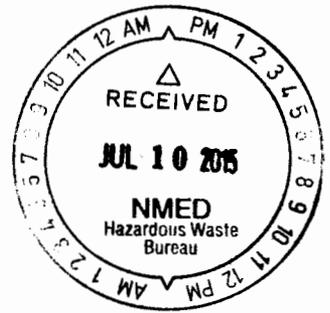




ENTERED

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 49TH WING (ACC)
HOLLOMAN AIR FORCE BASE, NEW MEXICO



8 July 2015

Adam Kusmak
Chief Installation Management Flight, Holloman AFB
550 Tabosa Avenue
Holloman AFB NM 88330-8458

USEPA, Region 6 (6PD-F)
Attn: Mr. Chuck Hendrickson, Project Manager
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

Dear Mr. Hendrickson,

Holloman AFB is pleased to submit the Final Engineering Evaluation / Cost Analysis for TS851a Former Skeet Range Munitions Response Site, Holloman Air Force Base, NM.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

If you have any questions regarding this submittal, please contact me at (575) 572-6675.

Sincerely,

ADAM M. KUSMAK, GS-13, USAF

Attachment:

Final Engineering Evaluation / Cost Analysis for TS851a Former Skeet Range Munition Response Site, Holloman Air Force Base, New Mexico. June 2015.

cc:

(w/Atch)
Mr. David Strasser
Hazardous Waste Bureau
5500 San Antonio Dr, NE
Albuquerque NM 87109-4127

(w/Atch)
Mr. John Kieling, Chief
Hazardous Waste Bureau
2905 Rodeo Park Dr, East, Building 1
Santa Fe NM 87505-6303

(w/o Atch)
Mr. Will Moats
Hazardous Waste Bureau
5500 San Antonio Dr, NE
Albuquerque NM 87109-4127

TS851a - FORMER SKEET RANGE

**ENGINEERING EVALUATION/
COST ANALYSIS**

**HOLLOMAN AIR FORCE BASE
NEW MEXICO
RCRA PERMIT No. NM6572124422**

**Performance Based Remediation
Contract Number: FA8903-13-C-0008**

Prepared for



**AIR FORCE CIVIL ENGINEER CENTER
2261 Hughes Ave., Suite 163
Joint Base San Antonio - Lackland, Texas 78236-9853**

June 2015

Prepared by:

FPM Remediations, Inc.

**584 Phoenix Drive
Rome, NY 13441**

This page is intentionally left blank.

Section 1	Introduction.....	1-1
	1.1 Authority.....	1-1
	1.2 Purpose and Scope.....	1-1
	1.3 Installation Description and Background.....	1-2
	1.4 Report Organization.....	1-4
Section 2	Site Characterization.....	2-1
	2.1 Site Description and Background.....	2-1
	2.1.1 Site Location and History.....	2-1
	2.1.2 Physical and Environmental Setting.....	2-3
	2.1.3 Sensitive Ecosystems.....	2-5
	2.1.4 Current and Future Land Use.....	2-5
	2.2 Previous investigations.....	2-6
	2.2.1 Modified Comprehensive Site Evaluation Phase I.....	2-6
	2.2.2 Comprehensive Site Evaluation Phase II.....	2-6
	2.3 Source, Nature, and Extent of Contamination.....	2-8
	2.4 Streamlined Risk Evaluation.....	2-11
	2.4.1 Conceptual Site Model.....	2-11
	2.4.2 Human Health Risk Screening.....	2-14
Section 3	Development of Removal Action Objectives.....	3-1
	3.1 Justification for the proposed removal action.....	3-1
	3.2 Applicable or relevant and appropriate requirements.....	3-1
	3.2.1 Chemical-Specific ARARs.....	3-2
	3.2.2 Location-Specific ARARs.....	3-3
	3.2.3 Action-Specific ARARs.....	3-3
	3.3 Removal Action Objectives.....	3-4
Section 4	Development of Removal Action Alternatives.....	4-1
	4.1 General Response Actions.....	4-1
	4.1.1 No Action.....	4-1
	4.1.2 Land Use Controls.....	4-1
	4.1.3 Removal and Disposal.....	4-2
	4.2 Assembly and Description of Alternatives.....	4-2
	4.2.1 Alternative One: No Action.....	4-2
	4.2.2 Alternative Two: Land Use Controls.....	4-2
	4.2.3 Alternative Three: Excavation with Off-Site Disposal.....	4-3
Section 5	Analysis of Alternatives.....	5-1
	5.1 Evaluation Criteria.....	5-1
	5.2 Individual Analysis of Alternatives.....	5-2
	5.2.1 Alternative 1—No Action.....	5-2
	5.2.2 Alternative 2—Land Use Controls.....	5-2
	5.2.3 Alternative 3—Excavation with Off-Site Disposal.....	5-3
	5.3 Comparative Analysis of Alternatives.....	5-6

5.3.1	Effectiveness	5-6
5.3.2	Implementability	5-7
5.3.3	Cost	5-7
Section 6	Recommended Alternative	6-1
6.1	Removal Action Scope	6-1
6.2	Removal Action Schedule.....	6-1
Section 7	References	7-1

List of Appendices

- Appendix A Removal Action Alternatives Cost Estimates
- Appendix B Affidavits of Publication

List of Tables

Table 2-1	CSE Phase II XRF Lead Results.....	2-9
Table 2-2	CSE Phase II PAH Background Level Comparison.....	2-11
Table 2-3	Screening Level Human Health Risk Evaluation for Surface Soil PAH Exceedances	2-15
Table 2-4	Screening Level Human Health Risk Evaluation for Subsurface Soil PAH Exceedances	2-15
Table 3-1	Potential ARARs and TBCs	3-3
Table 3-2	TS851a Former Skeet Range MRS Cleanup Levels.....	3-5
Table 4-1	Removal Action Alternatives for Evaluation.....	4-3
Table 5-1	Comparative Analysis of Removal Action Alternatives	5-6

List of Figures

Figure 1-1	Holloman AFB Location	1-3
Figure 2-1	Former Skeet Range MRSs.....	2-2
Figure 2-2	CSE Phase II Former Skeet Range Visual Survey Transects Results	2-7
Figure 2-3	Former Skeet Range Lead Sample Results.....	2-10
Figure 2-4	Former Skeet Range PAH Sample Locations.....	2-12
Figure 2-5	Conceptual Site Model for TS851a Former Skeet Range MRS	2-13
Figure 6-1	Proposed Removal Area at TS851a MRS.....	6-2

Acronyms and Abbreviations

°F	degrees Fahrenheit
AAAF	Alamogordo Army Air Field
AAR	After Action Report
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
ARAR	applicable or relevant and appropriate requirement
BCY	bank cubic yards
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
DERP	Defense Environmental Restoration Program
EcoSSL	Ecological Soil Screening Level
EE/CA	Engineering Evaluation/Cost Analysis
FPM	FPM Remediations, Inc.
FS	Feasibility Study
ft	Feet
FW	Fighter Wing
HSTT	High Speed Test Track
MEC	Munitions and Explosives of Concern
MC	Munitions Constituents
mg/kg	milligrams per kilogram
MMRP	Military Munitions Response Program
MRA	munitions response area
MRS	munitions response site
MRSPP	Munitions Response Site Prioritization Protocol
N/A	Not available
NMED	New Mexico Environment Department
NCP	National Oil and Hazardous Substances Contingency Plan
NFA	No Further Action

NTCRA	non-time critical removal action
O&M	operation and maintenance
PAH	Polycyclic Aromatic Hydrocarbon
PP	Proposed Plan
PPE	Personal Protective Equipment
ppm	parts per million
PRSC	post-removal site control
RACER	Remedial Action Cost Engineering and Requirements
RAO	Removal Action Objective
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
RSL	Regional Screening Level
SSL	Soil Screening Level
TBC	to be considered
TDS	Total dissolved solids
U.S.C.	United States Code
USAF	United States Air Force
USEPA	United States Environmental Protection Agency
WSMR	White Sands Missile Range
WWII	World War II
XRF	X-ray fluorescence

This Engineering Evaluation/Cost Analysis (EE/CA) is being performed in support of the United States Air Force (USAF) Military Munitions Response Program (MMRP) at Holloman Air Force Base (AFB) near Alamogordo, New Mexico. The goal of the USAF MMRP is to make Munitions Response Areas (MRAs) and Munitions Response Sites (MRSs) safe for reuse and to protect human health and the environment in the process. This document was prepared in accordance with requirements under the National Oil and Hazardous Substances Contingency Plan (NCP), Code of Federal Regulations (CFR), Title 40, Part 300.415.

1.1 AUTHORITY

The MMRP was created by Congress in 2001 under the Defense Environmental Restoration Program (DERP) as established by Section 211 of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and is codified in Sections 2701-2710 of Title 10 of the United States Code (U.S.C.). This EE/CA is being completed in accordance with the USAF MMRP cleanup process that follows the requirements of the NCP as promulgated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by SARA. This EE/CA is being completed by the FPM Remediations, Inc. (FPM) Team, under FPM's Air Force Civil Engineering Center (AFCEC) Contract FA8903-13-C-0008, to support the USAF MMRP.

The USAF is the lead agency for this EE/CA. Participation of and cooperation with federal, state, and local authorities and the local public will be solicited for the duration of proposed activities and for all environmental restoration activities at Holloman AFB. Participation by these entities is required for the environmental restoration process and aids in ensuring the protection of human health and the environment. Federal, state, and local authorities will have input into the actions implemented at Holloman AFB through planning meetings, plan review, and the public comment process. Federal, state, and local authorities concerns will be solicited and provisions of federal, state, and local regulations will be given full consideration for all actions taken at Holloman AFB.

1.2 PURPOSE AND SCOPE

The purpose of this EE/CA is to evaluate alternatives and associated costs to mitigate hazards to human health and the environment associated with polycyclic aromatic hydrocarbon (PAHs)-impacted soils present within the TS851a Former Skeet Range MRS to support a non-time critical removal action (NTCRA). The Comprehensive Site Evaluation (CSE) Phase II analytical laboratory results indicate that concentrations of PAH compounds in soil exceed United States Environmental Protection Agency (USEPA) residential Regional Screening Levels (RSLs) and New Mexico Environment Department (NMED) soil screening levels (SSLs) for at least one of the following analytes: (benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoroanthene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene) in nine (9) of the 28 samples collected during the investigation.

1.3 INSTALLATION DESCRIPTION AND BACKGROUND

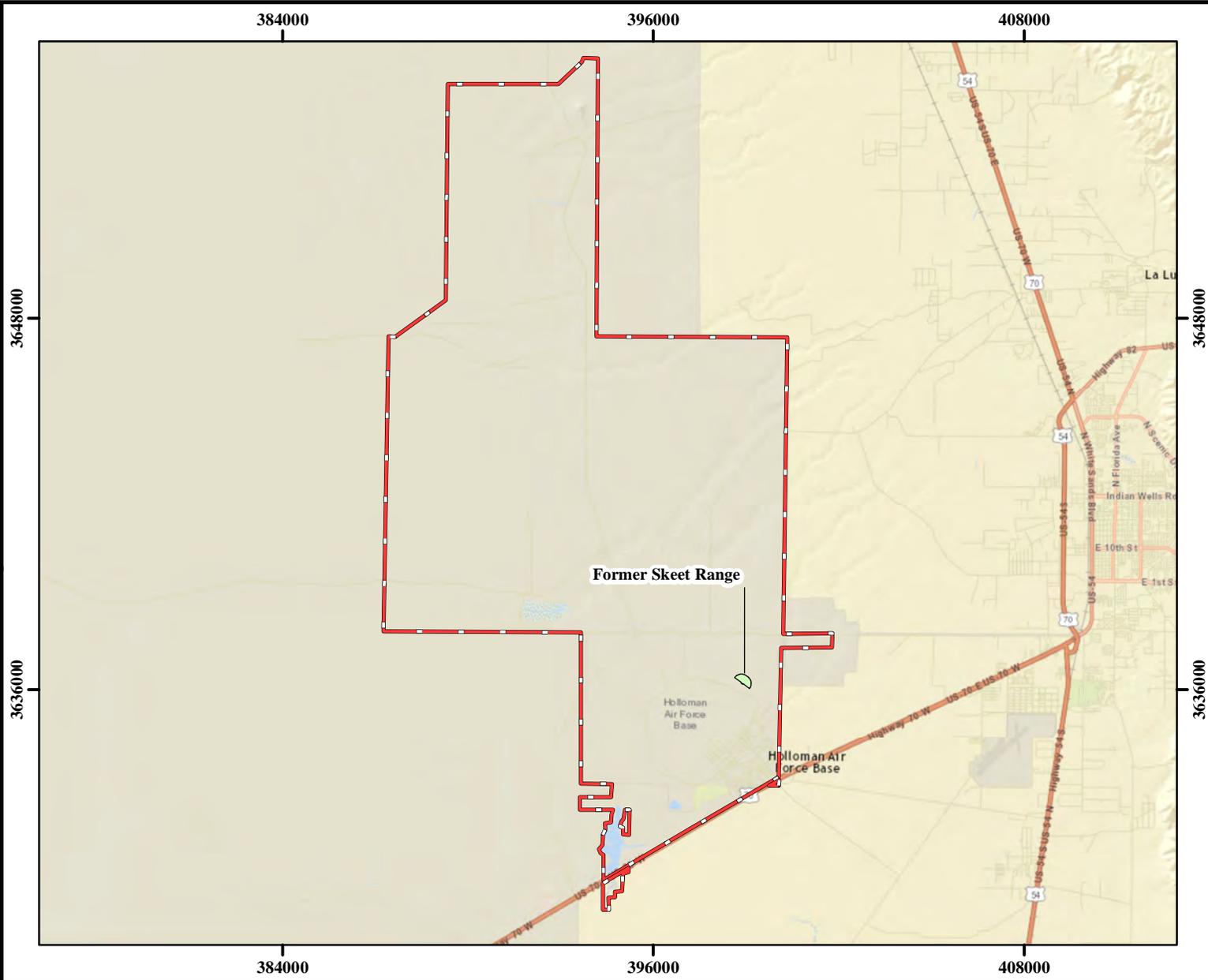
Holloman AFB is located in south-central New Mexico, seven miles west of the city of Alamogordo in Otero County. It is adjacent to the White Sands Missile Range (WSMR). A portion of the Base to the south is bordered by Route 70, which also runs roughly north-south and parallel to the eastern boundary of the Base. Holloman AFB occupies approximately 50,763 acres of land. It is contiguous to the much larger (2.2 million acre) WSMR, and located to the southeast of WSMR. The southern portion of Holloman AFB contains the flight line, composed of a series of runways running north-south, east-west, and northeast southwest. The Main Base is located at the southeast corner of the installation, where Route 70 borders the site. The Main Base contains housing and administrative buildings. The West Area and the North Area refer to the improved areas around the original airfield (southeastern triangle formed by the runways). High Speed Test Track (HSTT) runs north-south and is located northwest of the airfield. The track is the world's longest of its kind at 9.5 miles and has been used for an array of missile testing for decades and is still in use today. Access to Holloman AFB requires admittance through the security gate and there is a fence around the installation. (USACE, 2013). Holloman AFB and the Former Skeet Range MRA (MRA 851) locations are shown in **Figure 1-1**.

Holloman AFB was established nine months after the U.S. first entered World War II (WWII) and was an integral facility in the beginning stages of the U.S. space program during the Cold War. On 6 February 1942, construction began on an extensive bombing and gunnery range later known as the Alamogordo Bombing and Gunnery Range. On 10 August 1942, the Alamogordo Army Air Field (AAAF) was officially established. The facility was initially intended to be used by Great Britain as part of their WWII British Training Program for bomber crews, so the Base was designed after Royal Air Force bases (USACE, 2013).

The first atomic bomb was detonated on 16 July 1945 at the Trinity Site in the northwest corner of the Alamogordo Bombing and Gunnery Range (now the WSMR). In 1946, as more lands became available within the Tularosa Basin, the AAAF was reassigned to be a missile development facility. With the creation of the USAF as a separate service, the facility came under the direction of the Air Materiel Command, which decided that the facility would be used to conduct guided missile programs. On 13 January 1948, the Base was renamed Holloman AFB, after Col. George V. Holloman, an early pioneer in guided missile development (USACE, 2013).

To support the Holloman mission of developing guided missiles, the Army Ordnance Corps built White Sands Proving Grounds. The combined area of the White Sands Proving Grounds and Alamogordo Bombing Range was 100 miles long and 40 miles wide, and on 1 September 1952, the two ranges were combined to form the Integrated White Sands Range. From 1952 to 1970, missile development and testing at White Sands included the Snark, Matador, Mace, Falcon, Aerobee, JB-2 Loon, and Firebee missiles. High speed sled tests, high altitude balloon projects, and Aeromedical Field Laboratory experiments were also conducted. Testing activities included the Central Inertial Guidance Test Facility and the Radar Target Scatter Test Facility (USACE, 2013).

Path: Y:\GIS_Projects\Holloman_AFB\Projects\EE_CA\TS851A\Fig_1_1_Site_TS851A_Loc.mxd



- Legend**
- MRA 851
 - Installation Boundary

Performance Based Remediation
 New Mexico-Arizona
 Holloman Air Force Base
 Alamogordo, NM
 AFCEC

FIGURE 1-1

Holloman AFB

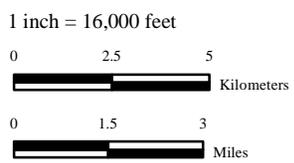


2014

NOTES:
 Revision Date: 9/16/2014

Coordinate System: NAD 1983 UTM Zone 13N
 Projection: Transverse Mercator
 False Easting: 500,000.0000
 Central Meridian: -105.0000
 Latitude Of Origin: 0.0000

Horizontal Datum: North American 1983
 False Northing: 0.0000
 Scale Factor: 0.9996
 Units: Meter



In 1972, the Base was taken over by Tactical Air Command and became primarily a fighter base with some continued developmental testing. On 15 November 1991, command responsibility passed to the 49th Fighter Wing (FW) from the 833rd Air Division. With the 49th Fighter Wing now supporting multiple unique missions, it was announced in early 2010 that the wing's name would change to the 49th Wing to more accurately portray the diverse wing. Today, the 49th Wing provides leadership to the installation. The HSTT and the Primate Research Lab, two projects begun during the Cold War era, continue on the Base to this day (USACE, 2013).

The current mission of Holloman AFB is to provide mission-ready forces and equipment to meet worldwide needs. The 49th Wing supports national security objectives with mission-ready F-22A aircraft. The 49th Wing mobilizes and deploys worldwide to rapidly meet peacetime and wartime needs, and it also provides training and fighter weapons instructor courses for German Air Force aircrews. The 49th Wing is designated as a support unit for space shuttle launches (USACE, 2013)

1.4 REPORT ORGANIZATION

This EE/CA is organized into the following seven sections:

- **Section 1 – Introduction.** Introduces the project authority, purpose, and scope. The Holloman AFB location and operational history are described herein.
- **Section 2 – MRS Characterization.** Presents MRS description and background information; previous investigations; the source, nature, and extent of contamination; and a streamlined risk evaluation for the TS851a Former Skeet Range MRS.
- **Section 3 – Development of Removal Action Objectives.** States the justification for the proposed removal action; chemical-specific, location-specific, and action-specific applicable or relevant and appropriate requirements (ARAR); and the removal action objectives (RAOs) for the TS851a Former Skeet Range MRS.
- **Section 4 – Development of Removal Action Alternatives.** Details the development of the removal action alternatives.
- **Section 5 – Analysis of Alternatives.** Presents and compares the effectiveness, implementability, and cost of each identified alternative.
- **Section 6 – Recommended Alternative.** Documents the recommended alternative for the removal action at the TS851a Former Skeet Range MRS.
- **Section 7 – References.** Provides references used to develop this document.
- **Appendix A – Removal Action Alternatives Cost Estimates**
- **Appendix B – Affidavits of Publication**

The following subsections present the MRS description, background information; previous investigations; the source, nature, and extent of contamination; and a streamlined risk evaluation for the TS851a Former Skeet Range MRS.

2.1 SITE DESCRIPTION AND BACKGROUND

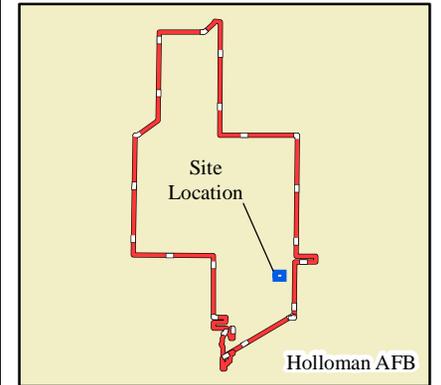
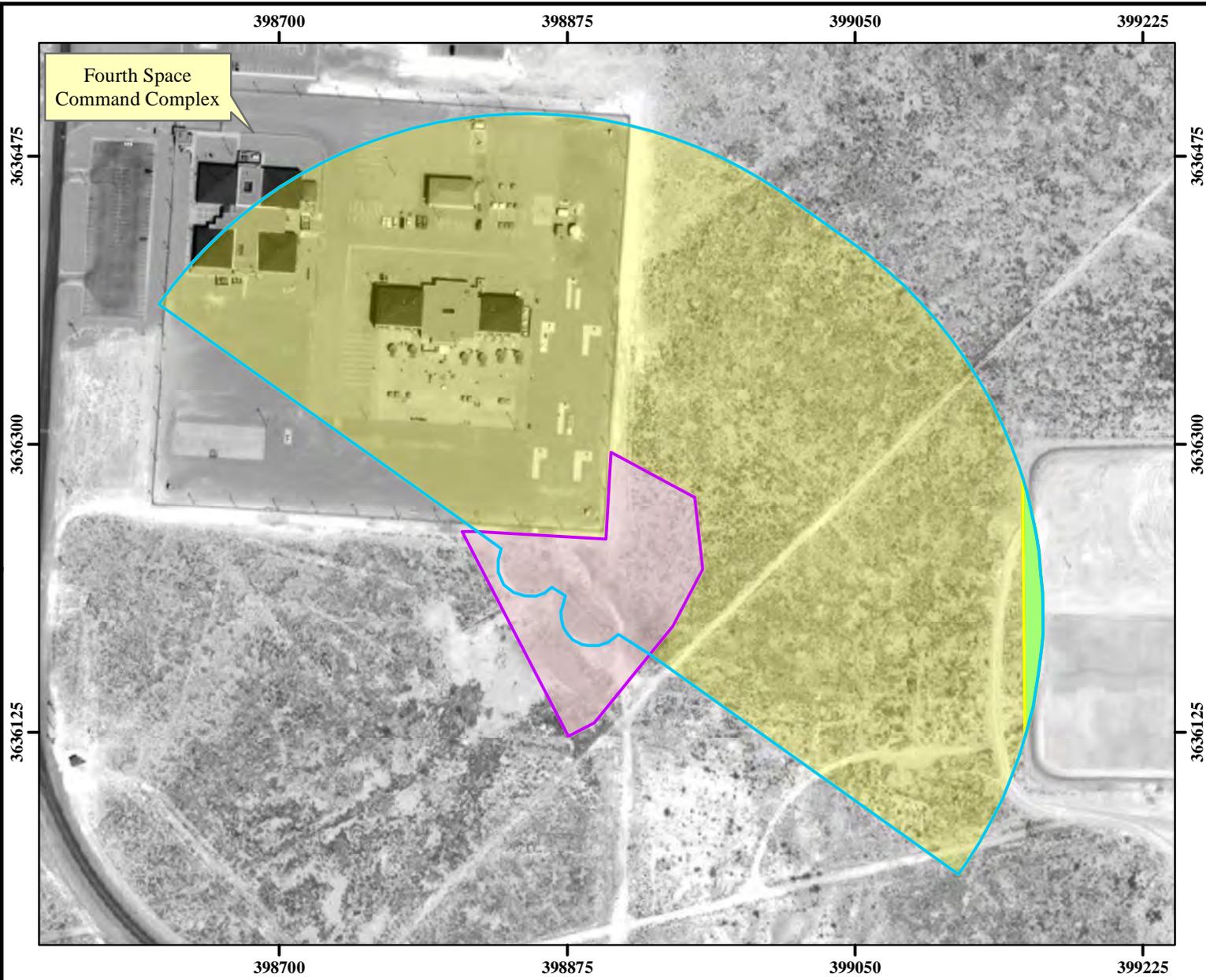
2.1.1 Site Location and History

The Former Skeet Range MRA (MRA 851) (comprised of the TS851, TS851a, and TS851b MRSs) consists of 33.9 acres, and is located in the southeastern portion of Holloman AFB. Based on the Modified CSE Phase I report, the outline of what appeared to be a two-position skeet range was visible at this location in an historical US Army Corps of Engineers aerial photograph from 1972. The skeet range was used for small arms training and practice with moving targets, and the firing direction of the range appeared to be oriented to the northeast. Typically, skeet ranges were used for training and/or recreational target shooting. Information collected during the Modified CSE Phase I indicated that there is no potential for munitions impacts from the Former Skeet Range to be located beyond the installation boundary, due in part because the area lies completely within the boundary of Holloman AFB. No further documentation has been found regarding the history of munitions-related activities in the Former Skeet Range MRA.

During the CSE Phase II visual reconnaissance surveys, small arms debris associated with 12-gauge shotgun, 9mm, .38-caliber, and .45-caliber weapons were observed. Small arms debris associated with 9mm, .38-caliber, and .45-caliber are not typical to skeet range activity. Areas with dense clay target debris were also documented within the typical target fall-out zone for the skeet range. Based on a review of the Final Modified CSE Phase I and CSE Phase II reports, lead shot was observed on the ground surface during the visual survey for the Modified CSE Phase I, and the highest concentration was noted within 500 feet (ft) of the firing points. There was no indication that Munitions and Explosives of Concern (MEC) larger than small arms were present, and the CSE Phase II X-ray fluorescence (XRF) results for lead in the soil were all <400 milligram per kilogram (mg/kg). During the active time period for the MRA, clay targets contained various PAH compounds. It was found during the CSE Phase II that the PAH concentrations in soils exceeded USEPA RSLs in nine of the 28 samples.

Based on the CSE Phase II findings, it was recommended that the Former Skeet Range MRA be split into three MRSs (**Figure 2-1**). TS851 Former Skeet Range MRS (30.5 acres) was recommended for no further action (NFA) due to the lack of MEC and munitions constituents (MC) exceeding USEPA RSLs. TS851a Former Skeet Range MRS (3.1 acres) was recommended for further munitions response action based on elevated PAH concentrations and visual confirmation of clay target debris. The MRA boundary was also slightly extended to the southwest due to identified PAH contamination beyond the originally identified MRA boundary. This additional acreage is accounted for in the TS851a MRS. TS851b Former Skeet Range MRS (0.3 acres) was not accessed during the CSE Phase II since the site was occupied by a contaminated soil remediation area and recommended to be administratively closed out of the MMRP. **Based on the CSE Phase II results, this EE/CA addresses the TS851a Former Skeet Range MRS only and not the TS851 or TS851b MRSs.**

Path: Y:\GIS_Projects\Holloman_AFB\Projects\EE_CA\TS851A\Fig_2_1_TS851A_FSR_MRS.mxd



- Legend**
- Former Skeet Range (TS851)
 - Former Skeet Range (TS851a) - EE/CA
 - Former Skeet Range (TS851b)
 - Former Skeet Range (MRA 851)
 - Installation Boundary

Performance Based Remediation
 New Mexico-Arizona
 Holloman Air Force Base
 Alamogordo, NM
 AFCEC

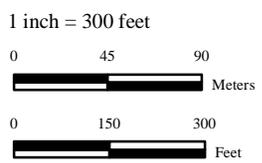
FIGURE 2-1

Former Skeet Range MRSs

- NOTES:**
1. Boundary based on CSE Phase II findings.
 2. Revision Date: 9/16/2014

Coordinate System: NAD 1983 UTM Zone 13N
 Projection: Transverse Mercator
 False Easting: 500,000.0000
 Central Meridian: -105.0000
 Latitude Of Origin: 0.0000

Horizontal Datum: North American 1983
 False Northing: 0.0000
 Scale Factor: 0.9996
 Units: Meter



2.1.2 Physical and Environmental Setting

Structures and Access Control

Although, there are no structures within the TS851a Former Skeet Range MRS, the Fourth Space Command Complex is adjacent to the MRS and contains multiple buildings. Due to the high security of the neighboring Fourth Space Command Complex, authorization to work in the surrounding areas requires coordination with security forces and the Fourth Space Command Complex security (USACE, 2010).

There is no fencing or other access control to the MRS, but access to Holloman AFB requires admittance through the security gate and there is a fence around the entire installation. Therefore, access to the TS851a Former Skeet Range MRS is restricted to the general public, but is open to personnel, contractors, and residents. Trespasser access is unlikely due to the security for the Fourth Space Command Complex (USACE, 2010).

Climate

Holloman AFB is located in a semi-arid region within the northern Chihuahuan Desert. The climate is similar to other semi-arid regions with warm to hot summer days, cool nights, and mild winters. Monthly mean high temperatures range from 55 degrees Fahrenheit (°F) in January to 93.6°F in August. Monthly mean low temperatures range from 29°F in January to 66°F in July. Evapotranspiration is usually high due to dry air, large daily solar radiation totals, seasonally high winds, and warm temperatures. Prevailing wind directions lead to seasonal fluctuations in precipitation, and can result in frontal storms from the north, the Pacific, or Caribbean cyclonic systems. Holloman AFB receives an average annual rainfall of 13.20 inches (in.), and approximately half of this falls during the summer monsoons between the months of July and September. These monsoon thunderstorms are usually short and intense, and occurrences are highly variable from year to year. One or two short-term events may account for a large percentage of the net annual precipitation. Average annual snowfall is approximately 4.5 inches (HGL, 2007).

Topography

Holloman AFB lies within the Tularosa basin of south-central New Mexico. The basin is considered a closed basin, because no surface water can run from it. This area is part of the Mexican Highland section of the Basin and is characterized by fault block mountains interspersed with low desert plains and basins. The Base lies on relatively flat alluvial plains below the Sacramento Mountains. The White Sands dune field borders the plain on the west. Elevations range from 4,000 to 4,250 feet (ft.) above mean sea level (msl) (USACE, 2013).

The location of the TS851a Former Skeet Range MRS exhibits relatively flat topography (USACE, 2010).

Soil and Vegetation Types

The United States Department of Agriculture Soil Conservation Service identified three primary soil types associated with Holloman AFB and several associations and complexes of Holloman, Gypsum Land, and Yesum soils, located in the flats; Dune Land, found in the White Sands dunes; and Mead silty clay loam soil, found in the alluvial floodplains (HGL, 2007). The soils at the Former Skeet Range (TS851a MRS) consist of the Alamogordo-Nasa-Corvus complex. None of the soil types are very productive, due to high gypsum and salt content, and all are highly susceptible to both wind and water erosion when the vegetation is sparse or the soil is exposed (USACE, 2013).

The vegetation at Holloman AFB is consistent with that of the Tularosa Basin and includes mesquite, creosote bush, and grasses. Succulents such as cactus, agave, and yucca are also present. There are sensitive species that currently receive no federal protection and include: lichen (*A. clauzadeana*), proposed for rare and endangered listing and the grama grass cactus, included due to its former candidate status (USACE, 2013). The TS851a Former Skeet Range MRS is open space consisting of desert scrubland and dirt roads.

Geology and Hydrogeology

Holloman AFB is located in the Tularosa Basin, a downfaulted, closed, intermountain basin associated with the southern portion of the Rio Grande Rift. The Sacramento Mountains to the east, San Andres Mountains, and the White Sands National Monument to the west are the prominent features. The Tularosa Basin is thought to have formed approximately 35 million years ago as a result of faulting, with the most recent formational activity having occurred as recently as 10,000 years ago. Erosion of the uplifted material and fluvial deposits from the Rio Grande River resulted in the fill found in the Tularosa Basin, and consist of coarse- to fine-grained alluvial fan deposits along the rims of the basin that gradually become finer-grained alluvial, fluvial, and lacustrine deposits in the basin interior. Extensive evaporate deposits within the interior basin, such as selenite, are also present (USACE, 2013).

Streams that are sustained by groundwater which discharge within the basin include Salt Creek and Malpais Spring. It is estimated that the groundwater resources of the Tularosa Basin contain over 100 million-acre feet of brackish groundwater. A wide range of water chemistries including sodium chloride, carbonate, and sulfate-based brine waters exist in the basin and water with salinity from 1,000 parts per million (ppm) Total Dissolved Solids (TDS), approximately equal to fresh water, to over 20,000 ppm TDS, approximate to sea water, can be found within the basin. The predominance of groundwater occurs as an unconfined aquifer in the unconsolidated deposits of the central basin. The primary source of groundwater recharge is percolation of rainwater and a minor contribution from stream run-off along the western edge of the Sacramento Mountains (USACE, 2013).

Depth to groundwater in the area ranges from 5 ft. to 50 ft. below ground surface (bgs). Groundwater flow is generally toward the southwest with localized influences from the variations in base topography with shallower groundwater found on the southern end of the Base (USACE, 2013).

Hydrology

The only permanent water in the Tularosa Basin is found in small streams between Alamogordo and Three Rivers, New Mexico. There are no perennial streams within Holloman AFB or in the nearby surrounding landscape; however, a set of perennial pools exist within the Base. They are the final one-third of the Lost River, a set of pools near the confluence of Ritas and Malone Draws, and the Salt Lakes just south of the Lost River and Camera Pad Road Pond. There are at least nine prominent east-west drainages that receive flows during seasonal thunderstorms. The largest of these drainages is the Lost River drainage system, including Malone Draw, Carter Draw, and Ritas Draw. Construction activities have disrupted the natural flow of this wetland ecosystem (USACE, 2013).

There are no wetlands or any other surface water features within the TS851a Former Skeet Range MRS (USACE, 2010).

2.1.3 Sensitive Ecosystems

No federally listed species covered under the Endangered Species Act resided at Holloman AFB. Several federally listed species, however, have been observed at the Base in the past. Mountain plover (proposed federally threatened) nested at Lake Holloman during the 1980s. Brown pelicans (federally endangered) are occasionally observed at Lake Holloman and associated constructed wetlands. Peregrine falcons (recently delisted) regularly forage at Lake Holloman. Five other sensitive species currently receive no federal protection: a lichen (*A. clauzadeana*), proposed for rare and endangered listing; the grama grass cactus, included due to its former candidate status; the White Sands pupfish, a state-endangered species; the western burrowing owl, a species of concern; and the western snowy plover, also a species of concern.

According to the 2011 Integrated Natural Resource Management Plan, White Sands Pupfish (*Cyprinodon tularosa*) habitat exists at Holloman AFB. This species is considered a Federal Species of Concern (formerly a Federal Category 2 species) and is listed by the State of New Mexico as 'threatened'. The species is managed under the jurisdiction of the New Mexico Department of Game and Fish. There is no potential White Sands Pupfish habitat areas associated with the TS851a Former Skeet Range MRS (USACE, 2013). The MRS does not support suitable habitat for ecologically sensitive species and there are no known ecologically sensitive areas identified within the MRS.

2.1.4 Current and Future Land Use

As previously mentioned the Fourth Space Command Complex is located to the northwest of the TS851a Former Skeet Range MRS, is covered entirely by buildings or pavement, and is encompassed by fencing. The TS851a Former Skeet Range MRS is open space consisting of desert scrubland and dirt roads (USACE, 2013). No future land use changes are anticipated.

2.2 PREVIOUS INVESTIGATIONS

Two previous investigations, a Modified CSE Phase I Report (USACE, 2010) and a MMRP CSE Phase II (USACE, 2013), have been completed at the former Skeet Range MRA (MRA 851) (and subsequently the TS851a Former Skeet Range MRS).

2.2.1 Modified Comprehensive Site Evaluation Phase I

In support of the MMRP at Holloman AFB, the CSE Phase I was performed to characterize the site; evaluate actual or potential release(s) of hazardous substance(s), pollutant(s), or contaminant(s) to migration/exposure pathways (groundwater, soil, and air) from MRAs; and evaluate associated targets of concern. The Modified CSE Phase I accumulated and evaluated information on Holloman AFB relating to the possible presence of MEC, site physical conditions, and current and future land uses and activities. Information sources included archival records from Holloman AFB, interviews with Holloman AFB personnel, additional archival information collected from public sources, and observations made during the visual surveys. This information was reviewed and used to evaluate the extent of MEC and/or potential for MC exposure at the site.

The Former Skeet Range MRA (MRA 851) was identified using an aerial photograph from 1972, and a visual survey revealed lead shot from small arms, clay target debris typical to the time period, and the remains of at least one firing point. Based on the Phase I findings, a CSE Phase II was recommended (USACE, 2010).

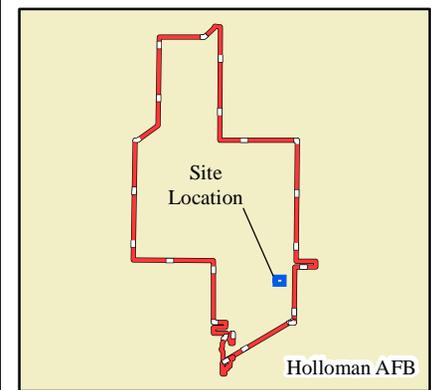
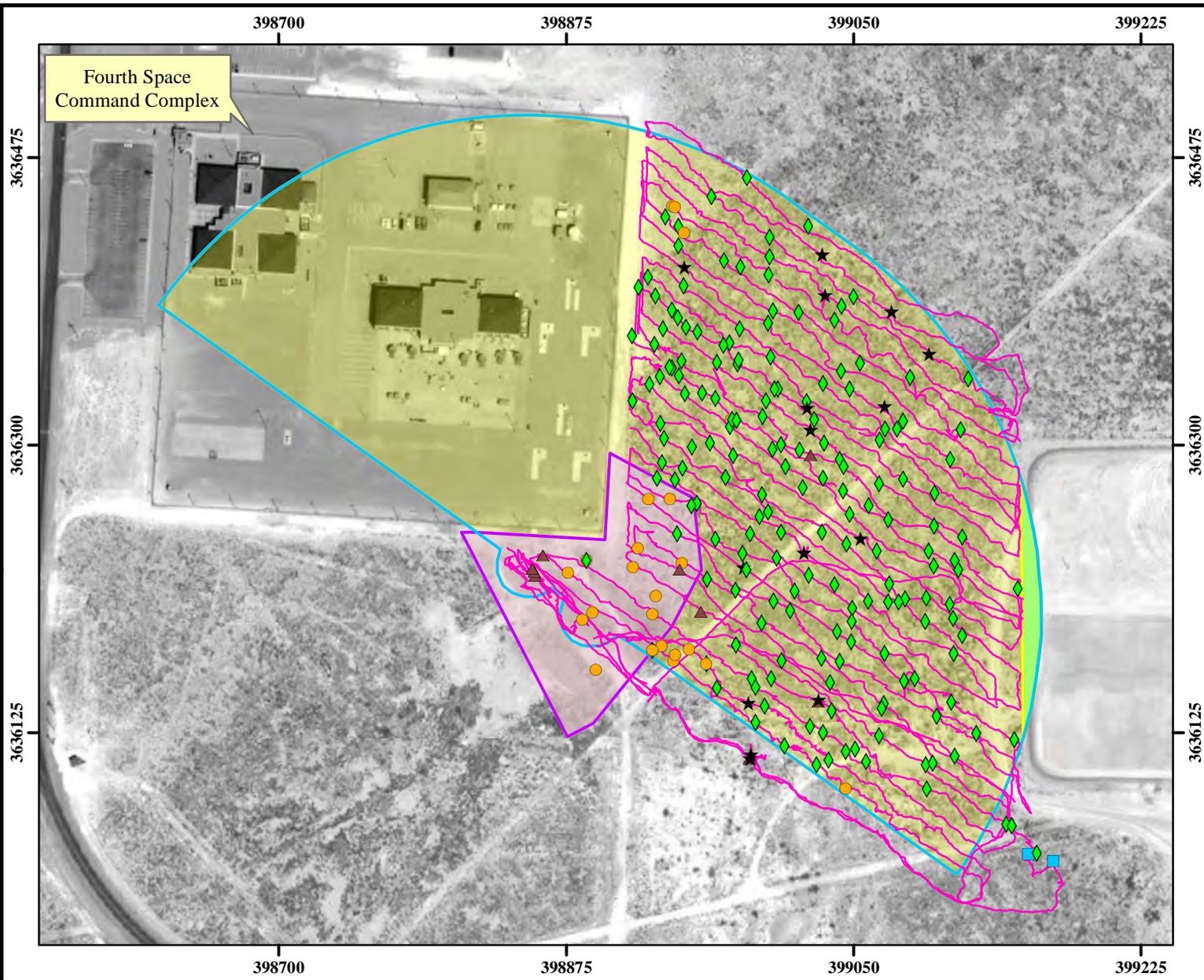
2.2.2 Comprehensive Site Evaluation Phase II

The CSE Phase II (USACE, 2013) activities compiled and evaluated information on Holloman AFB relating to the possible presence of MEC and associated soil contamination from MC. The CSE Phase II field investigation occurred from October 2011 to March 2012. During the field investigation visual survey transects were completed at the Former Skeet Range MRA as shown in **Figure 2-2**. The northwestern portion of the MRA was not surveyed due to the Fourth Space Command Complex which is entirely paved and fenced-in. A controlled 30-foot buffer zone was maintained around the fenced area. Additionally, a small portion of the MRA on the eastern range fan was not surveyed due to a fenced petroleum contaminated soil remediation area (USACE, 2013).

Clay target debris was observed within 300 feet of the historical firing points. Two firing points were still discernible; however, all other range infrastructure has been removed. Lead shot was also observed within the area (USACE, 2013). The lead shot and clay target debris observed are consistent with historical skeet range usage. In addition to the aforementioned debris, pistol bullets of 9mm, .38, and .45 calibers were also documented, these are not typically associated with skeet range activities. It was determined that the total area impacted by clay target debris was approximately 3.1 acres.

Surface and subsurface soil sampling was also performed to evaluate potentially impacted environmental media from range related MC. The CSE Phase II Report recommended splitting

Path: Y:\GIS_Projects\Holloman_AFB\Projects\EE_CA\TS851A\Fig_2_TS851A_FSR_CSE_Phase_II.mxd



Legend

- ▲ Casing/Blank/Shotgun Wad
- Munitions Debris
- Clay Target Debris
- ◆ Lead Shot
- ★ 9 mm, .38 cal, .45 cal Projectile
- Visual Survey Transects
- Former Skeet Range (TS851)
- Former Skeet Range (TS851a) - EE/CA
- Former Skeet Range (TS851b)
- Former Skeet Range (MRA 851)
- Installation Boundary

Performance Based Remediation
 New Mexico-Arizona
 Holloman Air Force Base
 Alamogordo, NM
 AFCEC

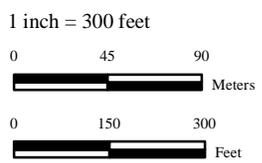
FIGURE 2-2

CSE Phase II Former Skeet Range
 Visual Survey Transects Results

NOTES:
 1. Boundary based on CSE Phase II findings.
 2. Revision Date: 9/16/2014

Coordinate System: NAD 1983 UTM Zone 13N
 Projection: Transverse Mercator
 False Easting: 500,000.0000
 Central Meridian: -105.0000
 Latitude Of Origin: 0.0000

Horizontal Datum: North American 1983
 False Northing: 0.0000
 Scale Factor: 0.9996
 Units: Meter



the MRA into the three following MRSs which were scored individually utilizing the Munitions Response Site Prioritization Protocol (MRSPP). TS851 MRS (30.5 acres) encompasses the portion of the MRA not impacted by PAH or lead contamination. The TS851 MRS received a Priority of 8 (Priority 1 being the highest potential hazard and Priority 8 being the lowest potential hazard). This MRS was recommended for NFA. The TS851a MRS (3.1 acres), delineated based on the visual extent of clay target debris, is defined as the portion of the MRA impacted by MC impacted soil. **TS851a was given a Priority of 5, and is the only MRS that was recommended for further munitions response action.** TS851b MRS (0.3 acres) was not investigated during the CSE Phase II due to access restrictions and an ongoing petroleum contaminated soil staging area. The TS851b Former Skeet Range MRS was administratively closed out of the USAF MMRP (USACE, 2013).

2.3 SOURCE, NATURE, AND EXTENT OF CONTAMINATION

Land associated with the TS851a Skeet Range MRS was used as a skeet range. During the use of the site, lead shot, small arms bullets and debris, and clay targets (potentially containing PAH compounds) were deposited on the surface of the skeet range. The primary range-related contaminants are considered lead and PAH compounds which may have been released directly to the soil during the initial deposition activity or through weathering. No MEC was discovered and there were no explosive safety concerns identified during previous investigations.

The CSE Phase II field activities included XRF field analysis of surface soil at the entire Former Skeet Range MRA to evaluate and define the nature and extent of any lead contamination. A total of 68 samples were collected and screened. The concentration of lead was significantly below the New Mexico Environment Department (NMED) soil screening level (SSL) of 400 mg/kg and USEPA residential RSL also 400 mg/kg for unrestricted/residential land use in all samples collected. Due to no surface soil lead levels exceeding the human health screening level of 400 mg/kg, no subsurface samples were collected. XRF results ranged from below the limit of detection (12 mg/kg) to a maximum of 154 mg/kg (USACE, 2013).

Surface soil XRF lead results collected during the CSE Phase II activities are summarized in **Table 2-1**. XRF sample locations and results are shown on **Figure 2-3**. Based on the results from the CSE Phase II, lead from small arms ammunition is not considered to pose a risk under any potential land use scenario.

Previous studies report that the upper limit for background lead concentration at Holloman AFB is 10.87 mg/kg, and the statewide background lead concentrations for New Mexico soils ranges from 7.0 to 21 mg/kg. Of the 68 samples analyzed by the XRF screening: 12 samples yielded results below the limit of detection (12 mg/kg); 23 samples yielded results within the state background range, and all other samples (33 samples) yielded results above background screening limits. The highest reported XRF value was 154 mg/kg. All samples analyzed were below the NMED SSL and USEPA RSL of 400 mg/kg (USACE, 2013).

Based on visual locations within the clay target debris area, a total of twenty-eight soil samples were collected for laboratory analysis of PAHs at a fixed-base laboratory. Samples included 20 surface soil, two subsurface soil from the 6-12 inch depth interval, two subsurface soil samples

from the 12-18 inch depth interval, and four background surface soil samples. PAHs in soils exceeded the USEPA human health screening levels for at least one of the following analytes; benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene, in nine of the 28 samples analyzed.

**Table 2-1
CSE Phase II XRF Lead Sampling Results**

Sample ID*	Lead (mg/kg)	Sample ID*	Lead (mg/kg)
C-XR-HL-02-SS-001	32	C-XR-HL-02-SS-035	17
C-XR-HL-02-SS-002	71	C-XR-HL-02-SS-036	15
C-XR-HL-02-SS-003	154	C-XR-HL-02-SS-037	12
C-XR-HL-02-SS-004	22	C-XR-HL-02-SS-038	47
C-XR-HL-02-SS-005	< LOD	C-XR-HL-02-SS-039	19
C-XR-HL-02-SS-006	28	C-XR-HL-02-SS-040	53
C-XR-HL-02-SS-007	< LOD	C-XR-HL-02-SS-041	24
C-XR-HL-02-SS-008	42	C-XR-HL-02-SS-042	55
C-XR-HL-02-SS-009	30	C-XR-HL-02-SS-043	22
C-XR-HL-02-SS-010	13	C-XR-HL-02-SS-044	23
C-XR-HL-02-SS-011	35	C-XR-HL-02-SS-045	37
C-XR-HL-02-SS-012	< LOD	C-XR-HL-02-SS-046	22
C-XR-HL-02-SS-013	14	C-XR-HL-02-SS-047	< LOD
C-XR-HL-02-SS-014	56	C-XR-HL-02-SS-048	12
C-XR-HL-02-SS-015	14	C-XR-HL-02-SS-049	18
C-XR-HL-02-SS-016	14	C-XR-HL-02-SS-050	17
C-XR-HL-02-SS-017	24	C-XR-HL-02-SS-051	16
C-XR-HL-02-SS-018	42	C-XR-HL-02-SS-052	19
C-XR-HL-02-SS-019	15	C-XR-HL-02-SS-053	14
C-XR-HL-02-SS-020	55	C-XR-HL-02-SS-054	26
C-XR-HL-02-SS-021	< LOD	C-XR-HL-02-SS-055	< LOD
C-XR-HL-02-SS-022	21	C-XR-HL-02-SS-056	24
C-XR-HL-02-SS-023	13	C-XR-HL-02-SS-057	13
C-XR-HL-02-SS-024	108	C-XR-HL-02-SS-058	16
C-XR-HL-02-SS-025	56	C-XR-HL-02-SS-059	19
C-XR-HL-02-SS-026	19	C-XR-HL-02-SS-060	< LOD
C-XR-HL-02-SS-027	31	C-XR-HL-02-SS-061	< LOD
C-XR-HL-02-SS-028	26	C-XR-HL-02-SS-062	21
C-XR-HL-02-SS-029	30	C-XR-HL-02-SS-063	18
C-XR-HL-02-SS-030	17	C-XR-HL-02-SS-064	16
C-XR-HL-02-SS-031	52	C-XR-HL-02-SS-065	14
C-XR-HL-02-SS-032	< LOD	C-XR-HL-02-SS-066	< LOD
C-XR-HL-02-SS-033	56	C-XR-HL-02-SS-067	< LOD
C-XR-HL-02-SS-034	30	C-XR-HL-02-SS-068	< LOD

(USACE, 2013)

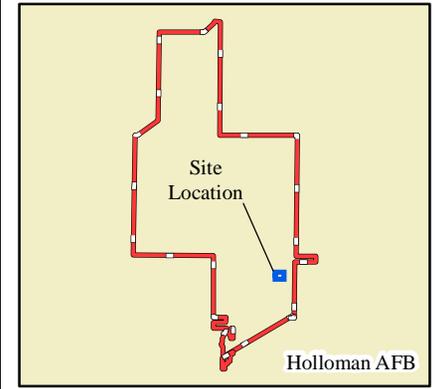
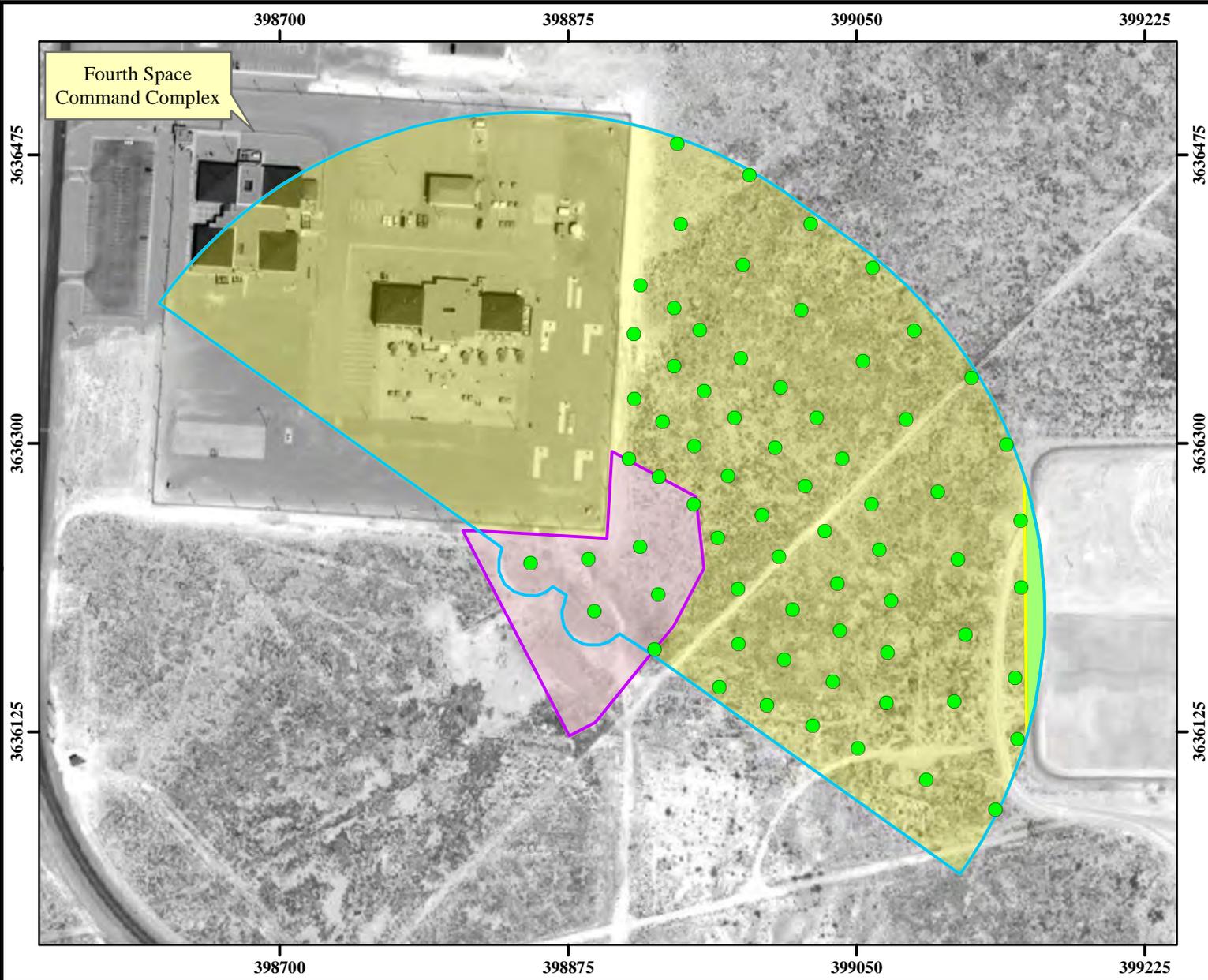
Notes:

< LOD = below limit of detection (12 mg/kg)

mg/kg = milligrams per kilogram

* All samples were collected at the surface interval of 0 - 6 inches

Path: Y:\GIS_Projects\Holloman_AFB\Projects\EE_CA\TS851A\Fig_2_3_TS851A_FSR_Pb_Results.mxd



Legend

- Pb < 400 mg/kg
- Former Skeet Range (TS851)
- Former Skeet Range (TS851a) - EE/CA
- Former Skeet Range (TS851b)
- Former Skeet Range (MRA 851)
- Installation Boundary

Performance Based Remediation
 New Mexico-Arizona
 Holloman Air Force Base
 Alamogordo, NM
 AFCEC

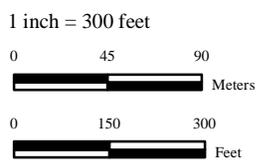
FIGURE 2-3

Former Skeet Range
 Lead Sample Results

- NOTES:**
1. Boundary based on CSE Phase II findings.
 2. Revision Date: 9/16/2014

Coordinate System: NAD 1983 UTM Zone 13N
 Projection: Transverse Mercator
 False Easting: 500,000.0000
 Central Meridian: -105.0000
 Latitude Of Origin: 0.0000

Horizontal Datum: North American 1983
 False Northing: 0.0000
 Scale Factor: 0.9996
 Units: Meter



The PAH sample locations are presented in **Figure 2-4** (USACE, 2013).

The locations where background samples were collected from were similar in soil type and human impact as the Former Skeet Range (with the exception of range related impacts). The maximum background concentrations were initially used to screen the data from the site to assess whether the concentrations were elevated, potentially representing contamination from range related activities. It was determined that PAH concentrations in soil collected from the TS851a Former Skeet Range MRS were higher than the background concentrations for several compounds (USACE, 2013). **Table 2-2** summarizes the PAHs comparison of the background samples to the samples collected at the MRA.

Table 2-2
CSE Phase II PAH Background Level Comparison

PAH	Background Value (mg/kg)	Surface Soil		Subsurface Soil	
		# of Samples above Background ¹	Max Concentration (mg/kg)	# of Samples above Background ¹	Max Concentration (mg/kg)
2-Methylnaphthalene	0.0055	4	0.098	0	Non-detect
Acenaphthene	0.0055	7	0.7	0	Non-detect
Acenaphthylene	0.0055	1	0.014	0	Non-detect
Anthracene	0.0022	10	0.88	0	Non-detect
Benz(a)anthracene	0.0167	9	9.9	0	0.0043
Benzo(a)pyrene	0.0165	10	13	0	0.0086
Benzo(b)fluoranthene	0.0090	11	9.5	0	Non-detect
Benzo(ghi)perylene	0.0149	9	9.8	0	0.014
Benzo(k)fluoranthene	0.0084	9	6.7	0	Non-detect
Chrysene	0.0169	9	6.0	0	0.007
Dibenzo(a,h)anthracene	0.0068	10	2.8	0	Non-detect
Fluoranthene	0.0477	12	7.0	0	0.0047
Fluorene	0.0055	6	0.31	0	Non-detect
Indeno(1,2,3-cd)pyrene	0.0184	10	6.4	0	0.0038
Naphthalene	0.0055	4	0.12	0	Non-detect
Phenanthrene	0.0210	9	3.4	0	Non-detect
Pyrene	0.0322	10	9.5	0	0.0047

(USACE, 2013)

Notes: ¹ Non-detect values assumed to be less than background concentration.

(<0.00125) – less than the largest limit of detection

Surface soil is defined as 0-6 inches bgs and subsurface soil is defined as >6 inches bgs.

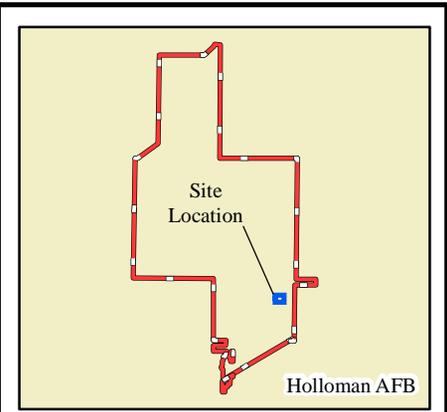
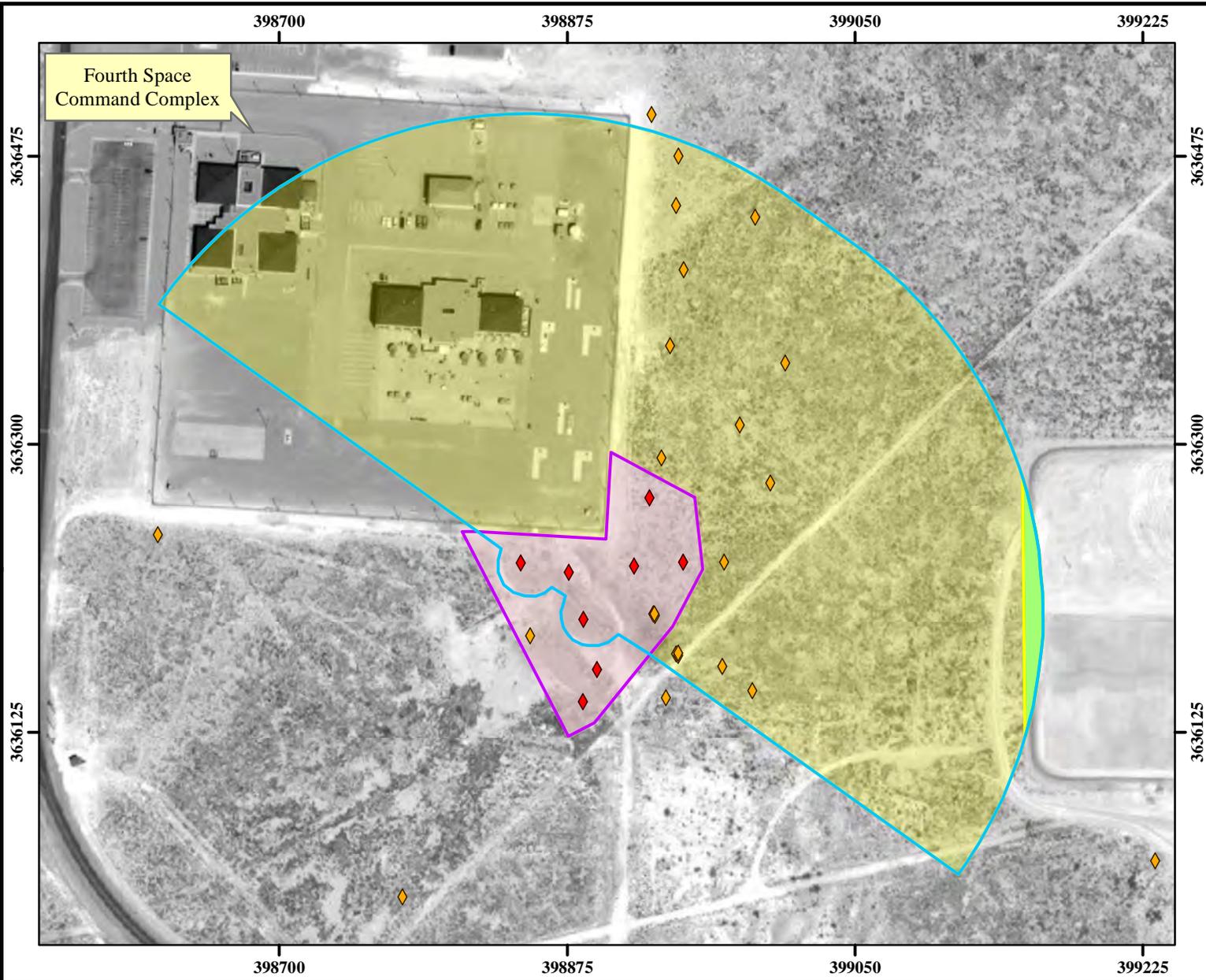
2.4 STREAMLINED RISK EVALUATION

The following subsections summarize the human health and ecological risk evaluation screening applicable to the TS851a Former Skeet Range MRS.

2.4.1 Conceptual Site Model

The Conceptual Site Model (CSM) for exposure to PAHs at the TS851a Former Skeet Range MRS is presented in **Figure 2-5**. The potential for exposure to PAHs results from clay target debris in the surface soil.

Path: Y:\GIS_Projects\Holloman_AFB\Projects\EE_CA\TS851A\Fig_2_4_TS851A_FSR_PAH_Results.mxd



Legend

- ◆ PAH Sample Location Below HHSL
- ◆ PAH Sample Location Above HHSL
- Former Skeet Range (TS851)
- Former Skeet Range (TS851a) - EE/CA
- Former Skeet Range (TS851b)
- Former Skeet Range (MRA 851)
- Installation Boundary

Performance Based Remediation
 New Mexico-Arizona
 Holloman Air Force Base
 Alamogordo, NM
 AFCEC

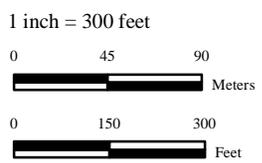
FIGURE 2-4

Former Skeet Range
 PAH Sample Locations

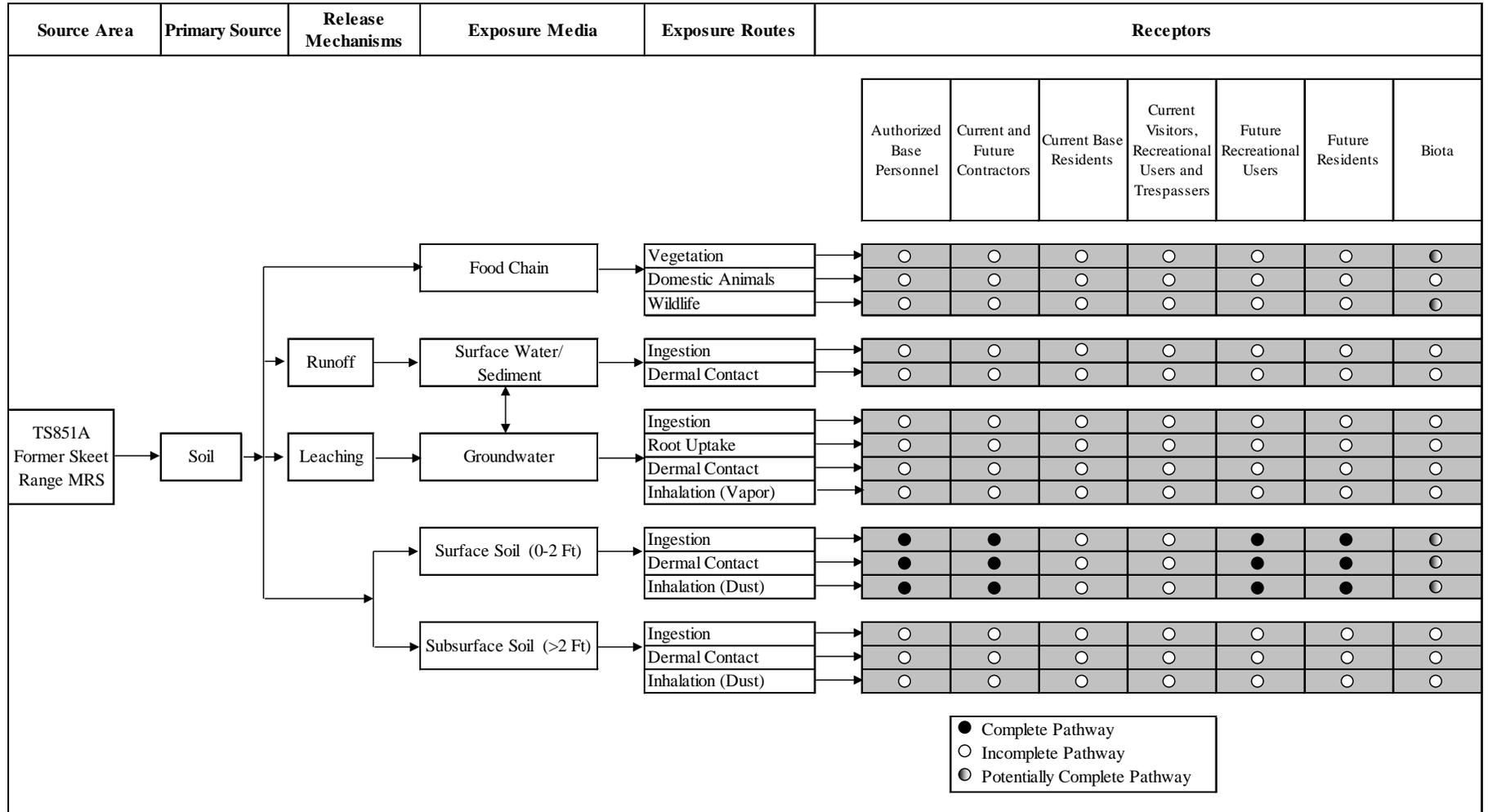
- NOTES:**
1. Boundary based on CSE Phase II findings.
 2. Revision Date: 9/16/2014

Coordinate System: NAD 1983 UTM Zone 13N
 Projection: Transverse Mercator
 False Easting: 500,000.0000
 Central Meridian: -105.0000
 Latitude Of Origin: 0.0000

Horizontal Datum: North American 1983
 False Northing: 0.0000
 Scale Factor: 0.9996
 Units: Meter



**Figure 2-5
Conceptual Site Model for TS851a Former Skeet Range MRS**



Based on the CSE Phase II findings of elevated PAH concentrations in surface soils, complete exposure pathways exist whereby current and future installation personnel, current and future contractors, future recreational users, and future potential residents may be exposed to PAH-impacted surface soil (where present) at the TS851a Former Skeet Range MRS. Current land use is not anticipated to change, however, exposure to future residents was evaluated due to the objective of site closeout and unlimited use/unrestricted exposure. Incomplete pathways are shown for current Base residents and current visitors/trespasser due to restricted access and/or security at the adjacent site (USACE, 2013). To meet the objective of site closeout, USEPA Residential RSLs. Based on the CSE Phase II evaluation of lead, the CSM does not indicate lead pathways. **Only PAH compounds will be addressed as contaminants of concern.**

During the CSE Phase II the ecological risk assessment concluded that for all low molecular weight PAHs no unacceptable risk is present. However, maximum concentrations of high molecular weight PAHs exceeded the Ecological Soil Screening Levels (EcoSSLs) for three of the four receptor categories in the expanded ecological screening. Average concentrations of high molecular weight PAHs exceeded the EcoSSLs for only the most sensitive receptor category. The potential for adverse effects for those exposed to high molecular weight PAHs is possible, though any such risk is likely limited due in part to the fact that PAH sampling was biased toward areas where clay target debris was observed, and thus PAH concentrations were highest (USACE, 2013). Although elevated levels of PAHs were identified in surface soils, the pathway for ecological receptors is considered potentially complete (as shown in **Figure 2-5**) at the TS851a Skeet Range MRS. Habitat constraints also limit the potential for adverse effects. Most of the vegetation at the site is grass typical of semiarid short grass scrubland and as such most biota would not likely find suitable habitat in the grassy areas with limited cover. The pathway for ecological receptors is therefore considered potentially complete for purpose of this EE/CA. Furthermore, the MRS does not support suitable habitat for ecologically sensitive species and there are no known ecologically sensitive areas identified within the MRS. PAH contamination identified at the MRS does not pose a risk to ecological receptors (USACE, 2013).

2.4.2 Human Health Risk Screening

Human health risk screening evaluation assesses the potential of adverse impacts to human health or risks associated with current or future receptor exposures to PAHs in soil at the TS851a Former Skeet Range MRS. Samples within the MRS were compared to human health screening criteria including the NMED SSLs and the USEPA RSLs. Concentrations exceeding both (NMED SSLs and USEPA residential RSLs) were reported in the surface soils collected at the MRS. **Table 2-3** illustrates the surface soil findings, and **Table 2-4** reiterates that detected PAHs in subsurface soils did not exceed either NMED SSLs or USEPA residential RSLs. Lead was not detected at concentrations exceeding human health screening criteria and does not indicate a potential risk to current or future site workers or residents.

Surface water and sediment are not present within the MRS; therefore, risk screening conclusions for surface water or sediment were not considered applicable to the TS851a Skeet Range MRS (USACE, 2013).

Table 2-3
Screening Level Human Health Risk Evaluation for Surface Soil PAH Exceedances

PAH	NMED SSL (µg/kg)	Frequency of Exceedance of NMED SSL ¹	USEPA RSL (µg/kg) ²	Frequency of Exceedance of USEPA RSL	Maximum Detected Concentration (µg/kg)
Benz(a)anthracene	1,480	4 / 28	150	6 / 28	9,900
Benzo(a)pyrene	148	8 / 28	15	9 / 28	13,000
Benzo(b)fluoranthene	1,480	4 / 28	150	8 / 28	9,500
Benzo(k)fluoranthene	14,800	0 / 28	1,500	4 / 28	6,700
Dibenz(a,h)anthracene	148	4 / 28	15	9 / 28	2,800
Indeno(1,2,3-cd)pyrene	1,480	4 / 28	150	7 / 28	6,400

(USACE, 2013)

¹ NMED SSLs obtained from Risk Assessment Guidance for Investigations and Remediation Volume I Feb. 2012 updated June 2012.

² USEPA Residential Soil Screening Levels Regional Screening Level Summary Table January 2015

Table 2-4
Screening Level Human Health Risk Evaluation for Subsurface Soil PAH Exceedances

PAH	NMED SSL (µg/kg)	Frequency of Exceedance of NMED SSL	USEPA RSL (µg/kg)	Frequency of Exceedance of USEPA RSL	Maximum Detected Concentration (µg/kg)
Benzo(a)anthracene	1,480	0 / 4	150	0 / 4	0.0043
Benzo(a)pyrene	148	0 / 4	15	0 / 4	0.0086
Benzo(b)fluoranthene	1,480	0 / 4	150	0 / 4	Non-detect
Benzo(k)fluoranthene	14,800	0 / 4	1,500	0 / 4	Non-detect
Dibenz(a,h)anthracene	148	0 / 4	15	0 / 4	Non-detect
Indeno(1,2,3-cd)pyrene	1,480	0 / 4	150	0 / 4	0.0038

¹ NMED SSLs obtained from Risk Assessment Guidance for Investigations and Remediation Volume I Feb. 2012 updated June 2012.

² USEPA Residential Soil Screening Levels Regional Screening Level Summary Table January 2015

This page is intentionally left blank.

3.1 JUSTIFICATION FOR THE PROPOSED REMOVAL ACTION

The purpose of the NTCRA is to reduce human health risks associated with complete exposure pathways at the MRS. Based on the CSE Phase II sampling and analysis results, surface soils at the TS851a Former Skeet Range MRS are impacted by PAHs above the NMED SSLs and USEPA RSLs. A NTCRA to address PAH-impacted soil is justified 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, animals, or the food chain from hazardous substances or pollutants or contaminants;
- High levels of contaminants (PAHs) in surface soils that have the potential to migrate.

At the TS851a Former Skeet Range MRS, PAHs in surface soils that could also migrate to deeper subsurface soil, air, and/or biota pose potential risk to current and future installation workers, current or future construction workers, and future potential residents (**Figure 2-5**).

3.2 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The ARARs addressing contaminated environmental media are identified in the following subsections. The NCP (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 citing laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site.” Only those promulgated state standards identified by a state in a timely manner that are substantive and equally or more stringent than federal requirements may be applicable. 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 citing 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.” Like “applicable” requirements, the NCP also provides that only those promulgated state requirements identified in a timely manner and are more stringent than corresponding federal requirements may be relevant and appropriate. USEPA identifies three basic types of ARARs. They include chemical-specific, location-specific, and action-specific, as described below:

- Chemical-specific ARARs are based on health- or risk-based concentration limits or discharge limitations in environmental media (i.e., air, soil, or water) for specific hazardous chemicals. These requirements may be used to set cleanup levels for the chemicals of concern in the designated media.
- Action-specific ARARs generally set performance, design, or other similar operational controls or restrictions on particular activities related to management of hazardous substances or pollutants. These requirements address specific activities that are used to

accomplish a remedy. Action-specific requirements do not in themselves determine the remedial action; rather, they indicate how a selected remedial action alternative must be designed, operated, or managed.

- Location-specific ARARs are restrictions placed on the types of activities that may occur in particular locations. The location of a site may be an important characteristic in determining its impact on human health and the environment.

Identification and evaluation of additional ARARs will be an iterative process, which will be performed throughout the life of the project, and particularly when evaluating and recommending an appropriate removal/remedial response.

In addition to ARARs, “to be considered” (TBC) guidance are non-promulgated advisories, proposed rules, criteria, or guidance documents issued by federal or state governments that do not have the status of potential ARARs. This TBC guidance is utilized when determining protective cleanup levels where no ARAR exists, or where ARARs are not sufficiently protective of human health and the environment.

The chemical-specific, location-specific, and action-specific ARARs for this Holloman AFB EE/CA are discussed in the following sections.

3.2.1 Chemical-Specific ARARs

Chemical-specific ARARs are health- or risk-based concentration limits for specific hazardous chemicals that may be used to set cleanup levels for the contaminants in a designated media. Guidance was obtained from the NMED Risk Assessment Guidance for Site Investigations and Remediation Volume I, February 2012 (updated June 2012) (NMED, 2012). Chemical-specific ARAR guidance also includes USEPA RSLs. In addition, a PAH in soil background study from the CSE Phase II is included in the chemical-specific guidance. The USEPA RSLs for PAHs in soil are proposed for the NTCRA, which should facilitate unrestricted use and unlimited exposure of the property (i.e., no land use controls required). The chemical-specific ARARs and TBCs for soil are presented in **Table 3-1**. Final chemical-specific ARARs (statutes and regulations) will be determined in consultation with the USEPA, NMED, and other appropriate federal and state agencies. These agencies are responsible for administration of programs that implement the potential chemical-specific ARARs.

**Table 3-1
Potential ARARs and TBCs**

Law/Regulation	Description	ARAR/TBC Status
Chemical-Specific		
SSLs/NMED (Risk Assessment Guidance for Investigations and Remediation Volume I Feb. 2012 updated June 2012.)	Provides SSLs for chemicals in soil that NMED considers to be below thresholds of concern for risks to human health. Provides maximum contaminant concentrations for specific site uses.	TBC Criteria. Comparison values for soil left in place at the MRS evaluated in this EE/CA.
RSLs/USEPA (Residential Soil Screening Levels Regional Screening Level Summary Table May 2014)	Provides RSLs of chemicals in soil that USEPA considers being protective for humans over a lifetime. Used for soil analytical screening.	ARAR. Applicable to soil left in place at the MRS evaluated in this EE/CA.
Action-Specific		
Solid Waste Disposal Act, as amended by Resource Conservation and Recovery Act of 1976 (42 U.S.C. Sect. 6901-6992K) Standards Applicable to Generators of Hazardous Waste (Subtitle C) (40 CFR Part 262.11)	Establishes standards for generators of hazardous waste. Characterize waste by using prescribed testing methods or applying generator knowledge based on information regarding material. If waste is determined to be hazardous, it must be managed in accordance with appropriate sections of 40 CFR 260-272.	ARAR. Applicable as removal action involves disposal characterization and off-site disposal or treatment of waste.
New Mexico Administrative Code Environmental Protection Statewide Ambient Air Quality Standards (20.2.3.109 – Total Suspended Particulates)	This state regulation addresses the maximum allowable concentrations of total suspended particulate in the ambient air. All activities resulting in the generation of emissions or dust at a site will conform to the regulations of this code.	ARAR. Applicable as the excavation activities for the planned remedial actions will involve particulate dust emissions.

3.2.2 Location-Specific ARARs

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 man-made features such as existing disposal areas and local historic buildings. No location-specific ARARs/TBC guidance was identified. Final location-specific ARARs (statutes and regulations) will be determined in consultation with the USEPA, NMED, and other appropriate federal and/or state agencies. These agencies are responsible for administration of programs that implement the potential location-specific ARARs.

3.2.3 Action-Specific ARARs

Based on the NTCRA alternatives developed to address PAH contamination at the TS851a Former Skeet Range MRS, certain action-specific ARARs will be considered. The action-specific ARARs are presented in **Table 3-1**. At present, New Mexico regulates military munitions through CERCLA. In addition, an NTCRA plan approved by NMED must incorporate all substantive requirements of state law, including public participation and review, compliance with state laws and regulations, and all other technical elements to ensure protection of public health and the environment.

3.3 REMOVAL ACTION OBJECTIVES

Based on the NCP requirements and the applicable ARARs previously discussed, the following RAOs were developed for the NTCRA at the TS851a Former Skeet Range MRS so the MRS can be recommended for site closeout under the USAF MMRP:

- Prevent exposure to PAH concentrations in surface soils above their respective USEPA Residential RSLs in soil.

The USEPA RSLs to obtain unrestricted use and unlimited exposure for the follow-on NTCRA are shown in **Table 3-2** along with NMED SSLs for comparison only.

Table 3-2
TS851a Former Skeet Range MRS Cleanup Levels

Analyte	NMED Residential Soil Screening Levels ¹ (mg/kg)	USEPA Residential Regional Soil Screening Levels ² (mg/kg)
1-methylnaphthalene	N/A	17
2-methylnaphthalene	N/A	23
Acenaphthene	3,440	350
Acenaphthylene	N/A	N/A
Anthracene	17,200	1,700
Benz(a)anthracene	1.48	0.15
Benzo(a)pyrene	0.148	0.015
Benzo(b)fluoranthene	1.48	0.15
Benzo(g,h,i)perylene	N/A	N/A
Benzo(k)fluoranthene	14.8	1.5
Chrysene	148	15
Dibenz(a,h)anthracene	0.148	0.015
Fluoranthene	2,290	230
Fluorene	2,290	230
Indeno(1,2,3-cd)pyrene	1.48	0.15
Naphthalene	43.0	3.8
Phenanthrene	1,830	N/A
Pyrene	1720	170

¹ NMED SSLs obtained from Risk Assessment Guidance for Investigations and Remediation Volume I Feb. 2012 updated June 2012.

² USEPA Residential Soil Screening Levels Regional Screening Level Summary Table January 2015

N/A = Values not found in NMED 2012 or USEPA 2015

mg/kg = milligrams per kilogram

This page is intentionally left blank.

This section presents the removal action alternatives developed from the technologies that are applicable to the conditions and contaminants at the TS851a Former Skeet Range MRS. 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.

Based on the guidelines presented in the Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA (USEPA, 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 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 alternatives.

4.1 GENERAL RESPONSE ACTIONS

This section identifies general response action categories that include no action; land use controls; and removal, treatment, and disposal. Removal action alternatives were developed based on these general response actions. Each general response action is identified along with its advantages and limitations and potential for being retained for further evaluation.

4.1.1 No Action

The no action general response action is included in accordance with the NCP and is used to provide a baseline for alternative comparison. For the no action general response action at the MRS, PAH-contaminated soil would remain in place. The advantages of this alternative include no cost and no implementation. The limitations of this alternative include: the source not being mitigated; the contaminated soil would remain and would require land use controls (e.g., institutional controls and/or engineering controls); and there is no reduction in mobility, toxicity, or volume of chemicals. As required, this response action will be retained for further evaluation.

4.1.2 Land Use Controls

The land use controls general response action utilizes engineering controls (e.g., fencing or signage) and institutional controls (e.g., administrative or legal restrictions) at a site to protect human health and the environment by limiting access and exposure to contaminants. Engineering controls are physical controls put into place at a site to prevent human and ecological exposure to contamination. Institutional controls are legal controls intended to minimize the potential for human exposure to contamination by limiting land use. Land use controls do not address contamination but rather restrict access to and development of the affected area. The advantages of this alternative are that direct exposure through inadvertent site access is reduced, the costs are generally lower than other response actions, and time to implement the action (i.e., response time) is short. The limitations of this alternative include: required five year reviews; the source is not mitigated; there is no reduction in mobility, toxicity, or volume of chemicals; potential exposure through inhalation is not mitigated; and engineering controls would require maintenance costs until the contamination is mitigated. This response action will be retained for further evaluation.

4.1.3 Removal and Disposal

The removal general response action includes removal of contaminated soil (and by default source material consisting of clay target debris) and then backfilling the excavated areas with clean fill compacted to local standards. The advantages of this response action include: contaminated soil is permanently removed; potential exposure through inhalation, ingestion, and dermal contact is mitigated; time to implement the action (i.e., response time) is short; there is a reduction in volume of chemicals at the MRS; and should allow for unrestricted use and unlimited exposure. The disposal portion general response action involves the transfer and discarding of excavated contaminated soils with PAH concentrations greater than specified cleanup levels to an off-site location. This option is paired with the removal general response action.

The limitations of this alternative include: if remediation becomes necessary at the off-site disposal facility, generators could be liable for cleanup of that facility; excavations remain open until material is placed, which creates potential short-term exposure risk via airborne chemicals unless backfilling is performed daily; and the cost can be high.

This combined response action will be retained for further evaluation.

4.2 ASSEMBLY AND DESCRIPTION OF ALTERNATIVES

The three alternatives in this EE/CA were assembled using the general response actions summarized in **Section 4.1**. A description of each alternative is provided below. An overview of each alternative is provided in **Table 4-1**.

4.2.1 Alternative One: No Action

The No Action alternative involves no action to be performed under current or future land use scenarios. This alternative is included in accordance with the NCP and is used to provide a baseline for alternative comparison.

4.2.2 Alternative Two: Land Use Controls

The Land Use Controls alternative includes engineering controls (e.g., fencing and warning signage) and institutional controls (e.g., military orders preventing access to the MRS). A Land Use Controls Plan would be developed to document engineering and institutional controls. The TS851a Former Skeet Range MRS would be either surrounded by fencing to prevent unauthorized access or 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 Holloman AFB transfers the land associated with the TS851a Former Skeet Range MRS, then land use controls including restrictions and a description of contaminated soil present at the MRS would need to be incorporated into any real property documents necessary for transferring ownership from Holloman AFB. A Remedial Investigation (RI)/Feasibility Study (FS) and Proposed Plan (PP)/Record of Decision (ROD) would also be needed to document regulatory approval of Alternative 2.

Table 4-1
Removal Action Alternatives for Evaluation

Removal Action Alternative	Task Activities
1. No Action	None
2. Land Use Controls	<p>Design Tasks</p> <ul style="list-style-type: none"> • Work Plan • Land Use Controls Plan • After Action Report • Remedial Investigation/Feasibility Study Report • Proposed Plan/Record of Decision <p>Field Tasks</p> <ul style="list-style-type: none"> • Install Fencing and Warning Signs • Other Activities <ul style="list-style-type: none"> — Project Management — Preparation of Health & Safety Plan — Preparation of Other Plans — 5-year Reviews
3. Excavation with Off-Site Disposal	<p>Design Tasks</p> <ul style="list-style-type: none"> • Action Memorandum • Removal Action Work Plan • After Action Report • Closure Documentation <p>Field Tasks</p> <ul style="list-style-type: none"> • Excavation, Disposal, and Restoration • Other Activities <ul style="list-style-type: none"> — Project Management — Preparation of Health and Safety Plan — Preparation of Other Plans

4.2.3 Alternative Three: Excavation with Off-Site Disposal

An estimated 5,000 bank cubic yard (BCY) of soil would be excavated from the TS851a - Former Skeet Range MRS and disposed at an approved off-base landfill. A conservative approach was used to estimate removal quantity due to the site not being fully delineated. Soil would initially be excavated by heavy equipment to depths ranging from the surface up to 2 ft bgs within the proposed excavation boundaries. Delineation for PAH soil contamination would be conducted utilizing a fixed-base laboratory and completed prior to the excavation to assist with the lateral and vertical delineation. This work will be described in detail in the NTCRA Work Plan. Post excavation confirmatory soil sampling will be conducted to ensure removal of all contaminated soil. If confirmatory sampling results indicate PAHs concentrations are above the cleanup levels, then additional soil would be excavated before collecting and submitting additional confirmation samples. An After Action Report (AAR) and closure documentation will also be completed to document the removal action detailed in Alternative 3.

This page is intentionally left blank.

In this section of the EE/CA, the three alternatives developed in **Section 4** are individually analyzed and then compared to one another relative to the RAOs. This analysis is performed using the criteria of effectiveness, implementability, and cost outlined in the Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA (USEPA, 1993).

5.1 EVALUATION CRITERIA

The USEPA EE/CA guidance document (USEPA, 1993) recommends identifying and assessing a limited number of alternatives appropriate for addressing the RAOs. The technologies and methods are considered presumptive remedies, have been used before, and are generally accepted in the remediation industry. The analysis is qualitative in nature and is based on three evaluation criteria: effectiveness, implementability, and relative cost.

Effectiveness

In terms of effectiveness, alternatives are evaluated based on the following criteria:

- Protectiveness – Is the alternative protective of human health, and the environment? Does the alternative comply with the ARARs?
- Ability to achieve RAOs – What level of treatment is expected? Are there concerns of residual effects? Will control be maintained until a long-term solution is implemented?

Soil sampling activities conducted during the CSE Phase II show that PAH-impacted soils at the TS851a Former Skeet Range MRS pose potential risks to current and future installation workers, current and future construction workers, and potential future residents. No ecologically sensitive species or ecologically sensitive areas were identified within the MRS; therefore, environmental protectiveness is not considered further.

Implementability

In terms of implementability, alternatives are evaluated based on the following criteria:

- Technical Feasibility (implementation factors, technology maturity, environmental conditions, and post-removal site control [PRSC] measures)
- Administrative Feasibility (permits and waivers)
- Availability of Services and Materials (personnel and technology, off-site disposal, services and materials, and prospective technologies)

Cost

In terms of cost, alternatives are evaluated based on the following criteria:

- Capital Costs
- PRSC Costs
- Present Value

For the purposes of the cost estimate summaries (**Appendix A**), Remedial Action Cost Engineering and Requirements (RACER) was utilized to develop alternative costs. RACER is an environmental remediation/corrective action cost-estimating system developed for Department of Defense cost-estimating use.

5.2 INDIVIDUAL ANALYSIS OF ALTERNATIVES

5.2.1 Alternative 1—No Action

Effectiveness

Alternative 1 does not provide short-term or long-term protection of public health. This alternative would not comply with the ARAR/TBC guidance. Time required to achieve RAOs is indefinite. Risks to current and future receptors would remain indefinitely. The toxicity, mobility, and volume of contamination at the TS851a Former Skeet Range MRS would not be reduced and potential receptor exposure pathways would remain for current and future receptors.

Implementability

This alternative is technically feasible, administratively feasible, and no services or materials are needed for implementation.

Cost

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

5.2.2 Alternative 2—Land Use Controls

Effectiveness

Alternative 2 provides limited short-term and long-term protection of public health. Short-term impacts related to construction activities can be implemented in a way that would minimize environmental impacts and human exposure. This alternative does not reduce or remove the volume of contaminated soil. RAOs would be achieved using land use controls. Risks to current and future receptors would remain indefinitely. Land use controls would limit access to the MRS; however, protection of human health would depend on the reliability of the access controls. If administered properly, ingestion and dermal contact exposure pathways for current and future receptors through unauthorized site 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. The toxicity, mobility, and volume of contamination at the MRS would not be reduced and potential receptor exposure pathways would remain for current and future receptors.

Implementability

This alternative is technically feasible, administratively feasible, and services and materials necessary to implement the land use controls are readily available in the local community. This alternative is considered technically feasible because the action is achievable using readily available construction equipment and accepted methods. Possible constraints to implementing the land use controls would be extreme weather conditions. In the case of extreme weather conditions, the installation of the fence and warning signage would be temporarily postponed. This alternative is considered administratively feasible because there are no foreseeable obstacles to implement land use controls. Installation of fencing around the MRS would require prior approval with Holloman AFB due to the proximity with the Fourth Space Command. All equipment, personnel, and services necessary to implement Alternative 2 are available in the vicinity of Holloman AFB.

Cost

The total estimated cost for Alternative 2 is \$291,932 (**Appendix A**). Alternative 2 includes capital costs for developing and implementing land use controls including institutional restrictions and engineering controls. Engineering controls include installation of fencing and warning signs. Alternative 2 also includes costs for RI/FS and PP/ROD in accordance with USAF's direction on land use control implementation.

For the Alternative 2 cost estimate summary, annual costs over 30 years are estimated at \$9,228 per year for a total of \$276,840 and with a total capital cost of \$15,093. PRSC costs associated with this alternative include annual operation and maintenance for 30 years and periodic costs to perform Five Year Reviews for 30 years.

5.2.3 Alternative 3—Excavation with Off-Site Disposal**Effectiveness**

Alternative 3 provides short-term and long-term protection of human health. This alternative complies with chemical-specific ARAR/TBC guidance. Detailed planning, as described below, is needed to comply with location-specific and action-specific ARAR/TBC guidance. RAOs would be achieved at the conclusion of the excavation and off-site disposal activities. The volume of contamination at the TS851a Former Skeet Range MRS would be reduced. Risks to current and future receptors related to PAH-impacted soils would be reduced to levels considered protective of human health. This alternative is considered to be reliable based on accepted industry standards for similar projects.

Short-term impacts related to construction activities can be implemented in a way that would minimize environmental impacts and human exposure. Worker protection would be provided during implementation of the alternative through strict adherence to a site-specific health and safety plan. An exclusion zone, a decontamination zone, and a staging zone would be established at the MRS to mitigate potential contamination of adjacent areas. The exclusion zone would encompass the contaminated areas and any persons entering this zone would be required to have the appropriate personal protective equipment (PPE). The decontamination

zone would be used to remove contamination from any equipment or PPE before it is cleared to leave the exclusion zone. The staging zone is where all decontaminated equipment would be kept when it is not in use in the exclusion zone.

To meet action-specific ARARs, dust suppression would be accomplished using water application, if necessary, to the ground surface, and real-time dust monitoring. Using real-time dust monitoring instrumentation would detect dust concentrations above the dust action levels. Dust suppression using water 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. Fugitive dust control measures would be implemented at the site during excavation activities to mitigate off-site dust migration onto adjacent properties through light watering of the active excavation area. Factors considered in providing fugitive dust control measures include wind direction and speed monitoring, dust control, and dust suppression.

All excavated soil from the MRS would be transported and disposed of at an approved off-base landfill. Haul trucks would be properly placarded, licensed, and insured, for the transportation of soil. When transporting impacted soil, 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 the vehicle, each vehicle would be inspected prior to departure to ensure that the material is properly contained within the vehicle. This would include inspecting around the end-dump gates, belly-dump openings, and inspecting the tarp or other covering.

Backfill materials used at the TS851a Former Skeet Range MRS would be clean soils obtained from an approved off-site borrow source. The finished surface would be reasonably smooth, compacted, and free from irregular surface changes. The degree of finish would be that ordinarily obtainable from a blade-grader. The final grades would provide positive drainage of surface water across the site with no closed drainage areas that would allow surface water to pond. Following backfilling and grading activities, the surface would be seeded with native vegetation. All temporary erosion control measures would be removed after establishing vegetation.

Implementability

This alternative is considered technically feasible, administratively feasible, and services and materials are readily available in Alamogordo, New Mexico. Excavation and off-site disposal is a proven method for achieving long-term contaminant reduction. The action would not affect future removal activities. The action could be implemented in a way that would minimize environmental impacts (e.g., dust suppression during excavation and disposal), and the action could be performed and completed in a relatively short time period. The terrain at TS851a Former Skeet Range MRS is relatively flat and does not pose any additional concerns. Possible constraints to implementing this alternative would be extreme weather conditions. In the case of extreme weather conditions, the excavation and disposal would have to be temporarily postponed. This alternative is considered administratively feasible, but there are several factors that need to be addressed with regard to the excavation and disposal. Prior to the excavation and disposal, several plans and permits would be prepared and submitted to Holloman AFB, NMED,

or the State of New Mexico before the excavation and disposal could proceed. These submittals include:

- Action Memorandum;
- Site-Specific NTCRA Work Plan composed of the following: Technical Management Plan, Accident Prevention Plan with Site Safety and Health Plan, Sampling Plan with a Uniform Federal Policy Quality Assurance Project Plan, Investigation-Derived Waste Management Plan, and Environmental Protection Plan;
- Base Civil Engineering Work Clearance Request (Air Force Form 103 needed for utility clearance before excavation can begin);
- After the removal action is completed, an AAR and closure documentation would be prepared to document the completion of the action and gain regulatory approval for site closure.

All equipment, personnel, and services necessary to implement Alternative 3 are available in the vicinity of Alamogordo, New Mexico. An off-site disposal facility will be used for disposal of Resource Conservation and Recovery Act (RCRA) contaminated soils which has the capacity to accept approximately 5,000 BCY. There is no need for an on-site laboratory facility, disposal characteristics will be determined prior to transportation to the approved facility. Confirmation samples would be shipped to a laboratory that is able to provide fast turnaround and has the capacity to test numerous samples seven days a week. There are reliable overnight shipping options in the vicinity of Alamogordo, New Mexico.

Cost

The total estimated cost for Alternative 3 is \$738,058 (**Appendix A**). Alternative 3 includes capital costs for excavating PAH-impacted soil in order to achieve the TS851a Former Skeet Range MRS cleanup levels for PAHs in soils. Approximately, 5,000 BCY of soil would be excavated from the MRS and disposed of at an approved off-base landfill. Following excavation, the area would be backfilled, re-graded to approximate pre-excavation contours, and restored to previous conditions. Alternative 3 also includes capital costs for AAR and closure documentation.

For the Alternative 3 cost estimate summary, there are no annual costs associated with the excavation and disposal. There are no PRSC costs associated with this alternative.

5.3 COMPARATIVE ANALYSIS OF ALTERNATIVES

Table 5-1 presents a comparative analysis of the three alternatives for the TS851a Former Skeet Range MRS.

**Table 5-1
Comparative Analysis of Removal Action Alternatives**

Evaluation Criteria	Alternative 1 - No Action	Alternative 2 - Land Use Controls	Alternative 3 - Excavation with Off-Site Disposal
Effectiveness	Qualitative Ranking		
Protection of Human Health/Environment	Low	Medium	High
Compliance with ARARs	Low	Medium	High
Long-Term Effectiveness	Low	Medium	High
Short-Term Effectiveness	Low	Medium	High
Achieve Removal Action Objectives	Low	Medium	High
Reduction of Toxicity, Mobility, or Volume	Low	Low	High
Implementability	Qualitative Ranking		
Technical Feasibility	High	High	High
Administrative Feasibility	High	High	High
Cost	Removal Cost		
Total Project Duration (Years)	0	30	1*
Capital Cost	\$0	\$15,093	\$738,058
Total O&M / Periodic Cost ¹	\$0	\$276,839	\$0
Total Present Cost of Alternative	\$0	\$291,932	\$738,058

Notes:

¹ – Annual O&M

*Removal action is anticipated at 14 days

ARAR - Applicable or Relevant and Appropriate Requirement

O&M - Operation and Maintenance

5.3.1 Effectiveness

Alternative 1 is considered the least effective alternative for public health protectiveness because risks to current and future receptors would remain indefinitely and the toxicity, mobility, and volume of contamination at the MRS would not be reduced. Alternative 2 is more effective than Alternative 1 but less effective than Alternative 3 for human health protectiveness because risks to current and future receptors would remain indefinitely and toxicity, mobility, and volume of contamination at the MRS would not be reduced. Alternative 3 is considered most effective for protectiveness of human health because PAH-impacted soil would be excavated and disposed of off-site at an approved landfill. The volume of contamination at the TS851a Former Skeet Range MRS would be reduced. Risks to receptors with regards to PAH-impacted soils at the MRS would be reduced to levels considered protective of human health. Based on a comparative analysis of effectiveness, Alternative 3 is considered the most effective alternative for public health protectiveness.

5.3.2 Implementability

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

5.3.3 Cost

The estimated costs for Alternatives 1, 2, and 3 at the MRS are shown in **Appendix A - Removal Action Alternatives Cost Estimates**.

This page is intentionally left blank.

Three alternatives were evaluated to achieve the RAOs for the TS851a Former Skeet Range MRS. These alternatives consist of the following:

- Alternative 1 – No Action
- Alternative 2 – Land Use Controls
- Alternative 3 – Excavation with Off-Site Disposal

Based on the analysis presented in **Section 5**, including Appendix A, Alternative 3 – Excavation with Off-Site Disposal of PAH-impacted soil is recommended as the preferred alternative for achieving the RAOs for the TS851a Former Skeet Range MRS.

6.1 REMOVAL ACTION SCOPE

The estimated areal extent of the removal action for MRS is shown on **Figure 6-1**. The depth of excavation is anticipated at less than 2 feet bgs, with possible localized deeper depths if determined necessary. The estimated PAH-impacted soil requiring removal is approximately 5,000 BCY. The removal will be extended laterally and vertically until confirmation results are below the cleanup levels for PAHs in soil.

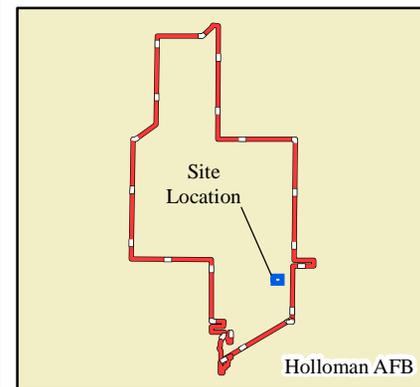
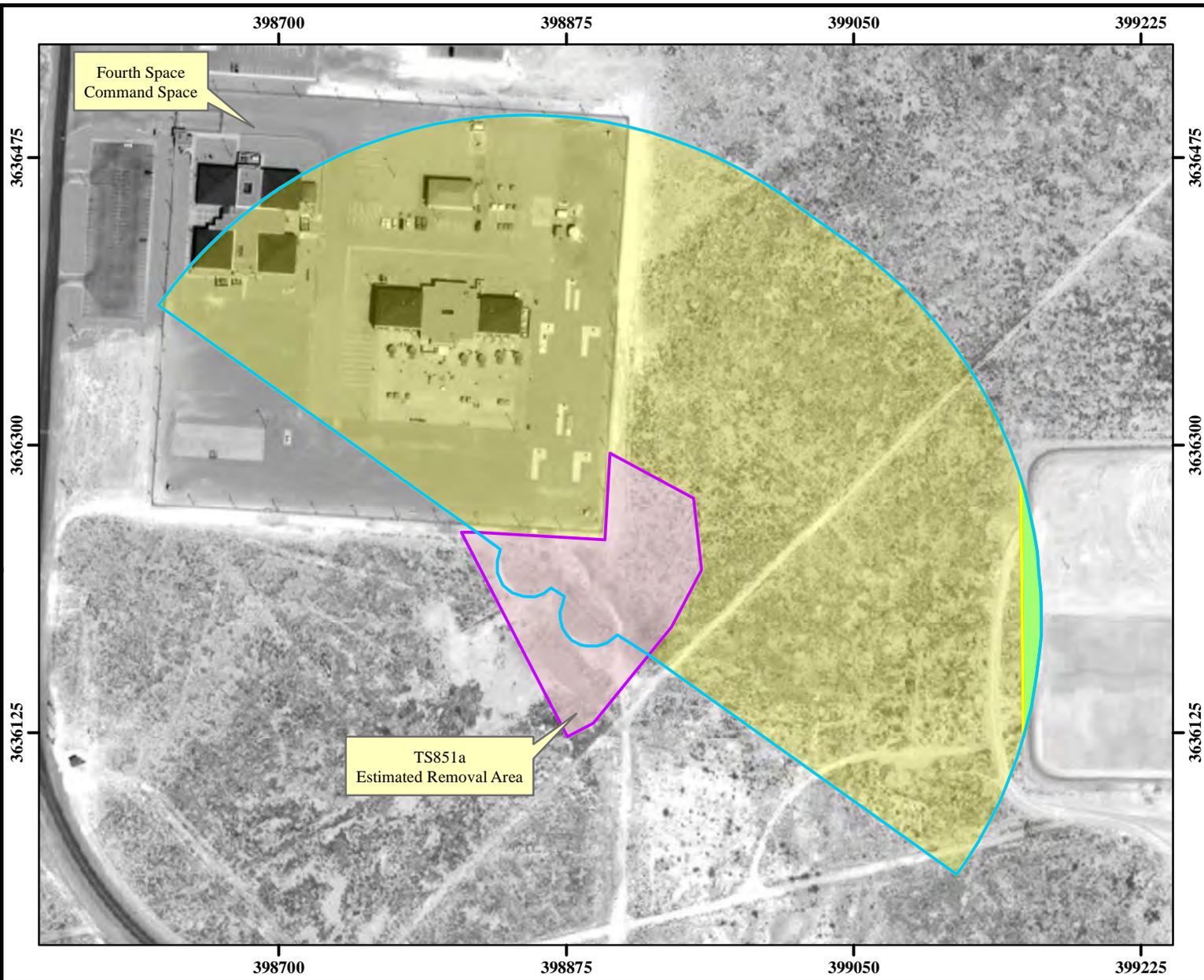
The ultimate goal of the removal action, upon completion, is to document that the hazards to human health from PAHs have been removed, and that no further contamination hazards remain at the TS851a Former Skeet Range MRS. When this goal is met, the MRS will be proposed for Unlimited Use and Unrestricted Exposure in a TS851a Skeet Range MRS Site Closeout Report.

6.2 REMOVAL ACTION SCHEDULE

A public notice was placed in the Alamogordo Daily News soliciting public comment on the EE/CA for a 30-day period (March 13th to April 13th). The Affidavits of Publication are provided in Appendix B. No public comments were received during this period. An Action Memorandum and a NTCRA Work Plan, including a Sampling Plan and an Accident Prevention Plan, will be prepared on a schedule that allows sufficient regulatory review before fieldwork commences. The following schedule identifies general completion time frames for activities associated with the removal action at the MRS.

- EE/CA and Action Memorandum (with public comment period) for TS851a MRS preparation, review, and approval (EE/CA - 15 November 2013 to 19 June 2015. Action Memorandum – 5 May 2014 to 12 October 2015)
- NTCRA Work Plan for TS851a MRS preparation, review, and approval (8 September 2014 to 14 April 2016)
- Removal Action field activities for TS851a MRS (15 April 2016 to 10 August 2016)
- AAR for TS851a MRS preparation, review, and approval (9 June 2016 to 13 February 2017)
- Site Closeout Report/Unlimited Use and Unrestricted Exposure DD, for TS851a MRS preparation, review, and approval (10 January 2017 to 6 September 2018)

Path: Y:\GIS_Projects\Holloman_AFB\Projects\EE_CA\TS851A\Fig_6_1_TS851a_Proposed_Removal_Areumxd



Legend

- Former Skeet Range (TS851)
- Former Skeet Range (TS851a) - EE/CA
- Former Skeet Range (TS851b)
- Former Skeet Range (MRA 851)
- Installation Boundary

Performance Based Remediation
 New Mexico-Arizona
 Holloman Air Force Base
 Alamogordo, NM
 AFCEC

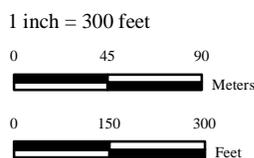
FIGURE 6-1

Proposed
 Removal Area at TS851a MRS

- NOTES:**
1. Boundary based on CSE Phase II findings.
 2. Revision Date: 9/16/2014

Coordinate System: NAD 1983 UTM Zone 13N
 Projection: Transverse Mercator
 False Easting: 500,000.0000
 Central Meridian: -105.0000
 Latitude Of Origin: 0.0000

Horizontal Datum: North American 1983
 False Northing: 0.0000
 Scale Factor: 0.9996
 Units: Meter



FPM Remediations, Inc.

2014

Code of Federal Regulations (CFR). 2003. Title 40 – Protection of the Environment, Part 300 - National Oil and Hazardous Substances Pollution Contingency Plan.

HydroGeoLogic, Inc (HGL). 2007. Supplemental RCRA Facility Investigation LF-10 (SWMUS 101 & 109) and LF-29 (SWMU 104) Holloman Air Force Base Alomogordo, New Mexico. July.

New Mexico Environment Department (NMED). 2012. Risk Assessment Guidance for Site Investigations and Remediation February. Updated June 2012.

Radian Corporation, 1992b. RI, Report, Volume II of III, Appendices A, B, C, and D, Investigation, Study and Recommendation for 29 Waste Sites.

United States Army Corps of Engineers (USACE), ITSI, Shaw. 2010. Holloman Air Force Base Modified Comprehensive Site Evaluation Phase I Report. May.

United States Army Corps of Engineers (USACE), HDR Environmental, Operations and Construction, Inc. 2013. Comprehensive Site Evaluation Phase II Final Report Military Munitions Response Program (MMRP) Holloman Air Force Base, New Mexico. September.

United States Environmental Protection Agency (USEPA) 1970. Summary of the Clean Air Act. 42 U.S.C. 7401 et seq. <http://www.epa.gov/lawsregs/laws/caa.html>

USEPA. 1993. Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA. OSWER Directive Number 9360.0-32, EPA/540-R-93-057. August.

USEPA. 2000. A Guide to Developing and Documenting Cost Estimates During the Feasibility Study. July.

USEPA. 2014. Regional Screening Level (RSL) Summary Table. May.

This page is intentionally left blank.

This page is intentionally left blank.

**COMPARISON OF TOTAL COST OF REMOVAL ACTION ALTERNATIVES
 TS851a FORMER SKEET RANGE MRS
 HOLLOMAN AFB, NEW MEXICO**

Site: TS851a MRS	Base Year: 2013		
Location: HOLLOMAN AFB			
<u>Description</u>	Option 1 - No Action	Option 2 - Land Use Controls	Option 3 - Excavation with Off-Site Disposal
Total Project Duration (Years)	0	30	1
Capital Cost	\$0	\$15,093	\$738,058
Total O&M/Periodic Cost	\$0	\$276,839	\$0
Total Cost of Alternative	\$0	\$291,932	\$738,058

Alternative 1
No Action

This page is intentionally left blank.

Alternative 2
Land Use Controls

This page is intentionally left blank.

Phase Cost Detail Report (with Markups)

System:

RACER Version: 10.4.0
Database Location: C:\Users\daniel.FPM-GROUP\Application Data\AECOM\RACER 10.4\Racer.mdb

Folder:

Folder Name: NM-AZ Group-EE/CAs

Project:

Project ID: Holloman AFB
Project Name: Holloman AFB
Project Category: None

Location

State / Country: NEW MEXICO
City: HOLLOMAN AFB

Location Modifier	Default	User
	1.093	1.093

Options

Database: System Costs
Cost Database Date: 2011
Report Option: Fiscal

Description

Phase Cost Detail Report (with Markups)

Site:

Site ID: TS851
Site Name: TS851
Site Type: None

Media/Waste Type

Primary: Soil
Secondary: N/A

Contaminant

Primary: Ordnance (residual)
Secondary: None

Phase Names

Pre-Study:
Study:
Design:
Removal/Interim Action:
Remedial Action:
Operations & Maintenance:
Long Term Monitoring:
Site Closeout:

Documentation

Description:
Support Team: Documentation of personnel used to provide support for estimator and preparation of the estimate.
References: Documentation of reference sources used in the preparation of the estimate.

Estimator Information

Estimator Name: Daniel Baldyga
Estimator Title: FPM Estimator

Phase Cost Detail Report (with Markups)

Agency/Org./Office: FPM

Business Address: FPM

Rome, New York 13441

Telephone Number: 315-336-7721

Email Address: d.baldyga@fpm-remediations.com

Estimate Prepared Date: 04/12/2013

Estimator Signature: _____ Date: _____

Reviewer Information

Reviewer Name:

Reviewer Title:

Agency/Org./Office:

Business Address:

Telephone Number:

Email Address:

Date Reviewed:

Reviewer Signature: _____ Date: _____

Phase Cost Detail Report (with Markups)

Phase:

Phase Type: Operations & Maintenance
Phase Name: Fencing and LUC/ICs-Alt2
Description:

Start Date: October, 2014
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Phase Markups: System Defaults

Technology Markups	Markup	% Prime	% Sub.
ADMINISTRATIVE LAND USE CONTROLS	Yes	100	0
MEC Institutional Controls	Yes	100	0

Phase Cost Detail Report (with Markups)

Technology	Direct Cost	Sub Overhead	Sub Profit	Prime Overhead	Prime Profit Contingency	Owner Cost	Markup Total	Total	
ADMINISTRATIVE LAND USE CONTROLS (100% Prime)	\$120,080	\$0	\$0	\$59,364	\$9,630	\$0	\$14,300	\$83,295	\$203,375
MEC Institutional Controls (100% Prime)	\$10,690	\$0	\$0	\$2,144	\$909	\$0	\$1,349	\$4,403	\$15,093
Total Phase Cost	\$130,771	\$0	\$0	\$61,508	\$10,539	\$0	\$15,650	\$87,697	\$218,468
							Escalation		\$73,464
							Escalated Phase Cost		\$291,932

Phase Cost Detail Report (with Markups)

Markup Template

System Defaults	Markup Percentage
Professional Labor Overhead/G&A	132.0
Field Office Overhead/G&A	25.0
Subcontractor Profit	8.0
Prime Profit	8.0
Contingency	0.0
Owner Cost	11.0
Comment:	

Phase Technology Cost Detail Report (with Markups)

System:

RACER Version: 10.4.0
Database Location: C:\Users\daniel.FPM-GROUP\Application Data\AECOM\RACER 10.4\Racer.mdb

Folder:

Folder Name: NM-AZ Group-EE/CAs

Project:

Project ID: Holloman AFB
Project Name: Holloman AFB
Project Category: None

Location

State / Country: NEW MEXICO
City: HOLLOMAN AFB

Location Modifier	Default	User
	1.093	1.093

Options

Database: System Costs
Cost Database Date: 2011
Report Option: Fiscal

Description

Phase Technology Cost Detail Report (with Markups)

Site:

Site ID: TS851
Site Name: TS851
Site Type: None

Media/Waste Type

Primary: Soil
Secondary: N/A

Contaminant

Primary: Ordnance (residual)
Secondary: None

Phase Names

Pre-Study:
Study:
Design:
Removal/Interim Action:
Remedial Action:
Operations & Maintenance:
Long Term Monitoring:
Site Closeout:

Documentation

Description:
Support Team: Documentation of personnel used to provide support for estimator and preparation of the estimate.
References: Documentation of reference sources used in the preparation of the estimate.

Estimator Information

Estimator Name: Daniel Baldyga
Estimator Title: FPM Estimator
Agency/Org./Office: FPM

Phase Technology Cost Detail Report (with Markups)

Business Address: FPM
Rome, New York 13441

Telephone Number: 315-336-7721

Email Address: d.baldyga@fpm-remediations.com

Estimate Prepared Date: 04/12/2013

Estimator Signature: _____ Date: _____

Reviewer Information

Reviewer Name:

Reviewer Title:

Agency/Org./Office:

Business Address:

Telephone Number:

Email Address:

Date Reviewed:

Reviewer Signature: _____ Date: _____

Phase Technology Cost Detail Report (with Markups)

Phase:

Phase Type: Operations & Maintenance
Phase Name: Fencing and LUC/ICs-Alt2
Description:

Start Date: October, 2014
Labor Rate Group: System Labor Rate
Analysis Rate Group: System Analysis Rate
Phase Markups: System Defaults

Technology Markups	Markup	% Prime	% Sub.
ADMINISTRATIVE LAND USE CONTROLS	Yes	100	0
MEC Institutional Controls	Yes	100	0

Phase Technology Cost Detail Report (with Markups)

Technology: ADMINISTRATIVE LAND USE CONTROLS

Element: Monitoring & Enforcement

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
33010108	Sedan, Automobile, Rental	2.00	DAY	0.00	0.00	0.00	63.64	\$127.28	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33010202	Per Diem (per person)	3.00	DAY	0.00	0.00	0.00	123.00	\$369.00	<input checked="" type="checkbox"/>	<input type="checkbox"/>
33022038	Overnight delivery service, 1 lb package	6.00	LB	0.00	0.00	0.00	49.11	\$294.66	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33041101	Airfare	2.00	LS	0.00	0.00	0.00	800.00	\$1,600.00	<input checked="" type="checkbox"/>	<input type="checkbox"/>
33220102	Project Manager	2.00	HR	0.00	193.20	0.00	0.00	\$386.39	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220106	Staff Engineer	8.00	HR	0.00	186.89	0.00	0.00	\$1,495.12	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220110	QA/QC Officer	4.00	HR	0.00	158.97	0.00	0.00	\$635.86	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220112	Field Technician	1.00	HR	0.00	115.90	0.00	0.00	\$115.90	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220114	Word Processing/Clerical	6.00	HR	0.00	81.71	0.00	0.00	\$490.26	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220115	Draftsman/CADD	4.00	HR	0.00	89.68	0.00	0.00	\$358.71	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220119	Health and Safety Officer	4.00	HR	0.00	142.09	0.00	0.00	\$568.37	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33240101	Other Direct Costs	1.00	LS	337.60	0.00	0.00	0.00	\$337.60	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$6,779.16		
Total 1st Year Technology Cost								\$6,779.16		

Phase Technology Cost Detail Report (with Markups)

Technology: MEC Institutional Controls

Element: Implementation

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
33010108	Sedan, Automobile, Rental	12.00	DAY	0.00	0.00	0.00	63.64	\$763.69	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33010202	Per Diem (per person)	12.00	DAY	0.00	0.00	0.00	123.00	\$1,476.00	<input checked="" type="checkbox"/>	<input type="checkbox"/>
33040927	UXO Senior Scientist	98.00	HR	0.00	120.59	0.00	0.00	\$11,817.38	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33240101	Other Direct Costs	1.00	LS	118.17	0.00	0.00	0.00	\$118.17	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$14,175.25		

Element: Engineering Controls

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
18040501	Hazardous Waste Signing	9.00	EA	63.89	38.07	0.00	0.00	\$917.67	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$917.67		
Total 1st Year Technology Cost								\$15,092.92		
Total Phase Cost								\$21,872.08		

Alternative 3
Excavation with Off-Site Disposal

This page is intentionally left blank.

Phase Cost Detail Report (with Markups)

System:

RACER Version: 10.4.0
Database Location: C:\Users\daniel.FPM-GROUP\Application Data\AECOM\RACER 10.4\Racer.mdb

Folder:

Folder Name: NM-AZ Group-EE/CAs

Project:

Project ID: Holloman AFB
Project Name: Holloman AFB
Project Category: None

Location

State / Country: NEW MEXICO
City: HOLLOMAN AFB

Location Modifier	Default	User
	1.093	1.093

Options

Database: System Costs
Cost Database Date: 2011
Report Option: Fiscal

Description

Phase Cost Detail Report (with Markups)

Site:

Site ID: TS851
Site Name: TS851
Site Type: None

Media/Waste Type

Primary: Soil
Secondary: N/A

Contaminant

Primary: Ordnance (residual)
Secondary: None

Phase Names

Pre-Study:
Study:
Design:
Removal/Interim Action:
Remedial Action:
Operations & Maintenance:
Long Term Monitoring:
Site Closeout:

Documentation

Description:
Support Team: Documentation of personnel used to provide support for estimator and preparation of the estimate.
References: Documentation of reference sources used in the preparation of the estimate.

Estimator Information

Estimator Name: Daniel Baldyga
Estimator Title: FPM Estimator

Phase Cost Detail Report (with Markups)

Agency/Org./Office: FPM

Business Address: FPM

Rome, New York 13441

Telephone Number: 315-336-7721

Email Address: d.baldyga@fpm-remediations.com

Estimate Prepared Date: 04/12/2013

Estimator Signature: _____ Date: _____

Reviewer Information

Reviewer Name:

Reviewer Title:

Agency/Org./Office:

Business Address:

Telephone Number:

Email Address:

Date Reviewed:

Reviewer Signature: _____ Date: _____

Phase Cost Detail Report (with Markups)

Phase:

Phase Type: Removal/Interim Action

Phase Name: Excavation of MC

Description:

Approach: Ex Situ

Start Date: November, 2015

Labor Rate Group: System Labor Rate

Analysis Rate Group: System Analysis Rate

Phase Markups: System Defaults

Technology Markups

	Markup	% Prime	% Sub.
Excavation	Yes	100	0
Load and Haul	Yes	100	0
Professional Labor Management	Yes	100	0

Phase Cost Detail Report (with Markups)

Technology	Direct Cost	Sub Overhead	Sub Profit	Prime Overhead	Prime Profit	Contingency	Owner Cost	Markup Total	Total
Excavation (100% Prime)	\$113,435	\$0	\$0	\$28,941	\$11,390	\$0	\$16,914	\$57,245	\$170,680
Load and Haul (100% Prime)	\$316,699	\$0	\$0	\$79,175	\$31,670	\$0	\$47,030	\$157,875	\$474,574
Professional Labor Management (100% Prime)	\$33,795	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$33,795
Total Phase Cost	\$463,929	\$0	\$0	\$108,116	\$43,060	\$0	\$63,944	\$215,120	\$679,049
								Escalation	\$59,009
								Escalated Phase Cost	\$738,058

Phase Cost Detail Report (with Markups)

Markup Template

System Defaults	Markup Percentage
Professional Labor Overhead/G&A	132.0
Field Office Overhead/G&A	25.0
Subcontractor Profit	8.0
Prime Profit	8.0
Contingency	0.0
Owner Cost	11.0
Comment:	

Phase Technology Cost Detail Report (with Markups)

System:

RACER Version: 10.4.0
Database Location: C:\Users\daniel.FPM-GROUP\Application Data\AECOM\RACER 10.4\Racer.mdb

Folder:

Folder Name: NM-AZ Group-EE/CAs

Project:

Project ID: Holloman AFB
Project Name: Holloman AFB
Project Category: None

Location

State / Country: NEW MEXICO
City: HOLLOWAN AFB

Location Modifier	Default	User
	1.093	1.093

Options

Database: System Costs
Cost Database Date: 2011
Report Option: Fiscal

Description

Phase Technology Cost Detail Report (with Markups)

Site:

Site ID: TS851
Site Name: TS851
Site Type: None

Media/Waste Type

Primary: Soil
Secondary: N/A

Contaminant

Primary: Ordnance (residual)
Secondary: None

Phase Names

Pre-Study:
Study:
Design:
Removal/Interim Action:
Remedial Action:
Operations & Maintenance:
Long Term Monitoring:
Site Closeout:

Documentation

Description:
Support Team: Documentation of personnel used to provide support for estimator and preparation of the estimate.
References: Documentation of reference sources used in the preparation of the estimate.

Estimator Information

Estimator Name: Daniel Baldyga
Estimator Title: FPM Estimator
Agency/Org./Office: FPM

Phase Technology Cost Detail Report (with Markups)

Business Address: FPM
Rome, New York 13441

Telephone Number: 315-336-7721

Email Address: d.baldyga@fpm-remediations.com

Estimate Prepared Date: 04/12/2013

Estimator Signature: _____ Date: _____

Reviewer Information

Reviewer Name:

Reviewer Title:

Agency/Org./Office:

Business Address:

Telephone Number:

Email Address:

Date Reviewed:

Reviewer Signature: _____ Date: _____

Phase Technology Cost Detail Report (with Markups)

Phase:

Phase Type: Removal/Interim Action

Phase Name: Excavation of MC

Description:

Approach: Ex Situ

Start Date: November, 2015

Labor Rate Group: System Labor Rate

Analysis Rate Group: System Analysis Rate

Phase Markups: System Defaults

Technology Markups

	Markup	% Prime	% Sub.
Excavation	Yes	100	0
Load and Haul	Yes	100	0
Professional Labor Management	Yes	100	0

Phase Technology Cost Detail Report (with Markups)

Technology: Excavation

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
17020416	12 CY Dump Truck Haul/Hour	275.00	HR	0.00	103.33	64.98	0.00	\$46,286.51	<input type="checkbox"/>	<input checked="" type="checkbox"/>
17030278	Excavate and load, bank measure, medium material, 3-1/2 C.Y. bucket, hydraulic excavator	5,000.00	BCY	0.00	1.14	1.42	0.00	\$12,793.43	<input type="checkbox"/>	<input checked="" type="checkbox"/>
17030423	Unclassified Fill, 6" Lifts, Off-Site, Includes Delivery, Spreading, and Compaction	5,750.00	CY	11.86	1.46	1.27	0.02	\$84,015.88	<input type="checkbox"/>	<input checked="" type="checkbox"/>
18050402	Seeding, Vegetative Cover	1.86	ACR	4,743.63	673.64	290.18	0.00	\$10,615.86	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33020401	Disposable Materials per Sample	112.00	EA	14.06	0.00	0.00	0.00	\$1,574.68	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33021710	Testing, soil & sediment analysis, metals (1 cp) (6010)	28.00	EA	0.00	0.00	0.00	20.58	\$576.30	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33022401	14 Nitroaromatic/Nitramine Compounds by EPA Method 8330	28.00	EA	0.00	0.00	0.00	299.48	\$8,385.35	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220102	Project Manager	7.00	HR	0.00	193.20	0.00	0.00	\$1,352.38	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220108	Project Scientist	18.00	HR	0.00	195.71	0.00	0.00	\$3,522.87	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220110	QA/QC Officer	3.00	HR	0.00	193.86	0.00	0.00	\$581.58	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220112	Field Technician	3.00	HR	0.00	115.90	0.00	0.00	\$347.70	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220114	Word Processing/Clerical	3.00	HR	0.00	99.65	0.00	0.00	\$298.94	<input type="checkbox"/>	<input checked="" type="checkbox"/>
33220115	Draftsman/CADD	3.00	HR	0.00	109.36	0.00	0.00	\$328.09	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$170,679.57		
Total 1st Year Technology Cost								\$170,679.57		

Phase Technology Cost Detail Report (with Markups)

Technology: Load and Haul

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
17020401	Dump Charges	5,000.00	EA	79.42	0.00	0.00	0.00	\$397,102.50	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
17030224	966, 4.0 CY, Wheel Loader	26.00	HR	0.00	110.73	111.67	0.00	\$5,782.56	<input type="checkbox"/>	<input checked="" type="checkbox"/>
17030288	26 CY, Semi Dump	360.00	HR	0.00	103.33	95.80	0.00	\$71,689.02	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Total Element Cost								\$474,574.08		
Total 1st Year Technology Cost								\$474,574.08		

Phase Technology Cost Detail Report (with Markups)

Technology: Professional Labor Management

Assembly	Description	Quantity	Unit of Measure	Material Unit Cost	Labor Unit Cost	Equipment Unit Cost	Sub Bid Unit Cost	Extended Cost	Cost Override	Markups Applied
33220149	Lump Sum Percentage Labor Cost	1.00	LS	0.00	33,795.00	0.00	0.00	\$33,795.00	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Total Element Cost								\$33,795.00		
Total 1st Year Technology Cost								\$33,795.00		
Total Phase Cost								\$679,048.65		

This page is intentionally left blank.

AFFIDAVIT OF PUBLICATION

ALAMOGORDO,
STATE OF NEW MEXICO
COUNTY OF OTERO.

SS.

I, CAROL A. BURGESS, being duly sworn, on my oath say that I am the General Manager of the Alamogordo Daily News, a newspaper of daily circulation, published and printed in the English language at the City of Alamogordo, Otero County, State of New Mexico. That the Alamogordo Daily News has been regularly published and issued for more than nine months prior to the date of the first publication hereinafter mentioned.

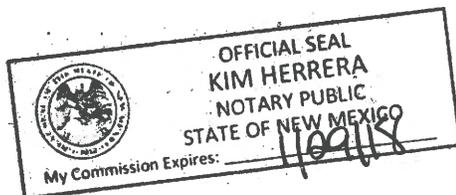
That the attached notice was published 1 time in 1 issue of said newspaper and not in any supplement thereof, the first publication being on March 13th 2015. That said notice was published in accordance with the laws of the State of New Mexico.

Carol A Burgess
General Manager

Subscribed in my presence and sworn before me this the
13 day of March, 2015.

Kim Herrera
Notary Public

My commission expires 11/29/18



MARY ANN WILKINSON. All persons having claims against the Estates are required to present their claims within two months after the date of first publication of his Notice which is MARCH 13TH 2015, or within two months after mailing or other delivery of this notice, whichever is later, or the claims will be forever barred. Claims must be presented either the undersigned Personal Representative at the Robert M. Doughty II, PC, P.O. Box 1569, Alamogordo, NM 88311-1569, or filed with the County of Otero, with a copy to Robert M. Doughty II, PC.

Dated: March 10th

Submissions of sealed bids are invited from Bidders for the Village of Ruidoso River B Well Rehabilitation IFB# 2015-005B in Ruidoso, NM. The nature of the project will consist of the drilling, geophysical logging, completion, development and test pumping of a production well to a depth of up to 1,500 ft. with a 14-in. nominal diameter casing and screen and various site improvements.

Bids to complete this work will be received by the Village of Ruidoso, Purchasing Agent, Mr. Billy Randolph, 311 Center Street, Ruidoso, New Mexico 88345, until 2:00 p.m. (local time),

set and will be re-funded only to plan holders upon return of the documents in good condition, within fourteen (14) days after award of a contract or rejection of all Bids. NO PARTIAL SETS WILL BE ISSUED. Contractors when obtaining plan sets must identify whether they are to be listed as a Prime Contractor or Sub Contractor.

A Mandatory Pre-Bid Conference will be held at 1:00pm. (local time), on Thursday, March 19th, 2015 at the Village Hall Council Chambers, 313 Cree Meadows with a project walk through to follow. Bid Security in the amount of 5% of the total Bid shall

ly payroll records bi-weekly to Huitt-Zollars, Inc. The Village reserves the right to reject any or all Bids and to waive informalities or irregularities in the Bidding. NOTICE OF REGISTRATION REQUIREMENT. Bidders are reminded that in order to be considered for bid award, all contractors (including their subcontractors if at a specific cost threshold) must be registered under the Labor Enforcement Fund with the New Mexico Department of Workforce Solutions on the date bids are unconditionally accepted for considera-

Legal # 5613 (Published 2/27, 3/6, 3/13 & 3/20/2015)

STATE OF NEW MEXICO COUNTY OF OTERO TWELFTH JUDICIAL DISTRICT

No. D-1215-CV-2014-00120

BANK OF AMERICA, N.A.,

Plaintiff, vs.

GUSTAVO FLORES and MARIA L. FLORES, jointly and severally and NEW MEXICO DEPARTMENT OF TAXATION AND REVENUE,

THE SOUTH 110 FEET OF LOT TWENTY-ONE (21), BLOCK FIVE (5) FRANK WEST RESUBDIVISION OF BLOCK 207, CITY OF ALAMOGORDO, OTERO COUNTY, NEW MEXICO.

THE FOREGOING SALE will be made to satisfy a judgment rendered by the above Court in the above entitled and numbered cause on September 10, 2014, being an action to foreclose a mortgage on the above described property. The Plaintiff's Judgment, which includes interest and costs, is \$39,738.79 and the same bears interest at 7.250% per annum from June 19, 2014, to the date of sale. The Plaintiff and/or its assignees has the right to bid at such sale and submit its bid verbally or in writing. The Plaintiff may apply all or any part of its judgment to the purchase price in lieu

Public/Special Notices 114 Public/Special Notices 114 Public/Special Notices 114 Public/Special Notices 114 Public/Special Notices 114

**PUBLIC NOTICE
ENGINEERING EVALUATION / COST ANALYSIS (EE/CA) REPORTS
FOR FI857a – FORMER BUNKER MUNITIONS RESPONSE SITE
and
TS851a – FORMER SKEET RANGE MUNITIONS RESPONSE SITE
at HOLLOWAN AIR FORCE BASE, NEW MEXICO**

The U.S. Air Force has recently announced the availability for public comments regarding two Engineering Evaluation and Cost Analysis (EE/CA) Reports at Holloman Air Force Base, New Mexico.

Comments are requested for the EE/CA Reports prepared to address hazards associated with the following two sites at the Base:

- FI857a Former Bunker Munitions Response Site (MRS) - Surface and subsurface Munitions and Explosives of Concern (MEC) / Material Potentially Presenting an Explosive Hazard (MPPEH).
- TS851a Former Skeet Range MRS - Surface and near surface polycyclic aromatic hydrocarbon (PAH) contaminated soils.

The EE/CA Reports examine the removal action alternatives and provides recommended actions for each MRS. The reports are consistent with the conclusions and recommendations contained in the Comprehensive Site Evaluation Phase II report for both sites dated September 2013.

For FI857a MRS, the MEC/MPPEH present on the ground surface and in the subsurface pose a potential and avoidable threat to public health and welfare. The removal of these items will prevent or mitigate potential human hazards associated with these items.

For FI857a MRS, the evaluated alternatives include:

- No Action
- Land Use Controls (LUCs)
- Surface Removal of MEC/MPPEH Combined with LUCs
- Surface and Subsurface Removal of MEC/MPPEH

For TS851a, approximately 4,000 bank cubic yards of soil may be contaminated with PAHs above the applicable Federal and State regulatory Regional Screening Levels. The removal of PAH-impacted soils will mitigate health risks posed by these contaminants.

For TS851a MRS, the evaluated alternatives include:

- No Action
- Land Use Controls (LUCs)
- Soil excavation and off-site disposal

The recommended alternative for FI857a MRS identified in the EE/CA is Surface and Subsurface Removal of MEC/MPPEH from the entire MRS. This alternative includes surface clearance, geophysical survey and removal of subsurface anomalies, MEC demolition, off-site recycling of Material Documented as Safe, and restoration of the site.

The recommended alternative identified for TS851a MRS is to perform 100 percent removal of PAH-impacted soils by excavation of surface and near-surface soils, off-site disposal of contaminated soils at an approved landfill, and confirmatory endpoint sampling to ensure site cleanup and site restoration activities.

In preparation of the decision regarding cleanup of this site, the Air Force will consider all comments submitted. The decision will be set forth in an Action Memorandum for each MRS. A written response to all substantive comments will be included in an attachment to each Action Memorandum.

The EE/CA Reports are available for public review during the 30-day public comment period from March 13th 2015 to April 13th 2015 at the following locations:

Alamogordo Public Library
920 Oregon Ave.
Alamogordo, N.M. 88310
(575) 439-4140

If you would like to provide any written comments or questions to this EE/CA, they can be submitted by mail to:

49th Wing Public Affairs
490 First Street, Building 29, Suite 1500
Holloman AFB, N.M. 88330

Comments can also be submitted via email to 49wgpaooffice@holloman.af.mil.
For additional questions, comments or concerns please call (575) 572-7381.

General Help Wanted 230



ACCOUNT
Fu

If you are looking for a career opportunity with earning potential, then the Ruidoso News is t

The Ruidoso News is seeking for an account newspaper. This person must have the ability t Must have a demonstrated ability to work in monthly sales goals. Knowledge of banner s and print is a plus.

If you are able to generate creative solutions platforms – this job is for you!

Job Requirements

- High school diploma/GED; college degree
- Cold calling, prospecting and discipline
- Ability to multi-task and establish prior
- Great communication skills; strong work
- Outgoing personality with expertise at c
- Proficient in Word, Excel, and PowerPoint
- Reliable transportation with valid driver

The Ruidoso News is part of Digital First Media reach 64 million Americans each month acrt Billy the Kid country, and is near Ski Apache, v

Please apply through our website at www.ruidoso.com top of our webpage or you may submit a cover

Texas/New M
Attn: I
500 W O
El Pa

We are an equal opportunity employer. We i workplace. Those who share this belief or r addition to a competitive salary, we offer ex dental, vision, flexible spending account, life i potential. Our concern is for the health and safe environment and conduct pre-employment dr

Your application/resume will be reviewed by your application/resume will be forwarded to the large number of applications and resu will be contacted.