Final

Hazardous Waste Management Unit Progress Status Report, 2012-2018
HWMU, Parcel 3

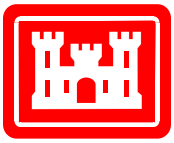
Revision 1.0

Fort Wingate Depot Activity
McKinley County, New Mexico

February 26, 2021

Contract No. W912BV-16-C-0033

Prepared for:



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Corps of Engineers –

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List of Acronyms

AECOM	AECOM Technical Services, Inc.
AOC	Area of Contamination
ALM	Adult Lead Exposure Model
APPL	Agriculture and Priority Pollutants Laboratories, Inc.
BIA	Bureau of Indian Affairs
BRAC	Base Realignment and Closure
CAMU	Corrective Action Management Unit
CDC	Current Detonation Crater
CRP	Current Residue Pile
DGM	Digital Geophysical Mapping
ECM	Earth Covered Magazine
ft	foot/feet
FWDA	Fort Wingate Depot Activity
HWMU	Hazardous Waste Management Unit
ID	Identification number
IEUBK	Integrated Exposure Uptake Biokinetic
LOQ	Limits of Quantitation
MD	Munitions Debris
MDAS	Material Documented as Safe
MEC	Munitions and Explosives of Concern
mg/kg	milligrams per kilogram
MPPEH	Material Potentially Presenting an Explosive Hazard
MS/MSD	Matrix Spike/Matrix Spike Duplicate
ng/kg	nanograms per kilogram
NMED	New Mexico Environment Department
OB/OD	Open Burning/Open Detonation
OBDA	Open Burning and Detonation Area
QA/QC	Quality Assurance/Quality Control
RC	Remote Controlled
RCRA	Resource Conservation Recovery Act
RSL	Regional Screening Level
SOP	Standard Operating Procedure
SSL	Soil Screening Level
SUXOS	Senior Unexploded Ordinance Supervisor
SVOC	Semi-Volatile Organic Compound

SWMU	Solid Waste Management Unit
TEAD	Tooele Army Depot
TEQ	Toxicity Equivalence
TNT	2,4,6-Trinitrotoluene
TPMC	TerranearPMC
URS	URS Group, Inc.
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
UXO	Unexploded Ordinance
VOC	Volatile Organic Compound

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1.1 INTRODUCTION

This status report has been prepared in response to a request by the New Mexico Environment Department (NMED) in a letter dated April 18, 2019 (NMED 2019). The letter requires the Army to submit annual Status Reports describing the work completed through the end of the previous calendar year at the Hazardous Waste Management Unit (HWMU) (Open Burning/ Open Detonation [OB/OD] Unit), at Fort Wingate Depot Activity (FWDA), McKinley County, New Mexico.

Removal activities have been conducted at the HWMU since 2012. This status report will reflect data collected from soil analysis of stockpiled soils processed through the plant, confirmation samples, and munitions and explosives of concern (MEC) recovery statistics from the start of the removal action in 2012, through the end of 2018. A separate status report will be submitted for operations occurring in 2019.

No operations were conducted from July 2015 through August 2017 due to the end of the initial work contract and the award of the current contract to AECOM Technical Services, Inc. (AECOM) (formerly URS Group, Inc. [URS]).

1.2 PROJECT PURPOSE AND SCOPE

The objective of the HWMU removal action is to satisfy the closure performance standards specified in the Resource Conservation Recovery Act (RCRA) Permit by removing hazardous wastes and hazardous waste residues from the HWMU. The primary tasks in the removal action include:

- HWMU Boundary and Topographic Land Survey
- Construction and Operation of a Corrective Action Management Unit (CAMU)
- Operate and Manage Earth Covered Magazines (ECMs)
- Debris and Soils Removal
- Debris and Soils Processing
- Soil Stockpile Management and Characterization Sampling
- Munitions Debris (MD) Flashing
- MEC and Material Documented as an Explosive Hazard Disposal
- Material Documented as Safe (MDAS) Disposal
- Post-excavation Digital Geophysical Mapping (DGM)
- Confirmation Soil Sampling
- Site Restoration

1.3 PROJECT LOCATION

FWDA is located in northwestern New Mexico in McKinley County, approximately 8 miles east of Gallup, New Mexico (**Figure 1-1**). FWDA currently occupies approximately 24 square miles (15,273 acres) of land with facilities formerly used to operate a reserve storage facility providing for the care, preservation, minor maintenance, and disposal of assigned commodities – primarily conventional military munitions.

1.4 SITE DESCRIPTION AND BACKGROUND

FWDA is an inactive United States Army Depot whose active mission was to store, ship, and receive material and dispose of obsolete or deteriorated explosives and military munitions. FWDA operated from the mid-1940s to 1993, at which time the active mission ceased, and the installation was then closed.

The installation was established as Fort Wingate in 1860. In 1941, Fort Wingate underwent major construction and expansion for the administration and earth covered magazine (ECM) area. In 1971, the depot was placed in reserve status and renamed Fort Wingate Depot Activity (MKM Engineers, Inc. 2008). In 1975, the installation was placed under the administrative command of Tooele Army Depot (TEAD), located near Salt Lake City, Utah. The active mission of FWDA ceased and the installation closed in January 1993 as a result of the Defense Authorization Amendments and Base Realignment and Closure (BRAC) Act of 1988. In 2002, the Army reassigned many functions at FWDA to the BRAC Division, including property disposal, caretaker duties, management of caretaker staff, and performance of environmental restoration and compliance activities. TEAD retained command and control responsibilities and continued to provide support services to FWDA until January 31, 2008. On January 31, 2008, command, control, and support functions were transferred to White Sands Missile Range; however, the BRAC office is conducting and administering the cleanup activities (TerranearPMC [TPMC] 2008). The cleanup activities are focused within Parcel 3, as illustrated in **Figure 1-2**.

FWDA is almost entirely surrounded by federally owned or administered lands, including both national forest and tribal lands. North and west of FWDA are Navajo tribal trust and allotted lands. The Bureau of Indian Affairs (BIA) administers the land east and south of Parcel 3 (Parcel 1). The land to the west is mostly undeveloped and is tribal trust and allotment land administered by the BIA, Navajo Nation, and individual Native American allottees (MKM Engineers, Inc. 2008).

1.4.1 Open Burning and Detonation Areas

The historic OB/OD activities at the FWDA were conducted primarily within a designated area of the installation; the Open Burning and Detonation Area (OBDA). The OBDA is located in the west-central portion of the installation and encompasses both the Current and Closed OB/OD Areas. The Closed OB/OD Area was used from 1948 to 1955. Beginning in the mid-1940s,

burning and detonation operations at the installation were performed within the Current OB/OD Area which includes the HWMU. In 1980, these operations were permitted and regulated under RCRA Interim Status (Environmental Resource Management 1995). Operations within the HWMU are listed on the FWDA RCRA Part A Permit Application dated August 1980. In 2002, the pathway for environmental restoration of the HWMU was determined to be a RCRA Permit. The Permit was finalized in 2005. **Figure 1-2** shows the location of the OB/OD area relative to the HWMU.

1.4.2 HWMU

The HWMU, as identified in Attachment 12 of the FWDA RCRA Permit (NMED 2005) and shown in **Figure 1-2,** is the focus of this project. The HWMU (32 acres) is within the Current OB/OD Area (104 acres) which is within Parcel 3 (1805.8 acres). The HWMU consists of the burning ground, 10 areas identified as Current Residue Piles (CRP) 1 through 10, and 12 open detonation craters identified as Current Detonation Craters (CDC) 1 through 12. After OB/OD operations were completed within the detonation craters, residual material and wastes were placed around the HWMU, typically pushed onto or over the arroyo bank. A detailed map illustrating the CRP and CDC areas within the HWMU is included in **Figure 1-3**.

Demilitarization of unserviceable, obsolete, or waste explosives, propellants, munitions, and munitions components was accomplished at the HWMU. Propellants, small arms, and bulk explosives were burned as a means of disposal. Explosive munitions were disposed of by detonation. Disposals by detonation were conducted within detonation craters that may have been tamped with an earthen cover to minimize fragmentation dispersal.

OB/OD operations were conducted on the ground surface within the HWMU, and residual materials appear to have been relocated around the HWMU via a variety of mechanisms, including earthmoving (e.g., piles of residuals were pushed onto/over arroyo banks using earthmoving equipment during FWDA operations), erosion (e.g., surface runoff has transported residual materials from the initial piles down arroyo banks and into/along the arroyo bottoms), and explosions (e.g., detonations have forced fragments and/or MEC beneath the ground surface) (TPMC 2008).

Beginning in 2012, in accordance with the NMED approved workplan submitted by URS (URS 2013), cleanup activities included the mechanized removal of contaminated soils from the HWMU area. The removed soils, which included MEC and other MD, were treated in a processing plant which separated ferrous and non-ferrous materials from the soil contents. All MEC items discovered during processing were inspected by trained unexploded ordinance (UXO) technicians and disposed of by burning or detonation. A discussion of MEC recovery is included in **Section 3.3**.

Soils leaving the treatment plant were placed into 250 cubic yard stockpiles. Soil samples were collected from each stockpile and analyzed by Agricultural and Priority Pollutants Laboratories, Inc. (APPL). Once laboratory results were received, a risk screening was completed for any detections in excess of the soil screening criteria. If the stockpile soil sample results were below

the screening criteria, the soil was used as backfill in the HWMU excavation area. If the stockpile soil sample results indicated that screening criteria have been exceeded but were below hazardous waste disposal criteria (**Table 1-1**), the soil was hauled to the Northwest New Mexico Regional Solid Waste Authority landfill. The soil was classified as non-hazardous waste. No hazardous waste was generated in the HWMU during the 2012-2018 removal activities.

The HWMU excavation area was divided into 100 feet (ft) by 100 ft grids. When a grid was thought to be cleared of all MEC and MD, the area was mapped with DGM to identify and removal any remaining anomalies. Once cleared, confirmation soil samples were collected from the extents of the excavation and submitted for laboratory analysis.

The NMED approval letter for the workplan submitted by URS is included in **Appendix D**. A discussion of soil sampling procedures is provided in **Section 2**, and the results and discussion are presented in **Section 3.1**.

TABLE 1-1
LANDFILL DISPOSAL CRITERIA
FORT WINGATE DEPOT ACTIVITY
MCKINLEY COUNTY, NEW MEXICO

Analyte[1]	CAS Number	TCLP Regulatory Level (mg/L)	Source
Arsenic	7740-38-2	5.0	CFR
Barium	7740-39-3	100.0	CFR
Cadmium	7740-43-9	1.0	CFR
Chromium	7740-47-3	5.0	CFR
Lead	7439-92-1	5.0	CFR
Mercury	7439-97-6	0.2	CFR
Selenium	7782-49-2	1.0	CFR
Silver	7440-22-4	5.0	CFR

Notes:

[1]Landfill disposal testing in addition to stockpile sampling analyses described in **Section 2.2.1**.

Ignitability (in accordance with 40 CFR 261.21)

Corrosivity (in accordance with 40 CFR 261.22)

Reactivity (in accordance with 40 CFR 261.23)

Paint Filter Liquid Test (in accordance with USEPA Test Method 9095)

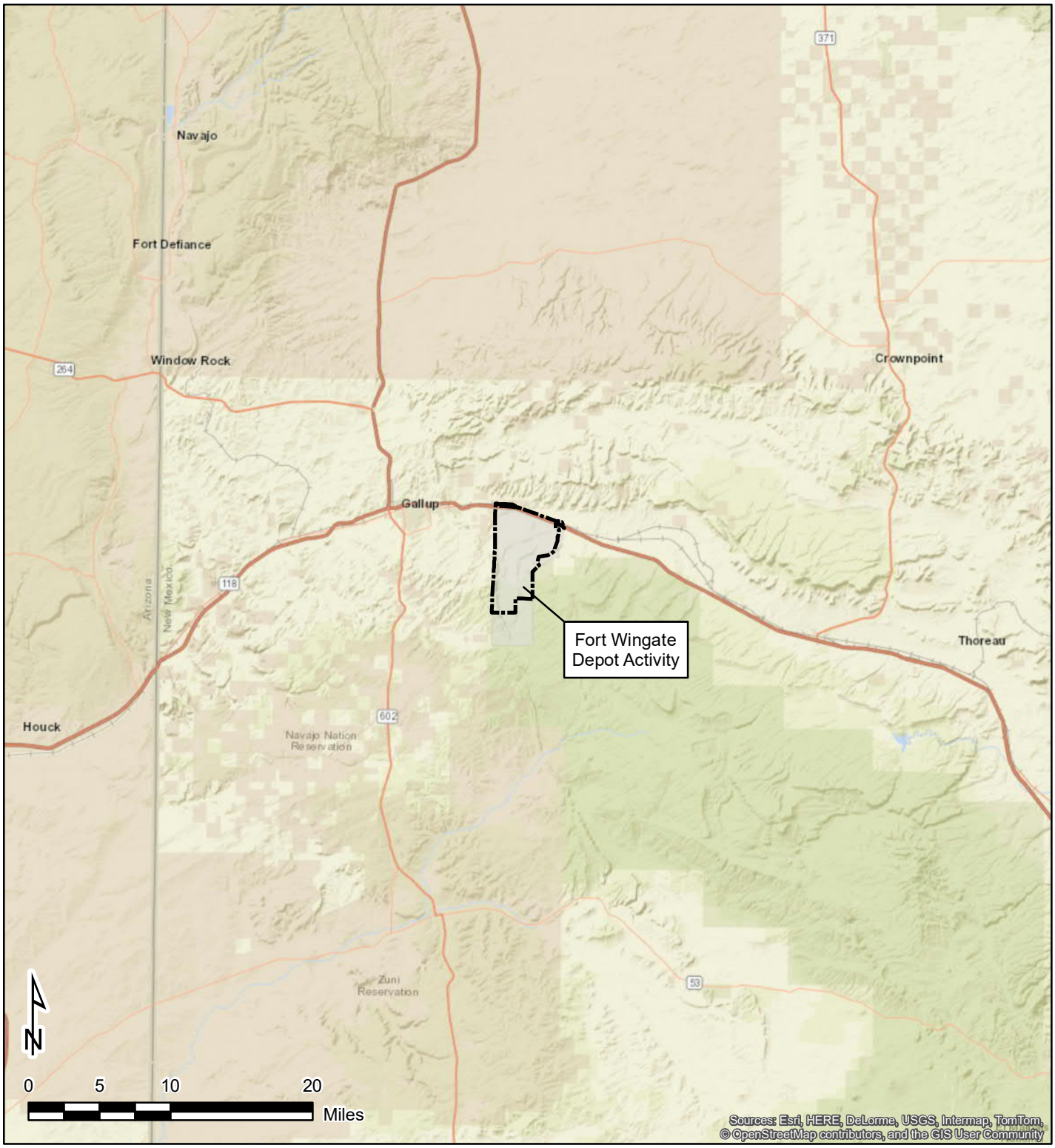
CAS - Chemical Abstracts Service

CFR - Code of Federal Regulations

mg/L - milligram(s) per liter

TCLP - Toxicity Characteristic Leaching Procedure

USEPA - United States Environmental Protection Agency



Legend

Installation Boundary

FWDA Location Map
Fort Wingate Depot Activity
McKinley County, New Mexico

Drawn By:	Date:	
JZ	3/17/2020	**Figure 1-1**
Checked By:	Project No.	
GB	60517380	

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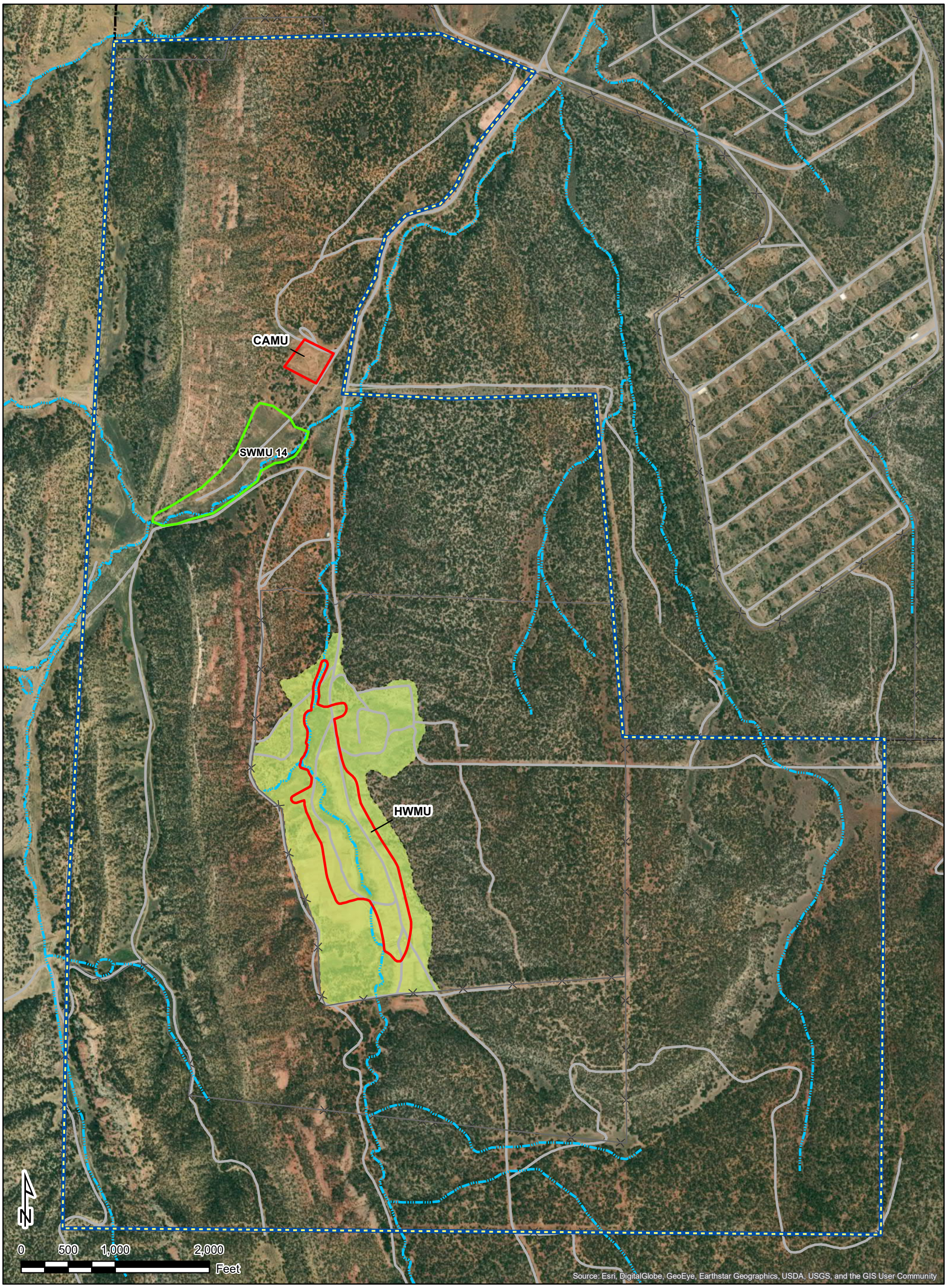
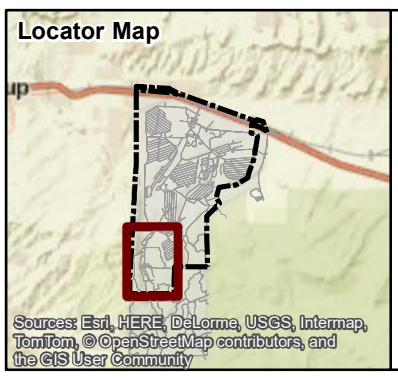


Locator Map



Legend

- Installation Boundary
- HWMU/CAMU Boundary
- SWMU 14 Boundary
- Parcel 3 Boundary
- OB/OD Area
- Road
- Fence
- Arroyo

HWMU Location Map
Fort Wingate Depot Activity
McKinley County, New Mexico

Drawn By:	Date:	
JZ	12/23/2020	**Figure 1-2**
Checked By:	Project No.	
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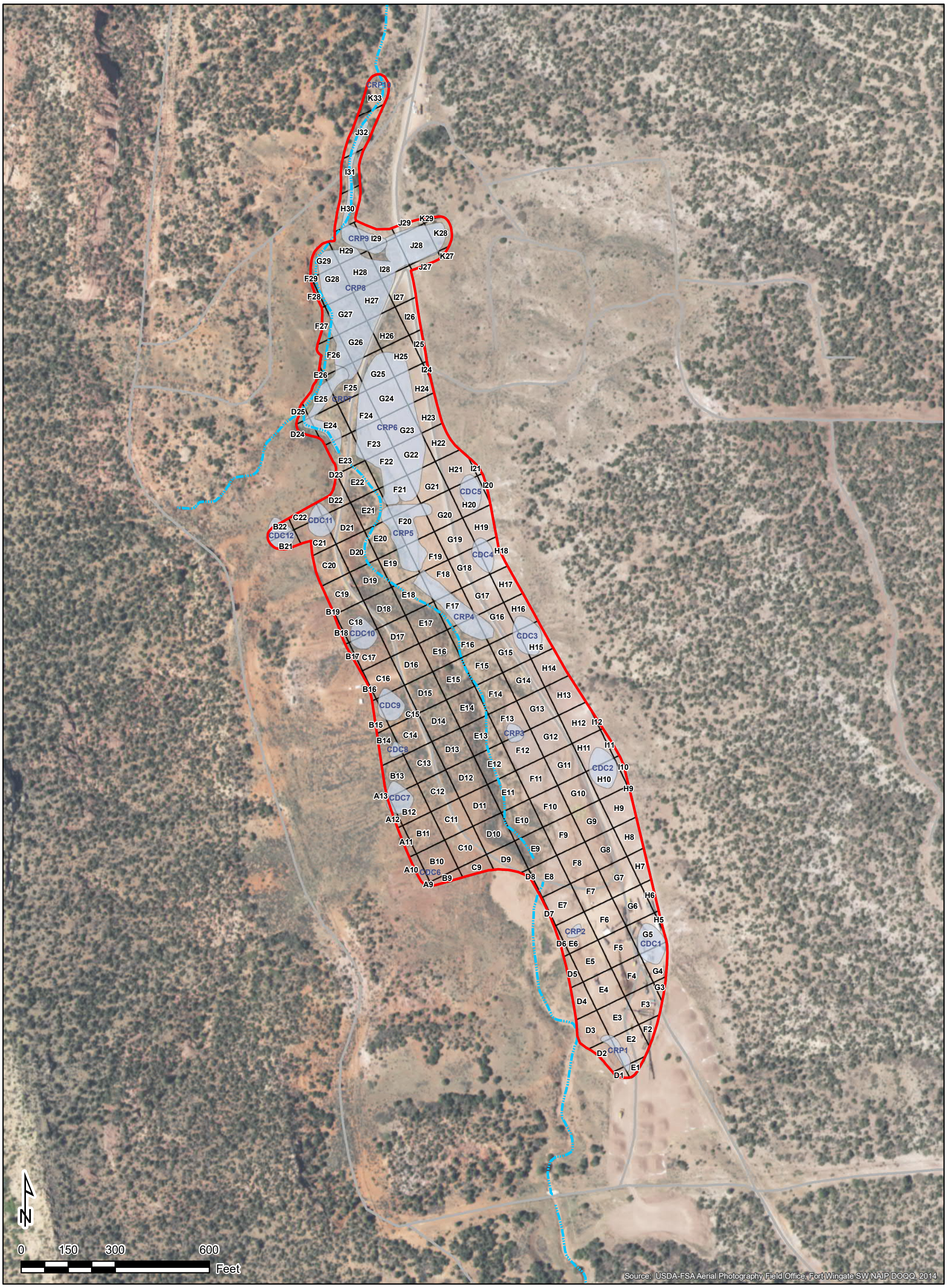

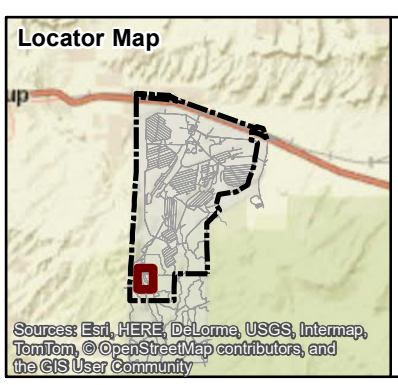

Legend

- Installation Boundary
- HWMU Boundary
- Arroyo
- Road
- HWMU Survey Grid
- CRP/CDC Area

HWMU Detail
Fort Wingate Depot Activity
McKinley County, New Mexico

Drawn By:	Date:	
JZ	5/6/2020	**Figure 1-3**
Checked By:	Project No.	
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This section presents a summary of the HWMU removal activities, including a description of the removal activities, removal areas, and soil sampling. For full descriptions of the soil processing plant setup, soil processing procedures, and soil sample procedures, refer to the NMED approved workplan submitted by URS in 2013. References to this document is included in **Section 5**.

2.1 HWMU REMOVAL ACTIVITIES

The overall goal for closure of the HWMU was to remove hazardous wastes and hazardous wastes residues (i.e., MEC and MD), and remove or decontaminate soils contaminated above screening levels in accordance with Section III of the RCRA Permit (NMED 2005). The objective was to remove MD and MEC from within the HWMU to a size of 5/8 inch and identify and remove any remaining contaminated soils.

2.1.1 Excavation Activities

Soils and debris were excavated from within the HWMU using remote controlled (RC) equipment. The RC equipment (i.e., excavators and dozers) worked in tandem to excavate and push material into piles, near the infeed, for conveyance to the processing plant. The soils and debris are excavated in layers to minimize the volume of material removed and facilitate periodic inspection of the excavation.

The RC equipment is also used to feed material to the processing plant. The infeed includes a feeder with a six-inch screen opening. The screen prevents potential ordnance larger than six inches from entering the plant, which protects the equipment and plant operators.

2.1.2 Processing Activities

Excavated material was processed through a closed-loop processing plant which separated material 5/8 inch or larger from soils. The processing plant utilized a series of electromagnets to remove ferrous metal debris from soils, a trommel screen to separate material 5/8 inch and smaller from all other material, a hammermill to decrease the size of material larger than 5/8 inch, and eddy currents to remove non-ferrous metals debris. Material continued to cycle through this closed loop plant until it is either removed with the electromagnets or eddy currents or passed through the 5/8-inch screen in the trommel.

All metallic debris removed from soils was deposited onto a conveyor that transferred the metal to an inspection line, manned with UXO Technicians. All metal underwent a material potentially presenting an explosive hazard (MPPEH) inspection, where MEC is identified and removed from the debris. MEC items that were determined to be acceptable to move were transferred to and stored in the ECMs until destruction at a later date. MEC items that were deemed unacceptable to move, were destroyed in the HWMU.

2.2 SOIL SAMPLE ACTIVITIES AND ANALYSES

Soil sampling activities were completed at two separate sampling areas. Processed soils were placed into 250 cubic yard stockpiles for characterization sampling. Confirmation soil sampling was completed from the limits of the remedial excavations to characterize the soils remaining, prior to placing backfill. Samples were collected in accordance with the standard operating procedures (SOPs) listed in the NMED approved workplan (URS 2013). The workplan approval letter is included in **Appendix D.**

2.2.1 Stockpile Soil Sampling

The purpose of the characterization sampling was to identify and segregate soil stockpiles that exhibited constituents meeting the screening criteria in Attachment 7 of the RCRA Permit from those that exceeded criteria. Each 250 cubic yard stockpile was placed on 6 mil poly and was given a unique numeric identifier so that when analytical results were received and validated, the results could be correlated with a specific stockpile. In total, 1,228 stockpiles were constructed either within the HWMU boundary or south of the HWMU boundary in an approved Area of Concern. The base of each stockpile was approximately 1,900 square feet. Following sampling collection, stockpiles determined to be acceptable for re-use (i.e., based on comparison to soil screening levels [SSLs] and cumulative risk calculations) were moved and used as backfill.

Each processed stockpile consisted of one discrete soil sample for volatile organic compounds (VOCs) (Method 8260B), and one composite sample collected and analyzed for target analyte list metals (Method 6010B/6020A/741B), semi-volatile organic compounds (SVOCs) (Method 8270D), explosives (Method 8330B), polychlorinated biphenyl aroclors (Method 8082A), nitrate (Method 9056A), cyanide (Method 9014), dioxins/furans (Method 8290), and perchlorate (Method 6850) as stipulated in Section III of the FWDA RCRA Permit. In order to be representative of the entire pile, the composite samples were composed of ten increments taken from varying locations throughout each pile. The samples were submitted to APPL for chemical analyses.

2.2.1.1 Field Quality Assurance/Quality Control Procedures and Samples

Field quality assurance/quality control (QA/QC) samples were designed to help identify potential sources of external sampling contamination and to evaluate potential error introduced by sample collection and handling. All QA/QC IDs were sent to the laboratory with the other samples for analysis. QA/QC samples were collected at a frequency of 10 percent.

2.2.1.1.1 Duplicate Samples

Duplicate samples were collected to assess precision of sampling and analysis. For the stockpile soil sampling, periodic duplicate samples were collected at the same time as the initial corresponding samples and co-located to the field sample location. The duplicate samples were packaged and handled identically to the initial samples, but were assigned a dedicated QA/QC ID.

2.2.1.1.2 Matrix Spikes and Matrix Spike Duplicates (MS/MSD)

MS/MSDs were utilized to assess the potential for matrix effects. Samples were designated for MS/MSD analysis on the Chain of Custody form and on sampling containers. MS/MSD samples were collected at a frequency of 5 percent.

2.2.2 Confirmation Soil Sampling

In accordance with Section III.A.4 of the Class 3 Permit Modification and the NMED approved work plan (URS 2013), soil samples were collected from the limits of the remedial excavations to characterize the remaining soils for future action(s). Confirmation samples were collected from those portions of the excavated areas where DGM data demonstrated that subsurface anomalies had been removed. Confirmation samples were collected from within detonation craters (when present); however, the entire HWMU is undergoing excavation and due to depths of the excavation and sloping requirements, individual craters have typically not been identifiable. In these cases, confirmation samples were collected from within the grid locations presented on **Figure 2-1**, which encompass the historical detonation craters.

The purpose of the confirmation sampling was to identify any areas where constituents exceeded the screening criteria stipulated in Attachment 7 of the RCRA Permit (NMED 2005). NMED SSLs for a residential land use scenario were used, or if an NMED residential SSL was not available for an analyte, the United States Environmental Protection Agency (USEPA) residential regional screening level (RSL) was used. When background concentrations of a constituent exceeded the NMED residential SSL, then the background concentration for that constituent was used as the screening value. The NMED SSL table and USEPA RSL table have been updated many times since the start of the FWDA removal activity. As a new update to the guidance table was released, the screening levels were changed on the results tables in **Appendix A**, and the risk screening tables in **Appendix B**. The NMED Risk Assessment Guidance for Site Investigations and Remediation (NMED 2012, 2014, 2017) was used to obtain SSLs. The USEPA Regional Screening Levels (RSLs)- Generic Tables were used to obtain RSLs (USEPA 2013). Refer to **Section 3.1** for a discussion on background levels at FWDA.

The tables presented in **Appendix A** are based on NMED SSL updates. The USEPA RSLs may be listed next to a sample as a more current update, but decisions made corresponding to RSL exceedances used the RSLs available at the time a sample was collected. **Table 3-1**, found after **Section 3**, provides a summary of soil sample screening level exceedances.

Confirmation soil samples were collected from the excavation. Due to the varying size and shape of each excavation, a composite sample was collected for every 100 ft of linear sidewall. If the excavation exceeded 20 ft in depth, a composite sample was collected for every 10 ft of depth every 100 ft of sidewall. Composite samples were also collected from the bottom of each 100 ft by 100 ft (i.e., 10,000 square ft) excavation (URS 2013).

Each sample area consisted of one discrete soil sample for VOCs (Method 8260B), and one composite sample collected and analyzed for target analyte list metals (Method

6010B/6020A/741B), SVOCs (Method 8270D), explosives (Method 8330B), polychlorinated biphenyl aroclors (Method 8082A), nitrate (Method 9056A), cyanide (Method 9014), dioxins/furans (Method 8290), and perchlorate (Method 6850) as stipulated in Section III of the FWDA RCRA Permit. Each composite sample consisted of sixteen subsamples (each subsample approximately 50-60 grams) randomly collected from within each sampling area. Subsamples were combined into a decontaminated or disposable bowl and thoroughly mixed with the sampling spoon. The samples were submitted to APPL for chemical analysis.

2.2.2.1 Field Quality Assurance/Quality Control Procedures and Samples

The field QA/QC procedures used during confirmation soil sampling match the procedures described for the stockpile soil sampling, which are described in **Section 2.2.1.1**.

2.3 SAMPLE IDENTIFICATION

Samples collected during site activities were given discrete sample identification numbers. Each sample was identified by a unique code that indicated the parcel number, site identifier, sample location identifier, and sample number. The following list defines the acronyms used the sample identifications.

- P3HWMU = Parcel 3, Hazardous Waste Management Unit
- SKPL = Stockpile
- CDC = Current Detonation Crater
- CRP = Current Residue Pile
- EB = Excavation Bottom
- 001 = sample #

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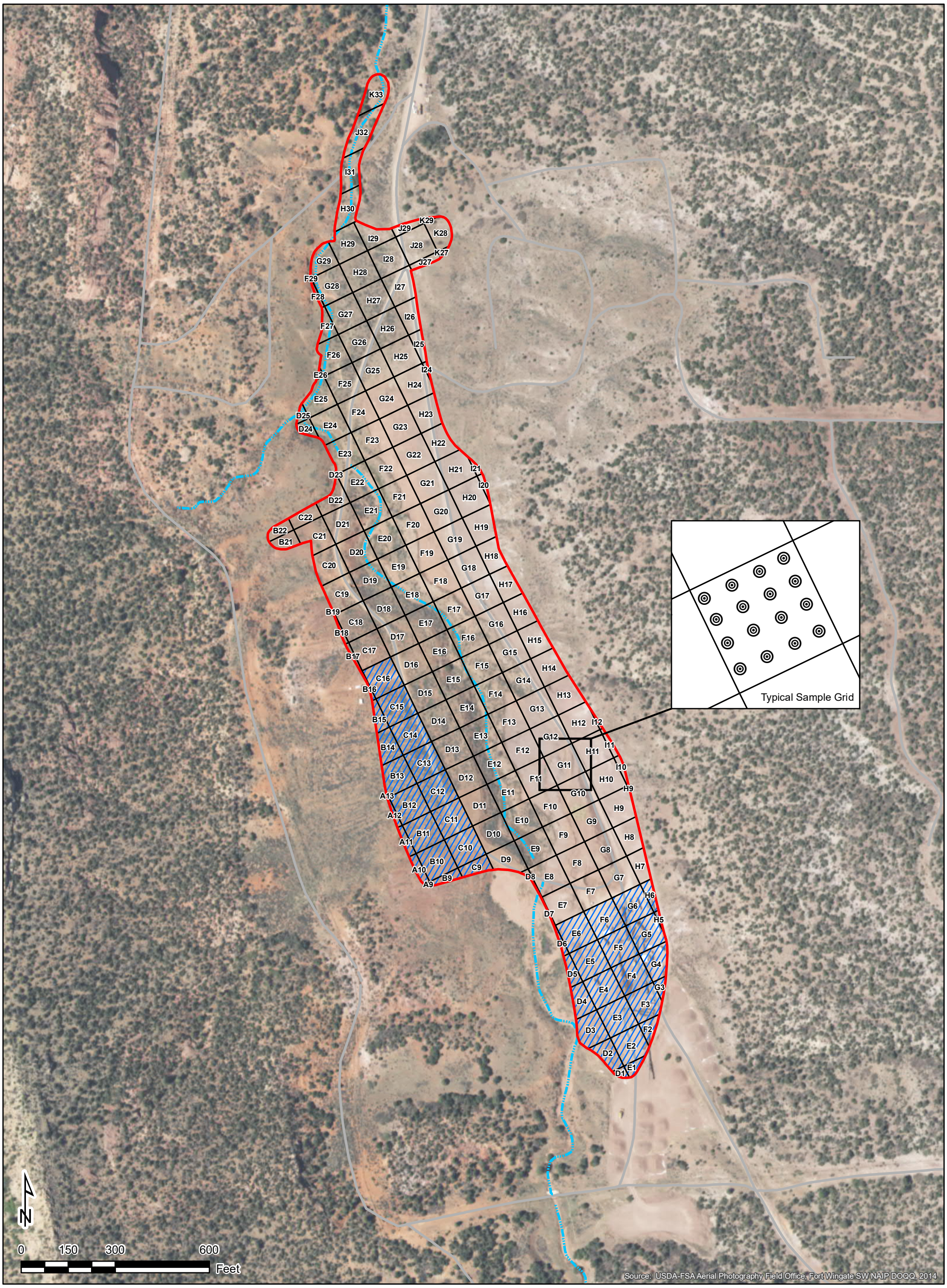

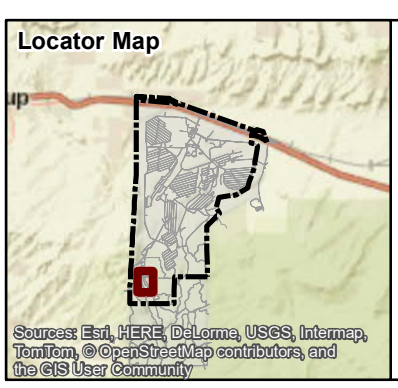

Legend

- Installation Boundary
- HWMU Boundary
- Arroyo
- Fence
- Road
- HWMU Survey Grid
- Sampled Grid
- Composite Sub Sample Location

Confirmation Sample Locations
Fort Wingate Depot Activity
McKinley County, New Mexico

Drawn By:	Date:	
JZ	12/23/2020	**Figure 2-1**
Checked By:	Project No.	
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3.1 SOIL SAMPLING RESULTS

All analyses were performed by APPL. APPL is Department of Defense Environmental Laboratory Accreditation Program (ELAP) certified. The full stockpile soil sampling results are included in **Appendix A.1** and confirmation soil sampling results are included in **Appendix A.2**. The stockpile soil samples that exceeded SSLs are summarized in **Table 3-1**. There were no confirmation samples that exceeded SSLs. Full laboratory reports were not required to be included with the yearly status reports, as stated in the Extension Request for the Parcel 3 Hazardous Waste Management Unit Investigation and Remediation Report letter from NMED on April 18, 2019. This letter is included in **Appendix D**.

The soil samples were submitted for analysis of VOCs (Method 8260B), target analyte list metals (Method 6010B/6020A/741B), SVOCs (Method 8270D), explosives (Method 8330B), polychlorinated biphenyl aroclors (Method 8082A), nitrate (Method 9056A), cyanide (Method 9014), dioxins/furans (Method 8290), and perchlorate (Method 6850) as stipulated in Section III of the FWDA RCRA Permit (NMED 2005).

Table 3-2 summarizes chemicals with a detection limit greater than the NMED SSL. One chemical (N-Nitrosodimethylamine) exhibited this quality. There were no detections of N-Nitrosodimethylamine in any of the soil samples submitted for laboratory analysis. Until recently, laboratory instrumentation did not allow for the N-Nitrosodimethylamine detection limit to meet the screening level. The Army is aware of this issue and recognizes the NMED considers this a data quality exception. The Army is currently working with the NMED on resolution of this issue.

To allow performance of the risk-based screen, the tables in **Appendices A.1** and **A.2** present the residential screening value, the source of the screening value (NMED Residential SSL, USEPA RSL, or background), the endpoint (cancer or noncancer), and the analytical result for each detected constituent. Limits of Quantitation (LOQs) were reviewed by the AECOM chemist to ensure that LOQs were below the screening values. The sampling results are compared to the following:

- **Soil Background Levels:** Site-specific soil background levels at FWDA are established in two documents: Soil Background Study and Data Evaluation Report (Shaw Environmental, Inc. 2010) and Phase 2 Soil Background Report (United States Army Corp of Engineers [USACE] 2013). When the background concentration of a metal exceeds the screening value, then the background concentration for that metal is used as the screening value.

  Arsenic is an exception to the methodology described for metals. Prior to the 2017 NMED SSL update, according to the December 18, 2013 letter from NMED (included as **Appendix D**) regarding the arsenic screening procedure, arsenic detections were to be compared to the specified site background reference of 5.6 milligrams/kilogram (mg/kg). If the detection was greater than 5.6 mg/kg, then it was compared to the site background range of 0.2 to 11.2 mg/kg. If the result exceeds 5.6 mg/kg, then the NMED SSL of 3.9 mg/kg (June 2012-December 2014) was used to assess risk, and an SSL of 4.25 mg/kg from December 2014 through March 2017. This procedure was adapted by NMED utilizing the

two background studies completed at FWDA (Shaw 2010) (USACE 2013). Following the March 2017 NMED SSL update, arsenic was screened against the SSL of 7.07 mg/kg.

Antimony was another exception to the methodology described for metals. The screening value for antimony was established to be 95 percent of the upper tolerance limit for soil unit 350 based on the 2012 soil background study conducted by USACE (USACE 2013).

- **NMED Residential SSLs:** The most current values were obtained at the time of sampling from the NMED Risk Assessment Guidance for Site Investigations and Remediation (htpps://www.env.nm.gov/hazardous-waste/guidance-documents/) (NMED 2012, 2014, 2017). The lower of the values for the cancer and noncancer endpoints was selected. This guidance was updated periodically throughout the duration of the removal activities, and updates to screening practices were made as new residential SSLs became available (NMED 2012, 2014, 2017).
- **USEPA Residential RSLs:** If an NMED SSL does not exist for a constituent, the USEPA RSL was utilized. Values were obtained from the most current RSL Residential Soil Table (TR=1E-06, HQ=1) on the USEPA RSLs- Generic Tables database (https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables) that was available at the time a sample was collected. This table was updated periodically throughout the duration of the removal activities, and updates to screening practices were made as new RSLs became available (USEPA 2013). USEPA RSLs based on a carcinogenic endpoint were adjusted by a factor of 10 to achieve the target cancer risk of 1E-05 (per NMED guidance).

3.1.1 Stockpile Soil Sampling Results

Stockpile soil samples were collected from 1,228 250 cubic yard stockpiles (1 sample per soil stockpile).

Organics were directly compared to the residential cancer and noncancer screening levels on a sample-by-sample basis. Inorganics, except arsenic, were directly compared to established background levels and the residential cancer and noncancer screening levels on a sample-by sample-basis. Arsenic was compared directly to the established site background as directed in the December 18, 2013 letter from NMED prior to the 2017 SSL update. Following the update, arsenic was compared directly to the NMED SSL of 7.07 mg/kg.

No VOCs, SVOCs, polychlorinated biphenyls, cyanide, nitrates, or perchlorate were detected at concentrations exceeding the residential cancer or noncancer screening levels in the 1,228 soil samples analyzed.

Explosive constituent 2,4,6-Trinitrotoluene (TNT) was detected above residential screening levels in 9 of the 1,228 stockpile soil samples analyzed. Concentrations in excess of the SSL (39.1 mg/kg) ranged from 52 mg/kg to the site maximum of 3,000 mg/kg in stockpile number P3HWMU-SKPL-0160.

Dioxins/furans were detected above screening levels in 1 of the 1,228 stockpile soil samples analyzed. The calculated toxicity equivalence (TEQ) for all detected dioxin and furan constituents was 47.0 nanograms per kilogram (ng/kg), which exceeded the residential cancer level of 45 ng/kg.

Metals were detected above screening levels/background concentrations in 2 of the 1,228 stockpile soil samples analyzed. One sample exhibited exceedances of two different metals: arsenic was detected at a concentration of 7.4 mg/kg, which exceeded the residential cancer screening level of 7.07 mg/kg; and iron was detected at a concentration of 94,900 mg/kg, which exceeded the residential noncancer screening level of 54,800 mg/kg. Thallium was detected in another sample at a concentration of 1.5 mg/kg, which exceeded the residential noncancer screening level of 0.213 mg/kg.

The stockpile soil samples that exceeded SSLs are summarized in **Table 3-1**

3.1.2 Confirmation Soil Sampling Results

Confirmation soil samples were collected from 62 excavation sidewall or bottom locations.

Of the 62 confirmation soil samples collected and analyzed for VOCs, SVOCs, explosives, polychlorinated biphenyls, dioxins/furans, metals, cyanide, nitrate, and perchlorate, there were no laboratory detections that exceeded the residential cancer or noncancer screening levels.

3.2 RISK SCREENING

3.2.1 Human Health

This section describes the general approach that was used to complete a risk screening for the HWMU Removal of Parcel 3. Confirmation samples were collected from excavation sidewalls and bottoms, or from individual soil stockpiles. Per NMED Guidance (NMED 2012, 2014, 2017), all detected organic compounds and metals exceeding background levels were compared to the NMED Residential SSLs. Risk screening tables for each collected soil sample are located in **Appendix B**.

Groundwater sampling was not required per the NMED approved workplan (URS 2013). No groundwater samples were collected as part of the HWMU removal activities; evaluation of groundwater was not completed as part of this risk screening.

There are no permanent surface water bodies present within the HWMU area; therefore, according to NMED guidance (NMED 2012, 2014, 2017), the surface water exposure pathways were considered incomplete, and a risk screening was not necessary.

The NMED SSLs and USEPA RSLs were updated several times throughout the life of the project. As a new update was released, the risk screening tables (**Appendix B**) were updated to reflect the most current screening levels available for future sampling. The risk screening levels

for previously collected samples were not changed, as these samples had already undergone the decision-making process (based on the risk screening) to be used as backfill or to be properly disposed if laboratory analysis indicated the sample exceeded SSLs.

3.2.1.1 Target Risk Levels

NMED SSLs are based on 1.0E-05 (1 in 100,000) target excess cancer risk or a target hazard quotient of 1.0 for noncarcinogens (NMED 2012, 2014, 2017). Exceeded NMED SSLs indicated that further evaluation of chemical concentrations and exposure assumptions may have been warranted.

3.2.1.2 Potentially Exposed Populations

NMED guidance provides screening criteria for three types of populations: residential, commercial/industrial, and construction workers. The residential screening values are generally the most conservative, especially for organic compounds; therefore, residential screening values were used to evaluate potential risks (URS 2013).

Some metals, such as manganese, have screening values that are more conservative for construction workers. Metals are initially screened against established background values. Generally, those metals with nonresidential screening values lower than residential screening values are lower than background. Therefore, background values would supersede the lower risk screening values. Background is further discussed in **Section 3.2.1.4**.

3.2.1.3 Preliminary Screening Exposure Concentrations

Concentrations were evaluated on a sample by sample basis. Therefore, the preliminary screening exposure concentration was the concentration of each chemical detected in a specific sample.

3.2.1.4 Comparison to Background Concentrations

For metals, sample concentrations were compared to established Fort Wingate HWMU background values from the 2009 background document (Shaw 2010). Arsenic and antimony are an exception. The arsenic value prior to the NMED 2017 SSL update was taken from a December 18, 2013 NMED letter (**Appendix D**). Following the 2017 update, arsenic is screened against the NMED SSL. The antimony value is the 95th percent UTL of soil unit 350 based on the 2012 background study conducted by USACE (USACE 2013). The background values are presented in the risk screening tables in **Appendix B**. Metals exceeding background values were included in the calculation of cumulative health risks (see **Section 3.2.1.5**). For further information about the arsenic and antimony screening procedures, see **Section 3.1**.

3.2.1.5 Calculation of Cumulative Human Health Risk

NMED guidance (NMED 2012, 2014, 2017) indicates that the potential cumulative risks and hazards should be considered in the screening evaluation to conclude whether further evaluation may be necessary. Therefore, consistent with the guidance, screening was performed by comparing maximum chemical concentrations detected at the site with NMED SSLs. NMED has published SSLs for the residential scenario. In the absence of NMED SSLs, USEPA RSLs were selected (carcinogenic RSLs were adjusted to a risk of 1.0E-05 per NMED guidance, consistent with NMED SSLs). Both NMED and USEPA soil screening level tables have been updated several times since 2012. The specific NMED SSLs and USEPA RSLs used to evaluate a specific sample are identified in the footnotes of the risk screening tables in **Appendix B**.

SSLs for individual carcinogenic chemicals were based on a cancer risk of 1.0E-05. SSLs for individual noncarcinogenic chemicals were based on a hazard quotient of 1.0. Cumulative cancer risks and hazard indices were calculated for each sample as follows:

- Cumulative Cancer Risk = (C1/SSL1 + C2/SSL2 + ……Cn/SSLn) x 1.0E-05
- Cumulative Hazard Index = (C1/SSL1 + C2/SSL2 + ……Cn/SSLn) x 1
- Where:
  - C1…Cn = Screening exposure concentration for chemical "1" to chemical "n."

    SSL1…SSLn = Soil screening level for chemical "1" to chemical "n" based on an SSL carcinogenic risk of 1.0E-05 or noncarcinogenic hazard of 1.0.

  Site risks less than the NMED target level of 1.0E-05 and hazard indices less than the NMED target level of 1.0 indicate that concentrations at the site are unlikely to result in adverse health impacts.

3.2.1.6 Risk Refinement

In accordance with NMED risk guidance current at the time a sample was evaluated (NMED 2012, 2014, 2017), if the hazard index was greater than 1.0, concentrations at the site were further evaluated.

A target organ/system assessment was completed if the cumulative hazard index for a sample exceeded 1.0 to determine if noncarcinogenic effects are additive. The process involved calculating hazard indices for each target organ or system and assessed whether the hazard index for an organ or organ system exceeds 1.0. Target organ/system assessments were completed as necessary throughout the reporting period.

3.2.1.7 Evaluation of Lead Concentrations

Exposure to lead can result in neurotoxic and developmental effects. The primary receptors of concern are children, whose nervous systems are still undergoing development and who also exhibit behavioral tendencies that increase their likelihood of exposure (e.g., pica). These effects

may occur at exposures so low they may be considered to have no threshold and are evaluated based on a blood lead level (rather than the external dose as reflected in the reference dose/reference concentration methodology) (USEPA 1994, 1996, 1998, 2016). Therefore, the risk evaluation and toxicological approach used by USEPA and other agencies for lead is unique from other chemicals. For residential exposures, USEPA recommends the Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children for setting site-specific preliminary risk-based remediation goals. NMED guidance (NMED 2012, 2014, 2017) also recommends the use of the IEUBK model for the evaluation of lead exposure for children. The Adult Lead Exposure Model (ALM) is the model currently used by USEPA to evaluate adult exposures in the workplace and is based on a pregnant mother's capacity to contribute to fetal blood lead levels. The models for lead back-calculate to a soil concentration that would not exceed an estimated blood-lead concentration of 10 micrograms per deciliter. NMED guidance (NMED 2012, 2014, 2017) also recommends the use of the ALM for the evaluation of adult exposures to lead. The NMED lead SSL for residential exposure is 4.00E+02 mg/kg. Hazard Quotients are not calculated for lead because there is no established threshold value. For screening, the maximum detected concentration is presented simply as a comparison with the receptor-specific SSL. Based on the screening comparison, no site lead concentrations exceeded background or the NMED residential SSL; therefore, the USEPA models were not run.

3.2.1.8 Summary of Human Health Risk Screening

A total of 1,128 stockpile samples and 62 confirmation soil samples were collected from 2012 to 2018 during the removal activities and were evaluated for human health risks. Two samples had cancer risks in excess of 1.0E-05. Eleven samples had hazard indices that exceeded 1.0 for a target organ. **Table 3-3** identifies the samples that exceeded the target cancer risk and target hazard quotient values.

3.3 MEC ITEMS AND MD RECOVERED

3.3.1 MEC Recovery Results

3.3.1.1 MEC Recovered During Surface Sweeps

Prior to the start of the HWMU mechanized recovery, surface sweeps were completed from within the HWMU, area of contamination (AOC), and clean stockpile area south of the HWMU fence. Forty-seven items were recovered from this area. Sixteen items discovered were determined to be unacceptable to move and were destroyed by detonation in place. All other items were considered acceptable to move and were transferred to the ECMs for disposal at a later date. The locations of each MEC item recovered during the surface sweeps are shown on **Figure 3-1**. MEC disposal of unacceptable to move items found during surface sweep was conducted within the HWMU where the item was originally located. Following disposal operations, the detonation crater and surrounding area was inspected by qualified UXO technicians to ensure no explosive hazards remain and recovered MD was removed. Additionally, detonation in place operations were conducted in a grid that will undergo

excavation and sampling in the future. Detonation in place operations occurred prior to the start of excavation and sampling. The detonation in place locations for items found during the surface sweep are shown on **Figure 3-1**.

3.3.1.2 MEC Recovered During Processing

A total of 19,560 MEC items were recovered from the MPPEH inspection lines of the processing plant. 132 items were determined to be unacceptable to move and were destroyed by detonation in the HWMU at the end of each day. All other items were considered acceptable to move and were transferred to the ECMs for disposal at a later date. MEC items discovered during recovery operations are logged each day on the Military Map Table. This table tracks all MEC items identified and recovered from within the FWDA Parcel 3 Inner Fence area. Since most items were recovered from the inspection lines, the locations of these items could not reasonably be determined; therefore, the location of each item is listed as HWMU, without coordinates. For the purposes of the Status Report, the table has been reduced to only items located from within the HWMU recovery area. The table has been further reduced to MEC items recovered by year, as shown in **Appendices C.1 – C.6.** Due to a contract change, no removal operations were conducted from July 2015 through August 2017; therefore, there is no table for 2016. MEC disposal of unacceptable to move items were detonated within the HWMU (i.e., within a HWMU grid that still requires excavation and processing). Following disposal operations, the detonation crater and surrounding area was inspected by qualified UXO technicians to ensure no explosive hazards remain and recovered MD was removed. The detonation in place operations for items recovered from 2012 through 2015 occurred in HWMU Grids E6, E7, G9, G10, H10, and H9, which required excavation and sampling in the future. Detonation in place operations for items recovered from 2017 through 2018 occurred in HWMU Grid H25 (shown on **Figure 2-1**), which will undergo excavation and sampling in the future. The detonation in place location is also shown on **Figure 3-1**.

- **Appendix C.1** – 2012
  - A total of 6 MEC items were identified and recovered from the HWMU in 2012.
- **Appendix C.2** – 2013
  - A total of 54 MEC items were identified and recovered from the HWMU in 2013.
- **Appendix C.3** – 2014
  - A total of 5,428 MEC items were identified and recovered from the HWMU in 2014.
- **Appendix C.4** – 2015
  - A total of 7,297 MEC items were identified and recovered from the HWMU in 2015.
- **Appendix C.5** – 2017
  - A total of 1,997 MEC items were identified and recovered from the HWMU in 2017.
- **Appendix C.6** – 2018
  - A total of 6,325 MEC items were identified and recovered from the HWMU in 2018.

3.3.1.3 MEC Recovered During DGM

In 2018, seven MEC items were located during DGM clearance activities near grid C15. Further excavation was completed to recover these seven items, and DGM was reperformed for the clearance following the excavations. The items detected during the DGM survey were located between two and twenty-four inches below ground surface (see **Table 3-4**). The item locations are illustrated in **Figure 3-1.**

3.3.1.4 MDAS Recovered

All metallic debris that was removed during the project was inspected and determined to be MDAS and flashed. Each batch of MDAS that was flashed was weighed prior to flashing to estimate the quantity of MDAS recovered during the work. Approximately 3.95 million pounds (1,975 tons) of MDAS were removed and flashed from 2012 to 2018. All MDAS generated was secured in lockable roll-off containers and shipped offsite for recycling. Each shipment of MDAS was accompanied by a Form 1348-1, documenting the material as MDAS, and a bill of lading.

3.3.2 MEC Disposal

MEC disposal operations were supervised by the Senior Unexploded Ordinance Supervisor (SUXOS) and coordinated with the on-site Ordinance and Explosives Safety Specialist. All explosive operations followed the procedures outlined in EM 385-1-97 (USACE 2008) and contractor SOPs. Transportation of donor explosives was conducted in accordance with applicable sections of 49 CFR Part 397. All appropriate notifications were made by the SUXOS prior to all MEC disposal operations.

Donor explosives were initiated by a radio-firing device, non-electric shock tube detonators, or electric blasting caps. Donor explosives, consisting of jet perforators or boosters, were obtained through an explosives vendor, and were stored in two ECMs.

After MEC disposal operations were completed, the UXO team conducted an inspection of the disposal area to confirm all explosives were consumed, and to conduct an MPPEH inspection on any remaining material.

MEC disposal of acceptable to move items was conducted within the CAMU, which is adjacent to the Solid Waste Management Unit (SWMU) 14. The CAMU and SWMU 14 are located approximately one-half mile north of the HWMU. The CAMU and SWMU 14 locations relative to the HWMU are shown on **Figure 1-2**.

3.3.2.1 AN-M66A2 Bomb Discovery

In November 2014, the discovery of an AN-M66A2, 2,000-pound general purpose bomb, which contained 1,146 pounds of high explosive filler, exceeded the allowable quantity of explosives treated at the CAMU. The item was recovered at approximately 18 feet below ground surface

during excavation sloping activities at along the southwestern HWMU boundary. The discovery led the Army to request an Emergency Permit for the Onsite Treatment of the bomb from the NMED. An Emergency Permit was issued to FWDA on May 12, 2015, permitting disposal of the bomb between May 20 and June 2, 2015.

The AN-M66A2 bomb was destroyed by controlled detonation at a location within the HWMU. Firing operations were initiated with a remote firing device and the bomb was destroyed at 10:43 a.m. on May 20, 2015. Prior to completing the treatment activities, a Legal Notice was posted in the Notices section of the May 16, 2015 printing of the Gallup Independent.

TABLE 3-1
SSL EXCEEDANCES - STOCKPILE SOIL SAMPLES
FORT WINGATE DEPOT ACTIVITY
MCKINLEY COUNTY, NEW MEXICO

Stockpile Sample Location	Date Sampled	Chemical in Exceedance of SSL	Result (mg/kg)	Residential SSL Cancer Endpoint* (mg/kg)	Residential SSL Noncancer Endpoint* (mg/kg)	Background Value**	Source (Update year)
0053	5/29/2014	2,4,6-Trinitrotoluene	59	-	39.1	-	NMED (2012)
0053	5/29/2014	TEQ***	47	45	-	-	NMED (2012)
0065	6/16/2014	2,4,6-Trinitrotoluene	610	-	39.1	-	NMED (2012)
0087	7/14/2014	2,4,6-Trinitrotoluene	130	-	39.1	-	NMED (2012)
0142	9/15/2014	2,4,6-Trinitrotoluene	71	-	39.1	-	NMED (2012)
0156	9/25/2014	2,4,6-Trinitrotoluene	67	-	39.1	-	NMED (2012)
0160	10/2/2014	2,4,6-Trinitrotoluene	3000	-	39.1	-	NMED (2012)
0178	10/14/2014	2,4,6-Trinitrotoluene	52	-	39.1	-	NMED (2012)
0423	8/16/2017	2,4,6-Trinitrotoluene	870	211	36	-	NMED (2017)
0483	8/23/2017	Arsenic**	7.4	7.07	13	5.6	NMED (2017)
0483	8/23/2017	Iron	94900	-	54800	22660	NMED (2017)
0732	3/14/2018	2,4,6-Trinitrotoluene	150	211	36	-	NMED (2017)
0799	4/23/2018	Thallium	1.5	NS	0.782	0.213	NMED (2017)

Notes:

*Residential SSL Cancer and Noncancer Endpoints reflect the levels published in the NMED Risk Assessment Guidance for Site Investigations and Remediation document, or USEPA Regional Screening Levels (RSLs)- Generic Tables that was current at the time a sample was collected. These levels have been updated several times throughout the life of this project, which explains why an SSL may change over time.

**Except for arsenic and antimony, background values are the 95% UTLs from the 2009 Background document. For antimony, the background value is the 95% UTL for soil unit 350ss based on the 2012 USACE background study. The New Mexico default value for arsenic is 7.07 mg/kg; however, Fort Wingate has site-specific values for arsenic. For arsenic, prior to the 2017 NMED SSL update, according to the December 18, 2013 letter from NMED regarding the arsenic screening procedure, arsenic detections were to be compared to the specified site background reference of 5.6 mg/kg. If the detection was greater than 5.6 mg/kg, then it was compared to the site background range of 0.2 to 11.2 mg/kg. If the result exceeds 5.6 mg/kg, then the NMED SSL of 3.9 mg/kg (June 2012-December 2014) was used to assess risk, and an SSL of 4.25 mg/kg from December 2014 through March 2017. This procedure was adapted by NMED utilizing the two background studies completed at FWDA by Shaw in 2009 and USACE in 2012. Following the March 2017 NMED SSL update, arsenic was screened against the SSL of 7.07 mg/kg.

***The dioxin and furan result and screening values are presented in ng/kg. TEQ calculation and the TEFs are from the 2005 World Health Organization (WHO) dioxin toxicity equivalence factors (TEFs) to calculate dioxin toxicity equivalence (TEQ) at CERCLA and RCRA Sites. (Van den Berg, 2005 WHO Reevaluation of Human and Mammalian TEFs Toxicological Sciences 93(2):223-241, 2006)

mg/kg- milligrams per kilogram

ng/kg- nanograms per kilogram

NMED- New Mexico Environment Department

NS- No Standard

SSL- Soil Screening Level

RSL- Regional Screening Level

USACE- United States Army Corps of Engineers

USEPA- United States Environmental Protection Agency

"-" - No available value

TABLE 3-2
CHEMICAL DETECTION LIMITS GREATER THAN SSLs
FORT WINGATE DEPOT ACTIVITY
MCKINLEY COUNTY, NEW MEXICO

Analyzed Chemical	CAS Number	Residential Value (Cancer Endpoint) (mg/kg)	Residential Value (Noncancer Endpoint) (mg/kg)	Limit of Detection* (mg/kg)	Detection Limit* (mg/kg)	Source (Update Year)
N-Nitrosodimethylamine	62-75-9	0.0226	-	0.036	0.024	NMED (2012)
N-Nitrosodimethylamine	62-75-9	0.0234	-	0.037	0.025	NMED (2014)
N-Nitrosodimethylamine	62-75-9	0.0234	0.493	0.035	0.025	NMED (2017)

Notes:

*Value may vary.

mg/kg- milligrams per kilogram

NMED- New Mexico Environment Department

"-" - No reported value

TABLE 3-3
SUMMARY OF RISK SCREENING EXCEEDANCES
FORT WINGATE DEPOT ACTIVITY
MCKINLEY COUNTY, NEW MEXICO

Sample Location	Date Sampled	Chemical in Exceedance of SSL	Result (mg/kg)	Residential SSL Cancer Endpoint* (mg/kg)	Residential SSL Noncancer Endpoint* (mg/kg)	Background Value**	Target Cancer Risk	Estimated Cancer Risk	Target Hazard Quotient	Estimated Hazard Quotient	Target Organ
SKPL0053	5/29/2014	Dioxin TEQ***	47	45	-	-	1.00E-05	1.04E-05			
SKPL0053	5/29/2014	2,4,6-Trinitrotoluene	59	-	39.1	-			1.00E+00	1.51	Liver
SKPL0065	6/16/2014	2,4,6-Trinitrotoluene	610	-	39.1	-			1.00E+00	15.6	Liver
SKPL0087	7/14/2014	2,4,6-Trinitrotoluene	130	-	39.1	-			1.00E+00	3.32	Liver
SKPL0142	9/15/2014	2,4,6-Trinitrotoluene	71	-	39.1	-			1.00E+00	1.82	Liver
SKPL0156	9/25/2014	2,4,6-Trinitrotoluene	67	-	39.1	-			1.00E+00	1.71	Liver
SKPL0160	10/2/2014	2,4,6-Trinitrotoluene	3000	-	39.1	-			1.00E+00	76.73	Liver
SKPL0178	10/14/2014	2,4,6-Trinitrotoluene	52	-	39.1	-			1.00E+00	1.33	Liver
SKPL0423	8/16/2017	2,4,6-Trinitrotoluene	870	211	39.1	-	1.00E-05	4.12E-05	1.00E+00	2.42	Liver
SKPL0483	8/23/2017	Arsenic**	7.4	7.07	13	5.6					GI, Heart, Brain, Kidney
SKPL0483	8/23/2017	Iron	94900	-	54800	22660			1.00E+00	1.73	GI
SKPL0732	3/14/2018	2,4,6-Trinitrotoluene	150	211	36	-			1.00E+00	4.14	Liver
SKPL0799	4/23/2018	Thallium	1.5	NS	0.782	0.213			1.00E+00	1.92	Hair, Eyes, Skin

Notes:

* Residential SSL Cancer and Noncancer Endpoints reflect the levels published in the NMED Risk Assessment Guidance for Site Investigations and Remediation document, or USEPA Regional Screening Levels (RSLs)- Generic Tables that was current at the time a sample was collected. These levels have been updated several times throughout the life of this project, which explains why an SSL may change over time.

**Except for arsenic and antimony, background values are the 95% UTLs from the 2009 Background document. For antimony, the background value is the 95% UTL for soil unit 350ss based on the 2012 USACE background study. The New Mexico default value for arsenic is 7.07 mg/kg; however, Fort Wingate has site-specific values for arsenic. For arsenic, prior to the 2017 NMED SSL update, according to the December 18, 2013 letter from NMED regarding the arsenic screening procedure, arsenic detections were to be compared to the specified site background reference of 5.6 mg/kg. If the detection was greater than 5.6 mg/kg, then it was compared to the site background range of 0.2 to 11.2 mg/kg. If the result exceeds 5.6 mg/kg, then the NMED SSL of 3.9 mg/kg (June 2012-December 2014) was used to assess risk, and an SSL of 4.25 mg/kg from December 2014 through March 2017. This procedure was adapted by NMED utilizing the two background studies completed at FWDA by Shaw in 2009 and USACE in 2012. Following the March 2017 NMED SSL update, arsenic was screened against the SSL of 7.07 mg/kg.

*** The dioxin and furan results and screening values are presented in ng/kg. TEQ calculation and the TEFs are from the 2005 World Health Organization (WHO) dioxin toxicity equivalence factors (TEFs) to calculate dioxin toxicity equivalence (TEQ) at CERCLA and RCRA sites. (Van den Berg, 2005 WHO Reevaluation of Human and Mammalian TEFs Toxicological Sciences 93(2): 223-241, 2006)

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act

GI - Gastrointestinal

mg/kg - milligrams per kilogram

ng/kg - nanograms per kilogram

NMED - New Mexico Environment Department

NS - No Standard

RCRA - Resource Conservation and Recovery Act

SSL - Soil Screening Level

"-" - No available value

TABLE 3-4
SUMMARY OF INTRUSIVE INVESTIGATION RESULTS
FORT WINGATE DEPOT ACTIVITY
MCKINLEY COUNTY, NEW MEXICO

Location	Item Type	Description	Depth (in)	Weight (lbs)
C16	MEC	105mm Projectile	24	7
C15	MEC	105mm Projectile	18	7
C15	MEC	40mm Projectile	6	1
C15	MEC	37mm Projectile	5	1
C15	MEC	BD Fuze	2	0.2

Notes:

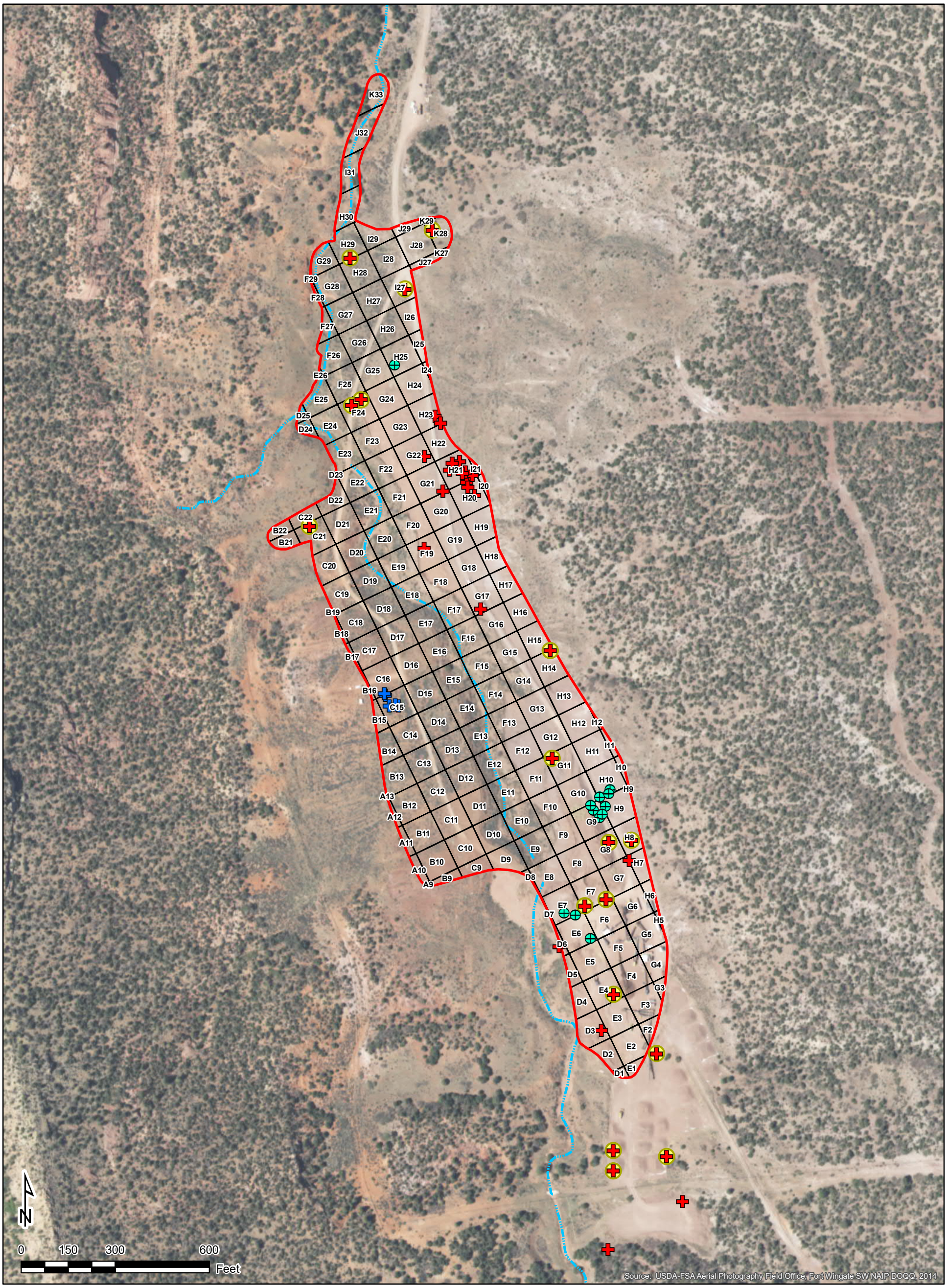
in = inche(s)

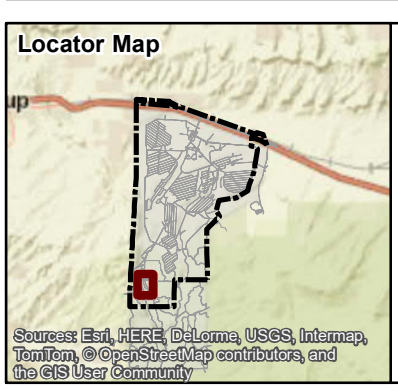
lbs = pounds

MEC = munitions and explosives of concern

MPPEH = materials potentially posing an explosive hazard

O:\DCS\Projects\ENV\GIS\Fort_Wingate\Parcel_3\Figures\HWMU_status_2018\Fig3-1_mec_recovered.mxd





Legend

- Installation Boundary
- HWMU Boundary
- Survey Grid
- Arroyo
- MEC (Surface Sweep)
- MEC (Post-Excavation DGM Dig)
- BIP Item
- Detonation in Place Location

Surface Sweep and Post-Excavation Recovered MEC
Fort Wingate Depot Activity
McKinley County, New Mexico

Drawn By:	Date:	
JZ	12/30/2020	**Figure 3-1**
Checked By:	Project No.	
GB	60517380	

Removal activities at the FWDA Parcel 3 HWMU area have been conducted from 2012 to current; however, operations ceased from late 2015 through the middle of 2017 as the initial work contract ended and a new work contract was awarded to AECOM (formerly URS). As such, there was no MEC recovery or soil sampling completed during the year 2016. This HWMU Status Report discusses data collected from 2012 through 2018. A following Status Report will be submitted for 2019.

The NMED SSLs and USEPA RSLs have been updated several times throughout the duration of the FWDA removal activity. As a new update was released, the risk screening tables were also updated. The risk screening was conducted using the most current SSL/RSL at the time a sample was collected.

Approximately 300,100 cubic yards of soil were excavated and processed through the closed-loop processing plant from 2012 to 2018. A total of 1,228 stockpile soil samples and 62 confirmation soil samples were collected from 2012 through 2018. Of the combined 1,290 samples collected from the HWMU area, 12 samples exceeded residential screening levels. Nine samples exceeded screening levels for TNT, ranging from 52 mg/kg to 3,000 mg/kg. Other detections that exceeded residential screening levels included dioxins/furans (47.0 ng/kg TEQ), arsenic (7.4 mg/kg), iron (94,900 mg/kg), and thallium (1.5 mg/kg). All exceedances were detected in stockpile soil samples and were properly disposed of at a nearby landfill. No hazardous waste was generated from within the HWMU during the 2012 through 2018 removal activities. There were no exceedances of residential screening levels from the confirmation soil samples. Stockpile soil samples that exceeded SSLs are summarized in **Table 3-1**. Confirmation samples were collected and confirmed the absence of contamination in the following 44 grids: A9 through A13, B9 through B16, C9 through C16, D1 through D6, E1 through E6, F2 through F6, G3 through G6, and H5 through H6, as shown on **Figure 2-1**. It is expected that the following grids will be excavated, processed, and sampled in 2019: B17 through B19, C17 through C20, and D10 through D20.

Risk screening was performed on all samples collected from the soil stockpiles and the confirmation samples. Two samples exhibited cancer risks in excess of 1.0E-05. Twelve samples exhibited a hazard index that exceeded 1.0 for a target organ; however, one of the samples that exceeded the 1.0 hazard index did not have any single chemical exceed 1.0, but the sum of several chemicals' hazard indices exceeded 1.0. A summary of the soil samples that exceeded risk screening levels is included in **Table 3-3**.

MEC recovery operations effectively identified and removed a total of 21,107 MEC items from the HWMU area. Most items were properly destroyed within the CAMU area (which is adjacent to SWMU 14); however, items that were designated unacceptable to move were detonated within the HWMU. MEC recovery and disposal operations were conducted by authorized on-site UXO technicians.

A total of 3.95 million pounds (1,975 tons) of MD was removed, inspected, designated as MDAS, flashed, and recycled.

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1 Information on enclosed CD

A.1 – Stockpile Soil Sampling Results

1 A.2 – Confirmation Soil Sampling Results

1 Information on enclosed CD

B.1 – Stockpile Soil Sampling Risk Tables

B.2 – Confirmation Soil Sampling Risk Tables

1 Information on enclosed CD

1 C.1 – 2012 MEC Recovered

1 C.2 – 2013 MEC Recovered

1 C.3 – 2014 MEC Recovered

1 C.4 – 2015 MEC Recovered

1 C.5 – 2017 MEC Recovered

1 C.6 – 2018 MEC Recovered

1 Information on enclosed CD

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