Final
RCRA Facility Investigation
Phase 2 Work Plan
Parcel 23
Revision 1.0

Fort Wingate Depot Activity
McKinley County, New Mexico

April 29, 2019

Contract No. W9126G-11-D-0040
Task Order No. 0002

Prepared for:

US Army Corps
of Engineers ®

United States Army Corps of Engineers
Fort Worth District
P.O. Box 17300
Fort Worth, Texas 76102

Prepared by:

amec
foster
wheeler

Amec Foster Wheeler Environment & Infrastructure, Inc.
4600 E. Washington Street, Ste. 600
Phoenix, Arizona 85034

[THIS PAGE INTENTIONALLY LEFT BLANK]

REPORT DOCUMENTATION PAGE	*Form Approved* *OMB No. 0704-0188*

1. REPORT DATE (DD-MM-YYYY) 04-29-2019	**2. REPORT TYPE** RFI Phase 2 Work Plan	**3. DATES COVERED *(From – To)*** July 2015 – July 2018

4. TITLE AND SUBTITLE Final RCRA Facility Investigation Phase 2 Work Plan Parcel 23 Fort Wingate Depot Activity McKinley County, New Mexico	**5a. CONTRACT NUMBER** W9126G-11-D-0040
	5b. GRANT NUMBER N/A
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S) Julie Hamilton/Amec Foster Wheeler	**5d. PROJECT NUMBER**
	5e. TASK NUMBER
	5d. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Amec Foster Wheeler Environment & Infrastructure, Inc. 4600 E. Washington Street, Ste 600 Phoenix, Arizona 85034	**8. PERFORMING ORGANIZATION REPORT NUMBER** AMEC912640002
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Corps of Engineers, Fort Worth District CESWF-PEC-EA 819 Taylor Street Fort Worth, TX 76102 Project Manager: Mr. Steven Smith	**10. SPONSOR/MONITOR'S ACRONYM(S)** **USACE**
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT
This RCRA Facility Investigation Phase 2 Work Plan describes additional investigation activities within Parcel 23 at Fort Wingate Depot Activity, McKinley County, New Mexico.

15. SUBJECT TERMS
Fort Wingate Depot Activity, Phase 2 RFI Work Plan, Parcel 23.

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**	SAR	165	Mark Patterson
U	U	U			**19b. TELEPHONE NUMBER (*Include area code*)** 330/358-7312

1
2

Standard Form 298 (Rev. 8/98)
Prescribed by ANSI Std. Z39.

[THIS PAGE INTENTIONALLY LEFT BLANK]

NMED APPROVAL LETTER
(WILL BE INSERTED)

[THIS PAGE INTENTIONALLY LEFT BLANK]

Final

RCRA Facility Investigation Phase 2 Work Plan Parcel 23 Revision 1.0

Fort Wingate Depot Activity
McKinley County, New Mexico

April 29, 2019

Contract No. W9126G-11-D-0040
Task Order No. 0002

Prepared for:

United States Army Corps of Engineers
Fort Worth District
P.O. Box 17300
Fort Worth, Texas 76102

Prepared by:

Amec Foster Wheeler Environment & Infrastructure, Inc.
4600 E. Washington Street, Ste. 600
Phoenix, Arizona 85034

[THIS PAGE INTENTIONALLY LEFT BLANK]

DOCUMENT CERTIFICATION

40 CFR 270.11
APRIL 2019

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

____
Mr. Steven Smith
Fort Wingate Program Manager

[THIS PAGE INTENTIONALLY LEFT BLANK]

PREFACE

This Resource Conservation and Recovery Act Facility Investigation Phase 2 Work Plan describes the supplemental field activities that will be conducted within Parcel 23 at Fort Wingate Depot Activity (FWDA), New Mexico. This work plan addresses the requirements of the U.S. Army Corps of Engineers (USACE) Statement of Work Modification 9.

This Work Plan was prepared by Amec Foster Wheeler Environment & Infrastructure, Inc. on July 24, 2018 and revised in response to New Mexico Environment Department (NMED) disapproval letter dated October 31, 2018. Mr. Mark Patterson served as the FWDA Defense Base Realignment and Closure Environmental Coordinator and Mr. Steve Smith served as the USACE Project Manager.

____

Julie Hamilton, PG
Program Manager

[THIS PAGE INTENTIONALLY LEFT BLANK]

DOCUMENT DISTRIBUTION LIST

Organization (Name)	**Number of Printed Copies**	**Number of Electronic Copies**
John Kieling (NMED HWB)	2	2
Chuck Hendrickson (USEPA 6)	1	1
Mark Patterson (FWDA BEC)	1	1
FWDA Admin Record (NM)	2	2
Ian Thomas (BRACD)	0	1
Steve Smith, Ft. Worth District (USACE SWF)	1	2
Cheryl Montgomery (USACE ERDC)	0	1
Sharlene Begay- Platero (NN)	1	7
Mark Harrington (POZ)	1	8
Clayton Seoutewa (BIA Zuni)	1	1
Dr. B.J Howerton (DOI/BIA)	0	1
George Padilla (BIA-NR)	1	2
Jennifer Turner, DOI- Office of the Solicitor	0	1
Administrative Record, OH	0	1
Totals	11	31

BIA Zuni - Bureau of Indian Affairs – Zuni Representative
BIA-NR - Bureau of Indian Affairs – Navajo Representative
BRACD – (U. S. Army) Base Realignment and Closure Division
DOI - Department of the Interior
FWDA BEC - Fort Wingate Depot Activity Base Environmental Coordinator
NM - New Mexico
NMED HWB - New Mexico Environment Department Hazardous Waste Bureau
NN - Navajo Nation
OH - Ohio
POZ - Pueblo of Zuni
USACE ERDC - U.S. Army Corps of Engineers – Engineer Research and Development Center
USACE SWF - U. S. Army Corps of Engineers – Fort Worth District
USEPA - United States Environmental Protection Agency

[THIS PAGE INTENTIONALLY LEFT BLANK]

TABLE OF CONTENTS

Section **Page**

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

[THIS PAGE INTENTIONALLY LEFT BLANK]

LIST OF ACRONYMS AND ABBREVIATIONS

°C	Degrees Centigrade
%	Percent
§	Section
AOC	Area of Concern
Army	United States Department of the Army
atm-m^3/mol	Atmospheres – cubic meter (s) per mole
AUF	Area use factor
AwM	Approval with Modifications
bgs	Below ground surface
CFR	Code of Federal Regulations
CLS	Claystone
COC	Chain-of-custody
COPC	Chemical of potential concern
COPEC	Chemical of potential ecological concern
CSM	Conceptual site model
DAF	Dilution attenuation factor
DoD	Department of Defense
DRO	Diesel range organics
EC	Effect concentration
EPC	Exposure point concentration
ESL	Ecological Screening Level
FWDA	Fort Wingate Depot Activity
g/mol	Grams per mole
GIS	Geographic information system
GPS	Global Positioning System
HASP	Health and Safety Plan
HCl	Hydrochloric acid
Hg	Mercury
HI	Hazard Index
HNO_3	Nitric acid
HQ	Hazard quotient
HSA	Hollow stem auger
HWB	Hazardous Waste Bureau

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

ID	Identification
IDW	Investigation-derived waste
L	Liter
LCS	Laboratory Control Sample
LOAEL	Lowest observed adverse effect level
LOD	Limit of detection
LOQ	Limit of quantitation
MCL	Maximum contaminant level
mg/kg	Milligrams per kilogram
mL	Milliliter
MS	Matrix spike
MSD	Matrix spike duplicate
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMOSE	New Mexico Office of the State Engineer
NOAEL	No observed adverse effect level
NOD	Notice of Disapproval
Oz	Ounce
PPE	Personal protective equipment
Permit	Resource Conservation and Recovery Act Permit NM 6213820974 for the Fort Wingate Depot Activity
QA	Quality assurance
QC	Quality control
QSM	Quality Systems Manual
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RPD	Relative percent difference
RSL	Regional screening level
Shaw	Shaw Environmental, Inc.
SLERA	Screening level ecological risk assessment
SLHQ	Screening level hazard quotient
SSL	Soil Screening Level
SSO	Site Safety Officer
SVOC	Semi-volatile organic compound
SWMU	Solid Waste Management Unit

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

TAL	Target analyte list
TPH	Total petroleum hydrocarbons
TRV	Toxicity reference values
UCL	Upper confidence limit
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UTL	upper tolerance limit
VI	Vapor intrusion
VISL	Vapor intrusion screening level
VOA	Volatile organic analysis
VOC	Volatile organic compound
WQCC	New Mexico Water Quality Control Commission

[THIS PAGE INTENTIONALLY LEFT BLANK]

SECTION 1.0 INTRODUCTION

This Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Phase 2 Work Plan describes the additional investigation activities to be completed within Parcel 23 at Fort Wingate Depot Activity (FWDA), McKinley County, New Mexico (see **Figures 1-1** and **1-2**).

This RFI Phase 2 Work Plan has been prepared by the United States Army Corps of Engineers (USACE) Fort Worth District for submission to the New Mexico Environment Department's (NMED) Hazardous Waste Bureau (HWB), as required by Section VII.H.1.a of the RCRA Permit (hereinafter referred to as "Permit"; NM 6213820974) for the FWDA, which became effective December 31, 2005 and was most recently modified in February 2015 (NMED, 2015a).

This work plan, originally submitted on July 24, 2018, has been revised to address NMED comments in a disapproval letter dated October 31, 2018. A copy of the disapproval letter along with the Army's response letter is included in Appendix A.

1.1 Purpose and Scope

The purpose of this RFI Phase 2 Work Plan is to propose additional investigation at select areas within Parcel 23 as recommended by the United States Department of the Army (Army) in the *RCRA Facility Investigation Report, Parcel 23, Revision 1.0, Fort Wingate Depot Activity*, hereafter referred to as the RFI Report, as prepared by the United States Geological Survey (USGS; 2015). This RFI Phase 2 Work Plan also addresses NMED comments related to the RFI Report as presented in the Notice of Disapproval (NOD) dated August 19, 2014 (NMED, 2014) and the Approval with Modifications (AwM) dated August 12, 2015 (NMED, 2015b). The additional sampling has been recommended to fill data gaps identified by previous investigations and reviews of previous investigations in order to better characterize the nature and extent of contamination.

1.2 Background Information

The Permit lists one Solid Waste Management Unit (SWMU) and one Area of Concern (AOC) within Parcel 23, as follows:

- SWMU 21 – Central Landfill;
- AOC 73 – Former buildings or structures along Road C-3.

The locations of SWMU 21 and AOC 73 are illustrated in **Figure 1-3**. Complete background information regarding FWDA and Parcel 23 is provided in numerous documents previously submitted to NMED, including the following:

- Final Historical Information Report, Parcel 23, Fort Wingate Depot Activity (CH2M Hill, 2009);

- Final – NMED Revision, RCRA Facility Investigation Work Plan, Parcel 23, Fort Wingate Depot Activity (hereafter referred to as the “RFI Work Plan”, CH2M Hill, 2010); and
- RFI Report (USGS, 2015).

RFI activities were detailed in the RFI Report submitted to NMED in April 2012. NMED responded to submittal of the RFI Report with a NOD in August 2014 (NMED, 2014). The RFI Report was revised based on the NOD comments and submitted as Revision 1.0 in February 2015 (USGS, 2015). An AwM was received from NMED in August of 2015 (NMED, 2015b).

The investigation activities described in this RFI Phase 2 Work Plan have been developed to address the Army recommendations contained in the RFI Report and comments from NMED in the AwM. The AwM also requires that Army address all comments within the NOD, specifically those comments referencing future actions through the development of a RFI Phase 2 Work Plan. For reference, the following documents are included in **Appendix A:**

- NMED NOD Letter - August 19, 2014
- Army Response to NOD - February 28, 2015
- NMED AwM - August 12, 2015
- Correspondence between NMED and Army regarding downgradient well location – April/May 2018

Appendix A also includes the following documents:

- NMED Work Plan Extension Request Approval Letters – December 22, 2015, January 19, 2016, December 1, 2016, December 6, 2017
- NMED Work Plan NOD Letter – October 31, 2018
- Army Response to NOD Letter – March 30, 2019

The following summarizes how this work plan addresses the NOD comments that were not already addressed as part of the revised RFI Report:

- **Comments 4 and 10**: NMED requested clarification of the excavation boundaries and the details of the additional landfill cell.

  In 1999, all waste and visibly impacted soil below the former Central Landfill was removed and disposed of at an offsite disposal facility (SCIENTECH, 1999a). An additional cell to the south of the original Central Landfill boundary was discovered during the excavation and its contents were also excavated (SCIENTECH, 1999b).

  The actual excavation boundaries for the new cell are not documented; however, the Release Assessment Report (Tetra Tech NUS, 2000) describes the samples being taken along the center line of the former excavation.

  The additional area is illustrated as SWMU 21 as depicted in **Figure 1-3** and is planned to be added to SWMU 21 as part of a future permit action.

- **Comment 6:** NMED requested additional investigation within the arroyo to assess potential impact from surface water run off or leachate migration.

  Proposed additional sample locations have been added to the north of the excavation area within the arroyo as described in Section 3.0.

- **Comment 9:** NMED requested additional information with respect to the backfill material used for landfill closure.

  Previous reports suggested that clean fill material was utilized for backfill; however, soil sample results collected after the backfill and grading activities indicated exceedances of semi-volatile organics (SVOCs) and metal. The revised RFI Report suggests that observed impacts may be the result of runoff from the adjacent coal burning boiler plant (Building 535).

  Sampling of the fill material is proposed as described in Section 3.0.

- **Comments 11 and 12**: NMED has requested a groundwater investigation to evaluate potential impacts associated with the former landfill.

  The proposed investigation activities are described in Section 4.0.

- **Comment 15**: NMED has requested three additional soil borings related to the exceedance at soil boring SB08 as described in the RFI Report.

  The proposed borings are described in Section 3.0.

The AwM included five comments. Two of these comments were substantive comments pertaining to further investigation activities. The following addresses how each of the comments have been addressed within this work plan:

- **AwM Comment 4:** This comment provides an additional clarification to Comments 9 and 15 of the NOD. NMED agrees with the proposed approach for the three additional borings but requests that samples be taken in the upper portion of the boring to characterize the backfill material. It further requests a site survey.

  The proposed boring and site survey are described in Section 3.0.

- **AwM Comment 5:** The RFI Report recommended no further action for AOC 73. This recommendation was made after comparison of the arsenic concentration of 4.1 mg/kg, detected at a single sample location, to the site-specific background concentration of 7.07 mg/kg for arsenic. In the AwM, NMED concurred with this recommendation pending an evaluation of the data collected for a soil background study based on incremental samples.

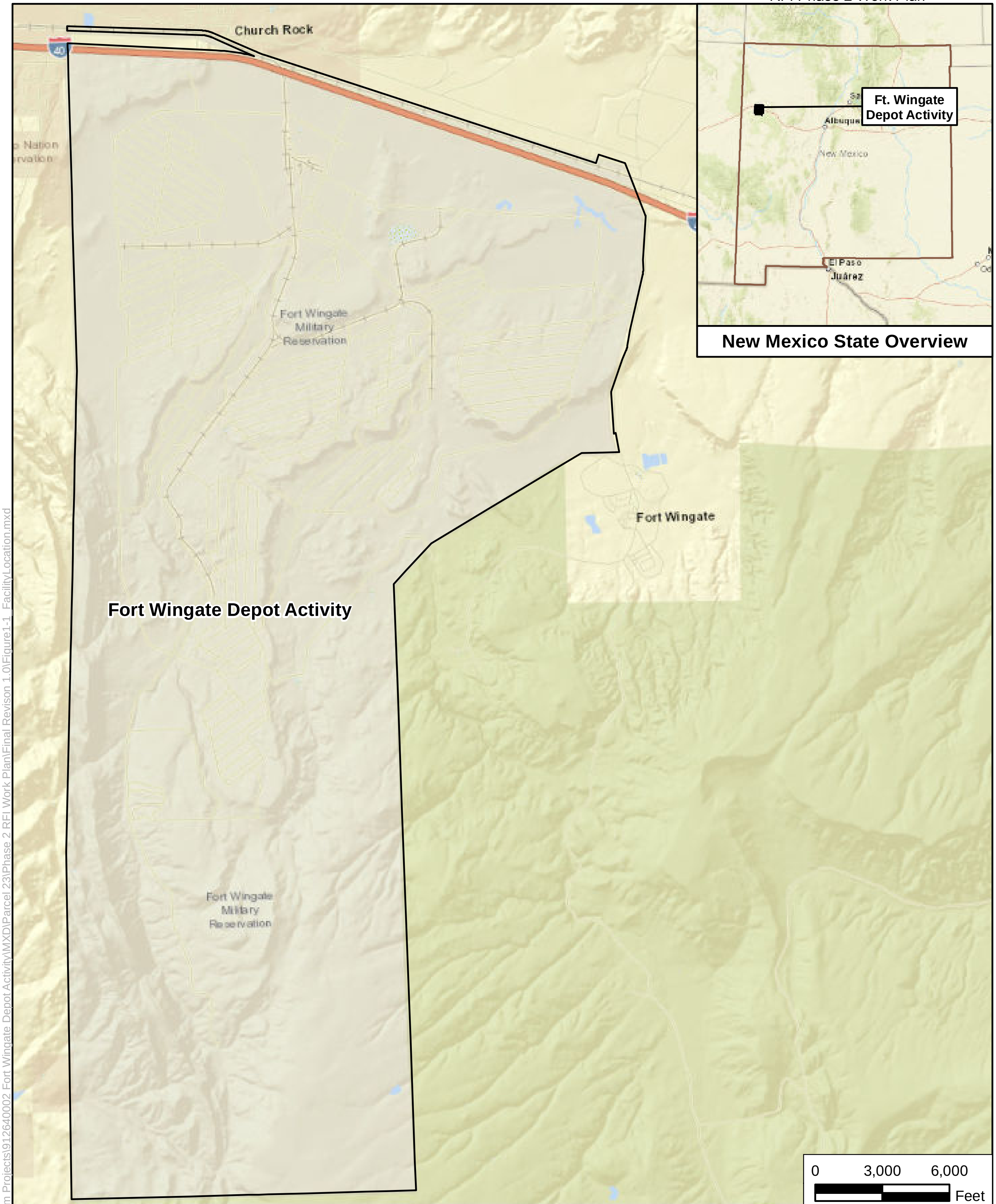
  The background study based upon incremental samples is no longer relevant. The arsenic concentration detected at AOC 73 is below the 2019 NMED Residential SSL of 7.07 mg/kg (NMED, 2019). As such, the Army considers Comment 5 of the AwM satisfied and no further actions are necessary for AOC 73.

- **AwM Comments 1, and 3:** These comments pertain to the request for a Phase 2 Work Plan, in accordance with current NMED guidance, that must address both the AwM Comments (NMED, 2015b) and NMED's NOD (NMED, 2014).
- **AwM Comment 2:** This comment states that future response letters to disapproval letters contain additional detail including a cross-reference to changes within the document.

1.3 Cultural Resources

Previous sampling was undertaken within Parcel 23 in 2010 and at that time, the Army coordinated with the Navajo Nation and the Pueblo of Zuni to determine if there were any cultural resource concerns associated with the sampling.

In response to the current proposed sampling within Parcel 23, a current review of the geographic information system (GIS) shape files of locations of archaeological sites recorded at FWDA determined that numerous archaeological sites have been recorded within this parcel. No archaeological sites recorded at FWDA are located within the horizontal footprint of SWMU 21. Should any sites outside of SWMU 21 show potential to be impacted by site related activities, these will be flagged and avoided during field work. Pursuant to the 2008 Programmatic Agreement for Cultural Resources on FWDA, avoidance is the first choice of RCRA Permit activities. As such, these archaeological sites will be temporarily flagged for avoidance during sampling within SWMU 21.



Job No.:	912640002
PM:	JH
Date:	3/19/2019
Scale:	1" = 6000 feet

N

Final RFI Phase 2 Work Plan, Revision 1.0
Parcel 23 - Fort Wingate Depot Activity
McKinley County, New Mexico

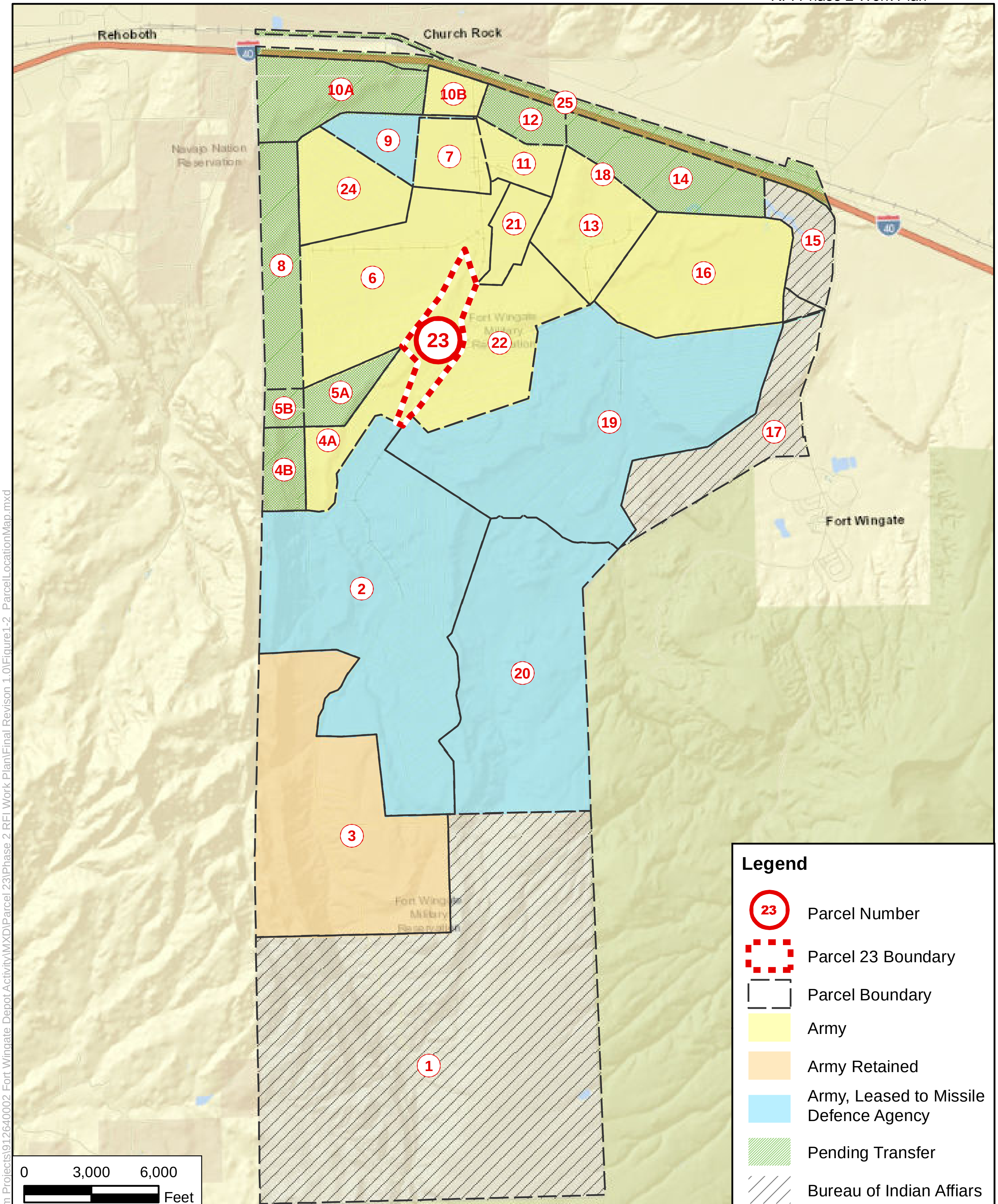
The map shown here has been created with all due and reasonable care and is strictly for use with Amec Foster Wheeler Project Number 912640002. This map has not been certified by a licensed land surveyor, and any third party use of this map comes without warranties of any kind. Amec Foster Wheeler assumes no liability, direct or indirect, whatsoever for any such third party or unintended use.

Facility Location Map

FIGURE
1-1

amec foster wheeler

Path: X:\Projects\20-Longterm Projects\912640002 Fort Wingate Depot Activity\MXD\Parcel 23\Phase 2 RFI Work Plan\Final Revison 1.0\Figure1-1_FacilityLocation.mxd



Job No.:	912640002
PM:	JH
Date:	3/19/2019
Scale:	1" = 6000 feet

N

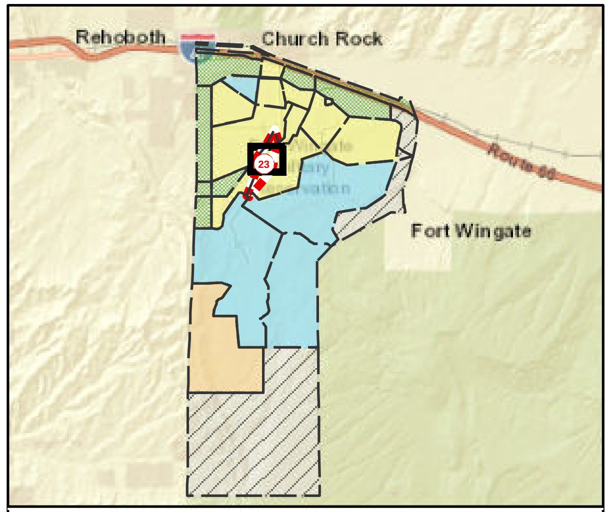
Final RFI Phase 2 Work Plan, Revision 1.0
Parcel 23 - Fort Wingate Depot Activity
McKinley County, New Mexico

Parcel Map

FIGURE
1-2

amec foster wheeler

Path: X:\Projects\20-Longterm Projects\912640002 Fort Wingate Depot Activity\MXD\Parcel 23\Phase 2 RFI Work Plan\Final Revison 1.0\Figure1-2_ParcelLocationMap.mxd



Parcel Map

Legend

- Additional area identified and removed (Tetra Tech NUS, 2000) to be formally added to SWMU 21 boundaries as a future permit modification
- AOC/SWMU Boundary
- Parcel Number
- Parcel 23 Boundary
- Parcel Boundary
- Road

Notes:

AOC	Area of Concern
SWMU	Solid Waste Management Unit

Aerial Image Source: 2009, CIR

0 75 150 300 Feet

N

Final RFI Phase 2 Work Plan, Revision 1.0
Parcel 23 - Fort Wingate Depot Activity
McKinley County, New Mexico

Site Location Map,
SWMU 21 - Central Landfill and
AOC 73 - Former Buildings or Structures
Along Road C-3

FIGURE **1-3**

Job No.:	912640002
PM:	JH
Date:	4/15/2019
Scale:	1" = 300'

amec foster wheeler

[THIS PAGE INTENTIONALLY LEFT BLANK]

SECTION 2.0 DESCRIPTION OF INVESTIGATION ACTIVITIES

This section provides general information regarding the planned field activities to be completed as part of this RFI Phase 2 Work Plan. Information related to specific sample locations within SWMU 21 is presented in Sections 3.0 and 4.0.

2.1 Site Safety and Awareness

All work will be accomplished in accordance with Army safety measures. A project-specific Health and Safety Plan (HASP) has been developed for sampling activities at FWDA. The HASP defines the roles and responsibilities of site personnel, establishes proper levels of personal protective equipment (PPE), and describes emergency response and contingency procedures. The associated Activity Hazard Analyses define hazards associated with each type of work activity and how those hazards will be mitigated. The HASP will be reviewed by site personnel prior to performing any site work. In addition, task-specific Activity Hazard Analyses will be reviewed before any new tasks are performed and periodically during daily tailgate safety meetings.

All work will be completed by a supervisor, operators, and technicians that have successfully completed 40-hour Hazardous Waste Operations and Emergency Response training in accordance with 29 *U.S. Code of Federal Regulations* 1910.120. A dedicated Site Safety Officer (SSO) will be on site during all field activities associated with implementation of this RFI Phase 2 Work Plan. The SSO will be responsible for conducting site-specific training, daily tailgate safety meetings, and conducting periodic safety inspections.

2.2 Sampling and Analysis

This section provides general information regarding the methods that will be employed for various sampling activities to be completed during site investigation. A summary of analytical methods, sample containers, preservatives, and holding times is provided in **Table 2-1**. The following subsections provide details regarding sample collection and management, quality assurance (QA) and quality control (QC).

2.2.1 Subsurface Soil Sampling

Shallow subsurface samples (up to 3 feet below ground surface [bgs]) will be collected from the bottom of the borehole using a decontaminated hand auger. Deeper subsurface samples (greater than 3 feet) will be collected using Direct-Push Technology or hollow-stem auger (HSA) equipment utilizing decontaminated split spoons, as appropriate. Samples will be collected from the sampling device using a decontaminated stainless-steel spoon or disposable plastic trowel.

For samples collected using split spoons, the liner containing the soil core will be split in half lengthwise using a decontaminated knife. If a sample is to be submitted for analysis of volatile organic compounds (VOCs), the VOC sample will be collected immediately after opening the sampling device by inserting the laboratory-supplied sampling device into the soil core; this sample will then be immediately extruded into the appropriate laboratory-supplied sample container(s) containing sodium bisulfate. Samples for all other analyses will be placed using either a stainless-steel spoon/trowel or a disposable scoop directly in laboratory supplied clean containers with a moisture-tight lid. The sample containers will then be placed into a cooler with ice and cooled to less than or equal to six degrees Centigrade (≤6ºC). Lids will be sealed by labels or custody seals to prevent tampering.

After soil samples are collected (to preserve sample integrity), the remaining lithologic samples will be fully described. After the contents of the sampler are measured, sampled, and described the core will be discarded and handled as Investigation-Derived Waste (IDW) as described in Section 2.10.

All HSA borings will be abandoned by grouting to surface, unless the boring will be completed as a monitoring well (see Section 4.0). For deeper borings (those extending into the water table), rigid tremie pipe will be extended to the bottom of the boring and pump grout through the pipe until undiluted grout flows from the boring at ground surface. For shallow borings (those not penetrating the water table), grout will be poured into the boring from the surface until grout flows from the boring at ground surface. Grout will be composed of 20 parts cement (Portland cement, Type II or V), up to 1 part bentonite, and a maximum of 8 gallons of approved water per 94-pound bag of cement.

All non-disposable drilling and sampling equipment will be decontaminated prior to initiation of drilling activities and between each borehole following standard operating procedures to prevent cross contamination. A temporary decontamination pad area will be constructed to contain decontamination water, which will be managed as IDW as described in Section 2.10.

2.2.2 Groundwater Sampling

In order to address comments from NMED in the NOD (NMED, 2014; specifically Comments 11 and 12), a groundwater investigation will be implemented to assess whether groundwater quality has been impacted as a result of former landfill. The general approach to evaluating whether or not groundwater is impacted will be to collect groundwater samples from the first water-bearing zone by means of a temporary well. All boreholes will be logged using a USACE Drilling Log (Form 1836 and 1836a). All boreholes will also be permitted through the New Mexico Office of the State Engineer (NMOSE). Additional details regarding temporary well installation and sampling are provided in Section 4.0.

2.3 Quality Control

In order to obtain data of sufficient quality to support project objectives, specific procedures are required to allow evaluation of data quality. The QA/QC procedures and requirements for their evaluation will comply with the Department of Defense (DoD) Quality Systems Manual (QSM), Version 5.0 (DoD, 2013). The applicable aspects of these reference documents, as they apply specifically to FWDA, are summarized below.

2.3.1 Field and Laboratory Quality Control Samples

Evaluation of field sampling procedures and laboratory equipment accuracy and precision requires the collection and evaluation of field and laboratory QC samples. **Table 2-2** summarizes the planned QC samples for this project. A description of each QC sample type is provided in the following sections.

2.3.1.1 Quality Control Analyses/Parameters Originated by the Laboratory

Method Blank

Method blanks are used to monitor each preparation or analytical batch for interference and/or contamination from glassware, reagents, and other potential sources within the laboratory. A method blank is a contaminant-free matrix (laboratory reagent water for aqueous samples or Ottawa sand, sodium sulfate, or glass beads [metals] for soil samples) to which all reagents are added in the same amount or proportions as are added to the samples. It is processed through the entire sample preparation and analytical procedures along with the samples in the batch.

There will be at least one method blank per preparation or analytical batch. If a target constituent is found at a concentration that exceeds one-half the limit of quantitation (LOQ) in the method blank, the laboratory must perform corrective action in an attempt to identify and, if possible, eliminate the contamination source. If sufficient sample volume remains in the sample container, samples associated with the blank contamination should be re-prepared and re-analyzed after the contamination source has been eliminated.

To determine is elimination is appropriate, the contractor will use the following protocol, during data validation, to determine if results should be qualified because of blank detections. If target analytes are detected in blank samples, the contractor will U qualify detected results from the associated field samples, at the higher of the detected concentration or the limit of detection, if the concentration detected in the sample is less than five times the concentration detected in the blank. The validation report will also include a table that summarizes blank detections, associated samples, and original and revised results that were qualified due to the blank detections.

Laboratory Control Sample

The Laboratory Control Sample (LCS) will consist of a contaminant-free matrix such as laboratory reagent water for aqueous samples or Ottawa sand, sodium sulfate, or glass beads (metals) for soil samples spiked with known amounts of constituents that come from a source different than that used for calibration standards. Target constituents will be spiked into the LCS. The spike levels will be less than or equal to the midpoint of the calibration range for each analyte. If LCS results are outside the specified control limits, corrective action must be taken, including sample re-preparation and re-analysis, if appropriate. If more than one LCS is analyzed in a preparation or analytical batch, the results for each LCS must be reported. Any LCS recovery outside QC limits affects the accuracy for the entire batch and requires corrective action.

Matrix Spike/Matrix Spike Duplicate

A sample matrix fortified with known quantities of specific compounds is called a matrix spike (MS). It is subjected to the same preparation and analytical procedures as the native sample. For this project, all target constituents will be spiked into the MS sample. Sample MS recoveries are used to evaluate the effect of the sample matrix on the recovery of the analytes of interest. A matrix spike duplicate (MSD) is a second aliquot of the MS sample, fortified at the same concentration as the MS. The Relative Percent Difference (RPD) between the results of the duplicate matrix spikes measures the precision of sample results.

Project-specific samples will be used by the laboratory for the MS/MSD samples, which will be designated on the chain-of-custody (COC) form. The spike levels will be less than or equal to the midpoint of the calibration range. MS/MSD pairs will be collected at a frequency of 5 percent (%). MS/MSDs are required in every analytical batch regardless of the rate of collection and how samples are received at the laboratory.

2.3.1.2 Quality Control Analyses Originated by the Field Team

Field QC samples will be collected to determine the accuracy and precision of the analytical results. Field sampling will be conducted from the least contaminated areas to the most contaminated areas, to minimize the potential for cross-contamination. The potential for phthalates/ plasticizers to be present in project samples will be minimized by using the appropriate type of gloves, minimizing use of plastic in sampling (i.e. maximum use of stainless steel), and when plastic is required (for example, tubing for groundwater sampling), it will be phthalate-free. Field QC samples will be used to evaluate if field equipment and sampling protocols have introduced phthalates. The QC sample frequencies are stated in the following subsections.

Equipment Blank

Equipment blanks will be collected to monitor the cleanliness of sampling equipment and the effectiveness of decontamination procedures. Contamination from the sampling equipment can bias the analytical results high or lead to false positive results being reported. Equipment blanks will be prepared by filling sample containers with laboratory-grade contaminant-free water that has been passed through a decontaminated or unused disposable sampling device. The required QC limits for equipment blank concentrations are to be less than the method’s LOQ. Equipment blanks will be collected daily. Samples associated with equipment blanks that have detected target constituents will be assessed during the data validation process. The usability of the associated analytical data will be documented and affected data will be appropriately qualified. Field corrective action to improve equipment decontamination procedures may also be implemented by the field team leader at the request of the project chemist.

Field Duplicate

Field duplicates are collected in the field simultaneously from adjacent locations in the field to evaluate the heterogeneity of the medium. Field duplicates will be collected and analyzed at a frequency of 10%, or one per sampling event.

Trip Blank

Trip blanks are used to monitor for contamination during sample shipping and handling, and for cross-contamination through volatile component migration among the collected samples. They are prepared in the laboratory by pouring organic-free water into a volatile organic analysis (VOA) sample container. They are then sealed, transported to the field, and transported back to the laboratory in the same cooler as the volatile component samples. One trip blank sample set (two VOAs) will accompany each volatile component sample cooler.

2.3.2 Data Precision, Accuracy, Representativeness, Comparability and Completeness

Field QA/QC samples and laboratory internal QA/QC samples are collected and analyzed to assess the data's quality and usability. The following subsections discuss the parameters that are used to assess the data quality.

Precision

The precision of laboratory analysis will be assessed by comparing the analytical results between MS/MSD and laboratory duplicate samples. The precision of the field sampling procedures will be assessed by reviewing field duplicate sample results. The RPD will be calculated for the duplicate samples using the equation:

$$\%RPD = \frac{2 * |S - D|}{(S + D)} \times 100$$

where:

S = first sample value (original value)
D = second sample value (duplicate value)

The precision criteria for laboratory duplicate samples (between MS and MSD results, LCS and LCS duplicate results, or duplicate analyses) will be ≤ 20% RPD. Precision criteria for field duplicates will be ≤ 50% RPD for soil samples or ≤ 30% RPD for water samples.

Accuracy

Accuracy of laboratory results will be assessed for compliance with the established QC criteria using the analytical results of method blanks, reagent/preparation blanks, LCS and MS/MSD samples and surrogate results, where applicable. Laboratory accuracy will be assessed using the laboratory's most current statistically-derived limits. LCS, MS, MSD, and surrogate recoveries will be calculated using the following equation:

Percent Recovery = (A/B) x 100

where:

A = the detected analyte concentration
B = the known spike concentration

Completeness

The data completeness of laboratory analysis results will be assessed for compliance with the amount of data required for decision making. Complete data are data that are not rejected. Data with qualifiers such as "J" or "UJ" are deemed acceptable and can be used to make project decisions as qualified. The completeness of the analytical data is calculated using the equation:

Percent Completeness = [(complete data obtained)/(total data planned)] x 100

The percent completeness goal for this sampling event is 90% for each analytical method.

Representativeness
Representativeness is the degree to which sampling data accurately and precisely represent site conditions, and is dependent on sampling and analytical variability and the variability of environmental media at the site. Representativeness is a qualitative “measure” of data quality.

Achieving representative data in the field starts with a properly designed and executed sampling program that carefully considers the project’s overall objectives. Proper location controls and sample handling are critical to obtaining representative samples.

The goal of achieving representative data in the laboratory is measured by assessing accuracy and precision. The laboratory will provide representative data when the analytical systems are in control. Laboratory representativeness is met when sample COC and sample preservation are properly documented, analytical procedures are followed and holding times are met.

Comparability
Comparability is the degree of confidence to which one data set can be compared to another. Comparability is a qualitative “measure” of data quality.

Achieving comparable data in the field starts with a properly designed and executed sampling program that carefully considers the project’s overall objectives. Proper location controls and sample handling are critical to obtaining comparable samples.

The goal of achieving comparable data in the laboratory is measured by assessing accuracy and precision. The laboratory will provide comparable data when analytical systems are in control. Therefore, comparability of data sets should be achieved if proper analytical procedures are followed and holding times are met.

Sensitivity
Sensitivity is the ability of the method or instrument to detect the contaminant of concern and other target compounds at the concentration of interest, and with acceptable precision and bias. Where possible, sampling and analytical methods will be selected that result in LOQs that are lower than the corresponding screening level for the analytes of interest, in order to support evaluation of the data against the established screening levels. For soil, the performance criteria are the screening levels presented in the NMED Risk Assessment Guidance for Site Investigations and Remediation (NMED, 2017 and2019). The NMED soil screening levels (SSLs) and ecological screening levels (ESLs) will be used to evaluate contaminant concentrations in soil samples. If NMED does not publish an SSL for human receptors, the United States Environmental Protection Agency (USEPA) soil regional screening level (RSL) may be used instead. For groundwater, the screening levels follow the hierarchy provided in Attachment 7, Section 7.1, of the Permit (NMED, 2015a), and include New Mexico Water Quality Control Commission (WQCC) standards as set forth in New Mexico Administrative Code (NMAC), USEPA maximum contaminant levels (MCLs), and USEPA tap water RSLs (USEPA, 2018). These groundwater screening levels will be used to evaluate contaminant concentrations in groundwater samples. Assessment of analytical sensitivity will require thorough data validation. A comparison

of the human health screening levels to laboratory quantitation limits is provided in **Table 2-3** and **Table 2-4**. A comparison of the ecological screening levels to laboratory quantitation limits is provided in **Table 2-5**.

In cases where sampling and analytical methods with LOQs below SSLs and ESLs for an analyte are not available, or where laboratory specific LOQs exceed the SSL or ESL, laboratory reporting to the limit of detection (LOD) will be required. As the LOD represents a concentration level where result uncertainty (i.e., precision and bias) are less predictable that they are at the LOQ, data between the LOQ and the LOD will be qualified as estimated, and the uncertainty will be reflected in discussions in the risk evaluation. In addition, results between the LOQ and the LOD will be subjected to additional scrutiny during data validation to try to identify any evident positive or negative biases, and the results of this added review will be incorporated into the data validation report and reflected in the risk evaluation.

2.3.3 Data Verification and Data Review Procedures

Personnel involved in data validation will be independent of any data generation effort. The project chemist will be responsible for the oversight of data verification, review, and validation. Data verification and review will be performed when the data packages are received from the laboratory. Verification will be performed on an analytical-batch basis using the summary results of calibration and laboratory QC, as well as those of the associated field samples. There are five stages of review defined in the USEPA Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use (2009):

- Stage 1: Verification and validation based only on completeness and compliance of sample receipt condition checks.
- Stage 2A: Verification and validation based on completeness and compliance checks of sample receipt conditions and ONLY sample-related QC results.
- Stage 2B: Verification and validation based on completeness and compliance checks of sample receipt conditions and BOTH sample-related and instrument-related QC results.
- Stage 3: Verification and validation based on completeness and compliance checks of sample receipt conditions, both sample-related and instrument-related QC results, AND recalculation checks.
- Stage 4: Verification and validation based on completeness and compliance checks of sample receipt conditions, both sample-related and instrument-related QC results, recalculation checks, AND the review of actual instrument outputs.

For this project, 100% of the data packages will undergo data verification and data review (Stage 2B); specifically, 90% will undergo Stage 2B and 10% will undergo Stage 4.

2.3.4 Data Assessment

Limitations on data usability will be assigned, if appropriate, as a result of the validation process described earlier. The results of the data validation will be discussed in a separate report so that overall data quality can be verified through the precision, accuracy, representativeness, comparability, and completeness of sample results. Data qualifiers that may be assigned based on the validation process are listed in **Table 2-6**.

2.4 Chain-of-Custody

The COC forms will be completed and will accompany each sample at all times. A completed COC form will accompany each cooler. Data on the COC will include the sample identification (ID) (as described in Section 2.9), depth interval, date sampled, time sampled, project name, project number, and signatures of those in possession of the sample. The COC forms will accompany those samples shipped to the designated laboratory so that sample possession information can be maintained. The field team will retain a separate copy of the COC at the field office. Additionally, the sample ID, date and time collected, collection location, and analysis requested will be documented in the field log book as discussed in Section 2.6.

2.5 Packaging and Shipping Procedures

All samples will be shipped by overnight air freight to the laboratory or hand-delivered. Unless otherwise indicated, samples will be treated as environmental samples, shipped in heavy duty coolers, packed in materials to prevent breakage, and preserved with ice in sealed plastic bags. Each shipment will include the appropriate field QC samples (i.e., trip blanks, duplicates, and equipment blanks).

Corresponding COC forms will be placed in waterproof bags and taped to the inside of the cooler lids. Each cooler shipped from the laboratory containing aqueous sample bottles for VOC analyses will contain a trip blank. The trip blank will stay with the cooler until the cooler is returned to the analytical laboratory. All coolers will be taped shut and will include a custody seal to ensure tampering has not occurred during transit.

2.6 Sample Documentation

Sample control and tracking information will be recorded in bound dedicated field logbooks and will include the following information: sample number and location, date, sampler's name, method of sampling, sample depth, soil sample physical description, ambient weather conditions, and miscellaneous observations. At the conclusion of each day in the field, the sampling team leader will review each page of the logbook for errors and omissions. Each reviewed page will be signed and dated.

2.7 Field Instrument Calibration

All field instruments will be calibrated following manufacturer recommended calibration procedures and frequencies. Field instrument calibrations will be recorded in a designated portion of the field logbook at the time of the calibration. Adverse trends in instrument calibration behavior will be corrected.

2.8 Survey of Sample Locations

The location of each sample collected will be surveyed using appropriate instrumentation and procedures to obtain horizontal accuracy of less than 0.1 foot. A Trimble Total Station Global Positioning System (GPS), Trimble Static GPS, or equivalent, will be utilized to document each soil sample location. A North American Datum 1983 Northing and Easting in United States Survey Feet will be established for all surveyed points and recorded in a dedicated field notebook. Survey data will be supplied in the Final Report in New Mexico State Plane and Universal Transverse Mercator Index coordinates.

2.9 Sample Identification

During sampling, unique sample ID numbers will be assigned to each sample or subsample. Each sample ID number will consist of a combination of the Parcel number, SWMU/AOC number, additional site identifier, source of sample, increment or boring number, type of sample, and depth of sample collection in accordance with the latest version of the FWDA Environmental Information Management Plan (USACE, 2007). Following is an example sample number and a description of the sample identifiers to be used during implementation of this RFI Phase 2 Work Plan.

Example Sample ID:	2321CLANDSB01A-0.5-1.0D-SO
Parcel:	23
SWMU or AOC:	in this case SWMU 21
Additional Site Identifier:	in this case CLAND (for Central Landfill)
Source of Sample:	in this case SB (soil boring)
Increment Number:	Samples collected within each SWMU/AOC will be assigned sequential 2-digit or 3-digit numbers (in this case 01)
Depth Identifier:	For samples collected at multiple depths at the same sample location, use of an alphabetic letter after the Increment Number will denote the different depths (in this case A)
Depth Range:	In feet (in this case 0.5-1.0 foot)
Type of Sample:	D (discrete)
Matrix:	SO (Soil)

QA/QC samples will carry the same sample nomenclature as the parent sample with a unique suffix and numeral (if required) to distinguish individual samples. Equipment blanks, trip blanks, and field blanks will carry the sample location identifier with an additional designation of TBXX or EBXX (where XX represents the sequence number of the sample). Each blank will have a unique tracking number.

2.10 Investigation-Derived Waste

Four types of IDW may be generated during the sampling of environmental media during the Parcel 23 Phase 2 RFI activities: residual soil volume; decontamination fluids; development water, purge water and excess sample water from monitoring wells; and disposable sampling equipment/PPE. These IDW categories will be managed as follows:

- Limited surface and shallow subsurface soil that remains after required sample volumes have been collected from drive samplers and hand augers will be returned to the hole as allowed by NMED. Drill cuttings from HSA borings will be containerized pending analysis of samples sent to the laboratory; disposal will be based on sample analytical results.
- Decontamination fluids will be contained within a temporary decontamination pad area during active sampling and decontamination activities at a site. Volumes of decontamination fluids are anticipated to be small. Accumulated wash and rinse water will be left within the decontamination pad area and allowed to evaporate. In the event of rainfall events, decontamination fluids will be containerized in drums temporarily and allowed to evaporate at a later date, but prior to demobilization for the sampling event. In no circumstance will accumulated fluids be stored on-site following the sampling event.
- Development water, purge water and excess sample water from monitoring wells will be containerized at the sample site in clean buckets and/or tanks with a watertight lid. Depending on the volumes generated, water from multiple wells may be consolidated into one or more containers. At the end of the sampling day, the filled IDW containers will be emptied into one of two low-density polyethylene-lined evaporation tanks. The evaporation tanks are located at the former Building 542 in Parcel 6.
- Used, non-decontaminated disposable sampling equipment or PPE will be placed in polyethylene trash bags and treated as general refuse. Refuse will be placed in suitable facility trash receptacles on a daily basis.

Table 2-1 Summary of Analytical Methods, Sample Containers, Preservation, and Holding Times

Target Analytes	Matrix	Analytical Method (USEPA SW846)	Sample Volume/Container	Preservative	Maximum Holding Time (collection until extraction/ extraction until analysis)
Volatile Organic Compounds	Soil	8260C	40-mL VOA Vial	Sodium bisulfate, Cool to ≤ 6°C	14 days
	Water	8260C	3 x 40-mL VOA Vial	HCl to pH < 2 Cool to ≤ 6°C	14 days
Semi-Volatile Organic Compounds	Soil	8270D	4-oz Glass Jar	Cool to ≤ 6°C	14/7 days to extraction (soil/water) 40 days to analysis
	Water		1 L Amber Bottle		
TAL Metals / Mercury	Soil	6020A / 7470 (water) / 7471 (soil)	4-oz Glass Jar	Cool to ≤ 6°C (only required for Hg)	6 months (28 days for Hg)
	Water		1 L Poly Bottle	HNO3 to pH < 2	
Total Petroleum Hydrocarbons – Diesel Range Organics (extended)	Soil	8015 modified	8-oz Glass Jar	Cool to ≤ 6°C	14/7 days to extraction (soil/water) 40 days to analysis
	Water	8015B	1 L Amber Bottle		
Explosives	Soil	8330B	8-oz Glass Jar	Cool to ≤ 6°C	14/7 days to extraction (soil/water) 40 days to analysis
	Water		2 x 1 L Amber Bottle		

Notes:

°C = Degrees Centigrade
Hg = Mercury
L = Liter
oz = Ounce
HCl = Hydrochloric acid
HNO_3 = Nitric acid
mL = Milliliter
TAL = Target Analyte List metals
USEPA = United States Environmental Protection Agency
VOA = Volatile organic analysis

More than one analysis may be performed from the same sample container, as long as all preservation requirements have been met and there is sufficient sample mass available.

Table 2-2 Quality Control Samples for Precision and Accuracy

Quality Control Type	Precision	Accuracy	Minimum Frequency
Field	Relative Percent Difference (RPD) Goal of ≤ 50% (for soil) and ≤ 30% (for water)	Duplicate Sample Laboratory Analysis	One every 10 samples (10%)
		Equipment Blank	One per day for reusable equipment
		Trip Blank	One per each cooler containing VOC samples
Laboratory	Matrix Spike/Matrix Spike Duplicate (RPD goal of ≤ 20% for metals, VOCs, and SVOCs, ≤ 30% for all other analyte classes)	Method Blank	One per batch, at least one every 20 samples (rounded up) (5%)
		Laboratory Control Sample or Blank Spike	One per batch, at least one every 20 samples (rounded up) (5%)
		Matrix Spike Percent Recovery (QSM 5.0 Percent Recovery Goals)	One every 20 samples (rounded up) (5%)
		Surrogate Spike (for organics only)	All samples and QC

Notes:
QC = Quality control
QSM = Quality Systems Manual
RPD = Relative Percent Difference
SVOC = semi-volatile organic compound
VOC = volatile organic compound

Table 2-3
Comparison of Human Health Soil Screening Levels to Laboratory Quantitation Limits

Analyte	Surrogate Analyte (used for screening value selection)	Analytical Method (1)	CASRN	Units	Background Value (2)	NMED Table A-1 Human Health Screening Levels Direct Contact (3)						USEPA RSL Table Human Health Screening Levels Direct Contact (4)				Human Health Screening Levels Groundwater Protection			Selected Human Health Direct Contact Screening Level (7,9)	Selected Human Health Groundwater Protection Screening Level (8, 9)	Achievable Laboratory Limits		
						Residential		Commercial/ Industrial		Construction Worker		Residential		Industrial		NMED Table A-1 Risk-based SSL (5)	NMED Table A-1 NMGW/MCL based SSL (5)	USEPA RSL Table Risk-based SSL (6)			LOQ	LOD	DL
						Cancer	Non-cancer	Cancer	Non-cancer	Cancer	Non-cancer	Cancer adj to 1x10^{-5}	Non-cancer	Cancer adj to 1x10^{-5}	Non-cancer	DAF = 20	DAF = 20	adjusted to DAF = 20					
TAL Metals																							
Aluminum		SW6020A	7429-90-5	mg/kg	23,340	NS	78,000	NS	1,290,000	NS	41,400	--	--	--	--	597,000	NS	--	41,400	597,000	20	10	5.0
Antimony		SW6020A	7440-36-0	mg/kg	0.230	NS	31.3	NS	519	NS	142	--	--	--	--	6.56	5.42	--	31.3	6.56	10	3.0	1.5
Arsenic		SW6020A	7440-38-2	mg/kg	7.07	7.07	13.0	35.9	208	216	41.2	--	--	--	--	0.499	5.83	--	7.07	7.07	1.0	0.40	0.20
Barium		SW6020A	7440-39-3	mg/kg	482	NS	15,600	NS	255,000	NS	4,390	--	--	--	--	2,700	1,650	--	4,390	2,700	1.0	0.20	0.10
Beryllium		SW6020A	7440-41-7	mg/kg	1.49	64,400	156	313,000	2,580	2,710	148	--	--	--	--	196	63.2	--	148	196	1.0	0.20	0.10
Cadmium		SW6020A	7440-43-9	mg/kg	0.224	85,900	70.5	417,000	1,110	3,610	72.1	--	--	--	--	9.39	7.52	--	70.5	9.39	1.0	0.20	0.10
Calcium		SW6020A	7440-70-2	mg/kg	91,760	NS	13,000,000	NS	40,600,000	NS	11,100,000	--	--	--	--	NS	NS	NS	11,100,000	91,760	100	50	20
Chromium (Total)		SW6020A	7440-47-3	mg/kg	18.1	96.6	45,200	505	314,000	468	134	--	--	--	--	205,000	3,600	--	96.6	205,000	1.0	0.30	0.15
Cobalt		SW6020A	7440-48-4	mg/kg	6.82	17,200	23.4	83,400	388	722	36.7	--	--	--	--	5.40	NS	--	23.4	6.82	1.0	0.20	0.10
Copper		SW6020A	7440-50-8	mg/kg	18.4	NS	3,130	NS	51,900	NS	14,200	--	--	--	--	556	915	--	3,130	915	1.0	0.30	0.15
Iron		SW6020A	7439-89-6	mg/kg	22,660	NS	54,800	NS	908,000	NS	248,000	--	--	--	--	6,960	NS	--	54,800	22,660	20	10	5.0
Lead (10)		SW6020A	7439-92-1	mg/kg	12.4	NS	NS	NS	NS	NS	NS	--	400	--	800	NS	0.0520	--	400	12.4	1.0	0.30	0.15
Magnesium		SW6020A	7439-95-4	mg/kg	8,170	NS	20,900,000	NS	5,680,000	NS	1,550,000	--	--	--	--	NS	NS	NS	1,550,000	8,170	100	50	20
Manganese		SW6020A	7439-96-5	mg/kg	1,058	NS	10,500	NS	160,000	NS	464	--	--	--	--	2,630	NS	--	1,058	2,630	1.0	0.30	0.15
Mercury		SW7471B	7439-97-6	mg/kg	0.0300	NS	23.6	NS	111	NS	20.5	--	--	--	--	0.654	2.09	--	20.5	2.09	0.10	0.020	0.01
Nickel		SW6020A	7440-02-0	mg/kg	19.5	595,000	1,560	2,890,000	25,700	25,000	753	--	--	--	--	485	NS	--	753	485	1.0	0.30	0.15
Potassium		SW6020A	7440-09-7	mg/kg	3,950	NS	15,600,000	NS	76,200,000	NS	20,800,000	--	--	--	--	NS	NS	NS	15,600,000	3,950	100	50	20
Selenium		SW6020A	7782-49-2	mg/kg	0.513	NS	391	NS	6,490	NS	1,750	--	--	--	--	10.2	5.17	--	391	10.2	1.0	0.50	0.2708
Silver		SW6020A	7440-22-4	mg/kg	0.130	NS	391	NS	6,490	NS	1,770	--	--	--	--	13.8	NS	--	391	13.8	1.0	0.30	0.15
Sodium		SW6020A	7440-23-5	mg/kg	2,526	NS	12,000,000	NS	37,300,000	NS	10,200,000	--	--	--	--	NS	NS	NS	10,200,000	2,526	100	50	20
Thallium		SW6020A	7440-28-0	mg/kg	0.213	NS	0.782	NS	13.0	NS	3.54	--	--	--	--	0.281	2.85	--	0.782	2.85	1.0	0.50	0.25
Vanadium		SW6020A	7440-62-2	mg/kg	27.2	NS	394	NS	6,530	NS	614	--	--	--	--	1,260	NS	--	394	1,260	1.0	0.25	0.10
Zinc		SW6020A	7440-66-6	mg/kg	49.2	NS	23,500	NS	389,000	NS	106,000	--	--	--	--	7,410	NS	--	23,500	7,410	2.0	1.0	0.614
Nitroaromatic and Nitroamine Explosives																							
1,3,5-Trinitrobenzene		SW8330B	99-35-4	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	2,200	NS	32,000	NS	NS	42.0	2,200	42.0	0.040	0.0080	0.0040
1,3-Dinitrobenzene		SW8330B	99-65-0	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	6.30	NS	82.0	NS	NS	0.0360	6.30	0.0360	0.040	0.0080	0.0040
2,4-Dinitrotoluene		SW8330B	121-14-2	mg/kg	NA	17.1	123	82.3	1,820	600	536	--	--	--	--	0.0492	NS	--	17.1	0.0492	0.040	0.0080	0.0044
2,6-Dinitrotoluene		SW8330B	606-20-2	mg/kg	NA	3.56	18.5	17.2	276	165	80.9	--	--	--	--	0.0102	NS	--	3.56	0.0102	0.040	0.0080	0.0051
2,4,6-Trinitrotoluene (TNT)		SW8330B	118-96-7	mg/kg	NA	211	36.0	1,070	573	7,500	161	--	--	--	--	0.861	NS	--	36.0	0.861	0.040	0.0080	0.0022
2-Amino-4,6-Dinitrotoluene		SW8330B	35572-78-2	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	150	NS	2,300	NS	NS	0.600	150	0.600	0.040	0.0080	0.0046
2-Nitrotoluene		SW8330B	88-72-2	mg/kg	NA	31.6	70.4	165	1,170	1,130	319	--	--	--	--	0.0458	NS	--	31.6	0.0458	0.040	0.01	0.0028
3-Nitrotoluene		SW8330B	99-08-1	mg/kg	NA	NS	6.16	NS	91.6	NS	26.9	--	--	--	--	0.0250	NS	--	6.16	0.0250	0.040	0.0080	0.0038
4-Amino-2,6-Dinitrotoluene		SW8330B	19406-51-0	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	150	NS	2,300	NS	NS	0.600	150	0.600	0.040	0.0080	0.0046
4-Nitrotoluene		SW8330B	99-99-0	mg/kg	NA	333	247	1,600	3,670	11,800	1,080	--	--	--	--	0.613	NS	--	247	0.613	0.040	0.0080	0.0035
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)		SW8330B	121-82-4	mg/kg	NA	83.1	301	428	4,886	2,957	1,352	--	--	--	--	0.0593	NS	--	83.1	0.0593	0.040	0.0080	0.0035
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)		SW8330B	479-45-8	mg/kg	NA	NS	156	NS	2,590	NS	706	--	--	--	--	5.59	NS	--	156	5.59	0.040	0.0080	0.0022
Nitrobenzene		SW8330B	98-95-3	mg/kg	NA	59.9	131	291	1,540	1,340	351	--	--	--	--	0.0144	NS	--	59.9	0.0144	0.040	0.0080	0.0038
Nitroglycerin		SW8330B	55-63-0	mg/kg	NA	313	6.16	1,510	91.6	11,100	26.9	--	--	--	--	0.0136	NS	--	6.16	0.0136	0.20	0.080	0.053
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)		SW8330B	2691-41-0	mg/kg	NA	NS	3,850	NS	63,300	NS	17,400	--	--	--	--	19.4	NS	--	3,850	19.4	0.040	0.0080	0.0051
Pentaerythritol Tetranitrate (PETN)		SW8330B	78-11-5	mg/kg	NA	NS	NS	NS	NS	NS	NS	1,400	130	5,700	1,600	NS	NS	5.60	130	5.60	0.20	0.080	0.053
Perchlorate																							
Perchlorate		SW6850	14797-73-0	mg/kg	NA	NS	54.8	NS	908	NS	248	--	--	--	--	0.117	0.0127	--	55	0.117	0.00282	0.0014	0.0007
Volatile Organic Compounds																							
1,1,1,2-Tetrachloroethane		SW8260C	630-20-6	mg/kg	NA	27.8	2,350	136	38,900	653	10,600	--	--	--	--	0.0360	NS	--	27.8	0.0360	0.25	0.050	0.025
1,1,1-Trichloroethane		SW8260C	71-55-6	mg/kg	NA	NS	14,300	NS	71,900	NS	13,500	--	--	--	--	51.1	1.28	--	13,500	51.1	0.25	0.050	0.025
1,1,2,2-Tetrachloroethane		SW8260C	79-34-5	mg/kg	NA	7.93	1,560	39.1	26,000	195	7,080	--	--	--	--	0.00481	NS	--	7.93	0.00481	0.25	0.050	0.025
1,1,2-Trichloro-1,2,2-Trifluoroethane		SW8260C	76-13-1	mg/kg	NA	NS	50,300	NS	241,000	NS	44,900	--	--	--	--	3,200	NS	--	44,900	3,200	0.25	0.10	0.050
1,1,2-Trichloroethane		SW8260C	79-00-5	mg/kg	NA	18.6	2.59	91.3	12.3	4,300	2.28	--	--	--	--	0.00223	0.0268	--	2.28	0.0268	0.25	0.050	0.025
1,1-Dichloroethane		SW8260C	75-34-3	mg/kg	NA	77.9	15,600	380	260,000	1,800	70,800	--	--	--	--	0.136	NS	--	77.9	0.136	0.25	0.050	0.025
1,1-Dichloroethene		SW8260C	75-35-4	mg/kg	NA	NS	436	NS	2,240	NS	420	--	--	--	--	1.95	0.0479	--	420	1.95	0.25	0.050	0.025
1,2,3-Trichlorobenzene		SW8260C	87-61-6	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	63.0	NS	930	NS	NS	0.420	63.0	0.420	0.25	0.10	0.050
1,2,3-Trichloropropane		SW8260C	96-18-4	mg/kg	NA	0.0510	7.03	1.21	33.7	8.26	6.26	--	--	--	--	0.0000582	NS	--	0.0510	0.0000582	0.25	0.10	0.050
1,2,4-Trichlorobenzene		SW8260C	120-82-1	mg/kg	NA	240	82.2	1,250	419	8,540	78.4	--	--	--	--	0.176	3.10	--	78.4	3.10	0.25	0.10	0.050
1,2,4-Trimethylbenzene		SW8260C	95-63-6	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	300	NS	1,800	NS	NS	1.62	300	1.62	0.25	0.10	0.028
1,2-Dibromo-3-Chloropropane		SW8260C	96-12-8	mg/kg	NA	0.0851	5.85	1.17	40.8	5.48	8.23	--	--	--	--	0.0000233	0.00139	--	0.0851	0.00139	0.25	0.10	0.050
1,2-Dibromoethane		SW8260C	106-93-4	mg/kg	NA	0.668	134	3.28	732	16.2	139	--	--	--	--	0.000352	0.000236	--	0.668	0.000352	0.25	0.050	0.025
1,2-Dichlorobenzene		SW8260C	95-50-1	mg/kg	NA	NS	2,140	NS	12,900	NS	2,470	--	--	--	--	4.58	9.08	--	2,140	9.08	0.25	0.050	0.025
1,2-Dichloroethane		SW8260C	107-06-2	mg/kg	NA	8.25	55.2	40.3	284	194	53.4	--	--	--	--	0.00814	0.0238	--	8.25	0.0238	0.25	0.050	0.025
1,2-Dichloropropane		SW8260C	78-87-5	mg/kg	NA	17.6	28.7	86.1	136	411	25.2	--	--	--	--	0.0243	0.0277	--	17.6	0.0277	0.25	0.050	0.025
1,3,5-Trimethylbenzene		SW8260C	108-67-8	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	270	NS	1,500	NS	NS	1.74	270	1.74	0.25	0.10	0.030
1,3-Dichlorobenzene	1,4-Dichlorobenzene	SW8260C	541-73-1	mg/kg	NA	1,290	5,480	6,730	NS	45,900	24,800	--	--	--	--	0.0720	1.12	--	1,290	1.12			
1,3-Dichloropropane		SW8260C	142-28-9	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	1,600	NS	23,000	NS	NS	2.60	1,600	2.60	0.25	0.050	0.025
1,4-Dichlorobenzene		SW8260C	106-46-7	mg/kg	NA	1,290	5,480	6,730	NS	45,900	24,800	--	--	--	--	0.0720	1.12	--	1,290	1.12	0.25	0.050	0.025
2,2-Dichloropropane	1,2-Dichloropropane	SW8260C	594-20-7	mg/kg	NA	17.6	28.7	86.1	136	411	25.2	--	--	--	--	0.0243	0.0277	--	17.6	0.0277	0.25	0.10	0.050
2-Butanone (MEK)		SW8260C	78-93-3	mg/kg	NA	NS	37,300	NS	409,000	NS	91,200	--	--	--	--	20.1	NS	--	37,300	20.1	0.50	0.25	0.13
2-Chlorotoluene		SW8260C	95-49-8	mg/kg	NA	NS	1,560	NS	26,000	NS	7,080	--	--	--	--	3.56	NS	--	1,560	3.56	0.25	0.10	0.041

Table 2-3
Comparison of Human Health Soil Screening Levels to Laboratory Quantitation Limits

Analyte	Surrogate Analyte (used for screening value selection)	Analytical Method (1)	CASRN	Units	Background Value (2)	NMED Table A-1 Human Health Screening Levels Direct Contact (3): Residential Cancer	NMED Residential Non-cancer	NMED Commercial/ Industrial Cancer	NMED Commercial/ Industrial Non-cancer	NMED Construction Worker Cancer	NMED Construction Worker Non-cancer	USEPA RSL Table Human Health Screening Levels Direct Contact (4): Residential Cancer adj to $1x10^{-5}$	USEPA RSL Residential Non-cancer	USEPA RSL Industrial Cancer adj to $1x10^{-5}$	USEPA RSL Industrial Non-cancer	Human Health Screening Levels Groundwater Protection: NMED Table A-1 Risk-based SSL (5) DAF = 20	NMED Table A-1 NMGW/MCL based SSL (5) DAF = 20	USEPA RSL Table Risk-based SSL (6) adjusted to DAF = 20	Selected Human Health Direct Contact Screening Level (7,9)	Selected Human Health Groundwater Protection Screening Level (8, 9)	Achievable Laboratory Limits: LOQ	LOD	DL
2-Hexanone		SW8260C	591-78-6	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	200	NS	1,300	NS	NS	0.176	200	0.176	0.50	0.25	0.15
4-Chlorotoluene		SW8260C	106-43-4	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	1,600	NS	23,000	NS	NS	4.80	1,600	4.80	0.25	0.10	0.034
Volatile Organic Compounds (continued)																							
4-Methyl-2-Pentanone (MIBK)		SW8260C	108-10-1	mg/kg	NA	NS	5,810	NS	81,500	NS	20,200	--	--	--	--	4.80	NS	--	5,810	4.80	0.50	0.25	0.14
Acetone		SW8260C	67-64-1	mg/kg	NA	NS	66,300	NS	959,000	NS	241,000	--	--	--	--	49.8	NS	--	66,300	49.8	0.50	0.25	0.16
Benzene		SW8260C	71-43-2	mg/kg	NA	17.7	114	86.5	724	420	141	--	--	--	--	0.0380	0.0418	--	17.7	0.0418	0.25	0.050	0.025
Bromobenzene		SW8260C	108-86-1	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	290	NS	1,800	NS	NS	0.840	290	0.840	0.25	0.050	0.025
Bromochloromethane		SW8260C	74-97-5	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	150	NS	630	NS	NS	0.420	150	0.420	0.25	0.050	0.025
Bromodichloromethane		SW8260C	75-27-4	mg/kg	NA	6.14	1,560	29.9	26,000	141	7,080	--	--	--	--	0.00621	NS	--	6.14	0.00621	0.25	0.050	0.025
Bromoform		SW8260C	75-25-2	mg/kg	NA	674	1,230	1,750	18,300	23,700	5,380	--	--	--	--	0.147	NS	--	674	0.147	0.25	0.10	0.050
Bromomethane		SW8260C	74-83-9	mg/kg	NA	NS	17.6	NS	93.7	NS	17.7	--	--	--	--	0.0343	NS	--	17.6	0.0343	0.50	0.10	0.090
Carbon Disulfide		SW8260C	75-15-0	mg/kg	NA	NS	1,540	NS	8,470	NS	1,610	--	--	--	--	4.42	NS	--	1,540	4.42	0.25	0.050	0.025
Carbon Tetrachloride		SW8260C	56-23-5	mg/kg	NA	10.6	144	52.1	1,010	250	200	--	--	--	--	0.0334	0.0367	--	10.6	0.0367	0.25	0.050	0.027
Chlorobenzene		SW8260C	108-90-7	mg/kg	NA	NS	376	NS	2,140	NS	408	--	--	--	--	0.836	1.08	--	376	1.08	0.25	0.050	0.025
Chloroethane		SW8260C	75-00-3	mg/kg	NA	NS	18,800	NS	88,700	NS	16,500	--	--	--	--	107	NS	--	16,500	107	0.25	0.10	0.065
Chloroform		SW8260C	67-66-3	mg/kg	NA	5.85	304	28.4	1,990	133	388	--	--	--	--	0.0109	NS	--	5.85	0.0109	0.25	0.050	0.025
Chloromethane		SW8260C	74-87-3	mg/kg	NA	40.8	266	199	1,250	947	233	--	--	--	--	0.0952	NS	--	40.8	0.0952	0.25	0.10	0.050
cis-1,2-Dichloroethene		SW8260C	156-59-2	mg/kg	NA	NS	156	NS	2,600	NS	708	--	--	--	--	0.184	0.352	--	156	0.352	0.25	0.050	0.025
Dibromochloromethane		SW8260C	124-48-1	mg/kg	NA	13.8	1,230	66.9	18,300	338	5,380	--	--	--	--	0.00755	NS	--	13.8	0.00755	0.25	0.050	0.025
Dibromomethane		SW8260C	74-95-3	mg/kg	NA	NS	57.4	NS	286	NS	53.4	--	--	--	--	0.0335	NS	--	53.4	0.0335	0.25	0.050	0.025
Dichlorodifluoromethane		SW8260C	75-71-8	mg/kg	NA	NS	180	NS	857	NS	159	--	--	--	--	7.23	NS	--	159	7.23	0.25	0.10	0.060
Ethylbenzene		SW8260C	100-41-4	mg/kg	NA	74.5	3,920	365	28,800	1,760	5,750	--	--	--	--	0.264	12.3	--	74.5	12.3	0.25	0.050	0.025
Hexachlorobutadiene		SW8260C	87-68-3	mg/kg	NA	68.3	61.6	51.7	916	2,400	269	--	--	--	--	0.0413	NS	--	51.7	0.0413	0.25	0.10	0.050
Isopropylbenzene		SW8260C	98-82-8	mg/kg	NA	NS	2,350	NS	14,100	NS	2,710	--	--	--	--	11.4	NS	--	2,350	11.4	0.25	0.10	0.032
m,p-Xylenes		SW8260C	179601-23-1	mg/kg	NA	NS	757	NS	3,700	NS	690	--	--	--	--	2.97	NS	--	690	2.97	0.50	0.10	0.050
Methyl Tert-Butyl Ether		SW8260C	1634-04-4	mg/kg	NA	968	37,400	4,780	176,000	24,000	32,800	--	--	--	--	0.553	NS	--	968	0.553	0.25	0.050	0.025
Methylene Chloride		SW8260C	75-09-2	mg/kg	NA	766	409	14,400	5,110	89,300	1,200	--	--	--	--	0.471	0.0221	--	409	0.471	0.50	0.25	0.10
Naphthalene		SW8260C	91-20-3	mg/kg	NA	NS	1,160	NS	16,800	NS	5,020	--	--	--	--	0.0823	NS	--	1,160	0.0823	0.50	0.10	0.050
n-Butylbenzene		SW8260C	104-51-8	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	3,900	NS	58,000	NS	NS	64.0	3,900	64.0	0.25	0.10	0.035
n-Propylbenzene		SW8260C	103-65-1	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	3,800	NS	24,000	NS	NS	24.0	3,800	24.0	0.25	0.10	0.033
o-Xylene		SW8260C	95-47-6	mg/kg	NA	NS	798	NS	3,910	NS	729	--	--	--	--	2.98	NS	--	729	2.98	0.25	0.050	0.025
Sec-Butylbenzene		SW8260C	135-98-8	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	7,800	NS	120,000	NS	NS	118	7,800	118	0.25	0.10	0.034
Styrene		SW8260C	100-42-5	mg/kg	NA	NS	7,230	NS	50,900	NS	10,100	--	--	--	--	20.6	1.71	--	7,230	20.6	0.25	0.10	0.050
Tert-Butylbenzene		SW8260C	98-06-6	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	7,800	NS	120,000	NS	NS	32.0	7,800	32.0	0.25	0.10	0.031
Tetrachloroethene		SW8260C	127-18-4	mg/kg	NA	335	110	1,640	624	7,840	119	--	--	--	--	0.321	0.0398	--	110	0.321	0.25	0.050	0.025
Toluene		SW8260C	108-88-3	mg/kg	NA	NS	5,220	NS	61,100	NS	14,000	--	--	--	--	12.1	11.1	--	5,220	12.1	0.25	0.050	0.025
Trans-1,2-Dichloroethene		SW8260C	156-60-5	mg/kg	NA	NS	293	NS	1,600	NS	303	--	--	--	--	0.469	0.503	--	293	0.503	0.25	0.050	0.025
Trichloroethene		SW8260C	79-01-6	mg/kg	NA	15.4	6.72	111	36.1	5,370	6.84	--	--	--	--	0.0161	0.0310	--	6.72	0.0310	0.25	0.050	0.025
Trichlorofluoromethane		SW8260C	75-69-4	mg/kg	NA	NS	1,220	NS	5,980	NS	1,120	--	--	--	--	15.7	NS	--	1,120	15.7	0.25	0.10	0.055
Vinyl Acetate		SW8260C	108-05-4	mg/kg	NA	NS	2,540	NS	12,200	NS	2,280	--	--	--	--	1.50	NS	--	2,280	1.50	0.25	0.10	0.065
Vinyl Chloride		SW8260C	75-01-4	mg/kg	NA	0.741	113	28.3	810	160	161	--	--	--	--	0.00217	0.0134	--	0.741	0.0134	0.25	0.10	0.070
Semi-Volatile Organic Compounds																							
1,2,4-Trichlorobenzene		SW8270D	120-82-1	mg/kg	NA	240	82.2	1,250	419	8,540	78.4	--	--	--	--	0.176	3.10	--	78.4	3.10	0.333	0.167	0.083
1,2-Dichlorobenzene		SW8270D	95-50-1	mg/kg	NA	NS	2,140	NS	12,900	NS	2,470	--	--	--	--	4.58	9.08	--	2,140	9.08	0.333	0.167	0.083
1,3-Dichlorobenzene	1,4-Dichlorobenzene	SW8270D	541-73-1	mg/kg	NA	1,290	5,480	6,730	NS	45,900	24,800	--	--	--	--	0.0720	1.12	--	1,290	1.12			
1,4-Dichlorobenzene		SW8270D	106-46-7	mg/kg	NA	1,290	5,480	6,730	NS	45,900	24,800	--	--	--	--	0.0720	1.12	--	1,290	1.12	0.333	0.167	0.083
2,4,5-Trichlorophenol		SW8270D	95-95-4	mg/kg	NA	NS	6,160	NS	91,600	NS	26,900	--	--	--	--	66.2	NS	--	6,160	66.2	0.333	0.167	0.091
2,4,6-Trichlorophenol		SW8270D	88-06-2	mg/kg	NA	484	61.6	2,330	916	17,000	269	--	--	--	--	0.674	NS	--	61.6	0.674	0.333	0.167	0.083
2,4-Dichlorophenol		SW8270D	120-83-2	mg/kg	NA	NS	185	NS	2,750	NS	807	--	--	--	--	0.825	NS	--	185	0.825	0.333	0.167	0.083
2,4-Dimethylphenol		SW8270D	105-67-9	mg/kg	NA	NS	1,230	NS	18,300	NS	5,380	--	--	--	--	6.45	NS	--	1,230	6.45	0.333	0.167	0.083
2,4-Dinitrophenol		SW8270D	51-28-5	mg/kg	NA	NS	123	NS	1,830	NS	538	--	--	--	--	0.669	NS	--	123	0.669	0.667	0.167	0.086
2,4-Dinitrotoluene		SW8270D	121-14-2	mg/kg	NA	17.1	123	82.3	1,820	600	536	--	--	--	--	0.0492	NS	--	17.1	0.0492	0.333	0.167	0.083
2,6-Dinitrotoluene		SW8270D	606-20-2	mg/kg	NA	3.56	18.5	17.2	276	165	80.9	--	--	--	--	0.0102	NS	--	3.56	0.0102	0.333	0.167	0.083
2-Chloronaphthalene		SW8270D	91-58-7	mg/kg	NA	NS	6,260	NS	104,000	NS	28,300	--	--	--	--	57.0	NS	--	6,260	57.0	0.333	0.167	0.083
2-Chlorophenol		SW8270D	95-57-8	mg/kg	NA	NS	391	NS	6,490	NS	1,770	--	--	--	--	1.15	NS	--	391	1.15	0.333	0.167	0.083
2-Methylnaphthalene		SW8270D	91-57-6	mg/kg	NA	NS	232	NS	3,370	NS	1,000	--	--	--	--	2.76	NS	--	232	2.76	0.333	0.167	0.083
2-Methylphenol		SW8270D	95-48-7	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	3,200	NS	41,000	NS	NS	15.0	3,200	15.0	0.333	0.167	0.083
2-Nitroaniline		SW8270D	88-74-4	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	630	NS	8,000	NS	NS	1.60	630	1.60	0.333	0.167	0.083
2-Nitrophenol	2-Chlorophenol	SW8270D	88-75-5	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.333	0.167	0.083
3,3'-Dichlorobenzidine		SW8270D	91-94-1	mg/kg	NA	11.8	NS	57.0	NS	410	NS	--	--	--	--	0.124	NS	--	11.8	0.124	0.333	0.167	0.084
4,6-Dinitro-2-Methylphenol		SW8270D	534-52-1	mg/kg	NA	NS	4.93	NS	73.3	NS	21.5	--	--	--	--	0.0398	NS	--	4.93	0.0398	0.667	0.167	0.083
4-Chloro-3-Methylphenol		SW8270D	59-50-7	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	6,300	NS	82,000	NS	NS	34.0	6,300	34.0	0.667	0.167	0.083
4-Chloroaniline		SW8270D	106-47-8	mg/kg	NA	NS	NS	NS	NS	NS	NS	27.0	250	110	3,300	NS	NS	0.0320	27.0	0.0320	0.333	0.167	0.083
4-Methylphenol		SW8270D	106-44-5	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	6,300	NS	82,000	NS	NS	30.0	6,300	30.0	0.333	0.167	0.083
4-Nitroaniline		SW8270D	100-01-6	mg/kg	NA	NS	NS	NS	NS	NS	NS	270	250	1,100	3,300	NS	NS	0.320	250	0.320	0.333	0.167	0.12
Acetophenone		SW8270D	98-86-2	mg/kg	NA	NS	7,820	NS	130,000	NS	35,400	--	--	--	--	9.64	NS	--	7,820	9.64	0.333	0.167	0.083
Aniline		SW8270D	62-53-3	mg/kg	NA	NS	NS	NS	NS	NS	NS	950	440	4,000	5,700	NS	NS	0.920	440	0.920	0.667	0.167	0.083
Azobenzene		SW8270D	122-66-7	mg/kg	NA	6.66	NS	32.1	NS	234	NS	--	--	--	--	0.0379	NS	--	6.66	0.0379	0.333	0.167	0.096
Benzidine		SW8270D	92-87-5	mg/kg	NA	0.00518	185	0.112	2,750	0.812	807	--	--	--	--	0.0000427	NS	--	0.00518	0.0000427	2.00	0.867	0.863
Benzoic Acid		SW8270D	65-85-0	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	250,000	NS	3,300,000	NS	NS	300	250,000	300	1.33	0.667	0.333
Benzyl Alcohol		SW8270D	100-51-6	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	6,300	NS	82,000	NS	NS	9.60	6,300	9.60	0.333	0.167	0.083

Table 2-3
Comparison of Human Health Soil Screening Levels to Laboratory Quantitation Limits

Analyte	Surrogate Analyte (used for screening value selection)	Analytical Method (1)	CASRN	Units	Background Value (2)	NMED Table A-1 Human Health Screening Levels Direct Contact (3)						USEPA RSL Table Human Health Screening Levels Direct Contact (4)				Human Health Screening Levels Groundwater Protection			Selected Human Health Direct Contact Screening Level (7,9)	Selected Human Health Groundwater Protection Screening Level (8, 9)	Achievable Laboratory Limits		
						Residential		Commercial/ Industrial		Construction Worker		Residential		Industrial		NMED Table A-1 Risk-based SSL (5)	NMED Table A-1 NMGW/MCL based SSL (5)	USEPA RSL Table Risk-based SSL (6)			LOQ	LOD	DL
						Cancer	Non-cancer	Cancer	Non-cancer	Cancer	Non-cancer	Cancer adj to 1x10-5	Non-cancer	Cancer adj to 1x10-5	Non-cancer	DAF = 20	DAF = 20	adjusted to DAF = 20					
Bis(2-Chloroethoxy)Methane		SW8270D	111-91-1	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	190	NS	2,500	NS	NS	0.260	190	0.260	0.333	0.167	0.083
Bis(2-Chloroethyl)Ether		SW8270D	111-44-4	mg/kg	NA	3.10	NS	15.6	NS	1.93	NS	--	--	--	--	0.000605	NS	--	1.93	0.000605	0.333	0.167	0.083
Semi-Volatile Organic Compounds (continued)																							
Bis(2-Chloroisopropyl)Ether		SW8270D	108-60-1	mg/kg	NA	99.3	NS	519	NS	3,540	NS	--	--	--	--	0.0475	NS	--	99.3	0.0475	0.333	0.167	0.083
Bis(2-Ethylhexyl)Phthalate		SW8270D	117-81-7	mg/kg	NA	380	1,230	1,830	18,300	13,400	5,380	--	--	--	--	200	21.5	--	380	200	0.333	0.167	0.115
Butylbenzylphthalate		SW8270D	85-68-7	mg/kg	NA	NS	NS	NS	NS	NS	NS	2,900	13,000	12,000	160,000	NS	NS	48.0	2,900	48.0	0.333	0.167	0.083
Dibenzofuran		SW8270D	132-64-9	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	73.0	NS	1,000	NS	NS	3.00	73.0	3.00	0.333	0.167	0.083
Diethylphthalate		SW8270D	84-66-2	mg/kg	NA	NS	49,300	NS	733,000	NS	215,000	--	--	--	--	97.9	NS	--	49,300	97.9	0.333	0.167	0.083
Dimethylphthalate		SW8270D	131-11-3	mg/kg	NA	NS	61,600	NS	916,000	NS	269,000	--	--	--	--	3.57	NS	--	61,600	3.57	0.333	0.167	0.083
Di-N-Butylphthalate		SW8270D	84-74-2	mg/kg	NA	NS	6,160	NS	91,600	NS	26,900	--	--	--	--	33.8	NS	--	6,160	33.8	0.333	0.167	0.097
Di-n-Octylphthalate		SW8270D	117-84-0	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	630	NS	8,200	NS	NS	1,140	630	1,140	0.333	0.167	0.097
Hexachlorobenzene		SW8270D	118-74-1	mg/kg	NA	3.33	49.3	16.0	733	117	215	--	--	--	--	0.0185	0.189	--	3.33	0.189	0.333	0.167	0.083
Hexachlorobutadiene		SW8270D	87-68-3	mg/kg	NA	68.3	61.6	51.7	916	2,400	269	--	--	--	--	0.0413	NS	--	51.7	0.0413	0.333	0.167	0.083
Hexachlorocyclopentadiene		SW8270D	77-47-4	mg/kg	NA	NS	2.28	NS	5,490	NS	867	--	--	--	--	0.0198	2.40	--	2.28	2.40	0.333	0.167	0.083
Hexachloroethane		SW8270D	67-72-1	mg/kg	NA	133	43.1	641	641	4,670	188	--	--	--	--	0.0320	NS	--	43.1	0.0320	0.333	0.167	0.083
Isophorone		SW8270D	78-59-1	mg/kg	NA	5,610	12,300	27,000	183,000	198,000	53,700	--	--	--	--	4.23	NS	--	5,610	4.23	0.333	0.167	0.083
Nitrobenzene		SW8270D	98-95-3	mg/kg	NA	59.9	131	291	1,540	1,340	351	--	--	--	--	0.0144	NS	--	59.9	0.0144	0.333	0.167	0.083
N-Nitrosodimethylamine		SW8270D	62-75-9	mg/kg	NA	0.0234	0.493	0.503	7.33	3.66	2.14	--	--	--	--	0.0000204	NS	--	0.0234	0.0000204	0.333	0.167	0.083
N-Nitroso-Di-N-Propylamine		SW8270D	621-64-7	mg/kg	NA	NS	NS	NS	NS	NS	NS	0.780	NS	3.30	NS	NS	NS	0.00162	0.780	0.00162	0.333	0.167	0.083
N-Nitrosodiphenylamine		SW8270D	86-30-6	mg/kg	NA	1,090	NS	5,240	NS	37,900	NS	--	--	--	--	10.0	NS	--	1,090	10.0	0.333	0.167	0.153
N-Nitrosopyrrolidine		SW8270D	930-55-2	mg/kg	NA	2.54	NS	12.2	NS	88.9	NS	--	--	--	--	0.00230	NS	--	2.54	0.00230	0.333	0.167	0.083
Pentachlorophenol		SW8270D	87-86-5	mg/kg	NA	9.85	234	44.5	3,180	346	989	--	--	--	--	0.0629	0.152	--	9.85	0.152	0.667	0.167	0.083
Phenol		SW8270D	108-95-2	mg/kg	NA	NS	18,500	NS	275,000	NS	77,400	--	--	--	--	52.3	NS	--	18,500	52.3	0.333	0.167	0.083
Pyridine		SW8270D	110-86-1	mg/kg	NA	NS	NS	NS	NS	NS	NS	NS	78.0	NS	1,200	NS	NS	0.136	78.0	0.136	1.33	0.667	0.333
Semi-Volatile Organic Compounds-8270SIM																							
Acenaphthene		SW8270D SIM	83-32-9	mg/kg	NA	NS	3,480	NS	50,500	NS	15,100	--	--	--	--	82.5	0.0309	--	3,480	82.5	0.333	0.167	0.083
Anthracene		SW8270D SIM	120-12-7	mg/kg	NA	NS	17,400	NS	253,000	NS	75,300	--	--	--	--	851	NS	--	17,400	851	0.333	0.167	0.083
Benzo(a)anthracene		SW8270D SIM	56-55-3	mg/kg	NA	1.53	NS	32.3	NS	240	NS	--	--	--	--	0.637	NS	--	1.53	0.637	0.333	0.167	0.083
Benzo(a)pyrene		SW8270D SIM	50-32-8	mg/kg	NA	1.12	NS	23.6	NS	173	106	--	--	--	--	4.42	3.53	--	1.12	4.42	0.333	0.167	0.083
Benzo(b)fluoranthene		SW8270D SIM	205-99-2	mg/kg	NA	1.53	NS	32.3	NS	240	NS	--	--	--	--	6.17	NS	--	1.53	6.17	0.333	0.167	0.086
Benzo(k)fluoranthene		SW8270D SIM	207-08-9	mg/kg	NA	15.3	NS	323	NS	2,310	NS	--	--	--	--	60.5	NS	--	15.3	60.5	0.333	0.167	0.083
Chrysene		SW8270D SIM	218-01-9	mg/kg	NA	153	NS	3,230	NS	23,100	NS	--	--	--	--	186	NS	--	153	186	0.333	0.167	0.083
Dibenz(a,h)anthracene		SW8270D SIM	53-70-3	mg/kg	NA	0.153	NS	3.23	NS	24.0	NS	--	--	--	--	1.97	NS	--	0.153	1.97	0.333	0.167	0.083
Fluoranthene		SW8270D SIM	206-44-0	mg/kg	NA	NS	2,320	NS	33,700	NS	10,000	--	--	--	--	1,340	NS	--	2,320	1,340	0.333	0.167	0.126
Fluorene		SW8270D SIM	86-73-7	mg/kg	NA	NS	2,320	NS	33,700	NS	10,000	--	--	--	--	80.0	NS	--	2,320	80.0	0.333	0.167	0.083
Indeno(1,2,3-c,d)pyrene		SW8270D SIM	193-39-5	mg/kg	NA	1.53	NS	32.3	NS	240	NS	--	--	--	--	20.1	NS	--	1.53	20.1	0.333	0.167	0.083
Naphthalene		SW8270D SIM	91-20-3	mg/kg	NA	NS	1,160	NS	16,800	NS	5,020	--	--	--	--	0.0823	NS	--	1,160	0.0823	0.333	0.167	0.083
Phenanthrene		SW8270D SIM	85-01-8	mg/kg	NA	NS	1,740	NS	25,300	NS	7,530	--	--	--	--	85.9	NS	--	1,740	85.9	0.333	0.167	0.083
Pyrene		SW8270D SIM	129-00-0	mg/kg	NA	NS	1,740	NS	25,300	NS	7,530	--	--	--	--	192	NS	--	1,740	192	0.333	0.167	0.16
Semi-Volatile Organic Compounds-8270 SIM Low Level																							
Acenaphthene		SW8270D SIM	83-32-9	mg/kg	NA	NS	3,480	NS	50,500	NS	15,100	--	--	--	--	82.5	0.0309	--	3,480	82.5	0.01	0.0025	0.0013
Anthracene		SW8270D SIM	120-12-7	mg/kg	NA	NS	17,400	NS	253,000	NS	75,300	--	--	--	--	851	NS	--	17,400	851	0.01	0.0025	0.0013
Benzo(a)anthracene		SW8270D SIM	56-55-3	mg/kg	NA	1.53	NS	32.3	NS	240	NS	--	--	--	--	0.637	NS	--	1.53	0.637	0.01	0.0050	0.0025
Benzo(a)pyrene		SW8270D SIM	50-32-8	mg/kg	NA	1.12	NS	23.6	NS	173	106	--	--	--	--	4.42	3.53	--	1.12	4.42	0.01	0.0025	0.0013
Benzo(b)fluoranthene		SW8270D SIM	205-99-2	mg/kg	NA	1.53	NS	32.3	NS	240	NS	--	--	--	--	6.17	NS	--	1.53	6.17	0.01	0.0025	0.0013
Benzo(k)fluoranthene		SW8270D SIM	207-08-9	mg/kg	NA	15.3	NS	323	NS	2,310	NS	--	--	--	--	60.5	NS	--	15.3	60.5	0.01	0.0025	0.0013
Chrysene		SW8270D SIM	218-01-9	mg/kg	NA	153	NS	3,230	NS	23,100	NS	--	--	--	--	186	NS	--	153	186	0.01	0.0050	0.0022
Dibenz(a,h)anthracene		SW8270D SIM	53-70-3	mg/kg	NA	0.153	NS	3.23	NS	24.0	NS	--	--	--	--	1.97	NS	--	0.153	1.97	0.01	0.0025	0.0013
Fluoranthene		SW8270D SIM	206-44-0	mg/kg	NA	NS	2,320	NS	33,700	NS	10,000	--	--	--	--	1,340	NS	--	2,320	1,340	0.01	0.0025	0.0013
Fluorene		SW8270D SIM	86-73-7	mg/kg	NA	NS	2,320	NS	33,700	NS	10,000	--	--	--	--	80.0	NS	--	2,320	80.0	0.01	0.0025	0.0013
Indeno(1,2,3-c,d)pyrene		SW8270D SIM	193-39-5	mg/kg	NA	1.53	NS	32.3	NS	240	NS	--	--	--	--	20.1	NS	--	1.53	20.1	0.01	0.0025	0.0013
Naphthalene		SW8270D SIM	91-20-3	mg/kg	NA	NS	1,160	NS	16,800	NS	5,020	--	--	--	--	0.0823	NS	--	1,160	0.0823	0.01	0.0025	0.0013
Phenanthrene		SW8270D SIM	85-01-8	mg/kg	NA	NS	1,740	NS	25,300	NS	7,530	--	--	--	--	85.9	NS	--	1,740	85.9	0.01	0.0025	0.0013
Pyrene		SW8270D SIM	129-00-0	mg/kg	NA	NS	1,740	NS	25,300	NS	7,530	--	--	--	--	192	NS	--	1,740	192	0.01	0.0025	0.0013
Total Petroleum Hydrocarbons																							
TPH-DRO (11)		SW8015B	68334-30-5	mg/kg	NA	NS	1,000	NS	3,000	NS	3,000	--	--	--	--	5,270	NS	NS	1,000	5,270	10	5.0	2.5
TPH-ORO (11)		SW8015B	21274-30-0	mg/kg	NA	NS	1,000	NS	3,000	NS	3,000	--	--	--	--	11,300	NS	NS	1,000	11,300	20	5.0	2.5

Notes:

1. Analytical Method - USEPA Test Methods for Evaluating Solid Waste latest edition (the most current version of each method will be used). www.epa.gov/hw-sw846
2. FWDA background levels as taken from:
   - All metals except for arsenic and antimony - Table 8-1 from *"Soil Background Study and Data Evaluation Report"* (Shaw, 2010).
   - Arsenic - "*Evaluation of Background Levels for Arsenic in Soil*" (NMED, 2013)
   - The antimony background level of 0.23 mg/kg is from soil unit 350ss as presented in Table 4-1 of the *Phase 2 Soil Background Report* (USACE, 2013).
3. NMED *Risk Assessment Guidance for Site Investigations and Remediation*, February 2019 Revised (Appendix A, Table A-1).
4. USEPA RSL Summary Table (TR=1E-06, HQ=1), November 2018 (resident soil and industrial soil). The RSLs for carcinogenic analytes are adjusted to a TR=1E-05.
5. NMED *Risk Assessment Guidance for Site Investigations and Remediation*, February 2019 Revised (Appendix A, Table A-1).
6. USEPA RSL Summary Table (TR=1E-06, HQ=1), November 2018. (Protection of groundwater risk-based SSL). Carcinogenic analytes are adjusted to a TR of 1E-05. All analytes are adjusted to a DAF of 20.
7. The selected screening level is the lowest direct contact screening level, except for arsenic where the background value is selected, and for other metals where the background value is selected if it is greater than the lowest direct contact screening level. If metals are determined to be present at concentrations greater than the background level, then risk-based screening levels published by NMED (or USEPA) will be used in the cumulative risk evaluation.
8. The selected screening level is the greatest groundwater protection screening level published by NMED, or the USEPA risk-based SSL if NMED does not publish a groundwater protection SSL, except for arsenic where the background level is selected, and for other metals where the background value is selected if is greater than the groundwater protection screening level. If metals are determined to be present at concentrations greater than the background level, then risk-based screening levels published by NMED (or USEPA) will be used in the cumulative risk evaluation.

Table 2-3
Comparison of Human Health Soil Screening Levels to Laboratory Quantitation Limits

Analyte	Surrogate Analyte (used for screening value selection)	Analytical Method (1)	CASRN	Units	Background Value (2)	NMED Table A-1 Human Health Screening Levels Direct Contact (3)						USEPA RSL Table Human Health Screening Levels Direct Contact (4)				Human Health Screening Levels Groundwater Protection			Selected Human Health Direct Contact Screening Level (7,9)	Selected Human Health Groundwater Protection Screening Level (8, 9)	Achievable Laboratory Limits		
						Residential		Commercial/ Industrial		Construction Worker		Residential		Industrial		NMED Table A-1 Risk-based SSL (5)	NMED Table A-1 NMGW/MCL based SSL (5)	USEPA RSL Table Risk-based SSL (6)			LOQ	LOD	DL
						Cancer	Non-cancer	Cancer	Non-cancer	Cancer	Non-cancer	Cancer adj to $1x10^{-5}$	Non-cancer	Cancer adj to $1x10^{-5}$	Non-cancer	DAF = 20	DAF = 20	adjusted to DAF = 20					

9. The most recent screening levels published by NMED and USEPA at the time the risk evaluation is conducted will be used in the risk evaluation.
10. Lead human health screening levels appear in the non-cancer column, but the health effects of lead are not correlated with the typical carcinogenic or non-carcinogenic dose-based toxicity values that characterize other chemicals.
Instead, the screening levels for lead are based on a modeled concentration in soil (developed using the IEUBK model) that results in an acceptable blood lead level protective of adverse developmental health effects (NMED, 2019; Section
11. Petroleum hydrocarbon screening levels taken from Table 6-4 of the NMED *Risk Assessment Guidance for Site Investigations and Remediation,* February 2019 Revised.
Cells shaded in blue show that the selected screening level is lower than the LOQ. If identified as a chemical of potential concern, these analytes will be addressed in the uncertainty discussion.
-- Indicates it was not necessary to look for a screening value because one was available from a preferred source in the hierarchy.

Acronyms and Abbreviations:
CASRN = Chemical Abstracts Service Registry Number
DAF = dilution attenuation factor
DL = detection limit
DRO = diesel-range organics
FWDA = Fort Wingate Depot Activity
HQ = hazard quotient
LOD = limit of detection
LOQ = limit of quantitation
MCL = maximum contaminant level
mg/kg = milligram per kilogram
NA = not applicable
NMED = New Mexico Environment Department
NMGW = New Mexico groundwater
NS = no standard
ORO = oil-range organics
RSL = regional screening level
SIM = selected ion mode
SSL = soil screening level
TAL = target analyte list
TPH = total petroleum hydrocarbons
USEPA = United States Environmental Protection Agency
USACE = United States Army Corps of Engineers

Table 2-4
Comparison of Human Health Groundwater Screening Levels to Laboratory Quantitation Limits

Analyte	Surrogate Analyte (used for groundwater criteria selection)	Analytical Method	CASRN	Units	NMWQCC Standard (1)	USEPA MCL (2)	USEPA Tap Water RSL (3) (cancer)	USEPA Tap Water RSL (4) (non-cancer)	Selected Screening Value (5, 6)	Achievable Laboratory Limits		
										LOQ	LOD	DL
TAL Metals												
Aluminum		SW6020A	7429-90-5	µg/L	NS	200	--	--	200	200	100	50
Antimony		SW6020A	7440-36-0	µg/L	NS	6.0	--	--	6.0	100	30	15
Arsenic		SW6020A	7440-38-2	µg/L	100	10	--	--	10	10	5.0	3.0
Barium		SW6020A	7440-39-3	µg/L	1,000	2,000	--	--	1,000	10	2.0	1.0
Beryllium		SW6020A	7440-41-7	µg/L	NS	4.0	--	--	4.0	10	1.0	0.50
Cadmium		SW6020A	7440-43-9	µg/L	10	5.0	--	--	5.0	10	2.0	1.0
Calcium		SW6020A	7440-70-2	µg/L	NS	NS	NS	NS	NS	1,000	500	200
Total Chromium		SW6020A	7440-47-3	µg/L	50	100	--	--	50	10	3.0	1.5
Cobalt		SW6020A	7440-48-4	µg/L	NS	NS	NS	6.0	6.0	10	2.0	1.0
Copper		SW6020A	7440-50-8	µg/L	1,000	1,300	--	--	1,000	10	3.0	1.5
Iron		SW6020A	7439-89-6	µg/L	1,000	300	--	--	300	200	100	50
Lead		SW6020A	7439-92-1	µg/L	50	15	--	--	15	10	3.0	1.7
Magnesium		SW6020A	7439-95-4	µg/L	NS	NS	NS	NS	NS	1,000	500	200
Manganese		SW6020A	7439-96-5	µg/L	200	50	--	--	50	10	3.0	1.5
Mercury		SW7470A	7439-97-6	µg/L	2.0	2.0	--	--	2.0	0.50	0.10	0.054
Nickel		SW6020A	7440-02-0	µg/L	NS	NS	NS	390	390	10	3.0	1.5
Potassium		SW6020A	7440-09-7	µg/L	NS	NS	NS	NS	NS	1,000	500	200
Selenium		SW6020A	7782-49-2	µg/L	50	50	--	--	50	10	5.0	2.5
Silver		SW6020A	7440-22-4	µg/L	50	100	--	--	50	10	3.0	1.5
Sodium		SW6020A	7440-23-5	µg/L	NS	NS	NS	NS	NS	1,000	500	200
Thallium		SW6020A	7440-28-0	µg/L	NS	2.0	--	--	2.0	10	5.0	2.5
Vanadium		SW6020A	7440-62-2	µg/L	NS	NS	NS	86	86	10	2.0	1.0
Zinc		SW6020A	7440-66-6	µg/L	10,000	5,000	--	--	5,000	20	10	7.0
Nitroaromatics and Nitramines Explosives												
1,3,5-Trinitrobenzene		SW8330B	99-35-4	µg/L	NS	NS	NS	590	590	1.0	0.20	0.10
1,3-Dinitrobenzene		SW8330B	99-65-0	µg/L	NS	NS	NS	2.0	2.0	1.0	0.20	0.10
2,4-Dinitrotoluene		SW8330B	121-14-2	µg/L	NS	NS	2.4	38	2.4	1.0	0.20	0.12
2,6-Dinitrotoluene		SW8330B	606-20-2	µg/L	NS	NS	0.49	5.7	0.49	1.0	0.20	0.10
2,4,6-Trinitrotoluene (TNT)		SW8330B	118-96-7	µg/L	NS	NS	25	9.8	9.8	1.0	0.40	0.16
2-Amino-4,6-Dinitrotoluene		SW8330B	35572-78-2	µg/L	NS	NS	NS	39	39	1.0	0.20	0.10
2-Nitrotoluene		SW8330B	88-72-2	µg/L	NS	NS	3.1	16	3.1	1.0	0.20	0.11
3-Nitrotoluene		SW8330B	99-08-1	µg/L	NS	NS	NS	1.7	1.7	1.0	0.40	0.16
4-Amino-2,6-Dinitrotoluene		SW8330B	19406-51-0	µg/L	NS	NS	NS	39	39	1.0	0.20	0.20
4-Nitrotoluene		SW8330B	99-99-0	µg/L	NS	NS	43	71	43	1.0	0.20	0.10
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)		SW8330B	121-82-4	µg/L	NS	NS	9.7	80	9.7	1.0	0.40	0.16
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)		SW8330B	479-45-8	µg/L	NS	NS	NS	39	39	1.0	0.20	0.10
Nitrobenzene		SW8330B	98-95-3	µg/L	NS	NS	1.4	13	1.4	1.0	0.20	0.10
Nitroglycerin		SW8330B	55-63-0	µg/L	NS	NS	45	2.0	2.0	125	62.5	33
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)		SW8330B	2691-41-0	µg/L	NS	NS	NS	1,000	1,000	1.0	0.20	0.10
Pentaerythritol Tetranitrate (PETN)		SW8330B	78-11-5	µg/L	NS	NS	190	39	39	125	62.5	31
Perchlorate												
Perchlorate		SW6850	14797-73-0	µg/L	NS	15	NS	14	15	0.050	0.010	0.0040
Volatile Organic Compounds												
1,1,1,2-Tetrachloroethane		SW8260C	630-20-6	µg/L	NS	NS	5.7	480	5.7	1.0	0.20	0.10
1,1,1-Trichloroethane		SW8260C	71-55-6	µg/L	60	200	--	--	60	1.0	0.20	0.10
1,1,2,2-Tetrachloroethane		SW8260C	79-34-5	µg/L	10	NS	--	--	10	1.0	0.20	0.112
1,1,2-Trichloro-1,2,2-trifluoroethane		SW8260C	76-13-1	µg/L	NS	NS	NS	10,000	10,000	1.0	0.30	0.174

Table 2-4
Comparison of Human Health Groundwater Screening Levels to Laboratory Quantitation Limits

Analyte	Surrogate Analyte (used for groundwater criteria selection)	Analytical Method	CASRN	Units	NMWQCC Standard (1)	USEPA MCL (2)	USEPA Tap Water RSL (3) (cancer)	USEPA Tap Water RSL (4) (non-cancer)	Selected Screening Value (5, 6)	Achievable Laboratory Limits		
										LOQ	LOD	DL
1,1,2-Trichloroethane		SW8260C	79-00-5	µg/L	10	5.0	--	--	5.0	1.0	0.20	0.102
1,1-Dichloroethane		SW8260C	75-34-3	µg/L	25	NS	--	--	25	1.0	0.20	0.10
Volatile Organic Compounds (continued)												
1,1-Dichloroethene		SW8260C	75-35-4	µg/L	5.0	7.0	--	--	5.0	1.0	0.20	0.10
1,2,3-Trichlorobenzene		SW8260C	87-61-6	µg/L	NS	NS	NS	7.0	7.0	1.0	0.30	0.15
1,2,3-Trichloropropane		SW8260C	96-18-4	µg/L	NS	NS	0.0075	0.62	0.0075	2.0	0.50	0.25
1,2,4-Trichlorobenzene		SW8260C	120-82-1	µg/L	NS	70	--	--	70	1.0	0.30	0.152
1,2,4-Trimethylbenzene		SW8260C	95-63-6	µg/L	NS	NS	NS	56	56	1.0	0.20	0.109
1,2-Dibromo-3-Chloropropane		SW8260C	96-12-8	µg/L	NS	NS	0.0033	0.37	0.0033	2.0	0.50	0.25
1,2-Dibromoethane		SW8260C	106-93-4	µg/L	0.10	0.050	--	--	0.050	1.0	0.20	0.103
1,2-Dichlorobenzene		SW8260C	95-50-1	µg/L	NS	600	--	--	600	1.0	0.20	0.10
1,2-Dichloroethane		SW8260C	107-06-2	µg/L	10	5.0	--	--	5.0	1.0	0.20	0.10
1,2-Dichloropropane		SW8260C	78-87-5	µg/L	NS	5.0	--	--	5.0	1.0	0.20	0.10
1,3,5-Trimethylbenzene		SW8260C	108-67-8	µg/L	NS	NS	NS	60	60	1.0	0.20	0.125
1,3-Dichlorobenzene		SW8260C	541-73-1	µg/L	NS	NS	NS	NS	NS	1.0	0.20	0.10
1,3-Dichloropropane		SW8260C	142-28-9	µg/L	NS	NS	NS	370	370	1.0	0.20	0.10
1,4-Dichlorobenzene		SW8260C	106-46-7	µg/L	NS	75	--	--	75	1.0	0.20	0.10
2,2-Dichloropropane	1,2-Dichloropropane	SW8260C	594-20-7	µg/L	NS	5.0	--	--	5.0	1.0	0.20	0.162
2-Butanone (MEK)		SW8260C	78-93-3	µg/L	NS	NS	NS	5,600	5,600	10	4.0	2.00
2-Chlorotoluene		SW8260C	95-49-8	µg/L	NS	NS	NS	240	240	1.0	0.20	0.115
2-Hexanone		SW8260C	591-78-6	µg/L	NS	NS	NS	38	38	10	4.0	2.3
4-Chlorotoluene		SW8260C	106-43-4	µg/L	NS	NS	NS	250	250	1.0	0.20	0.108
4-Methyl-2-pentanone (MIBK)		SW8260C	108-10-1	µg/L	NS	NS	NS	6,300	6,300	10	4.0	2.1
Acetone		SW8260C	67-64-1	µg/L	NS	NS	NS	14,000	14,000	10	5.0	2.6
Benzene		SW8260C	71-43-2	µg/L	10	5.0	--	--	5.0	1.0	0.20	0.10
Bromobenzene		SW8260C	108-86-1	µg/L	NS	NS	NS	62	62	1.0	0.20	0.10
Bromochloromethane		SW8260C	74-97-5	µg/L	NS	NS	NS	83	83	1.0	0.20	0.114
Bromodichloromethane		SW8260C	75-27-4	µg/L	NS	80	--	--	80	1.0	0.20	0.10
Bromoform		SW8260C	75-25-2	µg/L	NS	80	--	--	80	1.0	0.30	0.150
Bromomethane		SW8260C	74-83-9	µg/L	NS	NS	NS	7.5	7.5	1.0	0.30	0.164
Carbon disulfide		SW8260C	75-15-0	µg/L	NS	NS	NS	810	810	1.0	0.50	0.25
Carbon tetrachloride		SW8260C	56-23-5	µg/L	10	5.0	--	--	5.0	1.0	0.20	0.10
Chlorobenzene		SW8260C	108-90-7	µg/L	NS	100	--	--	100	1.0	0.20	0.10
Chloroethane		SW8260C	75-00-3	µg/L	NS	NS	NS	21,000	21,000	1.0	0.50	0.268
Chloroform		SW8260C	67-66-3	µg/L	100	80	--	--	80	1.0	0.20	0.10
Chloromethane		SW8260C	74-87-3	µg/L	NS	NS	NS	190	190	1.0	0.30	0.15
cis-1,2-Dichloroethene		SW8260C	156-59-2	µg/L	NS	70	--	--	70	1.0	0.20	0.10
Dibromochloromethane		SW8260C	124-48-1	µg/L	NS	80	--	--	80	1.0	0.20	0.10
Dibromomethane		SW8260C	74-95-3	µg/L	NS	NS	NS	8.3	8.3	1.0	0.20	0.10
Dichlorodifluoromethane		SW8260C	75-71-8	µg/L	NS	NS	NS	200	200	1.0	0.30	0.15
Ethylbenzene		SW8260C	100-41-4	µg/L	750	700	--	--	700	1.0	0.20	0.10
Hexachlorobutadiene		SW8260C	87-68-3	µg/L	NS	NS	1.4	6.5	1.4	1.0	0.30	0.221
Isopropylbenzene		SW8260C	98-82-8	µg/L	NS	NS	NS	450	450	1.0	0.20	0.10
m,p-Xylenes		SW8260C	179601-23-1	µg/L	620	10,000	--	--	620	2.0	0.40	0.212
Methyl Tert-Butyl Ether		SW8260C	1634-04-4	µg/L	NS	NS	140	6,300	140	1.0	0.20	0.132
Methylene Chloride		SW8260C	75-09-2	µg/L	100	5.0	--	--	5.0	2.0	1.0	0.500
Naphthalene		SW8260C	91-20-3	µg/L	30	NS	--	--	30	2.0	1.0	0.500
n-Butylbenzene		SW8260C	104-51-8	µg/L	NS	NS	NS	1,000	1,000	1.0	0.30	0.172

Table 2-4
Comparison of Human Health Groundwater Screening Levels to Laboratory Quantitation Limits

Analyte	Surrogate Analyte (used for groundwater criteria selection)	Analytical Method	CASRN	Units	NMWQCC Standard (1)	USEPA MCL (2)	USEPA Tap Water RSL (3) (cancer)	USEPA Tap Water RSL (4) (non-cancer)	Selected Screening Value (5, 6)	Achievable Laboratory Limits		
										LOQ	LOD	DL
N-Propylbenzene		SW8260C	103-65-1	µg/L	NS	NS	NS	660	660	1.0	0.30	0.13
o-Xylene		SW8260C	95-47-6	µg/L	620	NS	--	--	620	1.0	0.20	0.10
Volatile Organic Compounds (continued)												
Styrene		SW8260C	100-42-5	µg/L	NS	100	--	--	100	2.0	1.0	0.50
tert-Butylbenzene		SW8260C	98-06-6	µg/L	NS	NS	NS	690	690	1.0	0.20	0.127
Tetrachloroethene		SW8260C	127-18-4	µg/L	20	5.0	--	--	5.0	1.0	0.20	0.152
Toluene		SW8260C	108-88-3	µg/L	750	1,000	--	--	750	1.0	0.20	0.10
trans-1,2-Dichloroethene		SW8260C	156-60-5	µg/L	NS	100	--	--	100	1.0	0.20	0.10
Trichloroethene		SW8260C	79-01-6	µg/L	100	5.0	--	--	5.0	1.0	0.20	0.10
Trichlorofluoromethane		SW8260C	75-69-4	µg/L	NS	NS	NS	5,200	5,200	1.0	0.30	0.15
Vinyl Acetate		SW8260C	108-05-4	µg/L	NS	NS	NS	410	410	2.0	0.50	0.25
Vinyl chloride		SW8260C	75-01-4	µg/L	1.0	2.0	--	--	1.0	1.0	0.20	0.116
Semi-Volatile Organic Compounds				µg/L								
1,2,4-Trichlorobenzene		SW8270D	120-82-1	µg/L	NS	70	--	--	70	10	5.0	2.5
1,2-Dichlorobenzene		SW8270D	95-50-1	µg/L	NS	600	--	--	600	10	5.0	2.5
1,3-Dichlorobenzene		SW8270D	541-73-1	µg/L	NS	NS	NS	NS	NS	10	5.0	2.5
1,4-Dichlorobenzene		SW8270D	106-46-7	µg/L	NS	75	--	--	75	10	5.0	2.5
2,4,5-Trichlorophenol		SW8270D	95-95-4	µg/L	NS	NS	NS	1,200	1,200	10	5.0	2.5
2,4,6-Trichlorophenol		SW8270D	88-06-2	µg/L	NS	NS	41	12	12	10	5.0	2.5
2,4-Dichlorophenol		SW8270D	120-83-2	µg/L	NS	NS	NS	46	46	10	5.0	2.5
2,4-Dimethylphenol		SW8270D	105-67-9	µg/L	NS	NS	NS	360	360	10	5.0	2.6
2,4-Dinitrophenol		SW8270D	51-28-5	µg/L	NS	NS	NS	39	39	20	5.0	2.5
2,4-Dinitrotoluene		SW8270D	121-14-2	µg/L	NS	NS	2.4	38	2.4	10	5.0	2.5
2,6-Dinitrotoluene		SW8270D	606-20-2	µg/L	NS	NS	0.49	5.7	0.49	10	5.0	2.5
2-Chloronaphthalene		SW8270D	91-58-7	µg/L	NS	NS	NS	750	750	10	5.0	2.5
2-Chlorophenol		SW8270D	95-57-8	µg/L	NS	NS	NS	91	91	10	5.0	2.5
2-Methylnaphthalene		SW8270D	91-57-6	µg/L	0.70	0.20	--	--	0.20	10	5.0	2.5
2-Methylphenol		SW8270D	95-48-7	µg/L	NS	NS	NS	930	930	10	5.0	2.5
2-Nitroaniline		SW8270D	88-74-4	µg/L	NS	NS	NS	190	190	10	5.0	2.5
2-Nitrophenol	2-Chlorophenol	SW8270D	88-75-5	µg/L	NS	NS	NS	91	91	10	5.0	2.5
3,3'-Dichlorobenzidine		SW8270D	91-94-1	µg/L	NS	NS	1.3	NS	1.3	10	5.0	2.5
4,6-Dinitro-2-Methylphenol		SW8270D	534-52-1	µg/L	NS	NS	NS	1.5	1.5	20	5.0	2.5
4-Chloro-3-Methylphenol		SW8270D	59-50-7	µg/L	NS	NS	NS	1,400	1,400	10	5.0	2.5
4-Chloroaniline		SW8270D	106-47-8	µg/L	NS	NS	3.7	76	3.7	10	5.0	4.2
4-Methylphenol		SW8270D	106-44-5	µg/L	NS	NS	NS	1,900	1,900	10	5.0	2.5
4-Nitroaniline		SW8270D	100-01-6	µg/L	NS	NS	38	78	38	10	5.0	2.5
Acetophenone		SW8270D	98-86-2	µg/L	NS	NS	NS	1,900	1,900	10	5.0	2.5
Aniline		SW8270D	62-53-3	µg/L	NS	NS	130	140	130	20	10	5.3
Azobenzene		SW8270D	122-66-7	µg/L	NS	NS	0.78	NS	0.78	10	5.0	2.5
Benzidine		SW8270D	92-87-5	µg/L	NS	NS	0.0011	59	0.0011	40	20	10
Benzoic Acid		SW8270D	65-85-0	µg/L	NS	NS	NS	75,000	75,000	100	40	20
Benzyl Alcohol		SW8270D	100-51-6	µg/L	NS	NS	NS	2,000	2,000	10	5.0	2.5
Bis(2-Chloroethoxy)Methane		SW8270D	111-91-1	µg/L	NS	NS	NS	59	59	10	5.0	2.5
Bis(2-Chloroethyl)Ether		SW8270D	111-44-4	µg/L	NS	NS	0.14	NS	0.14	10	5.0	2.5
Bis(2-Chloroisopropyl)Ether		SW8270D	108-60-1	µg/L	NS	NS	NS	710	710	10	5.0	2.5
Bis(2-Ethylhexyl)Phthalate		SW8270D	117-81-7	µg/L	NS	6.0	--	--	6.0	10	5.0	2.5
Butylbenzylphthalate		SW8270D	85-68-7	µg/L	NS	NS	160	1,700	160	10	5.0	2.5
Dibenzofuran		SW8270D	132-64-9	µg/L	NS	NS	NS	7.9	7.9	10	5.0	2.5

Table 2-4
Comparison of Human Health Groundwater Screening Levels to Laboratory Quantitation Limits

Analyte	Surrogate Analyte (used for groundwater criteria selection)	Analytical Method	CASRN	Units	NMWQCC Standard (1)	USEPA MCL (2)	USEPA Tap Water RSL (3) (cancer)	USEPA Tap Water RSL (4) (non-cancer)	Selected Screening Value (5, 6)	Achievable Laboratory Limits		
										LOQ	LOD	DL
Diethylphthalate		SW8270D	84-66-2	µg/L	NS	NS	NS	15,000	15,000	10	5.0	2.5
Dimethylphthalate	Diethyl phthalate	SW8270D	131-11-3	µg/L	NS	NS	NS	15,000	15,000	10	5.0	2.5
Semi-Volatile Organic Compounds (continued)				µg/L								
Di-N-Butylphthalate		SW8270D	84-74-2	µg/L	NS	NS	NS	900	900	10	5.0	2.5
Di-n-Octylphthalate		SW8270D	117-84-0	µg/L	NS	NS	NS	200	200	10	5.0	2.5
Hexachlorobenzene		SW8270D	118-74-1	µg/L	NS	1.0	--	--	1.0	10	5.0	2.5
Hexachlorobutadiene		SW8270D	87-68-3	µg/L	NS	NS	1.4	6.5	1.4	10	5.0	2.5
Hexachlorocyclopentadiene		SW8270D	77-47-4	µg/L	NS	50	--	--	50	10	5.0	2.5
Hexachloroethane		SW8270D	67-72-1	µg/L	NS	NS	3.3	6.2	3.3	10	5.0	2.5
Isophorone		SW8270D	78-59-1	µg/L	NS	NS	780	3,800	780	10	5.0	2.5
Nitrobenzene		SW8270D	98-95-3	µg/L	NS	NS	1.4	13	1.4	10	5.0	2.5
N-Nitrosodimethylamine		SW8270D	62-75-9	µg/L	NS	NS	0.0011	0.055	0.0011	10	5.0	2.5
N-Nitroso-Di-N-Propylamine		SW8270D	621-64-7	µg/L	NS	NS	0.11	NS	0.11	10	5.0	2.5
N-Nitrosodiphenylamine		SW8270D	86-30-6	µg/L	NS	NS	120	NS	120	10	5.0	2.5
N-Nitrosopyrrolidine		SW8270D	930-55-2	µg/L	NS	NS	0.37	NS	0.37	10	5.0	2.5
Pentachlorophenol		SW8270D	87-86-5	µg/L	NS	1.0	--	--	1.0	20	5.0	2.5
Phenol		SW8270D	108-95-2	µg/L	NS	NS	NS	5,800	5,800	10	5.0	2.5
Pyridine		SW8270D	110-86-1	µg/L	NS	20	--	--	20	40	20	2.5
Semi-Volatile Organic Compounds-8270SIM												
Acenaphthene		SW8270D SIM	83-32-9	µg/L	0.70	0.20	--	--	0.20	10.0	5.00	2.50
Anthracene		SW8270D SIM	120-12-7	µg/L	0.70	0.20	--	--	0.20	10.0	5.00	2.50
Benzo(a)anthracene		SW8270D SIM	56-55-3	µg/L	0.70	0.20	--	--	0.20	10.0	5.00	2.50
Benzo(a)pyrene		SW8270D SIM	50-32-8	µg/L	0.70	0.20	--	--	0.20	10.0	5.00	2.50
Benzo(b)fluoranthene		SW8270D SIM	205-99-2	µg/L	0.70	0.20	--	--	0.20	10.0	5.00	2.60
Benzo(k)fluoranthene		SW8270D SIM	207-08-9	µg/L	0.70	0.20	--	--	0.20	10.0	5.00	2.50
Chrysene		SW8270D SIM	218-01-9	µg/L	0.70	0.20	--	--	0.20	10.0	5.00	2.50
Dibenz(a,h)anthracene		SW8270D SIM	53-70-3	µg/L	0.70	0.20	--	--	0.20	10.0	5.00	2.50
Fluoranthene		SW8270D SIM	206-44-0	µg/L	0.70	0.20	--	--	0.20	10.0	5.00	2.50
Fluorene		SW8270D SIM	86-73-7	µg/L	0.70	0.20	--	--	0.20	10.0	5.00	2.50
Indeno(1,2,3-cd)pyrene		SW8270D SIM	193-39-5	µg/L	0.70	0.20	--	--	0.20	10.0	5.00	2.50
Naphthalene		SW8270D SIM	91-20-3	µg/L	30	0.20	--	--	0.20	10.0	5.00	2.50
Phenanthrene		SW8270D SIM	85-01-8	µg/L	0.70	0.20	--	--	0.20	10.0	5.00	2.50
Pyrene		SW8270D SIM	129-00-0	µg/L	0.70	0.20	--	--	0.20	10.0	5.00	2.50
Semi-Volatile Organic Compounds-8270 SIM Low Level												
Acenaphthene		SW8270D SIM	83-32-9	µg/L	0.70	0.20	--	--	0.20	0.50	0.10	0.050
Anthracene		SW8270D SIM	120-12-7	µg/L	0.70	0.20	--	--	0.20	0.50	0.10	0.050
Benzo(a)anthracene		SW8270D SIM	56-55-3	µg/L	0.70	0.20	--	--	0.20	0.50	0.20	0.094
Benzo(a)pyrene		SW8270D SIM	50-32-8	µg/L	0.70	0.20	--	--	0.20	0.50	0.10	0.050
Benzo(b)fluoranthene		SW8270D SIM	205-99-2	µg/L	0.70	0.20	--	--	0.20	0.50	0.10	0.050
Benzo(k)fluoranthene		SW8270D SIM	207-08-9	µg/L	0.70	0.20	--	--	0.20	0.50	0.10	0.050
Chrysene		SW8270D SIM	218-01-9	µg/L	0.70	0.20	--	--	0.20	0.50	0.20	0.060
Dibenz(a,h)anthracene		SW8270D SIM	53-70-3	µg/L	0.70	0.20	--	--	0.20	0.50	0.10	0.050
Fluoranthene		SW8270D SIM	206-44-0	µg/L	0.70	0.20	--	--	0.20	0.50	0.10	0.050
Fluorene		SW8270D SIM	86-73-7	µg/L	0.70	0.20	--	--	0.20	0.50	0.10	0.050
Indeno(1,2,3-cd)pyrene		SW8270D SIM	193-39-5	µg/L	0.70	0.20	--	--	0.20	0.50	0.10	0.050
Naphthalene		SW8270D SIM	91-20-3	µg/L	30	0.20	--	--	0.20	0.50	0.10	0.050
Phenanthrene		SW8270D SIM	85-01-8	µg/L	0.70	0.20	--	--	0.20	0.50	0.10	0.050
Pyrene		SW8270D SIM	129-00-0	µg/L	0.70	0.20	--	--	0.20	0.50	0.10	0.050

Table 2-4
Comparison of Human Health Groundwater Screening Levels to Laboratory Quantitation Limits

Analyte	Surrogate Analyte (used for groundwater criteria selection)	Analytical Method	CASRN	Units	NMWQCC Standard (1)	USEPA MCL (2)	USEPA Tap Water RSL (3) (cancer)	USEPA Tap Water RSL (4) (non-cancer)	Selected Screening Value (5, 6)	Achievable Laboratory Limits		
										LOQ	LOD	DL
Total Petroleum Hydrocarbons - Diesel Range Organics (extended)												
TPH-DRO		SW8015B	68334-30-5	µg/L	NS	NS	NS	NS	NS	500	100	50
TPH-RRO		SW8015B	21274-30-0	µg/L	NS	NS	NS	NS	NS	500	100	50

Notes:
1. Subsections A and B from NMWQCC, 20.6.2.3103, Standards for Groundwater of 10,000 mg/L Total Dissolved Solids concentration or less.
2. USEPA MCLs for Drinking Water, May 2009.
3. USEPA RSLs for Tap Water for carcinogenic analytes (adjusted to TR=1E-05), November 2018.
4. USEPA RSLs for Tap Water for noncarcinogenic analytes, November 2018.
5. The selected screening value is the lowest of the NMWQCC standard or USEPA MCL, or the lowest of the USEPA tap water RSLs considering carcinogenic and noncarcinogenic effects, if no NWWQCC standard or USEPA MCL is published. This hierarchy is taken from Section 7.1 of Attachment 7 of the RCRA Permit (NMED, 2005 and updated in February 2015).
6. The most recent screening levels published by NMED and USEPA at the time the risk evaluation is conducted will be used in the risk evaluation.

Cells shaded in blue show that the selected screening level is lower than the achievable LOQ. If identified as a chemical of potential concern, these analytes will be addressed in the uncertainty discussion.

-- A drinking water standard is published so an RSL is not needed.

Acronyms and Abbreviations:
µg/L = micrograms per liter
CASRN = Chemical Abstracts Service Registry Number
DL = detection limit
DRO = diesel-range organics
LOD = limit of detection
LOQ = limit of quantitation
MCL = maximum contaminant level
mg/L = miligrams per liter
NMWQCC = New Mexico Water Quality Control Commission
NS = no standard
RRO = residual-range organics
RSL = regional screening level
SIM = selected ion mode
TAL = target analyte list
TPH = total petroleum hydrocarbons
TR = target risk
USEPA = United States Environmental Protection Agency

[THIS PAGE INTENTIONALLY LEFT BLANK]

Table 2-5
Comparison of Ecological Soil Screening Levels to Laboratory Quantitation Limits

Analyte	Analytical Method (1)	CASRN	Units	Background Value (2)	Ecological Screening Value (3)			Most Protective ESL or Background Value (4, 5)	Achievable Laboratory Limits		
					Plants	Deer Mouse	Horned Lark		LOQ	LOD	DL
TAL Metals											
Aluminum	SW6020A	7429-90-5	mg/kg	23,340	NS	564	520	23,340	20	10	5.0
Antimony	SW6020A	7440-36-0	mg/kg	0.230	11.4	0.536	NS	0.536	10	3.0	1.5
Arsenic	SW6020A	7440-38-2	mg/kg	7.07	18.0	9.45	10.6	9.45	1.0	0.40	0.20
Barium	SW6020A	7440-39-3	mg/kg	482	118	471	348	482	1.0	0.20	0.10
Beryllium	SW6020A	7440-41-7	mg/kg	1.49	2.50	4.84	NS	2.50	1.0	0.20	0.10
Cadmium	SW6020A	7440-43-9	mg/kg	0.224	32.0	7.00	6.95	6.95	1.0	0.20	0.10
Calcium	SW6020A	7440-70-2	mg/kg	91,760	NS	NS	NS	91,760	100	50	20
Chromium (Total)	SW6020A	7440-47-3	mg/kg	18.1	NS	21.8	12.6	18.1	1.0	0.30	0.15
Cobalt	SW6020A	7440-48-4	mg/kg	6.82	13.0	66.6	36.0	13.0	1.0	0.20	0.10
Copper	SW6020A	7440-50-8	mg/kg	18.4	70.0	50.9	19.2	19.2	1.0	0.30	0.15
Iron	SW6020A	7439-89-6	mg/kg	22,660	NS	NS	NS	22,660	20	10	5.0
Lead	SW6020A	7439-92-1	mg/kg	12.4	120	42.7	7.71	12.4	1.0	0.30	0.15
Magnesium	SW6020A	7439-95-4	mg/kg	8,170	NS	NS	NS	8,170	100	50	20
Manganese	SW6020A	7439-96-5	mg/kg	1,058	220	468	847	1,058	1.0	0.30	0.15
Mercury	SW7471B	7439-97-6	mg/kg	0.0300	34.9	12.8	0.0899	0.0899	0.10	0.020	0.01
Nickel	SW6020A	7440-02-0	mg/kg	19.5	38.0	15.5	31.7	19.5	1.0	0.30	0.15
Potassium	SW6020A	7440-09-7	mg/kg	3,950	NS	NS	NS	3,950	100	50	20
Selenium	SW6020A	7782-49-2	mg/kg	0.513	0.520	1.30	1.37	0.520	1.0	0.50	0.2708
Silver	SW6020A	7440-22-4	mg/kg	0.130	560	54.7	10.4	10.40	1.0	0.30	0.15
Sodium	SW6020A	7440-23-5	mg/kg	2,526	NS	NS	NS	2,526	100	50	20
Thallium	SW6020A	7440-28-0	mg/kg	0.213	0.0500	0.0645	1.66	0.213	1.0	0.50	0.25
Vanadium	SW6020A	7440-62-2	mg/kg	27.2	60.0	37.8	1.63	27.2	1.0	0.25	0.10
Zinc	SW6020A	7440-66-6	mg/kg	49.2	160	685	313	160	2.0	1.0	0.614
Nitroaromatic and Nitroamine Explosives											
1,3,5-Trinitrobenzene	SW8330B	99-35-4	mg/kg	NA	NS	122	NS	122	0.04	0.008	0.004
1,3-Dinitrobenzene	SW8330B	99-65-0	mg/kg	NA	NS	1.03	2.00	1.03	0.04	0.008	0.004
2,4-Dinitrotoluene	SW8330B	118-96-7	mg/kg	NA	62.1	315	46.1	46.1	0.04	0.008	0.0044
2,6-Dinitrotoluene	SW8330B	121-14-2	mg/kg	NA	6.00	24.4	NS	6.00	0.04	0.008	0.0051
2,4,6-Trinitrotoluene (TNT)	SW8330B	606-20-2	mg/kg	NA	NS	16.1	284	16.1	0.04	0.008	0.0022
2-Amino-4,6-Dinitrotoluene	SW8330B	35572-78-2	mg/kg	NA	14.0	126	NS	14.0	0.04	0.008	0.0046
2-Nitrotoluene	SW8330B	88-72-2	mg/kg	NA	NS	81.0	NS	81.0	0.04	0.01	0.0028
3-Nitrotoluene	SW8330B	99-08-1	mg/kg	NA	NS	97.3	NS	97.3	0.04	0.008	0.0038
4-Amino-2,6-Dinitrotoluene	SW8330B	19406-51-0	mg/kg	NA	33.0	87.2	NS	33.0	0.04	0.008	0.0046
4-Nitrotoluene	SW8330B	99-99-0	mg/kg	NA	NS	178	NS	178	0.04	0.008	0.0035
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	SW8330B	121-82-4	mg/kg	NA	NS	81.3	11.2	11.2	0.04	0.008	0.0035
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	SW8330B	479-45-8	mg/kg	NA	NS	11.8	NS	11.8	0.04	0.008	0.0022
Nitrobenzene	SW8330B	98-95-3	mg/kg	NA	NS	53.6	NS	53.6	0.04	0.008	0.0038
Nitroglycerin	SW8330B	55-63-0	mg/kg	NA	21.0	876	NS	21.0	0.2	0.08	0.053
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	SW8330B	2691-41-0	mg/kg	NA	2,740	682	NS	682	0.04	0.008	0.0051
Pentaerythritol Tetranitrate (PETN)	SW8330B	78-11-5	mg/kg	NA	NS	636	NS	636	0.2	0.08	0.053
Perchlorate											
Perchlorate	SW6850	14797-73-0	mg/kg	NA	NS	NS	NS	NS	0.00282	0.0014	0.0007
Volatile Organic Compounds											
1,1,1,2-Tetrachloroethane	SW8260C	630-20-6	mg/kg	NA	NS	NS	NS	NS	0.25	0.050	0.025
1,1,1-Trichloroethane	SW8260C	71-55-6	mg/kg	NA	NS	9,080	NS	9,080	0.25	0.050	0.025

Table 2-5
Comparison of Ecological Soil Screening Levels to Laboratory Quantitation Limits

Analyte	Analytical Method (1)	CASRN	Units	Background Value (2)	Ecological Screening Value (3)			Most Protective ESL or Background Value (4, 5)	Achievable Laboratory Limits		
					Plants	Deer Mouse	Horned Lark		LOQ	LOD	DL
1,1,2,2-Tetrachloroethane	SW8260C	79-34-5	mg/kg	NA	NS	403	NS	403	0.25	0.050	0.025
1,1,2-Trichloro-1,2,2-Trifluoroethane	SW8260C	76-13-1	mg/kg	NA	NS	NS	NS	NS	0.25	0.10	0.050
Volatile Organic Compounds (continued)											
1,1,2-Trichloroethane	SW8260C	79-00-5	mg/kg	NA	NS	35.5	NS	35.5	0.25	0.050	0.025
1,1-Dichloroethane	SW8260C	75-34-3	mg/kg	NA	NS	3,470	NS	3,470	0.25	0.050	0.025
1,1-Dichloroethene	SW8260C	75-35-4	mg/kg	NA	NS	273	NS	273	0.25	0.050	0.025
1,2,3-Trichlorobenzene	SW8260C	87-61-6	mg/kg	NA	NS	NS	NS	NS	0.25	0.10	0.050
1,2,3-Trichloropropane	SW8260C	96-18-4	mg/kg	NA	NS	NS	NS	NS	0.25	0.10	0.050
1,2,4-Trichlorobenzene	SW8260C	120-82-1	mg/kg	NA	NS	13.5	NS	13.5	0.25	0.10	0.050
1,2,4-Trimethylbenzene	SW8260C	95-63-6	mg/kg	NA	NS	NS	NS	NS	0.25	0.10	0.028
1,2-Dibromo-3-Chloropropane	SW8260C	96-12-8	mg/kg	NA	NS	NS	NS	NS	0.25	0.10	0.050
1,2-Dibromoethane	SW8260C	106-93-4	mg/kg	NA	NS	NS	NS	NS	0.25	0.050	0.025
1,2-Dichlorobenzene	SW8260C	95-50-1	mg/kg	NA	NS	22.7	NS	22.7	0.25	0.050	0.025
1,2-Dichloroethane	SW8260C	107-06-2	mg/kg	NA	NS	452	21.8	21.8	0.25	0.050	0.025
1,2-Dichloropropane	SW8260C	78-87-5	mg/kg	NA	NS	NS	NS	NS	0.25	0.050	0.025
1,3,5-Trimethylbenzene	SW8260C	108-67-8	mg/kg	NA	NS	NS	NS	NS	0.25	0.10	0.030
1,3-Dichlorobenzene	SW8260C	541-73-1	mg/kg	NA	NS	22.7	NS	22.7	0.25	0.050	0.025
1,3-Dichloropropane	SW8260C	142-28-9	mg/kg	NA	NS	NS	NS	NS	0.25	0.050	0.025
1,4-Dichlorobenzene	SW8260C	106-46-7	mg/kg	NA	NS	22.7	NS	22.7	0.25	0.050	0.025
2,2-Dichloropropane	SW8260C	594-20-7	mg/kg	NA	NS	NS	NS	NS	0.25	0.10	0.050
2-Butanone (MEK)	SW8260C	78-93-3	mg/kg	NA	NS	16,100	NS	16,100	0.50	0.25	0.13
2-Chlorotoluene	SW8260C	95-49-8	mg/kg	NA	NS	NS	NS	NS	0.25	0.10	0.041
2-Hexanone	SW8260C	591-78-6	mg/kg	NA	NS	75.2	4.73	4.73	0.50	0.25	0.15
4-Chlorotoluene	SW8260C	106-43-4	mg/kg	NA	NS	NS	NS	NS	0.25	0.10	0.034
4-Methyl-2-Pentanone (MIBK)	SW8260C	108-10-1	mg/kg	NA	NS	227	NS	227	0.50	0.25	0.14
Acetone	SW8260C	67-64-1	mg/kg	NA	NS	90.9	951	90.9	0.50	0.25	0.16
Benzene	SW8260C	71-43-2	mg/kg	NA	NS	240	NS	240	0.25	0.050	0.025
Bromobenzene	SW8260C	108-86-1	mg/kg	NA	NS	NS	NS	NS	0.25	0.050	0.025
Bromochloromethane	SW8260C	74-97-5	mg/kg	NA	NS	NS	NS	NS	0.25	0.050	0.025
Bromodichloromethane	SW8260C	75-27-4	mg/kg	NA	NS	NS	NS	NS	0.25	0.050	0.025
Bromoform	SW8260C	75-25-2	mg/kg	NA	NS	NS	NS	NS	0.25	0.10	0.050
Bromomethane	SW8260C	74-83-9	mg/kg	NA	NS	NS	NS	NS	0.50	0.10	0.090
Carbon Disulfide	SW8260C	75-15-0	mg/kg	NA	NS	2.27	NS	2.27	0.25	0.050	0.025
Carbon Tetrachloride	SW8260C	56-23-5	mg/kg	NA	NS	NS	NS	NS	0.25	0.050	0.027
Chlorobenzene	SW8260C	108-90-7	mg/kg	NA	NS	545	284	284	0.25	0.050	0.025
Chloroethane	SW8260C	75-00-3	mg/kg	NA	NS	NS	NS	NS	0.25	0.10	0.065
Chloroform	SW8260C	67-66-3	mg/kg	NA	NS	136	NS	136	0.25	0.050	0.025
Chloromethane	SW8260C	74-87-3	mg/kg	NA	NS	NS	NS	NS	0.25	0.10	0.050
cis-1,2-Dichloroethene	SW8260C	156-59-2	mg/kg	NA	NS	411	NS	411	0.25	0.050	0.025
Dibromochloromethane	SW8260C	124-48-1	mg/kg	NA	NS	NS	NS	NS	0.25	0.050	0.025
Dibromomethane	SW8260C	74-95-3	mg/kg	NA	NS	NS	NS	NS	0.25	0.050	0.025
Dichlorodifluoromethane	SW8260C	75-71-8	mg/kg	NA	NS	NS	NS	NS	0.25	0.10	0.060
Ethylbenzene	SW8260C	100-41-4	mg/kg	NA	NS	NS	NS	NS	0.25	0.050	0.025
Hexachlorobutadiene	SW8260C	87-68-3	mg/kg	NA	NS	NS	NS	NS	0.25	0.10	0.050
Isopropylbenzene	SW8260C	98-82-8	mg/kg	NA	NS	NS	NS	NS	0.25	0.10	0.032
m,p-Xylenes	SW8260C	179601-23-1	mg/kg	NA	NS	NS	NS	NS	0.50	0.10	0.050

Table 2-5
Comparison of Ecological Soil Screening Levels to Laboratory Quantitation Limits

Analyte	Analytical Method (1)	CASRN	Units	Background Value (2)	Ecological Screening Value (3)			Most Protective ESL or Background Value (4, 5)	Achievable Laboratory Limits		
					Plants	Deer Mouse	Horned Lark		LOQ	LOD	DL
Methyl Tert-Butyl Ether	SW8260C	1634-04-4	mg/kg	NA	NS	NS	NS	NS	0.25	0.050	0.025
Methylene Chloride	SW8260C	75-09-2	mg/kg	NA	1,670	53.2	NS	53.2	0.50	0.25	0.10
Volatile Organic Compounds (continued)											
Naphthalene	SW8260C	91-20-3	mg/kg	NA	1.00	130	71.0	1.00	0.50	0.10	0.050
n-Butylbenzene	SW8260C	104-51-8	mg/kg	NA	NS	NS	NS	NS	0.25	0.10	0.035
n-Propylbenzene	SW8260C	103-65-1	mg/kg	NA	NS	NS	NS	NS	0.25	0.10	0.033
o-Xylene	SW8260C	95-47-6	mg/kg	NA	NS	NS	NS	NS	0.25	0.050	0.025
Sec-Butylbenzene	SW8260C	135-98-8	mg/kg	NA	NS	NS	NS	NS	0.25	0.10	0.034
Styrene	SW8260C	100-42-5	mg/kg	NA	3.20	NS	NS	3.20	0.25	0.10	0.050
Tert-Butylbenzene	SW8260C	98-06-6	mg/kg	NA	NS	NS	NS	NS	0.25	0.10	0.031
Tetrachloroethene	SW8260C	127-18-4	mg/kg	NA	10.0	18.2	NS	10.0	0.25	0.050	0.025
Toluene	SW8260C	108-88-3	mg/kg	NA	200	236	NS	200	0.25	0.050	0.025
Trans-1,2-Dichloroethene	SW8260C	156-60-5	mg/kg	NA	NS	411	NS	411	0.25	0.050	0.025
Trichloroethene	SW8260C	79-01-6	mg/kg	NA	NS	909	NS	909	0.25	0.050	0.025
Trichlorofluoromethane	SW8260C	75-69-4	mg/kg	NA	NS	1,930	NS	1,930	0.25	0.10	0.055
Vinyl Acetate	SW8260C	108-05-4	mg/kg	NA	NS	NS	NS	NS	0.25	0.10	0.065
Vinyl Chloride	SW8260C	75-01-4	mg/kg	NA	NS	1.55	NS	1.55	0.25	0.10	0.070
Semi-Volatile Organic Compounds											
1,2,4-Trichlorobenzene	SW8270D	120-82-1	mg/kg	NA	NS	13.5	NS	13.5	0.333	0.167	0.083
1,2-Dichlorobenzene	SW8270D	95-50-1	mg/kg	NA	NS	22.7	NS	22.7	0.333	0.167	0.083
1,3-Dichlorobenzene	SW8270D	541-73-1	mg/kg	NA	NS	22.7	NS	22.7	0.333	0.167	0.083
1,4-Dichlorobenzene	SW8270D	106-46-7	mg/kg	NA	NS	22.7	NS	22.7	0.333	0.167	0.083
2,4,5-Trichlorophenol	SW8270D	95-95-4	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.091
2,4,6-Trichlorophenol	SW8270D	88-06-2	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.083
2,4-Dichlorophenol	SW8270D	120-83-2	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.083
2,4-Dimethylphenol	SW8270D	105-67-9	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.083
2,4-Dinitrophenol	SW8270D	51-28-5	mg/kg	NA	NS	NS	NS	NS	0.667	0.167	0.086
2,4-Dinitrotoluene	SW8270D	121-14-2	mg/kg	NA	6.00	24.4	NS	6.00	0.333	0.167	0.083
2,6-Dinitrotoluene	SW8270D	606-20-2	mg/kg	NA	NS	16.1	284	16.1	0.333	0.167	0.083
2-Chloronaphthalene	SW8270D	91-58-7	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.083
2-Chlorophenol	SW8270D	95-57-8	mg/kg	NA	NS	4.55	5.34	4.55	0.333	0.167	0.083
2-Methylnaphthalene	SW8270D	91-57-6	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.083
2-Methylphenol	SW8270D	95-48-7	mg/kg	NA	0.670	2,000	NS	0.670	0.333	0.167	0.083
2-Nitroaniline	SW8270D	88-74-4	mg/kg	NA	NS	27.3	NS	27.3	0.333	0.167	0.083
2-Nitrophenol	SW8270D	88-75-5	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.083
3,3'-Dichlorobenzidine	SW8270D	91-94-1	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.084
4,6-Dinitro-2-Methylphenol	SW8270D	534-52-1	mg/kg	NA	NS	NS	NS	NS	0.667	0.167	0.083
4-Chloro-3-Methylphenol	SW8270D	59-50-7	mg/kg	NA	NS	NS	NS	NS	0.667	0.167	0.083
4-Chloroaniline	SW8270D	106-47-8	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.083
4-Methylphenol	SW8270D	106-44-5	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.083
4-Nitroaniline	SW8270D	100-01-6	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.12
Acetophenone	SW8270D	98-86-2	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.083
Aniline	SW8270D	62-53-3	mg/kg	NA	NS	NS	NS	NS	0.667	0.167	0.083
Azobenzene	SW8270D	122-66-7	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.096
Benzidine	SW8270D	92-87-5	mg/kg	NA	NS	NS	NS	NS	2.00	0.867	0.863
Benzoic Acid	SW8270D	65-85-0	mg/kg	NA	NS	NS	NS	NS	1.33	0.667	0.333

Table 2-5
Comparison of Ecological Soil Screening Levels to Laboratory Quantitation Limits

Analyte	Analytical Method (1)	CASRN	Units	Background Value (2)	Ecological Screening Value (3)			Most Protective ESL or Background Value (4, 5)	Achievable Laboratory Limits		
					Plants	Deer Mouse	Horned Lark		LOQ	LOD	DL
Benzyl Alcohol	SW8270D	100-51-6	mg/kg	NA	NS	1,300	NS	1,300	0.333	0.167	0.083
Bis(2-Chloroethoxy)Methane	SW8270D	111-91-1	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.083
Semi-Volatile Organic Compounds (continued)											
Bis(2-Chloroethyl)Ether	SW8270D	111-44-4	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.083
Bis(2-Chloroisopropyl)Ether	SW8270D	108-60-1	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.083
Bis(2-Ethylhexyl)Phthalate	SW8270D	117-81-7	mg/kg	NA	NS	166	5.20	5.20	0.333	0.167	0.115
Butylbenzylphthalate	SW8270D	85-68-7	mg/kg	NA	NS	1,450	NS	1,450	0.333	0.167	0.083
Dibenzofuran	SW8270D	132-64-9	mg/kg	NA	6.17	NS	NS	6.17	0.333	0.167	0.083
Diethylphthalate	SW8270D	84-66-2	mg/kg	NA	100	41,800	NS	100	0.333	0.167	0.083
Dimethylphthalate	SW8270D	131-11-3	mg/kg	NA	NS	618	NS	618	0.333	0.167	0.083
Di-N-Butylphthalate	SW8270D	84-74-2	mg/kg	NA	167	12,200	0.662	0.662	0.333	0.167	0.097
Di-n-Octylphthalate	SW8270D	117-84-0	mg/kg	NA	NS	592	NS	592	0.333	0.167	0.097
Hexachlorobenzene	SW8270D	118-74-1	mg/kg	NA	10.0	64.5	23.7	10.0	0.333	0.167	0.083
Hexachlorobutadiene	SW8270D	87-68-3	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.083
Hexachlorocyclopentadiene	SW8270D	77-47-4	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.083
Hexachloroethane	SW8270D	67-72-1	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.083
Isophorone	SW8270D	78-59-1	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.083
Nitrobenzene	SW8270D	98-95-3	mg/kg	NA	NS	53.6	NS	53.6	0.333	0.167	0.083
N-Nitrosodimethylamine	SW8270D	62-75-9	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.083
N-Nitroso-Di-N-Propylamine	SW8270D	621-64-7	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.083
N-Nitrosodiphenylamine	SW8270D	86-30-6	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.153
N-Nitrosopyrrolidine	SW8270D	930-55-2	mg/kg	NA	NS	NS	NS	NS	0.333	0.167	0.083
Pentachlorophenol	SW8270D	87-86-5	mg/kg	NA	5.00	76.5	31.8	5.00	0.667	0.167	0.083
Phenol	SW8270D	108-95-2	mg/kg	NA	0.790	545	NS	0.790	0.333	0.167	0.083
Pyridine	SW8270D	110-86-1	mg/kg	NA	NS	NS	NS	NS	1.33	0.667	0.333
Semi-Volatile Organic Compounds-8270SIM											
Acenaphthene	SW8270D SIM	83-32-9	mg/kg	NA	0.250	636	NS	0.250	0.333	0.167	0.083
Anthracene	SW8270D SIM	120-12-7	mg/kg	NA	6.88	909	NS	6.88	0.333	0.167	0.083
Benzo(a)anthracene	SW8270D SIM	56-55-3	mg/kg	NA	18.0	1.55	0.506	0.506	0.333	0.167	0.083
Benzo(a)pyrene	SW8270D SIM	50-32-8	mg/kg	NA	NS	50.7	NS	50.7	0.333	0.167	0.083
Benzo(b)fluoranthene	SW8270D SIM	205-99-2	mg/kg	NA	18.0	36.4	NS	18.0	0.333	0.167	0.086
Benzo(k)fluoranthene	SW8270D SIM	207-08-9	mg/kg	NA	NS	65.4	NS	65.4	0.333	0.167	0.083
Chrysene	SW8270D SIM	218-01-9	mg/kg	NA	NS	1.55	NS	1.55	0.333	0.167	0.083
Dibenz(a,h)anthracene	SW8270D SIM	53-70-3	mg/kg	NA	NS	12.1	NS	12.1	0.333	0.167	0.083
Fluoranthene	SW8270D SIM	206-44-0	mg/kg	NA	NS	114	NS	114	0.333	0.167	0.126
Fluorene	SW8270D SIM	86-73-7	mg/kg	NA	NS	1,140	NS	1,140	0.333	0.167	0.083
Indeno(1,2,3-c,d)pyrene	SW8270D SIM	193-39-5	mg/kg	NA	NS	65.4	NS	65.4	0.333	0.167	0.083
Naphthalene	SW8270D SIM	91-20-3	mg/kg	NA	1.00	130	71.0	1.00	0.333	0.167	0.083
Phenanthrene	SW8270D SIM	85-01-8	mg/kg	NA	NS	46.7	NS	46.7	0.333	0.167	0.083
Pyrene	SW8270D SIM	129-00-0	mg/kg	NA	NS	68.2	97.0	68.2	0.333	0.167	0.16
Semi-Volatile Organic Compounds-8270 SIM Low Level											
Acenaphthene	SW8270D SIM	83-32-9	mg/kg	NA	0.250	636	NS	0.250	0.01	0.0025	0.0013
Anthracene	SW8270D SIM	120-12-7	mg/kg	NA	6.88	909	NS	6.88	0.01	0.0025	0.0013
Benzo(a)anthracene	SW8270D SIM	56-55-3	mg/kg	NA	18.0	1.55	0.506	0.506	0.01	0.0050	0.0025
Benzo(a)pyrene	SW8270D SIM	50-32-8	mg/kg	NA	NS	50.7	NS	50.7	0.01	0.0025	0.0013
Benzo(b)fluoranthene	SW8270D SIM	205-99-2	mg/kg	NA	18.0	36.4	NS	18.0	0.01	0.0025	0.0013

Table 2-5
Comparison of Ecological Soil Screening Levels to Laboratory Quantitation Limits

Analyte	Analytical Method (1)	CASRN	Units	Background Value (2)	Ecological Screening Value (3)			Most Protective ESL or Background Value (4, 5)	Achievable Laboratory Limits		
					Plants	Deer Mouse	Horned Lark		LOQ	LOD	DL
Benzo(k)fluoranthene	SW8270D SIM	207-08-9	mg/kg	NA	NS	65.4	NS	65.4	0.01	0.0025	0.0013
Chrysene	SW8270D SIM	218-01-9	mg/kg	NA	NS	1.55	NS	1.55	0.01	0.0050	0.0022
Semi-Volatile Organic Compounds-8270 SIM Low Level (continued)											
Dibenz(a,h)anthracene	SW8270D SIM	53-70-3	mg/kg	NA	NS	12.1	NS	12.1	0.01	0.0025	0.0013
Fluoranthene	SW8270D SIM	206-44-0	mg/kg	NA	NS	114	NS	114	0.01	0.0025	0.0013
Fluorene	SW8270D SIM	86-73-7	mg/kg	NA	NS	1,140	NS	1,140	0.01	0.0025	0.0013
Indeno(1,2,3-c,d)pyrene	SW8270D SIM	193-39-5	mg/kg	NA	NS	65.4	NS	65.4	0.01	0.0025	0.0013
Naphthalene	SW8270D SIM	91-20-3	mg/kg	NA	1.00	130	71.0	1.00	0.01	0.0025	0.0013
Phenanthrene	SW8270D SIM	85-01-8	mg/kg	NA	NS	46.7	NS	46.7	0.01	0.0025	0.0013
Pyrene	SW8270D SIM	129-00-0	mg/kg	NA	NS	68.2	97.0	68.2	0.01	0.0025	0.0013
Total Petroleum Hydrocarbons - Diesel Range Organics (extended)											
TPH-DRO	SW8015B	68334-30-5	mg/kg	NA	NS	NS	NS	NS	10	5.0	2.5
TPH-RRO	SW8015B	21274-30-0	mg/kg	NA	NS	NS	NS	NS	20	5.0	2.5

Notes:

1. Analytical Method - USEPA Test Methods for Evaluating Solid Waste latest edition (the most current version of each method will be used). www.epa.gov/hw-sw846
2. FWDA background levels as taken from:
   - All metals except for arsenic and antimony - Table 8-1 from *"Soil Background Study and Data Evaluation Report"* (Shaw, 2010).
   - Arsenic - "*Evaluation of Background Levels for Arsenic in Soil*" (NMED, 2013)
   - The antimony background level of 0.23 mg/kg is from soil unit 350ss as presented in Table 4-1 of the *Phase 2 Soil Background Report* (USACE, 2013).
3. NMED *Risk Assessment Guidance for Site Investigations and Remediation, Volume II - Soil Screening Guidance for Ecological Risk Assessments,* Attachment C. March 2017 Revised.
4. The selected screening level is the lowest ESL, except for some metals where the background value was selected because it was greater than the ESLs.
   If these metals are determined to be present at concentrations greater than the background level, then risk-based screening levels published by NMED will be used in the cumulative risk evaluation.
5. The most recent screening levels published by NMED at the time the risk evaluation is conducted will be used in the risk evaluation.

Cells shaded in blue show that the selected screening level is lower than the LOQ. If identified as a chemical of potential ecological concern, these analytes will be addressed in the uncertainty discussion.

Acronyms and Abbreviations:

CASRN = Chemical Abstracts Service Registry Number
DL = detection limit
DRO = diesel-range organics
ESL = ecological screening level
FWDA = Fort Wingate Depot Activity
LOD = limit of detection
LOQ = limit of quantitation
mg/kg = milligram per kilogram
NA = not applicable
NMED = New Mexico Environment Department
NS = no standard
RRO = residual-range organics
SIM = selected ion mode
TAL = target analyte list
USEPA = United States Environmental Protection Agency
USACE = United State Army Corps of Engineers

[THIS PAGE INTENTIONALLY LEFT BLANK]

Table 2-6 Data Validation Flags

Flag	Interpretation
R	The sample results are rejected because of serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the constituent cannot be verified.
NJ	The analysis indicates the presence of a constituent that has been tentatively identified and the associated numerical value represents its approximate concentration.
UJ	The constituent was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the constituent in the sample.
U	The constituent was analyzed for but was not detected above the reported sample quantitation limit.
J	The constituent was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

Note: Flags are listed in order of severity, from most severe (R) to least severe (J).

[THIS PAGE INTENTIONALLY LEFT BLANK]

SECTION 3.0 SOIL SAMPLING AND ANALYSIS AT SWMU 21 – CENTRAL LANDFILL

The purpose of the soil sampling at the former landfill is to address data gaps that were identified in the findings of the RFI (USGS, 2015) and as required by the NMED, as discussed in Section 1.2 of this Work Plan. Specifically, the investigation activities are: 1) to further define the extent of impact in areas where previous samples exceeded the SSLs; 2) evaluate the backfill material that was placed after the landfill removal activities; and, 3) to assess the soil in the arroyo to the north of the former landfill for potential impacts from surface water runoff or leachate migration. Sampling locations and depths were determined based on the findings and recommendations in the RFI report (USGS, 2015). Section 3.4 was added to this revised work plan to clarify how the proposed borings will be utilized to determine the backfill and native soil interface as well as provide information regarding the lateral extent of the backfill material.

3.1 Borings in Areas of Previous Exceedances

Previous sample locations and analytes which exceed the lowest 2019 NMED SSLs for a residential receptor (which is either the direct contact SSL or the groundwater protection SSL) are summarized in **Tables 3-1** through **3-3** and illustrated in **Figure 3-1**.

Planned sample locations and depths are listed in **Table 3-4**; planned sample locations are illustrated in **Figure 3-2**. A description of each sample location is presented below. All samples will be analyzed for SVOCs, VOCs, extended diesel-range organics (DRO), target analyte list (TAL) metals, perchlorate, and explosives. The analyte list was selected to fill data gaps after completion of the RFI Report (USGS, 2015).

To better define the vertical and lateral extent of impacted soils, a total of nine step-out soil borings will be drilled within an approximate 10-feet radius of previous sample locations where analytes were detected above 2019 SSLs. These samples correspond to soil boring ID numbers 2321CLAND-SB24 through 2321CLAND-SB32. Samples will be collected from the depth intervals corresponding to 0-1 foot, 1-2 feet, 3-4 feet, 5-6 feet, 7-8 feet, 8-9 feet, and 9-10 feet below the depth of backfill.

Based on recommendations in the RFI Report (USGS, 2015), soil borings will be completed at a distance of 25 feet to the north, east, and west of previous sample ID 2321CLAND-SB08. These borings will be identified with soil boring ID numbers 2321CLAND-SB33 through 2321CLAND-SB35. Samples will be collected within a 4-feet horizon above and a 4-feet horizon below the sample previously collected at location SB08 at 17-18 feet bgs. Sample locations will be surveyed in order to accurately apply elevation correction factors for terrain slope.

3.2 Borings to Characterize the Backfill Material

No data exists regarding soils used for backfill after removal of the landfill contents. In order to fill this data gap, samples will be collected from soils overlaying the native soil. A total of eleven shallow soil borings will be conducted within the boundaries of the former landfill (soil boring ID numbers 2321CLAND-SB13 through 2321CLAND-SB23). Samples will be collected from the 0-1 foot, 1-2 feet, 3-4 feet, 5-6 feet, 7-8 feet, 8-9 feet, and 9-10 feet bgs depth intervals. These samples specifically address Comment 9 from NMED contained in the 2014 NOD.

3.3 Borings to Assess Arroyo

Two shallow soil borings (10 feet total depth) will be conducted in the arroyo, one 25 feet northwest and one 50 feet northwest of the northern border of the former landfill (soil boring ID numbers 2321CLAND-SB11 and 2321CLAND-SB12). Samples will be collected from the 0-1 foot, 1-2 feet, 3-4 feet, 5-6 feet, 7-8 feet, 8-9 feet, and 9-10 feet bgs depth intervals. These samples specifically address Comment 6 from NMED contained in the 2014 NOD. Sample intervals and total depth of the borings may be adjusted to ensure samples are collected in the upper 6 inches of the surface and at the native soil and fill interface, as requested by Comment 10 of the 2018 NOD.

3.4 Thickness and Extent of Backfill Material

In order to determine the interface between the fill material and native soils, each borehole described in sections 3.1, 3.2 and 3.3 will be drilled using a hollow stem auger rig with continuous split-spoon soil sampling techniques at the direction of a field geologist. The field geologist will be responsible for identifying the interface between the fill material and the native soil. The field geologist will monitor for differences in material density as determined by blow counts as the split spoon sampler is driven into the material. The field geologist will also visually observe each sample for differences in color and/or consistency. The proposed sample intervals will be adjusted as necessary to ensure that soil samples are collected immediately above and below the interface. All information obtained from these borings will be utilized to obtain a better understanding of the extent and thickness of the backfill material.

The split-spoon sampling protocol in accordance with American Society for Testing and Materials (ASTM) Designation D 1586 is described below.

- The split-spoon sampler (spoon) consists of a 2-inch (outside diameter) by 1-3/8 inch (inside diameter), 18-inch to 24-inch length, heat-treated, case-hardened steel head, split-spoon, and shoe assembly.
- The drive rods, which connect the spoon to the drive head, have a stiffness equal to or greater than that of the A-rod. The size of the drive rods are kept constant throughout a specific drilling program, as the energy absorbed by the rods will vary with the size and weight of the rod employed.
- The drive head consists of a guide rod to give the drop hammer (140 pounds) free fall in order to strike the anvil attached to the lower end of the assembly. The drop hammer used in determining standard penetration test (SPT) resistance weighs 140 pounds and has a 2.5 inch diameter hole through the center, for passage of the drive head guide rod. The hammer is raised with a rope activated by the drill rig cathead. A 30 inch hammer drop is mandatory for proper SPT determination.
- The pre-cleaned split-spoon sampler is attached to the drill rods and lower the assembly to the bottom of the borehole. The 140-pound hammer is raised 30 inches above the drive-

head anvil and then allowed to free fall and strike the anvil. This procedure is repeated until the sampler has penetrated the full length of the sampler (18 to 24 inches depending on the sampler) into the stratum at the bottom of the borehole.

- The number of blows of the hammer required for each 6 inch penetration is counted and recorded on the boring log. The penetration resistance (N) is determined by adding the second and third 6-inch resistance blow counts together.
- The sampler is then withdrawn from the borehole, preferably by pulling on the rope. If the sampler is difficult to remove from the stratum, it may be necessary to remove it by hitting the drive head upward with short, light hammer strokes. The sampler is removed from the bottom of the borehole slowly to minimize disturbance.
- Careful measurement of all drilling tools, samplers, and casing will be exercised during all phases of the boring operations, to insure maximum quality and recovery of the sample.
- The split-spoon is opened and carefully examined, noting all soil characteristics, color seam, disturbance, etc. A representative sample from the specified interval is selected and placed into the sampling containers.
- The field geologist shall record, at a minimum, the weight of the hammer, the length of the split spoon sampler, and the number of hammer blows on the spoon per 6 inches of penetration.
- The field geologist will manually describe soils encountered in accordance with American Society for Testing and Materials (ASTM) Standard D2488-93, *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).* These descriptions will be recorded on a boring log for each boring.

[THIS PAGE INTENTIONALLY LEFT BLANK]

Table 3-1 Sample Locations and Analytes Exceeding 2019 Screening Levels - 1999 Sampling Effort

Analyte	Screening Level	Sample Identification Number												
		E507	E553	E554	E555	E556	E559	E5560	E562	E565	E566	E567	E568	E569
Arsenic	5.83	**16**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Thallium	0.782	NA	**10**	<8.9	<8.9	<8.9	<8.9	<8.9	**11**	<8.9	<8.9	<8.9	**9.2**	<8.9
Benzo(a)anthracene	0.637	0.160	**0.69**	**2.1**	**1.6**	**3.7**	0.17	**2.1**	ND	0.18	**1.9**	**1.10**	**0.68**	0.5
Benzo(a)pyrene	1.12	0.082	0.57	**2.1**	**1.3**	**3.4**	0.18	**1.9**	ND	0.17	**1.7**	0.88	0.56	0.47
Benzo(b)fluoranthene	1.53	0.11	0.68	**2.6**	**1.7**	**3.8**	0.21	**2.1**	ND	0.19	**1.9**	1.20	0.55	0.44
Dibenzo(a,h)anthracene	0.15	ND	0.11	**0.43**	**0.22**	**0.6**	0.075	**0.370**	ND	ND	**0.27**	ND	**0.17**	0.095
Indeno(1,2,3-cd)pyrene	1.53	ND	0.44	**1.7**	1.0	**3.0**	0.20	1.5	ND	0.15	1.3	0.75	0.54	0.34

Table 3-2 Sample Locations and Analytes Exceeding 2019 Screening Levels - 2000 Sampling Effort

Analyte	Screening Level	Sample Identification Number												
		CMAIN05	CMAIN07	CMAIN08	CMAIN10	CMAIN11	CMAIN12	CMAIN14	CMAIN16	CMAIN19	CMAIN20	CMAIN21	CMAIN22	CMAIN24
Benzo(a)anthracene	0.637	**1.22**	**0.956**	**3.21**	**6.89**	0.611	0.474	**9.88**	**14.6**	**4.7**	**1.71**	**0.997**	**6.26**	**0.762**
Benzo(a)pyrene	1.12	**1.26**	0.991	**3.3**	**6.89**	0.603	0.424	**9.99**	**14.6**	**4.77**	**1.71**	1.02	**5.35**	0.726
Benzo(b)fluoranthene	1.53	0.984	0.667	**2.24**	**4.76**	0.495	0.37	**7.09**	**11.1**	**3.54**	1.28	0.815	**4.36**	0.646
Dibenzo(a,h)anthracene	0.15	**0.227**	ND	**0.579**	**1.54**	ND	ND	**1.29**	**2.92**	**0.659**	**0.281**	ND	**0.879**	ND
Indeno(1,2,3-cd)pyrene	1.53	1.12	0.888	**3.23**	**7.41**	0.44	ND	**6.94**	**15.2**	**3.12**	1.36	0.788	**4.65**	ND
2,4,6-Trinitrotoluene	0.861	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**69**	ND	ND

Table 3-3 Sample Locations and Analytes Exceeding 2019 Screening Levels - 2011 Sampling Effort

Analyte	Screening Level	Sample Identification Number
		2321CLAND-SB08
Benzo(a)anthracene	0.637	**9**
Benzo(a)pyrene	1.12	**6.7**
Benzo(b)fluoranthene	1.53	**12**
Indeno(1,2,3-cd)pyrene	1.53	**3.2**

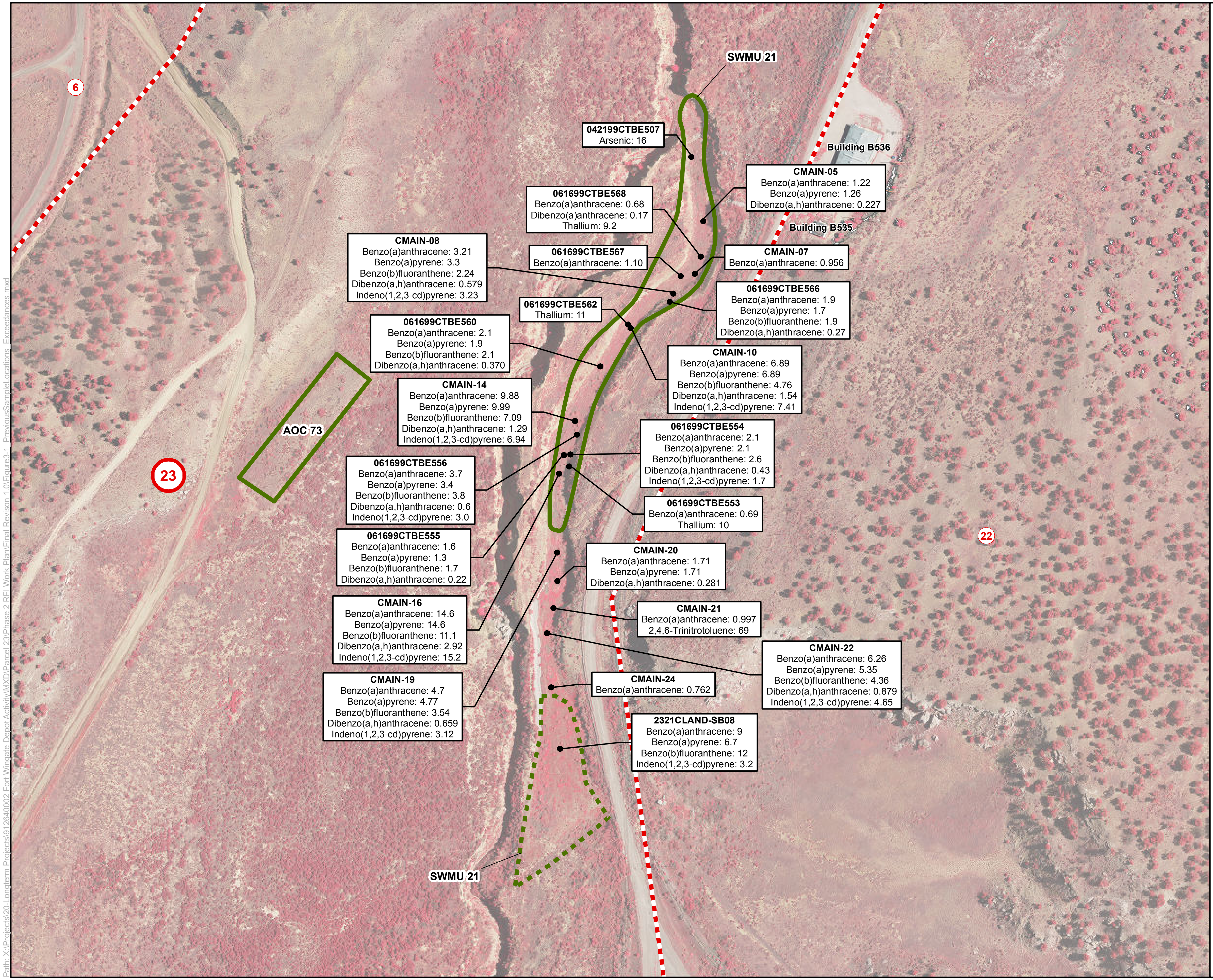
Notes:
All concentrations reported in mg/kg.
Highlighted cells with **bold** results indicate the concentration exceeds the 2019 NMED SSL - based upon the lower of the 2019 screening levels for residential direct contact and soil to groundwater (based upon DAF 20).

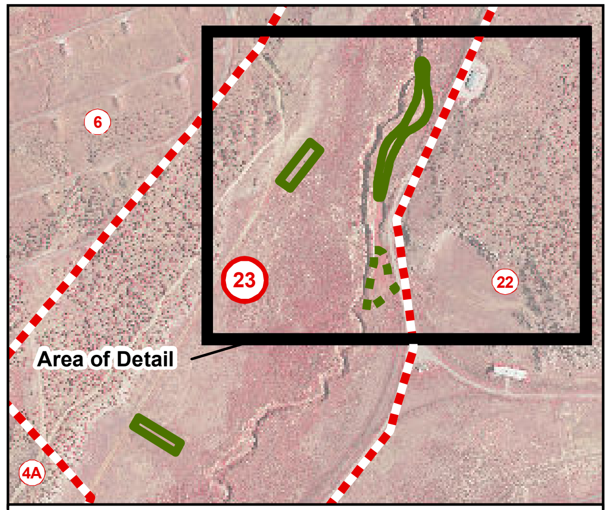
[THIS PAGE INTENTIONALLY LEFT BLANK]

Table 3-4 Summary of Samples to be Collected from Soil Borings at SWMU 21 – Central Landfill

<table>
<tr><th>Soil Boring ID Number</th><th>Target Soils</th><th>Sample Depth Interval (feet)</th><th>Sample Analyses</th></tr>
<tr><td>2321CLAND-SB11</td><td rowspan="2">Arroyo</td><td rowspan="13">0-1, 1-2, 3-4, 5-6, 7-8, 8-9, and 9-10 bgs</td><td rowspan="25">VOCs - 8260C
SVOCs - 8270D
DRO extended
TAL metals – 6020A/7471B
Explosives – 8330B
Perchlorate - 6860</td></tr>
<tr><td>2321CLAND-SB12</td></tr>
<tr><td>2321CLAND-SB13</td><td rowspan="11">Backfill</td></tr>
<tr><td>2321CLAND-SB14</td></tr>
<tr><td>2321CLAND-SB15</td></tr>
<tr><td>2321CLAND-SB16</td></tr>
<tr><td>2321CLAND-SB17</td></tr>
<tr><td>2321CLAND-SB18</td></tr>
<tr><td>2321CLAND-SB19</td></tr>
<tr><td>2321CLAND-SB20</td></tr>
<tr><td>2321CLAND-SB21</td></tr>
<tr><td>2321CLAND-SB22</td></tr>
<tr><td>2321CLAND-SB23</td></tr>
<tr><td>2321CLAND-SB24</td><td rowspan="12">Native Soil</td><td rowspan="9">0-1, 1-2, 3-4, 5-6, 7-8, 8-9, and 9-10 below depth of backfill</td></tr>
<tr><td>2321CLAND-SB25</td></tr>
<tr><td>2321CLAND-SB26</td></tr>
<tr><td>2321CLAND-SB27</td></tr>
<tr><td>2321CLAND-SB28</td></tr>
<tr><td>2321CLAND-SB29</td></tr>
<tr><td>2321CLAND-SB30</td></tr>
<tr><td>2321CLAND-SB31</td></tr>
<tr><td>2321CLAND-SB32</td></tr>
<tr><td>2321CLAND-SB33</td><td rowspan="3">13-14, 15-16, 17-18, 19-20, and 21-22 bgs
(plus 0-1 interval for SB33 for risk evaluation purposes)</td></tr>
<tr><td>2321CLAND-SB34</td></tr>
<tr><td>2321CLAND-SB35</td></tr>
</table>

[THIS PAGE INTENTIONALLY LEFT BLANK]





Parcel 23 Detail

Legend

- Previous Sample Location with Analytes Exceeding 2019 NMED SSLs (NMED, 2019a) as Listed:
  - Arsenic - 7.07 mg/kg
  - Benzo(a)anthracene - 0.637 mg/kg
  - Benzo(a)pyrene - 1.12 mg/kg
  - Benzo(b)fluoranthene - 1.53 mg/kg
  - Dibenzo(a,h)anthracene - 0.15 mg/kg
  - Indeno(1,2,3-cd)pyrene - 1.53 mg/kg
  - 2,4,6-Trinitrotoluene - 0.861 mg/kg
  - Thallium - 0.782 mg/kg
- Additional area identified and removed (Tetra Tech NUS, 2000) to be formally added to SWMU 21 boundary as a future permit modification
- AOC/SWMU Boundary
- Parcel 23 Boundary
- Parcel Number

Notes:

AOC	Area of Concern
mg/kg	Milligrams per Kilogram
NMED	New Mexico Environment Department
SSL	Soil Screening Level
SWMU	Solid Waste Management Unit

Sample Identification Explanation:

23 21 CLAND SB 08

Parcel # · SWMU # · Additional Site Identifier · Source of Sample · Increment #

Aerial Image Source: 2009, CIR

0 50 100 200 Feet

N

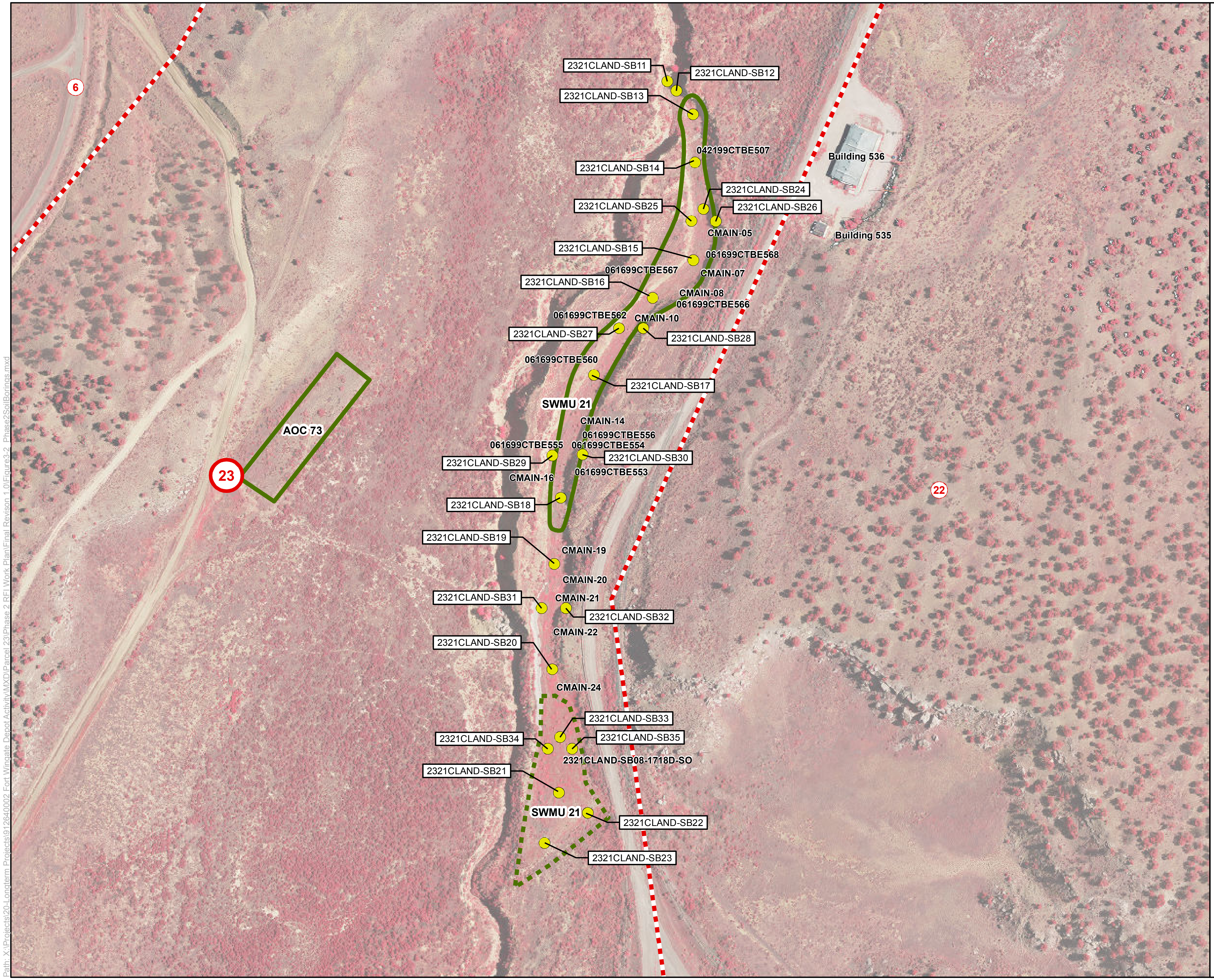
Final RFI Phase 2 Work Plan, Revision 1.0
Parcel 23 - Fort Wingate Depot Activity
McKinley County, New Mexico

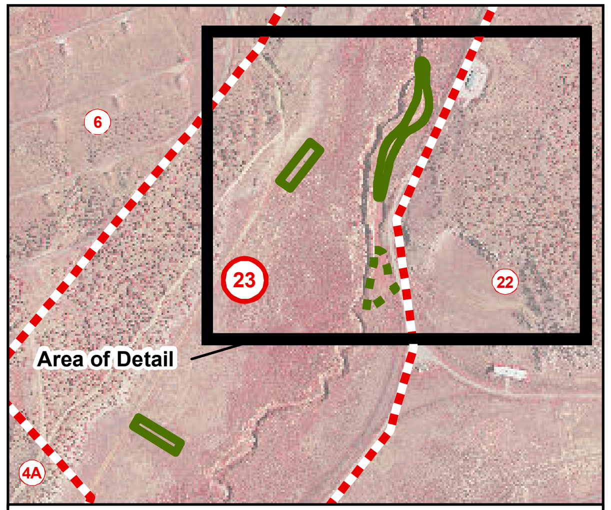
Previous Sample Locations with Analytes Exceeding 2019 NMED SSLs

FIGURE **3-1**

Job No.: 912640002
PM: JH
Date: 4/15/2019
Scale: 1" = 200'

amec foster wheeler





Parcel 23 Detail

Legend

- Proposed Phase 2 Soil Boring Location
- Previous Sample Location with Analytes Exceeding 2019 NMED SSLs (NMED, 2019a)
- Additional area identified and removed (Tetra Tech NUS, 2000) to be formally added to SWMU 21 boundary as a future permit modification
- AOC/SWMU Boundary
- Parcel Number
- Parcel 23 Boundary

Notes:

AOC	Area of Concern
NMED	New Mexico Environment Department
SSL	Soil Screening Level
SWMU	Solid Waste Management Unit

Sample Identification Explanation:

23 (Parcel #) 21 (SWMU #) CLAND (Additional Site Identifier) SB (Source of Sample) 13 (Increment #)

Aerial Image Source: 2009, CIR

0 50 100 200 Feet

N

Final RFI Phase 2 Work Plan, Revision 1.0
Parcel 23 - Fort Wingate Depot Activity
McKinley County, New Mexico

Proposed Phase 2
Soil Boring Locations

FIGURE 3-2

Job No.:	912640002
PM:	JH
Date:	4/15/2019
Scale:	1" = 200'

amec foster wheeler

SECTION 4.0 GROUNDWATER INVESTIGATION AT SWMU 21 – CENTRAL LANDFILL

As discussed in Section 1.2, the NOD (NMED, 2014) Comments 11 and 12 require an investigation of the groundwater to assess whether groundwater quality has been impacted as a result of operations of the former landfill. The approach to achieve this objective was discussed between the Army and NMED during the April 25, 2018 meeting at FWDA. Email correspondence confirming the agreed-upon approach is included in **Appendix A**.

The investigation will include the collection a groundwater sample via a temporary well placed in a downgradient direction from the former landfill (2321CLAND-MW-1). If groundwater is impacted, a permanent well will be installed and an additional well will be drilled and installed in an upgradient direction (2321CLAND-MW-2). **Figure 4-1** depicts the location of the proposed upgradient and downgradient well locations.

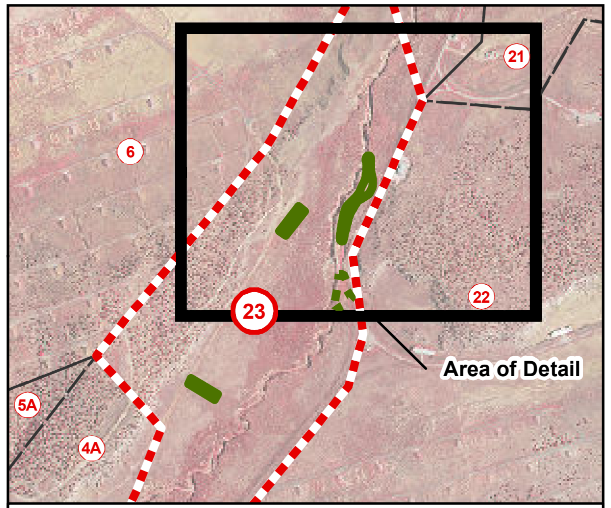
The downgradient boring/temporary well will be placed as close as possible to the arroyo without jeopardizing the safety of the drilling equipment and field staff. The drilling will be performed by a New Mexico licensed driller using one of, or a combination of, the following techniques: hollow stem auger, air rotary, or rotosonic drilling. The borings will be advanced to the first water bearing zone or a maximum depth of 120 feet if groundwater is not encountered.

The borehole will be converted to a temporary well and screened in the first water bearing zone. If no water bearing zone is encountered the borehole will still be converted to a temporary well and the NMED will be contacted for concurrence on a proposed screening interval, which the field geologist will propose after reviewing the borehole lithology. The temporary well will be constructed with a filter-pack, 2-inch diameter 0.010-inch slot screen, and casing. Development will be performed by pumping until the groundwater is sufficiently clear to collect a groundwater sample. The well will be left in place for a minimum of two years. During this time the well will be sampled on a quarterly basis in general accordance with the procedures detailed in the Final 2017 Interim Measures Facility-Wide Groundwater Monitoring Plan Version 10, Revision 1 (Sundance, July 2018) as approved with modifications by NMED on October 22, 2018. Even if groundwater is not present in the well at the time of installation, the Army will check the well for the presence of seasonal water on a quarterly basis.

The temporary well will be covered and left in place until groundwater sample analytical results are reviewed and evaluated. Sample results will be compared to current state or federal drinking water standards (or USEPA tap water RSLs for analytes without published drinking water standards), in accordance with the hierarchy of screening values presented in Section 7.1 of the Permit (NMED, 2015a).

If there are no indications of impact to the groundwater quality after the two year period, the temporary well will be abandoned with NMED's approval. Temporary boreholes will be abandoned following NMOSE guidance and regulations. The casing will be removed as the bentonite slurry is pumped into the borehole. If the casing cannot be removed, it will be cut below the ground surface and abandoned in place.

If it appears that the groundwater quality is impacted, the temporary well will be converted to a permanent groundwater monitoring well. An additional well would also be installed in an upgradient direction. Monitoring wells will be constructed in accordance with *NMED Ground Water Quality Bureau Monitoring Well Construction and Abandonment Guidelines* (Revision 1.1, NMED 2011).



Parcel 23 Detail

Legend

- Proposed Boring/Temporary Well Location
- Additional area identified and removed (Tetra Tech NUS, 2000) to be formally added to SWMU 21 boundary as a future permit modification
- AOC/SWMU Boundary
- Parcel Number
- Parcel 23 Boundary

Notes:

AOC Area of Concern
SWMU Solid Waste Management Unit
Sample Identification Explanation:

23	21	CLAND	MW	1
Parcel #	SWMU #	Additional Site Identifier	Source of Sample	Increment #

Aerial Image Source: 2009, CIR

0 75 150 300
Feet
N

Final RFI Phase 2 Work Plan, Revision 1.0
Parcel 23 - Fort Wingate Depot Activity
McKinley County, New Mexico

Proposed Boring/ Temporary Well Locations

FIGURE **4-1**

Job No.:	912640002
PM:	JH
Date:	4/15/2019
Scale:	1" = 300'

amec foster wheeler

[THIS PAGE INTENTIONALLY LEFT BLANK]

SECTION 5.0 POST-IMPLEMENTATION REPORTING

All activities conducted as part of this RFI Phase 2 Work Plan will be documented in a Phase 2 Report. The final report will contain, at a minimum, a detailed schedule of completed activities, a summary of analytical data, and an evaluation comparing analytical results to the appropriate screening levels, including an evaluation of cumulative risk. The approach to be used in the human health and ecological risk evaluations is described in the following sections, and is based on the requirements contained in the NMED Risk Assessment Guidance for Site Investigations and Remediation (NMED, 2017 and2019).

5.1 Human Health Risk Evaluation

A human health risk evaluation will be conducted for SWMU 21 as described in this section.

5.1.1 NMED Target Risk Thresholds

NMED risk guidance (NMED, 2019; Section 1.2.3 and Section 5) identifies two target risk thresholds that are used to evaluate if cancer risks and noncancer hazards are acceptable. NMED indicates that adverse health impacts are unlikely when the cancer risk is less than $1x10^{-5}$ for carcinogenic analytes, and when the hazard index (HI) is less than 1.0 for noncarcinogenic analytes. These are the target risk thresholds used in the human health risk evaluation for Parcel 23.

5.1.2 Selection of Screening Levels

Two media will be evaluated: 1) soil, and 2) groundwater (assuming it is encountered during investigation activities). These media will be evaluated through use of screening levels selected to reflect the requirements of the Permit (NMED, 2015a; Attachment 7, Section 7.2) and the NMED risk guidance (NMED, 2019).

The hierarchy of soil screening levels is provided below for potentially complete pathways identified by the preliminary exposure pathway evaluation and included in the conceptual site model (CSM):

1. Screening levels published by NMED in Appendix A of the NMED risk guidance (NMED, 2019) for direct contact and groundwater protection.
2. RSLs published by USEPA for residential and industrial receptors for soil are selected when NMED does not publish a value. USEPA RSLs based on a noncancer endpoint correspond to the NMED target hazard quotient (HQ) of 1.0 for noncarcinogenic analytes. USEPA RSLs based on a cancer endpoint will be adjusted to a cancer risk of $1x10^{-5}$ for consistency with the NMED target risk threshold of $1x10^{-5}$ (NMED, 2019; Section 1.2). USEPA risk-based SSLs for the protection of groundwater will be adjusted to a dilution attenuation factor (DAF) of 20 based upon the following justification:
   a) Contaminants of Concern and Their Characteristics: PAHs are the only COCs present in surficial soils that show low-level concentrations exceeding DAF 20 soil-to-

groundwater SSLs over the length of the SWMU. PAHs have low water solubility and are not likely to leach vertically and migrate to groundwater (WHO, 2003 https://www.who.int/water_sanitation_health/water-quality/guidelines/chemicals/polyaromahydrocarbons.pdf and USEPA, 1976 https://nepis.epa.gov/Exe/ZyPDF.cgi/9100RZ55.PDF?Dockey=9100RZ55.PDF).

b) Lack of Infinite Source: This Phase 2 RFI work plan is in follow-up to the removal of the landfill in 1999. All landfill waste and visibly impacted soil below the former landfill was removed and disposed of at an off-site disposal facility (Final RCRA Facility Investigation Parcel 23 (2012)). This removal will have mitigated the "infinite source" of on-going contamination.

c) Soil Characteristics: The boring logs located in Appendix K of the Parcel 23 RFI Report identified the soils using the Unified Soil Classification System (USCS) and classified them as being within the silty clay (CL-ML) and sandy silt (ML) classes (ASTM D2487-17), both of which are classified as fine grained materials composed of fifty percent of more by dry mass of particles passing the No. 200 (75 µm) sieve. Such fine grained materials will bind PAHs and retard their vertical migration (ATSDR, 1995 https://www.atsdr.cdc.gov/ToxProfiles/tp69-c1-b.pdf).

d) Infiltration Rates: “Infiltration rates across much of New Mexico are substantially less than the average range of 0.15 to 0.24 m/yr reported for many of the hydrogeologic regions used in the USEPA analysis” (NMED 2019 (revised), Section 4.4). Aller et al (1987, EPA/600/2-87/035) described the hydrogeologic setting for FWDA as the Colorado Plateau and Wyoming Basin. The infiltration rates used for these arid to semi-arid regions in the USEPA analysis were 0.03 to 0.14 m/y, rates which are 40-80% less than the average range reported for many regions in the U.S., as noted above. Reduced infiltration rates reduces vertical migration.

e) Surface Water: The topographic contours for Parcel 23 is relatively flat with the exception of the arroyo channel. Surface runoff during rainfall/snowmelt events collects in the arroyo channel, which only flows intermittently during precipitation events or pools locally in low areas where it evaporates. No other intermittent surface water bodies exist within Parcel 23. However, southwest of Parcel 23 is Parcel 2, which surface water samples have been intermittently collected since 1992. No COC that were analyzed for results were non-detect to low detects.

f) Comparative Source Area Size to DAFs: Default DAFs of 10 for a 30 acre source and 20 for a 0.5 acre source have been proposed by USEPA as values generally protective nationwide. When the relative area of the Parcel 23 source area is considered, it is much closer to the 0.5 acre site than the 30 acre site making the application of the DAF 20 reasonable for screening purposes.

g) Depth to Groundwater: Depth to the first water-bearing zone is unknown for this area, but is expected to be between approximately 50 and 60 feet bgs, based on installed groundwater monitoring wells to the north of SWMU 21. Depth to the second water-bearing zone is unknown for SWMU 21, but is expected to be between 70 and 120 feet bgs, based on installed groundwater wells to the north of SWMU 21 (Parcel 23 RFI Report Final).

h) Vulnerable Groundwater Environment: Vulnerable groundwater is defined as “areas close to perennial streams or where groundwater is very shallow” (NMED 2019 Revised Guidance Section 4.4 pg 79). SWMU 21 is not near a perennial stream and shallow groundwater has not been detected to date. The impacts to groundwater at FWDA need to be investigated and is responding to this in the facility wide groundwater assessment program.

i) Lack of Presence of Liquids: Land use around SWMU 21 does not include any liquid source(s) that could drive the vertical migration of COCs.

j) Weather Regimes: semi-arid/arid weather regimes at FWDA result in little precipitation and significant evaporation on an annual basis, further attenuating dissolution and vertical migration.

Although the source area orientation is generally to the northeast and parallels both the arroyo and groundwater, this is not expected to override the attenuation of vertical transport supported by the lines of evidences presented above.

The hierarchy of groundwater screening levels is provided below:

1. WQCC standards for the analytes listed in NMAC § 20.6.2.7.WW having the values listed in NMAC § 20.6.2.3103.A and B.
2. USEPA drinking water MCLs provided under Title 40 Code of Federal Regulations (CFR) Parts 141 and 143.
3. If both a WQCC standard and an USEPA MCL have been established for a chemical of potential concern (COPC), the lowest value of (1) and (2) above will be selected.
4. If no WQCC standard or USEPA MCL has been established for a carcinogenic hazardous constituent, values will be selected from the most recent version of the USEPA RSLs for tap water (currently dated November 2018), adjusted to a target excess cancer risk threshold of 1×10^{-5}.
5. If no WQCC standard or USEPA MCL has been established for a noncarcinogenic hazardous constituent, values will be selected from the most recent version of the USEPA RSLs for tap water (currently dated November 2018) with a target HI of 1.0.
6. No current WQCC or USEPA MCL standard is published for perchlorate. The RCRA Permit directs use of USEPA tap water RSLs when no WQCC or USEPA MCL is published, and thus the most recently published USEPA tap water RSL for perchlorate is selected (currently dated November 2018), until a WQCC or USEPA MCL is published.

If volatile analytes are detected in soil or groundwater and indicate that the vapor intrusion (VI) pathway is complete or potentially complete, an evaluation of the VI pathway will be conducted. For soil, a qualitative evaluation will be performed because NMED does not publish VI screening levels (VISLs) for soil. NMED follows USEPA VI guidance, which does not support reliance on bulk soil as an effective means of quantifying potential risks through the VI pathway. The qualitative discussion will present lines of evidence consistent with Section 2.5.2.2 of the NMED risk guidance (NMED, 2019) as listed below:

1. Number and magnitude of detections of volatile compounds;
2. If there is a suspected source of volatile compounds within the SWMU;
3. Decreasing concentration trends;
4. No evidence of sinking or dense vapors; and
5. If a removal action has, or could, mitigate the presence of VOCs in soil.

Where the qualitative discussion provides sufficient evidence that risk to future land use is unlikely, no further work to evaluate or mitigate for VI will be required.

For groundwater, a quantitative evaluation will be performed using the VISLs published in the NMED risk guidance (NMED, 2019; Appendix A [Table A-3]). Values are published for residential and industrial receptors. Both will be used to evaluate potential human health risks. The VI pathway is not evaluated for construction workers because they work outdoors.

Analytes without screening levels published by NMED or USEPA will be evaluated using surrogate analytes that are structurally similar or that provide a conservative estimate of toxicity. Surrogate analytes are identified in **Table 2-3** and **Table 2-4**. The uncertainty introduced by use of surrogate analytes in the risk evaluation, or the lack of appropriate surrogate for quantitative evaluation, will be addressed in the uncertainty discussion, where applicable.

5.1.3 Identification of COPCs

Analytes detected in one or more samples in each medium of concern from the Phase 2 RFI data set will be retained as COPCs. Analytes that are not detected in any sample will not be retained as COPCs. Analytical testing will be performed for VOCs, SVOCs, total petroleum hydrocarbons (TPH)-DRO, TAL metals, mercury, perchlorate, and explosives.

5.1.4 Preliminary Exposure Pathway Evaluation

NMED risk guidance (NMED, 2019) requires the evaluation of four types of exposure to COPCs in soil: 1) direct contact, 2) ingestion of beef that has bioaccumulated COPCs while grazing, 3) inhalation of volatile COPCs that have migrated from the soil to indoor air, and 4) exposure to COPCs in soil that migrate to groundwater that is used as a potable water source.

NMED risk guidance also requires evaluation of exposure to COPCs in tap water from domestic use.

5.1.4.1 Direct Contact

NMED risk guidance (NMED, 2019) identifies three receptor types: 1) residential receptors, 2) commercial/industrial workers, and 3) construction workers with the potential for exposure through direct contact with soil. Although these receptors are not currently living or working at SWMU 21, they have the potential to be present in the future. These three receptors could be exposed to site-related COPCs in soil via dermal contact, incidental ingestion, and inhalation of dust/volatiles in ambient air.

5.1.4.2 Beef Ingestion

NMED risk guidance (NMED, 2019) requires a qualitative evaluation for the beef ingestion pathway for sites that are greater than 2 acres. A qualitative evaluation will be completed.

5.1.4.3 Vapor Intrusion

NMED risk guidance (NMED, 2019) requires an evaluation of VI from subsurface media to indoor air when volatile analytes are detected. This pathway is not currently complete because there are no structures present at SWMU 21. Volatile analytes were not found during prior investigations at concentrations that exceeded screening criteria; however, VOCs are included in the analytical testing suite for the Phase 2 RFI. Therefore, the VI pathway is considered potentially complete in the southern portion of SWMU 21 where site topography and geography provide few limitations on future redevelopment and use. The VI pathway in the northern portion of SWMU 21 that falls within the arroyo is considered incomplete because there are no current structures, and the physical setting makes it unlikely that structures would be constructed in the future.

5.1.4.4 Soil to Groundwater

NMED risk guidance (NMED, 2019) requires that the potential for COPCs in soil to leach to groundwater, which could be subsequently used as a potable water source, should be evaluated if this exposure pathway is potentially complete for a site. There are no domestic water wells present at SWMU 21, but this pathway will be considered potentially complete and assessed in the risk evaluation. This pathway is considered potentially complete for residential receptors, consistent with Table 1-1 of the NMED risk guidance (NMED, 2019).

5.1.4.5 Domestic Tap Water Use

The scope of the Phase 2 RFI includes collection and testing of groundwater, if encountered within 100 feet bgs. This pathway is not currently complete because there are no domestic water wells present at SWMU 21, but it will be considered potentially complete and assessed in the risk evaluation if groundwater is encountered. This pathway is considered potentially complete for residential receptors, consistent with Table 1-1 of the NMED risk guidance (NMED, 2019).

5.1.5 Conceptual Site Model

Site investigations are conducted within the context of a human health CSM. The purpose of the CSM is to describe complete or potentially complete exposure pathways for current or reasonably anticipated future receptors that may be exposed to site-related contamination. Based on the summary of RFI investigation results described in previous sections, potential receptors accessing the site could potentially be exposed to chemicals released from historical activities conducted at Fort Wingate and remaining in the subsurface. At SWMU 21, the potential source of exposure is residual contamination in surface and subsurface soil, and potentially in groundwater, from a historical landfill. Currently, no buildings or other structures are present within SWMU 21. The site is currently vacant and current land use is as an out-of-use military installation undergoing remediation.

The preliminary exposure pathway analysis presented in Section 5.1.4 identified that the direct contact, VI, soil to groundwater, beef ingestion, and domestic tap water use pathways were complete or potentially complete.

Potential health risks will be evaluated for residential, commercial/industrial worker, and construction worker receptors exposed to site-related COPCs in soil or groundwater as illustrated in the CSM presented in **Figure 5-1** and as summarized below:

- Future residents – Potentially complete pathways include direct contact with surface (0-1 foot bgs) and subsurface soil (1-10 feet bgs), VI from COPCs in soil and groundwater in the southern portion of SWMU 21, soil leaching to groundwater used domestically as tap water, and from tap water use, if groundwater is present. The direct contact pathway for residential receptors will be evaluated using results for samples collected from 0-10 feet bgs (NMED, 2019; Section 2.8.2). The VI and soil to groundwater pathways will be evaluated using all results regardless of depth because volatilization and leaching can occur at depths greater than 10 feet. The tap water pathway will be evaluated using all results regardless of depth or location because there is currently no restriction on where a drinking water well could be installed.
- Future commercial/industrial workers – Potentially complete exposure pathways include direct contact with surface soil (0-1 foot bgs) and VI from COPCs in soil and groundwater in the southern portion of SWMU 21. Commercial/industrial workers are not evaluated for the soil to groundwater pathway or tap water use, consistent with NMED risk guidance which indicates that groundwater exposure is not a concern for commercial/industrial workers (NMED, 2019; Section 1.2.1). The direct contact pathway for commercial/industrial workers will be evaluated using results for samples collected from 0-1 foot bgs (NMED, 2019; Section 2.8.2). The VI pathway will be evaluated using all results regardless of depth because volatilization can occur at depths greater than 10 feet.
- Future construction workers – Potentially complete pathways include direct contact with surface (0-1 foot bgs) and subsurface soil (1-10 feet bgs). Construction workers are not exposed to site groundwater because they bring their own drinking water to job sites and because groundwater occurs at depths greater than the typical exposure horizon (10 feet) for a construction worker. Construction workers are also not exposed to volatile analytes through the VI pathway because they spend the majority of their time outdoors. The direct contact pathway for construction workers will be evaluated using results for samples collected from 0-10 feet bgs (NMED, 2019; Section 2.8.2).

There are no complete exposure pathways for contaminants in surface water or sediment because there are no year-round surface water bodies at SWMU 21. Drainages within SWMU 21 carry precipitation and stormwater flow only during rainfall events, but are otherwise dry.

5.1.6 Risk Evaluation Approach

The potential for unacceptable health risks from exposure to remaining FWDA-related contamination will be evaluated for potentially complete pathways as defined by the exposure pathway evaluation and presented in the CSM. The risk evaluation will consist of four parts:

1. Part 1 is a risk screening step that compares the analytical results in each medium for each detected constituent in each sample to the corresponding medium-specific screening level.
2. Part 2 is an evaluation of metals background concentrations and essential nutrients.
3. Part 3 is a cumulative risk evaluation to assess the potential health risks from simultaneous exposure to multiple analytes in soil and potentially in groundwater.
4. Part 4 is an evaluation of the VI pathway.

The details for each part of the risk evaluation are presented below.

5.1.6.1 Risk Screening (Part 1)

The risk screening step presents a sample-by-sample evaluation of analyte detections in soil and groundwater compared to screening levels, based on the hierarchy presented in Section 5.1.2 and as relevant for the complete exposure pathways within SWMU 21. The background level for metals is selected when it is greater than the selected screening value for each exposure pathway. Background levels are discussed further in the next section. The screening levels considered for use in the risk screening step are presented in **Table 2-3** (for soil) and **Table 2-4** (for groundwater). The most current risk evaluation guidelines will be used at the time of the risk evaluation.

As discussed previously in Section 4.0, groundwater results from the first temporary well location will be screened against current state or federal drinking water standards (or USEPA tap water RSLs for analytes without published drinking water standards). If there are no indications of impact to the groundwater quality based on the risk screening step, the temporary well will be abandoned and no further evaluation of groundwater will be required.

5.1.6.2 Evaluation of Metals Background Levels (Part 2)

As allowed by NMED risk guidance (NMED, 2019; Section 2.8.3.2), the risk evaluation process may incorporate a comparison to background concentrations before evaluating cumulative risks. This is consistent with Attachment 7 (Section 7.6) of the Permit (NMED, 2015a) which indicates that the screening level for naturally occurring (in other words, background) constituents can be set at the background level if a background level is approved by NMED. NMED risk guidance (NMED, 2019; Section 5.2) also allows for an evaluation of essential nutrients prior to evaluating cumulative risks. This section provides a summary of the background studies completed at the site, and the steps to be performed to evaluate if metals and essential nutrients should be retained as COPCs.

5.1.6.2.1 Summary of Metals Background Studies

At FWDA, site-specific background concentrations for metals in soil were established through the completion of a background study conducted in 2009 and documented in a report titled *Soil Background Study and Data Evaluation Report* (Shaw, 2010). The study included collection of 124 samples from areas of FWDA in Parcels 1, 2, 5A, 8, 14, 15, 17, 19, and 20 believed to be unimpacted by historical operations. Table 8-1 of the 2010 background study report presents the background value selected for each metal in soil included in the study. A supplemental background study was conducted in 2012 and documented in a report titled *Final Phase 2 Soil Background Report* (USACE, 2013). The purpose of the supplemental investigation was to refine the background levels for arsenic and antimony. The study resulted in a revised background value of 0.23 mg/kg for antimony, which is the 95% upper tolerance limit (UTL) from soil unit 350ss, as presented in Table 4-1 of the Final Phase 2 Soil Background Report, but arsenic concentrations at investigation areas without known arsenic sources continued to exceed the background level.

The background values for soil that will be used to evaluate sample results are presented **in Table 2-3** and **Table 2-5**. Background values for groundwater have not been established or approved by NMED as of the date of this work plan. A metals background evaluation for groundwater will not be conducted if groundwater background levels for FWDA have not been approved at the time the risk evaluation is completed. A metals background evaluation for groundwater will not be conducted if the concentrations of detected analytes are less than current state or federal drinking water standards (or USEPA tap water RSLs for analytes without published drinking water standards).

5.1.6.2.2 Evaluate the Maximum Concentration

NMED risk guidance (NMED, 2019; Section 2.8.3.2) allows metals to be eliminated from further consideration when the maximum detected concentration is less than or equal to its background threshold value (BTV), defined as its calculated UTL. Metals detected in soil at concentrations less than their respective background threshold values will not be retained as COPCs and will not be evaluated further. Metals detected in soil at concentrations greater than background levels or that are considered essential nutrients will be further evaluated.

5.1.6.2.3 Evaluate Essential Nutrients

NMED risk guidance (NMED, 2019; Section 5.2) allows for an evaluation of metals and other inorganics classified as essential nutrients separate from the cumulative risk evaluation. The metals and other inorganics classified as essential nutrients are calcium, chloride, magnesium, phosphorous, potassium, and sodium. SSLs for essential nutrients were developed by NMED based on dietary guidelines developed by the Institute of Medicine and the National Academy of Sciences.

The maximum concentration will be compared to the SSL. Essential nutrients with maximum concentrations less than the SSL will not be retained as COPCs and are not evaluated further. Essential nutrients that are not metals and that have maximum concentrations greater than the essential nutrient SSLs will be retained as COPCs. Essential nutrients that are metals with maximum concentrations greater than the essential nutrient SSLs will be further evaluated.

5.1.6.2.4 Conduct Statistical Evaluation of the Metals

Metals with maximum concentrations greater than background levels and the essential nutrient SSLs from discrete samples may undergo additional evaluation in the form of a more robust statistical evaluation as described in Section 2.8.3.2 of the NMED risk guidance (NMED, 2019) using ProUCL statistical software (most current version). The more robust statistical evaluation, if performed, would include conducting a two-sample hypothesis test for data sets consisting of at least eight samples and at least five detections, conducting a point-by-point comparison to background levels for data sets that are smaller, and preparation of graphical displays to provide further rationale to determine if metals concentrations are consistent with background levels or elevated above background levels.

Metals determined to be consistent with background levels will not be retained as COPCs and are not evaluated further. Metals determined to be elevated above background levels will be further evaluated through a lines of evidence discussion.

5.1.6.2.5 Present Additional Lines of Evidence

NMED allows for a lines-of-evidence discussion to be developed to support exclusion of one or more metals as representative of background rather than being site-related, as long as there are sufficient data to define the nature and extent of potential hotspots. The lines of evidence could include information regarding site history and historical operations, an assessment of the number of detections versus non-detects, an assessment of whether or not the distribution of results for one or more metals is indicative of a release or source area. Metals for which sufficient lines of evidence demonstrate they are not site-related or not significantly elevated above the background level will not be retained as COPCs and are not evaluated further. Metals without sufficient lines of evidence to eliminate them as COPCs will be carried forward to the cumulative risk evaluation.

5.1.6.3 Cumulative Risk Evaluation (Part 3)

The cumulative risk evaluation assesses if there are potential health risks from simultaneous exposure to multiple analytes. The cumulative risk evaluation incorporates the results of the metals background concentrations and proceeds to evaluate potential health risks based on the maximum detected concentrations of each COPC. Subsequent refinements may be incorporated into the cumulative risk evaluation if an unacceptable cancer risk or noncancer hazard is identified in the initial cumulative risk evaluation. The cumulative risk evaluation may include up to three steps to evaluate potential health risks.

The cumulative risk evaluation will focus on soil. It will not address groundwater because the data set to be generated under this work plan will too small to warrant a separate cumulative evaluation (up to two wells, up to two samples). If the concentrations of detected analytes exceed screening levels, then further evaluation of groundwater at Parcel 23 will be conducted separately as part of the FWDA groundwater monitoring program.

5.1.6.3.1 Step 1 – Initial Cumulative Risk Evaluation

The initial cumulative risk evaluation provides an assessment of potential health risks from exposure to COPCs in soil for the worst-case exposure. The maximum detected concentration in the sample data set for each COPC is used to evaluate the complete exposure pathways identified by the exposure pathway analysis and CSM. Cumulative cancer risks and non-cancer hazards will be calculated for soil using the following steps:

1. Select the maximum concentration for each detected COPC. Exclude compounds not detected in any sample within a given medium for that AOC or SWMU. Also exclude metals determined to be present at background levels and essential nutrients found at concentrations below screening levels based on dietary intake.
2. Divide the maximum concentration by the screening level to calculate a risk ratio. Multiply the ratio for carcinogenic analytes by $1x10^{-5}$. Multiply the ratio for noncarcinogenic analytes by 1.0.
3. Sum the risk ratios for carcinogenic analytes to calculate the cumulative cancer risk. Sum the risk ratios for noncarcinogenic analytes to calculate the HI.
4. Lead is evaluated separately through comparison to the screening level because its health effects are not correlated with the typical carcinogenic or noncarcinogenic dose-based toxicity values that characterize other chemicals. Instead, the screening level for lead is based on a modeled concentration in soil that results in an acceptable blood lead level protective of adverse developmental health effects, or that is the action level identified by USEPA for groundwater.
5. The TPH is evaluated separately because its indicator chemicals, as identified in Section 6.2 of the NMED risk guidance (NMED, 2019), will be included in the cumulative risk evaluation when they are detected through analysis of VOCs and SVOCs. The TPH concentrations will be compared to the appropriate NMED screening level as published in Table 6.2 of the NMED risk guidance (NMED, 2019). Justification for the selection of the TPH screening level will be provided in the risk evaluation.

The NMED target risk thresholds are $1x10^{-5}$ for carcinogenic analytes and 1.0 for noncarcinogenic analytes. If the initial cumulative cancer risks and noncancer hazards for soil are less than NMED target risk thresholds, and the maximum concentrations of lead and TPH are less than their respective screening levels, then the predicted health risks will be considered acceptable and the cumulative risk evaluation is complete. No further investigation or removal action is required. If initial cumulative cancer risks or noncancer hazards exceed the target risk thresholds, or if the maximum concentration of either lead or TPH exceeds its respective screening level, the analytes contributing to the exceedance will be carried forward to Step 2.

5.1.6.3.2 Step 2 – Refined Cumulative Risk Evaluation

If the initial cumulative risks or hazards exceed the NMED target risk thresholds, then a refined cumulative risk evaluation will be conducted using one or more of the following in the evaluation:

1. Development of a refined exposure concentration, specifically the 95% UCL, where sufficient data are available to support development of a UCL. ProUCL (most current version) will be used to calculate the 95% UCL which will be used in place of the maximum concentration.
2. Evaluation of cumulative risks within a smaller exposure area, using the maximum concentrations, or a 95% UCL (if sufficient data are available), from within the smaller area, where it is reasonable to consider that receptor exposure over the entire SWMU is unlikely.
3. Segregation of noncancer hazards by toxic endpoint to determine if cumulative hazards exceed target the risk threshold for a particular organ or body system. The toxic endpoint includes the critical or primary organ or body system effected by exposure to a noncarcinogenic analyte, as well as organs or health effects secondary to the critical effect associated with the chronic toxicity criteria used to establish the NMED screening level. The sources of toxicity information reviewed when toxic endpoints are evaluated are those listed in Section 2.1 of the NMED risk guidance (NMED, 2019).
4. Qualitative discussion of additional lines of evidence relevant to the COPC to describe why a potentially unacceptable level of cancer risk or noncancer hazard may not be significant. Examples of lines of evidence could include a review of the subsurface conditions, the physical and chemical properties of an analyte, frequency of detection, number and/or magnitude of exceedances, visual evidence of contamination, concentration trends, and statements about historical use or sources of an analyte at FWDA.

The cumulative cancer risks and noncancer hazards will be recalculated. If the cumulative risk/hazard sums are less than target risk thresholds, then the cumulative risk evaluation is complete, no further evaluation is required and no removal actions are required. If the refined cumulative risk evaluation still indicates unacceptable health risks, then analytes contributing to the exceedance will be carried forward to Step 3.

5.1.6.3.3 Step 3 – Additional Cumulative Risk Evaluation

When unacceptable risks are predicted from both the initial and refined cumulative risk evaluations, additional site-specific data evaluation could be conducted to further characterize the nature and uncertainty of the estimated risks or hazards. The additional evaluation, if performed, may include an evaluation of cumulative risk on a sample-by-sample basis, incorporation of refined exposure assumptions or other appropriate refinement. This step would only be performed if the results of the Steps 1 and 2 indicate that further evaluation would provide additional understanding of potential risks that could further characterize the significance of the unacceptable risks/hazards, or aid in developing a corrective action measure to mitigate the potential health risks.

The results of the cumulative risk evaluation will be presented in the RFI Phase 2 Report, and will include tables showing the cumulative risk calculations and appendices presenting the relevant backup documentation.

5.1.6.4 Vapor Intrusion Pathway Evaluation (Part 4)

NMED requires this pathway be evaluated when volatile analytes are detected in soil or groundwater (NMED, 2019). As described in Section 2.5 of the NMED risk guidance (NMED, 2019), volatile chemicals are those chemicals with Henry's Law constant greater than $1x10^{-5}$ atmospheres – cubic meter per mole (atm-m^3/mol) and molecular weights less than 200 grams per mole (g/mol). NMED risk guidance requires that the VI pathway be identified with one of the following designations:

1. Incomplete pathway and no action required.
2. Potentially complete pathway and a qualitative evaluation required.
3. Complete pathway and quantitative evaluation required.

The VI pathway evaluation will assess the potential for health risk from exposure to COPCs and soil, and in groundwater (if it is encountered and if concentrations are less than groundwater screening levels), from inhalation inside buildings.

NMED does not publish VISLs for bulk soil because NMED follows USEPA VI guidance, which does not support reliance on bulk soil as an effective means of quantifying potential risks through the VI pathway. Therefore, the evaluation of volatile analytes in soil will be qualitative and rely on a lines-of-evidence discussion to characterize the potential for health risks. The lines of evidence referenced in Section 2.5.2.2 of the NMED risk guidance (NMED, 2019), along with discussion of historical use of volatile analytes at FWDA and the results of the groundwater VI evaluation, will be provided in the RFI Phase 2 Report.

NMED does publish VISLs for groundwater that will be used to quantitatively evaluate volatile analytes detected in groundwater, if groundwater is encountered. If volatile analyte concentrations in groundwater are less than VISLs, then no further work to evaluate or mitigate the VI pathway for groundwater will be required. If volatile analyte concentrations in groundwater are greater than VISLs, the VI pathway for groundwater will be further evaluated through a lines-of-evidence discussion that addresses historical uses of volatile analytes at the FWDA, the nature and extent of volatile analyte detections, the frequency and magnitude of exceedances, and may also consider if the assumptions underlying the VISLs are appropriate for the site being evaluated.

If sufficient lines of evidence are developed to support that volatile analytes in soil and groundwater are unlikely to pose health risks through the VI pathway, then no further evaluation or mitigation of the VI pathway is required. If there are not sufficient lines of evidence to rule out health risk through the VI pathway, then additional evaluation of the VI pathway through a site-specific assessment, sampling of soil-gas, or additional sampling of groundwater may be recommended in the conclusions of the RFI Phase 2 Report.

5.1.6.5 Uncertainty Discussion

An uncertainty discussion will be prepared to address the uncertainty associated with the specific data set and risk evaluation. The uncertainty discussion considers the effects of qualifiers added during data validation and of LOQs that may be greater than the screening levels. It also addresses the use of surrogates, or the lack of surrogates if no appropriate surrogate is available. The uncertainty discussion will provide an assessment of whether the uncertainty contributes to an overestimation of risk, an underestimation of risk, or has a neutral impact on estimated risks.

5.2 Ecological Risk Evaluation

A screening level ecological risk evaluation will be conducted for SWMU 21 in Parcel 23 as described in this section. The Screening Level Ecological Risk Assessment (SLERA) will assess potential risks to ecological receptors as required by the Permit (NMED, 2015a; Attachment 7, Section 7.5), and using Volume 2 of the NMED risk guidance (NMED, 2017) titled *Screening-Level Ecological Risk Assessments*.

5.2.1 Define NMED Target Risk Thresholds

NMED risk guidance (NMED, 2017; Section 3.5) identifies the target risk threshold as 1.0. This risk level is the threshold over which the potential for adverse effects on ecological receptors can occur and triggers additional ecological evaluation (i.e., Tier 2).

5.2.2 Selection of Screening Levels

The screening levels selected for evaluating ecological hazards for SWMU 21 are those published for representative receptors by NMED in Attachment C of its risk guidance (NMED, 2017). The ecological screening levels are presented in **Table 2-5**. The screening levels in effect at the time the risk evaluation is conducted will be used in the risk evaluation.

5.2.3 Selection of COPEC

Analytes detected at least once in the Phase 2 RFI data set will be considered chemicals of potential ecological concern (COPEC). Analytes that are not detected in any sample will not be retained as COPECs.

5.2.4 Exposure Pathway Evaluation

The ecological exposure pathway analysis considers the six groups of representative receptors identified in NMED risk guidance: 1) shallow-rooted and deep-rooted plants, 2) deer mouse, 3) horned lark, 4) kit fox, 5) red-tailed hawk, and 6) prong-horned antelope (NMED, 2017). The exposure pathway analysis serves to focus the evaluation on only those receptors for which the pathway is potentially complete. Receptors for which the exposure pathway is incomplete, or for which the home range size is much greater than the size of the area being evaluated, were eliminated from the ecological risk evaluation. The size of SWMU 21 is the primary line of evidence to support no further evaluation of a particular ecological receptor.

SWMU 21 is comprised of approximately 2.2 acres. Based upon this area, three large home range receptors can be eliminated from further evaluation: 1) kit fox (only for sites greater than 267 acres), 2) red tailed hawk (only for sites greater than 177 acres), and 3) prong-horned antelope (only for sites greater than 342 acres). NMED risk guidance requires plants, the deer mouse and the horned lark to be evaluated at all sites, regardless of size (NMED, 2017). Therefore, the ecological risk evaluation will consider each of these three receptors.

5.2.5 Conceptual Site Model

The CSM is based on the exposure pathway evaluation and includes potentially complete exposure pathways in soil for plants, the deer mouse, and the horned lark as illustrated on **Figure 5-2**. The primary exposure route for plants is through direct contact. The deer mouse and horned lark may be exposed through direct contact, inhalation, and ingestion. Shallow-rooted plants and the horned lark will be evaluated using the results from samples collected from 0-1 foot bgs (NMED, 2017; Section 3.2). Deep-rooted plants and the deer mouse will be evaluated using the results from samples collected from 0-10 feet bgs (NMED, 2017; Section 3.2). There are no complete pathways for groundwater because it occurs at depths greater than 10 feet and does not discharge to any surface water features.

5.2.6 Risk Evaluation Approach

The ecological risk evaluation consists of two tiers:

1. Tier 1 – Presents an initial quantitative assessment of ecological risk under the most conservative conditions (for example, maximum concentrations, minimum body weights, use of no observed adverse effect level [NOAEL] toxicity reference values [TRV], and other conservative assumptions). A refined Tier 1 risk evaluation may be developed to assess the two areas of SWMU 21 separately.
2. Tier 2 – Presents a refined quantitative assessment of ecological risk that incorporates revisions to the exposure dose input parameters and that uses the lowest observed adverse effect level (LOAEL) TRVs (provided in Attachment C of NMED, 2017), and re-assesses ecological risk using more realistic assumptions. A lines-of-evidence discussion may also be developed as part of the Tier 2 risk evaluation.

5.2.6.1 Tier 1 Ecological Risk Evaluation

The Tier 1 risk evaluation provides an assessment of potential ecological risks by using the maximum detected concentration in surface soil (0-1 foot bgs) for non-burrowing receptors, and 0-10 feet bgs for burrowing receptors for each COPEC and the most protective ESL (or the effect concentration for plants) for the representative receptors with complete exposure pathways identified by the CSM. Any detected analyte that is identified as a COPEC, except for those metals that are found to be present at background levels as determined in the human health risk evaluation using the process described in Section 5.1.6.2.1, will be evaluated.

Ecological risks will be calculated using the following steps:

1. Select the maximum concentration for each detected analyte. Exclude compounds not detected in any sample. Also exclude metals determined to be present at naturally occurring levels in the background evaluation.

2. Divide the maximum concentration by the most protective Tier 1 ESL (or the effect concentration for plants) to calculate the screening level hazard quotient (SLHQ) using Equations 6 and 8 as provided in the NMED risk guidance (NMED, 2017; Section 3.5).
3. Sum the individual SLHQs to calculate the overall HI.
4. Compare the overall HI to the NMED target risk threshold of 1.0.
5. If the overall HI is less than 1.0, then there is no ecological hazard predicted and no further evaluation is required. If the overall HI is greater than 1.0, then there is the potential for an unacceptable ecological hazard and the risk evaluation progresses to a refined Tier 1 evaluation or to a Tier 2 evaluation.

5.2.6.2 Refined Tier 1 Risk Evaluation

The Refined Tier 1 risk evaluation will be conducted to evaluate the ecological hazard posed by each area of SWMU 21. The same process described in Section 5.2.6.1 will be applied to each exposure area.

If the HI for receptors with complete exposure pathways in a given exposure area are less than the NMED target risk threshold of 1.0, then no ecological hazard is predicted for that receptor in that exposure area and no further evaluation was required. If the HI is greater than 1.0 for a receptor in a particular exposure area, then that receptor and exposure area will be carried forward to a Tier 2 risk evaluation.

5.2.6.3 Tier 2 Risk Evaluation

The Tier 2 ecological risk evaluation allows for multiple assumptions to be refined before re-calculating the SLHQ and HI for those receptors having SLHQs or overall HIs greater than 1.0 in the refined Tier 1 ecological risk evaluation. This section describes the refinements allowed by NMED risk guidance that will be considered for use in the Tier 2 ecological risk evaluation (NMED, 2017).

5.2.6.3.1 Refine the Toxicity Reference Values

NMED risk guidance (NMED, 2017; Section 4.1.1) provides for revisions to the TRVs (or effect concentrations for plants) to those based on LOAELs. Tier 2 TRVs/effect concentrations (ECs) represent concentrations that are protective of the population as a whole, as opposed to NOAEL-based TRVs that are protective of the most sensitive individuals.

5.2.6.3.2 Develop Refined Exposure Doses for Affected Receptors

NMED risk guidance (NMED, 2017; Section 4.0) provides for revisions to multiple factors in the calculation of exposure doses for Tier 2 evaluations. These factors, and the refinements that are allowed, are listed below:

- Exposure point concentration (EPC): The maximum concentration may be refined by calculating the 95% UCL, if there are sufficient data to support a UCL calculation. ProUCL (most current version) will be to calculate the 95% UCL.
- Area use factor (AUF): This value may be refined using the actual exposure area size and the receptor's average home range size. If the average home range size is less than the size of the exposure area, the AUF will remain at 1.
- Body weight: The average body weight may be used instead of the minimum body weight.
- Ingestion rate: The average reported food ingestion rate may be used instead of the maximum food ingestion rate.
- Wet-weight to dry-weight conversion factor: This may be included to account for the difference in reporting body weight (as wet-weight) and soil concentrations (as dry weight).

In addition, a lines-of-evidence discussion may be developed where appropriate to provide additional context for the results of the Tier 2 risk evaluation or to demonstrate that a particular COPEC is not site-related.

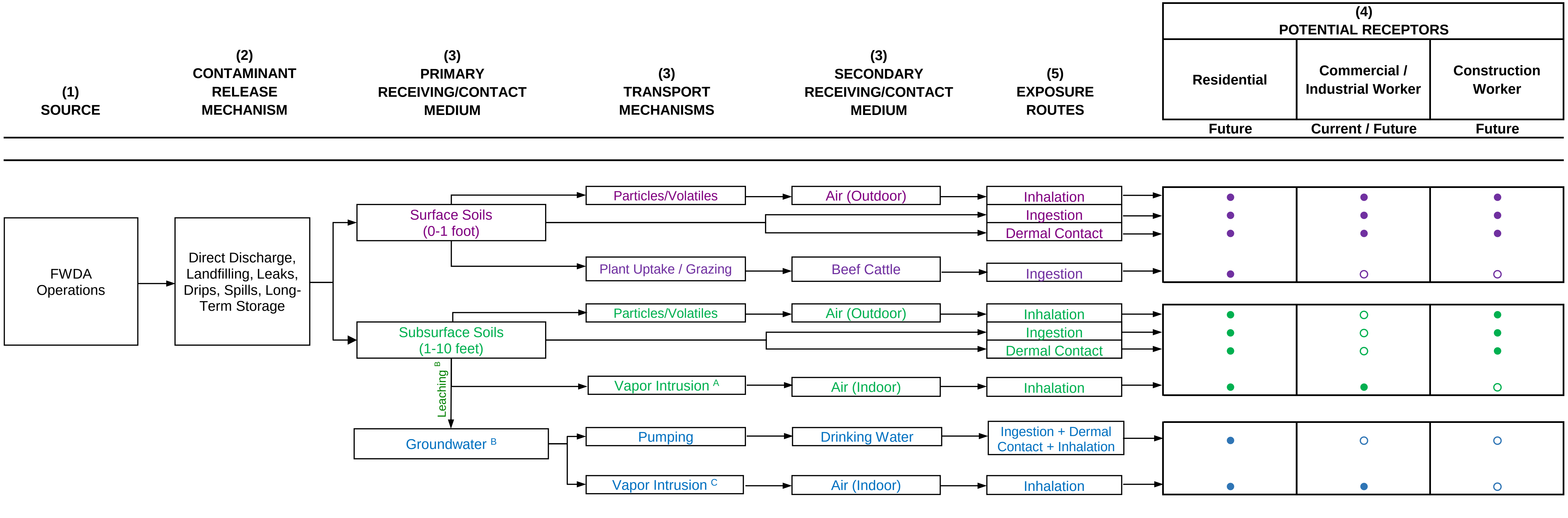
5.2.6.3.3 Conduct the Tier 2 Risk Evaluation

The Tier 2 risk evaluation is conducted using the same procedure as used in the Tier 1 risk evaluation, for those receptors and exposure area that progress into the Tier 2 risk evaluation. The Tier 2 risk evaluation incorporates one or more of the refinements listed in the prior two sections to re-assess the ecological risks.

The Tier 2 risk evaluation is considered complete, and no further evaluation is needed, when the HI for each receptor is less than 1.0. In circumstances where the HI for one or more receptors is greater than 1.0 after applying all refinements, the Army will consider if a site-specific ecological risk evaluation is warranted, or if a soil removal action is preferred to additional ecological risk evaluation. The approach to performing a site-specific ecological risk evaluation is not addressed in this RFI Phase 2 Work Plan. The Army will work in consultation with NMED on the approach to a site-specific ecological risk evaluation if that is the Army's selected course of action.

5.2.7 Uncertainty Discussion

An uncertainty discussion will be prepared to address the uncertainty associated with the specific dataset and risk evaluation. The uncertainty discussion will consider the effects of qualifiers added during data validation, of LOQs that may be greater than the ESLs (or ECs for plants), and of exposure assumptions that may not be representative of anticipated receptor use at Parcel 23. The uncertainty discussion will provide an assessment of whether the uncertainty contributes to an overestimation of risk, an underestimation of risk, or has a neutral impact on estimated risks.



Notes: The numbers appearing at the top of each column are taken from the 5 elements that make up a complete exposure pathway presented in Section 1.2.1 of the NMED Risk Guidance (NMED, 2019 Revised).

- ● Potentially complete exposure pathway.
- ○ Incomplete exposure pathway.

A The vapor intrusion pathway for soil is incomplete for the northern portion of SWMU 21 because it is within the arroyo, no structures are currently present and none are reasonably likely to be built in the future. The vapor intrusion pathway for soil for the southern portion of SMWU 21 will be considered complete if volatile analytes are detected in the Phase 2 RFI samples.

B The soil leaching to groundwater pathway will be evaluated if the geologic conditions indicate the potential for soil contamination to leach to groundwater.

C The vapor intrusion pathway for groundwater is only considered potentially complete for the southern portion of SWMU 21 because no structures are currently located within the arroyo and none are reasonably likely to be constructed in the future.

Final RFI Phase 2 Work Plan, Revision 1.0
Parcel 23 - Fort Wingate Depot Activity
McKinley County, New Mexico

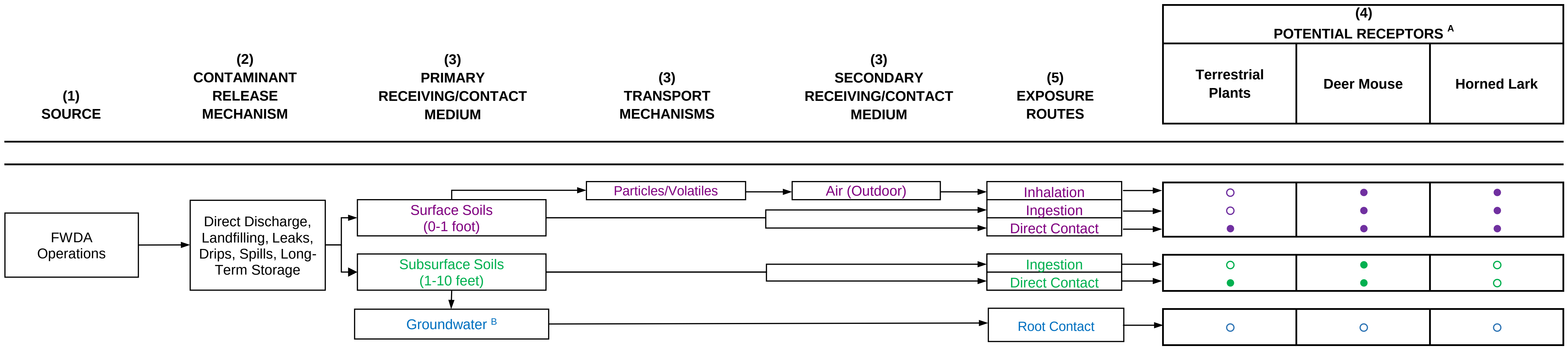
SWMU 21 - Conceptual Site Model for Human Receptors

FIGURE **5-1**

Job No.: 912640002
PM: JH
Date: 4/15/2019
Scale: NTS

amec foster wheeler

Path: X:\Projects\20-Longterm Projects\912640002 Fort Wingate Depot Activity\MXD\Parcel 23\Phase 2 RFI Work Plan\Final Revision 1.0\Figure5-1_CSM_HumanReceptors_SWMU21.ai



Notes: The numbers appearing at the top of each column are taken from the 5 elements that make up a complete exposure pathway presented in Section 1.2.1 of the NMED Risk Guidance (NMED, 2017 Revised).

● Potentially complete exposure pathway.

○ Incomplete exposure pathway.

A The size of SWMU 21 is less than 10% of the home range size for the kit fox, red-tailed hawk, and pronghorn antelope, and thus the risk to these receptors from SWMU are negligible; these receptors are not evaluated further.

B Groundwater does not discharge to surface water, it is too deep for root contact by plants, and there are no year-round surface water bodies within SWMU 21. Thus, groundwater, surface water and sediment are not media of concern for ecological receptors at SWMU 21.

Final RFI Phase 2 Work Plan, Revision 1.0
Parcel 23 - Fort Wingate Depot Activity
McKinley County, New Mexico

**SWMU 21 -
Conceptual Site Model for
Ecological Receptors**

FIGURE **5-2**

Job No.: 912640002
PM: JH
Date: 3/19/2019
Scale: NTS

amec foster wheeler

SECTION 6.0 SCHEDULE

A summary of the expected schedule for conducting the Phase 2 RFI activities at Parcel 23 is presented below. Days listed are days following NMED approval of this RFI Phase 2 Work Plan and Army notice to proceed.

- 30 days – Provide 30-day notice to NMED
- 60 days – Initial mobilization to conduct investigation
- 120 days – Submittal of Army Draft RFI Phase 2 Report
- 165 days – Submittal of Final RFI Phase 2 Report

[THIS PAGE INTENTIONALLY LEFT BLANK]

SECTION 7.0 REFERENCES

CH2M Hill, 2009. *Final Historical Information Report, Parcel 23*. CH2M Hill, 27 April 2009.

CH2M Hill, 2010. *Final – NMED Revision, RCRA Facility Investigation Work Plan, Parcel 23.* CH2M Hill, 06 April 2010.

Department of Defense (DoD), 2013. *DoD Quality Systems Manual Version 5.0*. United States Department of Defense, July 2013.

Innovar and CB&I, 2015. *Final 2015 Interim Measures Facility-Wide Groundwater Monitoring Plan, Version 8, Revision 1, Fort Wingate Depot Activity, McKinley County, New Mexico*. Innovar Environmental, Inc. and CB&I, 28 April 2015.

New Mexico Environment Department (NMED), 2011. *New Mexico Environment Department Groundwater Quality Bureau Monitoring Well Construction and Abandonment Guidelines, Revision 1.1*. New Mexico Environment Department, March 2011.

NMED, 2013, *Evaluation of Background Levels for Arsenic in Soil, Fort Wingate Depot Activity*, New Mexico. Letter, December 18, 2013.

NMED, 2014. Letter from the New Mexico Environment Department to Mark Patterson (FWDA, BRAC Coordinator) and Steve Smith (USACE FWDA Program Manager) *Re: Disapproval, Final RCRA Facility Investigation Report, Parcel 23, Fort Wingate Depot Activity, McKinley County, New Mexico, USEPA ID# NM6213820974, HWB-FWDA-12-002*. New Mexico Environment Department, August 19, 2014.

NMED, 2015a. Resource Conservation and Recovery Act Permit, USEPA ID No. NM 6213820974. New Mexico Environment Department Hazardous Waste Bureau, December 1, 2005, Revised February 2015.

NMED, 2015b. Letter from the New Mexico Environment Department to Mark Patterson (FWDA, BRAC Coordinator) and Steve Smith (USACE FWDA Program Manager) *Re: Approval with Modifications, Final RCRA Facility Investigation Report, Parcel 23, Revision 1.0, Fort Wingate Depot Activity, McKinley County, New Mexico, USEPA ID# NM6213820974, HWB-FWDA-12-002.* New Mexico Environment Department, August 12, 2015.

NMED, 2017. *Risk Assessment Guidance for Site Investigations and Remediation*. Volume II Soil Screening Guidance for Ecological Risk Assessments, NMED Hazardous Waste Bureau. March, 2017 Revised.

NMED, 2018. Letter from the New Mexico Environment Department to Mark Patterson (FWDA, BRAC Coordinator) and Steve Smith (USACE FWDA Program Manager) *Re:, Disapproval Final RCRA Facility Investigation Phase 2 Work Plan, Parcel 23, Fort Wingate Depot Activity, McKinley County, New Mexico, USEPA ID# NM6213820974, HWB-FWDA-18-004.* New Mexico Environment Department, October 31, 2018.

NMED, 2019. *Risk Assessment Guidance for Site Investigations and Remediation*. Volume I Soil Screening Guidance for Human Health Risk Assessments, NMED Hazardous Waste Bureau. March, 2019 Revised.

SCIENTECH, Inc., 1999a. *Chemical Quality Control Summary Report for the Landfill Closure: Removal and Disposal of Group "C" and Central Landfills, Fort Wingate, New Mexico*. August 1999.

SCIENTECH, Inc., 1999b. *Chemical Quality Control Summary Report for Confirmation Soil Sampling of Central Landfill in Support of Landfill Closure: Removal and Disposal of Group "C" and Central Landfills, Fort Wingate, New Mexico*. December 1999.

Shaw Environmental Inc. (Shaw), 2010. *Soil Background Study and Data Evaluation Report*, Fort Wingate Depot Activity, Gallup, New Mexico. Shaw Environmental, Inc. October 2010.

Tetra Tech NUS, 2000. *Final Release Assessments Report*. December 2000.

United States Army Corp of Engineers (USACE), 2007. *Environmental Information Management Plan, Fort Wingate Depot Activity*. USACE, 21 December 2007.

USACE, 2013. *Final Phase 2 Soil Background Report*, Fort Wingate Depot Activity, McKinley County, New Mexico, USACE, February 5, 2013.

United States Environmental Protection Agency (USEPA), 2009. *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use.* United States Environmental Protection Agency, 13 January 2009.

USEPA, 2018. Regional Screening Level (RSL) Summary Table (TR=1E-06, HQ=1), November, 2018.

United States Geological Survey (USGS), 2015. *Final RCRA Facility Investigation Report, Parcel 11, Revision 1.0, Fort Wingate Depot Activity*. USGS New Mexico Water Science Center, 28 February 2015.

APPENDIX A
CORRESPONDENCE WITH NMED

[THIS PAGE INTENTIONALLY LEFT BLANK]

Army Response to October 31, 2018 Disapproval Letter
April 25, 2019

[THIS PAGE INTENTIONALLY LEFT BLANK]

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT CHIEF OF STAFF FOR INSTALLATION MANAGEMENT
600 ARMY PENTAGON
WASHINGTON, DC 20310-0600

April 25, 2019

Base Realignment and Closure Division

Mr. John Kieling
Chief, Hazardous Waste Bureau
New Mexico Environment Department
2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303

RE: Response to October 31, 2018 Disapproval Letter, Final RCRA Facility Investigation Phase 2 Work Plan, Parcel 23, Fort Wingate Depot Activity, McKinley County, NM EPA #NM6213820974, HWB-FWDA-18-004

Dear Mr. Kieling:

This letter presents our responses to your comments presented in the Disapproval Letter dated October 31, 2018 regarding the Final RCRA Facility Investigation Phase 2 Work Plan, Parcel 23 for the Fort Wingate Depot Activity (FWDA) under RCRA Permit USEPA ID No. NM6213820974 (October 5, 2016). The report has been revised to address each comment as described below and is being submitted under separate cover as *Final RCRA Facility Investigation Phase 2 Work Plan, Parcel 23, Revision 1.0,* April 29, 2019. The revised report describes the removal activities at Parcel 23 FWDA, McKinley County, New Mexico and is being submitted concurrently for tribal and regulatory review.

In addition to changes specific to NMED comments, changes were also made to reference to the NMED 2019 Risk Assessment Guidance for Site Investigations and Remediation.

NMED COMMENT 1 - Section 1.2, Background Information, lines 7-9, page 1-2

Permittee Statement: "The Approval with Modifications (AwM) (Comment 6) also requires that Army address all comments within the NOD, specifically those comments referencing future actions through the development of a RFI Phase 2 Work Plan."

NMED Comment: Although the Permittee's statement is true, the referenced correspondence (Approval with Modifications) does not contain Comment 6. Correct the typographical error in the revised Work Plan.

Permittee Response:

The edit has been made as requested. The sentence now reads as follows:

The Approval with Modifications AwM also requires that Army address all comments within the NOD, specifically those comments referencing future actions through the development of a RFI Phase 2 Work Plan.

NMED COMMENT 2 - Section 1.2, Background Information, lines 9-12, page 1-2

Permittee Statement: "For reference, the following documents are included in Appendix A:
• NOD Letter - August 19, 2014
• Response to NOD - February 28, 2015
• AwM – August 12, 2015."

NMED Comment: ·Appendix A also contains email correspondence between the Permittee and NMED regarding the proposed locations of monitoring wells and a figure showing the locations. Provide a more accurate description. In addition, include all extension request approval letters for this document in Appendix A.

Permittee Response:
The text has been edited to reference all documents in Appendix A as follows:

For reference, the following documents are included in **Appendix A:**
- NMED NOD Letter - August 19, 2014
- Army Response to NOD - February 28, 2015
- NMED AwM - August 12, 2015
- Correspondence between NMED and Army regarding downgradient well location – April/May 2018

Appendix A also includes the following documents:
- NMED Work Plan Extension Request Approval Letters – December 22, 2015, January 19, 2016, December 1, 2016, December 6, 2017

- NMED Work Plan NOD Letter – October 31, 2018
- Army Response to NOD Letter – April 29, 2019

NMED COMMENT 3 - Section 1.2, Background information, Comment 9, lines34-36, page 1-2

Permittee Statement: "The revised RFI Report suggests that observed impacts may be the result of runoff from the adjacent coal burning boiler plant (Building 535)."

NMED Comment: A figure showing the location of Building 536 was included in the Work Plan; however, the locations of Building 535 and the borrow pit that supplied the fill material are not indicated in any figure in the Work Plan. Include a figure depicting these locations in the revised Work Plan.

Permittee Response:

Figures 1-3, 3-1, 3-2, and 4-1 have been revised to call out the location of Former Buildings 535 and 536.

The source of the fill material is unknown and therefore not indicated on a figure. Because the source is unknown, samples are proposed to be collected from the backfill. This is discussed in Section 3.0 of the work plan.

NMED COMMENT 4 - Section 1.3, Cultural Resources, lines 36-37, page 1-3 and line 1, page 1-4

Permittee Statement: "No archaeological site is within the horizontal footprint of SWMU 21; however, several archaeological sites are within close proximity to these locations (LA101952 and LA101743)."

NMED Comment: The locations of archaeological sites are designated as LA101952 and LA101743; however, they are not shown in any figure. The designation is meaningless unless referenced in a figure. Include a figure showing these locations in the revised Work Plan or remove the reference to the archeological sites from the statement.

Permittee Response:

The text has been revised as follows:

No archaeological sites recorded at FWDA are located within the horizontal footprint of SWMU 21. Should any sites outside of SWMU 21 show potential to be impacted by site related activities, these will be flagged and avoided during field work.

NMED COMMENT 5 - Section 2.2.2, Groundwater Sampling, lines 24-26, page 2-2

Permittee Statement: "The general approach to evaluating whether or not groundwater is impacted will be to collect groundwater samples from the first water-bearing zone by means of a temporary well."

NMED Comment: The Parcel 3 groundwater investigation indicates that some wells close to arroyos initially retained groundwater; however, the wells went dry during the subsequent monitoring event. The groundwater conditions in Parcel 23 may be similar to Parcel 3, especially along the arroyos. Since the presence of groundwater may be ephemeral, similar to the arroyos, propose to install and monitor the temporary well for a minimum of two years, even if groundwater is not present at the time of installation. Revise the Work Plan accordingly.

Permittee Response:

The Army concurs with installing a monitoring well and leaving it open for approximately 2 years. Text within Section 2.2.2 has not been changed. The revision was made in Section 4.0. The text has been revised as follows:

The downgradient boring/temporary well will be placed as close as possible to the arroyo without jeopardizing the safety of the drilling equipment and field staff. The drilling will be performed by a New Mexico licensed driller using one of, or a combination of, the following techniques: hollow stem auger, air rotary, or rotosonic drilling. The borings will be advanced to the first water bearing zone or a maximum depth of 120 feet if groundwater is not encountered.

The borehole will be converted to a temporary well and screened in the first water bearing zone. If no water bearing zone is encountered the borehole will still be converted to a temporary well and the NMED will be contacted for concurrence on a proposed screening interval, which the field geologist will propose after reviewing the borehole lithology. The temporary well will be constructed with a filter-pack, 2-inch diameter 0.010-inch slot screen, and casing. Development will be performed by pumping until the groundwater is sufficiently clear to collect a groundwater sample. The well will be left in place for a minimum of two years. During this time the well will be sampled on a quarterly basis in general accordance with the procedures detailed in the Final 2017 Interim Measures Facility-Wide Groundwater Monitoring Plan Version 10, Revision 1 (Sundance, July 2018) as approved with modifications by NMED on October 22, 2018. Even if groundwater is not present in the well at the time of installation, the Army will check the well for the presence of seasonal water on a quarterly basis.

The temporary well will be covered and left in place until groundwater sample analytical results are reviewed and evaluated. Sample results will be compared to current state or federal drinking water standards (or USEPA tap water RSLs for analytes without published drinking water standards), in accordance with the hierarchy of screening values presented in Section 7.1 of the Permit (NMED, 2015a).

If there are no indications of impact to the groundwater quality after the two-year period, the temporary well will be abandoned with NMED's approval. Temporary boreholes will be abandoned following NMOSE guidance and regulations. The casing will be removed as the bentonite slurry is pumped into the borehole. If the casing cannot be removed, it will be cut below the ground surface and abandoned in place.

NMED COMMENT 6 - Section 2.3.1.1, Quality Control Analyses/Parameters Originated by the Laboratory, Method Blank, lines 14-19, page 2-3

Permittee Statement: "If a target constituent is found at a concentration that exceeds one-half the limit of quantitation (LOQ) in the method blank, the laboratory must perform corrective action in an attempt to identify and, if possible, eliminate the contamination source. If sufficient sample volume remains in the sample container, samples associated with the blank contamination should be re-prepared and re-analyzed after the contamination source has been eliminated."

NMED Comment: Several contaminants were eliminated from risk assessment in the Final RCRA Facility Investigation Report Parcel 7 Revision 1, dated June 27, 2018 because these contaminants were detected in blanks. However, the rationale for the elimination must be validated. Regardless of the detection level, if contaminants are detected in both blanks and samples and unless re-analysis after eliminating the source of contamination is performed, provide a table that lists detected contaminant concentrations in both blanks and samples. These concentrations must be compared and evaluated to determine whether elimination is appropriate. Include the protocol in the revised Work Plan.

Permittee Response:

The following paragraph was added to this section (Method Blank):

To determine if elimination is appropriate, the contractor will use the following protocol, during data validation, to determine if results should be qualified because of blank detections. If target analytes are detected in blank samples, the contractor will U qualify detected results from the associated field samples, at the higher of the detected concentration or the limit of detection, if the concentration detected in the sample is less than five times the concentration detected in the blank. The validation report will also include a table that summarizes blank detections, associated samples, and original and revised results that were qualified due to the blank detections.

NMED COMMENT 7 - Section 3.1, Borings in Areas of Previous Exceedances, lines 11-14, page 3-1

Permittee Statement: "Previous sample locations and analytes which exceed the lowest 2017 NMED SSLs for a residential receptor (which is either the direct contact SSL or the groundwater protection SSL, except for arsenic where the site-specific background level is used instead of an SSL) are summarized in Tables 3-1 through 3-3 and illustrated in Figure 3- 1."

NMED Comment: The site-specific background level of 5.6 mg/kg was used to screen arsenic as a potential COPC and for assessing site risk. The agreement with NMED to use 5.6 mg/kg for screening purposes was based on the fact that at the time of this agreement, the SSL for arsenic was below the background level. However, the 2017 direct contact SSL for arsenic is 7.07 mg/kg (residential). The current SSL for arsenic must be used for estimating risk to avoid an overly conservative evaluation for arsenic in future investigations at the site.

Permittee Response:

The text, tables and figures have been revised to remove the reference to arsenic site specific background. Further all references to NMED Guidance have been changed to 2019. The revised text for this specific section is as follow:

Previous sample locations and analytes which exceed the lowest 2019 NMED SSLs for a residential receptor (which is either the direct contact SSL or the groundwater protection SSL) are summarized in **Tables 3-1** through **3-3** and illustrated in **Figure 3-1**.

NMED COMMENT 8 - Section 3.1, Borings in Areas of Previous Exceedances, lines 16-18, page 3-1

Permittee Statement: "All samples will be analyzed for SVOCs, VOCs, extended diesel-range organics (DRO), target analyte list (TAL) metals, and explosives."

NMED Comment: Perchlorate may also be a chemical of potential concern due to the past activities at the site. Perchlorate was detected in groundwater samples collected from wells in Parcel 3. The arroyo may be a conduit for contaminants; therefore, perchlorate may be present in groundwater. Include perchlorate analysis for groundwater samples collected at the site. Revise the Work Plan accordingly.

Permittee Response:

The analyte list has been revised to include perchlorate. The text has been revised as follows:

All samples will be analyzed for SVOCs, VOCs, extended diesel- range organics (DRO), target analyte list (TAL) metals, perchlorate, and explosives.

NMED COMMENT 9 - Section 3.1, Boring in Areas of Previous Exceedances, lines 23-25, page 3-1, and Section 3.2, Borings to Characterize the Backfill Material, lines 36-37

Permittee Statements: "[Native soil] [s]amples will be collected from the depth intervals - corresponding to 0-1 foot, 1-2 feet, 3:4 feet; 56 feet, 7-8 feet, 8-9 feet, and 9-10 feet below the depth of backfill." - and,
"[Backfill] [s]amples will be collected from the 0-1 foot, 1-2 feet, 3-4 feet, 5-6 feet, 7-8 feet, 8-9 feet, and 9-10 feet bgs depth intervals."

NMED Comment: It is not clear how the Permittee determines the interface between backfill and native soils. Describe the method for identifying the interface in the revised Work Plan. Residual contaminants likely accumulate close to the fill-native soil interface. Revise the Work Plan to propose to collect all soil samples from immediately above and below the fill-native soil interface. Furthermore, provide information regarding (1) the lateral extent of backfill placement and (2) the thickness of backfill. The thickness of backfill appears to exceed 10 feet at the site. Revise the Work Plan to include this information or provide references to the reports that include the information.

Permittee Responses:

A sentence was added to the end of Section 3.0 as follows:

Section 3.4 was added to this revised work plan to clarify how the proposed borings will be utilized to determine the backfill and native soil interface as well as provide information regarding the lateral extent of the backfill material.

The new Section 3.4 reads as follows:

Section 3.4 has been added to the work plan to describe the approach to determining the interface between the native soil and fill material. This section indicates that proposed sample intervals will be adjusted to ensure samples are collected immediately above and below the interface. Further, it notes that the information from all the borings will be utilized to provide a better understand of the thickness and extent of the backfill material, as this information does not currently exist.

The revised section reads as follows:

3.4 Thickness and Extent of Backfill Material
In order to determine the interface between the fill material and native soils, each borehole described in sections 3.1, 3.2 and 3.3 will be drilled using a hollow stem auger rig with continuous split-spoon soil sampling techniques at the direction of a field geologist. The field geologist will be responsible for identifying the interface between the fill material and the native soil. The field geologist will monitor for differences in material density as determined by blow counts as the split spoon sampler is driven into the material. The field geologist will also visually observe each sample for differences in color and/or consistency. The proposed sample intervals will be adjusted as necessary to ensure that soil samples are collected immediately above and below the interface. All information obtained from these borings will be utilized to obtain a better understanding of the extent and thickness of the backfill material. The split-spoon sampling protocol in accordance with American Society for Testing and Materials (ASTM) Designation D 1586 is described below.

- The split-spoon sampler (spoon) consists of a 2-inch (outside diameter) by 1-3/8 inch (inside diameter), 18-inch to 24-inch length, heat-treated, case-hardened steel head, split-spoon, and shoe assembly.
- The drive rods, which connect the spoon to the drive head, have a stiffness equal to or greater than that of the A-rod. The size of the drive rods are kept constant throughout a specific drilling program, as the energy absorbed by the rods will vary with the size and weight of the rod employed.
- The drive head consists of a guide rod to give the drop hammer (140 pounds) free fall in order to strike the anvil attached to the lower end of the assembly. The drop hammer used in determining standard penetration test (SPT) resistance weighs 140 pounds and has a 2.5-inch diameter hole through the center, for passage of the drive head guide rod. The hammer is raised with a rope activated by the drill rig cathead. A 30-inch hammer drop is mandatory for proper SPT determination.
- The pre-cleaned split-spoon sampler is attached to the drill rods and lower the assembly to the bottom of the borehole. The 140-pound hammer is raised 30 inches above the drive-head anvil and then allowed to free fall and strike the anvil. This procedure is repeated until the sampler has penetrated the full length of the sampler (18 to 24 inches depending on the sampler) into the stratum at the bottom of the borehole.
- The number of blows of the hammer required for each 6-inch penetration is counted and recorded on the boring log. The penetration resistance (N) is determined by adding the second and third 6-inch resistance blow counts together.
- The sampler is then withdrawn from the borehole, preferably by pulling on the rope. If the sampler is difficult to remove from the stratum, it may be necessary to remove it by hitting the drive head upward with short, light hammer strokes. The sampler is removed from the bottom of the borehole slowly to minimize disturbance.
- Careful measurement of all drilling tools, samplers, and casing will be exercised during all phases of the boring operations, to insure maximum quality and recovery of the sample.
- The split-spoon is opened and carefully examined, noting all soil characteristics, color seam, disturbance, etc. A representative sample from the specified interval is selected and placed into the sampling containers.
- The field geologist shall record, at a minimum, the weight of the hammer, the length of the split spoon sampler, and the number of hammer blows on the spoon per 6 inches of penetration.
- The field geologist will manually describe soils encountered in accordance with American Society for Testing and Materials (ASTM) Standard D2488-93, *Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).* These descriptions will be recorded on a boring log for each boring.

NMED COMMENT 10 - Section 3.3, Borings to Assess Arroyo, lines 2-5, page 3-2

Permittee Statement: "Two shallow soil borings (10 feet total depth) will be conducted in the arroyo, one 25 feet northwest and one 50 feet northwest of the northern border of the former landfill (soil boring ID numbers 2321CLAND-SB11 and 2321CLAND-SB12). [Arroyo sediment] [s]amples will be collected from the 0-1 foot, 1-2 feet, 3-4 feet, 5-6 feet, 7-8 feet, 8-9 feet, and 9-10 feet bgs depth intervals."

NMED Comment: The location of the backfill was unidentified. The depth to the interface between backfill and native soils, if present, must be identified. Soil samples must be collected from the depths where residual contaminants are most likely to accumulate (see Comment 9). In this case, contaminants associated with surface water runoff from the landfill are likely detected at (1) six inches below the apparent ground surface and (2) six inches below and above the interface where native soils are encountered. Revise the Work Plan accordingly.

Permittee Response:

Determination of the depth to interface between fill material and native soil as well as the extent of backfill is discussed in response to comment 9.

Section 3.3 has been revised to include the following sentence:

Sample intervals and total depth of the borings may be adjusted to ensure samples are collected in the upper 6 inches of the surface and at the native soil and fill interface, as requested by Comment 10 of the 2018 NOD.

NMED COMMENT 11 - Section 4.0, Groundwater Investigation at SWMU 21- Central Landfill, lines 7-8, page 4-1

Permittee Statement: "The investigation will include the collection a groundwater sample via a temporary well placed in a downgradient direction from the former landfill (2321CLAND-MW-1)."

NMED Comment: The wells are designated as P23-TMW01A and P23-TMW01B in a figure included in Appendix A. Provide an explanation for the variance in nomenclature; otherwise, revise the Work Plan to correct the discrepancy.

Permittee Response:

The narrative text is the correct nomenclature. The figure included in the Appendix A has been revised with a notation to indicate the correct nomenclature.

.

NMED COMMENT 12 - Section 4.0, Groundwater Investigation at SWMU 21 - Central Landfill, lines 15-16, page 4-1, and Section 5.1.4.5, Domestic Tap Water Use, lines 14-15, page 5-4

Permittee Statements: "The borings will be advanced to the first water bearing zone or a maximum depth of 100 feet if groundwater is not encountered."
and,
"The scope of the Phase 2 RFI includes collection and testing of groundwater, if encountered within 100 feet bgs."

NMED Comment: The floor of arroyo may be more than 20 feet below the elevation where temporary wells are to be installed. A maximum boring depth of 100 feet below the floor of arroyo must be proposed if groundwater is not encountered. In addition, since the presence of groundwater may be ephemeral, similar to the arroyos, propose to preserve and monitor the temporary well for a period of two years, even if groundwater is not present at the time of installation. Revise the Work Plan accordingly. See Comment 5.

Permittee Response:

Section 4.0 of the work plan has been revised as follows:

The downgradient boring/temporary well will be placed as close as possible to the arroyo without jeopardizing the safety of the drilling equipment and field staff. The drilling will be performed by a New Mexico licensed driller using one of, or a combination of, the following techniques: hollow stem auger, air rotary, or rotosonic drilling. The borings will be advanced to the first water bearing zone or a maximum depth of 120 feet if groundwater is not encountered.

The borehole will be converted to a temporary well and screened in the first water bearing zone. If no water bearing zone is encountered the borehole will still be converted to a temporary well and the NMED will be contacted for concurrence on a proposed screening interval. The field geologist will propose the screened interval after reviewing the borehole lithology. The temporary well will be constructed with a filter-pack, 2-inch diameter 0.010-inch slot screen, and casing. Development will be performed by pumping until the groundwater is sufficiently clear to collect a groundwater sample. The well will be left in place for a minimum of two years. During this time the well will be sampled on a quarterly basis in general accordance with the procedures detailed in the Final 2017 Interim Measures Facility-Wide Groundwater Monitoring Plan Version 10, Revision 1 (Sundance, July 2018) as approved with modifications by NMED on October 22, 2018. Even if groundwater is not present in the well at the time of installation, the Army will check the well for the presence of seasonal water on a quarterly basis.

The temporary well will be covered and left in place until groundwater sample analytical results are reviewed and evaluated. Sample results will be compared to current state or federal drinking water standards (or USEPA tap water RSLs for analytes without published drinking water standards), in accordance with the hierarchy of screening values presented in Section 7.1 of the Permit (NMED, 2015a).

If there are no indications of impact to the groundwater quality after the two-year period, the temporary well will be abandoned with NMED's prior approval. Temporary boreholes will be abandoned following NMOSE guidance and regulations. The casing will be removed as the bentonite slurry is pumped into the borehole. If the casing cannot be removed, it will be cut below the ground surface and abandoned in place.

NMED COMMENT 13 - Section 4.0, Groundwater Investigation at SWMU 21 - Central Landfill, lines 20-22, page 4-1

Permittee Statement: "Sample collection will be conducted in general accordance with the procedures detailed in the Final 2015 Interim Measures Facility-Wide Groundwater Monitoring Plan (Innovar and CB&I, 2015)."

NMED Comment: The referenced submittal is not an approved plan. Sample collection must be conducted in accordance with an approved groundwater monitoring plan. Revise the Work Plan accordingly.

Permittee Response:

The work plan has been revised as follows:

During this time the well will be sampled on a quarterly basis in general accordance with the procedures detailed in the Final 2017 Interim Measures Facility-Wide Groundwater Monitoring Plan Version 10, Revision 1 (Sundance, July 2018) as approved with modifications by NMED on October 22, 2018.

NMED COMMENT 14 - Section 5.1.2, Selection of Screening Levels, lines 26-29, page 5-1

Permittee Statement: "Screening levels published by NMED in Appendix A of the NMED risk guidance (NMED, 2017a) for direct contact and groundwater protection. The exception to this is for evaluation of arsenic in soil, where NMED is allowing use of the site-specific background level of 5.6 milligrams per kilogram (mg/kg) in lieu of the NMED screening level."

NMED Comment: The site-specific background level of 5.6 mg/kg was used to evaluate arsenic as a potential COPC and for assessing site risk. The agreement with NMED to use 5.6 mg/kg for screening purposes was based on the fact that at the time of this agreement, the SSL for arsenic was below the background level. However, the 2017 SSL for arsenic is 7.07 mg/kg (residential). The current SSL for arsenic must be used for estimating risk for future investigations at the site (see Comment 7).

Permittee Response:

The text has been revised to remove reference to using the site-specific background for arsenic. The entire sentence was deleted. The text now reads as follows:

Screening levels published by NMED in Appendix A of the NMED risk guidance (NMED, 2019) for direct contact and groundwater protection.

NMED COMMENT 15 - Section 5.1.2, Selection of Screening Levels, line 37, page 5-1 and lines 1-2, page 5-2

Permittee Statement: "USEPA risk-based SSLs for the protection of groundwater will be adjusted to a dilution attenuation factor (DAF) of 20 for consistency with the NMED presumption that this DAF is reasonably protective."

NMED Comment: The contaminant distribution shown in Figure 3-1, Previous Sample Locations with Analytes Exceeding 2017 NMED SSLs, suggests that the source area of potential groundwater contamination easily exceeds 0.5 acre. Since the DAF of 20 is protective of groundwater for a 0.5-acre source but not for a larger source area, the DAF values must be revised if groundwater is found to be affected. Discuss whether a DAF of 20 is appropriate for the site in the revised Work Plan.

Permittee Response:

The Army believes the DAF 20 is appropriate for Parcel 23, SWMU 21, in spite of the fact that NMEDs soil-to-groundwater soil screening levels using a DAF of 20 are based upon a source area of 0.5 acres and the estimated Parcel 23 SWMU 21 source area is estimated to be slightly in excess of 2 acres. The text of the work plan (Section 5.1.2, bullet 2) has been revised as follows:

2. RSLs published by USEPA for residential and industrial receptors for soil are selected when NMED does not publish a value. USEPA RSLs based on a noncancer endpoint correspond to the NMED target hazard quotient (HQ) of 1.0 for noncarcinogenic analytes. USEPA RSLs based on a cancer endpoint will be adjusted to a cancer risk of $1x10^{-5}$ for consistency with the NMED target risk threshold of $1x10^{-5}$ (NMED, 2017a; Section 1.2). USEPA risk-based SSLs for the protection of groundwater will be adjusted to a dilution attenuation factor (DAF) of 20 based upon the following justification:

a) Contaminants of Concern and Their Characteristics: PAHs are the only COCs present in surficial soils that show low-level concentrations exceeding DAF 20 soil-to-groundwater SSLs over the length of the SWMU. PAHs have low water solubility and are not likely to leach vertically and migrate to groundwater (WHO, 2003
https://www.who.int/water_sanitation_health/water-quality/guidelines/chemicals/polyaromahydrocarbons.pdf
USEPA,1976
https://nepis.epa.gov/Exe/ZyPDF.cgi/9100RZ55.PDF?Dockey=9100RZ55.PDF)

b) Lack of Infinite Source: This Phase 2 RFI work plan is in follow-up to the removal of the landfill in 1999. All landfill waste and visibly impacted soil below the former landfill was removed and disposed of at an off-site disposal facility (Final RCRA Facility Investigation Parcel 23 (2012)). This removal will have mitigated the "infinite source" of on-going contamination

c) Soil Characteristics: The boring logs located in Appendix K of the Parcel 23 RFI Report identified the soils using the Unified Soil Classification System (USCS) and classified them as being within the silty clay (CL-ML) and sandy silt (ML) classes (ASTM D2487-17), both of which are classified as fine grained materials composed of fifty percent of more by dry mass of particles passing the No. 200 (75 µm) sieve. Such fine grained materials will bind PAHs and retard their vertical migration
(ATSDR, 1995 https://www.atsdr.cdc.gov/ToxProfiles/tp69-c1-b.pdf)

d) Infiltration Rates: “Infiltration rates across much of New Mexico are substantially less than the average range of 0.15 to 0.24 m/yr. reported for many of the hydrogeologic regions used in the USEPA analysis” (NMED 2019 (revised), Section 4.4). Aller et al (1987, EPA/600/2-87/035) described the hydrogeologic setting for FWDA as the Colorado Plateau and Wyoming Basin. The infiltration rates used for these arid to semi-arid regions in the USEPA analysis were 0.03 to 0.14 m/y, rates which are 40-80% less than the average range reported for many regions in the U.S., as noted above. Reduced infiltration rates reduce vertical migration

e) Surface Water: The topographic contours for Parcel 23 is relatively flat with the exception of the arroyo channel. Surface runoff during rainfall/snowmelt events collects in the arroyo channel, which only flows intermittently during precipitation events or pools locally in low areas where it evaporates. No other intermittent surface water bodies exist within Parcel 23. However, southwest of Parcel 23 is Parcel 2, which surface water samples have been intermittently collected since 1992. No COC that were analyzed for results were non-detect to low detects.

f) Comparative Source Area Size to DAFs: Default DAFs of 10 for a 30-acre source and 20 for a 0.5-acre source have been proposed by USEPA as values generally protective nationwide. When the relative area of the Parcel 23 source area is considered, it is much closer to the 0.5-acre site than the 30-acre site making the application of the DAF 20 reasonable for screening purposes.

g) Depth to Groundwater: Depth to the first water-bearing zone is unknown for this area, but it is expected to be between approximately 50 and 60 feet bgs, based on installed groundwater monitoring wells to the north of SWMU 21. Depth to the second water-bearing zone is unknown for SWMU 21, but is expected to be between 70 and 120 feet bgs, based on installed groundwater wells to the north of SWMU 21 (Parcel 23 RFI Report Final).

h) Vulnerable Groundwater Environment: Vulnerable groundwater is defined as "areas close to perennial streams or where groundwater is very shallow" (NMED 2017 Revised Guidance Section 4.4 pg77). SWMU 21 is not near a perennial stream and shallow groundwater has not been detected to date. The Army agrees that impacts to groundwater at FWDA need to be investigated and is responding to this in the facility wide groundwater assessment program

i) Lack of Presence of Liquids: Land use around SWMU 21 does not include any liquid source(s) that could drive the vertical migration of COCs.

j) Weather Regimes: semi-arid/arid weather regimes at FWDA result in little precipitation and significant evaporation on an annual basis, further attenuating dissolution and vertical migration.

Although the source area orientation is generally to the northeast and parallels both the arroyo and groundwater, this is not expected to override the attenuation of vertical transport supported by the lines of evidences presented above.

NMED COMMENT 16 - Section 5.1.3, Identification of COPCs, lines 10-12, page 5-3

Permittee Statement: "Analytes that are not detected in any sample will not be retained as COPCs. Analytical testing will be performed for VOCs, SVOCs, total petroleum hydrocarbons (TPH)-DRO, TAL metals, mercury, and explosives."

NMED Comment: Perchlorate analysis must also be performed for all groundwater and soil samples collected at the site. Revise the Work Plan accordingly. Refer to Comment 8.

Permittee Response:
The work plan has been revised to include perchlorate. The revised text will read as follows:

Analytes that are not detected in any sample will not be retained as COPCs. Analytical testing will be performed for VOCs, SVOCs, total petroleum hydrocarbons (TPH)-DRO, TAL metals, mercury, perchlorate and explosives.

Tables 2-1, 2-3, 2-4, 2-5 and 3-4 have also been revised to include perchlorate.

NMED COMMENT 17 - Section 5.1.4.2, Beef Ingestion, lines 28-30, page 5-3, and Section 5.1.5, Conceptual Site Model, lines 32-33, page 5-4

Permittee Statement: "The total acreage of SWMU 21 is 2.2 acres, but the beef ingestion pathway is not considered to be complete because SWMU 21 is comprised of two non-contiguous areas, each of which are less than 2 acres in size."

NMED Comment: In Figure 3-1, a distribution of SVOC exceedances was observed in the area between the two boundaries as well as in the areas within the boundaries. Therefore, these two areas must be considered to be contiguous and must not be evaluated separately. In addition, the lateral extent of SVOC exceedances is not defined to the north and south along the arroyo. The extent of contamination has not been defined. The beef ingestion pathway must be evaluated in the Phase 2 Investigation Report. Revise the Work Plan accordingly.

Permittee Response:

Section 5.1.4.2 has been revised as follows:

NMED risk guidance (NMED, 2019) requires a qualitative evaluation for the beef ingestion pathway for sites that are greater than 2 acres. A qualitative evaluation will be completed.

NMED COMMENT 18 - Section 5.1.6.3.2, Step 2 - Refined Cumulative Risk Evaluation, lines 14-15, page 5-10

Permittee Statement: "SWMU 21 consists of two separate, non-contiguous areas that may be evaluated separately."

NMED Comment: SWMU 21 is contiguous due to the distribution of SVOCs along the arroyo. Refer to Comment 17. The Permittee must evaluate risks associated with SWMU 21 as a continuous area. Revise the Work Plan accordingly.

Permittee Response:
The text (bullet item 2.) was revised to strike the sentence: “SWMU 21 consists of two separate, non-contiguous areas that may be evaluated separately.” Reference to non-contiguous areas in other sections was also removed, including section 5.1.5, 5.2.4, and Figure 5-1.

If you have questions or require further information, please call me at (505) 721-9770.

Sincerely,

PATTERSON.MARK.C.1229214493 Digitally signed by PATTERSON.MARK.C.1229214493 Date: 2019.04.25 15:18:24 -04'00'

Mark Patterson
BRAC Environmental Coordinator
Fort Wingate Depot Activity

CF:	Media
John Kieling (NMED HWB)	2 hard copies, 2 CDs
Dave Cobrain with NMED	
Ben Wear with NMED	
Michiya Suzuki with NMED	
Chuck Hendrickson (USEPA 6)	1 hard copy, 1 CD
Mark Patterson (FWDA BEC)	1 hard copy, 1 CD
FWDA Admin Record (NM)	2 hard copies, 2 CDs
Ian Thomas (BRACD)	0 hard copy, 1 CD
Steve Smith (USACE SWF)	1 hard copy, 2 CDs
Cheryl Montgomery (USACE ERDC)	0 hard copy, 1 CD
Sharlene Begay-Platero (NN)	1 hard copy, 7 CDs
Mark Harrington (POZ)	1 hard copy, 8 CDs
Clayton Seoutewa (BIA Zuni)	1 hard copy, 1 CD
B.J Howerton (DOI/BIA)	0 hard copy, 1 CD
George Padilla (BIA-NR)	1 hard copy, 2 CDs
Jennifer Turner, DOI-Office of the Solicitor	0 hard copy, 1 CD
Admin Record, OH	0 hard copy, 1 CD

NMED NOD Letter to Work Plan
October 31, 2018

[THIS PAGE INTENTIONALLY LEFT BLANK]

State of New Mexico
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6313
Phone (505) 476-6000 Fax (505) 476-6030
www.env.nm.gov

SUSANA MARTINEZ
Governor

JOHN A. SANCHEZ
Lieutenant Governor

BUTCH TONGATE
Cabinet Secretary

BRUCE YURDIN
Acting Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

October 31, 2018

Mark Patterson
BRAC Environmental Coordinator
Fort Wingate Depot Activity
13497 Elton Road
North Lima, OH 44452

Steve Smith
USACE
CESWF-PER-DD
819 Taylor Street, Room 3B06
Fort Worth, TX 76102

RE: DISAPPROVAL
FINAL RCRA FACILITY INVESTIGATION PHASE 2 WORK PLAN
PARCEL 23
FORT WINGATE DEPOT ACTIVITY
MCKINLEY COUNTY, NEW MEXICO
EPA ID# NM6213820974
HWB-FWDA-18-004

Dear Messrs. Patterson and Smith:

The New Mexico Environment Department (NMED) is in receipt of the Fort Wingate Depot Activity (Permittee) *Final RCRA Facility Investigation Phase 2 Work Plan Parcel 23* (Work Plan), dated July 24, 2018. NMED has reviewed the Work Plan and hereby issues this Disapproval. The Permittee must address the following comments.

1. **Section 1.2, Background Information, lines 7-9, page 1-2**

   Permittee Statement: "The [Approval with Modifications] AwM (Comment 6) also requires that Army address all comments within the NOD, specifically those comments referencing future actions through the development of a RFI Phase 2 Work Plan."

   NMED Comment: Although the Permittee's statement is true, the referenced correspondence (Approval with Modifications) does not contain Comment 6. Correct the typographical error in the revised Work Plan.

2. **Section 1.2, Background Information, lines 9-12, page 1-2**

   Permittee Statement: "For reference, the following documents are included in Appendix A:
   • NOD Letter - August 19, 2014
   • Response to NOD - February 28, 2015
   • AwM - August 12, 2015."

   NMED Comment: Appendix A also contains email correspondence between the Permittee and NMED regarding the proposed locations of monitoring wells and a figure showing the locations. Provide a more accurate description. In addition, include all extension request approval letters for this document in Appendix A.

3. **Section 1.2, Background Information, Comment 9, lines 34-36, page 1-2**

   Permittee Statement: "The revised RFI Report suggests that observed impacts may be the result of runoff from the adjacent coal burning boiler plant (Building 535)."

   NMED Comment: A figure showing the location of Building 536 was included in the Work Plan; however, the locations of Building 535 and the borrow pit that supplied the fill material are not indicated in any figure in the Work Plan. Include a figure depicting these locations in the revised Work Plan.

4. **Section 1.3, Cultural Resources, lines 36-37, page 1-3 and line 1, page 1-4**

   Permittee Statement: "No archaeological site is within the horizontal footprint of SWMU21; however, several archaeological sites are within close proximity to these locations (LA101952 and LA101743)."

   NMED Comment: The locations of archaeological sites are designated as LA101952 and LA101743; however, they are not shown in any figure. The designation is meaningless unless referenced in a figure. Include a figure showing these locations in the revised Work Plan or remove the reference to the archeological sites from the statement.

5. **Section 2.2.2, Groundwater Sampling, lines 24-26, page 2-2**

   Permittee Statement: "The general approach to evaluating whether or not groundwater is impacted will be to collect groundwater samples from the first water-bearing zone by means of a temporary well."

   NMED Comment: The Parcel 3 groundwater investigation indicates that some wells close to arroyos initially retained groundwater; however, the wells went dry during the subsequent monitoring event. The groundwater conditions in Parcel 23 may be similar to Parcel 3, especially along the arroyos. Since the presence of groundwater may be ephemeral, similar to the arroyos, propose to install and monitor the temporary well for a minimum of two years, even if groundwater is not present at the time of installation. Revise the Work Plan accordingly.

6. **Section 2.3.1.1, Quality Control Analyses/Parameters Originated by the Laboratory, Method Blank, lines 14-19, page 2-3**

   Permittee Statement: "If a target constituent is found at a concentration that exceeds one-half the limit of quantitation (LOQ) in the method blank, the laboratory must perform corrective action in an attempt to identify and, if possible, eliminate the contamination source. If sufficient sample volume remains in the sample container, samples associated with the blank contamination should be re-prepared and re-analyzed after the contamination source has been eliminated."

   NMED Comment: Several contaminants were eliminated from risk assessment in the *Final RCRA Facility Investigation Report Parcel 7 Revision 1,* dated June 27, 2018 because these contaminants were detected in blanks. However, the rationale for the elimination must be validated. Regardless of the detection level, if contaminants are detected in both blanks and samples and unless re-analysis after eliminating the source of contamination is performed, provide a table that lists detected contaminant concentrations in both blanks and samples. These concentrations must be compared and evaluated to determine whether elimination is appropriate. Include the protocol in the revised Work Plan.

7. **Section 3.1, Borings in Areas of Previous Exceedances, lines 11-14, page 3-1**

   Permittee Statement: "Previous sample locations and analytes which exceed the lowest 2017 NMED SSLs for a residential receptor (which is either the direct contact SSL or the groundwater protection SSL, except for arsenic where the site-specific background level is used instead of an SSL) are summarized in Tables 3-1 through 3-3 and illustrated in Figure 3-1."

   NMED Comment: The site-specific background level of 5.6 mg/kg was used to screen arsenic as a potential COPC and for assessing site risk. The agreement with NMED to use 5.6 mg/kg for screening purposes was based on the fact that at the time of this agreement, the SSL for arsenic was below the background level. However, the 2017 direct contact SSL for arsenic is 7.07 mg/kg (residential). The current SSL for arsenic must be used for estimating risk to avoid an overly conservative evaluation for arsenic in future investigations at the site.

8. **Section 3.1, Borings in Areas of Previous Exceedances, lines 16-18, page 3-1**

   Permittee Statement: "All samples will be analyzed for SVOCs, VOCs, extended diesel-range organics (DRO), target analyte list (TAL) metals, and explosives."

   NMED Comment: Perchlorate may also be a chemical of potential concern due to the past activities at the site. Perchlorate was detected in groundwater samples collected from wells in Parcel 3. The arroyo may be a conduit for contaminants; therefore, perchlorate may be present in groundwater. Include perchlorate analysis for groundwater samples collected at the site. Revise the Work Plan accordingly.

9. **Section 3.1, Boring in Areas of Previous Exceedances, lines 23-25, page 3-1, and Section 3.2, Borings to Characterize the Backfill Material, lines 36-37**

   Permittee Statements: "[Native soil] [s]amples will be collected from the depth intervals corresponding to 0-1 foot, 1-2 feet, 3-4 feet, 5-6 feet, 7-8 feet, 8-9 feet, and 9-10 feet below the depth of backfill."
   and,
   "[Backfill] [s]amples will be collected from the 0-1 foot, 1-2 feet, 3-4 feet, 5-6 feet, 7-8 feet, 8-9 feet, and 9-10 feet bgs depth intervals."

   NMED Comment: It is not clear how the Permittee determines the interface between backfill and native soils. Describe the method for identifying the interface in the revised Work Plan. Residual contaminants likely accumulate close to the fill-native soil interface. Revise the Work Plan to propose to collect all soil samples from immediately above and below the fill-native soil interface. Furthermore, provide information regarding (1) the lateral extent of backfill placement and (2) the thickness of backfill. The thickness of backfill appears to exceed 10 feet at the site. Revise the Work Plan to include this information or provide references to the reports that include the information.

10. **Section 3.3, Borings to Assess Arroyo, lines 2-5, page 3-2**

    Permittee Statement: "Two shallow soil borings (10 feet total depth) will be conducted in the arroyo, one 25 feet northwest and one 50 feet northwest of the northern border of the former landfill (soil boring ID numbers 2321CLAND-SB11 and 2321CLAND-SB12). [Arroyo sediment] [s]amples will be collected from the 0-1 foot, 1-2 feet, 3-4 feet, 5-6 feet, 7-8 feet, 8-9 feet, and 9-10 feet bgs depth intervals."

    NMED Comment: The location of the backfill was unidentified. The depth to the interface between backfill and native soils, if present, must be identified. Soil samples must be collected from the depths where residual contaminants are most likely to accumulate (see Comment 9). In this case, contaminants associated with surface water runoff from the landfill are likely detected at (1) six inches below the apparent ground surface and (2) six inches below and above the interface where native soils are encountered. Revise the Work Plan accordingly.

11. **Section 4.0, Groundwater Investigation at SWMU 21 – Central Landfill, lines 7-8, page 4-1**

    Permittee Statement: "The investigation will include the collection a groundwater sample via a temporary well placed in a downgradient direction from the former landfill (2321CLAND-MW-1)."

NMED Comment: The wells are designated as P23-TMW01A and P23-TMW01B in a figure included in Appendix A. Provide an explanation for the variance in nomenclature; otherwise, revise the Work Plan to correct the discrepancy.

12. Section 4.0, Groundwater Investigation at SWMU 21 – Central Landfill, lines 15-16, page 4-1, and Section 5.1.4.5, Domestic Tap Water Use, lines 14-15, page 5-4

Permittee Statements: "The borings will be advanced to the first water bearing zone or a maximum depth of 100 feet if groundwater is not encountered."
and,
"The scope of the Phase 2 RFI includes collection and testing of groundwater, if encountered within 100 feet bgs."

NMED Comment: The floor of arroyo may be more than 20 feet below the elevation where temporary wells are to be installed. A maximum boring depth of 100 feet below the floor of arroyo must be proposed if groundwater is not encountered. In addition, since the presence of groundwater may be ephemeral, similar to the arroyos, propose to preserve and monitor the temporary well for a period of two years, even if groundwater is not present at the time of installation. Revise the Work Plan accordingly. See Comment 5.

13. Section 4.0, Groundwater Investigation at SWMU 21 – Central Landfill, lines 20-22, page 4-1

Permittee Statement: "Sample collection will be conducted in general accordance with the procedures detailed in the Final 2015 Interim Measures Facility-Wide Groundwater Monitoring Plan (Innovar and CB&I, 2015)."

NMED Comment: The referenced submittal is not an approved plan. Sample collection must be conducted in accordance with an approved groundwater monitoring plan. Revise the Work Plan accordingly.

14. Section 5.1.2, Selection of Screening Levels, lines 26-29, page 5-1

Permittee Statement: "Screening levels published by NMED in Appendix A of the NMED risk guidance (NMED, 2017a) for direct contact and groundwater protection. The exception to this is for evaluation of arsenic in soil, where NMED is allowing use of the site-specific background level of 5.6 milligrams per kilogram (mg/kg) in lieu of the NMED screening level."

NMED Comment: The site-specific background level of 5.6 mg/kg was used to evaluate arsenic as a potential COPC and for assessing site risk. The agreement with NMED to use 5.6 mg/kg for screening purposes was based on the fact that at the time of this agreement, the SSL for arsenic was below the background level. However, the 2017 SSL for arsenic is 7.07 mg/kg (residential). The current SSL for arsenic must be used for estimating risk for future investigations at the site (see Comment 7).

15. Section 5.1.2, Selection of Screening Levels, line 37, page 5-1 and lines1-2, page 5-2

Permittee Statement: "USEPA risk-based SSLs for the protection of groundwater will be adjusted to a dilution attenuation factor (DAF) of 20 for consistency with the NMED presumption that this DAF is reasonably protective."

NMED Comment: The contaminant distribution shown in Figure 3-1, *Previous Sample Locations with Analytes Exceeding 2017 NMED SSLs,* suggests that the source area of potential groundwater contamination easily exceeds 0.5 acre. Since the DAF of 20 is protective of groundwater for a 0.5-acre source but not for a larger source area, the DAF values must be revised if groundwater is found to be affected. Discuss whether a DAF of 20 is appropriate for the site in the revised Work Plan.

16. Section 5.1.3, Identification of COPCs, lines 10-12, page 5-3

Permittee Statement: "Analytes that are not detected in any sample will not be retained at [sic] COPCs. Analytical testing will be performed for VOCs, SVOCs, total petroleum hydrocarbons (TPH)-DRO, TAL metals, mercury, and explosives."

NMED Comment: Perchlorate analysis must also be performed for all groundwater and soil samples collected at the site. Revise the Work Plan accordingly. Refer to Comment 8.

17. Section 5.1.4.2, Beef Ingestion, lines 28-30, page 5-3, and Section 5.1.5, Conceptual Site Model, lines 32-33, page 5-4

Permittee Statement: "The total acreage of SWMU 21 is 2.2 acres, but the beef ingestion pathway is not considered to be complete because SWMU 21 is comprised of two non-contiguous areas, each of which are less than 2 acres in size."

NMED Comment: In Figure 3-1, a distribution of SVOC exceedances was observed in the area between the two boundaries as well as in the areas within the boundaries. Therefore, these two areas must be considered to be contiguous and must not be evaluated separately. In addition, the lateral extent of SVOC exceedances is not defined to the north and south along the arroyo. The extent of contamination has not been defined. The beef ingestion pathway must be evaluated in the Phase 2 Investigation Report. Revise the Work Plan accordingly.

18. Section 5.1.6.3.2, Step 2 – Refined Cumulative Risk Evaluation, lines 14-15, page 5-10

Permittee Statement: "SWMU 21 consists of two separate, noncontiguous areas that may be evaluated separately."

NMED Comment: SWMU 21 is contiguous due to the distribution of SVOCs along the arroyo. Refer to Comment 17. The Permittee must evaluate risks associated with SWMU 21 as a continuous area. Revise the Work Plan accordingly.

The Permittee must submit a revised Work Plan that addresses all comments contained in this Disapproval. In addition, the Permittee must include a response letter that cross-references where NMED's numbered comments were addressed. The Permittee must also submit an electronic redline-strikeout version of the revised Work Plan showing all changes that have been made. The revised Work Plan must be submitted no later than **April 30, 2019**.

Should you have any questions, please contact Michiya Suzuki of my staff at (505) 476-6059.

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
B. Wear, NMED HWB
M. Suzuki, NMED HWB
C. Hendrickson, U.S. EPA Region 6
L. Rodgers, Navajo Nation
S. Begay-Platero, Navajo Nation
M. Harrington, Pueblo of Zuni
C. Seoutewa, Southwest Region BIA
G. Padilla, Navajo BIA
J. Wilson, BIA
B. Howerton, BIA
R. White, BIA
C. Esler, Sundance Consulting, Inc.

File: FWDA 2018 and Reading, Parcel 23, FWDA-18-004

[THIS PAGE INTENTIONALLY LEFT BLANK]

Army and NMED Correspondence Regarding Proposed Well Locations as Determined during April 25, 2015 Site Visit

[THIS PAGE INTENTIONALLY LEFT BLANK]

Hamilton, Julie

From:	Cobrain, Dave, NMENV <dave.cobrain@state.nm.us>
Sent:	Thursday, May 10, 2018 2:02 PM
To:	Smith, Steven W CIV USARMY CESWF (US); Wade, Roy CIV (US); Wear, Benjamin, NMENV; Suzuki, Michiya, NMENV
Cc:	Mark Patterson (mark.c.patterson.civ@mail.mil); Theel, Heather J CIV USARMY CEERD-EL (US); Khan, Mohammad S CIV USARMY CESWF (US); Scoville, Michael G CIV USARMY CESWF (US); Hamilton, Julie
Subject:	RE: Parcel 23 Central Landfill Well and Boring Locations (UNCLASSIFIED)

Steve,

I'm not sure what you're referring to but my email was only referring to a downstream well location and 2 proposed borings where (SVOC?) contamination was detected at the deepest sampling depths. I wasn't relying on the attached map.

Dave

-----Original Message-----
From: Smith, Steven W CIV USARMY CESWF (US) [mailto:Steve.W.Smith@usace.army.mil]
Sent: Thursday, May 10, 2018 12:34 PM
To: Wade, Roy CIV (US) <Roy.Wade@usace.army.mil>; Cobrain, Dave, NMENV <dave.cobrain@state.nm.us>; Wear, Benjamin, NMENV <Benjamin.Wear@state.nm.us>
Cc: Mark Patterson (mark.c.patterson.civ@mail.mil) <mark.c.patterson.civ@mail.mil>; Theel, Heather J CIV USARMY CEERD-EL (US) <Heather.J.Theel@usace.army.mil>; Khan, Mohammad S CIV USARMY CESWF (US) <Mohammad.S.Khan@usace.army.mil>; Scoville, Michael G CIV USARMY CESWF (US) <Michael.G.Scoville@usace.army.mil>; Hamilton, Julie <julie.hamilton@woodplc.com>
Subject: RE: Parcel 23 Central Landfill Well and Boring Locations (UNCLASSIFIED)

CLASSIFICATION: UNCLASSIFIED

Dave,

Just to clarify, the Figure 5-5 sent on the email below was from the Phase 1 RFI Work Plan not the upcoming Phase 2 RFI work plan.

Steve

-----Original Message-----
From: Wade, Roy CIV (US)
Sent: Monday, April 30, 2018 12:28 PM
To: Cobrain, Dave, NMENV <dave.cobrain@state.nm.us>; Wear, Benjamin, NMENV <Benjamin.Wear@state.nm.us>
Cc: Mark Patterson (mark.c.patterson.civ@mail.mil) <mark.c.patterson.civ@mail.mil>; Smith, Steven W CIV USARMY CESWF (US) <Steve.W.Smith@usace.army.mil>; Theel, Heather J CIV USARMY CEERD-EL (US) <Heather.J.Theel@usace.army.mil>; Khan, Mohammad S CIV USARMY CESWF (US) <Mohammad.S.Khan@usace.army.mil>; Scoville, Michael G CIV USARMY CESWF (US) <Michael.G.Scoville@usace.army.mil>
Subject: Parcel 23 Central Landfill Well and Boring Locations

Good Morning Dave,

It was a pleasure meeting you last week, we appreciate you taking the time to visit FWDA to clarify outstanding P23 issues related to monitoring wells and develop a coordinated path forward as summarized below:

Attached is a GPS location of a temporary monitoring well location at Parcel 23 that we marked Wednesday (April 25) afternoon.

P23 Army/NMED Coordinated Path Forward:

1. The drill rig is to get as close to the Arroyo as safely as possible, i.e. labeled TMW-01A or TMW-01B (P23NMEDWellLoc.pdf) 2. The temporary monitoring well (TMW 1) is located downgradient of former Central Landfill (P23NMEDWellLoc.pdf) 3. If no groundwater is found at suitable depth (100 feet) then no need to install monitoring wells.
4. If groundwater is found, we will collect water samples for analyses of chemical of potential concerns (COPCs).
 4a: If the samples come back non-detect or below the corresponding SSL, no further sampling of groundwater is warranted.
 4b: If the samples come back with COPCs, above the SSLs, we will convert the well into a permanent well and add the well into the monitoring network. At this point, we would install an upgradient well.
5. Within the landfill footprint, Army will collect samples at locations (2321-SB-1 thru -SB-10). These locations will be at the location where previous investigation showed contaminants (P23_BoringLocations Figure 5-5).

Recap from previous email dated 3/27/18 07:58 AM: Soil Sampling: Additional sub-surface soil samples will be collected from 5 locations (2321-SB-1 thru -SB-10) beginning at the bottom of the landfill backfill (beginning of native soil) with samples collected at 5 feet intervals to a total depth of 30 feet below the bottom of the landfill backfill. These samples will be submitted to the laboratory for the analysis of COPCs. The results will be compared with the New Mexico risk guidance 2017. The soil boring locations are presented in the attached file (P23_BoringLocations Figure 5-5).

Please provide concurrence on the NMED/ARMY coordinated path forward for P23 monitoring wells as discussed during the April 25, 2018 site visit, and Army will incorporate this procedure into the revised work plan.

Thanks..............................Roy

Roy Wade
Environmental Engineer
USACE-ERDC
Fort Wingate Technical Manager
601-634-4019

CLASSIFICATION: UNCLASSIFIED

Hamilton, Julie

From: Khan, Mohammad S CIV USARMY CESWF (US) <Mohammad.S.Khan@usace.army.mil>
Sent: Tuesday, May 15, 2018 1:08 PM
To: Hamilton, Julie
Cc: Wade, Roy CIV (US)
Subject: FW: Parcel 23 Central Landfill Well and Boring Locations

Hi Julie: Here is the email you requested.
Thanks

M. Saqib Khan, P.G.
Project Manager
Regional Planning & Environmental Center (RPEC) Suite 1600
2488 E 81st Street
Tulsa OK 74137.
918-669-7374 (D)
816-223-0392 (M)

-----Original Message-----
From: Cobrain, Dave, NMENV [mailto:dave.cobrain@state.nm.us]
Sent: Wednesday, May 9, 2018 10:58 AM
To: Wade, Roy CIV (US) <Roy.Wade@usace.army.mil>; Wear, Benjamin, NMENV <Benjamin.Wear@state.nm.us>
Cc: Mark Patterson (mark.c.patterson.civ@mail.mil) <mark.c.patterson.civ@mail.mil>; Smith, Steven W CIV USARMY CESWF (US) <Steve.W.Smith@usace.army.mil>; Theel, Heather J CIV USARMY CEERD-EL (US) <Heather.J.Theel@usace.army.mil>; Khan, Mohammad S CIV USARMY CESWF (US) <Mohammad.S.Khan@usace.army.mil>; Scoville, Michael G CIV USARMY CESWF (US) <Michael.G.Scoville@usace.army.mil>
Subject: [Non-DoD Source] RE: Parcel 23 Central Landfill Well and Boring Locations

Roy,

NMED agrees with your summary with the following:

If groundwater is present in the well labeled either P23-TMW01A or P23-TMW01B in the attached figure and constituents are detected at any concentration, then a permanent well must be installed. If the detected constituents are solely concentrations of metals, we should discuss the need for a well before a decision is made to install a permanent well. Assuming that the two boring locations in the arroyo correspond to the locations of previously detected SVOCs, NMED agrees with those locations.

Dave

-----Original Message-----
From: Wade, Roy CIV (US) [mailto:Roy.Wade@usace.army.mil]
Sent: Monday, April 30, 2018 11:28 AM
To: Cobrain, Dave, NMENV <dave.cobrain@state.nm.us>; Wear, Benjamin, NMENV <Benjamin.Wear@state.nm.us>
Cc: Mark Patterson (mark.c.patterson.civ@mail.mil) <mark.c.patterson.civ@mail.mil>; Smith, Steven W CIV USARMY CESWF (US) <Steve.W.Smith@usace.army.mil>; Theel, Heather J CIV USARMY CEERD-EL (US) <Heather.J.Theel@usace.army.mil>; Khan, Mohammad S CIV USARMY CESWF (US) <Mohammad.S.Khan@usace.army.mil>; Scoville, Michael G CIV USARMY CESWF (US) <Michael.G.Scoville@usace.army.mil>

Subject: Parcel 23 Central Landfill Well and Boring Locations

Good Morning Dave,

It was a pleasure meeting you last week, we appreciate you taking the time to visit FWDA to clarify outstanding P23 issues related to monitoring wells and develop a coordinated path forward as summarized below:

Attached is a GPS location of a temporary monitoring well location at Parcel 23 that we marked Wednesday (April 25) afternoon.

P23 Army/NMED Coordinated Path Forward:

1. The drill rig is to get as close to the Arroyo as safely as possible, i.e. labeled TMW-01A or TMW-01B (P23NMEDWellLoc.pdf) 2. The temporary monitoring well (TMW 1) is located downgradient of former Central Landfill (P23NMEDWellLoc.pdf) 3. If no groundwater is found at suitable depth (100 feet) then no need to install monitoring wells.

4. If groundwater is found, we will collect water samples for analyses of chemical of potential concerns (COPCs).

4a: If the samples come back non-detect or below the corresponding SSL, no further sampling of groundwater is warranted.

4b: If the samples come back with COPCs, above the SSLs, we will convert the well into a permanent well and add the well into the monitoring network. At this point, we would install an upgradient well.

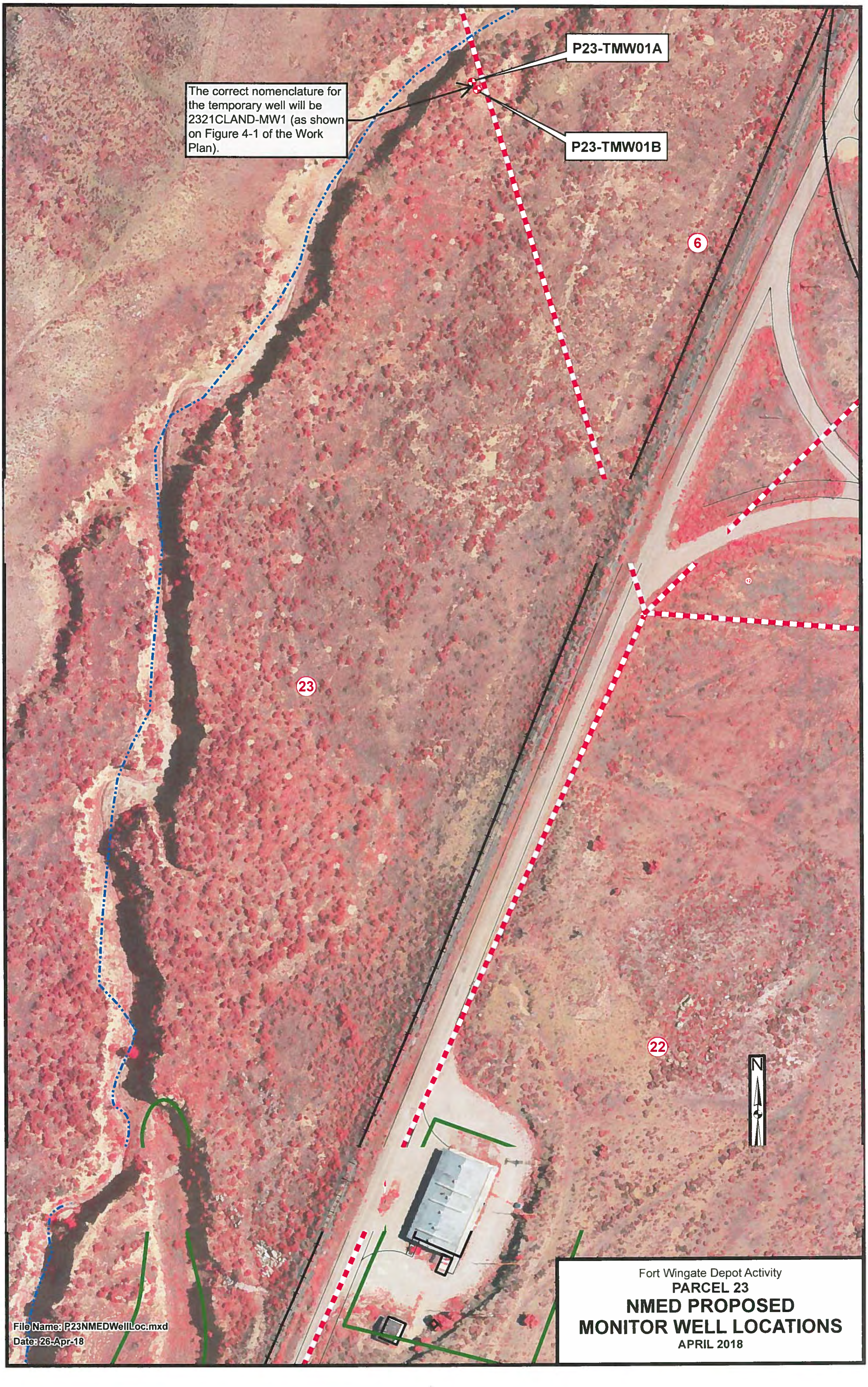
5. Within the landfill footprint, Army will collect samples at locations (2321-SB-1 thru -SB-10). These locations will be at the location where previous investigation showed contaminants (P23_BoringLocations Figure 5-5).

Recap from previous email dated 3/27/18 07:58 AM: Soil Sampling: Additional sub-surface soil samples will be collected from 5 locations (2321-SB-1 thru -SB-10) beginning at the bottom of the landfill backfill (beginning of native soil) with samples collected at 5 feet intervals to a total depth of 30 feet below the bottom of the landfill backfill. These samples will be submitted to the laboratory for the analysis of COPCs. The results will be compared with the New Mexico risk guidance 2017. The soil boring locations are presented in the attached file (P23_BoringLocations Figure 5-5).

Please provide concurrence on the NMED/ARMY coordinated path forward for P23 monitoring wells as discussed during the April 25, 2018 site visit, and Army will incorporate this procedure into the revised work plan.

Thanks.............................Roy

Roy Wade
Environmental Engineer
USACE-ERDC
Fort Wingate Technical Manager
601-634-4019


P23-TMW01A
The correct nomenclature for the temporary well will be 2321CLAND-MW1 (as shown on Figure 4-1 of the Work Plan).
P23-TMW01B
6
23
22
N
File Name: P23NMEDWellLoc.mxd
Date: 26-Apr-18
Fort Wingate Depot Activity
PARCEL 23
NMED PROPOSED
MONITOR WELL LOCATIONS
APRIL 2018

[THIS PAGE INTENTIONALLY LEFT BLANK]

NMED Work Plan
Extension Approvals

[THIS PAGE INTENTIONALLY LEFT BLANK]

NEW MEXICO
ENVIRONMENT DEPARTMENT

SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Phone (505) 476-6000 Fax (505) 476-6030
www.env.nm.gov

RYAN FLYNN
Cabinet Secretary
BUTCH TONGATE
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

December 22, 2015

Mark Patterson
FWDA, BRAC Coordinator
P.O. Box 93
Ravenna, OH 44266

Steve Smith
USACE
CESWF-PER-DD
819 Taylor Street, Room 3B06
Fort Worth, TX 76102

SUBJECT: EXTENSION REQUEST FOR PARCEL 23 REVISED PHASE II RCRA FACILITY INVESTIGATION WORK PLAN,
FORT WINGATE DEPOT ACTIVITY
MCKINLEY COUNTY, NEW MEXICO
EPA # NM6213820974
HWB-FWDA-12-002

Dear Messrs. Patterson and Smith:

The New Mexico Environment Department (NMED) is in receipt of the Fort Wingate Depot Activity's (Permittee) letter requesting an extension for the Parcel 23 Revised Phase II RCRA Facility Investigation Work Plan, dated November 17, 2015 and received November 23, 2015.

The Permittees request an extension to submit the revision of the *Phase II RCRA Facility Investigation Work Plan for Parcel 23* (IWP). The Permittee requires additional time to respond to and clarify comments from NMED and to prepare the revised IWP.

The Permittees have shown good cause for an extension; therefore, NMED grants the requested extension. The date to submit the revised IWP has been changed to January 29, 2016, as requested.

Should you have any questions, please contact Ben Wear of my staff at (505) 476-6041.
Sincerely,

for

John Kieling
Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
N. Dhawan, NMED HWB
B. Wear, NMED HWB
C. Hendrickson, U.S. EPA Region 6
T. Perry, Navajo Nation
V. Panteah, Zuni Pueblo
C. Seoutewa, Southwest Region BIA
R. Duwyenie, Navajo BIA
J. Wilson, BIA
E. Stevens, BIA
R. White, BIA
C. Esler, Sundance Consulting, Inc.

File: FWDA 2015 and Reading, Parcel 23, FWDA-12-002

SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

NEW MEXICO
ENVIRONMENT DEPARTMENT

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Phone (505) 476-6000 Fax (505) 476-6030
www.env.nm.gov

RYAN FLYNN
Cabinet Secretary
BUTCH TONGATE
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

January 19, 2016

Mark Patterson
FWDA, BRAC Coordinator
P.O. Box 93
Ravenna, OH 44266

Steve Smith
USACE
CESWF-PER-DD
819 Taylor Street, Room 3B06
Fort Worth, TX 76102

SUBJECT: SECOND EXTENSION REQUEST FOR THE PARCEL 23 PHASE II RCRA FACILITY INVESTIGATION WORK PLAN, FORT WINGATE DEPOT ACTIVITY MCKINLEY COUNTY, NEW MEXICO EPA # NM6213820974 HWB-FWDA-12-002

Dear Messrs. Patterson and Smith:

The New Mexico Environment Department (NMED) is in receipt of the Fort Wingate Depot Activity's (Permittee) letter requesting an extension for the revised *Parcel 23 Phase II RCRA Facility Investigation Work Plan*, dated January 7, 2016.

The Permittees request an extension to submit the *Phase II RCRA Facility Investigation Work Plan for Parcel 23* (IWP). This is the second request for an extension to submit the IWP (the previous extension was granted on December 22, 2015). The Permittee requires additional time to respond to and clarify comments from NMED and to prepare the revised IWP.

The letters sent by the Permittees requesting the extensions for this document both refer to the document as a revision; this in not accurate. The Phase II IWP was required in NMED's August 12, 2015 Approval with Modifications for the Final RCRA Facility Investigation Report for Parcel 23. Ensure all documents are accurately cited in all future correspondence in order to facilitate document and project tracking. In addition, for future extension requests, please request adequate time to complete the project in lieu of submitting multiple requests over short periods of time.

The Permittees have shown good cause for an extension; therefore, NMED grants the requested extension. Because this is the second request for an extension for this deliverable and multiple extension requests over short periods of time cause issues for project tracking, the date to submit the revised IWP has been extended for one year from the original due date specified in NMED's August 12, 2015 Approval with Modifications, to **November 30, 2016**.

Should you have any questions, please contact Ben Wear of my staff at (505) 476-6041.

Sincerely,

John Kieling
Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
N. Dhawan, NMED HWB
B. Wear, NMED HWB
C. Hendrickson, U.S. EPA Region 6
T. Perry, Navajo Nation
V. Panteah, Zuni Pueblo
C. Seoutewa, Southwest Region BIA
R. Duwyenie, Navajo BIA
J. Wilson, BIA
E. Stevens, BIA
R. White, BIA
C. Esler, Sundance Consulting, Inc.

File: FWDA 2016 and Reading, Parcel 23, FWDA-12-002

NEW MEXICO
ENVIRONMENT DEPARTMENT

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Phone (505) 476-6000 Fax (505) 476-6030
www.env.nm.gov

SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

RYAN FLYNN
Cabinet Secretary
BUTCH TONGATE
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

December 1, 2016

Mark Patterson
FWDA, BRAC Coordinator
P.O. Box 93
Ravenna, OH 44266

Steve Smith
USACE
CESWF-PER-DD
819 Taylor Street, Room 3B06
Fort Worth, TX 76102

**SUBJECT: THIRD EXTENSION REQUEST FOR THE PARCEL 23 PHASE 2 RCRA FACILITY INVESTIGATION WORK PLAN,
FORT WINGATE DEPOT ACTIVITY
MCKINLEY COUNTY, NEW MEXICO
EPA # NM6213820974
HWB-FWDA-12-002**

Dear Messrs. Patterson and Smith:

The New Mexico Environment Department (NMED) is in receipt of the Fort Wingate Depot Activity's (Permittee) letter requesting an extension for the *Parcel 23 Phase II RCRA Facility Investigation Work Plan*, dated November 17, 2016 and received November 28, 2016.

The Permittees request an extension to submit the *Phase II RCRA Facility Investigation Work Plan for Parcel 23* (IWP). This is the third request for an extension to submit the IWP (the previous extensions were granted on December 22, 2015 and January 19, 2016). The Permittee requires additional time to respond to and clarify comments from NMED and to prepare the revised IWP. For future extension requests, please request adequate time to complete the project in lieu of submitting multiple extension requests.

The Permittees have shown good cause for an extension; therefore, NMED grants the requested extension. Because this is the third request for an extension for this deliverable and multiple extension requests cause issues for project tracking, the date to submit the revised IWP has been extended for one year from the most recent due date specified in NMED's January 19, 2016 Extension Approval, to **November 30, 2017**.

Should you have any questions, please contact Ben Wear of my staff at (505) 476-6041.

Sincerely,

John Kieling
Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
B. Wear, NMED HWB
C. Hendrickson, U.S. EPA Region 6
L. Rodgers, Navajo Nation
S. Begay-Platero, Navajo Nation
M. Harrington, Pueblo of Zuni
C. Seoutewa, Southwest Region BIA
R. Duwyenie, Navajo BIA
J. Wilson, BIA
E. Stevens, BIA
R. White, BIA
C. Esler, Sundance Consulting, Inc.

File: FWDA 2016 and Reading, Parcel 23, FWDA-12-002

State of New Mexico
ENVIRONMENT DEPARTMENT

Hazardous Waste Bureau

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6313
Phone (505) 476-6000 Fax (505) 476-6030
www.env.nm.gov

SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

BUTCH TONGATE
Cabinet Secretary
J. C. BORREGO
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

December 6, 2017

Mark Patterson
BRAC Environmental Coordinator
Fort Wingate Depot Activity
13497 Elton Road
North Lima, OH 44452

Steve Smith
USACE
CESWF-PER-DD
819 Taylor Street, Room 3B06
Fort Worth, TX 76102

RE: FOURTH EXTENSION REQUEST FOR PARCEL 23 PHASE 2 RCRA FACILITY INVESTIGATION WORK PLAN
FORT WINGATE DEPOT ACTIVITY
MCKINLEY COUNTY, NEW MEXICO
EPA # NM6213820974
HWB-FWDA-12-002

Dear Messrs. Patterson and Smith:

The New Mexico Environment Department (NMED) is in receipt of the Fort Wingate Depot Activity (Permittee) letter requesting an extension for the *Parcel 23 Phase 2 RCRA Facility Investigation Work Plan* (Plan), dated November 17, 2017 and received November 27, 2017.

This is the fourth request for an extension to submit the Plan (previous extensions were granted on December 22, 2015, January 19, 2016, and December 1, 2016). The Permittee requires additional time to evaluate existing data and investigate additional potential activities that may need to be included in the plan. For future extension requests, please request adequate time to complete the project in lieu of submitting multiple extension requests.

The Permittees have shown good cause for an extension; therefore, NMED grants the requested extension. Because this is the fourth request within a two-year period for an extension for this deliverable and multiple extension requests can cause issues for project tracking, the date to submit the revised Plan has been extended for two years from the most recent due date specified in NMED's December 1, 2016 Extension Approval, to **November 30, 2019**.

If you have any questions regarding this letter, please contact Ben Wear at (505) 476-6041.

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: D. Cobrain, NMED HWB
B. Wear, NMED HWB
M. Suzuki, NMED HWB
C. Hendrickson, U.S. EPA Region 6
L. Rodgers, Navajo Nation
S. Begay-Platero, Navajo Nation
M. Harrington, Pueblo of Zuni
C. Seoutewa, Southwest Region BIA
G. Padilla, Navajo BIA
J. Wilson, BIA
B. Howerton, BIA
R. White, BIA
C. Esler, Sundance Consulting, Inc.

File: FWDA 2017 and Reading, Parcel 23, FWDA-12-002

NMED NOD Letter to RFI Report
April 19, 2014

[THIS PAGE INTENTIONALLY LEFT BLANK]

NEW MEXICO
ENVIRONMENT DEPARTMENT

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Phone (505) 476-6000 Fax (505) 476-6030
www.nmenv.state.nm.us

SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

RYAN FLYNN
Secretary
BUTCH TONGATE
Deputy Secretary

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

August 19, 2014

Mark Patterson
FWDA, BRAC Coordinator
P.O. Box 93
Ravenna, OH 44266

Steve Smith
USACE FWDA Program Manager
CESWF-PEC-EF
819 Taylor Street, Room 3A12
Fort Worth, TX 76102

RE: DISAPPROVAL
FINAL RCRA FACILITY INVESTIGATION REPORT
PARCEL 23
FORT WINGATE DEPOT ACTIVITY
MCKINLEY COUNTY, NEW MEXICO
EPA ID# NM6213820974
HWB-FWDA-12-002

Dear Messrs. Patterson and Smith:

The New Mexico Environment Department (NMED) has reviewed the *Final RCRA Facility Investigation Report; Parcel 23* (Report) dated April 30, 2012 for Fort Wingate Depot Activity (FWDA). NMED hereby disapproves this Report with the following comments:

Comment 1.
In Section 2.2.2, Topography, lines 30 – 3, page 2-2, the Permittee states "[t]he elevation of FWDA ranges from approximately 8,200 feet above mean sea level (MSL) in the south to 6,660 feet above MSL in the north, as shown in Figure 2-7." Refer to Figure 2-4 as Figure 2-7 was not included in the document. Provide the correct references in a revised Report.

Comment 2.
In Section 2.2.5.1, Stratigraphy, lines 2-3, page 2-4, the Permittee states "[a] stratigraphic column and description of the various lithologic units in the FWDA area is presented in Figure 2-10 at the end of this section." The Report does not include Figure 2-10. Correct the reference.

Comment 3.
Table 3-1F, 1999, listed dilution attenuation factors (DAFs) for some of the detected constituents of concern; however, some constituents are listed "NA" but have a listed DAF. For example, Table 3-1F lists the 2009 NMED DAF-20 value NA for Dieldrin. Although the 2009 NMED Table A-1 listed a DAF-20 value of 0.0135 mg/kg. Screening criteria must be applied to all data and consistently. Additionally, superscript "e" for NMED DAF-20 Values was not located in the notes section at the end of the table. Provide a revised Report to include revised tables that compare the 2009 NMED DAF-20 values to the results.

Note: Table 3-1F states that the depth of the samples was not known. However, these samples were collected at a depth of 12 inches. The information was located on the chain-of-custody forms in the analytical data package and can be found in the NMED library under FWDA 1999 Soil Analysis, Central and Group C landfill. Provide revised tables to include the depth.

Comment 4.
Figure 3-2, Previous Soil Sampling Locations at SWMU 21, page 3-52 provides the Calendar Year (CY) 2000 soil sampling locations for SWMU 21 as well as for the new cell that was located during the excavation. Figure 3-5, page 3-55 (Proposed Soil Sampling Locations for SWMU 21), states in the legend that the outlined green line was the area that was excavated in 1999. The excavated area depicted in Figure 3-5 does not correspond to the area that Figure 3-2 shows as being sampled. Provide clarification regarding the excavation boundaries and whether or not the newly discovered cell was excavated. If the new cell was excavated, provide an updated figure that depicts the extent of the excavation.

Comment 5.
As stated in comment 4 above; it appears that the boundary at SWMU 21 has changed and would need a Class 1 permit modification. Request a Class 1 permit modification to change the SWMU 21 boundary.

Comment 6.
Figure 2-4, Topographic Map, page 2-14, demonstrates that surface water flows to the north. In addition, ground water flows in the same general direction as the surface water flow. However, data has not been collected to the north of the landfill boundary in the arroyo where the landfill is located. Surface water runoff could have transported contamination into this arroyo; therefore, soils in the arroyo must be investigated. Provide a work plan proposing additional sampling locations to the north of the landfill within the general area of surface water runoff into the arroyo.

Comment 7.
In Section 2.3, Current Investigation (2011), page 2-6, line 27, the Permittee refers to Section 5.4.7. However, Section 5.4.7 does not exist within this Report. Provide a replacement page with the correct reference.

Comment 8.
Tables 3-3 through 3-8, Parcel 23 SWMU 21 Soil Investigation Data, include a column to compare the values to the 2012 NMED DAF-20 values. Revise the tables to provide a comparison to the 2012 NMED DAF-20 values.

Comment 9.
In Section 3.2.2.3, (Chemical Quality Control Summary Report for the Landfill Closure), page 3-5, line 36-37, the Permittee states "[t]he excavation was backfilled with clean soil, graded and re-seeded with native vegetation. The depth of the backfill was not reported." The 1999 Operations Plan for SWMU 21 states that grading operation will consist of re-grading the site by cutting the native soil surrounding the landfill and using the material to fill in the excavated area. Although, the plan states the soil will be tested and certified clean, no data was provided to demonstrate "clean fill." The soil data from the 2000 sampling event, which was collected after the re-grading, indicates exceedances of semi volatile organic compounds (SVOCs) and metals. Provide a statement that clarifies the use of existing soil and, if the soil contained contaminants, that the concentrations were below NMED's residential soil screen levels (SSLs).

Comment 10.
In Section 3.2.2.4, Chemical Quality Control Summary Report for Confirmation Soil Sampling [...], page 3-6 line 7-8, the Permittee states "[d]uring excavation of the Central Landfill, an additional landfill cell was discovered immediately to the south. The cell measured 40 feet by 450 feet. A total of 18 soil samples were collected from this area at a frequency of one sample every 25 feet at a depth of 1 foot bgs, or approximately 20 feet below the original landfill grade." Provide information that clarifies whether or not the newly discovered cell was excavated when the soil samples were collected in a revised Report. See Comment 4.

Comment 11.
In Section 3.2.3.2, Fate and Transport, page 3-7, line 18 -19, the Permittee states, "[i]f contamination is present at SWMU 21, it could pose a threat to human health and the environment through exposure to contaminated surface or subsurface soils." SWMU 21 most likely generated leachate, which may have contaminated ground water. Given the proximity of SWMU 21 to the arroyo, contamination of ground water is a potential exposure pathway. Provide this information in a revised Report.

Comment 12.
In Section 3.4.1, Soil Characterization, page 3-10, line 33-34, the Permittee states "[a] ground water monitoring well was not installed in SWMU 21 because the water table was not encountered during the soil boring investigations." The Permittee attempted to utilize SB01,

SB03, SB05, and SB07 in an effort to search for ground water. SB01 was drilled to a total depth of 35 feet bgs, SB03 was drilled to a total depth of 9-10 feet bgs, SB05 was not drilled due to refusal, and SB08 was drilled to a total depth of 24 feet bgs. It appears that the Permittee used a drilling method that was unsuitable for the site conditions, using a geoprobe direct push technology to identify bedrock can sometimes be misleading since refusal can be caused by cobble, a boulder or cemented soil conditions. Propose to use an alternative drilling method as direct push did not provide the data needed to make an assessment of ground water contamination. If as stated within this Report; the hydrogeology at SWMU 21 is similar to the TNT beds, then ground water should be located at a depth of 50 to 70 feet bgs. Provide a work plan and propose to drill up to three ground water monitoring wells: one in the up-gradient direction and two down-gradient direction from the site using hollow stem auger. When ground water is encountered the following constituents of concern must be analyzed: volatile organic compounds (VOCs), SVOCs, diesel-range (extended) organics (DRO), explosives and TAL metals.

Comment 13.
In Section 4.2.2, Sampling Data and Section 4.2.3.3, Data Gaps, the Permittee refers to Section 6.3.2; the correct reference in Section 4.3.2. Provide this information in the revised Report.

Comment 14.
NMED is unable to find a reference and explanation for Table 4-1. Provide this information in the revised Report.

Comment 15.
In Section 3.6.2, SWMU 21, Conclusions and Recommendations, page 3-12, lines 4-10, the Permittee proposes to conduct three additional borings in an effort to evaluate the horizontal extent of contamination near soil boring SB08. The Permittee must submit a Work Plan in accordance with Section VII.H.1.b of the Permit prior to conducting any field activity. The work plan must describe the proposed soil sampling activities and include figures identifying the proposed soil borings locations.

Comment 16.
Tables such as Table 3-1A, Soil Analytical Results from ESE, 1981 for SWMU 21, Central landfill, FWDA, that contain data collected prior to the excavation should be removed from the report as they have no relevance to existing conditions. Submit a revised Report to exclude all pre-excavation data from this Report and reference the appropriate documents in the appropriate sections where they can be located.

The Permittee must submit a table that details where the NMEDs comments were addressed in the work plan. The Permittee must submit a revised Report with responses to NMED's comments, cross-referencing NMED's numbered comments. The revised Report must be submitted on or before **October 31, 2014**. In addition, submit a Work Plan for the additional monitoring wells and boreholes at SWMU 21 must be submitted on or before **December 31,**

2014 (See comment 12 and 15). The Permittee must also submit an electronic version of the Work Plan.

If you have any questions regarding this letter, please contact Vicky Baca at (505) 476-6059.

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: Dave Cobrain, NMED, HWB
Neelam Dhawan, NMED, HWB
Kristen Vanhorn, NMED, HWB
Shannon Duran, NMED, HWB
Chuck Hendrickson, EPA-6PD-N
Tony Perry, Navajo Nation
Darrell Tsabetsaye, Zuni Pueblo
Clayton Seoutewa, Southwest Region BIA
Rose Duwyenie, Navajo BIA
Judith Wilson, BIA
Eldine Stevens, BIA
Robin White, BIA
Mike Scoville, USACE Ft. Worth
Eric Kirwan, USACE Ft. Worth

File: FWDA 2014 and Reading
FWDA-12-002

Army Response to NOD Letter for RFI Report
February 28, 2015

[THIS PAGE INTENTIONALLY LEFT BLANK]

February 28, 2015

RE: RESPONSE TO THE NOTICE OF DISAPPROVAL, AUGUST 19, 2014
FINAL RCRA FACILITY INVESTIGATION REPORT
PARCEL 23
FORT WINGATE DEPOT ACTIVITY
MCKINLEY COUNTY, NEW MEXICO
EPA ID# NM6213820974
HWB-FWDA-12-002

Dear Mr. Kieling:

This letter documents the Department of the Army's response to comments in the Notice of Disapproval letter (August 19, 2014) for the *Final RCRA Facility Investigation Report; Parcel 23* (Report) dated April 30, 2012 for Fort Wingate Depot Activity (FWDA). This letter is submitted with the *Final RCRA Facility Investigation Report; Parcel 23 Revision 1.0* dated February 28, 2015.

Comment 1.
In Section 2.2.2, Topography, lines 30 – 3, page 2-2, the Permittee states "[t]he elevation of FWDA ranges from approximately 8,200 feet above mean sea level (MSL) in the south to 6,660 feet above MSL in the north, as shown in Figure 2-7." Refer to Figure 2-4 as Figure 2-7 was not included in the document. Provide the correct references in a revised Report.

- Response: Figure reference corrected.

Comment 2.
In Section 2.2.5.1, Stratigraphy, lines 2-3, page 2-4, the Permittee states "[a] stratigraphic column and description of the various lithologic units in the FWDA area is presented in Figure 2-10 at the end of this section." The Report does not include Figure 2-10. Correct the reference.

- Response: Figure reference removed.

Comment 3.
Table 3-1F, 1999, listed dilution attenuation factors (DAFs) for some of the detected constituents of concern; however, some constituents are listed "NA" but have a listed DAF. For example, Table 3-1F lists the 2009 NMED DAF-20 value NA for Dieldrin. Although the 2009 NMED Table A-1 listed a DAF-20 value of 0.0135 mg/kg. Screening criteria must be applied to all data and consistently. Additionally, superscript "e" for NMED DAF-20 Values was not located in the notes section at the end of the table. Provide a revised Report to include revised tables that compare the 2009 NMED DAF-20 values to the results.

Note: Table 3-1F states that the depth of the samples was not known. However, these samples were collected at a depth of 12 inches. The information was located on the chain-of-custody forms in the analytical data package and can be found in the NMED library under FWDA 1999 Soil Analysis, Central and Group C landfill. Provide revised tables to include the depth.

- Response: Tables were pulled directly from work plan, unfortunately there was a formatting error that was identified after reviewing the source files. The tables are reformatted and exclude the references noted above.

Comment 4.
Figure 3-2, Previous Soil Sampling Locations at SWMU 21, page 3-52 provides the Calendar Year (CY) 2000 soil sampling locations for SWMU 21 as well as for the new cell that was located during the excavation. Figure 3-5, page 3-55 (Proposed Soil Sampling Locations for SWMU 21), states in the legend that the outlined green line was the area that was excavated in 1999. The excavated area depicted in Figure 3-5 does not correspond to the area that Figure 3-2 shows as being sampled. Provide clarification regarding the excavation boundaries and whether or not the newly discovered cell was excavated. If the new cell was excavated, provide an updated figure that depicts the extent of the excavation.

- Response: The actual excavation boundaries for the new cell is not documented, however the Release Assessment Report, 2000 describes the samples being taken along the center line of the former excavation. A figure will be presented in a Phase 2 RFI work plan based on field observations and historical aerial photographs.

Comment 5.
As stated in comment 4 above; it appears that the boundary at SWMU 21 has changed and would need a Class 1 permit modification. Request a Class 1 permit modification to change the SWMU 21 boundary.

- Response: The Army will request a change to the boundaries through the Permit Renewal to add the new cell as shown in the attached figure. The limit of the new area is approximated using available information.

Comment 6.
Figure 2-4, Topographic Map, page 2-14, demonstrates that surface water flows to the north. In addition, ground water flows in the same general direction as the surface water flow. However, data has not been collected to the north of the landfill boundary in the arroyo where the landfill is located. Surface water runoff could have transported contamination into this arroyo; therefore, soils in the arroyo must be investigated. Provide a work plan proposing additional sampling locations to the north of the landfill within the general area of surface water runoff into the arroyo.

- Response: The Army will provide a phase 2 RFI work plan for the additional work.

Comment 7.
In Section 2.3, Current Investigation (2011), page 2-6, line 27, the Permittee refers to Section 5.4.7. However, Section 5.4.7 does not exist within this Report. Provide a replacement page with the correct reference.

- Response: Corrected reference to 3.4

Comment 8.

Tables 3-3 through 3-8, Parcel 23 SWMU 21 Soil Investigation Data, include a column to compare the values to the 2012 NMED DAF-20 values. Revise the tables to provide a comparison to the 2012 NMED DAF-20 values.

- Response: The sampling was performed and the report was initiated prior to the publication of the 2012 SSL update and analytical results are compared to the current residential soil screening levels as directed in the approved Work Plan.

Comment 9.
In Section 3.2.2.3, (Chemical Quality Control Summary Report for the Landfill Closure), page 3-5, line 36-37, the Permittee states "[t]he excavation was backfilled with clean soil, graded and re-seeded with native vegetation. The depth of the backfill was not reported." The 1999 Operations Plan for SWMU 21 states that grading operation will consist of re-grading the site by cutting the native soil surrounding the landfill and using the material to fill in the excavated area. Although, the plan states the soil will be tested and certified clean, no data was provided to demonstrate "clean fill." The soil data from the 2000 sampling event, which was collected after the re-grading, indicates exceedances of semi volatile organic compounds (SVOCs) and metals. Provide a statement that clarifies the use of existing soil and, if the soil contained contaminants, that the concentrations were below NMED's residential soil screen levels (SSLs).

- Response: Information on the back fill was not able to be located. The Army reviewed the historic reports again and due to an oversight did show the exceedances found in the document referenced in NMED's comment on Figures 3-7 and 3-8 of the RFI report. The low hits and consistent concentrations of SVOCs appear to be ubiquitous at SWMU 21. The coal burning boiler plant (Building 535) across the street may have impacted the area. The Building 535 site drains directly to the SWMU 21 site. The Army will contract and prepare a phase 2 RFI work plan for submittal to the stakeholders. The work plan will look further into the potential impacts of the coal burning boiler at Building 535.

Comment 10.
In Section 3.2.2.4, Chemical Quality Control Summary Report for Confirmation Soil Sampling […], page 3-6 line 7-8, the Permittee states "[d]uring excavation of the Central Landfill, an additional landfill cell was discovered immediately to the south. The cell measured 40 feet by 450 feet. A total of 18 soil samples were collected from this area at a frequency of one sample every 25 feet at a depth of 1 foot bgs, or approximately 20 feet below the original landfill grade." Provide information that clarifies whether or not the newly discovered cell was excavated when the soil samples were collected in a revised Report. See Comment 4.

- Response: The actual excavation boundaries for the new cell are not documented, however the Release Assessment Report, 2000 describes the samples a being taken along the center line of the former excavation. Refer to response to comment No. 4.

Comment 11.
In Section 3.2.3.2, Fate and Transport, page 3-7, line 18 -19, the Permittee states, "[i]f contamination is present at SWMU 21, it could pose a threat to human health and the environment through exposure to contaminated surface or subsurface soils." SWMU 21 most likely generated leachate, which may have contaminated ground water. Given the proximity of

SWMU 21 to the arroyo, contamination of ground water is a potential exposure pathway. Provide this information in a revised Report.

- Response: The Army proposes to address this comment by initiating a Phase 2 RFI to determine if leachate exists, and whether this potential leachate migrated to the arroyo below the central landfill. USACE plans to conduct soil and groundwater sample using a hollow-stem auger drill. Groundwater sample will be collected from temporary boreholes to determine if contamination reached groundwater. If contamination is found in groundwater, permanent monitoring wells will be installed.

Comment 12.

In Section 3.4.1, Soil Characterization, page 3-10, line 33-34, the Permittee states "[a] ground water monitoring well was not installed in SWMU 21 because the water table was not encountered during the soil boring investigations." The Permittee attempted to utilize SB01, SB03, SB05, and SB07 in an effort to search for ground water. SB01 was drilled to a total depth of 35 feet bgs, SB03 was drilled to a total depth of 9-10 feet bgs, SB05 was not drilled due to refusal, and SB08 was drilled to a total depth of 24 feet bgs. It appears that the Permittee used a drilling method that was unsuitable for the site conditions, using a geoprobe direct push technology to identify bedrock can sometimes be misleading since refusal can be caused by cobble, a boulder or cemented soil conditions. Propose to use an alternative drilling method as direct push did not provide the data needed to make an assessment of ground water contamination. If as stated within this Report; the hydrogeology at SWMU 21 is similar to the TNT beds, then ground water should be located at a depth of 50 to 70 feet bgs. Provide a work plan and propose to drill up to three ground water monitoring wells: one in the up-gradient direction and two down-gradient direction from the site using hollow stem auger. When ground water is encountered the following constituents of concern must be analyzed: volatile organic compounds (VOCs), SVOCs, diesel-range (extended) organics (DRO), explosives and TAL metals.

- Response: To address this comment, the Army proposes a Phase 2 RFI to address this comment. The work plan for the Phase 2 RFI will recommend the use of a hollow-stem auger to determine the depth of bedrock, or groundwater if encountered. If groundwater is encountered, grab sample will be collected from temporary borehole to determine if leachate migrated to groundwater. If contamination is found in groundwater, permanent groundwater monitoring wells will be installed.

Comment 13.

In Section 4.2.2, Sampling Data and Section 4.2.3.3, Data Gaps, the Permittee refers to Section 6.3.2; the correct reference in Section 4.3.2. Provide this information in the revised Report.

- Response: corrected reference

Comment 14.

NMED is unable to find a reference and explanation for Table 4-1. Provide this information in the revised Report.

- Response: added reference in section 4.3.2

Comment 15.

In Section 3.6.2, SWMU 21, Conclusions and Recommendations, page 3-12, lines 4-10, the Permittee proposes to conduct three additional borings in an effort to evaluate the horizontal extent of contamination near soil boring SB08. The Permittee must submit a Work Plan in accordance with Section VII.H.1.b of the Permit prior to conducting any field activity. The work plan must describe the proposed soil sampling activities and include figures identifying the proposed soil borings locations.

- Response: A Phase 2 Work Plan will be completed under a separate contract.

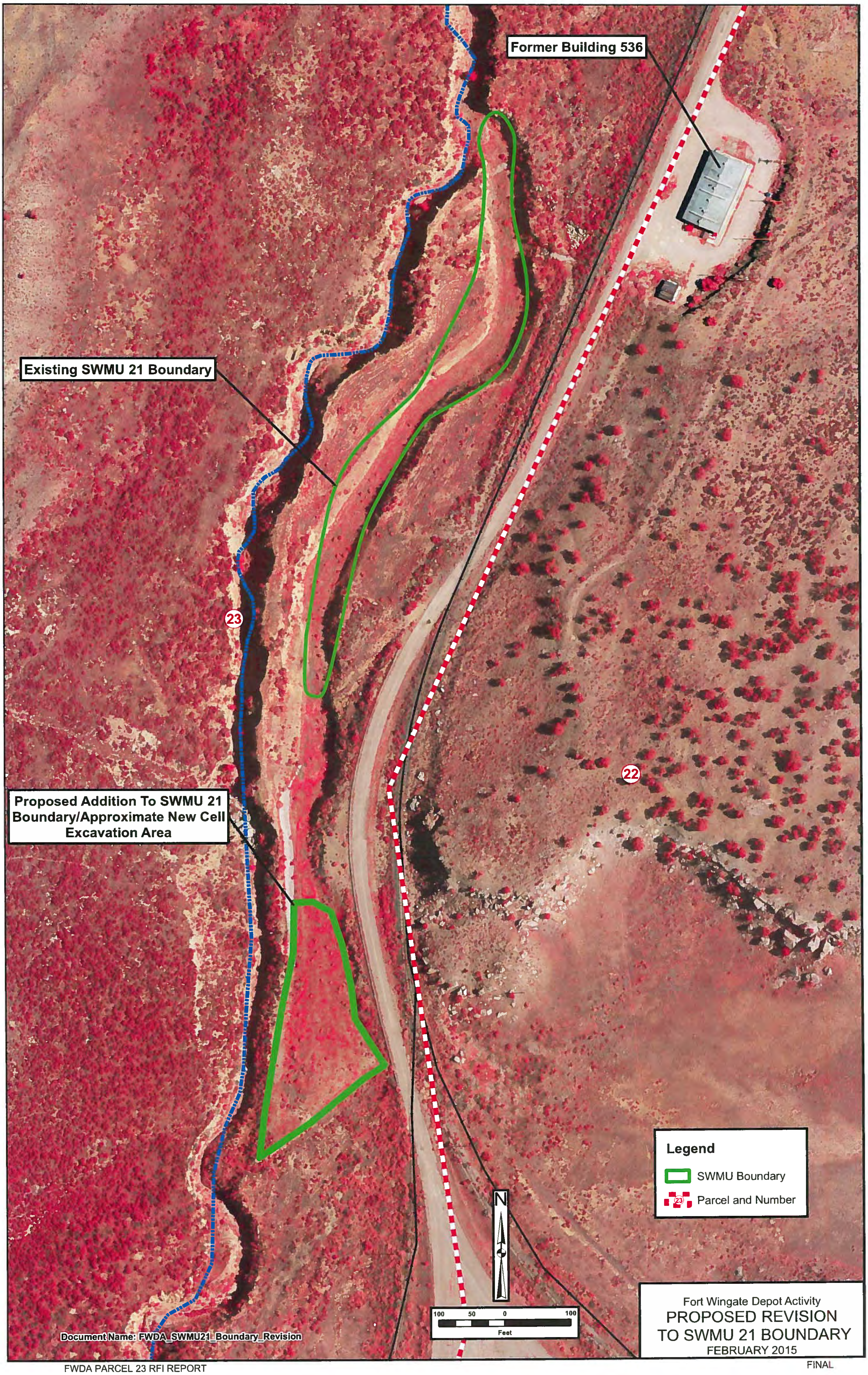
Comment 16.
Tables such as Table 3-1A, Soil Analytical Results from ESE, 1981 for SWMU 21, Central landfill, FWDA, that contain data collected prior to the excavation should be removed from the report as they have no relevance to existing conditions. Submit a revised Report to exclude all pre-excavation data from this Report and reference the appropriate documents in the appropriate sections where they can be located.

- Response: The RFI is written as a stand-alone report that documents, not only the current investigation, but also the historical use and characterizations that preceded this work. NMED has previously directed the Army to include a complete summary of the historical information about the site in prior report submissions confirming the intent and approach of the RFI.

Sincerely,

Mark Patterson
BRAC Environmental Coordinator

[THIS PAGE INTENTIONALLY LEFT BLANK]


Former Building 536
Existing SWMU 21 Boundary
23
22
Proposed Addition To SWMU 21 Boundary/Approximate New Cell Excavation Area
Legend
SWMU Boundary
Parcel and Number
N
100 50 0 100
Feet
Document Name: FWDA_SWMU21_Boundary_Revision
Fort Wingate Depot Activity
PROPOSED REVISION TO SWMU 21 BOUNDARY
FEBRUARY 2015

[THIS PAGE INTENTIONALLY LEFT BLANK]

NMED Approval with Modifications to Final RFI Report
August 12, 2015

[THIS PAGE INTENTIONALLY LEFT BLANK]

NEW MEXICO
ENVIRONMENT DEPARTMENT

2905 Rodeo Park Drive East, Building 1
Santa Fe, New Mexico 87505-6303
Phone (505) 476-6000 Fax (505) 476-6030
www.env.nm.gov

SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

RYAN FLYNN
Cabinet Secretary
BUTCH TONGATE
Deputy Secretary

CERTIFIED MAIL – RETURN RECEIPT REQUESTED

August 12, 2015

Mark Patterson
FWDA, BRAC Coordinator
P.O. Box 93
Ravenna, OH 44266

Steve Smith
USACE FWDA Program Manager
CESWF-PEC-EF
819 Taylor Street, Room 3A12
Fort Worth, TX 76102

**RE: APPROVAL WITH MODIFICATIONS
FINAL RCRA FACILITY INVESTIGATION REPORT
PARCEL 23, REVISION 1.0
FORT WINGATE DEPOT ACTIVITY
MCKINLEY COUNTY, NEW MEXICO
EPA ID# NM6213820974
HWB-FWDA-12-002**

Dear Messrs. Patterson and Smith:

The New Mexico Environment Department (NMED) has reviewed the *Final RCRA Facility Investigation Report, Parcel 23, Revision 1.0* (Report), dated February 28, 2015 for Fort Wingate Depot Activity (Permittee). NMED hereby issues this Approval with Modifications with the following modifications.

Modifications

1. The Permittee must submit a Phase II Work Plan as stated in the response to NMEDs Disapproval, dated August 19, 2014. The Permittee's response letter was dated February 28, 2015 and is included in Attachment A of this Report. The Phase II Work Plan must be written and submitted in accordance with Section VII.H.1.b of the Permit prior to conducting any field activity. The work plan must describe in detail the proposed soil sampling activities and include figures identifying the proposed soil boring locations.

2. In future responses to Disapprovals the Permittee must reference the Permittee's response letter comments in the applicable sections of the Report where future work is being proposed; otherwise it appears that comments in the disapproval were not addressed. The Permittee is required to provide a response letter that cross-references NMEDs comments and demonstrates where changes have been made to the revised document.

3. The Permittee must use the 2014 NMED Risk Assessment Guidance as updated for the work proposed performed in the Phase II Work Plan.

4. In Section 3.6.2, the Permittee proposed to install three additional borings at SWMU 21 in an effort to evaluate the horizontal extent of contamination near soil boring SB08. The proposed method is acceptable; however, a survey must be conducted in order to accurately apply correction factors for terrain slope in order to ensure that the proposed depth of 17-18 feet-below ground surface (ft-bgs), relative to soil boring 08 (SB08) to equal the baseline ground surface depth of 0 feet. NMED recommends that samples be collected at two-and-one-half-foot intervals for the upper ten feet and at five foot intervals from the surface thereafter. This recommendation stems from the exceedances in the "clean fill" and the fact that residential risk is applicable to 10 ft-bgs. The method proposed by the Permittee would not provide data to determine an acceptable risk for the first 10 ft-bgs as proposed in this Report.

5. In Section 4.6.2, the Permittee recommends no further corrective action for AOC 73. NMED concurs with this recommendation pending an evaluation of the data collected for a soil background study based on incremental (IM) samples. The approved 2010 Shaw soil background study conducted at FWDA represents grab samples, which are discrete sample data. Discrete sample results provide a measure of the distribution of concentrations in relatively small volumes of soil in a specified area, where IM samples provides measure of the distribution of mean concentrations, each of which is an estimate of the population mean for the entire decision unit. Due to the differences in attributes, a comparison of IM results to discrete background data cannot be conducted. Comparison of an IM estimate of the mean to a discrete sample collected from soil representing background is likely to lead to decision errors in which one incorrectly concludes that the contaminant distribution on site is consistent with background conditions (refer to Chapter 4 ITRC Incremental Sampling Methodology: http://www.itrcweb.org/). Submit a Phase II Work Plan to conduct a soil background study for IM data for comparison to the site IM data.

The Permittee must submit a Phase II Work Plan to address comments contained in NMED's Disapproval dated August 19, 2014 and must address all comments contained in this Approval with Modifications. The Phase II Work Plan must be submitted on or before **November 30, 2015.**

If you have any questions regarding this letter, please contact Vicky Baca at (505) 476-6059.

Sincerely,

John E. Kieling
Chief
Hazardous Waste Bureau

cc: Dave Cobrain, NMED, HWB
Neelam Dhawan, NMED, HWB
Kristen Vanhorn, NMED, HWB
Chuck Hendrickson, EPA-6PD-N
Tony Perry, Navajo Nation
Val Panteah, Governor, Pueblo of Zuni
Clayton Seoutewa, Southwest Region BIA
Rose Duwyenie, Navajo BIA
Judith Wilson, BIA
Eldine Stevens, BIA
Christy Esler, Sundance Consulting, Inc.

File: FWDA 2015 and Reading
FWDA-12-002