Draft Final

Engineering Evaluation/Cost Analysis for Non-Time-Critical Interim Removal Action at the 1940s Skeet Range (MRS TS876a), 1970s Skeet Range (MRS TS877a), and Former EOD Proficiency Range (MRS ED879)

Mountain Home Air Force Base, Idaho

November 2013

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November 2013

Version 0

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Chimera/ERRG JV

Signature	Date
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Name	Title

Signature	Date
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Executive Summary

This Engineering Evaluation/Cost Analysis (EE/CA) has been prepared for a non-time-critical interim removal action (IRA) at three munitions response sites (MRSs) at Mountain Home Air Force Base (MHAFB) Idaho. The EE/CA has been prepared in accordance with appropriate guidance (U.S. Environmental Protection Agency [EPA], 1993) to fulfill the requirements, including public participation, for a non-time-critical IRA under the Comprehensive Environmental Response, Compensation, and Liability Act and the National Oil and Hazardous Substances Contingency Plan. This EE/CA was completed using information from the Comprehensive Site Evaluation Phase II Draft Report (SKY Research [SKY], 2011). This document is found in the Administrative Record for MHAFB.

The EE/CA pertains to the following three MRSs at MHAFB:

MRS	Site Name	Reason for Including MRS in the EE/CA
TS876a	1940s Skeet Range	Concentrations of polycyclic aromatic hydrocarbons (PAHs) in soil present an unacceptable risk to human under a future unrestricted land use scenario.
TS877a	1970s Skeet Range	Concentrations of PAHs in soil present an unacceptable risk to human health under a future unrestricted land use scenario.
ED879	Former Explosive Ordnance Disposal (EOD) Proficiency Range	Munitions and explosives of concern (MEC) may be present below the ground surface.

The three MRSs are being considered for an IRA because of the imminent and substantial risk to human health and the environment at the three sites. Under the current conditions, the MRSs pose a risk to current or future receptors and do not meet the criteria for no further action (NFA) with unrestricted use. The U.S. Air Force (USAF) prefers that the three MRSs be addressed in a manner that allows for unrestricted use. This approach would not require implementation of land use controls (LUCs), which would incur long-term costs for monitoring and enforcement, and would provide the USAF flexibility in determining the future uses of these sites. The Federal Facility Agreement team members have agreed to use EPA Regions 3, 6, and 9 regional screening levels (RSLs) as the cleanup levels for this IRA because the RSLs are conservative risk-based criteria that are protective of human health.

This EE/CA evaluates three separate IRA alternatives for each of the three MRSs as follows:

- Alternative 1 – No Action
- Alternative 2 – LUCs
- Alternative 3 – Excavation and Disposal of Contaminated Soil and MEC

Under Alternative 1, no action would be taken at the site under current or future land use scenarios. The no-action alternative is evaluated as required by the NCP to provide a baseline for comparison with other alternatives. Alternative 2 evaluates LUCs as the only means by which unacceptable exposure to contaminated soil or munitions debris (MD) would be prevented. Alternative 3 evaluates excavation and disposal as the means by which unacceptable exposure to contaminated soil or MEC would be prevented. Based on the available information on the distribution of PAHs at MRS TS876a and MRS TS877a, Alternative 3 assumes that excavation and disposal of contaminated soil can cost-effectively meet the cleanup levels associated with unrestricted use (specifically, RSLs for residential use for the PAH-contaminated soil).

The IRA alternatives presented above were developed and screened for each of the three sites against the following criteria:

- Effectiveness
- Implementability
- Cost

The results of the comparative analysis of the IRA alternatives are summarized below.

Effectiveness

1940s Skeet Range (MRS TS876a) and 1970s Skeet Range (MRS TS877a)

Alternative 1 would be the least effective IRA alternative because no action would be taken to mitigate risks to current and future receptors. Alternative 2 would be a moderately effective IRA alternative because LUCs would prevent unacceptable exposure to PAH-contaminated soil. Alternative 3 would be the most effective IRA alternative because PAH-contaminated soil would be excavated and disposed of off site at an approved disposal facility, thereby permanently mitigating risks to current and future receptors.

Former EOD Proficiency Range (MRS ED879)

Alternative 1 would be the least effective IRA alternative because no action would be taken to mitigate risks to current and future receptors. Alternative 2 would be a moderately effective IRA alternative because LUCs would prevent unacceptable exposure to MEC. Alternative 3 would be the most effective IRA alternative because MEC would be excavated and detonated as necessary and material documented as safe (MDAS) would be disposed of at an approved offsite scrap recycling facility, thereby permanently mitigating risks to current and future receptors.

Implementability

1940s Skeet Range (MRS TS876a) and 1970s Skeet Range (MRS TS877a)

The three IRA alternatives are technically and administratively feasible, and the services and materials necessary to implement the IRA alternatives are readily available.

Former EOD Proficiency Range (MRS ED879)

The three IRA alternatives are technically and administratively feasible, and the services and materials necessary to implement the IRA alternatives are readily available.

Costs

1940s Skeet Range (MRS TS876a) and 1970s Skeet Range (MRS TS877a)

The estimated present values of each IRA alternative are as follows:

- Alternative 1 $0
- Alternative 2 $772,084
- Alternative 3 $1,495,715

The estimated present values of each IRA alternative represent the effort to address PAH-contaminated soil at both MRS TS876a and MRS TS877a.

Former EOD Proficiency Range (MRS ED879)

The estimated present values of each IRA alternative are as follows:

- Alternative 1 $0
- Alternative 2 $1,074,558
- Alternative 3 $531,936

Recommended Interim Removal Action Alternative

1940s Skeet Range (MRS TS876a) and 1970s Skeet Range (MRS TS877a)

The recommended IRA alternative to address PAH-contaminated soil at MRS TS876a and MRS TS877a is Alternative 3 – Excavation and Disposal. Alternative 3 includes excavation of PAH-contaminated soil and disposal of the excavated soil at an appropriate offsite facility. The completed excavations will be backfilled with clean borrow soil and the site will be restored, providing for unrestricted future use of the site. The time to complete the IRA is less than 1 year, and the estimated present value cost is $1,495,715.

Former EOD Proficiency Range (MRS ED879)

The recommended IRA alternative to address anomalies in subsurface soil at MRS ED879 is Alternative 3 – Excavation and Disposal. Alternative 3 includes excavation of subsurface anomalies within MRS

ED879, disposal of MEC as necessary, and recycling of MDAS at an offsite scrap recycler facility. All excavations will be backfilled and the site will be restored, providing for unrestricted future use of the site. The time to complete the IRA is less than 1 year, and the estimated present value cost is $531,936.

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Abbreviations and Acronyms

ARARs	applicable or relevant and appropriate requirements
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSE	Comprehensive Site Evaluation
CSM	conceptual site model
DGM	digital geophysical mapping
Eco-SSLs	ecological soil screening levels
EE/CA	Engineering Evaluation/Cost Analysis
EOD	Explosive Ordnance Disposal
EPA	U.S. Environmental Protection Agency
FFA	Federal Facility Agreement
GRAs	general response actions
HHRA	human health risk assessment
HMW	high molecular weight
HRS	Hazard Ranking System
ICRMP	Integrated Cultural Resources Management Plan
IDEQ	Idaho Department of Environmental Quality
IRA	Interim Removal Action
LMW	low-molecular-weight
LUCs	land use controls
LUCAP	Land Use Control Assurance Plan
MC	munitions constituents
MD	munitions debris
MDAS	material documented as safe
MEC	munitions and explosives of concern
mg/kg	milligrams per kilogram
MHAFB	Mountain Home Air Force Base
MHGP	Mountain Home General Plan

Abbreviations and Acronyms *(continued)*

MMRP	Military Munitions Response Program
MRAs	Munitions Response Areas
MRSPP	Munitions Response Site Prioritization Protocol
MRSs	Munitions Response Sites
mV	millivolt
NFA	no further action
NRCS	Natural Resources Conservation Service
NCP	National Oil and Hazardous Substances Contingency Plan
PAHs	polycyclic aromatic hydrocarbons
PPE	personal protective equipment
PRSC	post-removal site control
RAOs	removal action objectives
RCRA	Resource Conservation and Recovery Act
RSLs	regional screening levels
SKY	SKY Research
SLERA	screening-level ecological risk assessment
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
UXO	unexploded ordnance
XRF	x-ray fluorescence
§	Section

Section 1. Introduction

This Engineering Evaluation/Cost Analysis (EE/CA) was prepared in support of the U.S. Air Force (USAF) Military Munitions Response Program (MMRP) for a non-time-critical interim removal action (IRA) at three munitions response sites (MRSs) at Mountain Home Air Force Base (MHAFB) Idaho. The purpose of this EE/CA is to identify, evaluate, and recommend IRA alternatives for the following MRSs at MHAFB (Figure 1):

MRS	Site Name	Reason for Including MRS in the EE/CA
TS876a	1940s Skeet Range	Concentrations of polycyclic aromatic hydrocarbons (PAHs) in soil present an unacceptable risk to human under a future unrestricted land use scenario.
TS877a	1970s Skeet Range	Concentrations of PAHs in soil present an unacceptable risk to human health under a future unrestricted land use scenario.
ED879	Former Explosive Ordnance Disposal (EOD) Proficiency Range	Munitions and explosives of concern (MEC) may be present below the ground surface.

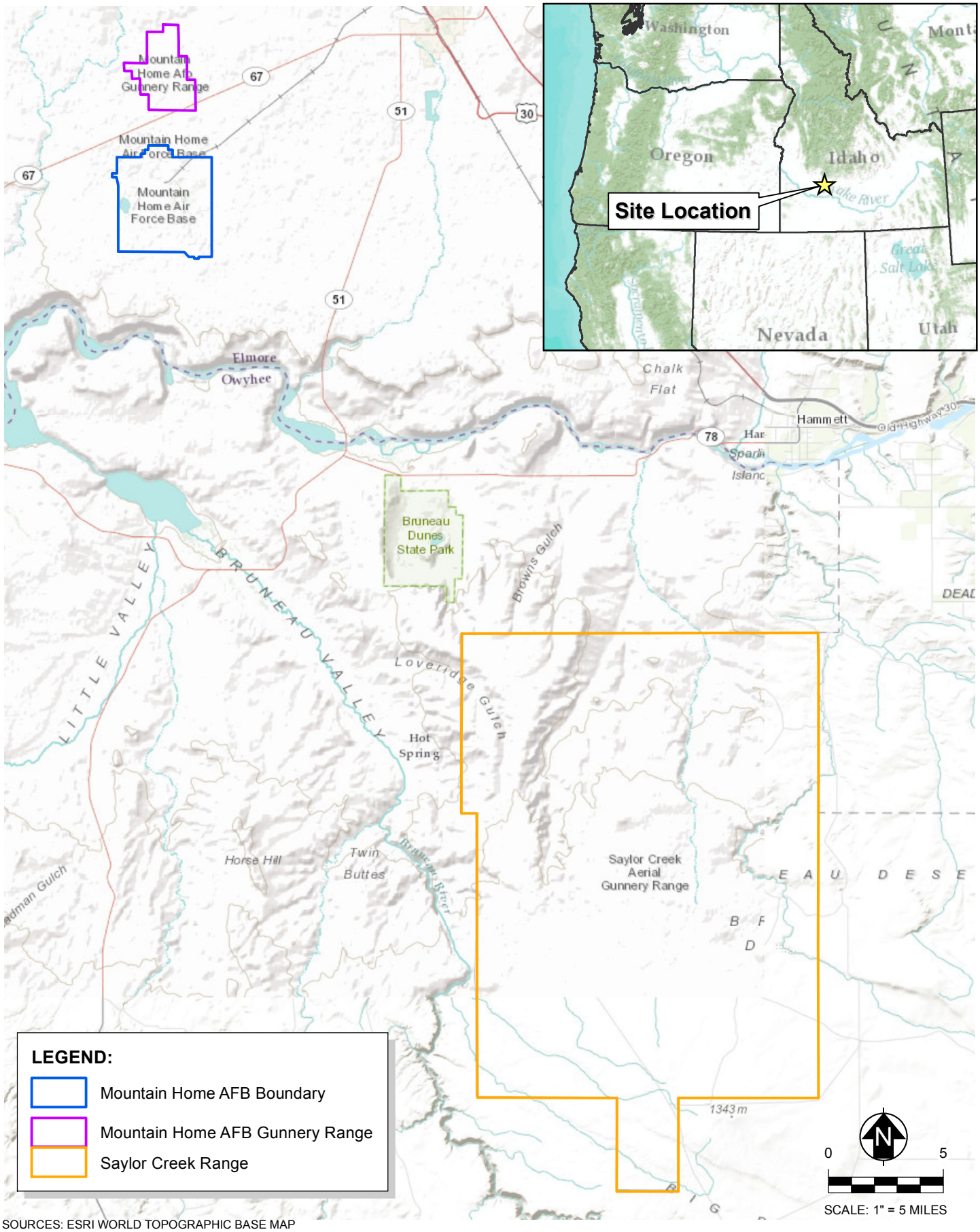
The goal of the USAF MMRP is to make each MRS safe for reuse and to protect human health and the environment in the process.

This EE/CA was prepared in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act, and the requirements of the National Oil and Hazardous Substances Contingency Plan (NCP), Code of Federal Regulations (CFR) Title 40 Section (§) 300.415, as well as in accordance with the following federal guidance:

- "Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA" (U.S. Environmental Protection Agency [EPA], 1993)
- "A Guide to Development and Documenting Cost Estimates During the Feasibility Study" (EPA, 2000)

1.1. AUTHORITY

The U.S. Army Corps of Engineers (USACE) Omaha District has authorized Chimera/ERRG Joint Venture to complete this EE/CA under Contract No. W9128F-10-D-0041, Delivery Order 0005.



SOURCES: ESRI WORLD TOPOGRAPHIC BASE MAP

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U.S. Army Corps of Engineers, Omaha District
1616 Capitol Avenue
Omaha, NE 98102-4901

CLIENT: U.S. ARMY CORPS OF ENGINEERS

SITE LOCATION AND VICINITY MAP

LOCATION:	DRAWN BY:	CHECKED BY:	PROJECT NO.	FIG NO.
MOUNTAIN HOME AFB ELMORE COUNTY, IDAHO	JJC 10/1/2012	MH 10/10/2012	2012-141	1

1.2. PURPOSE

The purpose of this EE/CA is to identify and evaluate IRA alternatives to mitigate hazards to human health and the environment associated with an approximately 2-acre area of PAH-contaminated soil at the 1940s Skeet Range (MRS TS876a) and 1970s Skeet Range (MRS TS877a), and a 28.5-acre area potentially containing MEC below the ground surface at the Former EOD Proficiency Range (MRS ED879). Figure 2 shows the location of each MRS within MHAFB. An IRA alternative will be selected for each MRS, and this decision will be documented in a separate action memorandum. In addition, a separate IRA work plan will be prepared that specifies details on the methods by which the IRAs will be performed.

1.3. MHAFB GENERAL DESCRIPTION, HISTORY, AND BACKGROUND

The following sections provide a general site description and background for MHAFB, including its location, operational history, physical setting, and previous investigations.

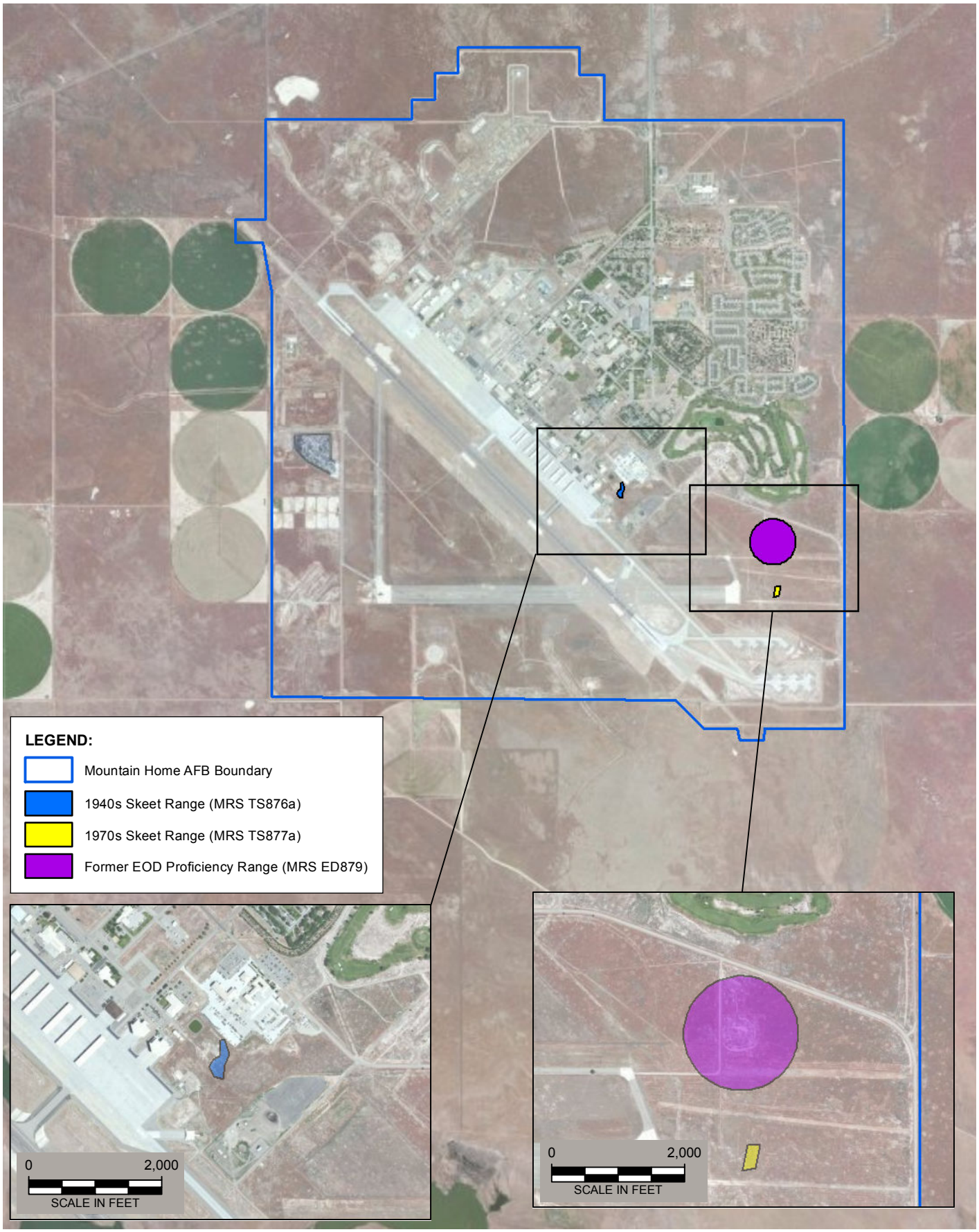
1.3.1. Location

MHAFB is located approximately 50 miles southeast of the city of Boise and 10 miles southwest of the city of Mountain Home in Elmore County, Idaho (Figure 1). MHAFB comprises three areas: the main portion, which is 6,844 acres; an active small arms range (MHAFB Gunnery Range), which is 3,184 acres; and the Saylor Creek Range, which is 12,000 acres. The main portion of the base consists of administrative and housing areas in the eastern portion and flight operations in the western portion.

1.3.2. Base History and Background

MHAFB was established in 1943 to provide U.S. Army Air Forces bombardment training during World War II. The base was to be used to train crews for the B-17 Flying Fortress heavy bomber; however, prior to the start of that mission, the base shifted to training crews for the B-24 Liberator heavy bomber. The 470th Bombardment Group was the first group to train at MHAFB, beginning in May 1943 until January 1944. The base was used to train B-24 crews under different Bombardment Groups until the end of World War II. The mission also added fighter aircraft to aid in the training of bomber crews. For a short period, MHAFB also was used for training crews on the B-29 Superfortress heavy bomber. At the end of World War II, the base was deactivated (SKY, 2011).

The installation has changed missions and command several times, including two deactivations (1945 to 1948 and 1950 to 1951). In 1949, MHAFB was reactivated as a Strategic Air Command installation. The 9th Bombardment Wing was relocated to MHAFB in 1953. The 9th Bombardment Wing flew B-29 Bombers and KB-29H refueling aircraft. In 1954, the 9th Bombardment Wing began converting to the B-47 Stratojet Bomber and KC-7 tanker. As a deterrent force during the Cold War, bombers were kept on alert at MHAFB (SKY, 2011).



SOURCES: ESRI WORLD TOPOGRAPHIC BASE MAP

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U.S. Army Corps of Engineers, Omaha District
1616 Capitol Avenue
Omaha, NE 98102-4901

CLIENT:	MUNITIONS RESPONSE SITE LOCATIONS			
MOUNTAIN HOME AIR FORCE BASE				
LOCATION:	DRAWN BY:	CHECKED BY:	PROJECT NO.	FIG NO.
MOUNTAIN HOME AFB ELMORE COUNTY, IDAHO	JJC 10/1/2012	MH 10/10/2012	2012-141	2

Mountain Home AFB hosted three Titan I missile complexes, which were located at Bruneau, Oreana, and near Boise. This missile squadron had a short existence; it was deactivated in 1965. In 1966, with the closure of Titan I missile sites and the move of the 67th Tactical Reconnaissance Wing to Mountain Home AFB, control of the base passed from Strategic Air Command to Tactical Air Command. The 67th flew RF-4C aircraft and conducted photographic, visual, radar, and thermal reconnaissance operations. In 1992, as part of USAF restructuring, the Air Combat Command replaced Tactical Air Command. In October 1992, the 22nd Air Refueling Squadron was activated and equipped with the KC-135R Stratotankers. In 1996, the 726th Air Control Squadron was reassigned from Shaw AFB to Mountain Home AFB. In 2002, the 366th Supply Squadron was redesignated as the 366th Logistics Readiness Squadron, thus merging the supply and transportation missions. While missions have changed at the base over the years, the installation boundary has remained virtually unchanged since the base's inception (SKY, 2011).

MHAFB is currently home to the 366th Fighter Wing, which provides integrated combat air power and responds rapidly to contingency tasks. The logistic components managed by MHAFB include the main installation and several off-installation sites. Mission-related activities include aircraft and vehicle repair and maintenance and fueling operations (SKY, 2011).

1.3.3. Physical Setting

1.3.3.1. Climate

The climate of MHAFB is hot and dry during the summer and cold and wet during the winter. Monthly mean high temperatures range from 36°F in January to 90°F in July. Monthly mean low temperatures range from 21°F in January to 58°F in July. Average annual precipitation is approximately 12.0 inches, and average annual snowfall is approximately 22.0 inches (SKY, 2011).

1.3.3.2. Topography

MHAFB is located in the Snake River Plain, which consists of flat to gently rolling hills and plateaus. Elevation at the base ranges from 2,990 to 3,050 feet above mean sea level. Approximately 2.5 miles south of MHAFB, the Snake River has developed a 400-foot deep canyon, which is defined by rimrock in many areas (SKY, 2011).

1.3.3.3. Hydrology

MHAFB is located in a semi-arid region in a small, shallow basin with 55 square miles of drainage area. Surface water tends to flow from northeast to southwest into Canyon Creek, which ultimately drains into the Snake River. Few wetlands are located in the Great Basin region of southwestern Idaho, and none are present at MHAFB (SKY, 2011).

1.3.3.4. Soil and Vegetation

The alluvial deposits in the MHAFB vicinity are variable, consisting of sand, silt, and loam. The soil type, Bahem silt loam, is within the boundaries of the MRSs, as described in the Soil Survey of Elmore County Area, Idaho (Natural Resources Conservation Service [NRCS], 1991).

Bahem silt loam is found on alluvial plains and basalt plains at elevations around 3,000 feet above sea level. The soil is very deep and well drained. The surface profile is typically covered by 0 to 15 inches of brown silt loam, 15 to 46 inches of pale brown very fine sandy loam, and 46 to 60 inches of light yellowish-brown fine sandy loam. The soil has moderate permeability, high available water capacity, slow runoff, a slight potential for erosion due to water, and a moderate hazard due to wind (NRCS, 1991).

MHAFB is located within the Intermountain Sagebrush Province/Sagebrush Steppe Ecosystem. This ecosystem contains a large diversity of landforms and vegetation types, ranging from vast expanses of flat, sagebrush-covered plateaus to rugged mountains blanketed with juniper woodlands and grasslands (SKY, 2011).

Much of MHAFB is covered by either buildings (including residences, hangars, and support and training facilities), runways, streets, sewage ponds, landfills, or rubble piles. Vegetative cover has been altered significantly from the predevelopment natural conditions. Most areas of vegetation on base consist of low grasses and small shrubs (SKY, 2011).

1.3.3.5. Geology and Hydrogeology

The Mountain Home Plateau, on which MHAFB is located, is underlain by over 10,000 feet of volcanic and sedimentary rocks. The principal geologic formations of interest are the Glenns Ferry Formation, the Bruneau Formation of the Idaho Group, and the Snake River Group, which is the uppermost bedrock unit. The Snake River Group, which is 550 feet thick, consists of several basalt flows and unconsolidated alluvial deposits. The basalt originated from volcanic sources as much as 60 miles east of MHAFB and elsewhere in the Mountain Home Plateau (SKY, 2011).

Wind-blown and alluvial deposits overlie the Snake River Group. These deposits consist of a layer of unconsolidated silt and sand ranging in thickness from several inches to approximately 30 feet (SKY, 2011).

MHAFB is underlain by the Snake River Plain regional aquifer system. This aquifer is an unconfined aquifer used primarily for drinking water and irrigation. Depth to groundwater is 350 to 400 feet below ground surface (bgs) (SKY, 2011).

1.3.4. Previous Investigations

As part of the USAF MMRP, a Comprehensive Site Evaluation (CSE) Phase I and Phase II were conducted at munitions response areas (MRAs) within MHAFB. Based on information obtained during

the CSE Phase I and Phase II, each MRA was either designated as a single MRS or subdivided into multiple, smaller MRSs. The three MRSs evaluated in this IRA were all developed from previously identified MRAs. Subdividing the MRAs into smaller MRSs is based upon site-specific factors and allows for more efficient characterization and response. The following subsections summarize the CSE Phase I and Phase II and the conditions that warranted delineating the MRSs that are the subject of this EE/CA from the original MRAs.

1.3.4.1. Modified Comprehensive Site Evaluation Phase I

In accordance with the MMRP, a CSE Phase I was issued in May 2010 (SKY, 2011). The CSE Phase I was the initial step in achieving the MMRP goal of making an MRA safe for reuse, so that the areas will be compatible with their designated appropriate future land use. The objectives of the CSE Phase I were to characterize the MRAs; evaluate actual or potential releases of hazardous substances, pollutants, or contaminants to migrate via exposure pathways (i.e., groundwater, soil, and air) from the MRAs; and evaluate associated targets of concern. The Modified CSE Phase I investigated seven MRAs.

The Final Modified CSE Phase I Report for Mountain Home AFB was issued May of 2010 (SKY, 2011). The USAF modified the CSE Phase I process by deferring some actions typically performed in a Phase I, to the CSE Phase II, should a CSE Phase II be required. For this modified CSE Phase I, it was determined that the conceptual site model (CSM), and Munitions Response Site Prioritization Protocol (MRSPP) and Hazard Ranking System (HRS) scoring were not required. Because the MRAs identified in the Phase I required future evaluation, these tools (CSM, MRSPP, and HRS scoring) were used during the CSE Phase II.

The Modified CSE Phase I included collection and evaluation of a large amount of information on past military munitions-related activities at MHAFB, current conditions on site with respect to the presence of MEC, physical setting of the land, current land use, and plans for future use of the property. Information sources included review of national, regional, and local archival records; interviews with MHAFB personnel; and observations made during the field reconnaissance.

The information obtained during the Modified CSE Phase I was used to develop and refine an interim CSM of potential exposures to MEC and munitions constituents (MC). The CSM evaluated the identified sources of explosive items and the potential for people to come into direct contact with MEC and MC under both current and projected future land use scenarios. The exposure pathways evaluated included the possible transport or migration of potential MEC items from place to place as the result of natural processes or human activities. The compiled information was then used to assess the potential explosive hazards and risks to human health at each MRA.

Based on the findings of the Modified CSE Phase I (which included a walk-through examination of the ranges), it was concluded that three of the seven MRAs had no evidence of historical munitions use or

potential sources for munitions-related contamination, thus they do not require further investigations. Additionally, it was concluded that no MC releases were present that warranted immediate action. However, the results of the Modified CSE Phase I investigation concluded that small arms and skeet range activities that occurred at the 1940s Skeet Range (MRA TS876) and 1970s Skeet Range (MRA TS877) may have released MC and chemicals incidental to munitions use (i.e., PAHs) to environmental media. However, there is no evidence of MEC at either of these two ranges. Additionally, detonation and burning of munitions that occurred at the Former EOD Proficiency Range (MRA ED879) and small arms and practice bombing activities at the Saylor Creek Range Buffer Zone (MRA MU878) may have released MEC and MC to environmental media. As a result, the following four MRAs were carried into the CSE Phase II for further investigation:

- 1940s Skeet Range (MRA TS876)
- 1970s Skeet Range (MRA TS877)
- Former EOD Proficiency Range (MRA ED879)
- Saylor Creek Range Buffer Zone (MRA MU878)

1.3.4.2. Comprehensive Site Evaluation Phase II

The primary objective of the CSE Phase II was to evaluate conditions at four MRAs (TS876, TS877, ED879, and MU878) within MHAFB to identify whether (1) additional munitions response activities were warranted or (2) a no further action (NFA) decision could be adequately documented. The following activities were conducted as part of the CSE Phase II:

- Visual surveys
- X-ray fluorescence (XRF) sampling
- Geophysical survey
- Soil sampling and analysis for MC

The resulting information was reviewed and used to refine the initial CSMs developed during the Modified CSE Phase I. The refined CSMs were used to identify all actual, potentially complete, or incomplete exposure pathways at the MRAs based on both the current and reasonably anticipated future land uses. The CSMs also considered the possible transport or migration of MEC items from place to place as the result of natural processes or the activities of people, as well as impacts associated with migration of contaminants associated with munitions activities. Land use scenarios were evaluated with respect to how human and ecological receptors would interact with the land at MHAFB. The compiled information was then used to assess the potential explosive and environmental hazards of the four MRAs through application of the MRSPP.

A screening-level human health risk assessment (HHRA) and screening-level ecological risk assessment (SLERA) were performed as part of the CSE Phase II. Soil sample results were compared with the following sets of screening criteria for the HHRA and SLERA:

- HHRA: EPA regional screening levels (RSLs) for residential soil (EPA, 2012a) and Idaho initial default target levels (IDEQ, 2004).
- SLERA: EPA ecological soil screening levels (Eco-SSLs) for PAHs (EPA, 2007), and EPA Eco-SSLs for lead (EPA, 2005).

Rather than develop ecological screening levels for individual PAH compounds, EPA developed screening benchmarks for groups of PAHs based upon molecular weight. Screening levels for high–molecular-weight (HMW) and low-molecular-weight (LMW) PAHs are intended to be the sum of the concentrations of individual HMW PAH compounds and LMW PAH compounds, respectively. Per EPA guidance (EPA, 2012b), PAHs at Mountain Home AFB are screened as the sum of total HMW PAHs and the sum of total LMW PAHs. PAHs in soil are largely the result of anthropogenic sources and can vary widely based on proximity to roadways and industrial sources. Sections 2.2 and 3.2, discuss the PAH results for soil samples collected at MRAs TS876 and TS877.

Fifty-one surface soil samples were collected at MRA TS876 for XRF analysis of lead. Seventy-eight surface soil samples were collected at the MRA TS877 for XRF analysis of lead. Seventy surface soil samples were collected at MRA ED879 for XRF analysis of lead. None of the surface sample results exceeded the residential human health screening criterion for lead of 400 milligrams per kilogram (mg/kg). Maximum lead concentrations at each of the three MRAs exceeded the Eco-SSL (11 mg/kg) for the most sensitive receptors. However, the CSE Phase II Report indicated lead concentrations were determined to be consistent with background concentrations, thus lead would not pose an unacceptable risk to ecological receptors. As a result, lead was dropped as an MC and is not discussed further in this EE/CA.

The CSE Phase II Report recommended that MRAs TS876, TS877, and ED879 be split into separate MRSs that, as discussed in Sections 2, 3, and 4, are the subject of this EE/CA.

The USAF determined that MRA MU878 is a buffer zone that is part of the operational range, thus this site is ineligible for the MMRP. Therefore, it will not be discussed further in this EE/CA.

1.4. REPORT ORGANIZATION

Following this introduction, the remainder of this EE/CA is organized as follows:

- **Section 2 – 1940s Skeet Range (MRS TS876a)** summarizes the site-specific information for MRS TS876a. The information provided includes the site description and history, nature and extent of contamination, and a streamlined risk evaluation. This information is provided as pertinent background information to support the evaluations in this EE/CA.
- **Section 3 – 1970s Skeet Range (MRS TS877a)** summarizes the site-specific information for MRS TS877a. The information provided includes the site description and history, nature and extent of contamination, and a streamlined risk evaluation. This information is provided as pertinent background information to support the evaluations in this EE/CA.
- **Section 4 – Former EOD Proficiency Range (MRS ED879)** summarizes the site-specific information for MRS ED879. The information provided includes the site description and history, nature and extent of contamination, and a streamlined risk evaluation. This information is provided as pertinent background information to support the evaluations in this EE/CA.
- **Section 5 – Identification of Removal Action Objectives** presents the removal action objectives (RAOs) and summarizes applicable or relevant and appropriate requirements (ARARs).
- **Section 6 – Identification and Analysis of Interim Removal Action Alternatives**, identifies and analyzes the IRA alternatives for the three MRSs.
- **Section 7 – Comparative Analysis of Interim Removal Action Alternatives** summarizes the comparative analysis of alternatives.
- **Section 8 – Recommended Interim Removal Action Alternative** presents the recommended IRA alternative for the three MRSs.
- **Section 9 – References**, lists the documents and guidance used to develop this EE/CA.

Section 2. 1940s Skeet Range (MRS TS876a)

The following subsections describe the site and its history, nature and extent of contamination, and results of the streamlined risk evaluation for MRS TS876a.

2.1. SITE DESCRIPTION AND HISTORY

MRS TS876a is an approximately 1.1-acre site that was originally part of the 1940s Skeet Range (MRA TS876). The 1940s Skeet Range (MRA TS876) is a 32.9-acre site located in the southern portion of the base, east of the flightline. The entire range measures approximately 1,952 feet by 972 feet with a perimeter of 5,087 feet (Figure 3). MRA TS876 consisted of two firing points, two high houses, two low houses, and a designated shot fall zone. The range was in use from the early 1940s until the late 1940s or early 1950s. Based on the PAH contamination outside the original MRA boundary, the overall acreage of MRA TS876 increased from 32.9 acres to 33.1 acres. MRA TS876 was divided into the following MRSs:

- MRS TS876: 1940s Skeet Range – Approximately 32 acres (NFA)
- MRS TS876a: 1940s Skeet Range – Approximately 1.1 acres

The 1.1-acre portion of MRA TS876, now designated MRS TS876a, was recommended for further action because elevated concentrations of PAHs are present in soil.

2.1.1. Structures

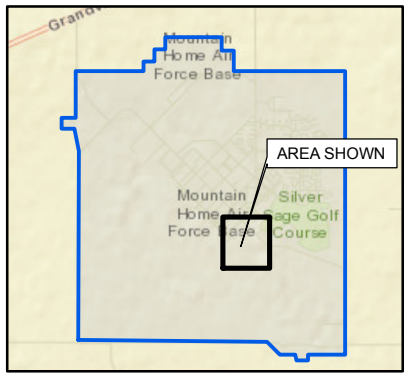
No buildings or concrete structures are located within MRS TS876a. The 726th Air Control Squadron building and a number of other administrative buildings are located near MRS TS876a. Hangar facilities to the west of MRS TS876a are associated with the MHAFB flightline.

2.1.2. Physical Setting

Vegetation in MRS TS876a consists of low grassland communities. The topography is flat, and the depth to groundwater is approximately 350 feet to 400 feet bgs. Soil consists of Bahem silt loam. No wetlands or surface water features are located within the boundary of MRS TS876a (SKY, 2011). No fencing is present specific to the site's perimeter that restricts access; however, flightline fencing surrounds most of the site.

LEGEND:

- MRS TS876a Boundary
- MRA TS876 Boundary
- Mountain Home AFB Boundary



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SCALE IN FEET

SOURCES: ESRI WORLD TOPOGRAPHIC BASE MAP

U.S. Army Corps of Engineers, Omaha District
1616 Capitol Avenue
Omaha, NE 98102-4901

CLIENT:				
U.S. ARMY CORPS OF ENGINEERS	**1940s SKEET RANGE (MRS TS876A)**			
LOCATION:	DRAWN BY:	CHECKED BY:	PROJECT NO.	FIG NO.
MOUNTAIN HOME AFB ELMORE COUNTY, IDAHO	JJC 10/1/2012	MH 10/10/2012	2012-141	3

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2.1.3. Current and Future Land Use

MRS TS876a is currently located west of Liberator Street (Bomber Road) between the Fire Training Area and the 726th Air Control Squadron storage yard. The site is relatively flat and contains concrete rubble piles in the western portion of the site that may have been used as a staging or disposal area for construction debris. Two antennae are located at the eastern end of the site and are associated with activities at the 726th Air Control Squadron. Current land use is an industrial use area associated with the flightline maintenance facilities. Future land use is expected to remain as an industrial use area consisting of flightline maintenance facilities after the removal of contaminated soil (USAF, 2009).

2.1.4. Sensitive Ecosystems

No known threatened or endangered species are present at MRS TS876a; however, habitat of the western burrowing owl (*Athene cunicularia*), a state-listed species of concern, has been identified on site (USAF, 2012; SKY, 2011).

2.1.5. Natural and Cultural Resources

Historical archaeological sites recorded on MHAFB include sheepherder camps and dumps. In addition, historical isolated artifacts have been recorded. However, as discussed in the MHAFB Integrated Cultural Resources Management Plan (ICRMP), no known archaeological resources have been identified at MRS TS876a (USAF, 2011).

2.2. SOURCE, NATURE, AND EXTENT OF CONTAMINATION

The following sections describe the field investigation results of the CSE Phase II at MRS TS876a. The field investigation was conducted throughout the MRA; however, the following sections summarize the munitions and PAH results that are pertinent to MRS TS876a.

2.2.1. Range-Related Debris

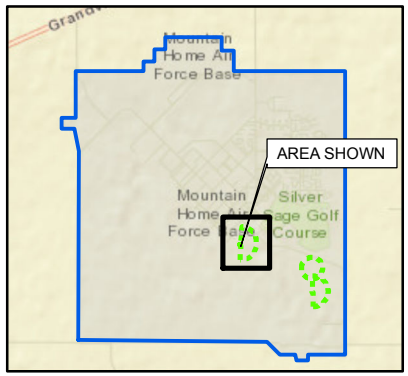
During the CSE Phase II field investigation, visual survey transects were completed throughout MRS TS876a. To the northeast of the flightline fence, concrete and clay target debris were observed and logged near the historical firing points, which are no longer present (SKY, 2011). The clay target debris observed during the visual survey was consistent with historical use of the skeet range and observations from the CSE Phase I.

2.2.2. Soil

Ten surface soil samples (plus 1 duplicate) were collected from areas where clay target debris was observed within MRS TS876a. The soil samples were analyzed for PAHs, which were detected in all 10 samples. All 10 samples exhibited PAH concentrations that exceeded residential human health screening criterion (Figure 4). The highest concentrations of PAHs were reported at sample locations C-1S-MH-01-SS-014 and C-1S-MH-01-SS-015 (SKY, 2011).

LEGEND:

- PAH Concentration Exceeding Human Health Screening Criteria
- MRS TS876a
- MRA Boundary



0 500

SCALE IN FEET

SOURCES: ESRI WORLD TOPOGRAPHIC BASE MAP

U.S. Army Corps of Engineers, Omaha District
1616 Capitol Avenue
Omaha, NE 98102-4901

CLIENT: U.S. ARMY CORPS OF ENGINEERS

LOCATION: MOUNTAIN HOME AFB ELMORE COUNTY, IDAHO

PAH RESULTS FOR 1940s SKEET RANGE (MRS TS876A)

DRAWN BY:	CHECKED BY:	PROJECT NO.	FIG NO.
JJC 10/1/2012	MH 10/10/2012	2012-141	4

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Maximum concentrations of total HMW PAHs exceeded Eco-SSLs in soil samples from MRS TS876a. However, concentrations of LMW PAHs were less than their respective Eco-SSLs (SKY, 2011).

Subsurface soil samples were not collected at MRS TS876a.

2.2.3. Surface Water, Sediment, and Groundwater

Surface water and sediment are not present at MRS TS876a; therefore, no surface water or sediment samples were collected during the CSE Phase II. In addition, because of the depth to groundwater (350 to 400 feet bgs) and the low mobility of the chemicals of potential concern (i.e., PAHs), no groundwater samples were collected at MRS TS876a.

2.3. SCREENING-LEVEL RISK ASSESSMENT

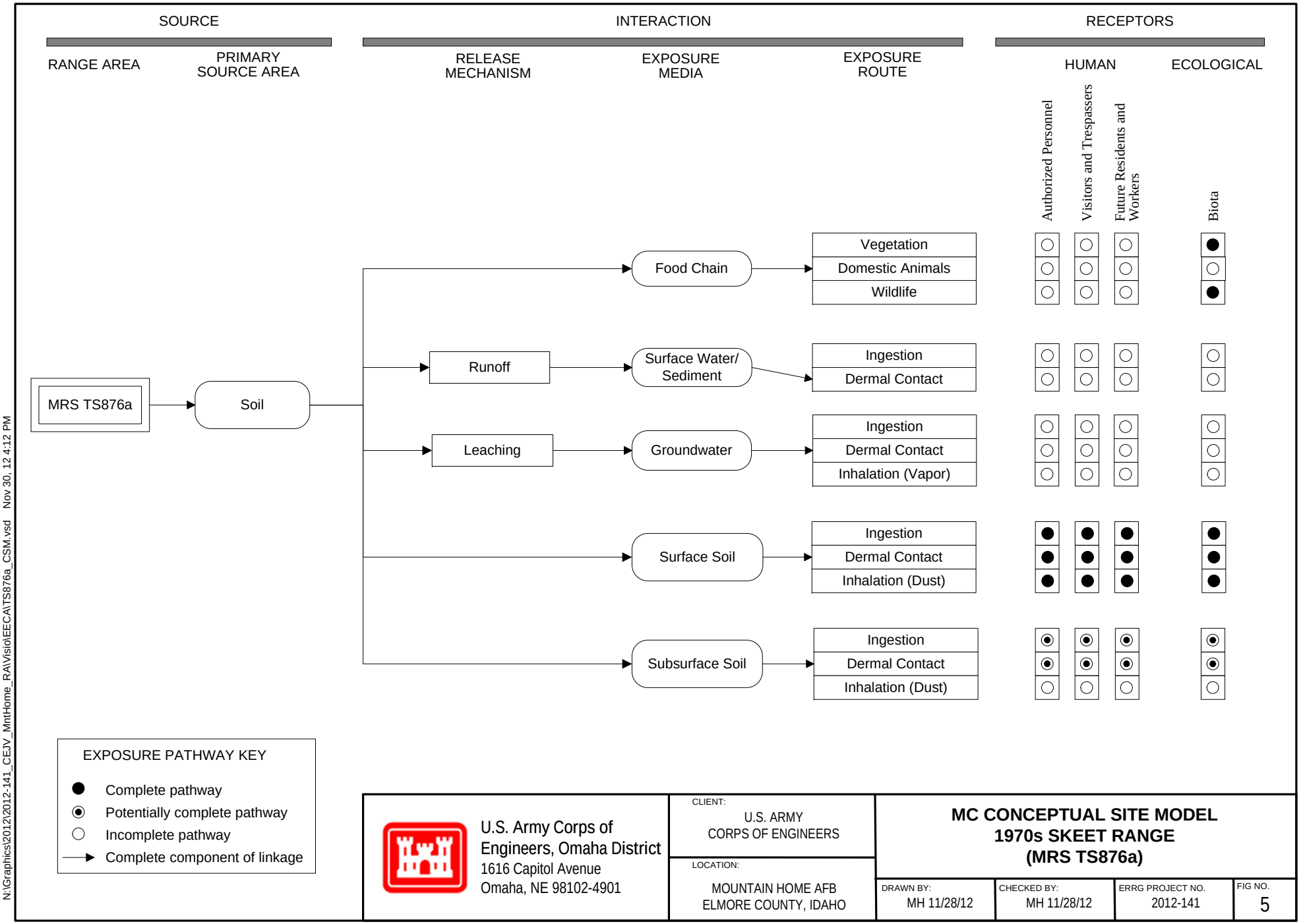
A screening-level risk assessment was performed for MRS TS876a as part of the CSE Phase II. This assessment showed that PAHs that exceeded risk screening levels pose an imminent and substantial threat to human health under current land use, given that the site does not have perimeter fencing that prevents access. The following subsections summarize the CSM and the results of the screening-level HHRA and SLERA as they relate to MRS TS876a.

2.3.1. Conceptual Site Model

Because clay target debris was encountered at the PAH-contaminated area and within MRS TS876a and MEC was not, a CSM for MEC is not necessary for this site. PAHs from clay target debris are present in surface soil (0 to 6 inches bgs) within the PAH-contaminated area. Figure 5 shows the CSM for exposure to PAHs in soil.

The following human and ecological receptors have the potential to be present at MRS TS876a:

- Authorized personnel, including current and future maintenance workers who have access to this property, as well as other types of workers who will not typically be exposed to subsurface soil.
- Visitors, including authorized recreational users who currently, or may in the future, use or move across MRS TS876a during recreational activities (e.g., joggers, air show attendees, etc.). Also, trespassers that currently, or may in the future, use or move across MRS TS876a during unauthorized recreational activities.
- Hypothetical future residents and people currently living in base housing who may visit this area. Also, future construction workers that may perform intrusive (i.e., subsurface) activities at MRS TS876a to transform the property for its next intended use, as well as other types of workers who may also be exposed to subsurface soil.
- Ecological receptors include all current and future animal and plant life that may be exposed to soil at MRS TS876a.



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U.S. Army Corps of Engineers, Omaha District
1616 Capitol Avenue
Omaha, NE 98102-4901

CLIENT: U.S. ARMY CORPS OF ENGINEERS

LOCATION: MOUNTAIN HOME AFB ELMORE COUNTY, IDAHO

MC CONCEPTUAL SITE MODEL
1970s SKEET RANGE
(MRS TS876a)

DRAWN BY:	CHECKED BY:	ERRG PROJECT NO.	FIG NO.
MH 11/28/12	MH 11/28/12	2012-141	5

2.3.2. Human Health Risk Assessment

Based on the results of the HHRA (Table 1), some PAHs may pose an unacceptable risk to human health under a conservative residential land use. PAHs were detected at concentrations exceeding screening criteria in all 10 samples collected within the MRS.

Table 1. Human Health Screening Evaluation, 1940s Skeet Range (MRS TS876a)

Analyte	Frequency Detected	Maximum Detected Concentration (mg/kg)[1]	Screening Criterion (mg/kg)[2]	Exceeds Screening Criterion (Yes or No)
Acenaphthene	10/10	0.083	3,400	No
Acenaphthylene	8/10	0.0032	3,400	No
Anthracene	10/10	0.29	17,000	No
Benzo(a)anthracene	10/10	2.6	0.15	**Yes**
Benzo(a)pyrene	10/10	3.7	0.015	**Yes**
Benzo(b)fluoranthene	10/10	5.2	0.15	**Yes**
Benzo(g,h,i)perylene	10/10	2.8	1,180	No
Benzo(k)fluoranthene	10/10	1.8	1.5	**Yes**
Chrysene	10/10	3.3	15	No
Dibenz(a,h)anthracene	10/10	0.54	0.015	**Yes**
Fluoranthene	10/10	3.6	2,300	No
Fluorene	8/10	0.041	2,300	No
Indeno(1,2,3-cd)pyrene	10/10	3.2	0.15	**Yes**
1-Methylnaphthalene	8/10	0.0047	22	No
2-Methylnaphthalene	9/10	0.014	310	No
Naphthalene	9/10	0.051	1.14	No
Phenanthrene	10/10	1.4	1,700	No
Pyrene	10/10	3.3	1,700	No

Notes:

1 = Maximum concentration detected in surface soil samples collected at MRS TS876a during field activities as part of the Comprehensive Site Evaluation Phase II (SKY, 2011)

2 = Screening criterion is from Table 4-1 of the Comprehensive Site Evaluation Phase II (SKY, 2011)

mg/kg = milligrams per kilogram

2.3.3. Ecological Risk Assessment

Concentrations of total HMW PAHs exceeded ecological screening criteria in 8 of 10 samples, with maximum concentrations exceeding screening criteria. Maximum concentrations of LMW PAHs were less than ecological screening criteria (Table 2); therefore, LMW PAHs do not pose an unacceptable risk at MRS TS876a.

Table 2. Ecological Screening Evaluation, 1940s Skeet Range (MRS TS876a)

Analyte	Frequency Detected	Maximum Detected Concentration (mg/kg)[1]	Screening Criterion (mg/kg)[2]	Exceeds Screening Criterion (Yes or No)
Total HMW PAHs	10/10	30	1.1	**Yes**
Total LMW PAHs	10/10	1.87	29	No

Notes:

1 = Maximum concentration detected in surface soil samples collected at MRS TS876a during field activities as part of the Comprehensive Site Evaluation Phase II (SKY, 2011)

2 = Screening criterion is from Table 9-2 of the Comprehensive Site Evaluation Phase II (SKY, 2011)

HMW = high-molecular-weight

LMW= low-molecular-weight

mg/kg = milligram per kilogram

PAHs = polycyclic aromatic hydrocarbons

Section 3. 1970s Skeet Range (MRS TS877a)

The following subsections describe the site and its history, nature and extent of contamination, and results of the streamlined risk evaluation for MRS TS877a.

3.1. SITE DESCRIPTION AND BACKGROUND

MRS TS877a is an approximately 0.9-acre site that was originally part of the 1970s Skeet Range (MRA TS877). The 1970s Skeet Range (MRA TS877) is a 29.6-acre site located in the southeastern portion of the base near the southern flightline. The entire range measures approximately 1,805 feet by 967 feet, with a perimeter of 4,719 feet (Figure 6). The range consisted of a firing point, a high house, a low house, and a designated shot fall zone. The concrete firing point is currently present. MRA TS877 was in use in the late 1960s and 1970s and received heavy use in 1972. The high and low houses were demolished in 1980, suggesting that all activity at the skeet range ceased by 1980. MRA TS877 was divided into the following MRSs:

- MRS TS877: 1970s Skeet Range – Approximately 28 acres (NFA)
- MRS TS877a: 1970s Skeet Range – Approximately 0.9 acres

The 0.9-acre portion of MRA TS877, now designated as MRS TS877a, is recommended for further action because elevated concentrations of PAHs are present in soil.

3.1.1. Structures

No buildings or concrete structures are located near or within MRS TS877a.

3.1.2. Physical Setting

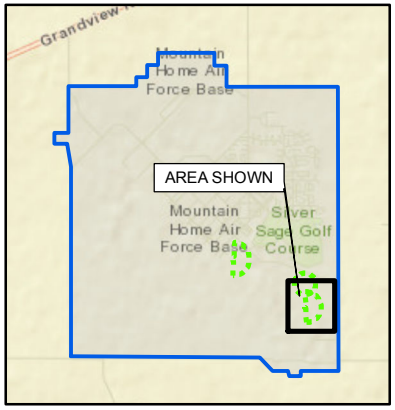
MRS TS877a is vegetated with low grasses. The topography is flat, and the depth to groundwater is approximately 350 feet to 400 feet bgs. Soil consists of Bahem silt loam. No wetlands or surface water features are associated with the site (SKY, 2011). No perimeter fencing is present at the site.

3.1.3. Current and Future Land Use

MRS TS877a is currently designated as open space, within the approach zone clear area for the runway on the southeast corner of the base. In accordance with the MHGP, future land use is not expected to change after the removal of contaminated soil (USAF, 2009).

LEGEND:

- MRS TS877a Boundary
- MRA TS877 Boundary
- Mountain Home AFB Boundary



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SCALE IN FEET

SOURCES: ESRI WORLD TOPOGRAPHIC BASE MAP

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U.S. Army Corps of Engineers, Omaha District
1616 Capitol Avenue
Omaha, NE 98102-4901

CLIENT:				
U.S. ARMY CORPS OF ENGINEERS	**1970s SKEET RANGE (MRS TS877A)**			
LOCATION:	DRAWN BY:	CHECKED BY:	PROJECT NO.	FIG NO.
MOUNTAIN HOME AFB ELMORE COUNTY, IDAHO	JJC 10/1/2012	MH 10/10/2012	2012-141	**6**

3.1.4. Sensitive Ecosystems

No known threatened or endangered species are present in MRS TS877a; however, habitat of the western burrowing owl (*Athene cunicularia*), which is a state-listed species of concern, has been identified on site (USAF, 2012; SKY, 2011).

3.1.5. Natural and Cultural Resources

Historical archaeological sites recorded on MHAFB include sheepherder camps and dumps. In addition, historical isolates have been recorded. No known archaeological resources have been identified at MRS TS877a (USAF, 2011).

3.2. SOURCE, NATURE, AND EXTENT OF CONTAMINATION

The following sections describe the field investigation results of the CSE Phase II at MRS TS877a. The field investigation was conducted throughout the MRA; however, the following sections only summarize the munitions and PAH results that are pertinent to MRS TS877a.

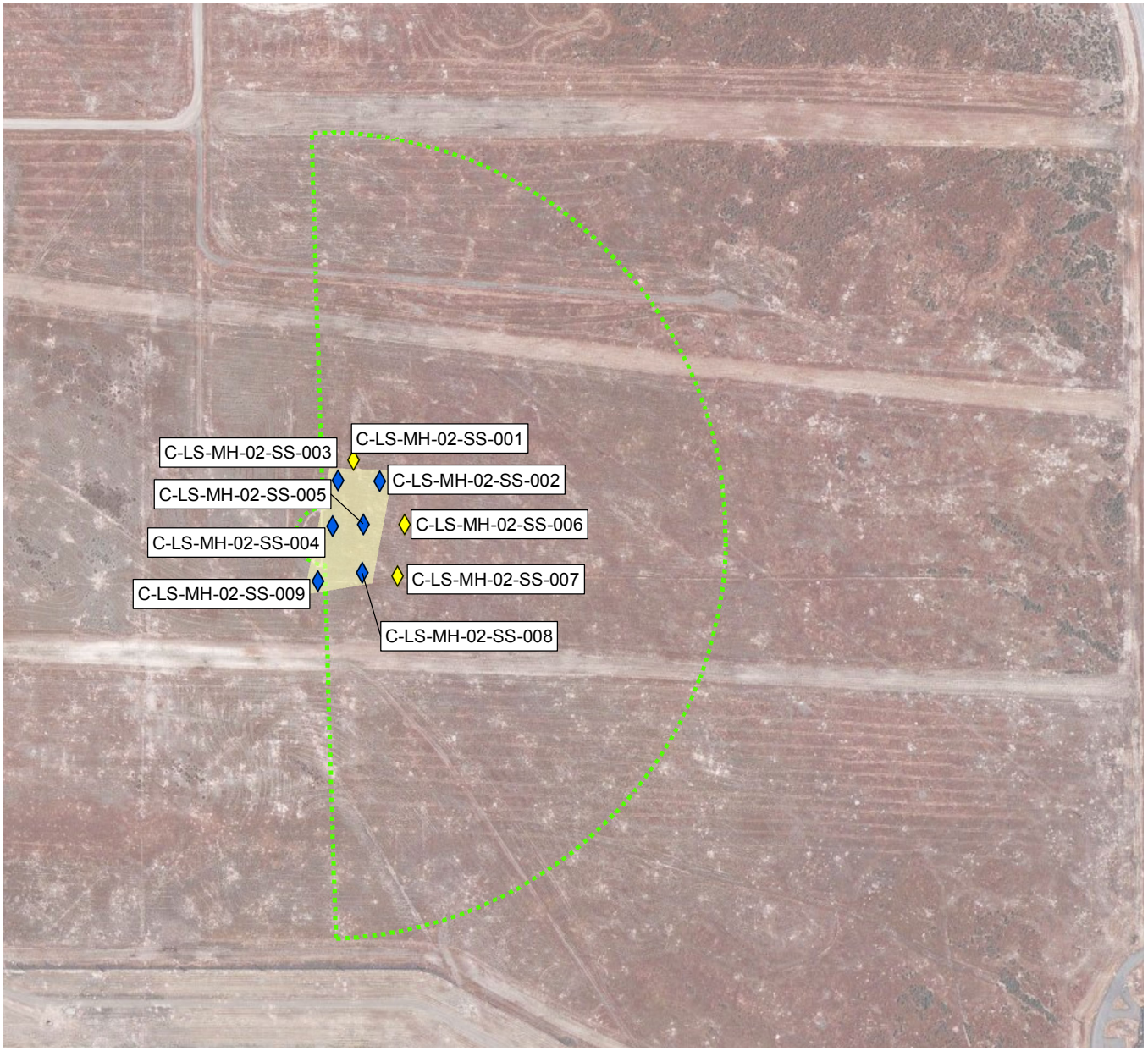
3.2.1. Range-Related Debris

During the CSE Phase II visual surveys at MRA TS877, features associated with historical use of the skeet range were observed and logged. A key feature that confirmed the position of the skeet range is the intact concrete firing pad, which indicates that the direction of fire would have been to the east. The firing pad is the characteristic half-circle shape with approximately five firing locations visible around the concrete pad. Two concrete foundation blocks were observed at the southern corner of the firing pad and may be indicative of range structures such as the high or low houses (SKY, 2011).

Debris consisting of 20 gauge shotgun casings, .410 gauge shotgun casings, and shotgun wads were observed in close proximity to the firing pad. Clay target debris also was observed immediately east of the concrete firing pad and within 300 feet in the direction of fire. The highest concentration of clay target debris was observed within 60 to 90 feet of the concrete firing pad. Shotgun ammunition debris and clay target debris are consistent with historical use of the skeet range and observations from the CSE Phase I. Other small arms and munitions debris (MD) items such as 5.56 blanks and 30-millimeter target practice projectiles were observed throughout MRA TS877. Such debris is consistent with more recent training activities rather than historical skeet range activities (SKY, 2011).

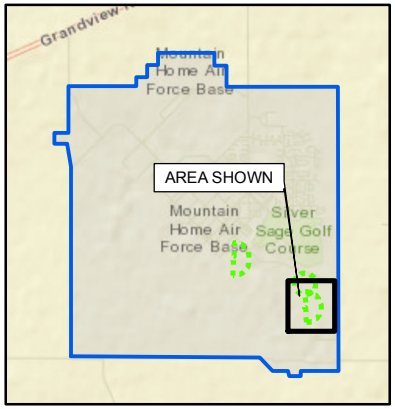
3.2.2. Soil

Nine surface soil samples (plus one duplicate) were collected from areas where clay target debris was observed at MRS TS877a. The samples were analyzed for PAHs, which were detected in all nine samples. PAH concentrations exceeded the residential human health screening criteria in six of the nine samples (Figure 7). The highest concentrations of PAHs were found at locations C-1S-MH-02-SS-004 and C-1S-MH-02-SS-005.



LEGEND:

- PAH Concentration Less Than Human Health Screening Criterion
- PAH Concentration Exceeded Human Health Screening Criterion
- MRS TS877a
- MRA Boundary



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SCALE IN FEET

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SOURCES: ESRI WORLD TOPOGRAPHIC BASE MAP

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U.S. Army Corps of Engineers, Omaha District
1616 Capitol Avenue
Omaha, NE 98102-4901

CLIENT: U.S. ARMY CORPS OF ENGINEERS

LOCATION: MOUNTAIN HOME AFB ELMORE COUNTY, IDAHO

PAH RESULTS FOR 1970s SKEET RANGE (MRS TS877A)

DRAWN BY:	CHECKED BY:	PROJECT NO.	FIG NO.
JJC 10/1/2012	MH 10/10/2012	2012-141	7

Maximum concentrations of total HMW PAHs exceeded ecological screening criteria in nine soil samples at MRS TS877a. However, concentrations of LMW PAHs were less than ecological screening criteria in all soil samples.

Subsurface soil samples were not collected at MRS TS877a.

3.2.3. Surface Water, Sediment, and Groundwater

Surface water and sediment are not present at MRS TS877a; therefore, no surface water or sediment samples were collected during the CSE Phase II. In addition, because of the depth to groundwater (350 to 400 feet bgs) and the low mobility of the chemicals of potential concern (e.g., PAHs), no groundwater samples were collected at MRS TS877a (Sky, 2011).

3.3. SCREENING-LEVEL RISK ASSESSMENT

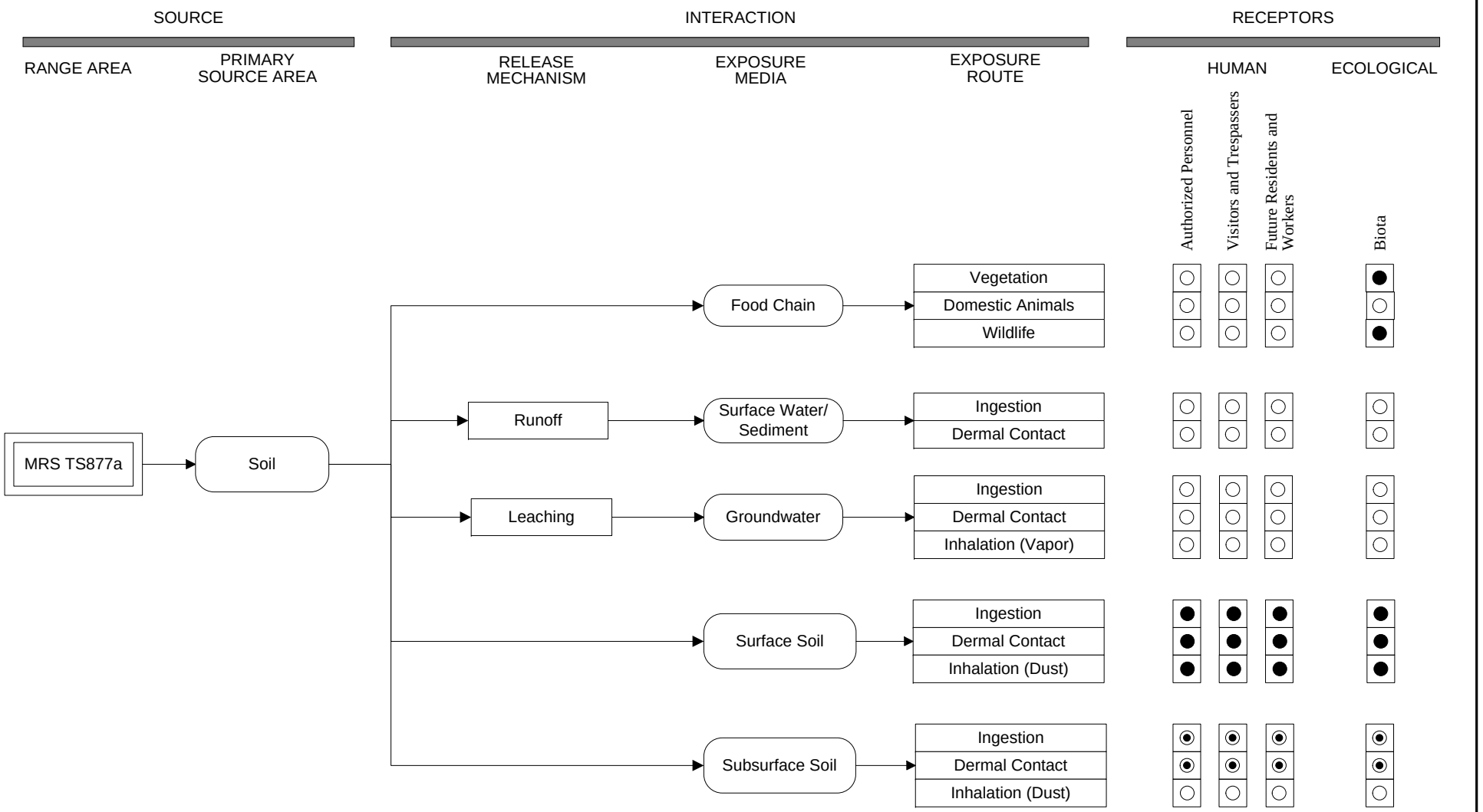
A screening-level risk assessment was performed for MRS TS877a as part of the CSE Phase II. This assessment showed that PAHs that exceeded risk screening levels pose an imminent and substantial threat to human health under current land use, given that the site does not have a fence around it. The following subsections summarize the CSM and the results of the screening-level HHRA and SLERA as they relate to MRS TS877a.

3.3.1. Conceptual Site Model

Because clay target debris was encountered at the PAH-contaminated area and within MRS TS876a and MEC was not, a CSM for MEC is not necessary for this site. PAHs from clay target debris are present in surface soil (0 to 6 inches) within the PAH-contaminated area. Figure 8 shows the CSM for exposure to PAHs in soil.

The following human and ecological receptors have the potential to be present at MRS TS877a:

- Authorized personnel, including current and future maintenance workers who have access to this property, as well as other types of workers who will not typically be exposed to subsurface soil.
- Visitors, including authorized recreational users who currently, or may in the future, use or move across MRS TS876a during recreational activities (e.g., joggers, air show attendees, etc.). Also, trespassers that currently, or may in the future, use or move across MRS TS876a during unauthorized recreational activities.
- Hypothetical future residents and people currently living in base housing who may visit this area. Also, future construction workers that may perform intrusive (i.e., subsurface) activities at MRS TS876a to transform the property for its next intended use, as well as other types of workers who may also be exposed to subsurface soil.
- Ecological receptors include all current and future animal and plant life that may be exposed to soil at MRS TS877a.



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U.S. Army Corps of Engineers, Omaha District
1616 Capitol Avenue
Omaha, NE 98102-4901

CLIENT: U.S. ARMY CORPS OF ENGINEERS

LOCATION: MOUNTAIN HOME AFB ELMORE COUNTY, IDAHO

MC CONCEPTUAL SITE MODEL
1970s SKEET RANGE
(MRS TS877a)

DRAWN BY:	CHECKED BY:	ERRG PROJECT NO.	FIG NO.
MH 11/28/12	MH 11/28/12	2012-141	8

3.3.2. Human Health Risk Assessment

Based on the results of the HHRA (Table 3), some PAHs may pose an unacceptable risk to human health under a conservative residential land use. PAHs were detected at concentrations exceeding screening criteria in six of the nine samples collected within MRS TS877a.

Table 3. Human Health Risk Assessment Screening Levels, 1970s Skeet Range (MRS TS877a)

Analyte	Frequency Detected	Maximum Detected Concentration (mg/kg)[1]	Screening Criterion (mg/kg)[2]	Exceeds Screening Criterion (Yes or No)
Acenaphthene	7/9	0.13	3,400	No
Acenaphthylene	2/9	0.00043	3,400	No
Anthracene	5/9	0.10	17,000	No
Benzo(a)anthracene	8/9	1.9	0.15	**Yes**
Benzo(a)pyrene	9/9	4.8	0.015	**Yes**
Benzo(b)fluoranthene	9/9	4.5	0.15	**Yes**
Benzo(g,h,i)perylene	9/9	3.6	1,180	No
Benzo(k)fluoranthene	9/9	1.9	1.5	**Yes**
Chrysene	9/9	2.4	15	No
Dibenz(a,h)anthracene	6/9	0.78	0.015	**Yes**
Fluoranthene	9/9	1.6	2,300	No
Fluorene	2/9	0.0032	2,300	No
Indeno(1,2,3-cd)pyrene	9/9	3.9	0.15	**Yes**
1-Methylnaphthalene	3/9	0.012	22	No
2-Methylnaphthalene	6/9	0.018	310	No
Naphthalene	7/9	0.052	1.14	No
Phenanthrene	7/9	0.39	1,700	No
Pyrene	9/9	1.9	1,700	No

Notes:

1 = Maximum concentration detected in surface soil samples collected at Munitions Response Site TS877a during field activities as part of the Comprehensive Site Evaluation Phase II (SKY, 2011)

2 = Screening criterion is from Table 4-1 of the Comprehensive Site Evaluation Phase II (SKY, 2011)

mg/kg = milligrams per kilogram

3.3.3. Ecological Risk Assessment

Concentrations of total HMW PAH exceeded ecological screening criteria in three of nine samples (Table 4), with maximum concentrations exceeding screening criteria. Maximum concentrations of LMW PAHs were less than ecological screening criteria; therefore, LMW PAHs do not pose an unacceptable risk at MRS TS877a.

Table 4. Ecological Screening Assessment, 1970s Skeet Range (MRS TS877a)

Analyte	Frequency Detected	Maximum Detected Concentration (mg/kg)[1]	Screening Criterion (mg/kg)[2]	Exceeds Screening Criterion (Yes or No)
Total HMW PAHs	9/9	27.6	1.1	**Yes**
Total LMW PAHs	7/9	0.72	29	No

Notes:

1 = Maximum concentration detected in surface soil samples collected at Munitions Response Site TS877a during field activities as part of the Comprehensive Site Evaluation Phase II (SKY, 2011)

2 = Screening criterion is from Table 9-5 of the Comprehensive Site Evaluation Phase II (SKY, 2011)

HMW = high-molecular-weight

LMW= low-molecular*weight

mg/kg = milligram per kilogram.

PAHs = polycyclic aromatic hydrocarbons

Section 4. Former EOD Proficiency Range (MRS ED879)

The following subsections describe the site and its history, nature and extent of contamination, and results of the streamlined risk evaluation for MRS ED879.

4.1. SITE DESCRIPTION AND BACKGROUND

The Former EOD Proficiency Range (MRA ED879) is a 28.5-acre site located in the southeastern portion of MHAFB, south of Silver Sage Golf Course, off Bomber Street (Figure 9). MRA ED879 was in use until the late 1990s; however, the exact dates of use are unknown. Upon site closure, EOD training was moved to the west side of the airfield away from the housing and administrative area of the base. A variety of munitions is assumed to have been detonated at this range for training and proficiency exercises; the exact types of munitions are unknown. At the beginning of the CSE Phase II field investigation, a MHAFB representative stated that inert training munitions may have been buried at the site. Mr. Estrada from the Mountain Home AFB EOD unit stated that the training items had been recovered since the range was relocated to the western side of the flightline (SKY, 2011).

The entire area of MRA ED879 was recommended for further action (as MRS ED879) because a high density of subsurface anomalies was identified.

4.1.1. Structures

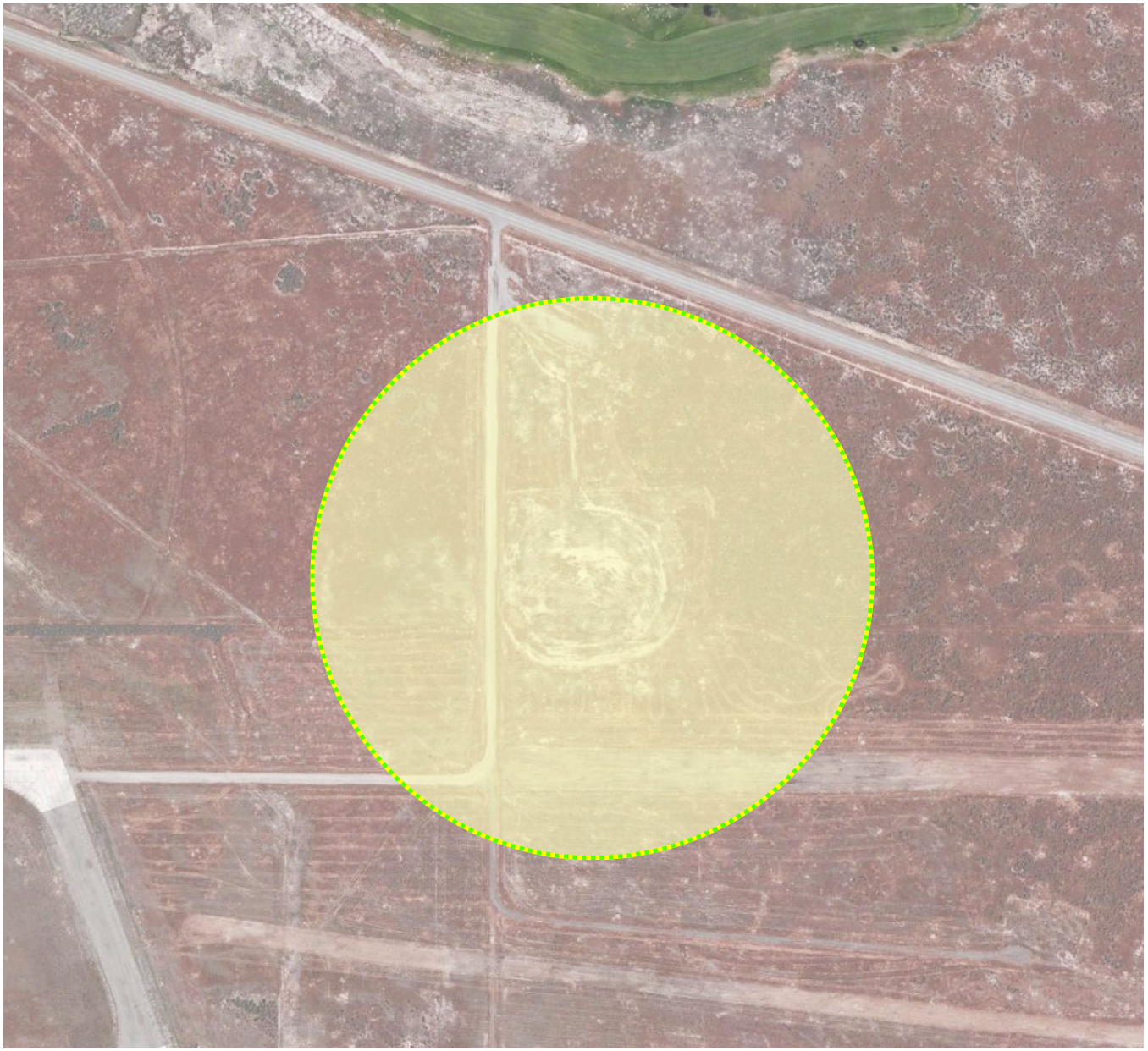
No buildings are located near or within MRS ED879.

4.1.2. Physical Setting

MRS ED879 is vegetated with sage brush and low grasses. Soil consists of Bahem silt loam, and the topography is flat. The depth to groundwater is approximately 350 feet to 400 feet bgs. No wetlands or surface water features are associated with this site (SKY, 2011). No perimeter fencing is present at the site.

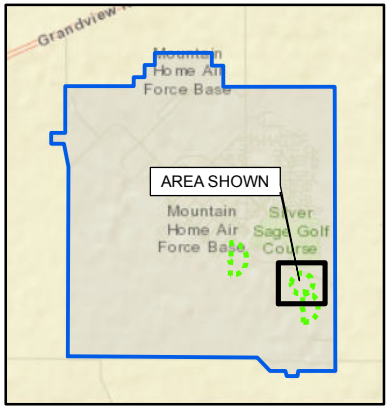
4.1.3. Current and Future Land Use

MRS ED879 is currently an open field. Current land use is an industrial use area partially overlapping the "open space" area and the runway clear zone. In accordance with the MHGP, future land use is not expected to change after the removal of potential munitions or munitions-related debris (USAF, 2009).



LEGEND:

- MRS ED879 Boundary
- MRA ED879 Boundary
- Mountain Home AFB Boundary



0 500

SCALE IN FEET

SOURCES: ESRI WORLD TOPOGRAPHIC BASE MAP

U.S. Army Corps of Engineers, Omaha District
1616 Capitol Avenue
Omaha, NE 98102-4901

CLIENT:				
U.S. ARMY CORPS OF ENGINEERS	**FORMER EOD PROFICIENCY RANGE (MRS ED879)**			
LOCATION:	DRAWN BY:	CHECKED BY:	PROJECT NO.	FIG NO.
MOUNTAIN HOME AFB ELMORE COUNTY, IDAHO	JJC 10/1/2012	MH 10/10/2012	2012-141	**9**

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4.1.4. Sensitive Ecosystems

No known threatened or endangered species are present at MRS ED879; however, habitat of the western burrowing owl (*Athene cunicularia*), a state-listed species of concern, has been identified on site (USAF 2012; SKY, 2011).

4.1.5. Natural and Cultural Resources

Historical archaeological sites recorded on MHAFB include sheepherder camps and dumps. In addition, historical isolates have been recorded. However, as discussed in the MHAFB ICRMP, no known archaeological resources have been identified at MRS TS879 (USAF, 2011).

4.2. SOURCE, NATURE, AND EXTENT OF CONTAMINATION

The following sections describe the field investigation results of the CSE Phase II at MRS ED879 (SKY, 2011).

4.2.1. Visual Survey

During the CSE Phase II field investigation, visual survey transects were completed at MRS ED879. Evidence of EOD proficiency activities was observed throughout MRS ED879. A large circle of bare ground located in the center of the MRS is where former demolition training activities primarily took place. Evidence of EOD proficiency activities included demolition blast plates, three M60 time fuze igniters, and slag located near the center of the bare ground circle. A .50 caliber de-armor slug, landmine training area, an additional M60 time fuze igniter, a grenade can lid, and a parachute cover for a MK 80 series bomb also were observed in the southern portion of MRS ED879 (SKY, 2011).

A 6-foot by 12-foot pit and an 8-foot by 4-foot square depression were observed and documented in the western portion of the range. A discussion with MHAFB EOD personnel indicated that these areas may have been the locations where inert munitions items were buried for EOD detection and training purposes (SKY, 2011).

Observed MD included fuze components, an aluminum flare end, pieces of unidentifiable MD, debris from a 100-pound practice bomb, one practice grenade, a 250-pound bomb tail assembly, and a strong-back plate for an unknown bomb. The 250-pound bomb tail assembly and the strong-back plate were observed near a line of boulders and old fencing materials at the western end of MRS ED879 (SKY, 2011).

The small arms debris observed in the northern portion of the range included a full magazine of unused blanks, 5.56 blank casings, and a 0.50 caliber casing (SKY, 2011).

4.2.2. Geophysical Survey

Based on the results of the visual survey, digital geophysical mapping (DGM) was performed to identify munitions-related items and metallic debris in the subsurface at MRS ED879 and determine the density and extent of the geophysical anomalies at the site. All anomalies determined to be associated with non-munitions-related metallic surface features were removed from the anomaly list during data processing. The DGM identified a buried utility line with two connected segments trending northwest–southeast and north–south in the southwestern portion of the site. Anomalies related to the utility line were removed during data processing activities (SKY, 2011).

The DGM data exhibited predominantly low (4 to 10 millivolt [mV], EM61 Channel 3) amplitude anomalies, with a greater concentration of anomalies in the western half of MRS ED879. Three clusters of anomalies are situated at the north, central, and southern portions of the western half of MRS ED879. These clusters have high and medium anomaly density features as shown on Figure 10. Most of the medium (10 to 50 mV) and high (greater than 50 mV) amplitude anomalies occur within the western half of MRS ED879. DGM data for the medium- and high-density features on the western half of MRS ED879 show source objects that were made of metallic debris and MD such as rebar, barrels, pipe, scrap metal, signs, debris from a 100-pound practice bomb, and a demolition plate (SKY, 2011).

4.2.3. Soil

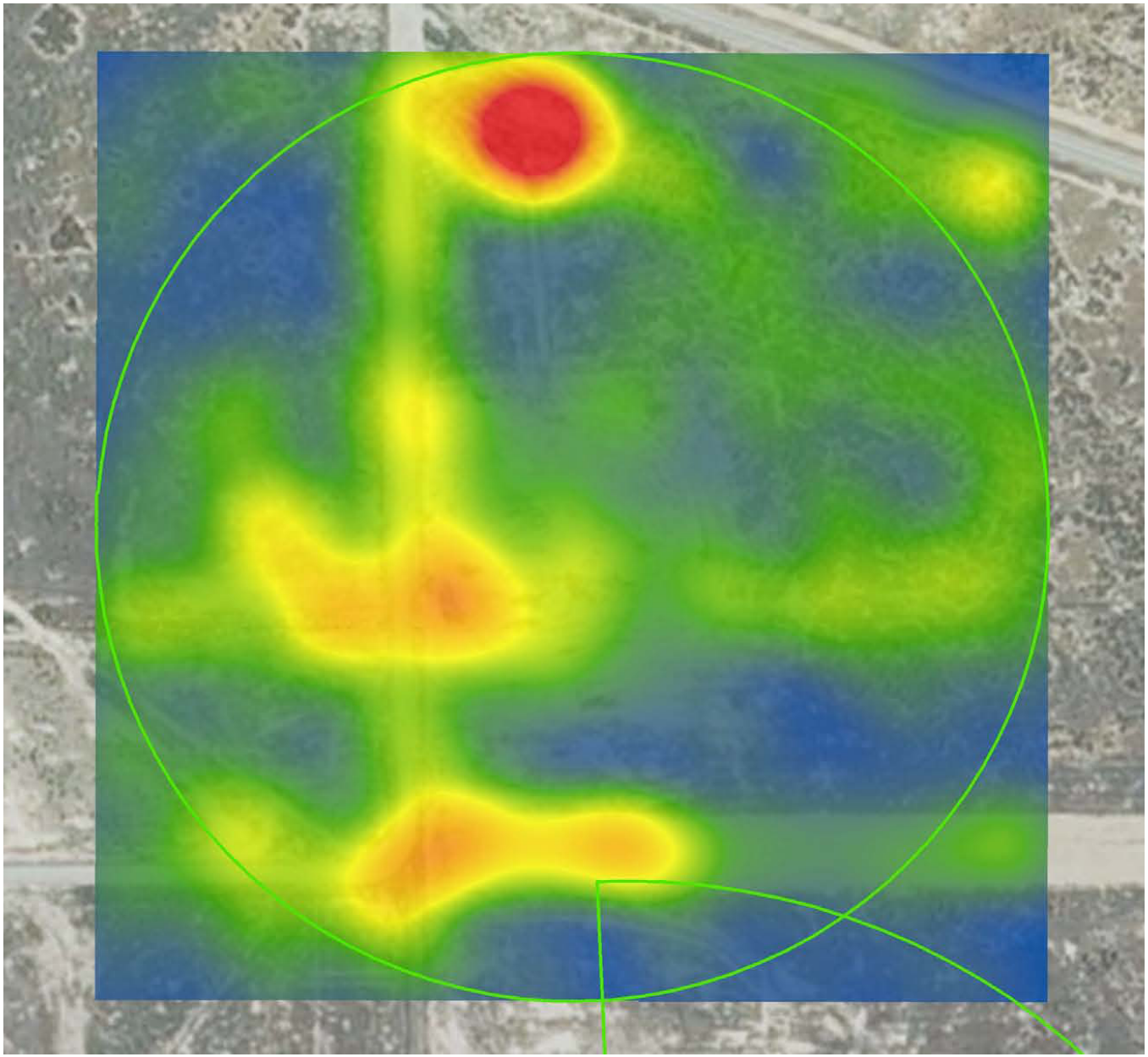
Seventy surface soil samples were collected at MRS ED879 and analyzed for lead. As discussed in Section 1.3.2., lead concentrations were determined to be consistent with background concentrations. No MEC was observed during the visual survey, so soil samples were not analyzed for explosives. Clay target debris was observed but not in quantities that would be a sufficient source of contamination, thus no soil samples were analyzed for PAHs. Subsurface soil samples were not collected at MRS ED879.

4.2.4. Surface Water, Sediment, and Groundwater

Surface water and sediment are not present at MRS ED879; therefore, no surface water or sediment samples were collected during the CSE Phase II. In addition, because of the depth to groundwater (350 to 400 feet bgs) and the low mobility of the chemicals of potential concern (e.g., metals),no groundwater samples were collected at MRS ED879.

4.3. SCREENING-LEVEL RISK ASSESSMENT

A screening-level risk assessment was performed for MRS ED879 as part of the CSE Phase II. This assessment showed that PAHs that exceeded risk screening levels pose an imminent and substantial threat to human health under current land use. The following subsections summarize the CSM and the results of the screening-level HHRA and SLERA.



Legend

MRS Boundary

Mountain Home AFB Boundary

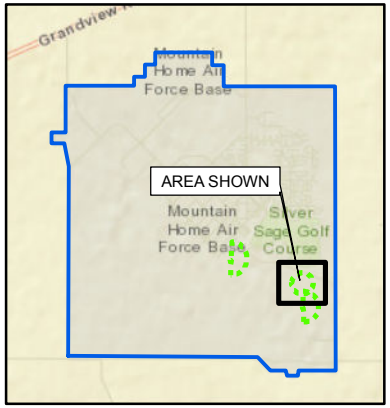
DGM Anomaly Density

36m Search Radius

High : 250

Anomalies / Acre

Low : 0



0 300

APPROXIMATE SCALE IN FEET

N

SOURCES: ESRI WORLD TOPOGRAPHIC BASE MAP

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U.S. Army Corps of Engineers, Omaha District
1616 Capitol Avenue
Omaha, NE 98102-4901

CLIENT:	DGM RESULTS FOR FORMER EOD PROFICIENCY RANGE (MRS ED879)			
U.S. ARMY CORPS OF ENGINEERS				
LOCATION:	DRAWN BY:	CHECKED BY:	PROJECT NO.	FIG NO.
MOUNTAIN HOME AFB ELMORE COUNTY, IDAHO	JJC 11/5/2012	MH 11/5/2012	2012-141	10

4.3.1. Conceptual Site Model

Based on the historical use of MRS ED879 as an EOD Proficiency Range, MEC was previously handled at the site and may still be present at the site. Although a surface clearance has been completed, no subsurface removal actions have been completed to date. Based on the DGM survey conducted as part of the CSE Phase II, three clusters of subsurface anomalies are present at the north, central, and southern portions of the western half of MRS ED879; these clusters have high and medium density of anomalies and may represent subsurface MEC. Figure 11 shows the CSM for exposure to MEC in soil.

The following human and ecological receptors have the potential to be present at MRS ED879:

- Authorized range and base personnel who have access to this property, as well as other types of base personnel who will not typically be exposed to MEC buried in subsurface soil.
- Authorized contractors include future intrusive workers who may work at MRS ED879 to transform the property for its next intended use, as well as other types of workers who also may be exposed to MEC buried in subsurface soil.
- Visitors and authorized recreational users who currently, or may in the future, use or move across MRS ED879 during recreational activities (e.g., air show attendees, etc.).
- Ecological receptors include all current and future animal life that may encounter MEC at MRS ED879.

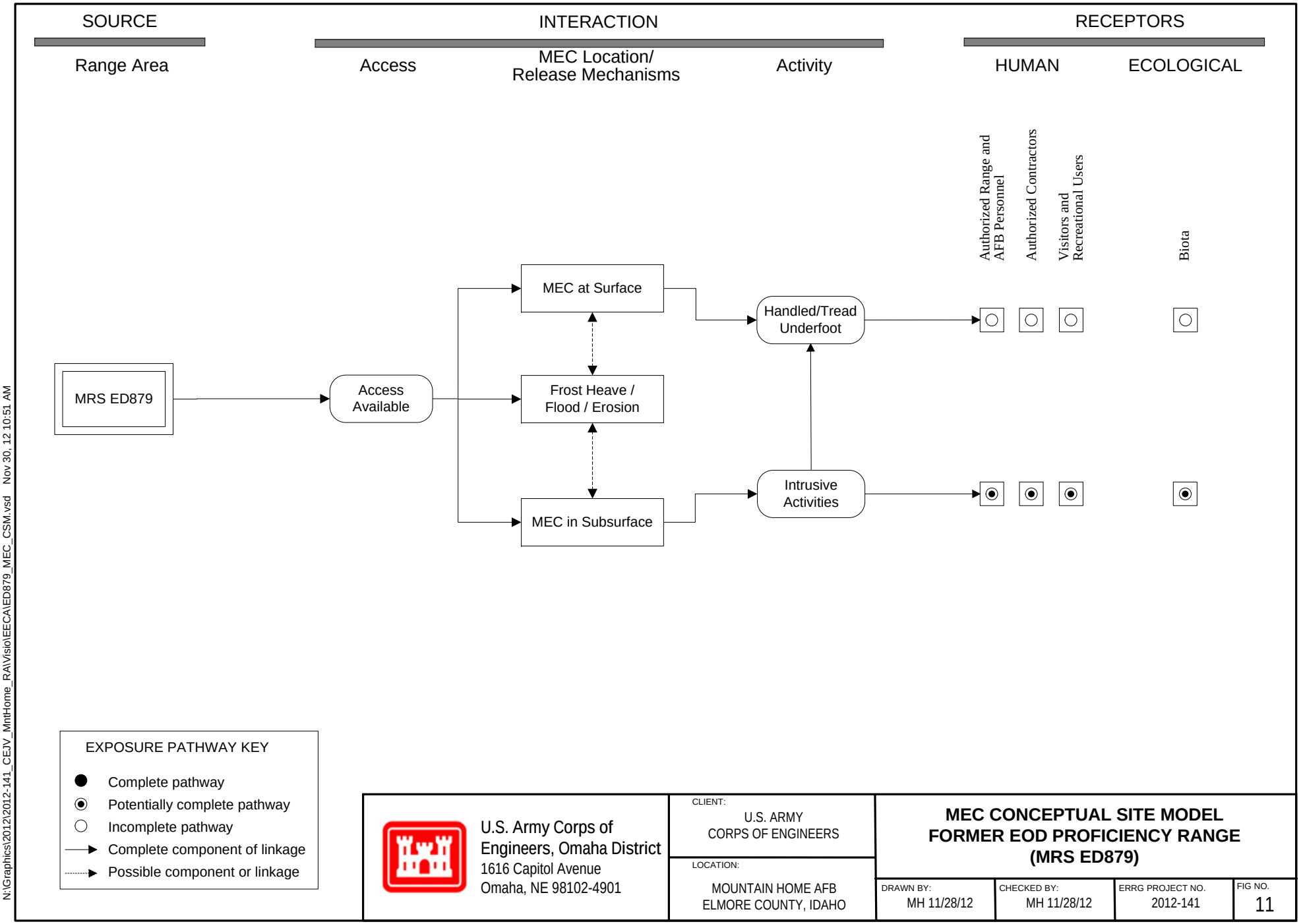
A CSM for MC is not necessary for this site based historical site use and soil sample results (see Section 4.3.2 and 4.3.3).

4.3.2. Human Health Risk Assessment

As discussed in Section 1.3.2., lead concentrations in soil are unlikely to pose an unacceptable risk to any human receptors at MRS ED879.

4.3.3. Ecological Risk Assessment

As discussed in Section 1.3.4.2, lead concentrations in soil are unlikely to pose an unacceptable risk to ecological receptors at MRS ED879.



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U.S. Army Corps of Engineers, Omaha District
1616 Capitol Avenue
Omaha, NE 98102-4901

CLIENT: U.S. ARMY CORPS OF ENGINEERS

LOCATION: MOUNTAIN HOME AFB ELMORE COUNTY, IDAHO

MEC CONCEPTUAL SITE MODEL FORMER EOD PROFICIENCY RANGE (MRS ED879)

DRAWN BY:	CHECKED BY:	ERRG PROJECT NO.	FIG NO.
MH 11/28/12	MH 11/28/12	2012-141	11

Section 5. Identification of Interim Removal Action Objectives

This section defines the RAOs and identifies the ARARs for the IRA.

5.1. INTERIM REMOVAL ACTION OBJECTIVES

RAOs for MRS TS876a and MRS TS877a are medium-specific goals that specify (1) the chemicals of concern (i.e., PAHs), (2) the exposure route(s) and receptor(s), and (3) an acceptable chemical concentration or range of concentrations for each exposure pathway and medium. RAOs for MRS ED879 specify (1) the contaminants of concern (i.e., MEC) and (2) the exposure route(s) and receptor(s) for each exposure pathway and medium.

The following RAOs were developed for the IRA at the PAH-contaminated areas within MRS TS876a and MRS TS877a and the possible MEC within MRS ED879:

- Prevent or minimize exposure to soil at MRS TS876a and MRS TS877a that contains PAHs at concentrations greater than the residential RSLs as defined by EPA Regions 3, 6, and 9.
- Prevent exposure to MEC at MRS ED879 in the subsurface in all areas with a high density of anomalies.

Table 5 lists the cleanup levels for the IRA at the PAH-contaminated areas within MRS TS876a and MRS TS877a. The cleanup levels were selected using the more conservative EPA residential RSLs. Residential cleanup levels were used because no fencing is present preventing access to the site.

Table 5. Proposed PAH Cleanup Levels

Exposure Scenario	PAH	Cleanup Level (mg/kg)
Residential[1]	Benzo(a)anthracene	0.15
	Benzo(a)pyrene	0.015
	Benzo(b)fluoranthene	0.15
	Benzo(k)fluoranthene	1.5
	Dibenz(a,h)anthracene	0.015
	Indeno(1,2,3-cd)pyrene	0.15

Notes:

1 = Residential exposure scenario was chosen because it is expected be the most conservative and would be protective of other scenarios.

mg/kg = milligrams per kilogram PAH = polycyclic aromatic hydrocarbons

5.2. IDENTIFICATION OF AND COMPLIANCE WITH APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

This section identifies the ARARs that address contaminated environmental media (i.e., soil). ARARs include standards, requirements, criteria, or limitations established under federal environmental law or any more stringent standards, requirements, criteria, or limitations promulgated in accordance with a state environmental statute.

The NCP (Title 40 CFR § 300.5) defines "applicable" requirements as "those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site." The NCP (40 CFR § 300.5) further defines "relevant and appropriate" requirements as "those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not 'applicable' to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site." The NCP also provides that only those promulgated state requirements identified in a timely manner and that are more stringent than corresponding federal requirements may be ARARs. EPA identifies the following three basic types of ARAR:

- Chemical-specific ARARs are health- or risk-based concentration limits or discharge limitations in environmental media (i.e., air, soil, or water) for specific hazardous chemicals. These limits establish the acceptable concentration of a chemical that may be found in, or discharged to, the ambient environment. These requirements may be used to set cleanup levels for chemicals of concern in site media.
- Location-specific ARARs set restrictions on the types of activities that can be performed based on site-specific characteristics or location. Alternative actions may be restricted or precluded based on proximity to wetlands or floodplains, presence of natural or cultural resources, or to manmade features such as local historic buildings.
- Action-specific ARARs are technology or activity-based requirements on actions taken with respect to hazardous substances or pollutants. These requirements are triggered by the particular activities that are selected to accomplish a remedy. Thus, action-specific requirements in themselves do not determine the removal alternative; rather, they indicate how a selected alternative must be achieved (through design, operation, or management).

The following subsections and Table 6 summarize the potential chemical-, location-, and action-specific ARARs for the IRA based on the contaminants present, the location of the IRA, and the potential IRA itself.

Table 6. Potential Applicable or Relevant and Appropriate Requirements

Standard, Requirement, Criteria, or Limitation	Citation[a]	Preliminary ARAR Determination	Comments	Amendment Date	TS876a	TS877a	ED879
Chemical-Specific ARARs							
EPA RSLs (Formerly PRGs)	Regional Screening Levels for Chemical Contaminants[b]	To Be Considered	Predetermined risk-based criteria used as a screening tool to evaluate the presence of pollutants, trigger investigation, and identify initial cleanup goals. EPA RSLs are not promulgated, and there is no identical standard promulgated by the State of Idaho; however, these criteria will be considered in developing cleanup goals.	2004 PRGs tables updated as RSL tables November 2012	✓	✓	
Location-Specific ARARs							
Endangered Species Act	16 USC 1531–1544 50 CFR Part 200 and 50 CFR Part 402	Relevant and appropriate for excavation alternative	Requires action to conserve endangered or threatened species, including consultation with the U.S. Department of the Interior and the U.S. Fish and Wildlife Service. Remedial actions cannot threaten or adversely affect the habitats of migratory waterfowl, raptors, or passerine songbirds.	16 USC 1531 (no change) 50 CFR Part 200 (November 2005) 50 CFR Part 402 (November 2005)	✓	✓	✓
Migratory Bird Treaty Act	16 USC 703 et seq.	Relevant and appropriate for excavation alternative	Potentially relevant and appropriate for protecting migratory bird species during nesting and fledging periods. Remedial actions cannot threaten or adversely affect the habitats of migratory waterfowl, raptors, or passerine songbirds.	--	✓	✓	✓

Table 6. Potential Applicable or Relevant and Appropriate Requirements *(continued)*

Standard, Requirement, Criteria, or Limitation	Citation[a]	Preliminary ARAR Determination	Comments	Amendment Date	TS876a	TS877a	ED879
Location-Specific ARARs *(continued)*							
Native American Graves Protection and Repatriation Act	25 USC 3001 et seq; 43 CFR 10	Applicable for excavation alternative	Requires federal agencies and institutions that receive federal funding to return Native American "cultural items" to lineal descendants and culturally affiliated Indian tribes and Native Hawaiian organizations. Cultural items include human remains, funerary objects, sacred objects, and objects of cultural patrimony. Establishes procedures for the inadvertent discovery or planned excavation of Native American cultural items on federal or tribal lands. Potentially applicable for any cultural resources found during the performance of remedial actions or ground-disturbing activities such as soil grading and removal.	--	✓	✓	✓
American Indian Religious Freedom Act	42 USC 1996 et seq.	To be considered	Enacted to protect and preserve the traditional religious rights and cultural practices of American Indians, Eskimos, Aleuts, and Native Hawaiians. These rights include, but are not limited to, access of sacred sites, freedom to worship through ceremonial and traditional rights and use, and possession of objects considered sacred. To be considered if the site of the soil excavation is identified to be of religious importance to American Indians.	--	✓	✓	✓

Table 6. Potential Applicable or Relevant and Appropriate Requirements *(continued)*

Standard, Requirement, Criteria, or Limitation	Citation[a]	Preliminary ARAR Determination	Comments	Amendment Date	TS876a	TS877a	ED879
Action-Specific ARARs							
Control of Fugitive Dust	IDAPA 58.01.01. 650-651	Applicable for excavation alternative	Regulations that control visible emissions, including fugitive dust. These rules state that "All reasonable precautions shall be taken to prevent particulate matter from becoming airborne. In determining what is reasonable, consideration will be given to factors such as the proximity of dust emitting operations to human habitations and/or activities, the proximity to mandatory Class I Federal Areas and atmospheric conditions which might affect the movement of particulate matter."	--	✓	✓	✓
Resource Conservation and Recovery Act (RCRA) Hazardous Waste and Idaho Hazardous Waste Management Requirements	40 CFR Part 261 as incorporated by Idaho Statutes Title 39 Chapter 44	Applicable for excavation alternative	Establishes procedures and numeric limits for identification and management of characteristic hazardous wastes and listed hazardous wastes.	40 CFR Part 261 (September 2005)	✓	✓	
Idaho Land Remediation Rules	IDAPA 58.01.18.027	Relevant and appropriate for excavation alternative	Potentially relevant and appropriate for actions conducted under the remedy that results in remaining residual concentrations of chemicals in excess of regulatory levels.	--	✓	✓	

Table 6. Potential Applicable or Relevant and Appropriate Requirements *(continued)*

Notes:

a = Only the substantive provisions of the requirements cited in this table are potential ARARs. Non-promulgated guidelines (including but not limited to dig permits and site access permits) are not listed because they do not meet the criteria for the definition of an ARAR.

b = EPA, 2012. "Regional Screening Levels (Formerly PRGs), Screening Levels for Chemical Contaminants." November. Available Online at: <http://www.epa.gov/region9/superfund/prg/>.

ARARs = applicable or relevant and appropriate requirements

CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act

CFR = Code of Federal Regulations

EPA = U.S. Environmental Protection Agency

GWQSs = Ground Water Quality Standards

IDAPA = Idaho Administrative Procedures Act

MCLs = maximum contaminant levels

NAAQS = National Ambient Air Quality Standards

PRGs = preliminary remediation goals

RAGS = Risk Assessment Guidance for Superfund

RCRA = Resource Conservation and Recovery Act

RSLs = regional screening levels

USC = United States Code

Section 6. Identification and Analysis of Interim Removal Action Alternatives

This section identifies general response actions (GRAs) and evaluates available technologies and process options to address the RAOs as discussed in Section 5. IRA alternatives for MRS TS876a, TS877a, and ED879 were identified and evaluated consistent with the procedures identified in EPA guidance (EPA, 1993). Pertinent technologies and process options are screened for each GRA (such as removal), and the retained technologies and process options are assembled into IRA alternatives. Technologies are combined, if applicable, to create alternatives that will meet the RAOs that are appropriate for the site conditions and have been shown to be effective at similar sites. The IRA alternatives are then evaluated with respect to their effectiveness, implementability, and cost.

Based on the guidelines presented in the "Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA" (EPA, 1993), only the most qualified technologies that apply to the media or source of contamination should be discussed in the EE/CA. Limiting the number of IRA alternatives to those that have been selected in the past at similar sites or for similar contaminants provides an immediate focus to the discussion and selection of IRA alternatives.

The remainder of this section summarizes the GRAs, presents the evaluation criteria, identifies the IRA alternatives, and summarizes the analysis of IRA alternatives with respect to the evaluation criteria.

6.1. GENERAL RESPONSE ACTIONS

This section identifies GRA categories that include no action, land use controls (LUCs), and removal and disposal of soil and MEC. IRA alternatives were identified based on these GRAs (Section 6.2). GRAs are summarized below, based on effectiveness, implementability, and cost.

- No action
- LUCs (i.e., engineering controls such as fencing or signage and institutional controls such as administrative or legal restrictions)
- Excavation and disposal of contaminated soil and MEC

The no-action alternative is retained throughout the evaluation process as required by the NCP to provide a baseline for comparison with other IRA alternatives. Table 7 summarizes the screening of technologies and processes associated with the GRAs.

Table 7. Screening of General Response Actions, Technologies, and Process Options

GRA	Technology and Process	Description	Screening Summary
1. No Action	None	None	Not protective of human health; does not meet RAOs. Not effective or permanent in the long-term. Because no action is taken, workers would not be adversely affected in the short-term. There is no reduction of toxicity, mobility, or volume through treatment. There are no technical or administrative feasibility concerns, and there are no availability concerns.
2. LUCs	Perimeter Fencing, Warning Signage, and Institutional Controls	▪ Surround the perimeter of the site with a fence ▪ Institute military orders preventing access	Protective of human health and meets RAOs. Meets some location- and action-specific ARARs. May be effective in controlling access to the site but its long-term effectiveness is moderate because mitigating risks to current and future receptors would require long-term maintenance and inspections of access controls. In addition, LUCs reduce the ability to use the site in the future. There is no reduction of toxicity, mobility, or volume through treatment. Technically and administratively feasible, and there are no service or material availability concerns.
3. Excavation and Disposal	Remove Contaminated Soil and MEC and Dispose	▪ Excavate PAH-contaminated soil, load soil into dump trucks, and transport to an offsite landfill for disposal ▪ Excavate subsurface anomalies, explosively destruct MEC as needed, and transport to an authorized recycler	Protective of human health; meets RAOs. Meets all action and location-specific ARARs. Effective and permanent in the long-term because PAH and MEC hazards would be removed from the site. Removal of PAHs and MEC would not adversely affect workers in the short-term. There is no reduction of toxicity, mobility, or volume through treatment. Removal of PAHs and MEC would not adversely affect workers in the short-term because workers will use protective practices and PPE to minimize hazards. There is no reduction of toxicity, mobility, or volume through treatment[1]. This alternative is considered technically and administratively feasible, and services and materials are readily available in the local community.

Notes:

1 = Although excavation does not involve treatment, it will result in the reduction of toxicity, mobility, and volume of the contaminants at this site.

ARARs = applicable or relevant and appropriate requirements

GRA = general response action

LUCs = land use controls

MEC = munitions and explosives of concern

PAH = polycyclic aromatic hydrocarbon

RAOs = removal action objectives

6.2. EVALUATION CRITERIA

The analysis of IRA alternatives is qualitative in nature and is based on the following three evaluation criteria, as recommended by EPA (1993): effectiveness, implementability, and relative cost. The following subsections summarize each criterion.

6.2.1. Effectiveness

IRA alternatives are evaluated for effectiveness based on the following criteria:

- Overall Protection of Public Health and the Environment: This criterion assesses the ability of the IRA alternative to be protective of human health and the environment under present and future land use conditions.
- Compliance with ARARs and Other Criteria, Advisories, and Guidance: Identifies whether or not implementation of the IRA alternative would comply with all chemical-specific, action-specific, and location-specific ARARs.
- Long-Term Effectiveness and Permanence: This criterion addresses the magnitude of residual risk remaining at the conclusion of field activities. It addresses the adequacy and reliability of controls established by an IRA alternative to maintain reliable protection of human health and the environment over time.
- Reduction of Toxicity, Mobility, or Volume through Treatment: Identifies whether or not implementation of the IRA alternative would reduce contaminant toxicity (e.g., reduction of PAHs), mobility, or actual volume of the hazardous substances.
- Short-Term Effectiveness: This criterion addresses the effects of an IRA alternative during the removal and implementation phase until the RAOs are met. This criterion includes the time with which the remedy achieves protectiveness and potential to create adverse impacts on human health and the environment during removal and implementation.

6.2.2. Implementability

IRA alternatives are evaluated for implementability based on the following criteria:

- Technical Feasibility: Evaluates constructability and operational considerations, as well as demonstrated performance and useful life.
- Administrative Feasibility: Evaluates those activities such as statutory limits, permitting requirements, easements and rights of way, and impacts on adjoining property.
- Availability of Services and Materials: Evaluates the availability of qualified contractors to conduct site preparation and design; provide equipment, personnel, services, and materials; perform excavation; provide disposal capacity; and provide transportation in time to maintain the field schedule. Evaluates the availability of disposal facilities that are licensed to accept liquid and solid waste classified as hazardous and nonhazardous.

- State Acceptance: The concurrence of the State of Idaho with the proposed alternatives.
- Community Acceptance: The acceptance of the proposed alternatives by stakeholders.

6.2.3. Cost

IRA alternatives are evaluated for cost based on the following criteria:

- Capital Costs
- Post-Removal Site Control (PRSC) Costs
- Present Value

For the purposes of the cost estimates (Appendix A), selected contingency and technical service percentages are based on "A Guide to Developing and Documenting Cost Estimates During the Feasibility Study" (EPA, 2000). The typical design contingency is 10 to 25 percent, and the construction contingency typically ranges from 10 to 20 percent. Technical service percentages are based on capital cost expenditures associated with each alternative. The present values were calculated using a 2 percent discount rate.

6.3. IDENTIFICATION AND ANALYSIS OF IRA ALTERNATIVES

The following IRA alternatives were identified for MRSs TS876a, TS877a, and ED879 based on the GRAs and screening discussed in Section 6.1:

- Alternative 1, No Action
- Alternative 2, LUCs
- Alternative 3, Excavation and Disposal

Each IRA alternative was analyzed below for its capability to reduce the risks detailed in Sections 2, 3, and 4. Specifically, the IRA alternatives are analyzed for effectiveness, implementability, and cost. Following the individual analysis of IRA alternatives presented below, each IRA alternative is compared against the others to select the recommended IRA alternative (see Sections 7 and 8).

6.4. ANALYSIS OF IRA ALTERNATIVES FOR MRS TS876a AND MRS TS877a

The IRA alternatives are discussed individually with respect to the evaluation criteria for MRS TS876a and MRS TS877a.

6.4.1. Alternative 1 – No Action

Under Alternative 1, no action would be taken at the site under current or future land use scenarios and soil would be left in place. The no-action alternative is evaluated as required by the NCP to provide a baseline for comparison with other IRA alternatives.

6.4.1.1. Effectiveness

Alternative 1 would not provide short-term or long-term protection of public health because soil contributing risks to human receptors would not be removed from MRS TS876a and MRS TS877a. This IRA alternative would not involve any action, so a comparison with ARARs is not applicable. The time required to achieve the RAO would be indefinite, and risks to current and future receptors would remain indefinitely because PAHs do not readily degrade in the environment. The toxicity, mobility, or volume of contamination at the site would not be reduced through treatment, and potential exposure pathways would remain for current and future receptors. Alternative 1 would not have any adverse short-term effects because it would not involve remediation activities that might pose risks to the community, workers, or the environment.

6.4.1.2. Implementability

No resources, services, or materials would be required to implement Alternative 1, and no known administrative considerations would affect its overall implementability. As a result, Alternative 1 would be technically and administratively feasible. State and community acceptance for Alternative 1 will be assessed following comment on this EE/CA.

6.4.1.3. Cost

The total estimated cost for Alternative 1 is $0 (Appendix A). No capital or PRSC costs, contingencies, or professional or technical services are associated with this IRA alternative.

6.4.2. Alternative 2 – Land Use Controls

Alternative 2 includes engineering controls (e.g., fencing and warning signage) and institutional controls (e.g., military orders preventing access to the site). A Land Use Controls Assurance Plan (LUCAP) would be developed to document engineering and institutional controls. The PAH-contaminated areas within MRS TS876a and MRS TS877a would be surrounded by fencing to prevent unauthorized access. Warning signage would be posted around the perimeter of the fence to restrict unauthorized personnel from entering. The fencing and warning signage would be maintained indefinitely under this alternative. If MHAFB transfers the land associated with the PAH-contaminated areas within MRS TS876a and MRS TS877a, then LUCs—including restrictions and a description of contaminated soil present at the sites—would need to be incorporated into any real property documents necessary for transferring ownership from MHAFB.

6.4.2.1. Effectiveness

Alternative 2 would provide moderate short-term and long-term protection of public health. Removal activities could be implemented in a way that would minimize short-term impacts to construction workers. Alternative 2 does not comply with the chemical-specific ARARs. The RAO would be achieved using LUCs; however, risks to current and future receptors would remain indefinitely at the site because PAHs do not readily degrade in the environment. The toxicity, mobility, or volume of

contamination at the site would not be reduced through treatment. LUCs would limit access to the site; however, protection of human health would depend on the reliability of the access controls. If administered properly, the ingestion and dermal contact exposure pathways for current and future receptors through unauthorized access would be reduced. Regardless of the reliability of the access controls, a potential exposure pathway for current and future receptors through inhalation would remain. However, the inhalation pathway would not contribute significantly to the risk to human receptors, and this exposure pathway could be partially mitigated by lining the fence with a barrier.

6.4.2.2. Implementability

Alternative 2 would be technically and administratively feasible, and services or materials necessary to implement the LUCs would be readily available in the local community. Weather conditions could possibly restrict and delay implementation of the LUCs. A MHAFB-issued dig permit would be required to implement Alternative 2; however, no other permits, waivers, or easements would be necessary to install a fence and warning signs at the site. Access would need to be coordinated with MHAFB. State and community acceptance for Alternative 2 will be assessed following comment on this EE/CA.

6.4.2.3. Cost

The total present-worth cost for Alternative 2 is $772,084 (Appendix A). Alternative 2 includes capital costs for developing and implementing LUCs, including institutional controls and engineering controls. Engineering controls include installation of an estimated 2,700 linear feet of fencing and 27 warning signs. For this cost estimate, the design contingency was estimated at 10 percent and the construction contingency was estimated at 10 percent. Technical services for projects with capital costs between $100,000 and $500,000 include project management (10 percent), remedial design (12 percent), and construction management (10 percent). PRSC costs associated with Alternative 2 include annual operation and maintenance for 30 years and periodic costs to perform five-year reviews for 30 years. Note that, because contamination would remain in place indefinitely, the long-term costs associated with maintaining LUCs (LUC inspections, LUC reports, and Five-Year Reviews) would continue in perpetuity; meaning, the out-year costs (beyond the 30-year costing period mandated by the NCP) would be significantly higher.

6.4.3. Alternative 3 – Excavation and Disposal

Alternative 3 includes excavation and offsite disposal of PAH-contaminated soil from MRS TS876a and MRS TS877a. A combined estimated 3,350 bank cubic yards (1,850 bank cubic yards from MRS TS876a and 1,500 bank cubic yards from MRS TS877a) of PAH-contaminated soil would be excavated from both sites and disposed of at an approved offsite RCRA Subtitle D landfill. Soil would be excavated by heavy equipment to depths ranging from 0 to 12 inches bgs within the proposed excavation boundaries. Once soil has been excavated, confirmation soil samples would be collected and submitted to an offsite analytical laboratory for analysis of PAHs. If laboratory results indicate PAH concentrations exceed the cleanup

levels, then additional soil would be excavated and additional confirmation samples would be collected for laboratory analysis. Soil would be removed laterally and vertically until confirmation results are less than the cleanup levels for PAHs in soil (Table 6). The site would then be backfilled using approved source material.

6.4.3.1. Effectiveness

Alternative 3 would provide short-term and long-term protection of human health. Alternative 3 complies with the chemical-specific ARARs. However, detailed planning, as described below would be needed to comply with location-specific and action-specific ARARs. The RAO would be achieved at the conclusion of the removal activities. The toxicity, mobility, or volume of contamination at the site would not be reduced through treatment. Risks to current and future receptors related to PAH-contaminated soil would be reduced by removal to concentrations considered protective of human health for all intended uses (i.e., the residential level). Alternative 3 is considered to be reliable based on accepted industry standards for similar projects.

Removal activities could be implemented in such a way that short-term impacts to humans and the environment would be minimized. Public and worker protection would be provided during implementation through strict adherence to a site-specific safety and health plan. An exclusion zone, a decontamination zone, and a staging zone would be established at the site to reduce potential migration of contamination to adjacent areas. The exclusion zone would encompass the contaminated areas, and any persons entering this zone would be required to don the appropriate personal protective equipment (PPE). The decontamination zone would be used to remove contamination from equipment and PPE before it is cleared to leave the exclusion zone. The staging zone is where decontaminated equipment would be stored when not in use in the exclusion zone.

To meet action-specific ARARs, dust generation would be suppressed by applying water, if necessary, and performing real-time dust monitoring. Real-time dust monitoring instruments would detect particulate concentrations greater than applicable dust action levels. The use of water trucks is generally highly effective and eliminates the need to use respiratory protection. Airborne dust monitoring would be completed using portable hand-held dust monitors to verify and document daily dust-suppression efforts. These dust control methods also provide fugitive dust control measures to reduce the migration of dust onto adjacent properties.

Excavated soil from the site would be transported and disposed of at an approved offsite RCRA Subtitle D landfill. Haul trucks would be properly placarded, licensed, and insured for transportation of the material. Transport vehicles would be fitted with a tarp or other covering device to prevent dispersal of material during transport. To prevent material from spilling from haul trucks, each vehicle would be inspected prior to departure to ensure that the material is properly contained within the vehicle.

Backfill materials used at the site would be clean soil from an approved borrow source. The finished surface would be reasonably smooth, compacted, and free from irregular surface changes. The final grades would provide positive drainage of surface water across the PAH-contaminated areas within MRS TS876a and MRS TS877a. Temporary erosion control measures would be removed after vegetation is established comparable to the surrounding area.

6.4.3.2. Implementability

Alternative 3 is considered technically and administratively feasible, and services and materials would be readily available in the local community. Excavation and offsite disposal is a proven method for achieving long-term reduction of contamination. Alternative 3 would not affect future removal activities and action could be implemented in a way that would minimize environmental impacts. Alternative 3 could be completed within a couple of months. The terrain at the PAH-contaminated areas within MRS TS876a and MRS TS877a is relatively flat and does not pose any additional concerns. A possible constraint to implementing this alternative would be extreme weather conditions causing a schedule delay. Alternative 3 is considered administratively feasible, but several factors need to be addressed with regard to excavation and disposal. Prior to mobilization, the following documents would need to be prepared and submitted to MHAFB, IDEQ, or the State of Idaho.

- Action Memorandum
- Site-Specific Work Plan, including Technical Management Plan, Accident Prevention Plan with Site Safety and Health Plan, Sampling and Analysis Plan , Investigation-Derived Waste Management Plan, and Environmental Protection Plan with a Stormwater Pollution Prevention Plan
- MHAFB-issued Dig Permit
- Base Civil Engineering Work Clearance Request (AF Form 103) required for utility clearance prior to excavation

Equipment, personnel, and services necessary to implement this alternative would be available in the vicinity of MHAFB. The offsite disposal facility permitted for RCRA Subtitle D materials would have the capacity to accept 3,350 bank cubic yards of soil from the PAH-contaminated areas within MRS TS876a and MRS TS877a.

An onsite laboratory would not be needed. Confirmation soil samples would be shipped to an offsite laboratory that is able to provide expedited turnaround. State and community acceptance for Alternative 3 will be assessed following comment on this EE/CA.

6.4.3.3. Cost

The total present-worth cost for Alternative 3 is $1,495,715 (Appendix A). Alternative 3 includes capital costs for excavating PAHs to achieve the cleanup levels. An estimated 3,350 bank cubic yards would require excavation and offsite disposal. Following excavation, the area would be backfilled, regraded, and

restored to previous conditions. For this cost estimate, the design contingency was estimated at 10 percent and the construction contingency was estimated at 10 percent. Technical services for projects with costs between $500,000 and $2,000,000 include project management (10 percent), remedial design (12 percent), and construction management (10 percent). No PRSC costs are associated with Alternative 3.

6.5. ANALYSIS OF IRA ALTERNATIVES FOR MRS ED879

The IRA alternatives are discussed individually with respect to the evaluation criteria for MRS ED879.

6.5.1. Alternative 1 – No Action

Under Alternative 1, no action would be taken at the site under current or future land use scenarios. The no-action alternative is evaluated as required by the NCP to provide a baseline for comparison with other IRA alternatives.

6.5.1.1. Effectiveness

Alternative 1 would not provide short-term or long-term protection of public health. Alternative 1 would not involve any action, so a comparison with ARARs is not applicable. The time required to achieve the RAO is indefinite, and risks to current and future receptors would remain indefinitely. The toxicity, mobility, and volume of contamination at the site would not be reduced through treatment and potential exposure pathways would remain for current and future receptors. Alternative 1 would not have any adverse short-term effects because it would not involve remediation activities that might pose risks to the community, workers, or the environment.

6.5.1.2. Implementability

No resources, services, or materials would be required to implement Alternative 1, and no known administrative considerations would affect its overall implementability. As a result, Alternative 1 would be technically and administratively feasible, and no services or materials would be needed for implementation. State and community acceptance for Alternative 1 will be assessed following comment on this EE/CA.

6.5.1.3. Cost

The total estimated cost for Alternative 1 is $0 (Appendix A). No capital or PRSC costs, contingencies, or professional or technical services are associated with this alternative.

6.5.2. Alternative 2 – Land Use Controls

Alternative 2 includes engineering controls (e.g., fencing and warning signage) and institutional controls (e.g., military orders preventing access to the site). A LUCAP would be developed to document engineering and institutional controls. The anomaly area within MRS ED879 would be surrounded by fencing to prevent unauthorized access. Warning signage would be posted around the perimeter of the fence to restrict

unauthorized personnel from entering. The fencing and warning signage would be maintained indefinitely under this alternative. If MHAFB transfers the land associated with the anomaly areas within MRS ED879, then LUCs—including restrictions and a description of MEC present at the site—would need to be incorporated into any real property documents necessary for transferring ownership from MHAFB.

6.5.2.1. Effectiveness

Alternative 2 would provide moderate short-term and long-term protection of public health. Future work activities could be implemented in a way that would minimize short-term impacts to base personnel or workers. Alternative 2 would comply with all ARARs. The RAO would be achieved using LUCs; however, potential risks to current and future receptors would remain indefinitely at MRS ED879. The toxicity, mobility, and volume of contamination at the site would not be reduced through treatment. LUCs would limit access to the site; however, protection of human health would depend on the reliability of the access controls.

6.5.2.2. Implementability

Alternative 2 would be technically and administratively feasible, and services or materials necessary to implement the LUCs would be readily available in the local community. Weather conditions could possibly restrict and delay implementation of the LUCs. A MHAFB-issued dig permit would be required to implement Alternative 2; however, no other permits, waivers, or easements would be necessary to install a fence and warning signs at the site. Access would need to be coordinated with MHAFB staff.

6.5.2.3. Cost

The total present-worth cost for Alternative 2 is $1,074,558 (Appendix A). Alternative 2 includes capital costs for developing and implementing LUCs, including institutional restrictions and engineering controls. Engineering controls include installation of an estimated 5,500 linear feet of fencing and 55 warning signs. For this cost estimate, the design contingency was estimated at 10 percent and the construction contingency was estimated at 10 percent. Technical services for projects with capital costs between $100,000 and $500,000 include project management (10 percent), remedial design (12 percent), and construction management (10 percent). PRSC costs associated with Alternative 2 include annual operation and maintenance for 30 years and periodic costs to perform five-year reviews for 30 years. Note that, because contamination would remain in place indefinitely, the long-term costs associated with maintaining LUCs (LUC inspections, LUC reports, and Five-Year Reviews) would continue in perpetuity; meaning, the out-year costs (beyond the 30-year costing period mandated by the NCP) would be significantly higher.

6.5.3. Alternative 3 – Excavation and Disposal

Alternative 3 includes excavation and removal of selected subsurface anomalies[1] within MRS ED879, explosive destruction of any MEC encountered, and recycling of all resulting material documented as safe (MDAS). The geophysical data collected to date would be evaluated to select anomalies that have potential to be MEC. A qualified unexploded ordnance (UXO) team would then excavate subsurface anomalies primarily by hand or by mini-excavator if hard soil is encountered. Each item would be inspected, identified, and its condition assessed. Any MD would be certified as MDAS and transported to an offsite scrap recycler. Any live items or items containing energetic material would be disposed of explosively. Qualified UXO technicians would be used to complete the work, and an approved explosives safety submission would be obtained before the start of work.

6.5.3.1. Effectiveness

Alternative 3 would provide short-term and long-term protection of human health. Implementation of this alternative would comply with ARARs through planning. The RAO, which is to prevent exposure to MEC at MRS ED879 in the subsurface in areas with a high density of anomalies, would be achieved through removal activities. The toxicity and/or mobility and volume of contamination at the site would not be reduced through chemical treatment; however, it would be reduced through removal. Alternative 3 is considered to be reliable based on accepted industry standards for similar projects.

Removal activities could be implemented in such a way that short-term impacts to humans and the environment would be minimized. Public and worker protection would be provided during implementation through strict adherence to a site-specific safety and health plan. An exclusion zone and a support zone would be established at the site where heavy equipment is being operated and there is a potential for site personnel to be exposed to MEC. The exclusion zone would encompass the areas of intrusive activities; any persons entering this zone must be authorized to be present during MEC clearance or disposal activities. The support zone is where equipment and material storage areas, employee break areas, safety information and supplies, etc. are located and will be considered open access for site personnel.

Items recovered during the excavation of subsurface geophysical anomalies will go through an inspection process. Items identified as MEC would be explosively destroyed. MDAS would be stored in a locked and sealed transport container to prevent public access to the material until its delivery to an offsite scrap recycling facility. Non-munitions-related debris may be transported to the on-base recycling center. Excavations would be backfilled with excavated soil and the finished surface would be reasonably smooth, compacted, and free from irregular surface changes.

[1] The geophysical data collected at the MRS is processed, digitally filtered for various corrections, and analyzed. Selection of anomalies is based on the peak responses that fall above the required millivolt threshold criteria that would be indicative of items large enough to be potential MEC. This process involves the use of peak-picking algorithms, as well as the processor visually reviewing the data to selected anomalies that may have been missed by the algorithm but with peak values above the threshold, or areas masked by larger adjacent anomalies.

6.5.3.2. Implementability

Alternative 3 would be technically and administratively feasible, and most services and materials would be readily available in the local community or could be easily brought to the site from Boise, Idaho. Excavation and disposal is a proven method for achieving long-term reduction of contamination. Alternative 3 would not affect future use of the sites and could be implemented in a way that would minimize environmental impacts. A MHAFB-issued dig permit would be required to implement Alternative 3; however, no other permits, waivers, or easements would be necessary to perform excavation and disposal activities. Alternative 3 could be completed within two months. The terrain of the anomaly areas within MRS ED879 is relatively flat and would not pose any additional concerns. A possible constraint to implementing Alternative 3 would be extreme weather conditions causing a schedule delay. Alternative 3 is considered administratively feasible, but several factors would need to be addressed with regard to excavation and disposal. Prior to mobilization, the following documents would need to be prepared and submitted to MHAFB, IDEQ, or the State of Idaho:

- Action Memorandum
- Site-Specific Work Plan, including Technical Management Plan, Accident Prevention Plan with Site Safety and Health Plan, and Environmental Protection Plan with a Stormwater Pollution Prevention Plan
- Explosives Safety Submission
- MHAFB-issued Dig Permit
- Base Civil Engineering Work Clearance Request (AF Form 103) required for utility clearance prior to excavation

Equipment, personnel, and services necessary to implement Alternative 3 would be available in the vicinity of MHAFB.

6.5.3.3. Cost

The total present-worth cost for Alternative 3 is $531,936 (Appendix A). Alternative 3 includes capital costs for excavating subsurface anomalies. Following excavation, the anomaly excavations would be backfilled and restored to previous conditions. For this cost estimate, the design contingency was estimated at 10 percent and the construction contingency was estimated at 10 percent. Technical services for projects with costs between $400,000 and $1,000,000 include project management (10 percent), remedial design (12 percent), and construction management (10 percent). No PRSC costs are associated with Alternative 3.

Section 7. Comparative Analysis of Interim Removal Action Alternatives

The comparative evaluation of IRA alternatives presented in this section describes the relative performance of each IRA alternative using the evaluation criteria described in Section 6.2.

7.1. MRS TS876a and MRS TS877a

This section describes the results of the comparative analysis of IRA alternatives for MRS TS876a and MRS TS877a. Table 8 summarizes the comparative analysis of IRA alternatives and their associated costs.

7.1.1. Effectiveness

Alternative 1 would be the least effective alternative (low) because no action would be taken to mitigate risks to current and future receptors. Alternative 2 would be moderately effective (medium) because LUCs would prevent unacceptable exposure to PAH-contaminated soil. Alternative 3 would be the most effective alternative (high) because PAH-contaminated soil would be excavated and disposed of off site at an approved disposal facility, thereby permanently mitigating risks to current and future receptors.

7.1.2. Implementability

All three IRA alternatives would be technically and administratively feasible (high), and the services and materials necessary to implement the IRA alternative would be readily available.

7.1.3. Cost

The estimated cost for Alternative 1 is $0. The estimated present value cost for Alternative 2 is $772,084. The estimated present value cost for Alternative 3 is $1,495,715. Note that, because contamination would remain in place indefinitely, the long-term costs associated with Alternative 2 for maintaining LUCs (LUC inspections, LUC reports, and Five-Year Reviews) would continue in perpetuity; meaning, the out-year costs (beyond the 30-year costing period mandated by the NCP) would be significantly higher.

7.2. MRS ED879

This section describes the results of the comparative analysis of IRA alternatives for MRS ED879. Table 9 summarizes the comparative analysis of alternatives and their associated costs.

Table 8. Comparative Analysis of IRA Alternatives at MRS TS876a and MRS TS877a

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Land Use Controls	Alternative 3 Excavation and Offsite Disposal
Effectiveness		**Qualitative Ranking**	
Overall Protection of Public Health and Environment	Low	Medium	High
Compliance with ARARs and Other Criteria, Advisories, and Guidance	NA	Medium	High
Long-Term Effectiveness and Permanence	Low	Medium	High
Reduction of Toxicity, Mobility, or Volume through Treatment	Low	Low	Low[1]
Short-Term Effectiveness	Low	Medium	High
Achieve RAOs	Low	Medium	High
Implementability		**Qualitative Ranking**	
Technical Feasibility	High	High	High
Administrative Feasibility	High	High	High
Availability of Services or Materials	NA	High	High
Cost		**IRA Cost**	
Period of Analysis (Years)	30	30	30
Estimated Capital Cost	$0	$250,331	$1,495,715
Estimated Annual/Periodic Cost	$0	$461,835/$246,725	$0/$0
Estimated Total Cost	$0	$958,891	$1,495,715
Estimated Total Present Value of Alternative	$0	$772,084[2]	$1,495,715

Notes:

1 = Although excavation does not involve treatment, it will result in the reduction of toxicity, mobility, and volume of the contaminants at this site.

2 = Note that, because contamination would remain in place indefinitely, the long-term costs associated with maintaining LUCs (LUC inspections, LUC reports, and Five-Year Reviews) would continue in perpetuity; meaning, the out-year costs (beyond the 30-year costing period mandated by the NCP) would be significantly higher.

ARARs = applicable or relevant and appropriate requirements
NA = not applicable
IRA = interim removal action
RAOs = removal action objectives

Table 9. Comparative Analysis of IRA Alternatives at MRS ED879

Evaluation Criteria	Alternative 1 No Action	Alternative 2 Land Use Controls	Alternative 3 Excavation and Offsite Disposal
Effectiveness		**Qualitative Ranking**	
Overall Protection of Public Health and Environment	Low	Medium	High
Compliance with ARARs and Other Criteria, Advisories, and Guidance	NA	Medium	High
Long-Term Effectiveness and Permanence	Low	Medium	High
Reduction of Toxicity, Mobility, or Volume through Treatment	Low	Low	Low[1]
Short-Term Effectiveness	Low	Medium	High
Achieve RAOs	Low	Medium	High
Implementability		**Qualitative Ranking**	
Technical Feasibility	High	High	High
Administrative Feasibility	High	High	High
Availability of Services or Materials	NA	High	High
Cost		**IRA Cost**	
Period of Analysis (Years)	30	30	30
Estimated Capital Cost	$0	$350,246	$531,936
Estimated Annual/Periodic Cost	$0	$652,280/$330,909	$0/$0
Estimated Total Cost	$0	$1,333,435	$531,936
Estimated Total Present Value of Alternative	$0	$1,074,558[2]	$531,936

Notes:

1 = Although excavation does not involve treatment, it will result in the reduction of toxicity, mobility, and volume of the contaminants at this site.

2 = Note that, because contamination would remain in place indefinitely, the long-term costs associated with maintaining LUCs (LUC inspections, LUC reports, and Five-Year Reviews) would continue in perpetuity; meaning, the out-year costs (beyond the 30-year costing period mandated by the NCP) would be significantly higher.

ARARs = applicable or relevant and appropriate requirements

IRA = interim removal action

NA = not applicable

RAOs = removal action objectives

7.2.1. Effectiveness

Alternative 1 would be the least effective alternative (low) because no action would be taken to mitigate risks to current and future receptors. Alternative 2 would be a moderately effective (medium) alternative because LUCs would prevent unacceptable exposure to MEC. Alternative 3 would be the most effective alternative (high) because subsurface MEC would be removed, permanently mitigating risks to current and future receptors.

7.2.2. Implementability

The three IRA alternatives are technically and administratively feasible (high), and the services and materials necessary to implement the IRA alternative are readily available.

7.2.3. Cost

The estimated cost for Alternative 1 is $0. The estimated present value cost for Alternative 2 is $1,074,558. The estimated present value cost for Alternative 3 is $531,936 (Table 9).

Section 8. Recommended Interim Removal Action Alternative

This section recommends an IRA alternative for each site based on the analyses presented in Sections 6 and 7.

8.1. RECOMMENDED IRA ALTERNATIVE FOR MRS TS876a AND MRS TS877a

Based on analytical results of the CSE Phase II, surface soil within MRS TS876a and MRS TS877a contains PAHs at concentrations exceeding human health risk-based criteria. As a result, an IRA is necessary to address PAH-contaminated soil for the following reasons, as identified in Section 300.415(b)(2)(i)-(viii) of the NCP:

- Actual or potential exposure to nearby human populations from hazardous substances or pollutants or contaminants.
- High levels of hazardous substances, pollutants, or contaminants in soil largely at or near the surface that may migrate.

Because no fence surrounds MRS TS876a and TS877 and PAHs in surface soil could migrate to subsurface soil or air and pose a potential risk to authorized personnel (i.e., base maintenance workers, construction workers, and residents), visitors (i.e., recreational users), and trespassers, the recommended IRA alternative to address PAH-contaminated soil at MRS TS876a and MRS TS877a is Alternative 3, Excavation and Disposal. Alternative 3 includes excavation of PAH-contaminated soil at each MRS and disposal of the excavated soil at an appropriate offsite facility. The completed excavations will be backfilled with clean borrow soil and the site will be restored, providing for unrestricted future land use of the site. The time to complete the IRA is estimated to take about 4 weeks, and the estimated present-value cost is $1,495,715.

8.1.1. MRS TS876a IRA Scope

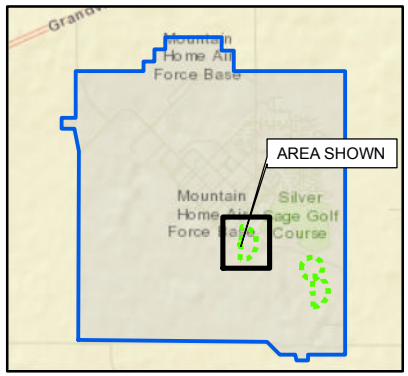
Figure 12 shows the estimated areal extent of the IRA for the PAH-contaminated area within MRS TS876a. The scope of the IRA is to remove PAH-contaminated soil at the site to meet the criteria for unrestricted use. The limits of the excavation are anticipated to be about 12 inches deep. The total volume of contaminated soil estimated to be removed is approximately 1,850 bank cubic yards.

Once the IRA is complete, additional actions will not be required at the site and the site will be recommended for NFA.

LEGEND:

1940s SKEET RANGE (MRS TS876a)

Mountain Home AFB Boundary



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SCALE IN FEET

SOURCES: ESRI WORLD TOPOGRAPHIC BASE MAP

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U.S. Army Corps of Engineers, Omaha District 1616 Capitol Avenue Omaha, NE 98102-4901	CLIENT: U.S. ARMY CORPS OF ENGINEERS	**PROPOSED REMOVAL ACTION AREA FOR 1940s SKEET RANGE (MRS TS876A)**			
	LOCATION: MOUNTAIN HOME AFB ELMORE COUNTY, IDAHO	DRAWN BY: JJC 10/1/2012	CHECKED BY: MH 10/10/2012	PROJECT NO. 2012-141	FIG NO. 12

8.1.2. MRS TS877a IRA Scope

Figure 13 shows the estimated areal extent of the IRA for the PAH-contaminated area within MRS TS877a. The scope of the IRA is to remove PAH-contaminated soil at the site to meet the criteria for unrestricted use. The limits of the excavation are anticipated to be about 12 inches deep. The total volume of contaminated soil estimated to be removed is approximately 1,500 bank cubic yards. Once the IRA is complete, additional actions will not be required at the site and the site will be recommended for NFA.

8.2. RECOMMENDED IRA ALTERNATIVE FOR MRS ED879

During the CSE Phase II, 11,319 subsurface anomalies were detected at MRS ED879 using a Channel 3 amplitude threshold of 4 mV from a gridded image map of the data using a gridded map picker in Geosoft's Oasis Montaj software. An initial list of 1,958 anomalies was selected for reacquisition. However, an additional 10 percent of the anomalies was included for QC, and a final list of 2,154 anomalies was selected for intrusive investigation. As a result, an IRA is necessary to investigate the anomalies for the following reason, as identified in Section 300.415(b)(2)(i)-(viii) of the NCP:

- Actual or potential exposure to nearby human populations from hazardous substances or pollutants or contaminants.

The final list of anomalies will be included in the Draft IRA Work Plan. MEC in subsurface soil within MRS ED879 poses a potential risk to authorized range and MHAFB personnel, authorized contractors, visitors and recreational users. The recommended alternative to address MRS ED879 is Alternative 3 – Excavation and Disposal. Alternative 3 includes excavation of the subsurface anomalies within MRS ED879, explosive destruction of any MEC encountered, and recycling of all resulting MD at an approved offsite recycler. The completed excavations will be backfilled with any excavated soil, and the site will be restored, providing for unrestricted future land use of the site. The time to complete the IRA is estimated to take about 4 weeks, and the estimated present-value cost is $531,936.

8.2.1. MRS ED879 IRA Scope

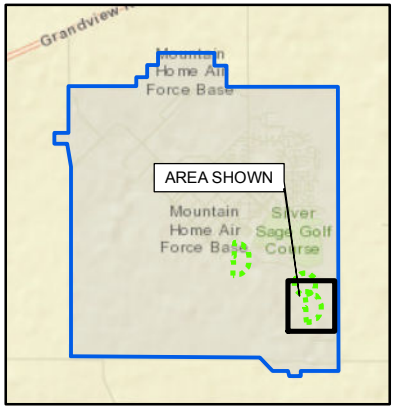
Figure 14 shows the estimated extent of the IRA for subsurface anomalies identified within MRS ED879. A qualified UXO team will excavate the subsurface anomalies. Any items that cannot be determined to be free of explosive hazards will be explosively destroyed. MDAS will be transported to an offsite scrap recycler. Non-munitions-related debris will be transported to the on-base recycling center.

The ultimate goal of the IRA is to document that the hazards to human health associated with MEC have been removed, and that no further MEC hazards remain at the site. When this goal is met, the site will be recommended for NFA.

LEGEND:

1970s SKEET RANGE (MRS TS877a)

Mountain Home AFB Boundary



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SCALE IN FEET

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SOURCES: ESRI WORLD TOPOGRAPHIC BASE MAP

U.S. Army Corps of Engineers, Omaha District
1616 Capitol Avenue
Omaha, NE 98102-4901

CLIENT: U.S. ARMY CORPS OF ENGINEERS

LOCATION: MOUNTAIN HOME AFB ELMORE COUNTY, IDAHO

PROPOSED REMOVAL ACTION AREA FOR 1970s SKEET RANGE (MRS TS877A)

DRAWN BY:	CHECKED BY:	PROJECT NO.	FIG NO.
JJC 10/1/2012	MH 10/10/2012	2012-141	13

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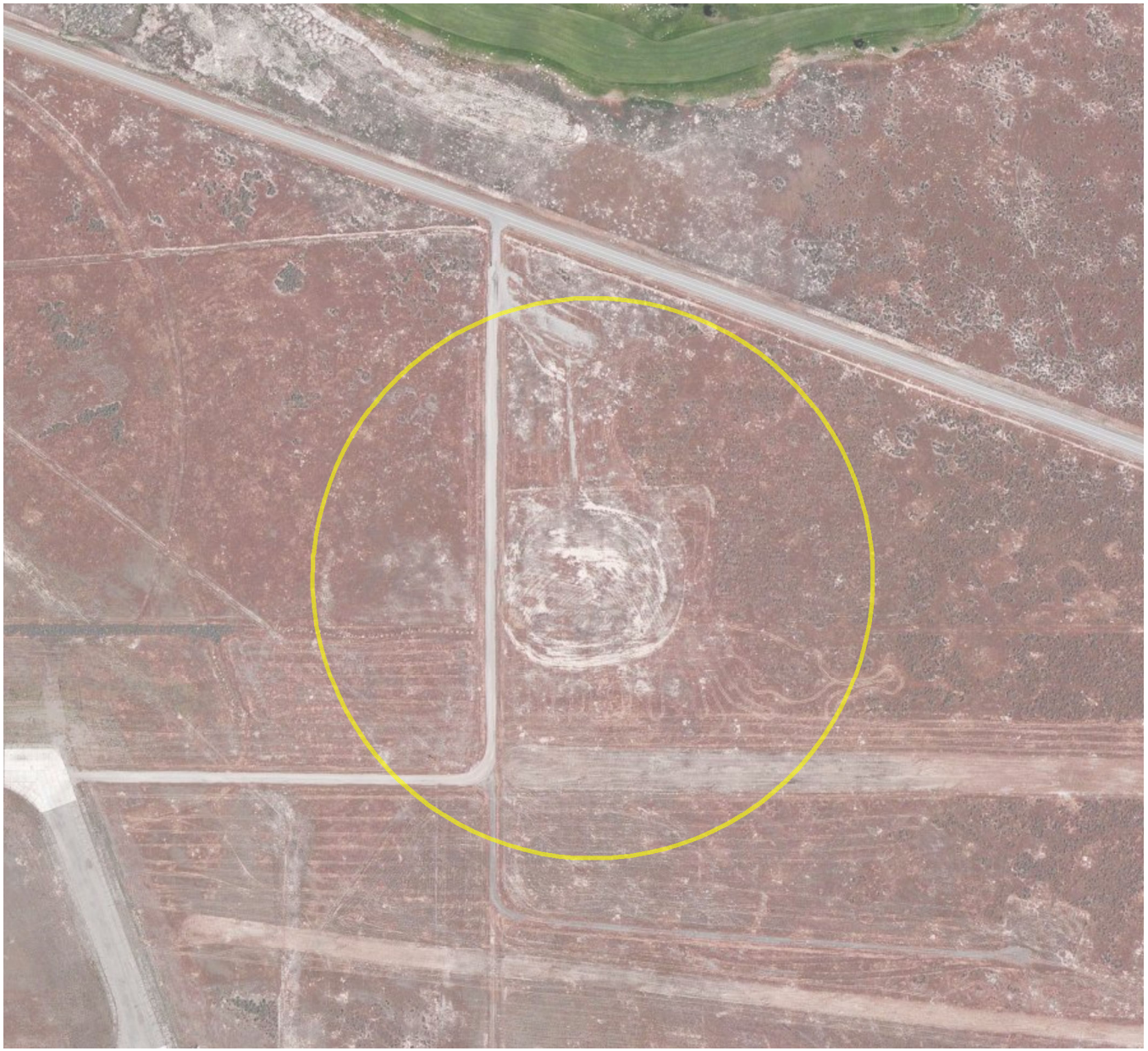
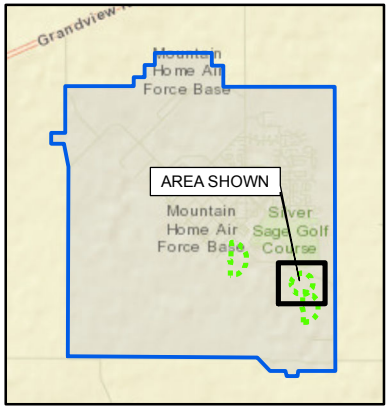


LEGEND:

- Former EOD Proficiency Range (MRS ED879)
- Mountain Home AFB Boundary



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SCALE IN FEET

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SOURCES: ESRI WORLD TOPOGRAPHIC BASE MAP

U.S. Army Corps of Engineers, Omaha District
1616 Capitol Avenue
Omaha, NE 98102-4901

CLIENT: U.S. ARMY CORPS OF ENGINEERS

LOCATION: MOUNTAIN HOME AFB ELMORE COUNTY, IDAHO

PROPOSED REMOVAL ACTION AREA FOR FORMER EOD PROFICIENCY RANGE (MRS ED879)

DRAWN BY:	CHECKED BY:	PROJECT NO.	FIG NO.
JJC 10/1/2012	MH 10/10/2012	2012-141	14

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8.3. REMOVAL SCHEDULE

Following regulatory agency and public review of this EE/CA, an action memorandum will be prepared to select the IRA alternatives for MRSs TS876a, TS877a, and ED879. Following the regulatory agency and public review of the action memorandum, an IRA Work Plan with an explosives safety submission will be prepared to describe how the IRA will be implemented. Fieldwork will be initiated after regulatory agency review of the IRA Work Plan. At this time, fieldwork is tentatively scheduled to begin in April 2014.

Section 9. References

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Appendix A. Cost Estimates

Table A1-1. Alternatives Cost Estimate Summary

Site: MRS TS876a and MRS TS877a
Location: Mountain Home Air Force Base, Idaho
Phase: Engineering Evaluation/Cost Analysis

Remedial Alternative	Total Capital Cost	Total Annual Cost	Total Periodic Cost	Period of Analysis[2]	Present Worth Cost[4]	Accuracy Range (-30% / +50%) [5]
1[6]	$ -	$ -	$ -	30 years	$ -	$ - to $ -
2[7]	$ 250,331	$ 461,835	$ 246,725	30 years	$ 772,084	$ 540,459 to $ 1,158,126
3[8]	$ 1,485,729	$ -	$ -	30 years	$ 1,485,729	$ 1,040,010 to $ 2,228,593

Notes:

[1] Appended tables summarize backup calculations for all cost estimates provided.

[2] Period of analysis assumes the base year is 2012.

[3] Total cost includes a 20 percent contingency factor to account for changes in scope, changes to bid quantites, and inflation.

[4] Based on a 2.0 percent discount factor for projects with a 30-year (or greater) duration, as specified for federal facility sites in Appendix C of Office of Management and Budget Circular A-94 (effective December 2011) at http://www.whitehouse.gov/omb/circulars/a094/a94_appx-c.html.

[5] Accuracy range is consistent with EPA guidance (2000) titled "A Guide to Development and Documenting Cost Estimates During the Feasibility Study".

[6] Alternative 1 is the no action alternative.

[7] Alternative 2 consists of implementing land use controls to prevent access to the contaminated areas. Includes fencing, signage, and legal/administrative controls.

[8] Alternative 3 consists of excavating and disposing of contaminated soil at an offsite landfill. Includes restoring the excavated areas with onsite backfill and covering the backfilled material with native plants for erosion control.

Table A1-2. Alternative 2 - Cost Detail

ITEMS	QUANTITIES	UNITS	UNIT COSTS	EXTENDED COSTS	NOTES	REFERENCES
CAPITAL COSTS						
Pre-/Post-Construction Documents						
Pre-construction submittals	1	LS	$22,311.11	$22,311.11	Action Memo, Design, CQC Plan, Site Health and Safety Plan, etc. (Assume 20% of capital costs for construction)	
Post-construction submittals	1	LS	$33,466.67	$33,466.67	Removal Action Completion Report, Land Use Control Documentation (e.g., Land Use Controls Implementation Plan, Risk Management Plan, Deed Restrictions, etc.) (Assume 30% of capital costs for construction)	
SUBTOTAL:				$55,777.79		
Mobilization/Demobilization and Site Setup/Cleanup						
Temporary Facilities [(1)]	2	WK	$52.44	$104.88	Toilet, portable chemical	RS Means Heavy Construction Cost Data 2012, 01 54 33 40 6410
Work zone safety equipment	1	LS	$383.97	$383.97	10lb. Fire extinguisher, eyewash station.	Product codes: 330205456, 12132000200. White Cap Construction Supply: www.whitecap.com
Mobile Storage Unit Rental	0.5	MO	$69.05	$34.52	Storage box, 20'x8'; Storage of tools, equipment, materials, supplies, etc.	RS Means Heavy Construction Cost Data 2012, 01 52 13.20 1250
Water Truck	2	WK	$10,837.60	$21,675.20	Water truck, off highway, 6000 gallons; Dust control, equipment cleaning, etc.	RS Means Heavy Construction Cost Data 2012, 01 54 33 40 6950
Travel Expenses	2	EA	$360.00	$720.00	Assumes construction management team of 2, roundtrip flight from San Francisco, CA to Boise, ID	Online airfare search
General construction waste disposal/recycling	1	WK	$441.37	$441.37	Rubbish handling, dumpster, weekly rental, 1 dump/wk, 6cy capacity (2 tons)	RS Means Heavy Construction Cost Data 2012, 02 41 19.19 0600
SUBTOTAL:				$23,359.94		
Site-Preparation [(2)]						
Pre-Construction and Post-Construction Survey	10	HR	$125.00	$1,250.00	Pre-construction layout and post-construction as-built	Accurate Surveying & Mapping, Boise, ID. Verbal quote 10/18/12
SUBTOTAL:				$1,250.00		
Construction						
MRS TS876a Fence installation (8' chain link)	1,500	LF	$23.60	$35,397.00	3 strands barbed wire, 2" posts @ 10' O.C., set in concrete, 6' H, 9 ga. wire, galv. steel, in concrete.	RS Means Heavy Construction Cost Data 2012, 32 31 13.20 0200
MRS TS877a Fence installation (8' chain link)	1,200	LF	$23.60	$28,317.60	3 strands barbed wire, 2" posts @ 10' O.C., set in concrete, 6' H, 9 ga. wire, galv. steel, in concrete.	RS Means Heavy Construction Cost Data 2012, 32 31 13.20 0200
MRS TS876a Post mounted warning signs	15	EA	$22.72	$340.86	Guide and directional signs, 18" x 24" reflectorized, high intensity + Steel posts, galvanized	RS Means Heavy Construction Cost Data 2012, 10 14 53.20 0900 and 10 14 53.20 1500
MRS TS877a Post mounted warning signs	12	EA	$22.72	$272.69	Guide and directional signs, 18" x 24" reflectorized, high intensity + Steel posts, galvanized	RS Means Heavy Construction Cost Data 2012, 10 14 53.20 0900 and 10 14 53.20 1500
Site Superintendent	80	HR	$150.00	$12,000.00	Assumed rate: Site Superintendent	
Project Management	1	LS	$11,155.56	$11,155.56	Assumes 10% of Capital Costs	
Engineering Design/Permitting	1	LS	$13,386.67	$13,386.67	Assumes 12% of Capital Costs	
Prime Contractor Overhead	1	LS	$11,155.56	$11,155.56	Assumes 10% of Capital Costs	
Prime Contractor Profit	1	LS	$5,577.78	$5,577.78	Assumes 5% of Capital Costs	
Performance Bond	1	LS	$2,231.11	$2,231.11	Assumes 2% of Capital Costs	
SUBTOTAL				$41,275.56		
TOTAL CAPITAL COSTS:				**$250,330.70**	Includes 20% contingency factor	

Table A1-2. Alternative 2 - Cost Detail

ITEMS	QUANTITIES	UNITS	UNIT COSTS	EXTENDED COSTS	NOTES	REFERENCES
ANNUAL COSTS:						
Annual Inspection	1	LS	$4,910.00	$5,155.50	Assumes 2 staff engineers, 2 days plus travel expenses to visit site and examine fence condition, and produce inspection report (1 day) upon return. Airfare plus 1 day and 1 night per diem included per person	Assumed rate: Staff Engineer (Engineer I)
Minor Repair	1	LS	$4,347.28	$4,347.28	Assumes 5% of Fence Construction Cost (Capital Cost)	
Project Management	1	LS	$1,900.56	$1,900.56	Assumes 20% of Annual Repair and Inspection Costs	
Prime Contractor Overhead	1	LS	$950.28	$950.28	Assumes 10% of Annual Repair and Inspection Costs	
Prime Contractor Profit	1	LS	$475.14	$475.14	Assumes 5% of Annual Repair and Inspection Costs	
SUBTOTAL				$12,828.75		
TOTAL ANNUAL O&M COSTS:				**$15,394.51**	Includes 20% contingency factor	
PERIODIC COSTS:						
Five-Year Review	1	LS	$16,688.71	$16,688.71	Report with data summary from past 5 years. Project engineer. Assumes 8% of Capital Costs.	
Major Repair	1	LS	$8,694.56	$8,694.56	Assumes 10% of Fence Construction Cost (Capital Cost)	
Project Management	1	LS	$5,076.66	$5,076.66	Assumes 20% of Periodic Repair and 5-year Review Costs	
Prime Contractor Overhead	1	LS	$2,538.33	$2,538.33	Assumes 10% of Periodic Repair and 5-year Review Costs	
Prime Contractor Profit	1	LS	$1,269.16	$1,269.16	Assumes 5% of Periodic Repair and 5-year Review Costs	
SUBTOTAL				$34,267.42		
TOTAL PERIODIC COSTS (per period):				**$41,120.91**	Includes 20% contingency factor	

Notes and Assumptions:

(1) Rates derived from the "RS Means Heavy Construction Cost Data 2012" were multiplied by a factor of 0.874 to adjust published national average rates to for materials and installation to the project location (Location Factor for Boise, Idaho; Means 2012]', p. 589).

(2) Mountain Home Air Force Base to perform on-site utility location.

Table A1-3. Alternative 2 - Cash Flow Analysis

Year[1,2]	Capital Cost[3]	Annual Cost[3]	Periodic Cost[3]	Total Cost	Present Value	Notes
0	$ 250,331	$ -	$ -	$ 250,331	$ 250,331	Pre-/post-construction documents; construction
1	$ -	$ 15,395	$ -	$ 15,395	$ 15,093	Annual inspection and minor repair
2	$ -	$ 15,395	$ -	$ 15,395	$ 14,797	Annual inspection and minor repair
3	$ -	$ 15,395	$ -	$ 15,395	$ 14,507	Annual inspection and minor repair
4	$ -	$ 15,395	$ -	$ 15,395	$ 14,222	Annual inspection and minor repair
5	$ -	$ 15,395	$ 41,121	$ 56,515	$ 51,188	Annual inspection, 5-yr review, minor repair and major repair
6	$ -	$ 15,395	$ -	$ 15,395	$ 13,670	Annual inspection and minor repair
7	$ -	$ 15,395	$ -	$ 15,395	$ 13,402	Annual inspection and minor repair
8	$ -	$ 15,395	$ -	$ 15,395	$ 13,139	Annual inspection and minor repair
9	$ -	$ 15,395	$ -	$ 15,395	$ 12,881	Annual inspection and minor repair
10	$ -	$ 15,395	$ 41,121	$ 56,515	$ 46,362	Annual inspection, 5-yr review, minor repair and major repair
11	$ -	$ 15,395	$ -	$ 15,395	$ 12,381	Annual inspection and minor repair
12	$ -	$ 15,395	$ -	$ 15,395	$ 12,138	Annual inspection and minor repair
13	$ -	$ 15,395	$ -	$ 15,395	$ 11,900	Annual inspection and minor repair
14	$ -	$ 15,395	$ -	$ 15,395	$ 11,667	Annual inspection and minor repair
15	$ -	$ 15,395	$ 41,121	$ 56,515	$ 41,992	Annual inspection, 5-yr review, minor repair and major repair
16	$ -	$ 15,395	$ -	$ 15,395	$ 11,214	Annual inspection and minor repair
17	$ -	$ 15,395	$ -	$ 15,395	$ 10,994	Annual inspection and minor repair
18	$ -	$ 15,395	$ -	$ 15,395	$ 10,779	Annual inspection and minor repair
19	$ -	$ 15,395	$ -	$ 15,395	$ 10,567	Annual inspection and minor repair
20	$ -	$ 15,395	$ 41,121	$ 56,515	$ 38,033	Annual inspection, 5-yr review, minor repair and major repair
21	0	$ 15,395	$ -	$ 15,395	$ 10,157	Annual inspection and minor repair
22	0	$ 15,395	$ -	$ 15,395	$ 9,958	Annual inspection and minor repair
23	0	$ 15,395	$ -	$ 15,395	$ 9,763	Annual inspection and minor repair
24	0	$ 15,395	$ -	$ 15,395	$ 9,571	Annual inspection and minor repair
25	0	$ 15,395	$ 41,121	$ 56,515	$ 34,448	Annual inspection, 5-yr review, minor repair and major repair

Notes:

(1) Capital cost occur in year 0 (base year), annual costs in years 1-30, and periodic costs in years 5, 10, 15, 20, 25, and 30.

(2) Base year is assumed to be 2012

(3) Based on a 2.0 percent discount factor for projects with a 30-year (or greater) duration, as specified for federal facility sites in Appendix C of Office of Management and Budget Circular A-94 (effective December 2011) at http://www.whitehouse.gov/omb/circulars/a094/a94_appx-c.html.

Table A1-4. Alternative 3 - Cost Detail

ITEMS	QUANTITIES	UNITS	UNIT COSTS	EXTENDED COSTS	NOTES	REFERENCES
CAPITAL COSTS						
Pre-/Post-Construction Documents						
Pre-construction submittals	1	LS	$41,839.26	$41,839.26	Removal Action Work Plan, Design, CQC Plan, Site Health and Safety Plan, Sampling and Analysis Plan Environmental Protection Plan, Waste Handling Plan, etc. (Assume 5% of capital costs for construction)	
Post-construction submittals	1	LS	$25,103.56	$25,103.56	Removal Action Completion Report (Assume 3% of capital costs for construction)	
SUBTOTAL:				$66,942.82		
Mobilization/Demobilization and Site Setup/Cleanup						
Temporary Facilities [1]	4	WK	$52.44	$209.76	Toilet, portable chemical	RS Means Heavy Construction Cost Data 2012, 01 54 33 40 6410
Work zone safety equipment	1	LS	$383.97	$383.97	10lb. Fire extinguisher, eyewash station.	Product codes: 330205456, 12132000200. White Cap Construction Supply: www.whitecap.com
Mobile Storage Unit Rental	1	MO	$69.05	$69.05	Storage box, 20'x8'; Storage of tools, equipment, materials, supplies, etc.	RS Means Heavy Construction Cost Data 2012, 01 52 13.20 1250
Water Truck	4	WK	$10,837.60	$43,350.40	Water truck, off highway, 6000 gallons; Dust control, equipment cleaning, etc.	RS Means Heavy Construction Cost Data 2012, 01 54 33 40 6950
Heavy Equipment Mobilization/Demobilization	8	EA	$322.51	$2,580.05	Dozer, loader, roller, and skidsteer; 70 to 150 HP. Assume rental from Boise, ID (50 mi haul distance)	RS Means Heavy Construction Cost Data 2012, 01 54 36.50 0020 and 0154 36.50 2500
Travel Expenses - Construction	7	EA	$360.00	$2,520.00	Assumes craft team of 5 and construction management team of 2, roundtrip flight from San Francisco, CA to Boise, ID.	Online airfare search
General construction waste disposal/recycling	4	WK	$441.37	$1,765.48	Rubbish handling, dumpster, weekly rental, 1 dump/wk, 6cy capacity (2 tons)	RS Means Heavy Construction Cost Data 2012, 02 41 19.19 0600
SUBTOTAL:				$50,878.70		
Site-Preparation [2]						
Pre-Construction and Post-Construction Survey	10	HR	$125.00	$1,250.00	Pre-construction layout and post-construction as-	Accurate Surveying & Mapping, Boise, ID. Verbal quote 10/18/12
SUBTOTAL:				$1,250.00		
Construction						
MRS TS876a Shallow Excavation (12" over 1.1 acres)	1,850	CY	$2.76	$5,109.40	Excavating, Bulk, Dozer, 80HP, 50' haul, common earth.	RS Means Heavy Construction Cost Data 2012, 31 23 16.46 2020
MRS TS877a Shallow Excavation (12" over 0.9 acres)	1,500	CY	$2.76	$4,142.76	Excavating, Bulk, Dozer, 80HP, 50' haul, common earth.	RS Means Heavy Construction Cost Data 2012, 31 23 16.46 2020
Confirmation sampling (MRS TS876 and MRS TS877a only)	248	EA	$154.00	$38,192.00	Analysis for PAHs. Bottom and sidewall samples every 25' (MRS TS876a: 77 bottom samples and 60 sidewall samples, MRS TS877a: 63 bottom samples and 48 sidewall samples).	Analytical Laboratories, Inc., Boise, Idaho. Verbal quote 10/18.12
Sample courier service	4	TRIP	$99.00	$396.00	Courier service to Boise, ID.	Analytical Laboratories, Inc., Boise, Idaho. Verbal quote 10/18/12
Truck loading (all spoils)	3,350	CY	$5.07	$16,981.82	Load and haul common earth, 3cy wheel loader, six 20cy dump trailers, 2 mi round trip to stockpile area.	RS Means Heavy Construction Cost Data 2012, G1030 140 6600
Compaction Testing (Field)	530	EA	$33.65	$17,833.97	Soil density, nuclear method, ASTM D2922. One test every 50' = 530 tests.	RS Means Heavy Construction Cost Data 2012, 01 45 23.50 4735
Site Superintendent	160	HR	$150.00	$24,000.00	Assumed rate: Site Superintendent	
CQC Officer/Site Health and Safety Officer	160	HR	$90.00	$14,400.00	Assumed rate: Assistant Project Engineer (Engineer II)	

Table A1-4. Alternative 3 - Cost Detail

ITEMS	QUANTITIES	UNITS	UNIT COSTS	EXTENDED COSTS	NOTES	REFERENCES
4X4 Pickup Truck - Construction	4	WK	$589.95	$2,359.80	Truck, pickup, 3/4 ton, 4 wheel drive; 3 trucks for use on site by contruction and oversight teams	RS Means Heavy Construction Cost Data 2012, 01 54 33 40 7200
Per Diem and Incidental Expenses - Construction	140	DAY	$123.00	$17,220.00	Assumes per diem for craft team and construction oversight team, 7 persons, 4 weeks	GSA FY 2013 Per Diem Rates for ZIP 83647 (http://www.gsa.gov/portal/category/100120)
Personal Protection Equipment (Level C)	7	EA	$85.44	$598.08	Assumes PPE for craft team and construction oversight team, 7 persons. Hardhat, half-face respirator with P100 cartridges, nitrile work gloves, safety vest, tyvek coveralls, safety glasses.	Product codes: 216E1RWW, 6878943, 223205709, 175FPCB188L, 590CL, 263S2580S. White Cap Construction Supply: www.whitecap.com
SUBTOTAL:				$784,656.50		
Contract Administration (for construction effort)						
Project Management	1	LS	$90,372.80	$90,372.80	Assumes 10% of Capital Costs	
Engineering Design/Permitting	1	LS	$108,447.36	$108,447.36	Assumes 12% of Capital Costs	
Prime Contractor Overhead	1	LS	$90,372.80	$90,372.80	Assumes 10% of Capital Costs	
Prime Contractor Profit	1	LS	$45,186.40	$45,186.40	Assumes 5% of Capital Costs	
Performance Bond	1	LS	$18,074.56	$18,074.56	Assumes 2% of Capital Costs	
SUBTOTAL				$334,379.37		
TOTAL CAPITAL COSTS:				**$1,485,728.87**	Includes 20% contingency factor	
ANNUAL COSTS:						
None	1	LS	$0.00	$0.00	No further action required	
SUBTOTAL				$0.00		
TOTAL ANNUAL O&M COSTS:				**$0.00**		
PERIODIC COSTS:						
None	1	LS	$0.00	$0.00	No further action required	
SUBTOTAL				$0.00		
TOTAL PERIODIC COSTS (per period):				**$0.00**		

Notes and Assumptions:

(1) Rates derived from the "RS Means Heavy Construction Cost Data 2012" were multiplied by a factor of 0.874 to adjust published national average rates to for materials and installation to the project location (Location Factor for Boise, Idaho; Means 2012]', p. 589).

(2) Mountain Home Air Force Base to perform on-site utility location.

Table A1-5. Alternative 3 - Cash Flow Analysis

Year[1,2]	Capital Cost[3]	Annual Cost[3]	Periodic Cost[3]	Total Cost	Present Value	Notes
0	$ 1,485,729	$ -	$ -	$ 1,485,729	$ 1,485,729	Removal action documents, design, and construction
1	$ -	$ -	$ -	$ -	$ -	No further action required
2	$ -	$ -	$ -	$ -	$ -	No further action required
3	$ -	$ -	$ -	$ -	$ -	No further action required
4	$ -	$ -	$ -	$ -	$ -	No further action required
5	$ -	$ -	$ -	$ -	$ -	No further action required
6	$ -	$ -	$ -	$ -	$ -	No further action required
7	$ -	$ -	$ -	$ -	$ -	No further action required
8	$ -	$ -	$ -	$ -	$ -	No further action required
9	$ -	$ -	$ -	$ -	$ -	No further action required
10	$ -	$ -	$ -	$ -	$ -	No further action required
11	$ -	$ -	$ -	$ -	$ -	No further action required
12	$ -	$ -	$ -	$ -	$ -	No further action required
13	$ -	$ -	$ -	$ -	$ -	No further action required
14	$ -	$ -	$ -	$ -	$ -	No further action required
15	$ -	$ -	$ -	$ -	$ -	No further action required
16	$ -	$ -	$ -	$ -	$ -	No further action required
17	$ -	$ -	$ -	$ -	$ -	No further action required
18	$ -	$ -	$ -	$ -	$ -	No further action required
19	$ -	$ -	$ -	$ -	$ -	No further action required
20	$ -	$ -	$ -	$ -	$ -	No further action required
21	0	$ -	$ -	$ -	$ -	No further action required
22	0	$ -	$ -	$ -	$ -	No further action required
23	0	$ -	$ -	$ -	$ -	No further action required
24	0	$ -	$ -	$ -	$ -	No further action required
25	0	$ -	$ -	$ -	$ -	No further action required

Notes:

[1] Capital cost occur in year 0 (base year); there are no annual or periodic costs associated with this alternative.

[2] Base year is assumed to be 2012

[3] Includes 20% contingency factor (10% Scope and 10% Bid)

[4]Based on a 2.0 percent discount factor for projects with a 30-year (or greater) duration, as specified for federal facility sites in Appendix C of Office of Management and Budget Circular A-94 (effective December 2011) at http://www.whitehouse.gov/omb/circulars/a094/a94_appx-c.html.

Table A2-1. Alternatives Cost Estimate Summary

Site: MRS ED879
Location: Mountain Home Air Force Base, Idaho
Phase: Engineering Evaluation/Cost Analysis

Remedial Alternative	Total Capital Cost	Total Annual Cost	Total Periodic Cost	Period of Analysis[2]	Total Cost[3]	Present Worth Cost[4]	Accuracy Range (-30% / +50%) [5]
1[6]	$ -	$ -	$ -	30 years	$ -	$ -	$ - to $ -
2[7]	$ 350,246	$ 652,280	$ 330,909	30 years	$ 1,333,435	$ 1,074,558	$ 752,191 to $ 1,611,837
3[8]	$ 531,936	$ -	$ -	30 years	$ 531,936	$ 531,936	$ 372,355 to $ 797,904

Notes:

[1] Appended tables summarize backup calculations for all cost estimates provided.

[2] Period of analysis assumes the base year is 2012.

[3] Total cost includes a 20 percent contingency factor to account for changes in scope, changes to bid quantites, and inflation.

[4] Based on a 2.0 percent discount factor for projects with a 30-year (or greater) duration, as specified for federal facility sites in Appendix C of Office of Management and Budget Circular A-94 (effective December 2011) at http://www.whitehouse.gov/omb/circulars/a094/a94_appx-c.html.

[5] Accuracy range is consistent with EPA guidance (2000) titled "A Guide to Development and Documenting Cost Estimates During the Feasibility Study".

[6] Alternative 1 is the no action alternative.

[7] Alternative 2 consists of implementing land use controls to prevent access to the contaminated areas. Includes fencing, signage, and legal/administrative controls.

[8] Alternative 3 consists of excavating and disposing of munitions debris at a recycling facility. Includes restoring the excavated areas with onsite backfill and covering the backfilled material with native plants for erosion control.

Table A2-2. Alternative 2 - Cost Detail

ITEMS	QUANTITIES	UNITS	UNIT COSTS	EXTENDED COSTS	NOTES	REFERENCES
CAPITAL COSTS						
Pre-/Post-Construction Documents						
Pre-construction submittals	1	LS	$25,453.92	$25,453.92	Action Memo, Design, CQC Plan, Site Health and Safety Plan, etc. (Assume 15% of capital costs for construction)	
Post-construction submittals	1	LS	$33,938.56	$33,938.56	Removal Action Completion Report, Land Use Control Documentation (e.g., Land Use Controls Implementation Plan, Risk Management Plan, Deed Restrictions, etc.) (Assume 20% of capital costs for construction)	
SUBTOTAL:				$59,392.48		
Mobilization/Demobilization and Site Setup/Cleanup						
Temporary Facilities [1]	2	WK	$52.44	$104.88	Toilet, portable chemical	RS Means Heavy Construction Cost Data 2012, 01 54 33 40 6410
Work zone safety equipment	1	LS	$383.97	$383.97	10lb. Fire extinguisher, eyewash station.	Product codes: 330205456, 12132000200. White Cap Construction Supply: www.whitecap.com
Mobile Storage Unit Rental	0.5	MO	$69.05	$34.52	Storage box, 20'x8'; Storage of tools, equipment, materials, supplies, etc.	RS Means Heavy Construction Cost Data 2012, 01 52 13.20 1250
Travel Expenses	6	EA	$360.00	$2,160.00	Assumes craft team of 2, construction management team of 2, Tech II, and project manager, roundtrip flight from San Francisco, CA to Boise, ID	Online airfare search
General construction waste disposal/recycling	1	WK	$441.37	$441.37	Rubbish handling, dumpster, weekly rental, 1 dump/wk, 6cy capacity (2 tons)	RS Means Heavy Construction Cost Data 2012, 02 41 19.19 0600
SUBTOTAL:				$3,124.74		
Site-Preparation [2]						
Pre-Construction and Post-Construction Survey	10	HR	$125.00	$1,250.00	Pre-construction layout and post-construction as-built	Accurate Surveying & Mapping, Boise, ID. Verbal quote 10/18/12
SUBTOTAL:				$1,250.00		
Construction						
MRS ED879 Fence installation (8' chain link)	5500	LF	$23.60	$129,789.00	3 strands barbed wire, 2" posts @ 10' O.C., set in concrete, 6' H, 9 ga. wire, galv. steel, in concrete.	RS Means Heavy Construction Cost Data 2012, 32 31 13.20 0200
MRS ED879 Post mounted warning signs	55	EA	$22.72	$1,249.82	Guide and directional signs, 18" x 24" reflectorized, high intensity + Steel posts, galvanized	RS Means Heavy Construction Cost Data 2012, 10 14 53.20 0900 and 10 14 53.20 1500
Site Superintendent	80	HR	$150.00	$12,000.00	Assumed rate: Site Superintendent	
CQC Officer	80	HR	$90.00	$7,200.00	Assumed rate: Assistant Project Engineer (Engineer II)	
Site Health and Safety Officer	80	HR	$80.00	$6,400.00	Assumed rate: UXO Tech (Tech II)	
4X4 Pickup Truck	2	WK	$393.30	$786.60	Truck, pickup, 3/4 ton, 4 wheel drive; 2 trucks for use on site by contruction oversight team	RS Means Heavy Construction Cost Data 2012, 01 54 33 40 7200
Per Diem and Incidental Expenses	60	DAY	$123.00	$7,380.00	Assumes per diem for craft team and construction oversight team, 6 persons, 2 weeks	GSA FY 2013 Per Diem Rates for ZIP 83647 (http://www.gsa.gov/portal/category/100120)
Personal Protection Equipment (Level D)	6	EA	$85.44	$512.64	Assumes PPE for craft team and construction oversight team, 6 persons. Work gloves, safety vest, safety glasses.	Product codes: 216E1RWW, 6878943, 223205709, 175FPCB188L, 590CL, 263S2580S. White Cap Construction Supply: www.whitecap.com
SUBTOTAL:				$165,318.06		
Contract Administration (for construction effort)						
Project Management	1	LS	$16,969.28	$16,969.28	Assumes 10% of Capital Costs	
Engineering Design/Permitting	1	LS	$20,363.14	$20,363.14	Assumes 12% of Capital Costs	
Prime Contractor Overhead	1	LS	$16,969.28	$16,969.28	Assumes 10% of Capital Costs	
Prime Contractor Profit	1	LS	$8,484.64	$8,484.64	Assumes 5% of Capital Costs	
Performance Bond	1	LS	$3,393.86	$3,393.86	Assumes 2% of Capital Costs	
SUBTOTAL				$62,786.34		
TOTAL CAPITAL COSTS:				**$350,245.95**	Includes 20% contingency factor	

Table A2-2. Alternative 2 - Cost Detail

ITEMS	QUANTITIES	UNITS	UNIT COSTS	EXTENDED COSTS	NOTES	REFERENCES
ANNUAL COSTS:						
Annual Inspection	1	LS	$4,910.00	$5,155.50	Assumes 2 staff engineers, 2 days plus travel expenses to visit site and examine fence condition, and produce inspection report (1 day) upon return. Airfare plus 1 day and 1 night per diem included per person.	Assumed rate: Staff Engineer (Engineer I)
Minor Repair	1	LS	$8,265.90	$8,265.90	Assumes 5% of Fence Construction Cost (Capital Cost)	
Project Management	1	LS	$2,684.28	$2,684.28	Assumes 20% of Annual Repair and Inspection Costs	
Prime Contractor Overhead	1	LS	$1,342.14	$1,342.14	Assumes 10% of Annual Repair and Inspection Costs	
Prime Contractor Profit	1	LS	$671.07	$671.07	Assumes 5% of Annual Repair and Inspection Costs	
SUBTOTAL				$18,118.89		
TOTAL ANNUAL O&M COSTS:				**$21,742.67**	Includes 20% contingency factor	
PERIODIC COSTS:						
Five-Year Review	1	LS	$17,512.30	$17,512.30	Report with data summary from past 5 years. Project engineer. Assumes 6% of Capital Costs.	
Major Repair	1	LS	$16,531.81	$16,531.81	Assumes 10% of Fence Construction Cost (Capital Cost)	
Project Management	1	LS	$6,808.82	$6,808.82	Assumes 20% of Periodic Repair and 5-year Review Costs	
Prime Contractor Overhead	1	LS	$3,404.41	$3,404.41	Assumes 10% of Periodic Repair and 5-year Review Costs	
Prime Contractor Profit	1	LS	$1,702.21	$1,702.21	Assumes 5% of Periodic Repair and 5-year Review Costs	
SUBTOTAL				$45,959.54		
TOTAL PERIODIC COSTS (per period):				**$55,151.45**	Includes 20% contingency factor	

Notes and Assumptions:

(1) Rates derived from the "RS Means Heavy Construction Cost Data 2012" were multiplied by a factor of 0.874 to adjust published national average rates to for materials and installation to the project location (Location Factor for Boise, Idaho; Means 2012]', p. 589).

(2) Mountain Home Air Force Base to perform onsite utility location.

Table A2-3. Alternative 2 - Cash Flow Analysis

Year[1,2]	Capital Cost[3]	Annual Cost[3]	Periodic Cost[3]	Total Cost	Discount Factor (2.0%)[4]	Present Value	Notes
0	$ 350,246	$ -	$ -	$ 350,246	1.000	$ 350,246	Action documents, design, construction, and administrative controls
1	$ -	$ 21,743	$ -	$ 21,743	0.980	$ 21,316	Annual inspection and minor repair
2	$ -	$ 21,743	$ -	$ 21,743	0.961	$ 20,898	Annual inspection and minor repair
3	$ -	$ 21,743	$ -	$ 21,743	0.942	$ 20,489	Annual inspection and minor repair
4	$ -	$ 21,743	$ -	$ 21,743	0.924	$ 20,087	Annual inspection and minor repair
5	$ -	$ 21,743	$ 55,151	$ 76,894	0.906	$ 69,645	Annual inspection, 5-yr review, minor repair and major repair
6	$ -	$ 21,743	$ -	$ 21,743	0.888	$ 19,307	Annual inspection and minor repair
7	$ -	$ 21,743	$ -	$ 21,743	0.871	$ 18,928	Annual inspection and minor repair
8	$ -	$ 21,743	$ -	$ 21,743	0.853	$ 18,557	Annual inspection and minor repair
9	$ -	$ 21,743	$ -	$ 21,743	0.837	$ 18,193	Annual inspection and minor repair
10	$ -	$ 21,743	$ 55,151	$ 76,894	0.820	$ 63,080	Annual inspection, 5-yr review, minor repair and major repair
11	$ -	$ 21,743	$ -	$ 21,743	0.804	$ 17,487	Annual inspection and minor repair
12	$ -	$ 21,743	$ -	$ 21,743	0.788	$ 17,144	Annual inspection and minor repair
13	$ -	$ 21,743	$ -	$ 21,743	0.773	$ 16,808	Annual inspection and minor repair
14	$ -	$ 21,743	$ -	$ 21,743	0.758	$ 16,478	Annual inspection and minor repair
15	$ -	$ 21,743	$ 55,151	$ 76,894	0.743	$ 57,133	Annual inspection, 5-yr review, minor repair and major repair
16	$ -	$ 21,743	$ -	$ 21,743	0.728	$ 15,838	Annual inspection and minor repair
17	$ -	$ 21,743	$ -	$ 21,743	0.714	$ 15,528	Annual inspection and minor repair
18	$ -	$ 21,743	$ -	$ 21,743	0.700	$ 15,223	Annual inspection and minor repair
19	$ -	$ 21,743	$ -	$ 21,743	0.686	$ 14,925	Annual inspection and minor repair
20	$ -	$ 21,743	$ 55,151	$ 76,894	0.673	$ 51,748	Annual inspection, 5-yr review, minor repair and major repair
21	$ -	$ 21,743	$ -	$ 21,743	0.660	$ 14,345	Annual inspection and minor repair
22	$ -	$ 21,743	$ -	$ 21,743	0.647	$ 14,064	Annual inspection and minor repair
23	$ -	$ 21,743	$ -	$ 21,743	0.634	$ 13,788	Annual inspection and minor repair
24	$ -	$ 21,743	$ -	$ 21,743	0.622	$ 13,518	Annual inspection and minor repair
25	$ -	$ 21,743	$ 55,151	$ 76,894	0.610	$ 46,869	Annual inspection, 5-yr review, minor repair and major repair
26	$ -	$ 21,743	$ -	$ 21,743	0.598	$ 12,993	Annual inspection and minor repair
27	$ -	$ 21,743	$ -	$ 21,743	0.586	$ 12,738	Annual inspection and minor repair
28	$ -	$ 21,743	$ -	$ 21,743	0.574	$ 12,488	Annual inspection and minor repair
29	$ -	$ 21,743	$ -	$ 21,743	0.563	$ 12,244	Annual inspection and minor repair
30	$ -	$ 21,743	$ 55,151	$ 76,894	0.552	$ 42,451	Annual inspection, 5-yr review, minor repair and major repair
TOTALS	**$ 350,246**	**$ 652,280**	**$ 330,909**	**$ 1,333,435**		**$ 1,074,558**	

Notes:

(1) Capital cost occur in year 0 (base year), annual costs in years 1-30, and periodic costs in years 5, 10, 15, 20, 25, and 30.

(2) Base year is assumed to be 2012

(3) Based on a 2.0 percent discount factor for projects with a 30-year (or greater) duration, as specified for federal facility sites in Appendix C of Office of Management and Budget Circular A-94 (effective December 2011) at http://www.whitehouse.gov/omb/circulars/a094/a94_appx-c.html.

Table A2-4. Alternative 3 - Cost Detail

ITEMS	QUANTITIES	UNITS	UNIT COSTS	EXTENDED COSTS	NOTES	REFERENCES
CAPITAL COSTS						
Pre-/Post-Construction Documents						
Pre-construction submittals	1	LS	$38,827.43	$38,827.43	Removal Action Work Plan, Design, CQC Plan, Site Health and Safety Plan, Sampling and Analysis Plan, Environmental Protection Plan, Waste Handling Plan, etc. (Assume 15% of capital costs for construction)	
Post-construction submittals	1	LS	$25,884.95	$25,884.95	Removal Action Completion Report (Assume 10% of capital costs for construction)	
SUBTOTAL:				$64,712.38		
Mobilization/Demobilization and Site Setup/Cleanup						
Temporary Facilities [1]	5	WK	$52.44	$262.20	Toilet, portable chemical	RS Means Heavy Construction Cost Data 2012, 01 54 33 40 6410
Work zone safety equipment	1	LS	$383.97	$383.97	10lb. Fire extinguisher, eyewash station.	Product codes: 330205456, 12132000200. White Cap Construction Supply: www.whitecap.com
Mobile Storage Unit Rental	1.25	MO	$69.05	$86.31	Storage box, 20'x8'; Storage of tools, equipment, materials, supplies, etc.	RS Means Heavy Construction Cost Data 2012, 01 52 13.20 1250
Travel Expenses - UXO	9	EA	$365.00	$3,285.00	Assumes UXO team of 7, SUXOS, and QC/UXOSO, roundtrip flight from Phoenix, AZ to Boise, ID.	Online airfare search
Travel Expenses - Geophysical Team	1	EA	$481.50	$481.50		Verbal quote
General construction waste disposal/recycling	5	WK	$441.37	$2,206.85	Rubbish handling, dumpster, weekly rental, 1 dump/wk, 6cy capacity (2 tons)	RS Means Heavy Construction Cost Data 2012, 02 41 19.19 0600
SUBTOTAL:				$6,705.83		
Site-Preparation [2]						
Pre-Construction and Post-Construction Survey	10	HR	$125.00	$1,250.00	Pre-construction layout and post-construction as-built	Accurate Surveying & Mapping, Boise, ID. Verbal quote 10/18/12
SUBTOTAL:				$1,250.00		
Construction						
4X4 Pickup Truck	5	WK	$589.95	$2,949.75	Truck, pickup, 3/4 ton, 4 wheel drive; 3 trucks for use on site by UXO team	RS Means Heavy Construction Cost Data 2012, 01 54 33 40 7200
Vehicle Fuel	600	Gallons	$4.50	$2,700.00		
MRS ED879 Intrusive Investigation	1400	HR	$70.00	$98,000.00	1 Tech III, 2 Tech II, and 4 Tech I	2,200 anomalies over 28.5 acres
UXOQC/UXO Safety Officer	200	HR	$85.00	$17,000.00	Assumed rate: UXO QC (Tech III)	
Senior UXO Supervisor	200	HR	$90.00	$18,000.00	Assumed rate: SUXOS (Tech III)	
Field equipment	25	DAY	$100.00	$2,500.00	Shovels, all metal detectors, etc…	
Demolition Materials	1	LS	$1,500.00	$1,500.00		Verbal quote
Locking Bins	1	LS	$700.00	$700.00		Demil Transport Services, verbal quote
MD Disposal	1	LS	$200.00	$200.00		
Geophysical Subcontractor	1	LS	$78,900.00	$78,900.00	22 field-days will be required for the support of dig team performing intrusive investigation of 2,200 subsurface targets.	InDepth Geophysical. Written quote
Per Diem and Incidental Expenses	225	DAY	$123.00	$27,675.00	Assumes per diem for UXO and oversight team, 9 persons, 5 weeks	GSA FY 2013 Per Diem Rates for ZIP 83647 (http://www.gsa.gov/portal/category/100120)
Personal Protection Equipment (Level D)	9	EA	$85.44	$768.96	Assumes PPE for UXO team and oversight team, 9 persons. Work gloves, safety vest, and safety glasses.	Product codes: 223205709, 175FPCB188L, 263S2580S. White Cap Construction Supply: www.whitecap.com
SUBTOTAL:				$250,893.71		

Table A2-4. Alternative 3 - Cost Detail

ITEMS	QUANTITIES	UNITS	UNIT COSTS	EXTENDED COSTS	NOTES	REFERENCES
Contract Administration (for construction effort)						
Project Management	1	LS	$32,356.19	$32,356.19	Assumes 10% of Capital Costs	
Engineering Design/Permitting	1	LS	$38,827.43	$38,827.43	Assumes 12% of Capital Costs	
Prime Contractor Overhead	1	LS	$32,356.19	$32,356.19	Assumes 10% of Capital Costs	
Prime Contractor Profit	1	LS	$16,178.10	$16,178.10	Assumes 5% of Capital Costs	
SUBTOTAL				$119,717.91		
TOTAL CAPITAL COSTS:				**$531,935.80**	Includes 20% contingency factor	
ANNUAL COSTS:						
None	1	LS	$0.00	$0.00	No further action required	
SUBTOTAL				$0.00		
TOTAL ANNUAL O&M COSTS:				**$0.00**		
PERIODIC COSTS:						
None	1	LS	$0.00	$0.00	No further action required	
SUBTOTAL				$0.00		
TOTAL PERIODIC COSTS (per period):				**$0.00**		

Notes and Assumptions:

(1) Rates derived from the "RS Means Heavy Construction Cost Data 2012" were multiplied by a factor of 0.874 to adjust published national average rates to for materials and installation to the project location (Location Factor for Boise, Idaho; Means 2012]', p. 589).

(2) Mountain Home Air Force Base to perform onsite utility location.

Table A2-5. Alternative 3 - Cash Flow Analysis

Year[1,2]	Capital Cost[3]	Annual Cost[3]	Periodic Cost[3]	Total Cost	Discount Factor (2.0%)[4]	Present Value	Notes
0	$ 531,936	$ -	$ -	$ 531,936	1.000	$ 531,936	Removal action documents, design, and construction
1	$ -	$ -	$ -	$ -	0.980	$ -	No further action required
2	$ -	$ -	$ -	$ -	0.961	$ -	No further action required
3	$ -	$ -	$ -	$ -	0.942	$ -	No further action required
4	$ -	$ -	$ -	$ -	0.924	$ -	No further action required
5	$ -	$ -	$ -	$ -	0.906	$ -	No further action required
6	$ -	$ -	$ -	$ -	0.888	$ -	No further action required
7	$ -	$ -	$ -	$ -	0.871	$ -	No further action required
8	$ -	$ -	$ -	$ -	0.853	$ -	No further action required
9	$ -	$ -	$ -	$ -	0.837	$ -	No further action required
10	$ -	$ -	$ -	$ -	0.820	$ -	No further action required
11	$ -	$ -	$ -	$ -	0.804	$ -	No further action required
12	$ -	$ -	$ -	$ -	0.788	$ -	No further action required
13	$ -	$ -	$ -	$ -	0.773	$ -	No further action required
14	$ -	$ -	$ -	$ -	0.758	$ -	No further action required
15	$ -	$ -	$ -	$ -	0.743	$ -	No further action required
16	$ -	$ -	$ -	$ -	0.728	$ -	No further action required
17	$ -	$ -	$ -	$ -	0.714	$ -	No further action required
18	$ -	$ -	$ -	$ -	0.700	$ -	No further action required
19	$ -	$ -	$ -	$ -	0.686	$ -	No further action required
20	$ -	$ -	$ -	$ -	0.673	$ -	No further action required
21	$ -	$ -	$ -	$ -	0.660	$ -	No further action required
22	$ -	$ -	$ -	$ -	0.647	$ -	No further action required
23	$ -	$ -	$ -	$ -	0.634	$ -	No further action required
24	$ -	$ -	$ -	$ -	0.622	$ -	No further action required
25	$ -	$ -	$ -	$ -	0.610	$ -	No further action required
26	$ -	$ -	$ -	$ -	0.598	$ -	No further action required
27	$ -	$ -	$ -	$ -	0.586	$ -	No further action required
28	$ -	$ -	$ -	$ -	0.574	$ -	No further action required
29	$ -	$ -	$ -	$ -	0.563	$ -	No further action required
30	$ -	$ -	$ -	$ -	0.552	$ -	No further action required
TOTALS	**$ 531,936**	**$ -**	**$ -**	**$ 531,936**		**$ 531,936**	

Notes:

(1) Capital cost occur in year 0 (base year); there are no annual or periodic costs associated with this alternative.

(2) Base year is assumed to be 2012

(3) Includes 20% contingency factor (10% Scope and 10% Bid)

(4) Based on a 2.0 percent discount factor for projects with a 30-year (or greater) duration, as specified for federal facility sites in Appendix C of Office of Management and Budget Circular A-94 (effective December 2011) at http://www.whitehouse.gov/omb/circulars/a094/a94_appx-c.html.