises and Inspections. Additionally, Volk Field oversees operations and scheduling of the Hardwood Air-to-Ground Gunnery Range and over 11,000 square miles of special use military training airspace (WIANG 2007).

A second mission is to support Camp Williams, which consists of the United States Property and Fiscal Office, the 32nd Brigade Headquarters, and the Combined Support Maintenance Shop. A third mission is to support the Northeast Counter Drug Training Center and Wisconsin counter drug programs which provide training to regional law enforcement on drug demand reduction (WIANG 2007).

1.2.2.2 Installation History

Volk Field dates to 1888 when the State Adjutant General, General Chandler Chapman, purchased land for a rifle range and offered it to the state for training. The State Legislature authorized the purchase of 440 acres for a permanent camp and a rifle range, known as the Wisconsin Rifle Range, for the Wisconsin National Guard in 1889. In 1890, additional land was purchased for a total of 600 acres. By 1897, the Wisconsin Rifle Range was known as the Wisconsin Military Reservation and was used by infantry, artillery, and cavalry units for a variety of field programs, including simulating combat conditions.

The reservation was renamed Camp Williams in 1927. Construction of a grass runway began in 1936; was paved in 1939; and expanded during World War II (WWII) to improve training capabilities. The Wisconsin Army National Guard (WARNG) and WIANG were formed as part of the DoD reorganization in 1947.

In 1954, the Federal Government leased the field from the State of Wisconsin for use as a permanent field training site. In 1957, the Wisconsin State Legislature renamed the field Volk

Field in honor of First Lieutenant Jerome A. Volk, the first WIANG pilot killed in the Korean War.

During the 1960s, Volk Field served as a Dispersed Operating Base for the active duty Air Defense Mission in Duluth, Minnesota, with over 200 personnel assigned to the base. In 1970 the unit was re-designated as Detachment 1, 87th Fighter Interceptor Squadron and reported through K. I. Sawyer Air Force Base, Michigan. The detachment was deactivated in 1974 and the WIANG assumed exclusive control of the base.

In the 1980s, Volk Field ANG began year-round operations for training the WIANG, other DoD services, and some foreign allies. In 1988, Volk Field ANGB was chosen to house the ANG training program, and the base designated as a CRTC in 1990.

1.2.3 Regional Climate

The climate at Volk Field is mild, with monthly mean high temperatures ranging from 25 degrees Fahrenheit (°F) in January to 84°F in July, and monthly mean low temperatures ranging from 6°F in January to 57°F in July. The average annual precipitation is approximately 32.3 inches. The annual mean snowfall is approximately 31.4 inches (Sky Research 2011).

The frost depth for Volk Field is 114 inches according to Unified Facilities Criteria 3-301-01. This is considered the maximum depth where frost may occur and maximum depth where frost-related migration of MEC is possible (DoD 2011).

1.2.4 Topography

Volk Field lies in relatively flat to gently sloping topography with an elevation of approximately 905 ft. above mean sea level (msl). A quartz-rich sandstone forested butte with elevation of 1,100 ft. above msl occupies approximately 200 acres in the southeastern portion of the installation. This butte typifies the surrounding topography in the region as it is the result of an eroding escarpment located to the southwest. Otherwise, the area around the Volk Field is generally flat to gently sloping.

Volk Field is located within the drainage basin of the Lemonweir and Little Lemonweir Rivers. The Lemonweir River flows from northwest to southeast and is located approximately 3,700 ft. northeast of the installation boundary. The Little Lemonweir River is approximately 2.5 miles south of the Volk Field boundary and flows from west to east. The Little Lemonweir River joins the Lemonweir River 4.5 miles southeast of Volk Field at the city of New Lisbon.

1.2.5 Geology and Hydrogeology

1.2.5.1 Geology

Volk Field is underlain by 130 ft. of Pleistocene-age glacially deposited unconsolidated sand, silt, gravel, and minor amounts of clay. The glacial sediments overlie quartz-rich sandstone bedrock included in the Elk Mound Group (WIANG 2007). The Elk Mound Group outcrops as a sandstone butte on the southeast portion of the installation.

1.2.5.2 Hydrogeology

The uppermost groundwater under the installation occurs within the glacial deposits and is encountered at a depth of about 10 to 15 ft. below ground surface (bgs). Groundwater flows is generally in an east-northeasterly direction.

Volk Field maintains three production water wells used to provide a potable water supply. The primary wells are located near Buildings 319 and Building 28. The well at Building 319 has a depth of 191 ft. and draws water at 80 ft. bgs. The well at Building 28 has a depth of 80 ft. and draws water at depths as shallow as 12 ft. A well located at the top of the bluff serves only Building 323. Depth of the well is unknown. A shallow groundwater well at the Leadership Reaction Course was capped and abandoned in 2013.

1.2.6 Surface Water Hydrology

Storm water runoff from Volk Field is facilitated by a system of ditches that drain toward the south and east and eventually lead to the Lemonweir River or the Little Lemonweir River (Sky Research 2011).

1.2.7 Current and Future Land Use

1.2.7.1 Surrounding Land Use and Populations

The property surrounding Volk Field is classified as rural and agricultural, consisting of small farms. In the immediate vicinity located southwest of the installation is Camp Douglas. The population of Camp Douglas is approximately 580. The City of New Lisbon, located approximately 10 miles southeast of Volk Field, has a population of 2,343 (Bay West 2015).

The Camp Williams Army National Guard facility, along with Volk Field operational, base housing, and administrative buildings supporting the CRTC mission are located within a one-mile radius. The Ammunition Storage Area and Munitions Storage Depot are located within a one-half-mile radius. Buildings supporting the flight line are in close proximity.

1.2.7.2 Current Land Use

Volk Field covers approximately 2,230 acres controlled by the WIANG. There are approximately 120 military and 70 permanent civilian employees assigned to Volk Field CRTC with approximately 130 additional employees associated with various tenant units. The base contains 143 buildings (WIANG 2007).

Camp Williams, located within the southwest portion of Volk Field, is home to the 32nd Infantry Brigade, WARNG. Camp Williams is also home to the United States Property and Fiscal Office for the State of Wisconsin. Camp Williams has approximately 50 structures. There is no fence or physical boundary between Volk Field and Camp Williams.

1.2.7.3 Future Land Use

No changes to the current land use are anticipated.

1.2.8 Summary of Historical Military Munitions Related Activities

The USACE, Omaha District, contracted with Sky Research, Inc. to conduct CSE Phase I and CSE Phase II investigations at Volk Field. The CSE Phase I consisted of a historical records review (HRR) to investigate documentation regarding munitions usage. The documentation review indicated munitions use had occurred on base, confined to two potential impact areas, small arms ranges and possibly buried debris.

The CSE Phase II Report confirmed historical munitions use at each of the MRSs investigated. The presence of MEC was identified as a potential concern at six out of the thirteen MRSs based on historic MEC finds or the presence of MD during the CSE Phase II site visit. However, no MC data was collected during the CSE Phase II and this was identified as a data gap at each of the thirteen MRSs. The CSE Phase II Report recommended all of the MRSs be further investigated during an RI, to collect MC data at each of the MRSs and to address the potential MEC presence, where applicable.

At the conclusion of the CSE process, thirteen MRSs were carried over to the RI phase. The RI recommended further action at seven of the thirteen MRSs. This EE/CA addresses the seven MRSs that were recommended for RAs in the RI as listed below:

- Former Firing-In-Buttress #1 (FR501)
- Former Rifle Range #1/Machine Gun Range (SR503)
- Former Rifle Range #5/Range #250 (SR503c)
- Former Small Arms Range #251 (SR504)
- Former Mortar/Artillery Range (MU505) (Excluding inaccessible areas)
- Former Small Arms Debris Area (SR506) (Excluding inaccessible areas)
- Potential Civil War Era Impact Area (MU507) (Excluding inaccessible areas).

1.2.8.1 Former Firing-In-Buttress #1 (FR501)

FIB #1 was identified during the CSE Phase I on a topographic survey map titled *Topographic Survey of Firing Butt East of 932 (Aug, 1973).* FIB #1 was constructed in 1956 and ground scarring from the construction activities is evident in 1957 aerial photos. The aircraft tie down and firing point for the FIB is currently used as the Power Check Pad along Taxiway A. The FIB target facility is located southeast of the aircraft tie down and firing point.

The primary aircraft using FIB #1 would have been P-51, F-84, F-86, F-100, and A-7 aircraft (WIANG 2007). Munitions historically used by these aircraft are what would have been fired into the FIB, 0.50 caliber ammunition and 20 mm projectiles.

According to a 2007 Environmental Baseline Study (EBS), the range was reportedly used until the early 1970s and was taken off of the Installation's real property listing as of 1984. No environmental investigation was previously performed at this site (Sky Research 2011).

A summary of the RI with respect to this MRS (FR501) is provided below.

MEC Investigation

A surface clearance was performed prior to the digital geophysical mapping (DGM) and analog magnetic surveys. The DGM survey was conducted over approximately 3.16 acres of FIB #1 to identify locations of subsurface anomalies. This included only those areas accessible to the DGM instrumentation. The DGM data with target locations are presented in Figure 1-2.

An analog magnetic survey was performed over approximately 1.1 acres of the area extending from the floor to the MRS boundary to address some of the areas that were inaccessible to the DGM equipment. The area directly behind the FIB structure was not surveyed as no munitions fired into the catch box would penetrate all the way through the structure. Additionally, approximately 0.4 acres of steep wall area bounding the floor, that were initially not surveyed due to icy ground conditions that presented a safety hazard, were surveyed during a later field event (Bay West 2015). The analog survey target locations are presented in Figure 1-3. A total of 324 additional targets were identified and flagged during the analog survey.

The DGM and analog surveys identified 859 and 324 targets, respectively. The 1,183 targets were intrusively investigated and removed. No MEC were encountered. A total of 48 pounds of MD and 447 pounds of non-munitions related debris (NMRD) were recovered from the excavations. The MD items were predominantly from 20 mm practice training projectiles. Fragments of larger ordnance (e.g., 75 mm projectiles) were scattered across the area, but the pattern did not indicate use as an impact area.

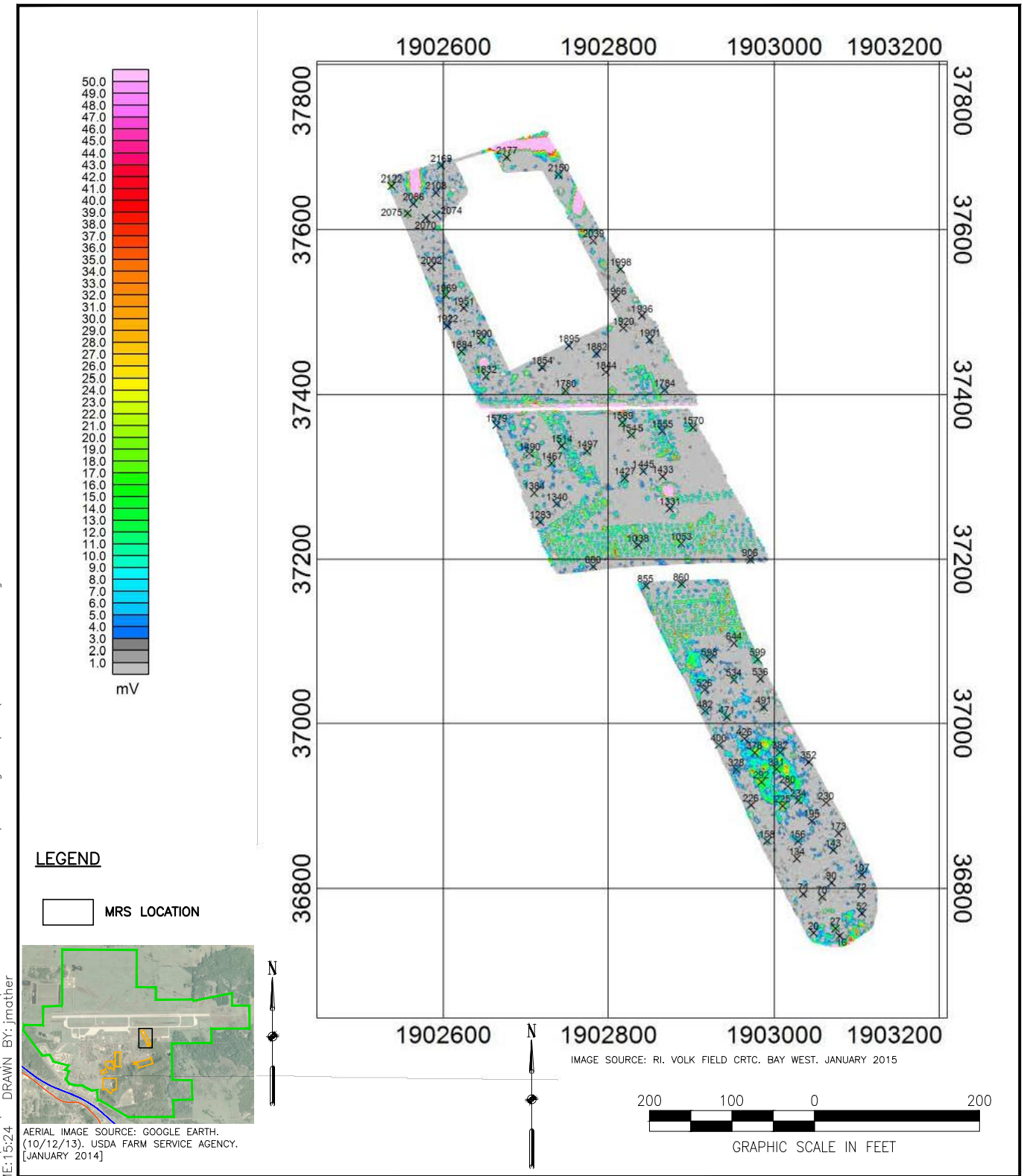
Historic records indicate fill material for the construction of training areas was obtained from near the base of the sandstone bluff that was formerly used as an artillery target (Bay West 2015). The MD identified at FIB #1 was likely deposited as fill material during the FIB construction.

Nine small test pits were hand excavated inside the FIB structure and the soil from the impact berm was screened for munitions related debris. The impact berm soil was inspected and determined to contain MD from 20 mm high explosive (HE) projectiles. Based on the quantity of MD identified inside the FIB structure, it was estimated that there was average density of 14.3 projectiles per cubic foot of soil. This was compared to the estimated volume of soil from the impact berm (approximately 400 cubic yards [cy]), resulting in an estimate of 150,000 to 160,000 projectiles potentially remaining in the impact berm soil.

MC Investigation

During the RI, discrete soil samples were collected by scoop or hand auger at 20 locations. Two samples were collected next to the location where planes would have been anchored while using the range. Nine sample locations were located near the FIB structure in the area where projectiles wide of the target would have impacted, and three samples were collected directly in front of the impact berm where undershoots would have impacted. Six samples were collected from the impact berm inside the FIB structure (Figure 1-4).

Three soil borings were installed along the northern edge of the impact berm at the undershoot locations with a Direct Push Technology (DPT) rig. The FIB #1 structure prevented direct access to soil under the impact berm so the DPT rig was placed as close to the structure as possible, and the borings were angled at 45 degrees to collect samples from under the impact berm. Samples were collected from 0-6 inch and 24-48 inch intervals.



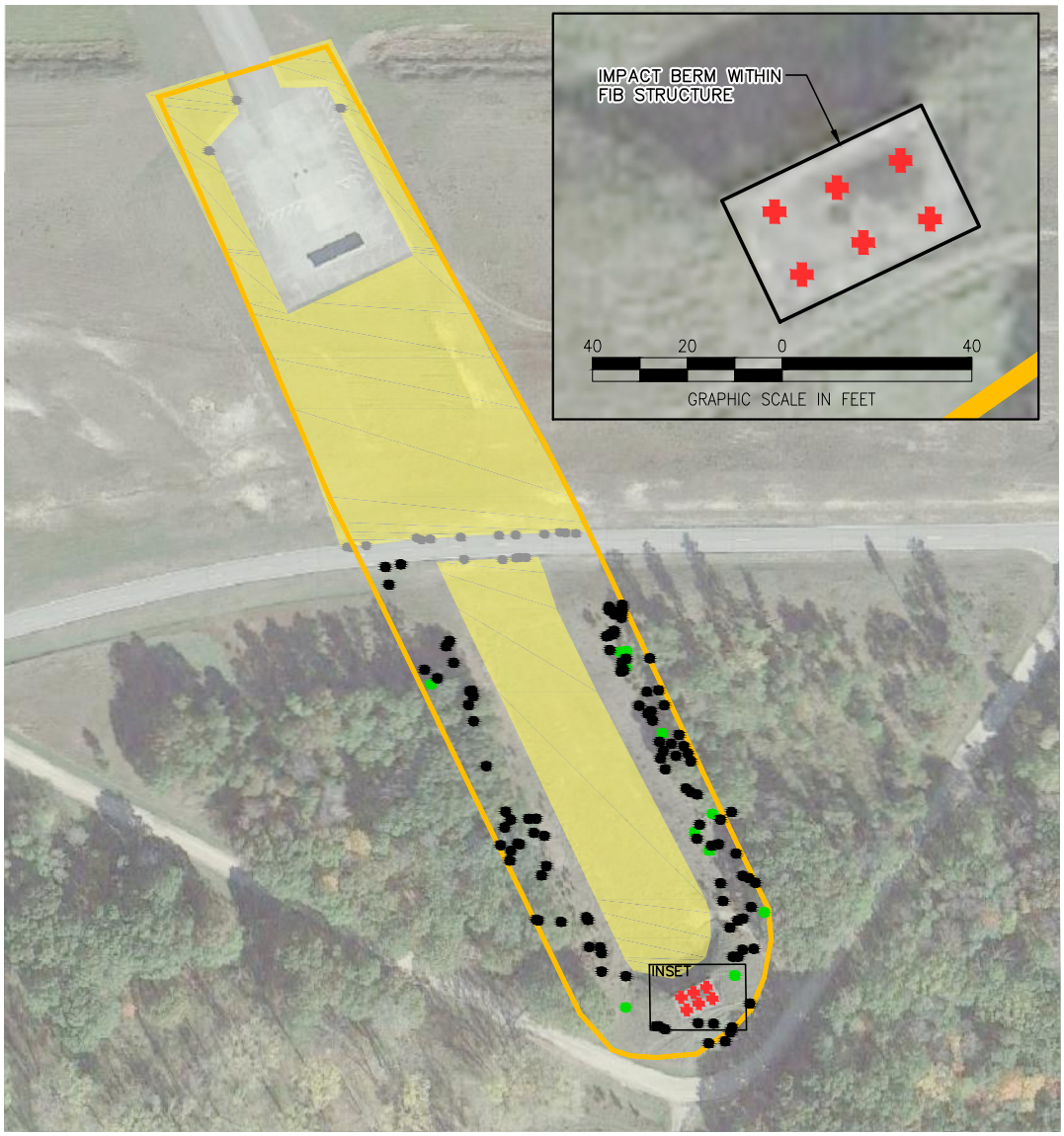
DRAWING NAME: F:\Federal\DOD\USACE\PROJECTS\6246608 Volk Field IRA\C – Figures\CAD\EECA FIGURES.dwg
DATE:02/17/2015 TIME:15:24 DRAWN BY: jmather

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC

VOLK FIELD CRTC
JUNEAU COUNTY, WISCONSIN

FORMER FIRING–IN–BUTTRESS #1 (FR501)
GEOPHYSICAL SURVEY RESULTS

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
JMR	JRB	NDD	RT	AS SHOWN	FEB. 2015	6246608	1–2



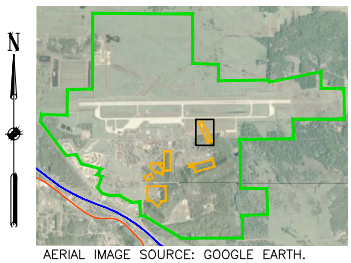
DATA SOURCE: BAY WEST RI, GIS FILES

200 100 0 200
GRAPHIC SCALE IN FEET

LEGEND

- MRS LOCATION
- MRS BOUNDARY
- INSTALLATION BOUNDARY
- DGM AREA
- TEST PIT LOCATIONS
- MD – MUNITIONS DEBRIS
- NMRD – NON MUNITIONS RELATED DEBRIS
- LOCATION UNDER PAVEMENT (INACCESSIBLE)

NOTE:
ADDITIONAL ANALOG SURVEY DATA COLLECTED DURING LATER RI ACTIVITIES NOT SHOWN; REFER TO FIGURE 5-2 OF FINAL RI REPORT (BAY WEST 2015).



AERIAL IMAGE SOURCE: GOOGLE EARTH. (10/12/13). USDA FARM SERVICE AGENCY. [JANUARY 2014]

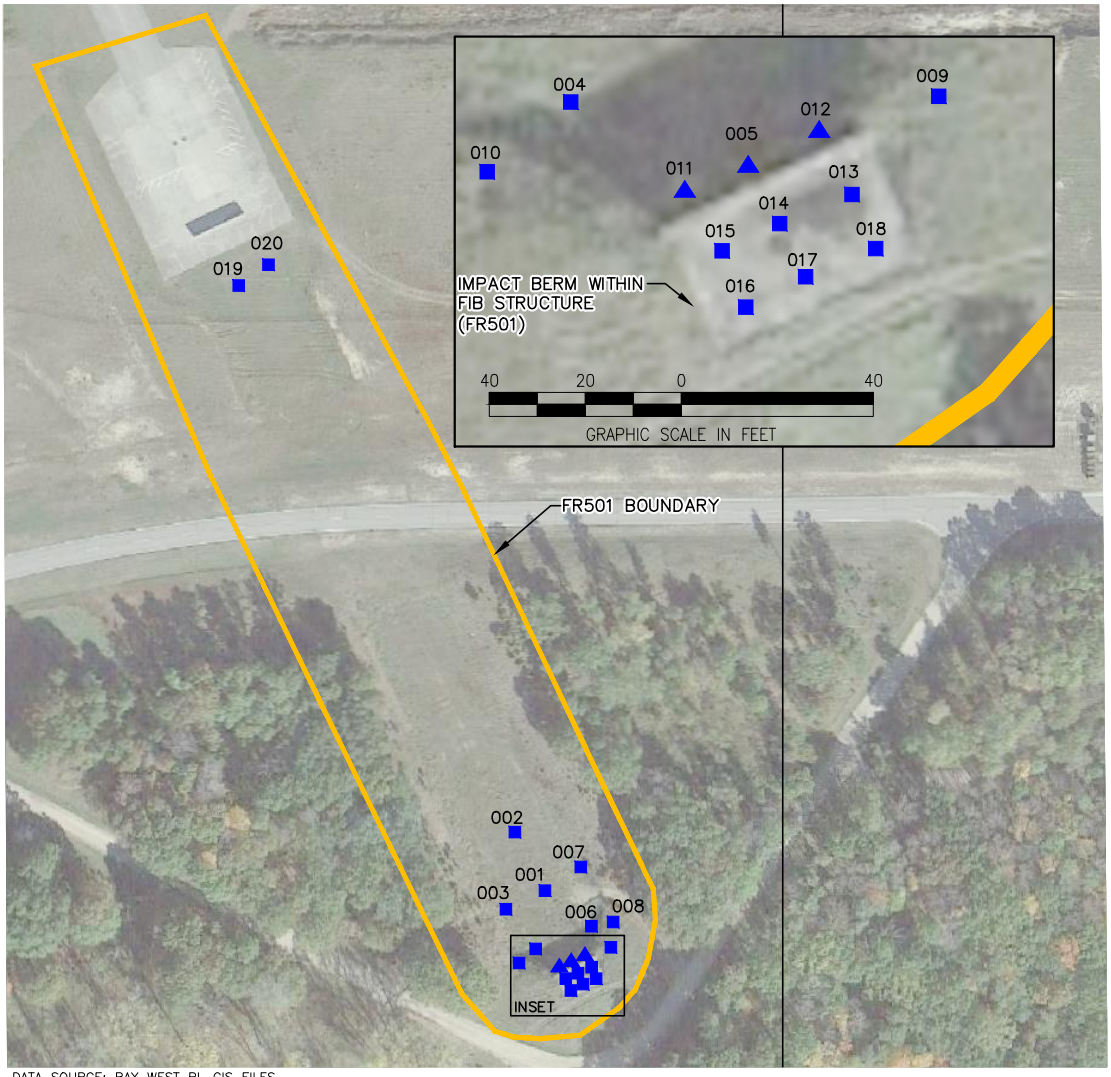
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC

VOLK FIELD CRTC
JUNEAU COUNTY, WISCONSIN

FORMER FIRING-IN-BUTTRESS #1 (FR501)
ANALOG SURVEY RESULTS

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
JMR	JRB	NDD	RT	AS SHOWN	FEB. 2015	6246608	1-3

DRAWING NAME: F:\Federal\DOD\USACE\PROJECTS\6246608 Volk Field IRA\C - Figures\CAD\EECA FIGURES.dwg
DATE:02/17/2015 TIME:15:24 DRAWN BY: jmather



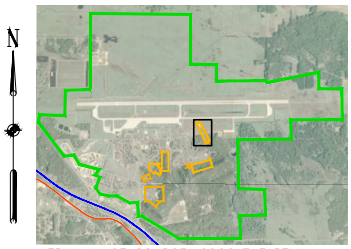
LEGEND

- MRS LOCATION
- MRS BOUNDARY
- INSTALLATION BOUNDARY
- MEC/MD EXTENT

NOTE:
NO SAMPLES IN THIS MRS CONTAINED LEAD CONCENTRATIONS GREATER THAN 400 mg/kg.

XRF/ ANALYTICAL RESULTS
LEAD CONCENTRATIONS IN mg/kg

- <LOD – 200
- 201 – 400
- 401 – 600
- 601 +
- XRF SAMPLE
- DIRECT PUSH TECHNOLOGY SAMPLE
- ANALYTICAL LAB RESULT
- 008 SAMPLE IDENTIFICATION (NOT CONCENTRATION)



AERIAL IMAGE SOURCE: GOOGLE EARTH. (10/12/13). USDA FARM SERVICE AGENCY. [JANUARY 2014]

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC

VOLK FIELD CRTC
JUNEAU COUNTY, WISCONSIN

FORMER FIRING–IN–BUTTRESS #1 (FR501)
SUMMARY OF RI RESULTS

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
JMR	JRB	NDD	RT	AS SHOWN	FEB. 2015	6246608	1–4

DRAWING NAME: F:\Federal\DOD\USACE\PROJECTS\6246608 Volk Field IRA\C – Figures\CAD\EECA FIGURES.dwg
DATE:02/17/2015 TIME:15:24 DRAWN BY: jmather

The soil samples from the three borings were sent off-site for laboratory analysis of MC-related compounds, including antimony, copper, lead, and zinc. None of the sample concentrations exceeded the EPA RSLs or WDNR screening levels for residential soil, with a highest detected value of 140 mg/kg for lead.

At one of the three soil boring locations (FR501-LS005), all samples from all depths were also analyzed for Synthetic Precipitation Leaching Procedure (SPLP) lead. The SPLP lead values slightly exceeded the USEPA MCL criteria at the 4-foot depth; however, the total lead concentration at this sample location (0.91 mg/kg) did not exceed the EPA's RSL default value for groundwater protection (i.e., 14 mg/kg for lead). Therefore, leaching to groundwater is not considered to be of concern at FR501 (Bay West 2015).

In August 2014, an attempt was made to install a groundwater monitoring well directly in front of the FIB structure. During installation, the drill encountered bedrock refusal at 7 feet bgs and groundwater was not encountered. Further supporting that that leaching to groundwater is not considered to be a concern at the MRS.

Following the MEC and MC investigation, the Final RI Report recommended splitting the FIB#1 site into MRS FR501, consisting of approximately 1.0 acres encompassing the FIB structure and the associated impact berm, and MRS FR501a, consisting of the remaining area. The RI recommended that an NTCRA be completed for FR501 to reduce the potential explosive hazards and environmental risks, while FR501a does not require any further action.

1.2.8.2 Former Rifle/Small Arms Ranges – Multiple Sites (SR503 and SR503c)

Six original ranges, numbered Rifle Range #1 through Rifle Range #6, were orientated with the firing lines towards the sandstone bluff located on the southeastern portion of the installation and were constructed by the authority of the Adjutant General by the year 1894. Former Rifle Ranges #1 through #5 were interconnected, while Former Rifle Range #6 remained a separate range.

These former rifle ranges were constructed in conjunction with training exercises performed by infantry, artillery, and cavalry units. The footprint of the former ranges has been extensively redeveloped and no evidence of the firing lines remains (Sky Research 2011).

Since development of Ranges #1 through #6, other small arms ranges were developed over portions of the footprints of the original rifle ranges. For example, a Machine Gun/Pistol Range, identified on a historic figure titled "*The Location of the Rifle and Machine Guns Ranges at Camp Williams*" was constructed over the southeastern footprint of former Rifle Range #1 and eastern portion of former Rifle Range #2 sometime in the 1930s (Sky Research 2011).

Small Arms Range #250 was constructed over portions of the former footprint of Rifle Ranges #4 and #5. Small Arms Range #250 first appears on a March 9, 1943 map entitled *Plat Camp Williams, Camp Douglas, Wisconsin* prepared for the Office of the Quartermaster by Henry C. Hengels. Small Arms Range #250 was reportedly used until the late 1980s. When Small Arms Range #250 was in use, Volk Field CRTC personnel barricaded Wisconsin Avenue where it cut through the Former Rifle Range #6 (Sky Research 2011).

Range #250 was used for small arms training by ANG personnel, law enforcement personnel, and at times, Civil War Era re-enactors. Documentation discussing the type or size of munitions

used at these ranges was not identified. However, visual observations identified remnants of 40 mm projectiles and extensive small arms debris (Sky Research 2011).

The RI conducted at Volk Field included two non-contiguous areas within the Former Rifle Range/Small Arms Ranges – Multiple Sites, the Former Rifle Range #1/Machine Gun Range (SR503) (Figure 1-5) and the Former Rifle Range #5/Former Range 250 (SR503c) (Figure 1-6). A summary of the RI with respect to the Former Rifle Range #1/Machine Gun Range (SR503) and the Former Rifle Range #5/Range #250 (SR503c) is provided below.

Former Rifle Range #1/Machine Gun Range (SR503)

MEC Investigation

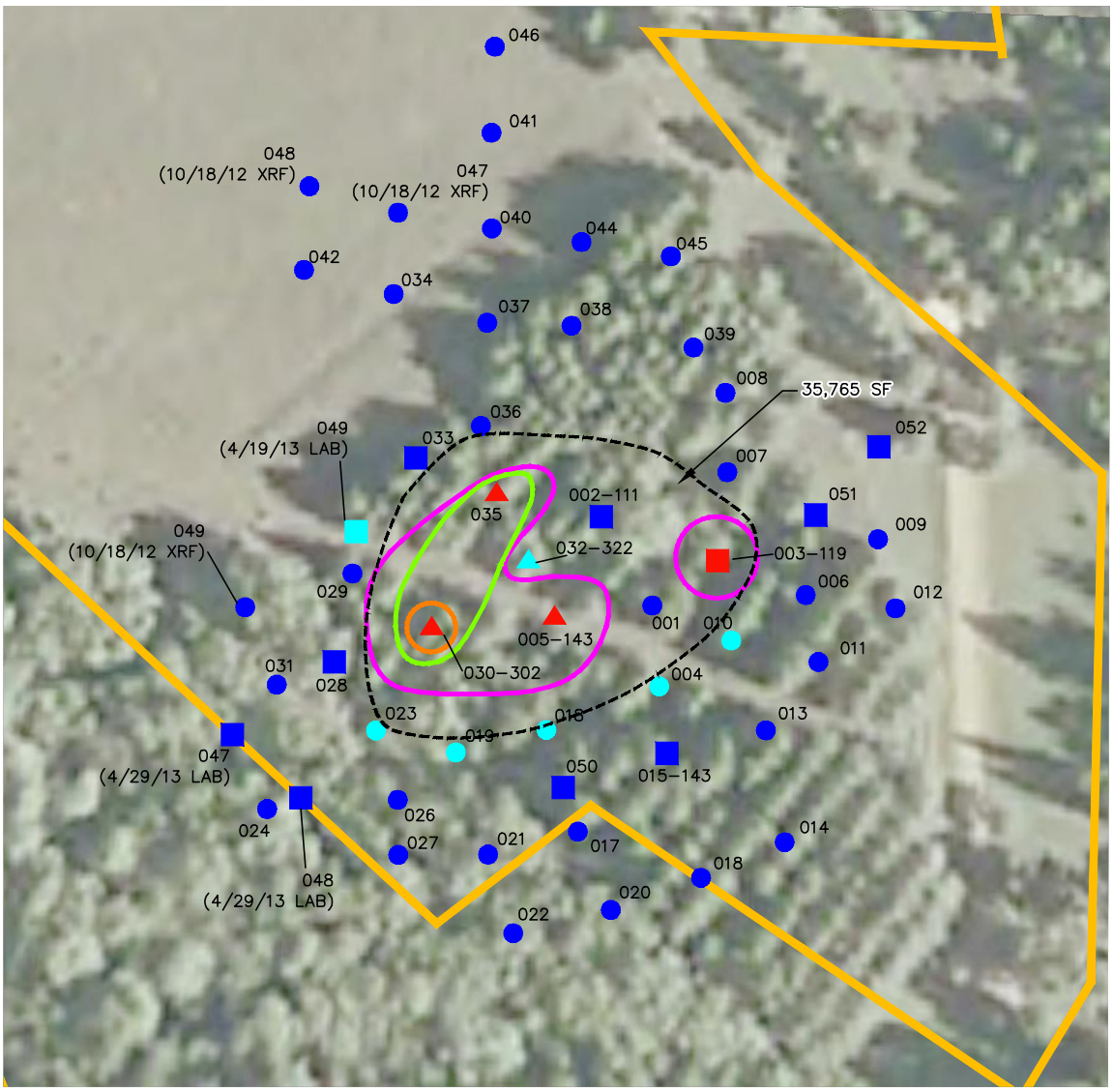
A visual survey was performed between firing points and target berms, which had been located using historical aerial photographs. No MEC was identified during the visual survey.

MC Investigation

During the RI, 48 locations were sampled for soil and screened for lead by X-Ray Fluorescence (XRF) at the Former Rifle Range #1/Machine Gun Range. Beginning at the target placement area, the sample locations followed an approximate 50 foot by 50 foot grid moving up the sloped area behind the target placement area. Twelve soil samples representing a range of XRF readings were sent to an off-site laboratory for correlation of field XRF lead values with fixed laboratory analysis. The XRF lead correlation samples were also analyzed for MC-related metals (e.g., antimony, copper and zinc) to evaluate the presence of MC-related metals.

Lead concentrations in ten samples at four locations exceeded the EPA RSL and WDNR screeing level for residential soils (400 mg/kg). Of these samples seven also exceeded the EPA RSL and WDNR screening level for industrial soils (800 mg/kg). Antimony was detected in five samples at four locations at concentrations exceeding the EPA RSL for residential soil. However, only three of the samples at two of the locations also exceeded the EPA RSL for industrial soil. One soil sample had a lead concentration of 80,000 mg/kg; however, the split duplicate sample had a lead concentration of only 630 mg/kg. Antimony was identified at the same location at 970 mg/kg, but in the split duplicate sample the antimony concentration was 0.52 mg/kg. The isolated incident of 80,000 mg/kg lead and 970 mg/kg antimony in one soil sample is most likely attributed to bullet fragment in the sample, resulting in an abnormal spike.

In the area where the highest lead concentrations were identified with the XRF, four locations were sampled using the DPT to a depth of 8 feet (ft.) at the following intervals: 0-6, 6-24, 24-48, 48-72, and 72-96 inches. The samples were analyzed for total lead and SPLP lead. The SPLP lead values exceeded the EPA MCL down to the 2-foot depth at one location (FRRMG-LS005-SB01-005-PS). At location FRRMG-LS030-SB01-030-PS, the SPLP lead levels exceeded the EPA maximum contaminant level (MCL) down to the 6-foot depth. However, SPLP concentrations beneath the 6-foot depth did not exceed the USEPA MCL and the total concentration was below the USEPA's RSL default value for groundwater protection. Combined with the age of release and depth to groundwater (estimated at approximately 16 ft bgs), the threat to groundwater at the MRS is expected to be of limited concern (Bay West 2015). In addition, bedrock refusal was met at 28 ft bgs, without encountering groundwater, in an August 2014 attempt to install a temporary well.



DATA SOURCE: BAY WEST RI, GIS FILES

100 50 0 100

GRAPHIC SCALE IN FEET

LEGEND

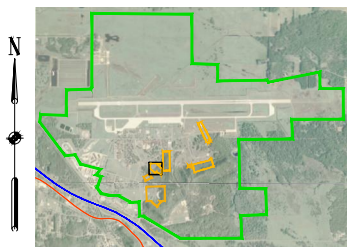
- MRS LOCATION
- MRS BOUNDARY
- INSTALLATION BOUNDARY
- SAA/MD EXTENT
- LEAD CONC.>400 mg/kg -- 0–6 INCH
- LEAD CONC.>400 mg/kg -- 6–12 INCH
- LEAD CONC.>400 mg/kg -- 12–48 INCH

XRF/ ANALYTICAL RESULTS

LEAD CONCENTRATIONS IN mg/kg

- <LOD – 200
- 201 – 400
- 401 – 600
- 601 +

- XRF SAMPLE
- DIRECT PUSH TECHNOLOGY SAMPLE
- ANALYTICAL LAB RESULT
- 008 SAMPLE IDENTIFICATION (NOT CONCENTRATION)



AERIAL IMAGE SOURCE: GOOGLE EARTH. (10/12/13). USDA FARM SERVICE AGENCY. [JANUARY 2014]

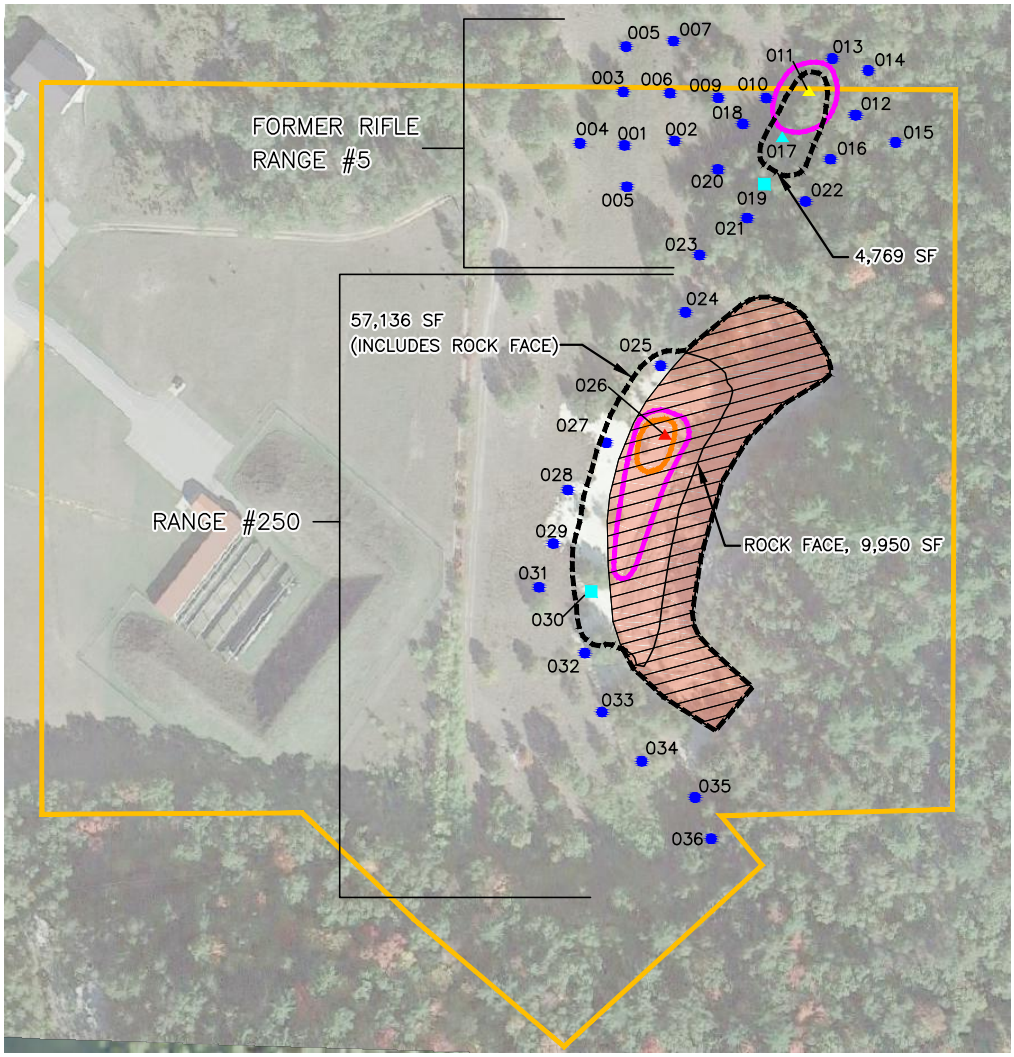
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC

VOLK FIELD CRTC
JUNEAU COUNTY, WISCONSIN

FORMER RIFLE RANGE #1/MACHINE GUN RANGE (SR503C)
SUMMARY OF RI RESULTS

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
JMR	JRB	NDD	RT	AS SHOWN	FEB. 2015	6246608	1–5

DRAWING NAME: F:\Federal\DOD\USACE\PROJECTS\6246608 Volk Field IRA\C – Figures\CAD\EECA FIGURES.dwg
DATE:02/17/2015 TIME:15:24 DRAWN BY: jmather



DATA SOURCE: BAY WEST RI, GIS FILES

200 100 0 200

GRAPHIC SCALE IN FEET

LEGEND

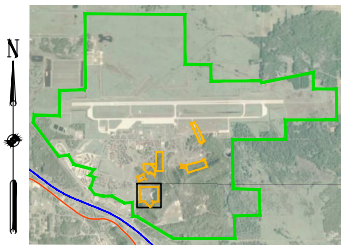
- MRS LOCATION
- MRS BOUNDARY
- INSTALLATION BOUNDARY
- EXPLOSIVE HAZARD AREA BOUNDARY (NOT FULLY INVESTIGATED DURING RI)
- SAA/MD EXTENT
- LEAD CONC.>400 mg/kg -- 0–6 inch

XRF/ ANALYTICAL RESULTS
LEAD CONCENTRATIONS IN mg/kg

- <LOD – 200
- 201 – 400
- 401 – 600
- 601 +

- XRF SAMPLE
- DIRECT PUSH TECHNOLOGY SAMPLE
- ANALYTICAL LAB RESULT
- 008 SAMPLE IDENTIFICATION (NOT CONCENTRATION)

NOTE: AN INTACT 40mm RIFLE GRENADE WAS IDENTIFIED AT FORMER RANGE #250 DURING THE RI KICKOFF MEETING. THE EXACT LOCATION IS UNKNOWN.



AERIAL IMAGE SOURCE: GOOGLE EARTH. (10/12/13). USDA FARM SERVICE AGENCY. [JANUARY 2014]

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC

VOLK FIELD CRTC
JUNEAU COUNTY, WISCONSIN

FORMER RIFLE RANGE #5/RANGE #250 (SR503C)
SUMMARY OF RI RESULTS

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
JMR	JRB	NDD	RT	AS SHOWN	FEB. 2015	6246608	1–6

DRAWING NAME: F:\Federal\DOD\USACE\PROJECTS\6246608 Volk Field IRA\C – Figures\CAD\EECA FIGURES.dwg
DATE:02/17/2015 TIME:15:24 DRAWN BY: jmather

A second sampling event occurred in April 2013 to more accurately delineate the impact area. Soil samples were collected from ten locations at six intervals: 0-6, 6-12, 12-18, 18-24, 24-36, and 36-48 inches, and analyzed for lead. The 24-36 and 36-48 inch depth samples were submitted to the laboratory, but were not analyzed because there were no lead detections above 400 mg/kg at the 18-24 inch interval.

The location of the 80,000 mg/kg sample result was one of the resampled locations. The lead and antimony concentrations detected at this location during the April 2013 supplemental RI sampling event were 620 and 0.48 mg/kg respectively. This supports the conclusion that the high values found in the initial sample were most likely due to the presence of bullet fragments in the soil that were not visible during field sampling (Bay West 2015).

Former Rifle Range #5/Range #250 (SR503c)

MEC Investigation

An intact 40mm grenade was identified at Former Range #250 (refer to Figure 1-6) during a site tour performed in conjunction with the RI kickoff meeting. The grenade was brought to the attention of the Volk Field CRTC Safety Office. In turn, the Safety Office requested assistance from the EOD unit at Fort McCoy, Wisconsin. The EOD unit responded and determined the grenade was a M407A1 training grenade. The EOD team performed a blow-in-place (BIP) on the grenade.

A visual sweep of the Range #250 area was conducted between the firing points and the impact berm. No additional MEC was identified on the surface, but approximately 80 pounds of MD, primarily expended 40 mm grenade debris, were recovered.

The impact area was littered with small arms projectiles such that identifying discrete targets was not possible. Therefore, no subsurface investigation was performed, and the potential exists for additional 40 mm grenades to remain in the subsurface.

MC Investigation

Samples were taken at 36 locations (0-6 inches) and screened with the XRF. The sample locations at Former Rifle Range #5 fit on a roughly 50 ft. by 50 ft. grid, and extend from a small berm where the targets were placed, east to the top of the hill that served as the impact area (refer to Figure 1-6). However, due to rocky and unstable portions of the hillside, the 50 ft. by 50 ft. grid could not be followed precisely in some locations (Figure 1-8). At one location the lead concentration (540 mg/kg) was greater than the screening level for residential soil for lead.

At Former Range #250, the ground is heavily littered with expended small arms debris and material potentially presenting and explosive hazard (MPPEH) from 40 mm grenades (refer to Figure 1-6). Given the potential for 40 mm grenades to be present in the subsurface, a UXO Technician performed anomaly avoidance at the selected sample locations. Only one location was identified as safe to sample in the primary impact area. At this location, lead concentrations in soil were not evaluated in the 0-6 inch interval, but were evaluated and detected at the following concentrations in deeper intervals: 1,100 mg/kg in the 6-12 inch interval, 460 mg/kg in the 6-24 inch interval, and 400 mg/kg in the 24-48 inch interval. XRF samples were collected along the perimeter of the impact area to determine if lead was migrating away from the impact area. The results were below the screening levels for residential soil.

Samples were also analyzed for explosives; none were detected.

Samples were collected at three locations to a depth of 4 ft with sample intervals of 0-0.5, 0.5-2, and 2-4 ft and analyzed for total lead and SPLP lead. At one location (SAR250-LS017-SB01-017-PS), the SPLP lead values exceeded the USEPA MCL down to the 2-foot depth. At location SAR250-LS026-SB01-026-PS (where SPLP lead was detected at 1,900 µg/L in the 0-0.5 ft. interval), the SPLP lead levels exceeded the USEPA MCL down to the 4-foot depth. Samples below 4 foot were not collected due to the rocky terrain and presence of MD in the impact area. While the potential for leaching of lead is possible, it would be limited by the generally low mobility of MC, the age of the release, and the depth to groundwater (Bay West 2015).

Following the MEC and MC investigation, the Final RI Report recommended a NTCRA be completed for SR503c to reduce the potential explosive hazards and environmental risks (Bay West 2015).

1.2.8.3 Former Small Arms Range #251 (SR504)

Former Small Arms Range #251 (Figure 1-7) was identified in a 2007 EBS (Sky Research 2011). The range was in use from 1954 until 1999 when the new, active small arms range (Facility #243) was constructed at the southeastern portion of former Small Arms Range #250.

Former Small Arms Range #251 (SR504) was located within the southeastern portion of the footprint of former Rifle Range #3. The sandstone bluff located to the east was used as the target impact area for range activities. No documentation was identified discussing the types of munitions that were used at this range (Sky Research 2011).

A summary of the RI with respect to this MRS (SR504) is provided below.

MEC Investigation

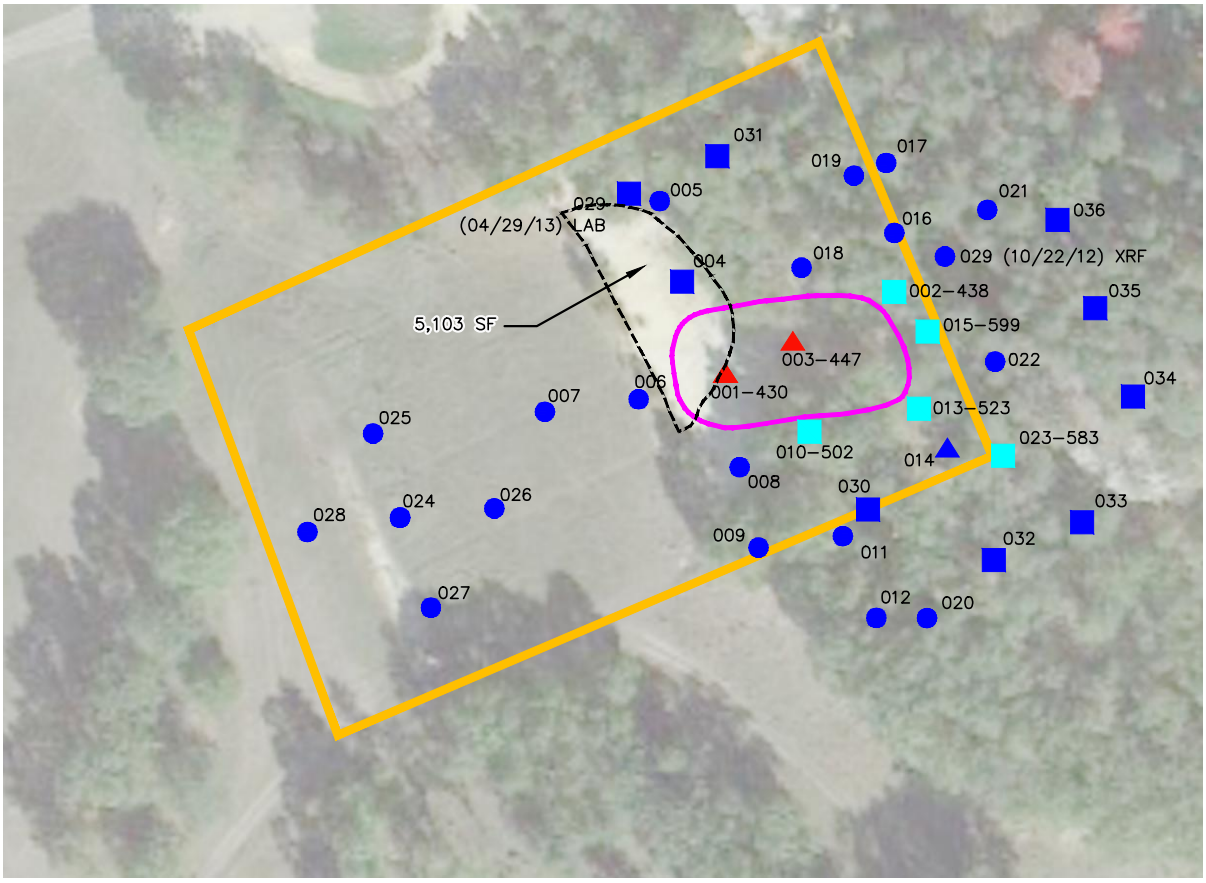
A visual survey was performed between firing points and target berms. No MEC was identified during the visual survey.

MC Investigation

During the RI, 31 locations were sampled based on a 50 ft. by 50 ft. grid beginning on the west-side at the previous firing line. However, due to problems with the global positioning system (GPS) acquiring satellites and extensive tree growth, not all points were located following the grid. Figure 1-7 shows the sampling locations.

All samples were screened with the XRF (Bay West 2015). At eleven locations, lead concentrations exceeded the XRF screening level of 200 mg/kg and consequently these samples were submitted to the lab for analysis. Only two of the eleven soil samples submitted to the laboratory exceeded the EPA screening criteria of 400 mg/kg. The analytical results indicated the concentrations of lead in soil samples SAR251-LS001-SB01-430 and SAR251-LS003-SB01-447 l were 720 and 850 mg/kg, respectively. Both of these samples were collected from the 0-6 inch interval.

A second sampling event occurred April 29 through May 1, 2013 to more accurately delineate the lead impacted area and to evaluate the vertical extent of elevated lead concentrations. Seven samples were collected from the same locations as the first sampling event; however, these seven samples were collected from the 6-12 inch interval. None of these soil sample concentrations



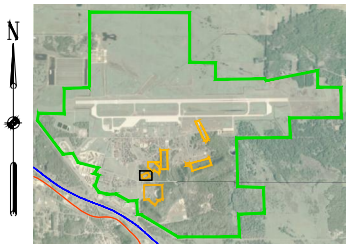
DATA SOURCE: BAY WEST RI, GIS FILES

LEGEND

- MRS LOCATION
- MRS BOUNDARY
- INSTALLATION BOUNDARY
- SAA/MD EXTENT
- LEAD CONC.>400 mg/kg -- 0–6 inch

XRF/ ANALYTICAL RESULTS
LEAD CONCENTRATIONS IN mg/kg

- <LOD – 200
- 201 – 400
- 401 – 600
- 601 +
- XRF SAMPLE
- DIRECT PUSH TECHNOLOGY SAMPLE
- ANALYTICAL LAB RESULT
- 008 SAMPLE IDENTIFICATION (NOT CONCENTRATION)



AERIAL IMAGE SOURCE: GOOGLE EARTH. (10/12/13). USDA FARM SERVICE AGENCY. [JANUARY 2014]

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC

VOLK FIELD CRTC
JUNEAU COUNTY, WISCONSIN

FORMER SMALL ARMS RANGE #251 (SR504)
SUMMARY OF RI RESULTS

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
JMR	JRB	NDD	RT	AS SHOWN	FEB. 2015	6246608	1–7

DRAWING NAME: F:\Federal\DOD\USACE\PROJECTS\6246608 Volk Field IRA\C – Figures\CAD\EECA FIGURES.dwg
DATE:02/17/2015 TIME:15:24 DRAWN BY: jmather

exceeded the EPA screening criteria of 400 mg/kg. Soil concentrations in the 6 to 12 inch interval ranged from 6.1 to 200 mg/kg. In addition, eight new sample locations were selected for sampling at 6 inches intervals to a depth of 48 inches. At these eight new locations samples from the 0-6 inch and 6-12 inch intervals were analyzed in the lab. Soil concentrations in the 0 to 6 inch interval ranged from 15 to 150 mg/kg. Soil concentrations in the 6 to 12 inch interval ranged from 2 to 45 mg/kg. Samples from the 12-24 inch, 24-36 inch, and 36-48 inch intervals were submitted to the lab, but were not analyzed because there were no lead detections above the EPA screening level (400 mg/kg) at these locations in the 0-6 and 6-12 inch intervals.

Three sampling locations were chosen for DPT borings based on the XRF field screening results (refer to Figure 1-7). Borings were drilled to 8 ft. bgs and samples were collected for total lead and SPLP lead analysis. At one location (SAR251-LS001-SB01-001-PS), lead was detected in the leachate at a concentration of 26 µg/L (exceeding the MCL of 15 µg/L) in the 2-4 ft. interval. At another location (SAR251-LS003-SB01-003-PS), lead was detected in the leachate at 140 µg/L (exceeding the MCL of 15 µg/L) in the 4-6 ft. interval. However, total lead concentrations at these sample locations do not exceed the USEPA's RSL default value for groundwater protection (i.e., 14 mg/kg lead) and the WDNR background threshold level for lead (52 mg/kg). Samples collected at the 6-8 ft interval did not contain SPLP lead above the MCL. Based on the age of the release, limited vertical migration of lead, and depth to groundwater (approximately 17 ft), no threat to groundwater from lead in soil is expected at this MRS (Bay West 2015).

Following the MEC and MC investigation, the Final RI Report recommended a NTCRA be completed for SR504 to reduce the potential environmental risks (Bay West 2015).

1.2.8.4 Former Mortar/Artillery Range (MU505)

A former Mortar/Artillery Impact Area (Figure 1-8) was identified during the CSE Phase I field investigation on a 1902 map obtained through the Wisconsin National Guard Museum showing the vicinity of Camp Douglas and potential mortar firing lines. The heavily wooded area is located along a ridge south of the present day Munitions Storage Area igloos and extends south into the bluff located on the southeastern portion of the installation (Sky Research 2011).

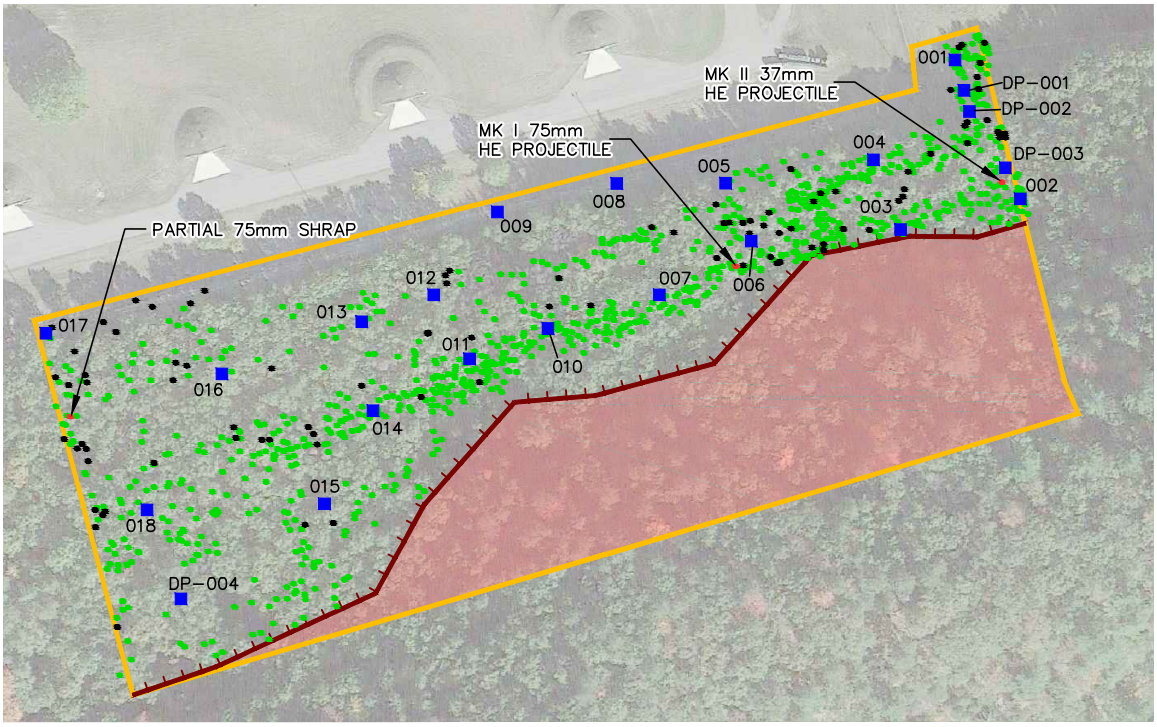
A summary of the RI with respect to this MRS (MU505) is provided below.

MEC Investigation

During the RI, approximately 3.1 acres of the 9.2 acre MRS were determined inaccessible due to slopes in excess of 30 degrees, including the essentially vertical face of the sandstone bluff. Surface clearance and analog surveys (mag and flag) were conducted over 6.1 acres with 10,667 anomalies found and flagged (approximately 1,750 anomalies per acre). The analog survey target locations are presented in Figure 1-8. A total of 1,067 (10%) of the anomalies were intrusively investigated. Three MEC items were encountered:

- One 75 mm MK I projectile, confirmed to be HE
- One partial 75 mm projectile with pusher plate and expelling charge intact
- One 37 mm Mk II projectile, confirmed to be HE.

A total of 1,146 pounds of MD and 98 pounds of NMRD were recovered. The MD was predominately fragments from munition items ranging from 37 mm to 155 mm projectiles. In the western end of the MRS, the MD was distributed with no apparent impact pattern. In the



DATA SOURCE: BAY WEST RI, GIS FILES

200 100 0 200

GRAPHIC SCALE IN FEET

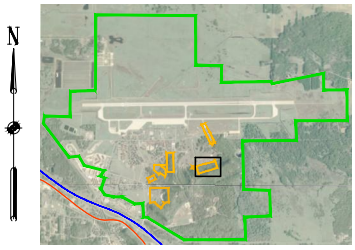
LEGEND

- MRS LOCATION
- MRS BOUNDARY
- INSTALLATION BOUNDARY
- INACCESSIBLE AREA
- CLIFF FACE
- MD – MUNITIONS DEBRIS
- MEC – MUNITIONS & EXPLOSIVES OF CONCERN
- NMRD – NON MUNITIONS RELATED DEBRIS

XRF/ ANALYTICAL RESULTS
LEAD CONCENTRATIONS IN mg/kg

- <LOD – 200
- 201 – 400
- 401 – 600
- 601 +

- XRF SAMPLE
- DIRECT PUSH TECHNOLOGY SAMPLE
- ANALYTICAL LAB RESULT
- DP — DEMOLITION PIT SAMPLE
- 008 — SAMPLE IDENTIFICATION (NOT CONCENTRATION)



AERIAL IMAGE SOURCE: GOOGLE EARTH. (10/12/13). USDA FARM SERVICE AGENCY. [JANUARY 2014]

NOTE:
NO SAMPLES IN THIS MRS CONTAINED LEAD CONCENTRATIONS GREATER THAN 400 mg/kg.

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC

VOLK FIELD CRTC
JUNEAU COUNTY, WISCONSIN

FORMER MORTAR/ARTILLERY RANGE (MU505)
ANALOG SURVEY RESULTS

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
JMR	JRB	NDD	RT	AS SHOWN	FEB. 2015	6246608	1-8

DRAWING NAME: F:\Federal\DOD\USACE\PROJECTS\6246608 Volk Field IRA\C – Figures\CAD\EECA FIGURES.dwg
DATE:02/17/2015 TIME:15:24 DRAWN BY: jmather

central and eastern portions of the MRS, distinct bands of MD were identified indicating the probable target line.

MC Investigation

During the RI, eighteen soil samples (i.e., 3 per acre investigated) were collected from 0-6 inches below ground surface (bgs) using a hand auger at locations shown on Figure 1-8. The sample locations were chosen in areas where MD was most evident during the surface sweep. Additionally, three soil samples were taken from what could have been shallow detonation trench locations near the eastern boundary of the MRS. An additional sample was collected in the southwestern portion of the MRS. Samples were collected from 0-6 inches bgs.

Samples were analyzed for explosives by EPA Method 8330A. None of the samples had concentrations that exceeded the screening levels for residential soil (Bay West 2015).

Following the MEC and MC investigation, the Final RI Report recommended an NTCRA be completed for SR505 to reduce the potential explosive hazards (Bay West 2015).

1.2.8.5 Former Small Arms Debris Area (SR506)

A Small Arms Debris Area (Figure 1-9) was reported by Volk Field CRTC personnel during the CSE Phase 1 interviews. The ground surface was reported to have a significant amount of small arms projectiles scattered over a small area. No information was available regarding use of the site or the time frame it was used was identified in the HRR (Sky Research 2011).

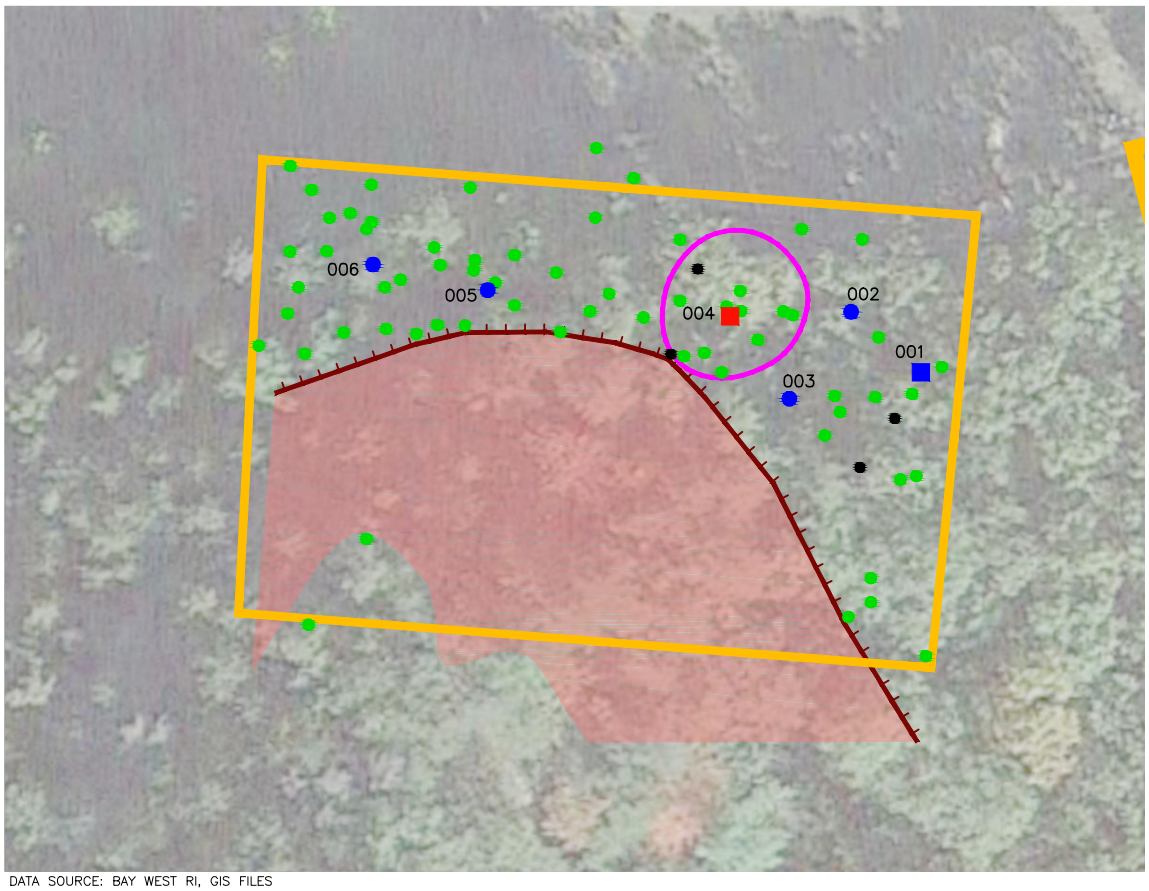
This heavily wooded area is contiguous with the former Mortar/Artillery Impact Area; however, no documentation regarding historical munitions activities in this area was identified and no munitions debris was identified in the CSE Phase II report (Sky Research 2011). Accordingly, the Former Small Arms Debris Area was designated as a separate MRS during the RI.

A summary of the RI with respect to this MRS is provided below.

MEC Investigation

The CSE Phase II report indicated only SAA debris was present. A small quantity of SAA debris was identified, collected, and removed from the MRS, while a large amount of MD was identified during the visual survey. The RI was expanded to include a surface clearance and mag and flag survey of the accessible portion of the MRS. The Former Small Arms Debris Area is heavily forested with heavy leaf and duff cover prevalent throughout the MRS. Approximately 0.2 acres (40%) of the 0.5 acre MRS was deemed inaccessible due to steep slopes in excess of 30 degrees.

A total of 684 subsurface anomalies were flagged, which equates to a density of approximately 1,800 anomalies per acre. The analog survey target locations are presented in Figure 1-9. A total of 69 anomalies (10%) were intrusively investigated. No MEC items were found. However, 295 pounds of MD and 1 pound of NMRD was recovered. The MD was predominately fragments from 75 mm projectiles, but fragments from ordnance ranging from 37 mm up to 155 mm were also recovered. The MD was distributed across the entire MRS with no discernible impact patterns.



DATA SOURCE: BAY WEST RI, GIS FILES

N

50 25 0 50

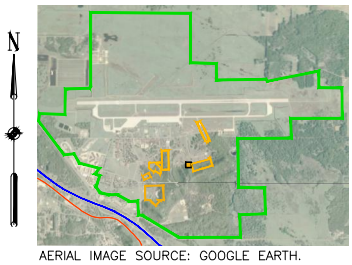
GRAPHIC SCALE IN FEET

LEGEND

- MRS LOCATION
- MRS BOUNDARY
- INSTALLATION BOUNDARY
- INACCESSIBLE AREA
- CLIFF FACE
- MD – MUNITIONS DEBRIS
- NMRD – NON MUNITIONS RELATED DEBRIS
- LEAD CONC.>400 mg/kg (0–6 INCHES)

XRF/ ANALYTICAL RESULTS
LEAD CONCENTRATIONS IN mg/kg

- <LOD – 200
- 201 – 400
- 401 – 600
- 601 +
- XRF SAMPLE
- DIRECT PUSH TECHNOLOGY SAMPLE
- ANALYTICAL LAB RESULT
- 008 SAMPLE IDENTIFICATION (NOT CONCENTRATION)



AERIAL IMAGE SOURCE: GOOGLE EARTH. (10/12/13). USDA FARM SERVICE AGENCY. [JANUARY 2014]

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC

VOLK FIELD CRTC
JUNEAU COUNTY, WISCONSIN

FORMER SMALL ARMS DEBRIS AREA (SR506)
ANALOG SURVEY RESULTS

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
JMR	JRB	NDD	RT	AS SHOWN	FEB. 2015	6246608	1–9

DRAWING NAME: F:\Federal\DOD\USACE\PROJECTS\6246608 Volk Field IRA\C – Figures\CAD\EECA FIGURES.dwg
DATE:02/17/2015 TIME:15:24 DRAWN BY: jmather

MC Investigation

During the RI, two soil samples were collected and analyzed by the lab for MC-related metals at locations shown on Figure 1-9. The analyte concentrations in samples from both locations were below the screening levels for residential soil; however, a duplicate sample at one location had a concentration of lead that was greater than the screening level of 400 mg/kg for residential soil. This location had concentrations of 330 mg/kg and 910 mg/kg of lead for the sample and duplicate, respectively.

In addition, four soil samples were collected in areas where MD was most evident during the surface sweep. Samples were analyzed for explosives; none were detected.

Following the MEC and MC investigation, the Final RI Report recommended an NTCRA be completed for SR506 to reduce the potential explosive hazards and MC risks (Bay West 2015).

1.2.8.6 Potential Civil War Era Impact Area (MU507)

Munitions debris from a Civil War Era projectile, a Hotchkiss 3 inch gun projectile, was identified in a heavily wooded area of the sandstone bluff during the CSE Phase I field investigation. While no documentation specifying the use of this area for artillery training was identified, it is known that artillery training did take place at Volk Field CRTC. No discernible features were identified during the historic aerial photograph review (Sky Research 2011).

A summary of the RI with respect to this MRS is provided below.

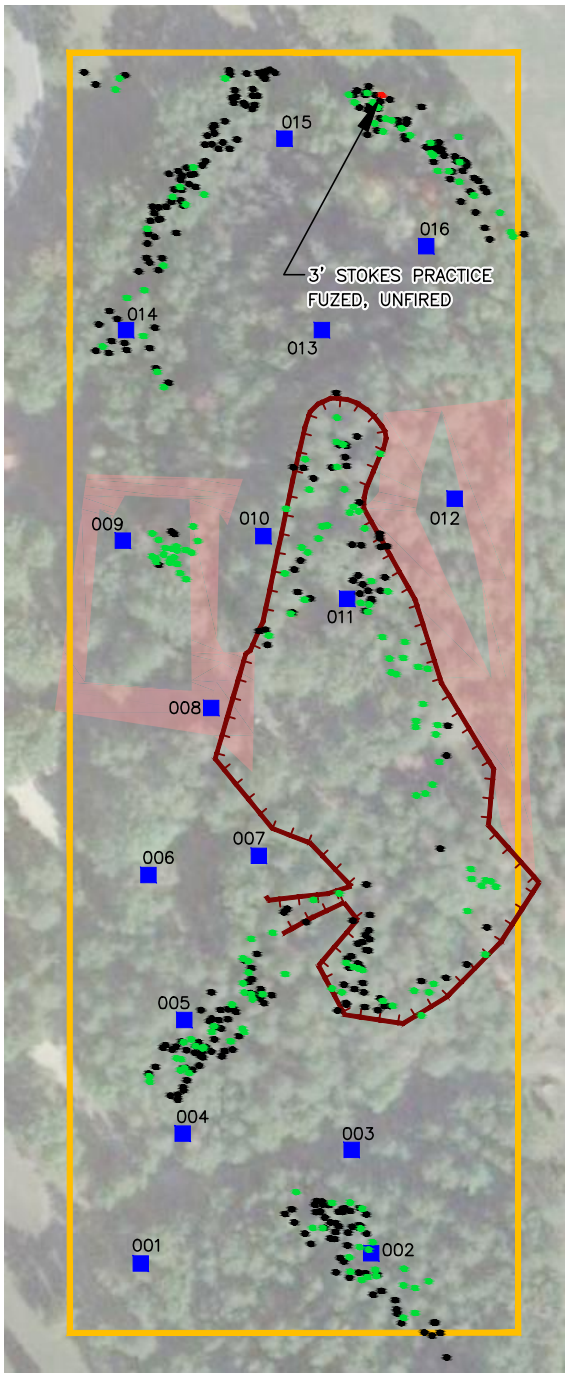
MEC Investigation

The Potential Civil War Era Impact Area is moderately heavy forest with moderate leaf and duff cover prevalent throughout the MRS. The terrain ranges from relatively flat to very steep. Approximately 0.5 acre of the 8.6 acre MRS was determined inaccessible due to slopes in excess of 30 degrees, including the essentially vertical face of the sandstone bluff. However, the bluff is relatively flat across the top and could be accessed (Figure 1-10).

An analog survey was conducted over approximately 8.1 acres with 5,038 anomalies flagged (approximately 620 anomalies per acre). The analog survey target locations are presented in Figure 1-10. A total of 504 (10%) anomalies were intrusively investigated. One potential MEC item was identified as an unfired Fuzed Practice 3-inch Stokes. After demolition, the item was confirmed to be a sand-filled practice round and was classified as discarded military munitions (DMM). In addition, 75 pounds of MD and 93 pounds of NMRD were removed from the MRS. The MD included fragments from ordnance items ranging from 75 mm to 155 mm projectiles. SAA debris and small MD items (i.e., grenade spoons) indicate the area was also used for small unit training exercises. The majority of the MD was clustered in distinct bands indicating possible target areas (refer to Figure 1-10).

MC Investigation

Sixteen soil samples were collected, at an average of two soil samples per acre. Samples were taken at a depth of 0-6 inches at the locations shown on Figure 1-10. Samples were collected at locations where MD was most evident during the surface sweep. All samples were analyzed for



DATA SOURCE: BAY WEST RI, GIS FILES

150 75 0 150

GRAPHIC SCALE IN FEET

LEGEND

- MRS LOCATION
- MRS BOUNDARY
- INSTALLATION BOUNDARY
- INACCESSIBLE AREA
- CLIFF FACE
- MD – MUNITIONS DEBRIS
- MEC – MUNITIONS & EXPLOSIVES OF CONCERN
- NMRD – NON MUNITIONS RELATED DEBRIS

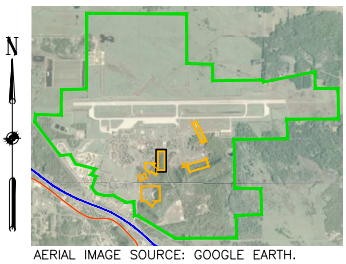
XRF/ ANALYTICAL RESULTS

LEAD CONCENTRATIONS IN mg/kg

- <LOD – 200
- 201 – 400
- 401 – 600
- 601 +
- XRF SAMPLE
- DIRECT PUSH TECHNOLOGY SAMPLE
- ANALYTICAL LAB RESULT
- 008 SAMPLE IDENTIFICATION (NOT CONCENTRATION)

NOTE:
NO SAMPLES IN THIS MRS CONTAINED LEAD CONCENTRATIONS GREATER THAN 400 mg/kg.

N



AERIAL IMAGE SOURCE: GOOGLE EARTH. (10/12/13). USDA FARM SERVICE AGENCY. [JANUARY 2014]

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC

VOLK FIELD CRTC
JUNEAU COUNTY, WISCONSIN

POTENTIAL CIVIL WAR ERA IMPACT AREA (MU507)
ANALOG SURVEY RESULTS

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
JMR	JRB	NDD	RT	AS SHOWN	FEB. 2015	6246608	1–10

DRAWING NAME: F:\Federal\DOD\USACE\PROJECTS\6246608 Volk Field IRA\C – Figures\CAD\EECA FIGURES.dwg
DATE:02/17/2015 TIME:15:24 DRAWN BY: jmather

explosives by EPA Method 8330A. None of the samples had analyte concentrations that exceeded the screening levels for residential soils.

Following the MEC and MC investigation, the Final RI Report recommended an NTCRA be completed for MU507 to reduce the potential explosive hazards (Bay West 2015).

1.3 Previous Removal Actions

As part of the RI intrusive investigations, MEC and MD were removed from FIB #1, Former Mortar/Artillery Range, Former Small Arms Debris Area, and the Potential Civil War Era Impact Area as discussed in Section 1.2.8.

1.4 Source, Nature, and Extent of Contamination

Investigations of the source and nature and extent of munitions items present at Volk Field were completed during the CSE Phase I and Phase II field investigations (Sky Research 2011) and the RI (Bay West 2015).

As summarized in Section 1.2, previous investigations include geophysical, analog, intrusive, and visual surveys and source sampling as the primary sources of data for this delineation effort. Data generated during the previous investigations indicate that MEC, MD, and MC may be present at the MRSs at Volk Field. Tables 1-1 and 1-2 summarize the sources and nature of potential MEC, MD, and MC contamination at the MRSs based on the RI (Bay West 2015). Figures 1-3 through 1-10 summarize the RI results and show the estimated extent of lead contamination for each MRS and the estimated extent of potential MEC, MD, or SAA for each MRS, as applicable.

Table 1-1: Potential MEC/MD Contamination

MRS	Reported Historic Munitions Use	MEC/MD Observed During the RI
Former Firing-in-Buttress #1 (FR501)	20 mm HE projectiles 75 mm projectiles .50 caliber ammunition	No MEC was observed; however, MD primarily from 20 mm HE projectiles was observed on the face of the impact berm inside the FIB structure.*
Former Rifle Range #1/Machine Gun Range (SR503)	small arms only	No MEC was observed. Small arms debris was observed in the impact area.
Former Rifle Range #5/Range #250 (SR503c)	40 mm grenades small arms ammunition	An intact 40 mm grenade was identified and MD from 40 mm grenades and small arms ammunition.
Former Small Arms Range #251 (SR504)	small arms only	No MEC was observed. Small arms debris was observed in the impact area.
Former Mortar/Artillery Range (MU505)	75 mm MK I projectiles 37 mm MK II projectiles 37 mm–155 mm projectiles	Three MEC (including a 75 mm MK 1 HE projectile, a partial 75 mm with pusher plate and expelling charge and a 37 mm MK II HE projectile) were identified, and MD was observed (the majority of the MD was from 75 mm projectiles) from expended ordnance ranging from 37 mm to 155 mm projectiles.
Former Small Arms Debris Area (SR506)	37 mm–155 mm projectiles	No MEC was observed during the RI; however, MD from ordnance ranging from 37 mm up to 155 mm projectiles was observed (the majority of the MD was from 75 mm projectiles).
Potential Civil War Era Impact Area (MU507)	75 mm–155 mm projectiles	One MEC item (an unfired Fuzed Practice 3 inch Stokes Mortar) was found and MD was observed (the majority of the MD was from the 75 mm projectiles) from 75 mm to 155 mm projectiles were observed.

Note: ***** Although MD from 75 mm projectiles was identified at the Former Firing-in-Buttress #1, MD from 20 mm HE was predominantly observed at the FIB. In the RI Report it was noted that 75 mm projectiles were not likely used at this MRS and MD from 75 mm projectiles were most likely deposited as fill material during the FIB construction.

Table 1-2: Potential MC Contamination

MRS	MC
Former Firing-in-Buttress #1 (FR501)	NA
Former Rifle Range #1/Machine Gun Range (SR503)	lead
Former Rifle Range #5/Range #250 (SR503c)	lead
Former Small Arms Range #251 (SR504)	lead
Former Mortar/Artillery Range (MU505)	NA
Former Small Arms Debris Area (SR506)	lead
Potential Civil War Era Impact Area (MU507)	NA
Note: NA = Not Applicable (based on MC concentrations relative to screening levels for residential soil)	

1.5 Analytical Data

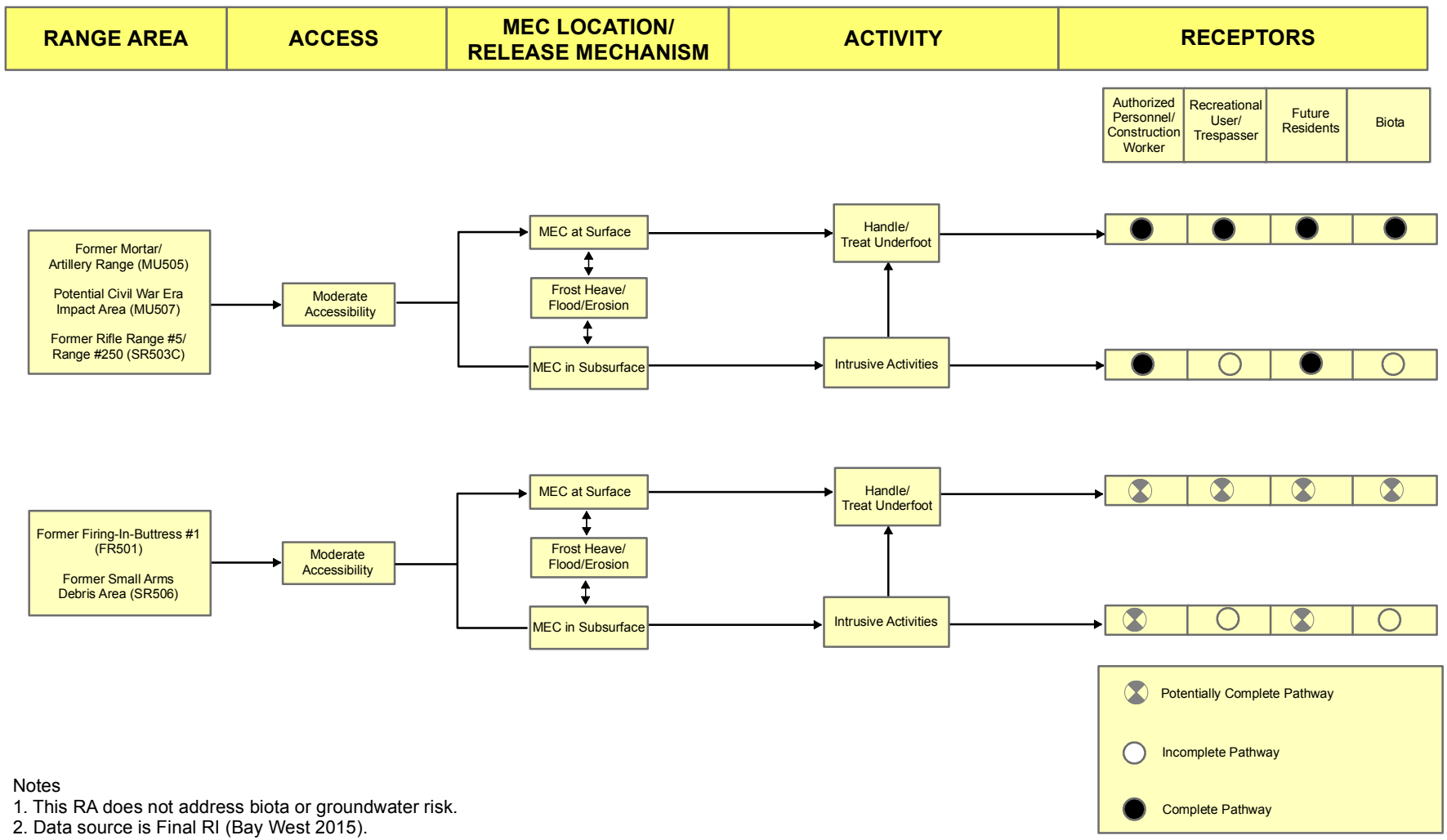
Previous investigations have been conducted at the MRSs, including a CSE Phase I and II (Sky Research 2011) and a RI (Bay West 2015). Sample documentation, visual survey observations, geophysical survey data, data validation reports, and a summary of the validated analytical data are presented in the Final CSE Phase II and the Final RI Report.

1.6 Streamlined Risk Evaluation

The RI presented detailed risk evaluations for MEC and MC. Conclusions from the RI human exposure risk evaluation are included below, as well as the conceptual site models (CSMs). Risk information for ecological receptors can be found in the Final RI Report (Bay West 2015).

1.6.1 MEC Exposure Pathway Analysis Conclusions

MEC investigation was performed during the RI. MEC was confirmed at the Former Rifle Range #5/Range #250 (SR503c) (40 mm grenade), Former Mortar/Artillery Range (MU505) (75-mm HE and 37 mm HE), and Potential Civil War Era Impact Area (MU507) (3-inch practice stokes). There is a complete MEC exposure pathway on the surface for all receptors (construction worker, trespasser, future resident, and biota), a complete MEC exposure pathway in the subsurface for the construction worker and future resident, and an incomplete MEC exposure pathway in the subsurface for the recreational user and biota at these MRSs. Evidence of historical munitions use was identified at the Firing-in-Buttress #1 (FR501) and the Former Small Arms Debris Area (SR506). The MEC exposure pathway on the surface for all receptors is potentially complete at these MRSs. The MEC exposure pathway in the subsurface is potentially complete for the construction worker and future resident and incomplete for the recreational user and biota at these MRSs. No evidence of MEC was identified at the Former Machine Gun Range/Range #1 (SR503) and the Former Small Arms Range #251 (SR504) and therefore, the pathways for potential MEC exposure are considered incomplete for all receptors at these MRSs. Figures 1-11 and 1-12 present the CSMs for MEC exposure based on the results of the RI (Bay West 2015).



Notes
1. This RA does not address biota or groundwater risk.
2. Data source is Final RI (Bay West 2015).

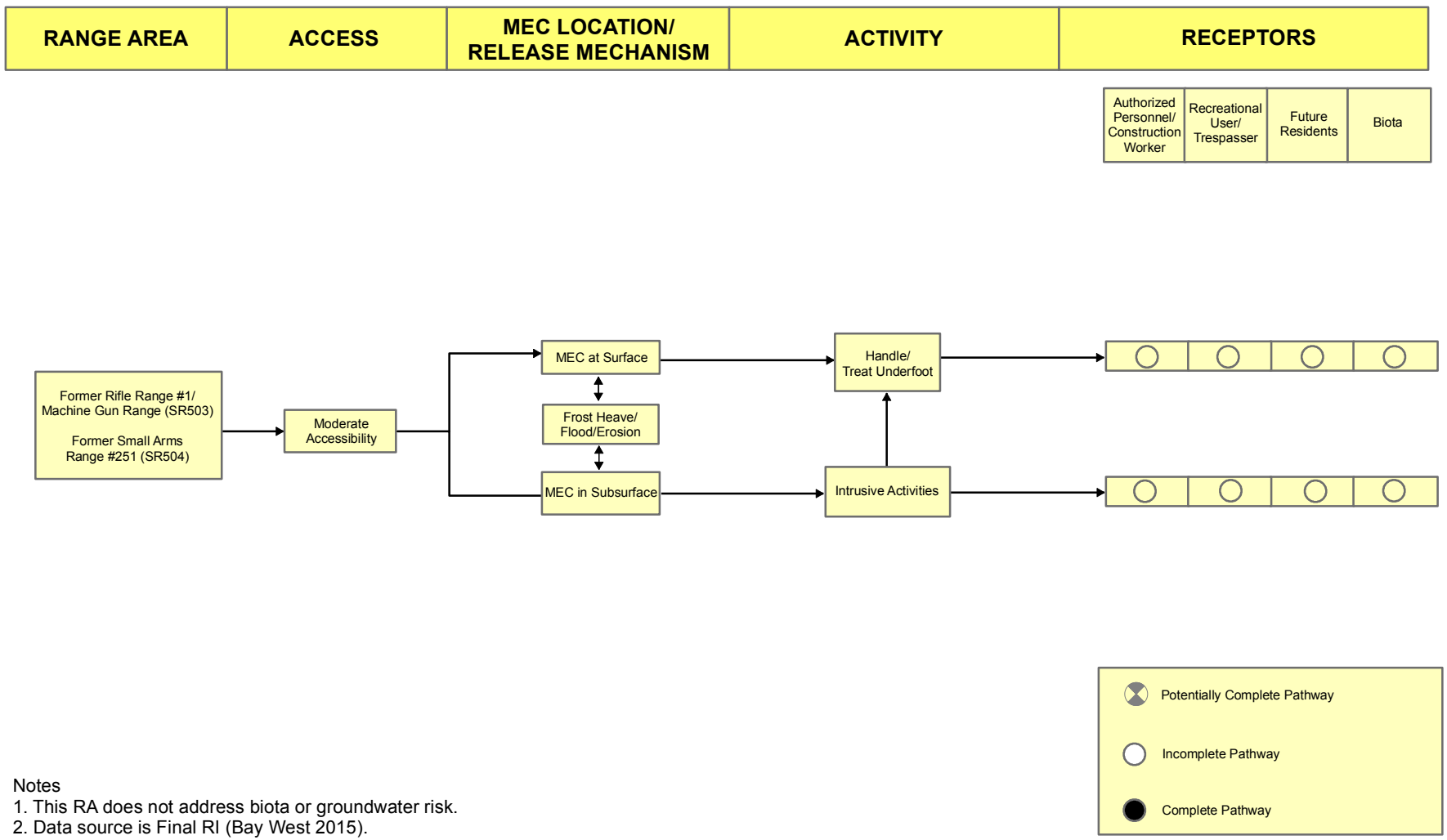
EA Engineering, Science, and Technology, Inc., PBC

VOLK FIELD CRTC
JUNEAU COUNTY, WISCONSIN

MEC CSM - COMPLETE OR POTENTIALLY COMPLETE EXPOSURE PATHWAYS

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
JMR	JRB	NDD	RT	--	FEB 2015	6246608	1-11

2015 -02-17 F:\Federal\DOD\USACE\PROJECTS\6246608 Volk Field IRA\C - Figures\GIS\1-11.mxd EA-Lincoln rsmith



Notes
1. This RA does not address biota or groundwater risk.
2. Data source is Final RI (Bay West 2015).

EA Engineering, Science, and Technology, Inc., PBC

VOLK FIELD CRTC
JUNEAU COUNTY, WISCONSIN

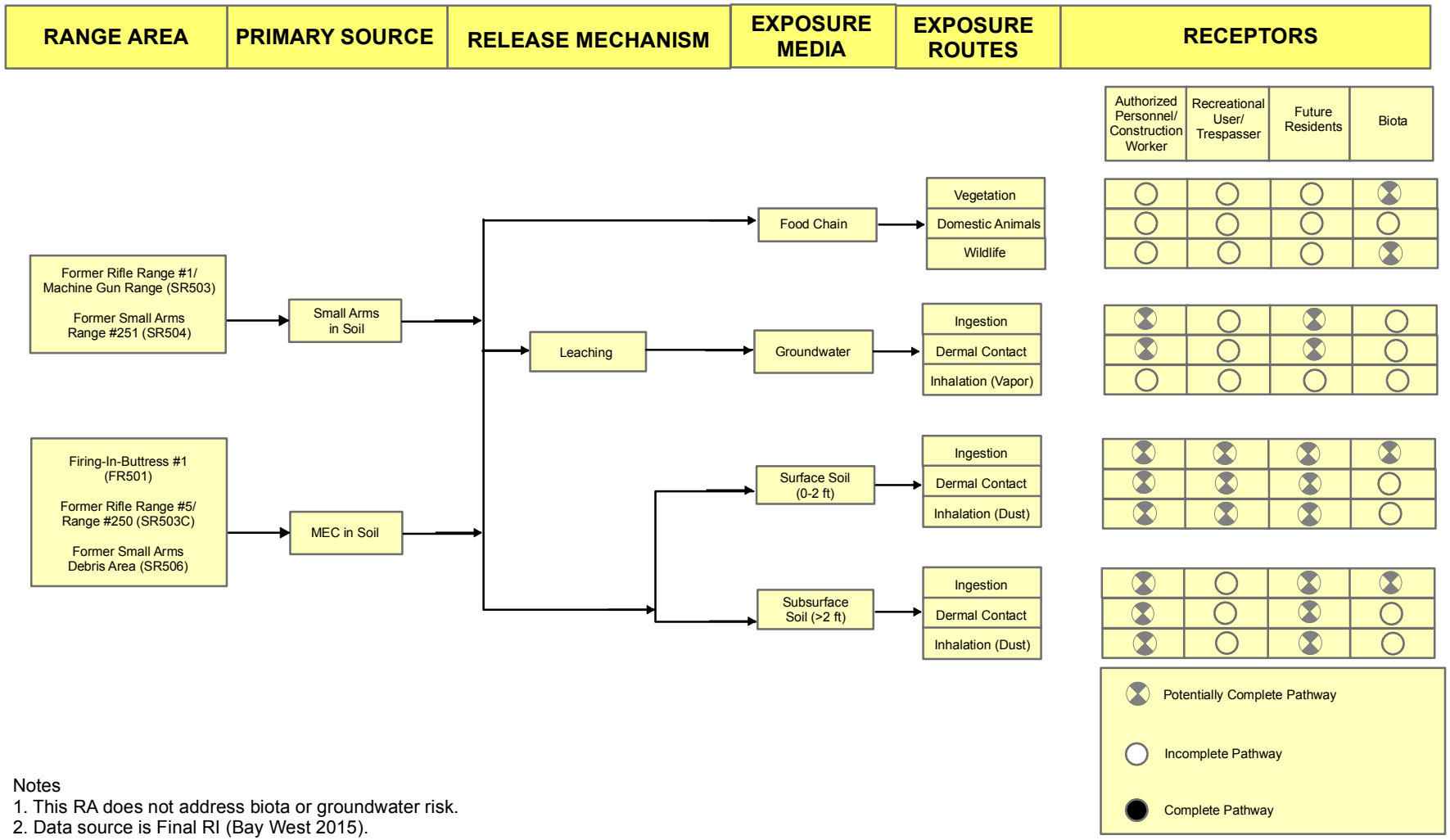
MEC CSM - INCOMPLETE EXPOSURE PATHWAYS

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
JMR	JRB	NDD	RT	--	FEB 2015	6246608	1-12

2015 -02-17 F:\Federal\DOD\USACE\PROJECTS\6246608 Volk Field IRA\C - Figures\GIS\1-12.mxd EA-Lincoln rsmith

1.6.2 MC Exposure Pathway Analysis Conclusions

Lead concentrations in surface soil exceeding screening levels for residential soil were identified at Former Rifle Range #1/Machine Gun Range (SR503), Former Rifle Range #5/Range #250 (SR503c), Former Small Arms Range #251 (SR504), and Former Small Arms Debris Area (SR506). Lead The exposure pathway is potentially complete for exposure to MC in surface soil for all receptors (construction worker, trespasser, future resident, and biota) at these MRSs. No MC was detected at the Former Mortar/Artillery Range (MU505) and Potential Civil War Era Impact Area (MU507) and therefore, the pathway for potential MC exposure is considered incomplete at these MRSs. MC CSMs are provided on Figures 1-13 and 1-14.



Notes
1. This RA does not address biota or groundwater risk.
2. Data source is Final RI (Bay West 2015).

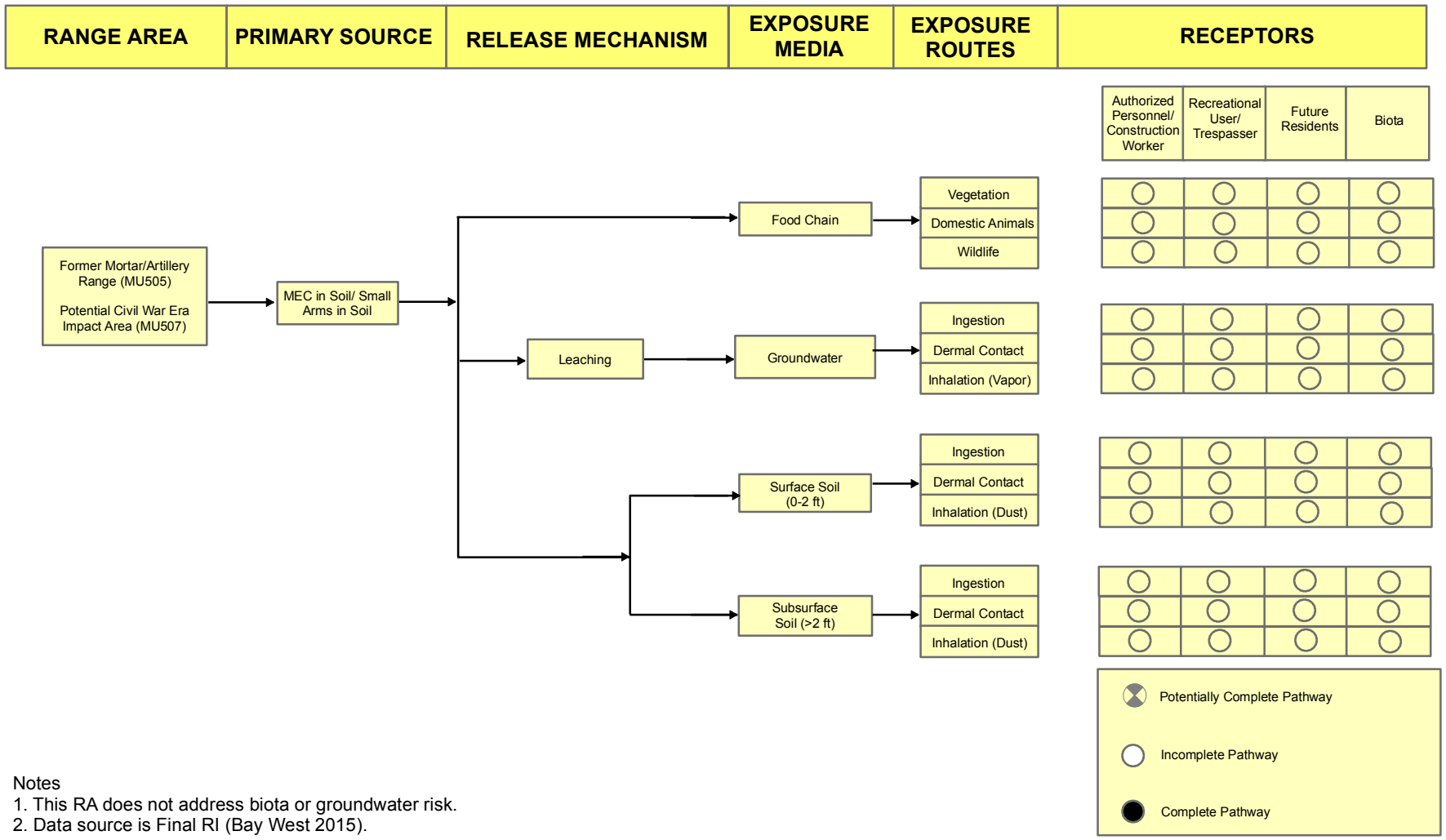
EA Engineering, Science, and Technology, Inc., PBC

VOLK FIELD CRTC
JUNEAU COUNTY, WISCONSIN

MC CSM - POTENTIALLY COMPLETE EXPOSURE PATHWAYS - HUMAN AND ECOLOGICAL

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
JMR	JRB	NDD	RT	--	FEB 2015	6246608	1-13

2015 -02-17 F:\Federal\DOD\USACE\PROJECTS\6246608 Volk Field IRA\C - Figures\GIS\1-13.mxd EA-Lincoln rsmith



Notes
1. This RA does not address biota or groundwater risk.
2. Data source is Final RI (Bay West 2015).

EA Engineering, Science, and Technology, Inc., PBC

VOLK FIELD CRTC
JUNEAU COUNTY, WISCONSIN

MC CSM - INCOMPLETE EXPOSURE PATHWAYS IDENTIFIED

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
JMR	JRB	NDD	RT	--	FEB 2015	6246608	1-14

2015-02-17 F:\Federal\DOD\USACE\PROJECTS\6246608 Volk Field IRA\C - Figures\GIS\1-14.mxd EA-Lincoln rsmith

2. IDENTIFICATION OF REMOVAL ACTION OBJECTIVES

2.1 Removal Action Scope and Goals

The scope of the IRA that is to remove MEC, MD, and lead contaminated soil from the accessible areas of the seven MRSs addressed in this EE/CA to allow for future residential land use. Ecological and groundwater risks will not be addressed as part of this IRA and may be included in future RAs. MRS removal action objectives (RAOs) are summarized in Table 2-1.

Table 2-1: Removal Action Objectives

MRS	Total Acreage	RA Objective(s)
Firing-in-Buttress #1 (FR501)	5	• Remove potential MEC and MD by excavating and sifting soil from berm within structure (approximately 0.5 acres).
Former Rifle Range #1/Machine Gun Range (SR503)	20.4	• Remove MD (including SAA) by excavating and sifting soil from the impact area (approximately 0.8 acres). • Remove soil exceeding 400 mg/kg lead from the impact area.
Former Rifle Range #5/Range #250 (SR503c)	51.1	• Remove MEC and MD (including SAA and MD from 40 mm grenades) via mag and dig (approximately 0.6 acres) • Remove MEC and MD from the rock face by blowing it off with air or mechanically sweeping soil and debris off the bluff towards the impact area. • Remove MEC and MD by excavating and sifting soil from the impact area (approximately 0.5 acres). • Remove soil exceeding 400 mg/kg lead from the impact area (approximately 0.5 acres).
Former Small Arms Range #251 (SR504)	13.2	• Remove MD (including SAA) from the impact area by excavating and sifting soil from the impact area (approximately 0.1 acres). • Remove soil exceeding 400 mg/kg lead from the impact area.

Table 2-1: Removal Action Objectives

MRS	Total Acreage	RA Objective(s)
Former Mortar/Artillery Range (MU505) (Excluding inaccessible areas)	9.2 (accessible areas to include 6.1 acres)	• Remove surface and subsurface MEC and MD from accessible areas of the MRS via mag and dig.
Former Small Arms Debris Area (SR506) (Excluding inaccessible areas)	0.48 (accessible areas to include 0.28 acres)	• Remove potential surface and subsurface MEC and MD from accessible areas of the MRS via mag and dig. • Excavate and remove soil exceeding 400 mg/kg lead.
Potential Civil War Era Impact Area (MU507) (Excluding inaccessible areas)	8.6 (accessible areas to include 8.1 acres)	• Remove surface and subsurface MEC and MD from accessible areas of the MRS via mag and dig.

2.2 Removal Schedule

The duration of the IRA field work is assumed to be three to four months following the commencement of remedy implementation. The tentative schedule for the Volk Field IRA is presented in Appendix A. These dates may be adjusted pending completion of the regulatory and public review and comment process and weather conditions during the IRA.

2.3 Planned Removal Activities

Components of this IRA will utilize standard soil excavation, armored soil excavation, sifting, stabilization, recycling and disposal operating procedures. Details concerning operating procedures will be provided in the Volk Field IRA Work Plan.

2.4 Applicable or Relevant and Appropriate Requirements

Applicable or Relevant and Appropriate Requirements (ARARs) require an analysis for applicability, relevance, and appropriateness. First, the requirement's applicability is determined. If the requirement is not applicable, an analysis is performed to determine whether it is both relevant and appropriate. When this analysis determines that a requirement is both relevant and appropriate, the requirement must be complied with to the same extent as if it were an applicable requirement.

Applicable requirements are those standards, and other substantive requirements, criteria, or limitations promulgated under federal environmental, state environmental, or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, IRA, location, or other

circumstance found at a site. Only standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable if they are consistently enforced.

The term "relevant and appropriate requirements" refers to standards, and other substantive requirements, criteria, or limitations promulgated under federal environmental, state environmental, or facility siting laws that, while not applicable to a hazardous substance, pollutant, contaminant, IRA, location, or other circumstance at a CERCLA site, such as a munitions response project, address problems or situations sufficiently similar to those encountered that their use is well suited to the particular site. Only standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be relevant and appropriate.

To be considered (TBC) criteria are advisories, or guidance issued by federal or state governments that are not legally binding and do not have the status of potential ARARs. However, in many circumstances TBCs may be considered along with ARARs as part of the site risk assessment and may be used in determining the necessary level of cleanup for protection of human safety, human health, or the environment.

EPA identifies three basic types of ARARs. They include the following: chemical-specific, action-specific, and location-specific.

2.4.1 Chemical-Specific ARARs

Chemical-specific ARARs are based on health- or risk-based concentration limits or discharge limitations in environmental media (i.e., air, soil, or water) for specific hazardous chemicals. The requirements may be used to set cleanup levels for the chemicals of concern in the designated media, or to set a safe level of discharge (e.g., air emission or wastewater discharge) where a discharge occurs as a part of the IRA.

2.4.2 Location-Specific ARARs

Location-specific ARARs are restrictions placed on the types of activities that may occur in particular locations. The location of a site may be an important characteristic in determining its impact on human health and the environment. Location-specific ARARs include federal requirements for wetlands protection and floodplain restrictions on management of hazardous waste.

2.4.3 Action-Specific ARARs

Action-specific ARARs generally set performance, design, or other similar operational controls or restrictions on particular activities related to management of hazardous substances or pollutants. These requirements address specific activities that are used to accomplish a remedy. Action-specific requirements do not in themselves determine the IRA; rather, they indicate how a selected removal action alternative (RAA) must be designed, operated, or managed.

Table 2-2 provides an evaluation of potentially applicable ARARs for the IRA at Volk Field.

Table 2-2: Potential ARARs

Chemical-Specific ARARs	Description	Comment
State of Wisconsin Soil Cleanup Standards (NR 720)	Establishes soil cleanup standards, for the remediation of soil contamination, which result in restoration of the environment to the extent practicable, minimize harmful effects to the air, lands and waters of the state and are protective of public health, safety and welfare, and the environment	Applicable for determining appropriate lead concentration for soil removal for future residential land use.
EPA Regional Screening Levels	Establishes risk-based screening levels for human health.	To be considered.
Location-Specific ARARs	**Description**	**Comment**
NA	NA	NA
Action-Specific ARARs	**Description**	**Comment**
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (40 CFR Part 264 Subpart X)	Establishes standards for owners and operators of hazardous waste treatment, storage, and disposal facilities.	Applicable to detonation of MEC onsite.

Note: NA – Not applicable, and not relevant and appropriate

3. IDENTIFICATION AND ANALYSIS OF REMOVAL ACTION ALTERNATIVES

The following RAAs were evaluated in this EE/CA:

- Alternative One: No Action
- Alternative Two: Land Use Controls
- Alternative Three: MEC/MD Removal and Lead Contaminated Soil Removal and Disposal for Residential Land Use.

3.1 Description of Removal Alternatives

IRA processes are included in alternatives except Alternative 1.

3.1.1 Alternative One: No Action

Alternative 1 assumes no action would be implemented. This alternative is required by the NCP and serves as a baseline against which other alternatives are compared.

3.1.2 Alternative Two: Land Use Controls

Alternative 2 includes Land Use Controls (LUCs) to protect potential receptors by restricting future land use. LUCs are used to limit risk by controlling exposure to MEC, MD, and lead contaminated soil using institutional or engineering controls. These controls would include deed restrictions limiting the use of properties, fences, signs, or other physical barriers to limit access to a contaminated site; and maintenance agreements or advisories issued to the public notifying them of the risks associated with contacting contaminated media. As part of LUCs, five-year reviews would be performed to ensure the LUCs remain effective to protect potential receptors. It was assumed five-year reviews would be conducted for 30 years and minimal maintenance would be required on fencing.

3.1.3 Alternative Three: MEC/MD Removal, Lead Contaminated Soil Removal and Disposal for Residential Land Use

For regulatory purposes the MRS boundaries have been defined as Areas of Contamination (AOC). Soil will be consolidated within the AOC and any treatment will be conducted within the AOC.

3.1.3.1 MEC

Alternative 3 includes surface clearance at 3 ranges, subsurface MEC/MD mag and dig removal at 5 ranges, and subsurface MEC, MD, and/or SAA sifting removal at 5 ranges. Figures 3-1 to 3-7 present the areas where the different types of removal actions will occur at each MRS.

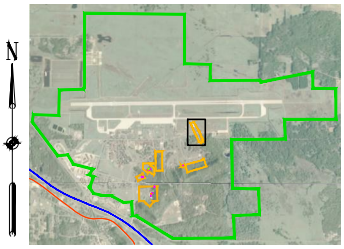
DATA SOURCE: BAY WEST RI, GIS FILES

200 100 0 200

GRAPHIC SCALE IN FEET

LEGEND

- MRS LOCATION
- MRS BOUNDARY
- INSTALLATION BOUNDARY
- SOIL SIFTING AREA



AERIAL IMAGE SOURCE: GOOGLE EARTH. (10/12/13). USDA FARM SERVICE AGENCY. [JANUARY 2014]

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC

VOLK FIELD CRTC
JUNEAU COUNTY, WISCONSIN

FORMER FIRING-IN-BUTTRESS #1 (FR501)
ALTERNATIVE 3
INTERIM REMOVAL ACTION

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
JMR	JRB	NDD	RT	AS SHOWN	FEB. 2015	6246608	3-1

DRAWING NAME: F:\Federal\DOD\USACE\PROJECTS\6246608 Volk Field IRA\C - Figures\CAD\EECA FIGURES.dwg
DATE:02/17/2015 TIME:15:24 DRAWN BY: jmather

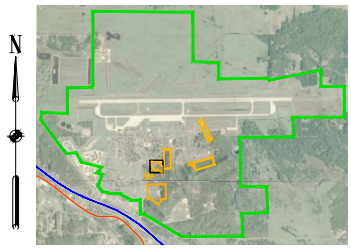
DATA SOURCE: BAY WEST RI, GIS FILES

100 50 0 100

GRAPHIC SCALE IN FEET

LEGEND

- MRS LOCATION
- MRS BOUNDARY
- INSTALLATION BOUNDARY
- SOIL SIFTING AREA
- LEAD CONC.>400 mg/kg -- 0-6 INCH
- LEAD CONC.>400 mg/kg -- 6-12 INCH
- LEAD CONC.>400 mg/kg -- 12-48 INCH



AERIAL IMAGE SOURCE: GOOGLE EARTH. (10/12/13). USDA FARM SERVICE AGENCY. [JANUARY 2014]

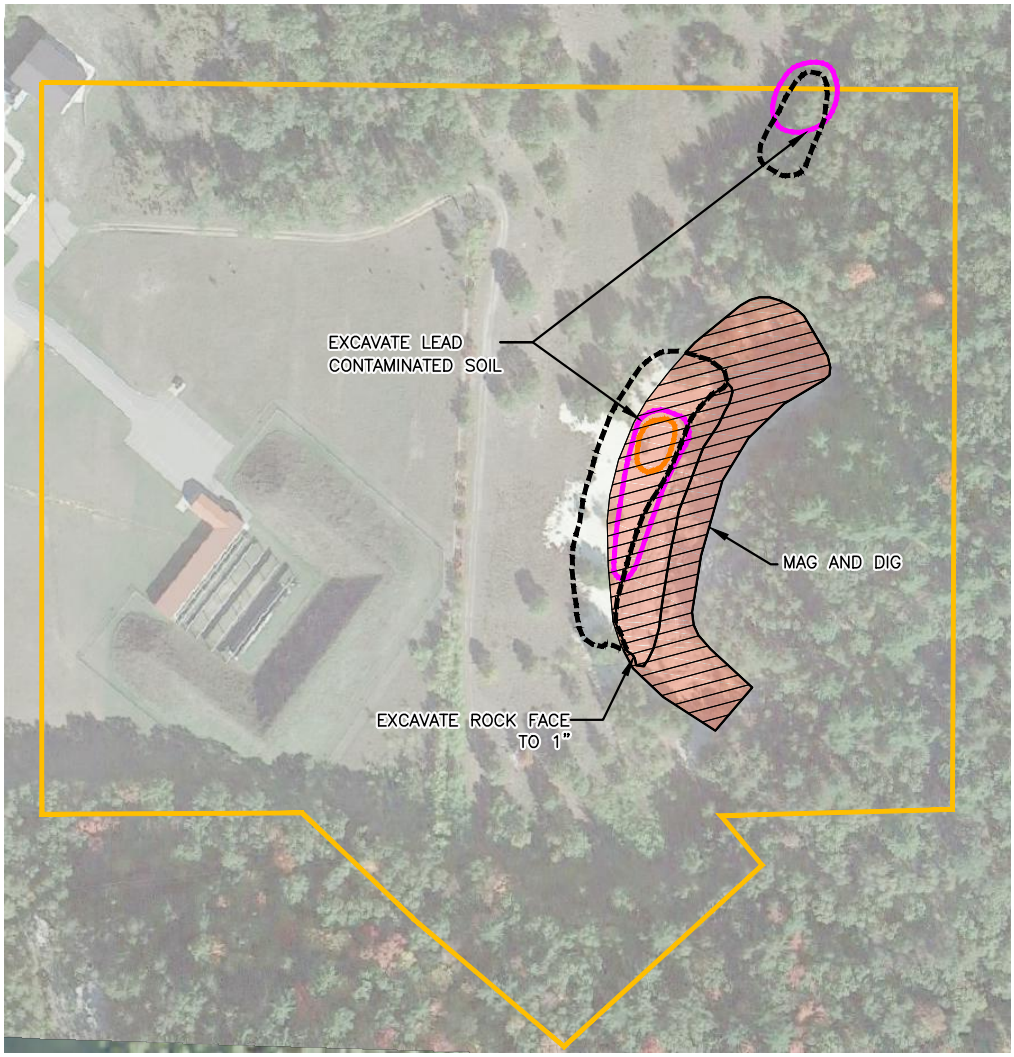
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC

VOLK FIELD CRTC
JUNEAU COUNTY, WISCONSIN

FORMER RIFLE RANGE #1/MACHINE GUN RANGE (SR503)
ALTERNATIVE 3
INTERIM REMOVAL ACTION

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
JMR	JRB	NDD	RT	AS SHOWN	FEB. 2015	6246608	3-2

DRAWING NAME: F:\Federal\DOD\USACE\PROJECTS\6246608 Volk Field IRA\C - Figures\CAD\EECA FIGURES.dwg
DATE:02/17/2015 TIME:15:24 DRAWN BY: jmather



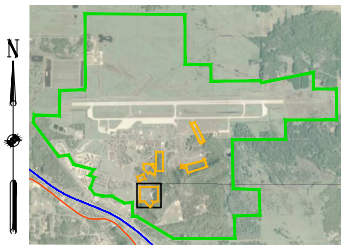
DATA SOURCE: BAY WEST RI, GIS FILES

200 100 0 200

GRAPHIC SCALE IN FEET

LEGEND

- MRS LOCATION
- MRS BOUNDARY
- INSTALLATION BOUNDARY
- SOIL SIFTING AREA
- EXPLOSIVE HAZARD AREA BOUNDARY (NOT FULLY INVESTIGATED)
- LEAD CONC.>400 mg/kg -- 0-6 INCH
- LEAD CONC.>400 mg/kg -- 0-48 INCH



AERIAL IMAGE SOURCE: GOOGLE EARTH. (10/12/13). USDA FARM SERVICE AGENCY. [JANUARY 2014]

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC

VOLK FIELD CRTC
JUNEAU COUNTY, WISCONSIN

FORMER RIFLE RANGE #5/RANGE #250 (SR503C)
ALTERNATIVE 3
INTERIM REMOVAL ACTION

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
JMR	JRB	NDD	RT	AS SHOWN	FEB. 2015	6246608	3-3

DRAWING NAME: F:\Federal\DOD\USACE\PROJECTS\6246608 Volk Field IRA\C - Figures\CAD\EECA FIGURES.dwg
DATE:02/17/2015 TIME:15:24 DRAWN BY: jmather

DATA SOURCE: BAY WEST RI, GIS FILES

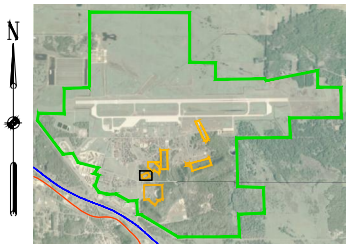
100 50 0 100

GRAPHIC SCALE IN FEET

N

LEGEND

- MRS LOCATION
- MRS BOUNDARY
- INSTALLATION BOUNDARY
- SOIL SIFTING AREA
- LEAD CONC.>400 mg/kg -- 0-6 INCH



AERIAL IMAGE SOURCE: GOOGLE EARTH. (10/12/13). USDA FARM SERVICE AGENCY. [JANUARY 2014]

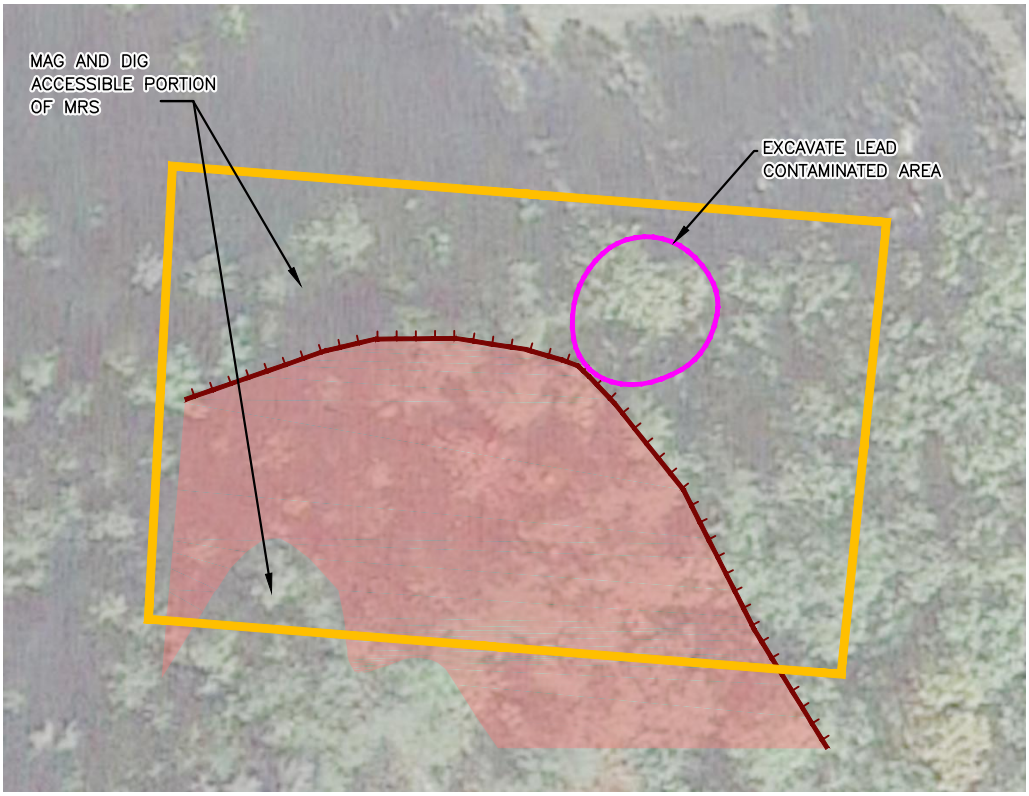
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC

VOLK FIELD CRTC
JUNEAU COUNTY, WISCONSIN

FORMER SMALL ARMS RANGE #251 (SR504)
ALTERNATIVE 3
INTERIM REMOVAL ACTION

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
JMR	JRB	NDD	RT	AS SHOWN	FEB. 2015	6246608	3-4

DRAWING NAME: F:\Federal\DOD\USACE\PROJECTS\6246608 Volk Field IRA\C - Figures\CAD\EECA FIGURES.dwg
DATE:02/17/2015 TIME:15:24 DRAWN BY: jmather



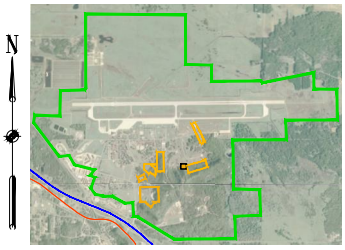
DATA SOURCE: BAY WEST RI, GIS FILES

50 25 0 50

GRAPHIC SCALE IN FEET

LEGEND

- MRS LOCATION
- MRS BOUNDARY
- INSTALLATION BOUNDARY
- CLIFF FACE
- INACCESSIBLE AREA
- SOIL SIFTING AREA
- LEAD CONC.>400 mg/kg -- 0-6 INCH



AERIAL IMAGE SOURCE: GOOGLE EARTH. (10/12/13). USDA FARM SERVICE AGENCY. [JANUARY 2014]

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC

VOLK FIELD CRTC
JUNEAU COUNTY, WISCONSIN

FORMER SMALL ARMS DEBRIS AREA (SR506)
ALTERNATIVE 3
INTERIM REMOVAL ACTION

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
JMR	JRB	NDD	RT	AS SHOWN	FEB. 2015	6246608	3-5

DRAWING NAME: F:\Federal\DOD\USACE\PROJECTS\6246608 Volk Field IRA\C - Figures\CAD\EECA FIGURES.dwg
DATE:02/17/2015 TIME:15:24 DRAWN BY: jmather

DATA SOURCE: BAY WEST RI, GIS FILES

LEGEND

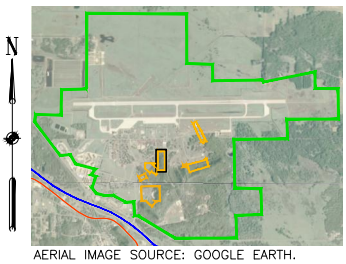
- MRS LOCATION
- MRS BOUNDARY
- INSTALLATION BOUNDARY
- INACCESSIBLE AREA
- CLIFF FACE

NOTE:
MAG AND DIG ENTIRE MRS AREA EXCEPT INACCESSIBLE PORTIONS OF MRS.

N

150 75 0 150

GRAPHIC SCALE IN FEET



AERIAL IMAGE SOURCE: GOOGLE EARTH. (10/12/13). USDA FARM SERVICE AGENCY. [JANUARY 2014]

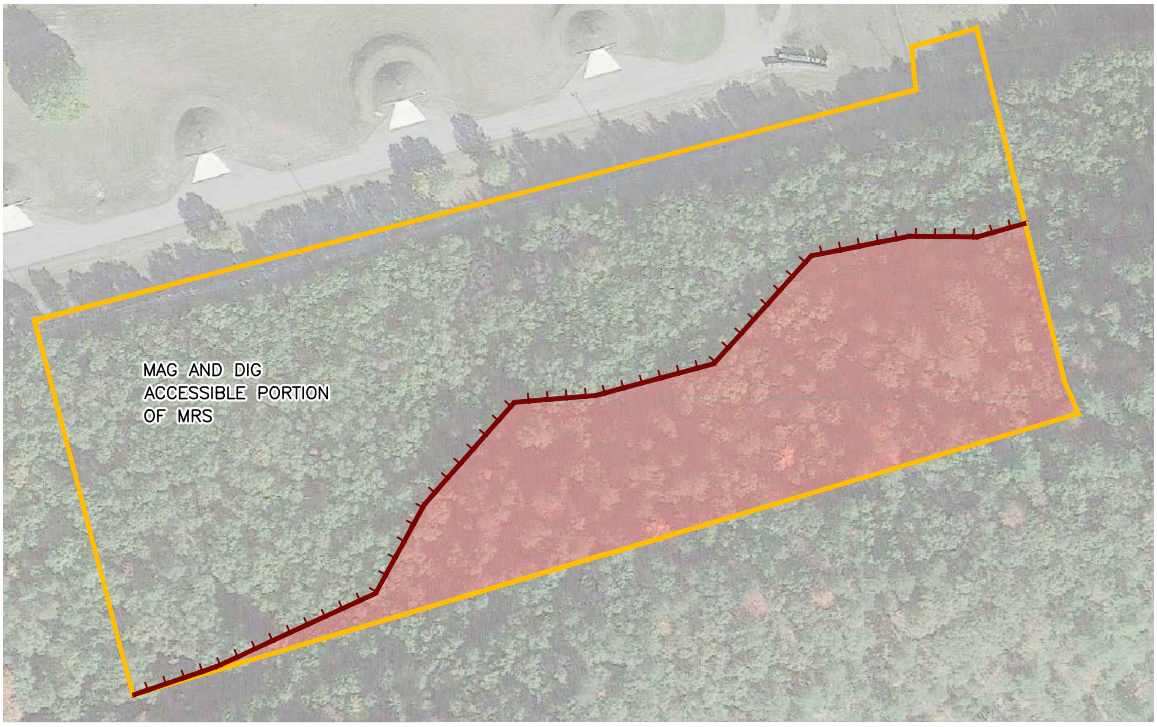
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC

VOLK FIELD CRTC
JUNEAU COUNTY, WISCONSIN

POTENTIAL CIVIL WAR ERA IMPACT AREA (MU507)
ALTERNATIVE 3
INTERIM REMOVAL ACTION

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
JMR	JRB	NDD	RT	AS SHOWN	FEB. 2015	6246608	3-6

DRAWING NAME: F:\Federal\DOD\USACE\PROJECTS\6246608 Volk Field IRA\C - Figures\CAD\EECA FIGURES.dwg
DATE:02/17/2015 TIME:15:24 DRAWN BY: jmather



DATA SOURCE: BAY WEST RI, GIS FILES

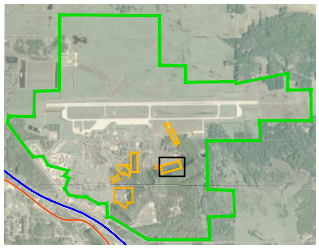
200 100 0 200

GRAPHIC SCALE IN FEET

N

LEGEND

- MRS LOCATION
- MRS BOUNDARY
- INSTALLATION BOUNDARY
- INACCESSIBLE AREA
- CLIFF FACE



AERIAL IMAGE SOURCE: GOOGLE EARTH. (10/12/13). USDA FARM SERVICE AGENCY. [JANUARY 2014]

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC., PBC

VOLK FIELD CRTC
JUNEAU COUNTY, WISCONSIN

FORMER MORTAR/ARTILLERY RANGE (MU505)
ALTERNATIVE 3
INTERIM REMOVAL ACTION

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT NO	FIGURE
JMR	JRB	NDD	RT	AS SHOWN	FEB. 2015	6246608	3-7

DRAWING NAME: F:\Federal\DOD\USACE\PROJECTS\6246608 Volk Field IRA\C - Figures\CAD\EECA FIGURES.dwg
DATE:02/17/2015 TIME:15:24 DRAWN BY: jmather

Alternative 3 includes the following tasks for each MRS to address potential MEC contamination:

Former Firing-in-Buttress #1 (FR501)

- Excavation and subsurface sifting clearance of the impact berm in the FIB #1 structure (approximately 400 cy)
- MEC and/or MD will be removed from the soil in the berm via sifting
- FIB #1 Structure will remain.
- Replace sifted soil.

Former Rifle Range #1/Machine Gun Range (SR503)

- Delineate impact area
- Clear trees as needed
- Visual surface clearance over 0.8 acres
- Excavation and subsurface sifting clearance over 0.8 acres
- MD (including SAA) will be removed via sifting.

Former Rifle Range #5/Range #250 (SR503c)

- Delineate impact area
- Clear trees as needed
- Blow soil and debris off rock face bluff towards the impact area for sifting
- Visual surface clearance over 0.5 acres
- Excavation and subsurface sifting clearance over 0.5 acres.
- Subsurface mag and dig clearance over 0.6 acres
- MEC and/or MD (including SAA) will be removed via sifting.

Former Small Arms Range #251 (SR504)

- Delineate impact area
- Clear trees as needed
- Visual surface clearance over 0.3 acres
- Excavation and subsurface sifting clearance over 0.1 acres
- MD (including SAA) will be removed via sifting.

Former Mortar/Artillery Range (MU505)

- Surface and subsurface mag and dig clearance over 6.1 acres
- MEC and/or MD will be removed.

Former Small Arms Debris Area (SR506)

- Delineate impact area
- Clear trees as needed
- Surface and subsurface mag and dig clearance over 0.28 acres
- Excavation clearance over 0.03 acres
- MEC and/or MD will be removed.

Potential Civil War Era Impact Area (MU507)

- Surface and subsurface mag and dig clearance over 8.1 acres
- MEC and/or MD will be removed.

During the surface clearance, visible MPPEH will be inspected and removed from the ground surface, where feasible. If MEC is identified, it will be disposed of through open detonation on-site. MD will remain in place and will later be removed by sifting excavated soils during the subsurface sifting clearance, or during subsurface mag and dig clearance. MD will be moved to a central location, within the MRS, for shipping to a recycling facility.

Previous MEC investigations have not been conducted at Former Rifle Range #5/Range #250, due to the high volume of MEC anticipated in this MRS. At Former Rifle Range #5/Range #250, UXO Technicians will conduct an analog magnetometer assisted delineation to identify the limits of the impact area prior to removing MEC and/or MD.

The mag and dig approach will be used to conduct a subsurface clearance at Former Mortar/Artillery Range, Potential Civil War Era Impact Area, Former Rifle Range #5/Range #250, and the Former Small Arms Debris Area. If MEC is identified, it will be detonated on-site. Post-BIP sampling for MC explosives will be conducted. Inspected and certified MD will be moved to a central location, within the MRS, for shipping as Material Documented as Safe (MDAS) to a recycling facility.

Subsurface sifting clearance at FIB #1, Former Rifle Range #1/Machine Gun Range, Former Small Arms Range #251, and Former Rifle Range #5/Range #250 will be accomplished by excavating, and sifting to remove MEC and/or MD. If MEC is identified, it will be detonated on-site. After sifting at the Former Rifle Range #1/Machine Gun Range, Former Small Arms Range #251, and Former Rifle Range #5/Range #250, the soil will be consolidated within the MRS for further evaluation of lead contamination. Note: Due to the limited area/volume of the former Small Arms Debris Area, it will be cleared of MEC and/or MD via magnetometer and dig and not sifted. After sifting at FIB #1, the soil will be consolidated within the MRS and left in place. Inspected and certified MD will be moved to a central location, within the MRS, for shipping as MDAS to a recycling facility.

3.1.3.2 MC (Lead)

After MEC and/or MD and/or SAA has been removed from Former Small Arms Debris Area, Former Rifle Range #5/Range #250, Former Rifle Range #1/Machine Gun Range, and Former Small Arms Range #251, these MRSs will undergo remediation for lead contaminated soil. Lead contaminated soil exceeding 400 mg/kg for total lead will be disposed of off-site after Toxicity

Characteristic Leaching Procedure (TCLP) testing. Figures 3-1 to 3-7 present the proposed excavation areas and depths for each MRS prior to subsurface sifting clearances.

Based on previous lead sampling and analysis, limits of lead contamination will be identified and additional lead analysis may be conducted to refine the limits within the four MRSs requiring lead remediation. The lead contaminated soil will be excavated, stabilized (if needed to pass TCLP), and disposed of at an off-site landfill. Excavated soil will be consolidated in the AOC. It is assumed that the contaminated soil will not be a characteristic hazardous waste (i.e., TCLP lead $\leq$ 5.0 mg/L) after stabilization within the AOC.

Where applicable, stabilization will be conducted using an industry accepted and proven stabilizer product for lead contaminated soils (a phosphate-based reagent or equivalent). The stabilizer will be blended into the soil piles using earth moving equipment (i.e. loader or excavator). Prior to on-site stabilization activities, testing of potential stabilization products will be conducted using samples of site soil to evaluate the effectiveness of the stabilizers and determine the appropriate product given the local soil conditions (i.e., soil type, lead concentrations, pH, etc.).

Alternative 3 includes the following tasks for each MRS to address potential MC contamination:

Former Rifle Range #1/Machine Gun Range (SR503)

- Replace sifted soil with total lead concentrations less than 400 mg/kg.
- Excavate ~360 cy from ~12,200 square feet (sqft) of the MRS soil.
- Stabilize (if needed), and dispose of soil with lead concentrations equal to or greater than 400 mg/kg.

Former Rifle Range #5/Range #250 (SR503c)

- Replace sifted soil with total lead concentrations less than 400 mg/kg.
- Excavate ~410 cy from ~10,700 sqft of the MRS soil.
- Stabilize (if needed), and dispose of soil with lead concentrations equal to or greater than 400 mg/kg.

Former Small Arms Range #251(SR504)

- Replace sifted soil with total lead concentrations less than 400 mg/kg.
- Excavate ~130 cy from ~6,900 sqft of the MRS soil.
- Stabilize (if needed), and dispose of soil with lead concentrations equal to or greater than 400 mg/kg.

Former Small Arms Debris Area (SR506)

- Replace soil with total lead concentrations less than 400 mg/kg.
- Excavate ~20 cy from ~1,100 sqft of the MRS soil.
- Stabilize (if needed), and dispose of soil with lead concentrations equal to or greater than 400 mg/kg.

Lead confirmation samples will be analyzed to verify excavation operations removed the lead contaminated soil exceeding the WI Not-To-Exceed Non-Industrial Direct Contact (DC) Residual Contaminant Level (RCL) of 400 mg/kg. Average excavation depths are minimal and range from 6 to 10 inches. Excavated areas will be blended to existing topography to the extent practical to minimize the need for backfill. If backfill is required where lead contaminated soil was excavated, clean fill from off-site sources will be used. Soil that is uncontaminated, but excavated and sifted to remove MD and SAA, and after laboratory testing confirmation, may be returned to the excavations from which they originated. Disturbed areas will be restored to approximate pre-RA conditions. Tree clearing is considered minimal and will not require reforestation.

3.1.4 Analysis of Removal Alternatives

As stated in EPA guidance (EPA 1993), RAs are evaluated against the short- and long-term aspects of three broad criteria:

- Effectiveness
- Implementability
- Cost.

The sub-criteria used to evaluate each alternative are listed below and are discussed in the paragraphs that follow:

- Protectiveness
- Ability to achieve removal objectives
- Technical feasibility
- Administrative feasibility
- Availability
- Cost.

3.1.5 Effectiveness

3.1.5.1 Overall Protection of Human Health and the Environment

This criterion assesses whether each alternative provides adequate protection of human health and the environment. The overall assessment of protection considers the alternative's long-term effectiveness, permanence, short-term effectiveness, and compliance with ARARs. The evaluation of protectiveness focuses on the reduction or elimination of site risks by the proposed remedial alternative. This criterion is considered a threshold and must be met by the selected alternative.

Alternative 1 (No Action) is the baseline (and current) condition. It does not provide any protection of human health and the environment.
Alternative 2 (LUCs) provides protection of human health by reducing the potential for human exposure to MEC and lead contaminated soil by controlling access. This alternative does not provide protection of the environment. However, the LUCs alternative does not meet the RAOs for removal of MEC and/or MD and lead contaminated soil.

Alternative 3 (MEC/MD Removal, and Lead Contaminated Soil Removal and Disposal for Residential Land Use) provides protection of human health by completely removing MEC/MD and lead-contaminated soil that has been determined to result in a potential human health risk for residential use. This alternative does not provide protection to the environment, but does meet the RAOs.

3.1.5.2 Compliance with ARARs

This criterion is used to evaluate whether each alternative will meet the federal and state ARARs identified or whether there is justification for waiving one or more ARARs. This criterion is also a threshold that must be met by the alternative selected.

Alternative 1 will not comply with ARARs as it leaves the MEC, MD, and lead contaminated soil in place which allows for receptors to contact the hazard. Alternative 2 complies with ARARs, but would require future LUCs that would not allow for residential use of the MRSs. Alternative 3 is able to meet and comply with applicable ARARs.

3.1.5.3 Long-Term Effectiveness and Permanence

Each alternative is evaluated in terms of risk that remains at the MRSs after the RAOs have been met. The primary focus of this evaluation is the extent and effectiveness of controls used to manage the risk posed by treatment residuals or untreated wastes. Long-term effectiveness is one of the balancing criteria. The following factors will be considered in evaluating this criterion:

- Adequacy of remedial controls
- Reliability of remedial controls
- Magnitude of the residual risk.

Alternative 1 will not effectively mitigate the source of the contamination. Alternative 2 will use LUCs to prevent human contact with MEC, MD, and lead contaminated soil as long as the LUCs are enforced and complied with. Alternative 3 will effectively mitigate the sources of contamination at each MRS and reduce the explosive hazards and/or environmental risks in the long-term as the lead contaminated soil will stabilized and/or removed and disposed of in a landfill and the accessible explosive hazards will be removed. Alternative 3 will reduce the explosive hazards and/or environmental risks at the seven MRSs. As recommended in the Final RI Report following the IRA (Alternative 3), explosive hazards and environmental risks associated with each MRS should be recalculated to determine the next appropriate action in accordance with the CERCLA process (e.g., developing the Decision Document, Proposed Plan, etc.).

3.1.5.4 Reduction of Toxicity, Mobility or Volume through Treatment

This evaluation criterion addresses the CERCLA statutory preference for treatment options that permanently and significantly reduce the toxicity, mobility, or volume of the contaminants. The preference is satisfied when treatment reduces the principal threats through the following:

- Destruction of toxic contaminants
- Reduction in contaminant mobility
- Reduction in the total mass of toxic contaminants
- Reduction in the total volume of contaminated media.

Although CERCLA includes a statutory preference for treatment, this criterion is not a threshold that must be met.

Alternatives 1 and 2 do not reduce the toxicity, mobility or volume through treatment (TMV) at the site and the source of the hazards would remain in place. Alternative 3 reduces TMV through MEC, MD removal, and lead contaminated soil removal and disposal.

3.1.5.5 Short-Term Effectiveness

This evaluation criterion addresses the effects of the alternative during the construction and implementation phase until the RAO is met. Under this criterion, alternatives are evaluated for their effects on human health and the environment during implementation of the IRA. The following factors will be considered:

- Exposure of the community during implementation
- Exposure of workers during construction
- Environmental impacts
- Time to achieve RAOs.

Alternative 1 assumes no change and contamination would remain as is. Alternative 2 would require several weeks to install fences and signs and file deed restrictions. Alternative 3 would require several months, dependent upon how quickly planning documents could be developed and approved, and the MRSs remediated.

None of the action alternatives would pose a significant risk to the community. Dust control measures will be implemented to control potential airborne contamination to the community. Alternatives 2 and 3 may pose some physical hazards for workers, mostly characteristic of a typical construction site and MEC remediation. Exposure hazards would be reduced through a properly implemented health, safety, and monitoring program. Work zone and access restrictions may be required during implementation of Alternatives 2 and 3.

3.1.6 Implementability

This criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials that may be required during its implementation. The following factors were considered:

- Ability to construct the technology
- Monitoring requirements
- Availability of equipment and specialists
- Ability to obtain approvals from regulatory agencies.

Alternative 1 has no action to implement. Alternative 2 would require advance notice for a fence company to install a fence around the MRSs and time for implementing deed notices and restrictions. Alternative 3 will require advanced notice for a remediation company to be contracted to execute the MEC/MD removal, lead contaminated soil removal and disposal, and coordination with Volk Field.

3.1.6.1 Technical Feasibility

There are no technical feasibility concerns associated with the Alternatives.

3.1.6.2 Administrative Feasibility

There are no administrative feasibility concerns associated with Alternative 1 because there are no actions performed. It is assumed that Alternatives 2 and 3 are administratively feasible.

3.1.6.3 Availability of Services and Materials

No availability of services and materials concerns is associated with Alternative 1 because there are no actions performed. Services and materials for Alternatives 2 and 3 are readily available with a few weeks to month advance notice.

3.1.6.4 Regulatory Acceptance

WDNR will conduct a review of the Draft Final EE/CA Report. Comments will be incorporated into the Final EE/CA Report.

3.1.6.5 Community Acceptance

Since the public has not yet been provided an opportunity to review the detailed analysis of removal alternatives, no formal comments are available for evaluation of community acceptance at this time. However, the public will be provided a 30 day comment period to review the Final EE/CA Report. Following the 30 day review period, the Project Team will review and provide a written response to significant comments in the administrative record file and will incorporate these comments in to Action Memorandum, as needed, to provide sufficient detail to justify the selected alternative.

3.1.7 Cost

Alternatives were costed for an IRA duration of 4 months and include costs for the five-year reviews required for the LUCs associated with Alternative 2. Alternative 1 is the baseline against which the other alternatives were compared. As such, no costs are associated with Alternative 1. Remedial Action Cost Engineering and Requirements (RACER) Software Version 11.1.12.0 was used for cost estimating. Additional cost information is provided in Appendixes B (Interim Removal Action Cost Estimate Summary – Present Value) and C (RACER Cost Backup). Costs are estimated for direct capital, indirect capital and annual post-removal site control costs.

- Direct capital costs are costs directly associated with conducting the action.
- Indirect capital costs are costs such as engineering costs and permit fees that are required in order to get the action in place but not directly associated with executing the action.
- Annual post-removal site control costs are costs such as operations and maintenance costs for interim controls, land use controls, and monitoring, which are incurred when the removal action does not sufficiently reduce site risks.

3.1.7.1 Alternative 2: Land Use Controls

- Capital Costs
  - Indirect Capital = $ 198,583
  - Direct Capital = $313,742
- Operation & Maintenance Costs
  - Five-Year Reviews (present value) = $ 105,728
- **Total Present Value = $ 618,053**

3.1.7.2 Alternative 3: MEC/MD Removal, and Lead Contaminated Soil Removal and Disposal for Residential Land Use

- Capital Costs
  - Indirect Capital = $ 97,371
  - Direct Capital = $3,100,5810
- Operation & Maintenance Costs
  - Five-Year Reviews (present value) = $0
- **Total Present Value = $ 3,197,951**

4. COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES

This chapter evaluates the RAAs developed in Chapter 3 using EPA's EE/CA guidance and Engineering Pamphlet (EP) 1110-1-18 (EPA 1993 and USACE 2000).

The information presented in Table 4-1 summarizes the relative advantages and disadvantages of each alternative, as well as relative costs of each, as discussed in Chapter 3. The three alternative for each the MRSs were compared against the following criteria: protection of human health and the environment, compliance with ARARs, long-term effectiveness and permanence, short-term effectiveness, reduction of toxicity, mobility or volume through treatment, implementability, and cost. The MRSs are grouped into three categories 1) MRSs with potential MEC hazards only, 2) MRSs with potential MEC hazards and lead contamination and 3) MRSs with SAA and lead contamination. This information can be used to make conclusions concerning the most appropriate RAAs for Volk Field.

Table 4-1
Comparative Analysis Summary by Alternative

Criterion	Alternative		
	1: No Action	**2: Land Use Controls**	**3: MEC/MD Removal, and Lead Contaminated Soil Removal and Disposal for Residential Land Use**
(NOTE: Alternatives ranked relative to each other with the best rating scored with a 1 and the worst rating scored with a 3. Comparable alternatives are ranked with the same score.)			
MRSs with potential MEC hazards only: Former Firing-In-Buttress #1 (FR501), Former Mortar/Artillery Range (MU505), and Potential Civil War Era Impact Area (MU507)			
Protection of Human Health & the Environment	3	1	1
Compliance with ARARs	3	1	1
Long-Term Effectiveness & Permanence	3	1	1
Short-Term Effectiveness	3	1	1
Reduction of Toxicity, Mobility or Volume through Treatment	3	3	1
Implementability	1	2	3
Present Value	1	2	3
MRSs with potential MEC hazards and lead contamination: Former Rifle Range #5/Range #250 (SR503c) and Former Small Arms Debris Area (SR506)			
Protection of Human Health & the Environment	3	2	1
Compliance with ARARs	3	2	1
Long-Term Effectiveness & Permanence	3	2	1
Short-Term Effectiveness	3	2	1
Reduction of Toxicity, Mobility or Volume through Treatment	3	3	1

Criterion	Alternative		
	1: No Action	**2: Land Use Controls**	**3: MEC/MD Removal, and Lead Contaminated Soil Removal and Disposal for Residential Land Use**
(NOTE: Alternatives ranked relative to each other with the best rating scored with a 1 and the worst rating scored with a 3. Comparable alternatives are ranked with the same score.)			
Implementability	1	2	3
Present Worth Cost	1	2	3
MRSs with SAA and lead contamination: Former Rifle Range #1/Machine Gun Range (SR503) and Former Small Arms Rang e#251 (SR504)			
Protection of Human Health & the Environment	3	2	1*
Compliance with ARARs	3	2	1
Long-Term Effectiveness & Permanence	3	2	1
Short-Term Effectiveness	3	1	1
Reduction of Toxicity, Mobility or Volume through Treatment	3	3	1
Implementability	1	2	3
Present Value	1	2	3
* Alternative is protective of human health for residential exposure to soil, but does not address ecological or groundwater risk.			

This page intentionally left blank

5. RECOMMENDED REMOVAL ACTION ALTERNATIVE

This EE/CA presents the selected removal alternative for the MRSs at Volk Field, developed in accordance with CERCLA as amended and consistent with the NCP. Based on the comparative analysis of alternatives, it was determined that Alternative 3: MEC/MD Removal, and Lead Contaminated Soil Removal and Disposal for Residential Land Use is the preferred alternative that meets ARARs and RAOs.

Alternative 3 will effectively mitigate the sources of contamination at each MRS and reduce the explosive hazards and/or environmental risks in the long-term as the lead contaminated soil will stabilized and/or removed and disposed of in a landfill and the accessible explosive hazards will be removed. Alternative 3 will reduce the explosive hazards and/or environmental risks at the seven MRSs. As recommended in the Final RI Report following the IRA (Alternative 3), explosive hazards and environmental risks associated with each MRS should be recalculated to determine the next appropriate action in accordance with the CERCLA process (e.g., developing the Decision Document, Proposed Plan, etc.).

Conditions of the site meet the NCP Section 300.415(b)(2) criteria for an IRA and approval of the proposed IRA is recommended. The total project cost, if activities associated with Alternative 3 are approved and implemented, is estimated to be ~$3,197,951.

This page intentionally left blank.

6. REFERENCES

Bay West. 2015. Final Remedial Investigation Report, Volk Field Combat Readiness Training Center, Camp Douglas, Wisconsin. January.

DoD. 2011. Unified Facilities Criteria 3-301-01, Structural Engineering, 31 January 2011.

EPA. 1993. "Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA." EPA540-R93-057. August.

Sky Research. 2011. Comprehensive Site Evaluation Phase II, Final CSE Phase II Desktop Report, Volk Field Combat Readiness Training Center, Wisconsin. February.

U.S. Army Corps of Engineers (USACE). 2000. Engineering Pamphlet (EP) 1110-1-18, Ordnance and Explosives Response. 24 April 2000.

WIANG. 2007. Volk Field Air National Guard Base Fact Sheet. May, 2007.

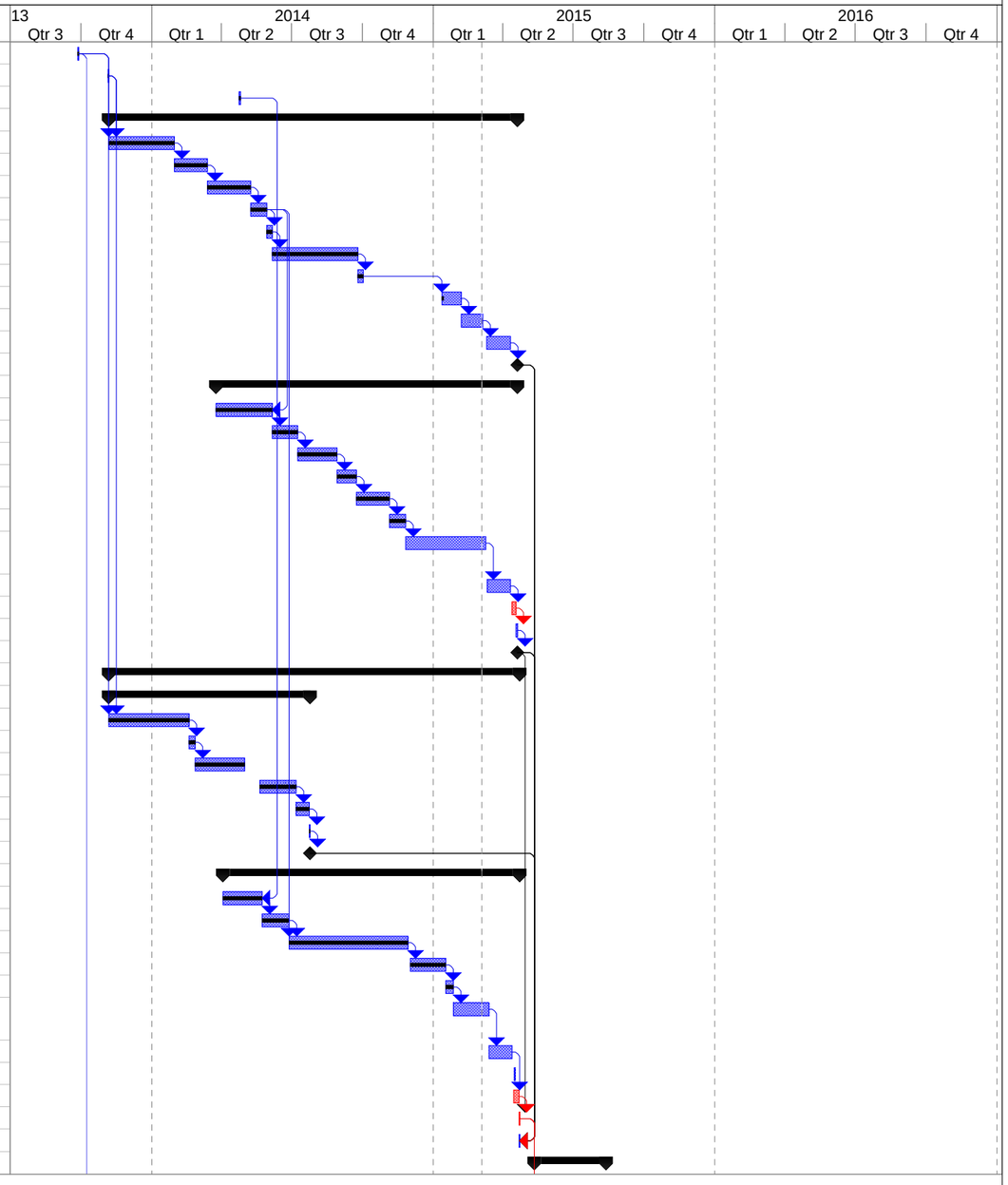
This page intentionally left blank.

APPENDIX A

Interim Removal Action Schedule

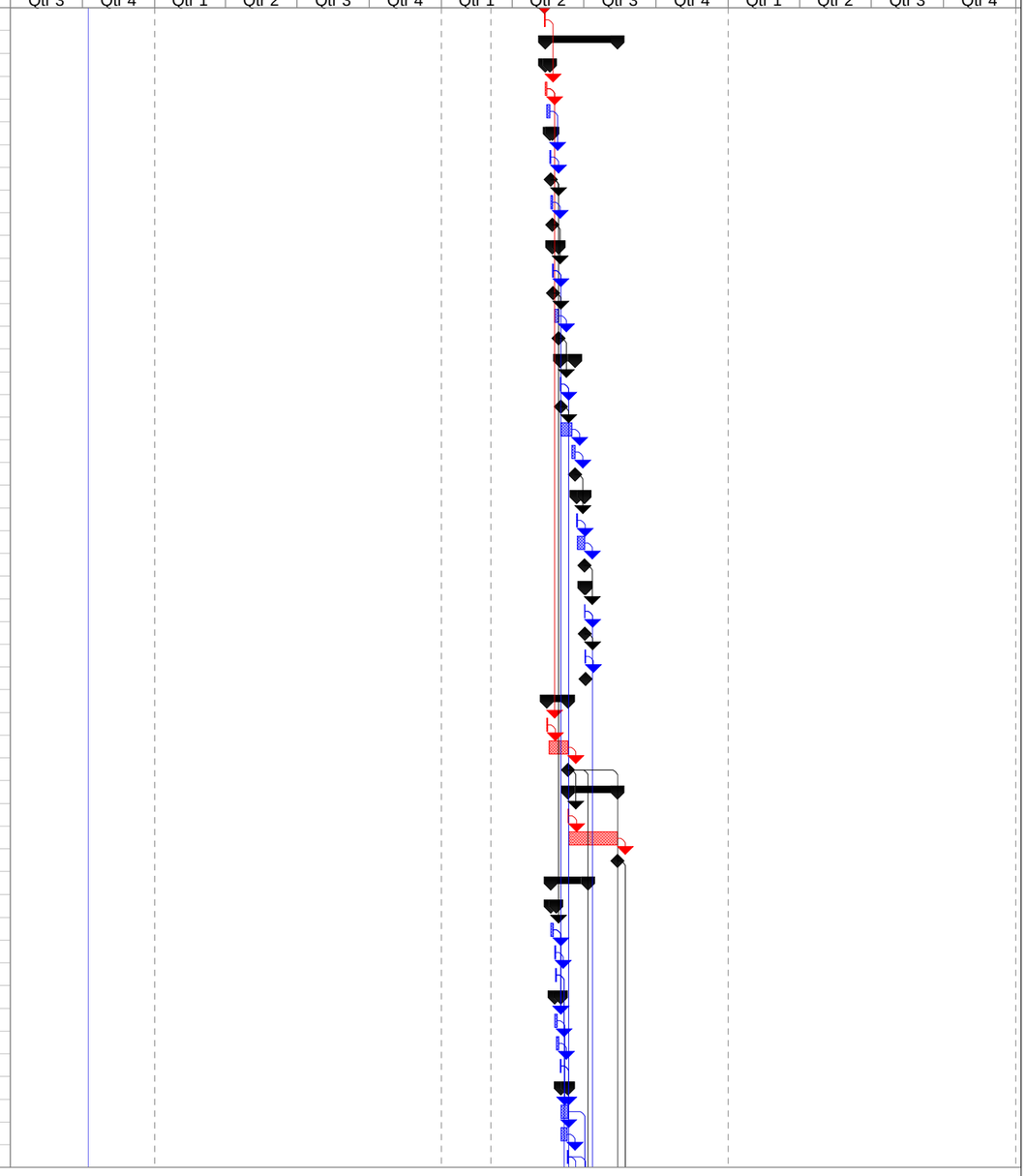
This page intentionally left blank.

ID	Task Name	Duration	Start	Finish	Predecessors	Successors
1	Project Award	1 day	Fri 9/27/13	Fri 9/27/13		5,30,168
2	Kickoff Meeting with USACE-Omaha	1 day	Tue 11/5/13	Tue 11/5/13		5,30
3	Kickoff Meeting at Volk Field	2 days	Thu 4/24/14	Fri 4/25/14		38FF+20 days
4	**EE/CA**	**378 days**	**Tue 11/5/13**	**Mon 4/20/15**		
5	Submit Draft EE/CA to USACE	85 edays	Tue 11/5/13	Wed 1/29/14	1,2	6
6	USACE Review	43 edays	Wed 1/29/14	Thu 3/13/14	5	7
7	EA Address Comments and Submit Draft Final EE/CA to Volk & ANG	56 edays	Thu 3/13/14	Thu 5/8/14	6	8
8	Volk & ANG Review	21 edays	Thu 5/8/14	Thu 5/29/14	7	40,9,17FF+5 days
9	EA Address Volk & ANG Comments and Submit Draft Final EE/CA to Regulators	7 edays	Thu 5/29/14	Thu 6/5/14	8	10
10	Regulator Review of Draft Final EE/CA	111 edays	Thu 6/5/14	Wed 9/24/14	9	11
11	EA Addresses Regulator Comments & Submits to USACE for Review	7 edays	Wed 9/24/14	Wed 10/1/14	10	12
12	USACE Reviews Responses to Regulator Comments	25 edays	Mon 1/12/15	Fri 2/6/15	11	13
13	Approval of Final EE/CA	28 edays	Fri 2/6/15	Fri 3/6/15	12	14FS+5 edays
14	Public Notice and 30 Day Comment Period of Final EE/CA	31 edays	Wed 3/11/15	Sat 4/11/15	13FS+5 edays	15FS+9 edays
15	Memorialize Final EE/CA in Final AM	0 days	Mon 4/20/15	Mon 4/20/15	14FS+9 edays	48FF,50FS+1 day
16	**AM**	**279 days**	**Mon 3/24/14**	**Sun 4/19/15**		
17	Submit Draft AM to USACE	73 edays	Mon 3/24/14	Thu 6/5/14	8FF+5 days	18
18	USACE Review	33 edays	Thu 6/5/14	Tue 7/8/14	17	19
19	EA Address Comments and Submits to USACE for Back check	51 edays	Tue 7/8/14	Thu 8/28/14	18	20
20	USACE Reviews Reponses and EA Submits Draft Final AM to Volk and ANG	25 edays	Fri 8/29/14	Tue 9/23/14	19	21
21	Volk & ANG Review Draft Final AM	43 edays	Tue 9/23/14	Wed 11/5/14	20	22
22	EA Address Volk & ANG Comments	21 edays	Wed 11/5/14	Wed 11/26/14	21	23
23	USACE Reviews Responses on Volk & ANG Comments and EA Submits Draft Final AM to Regulators	104 edays	Wed 11/26/14	Tue 3/10/15	22	24FS+2 days
24	Regulator Review AM	30 edays	Wed 3/11/15	Fri 4/10/15	23FS+2 days	25
25	EA Addresses Regulators Comments	5 days	Mon 4/13/15	Fri 4/17/15	24	26
26	EA Submits Final AM	2 edays	Fri 4/17/15	Sun 4/19/15	25	27
27	Approval of Final AM	0 days	Sun 4/19/15	Sun 4/19/15	26	47,48FF,50FS+1 day
28	**IRA Planning Documents**	**381 days**	**Tue 11/5/13**	**Wed 4/22/15**		
29	**Explosive Safety Submission (ESS)**	**187 days**	**Tue 11/5/13**	**Fri 7/25/14**		
30	Submit Draft ESS	104 edays	Tue 11/5/13	Mon 2/17/14	1,2	31
31	USACE Review	8 edays	Mon 2/17/14	Tue 2/25/14	30	32
32	EA Address Comments and Submit Draft Final ESS to USACE	64 edays	Tue 2/25/14	Wed 4/30/14	31	
33	Volk & ANG Review ESS	47 edays	Wed 5/21/14	Mon 7/7/14		34
34	EA Address Volk & ANG Comments	17 edays	Mon 7/7/14	Thu 7/24/14	33	35
35	Submit Final ESS AF Safety Center & DDESB for Approval	1 eday	Thu 7/24/14	Fri 7/25/14	34	36
36	DDESB Approval	0 edays	Fri 7/25/14	Fri 7/25/14	35	48FF,50FS+1 day
37	**IRA Work Plan**	**275 days**	**Wed 4/2/14**	**Wed 4/22/15**		
38	Submit Draft Work Plan to USACE	51 edays	Wed 4/2/14	Fri 5/23/14	3FF+20 days	39
39	USACE Review	35 edays	Fri 5/23/14	Fri 6/27/14	38	40
40	EA Address Comments and Submit Draft Final Work Plan to Volk & ANG	154 edays	Fri 6/27/14	Fri 11/28/14	39,8	41FS+3 edays
41	Volk & ANG Review Draft Final WP	46 edays	Mon 12/1/14	Fri 1/16/15	40FS+3 edays	42
42	EA Address Volk & ANG Comments	10 edays	Fri 1/16/15	Mon 1/26/15	41	43
43	USACE Reviews Responses to Volk & ANG Comments and Submit Draft Final WP to Regulators	46 edays	Mon 1/26/15	Fri 3/13/15	42	44
44	Regulator Review of WP	30 edays	Fri 3/13/15	Sun 4/12/15	43	46FS+2 edays
45	Conduct Work Plan Review and Entrance Brief with WDNR at Volk Field	1 day	Thu 4/16/15	Thu 4/16/15		
46	EA Address Comments and Submit Final Work Plan	5 days	Wed 4/15/15	Tue 4/21/15	44FS+2 edays	47
47	Approval of Final Work Plan	1 day	Wed 4/22/15	Wed 4/22/15	46,27	48FF,50FS+13 days
48	**IRA NTP**	1 day	Wed 4/22/15	Wed 4/22/15	36FF,47FF,27FF	
49	**IRA**	**67 days**	**Tue 5/12/15**	**Wed 8/12/15**		



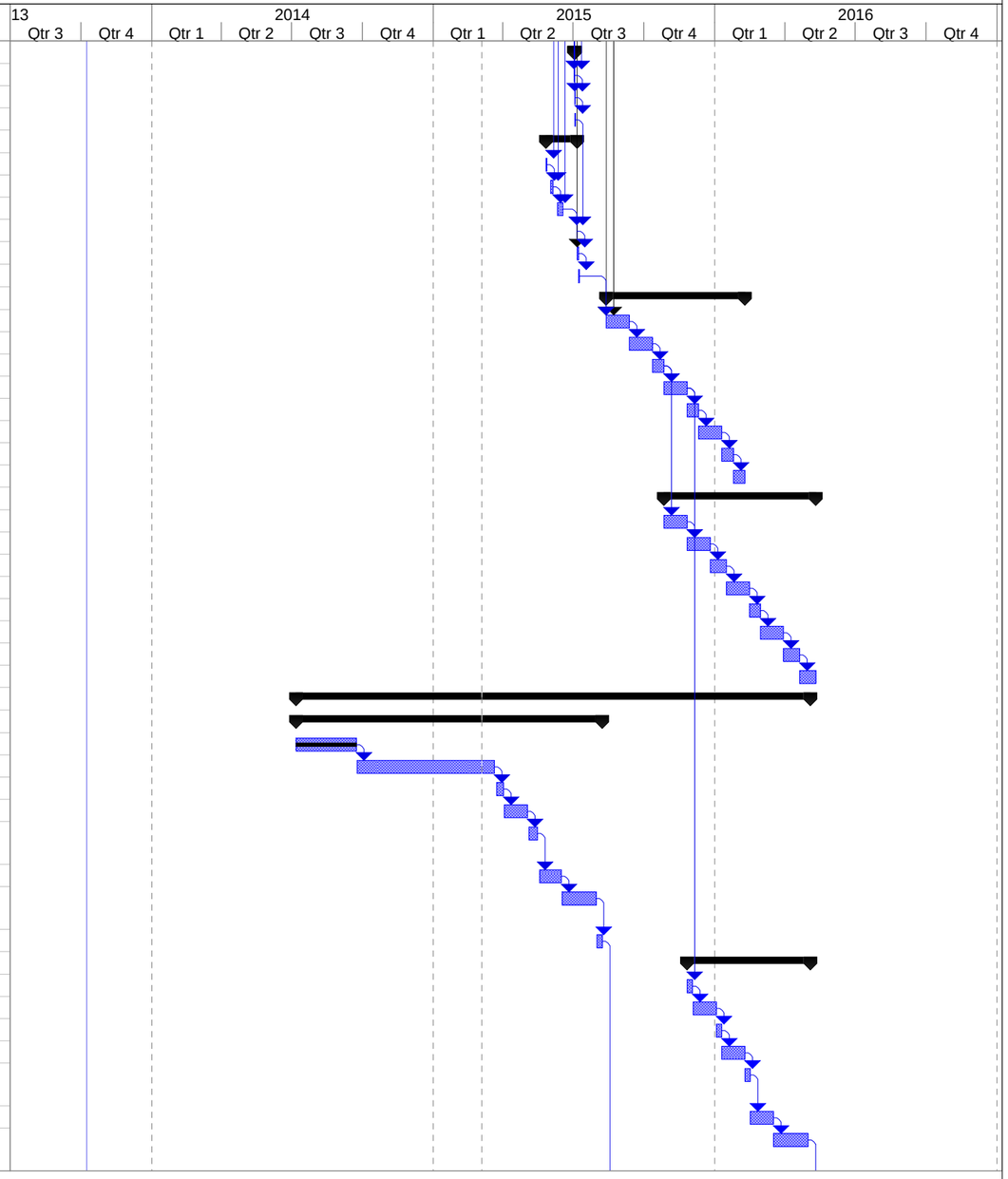
Task
Summary
Rolled Up Milestone
External Tasks
Inactive Task
Critical Task
Rolled Up Task
Rolled Up Progress
Project Summary
Progress
Milestone
Rolled Up Critical Task
Split
Group By Summary
Deadline

ID	Task Name	Duration	Start	Finish	Predecessors	Successors
50	Kickoff Meeting for MEC Portion	1 day	Tue 5/12/15	Tue 5/12/15	47FS+13 days,3(	53
51	**UXO Field Crew**	**66 days**	**Wed 5/13/15**	**Wed 8/12/15**		
52	**Mobilization Activities**	**4 days**	**Wed 5/13/15**	**Mon 5/18/15**		
53	Set Up Construction Trailer, Mob in Explosives, etc.	2 days	Wed 5/13/15	Thu 5/14/15	50	81,54
54	Mob in Shifters, Excavation Equipment (Armored)	2 days	Fri 5/15/15	Mon 5/18/15	53	56
55	**Former Small Arms Range #251**	**3 days**	**Tue 5/19/15**	**Thu 5/21/15**		
56	Site Setup	1 day	Tue 5/19/15	Tue 5/19/15	54	57
57	Tree Clearing and Delineation of MD	0 days	Tue 5/19/15	Tue 5/19/15	56	58,90
58	Excavate, Sieve, and Stockpile	2 days	Wed 5/20/15	Thu 5/21/15	57	59
59	Relocate to next MRS	0 days	Thu 5/21/15	Thu 5/21/15	58	61
60	**Former Rifle Range #1 / Machine Gun Range**	**6 days**	**Fri 5/22/15**	**Fri 5/29/15**		
61	Site Setup	1 day	Fri 5/22/15	Fri 5/22/15	59	62,94
62	Tree Clearing and Delineation of MD	0 days	Fri 5/22/15	Fri 5/22/15	61	63
63	Excavate, Sieve, and Stockpile	5 days	Mon 5/25/15	Fri 5/29/15	62	64
64	Relocate to next MRS	0 days	Fri 5/29/15	Fri 5/29/15	63	66
65	**Former Rifle Range #5 / Range #250**	**15 days**	**Mon 6/1/15**	**Fri 6/19/15**		
66	Site Setup	1 day	Mon 6/1/15	Mon 6/1/15	64	67,98
67	Tree Clearing and Delineation of MD	0 days	Mon 6/1/15	Mon 6/1/15	66	68
68	Excavate, Sieve, and Stockpile	10 days	Tue 6/2/15	Mon 6/15/15	67	69
69	Mag and Dig	4 days	Tue 6/16/15	Fri 6/19/15	68	70
70	Relocate to next MRS	0 days	Fri 6/19/15	Fri 6/19/15	69	72
71	**Former Firing-in-Buttress #1**	**8 days**	**Mon 6/22/15**	**Wed 7/1/15**		
72	Site Setup	1 day	Mon 6/22/15	Mon 6/22/15	70	73
73	Excavate, Sieve, and Stockpile	7 days	Tue 6/23/15	Wed 7/1/15	72	74
74	Relocate to next MRS	0 days	Wed 7/1/15	Wed 7/1/15	73	76
75	**Former Small Arms Debris Area**	**1.25 days**	**Thu 7/2/15**	**Fri 7/3/15**		
76	Site Setup	0.25 days	Thu 7/2/15	Thu 7/2/15	74	77,102
77	Tree Clearing and Delineation of MD	0 days	Thu 7/2/15	Thu 7/2/15	76	78
78	Excavate, Sieve, and Stockpile	1 day	Thu 7/2/15	Fri 7/3/15	77	79
79	Relocate to next MRS	0 days	Fri 7/3/15	Fri 7/3/15	78	
80	**Potential Civil War Era Impact Area**	**19 days**	**Fri 5/15/15**	**Wed 6/10/15**		
81	Site Setup	1 day	Fri 5/15/15	Fri 5/15/15	53	82
82	Mag and Dig	18 days	Mon 5/18/15	Wed 6/10/15	81	83
83	Relocate to next MRS	0 days	Wed 6/10/15	Wed 6/10/15	82	113,110,85
84	**Former Mortar / Artillery Range**	**45 days**	**Thu 6/11/15**	**Wed 8/12/15**		
85	Site Setup	1 day	Thu 6/11/15	Thu 6/11/15	83	86
86	Mag and Dig	44 days	Fri 6/12/15	Wed 8/12/15	85	87
87	Demobilize UXO Crew	0 days	Wed 8/12/15	Wed 8/12/15	86	113
88	**MC Remediation Crew**	**33.25 days**	**Wed 5/20/15**	**Mon 7/6/15**		
89	**Former Small Arms Range #251**	**5 days**	**Wed 5/20/15**	**Tue 5/26/15**		
90	Delineation of MC	3 days	Wed 5/20/15	Fri 5/22/15	57	91,94
91	Excavate, Stabilize, and Stockpile	1 day	Mon 5/25/15	Mon 5/25/15	90	92
92	Confirmation MC Sampling and Relocate to next MRS	1 day	Tue 5/26/15	Tue 5/26/15	91	95,106
93	**Former Rifle Range #1 / Machine Gun Range**	**6 days**	**Mon 5/25/15**	**Mon 6/1/15**		
94	Delineate MC	3 days	Mon 5/25/15	Wed 5/27/15	90,61	98
95	Excavate, Stabilize, and Stockpile	3 days	Wed 5/27/15	Fri 5/29/15	92	96
96	Confirmation MC Sampling and Relocate to next MRS	1 day	Mon 6/1/15	Mon 6/1/15	95	99,107
97	**Former Rifle Range #5 / Range #250**	**7 days**	**Tue 6/2/15**	**Wed 6/10/15**		
98	Delineate MC	7 days	Tue 6/2/15	Wed 6/10/15	94,66	102
99	Excavate, Stabilize, and Stockpile	6 days	Tue 6/2/15	Tue 6/9/15	96	100
100	Confirmation MC Sampling and Relocate to next MRS	1 day	Wed 6/10/15	Wed 6/10/15	99	103,108



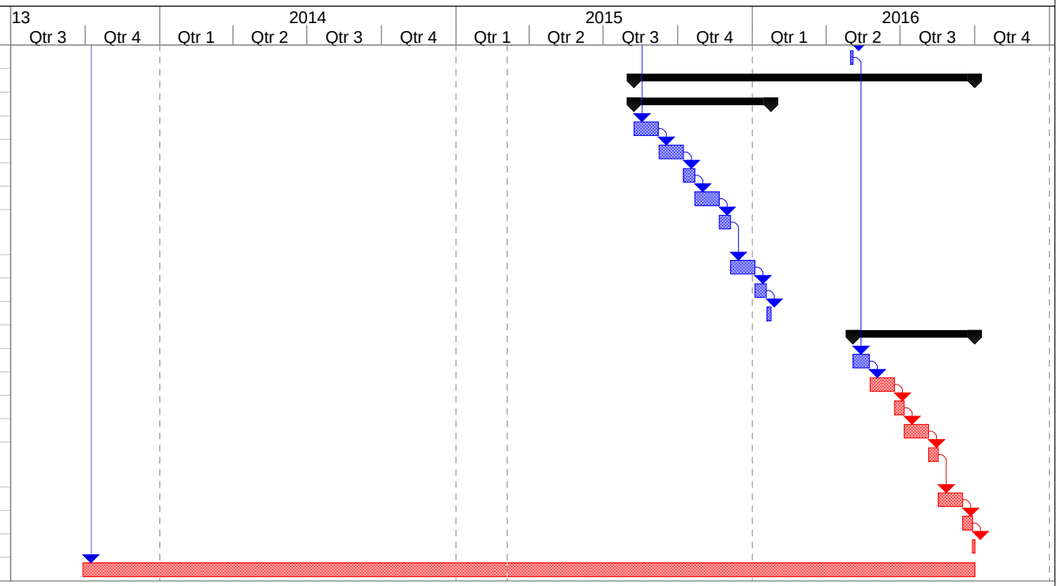
Task
Summary
Rolled Up Milestone
External Tasks
Inactive Task
Critical Task
Rolled Up Task
Rolled Up Progress
Project Summary
Progress
Milestone
Rolled Up Critical Task
Split
Group By Summary
Deadline

ID	Task Name	Duration	Start	Finish	Predecessors	Successors
101	**Former Small Arms Debris Area**	**1.75 days**	**Thu 7/2/15**	**Fri 7/3/15**		
102	Delineation of MC	1 day	Thu 7/2/15	Fri 7/3/15	98,76	103
103	Excavate, Stabilize, and Stockpile	0.5 days	Fri 7/3/15	Fri 7/3/15	102,100	104
104	Confirmation MC Sampling	0.25 days	Fri 7/3/15	Fri 7/3/15	103	109
105	**Load, Haul and Dispose of Contaminated Soil**	**28.25 days**	**Wed 5/27/15**	**Mon 7/6/15**		
106	Former Small Arms Range #251	1 day	Wed 5/27/15	Wed 5/27/15	92	107
107	Former Rifle Range #1 / Machine Gun Range	3 days	Tue 6/2/15	Thu 6/4/15	96,106	108
108	Former Rifle Range #5 / Range #250	5 days	Thu 6/11/15	Wed 6/17/15	100,107	109
109	Former Small Arms Debris Area	0.25 days	Mon 7/6/15	Mon 7/6/15	108,104	110
110	**Site Restoration**	2 days	Mon 7/6/15	Wed 7/8/15	109,83	111
111	**Demobilization**	1 day	Wed 7/8/15	Thu 7/9/15	110	113
112	**Site Specific Final Reports (SSFRs)**	**128 days**	**Wed 8/12/15**	**Mon 2/8/16**		
113	Submit Draft SSFRs to USACE	30 edays	Wed 8/12/15	Fri 9/11/15	111,83,87	114
114	USACE Reviews	30 edays	Fri 9/11/15	Sun 10/11/15	113	115
115	EA Address Comments and Submit Draft Final SSFRs to Volk and ANG	15 edays	Sun 10/11/15	Mon 10/26/15	114	116,122
116	Volk and ANG Review	30 edays	Mon 10/26/15	Wed 11/25/15	115	117,141
117	EA Address Comments from Volk and ANG on SSFRs & Submit to Regulators	15 edays	Wed 11/25/15	Thu 12/10/15	116	118
118	Regulator Review of SSFRs	30 edays	Thu 12/10/15	Sat 1/9/16	117	119
119	EA Address Regulator Comments and Submit Final SSFRs	15 edays	Sat 1/9/16	Sun 1/24/16	118	120
120	Approval of Final SSFRs	15 edays	Sun 1/24/16	Mon 2/8/16	119	
121	**AAR**	**141 days**	**Mon 10/26/15**	**Tue 5/10/16**		
122	Submit Draft AAR to USACE	30 edays	Mon 10/26/15	Wed 11/25/15	115	123
123	USACE Review	30 edays	Wed 11/25/15	Fri 12/25/15	122	124
124	EA Address Comments and Submit Draft Final AAR to Volk and ANG	21 edays	Fri 12/25/15	Fri 1/15/16	123	125
125	Volk and ANG Review	30 edays	Fri 1/15/16	Sun 2/14/16	124	126
126	EA Address Comments from Volk and ANG on AAR & Submit to Regulators	14 edays	Sun 2/14/16	Sun 2/28/16	125	127
127	Regulator Review of AAR	30 edays	Sun 2/28/16	Tue 3/29/16	126	128
128	EA Address Regulator Comments and Submit Final AAR	21 edays	Tue 3/29/16	Tue 4/19/16	127	129
129	Approval of Final AAR	21 edays	Tue 4/19/16	Tue 5/10/16	128	
130	**Proposed Plan (PP)**	**477 days**	**Mon 7/7/14**	**Tue 5/3/16**		
131	**Group 1 - PP**	**285 days**	**Mon 7/7/14**	**Fri 8/7/15**		
132	Submit Draft PP to USACE	78 edays	Mon 7/7/14	Tue 9/23/14		133FS+1 day
133	USACE Review of Draft PP	178 edays	Tue 9/23/14	Fri 3/20/15	132FS+1 day	134FS+3 edays
134	EA Address Comments and Submit Draft Final PP (Group 1) to Volk & ANG	9 edays	Mon 3/23/15	Wed 4/1/15	133FS+3 edays	135FS+1 day
135	Volk and ANG Review	30 edays	Thu 4/2/15	Sat 5/2/15	134FS+1 day	136FS+1 day
136	EA Address Comments from Volk and ANG on PP (Group 1) & Submit to Regulators	11 edays	Mon 5/4/15	Fri 5/15/15	135FS+1 day	137FS+1 day
137	Regulator Review of PP (Group 1)	28 edays	Mon 5/18/15	Mon 6/15/15	136FS+1 day	138FS+1 day
138	EA Address Regulator Comments and Submit Final PP (Group 1) for Public Comment	44 edays	Tue 6/16/15	Thu 7/30/15	137FS+1 day	139FS+1 day
139	Submit Final PP	7 edays	Fri 7/31/15	Fri 8/7/15	138FS+1 day	151
140	**Group 2 - PP**	**114 days**	**Wed 11/25/15**	**Tue 5/3/16**		
141	Submit Draft PP to USACE	7 edays	Wed 11/25/15	Wed 12/2/15	116	142FS+1 day
142	USACE Review of Draft PP	30 edays	Thu 12/3/15	Sat 1/2/16	141FS+1 day	143
143	EA Address Comments and Submit Draft Final PP (Group 2) to Volk & ANG	7 edays	Sat 1/2/16	Sat 1/9/16	142	144
144	Volk and ANG Review	30 edays	Sat 1/9/16	Mon 2/8/16	143	145
145	EA Address Comments from Volk and ANG on PP (Group 2) & Submit to Regulators	7 edays	Mon 2/8/16	Mon 2/15/16	144	146
146	Regulator Review of PP (Group 2)	30 edays	Mon 2/15/16	Wed 3/16/16	145	147
147	EA Address Regulator Comments and Submit Final PP (Group 2) for Public Comment	45 edays	Wed 3/16/16	Sat 4/30/16	146	148



Task
Summary
Rolled Up Milestone
External Tasks
Inactive Task
Critical Task
Rolled Up Task
Rolled Up Progress
Project Summary
Progress
Milestone
Rolled Up Critical Task
Split
Group By Summary
Deadline

ID	Task Name	Duration	Start	Finish	Predecessors	Successors
148	Submit Final PP	3 edays	Sat 4/30/16	Tue 5/3/16	147	160
149	**Decision Documents**	**300 days**	**Fri 8/7/15**	**Fri 9/30/16**		
150	**Group 1 - DD**	**120 days**	**Fri 8/7/15**	**Sat 1/23/16**		
151	Submit Draft DD to USACE	30 edays	Fri 8/7/15	Sun 9/6/15	139	152FS+1 day
152	USACE Review of Draft DD	30 edays	Mon 9/7/15	Wed 10/7/15	151FS+1 day	153
153	EA Address Comments and Submit Draft Final DD (Group 1) to Volk & ANG	14 edays	Wed 10/7/15	Wed 10/21/15	152	154
154	Volk & ANG Review	30 edays	Wed 10/21/15	Fri 11/20/15	153	155
155	EA Address Comments from Volk and ANG on DD (Group 1) & Submit to Regulators	14 edays	Fri 11/20/15	Fri 12/4/15	154	156
156	Regulator Review	30 edays	Fri 12/4/15	Sun 1/3/16	155	157
157	EA Address Regulator Comments and Submit Final DD (Group 1)	14 edays	Sun 1/3/16	Sun 1/17/16	156	158FS+1 day
158	Approval of Final DD (Group 1)	5 edays	Mon 1/18/16	Sat 1/23/16	157FS+1 day	
159	**Group 2 - DD**	**108 days**	**Tue 5/3/16**	**Fri 9/30/16**		
160	Submit Draft DD to USACE	20 edays	Tue 5/3/16	Mon 5/23/16	148	161FS+1 day
161	USACE Review of Draft DD	30 edays	Tue 5/24/16	Thu 6/23/16	160FS+1 day	162
162	EA Address Comments and Submit Draft Final DD (Group 2) to Volk & ANG	12 edays	Thu 6/23/16	Tue 7/5/16	161	163
163	Volk & ANG Review	30 edays	Tue 7/5/16	Thu 8/4/16	162	164
164	EA Address Comments from Volk and ANG on DD (Group 2) & Submit to Regulators	12 edays	Thu 8/4/16	Tue 8/16/16	163	165
165	Regulator Review	30 edays	Tue 8/16/16	Thu 9/15/16	164	166
166	EA Address Regulator Comments and Submit Final DD (Group 2)	12 edays	Thu 9/15/16	Tue 9/27/16	165	167
167	Approval of Final DD (Group 2)	3 edays	Tue 9/27/16	Fri 9/30/16	166	
168	**Period of Performance**	**1099 edays**	**Fri 9/27/13**	**Fri 9/30/16**	**1**	



Task		Summary		Rolled Up Milestone		External Tasks		Inactive Task	
Critical Task		Rolled Up Task		Rolled Up Progress		Project Summary		Progress	
Milestone		Rolled Up Critical Task		Split		Group By Summary		Deadline	

APPENDIX B

Interim Removal Action Cost Estimate Summary – Present Value

This page intentionally left blank.

Volk Field Interim Removal Action
Alternative 2 - Institutional Controls

Indirect Capital Costs:

Description	Quantity	Unit	Unit Cost	Cost	Notes
Documents (AM, APP, Health & Safety Plan, SSFR, and AAR), Engineer Oversight	1	LS	$198,583.00	$198,583	RACER Estimate, with markup
Contingency	0%			$0.00	Percentage of Indirect Capital Costs
Project Management	0%			$0.00	Percentage of Direct Capital Costs
Construction Management	0%			$0.00	Percentage of Direct Capital Costs
Subtotal				$0.00	
Subtotal Indirect Capital Costs				**$198,583.00**	

Direct Capital Costs:

Description	Quantity	Unit	Unit Cost	Cost	Notes
Fencing	9,000	LF	$34.86	$313,742.00	RACER Estimate, with markup
Subtotal 1				**$313,742.00**	
Contingency	0%			$0.00	Percentage of Direct Capital Costs
Subtotal Direct Capital Cost				**$313,742.00**	
Total Capital Cost				**$512,325.00**	

Annual O&M Costs:

Description	Years	Reviews	Unit Cost	Cost	Notes
Five Year Reviews	5	1	$37,005.00	$37,005.00	RACER Estimate, with markup
Subtotal 1				**$37,005.00**	
Contingency	0%			$0.00	
Subtotal 2				**$37,005.00**	
Project Management	0%			$0.00	
Technical Support	0%			$0.00	
Subtotal				$0.00	
Total O&M Cost Per 5 Year Review				**$37,005.00**	

Present Value Analysis:

Cost Type	Years	Total Cost	Total Cost Per Year	Discount Factor (7%)	Present Value	Notes
Capital Cost	1	$512,325.00	$512,325.00	1	$512,325.00	
Annual O&M Costs	~	$37,005.00	$7,401.00	14.29	$105,728.57	
		$549,330.00			$618,053.57	
Total Present Value of Alternative					**$619,000.00**	

Volk Field Interim Removal Action
Alternative 3 - MEC/MD (including SAA) Removal, and Lead Contaminated Soil Removal and Disposal for Residential Land Use

Indirect Capital Costs:

Description	Quantity	Unit	Unit Cost	Cost	Notes
Documents (AM, APP, Health & Safety Plan, SSFR, and AAR), Engineer Oversight	1	LS	$275,351.00	$84,670.00	RACER Estimate, with markup
Subtotal Indirect Capital Costs				**$84,670.00**	

Direct Capital Costs:

Description	Quantity	Unit	Unit Cost	Cost	Notes
MEC/MD and Soil Removal and Soil Disposal	1	LS	$2,696,157.00	$2,696,157.00	RACER Estimate, with markup
Subtotal Direct Capital Costs				**$2,696,157.00**	
Subtotal Capital Cost				**$2,780,827.00**	
Contingency	15%			$417,124.05	Percentage of Capital Costs
Total Capital Cost				**$3,197,951.05**	

Annual O&M Costs:

Description	Years	Reviews	Unit Cost	Cost	Notes
Five Year Reviews	5	0		$0.00	
Subtotal 1				**$0.00**	
Contingency	15%			$0.00	
Subtotal 2				**$0.00**	
Project Management	8%			$0.00	
Technical Support	10%			$0.00	
Subtotal				$0.00	
Total O&M Cost Per 5 Year Review				**$0.00**	

Present Value Analysis:

Cost Type	Years	Total Cost	Total Cost Per Year	Discount Factor (7%)	Present Value	Notes
Capital Cost	1	$3,197,951.05	$3,197,951.05	1	$3,197,951.05	
Annual O&M Costs	~	$0.00	$0.00	14.29	$0.00	
		$3,197,951.05			$3,197,951.05	
Total Present Value of Alternative					**$3,198,000.00**	

APPENDIX C

RACER Cost Backup

This page intentionally left blank.

Phase Technology Cost Detail Report
(with Markups)

System:

RACER Version: RACER™ Version 11.1.12.0
Database Location: C:\Users\Administrator\Desktop\RACER DATABASE_11_1_004.mdb

Folder:

Folder Name: VOLK

Project:

ID: 6246608
Name: Volk Field Combat Readiness Training Center
Category: None

Location
State / Country: WISCONSIN
City: VOLK

Location Modifier	Default	User	Reason for changes
	1.050	1.050	

Options
Database: System Costs
Cost Database Date: 2013
Report Option: Fiscal

Description EE/CA

Site:

ID: Volk
Name: Volk Field
Type: None

Media/Waste Type

Primary: Soil
Secondary: N/A

Contaminant

Primary: Metals
Secondary: None

Phase Names

SI ☐
RI/FS ☐
RD ☐
IRA ☑
RA(C) ☐
RA(O) ☐
LTM ☐

Documentation

Description: EE/CA for Non-Time-Critical Removal Action
Support Team: Jason Byler
Todd Roberts
Angela McGinty
Ivy Harvey
References: Comprehensive Site Evaluation Phase I
Comprehensive Site Evaluation Phase II
Remedial Investigation Report

Estimator Information

Estimator Name: Angela McGinty
Estimator Title: Engineer
Agency/Org./Office: EA Engineering, Science, and Technology, Inc.
Business Address: 1311 Continental Drive, Suite K
Abingdon, MD 21009
Telephone Number: 410-671-6051x1415
Email Address: amcginty@eaest.com
Estimate Prepared Date: 04/04/2014
Estimator Signature: Angela McGinty **Date:** 4/4/14

Reviewer Information

Reviewer Name: Jon M Ritterling, P.E.
Reviewer Title: Engineer
Agency/Org./Office: EA Engineering, Science, and Technology, Inc.
Business Address: 221 Sun Valley Boulevard, Suite D
Lincoln, NE 68528
Telephone Number: 402-817-7636
Email Address: jritterling@eaest.com
Date Reviewed: 04/04/2014
Reviewer Signature: J M. Ritterling **Date:** 4/4/14

Phase Documentation:

Phase Type: Removal/Interim Action
Phase Name: Alternative 2-Land Use Controls
Description: Land Use Controls includes deed restriction limiting use of the property, signs, fences, or other barriers to limit access. Advisories would be issued to the public, notifying them of the risks associated with contacting contaminated media. Five-year reviews would also be performed.
Approach: None
Start Date: January, 2014
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Phase Markup Template: System Defaults

Technology Markups	Markup	% Prime	% Sub.
ADMINISTRATIVE LAND USE CONTROLS	True	100	0
Five-Year Review	True	100	0
Fencing	True	100	0

Total Marked-up Cost: $734,353.09

Technologies:

Technology: ADMINISTRATIVE LAND USE CONTROLS

Element: Implementation

Technology: ADMINISTRATIVE LAND USE CONTROLS

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
18010412	Construction Signs	96	SF	41.70	0.00	0.00	0.00	$4,002.79	False
33022037	Overnight Delivery, 8 oz Letter	10	EA	0.00	0.00	0.00	22.83	$228.34	False
33040671	Portable GPS Set with Mapping, 5 cm Accuracy	1	MO	3,760.49	0.00	0.00	0.00	$3,760.49	False
33220102	Project Manager	80	HR	0.00	198.95	0.00	0.00	$15,915.83	False
33220105	Project Engineer	180	HR	0.00	166.15	0.00	0.00	$29,907.32	False
33220106	Staff Engineer	220	HR	0.00	222.61	0.00	0.00	$48,974.28	False
33220110	QA/QC Officer	51	HR	0.00	183.81	0.00	0.00	$9,374.08	False
33220114	Word Processing/Clerical	160	HR	0.00	99.22	0.00	0.00	$15,874.58	False
33220115	Draftsman/CADD	370	HR	0.00	106.39	0.00	0.00	$39,365.73	False
33220120	Computer Data Entry	200	HR	0.00	99.22	0.00	0.00	$19,843.22	False
33220213	Surveying - 3-man Crew	4	DAY	0.00	2,154.25	22.28	0.00	$8,706.12	False
33240101	Other Direct Costs	1	LS	2,629.96	0.00	0.00	0.00	$2,629.96	True

Total Element Cost:	$198,582.73
Total 1st Year Tech Cost:	$198,582.73

Technology: Five-Year Review

Element: Document Review

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
33220105	Project Engineer	6	HR	0.00	202.62	0.00	0.00	$1,215.74	False

Technology: Five-Year Review

33220108	Project Scientist	5	HR	0.00	224.15	0.00	0.00	$1,120.76	False
33220109	Staff Scientist	11	HR	0.00	129.75	0.00	0.00	$1,427.23	False

Total Element Cost: $3,763.74

Element: Interviews

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
33220102	Project Manager	12	HR	0.00	242.62	0.00	0.00	$2,911.43	False

Total Element Cost: $2,911.43

Element: Site Inspection

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
33220102	Project Manager	8	HR	0.00	242.62	0.00	0.00	$1,940.96	False
33220105	Project Engineer	8	HR	0.00	202.62	0.00	0.00	$1,620.99	False
33220108	Project Scientist	8	HR	0.00	224.15	0.00	0.00	$1,793.22	False
33220109	Staff Scientist	8	HR	0.00	129.75	0.00	0.00	$1,037.99	False

Total Element Cost: $6,393.16

Element: Report

			Unit of	Material	Labor Unit	Equipment	Sub Bid		Cost

Technology: Five-Year Review

Phase	Description	Quantity	Measure	Unit Cost	Cost	Unit Cost	Cost	Extended Cost	Override
33220102	Project Manager	12	HR	0.00	242.62	0.00	0.00	$2,911.43	False
33220105	Project Engineer	31	HR	0.00	202.62	0.00	0.00	$6,281.35	False
33220108	Project Scientist	25	HR	0.00	224.15	0.00	0.00	$5,603.82	False
33220109	Staff Scientist	50	HR	0.00	129.75	0.00	0.00	$6,487.43	False

Total Element Cost: $21,284.03

Element: Travel

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
33010108	Sedan, Automobile, Rental	4	DAY	0.00	0.00	0.00	67.09	$268.36	False
33010202	Per Diem (per person)	8	DAY	0.00	0.00	0.00	123.00	$984.00	True
33041101	Airfare	2	LS	0.00	0.00	0.00	700.00	$1,400.00	True

Total Element Cost: $2,652.36

Total 1st Year Tech Cost: $37,004.74

Technology: Fencing

Element:

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
18040105	Boundary Fence, 5' Galvanized	9,000	LF	16.85	14.90	2.57	0.00	$308,946.98	False

Technology: Fencing

18040501	Hazardous Waste Signing	45	EA	61.38	45.18	0.00	0.00	$4,794.96	False

Total Element Cost:	$313,741.94
Total 1st Year Tech Cost:	$313,741.94
Total Phase Element Cost	**$549,329.41**

Phase Technology Cost Detail Report
(with Markups)

System:

RACER Version: RACER™ Version 11.1.12.0
Database Location: C:\Users\Administrator\Desktop\RACER DATABASE_11_1_004.mdb

Folder:

Folder Name: VOLK

Project:

ID: 6246608
Name: Volk Field Combat Readiness Training Center
Category: None

Location
State / Country: WISCONSIN
City: VOLK

Location Modifier	Default	User	Reason for changes
	1.050	1.050	

Options
Database: System Costs
Cost Database Date: 2013
Report Option: Fiscal

Description EE/CA

Site:

ID: Volk
Name: Volk Field
Type: None

Media/Waste Type

Primary: Soil
Secondary: N/A

Contaminant

Primary: Metals
Secondary: None

Phase Names

SI ☐
RI/FS ☐
RD ☐
IRA ☑
RA(C) ☐
RA(O) ☐
LTM ☐

Documentation

Description: EE/CA for Non-Time-Critical Removal Action
Support Team: Jason Byler
Todd Roberts
Angela McGinty
Ivy Harvey
References: Comprehensive Site Evaluation Phase I
Comprehensive Site Evaluation Phase II
Remedial Investigation Report

Estimator Information

Estimator Name: Angela McGinty
Estimator Title: Engineer
Agency/Org./Office: EA Engineering, Science, and Technology, Inc.
Business Address: 1311 Continental Drive, Suite K
Abingdon, MD 21009
Telephone Number: 410-671-6051x1415
Email Address: amcginty@eaest.com
Estimate Prepared Date: 04/04/2014
Estimator Signature: Angela McGinty **Date:** 4/4/14

Reviewer Information

Reviewer Name: Jon M Ritterling, P.E.
Reviewer Title: Engineer
Agency/Org./Office: EA Engineering, Science, and Technology, Inc.
Business Address: 221 Sun Valley Boulevard, Suite D
Lincoln, NE 68528
Telephone Number: 402-817-7636
Email Address: jritterling@eaest.com
Date Reviewed: 04/04/2014
Reviewer Signature: J M. Ritt **Date:** 4/4/14

Phase Documentation:

Phase Type: Removal/Interim Action
Phase Name: Alternative 3-MEC/MD (including SAA) Removal, and Lead Contaminated Soil Removal and Disposal for Residential Land Use
Description: Surface clearance, mag and dig, MD sifting, and lead soil excavation, solidification, and disposal
Approach: Ordnance Removal
Start Date: July, 2014
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Phase Markup Template: System Defaults

Technology Markups	Markup	% Prime	% Sub.
MEC Sifting	True	100	0
MEC Removal Action	True	100	0
MEC Removal Action	True	100	0
Excavation	True	100	0
Ex Situ Solidification/Stabilization	True	100	0
Off-site Transportation and Waste Disposal	True	100	0
Professional Labor Management	False	0	0

Total Marked-up Cost: $2,780,828.01

Technologies:

Technology: MEC Sifting

Element: Site Preparation

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
17010402	Chipping brush, medium brush	1	ACR	0.00	2,121.86	610.67	0.00	$3,825.54	False
18050206	Erosion control, silt fence, polypropylene, 3' high, includes 7.5' posts	1,170	LF	1.24	3.39	0.00	0.00	$5,418.72	False
33010114	Mobilization Equipment (Soils)	1	LS	0.00	2,396.17	2,540.66	0.00	$4,936.83	False
33010202	Per Diem (per person)	5	DAY	0.00	0.00	0.00	123.00	$615.00	True
33040934	UXO Technician II	6	HR	0.00	52.29	0.00	0.00	$313.75	False
33040935	UXO Technician III (UXO Supervisor)	2	HR	0.00	61.49	0.00	0.00	$122.98	False

Total Element Cost: $15,232.82

Element: Excavation

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
17030234	Crawler-mounted, 4.0 CY, Koehring 1166 Hydraulic Excavator	30	HR	0.00	88.15	243.51	0.00	$9,949.78	False
33040515	UXO - Vehicle Modification	1	LS	0.00	23,452.87	72,329.29	0.00	$95,782.16	False

Total Element Cost: $105,731.94

Element: Sifting

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
17030285	12 CY, Dump Truck	30	HR	0.00	85.58	62.57	0.00	$4,444.52	False
17030427	Sand Bags	1,000	EA	1.01	0.00	0.00	0.00	$1,006.99	False
17030436	0.75 CY Wheel Loader	90	HR	0.00	128.99	45.40	0.00	$15,695.47	False
33010202	Per Diem (per person)	48	DAY	0.00	0.00	0.00	123.00	$5,904.00	True
33040515	UXO - Vehicle Modification	4	LS	0.00	23,452.87	72,329.29	0.00	$383,128.62	False
33040651	4 X 4 Truck- Rental/Lease	6	DAY	0.00	0.00	111.54	0.00	$669.21	False
33040662	Trommel Screener	1	MO	0.00	0.00	11,725.57	0.00	$11,725.57	False
33040663	Grizzly Shaker Unit	1	MO	0.00	0.00	6,969.01	0.00	$6,969.01	False
33040934	UXO Technician II	125	HR	0.00	52.29	0.00	0.00	$6,536.46	False
33040935	UXO Technician III (UXO Supervisor)	63	HR	0.00	61.49	0.00	0.00	$3,873.73	False
33188402	Conveyors, Material Handling, horizontal belt, center drive & takeup, 60 fpm, 24" belt, 61.5' length	1	EA	10,266.60	4,872.63	0.00	0.00	$15,139.23	False
33240101	Other Direct Costs	1	LS	23,071.69	0.00	0.00	0.00	$23,071.69	True
33341006	Man-Lift, Scissor, 25' Height, 1,500 Lbs	1	MO	0.00	0.00	3,397.89	0.00	$3,397.89	False

Total Element Cost: $481,562.40

Element: Backfill

Technology: MEC Sifting

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
17030401	950, 3.25 CY, Backfill with Excavated Material	2,598	CY	0.00	0.99	0.96	0.00	$5,060.24	False
17040101	Cleaning Up, site debris clean up and removal	1	ACR	0.00	693.50	58.02	0.00	$1,052.14	False
18050101	Area Preparation, 67% Level & 33% Slope	1	ACR	0.00	25.80	34.81	0.00	$84.86	False
18050401	Seeding, 67% Level & 33% Slope, Hydroseeding	1	ACR	3,221.30	1,096.03	936.01	0.00	$7,354.68	False
18050408	Fertilizer, Hydro Spread	1	ACR	164.49	105.89	43.06	0.00	$438.83	False
33010115	Demobilize Equipment (Soils)	1	LS	0.00	2,396.17	2,540.66	0.00	$4,936.83	False

Total Element Cost: $18,927.57

Element: Site Management

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
33010202	Per Diem (per person)	42	DAY	0.00	0.00	0.00	123.00	$5,166.00	True
33040921	Senior UXO Supervisor (SUXOS)	60	HR	0.00	75.61	0.00	0.00	$4,536.36	False
33040923	UXO Project Manager	60	HR	0.00	111.23	0.00	0.00	$6,673.56	False
33040930	UXO QC Specialist	60	HR	0.00	69.41	0.00	0.00	$4,164.42	False
33040931	UXO Safety Officer	60	HR	0.00	70.48	0.00	0.00	$4,228.84	False

Total Element Cost: $24,769.19

Total 1st Year Tech Cost:	$646,223.91

Technology: MEC Removal Action

Element: Site Visit

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
33010108	Sedan, Automobile, Rental	3	DAY	0.00	0.00	0.00	67.09	$201.27	False
33010202	Per Diem (per person)	9	DAY	0.00	0.00	0.00	123.00	$1,107.00	True
33040921	Senior UXO Supervisor (SUXOS)	40	HR	0.00	75.61	0.00	0.00	$3,024.24	False
33040923	UXO Project Manager	40	HR	0.00	111.23	0.00	0.00	$4,449.04	False
33040925	UXO Staff Engineer	40	HR	0.00	70.92	0.00	0.00	$2,836.97	False
33041101	Airfare	3	LS	0.00	0.00	0.00	750.00	$2,250.00	True
33240101	Other Direct Costs	1	LS	749.25	0.00	0.00	0.00	$749.25	True

Total Element Cost:	$14,617.78

Element: Surveying

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
33010202	Per Diem (per person)	2	DAY	0.00	0.00	0.00	123.00	$246.00	True
33040671	Portable GPS Set with Mapping, 5 cm Accuracy	1	MO	3,760.49	0.00	0.00	0.00	$3,760.49	False
33040935	UXO Technician III (UXO Supervisor)	20	HR	0.00	61.49	0.00	0.00	$1,229.75	False
33041101	Airfare	1	LS	0.00	0.00	0.00	750.00	$750.00	True
33220213	Surveying - 3-man Crew	2	DAY	0.00	2,154.25	22.28	0.00	$4,353.06	False

Technology: MEC Removal Action

33240101	Other Direct Costs	1	LS	325.07	0.00	0.00	0.00	$325.07	True

Total Element Cost: $10,664.38

Element: Vegetation Removal

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
17010401	Chipping brush, light brush	4	ACR	0.00	1,650.42	474.99	0.00	$7,970.28	False
17010402	Chipping brush, medium brush	8	ACR	0.00	2,121.86	610.67	0.00	$20,493.96	False
17010403	Chipping brush, heavy brush	4	ACR	0.00	4,126.78	1,187.69	0.00	$19,929.24	False
33010202	Per Diem (per person)	15	DAY	0.00	0.00	0.00	123.00	$1,845.00	True
33040935	UXO Technician III (UXO Supervisor)	90	HR	0.00	61.49	0.00	0.00	$5,533.89	False

Total Element Cost: $55,772.38

Element: UXO Mapping

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
33010202	Per Diem (per person)	412	DAY	0.00	0.00	0.00	123.00	$50,676.00	True
33021530	Differential GPS Unit Rental	2	MO	313.37	0.00	0.00	0.00	$626.75	False
33040223	Ordnance Locator, Schoenstedt, Model GA-72CD, weekly rental	44	WK	0.00	0.00	0.00	113.29	$4,984.61	False
33040230	Geonics EM-61 Metal Locator, Hand Held (Weekly Rental)	4	WK	0.00	0.00	0.00	469.01	$1,876.03	False
33040651	4 X 4 Truck- Rental/Lease	123	DAY	0.00	0.00	111.54	0.00	$13,718.89	False

Technology: MEC Removal Action

33040934	UXO Technician II	1,680	HR	0.00	52.29	0.00	0.00	$87,850.02	False
33040935	UXO Technician III (UXO Supervisor)	420	HR	0.00	61.49	0.00	0.00	$25,824.84	False
33040936	Geophysicist (UXO)	280	HR	0.00	100.27	0.00	0.00	$28,075.94	False
33041101	Airfare	10	LS	0.00	0.00	0.00	750.00	$7,500.00	True
33240101	Other Direct Costs	1	LS	8,795.55	0.00	0.00	0.00	$8,795.55	True

Total Element Cost: $229,928.62

Element: UXO Removal

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
33010202	Per Diem (per person)	602	DAY	0.00	0.00	0.00	123.00	$74,046.00	True
33040223	Ordnance Locator, Schoenstedt, Model GA-72CD, weekly rental	44	WK	0.00	0.00	0.00	113.29	$4,984.61	False
33040230	Geonics EM-61 Metal Locator, Hand Held (Weekly Rental)	5	WK	0.00	0.00	0.00	469.01	$2,345.03	False
33040646	Backhoe - Rental/Lease	72	DAY	0.00	0.00	398.51	0.00	$28,692.87	False
33040651	4 X 4 Truck- Rental/Lease	177	DAY	0.00	0.00	111.54	0.00	$19,741.82	False
33040934	UXO Technician II	2,460	HR	0.00	52.29	0.00	0.00	$128,637.52	False
33040935	UXO Technician III (UXO Supervisor)	600	HR	0.00	61.49	0.00	0.00	$36,892.63	False
33040936	Geophysicist (UXO)	380	HR	0.00	100.27	0.00	0.00	$38,103.07	False
33041001	16oz Standard TNT Booster	752	EA	0.61	0.00	0.00	0.00	$461.45	False
33041002	50 gr/ft Det -Cord (1000 ft roll)	113	EA	763.11	0.00	0.00	0.00	$86,231.55	False
33041004	12 ft Lead Primadet Non- Electric	376	EA	9.16	0.00	0.00	0.00	$3,443.16	False

Technology: MEC Removal Action

	Detonators								
33240101	Other Direct Costs	1	LS	17,568.31	0.00	0.00	0.00	$17,568.31	True

Total Element Cost: $441,148.01

Element: Site Management

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
33010202	Per Diem (per person)	788	DAY	0.00	0.00	0.00	123.00	$96,924.00	True
33040651	4 X 4 Truck- Rental/Lease	791	DAY	0.00	0.00	111.54	0.00	$88,224.73	False
33040921	Senior UXO Supervisor (SUXOS)	1,130	HR	0.00	75.61	0.00	0.00	$85,434.84	False
33040923	UXO Project Manager	1,130	HR	0.00	111.23	0.00	0.00	$125,685.42	False
33040930	UXO QC Specialist	1,130	HR	0.00	69.41	0.00	0.00	$78,430.00	False
33040931	UXO Safety Officer	1,130	HR	0.00	70.48	0.00	0.00	$79,643.11	False
33041101	Airfare	4	LS	0.00	0.00	0.00	750.00	$3,000.00	True

Total Element Cost: $557,342.10

Element: Stakeholder Involvement

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
33040923	UXO Project Manager	12	HR	0.00	111.23	0.00	0.00	$1,334.71	False
33040935	UXO Technician III (UXO Supervisor)	12	HR	0.00	61.49	0.00	0.00	$737.85	False
33041302	Site Specific Workplan (Moderate	1	EA	133.74	24,398.05	0.00	0.00	$24,531.79	False

Technology: MEC Removal Action

	Complexity)								
33041305	Explosive Safety Submission (Moderate Complexity)	1	EA	267.48	11,090.61	0.00	0.00	$11,358.09	False
33041314	UXO Removal Report (Moderate Complexity)	1	EA	267.48	30,136.06	0.00	0.00	$30,403.55	False

Total Element Cost:	$68,366.00
Total 1st Year Tech Cost:	$1,377,839.27

Technology: Excavation

Element:

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
17030277	Excavate and load, bank measure, medium material, 2 C.Y. bucket, hydraulic excavator	900	BCY	0.00	1.58	1.03	0.00	$2,348.94	False
18050402	Seeding, Vegetative Cover	1	ACR	4,914.02	792.42	302.65	0.00	$5,047.64	False
33020401	Disposable Materials per Sample	50	EA	15.49	0.00	0.00	0.00	$774.34	False
33021709	Testing, TAL metals (6010/7000s)	13	EA	0.00	0.00	0.00	147.46	$1,917.00	False
33220102	Project Manager	6	HR	0.00	242.62	0.00	0.00	$1,455.72	False
33220108	Project Scientist	9	HR	0.00	224.15	0.00	0.00	$2,017.38	False
33220110	QA/QC Officer	2	HR	0.00	224.15	0.00	0.00	$448.31	False
33220112	Field Technician	2	HR	0.00	111.78	0.00	0.00	$223.56	False
33220114	Word Processing/Clerical	2	HR	0.00	121.00	0.00	0.00	$241.99	False

Technology: Excavation

33220115	Draftsman/CADD	2	HR	0.00	129.75	0.00	0.00	$259.50	False

Total Element Cost:	$14,734.36
Total 1st Year Tech Cost:	$14,734.36

Technology: Ex Situ Solidification/Stabilization

Element:

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
17030220	910, 1.25 CY, Wheel Loader	150	HR	0.00	112.13	45.40	0.00	$23,630.13	False
17030285	12 CY, Dump Truck	150	HR	0.00	104.36	62.57	0.00	$25,040.40	False
19040401	Wastewater holding tanks, above ground, ss, DOT approved, monthly rental, 550 gal	1	MO	0.00	0.00	0.00	528.67	$528.67	False
19040408	Wastewater holding tanks, above ground, steel, open, stationary, monthly rental, 21,000 gal	1	MO	0.00	0.00	0.00	1,586.01	$1,586.01	False
33150405	Portland Cement Type I (Bulk)	200	TON	152.48	0.00	0.00	0.00	$30,569.31	False
33150408	Urrichem by Soliditech	13	TON	125.87	0.00	0.00	0.00	$1,682.94	False
33150418	1 CY Plywood Boxes	3	EA	36.11	74.84	0.00	0.00	$332.84	False
33150420	Operational Labor for Process Equipment	300	HR	0.00	99.58	0.00	0.00	$29,874.45	False
33150421	Bulk Chemical Transport (40,000 Lb Truckload)	12	EA	0.00	0.00	0.00	3,075.28	$36,903.33	False
33150422	2 CY Mixing System	1	MO	0.00	0.00	0.00	8,496.15	$8,496.15	False

Technology: Ex Situ Solidification/Stabilization

33150435	Solidification/Stabilization Ancillary Equipment	1	EA	1,164.33	0.00	0.00	0.00	$1,164.33	False
33150437	Maintenance of Solidification/Stabilization Unit		YR	0.00	15,534.71	0.00	0.00	$1,087.43	False
33199921	DOT steel drums, 55 gal., open, 17C	5	EA	111.74	0.00	0.00	0.00	$558.72	False
33420201	Diesel Fuel	450	GAL	4.30	0.00	0.00	0.00	$1,932.95	False
33420301	Process Water, Supplied by Tanker Truck	20	KGA	17.81	0.00	0.00	0.00	$356.22	False

Total Element Cost:	$163,743.90
Total 1st Year Tech Cost:	$163,743.90

Technology: MEC Removal Action

Element: Site Visit

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
33010108	Sedan, Automobile, Rental	3	DAY	0.00	0.00	0.00	67.09	$201.27	False
33010202	Per Diem (per person)	9	DAY	0.00	0.00	0.00	123.00	$1,107.00	True
33040921	Senior UXO Supervisor (SUXOS)	40	HR	0.00	75.61	0.00	0.00	$3,024.24	False
33040923	UXO Project Manager	40	HR	0.00	111.23	0.00	0.00	$4,449.04	False
33040925	UXO Staff Engineer	40	HR	0.00	70.92	0.00	0.00	$2,836.97	False
33041101	Airfare	3	LS	0.00	0.00	0.00	750.00	$2,250.00	True
33240101	Other Direct Costs	1	LS	749.25	0.00	0.00	0.00	$749.25	True

Total Element Cost: $14,617.78

Element: Surveying

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
33010202	Per Diem (per person)	1	DAY	0.00	0.00	0.00	123.00	$123.00	True
33040671	Portable GPS Set with Mapping, 5 cm Accuracy	1	MO	3,760.49	0.00	0.00	0.00	$3,760.49	False
33040935	UXO Technician III (UXO Supervisor)	10	HR	0.00	61.49	0.00	0.00	$614.88	False
33041101	Airfare	1	LS	0.00	0.00	0.00	750.00	$750.00	True
33220213	Surveying - 3-man Crew	1	DAY	0.00	2,154.25	22.28	0.00	$2,176.53	False
33240101	Other Direct Costs	1	LS	235.80	0.00	0.00	0.00	$235.80	True

Total Element Cost: $7,660.70

Element: Vegetation Removal

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
17010401	Chipping brush, light brush		ACR	0.00	1,650.42	474.99	0.00	$850.16	False
17010402	Chipping brush, medium brush	1	ACR	0.00	2,121.86	610.67	0.00	$2,186.02	False
17010403	Chipping brush, heavy brush		ACR	0.00	4,126.78	1,187.69	0.00	$2,125.79	False
33010202	Per Diem (per person)	1	DAY	0.00	0.00	0.00	123.00	$123.00	True
33040935	UXO Technician III (UXO Supervisor)	10	HR	0.00	61.49	0.00	0.00	$614.88	False

Total Element Cost: $5,899.85

Element: UXO Mapping

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
33010202	Per Diem (per person)	26	DAY	0.00	0.00	0.00	123.00	$3,198.00	True
33021530	Differential GPS Unit Rental	2	MO	313.37	0.00	0.00	0.00	$626.75	False
33040210	Geonics EM-61 Metal Locator, Towed (Weekly Rental)	1	WK	0.00	0.00	0.00	559.72	$559.72	False
33040223	Ordnance Locator, Schoenstedt, Model GA-72CD, weekly rental	7	WK	0.00	0.00	0.00	113.29	$793.01	False
33040230	Geonics EM-61 Metal Locator, Hand Held (Weekly Rental)	1	WK	0.00	0.00	0.00	469.01	$469.01	False
33040651	4 X 4 Truck- Rental/Lease	9	DAY	0.00	0.00	111.54	0.00	$1,003.82	False
33040653	All Terrain Vehicle (ATV) - Rental/Lease	1	DAY	0.00	0.00	0.00	226.57	$226.57	False
33040934	UXO Technician II	120	HR	0.00	52.29	0.00	0.00	$6,275.00	False
33040935	UXO Technician III (UXO Supervisor)	30	HR	0.00	61.49	0.00	0.00	$1,844.63	False
33040936	Geophysicist (UXO)	20	HR	0.00	100.27	0.00	0.00	$2,005.42	False
33041101	Airfare	10	LS	0.00	0.00	0.00	750.00	$7,500.00	True
33240101	Other Direct Costs	1	LS	1,277.74	0.00	0.00	0.00	$1,277.74	True

Total Element Cost: $25,779.67

Element: UXO Removal

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
33010202	Per Diem (per person)	71	DAY	0.00	0.00	0.00	123.00	$8,733.00	True

Technology: MEC Removal Action

33040223	Ordnance Locator, Schoenstedt, Model GA-72CD, weekly rental	8	WK	0.00	0.00	0.00	113.29	$906.29	False
33040230	Geonics EM-61 Metal Locator, Hand Held (Weekly Rental)	1	WK	0.00	0.00	0.00	469.01	$469.01	False
33040646	Backhoe - Rental/Lease	9	DAY	0.00	0.00	398.51	0.00	$3,586.61	False
33040651	4 X 4 Truck- Rental/Lease	21	DAY	0.00	0.00	111.54	0.00	$2,342.25	False
33040934	UXO Technician II	300	HR	0.00	52.29	0.00	0.00	$15,687.50	False
33040935	UXO Technician III (UXO Supervisor)	70	HR	0.00	61.49	0.00	0.00	$4,304.14	False
33040936	Geophysicist (UXO)	40	HR	0.00	100.27	0.00	0.00	$4,010.85	False
33041001	16oz Standard TNT Booster	60	EA	0.61	0.00	0.00	0.00	$36.82	False
33041002	50 gr/ft Det -Cord (1000 ft roll)	9	EA	763.11	0.00	0.00	0.00	$6,868.00	False
33041004	12 ft Lead Primadet Non- Electric Detonators	30	EA	9.16	0.00	0.00	0.00	$274.72	False
33240101	Other Direct Costs	1	LS	1,941.50	0.00	0.00	0.00	$1,941.50	True

Total Element Cost: $49,160.69

Element: Site Management

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
33010202	Per Diem (per person)	84	DAY	0.00	0.00	0.00	123.00	$10,332.00	True
33040651	4 X 4 Truck- Rental/Lease	84	DAY	0.00	0.00	111.54	0.00	$9,369.00	False
33040921	Senior UXO Supervisor (SUXOS)	120	HR	0.00	75.61	0.00	0.00	$9,072.73	False
33040923	UXO Project Manager	120	HR	0.00	111.23	0.00	0.00	$13,347.12	False
33040930	UXO QC Specialist	120	HR	0.00	69.41	0.00	0.00	$8,328.85	False

Technology: MEC Removal Action

33040931	UXO Safety Officer	120	HR	0.00	70.48	0.00	0.00	$8,457.68	False
33041101	Airfare	4	LS	0.00	0.00	0.00	750.00	$3,000.00	True

Total Element Cost: $61,907.37

Element: Stakeholder Involvement

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
33040923	UXO Project Manager	12	HR	0.00	111.23	0.00	0.00	$1,334.71	False
33040935	UXO Technician III (UXO Supervisor)	12	HR	0.00	61.49	0.00	0.00	$737.85	False
33041302	Site Specific Workplan (Moderate Complexity)	1	EA	133.74	24,398.05	0.00	0.00	$24,531.79	False
33041305	Explosive Safety Submission (Moderate Complexity)	1	EA	267.48	11,090.61	0.00	0.00	$11,358.09	False
33041314	UXO Removal Report (Moderate Complexity)	1	EA	267.48	30,136.06	0.00	0.00	$30,403.55	False

Total Element Cost: $68,366.00

Total 1st Year Tech Cost: $233,392.06

Technology: Off-site Transportation and Waste Disposal

Element:

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override

Technology: Off-site Transportation and Waste Disposal

33170910	Load Intermodal Container on Disposal Vehicle or Directly in Disposal Pit/Landfill	50	EA	0.00	157.31	56.13	0.00	$10,671.75	False
33190102	Bulk Solid Waste Loading Into Disposal Vehicle or Bulk Disposal Container	900	BCY	1.42	1.97	0.57	0.00	$3,557.83	False
33190317	Waste Stream Evaluation Fee, Not Including 50% Rebate on 1st Shipment	1	EA	0.00	0.00	0.00	78.67	$78.67	False
33190814	Bulk Solid Waste Disposal Container, 20 CY Intermodal	50	MO	4,405.59	0.00	0.00	0.00	$220,279.49	False
33197270	Landfill Nonhazardous Solid Bulk Waste by CY	900	CY	0.00	0.00	0.00	28.49	$25,636.76	False

Total Element Cost: $260,224.50

Total 1st Year Tech Cost: $260,224.50

Technology: Professional Labor Management

Element:

Phase	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Cost	Extended Cost	Cost Override
33220149	Lump Sum Percentage Labor Cost	1	LS	0.00	84,670.00	0.00	0.00	$84,670.00	True

Total Element Cost: $84,670.00

Total 1st Year Tech Cost: $84,670.00

	Total Phase Element Cost	**$2,780,828.01**