Final

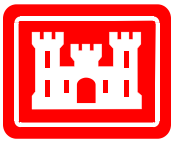
Hazardous Waste Management Unit Progress Status Report, 2019
HWMU, Parcel 3

Fort Wingate Depot Activity
McKinley County, New Mexico

June 23, 2020

Contract No. W912BV-16-C-0033

Prepared for:



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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.
bgs	below ground surface
BIA	Bureau of Indian Affairs
BRAC	Base Realignment and Closure
CAMU	Corrective Action Management Unit
CDC	Current Detonation Crater
CoC	Chain of Custody
CRP	Current Residue Pile
DDESB	Department of Defense Explosives Safety Board
DGM	Digital Geophysical Mapping
DoD	Department of Defense
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
SSHP	Site-Specific Safety and Health Plan
SSL	Soil Screening Level

SUXOS	Senior Unexploded Ordinance Supervisor
SVOC	Semi-Volatile Organic Compound
TEAD	Tooele Army Depot
TPMC	TerranearPMC
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) as an update on field operations and sampling results pertaining to the Removal Action at the Hazardous Waste Management Unit (HWMU) (Open Burning/ Open Detonation [OB/OD] Unit) (FTWG-002-R-01), at Fort Wingate Depot Activity (FWDA), McKinley County, New Mexico.

Removal action operations have been conducted at FWDA 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 operations by AECOM Technical Services, Inc. (AECOM) occurring in 2019.

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. 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) areas. 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 HWMU relative to the OB/OD area.

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-filled 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 throughout 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).

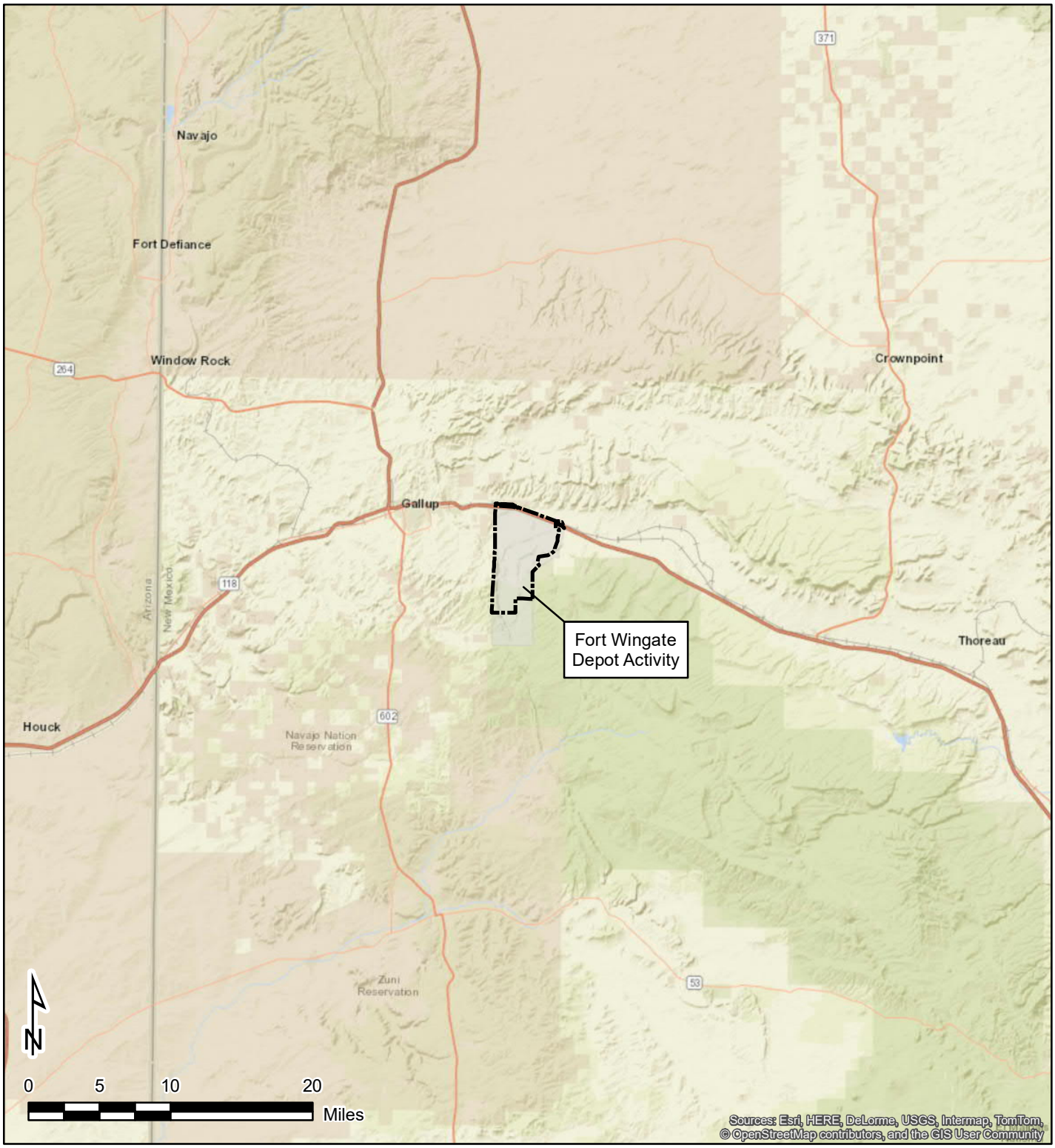
Beginning in 2012, in accordance with the NMED approved workplan submitted by URS (URS 2013), cleanup activities included the mechanized removal of contaminated soils from the HWMU area. The removed soils, which included MEC and other MD, were treated in a processing plant which separated ferrous and non-ferrous materials from the soil contents. All MEC items discovered during processing were inspected by trained unexploded ordnance (UXO) technicians and disposed of by burning or detonation. A discussion of the 2019 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 cleanup 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 were exceeded, but were below hazardous waste disposal criteria, 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 2019 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

remove 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**.



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Installation Boundary

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

Drawn By:	Date:	
JZ	6/8/2020	**Figure 1-1**
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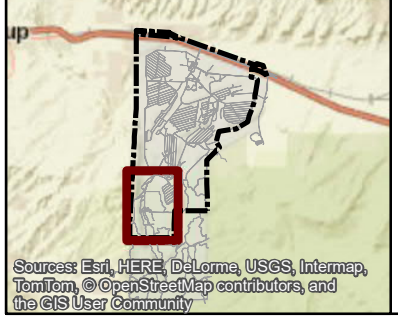
0 500 1,000 2,000
Feet

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, USDA, USGS, and the GIS User Community

Locator Map



Legend

- Installation Boundary
- HWMU 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	6/8/2020	**Figure 1-2**
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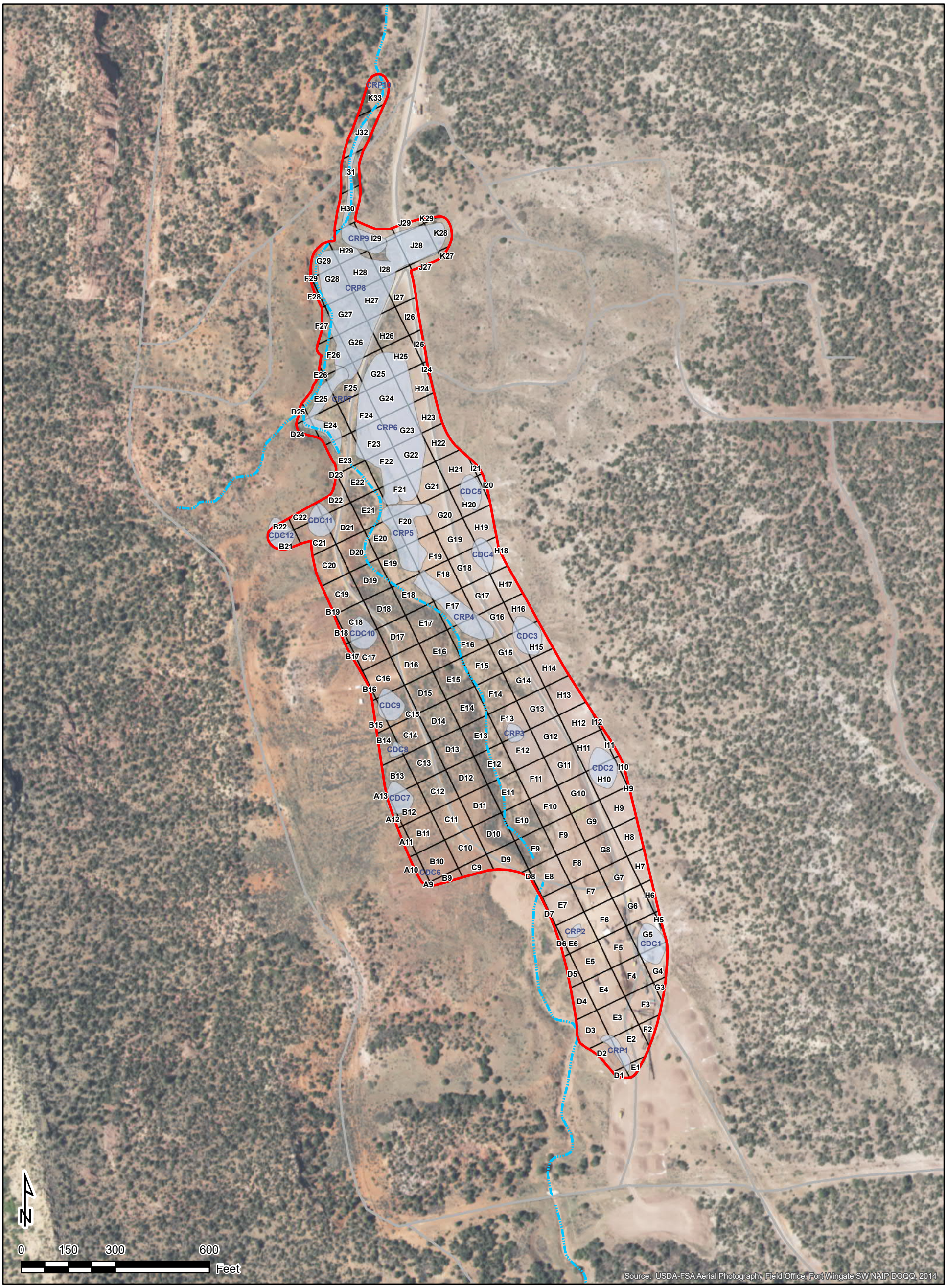

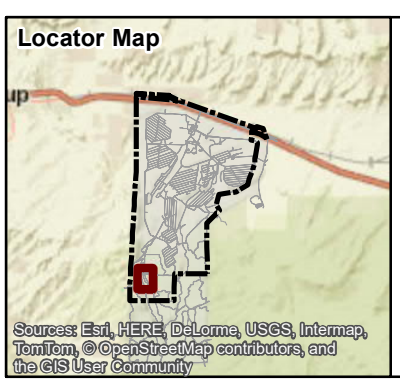

Legend

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

HWMU Detail
Fort Wingate Depot Activity
McKinley County, New Mexico

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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 (URS 2013). Reference to this document is included in **Section 5**.

2.1 HWMU REMOVAL ACTIVITES

The overall goal for closure of the HWMU was to remove hazardous wastes and hazardous waste 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 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 prevented potential ordnance larger than six inches from entering the plant to protect 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 metal debris. Material continued to cycle through this closed loop plant until it was either removed by the electromagnets or eddy currents, or it 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 was 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 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.

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/MSDs were utilized to assess the potential for matrix effects. Samples were designated for MS/MSD analysis on the CoC 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. The soil sampling confirmation grid locations are presented on **Figure 2-1**.

The purpose of the confirmation sampling was to identify any areas where constituents exceeded the cleanup criteria stipulated in Attachment 7 of the RCRA Permit (NMED 2005). NMED soil screening levels (SSLs) for a residential land use scenario were used, or if an NMED residential SSL was not available for an analyte, the 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 were updated during the 2019 removal activities. 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 2017, 2019) was used to obtain SSLs. The 2017 NMED SSL table was used up until the 2019 update was released in February 2019. The USEPA Regional Screening Levels (RSLs)- Generic Tables were used to obtain RSLs (USEPA 2018). Similar to the NMED SSL table updates, the November 2018 RSL table was used until the subsequent updates were released in May 2019 and November 2019. 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**, located after **Section 3**, provides a summary of soil sample screening level exceedances during the 2019 removal activities.

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 in accordance with the NMED approved workplan (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 was composed of nine subsamples randomly collected from within each sampling area. The samples were submitted to APPL for chemical analysis.

2.2.2.1 Field Quality Assurance/Quality Control Procedures and Samples

Refer to **Section 2.1.1.1** for field QA/QC procedures and samples.

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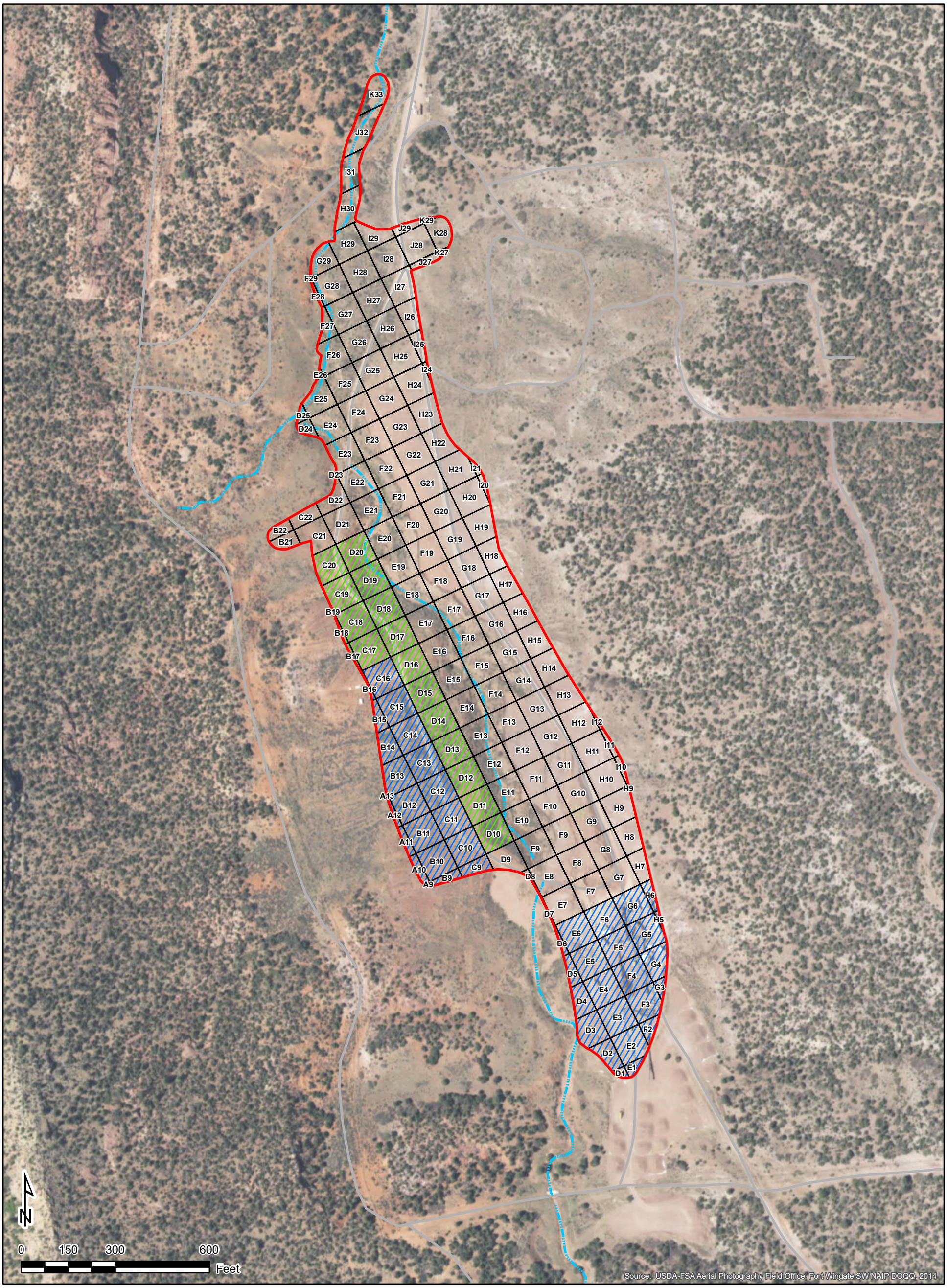

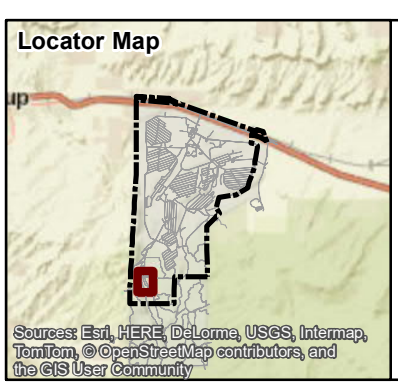

Legend

- Installation Boundary
- HWMU Boundary
- Arroyo
- Road
- HWMU Survey Grid
- Sampled Grid (2012-2018)
- Sampled Grid (2019)

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

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JZ	6/9/2020	**Figure 2-1**
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3.1 SOIL SAMPLING RESULTS

All analyses were performed by Agriculture and Priority Pollutants Laboratories. APPL is Department of Defense (DoD) 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.

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 [NMED 2017, 2019], USEPA RSL [USEPA 2018], or background [Shaw 2010] [USACE 2013]), 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 were compared to the following:

- **Soil Background Levels:** Site-specific soil background levels at FWDA were 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, the background concentration for that metal is used as the screening value.

  Antimony was an 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 2017, 2019). The 2017 NMED SSL table was used up until the 2019 update was released in February 2019. 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 2017, 2019).

- **USEPA Residential RSLs:** If an NMED SSL did 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 2018). Similar to the NMED SSL table updates, the November 2018 RSL table was used until the subsequent updates were released in May 2019 and November 2019. 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 a total of 416 250-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 were directly compared to established background levels and the residential cancer and noncancer screening levels on a sample-by-sample basis.

No VOCs, SVOCs, explosives, polychlorinated biphenyls, dioxins/furans, cyanide, nitrates, or perchlorate were detected at concentrations exceeding the residential cancer or noncancer screening levels in the 416 soil samples analyzed.

Metals were detected above screening levels in one of the 416 stockpile soil samples analyzed. Thallium was detected in one sample (sample ID: P3HWMU-SKPL-1416) at a concentration of 0.87 mg/kg, which exceeded the residential noncancer screening level (0.782 mg/kg) by a factor of 1.11.

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 18 excavation sidewall/bottom locations.

Of the 18 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 2017, 2019), all detected organic compounds and metals exceeding background levels were compared to the NMED Residential SSLs. The 2017 NMED guidance document and SSL tables were used until the February 2019 update was released, at which point the 2019 document and SSL tables were used. 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 2017, 2019), the surface water exposure pathways were considered incomplete, and a risk screening was not necessary.

The NMED SSLs and USEPA RSLs were updated during the 2019 removal activities. 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 2017, 2019). 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). Antimony is an exception. 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 antimony screening procedures, see **Section 3.1**.

3.2.1.5 Calculation of Cumulative Human Health Risk

NMED guidance (NMED 2017, 2019) 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 were updated during the 2019 removal activities. The specific NMED SSLs and USEPA RSLs used to evaluate a specific sample are identified in the footnotes of the risk screen 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 screening 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 2017, 2019), 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 were 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 exceeded 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 2017, 2019) 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 2017, 2019) 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 416 stockpile samples and 18 confirmation soil samples were collected in 2019 during the removal activities and were evaluated for human health risks. No samples had cancer risks in excess of 1.0E-05. One sample had a hazard index 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 during the reporting period.

3.3 MEC ITEMS AND MD RECOVERED

3.3.1 MEC Recovery Results

3.3.1.1 MEC Recovered During Processing

A total of 5,029 MEC items were recovered from the MPPEH inspection lines of the processing plant in 2019. 104 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 were recorded each day on the MEC Log. 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 removed from within the HWMU recovery area, as shown in **Appendix C.**

3.3.1.2 MEC Recovered During DGM

In 2019, two MEC items were located during DGM clearance activities near Grids D11 and D12. Further excavation was completed to recover these two items, and DGM was reperformed for clearance following the excavations. The item locations are illustrated in **Figure 3-1.**

3.3.1.3 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 733,000 pounds (366.5 tons) of MDAS were removed and flashed in 2019, with a total of 4.68 million pounds (2,341 tons) of MDAS removed and flashed since the beginning of the removal activities in 2012. 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 that explosives were consumed, and to conduct an MPPEH inspection on any remaining materials.

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)
1416	7/11/2019	Thallium	0.87	NS	0.782	0.213	NMED (2019)

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 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 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	0.0234	0.493	0.035	0.025	NMED (2017)
N-Nitrosodimethylamine	62-75-9	0.0234	0.493	0.036	0.025	NMED (2019)

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
SKPL1416	7/11/2019	Thallium	0.87	NS	0.782	0.213	-	-	1.00E+00	1.11	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 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 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

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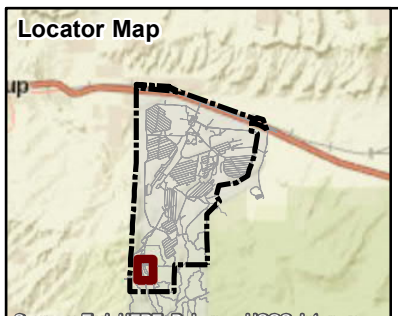
N

0 150 300 600
Feet

Source: USDA-FSA Aerial Photography Field Office, Fort Wingate SW NAIP DOQQ, 2014

Locator Map



Legend

- Installation Boundary
- HWMU Boundary
- Arroyo
- MEC (Post-Excavation DGM Dig)

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

Drawn By:	Date:	
JZ	6/8/2020	**Figure 3-1**
Checked By:	Project No.	
GB	60517380	

Remedial activities at the FWDA Parcel 3 HWMU area have been in operation from 2011 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 during the 2019 recovery operations.

The NMED SSLs and USEPA RSLs were updated during the 2019 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. The 2017 NMED guidance document and SSL tables were used until the February 2019 update. The November 2018 USEPA RSL tables were used until the subsequent updates were released in May 2019 and November 2019.

A total of 416 stockpile soil samples and 18 confirmation soil samples were collected in 2019. Of the 434 samples collected from the HWMU area, one sample exceeded residential screening levels. One stockpile soil sample exhibited a metals concentration of 0.871 mg/kg for thallium, which exceeded the NMED residential noncancer screening level (0.782 mg/kg). Stockpiles that exceeded screening criteria were disposed of in a licensed, off-site landfill. There were no other exceedances in the stockpile soil samples and no exceedances of residential screening levels from the confirmation soil samples. Stockpile soil samples that exceeded SSLs are summarized in **Table 3-1**.

Risk screening was performed on all samples collected from the soil stockpiles and the confirmation samples. No samples exceeded the cancer risk of 1.0E-05. One sample exhibited a hazard index that exceeded 1.0 for a target organ. A summary of the soil samples that exceeded risk screening levels in included in **Table 3-3**.

MEC recovery operations effectively removed a total of 5,029 MEC items from the HWMU area in 2019 (a total of 26,136 MEC items since the beginning of the removal activities in 2012). Most items were properly disposed of within the CAMU area; 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.

Approximately 733,000 pounds (366.5 tons) of MD was removed, inspected, designated as MDAS, flashed, and recycled in 2019, with a total of 4.68 million pounds (2,341 tons) of MDAS removed since the beginning of the removal activities in 2012.

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1 A.1 – Stockpile Soil Sampling Results

A.2 – Confirmation Soil Sampling Results

B.1 – Stockpile Soil Sampling Risk Tables

B.2 – Confirmation Soil Sampling Risk Tables