Final

Permittee-Initiated Interim Measures Work Plan Parcel 16 Revision 1.0

Fort Wingate Depot Activity
McKinley County, New Mexico

May 6, 2015

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:

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This Permittee-Initiated Interim Measures Work Plan describes activities planned for removal activities at Parcel 16, Fort Wingate Depot Activity, McKinley County, New Mexico.

15. SUBJECT TERMS

Fort Wingate Depot Activity, Permittee-Initiated Interim Measures Work Plan, Parcel 16, Revision 1.0

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MAY 2015

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_____

Mr. Steven W. Smith, P.E.
Fort Wingate Program Manager

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PREFACE

This Resource Conservation and Recovery Permittee-Initiated Interim Measures Work Plan (Work Plan) summarizes previous investigations and describes the field activities that will be conducted at Parcel 16 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 (SOW) dated April 23, 2014.

This Work Plan was prepared by Amec Foster Wheeler Environment & Infrastructure, Inc. (formerly known as AMEC Environment & Infrastructure, Inc.) in September 2014. Mr. Mark Patterson served as the FWDA Base Realignment and Closure Environmental Coordinator and Mr. Steve Smith served as the USACE Project Manager.

Julie Hamilton, PG	Tim Ostapuk, CIEC
Program Manager	Senior Project Scientist

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BIA-NR = Bureau of Indian Affairs – Navajo Representative.
BIA -Zuni= Bureau of Indian Affairs – Zuni Representative.
BRACD = U. S. Army Base Realignment and Closure Division.
EPA = United States Environmental Protection Agency.
FWDA BEC = Fort Wingate Depot Activity Base Realignment and Closure Environmental Coordinator.
NMED = New Mexico Environment Department.
NN = Navajo Nation.
POZ = Pueblo of Zuni.
USACE SWF = U. S. Army Corps of Engineers – Fort Worth District.

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LIST OF ACRONYMS AND ABBREVIATIONS

°C	degree centigrade
Amec Foster Wheeler	Amec Foster Wheeler Environment & Infrastructure, Inc.
AOC	Area of Concern
CESM	Conceptual Site Exposure Model
COC	chain of custody
COPCs	contaminant of potential concern
EC	Excavation Confirmation
EPA	U.S. Environmental Protection Agency
FWDA	Fort Wingate Depot Activity
GPS	Global Positioning System
HASP	Health and Safety Plan
HHMSSL	Human Health Medium-Specific Screening Level
ID	identification
IDW	investigation-derived waste
IEUBK	Integrated Exposure Uptake Biokinetic
LCS	laboratory control sample
MEC	munitions and explosives of concern
MS	matrix spike
MSD	matrix spike duplicate
MS/MSD	matrix spike/matrix spike duplicate
NMED	New Mexico Environment Department
PPE	personal protective equipment
QA	quality assurance
QC	quality control
QA/QC	quality assurance/quality control
RCRA	Resource Conservation and Recovery Act
RDX	Royal Demolition Explosive
RFI	RCRA Facility Investigation
RPD	Relative Percent Difference
RSL	Regional Screening Level

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

SOW	Statement of Work
SSL	Soil Screening Levels
SWMU	Solid Waste Management Unit
SWPPP	Stormwater Pollution Prevention Plan
TB	Trip Blank
TCLP	Toxicity Characteristic Leaching Procedure
USACE	U.S. Army Corps of Engineers
UXO	unexploded ordnance
WP	Waste Profile

SECTION 1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE) Fort Worth District is preparing to conduct removal activities at Area of Concern (AOC) 41 - Igloo Block K and Solid Waste Management Unit (SWMU) 16 - Z135-4 Open Storage Pad within Parcel 16 of Fort Wingate Depot Activity (FWDA), McKinley County, New Mexico. **Figure 1-1** presents a Regional Map showing the location of FWDA. **Figure 1-2** presents a Parcel Map showing the location of Parcel 16. **Figure 1-3** presents the locations of each site that will be addressed under this Permittee-Initiated Interim Measures Work Plan (Work Plan).

This Work Plan has been prepared by USACE Fort Worth District, under Contract No. W9126G-11-D-0040, Task Order No. 0002 in accordance with USACE's Statement of Work (SOW) dated April 23, 2014, and other guidance provided by the Fort Worth District.

This Work Plan has been revised to address review comments provided by the New Mexico Environment Department (NMED) in a Disapproval Letter dated 18 March 2015 (NMED, 2015). The NMED Disapproval Letter and responses to NMED comments are provided in **Appendix A**.

1.1 Purpose and Scope

The purpose of the removal activities is to remove soil impacted with lead and explosives to acceptable levels at Igloo Block K and Z135-4 Open Storage Pad that will be protective of a future residential land use scenario. For lead, which is evaluated separately from all other compounds, soil removal will be conducted until lead concentrations are below the NMED Residential Soil Screening Level (SSL). For explosives, soil removal will be conducted until the cumulative risks and hazards posed by exposure to explosives are below the NMED Residential SSLs and target risk or hazard levels. This Work Plan has been prepared for submission to the NMED – Hazardous Waste Bureau, in accordance with the Interim Measure requirements of Section VII.G.5 of Resource Conservation and Recovery Act (RCRA) Permit NM 6213820974 for the FWDA Permit, dated December 2005 (Revised April 2014). Project-specific planning documents, which do not require approval by NMED, will be completed prior to conducting field work.

The scope of activities includes the following:

- Pre-mobilization activities including finalization of site-specific planning documents, utility clearance, pre-removal survey at Z135-4 Open Storage Pad, filing of stormwater Notice of Intent, preparation of an Environmental Protection Plan, preparation of a Stormwater Pollution Prevention Plan (SWPPP), and coordination with FWDA, NMED, and the disposal facility;
- Waste profile sampling at Igloo Block K and Z135-4 Open Storage Pad;
- Excavation of impacted soils from removal areas that consists of approximately:
  - 4.25 cubic yards of soil impacted with lead and explosives under 18 drain pipes from 15 igloos at Igloo Block K; and
  - 1,000 cubic yards of soil impacted with explosives at Z135-4 Open Storage Pad.

- Removing, recycling and grout-sealing of 54 drain pipes from 27 igloos at Igloo Block K;
- Disposal of wastes generated;
- Confirmation sampling;
- Evaluation of individual and cumulative post-excavation risks/hazards;
- Backfill, final grading, and post-survey of Z135-4 Open Storage Pad; and
- Post-implementation reporting.

1.2 Site Safety and Awareness

All work will be accomplished in accordance with all applicable safety requirements, regulations and guidance. A project-specific Health and Safety Plan (HASP) will be developed prior to conducting site activities. 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.

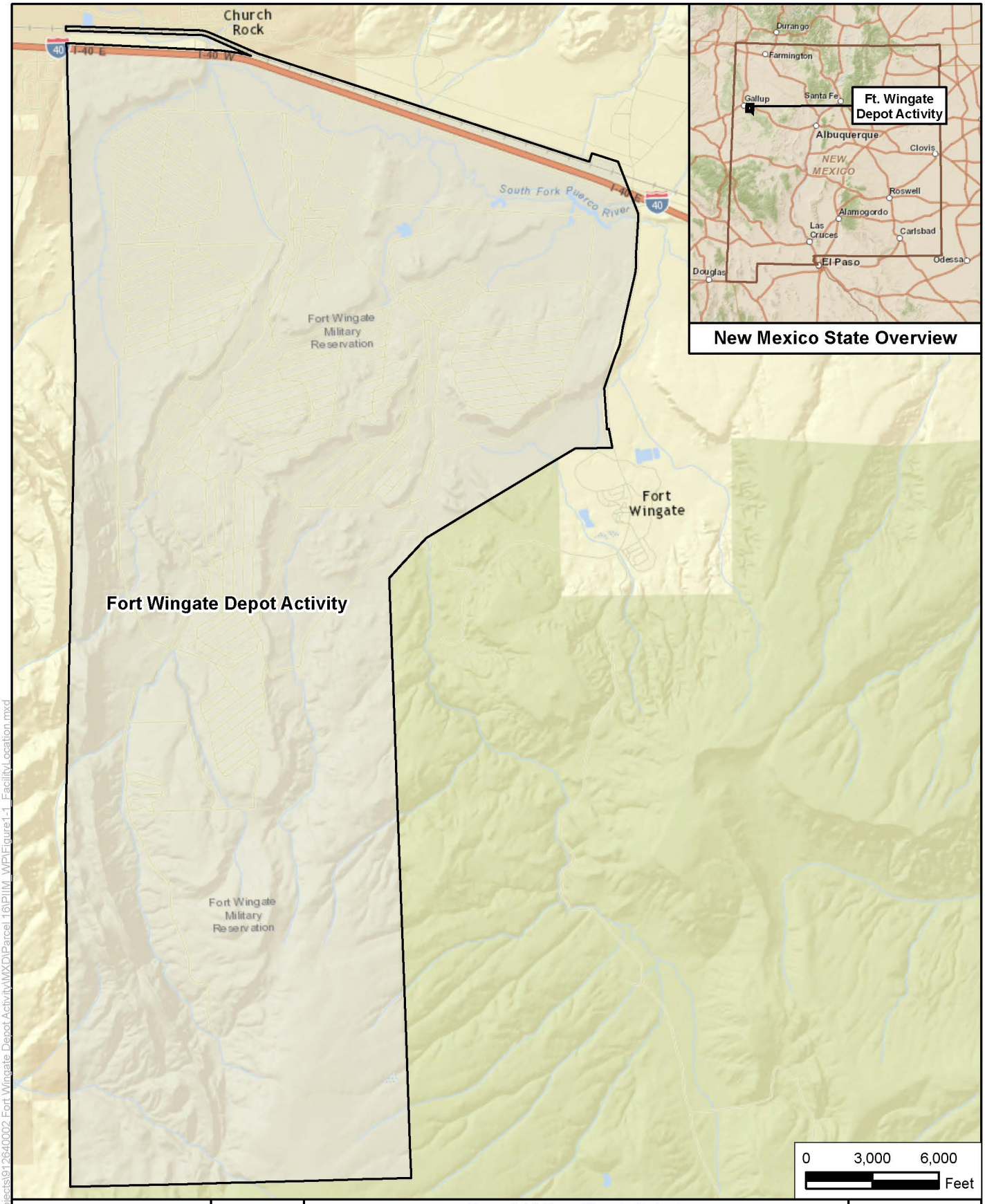
All work will be completed by a supervisor, operators, and technicians that have successfully completed 40-hour Hazardous Waste Operations and Emergency Response training in accordance with 29 *U.S. Code of Federal Regulations* 1910.120. A dedicated Site Safety Officer (SSO) will be on site during all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

1.3 Munitions and Explosives of Concern

There is no history of munitions and explosives of concern (MEC) being encountered at Igloo Block K and Z135-4 Open Storage Pad. If MEC is encountered during removal activities, work will cease and an on-site USACE Ordnance and Explosives Safety Specialist will be contacted.

1.4 Cultural Resources

In accordance with Section 106 of the National Historic Preservation Act, the USACE has consulted with the Pueblo of Zuni (Tsabetsaye, D., 2014), the Navajo Nation (Maldonado, 2014), and the New Mexico State Historic Preservation Office. Documentation of correspondence is provided in **Appendix B**. No cultural resources monitoring is planned during site operations. However, culturally sensitive sites are within the immediate vicinity of the removal areas in Parcel 16. Site personnel will be briefed on tribal concerns and potential cultural resources that may be encountered. If culturally sensitive issues arise and/or suspect items are encountered, they will be addressed, on site Army personnel will be notified immediately, and the Army will act in accordance with the Programmatic Agreement.



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Parcel 16 Permittee-Initiated
Interim Measures Work Plan
Fort Wingate Depot Activity
McKinley County, New Mexico

Regional Map

FIGURE
1-1

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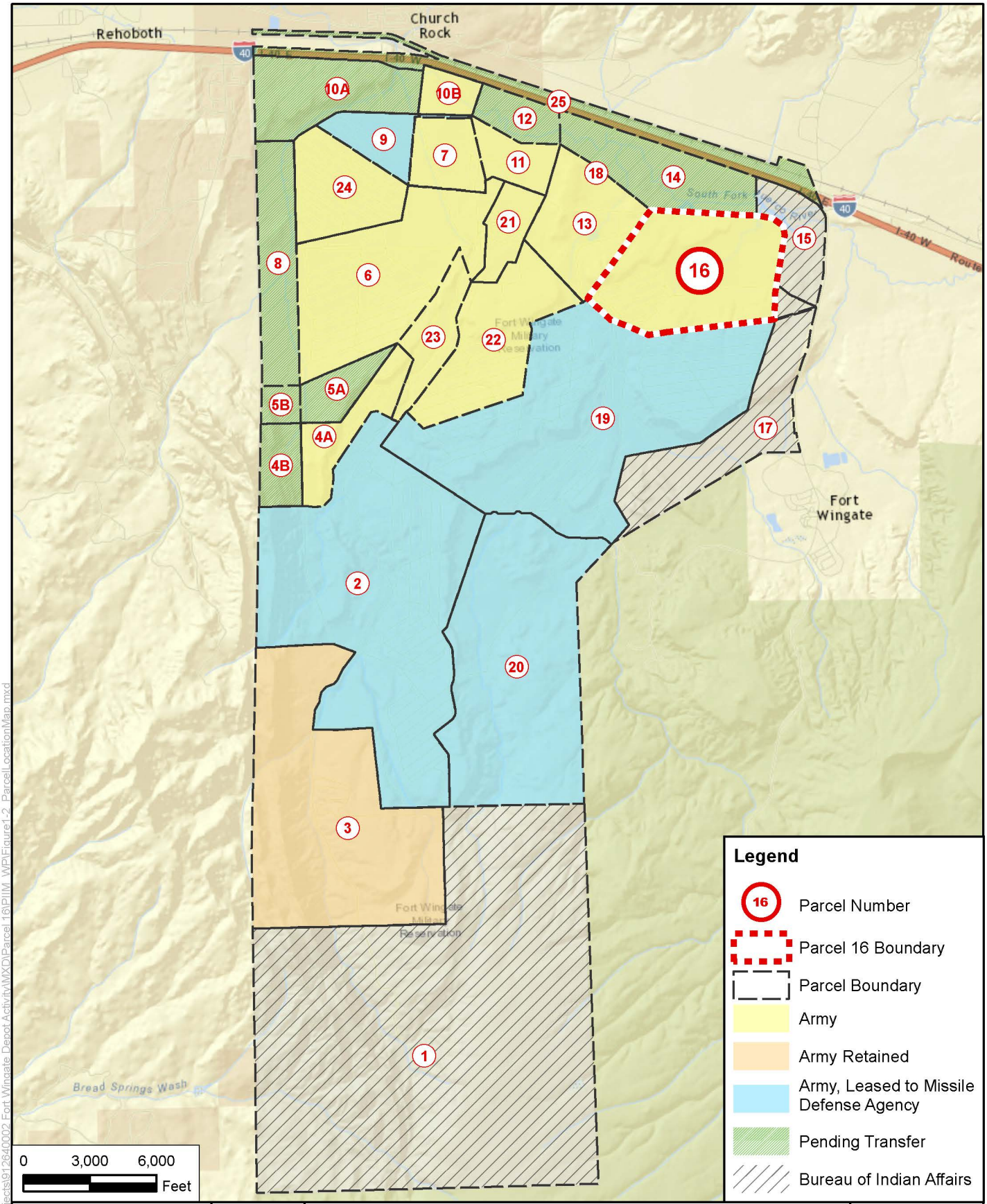

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Parcel 16 Permittee-Initiated
Interim Measures Work Plan
Fort Wingate Depot Activity
McKinley County, New Mexico

Parcel Map

FIGURE
1-2

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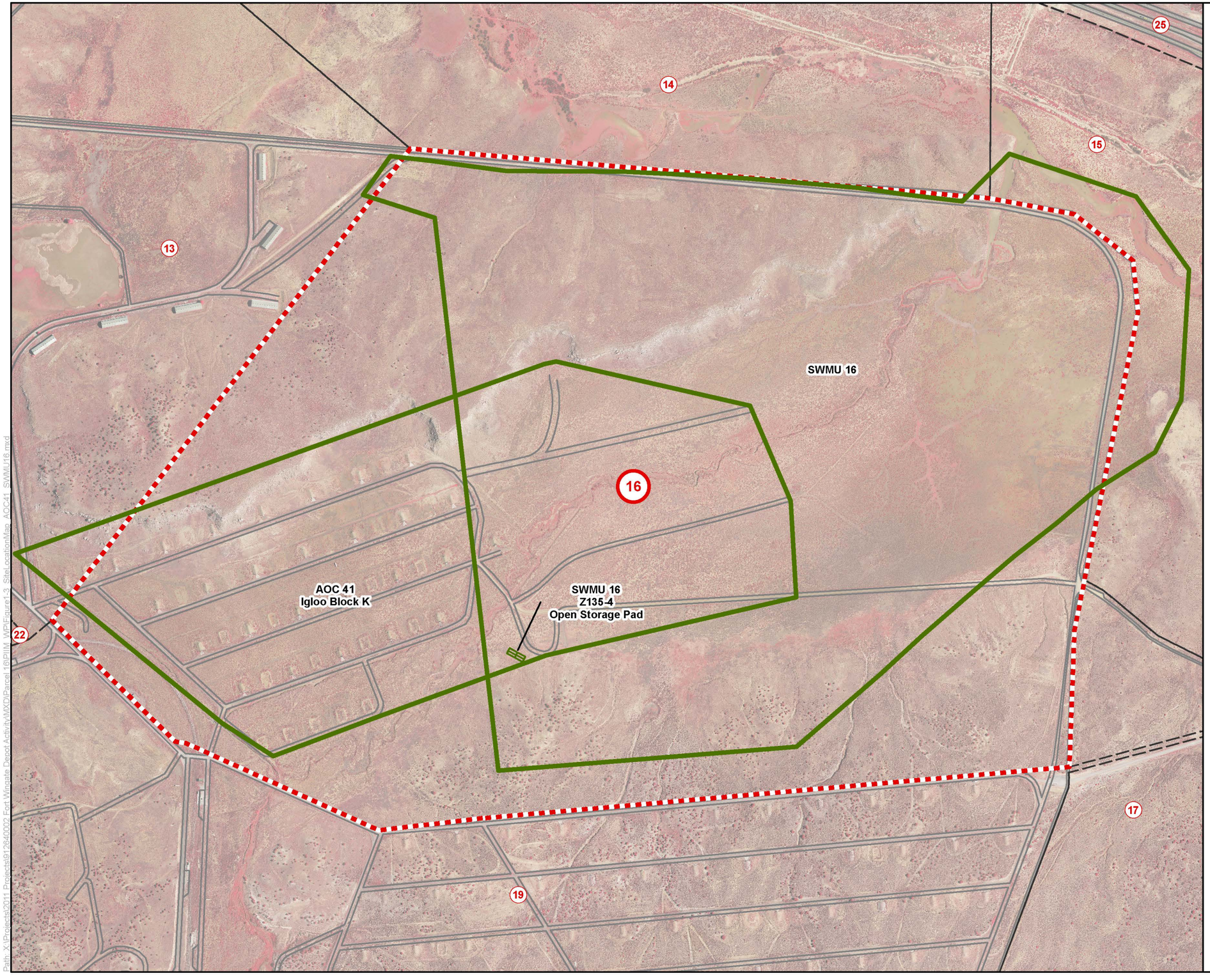

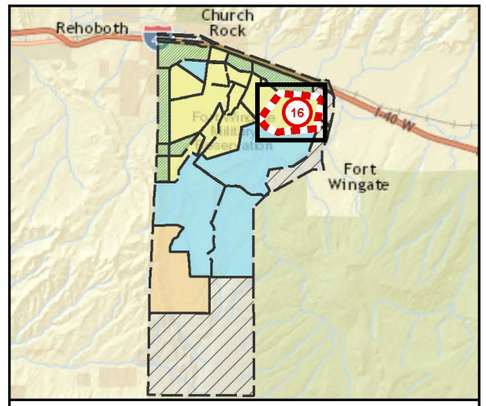

Parcel Map

Legend

- AOC/SWMU Boundary
- 16 Parcel Number
- Parcel 16 Boundary
- Parcel Boundary
- Road

Notes:

AOC Area of Concern
SWMU Solid Waste Management Unit
Aerial Image Source: 2009, CIR

0 200 400 800
Feet

N

Parcel 16 Permittee-Initiated
Interim Measures Work Plan
Fort Wingate Depot Activity
McKinley County, New Mexico

Site Location Map
AOC 41 - Igloo Block K and
SWMU 16 - Z135-4 Open Storage Pad

FIGURE		
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SECTION 2.0 CONTAMINANTS OF POTENTIAL CONCERN AND REMEDIATION GOALS

The overall goal of the efforts described in this Work Plan is to remove the soil impacted with lead and explosives to acceptable levels at Igloo Block K and Z135-4 Open Storage Pad that will be protective of a future residential land use scenario. For lead, which is evaluated separately from all other compounds, soil removal will be conducted until lead concentrations are below the NMED Residential SSL. For explosives, soil removal will be conducted until the cumulative risks or hazards posed by exposure to explosives are below the NMED Residential SSLs (or U.S. Environmental Protection Agency (EPA) Regional Screening Levels (RSLs) when an NMED SSL does not exist) and NMED target risk or hazard levels. The following sections discuss the Contaminants of Potential Concern (COPCs), a brief Conceptual Site Exposure Model (CSEM), and constituent-specific remediation goals for site activities.

2.1 Contaminants of Potential Concern & CSEM

Previous investigations as described in the 2013 Final RFI Report have provided adequate information regarding impacts to soils that have concentrations exceeding the 2012 NMED Residential SSLs or EPA RSLs for explosives (2,4-dinitrotoluene and Hexahydro-1,3,5-trinitro-1,3,5-triazine [RDX]) and lead (Toeroek, 2013). These COPCs were detected in surface soil and in subsurface soils above 10 feet below ground surface where receptors could be exposed to them through direct contact, incidental ingestion, and inhalation of dust or particulates. Based on current land use as an out-of-use military installation undergoing remediation, current receptors could include commercial/industrial workers and construction workers. The most likely future land use, as indicated in the FWDA permit, is residential and could include both adult and child receptors. The exposure assumptions that describe the residential exposure scenario are the most conservative, and therefore the most protective, of the three types of receptors addressed in the 2014 NMED Risk Assessment Guidance for Site Investigations and Remediation (NMED, 2014). Thus, the risk evaluation is based on NMED Residential SSLs and NMED cumulative risk/hazard target levels that will be protective of all receptor groups. Evaluation of ecological receptors is outside the scope of this work plan.

Samples collected for waste characterization and excavation confirmation will be analyzed using the most current recently published versions of the methods listed below. All methods are from EPA publication SW-846.

- Explosives – 8330B.
- Lead – 6010C.

Samples collected for waste characterization will be analyzed for lead in accordance with the Toxicity Characteristic Leaching Procedure (TCLP) method by EPA Method 1311/6010C to determine if the material would be considered hazardous waste. Two explosive constituents, 2,4-dinitrotoluene (DNT) and nitrobenzene, will also be analyzed using the TCLP method by EPA Method 1311/8270D or the most current recently published versions of the methods.

2.2 Remediation Goals

The remediation goals for site COPCs are listed in **Table 2-1 and 2-2**. These remediation goals will be used to confirm the limits of excavation for the activities conducted as part of this Work Plan. Soil removal will take place until remaining concentrations demonstrate that unacceptable potential cumulative risks and hazards based on a residential land use scenario are not expected to occur, except for lead which is evaluated separately from other COPCs. Soil removal associated with areas of lead impact will be conducted until lead concentrations are below the NMED SSL for lead.

Consistent with the FWDA Permit, the remediation goals are based on a residential land use scenario. Remediation goals have been developed based on the cleanup criteria presented in Attachment 7 of the FWDA Permit, which include the following:

- For all contaminants for which NMED has specified an SSL in NMED's *Technical Background Document for Development of Soil Screening Levels*, the cleanup level shall be the screening level specified in the most recent version of that document.
- The FWDA soil background for metals (with the exception of arsenic and antimony), are based on the Soil Background Study and Data Evaluation Report Version 2 (Shaw, 2010). 5.6 mg/kg will be used for arsenic in accordance with NMED's Evaluation of Background Levels for Arsenic in Soil, dated December 18, 2013. If the arsenic value of 5.6 mg/kg is exceeded, then consideration of the detected site range compared to the background range of 0.2-11.2 mg/kg is appropriate. Metals that are determined to be at or below background are eliminated from further consideration and are not considered for estimation of potential risk/hazard.
- For metals the initial comparison will be to background levels. Metals that are determined to be at or below background are eliminated from further consideration. If it is determined that background is exceeded then comparison will be made to the appropriate risk/hazard-based screening level (NMED residential SSL or EPA residential RSL, as appropriate) to estimate potential cumulative risk/hazard. Lead will be evaluated separately.
- If an NMED SSL has not been established for a hazardous waste or hazardous constituent, the Permittee shall propose for NMED approval, a cleanup level based on the most recent version of the EPA Region 6 Human Health Medium-Specific Screening Level (HHMSSL). The EPA Region 6 HHMSSLs were replaced in 2009 with the Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites, which are updated semiannually. Therefore, if NMED SSLs were not available, the remediation goal is based on the most recent version of the EPA RSL Residential Soil Table currently dated January 2015. The proposed remediation goal will be the same as the EPA RSL (i.e. based on a HI of one [1.0]) for compounds designated as "n" (noncarcinogenic effects), "nm" (RSL may exceed maximum ceiling limit concentration), "ns" (RSL may exceed soil saturation concentration) and "c**" (noncancer RSL is less than 10-fold below the cancer RSL), or ten times the EPA RSL for compounds designated "c" (carcinogenic effects) and "c*" (noncancer RSL is less than 100-fold below the cancer RSL) (i.e. a target excess cancer risk level of 10^{-5}). The hierarchy of

asterisk designations ensures the selection of the most conservative RSL between noncarcinogenic and carcinogenic health endpoints.

NMED has combined its remedial action guidance into a single document titled *Risk Assessment Guidance for Site Investigations and Remediation* (NMED, 2014). Accordingly, the remediation goals listed in **Table 2-1** are primarily based on NMED's SSLs for Residential Soil as listed in Table A-1 of the 2014 NMED Risk Assessment Guidance dated December 2014. The target levels listed in **Table 2-2** are taken from the NMED's risk guidance (NMED, 2014).

Consistent with the 2014 NMED Risk Assessment Guidance (NMED, 2014), potential risks/hazards from individual COPCs will be evaluated on a sample-by-sample basis by comparing the concentrations of detected compounds to the values provided in **Table 2-1**. Cumulative risks/hazards will be evaluated by summing the risk ratios or hazard rations of detected compounds and comparing the sums to the appropriate target level provided in **Table 2-2**, except for lead which is evaluated separately from other COPCs as discussed further in Section 3.0. Risk ratios for carcinogenic compounds will be summed separately from the hazard ratios of noncarcinogenic compounds. Cumulative risks/hazards may be evaluated on an area-wide basis (e.g. within an AOC or a SWMU), for each area of excavation, or for each sample, depending on the number of compounds detected and their locations within the AOC or SWMU. The risk evaluation approach proposed for each AOC or SWMU is discussed in more detail in Section 3.0 and Section 4.0.

Table 2-1 Summary of Soil Remediation Goals

Chemical	Endpoint	NMED SSL for Residential (mg/kg)[1]	EPA Residential RSLs (mg/kg)[2]
Explosives[3]			
1,3,5-Trinitrobenzene	n	NS	2,200
1,3-Dinitrobenzene	n	NS	6.2
2,4-Dinitrotoluene	c	17.1	------
2,6-Dinitrotoluene	n	3.56	------
2,4,6-Trinitrotoluene (TNT)	n	36.0	------
2-Amino-4,6-Dinitrotoluene	n	NS	150
2-Nitrotoluene	c	31.6	------
3-Nitrotoluene	n	6.16	------
4-Amino-2,6-Dinitrotoluene	n	NS	150
4-Nitrotoluene	n	247	------
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	c	60.4	------
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	n	156	------
Nitrobenzene	c	60.4	------
Nitroglycerin	n	6.16	------
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	n	3,850	------
Pentaerythritol Tetranitrate (PETN)	n	NS	120
Metals[4]			
Lead	IEUBK	400	------

Notes:
1 = Soil Screening Levels from NMED 2014: Risk Assessment Guidance for Site Investigations and Remediation, December 20142
= EPA Regional Screening Level Summary Table (TR=1E-6, HQ=1) January 2015; value multiplied by 10 to adjust to a 10^{-5} risk level for carcinogenic compounds, if applicable
3 = Explosives EPA Method 8330B
4 = Metals EPA Method 6010C/7471B
Samples will be analyzed using the most recently published versions of the analytical methods.
c = carcinogenic
n = noncarcinogenic
EPA = US Environmental Protection Agency
mg/kg = milligrams per kilogram
NS – Not Specified
NMED = New Mexico Environment Department

Table 2-2 Summary of Cumulative Risk Target Levels

Carcinogenic Target Level	Noncarcinogenic Target Level
1 x 10-5	1

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SECTION 3.0 DESCRIPTION OF REMOVAL ACTIVITIES AT IGLOO BLOCK K

Igloo Block K contains 27 earth-covered concrete munitions storage igloos. Previous sampling activities were conducted at Igloo Block K and COPCs, including lead and explosives, were identified in concentrations that exceeded NMED SSLs or U.S. EPA RSLs at 18 igloo drains. Seventeen samples collected from below drain outfalls in Igloo Block K exceeded the NMED SSL for lead of 400 mg/kg. The igloos with exceedances and drain locations (left or right) are as follows: K-1524L; K-1524R; K-1525L; K-1527L; K-1527R; K-1528R; K-1529L; K-1531R; K-1533L; K-1540L; K-1541L; K-1543R; K-1545L; K-1546L; K-1547L; K-1547R; and K-1549R. Sample K1540S001, collected from the left drain of Igloo K-1540L, was reported with a concentration of 510 mg/kg for 2,4-dinitrotoluene, which exceeded the NMED SSL of 15.7 mg/kg. Another sample, 1641K-1542L-SS-D-SO (duplicate), collected from under the left drain of Igloo K-1542L, was reported with a concentration of 6.9 mg/kg for RDX, which exceeded the U.S. EPA RSL 10^{-6} risk level of 6.0 mg/kg. Areas that have exceedances in Igloo Block K are depicted on **Figure 3-1**. USACE elected to perform removal action in the areas that exceeded NMED SSLs as recommended in the 2013 RFI report.

Concentrations of arsenic, 4.0 and 6.1 mg/kg, were identified at two igloos drains, K-1527R and K-1543R, respectively that exceeded the NMED SSL of 3.9 mg/kg. NMED recently conducted an assessment of arsenic background levels at FWDA (NMED, 2013). Based on the findings of the assessment, NMED determined that the background concentration for arsenic at FWDA is 5.6 mg/kg and that the range of arsenic concentrations related to background levels is between 0.2 mg/kg and 11.2 mg/kg. Therefore, the concentrations previously identified do not constitute as an exceedance and no removal will occur in these areas.

Waste profile sampling of the impacted soil of Igloo Block K will include the collection of one composite sample of the excavated soil from all igloos. The sample will be analyzed for TCLP lead by EPA Method 1311/6010C, TCLP SVOCs (2,4-dinitrotoluene and nitrobenzene only) by EPA Method 1311/8270D, and explosives using EPA Method 8330B or the most current recently published versions of the methods. The excavated soil will be stored on site in drums or a roll-off bin pending waste characterization and confirmation results.

Prior to the soil removal, all 54 steel drain pipes from the 27 igloos from Igloo Block K will be cut and removed from the igloos. In preparation for drain pipe removal, plastic sheeting will be placed below each pipe and the piping will be wrapped in tape to prevent any paint coating from being disturbed. The drain pipes at each igloo will be cut at the wall and the remaining drain holes will be sealed with a cement-based, non-shrink grout. The removed pipe sections will be recycled.

A few inches of soil will be removed from each of the 18 igloo drain outfalls, estimated to be approximately ¼ cubic yard per drain. It is anticipated that 4.5 cubic yards of soil will be excavated from Igloo Block K in the areas illustrated on **Figure 3-1**..

Following the removal of soil from under the left and/or right igloo drain pipes from Igloo Block K, one discrete confirmation sample will be collected from each removal area. The samples collected will be analyzed for lead using EPA Method 6010C or most updated version, with the exception of sample collected from Igloo K-1542, which will be analyzed for explosives using EPA Method 8330B or most current recently published version of the method. The

confirmation sample collected from the left igloo drain of Igloo K-1540 will be analyzed for explosives using EPA Method 8330B and lead using EPA Method 6010C or most updated version of the method. A total of 18 discrete samples and two (2) duplicate samples will be collected from Igloo Block K. The approximate locations of the excavation confirmation samples, along with associated sample numbers, are illustrated in **Figure 3-2**. If standards are exceeded, additional soil will be removed until the standard is met. Excavation sample identification numbers are discussed in Section 4.3 and are listed on **Table 3-1**.

The results from confirmation sampling will be used to evaluate the potential for unacceptable risks/hazards from exposure to lead and explosives. The evaluation of lead will be performed separately from the evaluation of explosives because lead has not been correlated with the typical carcinogenic or noncarcinogenic toxicity values that characterize other chemicals. Instead the SSL for lead is based on a modeled concentration in soil that results in an acceptable blood lead level protective of adverse developmental health effects as predicted by the EPA Integrated Exposure Uptake Biokinetic Model (IEUBK) model (NMED, 2014, Section 2.3.3).

The evaluation of lead will consist of a sample-by-sample comparison of confirmation sample results to the SSL. If the SSL is exceeded for lead at any location, additional soil will be removed at that location until the standard is met. Additional confirmation sample(s) will be collected following each additional round of excavation. Excavation will be considered complete for lead when all confirmation sample locations meet the SSL for lead..

The evaluation of explosives will consist of two steps: (1) comparison of the individual COPC results from each sample location to their respective SSLs, and (2) an evaluation of cumulative risks/hazards. In the first step, the concentration of each individual compound in each sample is divided by its SSL to calculate a risk ratio or a hazard ratio. At sample locations where the risk ratio or hazard ratio of one or more compounds is greater than 1 (i.e. concentration exceeds the remediation goal), additional soil will be removed until the standard is met (i.e. the risk ratio or hazard ratio is less than 1). An additional confirmation sample will be collected following each additional round of excavation.

When the risk ratio/hazard ratio for each COPC at each sample location is less than 1, the evaluation progresses to the second step, which is the evaluation of potential cumulative health risk. The cumulative risk evaluation will start with evaluation of a “worst-case” exposure that sums the potential health risks/hazards from the maximum detected concentration of each compound from all confirmation samples. As outlined in Section 5 of the 2014 NMED Risk Assessment Guidance (NMED, 2014), the sum of risk ratios for carcinogenic and hazard ratios for noncarcinogenic compounds will be calculated separately and compared to the target levels provided in **Table 2-2**. Note that the sum of risk ratios for carcinogenic compounds is multiplied by 1×10^{-5} to estimate an equivalent cancer risk for comparison with the cumulative target presented in **Table 2-2**. If cumulative noncancer hazard indices or cancer risks posed by potential “worst-case” exposure are less than the target levels, then excavation will be considered complete for explosives. If the cumulative noncancer hazard indices or cancer risks are greater than target levels, then a subsequent evaluation of the cumulative risks/hazards would be performed.

The subsequent evaluation of cumulative risk could be completed using a variety of approaches depending on the actual results from the confirmation sampling. These approaches could include one or more of the following: (1) by developing a UCL for one or more COPCs to use in calculating the individual risk ratios or hazard ratios that make up the sum in the cumulative evaluation, if sufficient detections are available and with NMED approval, (2) evaluation of cumulative risks/hazards at individual sample locations (by summing detected compounds on a sample-by-sample basis), or (3) in the case of a total hazard index greater than 1 predicted for cumulative exposure to noncarcinogenic compounds, the evaluation would segregate compounds that have similar health endpoints into separate sums to determine if a group of compounds that affect the same organ or system are contributing to unacceptable hazards. The discussion of noncarcinogenic health endpoints would also include a qualitative assessment of secondary toxic effects and critical toxic effect, where appropriate. If the subsequent evaluation indicates that cumulative noncancer hazard indices or cancer risks are less than target levels, the excavation will be considered complete. If the subsequent evaluation indicates that cumulative noncancer hazard indices or cancer risks are greater than target levels, additional soil will be removed until the standard is met. Additional confirmation samples will be collected following each round of excavation, until confirmation results demonstrate there is no unacceptable risk/hazard from individual COPCs or from exposure to multiple COPCs.

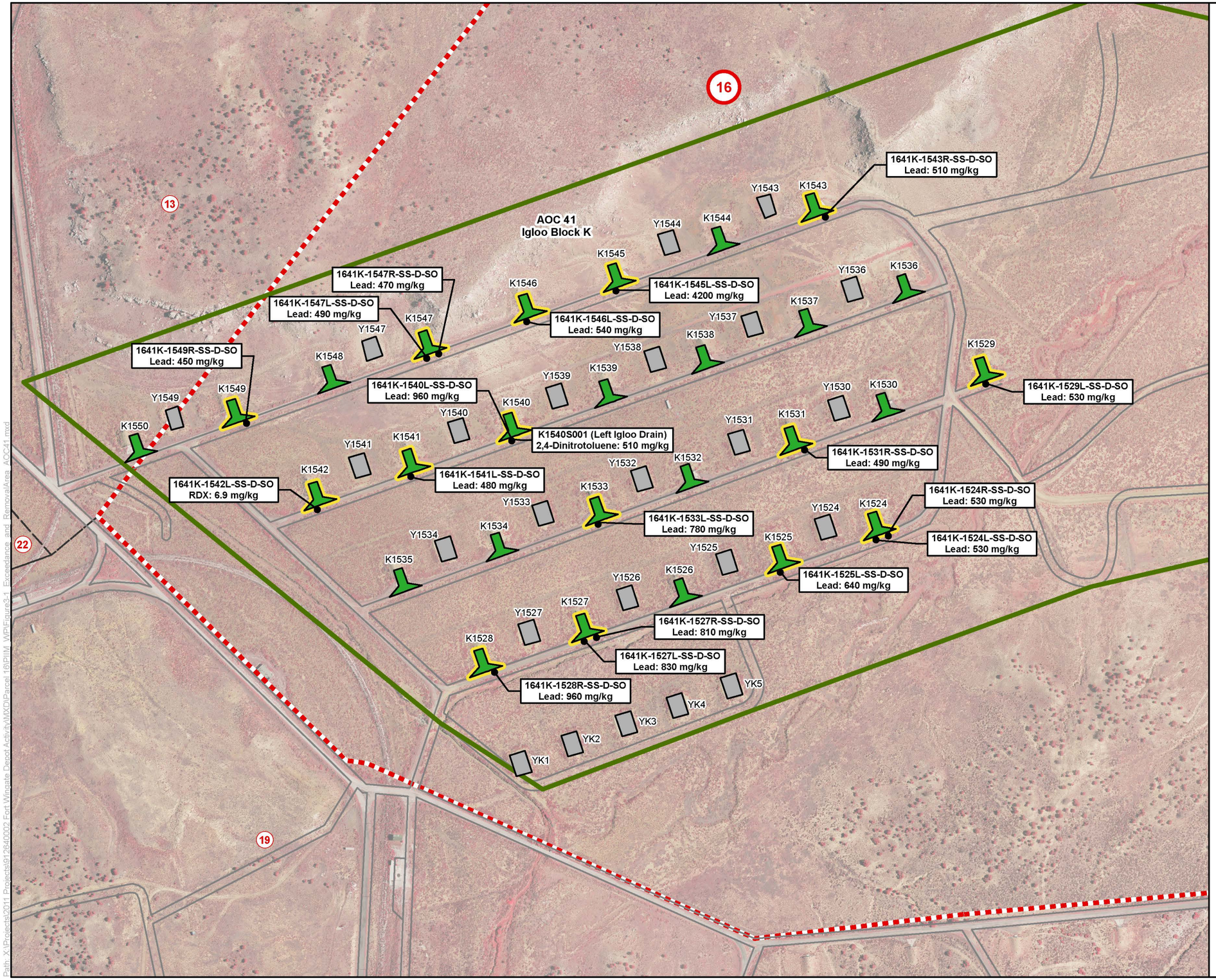
Table 3-1 Summary of Excavation Confirmation Samples to be Collected at AOC 41 - Igloo Block K

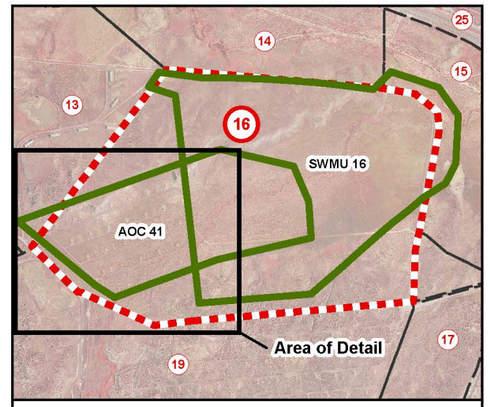
Sample Identification Number	Sample Depth (feet)	Sample Analyses
1641K-1524LEC-0.0-0.5D-SO	0 to 0.5	Lead – 6010C
1641K-1524REC-0.0-0.5D-SO	0 to 0.5	
1641K-1525LEC-0.0-0.5D-SO	0 to 0.5	
1641K-1525LEC-0.0-0.5D-DUP	0 to 0.5	
1641K-1527LEC-0.0-0.5D-SO	0 to 0.5	
1641K-1527REC-0.0-0.5D-SO	0 to 0.5	
1641K-1528REC-0.0-0.5D-SO	0 to 0.5	
1641K-1529LEC-0.0-0.5D-SO	0 to 0.5	
1641K-1531REC-0.0-0.5D-SO	0 to 0.5	
1641K-1533LEC-0.0-0.5D-SO	0 to 0.5	
1641K-1540LEC-0.0-0.5D-SO	0 to 0.5	Lead and Explosives – 6010C and 8330B
1641K-1540LEC-0.0-0.5D-DUP	0 to 0.5	Lead and Explosives – 6010C and 8330B
1641K-1541LEC-0.0-0.5D-SO	0 to 0.5	Lead – 6010C
1641K-1542LEC-0.0-0.5D-SO	0 to 0.5	Explosives –8330B
1641K-1543REC-0.0-0.5D-SO	0 to 0.5	Lead – 6010C
1641K-1545LEC-0.0-0.5D-SO	0 to 0.5	
1641K-1546LEC-0.0-0.5D-SO	0 to 0.5	
1641K-1547LEC-0.0-0.5D-SO	0 to 0.5	
1641K-1547REC-0.0-0.5D-SO	0 to 0.5	
1641K-1549REC-0.0-0.5D-SO	0 to 0.5	

Notes:
Samples will be analyzed using the most recently published versions of the analytical methods

Sample Nomenclature
1641K-1524LEC-0.0-0.5D-SO
Parcel: 16
AOC: 41
Additional Site Identifier: K-1524 (in this case it's Igloo Block K number 1524)
Source of Sample: L (left side of igloo)
Purpose of Sample: EC (excavation confirmation)
Sample Depth: Depth of samples will be designated with a 4-digit number, the first 2 digits starting depth, second 2 digits bottom depth (in this case 0.0 to 0.5 feet)
Sample Type: D (discrete)
Sample Matrix: SO (soil) or Duplicate (DUP) (in this case soil)

Refer to **Figure 3-2** Confirmation Sample Location Map. AOC 41 (Igloo Block K)





Parcel 16 Detail

Legend

- Soil Under Igloo Drain with Concentrations that Exceed NMED SSL or EPA RSL Criteria as Listed:
  - Lead - 400 mg/kg
  - 2,4-Dinitrotoluene - 15.7 mg/kg
  - RDX - 6.0 mg/kg
  - 1/4 Cubic Yards of Soil Will Be Removed From Under Each Igloo Drain
- Igloo with NMED SSL EPA RSL Exceedance
- Igloo Location
- Revetment Location
- AOC / SWMU Boundary
- 16 Parcel Number
- Parcel 16 Boundary
- Parcel Boundary
- Road

Notes:

AOC	Area of Concern
EPA	Environmental Protection Agency
mg/kg	milligrams per kilogram
NMED	New Mexico Environment Department
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine
RSL	Regional Screening Level
SSL	Soil Screening Levels
SWMU	Solid Waste Management Unit

Sample Identification Explanation:

16	41	K-1524L	SS	D	SO
Parcel #	AOC #	Additional Site Identifier	Source of Sample	Sample Type	Sample Matrix

Aerial Image Source: 2009, CIR

0 100 200 400

Feet

N

Parcel 16 Permittee-Initiated
Interim Measures Work Plan
Fort Wingate Depot Activity
McKinley County, New Mexico

Exceedance and Removal Area Map
AOC 41 - Igloo Block K

FIGURE **3-1**

Job No.:	912640002
PM:	JH
Date:	1/27/2015
Scale:	1" = 400'

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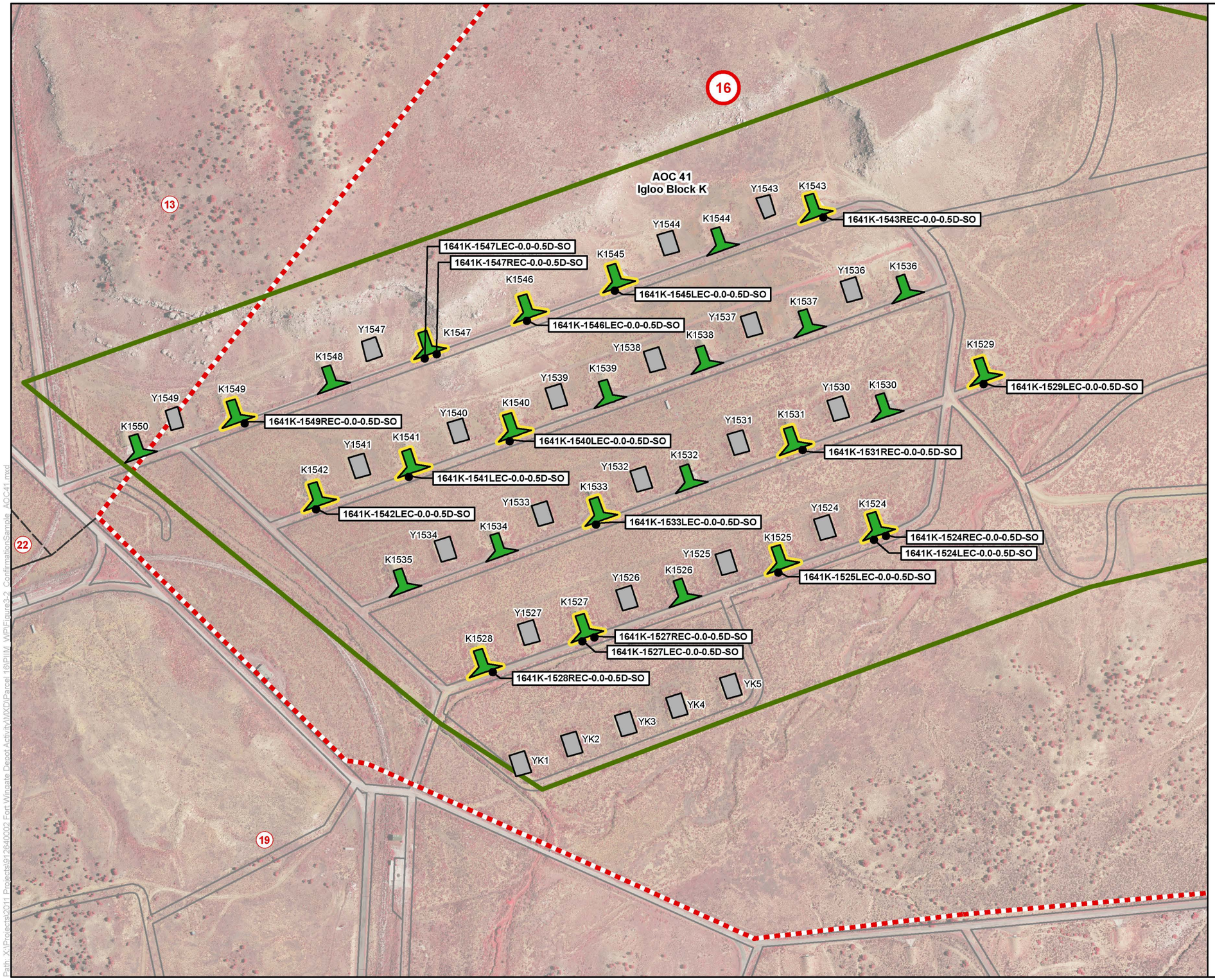
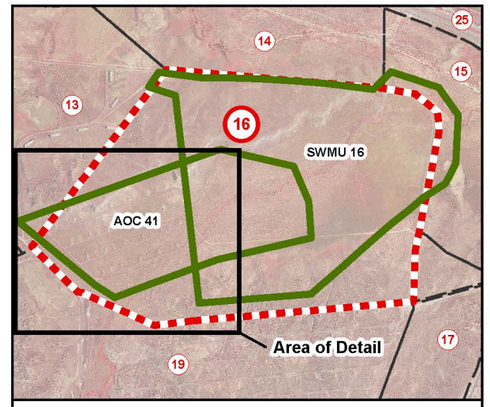




Parcel 16 Detail

Legend

- Proposed Location of Discrete Excavation Confirmation Sample
- Igloo with NMED SSL or EPA RSL Exceedance
- Igloo Location
- Revetment Location
- AOC / SWMU Boundary
- Road
- 16 Parcel Number
- Parcel 16 Boundary
- Parcel Boundary

Notes:

AOC	Area of Concern
EPA	Environmental Protection Agency
NMED	New Mexico Environment Department
RSL	Regional Screening Level
SSL	Soil Screening Levels
SWMU	Solid Waste Management Unit

Sample Identification Explanation:

16	41	K-1524	L	EC	0.0-0.5	D	SO
Parcel #	AOC #	Additional Site Identifier	Source of Sample	Purpose of Sample	Sample Depth	Sample Type	Sample Matrix

Aerial Image Source: 2009, CIR

0 100 200 400 Feet

N

Parcel 16 Permittee-Initiated
Interim Measures Work Plan
Fort Wingate Depot Activity
McKinley County, New Mexico

Excavation Confirmation Sample Location Map
AOC 41 - Igloo Block K

FIGURE **3-2**

Job No.:	912640002
PM:	JH
Date:	1/27/2015
Scale:	1" = 400'

amec foster wheeler

Path: X:\Projects\2011 Projects\912640002 Fort Wingate Depot Activity\MXD\Parcel16RIIM_WP\Figure3-2_ConfirmationSample_AOC41.mxd

SECTION 4.0 DESCRIPTION OF REMOVAL ACTIVITIES AT Z135-4 OPEN STORAGE PAD

Open Storage Pad Z135-4 was used as an outside storage area for munitions and materials handling. Previous soil sampling activities were conducted at Z135-4 Open Storage Pad that included subdividing the pad into four 50 by 150-foot areas: Z135-1; Z135-2; Z135-3; and Z135-4. An explosive constituent, 2,4,6-trinitrotoluene (TNT), was detected at 720 mg/kg in one *MULTI INCREMENT*®[1] sample,1616-Z-135-4B-SS-M-SO, collected at open storage area Z135-4 at the depth of 6 to 12 inches. This concentration exceeded the NMED SSL for 2,4,6-TNT of 39.1 mg/kg. No exceedances were detected in areas Z135-1, Z135-2, or Z135-3. The exceedance area at Z135-4 Open Storage Pad is depicted on **Figure 4-1**.

The 2013 RFI Report recommended additional characterization activities within Z135-4 quadrant of the Open Storage Pad consisting of subdividing area Z135-4 into four areas (Z135-4B1, Z135-4B2, Z135-4B3, and Z135-4B4), collecting composite samples from each grid, and collecting discrete samples outside the perimeter of Z135-4. USACE has elected to perform removal action of Z135-4 Open Storage Pad instead of performing additional characterization activities.

4.1 Waste Profile Sampling

Waste profile sampling of the impacted soil of Z135-4 Open Storage Pad will include the collection of one composite sample of the excavated soil from all removal areas. The excavated soil will be stockpiled on plastic sheeting pending waste characterization and confirmation results.

The landfill disposal facility, Waste Management's San Juan Regional Landfill in Aztec, New Mexico, requires profile samples for each 1,000 cubic yards of waste. It is anticipated that less than 1,000 cubic yards of soil will be excavated from Z135-4 Open Storage Pad for landfill disposal. Therefore, one waste profile sample is planned to be collected for analysis.

Waste profile sample identification numbers are discussed in Section 5.3 and are listed on **Table 4-1**. Samples will be submitted for analysis for explosives using EPA Method 8330B. Sample analytical data will be evaluated and provided to the disposal facility and a waste profile will be established prior to mobilizing for excavation, transportation, and disposal operations.

4.2 Excavation, Transportation, and Disposal

The goal of the work under this Work Plan is to remove all impacted soils to at the Z135-4 Open Storage Pad to levels that demonstrate that unacceptable potential cumulative risks and hazards based on a residential land use scenario are not expected to occur. It is anticipated that less than 1,000 cubic yards of soil will be removed at Z135-4 Open Storage Pad within Parcel 16. The removal area will be divided into four sections: Z135-4B1; Z135-4B2; Z135-4B3; and Z135-4B4. **Figure 4-2** illustrates the location of removal area at Z135-4 Open Storage Pad.

[1] MULTI INCREMENT ® is a registered trademark of EnviroStat, Inc.

Removed soil is anticipated to be transported and disposed as solid waste at Waste Management's San Juan Regional Landfill in Aztec, New Mexico, following waste profile acceptance. If hazardous waste is identified during the initial waste profile sampling, the proposed approach for remediation will be re-evaluated and the Work Plan will be modified accordingly.

All excavations and traffic areas will be watered throughout the duration of the project to minimize dust generation. Additional anticipated equipment on site will include a 2,000 or 4,000-gallon water truck and two service trucks equipped with portable fuel tanks (100 gallons or less) and tools. An office trailer and portable toilet facilities will also be provided and maintained through the duration of the project.

All waste will be transported in properly labeled vehicles permitted by New Mexico Department of Transportation and disposed in accordance with all Federal, State and local regulations. Each manifest will be signed by an approved representative of the Army as the generator. Copies of waste manifests, landfill weigh tickets, and metal recycling documentation will be maintained by the Army to document recycling and disposal activities, and will be included in the final report.

Confirmation samples will be collected at the removal area and analyzed for explosives to ensure concentrations are below NMED standards. If standards are exceeded, additional soil will be removed until the remediation goals established in Section 2.2 have been met.

4.3 Confirmation Sampling and Risk Evaluation

Following the removal of all impacted soil from Z135-4 Open Storage Pad, confirmation sampling will be conducted on the floor and sidewalls of the excavation. The confirmation samples will be analyzed for explosives using EPA Method 8330B. Discrete samples will be collected from the excavation area bottom of Z135-4 Open Storage Pad, which will be divided into four sections: Z135-4B1; Z135-4B2; Z135-4B3; and Z135-4B4. One discrete sample will be collected from each section of the excavation grid for a total of four samples and one duplicate sample. One nine-part composite sample will be collected every 50 feet along the entire perimeter of the removal area. A total of eight composite samples and one duplicate sample will be collected. In addition, per the recommendations in the 2013 RFI Report to further characterize the area, six discrete samples will be collected from the perimeter of the removal area, 10 feet from the northwest and southwest boundaries of the removal area. **Figure 4-3** depicts the excavation confirmation sample locations at Z135-4 Open Storage Pad.

Sample numbering will follow the protocol described in Section 5.3. Sample identification numbers for excavation confirmation samples collected at Z135-4 Open Storage Pad are listed on **Table 4-2.**

Analytical data will be compared to the remediation goals established in Section 2.2. The evaluation of potential risks/hazards from exposure to explosives will based on the confirmation sample results and will consist of two steps: (1) comparison of the individual results from each sample location to their respective SSL, and (2) an evaluation of cumulative risk.

In the first step, the concentration of each individual compound in each sample is divided by its SSL to calculate a risk ratio or hazard ratio. At sample locations where the risk ratio or hazard ratio of one or more compounds is greater than 1 (i.e. concentration exceeds the SSL), additional soil will be removed until the standard is met (i.e. the risk ratio/hazard ratio is less than 1 because the concentration is less than the SSL). Additional confirmation sample(s) will be collected following each additional round of excavation.

When the risk ratio for each COPC at each sample location is less than 1, the evaluation progresses to the second step, which is the evaluation of potential cumulative health risk/hazard. The cumulative risk/hazard evaluation will start with evaluation of a "worst-case" exposure that sums the potential health risks/hazards from the maximum detected concentration of each compound from all confirmation samples. As outlined in Section 5 of the 2014 NMED Risk Assessment Guidance (NMED, 2014), the sum of risk ratios for carcinogenic and hazard ratios for noncarcinogenic compounds will be calculated separately and compared to the target levels provided in **Table 2-2**. Note that the sum of risk ratios for carcinogenic compounds is multiplied by $1x10^{-5}$ to estimate an equivalent cancer risk for comparison with the cumulative target presented in **Table 2-2**. If cumulative noncancer hazard indices or cancer risks posed by potential "worst-case" exposure are less than the target levels, then excavation will be considered complete for explosives. If the cumulative noncancer hazard indices and cancer risks are greater than target levels, then a subsequent evaluation of the cumulative risk would be performed.

The subsequent evaluation of cumulative risk could be completed using a variety of approaches depending on the actual results from the confirmation samples. These approaches could include one or more of the following: (1) by developing an Upper Confidence Limit (UCL) for one or more COPCs to use in calculating the individual risk ratios/hazard ratios that make up the sum in the cumulative evaluation, if sufficient detections are available and with NMED approval, (2) evaluation of cumulative risks/hazards at individual sample locations (by summing detected compounds on a sample-by-sample basis), or (3) in the case of a total hazard index greater than 1 predicted for cumulative exposure to noncarcinogenic compounds, the evaluation would segregate compounds that have similar health endpoints into separate sums to determine if a group of compounds that affect the same organ or system are contributing to unacceptable hazards. The discussion of noncarcinogenic health endpoints would also include a qualitative assessment of secondary toxic effects and critical toxic effect, where appropriate. In cases where the subsequent evaluation indicates that cumulative noncancer hazard indices or cancer risks are less than target levels, the excavation will be considered complete. In cases where the subsequent evaluation indicates that cumulative noncancer hazard indices or cancer risks are greater than target levels, additional soil will be removed until the standard is met. Note that if cumulative risks/or hazards are identified for the composite sample taken from the excavation floor, then additional excavation would be conducted over the entire floor area represented by the composite sample unless additional discrete sampling was performed to allow targeted excavation of just a portion of the floor. Additional confirmation sampling will be conducted following each additional round of excavation until confirmation results demonstrate there is no unacceptable risk from individual COPCs or from exposure to multiple COPCs.

Confirmation sample analysis results and risk evaluation tables will be compiled and emailed to NMED in a short letter report. Verbal concurrence from NMED that all remediation goals have been met will be obtained prior to initiating backfill operations.

4.4 Waste Volume Determination

Pre and post surveys of the removal area from Z135-4 Open Storage Pad will be performed to determine waste removal volumes. The surveys will be performed under the supervision of a professional surveyor, licensed in the State of New Mexico.

4.5 Backfill, Compaction, and Final Grading

Following the completion of excavation operations as verified by confirmation sampling, the excavated areas at SWMU 8 will be backfilled to grade using imported fill material. The backfill material will be obtained from the same approved borrow area that was used for the backfill of the Eastern Landfill in Parcel 18. Samples were collected from the borrow area and results indicated that material would be suitable for use as backfill (AMEC, 2014).

Water will be added during excavation and loading operations to reduce dust generation and to achieve optimum moisture content requirements. Following the completion of borrow material excavation, the borrow area will be graded to blend with the surrounding topography in order to promote proper drainage, minimize erosion, and prevent ponding of surface water.

Fill material will be placed in the excavation and compacted using wheeled rolling from on-site equipment. No density testing is required. The final grade at Z135-4 Open Storage Pad will be sloped to promote proper storm water drainage and to prevent ponding if minor settling occurs.

Table 4-1 Summary of Waste Profile Samples to be Collected at SWMU 16 - Z135-4 Open Storage Area

Sample Identification Number	Sample Depth (feet)	Sample Analyses
1616Z135-4WP-0.0-0.5C-SO	0.0 to 0.5	Explosives - 8330B

Notes:
Samples will be analyzed using the most recently published versions of the analytical methods.

Sample Nomenclature
1616Z135-4WP-0.0-0.5C-SO
Parcel: 16
SWMU: 16
Additional Site Identifier: Z135-4 (in this case it's Z135-4 Open Storage Area)
Purpose of Sample: WP (Waste Profile)
Sample Depth: Depth of samples will be designated with a 4-digit number, the first 2 digits starting depth, second 2 digits bottom depth (in this case 0.0 to 0.5 feet)
Sample Type: C (composite)
Sample Matrix: SO (soil)

Table 4-2 Summary of Excavation Confirmation Samples to be Collected at SWMU 16 -Z135-4 Open Storage Pad

Sample Identification Number	Sample Location	Sample Analyses
1616Z135-4B1EC01-0.0-0.5D-SO	4B1 Excavation Bottom	Explosives - 8330B
1616Z135-4B2EC01-0.0-0.5D-SO	4B2 Excavation Bottom	
1616Z135-4B3EC01-0.0-0.5D-SO	4B3 Excavation Bottom	
1616Z135-4B4EC01-0.0-0.5D-SO	4B4 Excavation Bottom	
1616Z135-4B4EC01-0.0-0.5C-DUP	4B4 Excavation Bottom	
1616Z135-4EC-01C-SO	Excavation Sidewall	
1616Z135-4EC-02C-SO	Excavation Sidewall	
1616Z135-4EC-03C-SO	Excavation Sidewall	
1616Z135-4EC-04C-SO	Excavation Sidewall	
1616Z135-4EC-05C-SO	Excavation Sidewall	
1616Z135-4EC-05C-DUP	Excavation Sidewall	
1616Z135-4EC-06C-SO	Excavation Sidewall	
1616Z135-4EC-07C-SO	Excavation Sidewall	
1616Z135-4EC-08C-SO	Excavation Sidewall	
1616Z135-4B1EC02-0.0-0.5D-SO	4B1 NW Perimeter	
1616Z135-4B3EC02-0.0-0.5D-SO	4B3 SW Perimeter	
1616Z135-4B3EC03-0.0-0.5D-SO	4B3 SW Perimeter	
1616Z135-4B4EC02-0.0-0.5D-SO	4B4 NW Perimeter	
1616Z135-4B4EC03-0.0-0.5D-SO	4B4 SW Perimeter	
1616Z135-4B4EC04-0.0-0.5D-SO	4B4 SW Perimeter	

Notes:
Samples will be analyzed using the most recently published versions of the analytical methods

Sample Nomenclature
1616Z135-4B1EC01-0.0-0.5D-SO
Parcel: 16
AOC: 16
Additional Site Identifier: Z135-4 (in this case it's Z135-4 Open Storage Pad)
Source of Sample: B1 (in this case it's Z135-4 Open Storage Pad Area B1)
Purpose of Sample: EC (excavation confirmation)
Sample Increment Number: 01 (variable number of digits for subsample (in this case subsample 01)
Sample Depth: Depth of samples will be designated with a 4-digit number, the first 2 digits starting depth, second 2 digits bottom depth (in this case 0.0 to 0.5 feet)
Sample Type: C (composite) or D (discrete) (in this case it's composite)
Sample Matrix: SO (soil) or Duplicate (DUP)

1616Z135-4EC-01C-SO
Parcel: 16
AOC: 16
Additional Site Identifier: Z135-4 (in this case it's Z135-4 Open Storage Pad)
Purpose of Sample: EC (excavation confirmation)
Sample Increment Number: 01 (variable number of digits for subsample (in this case subsample 01)
Sample Type: C (composite) or D (discrete) (in this case it's discrete)
Sample Matrix: SO (soil) or Duplicate (DUP)

Refer to **Figure 4-3**. Excavation Confirmation Sample Location Map. SWMU 16 (Z135-4 Open Storage Pad)

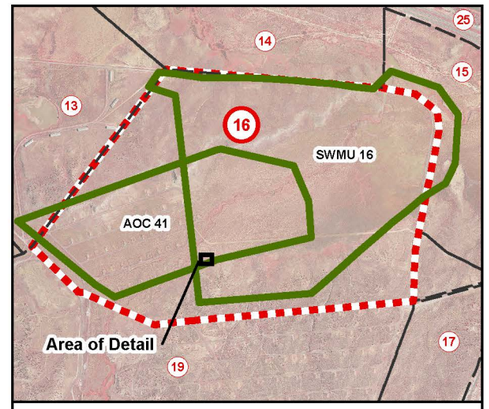
Z135-1

Z135-4

Z135-2

Z135-3

1616-Z135-4B-SS-M-SO
Depth: 6-12 inches
2,4,6 Trinitrotoluene: 720 mg/kg



Parcel 16 Detail

Legend

Previous Grid (50 feet x 150 feet) MI Sample with Concentrations that Exceed NMED SSL Criteria as Listed:
2,4,6-Trinitrotoluene - 39.1 mg/kg

Previously Sampled Grid
(50 feet x 150 feet) of Z135 Open Storage Pad

Notes:

AOC	Area of Concern
mg/kg	Milligram per Kilogram
MI	MULTI INCREMENT®
NMED	New Mexico Environment Department
SSL	Soil Screening Levels
SWMU	Solid Waste Management Unit

Sample Identification Explanation:

16	16	Z135-4B	SS	M	SO
Parcel #	SWMU #	Additional Site Identifier	Source of Sample	Sample Type	Sample Matrix

Aerial Image Source: 2009, CIR

0 10 20
Feet

N

Parcel 16 Permittee-Initiated
Interim Measures Work Plan
Fort Wingate Depot Activity
McKinley County, New Mexico

Exceedance Area Map
SWMU 16 - Z135-4
Open Storage Pad

FIGURE
4-1

Job No.:	912640002
PM:	JH
Date:	1/28/2015
Scale:	1" = 20'

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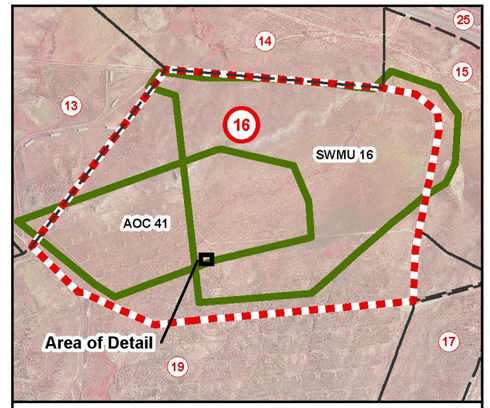


Parcel 16 Detail

Legend

- Removal Area (50 feet x 150 feet x 18 inches)
- Z135-4 Boundary and Sample Grid (25 feet x 75 feet)
- Previously Sampled Grid (50 feet x 150 feet) of Z135 Open Storage Pad

Notes:

AOC Area of Concern
SWMU Solid Waste Management Unit
Aerial Image Source: 2009, CIR

0 10 20
Feet

N

Parcel 16 Permittee-Initiated
Interim Measures Work Plan
Fort Wingate Depot Activity
McKinley County, New Mexico

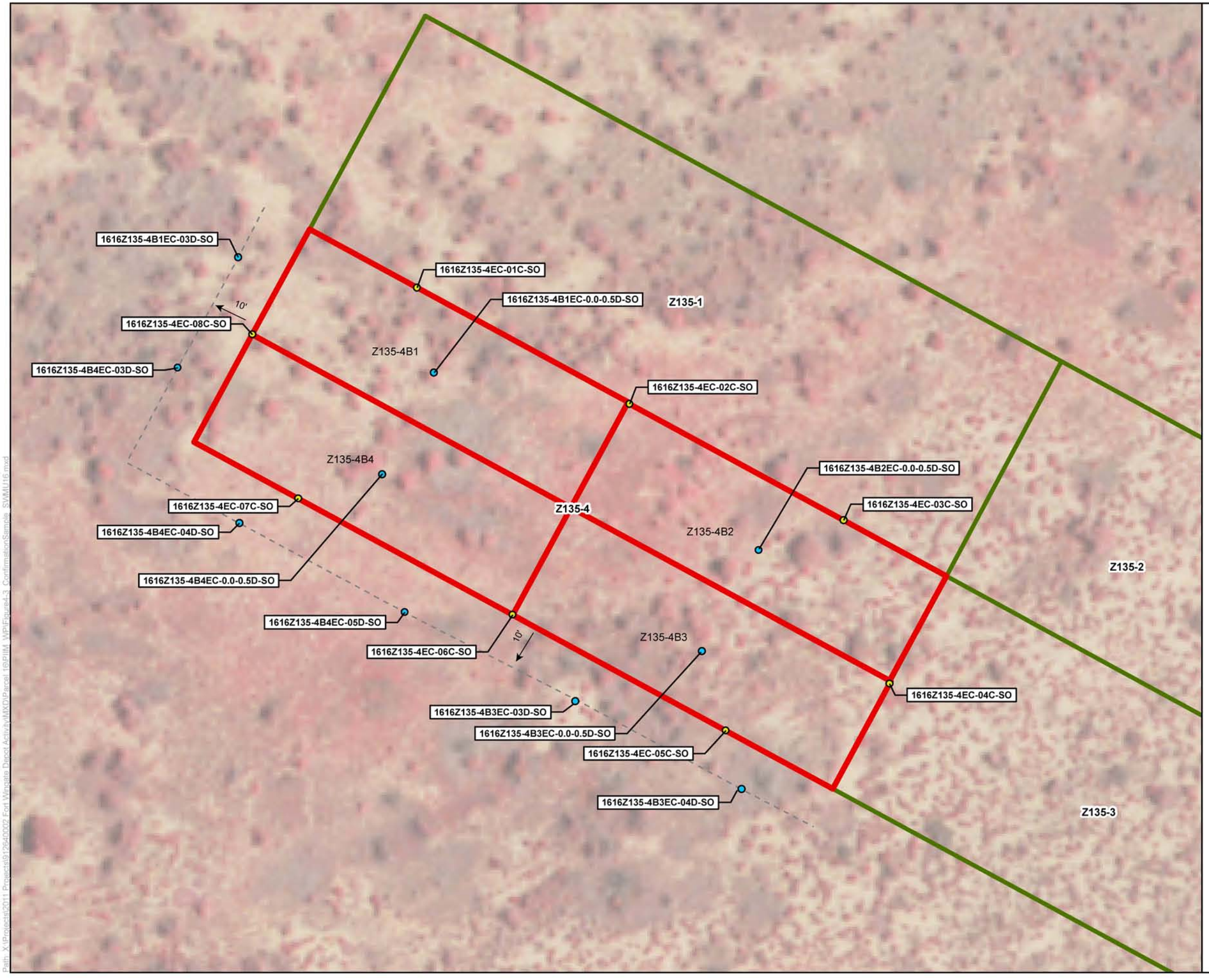
Removal Action Map
SWMU 16 - Z135-4
Open Storage Pad

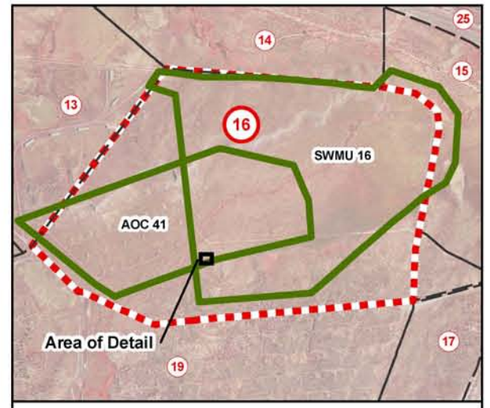
FIGURE **4-2**

Job No.:	912640002
PM:	JH
Date:	1/27/2015
Scale:	1" = 20'

amec foster wheeler

Path: K:\Projects\2011 Projects\912640002 Fort Wingate Depot Activity\MXD\Parcel 16\RIM_WP\Figure4-2_RemovalActionMap_SWMU16.mxd





Parcel 16 Detail

Legend

- Proposed Location of Discrete Excavation Confirmation Sample (Perimeter Sample; Depth 0.0-0.5 feet)
- Proposed Location of Nine-Part Composite Sidewall Excavation Confirmation Sample
- 10-foot Perimeter
- Z135-4 Boundary and Sample Grid (25 feet x 75 feet)
- Previously Sampled Grid (50 feet x 150 feet) of Z135 Open Storage Pad

Notes:

AOC Area of Concern
SWMU Solid Waste Management Unit

Sample Identification Explanation:

16	16	Z135-4	EC	01	C	SO
Parcel #	SWMU #	Additional Site Identifier	Purpose of Sample	Increment #	Sample Type	Sample Matrix

16	16	Z135-4	B1	EC	01	0.0-0.5	D	SO
Parcel #	SWMU #	Additional Site Identifier	Source of Sample	Purpose of Sample	Increment #	Sample Depth	Sample Type	Sample Matrix

Aerial Image Source: 2009, CIR

0 10 20
Feet

N

Parcel 16 Permittee-Initiated
Interim Measures Work Plan
Fort Wingate Depot Activity
McKinley County, New Mexico

Excavation Confirmation Sample Location Map
SWMU 16 - Z135-4
Open Storage Pad

FIGURE		
4-3	Job No.:	912640002
	PM:	JH
	Date:	4/16/2015
	Scale:	1" = 20'

amec foster wheeler

SECTION 5.0 SAMPLING AND ANALYSIS

This section provides general information regarding the methods that will be employed for various sampling activities to be completed during site activities. Sampling will be conducted for waste profiling and excavation confirmation purposes. A summary of analytical methods, sample containers, preservatives, and holding times is provided in **Table 5-1**. Details regarding waste profile and excavation confirmation sampling are provided in Section 5.3.

The following subsections provide details regarding sample collection and management, quality assurance (QA) and quality control (QC), surveying of sample locations, decontamination of non-disposable sampling equipment, and investigation-derived waste (IDW) management. All soil samples will be collected as composite or discrete samples directly from working surfaces or by using a backhoe bucket to collect soil and retrieving sample aliquots from the soil within the bucket.

5.1 Collection of Samples

Samples collected for lead and explosive analysis 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 6 degrees centigrade (ºC). Lids will be sealed by labels or custody seals to prevent tampering.

5.2 Quality Control

In order to attain data of sufficient quality to support project objectives, specific procedures are required to allow evaluation of data quality. These procedures and requirements for their evaluation are described in this section.

5.2.1 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 5-2** summarizes the planned QC samples for this project. A description of each QC sample type is provided in the following sections.

5.2.1.1 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 reporting limit, corrective action must be performed 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.

Laboratory Control Sample

The Laboratory Control Sample (LCS) will consist of an 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. 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 MSs 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 five percent (5%). MS/MSDs are required in every analytical batch regardless of the rate of collection and how samples are received at the laboratory.

5.2.1.2 Quality Control Analyses Originated by the Field Team

Field QC samples will be collected to determine the accuracy and precision of the analytical results. 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 reporting limit. Equipment blanks will be collected at a frequency of approximately five percent (5%) based on the professional judgment of the field team leader and conditions as presented in the field and only when non-disposable sampling equipment is used. 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 from a single aliquot of the sample to determine the precision and accuracy of the field team's sampling procedures. Field duplicates will be collected and analyzed at a frequency of 10 percent (10%).

5.2.2 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:

$$\%RPD = \{(S - D)/[(S + D)/2]\} \times 100$$

where:

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

The precision criteria for the duplicate samples will be ±50 percent in soil 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 for compliance with the established QC criteria and the analytical SOPs. The percent recovery (%R) of LCSs will be calculated using the equation:

$$\%R = (A/B) \times 100$$

where:

A = the analyte concentration determined experimentally from the LCS
B = the known amount of concentration in the sample

Completeness

The data completeness of laboratory analyses 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:

$$\%\text{Completeness} = [(\text{complete data obtained})/(\text{total data planned})] \times 100$$

The percent completeness goal for this sampling event is 90 percent per 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. Therefore, representativeness is a redundant objective for laboratory systems if sample COCs 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 is a redundant QC objective for laboratory systems 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 level of interest. Appropriate sampling and analytical methods were selected that have QC acceptance limits that support the achievement of established performance criteria. Assessment of analytical sensitivity will require thorough data validation. A comparison of the soil remediation goals to laboratory reporting limits is provided in **Table 5-3**.

5.2.3 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 validation. Data validation will be performed when the data packages are received from the laboratory. 90% of the data from field samples will undergo stage 2bdata validation and the remaining 10% will undergo stage 4data validation. The following items will be addressed in the data validation report:

- A review of the data set narrative to identify any issues that the lab reported in the data deliverable.
- A check of sample integrity (sample collection, preservation, and holding times).
- An evaluation of basic QC measurements used to assess the accuracy, precision and representativeness of data, including QC blanks, LCSs, MS/MSDs, surrogate recovery when applicable, and field or laboratory duplicate results.
- A review of sample results, target compound lists, and detection limits to verify that project analytical requirements are met.
- Initiation of corrective actions, as necessary, based on the data review findings.
- Qualification of the data using appropriate qualifier flags, as necessary, to reflect data usability limitations.
- Qualifier flags, if required, will be applied to the electronic sample results. If multiple flags are required for a result, the most severe flag will be applied to the electronic result. The hierarchy of flags from the most severe to the least severe will be as follows: R, NJ, UJ, U, and J. The qualifier flags are defined in **Table 5-4**.
- Any significant data quality problems will be brought to the attention of the project chemist.

5.2.4 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.

5.3 Sample Identification

Each sample identification (ID) will consist of a combination of the Parcel number, AOC or SWMU number, additional site identifier, source of sample, increment 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 are example sample numbers and a description of the sample identifiers to be used during implementation of this work plan.

Example Waste Profile Sample ID:

1616Z135-4WP-0.0-0.5C-SO
Parcel: 16
SWMU: 16
Additional Site Identifier: Z135-4 (in this case it's Z135-4 Open Storage Area)
Purpose of Sample: WP (Waste Profile)
Sample Depth: Depth of samples will be designated with a 4-digit number, the first 2 digits starting depth, second 2 digits bottom depth (in this case 0.0 to 0.5 feet)
Sample Type: C (composite)
Sample Matrix: SO (soil)

Example Excavation Confirmation Sample ID:

1641K-1524LEC-0.0-0.5D-SO
Parcel: 16
AOC: 41
Additional Site Identifier: K-1524 (in this case it's Igloo Block B number 1524)
Source of Sample: L (left side of igloo)
Purpose of Sample: EC (excavation confirmation)
Sample Depth: Depth of samples will be designated with a 4-digit number, the first 2 digits starting depth, second 2 digits bottom depth (in this case 0.0 to 0.5 feet)
Sample Type: D (discrete)
Sample Matrix: SO (soil)

For QA/QC samples, the sample matrix portion of the ID will be changed. Acceptable QA/QC sample matrices are EB for equipment blank/rinsate, DUP for duplicate samples, and MSMSD for MS/MSD. The sample ID may also be shortened if it is not associated with a specific soil sample (e.g., equipment blanks).

Example Duplicate of Excavation Confirmation Sample:

0628B-1001LEC-0.0-0.5D-DUP

5.4 Chain-of-Custody

COC forms will be completed and will accompany each sample at all times. Data on the COC will include the sample ID (as described in Section 5.3), depth interval, date sampled, time sampled, project name, project number, and signatures of those in possession of the sample. 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 5.6.

5.5 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 rinsates).

Corresponding COC forms will be placed in waterproof bags and taped to the inside of the cooler lids. All coolers will be taped shut and a custody seal will be placed over the tape to prevent tampering.

5.6 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. He or she will then date and sign each reviewed page.

5.7 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.

5.8 Survey of Sample Locations

The location of each sample collected, including waste profile and confirmation samples, will be surveyed using appropriate instrumentation and procedures to obtain horizontal accuracy of less than 0.1 feet. A Trimble Total Station Global Positioning System (GPS), Trimble Static GPS, or equivalent, will be utilized to collect the soil sample locations. A North American Datum 1983 Northing and Easting in U.S. Survey Feet will be established for all surveyed points and recorded in the field notebook. Survey data will be supplied in the Final Report in NM State Plane and Universal Transverse Mercator coordinates.

5.9 Decontamination Procedures

Decontamination of reusable sampling equipment, if used, and personnel will be performed to ensure chemical analyses reflect actual concentrations at sampling locations by maintaining the

quality of samples and preventing cross-contamination. The standard equipment decontamination procedures to be used during completion of soil sampling activities are as follows:

- Hand augers and reusable drive samplers are not expected to come into direct contact with soil samples recovered for laboratory analysis. However, the equipment will be decontaminated between boreholes.
- A simple decontamination wash pad shall be constructed using plastic sheeting which is rolled up at the ends (typically with lumber) to contain water. The pad shall be large enough to hold multiple 5-gallon buckets and equipment that requires decontamination and to provide ample working area within the pad (roughly 8 feet by 8 feet).
- Sampling equipment will be washed using a bristle brush in potable water to which alconox or liquinox laboratory detergent has been added. All items will then be thoroughly rinsed with potable water and allowed to air dry.
- Decontamination should be performed on the plastic sheeting of the temporary decontamination pad. Accumulated wash and rinse water will be left within the decontamination pad and allowed to evaporate.
- Once all decontamination water is evaporated, the plastic sheeting and associated pad materials shall be disposed of at an approved facility.
- After field cleaning, equipment will be handled only by personnel wearing clean gloves to prevent re-contamination. The equipment will be moved away from the cleaning area to prevent re-contamination. If the equipment is not to be immediately reused it will be covered with plastic sheeting or wrapped in aluminum foil to prevent re-contamination. The area where the equipment is stored prior to re-use must be free of contaminants.

5.10 Investigation-Derived Waste Characterization and Disposal

IDW anticipated to be generated during sampling activities may include disposable sampling equipment and PPE. Used IDW will be placed in polyethylene trash bags, which will be placed in transport containers along with excavated waste destined for landfill disposal.

Table 5-1 Summary of Analytical Methods, Sample Containers, Preservation, and Holding Times

Target Analytes	Matrix	Analytical Method (EPA SW846)	Sample Volume/Container	Preservative	Holding Time
Explosives	Soil	8330B	8-oz Glass Jar	Cool to ≤ 6°C	14 days
Lead	Soil	6010C	4-oz Glass Jar	Cool to ≤ 6°C	6 months (28 days for Hg)

Notes:

Samples will be analyzed using the most recently published versions of the analytical methods

EPA = U.S. Environmental Protection Agency
Hg = mercury
oz = ounce
RCRA = *Resource Conservation and Recovery Act*

1 **Table 5-2 Quality Control Samples for Precision and Accuracy**

Quality Control Type	Precision	Accuracy	Minimum Frequency
Field	Relative Percent Difference (RPD) Goal of ≤ 20%	Duplicate Sample Laboratory Analysis	One every 10 samples (10%)
		Equipment Blank, if necessary.	One per day for reusable equipment, if used. Not necessary if using disposable sampling equipment.
Laboratory	Matrix Spike/Matrix Spike Duplicate (RPD goal of ≤ 20%)	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 (Percent Recovery Goal of 80% to 120%)	One every 20 samples (rounded up) (5%)
		Surrogate Sample (for organics only)	One every 20 samples (rounded up) (5%)

Table 5-3 Comparison of Soil Remediation Goals to Laboratory Reporting Limits

Chemical	NMED SSL for Residential (mg/kg)[1]	EPA Residential RSLs (mg/kg)[2]	Limit of Quantitation (mg/kg)	Limit of Detection Limit (mg/kg)	Detection Limit (mg/kg)
Explosives[3]					
1,3,5-Trinitrobenzene	NS	2,200	0.04	0.008	0.004
1,3-Dinitrobenzene	NS	6.2	0.04	0.008	0.004
2,4-Dinitrotoluene	17.1	------	0.04	0.008	0.004
2,6-Dinitrotoluene	3.56	------	0.04	0.008	0.005
2,4,6-Trinitrotoluene (TNT)	36.0	------	0.04	0.008	0.002
2-Amino-4,6-Dinitrotoluene	NS	150	0.04	0.008	0.005
2-Nitrotoluene	31.6	------	0.04	0.01	0.003
3-Nitrotoluene	6.16	------	0.04	0.008	0.004
4-Amino-2,6-Dinitrotoluene	NS	150	0.04	0.008	0.005
4-Nitrotoluene	247	------	0.04	0.008	0.004
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	60.4	------	0.04	0.008	0.004
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	156	------	0.04	0.008	0.002
Nitrobenzene	60.4	------	0.04	0.008	0.004
Nitroglycerin	6.16	------	0.2	0.08	0.053
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	3,850	------	0.04	0.008	0.005
Pentaerythritol Tetranitrate (PETN)	NS	120	0.2	0.08	0.053
Metals[4]					
Lead	400	------	1.0	0.3	0.15

Notes:
1 = Soil Screening Levels from NMED 2014: Risk Assessment Guidance for Site Investigations and Remediation, December 20142
= EPA Regional Screening Level Summary Table (TR=1E-6, HQ=1) May 2014; value multiplied by 10 to adjust to a 10^{-5} risk level for carcinogenic compounds, if applicable
3 = Explosives EPA Method 8330B
4 = Metals EPA Method 6010C/7471B
Samples will be analyzed using the most recently published versions of the analytical methods.
EPA = US Environmental Protection Agency
mg/kg = milligrams per kilogram
NS – Not Specified
NMED = New Mexico Environment Department

Table 5-4 Data Validation Flags

Flag	Interpretation
R	The sample results are rejected because of serious deficiencies in the ability to analyze the sample and meet quality control 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 quantification limit. However, the reported quantification limit is approximate and may or may not represent the actual limit of quantification 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 quantification 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).

SECTION 6.0 PROJECT SCHEDULE

A summary of the expected schedule for conducting the removal activities at Parcel 16 is presented below. Days listed are days following USACE notice to proceed with field work.

- Implementation of Field Work – June to October 2015
- Submittal of Army Draft Final Report – December 2015
- Submittal of Final Report to Tribes/NMED – February 2016
- Regulatory/Tribal Review – February 2016 to August 2016
- Revised Final Report – September 2016 (as necessary)

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SECTION 7.0 POST-IMPLEMENTATION REPORTING

All activities conducted as part of this Work Plan will be documented in a final report. The final report will contain at a minimum a detailed schedule of completed activities, summaries of all analytical data, disposal documentation, and surveys.

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SECTION 8.0 REFERENCES

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APPENDIX A NMED DISAPPROVAL LETTER AND RESPONSES TO NMED COMMENTS CONSULTATION

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CERTIFIED MAIL - RETURN RECEIPT REQUESTED

March 18, 2015

Mark Patterson
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P.O. Box 93
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Steve Smith
USACE FWDA Program Manager
CESWF-PEC-EF
819 Taylor Street, Room 3A12
Fort Worth, TX 76102

RE: DISAPPROVAL
PERMITTEE-INITIATED INTERIM MEASURES WORK PLAN
PARCEL 16
FORT WINGATE DEPOT ACTIVITY
MCKINLEY COUNTY, NEW MEXICO
EPA ID# NM6213820974
HWB-FWDA-15-002

Dear Messrs. Patterson and Smith:

The New Mexico Environment Department (NMED) has received the *Permittee-Initiated Interim Measures Work Plan, Parcel 16,* (Plan) dated February 10, 2015 for Fort Wingate Depot Activity (Permittee). NMED has reviewed the Plan and hereby issues this disapproval. The Permittee must address the following comments.

Comment(s):

SECTION 2.0 CONTAMINANTS OF POTENTIAL CONCERN AND REMEDIATION GOALS

1. Permittee Statement – Section 2.1 Contaminants of Potential Concern & CSEM, page 2-1, lines, 22-24 and Table 2-1. "[t]he exposure assumptions that describe the residential exposure scenario are the most conservative, and therefore the most protective, of the three types of receptors addressed by the NMED risk assessment guidance (NMED, 2012)."

NMED Comment:
The 2014 NMED Risk Assessment Guidance replaces and supersedes the 2012 NMED Risk Assessment Guidance for Site Investigations and Remediation. The 2014 NMED Risk Assessment Guidance must be used for data assessment and for risk assessments conducted. This comment henceforth is applicable to all sections which reference the 2012 NMED Risk Assessment Guidance. Replace all references within the Plan to reflect the 2014 NMED Risk Assessment Guidance.

SECTION 3.0 REMOVAL ACTIVITIES AT IGLOO BLOCK K

2. Permittee Statement – Section 3.0 Removal Activities at Igloo Block K, page 3-1 lines 34-35. "[i]t is assumed the soil will be disposed as nonhazardous solid waste."

NMED Comment:
Revise this statement to reflect that waste profiling will determine the waste classification as previously discussed (e.g., waste profiling will determine the status of the impacted soil).

3. Permittee Statement – Section 3.0 Removal Activities at Igloo Block K, page 3-1 lines 37-42. "[d]uring the same time frame as the soil removal, all 200 steel drain pipes from the 100 igloos from Igloo Block B will be cut and removed from the igloos. In preparation for drain pipe removal, plastic sheeting will be placed below each pipe and the piping will be wrapped in tape to prevent any paint coasting from being disturbed. The drain pipes at each igloo will be cut at the wall and the remaining drain holes will be sealed with a cement-based, non-shrink grout. The removed pipe sections will be recycled."

NMED Comment:
As a precaution removal of these drains must be conducted prior to soil removal to ensure any cuttings are captured. No response necessary.

4. Permittee Statement –Section 3.0, Removal Activities at Igloo Block K, page 3-2, lines 21-24. "[i]f excavation of all lead results to below the SSL of 400 mg/kg is not feasible,

confirmation sample results can be combined to calculate an upper confidence limit (UCL) on the mean for comparison to the SSL, with NMED approval."

NMED Comment:
The Permittee's proposed method to calculate UCLs is not clear. If the Permittee uses this method to calculate UCLs as described, then the Permittee must revise the Plan to clarify how samples will be combined. Additionally, explain how combining samples will be representative of site conditions and provide a figure showing the proximity of sample locations. Note that analytical data from soil that has been removed from the site cannot be used in to calculate the UCL; confirmatory soil analytical samples must be used. Revise the Plan to either clarify this method or remove it from within the Plan.

SECTION 4.0 REMOVAL ACTIVITIES AT Z135-4 OPEN STORAGE PAD

5. Permittee Statement – Section 4.1 – Waste Profile Sampling, page 4-1, lines 24-25. "[t]he waste profile composite sample will be collected as a composite with individual surface grab samples from 0 to 0.5 foot depth over the entire area to be excavated.

NMED Comment:
Waste is not generated until the soil has been excavated; therefore, waste profiling cannot be conducted until soil is excavated. In addition, Table 4.1 does not provide information regarding the number of composite samples and where or how they will be collected. Each of the six areas to be excavated varies in depth and constituents of concern. Thus, sampling in-situ may not be representative of the waste generated. The Permittee must propose to collect the composite samples for waste profiling post excavation. Revise the Plan to include a detailed description of the soil excavation, sampling, and waste profiling process.

6. Permittee Statement – Section 4.3 – Confirmation Sampling and Risk Evaluation, page 4-2, lines 18-28. "[f]ollowing the removal of all impacted soil from Z135-4 Open Storage Pad, confirmation sampling will be conducted on the floor and sidewalls of the excavation. The confirmation samples will be analyzed for explosives using EPA Method 8330B. Composite samples will consist of nine-subsamples randomly collected for the excavation area bottom of Z135-4 Open Storage Pad, which will be divided into four sections: Z135-4B1; Z135-4B2; Z135-4B3; and Z135-4B4. One nine-part composite sample will be collected from each section of the excavation grid, for a total of four (4) samples. One discrete sample will be collected from the sidewalls of each section of the excavation grid for a total of eight (8) discrete samples. In addition, six (6) discrete samples will be collected from the perimeter of the removal area, 10 feet from the northwest and southwest boundaries of the removal area. **Figure 4-3** depicts the excavation confirmation sample locations at Z135-4 Open Storage Pad."

NMED Comment:
Compositing samples for cleanup verification are not accepted without prior NMED prior approval. Compositing may result in the contaminant concentrations that are not representative

of what remains in the soil. If concentrations within the soils are low, compositing may dilute the concentrations of a contaminant to levels less than the method reporting limit. Additionally, if contamination is detected in a composited sample, the location of the contamination remains unknown. Therefore, the Permittee must collect confirmation discrete samples along the limits of excavation (i.e., sidewalls), and from the base of the excavation. Additionally, it is unclear why the Permittee proposes collecting discrete confirmation samples 10 feet from the limits of the excavations. Revise the Plan to include the discrete confirmation sampling along the lateral limits and base of the excavations. Include a detailed description regarding the number of samples to be collected and revise Figure 4-3 to include the additional sample points. Specific information must be included in this Plan regarding the analytical test method(s) utilized for each soil sample collected.

7. Permittee Statement – Section 4.5 Backfill, Compaction, and Final Grading, page 4-4, line 8-9. "[t]he backfill material is anticipated to be obtained from an approved borrow area located on FWDA property."

NMED Comment:
In an effort to minimize the potential of introducing unacceptable fill material, the Permittee must demonstrate that the fill borrow area is appropriate. The fill material must be analyzed for potential contaminants based on the location and history of the source area. Detectable amounts of compounds of concern within the fill material must be evaluated for risk in accordance with the 2014 NMED Risk Assessment Guidance or approved site-specific soil background data. Revise the Plan to propose to analyze any borrow material before use.

The Permittee must submit a revised Plan to address all comments contained in this Disapproval. In addition, the Permittee must include a response letter that details where each comment was addressed, cross-referencing NMED's numbered comments. The Permittee must also submit an electronic redline-strikeout version of the revised Plan. The revised Plan must be submitted on or before **May 22, 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
Robin White, BIA

File: FWDA 2015 and Reading
FWDA-15-002

COMMENT RESPONSE TABLE FOR
FINAL, PERMITTEE-INITIATED INTERIM MEASURES WORK PLAN, PARCEL 16
FORT WINGATE DEPOT ACTIVITY, McKINLEY COUNTY, NM
DATED FEBRUARY 10, 2015

Comment Number	Section No./Page No./Line No.	Permittee Statement	NMED Response	Army Response
NEW MEXICO ENVIRONMENTAL DEPARTMENT – NOTICE OF DISAPPROVAL – MARCH 18, 2015				
1	Section 2.1, page 2-1, Lines 22-24, Table 2-1.	"[t]he exposure assumptions that describe the residential exposure scenario are the most conservative, and therefore the most protective, of the three types of receptors addressed by the NMED risk assessment guidance (NMED, 2012)."	The 2014 NMED Risk Assessment Guidance replaces and supersedes the 2012 NMED Risk Assessment Guidance for Site Investigations and Remediation. The 2014 Risk Assessment Guidance must be used for data assessment and for risk assessments conducted. This comment henceforth is applicable to all sections which reference the 2012 NMED Risk Assessment Guidance. Replace all references within the Plan to reflect the 2014 NMED Risk Assessment Guidance.	The Work Plan was revised to reflect the 2014 NMED Risk Assessment Guidance in Section 2.1, Section 2.2, Table 2-1, Section 3.0, Section 4.3, and Table 5.3.
2	Section 3.0, page 3-l, lines 34-35	"[i]t is assumed the soil will be disposed as nonhazardous solid waste."	Revise this statement to reflect that waste profiling will determine the waste classification as previously discussed (e.g. waste profiling will determine the status of the impacted soil).	The statement has been revised in Section 3.0 of the Work Plan.

COMMENT RESPONSE TABLE FOR
FINAL, PERMITTEE-INITIATED INTERIM MEASURES WORK PLAN, PARCEL 16
FORT WINGATE DEPOT ACTIVITY, McKINLEY COUNTY, NM
DATED FEBRUARY 10, 2015

Comment Number	Section No./Page No./Line No.	Permittee Statement	NMED Response	Army Response
3	Section 3.0, page 3-l, lines 37-42	"[d]uring the same time frame as the soil removal, all 54 steel drain pipes from the 27 igloos from Igloo Block K will be cut and removed from the igloos. In preparation for drain pipe removal, plastic sheeting will be placed below each pipe and the piping will be wrapped in tape to prevent any paint coating from being disturbed. The drain pipes at each igloo will be cut at the wall and the remaining drain holes will be sealed with a cement-based, non-shrink grout. The removed pipe sections will be recycled."	As a precaution removal of these drains should be conducted prior to soil removal to ensure any cuttings are captured. No response necessary.	The Work Plan has been revised to clarify that the drains will be removed prior to soil removal.
4	Section 3.0, page 3-2, lines 21-24	"[i]f excavation of all lead results to below the SSL of 400 mg/kg is not feasible, confirmation sample results can be combined to calculate an upper confidence limit (UCL) on the mean for comparison to the SSL, with NMED approval."	The Permittee's proposed method to calculate UCLs is not clear. If the Permittee uses this method to calculate UCLs as described, then the Permittee must revise the plan to clarify how samples will be combined. Additionally, explain how combining samples will be representative of site conditions and provide a figure showing the proximity of sample locations. Note that analytical data from soil that has been removed from the site cannot be used to calculate the UCL; conformity soil analytical samples must be used. Revise the Plan to either clarify or remove this approach from within the Plan.	The Permittee Statement has been removed from Section 3.0 of the Work Plan.

COMMENT RESPONSE TABLE FOR
FINAL, PERMITTEE-INITIATED INTERIM MEASURES WORK PLAN, PARCEL 16
FORT WINGATE DEPOT ACTIVITY, McKINLEY COUNTY, NM
DATED FEBRUARY 10, 2015

Comment Number	Section No./Page No./Line No.	Permittee Statement	NMED Response	Army Response
5	Section 4.1, page 4-1, lines 24-25	"[t]he waste profile composite sample will be collected as a composite with individual surface grab samples from 0 to 0.5 foot depth over the entire area to be excavated."	Waste is not generated until the soil has been excavated; therefore, waste profiling cannot be conducted until soil is excavated. In addition, Table 4.1 does not provide information regarding the number of composite samples and where or how they will be collected. Each of the six area to be excavated varies in depth and constituents of concern. Thus, sampling in –situ may not be representative of the waste generated. The Permittee must propose to collect the composite samples for waste profiling post excavation. Revise the Plan to include a detailed description of the soil excavation, sampling and waste profiling process.	Section 4.1 of the Work Plan revised to indicate that post-excavation waste profile sampling will be conducted from removed stockpiled material.
6	Section 4.3, page 4-2, lines 18-28	"[f]ollowing the removal of all impacted soil from Z135-4 Open Storage Pad, confirmation sampling will be conducted on the floor and sidewalls of the excavation. The confirmation samples will be analyzed for explosives using EPA Method 8330B. Composite Discrete samples will be consist of nine sub-samples randomly collected from the excavation area bottom of Z135-4 Open Storage Pad, which will be divided into four sections: Z135-4B1; Z135-4B2; Z135-4B3; and Z135-4B4. One nine-part	Composite sampling for cleanup verification is not acceptable without prior NMED approval. Compositing may result in the contaminant concentrations that are not representative of concentrations remaining in the soil. If concentrations within the soils are low, compositing may dilute the concentrations of a contaminant to less than the method reporting limit. Additionally, if contamination is indicated in a composited sample, the location of the contamination remains unknown. Therefore, the Permittee must collect confirmation discrete samples along the limits of excavation (i.e. sidewalls), and from the base of the excavation.	Section 4.3 and Table 4.2 have been revised in the Work Plan to incorporate the collection of discrete samples from the bottom of the removal areas. Sample numbers have been reassigned to reflect discrete sampling and specific analysis was included for each sample. As discussed during the March 25, 2015 conference call with the

COMMENT RESPONSE TABLE FOR
FINAL, PERMITTEE-INITIATED INTERIM MEASURES WORK PLAN, PARCEL 16
FORT WINGATE DEPOT ACTIVITY, McKINLEY COUNTY, NM
DATED FEBRUARY 10, 2015

Comment Number	Section No./Page No./Line No.	Permittee Statement	NMED Response	Army Response
		composite sample will be collected from each section of the excavation grid, for a total of four (4) samples. One discrete sample will be collected from the sidewalls of each section of the excavation grid for a total of eight (8) discrete samples. In addition, six (6) discrete samples will be collected from the perimeter of the removal area, 10 feet from the northwest and southwest boundaries of the removal area. Figure 4-3 depicts the excavation confirmation sample locations at Z135-4 Open Storage Pad."	Additionally, it is unclear why the Permittee proposes collecting discrete confirmation samples 10 feet from the limits of the excavations. Revise the Plan to include the discrete confirmation sampling along the lateral limits and base of the excavations. Include a detailed description regarding the number of samples to be collected and revise Figure 4-3 to include the additional samples points. Specific information must be included in this Plan regarding the analytical test method(s) utilized for each soil sample collected.	USACE and NMED, one nine-part composite sample will be collected every 50 feet along the entire perimeter or sidewall of each removal area. The section has also been revised to clarify that the discrete confirmation samples 10 feet from the limits of the excavation are being collected per recommendations in the RFI report. The sample numbers have been reassigned to reflect discrete sampling and specific analysis was included for each sample. Figure 4-3 has also been revised.
7	Section 4.5, page 4-5, line 8-9.	"[t]he backfill material is anticipated to be obtained from an approved borrow area located on FWDA property."	In an effort to minimize the potential of introducing unacceptable fill material, the Permittee must demonstrate that the fill borrow area is appropriate. The fill material must be analyzed for potential contaminants based on the location and history of the source area. Detectable amounts of constituents of concern within the fill material should be evaluated for risk in	Section 4.5 of the Work Plan has been revised to include sample results of the approved borrow area and reference to Parcel 18 Final.

Comment Number	Section No./Page No./Line No.	Permittee Statement	NMED Response	Army Response
			accordance with the 2014 NMED Risk Assessment Guidance or compared to NMED approved soil background data. Revise the Plan to propose to analyze the borrow material before use.	

APPENDIX B
DOCUMENTATION OF CULTURAL RESOURCES CONSULTATION

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DEPARTMENT OF THE ARMY
FORT WINGATE DEPOT ACTIVITY
P.O. BOX 268
FORT WINGATE, NM 87316

September 11, 2014

Mr. Ronald P. Maldonado
Navajo Nation Historic Preservation Department
Cultural Resource Compliance Section
P.O. Box 4950
Window Rock, Arizona 86515

Dear Mr. Maldonado:

The Army is preparing to implement soil removal and sampling activities described in the Fort Wingate Depot Activity (FWDA) Parcels 6, 16, 21 and 22 RFI Reports (Reports). The Tribes have already reviewed these four work plans. The purpose of this letter is to inform the Tribes of upcoming interim removal actions within the four parcels instead of a Phase 2 RFI. The RFI Reports for these four parcels recommend either additional soil sampling under Phase 2 or soil removal at the sites described in this letter. The Army has elected to perform soil removal at all of the sites mentioned in this letter under a permittee initiated interim measure in accordance with Resource Conservation Recovery Act (RCRA) Permit section VII.G.3 instead of a Phase 2 investigation. The Tribes will be provided work plans for the typical 60 day review of these upcoming actions in 2014 and 2015. The Army seeks Navajo Nation comments to comply with the Programmatic Agreement regarding cultural resources sites in the proposed work areas. A summary of the fieldwork is described below. Figures showing the locations of removal areas and sites to be sampled are enclosed.

Two locations in Parcel 6 will be subject to soil removal. SWMU 8 was subject to soil removal in the 1990s and further excavation of approximately 200 cubic yards (cu yd) of soil is required at this location to ensure all PCB contamination is removed to meet the NMED permit requirements. At SWMU 20, which partially extends into Parcel 7, a pile of surface debris will be removed for a total of approximately 1,200 cu yd of material removed. The closest archaeological site to the SWMU 8 location is approximately 400 feet away. There is an archaeological site located 200 feet from the SWMU 20 debris pile. In both cases, vehicles and equipment will be routed to ensure avoidance of all the sites within the parcel.

In Parcel 16, approximately 1,000 cu yd soil will be removed at the site of former Bldg Z135. Additional details can be found in section 3.5 of the Parcel 16 RFI Report. The nearest archaeological site to this location is approximately 350 feet. Vehicles and equipment will be routed to ensure avoidance of all the sites within the parcel.

Several areas within Parcel 21 will be subject to soil removal based on the results of earlier sampling. At SWMU 2 removal will cover one quarter of an acre and amount to approximately 750 cu yd. Additional soil will be removed west of former Building 515. In SWMU 7, SWMU 19, AOC 68, and AOC 63, soil removal will be on a small scale (50-300 cu

yd) and localized based on the results of earlier sampling. In AOC 60 only hand dug soil samples will be removed. Archaeological sites are located no closer than 400 feet (AOC 68) and up to 1,000 feet away from the planned soil removal sites in Parcel 21. Vehicles and equipment will be routed to ensure avoidance of all the sites within the parcel.

Also in Parcel 21, two former TNT beds will be fully removed from SWMU 1. These beds were sampled in the 1990s and will now be subject to total removal to comply with the NMED permit. Approximately 15,000 cu yd of soil is expected to be removed. A known archaeological site is located some 350- 400 feet away. Vehicles and equipment will be routed to ensure avoidance of all the sites within the parcel.

Finally, in Parcel 22 SWMU 27 soil removal will take place at five locations and total approximately 200 cu yd. The nearest archaeological site to this removal is approximately 250 feet away. Vehicles and equipment will be routed to ensure avoidance of all the sites within the parcel.

The Army is seeking Navajo comments pursuant to the Programmatic Agreement (PA). We seek input from the Navajo Nation for operating procedures for the Army Contractor to follow when performing removal actions. We would like to propose the following options:

a. Based on review of the previously submitted RFI Reports, this letter and enclosed figures, the Navajo are comfortable to make a determination that Cultural Sites are a sufficient distance away from the removal locations as to not be encountered during the field work or are in areas previously disturbed. If cultural resources are inadvertently encountered during the field work, the Army will immediately notify the Tribal cultural points of contact for consultation per section 1.8 of the PA. As stated in Section 1.4 of the PA, a*voidance of historic properties and potential NAGPRA cultural items will be the first choice for RCRA permit activities.*

b. The Army will set up a site visit with the Tribe to identify the general area of removal locations. Then, the Tribal representative(s) can visit the locations pursuant to Programmatic Agreement Sections 1.4 & 1.6 prior to removal to inspect, and then accept the location, or propose adjusting the removal area to avoid a cultural site(s), or propose no removal action at the site(s). This would require quick coordination between the Army, NMED, and the Tribal cultural contact. A written report/letter of any cultural resources monitoring/work will be required from the Tribe within 2 weeks of the conclusion of the field work for submittal to the Army in order to meet the Permit schedule. The Tribe will not be reimbursed by the Army or Contractor for the site visit, report, or letter.

Because the removal locations are in areas previously sampled, altered by construction and disposal activities with many years of work activities in the area, and because of the distance from the removal locations to identified cultural sites, we feel that either Option a or b would be reasonable, with a preference for Option a.

Please let us know which option the Navajo Nation prefers within 30 days of receipt of this letter or the Army will assume your concurrence with proposed Option a.

Should you have any questions, or require any further information concerning the above, please contact Ms. Nancy Parrish (Fort Wingate Project Archaeologist) of the U.S. Army Corps of Engineers, Fort Worth District, at (817) 886-1725, or by email at nancy.a.parrish@usace.army.mil.

Sincerely,

Mark Patterson

Mark Patterson
BRAC Environmental Coordinator
Fort Wingate Depot Activity

Enclosures
CF:
Tony Perry, Navajo Nation
David Cobrain, NMED, HWB
Chuck Hendrickson, U.S. EPA Region 6
Steve Smith, USACE-SWF
Bob Estes, NM SHPO

DEPARTMENT OF THE ARMY
FORT WINGATE DEPOT ACTIVITY
P.O. BOX 268
FORT WINGATE, NM 87316

September 11, 2014

Mr. Darrell Tsabetsaye
Attn: Governor's Office
P.O. Box 339
1203B State Hwy 53
Zuni, New Mexico 87327

Dear Mr. Tsabetsaye:

The Army is preparing to implement soil removal and sampling activities described in the Fort Wingate Depot Activity (FWDA) Parcels 6, 16, 21 and 22 RFI Reports (Reports). The Tribes have already reviewed these four work plans. The purpose of this letter is to inform the Tribes of upcoming interim removal actions within the four parcels instead of a Phase 2 RFI. The RFI Reports for these four parcels recommend either additional soil sampling under Phase 2 or soil removal at the sites described in this letter. The Army has elected to perform soil removal at all of the sites mentioned in this letter under a permittee initiated interim measure in accordance with Resource Conservation Recovery Act (RCRA) Permit section VII.G.3 instead of a Phase 2 investigation. The Tribes will be provided work plans for the typical 60 day review of these upcoming actions in 2014 and 2015. The Army seeks Pueblo of Zuni comments to comply with the Programmatic Agreement regarding cultural resources sites in the proposed work areas. A summary of the fieldwork is described below. Figures showing the locations of removal areas and sites to be sampled are enclosed.

Two locations in Parcel 6 will be subject to soil removal. SWMU 8 was subject to soil removal in the 1990s and further excavation of approximately 200 cubic yards (cu yd) of soil is required at this location to ensure all PCB contamination is removed to meet the NMED permit requirements. At SWMU 20, which partially extends into Parcel 7, a pile of surface debris will be removed for a total of approximately 1,200 cu yd of material removed. The closest archaeological site to the SWMU 8 location is approximately 400 feet away. There is an archaeological site located 200 feet from the SWMU 20 debris pile. In both cases, vehicles and equipment will be routed to ensure avoidance of all the sites within the parcel.

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Several areas within Parcel 21 will be subject to soil removal based on the results of earlier sampling. At SWMU 2 removal will cover one quarter of an acre and amount to approximately 750 cu yd. Additional soil will be removed west of former Building 515. In SWMU 7, SWMU 19, AOC 68, and AOC 63, soil removal will be on a small scale (50-300 cu

yd) and localized based on the results of earlier sampling. In AOC 60 only hand dug soil samples will be removed. Archaeological sites are located no closer than 400 feet (AOC 68) and up to 1,000 feet away from the planned soil removal sites in Parcel 21. Vehicles and equipment will be routed to ensure avoidance of all the sites within the parcel.

Also in Parcel 21, two former TNT beds will be fully removed from SWMU 1. These beds were sampled in the 1990s and will now be subject to total removal to comply with the NMED permit. Approximately 15,000 cu yd of soil is expected to be removed. A known archaeological site is located some 350- 400 feet away. Vehicles and equipment will be routed to ensure avoidance of all the sites within the parcel.

Finally, in Parcel 22 SWMU 27 soil removal will take place at five locations and total approximately 200 cu yd. The nearest archaeological site to this removal is approximately 250 feet away. Vehicles and equipment will be routed to ensure avoidance of all the sites within the parcel.

The Army is seeking Zuni comments pursuant to the Programmatic Agreement (PA). We seek input from the Pueblo of Zuni for operating procedures for the Army Contractor to follow when performing removal actions. We would like to propose the following options:

a. Based on review of the previously submitted RFI Reports, this letter and enclosed figures, the Zuni are comfortable to make a determination that Cultural Sites are a sufficient distance away from the removal locations as to not be encountered during the field work or are in areas previously disturbed. If cultural resources are inadvertently encountered during the field work, the Army will immediately notify the Tribal cultural points of contact for consultation per section 1.8 of the PA. As stated in Section 1.4 of the PA, a*voidance of historic properties and potential NAGPRA cultural items will be the first choice for RCRA permit activities.*

b. The Army will set up a site visit with the Tribe to identify the general area of removal locations. Then, the Tribal representative(s) can visit the locations pursuant to Programmatic Agreement Sections 1.4 & 1.6 prior to removal to inspect, and then accept the location, or propose adjusting the removal area to avoid a cultural site(s), or propose no removal action at the site(s). This would require quick coordination between the Army, NMED, and the Tribal cultural contact. A written report/letter of any cultural resources monitoring/work will be required from the Tribe within 2 weeks of the conclusion of the field work for submittal to the Army in order to meet the Permit schedule. The Tribe will not be reimbursed by the Army or Contractor for the site visit, report, or letter.

Because the removal locations are in areas previously sampled, altered by construction and disposal activities with many years of work activities in the area, and because of the distance from the removal locations to identified cultural sites, we feel that either Option a or b would be reasonable, with a preference for Option a.

Please let us know which option the Pueblo of Zuni prefers within 30 days of receipt of this letter or the Army will assume your concurrence with proposed Option a.

Should you have any questions, or require any further information concerning the above, please contact Ms. Nancy Parrish (Fort Wingate Project Archaeologist) of the U.S. Army Corps of Engineers, Fort Worth District, at (817) 886-1725, or by email at nancy.a.parrish@usace.army.mil.

Sincerely,

Mark Patterson

Mark Patterson
BRAC Environmental Coordinator
Fort Wingate Depot Activity

Enclosures
CF:
Kurt Dongoske, THPO
David Cobrain, NMED, HWB
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Steve Smith, USACE-SWF
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