Final

Permittee-Initiated Interim Measures Work Plan Parcel 22

Fort Wingate Depot Activity
McKinley County, New Mexico

February 24, 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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4600 E. Washington Street, Ste. 600
Phoenix, Arizona 85034

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This Permittee-Initiated Interim Measures Work Plan describes activities planned for removal activities at Parcel 22, Fort Wingate Depot Activity, McKinley County, New Mexico.

15. SUBJECT TERMS

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40 CFR 270.11
FEBRUARY 2014

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_____

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

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PREFACE

This Resource Conservation and Recovery Act Permittee-Initiated Interim Measures Work Plan (Work Plan) summarizes previous investigations and describes the field activities that will be conducted at Parcel 22 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 dated April 23, 2014.

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

_____	_____
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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.
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.
USEPA = United States Environmental Protection Agency

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LIST OF ACRONYMS AND ABBREVIATIONS

°C	degree Celsius
AOC	Area of Concern
bgs	below ground surface
BMPs	Best Management Practices
BRAC	Base Realignment and Closure
BRACD	BRAC Division
COC	chain of custody
COPC	contaminant of potential concern
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
mg/kg	milligrams per kilogram
MS	matrix spike
MSD	matrix spike duplicate
MS/MSD	matrix spike/matrix spike duplicate
NMED	New Mexico Environment Department
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyls
PPE	personal protective equipment
QA	quality assurance
QC	quality control
QA/QC	quality assurance/quality control

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

RCRA	Resource Conservation and Recovery Act
RDX	Royal Demolition Explosive
RPD	Relative Percent Difference
RSL	Regional Screening Level
SSL	Soil Screening Levels
SSO	Site Safety Officer
SVOC	semi-volatile organic compound
SWMU	Solid Waste Management Unit
UCL	upper confidence limit
USACE	U.S. Army Corps of Engineers
UXO	unexploded ordnance
VOC	volatile organic compounds
XRF	x-ray fluorescence

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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) 30 - Igloo Block D, Solid Waste Management Unit (SWMU) 12 – former Building 536 and SWMU 27 – former Building 528 Complex within Parcel 22 at Fort Wingate Depot Activity (FWDA), 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 22. **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 the USACE Fort Worth District, under Contract No. W9126G-11-D-0040, Task Order No. 0002 in accordance with the USACE's Statement of Work dated April 23, 2014, and other guidance provided by the Fort Worth District.

1.1 Purpose and Scope

The purpose of the removal activities is to remove soil impacted with explosives, polychlorinated biphenyls (PCBs), semi-volatile organic compounds (SVOCs), specifically polycyclic aromatic hydrocarbons (PAHs), explosives, and Resource Conservation and Recovery Act (RCRA) 8 metals to acceptable levels 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 New Mexico Environment Department (NMED) residential soil screening level (SSL). For other compounds, soil removal will be conducted until the cumulative risks and hazards are below the NMED Residential SSLs and the 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 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 and submitted to the USACE for approval.

The scope of activities includes the following:

- Pre-mobilization activities including finalization of site-specific planning documents, utility clearance, pre and post-removal survey at the former Building 528 Complex, filing of stormwater Notice of Intent, preparation of an Environmental Protection Plan, preparation of a Stormwater Pollution Prevention Plan, and coordination with FWDA, NMED, and the disposal facility
- Excavation and disposal of impacted soils as follows:
- Approximately 15 cubic yards of soil impacted with lead and explosives under 60 left and right drain pipes from 30 igloos at Igloo Block D;
- Approximately 200 cubic yards of soil impacted with SVOCs/PAHs and RCRA 8 metals at the former Building 528 Complex with Unexploded Ordnance (UXO) Technician oversight;

- Removal of Manholes F-1 and F-2 including base with soil impacted with PCBs, SVOCs/PAHs and explosives at the former Building 536;
- Removal and grout-sealing of 106 drain pipes from 53 igloos from Igloo Block D;
- Confirmation sampling from removal areas;
- Evaluation of individual and cumulative post-excavation risks/hazards; and
- Post-implementation reporting.

1.2 Site Safety and Awareness

All work will be accomplished in accordance with USACE and Corporate safety measures. 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

Due to the operational history of FWDA, there is a potential for munitions and explosives of concern (MEC) to be encountered during excavation operations at the former Building 528 Complex. Therefore, the Army will implement the procedures provided in USACE Publication EP 75-1-2 (USACE, 2004). This includes having an UXO Technician Level III and Technician Level II on site during any intrusive work. In the unlikely event that MEC items are found, work will stop and on site Army personnel will be notified immediately. Based on the determination by Army Ordnance and Explosive Safety Specialists, all further operations may be ceased. The discovery of MEC at the site may significantly delay any activities because Army safety plans will have to be prepared and approved. Removal will be continued only when all appropriate MEC safety procedures are in effect.

1.4 Cultural Resources

In accordance with Section 106 of the National Historic Preservation Act, the USACE has consulted with the Pueblo of Zuni, the Navajo Nation, and the New Mexico State Historic Preservation Office (Tsabetsaye, D., 2014). Documentation of correspondence is provided in **Appendix A**. No cultural resources monitoring is planned during site operations. However, culturally sensitive sites are within the immediate vicinity of the removal areas in Parcel 22. 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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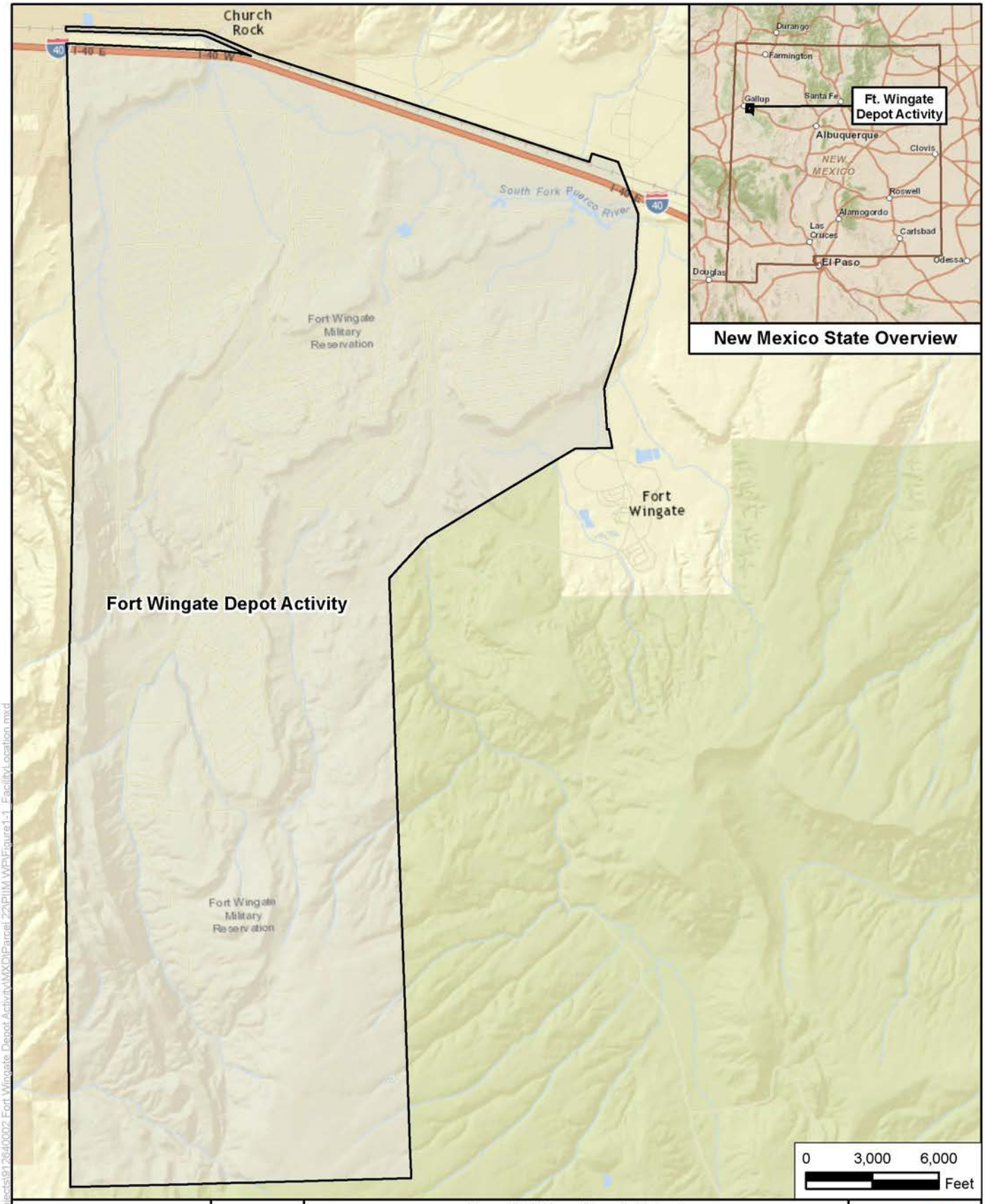

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Parcel 22 Permittee-Initiated
Interim Measures Work Plan
Fort Wingate Depot Activity
McKinley County, New Mexico

Regional Map

FIGURE 1-1

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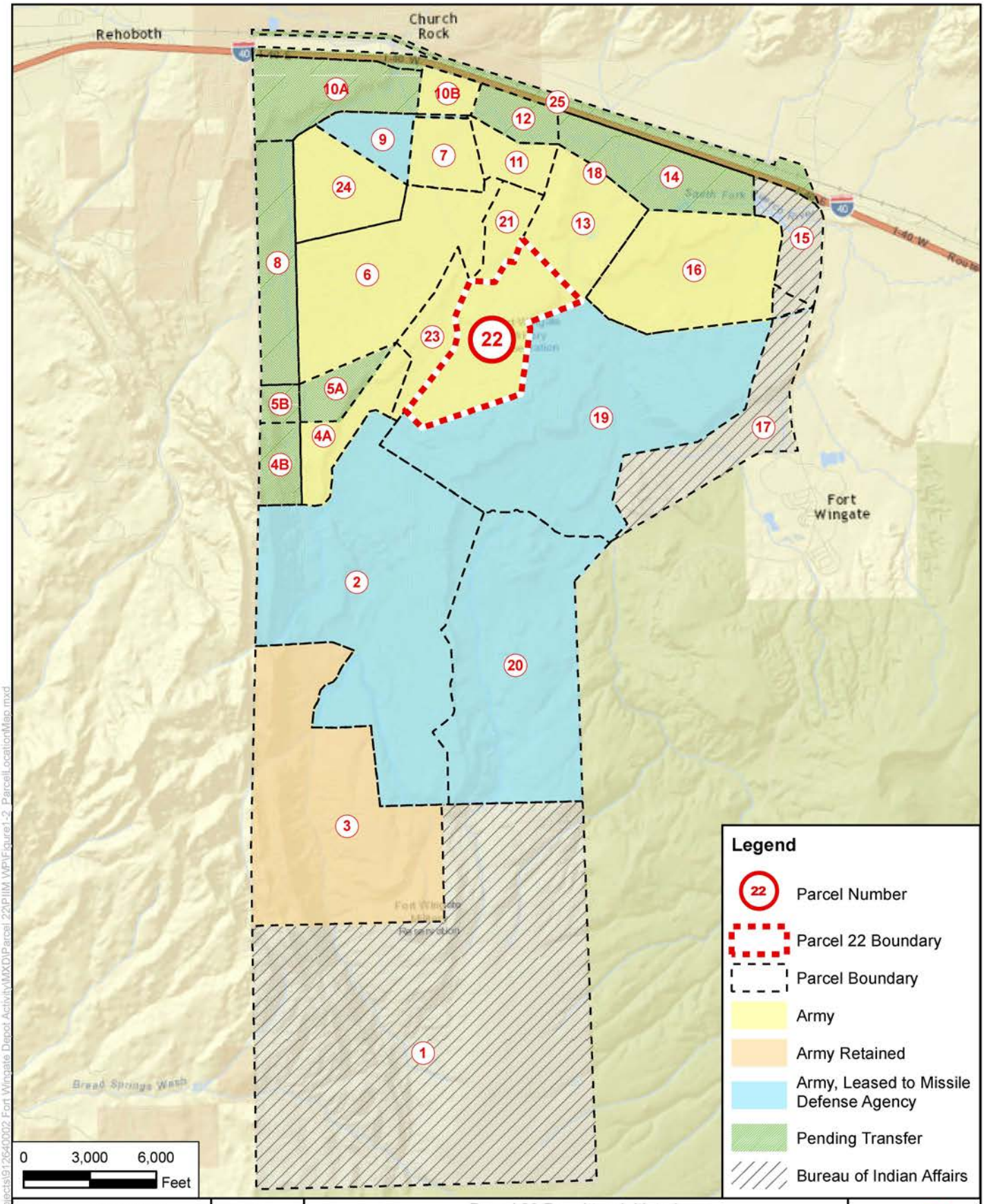

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Parcel 22 Permittee-Initiated
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McKinley County, New Mexico

Parcel Map

FIGURE
1-2

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SWMU 27
Former Building 550
(Vacuum Collector
Barricade)

SWMU 27
Former Building 551
(Service Magazine)

SWMU 27
Former Building 529
(Flammable Materials Storage)

SWMU 12
Former Building 536
(Workshop & Ammo
Renovation Depot)

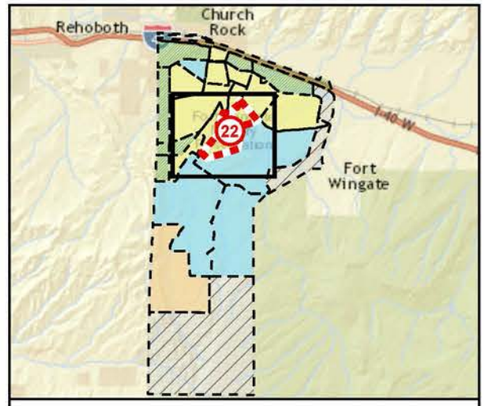
SWMU 27
Former Building 528 B
(Temporary Storage Igloo)

SWMU 27
Former Building 528
(Ammunition Normal
Maintenance Building)

SWMU 27
Former Building 528A
(Temporary Storage Igloo)

AOC 30
Igloo Block D

24 21 13 6 16 23 22 5A 4A 19 2 17



Parcel Map

Legend

- AOC/SWMU Boundary
- 22 Parcel Number
- Parcel 22 Boundary
- Parcel Boundary
- Road

Notes:

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

0 300 600 1,200
Feet

N

Parcel 22 Permittee-Initiated
Interim Measures Work Plan
Fort Wingate Depot Activity
McKinley County, New Mexico

Site Location Map
AOC 30 (Igloo Block D) and
SWMU 12 (Former Building 536) and
SWMU 27 (Former Building 528 Complex)

FIGURE
1-3

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Scale:	1" = 1200'

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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 soil impacted with contaminants of potential concern (COPCs) at Igloo Block D, former Building 536 and former Building 528 Complex within Parcel to acceptable levels that will be protective of a future residential land use scenario. The following sections discuss the COPCs, a brief Conceptual Site Exposure Model (CSEM), and constituent-specific remediation goals for site activities.

2.1 Contaminants of Potential Concern

Previous investigations as described in the 2013 Final RCRA Facility Investigation Report have provided adequate information regarding impacts to soils that have concentrations exceeding the current NMED Residential SSLs for explosives, PCBs, SVOCs/PAHs and RCRA 8 Metals (USACE, 2013). These COPCs were detected in surface soil and in subsurface soils above 10 feet below ground surface where receptors could potentially be exposed to them through dermal 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 redevelopment, which could include both adult and child receptors. The exposure assumptions that describe the residential exposure scenario are the most conservative of potential current and future receptors, and therefore the most protective of the three types of receptors addressed by the NMED risk assessment guidance (NMED, 2012). 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 recently published versions of the methods listed below. All methods are from U.S. Environmental Protection Agency (EPA) publication SW-846.

- Explosives – 8330B (Igloo Block D and former Building 536);
- PCBs – 8082A (former Building 536);
- RCRA 8 Metals – 6010C/7471B (Igloo Block D and former Building 528 Complex);
- SVOCs – 8270D (former Building 536 and former Building 528 Complex); and
- PAHs – 8270 SIM (former Building 536 and former Building 528 Complex).

Samples collected for waste characterization will be analyzed for metals 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.

2.2 Remediation Goals

The remediation goals for site COPCs are listed in **Tables 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 residential 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.
- 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 recently published version of the EPA RSL Residential Soil Table currently dated May 2014. If selected from the EPA RSL, the proposed remediation goal will be the same target risk level as the NMED SSL (i.e. based on a Hazard Index of one [1.0]) for compounds designated as "n" (noncarcinogenic effects), "nm" (RSL may exceed maximum ceiling limit concentration), and "ns" (RSL may exceed soil saturation concentration), or ten times the EPA RSL for compounds designated "c" (carcinogenic effects) or "c*" (noncancer RSL is less than 1---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, 2012). 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 Risk Assessment Guidance dated February 2012 (updated June 2012). The target levels listed in **Table 2-2** are taken from the NMED's risk assessment guidance (NMED, 2012).

Consistent with NMED risk assessment guidance (NMED, 2012), 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 ratios 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. 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, Section 4.0, and Section 5.0, for Igloo Block D, SWMU 12, and SWMU 27, respectively.

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Table 2-1 Summary of Soil Remediation Goals

Chemical	Endpoint	SSL for Residential (mg/kg)[1]	EPA Residential RSLs (mg/kg)[2]
Metals[3]			
Lead	IEUBK	400	------
Silver	n	391	------
Arsenic*	c	5.6*	------
Barium	n	15,600	------
Cadmium	n	70.3	------
Total Chromium	n	117,000	------
Selenium	n	391	------
Mercury	n	15.6	------
Polychlorinated Biphenyls[4]			
Aroclor-1016	n	3.93	------
Aroclor-1221	c	1.49	------
Aroclor-1232	c	1.49	------
Aroclor-1242	c	2.22	------
Aroclor-1248	c	2.22	------
Aroclor-1254	n	1.12	------
Aroclor-1260	c	2.22	------
Polynuclear Aromatic Hydrocarbons[5]			
Acenaphthene	n	3,440	------
Anthracene	n	17,200	------
Benzo(a)anthracene	c	1.48	------
Benzo(a)pyrene	c	0.148	------
Benzo(b)fluoranthene	c	1.48	------
Benzo(k)fluoranthene	c	14.8	------
Chrysene	c	148	------
Dibenz(a,h)anthracene	c	0.148	------
Fluoranthene	n	2,290	------
Fluorene	n	2,290	------
Indeno(1,2,3-c,d)pyrene	c	1.48	------
Naphthalene	c	43.0	------

Chemical	Endpoint	SSL for Residential (mg/kg)[1]	EPA Residential RSLs (mg/kg)[2]
Phenanthrene	n	1,830	------
Pyrene	n	1,720	------
Semi-Volatile Organic Compounds[6]			
1,2,4-Trichlorobenzene	n	73	------
1,2-Dichlorobenzene	n	2,310	------
1,4-Dichlorobenzene	c	31.7	------
2,4,5-Trichlorophenol	n	6,110	------
2,4,6-Trichlorophenol	n	61.1	------
2,4-Dichlorophenol	n	183	------
2,4-Dimethylphenol	n	1,220	------
2,4-Dinitrophenol	n	122	------
2,4-Dinitrotoluene	c	15.7	------
2,6-Dinitrotoluene	n	61.1	------
2-Chloronaphthalene	n	6,260	------
2-Chlorophenol	n	391	------
2-Methylnaphthalene	n	NS	230
2-Methylphenol	n	NS	3,100
2-Nitroaniline	n	NS	610
2-Nitrophenol	------	NS	NS
3,3'-Dichlorobenzidine	c	10.8	------
4,6-Dinitro-2-Methylphenol	n	4.89	------
4-Chloro-3-Methylphenol	n	NS	6,200
4-Chloroaniline	c	NS	27
4-Methylphenol	n	NS	6,200
4-Nitroaniline	n	NS	250
Acetophenone	n	7,820	------
Aniline	n	NS	430
Azobenzene	c	6.08	------
Benzidine	c	0.00501	------
Benzoic Acid	n	NS	250,000
Benzyl Alcohol	n	NS	6,200

Chemical	Endpoint	SSL for Residential (mg/kg)[1]	EPA Residential RSLs (mg/kg)[2]
Bis(2-Chloroethoxy)Methane	n	NS	180
Bis(2-Chloroethyl)Ether	c	2.68	------
Bis(2-Chloroisopropyl)Ether	c	91.5	------
Bis(2-Ethylhexyl)Phthalate	c	347	------
Butylbenzylphthalate	c	NS	2,800
Dibenzofuran	n	NS	72
Diethylphthalate	n	48,900	------
Dimethylphthalate	n	611,000	------
Di-N-Butylphthalate	n	6,110	------
Di-n-Octylphthalate	n	NS	620
Hexachlorobenzene	c	3.04	------
Hexachlorobutadiene	n	61.1	------
Hexachlorocyclopentadiene	n	367	------
Hexachloroethane	n	42.8	------
Isophorone	c	5,120	------
Nitrobenzene	c	53.5	------
N-Nitrosodimethylamine	c	0.0226	------
N-Nitroso-Di-N-Propylamine	c	NS	0.76
N-Nitrosodiphenylamine	c	993	------
N-Nitrosopyrrolidine	c	2.32	------
Pentachlorophenol	c	8.94	------
Phenol	n	18,300	------
Pyridine	n	NS	78
Explosives[7]			
1,3,5-Trinitrobenzene	n	NS	2,200
1,3-Dinitrobenzene	n	NS	6.2
2,4,6-Trinitrotoluene (TNT)	n	39.1	------
2,4-Dinitrotoluene	c	15.7	------
2,6-Dinitrotoluene	n	61.1	------
2-Amino-4,6-Dinitrotoluene	n	NS	150
2-Nitrotoluene	c	29.1	------

Chemical	Endpoint	SSL for Residential (mg/kg)[1]	EPA Residential RSLs (mg/kg)[2]
3-Nitrotoluene	n	7.82	------
4-Amino-2,6-Dinitrotoluene	n	NS	150
4-Nitrotoluene	n	244	------
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	c	58.2	------
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	n	244	------
Nitrobenzene	c	53.5	------
Nitroglycerin	n	6.11	------
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	n	3,910	------
Pentaerythritol Tetranitrate (PETN)	n	NS	120

Notes:
1 = Soil Screening Levels from NMED 2012: Risk Assessment Guidance for Site Investigations and Remediation, February 2012 (Updated June 2012)
2 = EPA Regional Screening Level Summary Table (TR=1E-6, HQ=1.0) May 2014; value multiplied by 10 to adjust to a $1x10^{-5}$ risk level for carcinogenic compounds, if applicable.
3 = Metals EPA Method 6010C/7471B
4 = PCBs EPA Method 8082A
5 = PAHs EPA Method 8270 SIM
6 = SVOC EPA Method 8270D
7 = Explosives EPA Method 8330B
Samples will be analyzed using the most recently published versions of the analytical methods.
* = Fort Wingate Depot Activity Site Specific Background for Arsenic (5.6 mg/kg) used in place of the NMED SSL of 3.9 mg/kg: NMED December 18, 2013 Letter, Evaluation of Background Levels for Arsenic in Soil, Fort Wingate Depot Activity, New Mexico. Arsenic concentrations ranging up to 11.2 mg/kg may also be considered consistent with background levels as described in the letter.

c = carcinogenic
n = noncarcinogenic
EPA = US Environmental Protection Agency
mg/kg = milligrams per kilogram
NA = not applicable
NS = Not Specified
NMED = New Mexico Environment Department

Table 2-2 Summary of Cumulative Risk Target Levels

Carcinogenic Target Level	Noncarcinogenic Target Level
1×10^{-5}	1

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SECTION 3.0 REMOVAL ACTIVITIES AT AOC 30 - IGLOO BLOCK D

Igloo Block D consists of 53 earth-covered concrete munitions storage igloos within Parcel 22 that were used for storage of munitions. Previous soil sampling activities conducted in 2009 by the USACE, which consisted of composite samples collected from beneath both igloo drains, were conducted at Igloo Block D. Lead was identified in concentrations that exceeded the NMED SSL (400 milligrams per kilogram [mg/kg]) at six of the igloos including: D-1139; D-1142; 1147; 1148; 1157; and 1165. Lead was also identified in concentrations that exceeded one-half the NMED SSL at 24 of the igloos including: D-1136; D-1137; D-1140; D-1141; D-1152; D-1155; D-1156; D-1158; D-1159; D-1160; D-1161; D-1162; D-1164; D-1167; D-1170; D-1171; D-1175; D-1177; D-1178; D-1179; D-1180; D-1181; D-1185; and D-1186. Sample 2230D-1186SS-C-SO, collected from beneath both igloo drains of Igloo D-1186, was reported with a concentration of 32 mg/kg for 2,4-dinitrotoluene, which exceeded the NMED SSL of 15.7 mg/kg (USACE, 2011).

In 2010, the USACE analyzed the soil using x-ray fluorescence (XRF) technology at both drain outfalls at 30 igloos where the 2009 soil results had lead concentrations at or above the NMED SSL of 400 mg/kg. The 2010 XRF analysis found additional NMED SSL exceedances for lead. The lead screening criteria was exceeded at four igloo drains including: D-1141 left drain (2230D-1141-L-XRF-SO at 520 mg/kg); D-1155 left drain (2230D-1155-L-XRF-SO at 433 mg/kg); D-1164 left drain (2230D-1164-L-XRF-SO at 1112 mg/kg); and D-1185 left drain (2230D-1185-L-XRF-SO at 435 mg/kg).

The 2010 XRF analysis also found additional NMED SSL exceedances for arsenic at Igloo Block D. The current arsenic screening criteria of 5.6 mg/kg, or the acceptable range for arsenic background concentrations of 0.2 mg/kg to 11.2 mg/kg, was exceeded at four igloo drains including: D-1162 left drain (2230D-1162-L-XRF-SO at 30.7 mg/kg); D-1170 right drain (2230D-1170-R-XRF-SO at 22 mg/kg); D-1178 right drain (2230D-1178-R-XRF-SO at 14 mg/kg); and D-1179 left drain (2230D-1179-L-XRF-SO at 47.8 mg/kg) (USACE, 2011).

Concentrations of mercury exceeding the NMED SSL of 7.71 mg/kg were also identified in 2010 at three igloos. NMED recently raised the SSL for mercury to 15.6 mg/kg. Therefore, the concentrations previously identified do not constitute an exceedance.

The USACE elected to use both the exceedances from the 2009 soil sampling and the 2010 XRF analysis to establish areas for interim removal action. Approximately ¼ cubic yard of soil will be removed from under the drain outfalls exceeding the SSLs for lead, arsenic and explosives. The USACE will also remove soil from under the drain outfalls exceeding one-half the NMED SSL for lead, as the samples collected were a composite from both igloo drains. Areas that have exceedances in Igloo Block D are depicted on **Figure 3-1**.

Waste profile sampling of the impacted soil of Igloo Block D will include the collection of one composite sample of the excavated soil from all igloos. The sample will be analyzed for lead and arsenic using EPA Method 6010C and explosives using EPA Method 8330B or the most recently published versions of the methods. Samples will be submitted for analysis for lead and arsenic, hexavalent chromium and iron using the TCLP method by EPA Method 1311/6010C or the most recently published version of the methods. 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 recently published version of the methods. The excavated soil will be stored on site in drums or a roll-off bin pending waste characterization and confirmation results.

A few inches of soil will be removed from each of the 60 igloo drain outfalls, estimated to be approximately ¼ cubic yard per drain. It is anticipated that 15 cubic yards of soil will be excavated from Igloo Block D in the areas illustrated on **Figure 3-1**. It is assumed the soil will be disposed as a nonhazardous solid waste.

Following the removal of soil from under the igloo drain pipes from Igloo Block D, one discrete confirmation sample will be collected from each removal area to ensure concentrations are below NMED SSLs. The samples collected will be analyzed as follows:

- The discrete samples collected from below the left and right drain from Igloos D-1136; D-1137; D-1139; D-1140; D-1141; D-1142; D-1147; D-1148; D-1152; D-1155; D-1156; D-1157; D-1158; D-1159; D-1160; D-1161; D-1162; D-1164; D-1165; D-1167; D-1170; D-1171; D-1175; D-1177; D-1178; D-1179; D-1180; D-1181; D-1185; and D-1186 will be analyzed for lead using EPA Method 6010C or most recently published version of the method.
- The discrete samples collected from below the left drain of Igloo D-1162; the right drain of Igloo D-1170; the right drain of Igloo D-1178; and the left drain of Igloo D-1179 will be analyzed for lead and arsenic using EPA Method 6010C or most recently published version of the method.
- The sample collected from below the left and right drains Igloo D-1186 will be analyzed for lead using EPA Method 6010C and explosives using EPA Method 8330B or most recently published versions of the methods.

During the same time frame as the soil removal, all 106 steel drain pipes from the 53 igloos from Igloo Block D within Parcel 22 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 total of 60 discrete samples and six duplicate samples will be collected from Igloo Block D. The proposed 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 6.3 and are listed on **Table 3-1**.

The results from confirmation sampling will be used to evaluate the potential for unacceptable risks from exposure to lead, arsenic, and explosives. The evaluation of lead will be performed separately from the evaluation of arsenic and 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 (IEUBK) model (NMED, 2012, 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. If excavation of all lead results 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 evaluation of arsenic and 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 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. At sample locations where the risk ratio or hazard 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/hazard ratio is less than 1). An additional confirmation sample will be collected following each additional round of excavation.

When the risk/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 “worse-case” exposure that sums the potential health risks from the maximum detected concentration of each COPC from all confirmation samples. As outlined in Section 5 of the NMED risk assessment guidance (NMED, 2012), the sum of risk ratios for carcinogenic compounds 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 “worse-case” exposure are less than the target levels, then excavation will be considered complete for all COPCs. If the cumulative noncancer hazard indices or cancer risks are greater than target levels, then a subsequent evaluation of the cumulative risk would be performed.

The subsequent evaluation of cumulative risks/hazards 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/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 from individual COPCs or from exposure to multiple COPCs.

Table 3-1 Summary of Excavation Confirmation Samples to be Collected at Area of AOC 30 - Igloo Block D

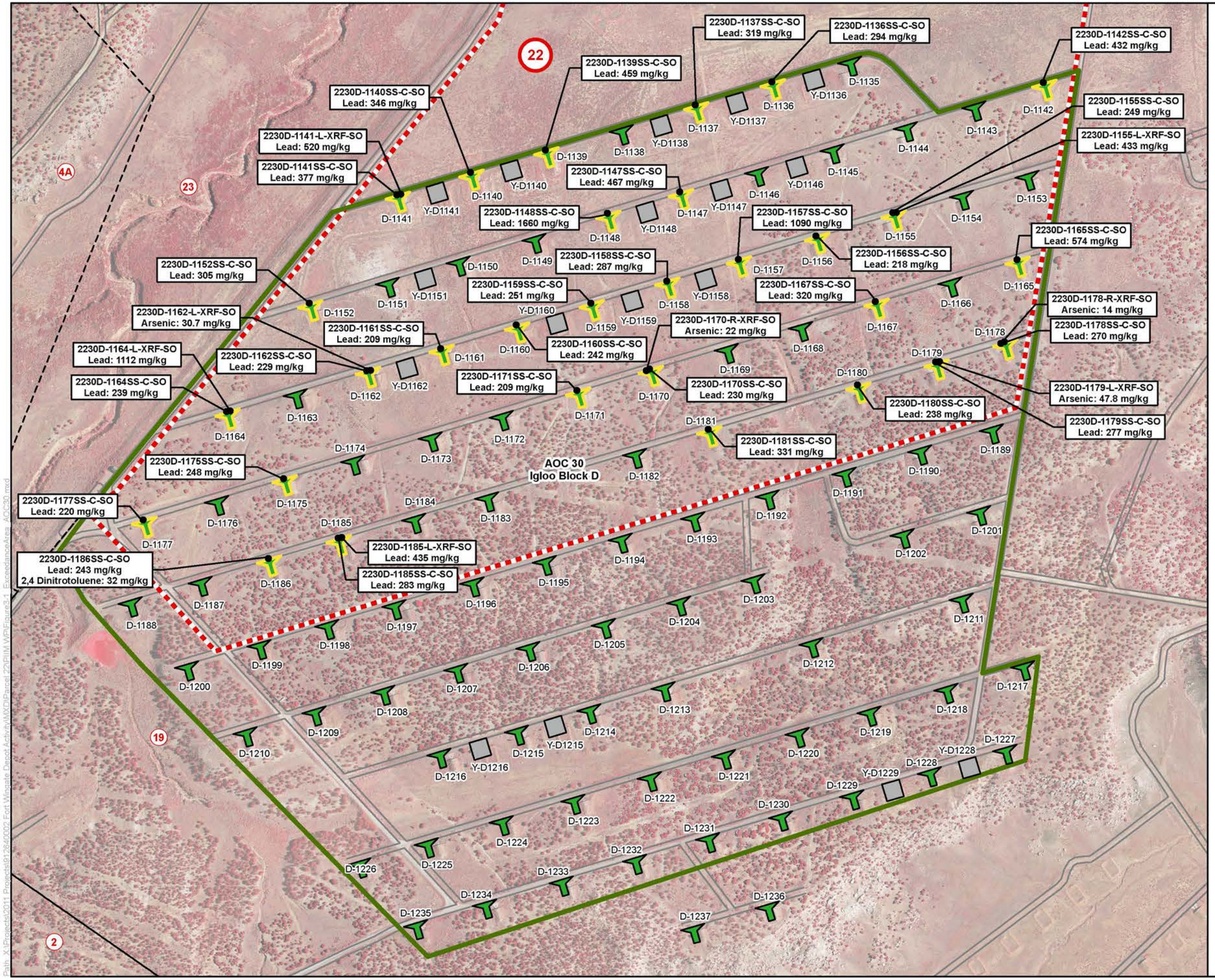
Sample Identification Number	Sample Depth (feet)	Sample Analyses
2230D-1136LEC-0.0-0.5D-SO	0 to 0.5	Lead – 6010C
2230D-1136REC-0.0-0.5D-SO	0 to 0.5	
2230D-1137LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1137REC-0.0-0.5D-SO	0 to 0.5	
2230D-1139LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1139REC-0.0-0.5D-SO	0 to 0.5	
2230D-1140LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1140REC-0.0-0.5D-SO	0 to 0.5	
2230D-1140REC-0.0-0.5D-DUP	0 to 0.5	
2230D-1141LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1141REC-0.0-0.5D-SO	0 to 0.5	
2230D-1142LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1142REC-0.0-0.5D-SO	0 to 0.5	
2230D-1147LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1147REC-0.0-0.5D-SO	0 to 0.5	
2230D-1148LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1148REC-0.0-0.5D-SO	0 to 0.5	
2230D-1152LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1152LEC-0.0-0.5D-DUP	0 to 0.5	
2230D-1152REC-0.0-0.5D-SO	0 to 0.5	
2230D-1155LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1155REC-0.0-0.5D-SO	0 to 0.5	
2230D-1156LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1156REC-0.0-0.5D-SO	0 to 0.5	
2230D-1157LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1157REC-0.0-0.5D-SO	0 to 0.5	
2230D-1158LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1158LEC-0.0-0.5D-DUP	0 to 0.5	
2230D-1158REC-0.0-0.5D-SO	0 to 0.5	
2230D-1159LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1159REC-0.0-0.5D-SO	0 to 0.5	
2230D-1160LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1160REC-0.0-0.5D-SO	0 to 0.5	
2230D-1161LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1161REC-0.0-0.5D-SO	0 to 0.5	
2230D-1162LEC-0.0-0.5D-SO	0 to 0.5	Lead and Arsenic – 6010C
2230D-1162REC-0.0-0.5D-SO	0 to 0.5	Lead – 6010C
2230D-1164LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1164REC-0.0-0.5D-SO	0 to 0.5	
2230D-1165LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1165REC-0.0-0.5D-SO	0 to 0.5	
2230D-1165REC-0.0-0.5D-DUP	0 to 0.5	
2230D-1167LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1167REC-0.0-0.5D-SO	0 to 0.5	
2230D-1170LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1170REC-0.0-0.5D-SO	0 to 0.5	

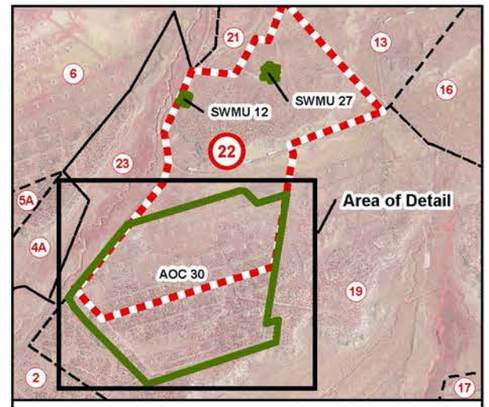
Sample Identification Number	Sample Depth (feet)	Sample Analyses
2230D-1171LEC-0.0-0.5D-SO	0 to 0.5	Lead – 6010C
2230D-1171REC-0.0-0.5D-SO	0 to 0.5	
2230D-1175LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1175REC-0.0-0.5D-SO	0 to 0.5	
2230D-1177LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1177REC-0.0-0.5D-SO	0 to 0.5	
2230D-1178LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1178REC-0.0-0.5D-SO	0 to 0.5	Lead and Arsenic – 6010C
2230D-1178REC-0.0-0.5D-DUP	0 to 0.5	Lead and Arsenic – 6010C
2230D-1179LEC-0.0-0.5D-SO	0 to 0.5	Lead and Arsenic – 6010C
2230D-1179REC-0.0-0.5D-SO	0 to 0.5	Lead – 6010C
2230D-1180LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1180REC-0.0-0.5D-SO	0 to 0.5	
2230D-1181LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1181REC-0.0-0.5D-SO	0 to 0.5	
2230D-1185LEC-0.0-0.5D-SO	0 to 0.5	
2230D-1185REC-0.0-0.5D-SO	0 to 0.5	
2230D-1186LEC-0.0-0.5D-SO	0 to 0.5	Lead and Explosives – 6010C and 8330B
2230D-1186REC-0.0-0.5D-SO	0 to 0.5	
2230D-1186REC-0.0-0.5D-DUP	0 to 0.5	

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

Sample Nomenclature
2230D-1136LEC-0.0-0.5D-SO
Parcel: 22
AOC: 30
Additional Site Identifier: D-1136 (in this case it's Igloo Block D number 1136)
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 Excavation Sample Location Map. AOC 30 - Igloo Block D





Parcel 22 Detail

Legend

- Previous Composite Sample or XRF Result with Concentrations Greater than 1/2 the NMED SSL for Lead or Greater than the NMED SSL Criteria as Listed:
  - Lead - 400 mg/kg
  - 2,4 Dinitrotoluene - 15.7 mg/kg
  - Arsenic - 11.2 mg/kg
- 1/4 Cubic Yards of Soil Will be Removed from Under Each Igloo Drain
- Igloo with NMED SSL Exceedance
- Igloo Location
- Revetment Location
- AOC/SWMU Boundary
- 22 Parcel Number
- Parcel 22 Boundary
- Parcel Boundary
- Road

Notes:

AOC	Area of Concern
mg/kg	Milligrams per Kilogram
NMED	New Mexico Environment Department
SSL	Soil Screening Levels
SWMU	Solid Waste Management Unit
XRF	X-Ray Fluorescence

Sample Identification Explanation:

22 (Parcel #), 30 (AOC #), D-1136 (Additional Site Identifier), SS (Source of Sample), C (Sample Type), SO (Sample Matrix)

Aerial Image Source: 2009, CIR

0 275 550 Feet

N

Parcel 22 Permittee-Initiated
Interim Measures Work Plan
Fort Wingate Depot Activity
McKinley County, New Mexico

Exceedance Area and Removal Area Map
AOC 30 - Igloo Block D

FIGURE **3-1**

Job No.:	912640002
PM:	JH
Date:	1/29/2015
Scale:	1" = 550'

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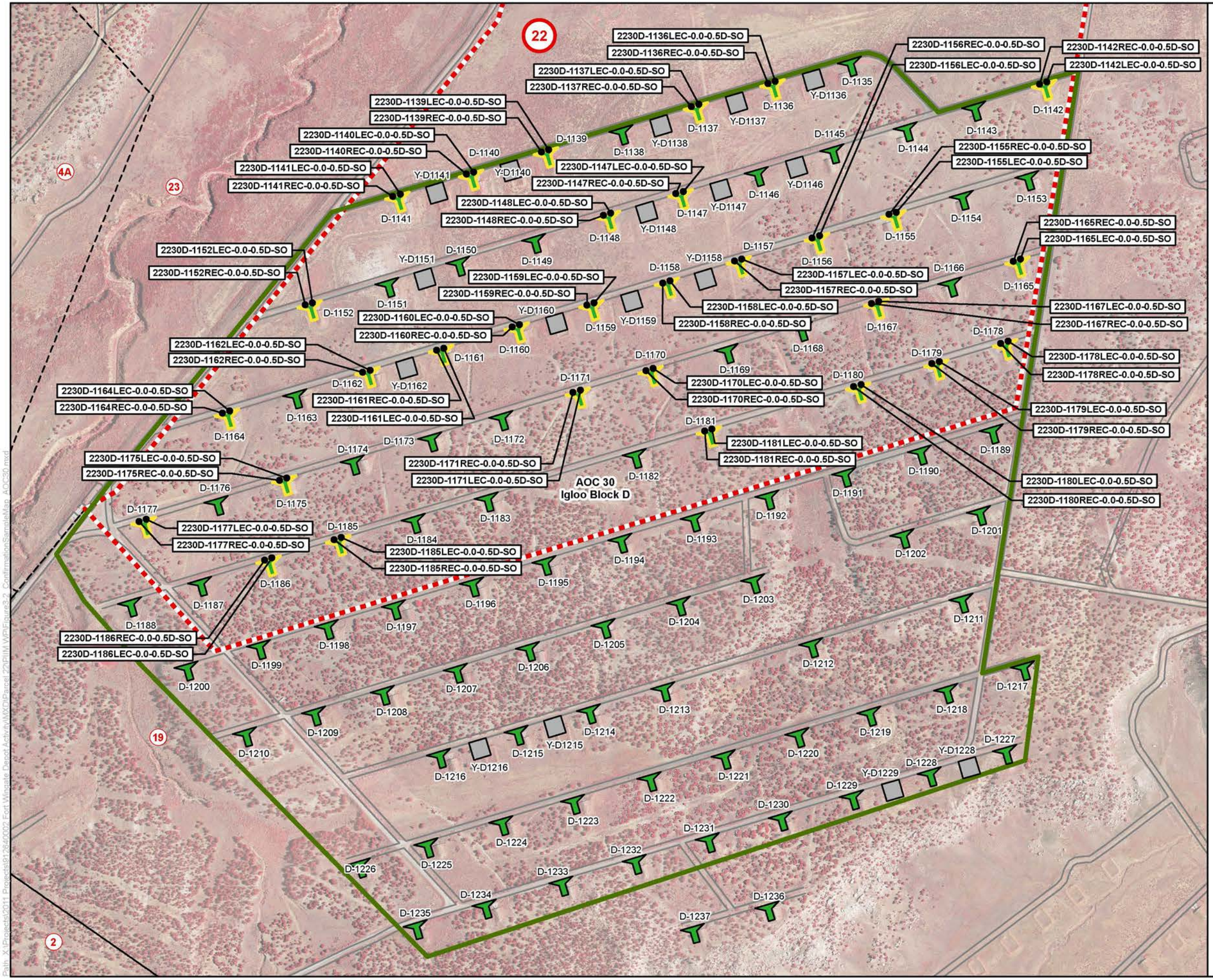

Parcel 22 Detail

Legend

- Proposed Location of Excavation Confirmation Sample to be Collected
- Igloo with NMED SSL Exceedance
- Igloo Location
- Revetment Location
- AOC/SWMU Boundary
- 22 Parcel Number
- Parcel 22 Boundary
- Parcel Boundary
- Road

Notes:

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

Sample Identification Explanation:

22	30	D-1136	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

0 275 550

Feet

N

Parcel 22 Permittee-Initiated Interim Measures Work Plan Fort Wingate Depot Activity McKinley County, New Mexico

Excavation Confirmation Sample Location Map AOC 30 - Igloo Block D

FIGURE 3-2

Job No.:	912640002
PM:	JH
Date:	1/29/2015
Scale:	1" = 550'

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SECTION 4.0 REMOVAL ACTIVITIES FOR TWO SEWER MANHOLES AT SWMU 12 – FORMER BUILDING 536

Building 536 was constructed in 1943 and demolished in 2010. The building contained areas for inspection and testing of various munitions. Building 536 was connected to the FWDA sanitary sewer system. The sewer line and two sewer manholes (Manholes F-1 and F-2) are present north of former Building 536 (USACE, 2011). General construction of the manholes consists of red brick and mortar with a concrete top and base.

Sediment samples were collected from the Manholes F-1 and F-2 with sample numbers 2212MANF1-SD03-00D-SO and 2212MANF2-SD04-00D-SO. The sample collected from the sediment of Manhole F-1 (2212MANF1-SS027D-SO) was analyzed for explosives, nitrocellulose, volatile organic compounds (VOCs), SVOCs, PCBs, nitrate, perchlorate, and RCRA total metals. The sample collected from the sediment of Manhole F-2 was only analyzed for explosives. One PCB constituent, Arochlor-1254 (5.1 mg/kg), one SVOC/PAH constituent, Benzo(a)pyrene (1.2 mg/kg), and one explosive constituent, 2,4-Dinitrotoluene (16.0 mg/kg) were detected in the sediment sample (2212MANF1-SD03-00D-SO) of sanitary sewer Manhole F-1 at concentrations that exceeded NMED SSLs. Explosives were not detected in the sediment of Manhole F-2 (USACE, 2011).

Soil samples were also collected from underneath Manholes F-1 and F-2 with sample numbers 2212MANF1-SS027D-SO and 2212MANF2-SS028D-SO. The samples were analyzed for VOCs, SVOCs, explosives, PCBs, RCRA total metals, nitrate, and perchlorate. Arsenic was detected in concentrations exceeding the NMED SSL of 3.90 mg/kg in the soil sample collected from underneath Manhole F-2 (2212MANF2-SS028D-SO) with a concentration of 4.2 mg/kg and in the sediment sample collected from Manhole F-1 (2212MANF1-SD03-00D-SO) with a concentration of 8.3 mg/kg (USACE, 2011). However, these concentrations do not exceed the new site-specific arsenic background level of 5.6 mg/kg for FWDA, or the acceptable range for arsenic background concentrations of 0.2 mg/kg to 11.2 mg/kg (NMED, 2013). Therefore, the concentrations previously identified do not constitute as an exceedance.

The locations of Manholes F-1 and F-2 with concentrations that exceeded NMED SSLs are depicted on **Figure 4-1**. The USACE recommended removing and properly disposing the sediment from Manholes F-1 and F-2 and to collapse and fill both manholes (USACE, 2011). The USACE has elected to perform removal actions of Manholes F-1 and F-2.

4.1 Waste Profile Sampling

An initial mobilization will be performed to conduct waste profile sampling for the sediment to be removed from Manholes F-1 and F-2. 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 approximately 100 cubic yards of sediment and material (red brick, mortar and concrete) will be excavated from Manholes F-1 and F2 for landfill disposal. Therefore, a total of one waste profile sample is planned to be collected and analyzed for PCBs using EPA Method 8082a, SVOCs using EPA Method 8270D, PAHs using EPA Method 8270 SIM, and explosives using EPA Method 8330B or most recently published

versions of the methods from the sediment of Manholes F-1 and F-2. Two explosive constituents, 2,4-dinitrotoluene (DNT) and nitrobenzene, will also be analyzed using the TCLP method by EPA Method 1311/8270D or most recently published version of the method.

Waste profile sample identification numbers are discussed in Section 6.3 and are listed on **Table 4-1**. 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 interim measures is to remove the manholes and surrounding impacted soil to levels that demonstrate that unacceptable potential cumulative risks and hazards based on a residential land use scenario are not expected to occur. This task includes all labor, materials and equipment required to remove Manholes F-1 and F-2 including the concrete base. A map showing the locations of Manholes F-1 and F-2 is provided as **Figure 4-1**.

Removed material 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 4,000-gallon water truck and two service trucks equipped with portable fuel tanks (100 gallons or less) and tools.

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 USACE to document recycling and disposal activities, and will be included in the final report.

4.3 Confirmation Sampling & Risk Evaluation

Following the removal of Manholes F-1 and F-2, one discrete confirmation sample will be collected from under the former base of each manhole and analyzed for PCBs using EPA Method 8082a, SVOCs using EPA Method 8270D, PAHs using EPA 8270 SIM, and explosives using EPA Method 8330B or most recently published versions of the methods. **Figure 4-2** depicts the proposed confirmation sample locations at the manholes.

Sample numbering will follow the protocol described in Section 6.3. Sample identification numbers are listed on **Table 4-2**.

The evaluation of potential risks/hazards from COPCs at Manhole F-1 will be performed separately from the evaluation of potential risks/hazards from COPCs at Manhole F-2. They are

being evaluated separately because they are separated by approximately 200 feet with no known soil impact between them.

The evaluation of COPCs at each manhole location will be 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 risk or hazard ratio is calculated for each detected compound for each sample by dividing the concentration by the SSL. At sample locations where the risk/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 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/hazard ratio for each compound at each sample location is less than 1, the evaluation progresses to the second step, which is the evaluation of potential cumulative health risk. As outlined in Section 5 of the NMED risk assessment guidance (NMED, 2012), the sum of risk ratios for carcinogenic compounds and hazard ratios for noncarcinogenic compounds will be calculated separately and compared to the target levels provided in **Table 2-2**. This will be done separately for each manhole. 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 provided in **Table 2-2**. If cumulative noncancer hazard indices or cancer risks are less than the target levels, then excavation will be considered complete. If the cumulative noncancer hazard indices and cancer risks are greater than target levels, then additional soil will be removed until the standard is met. 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 Backfill, Compaction, and Final Grading

Following the completion of excavation operations as verified by confirmation sampling, the former manhole locations will be backfilled to grade using imported fill material. The backfill material is anticipated to be obtained from an approved borrow area located on FWDA property.

Water will be added during excavation and loading operations to reduce dust generation and to achieve optimum moisture content requirements. Fill material will be placed in the excavations and compacted using wheeled rolling from on-site equipment. No density testing is required. The final grade 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 Manholes F-1 and F-2, SWMU 12 – Former Building 536

Sample Identification Number	Sample Depth (feet)	Sample Analyses
2212536WP-0.0-0.5C-SO	0.0 to 0.5	Polychlorinated Biphenyls - 8082 Semi-Volatile Organic Compounds – 8270D Polycyclic Aromatic Hydrocarbons - 8270 SIM Explosives – 8330B

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

Sample Nomenclature
2212536WP-0.0-0.5C-SO
Parcel: 22
SWMU: 12
Additional Site Identifier: 536 (in this case it's former Building 536)
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 Manholes F-1 and F-2, SWMU 12 – Former Building 536

Sample Identification Number	Sample Location	Sample Analyses
2212B536MANF-1EC-0.0-0.5D-SO	Base of Manhole F-1	Polychlorinated Biphenyls - 8082 Semi-Volatile Organic Compounds – 8270 Polycyclic Aromatic Hydrocarbons - 8270 SIM Explosives – 8330B
2212B536MANF-1EC-0.0-0.5D-DUP	Base of Manhole F-1	
2212B536MANF-2EC-0.0-0.5D-SO	Base of Manhole F-2	

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

Sample Nomenclature
2212B536MANF1-0.0-0.5C-SO
Parcel: 22
SWMU: 12
Additional Site Identifier: B536 (in this case it's former Building 536)
Source of Sample: MANF1 (in this case it's Manhole F-1)
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)

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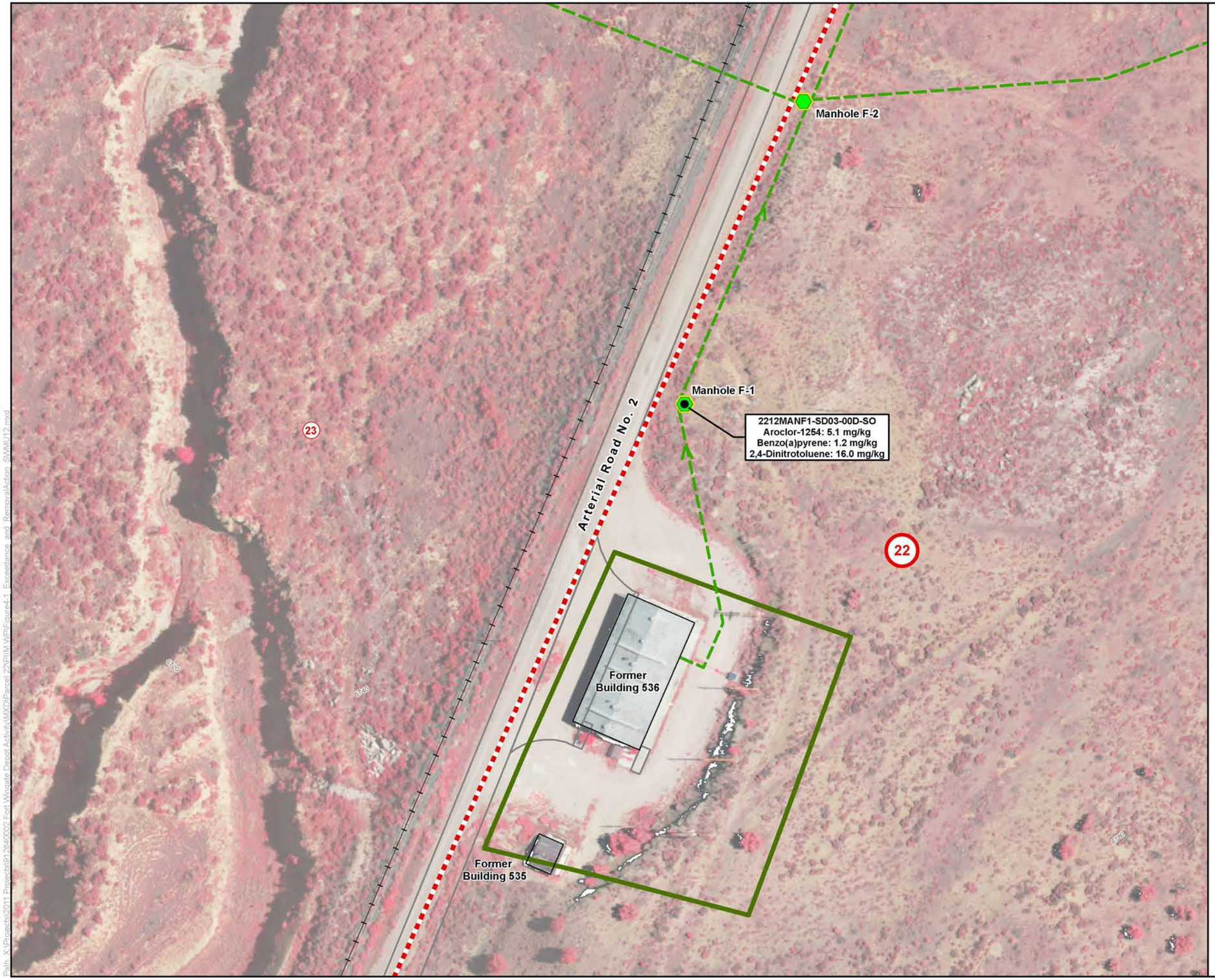

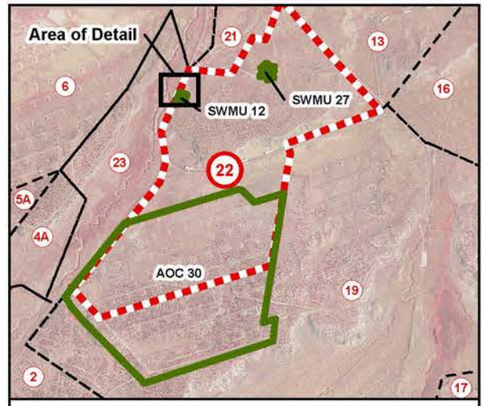

Parcel 22 Detail

Legend

- Previous Sample with Concentrations Greater than NMED SSL Criteria as Listed:
  - Aroclor-1254 - 1.12 mg/kg
  - Benzo(a)pyrene - 0.148 mg/kg
  - 2,4-Dinitrotoluene - 15.7 mg/kg
- Removal of Manhole Including Base
- Building Location
- Sanitary Sewer Line
- AOC/SWMU Boundary
- Road
- 22 Parcel Number
- Parcel 22 Boundary
- Parcel Boundary

Notes:

AOC	Area of Concern
J	Estimated Concentration
mg/kg	Milligrams per Kilogram
NMED	New Mexico Environment Department
SSL	Soil Screening Levels
SWMU	Solid Waste Management Unit
UST	Underground Storage Tank

Sample Identification Explanation:

22	12	MANF1	SD03	00	D	SO
Parcel #	SWMU #	Additional Site Identifier	Sediment Sample	Sample Depth	Sample Type	Sample Matrix

Aerial Image Source: 2009, CIR

0 40 80

Feet

N

Parcel 22 Permittee-Initiated
Interim Measures Work Plan
Fort Wingate Depot Activity
McKinley County, New Mexico

Exceedance and Removal Area Map
SWMU 12 - Former Building 536

FIGURE **4-1**

Job No.:	912640002
PM:	JH
Date:	1/29/2015
Scale:	1" = 80'

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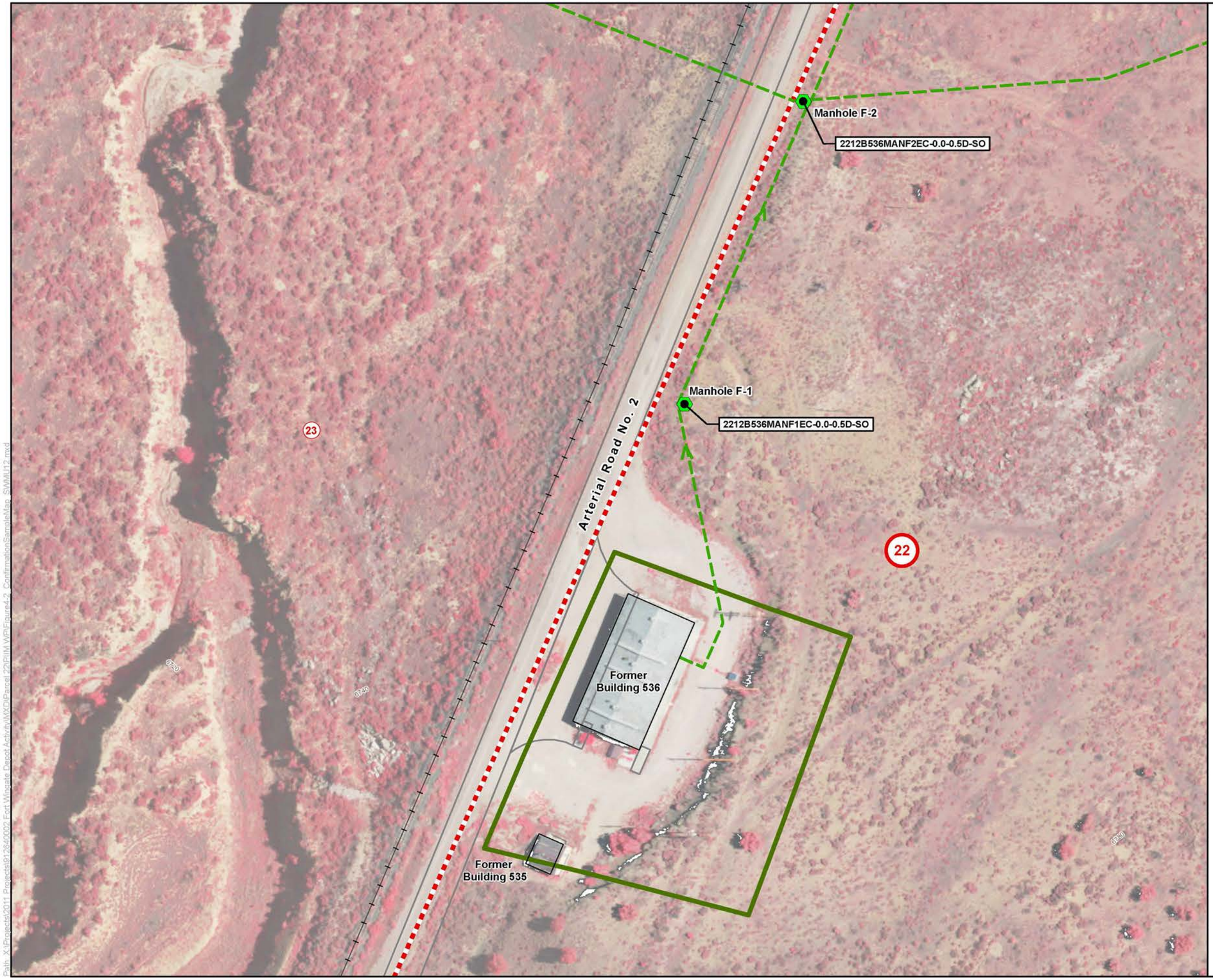

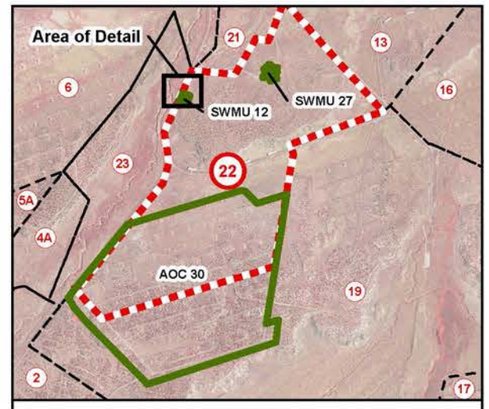

Parcel 22 Detail

Legend

- Proposed Location of Excavation Confirmation Sample to be Collected
- Manhole Location
- Building Location
- Sanitary Sewer Line
- AOC/SWMU Boundary
- Parcel Number
- Parcel 22 Boundary
- Parcel Boundary
- Road

Notes:

AOC Area of Concern
SWMU Solid Waste Management Unit
UST Underground Storage Tank

Sample Identification Explanation:

22	12	B536MANF1	EC	0.0-0.5	D	SO
Parcel #	SWMU #	Additional Site Identifier	Sample Purpose	Sample Depth	Sample Type	Sample Matrix

Aerial Image Source: 2009, CIR

0 40 80

Feet

N

Parcel 22 Permittee-Initiated
Interim Measures Work Plan
Fort Wingate Depot Activity
McKinley County, New Mexico

Excavation Confirmation Sample Location Map
SWMU 12 - Former Building 536

FIGURE **4-2**

Job No.:	912640002
PM:	JH
Date:	1/29/2015
Scale:	1" = 80'

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SECTION 5.0 REMOVAL ACTIVITIES AT SWMU 27 – FORMER BUILDING 528 COMPLEX

SWMU 27, the former Building 528 Complex, contained six structures: Building 528; Building 527; Building 550; Building 551; Buildings 528A and 528B; and Building 529, with another out building, Building 527. The structures contained areas for receiving, unpacking, disassembly and defusing of munitions, cleaning, derusting, painting, reassembly, container repairing, and abrasive blasting operations. The complex was connected to the sanitary sewer system and three manholes were present. All of the buildings in SWMU 27 along with their foundations were demolished in 2010. The manholes at the complex were also removed.

Previous soil investigations were performed to characterize the surface and subsurface impacts from former SWMU 27 operations. The following is a summary of areas where concentrations exceeding NMED SSLs were detected:

- PAH constituents (benzo(a)anthracene, benzo(a)pyrene, dibenzo(b)flouranthene, dibenzo(a,h)anthracene, and indeno(1,2,3)pyrene) were detected in seven samples (FAMSO02, FAMSO03, FAMSO04, FAMSO05, 2227BLDG528-SB27-05D-SO, 2227BLDG528-SB29-02D-SO, 2227BLDG528-SM30-05D-SO) at former Building 528 at depths up to 5 feet below ground surface (bgs). Concentrations of iron were also detected in one sample (FAMSO05) around former Building 528.
- One PAH constituent benzo(a)pyrene was detected in one sample (2227BLDGCOMP-SB38-00D-SO) collected from an area south of former Building 527 at a depth of less than 1 foot bgs.
- Arsenic concentrations were detected in two samples (2227B551P02SB-06-SO1 and 227B551P11SB-18-SO1) at former Building 551 at depths of up to 1.5 feet bgs.
- Arsenic and lead concentrations were detected in one sample (2227MANHOLEI1-SS092D-SO) at the former location of Manhole I-3 at a depth of less than 1 foot bgs. (The sample was mislabeled as Manhole I-1 during the previous soil characterization.)

The locations of the areas with concentrations that exceeded NMED SSLs are depicted on **Figure 5-1**.

Iron (40,700 mg/kg) and vanadium (88.3 mg/kg) were detected in concentrations that exceeded the previous NMED SSLs in soil samples FAMSO04 and FAMSO05 collected from around former Building 528. NMED recently elevated the SSLs for iron and vanadium. Therefore, the concentrations previously identified do not constitute as an exceedance. Removal will still occur at these areas because concentrations of PAH constituents and iron exceed NMED SSLs.

The USACE has elected to perform removal actions of the exceedance areas at SWMU 27. The removal will be performed with UXO technician oversight.

5.1 Waste Profile Sampling

An initial mobilization will be performed to conduct waste profile sampling at the former Building 528 Complex. 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 approximately 200 cubic yards of soil will be excavated from the former Building 528 Complex. Therefore, a total of one waste profile sample is planned to be collected for analysis.

The waste profile composite sample will be collected as surface grab samples from 0 to 0.5 foot depth over the entire areas to be excavated. Waste profile sample identification numbers are discussed in Section 6.3 and are listed on **Table 5-1**. Samples will be submitted for analysis for SVOCs using EPA Method 8270, PAHs using EPA Method 8270 SIM and RCRA 8 Metals using EPA Methods 6010C/7471B or the most current recently published versions of the methods. 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.

5.2 Excavation, Transportation, and Disposal

The goal of the interim measures is to remove all impacted soils associated with the former Building 528 complex to levels that demonstrate that unacceptable potential cumulative risks and hazards based on a residential land use scenario are not expected to occur. This task includes all labor, materials and equipment required to perform the removal of approximately 200 cubic yards of soil impacted with SVOCs, PAHs and metals at the former Building 528 Complex.

Based upon the SVOC/PAH and metals concentrations discovered during previous sampling activities at the former Building 528 Complex, there will be six removal areas (Building 528 Areas A, B, C, D, E, and F) located around the former Building 528. Two removal areas (Building 551 Areas A and B) will be located at former Building 551. Two other removal areas will be located south of former Building 527 (Building 527 Area A) and at the location of former Manhole I-3. Each removal area will be excavated to depths up to 5.5 feet bgs. A map showing the location and extent of removal areas for Building 528 Complex is provided as **Figure 5-2**.

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 4,000-gallon water truck and two service trucks equipped with portable fuel tanks (100 gallons or less) and tools.

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 USACE to document recycling and disposal activities, and will be included in the final report.

5.3 Confirmation Sampling & Risk Evaluation

Following the removal of impacted soil from the former Building 528 Complex, confirmation sampling will be conducted on the floor and sidewalls of each excavation. Composite samples will consist of nine sub-samples randomly collected from the excavation area bottoms. One discrete sample will be collected from the sidewalls of each excavation. A total of 10, nine-part composite samples, or one from each removal area, and one duplicate sample will be collected from the excavation areas. Four discrete samples will be collected from the sidewalls of each excavation area for a total of 40 discrete samples and four duplicate samples. **Figures 5-3 and 5-4** depict the proposed confirmation sample locations at the former Building 528 Complex.

Sample numbering will follow the protocol described in Section 6.3. Sample identification numbers are listed on **Table 5-2.** Confirmation samples will be analyzed for SVOCs using EPA Method 8270, PAHs using EPA Method 8270 SIM and RCRA 8 Metals using EPA Methods 6010C/7471B or the most current recently published versions of the methods.

Analytical data will be compared to the remediation goals established in Section 2.2. The evaluation of potential risks/hazards from COPCs within the Building 528 Complex will be segregated into two areas based on the list of COPCs: (1) PAHs and iron around Buildings 527-528, and (2) arsenic around former Buildings 550-551 and former Manhole I-3. These areas are being evaluated separately because they are separated by a minimum of 100 feet with no known soil impact between them, and because the COPCs between these areas do not overlap.

The evaluation of lead will be performed separately from the evaluation of other COPCs 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 IEUBK model (NMED, 2012, 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 arsenic at former Buildings 550-551 and former Manhole I-3 will consist of a sample-by-sample comparison of confirmation sample results to the SSL. If the SSL is exceeded for arsenic 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 arsenic when all confirmation sample locations meet the SSL for arsenic. No cumulative evaluation is required because former Buildings 527-528 and former Buildings 550-551 are being evaluated as two separate source and exposure areas.

The evaluation of PAHs and iron at former Buildings 527-528 will consist of two steps: (1) comparison of the individual PAH and iron results from each sample location to their respective SSLs, and (2) an evaluation of cumulative risk. The first step is to calculate the risk or hazard ratio for each detected COPC in each sample by dividing the concentration by SSL. At sample locations where the risk or hazard ratio of one or more COPCs is greater than 1 (i.e. concentration exceeds the SSL), additional soil will be removed until the standard is met (i.e. the risk/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. The cumulative risk evaluation will start with evaluation of a "worse-case" exposure that sums the potential health risks from the maximum detected concentration of each COPC from all confirmation samples. As outlined in Section 5 of the NMED risk assessment guidance (NMED, 2012), 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 provided in **Table 2-2**. If cumulative noncancer hazard indices or cancer risks posed by potential "worse-case" exposure are less than the target levels, then excavation will be considered complete for all COPCs. 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 would progress to an evaluation at the excavation level. This evaluation limits the assumed exposure area to each of the six excavations and would therefore sum potential health risks based on the maximum detected concentration for each area of excavation. If the cumulative noncancer indices and cancer risks predicted for the exposure at each excavation were less than target risk levels, the excavation would be considered complete for all COPCs. Although the evaluation limits the exposure area, closure based on an excavation-level evaluation is still considered protective because it would be unlikely for a future receptor to be exposed simultaneously to the maximum concentration within each of the six areas of excavation around former Buildings 527 and 528 for the exposure frequency (350 days/year) and exposure duration (30 years) assumed by the SSLs. However, if the cumulative noncancer hazard indices and cancer risks predicted for one or more excavation areas were greater than the target levels, then a further evaluation of cumulative risk would be performed for the affected excavations.

The evaluation of cumulative risk for the affected excavations 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 UCL concentrations 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 locations (by summing detected COPCs 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 COPCs that have similar health endpoints into separate sums to determine if a group of COPCs 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 cumulative noncancer hazard indices or cancer risks are less than target levels, then the excavation would be considered complete. If the cumulative noncancer hazard indices or cancer risks predicted are greater than target levels, then additional soil will be removed until the standard is met. Note that if cumulative risks/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.

5.4 Waste Volume Determination

Pre and post removal surveys at the former Building 528 Complex will be performed to determine waste volumes. The surveys will be performed under the supervision of a professional surveyor, licensed in the State of New Mexico.

5.5 Backfill, Compaction, and Final Grading

Following the completion of excavation operations as verified by confirmation sampling, the excavated areas at the former Building 528 Complex will be backfilled to grade using imported fill material, if necessary. The backfill material is anticipated to be obtained from an approved borrow area located on FWDA property.

Water will be added during excavation and loading operations to reduce dust generation and to achieve optimum moisture content requirements. Fill material will be placed in the excavations and compacted using wheeled rolling from on-site equipment. No density testing is required. The final grade at the former Building 528 Complex will be sloped to promote proper storm water drainage and to prevent ponding if minor settling occurs.

Table 5-1 Summary of Waste Profile Samples to be Collected at SWMU 27 - Former Building 528 Complex

Sample Identification Number	Sample Depth (feet)	Sample Analyses
2227528WP-0.0-0.5C-SO	0.0 to 0.5	Semi-Volatile Organic Compounds – 8270D Polycyclic Aromatic Hydrocarbons - 8270 SIM RCRA 8 Metals – 6010C/7471B

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

Sample Nomenclature
2227528WP01-0.0-0.5-D-SO
Parcel: 22
SWMU: 27
Additional Site Identifier: 528 (in this case it's former Building 528)
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: D (discrete)
Sample Matrix: SO (soil)

Table 5-2 Summary of Excavation Confirmation Samples to be Collected at SWMU 27 – Former Building 528 Complex

Sample Identification Number	Sample Location	Sample Analyses
2227B528AEC-0.0-0.5C-SO	Former Building 528 Area A Excavation Bottom	SVOCs – 8270D PAHs - 8270 SIM
2227B528BEC-0.0-0.5C-SO	Former Building 528 Area B Excavation Bottom	
2227B528CEC-0.0-0.5C-SO	Former Building 528 Area C Excavation Bottom	
2227B528CEC-0.0-0.5C-DUP	Former Building 528 Area C Excavation Bottom	
2227B528DEC-0.0-0.5C-SO	Former Building 528 Area D Excavation Bottom	
2227B528EEC-0.0-0.5CSO	Former Building 528 Area E Excavation Bottom	
2227B528FEC-0.0-0.5CSO	Former Building 528 Area F Excavation Bottom	
2227B527AEC-0.0-0.5C-SO	South of former Building 527 Area A Excavation Bottom	
2227B551AEC-0.0-0.5C-SO	Former Building 551 Area A Excavation Bottom	RCRA 8 Metals – 6010C/7471B
2227B551BEC-0.0-0.5C-SO	Former Building 551 Area B Excavation Bottom	
2227ManholeI-3EC-0.0-0.5C-SO	Former Manhole I-3 Excavation Bottom	RCRA 8 Metals – 6010C/7471B
2227B528AEC-01D-SO	Former Building 528 Area A Sidewall	SVOCs – 8270D PAHs - 8270 SIM RCRA 8 Metals – 6010C/7471B
2227B528AEC-02D-SO	Former Building 528 Area A Sidewall	
2227B528AEC-03D-SO	Former Building 528 Area A Sidewall	
2227B528AEC-04D-SO	Former Building 528 Area A Sidewall	
2227B528AEC-04D-DUP	Former Building 528 Area A Sidewall	
2227B528BEC-01D-SO	Former Building 528 Area B Sidewall	SVOCs – 8270D PAHs - 8270 SIM
2227B528BEC-02D-SO	Former Building 528 Area B Sidewall	
2227B528BEC-03D-SO	Former Building 528 Area B Sidewall	
2227B528BEC-04D-SO	Former Building 528 Area B Sidewall	
2227B528CEC-01D-SO	Former Building 528 Area C Sidewall	
2227B528CEC-02D-SO	Former Building 528 Area C Sidewall	
2227B528CEC-03D-SO	Former Building 528 Area C Sidewall	
2227B528CEC-04D-SO	Former Building 528 Area C Sidewall	

Sample Identification Number	Sample Location	Sample Analyses
2227B528DEC-01D-SO	Former Building 528 Area D Sidewall	SVOCs – 8270D PAHs - 8270 SIM
2227B528DEC-02D-SO	Former Building 528 Area D Sidewall	
2227B528DEC-03D-SO	Former Building 528 Area D Sidewall	
2227B528DEC-04D-SO	Former Building 528 Area D Sidewall	
2227B528DEC-04D-DUP	Former Building 528 Area D Sidewall	
2227B528EEC-01D-SO	Former Building 528 Area E Sidewall	
2227B528EEC-02D-SO	Former Building 528 Area E Sidewall	
2227B528EEC-03D-SO	Former Building 528 Area E Sidewall	
2227B528EEC-04D-SO	Former Building 528 Area E Sidewall	
2227B528FEC-01D-SO	Former Building 528 Area F Sidewall	
2227B528FEC-02D-SO	Former Building 528 Area F Sidewall	
2227B528FEC-03D-SO	Former Building 528 Area F Sidewall	
2227B528FEC-04D-SO	Former Building 528 Area F Sidewall	
2227B527EC-01D-SO	South of former Building 527 Area A Sidewall	
2227B527EC-02D-SO	South of former Building 527 Area A Sidewall	
2227B527EC-03D-SO	South of former Building 527 Area A Sidewall	
2227B527EC-04D-SO	South of former Building 527 Area A Sidewall	
2227B551AEC-01D-SO	Former Building 551 Area A Sidewall	RCRA 8 Metals – 6010C/7471B
2227B551AEC-02D-SO	Former Building 551 Area A Sidewall	
2227B551AEC-03D-SO	Former Building 551 Area A Sidewall	
2227B551AEC-04D-SO	Former Building 551 Area A Sidewall	
2227B551AEC-04D-DUP	Former Building 551 Area A Sidewall	
2227B551BEC-01D-SO	Former Building 551 Area B Sidewall	
2227B551BEC-02D-SO	Former Building 551 Area B Sidewall	
2227B551BEC-03D-SO	Former Building 551 Area B Sidewall	

Sample Identification Number	Sample Location	Sample Analyses
2227B551BEC-04D-SO	Former Building 551 Area B Sidewall	RCRA 8 Metals – 6010C/7471B
2227ManholeI-3EC-01D-SO	Former Manhole I-3 Sidewall	
2227ManholeI-3EC-01D-DUP	Former Manhole I-3 Sidewall	
2227ManholeI-3EC-02D-SO	Former Manhole I-3 Sidewall	
2227ManholeI-3EC-03D-SO	Former Manhole I-3 Sidewall	
2227ManholeI-3EC-04D-SO	Former Manhole I-3 Sidewall	

Notes:
Samples will be analyzed using the most recently published versions of the analytical methods.
SVOCs = Semi-Volatile Organic Compounds
PAHs = Polycyclic Aromatic Hydrocarbons

Sample Nomenclature
2227B528AEC-0.0-0.5-C-SO
Parcel: 22
SWMU: 27
Additional Site Identifier: B528 (in this case it's for former Building 528)
Source of Sample: A (in this case it's Building 537 Area A)
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)

2227B528AEC-01D-SO
Parcel: 22
SWMU: 27
Additional Site Identifier: B528 (in this case it's former Building 528)
Source of Sample: A (in this case it's Building 537 Area A)
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) (in this case it's soil)

Refer to Figures 5-3 and 5-4. Confirmation Sample Location Map. SWMU 8 (Building 537)

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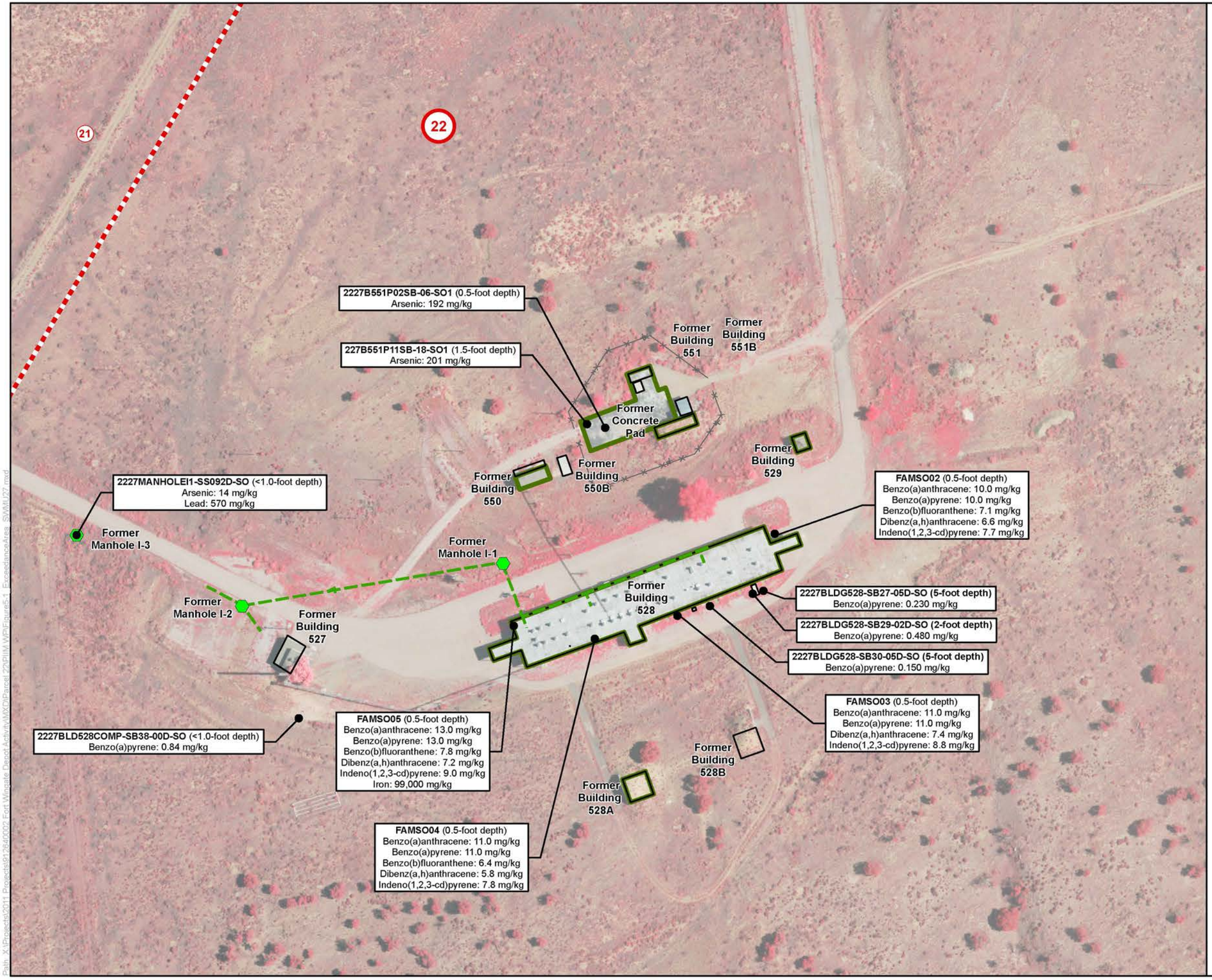
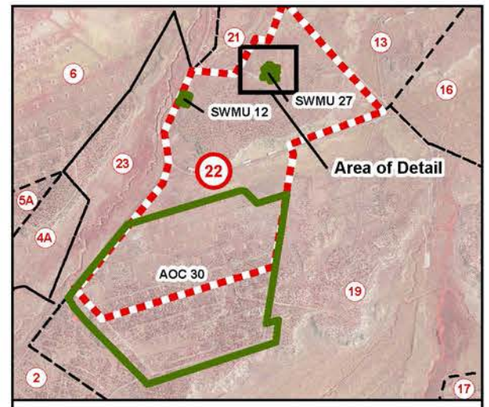




Parcel 22 Detail

Legend

- Previous Sample Location with Concentrations that Exceed NMED SSL Criteria as Listed:
  - Arsenic - 11.2 mg/kg
  - Benzo(a)anthracene - 1.48 mg/kg
  - Benzo(a)pyrene - 0.148 mg/kg
  - Benzo(b)fluoranthene - 1.48 mg/kg
  - Dibenz(a,h)anthracene - 0.148 mg/kg
  - Ideno(1,2,3-cd)pyrene - 1.48 mg/kg
  - Iron - 54,800 mg/kg
  - Lead 400.0 mg/kg
- Sanitary Sewer Line
- Building Location
- Fenceline
- Former Manhole Location
- AOC/SWMU Boundary
- 22 Parcel Number
- Parcel 22 Boundary
- Parcel Boundary

Notes:

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

The sample ID on the figure is abbreviated; the complete sample ID is defined below:

22	27	B551P11	SB	18	SO1
Parcel #	AOC #	Additional Site Identifier	Source of Sample	Sample Depth	Sample Matrix

Aerial Image Source: 2009, CIR

0 60 120

Feet

N

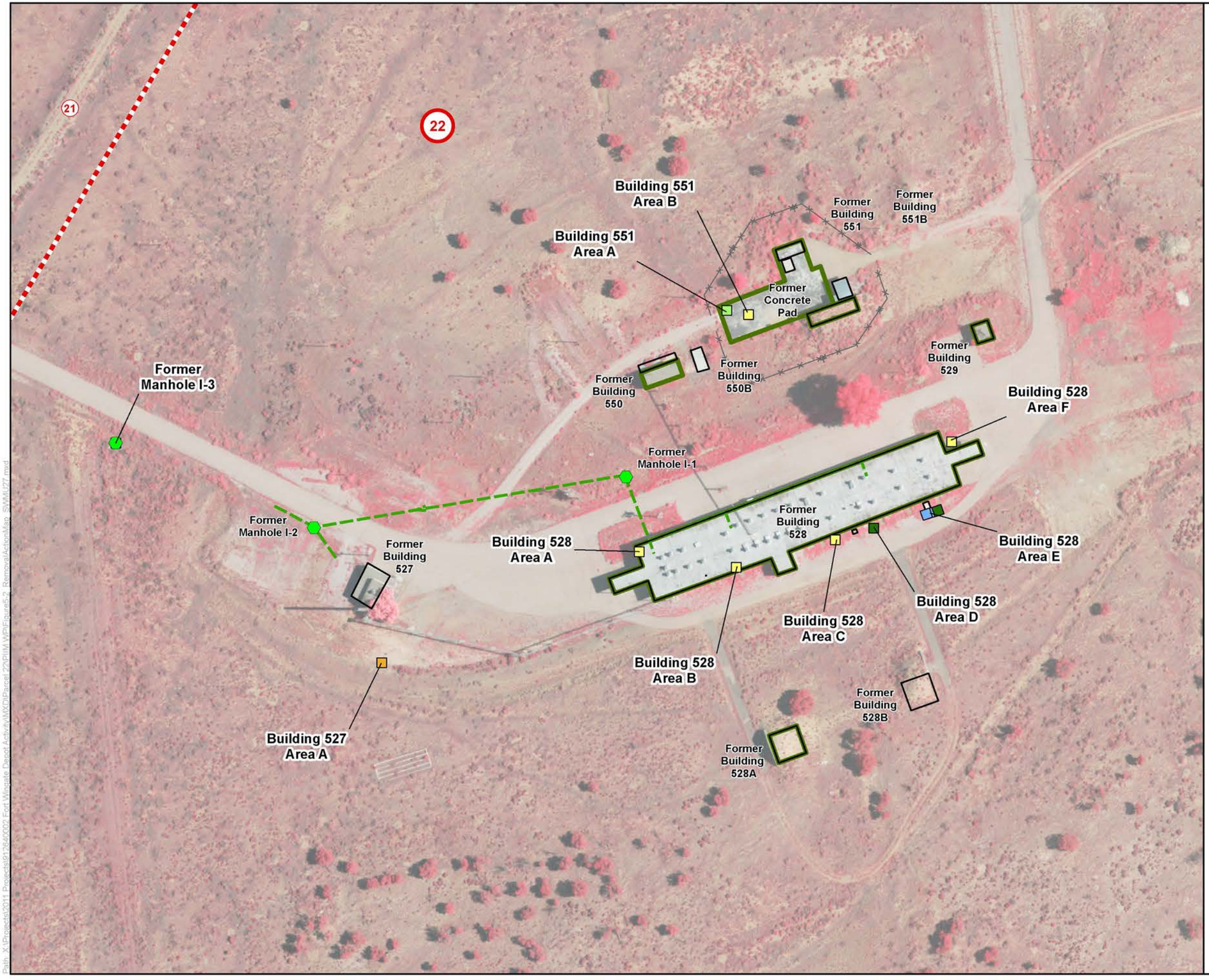
Parcel 22 Permittee-Initiated
Interim Measures Work Plan
Fort Wingate Depot Activity
McKinley County, New Mexico

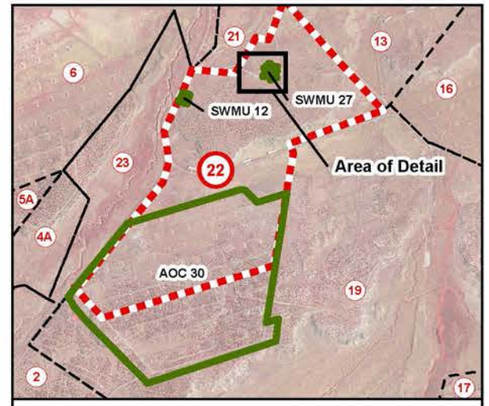
Exceedance Area Map
SWMU 27- Former Building 528 Complex

FIGURE **5-1**

Job No.:	912640002
PM:	JH
Date:	1/29/2015
Scale:	1" = 120'

amec foster wheeler





Parcel 22 Detail

Legend

Proposed Approximate Removal Area
(10 feet x 10 feet) and Depth

- 1 Foot
- 1.5 Feet
- 2 Feet
- 2.5 Feet
- 5.5 Feet
- Former Manhole Location
- Sanitary Sewer Line
- Building Location
- Fenceline
- AOC/SWMU Boundary
- 22 Parcel Number
- Parcel 22 Boundary
- Parcel Boundary

Notes:

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

0 60 120
Feet

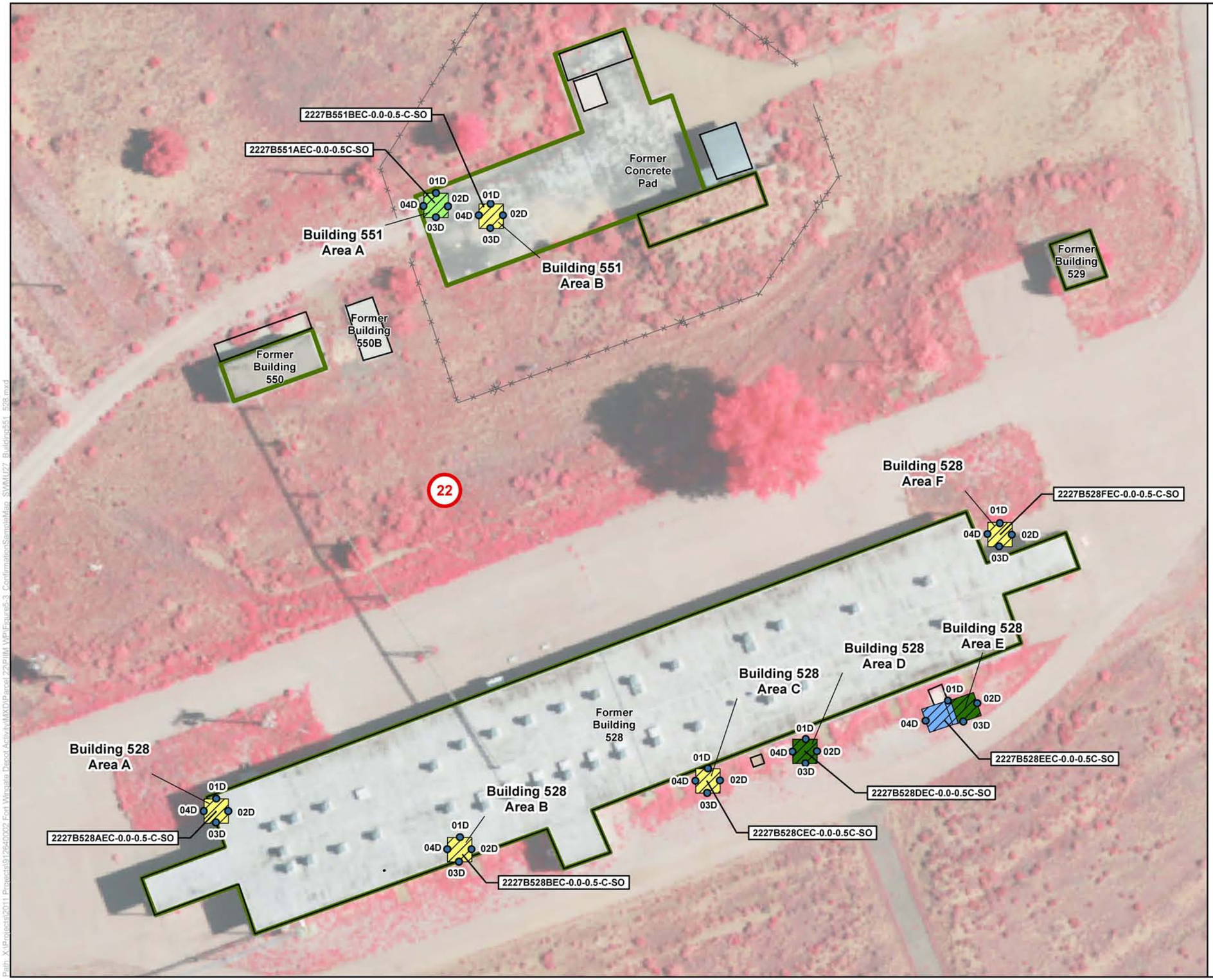
N

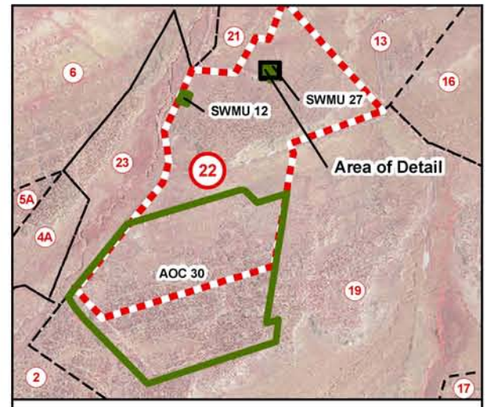
Parcel 22 Permittee-Initiated
Interim Measures Work Plan
Fort Wingate Depot Activity
McKinley County, New Mexico

Removal Action Map - SWMU 27
Former Building 528 Complex

FIGURE		
5-2	Job No.:	912640002
	PM:	JH
	Date:	1/29/2015
	Scale:	1" = 120'

amec foster wheeler





Parcel 22 Detail

Legend

- Proposed Location of Discrete Sidewall Excavation Confirmation Sample
- Proposed Composite Excavation Confirmation Sample from Bottom of Excavation (9 Increments; Depth 0.0-0.5 feet)

Approximate Removal Area (10 feet x 10 feet) and Depth

- 1 Foot
- 2 Feet
- 2.5 Feet
- 5.5 Feet
- Building Location
- Fenceline
- AOC/SWMU Boundary
- 22 Parcel Number
- Parcel 22 Boundary
- Parcel Boundary

Notes:

AOC Area of Concern
SWMU Solid Waste Management Unit

Sample Identification Explanation:

22	27	B528A	EC	0.0-0.5	D	SO
Parcel #	SWMU #	Additional Site Identifier	Source of Sample	Sample Depth	Sample Type	Sample Matrix

22	27	B528A	EC	01	D	SO
Parcel #	SWMU #	Additional Site Identifier	Source of Sample	Increment #	Sample Type	Sample Matrix

Aerial Image Source: 2009, CIR

0 20 40 Feet

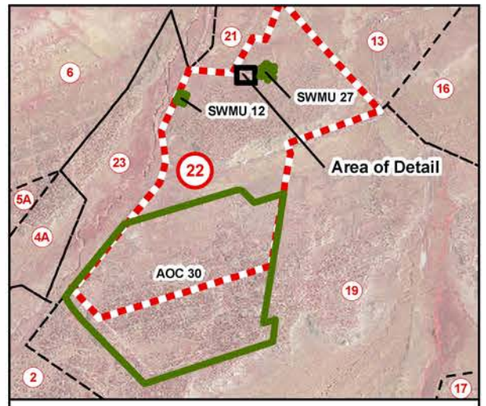
N

Parcel 22 Permittee-Initiated
Interim Measures Work Plan
Fort Wingate Depot Activity
McKinley County, New Mexico

Excavation Confirmation Sample Location Map SWMU 27- Former Buildings 551 and 528

FIGURE 5-3	Job No.:	912640002
	PM:	JH
	Date:	2/9/2015
	Scale:	1" = 40'

amec foster wheeler



Parcel 22 Detail

Legend

- Proposed Location of Discrete Sidewall Excavation Confirmation Sample
- Proposed Composite Excavation Confirmation Sample from Bottom of Excavation (9 Increments; Depth 0.0-0.5 feet)

Approximate Removal Area (10 feet x 10 feet) and Depth

- 1.5 Feet
- Former Manhole Location
- Parcel 22 Boundary
- Parcel Boundary
- 22 Parcel Number

Notes:

AOC Area of Concern
SWMU Solid Waste Management Unit

Sample Identification Explanation:

Parcel #	SWMU #	Additional Site Identifier	Source of Sample	Sample Depth	Sample Type	Sample Matrix
22	27	B527A	EC	0.0-0.5	D	SO

Parcel #	SWMU #	Additional Site Identifier	Source of Sample	Increment #	Sample Type	Sample Matrix
22	27	B527A	EC	01	D	SO

Aerial Image Source: 2009, CIR

0 20 40
Feet

N

Parcel 22 Permittee-Initiated
Interim Measures Work Plan
Fort Wingate Depot Activity
McKinley County, New Mexico

Excavation Confirmation Sample Location Map SWMU 27- Former Building 527 and Former Manhole I-3

FIGURE **5-4**

Job No.:	912640002
PM:	JH
Date:	2/9/2015
Scale:	1" = 40'

amec foster wheeler

Path: X:\Projects\2011 Projects\912640002 Fort Wingate Depot Activity\MXD\Parcel 22\FIM WP\Figure5-4_ConfirmationSampleMap_SWMU27_Building527_Manhole1-1.mxd

SECTION 6.0 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 characterization and excavation confirmation purposes. A summary of analytical methods, sample containers, preservatives, and holding times is provided in **Table 6-1**. Details regarding waste characterization sampling are provided in Sections 3.0, 4.1, and 5.1 for Igloo Block D, SWMU 12, and SWMU 27, respectively; details regarding excavation confirmation sampling are provided in Sections 3.0, 4.3, and 5.3 for Igloo Block D, SWMU 12, and SWMU 27, respectively.

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.

6.1 Collection of Samples for Other Analyses

Samples for all other analyses will be placed using either a stainless steel spoon/trowel or a disposable scoop directly in laboratory supplied clean containers with a moisture-tight lid. The sample containers will then be placed into a cooler with ice and cooled to less than or equal to 6 degrees centigrade (ºC). Lids will be sealed by labels or custody seals to prevent tampering.

6.2 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.

6.2.1 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 6-2** summarizes the planned QC samples for this project. A description of each QC sample type is provided in the following sections.

6.2.1.1 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.

6.2.1.2 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 and Water Blanks

Equipment blanks will be collected to monitor the cleanliness of sampling equipment and the effectiveness of decontamination procedures. A water blank of the source rinsate water for the

equipment blank will also be included. The water blank of the decontamination water will be added for each water source used for decontamination collected prior to initiating 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 and water blank concentrations are to be less than the method's reporting limit. Equipment and water 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. Samples associated with equipment water 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%).

6.2.2 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 described in Table B1 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

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

The percent completeness goal for this sampling event is 90 percent.

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 6-3**.

6.2.3 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 verification, review, and validation. Data verification and review will be performed when the data packages are received from the laboratory. Verification will be performed on an analytical-batch basis using the summary results of calibration and laboratory QC, as well as those of the associated field samples. 100% of the data packages will undergo data verification and data review. The following items will be addressed in the data verification and data review:

- 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 6-4**.
- Any significant data quality problems will be brought to the attention of the project chemist.

6.2.4 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.

6.3 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. Igloo Block D, Buildings 535 and 536 and the Former Building 528 Complex.

Example Waste Profile Sample ID:

2227528WP01-0.0-0.5-D-SO
Parcel: 22
SWMU: 27
Additional Site Identifier: 528 (in this case it's former Building 528)
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: D (discrete)
Sample Matrix: SO (soil)

Example Excavation Confirmation Sample ID:

2230D-1136LEC01-0.0-0.5-D-SO
Parcel: 22
AOC: 30
Additional Site Identifier: D-1136 (in this case it's Igloo Block D number 1136)
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 TB for trip blank, 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., trip blanks). Examples are provided below.

Example Duplicate of Excavation Confirmation Sample:

2230D-1136LEC01-0.0-0.5-D-DUP

6.4 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 6.4), 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 6.7.

6.5 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. Each cooler shipped from the laboratory containing aqueous sample bottles for VOC analyses will contain a trip blank. The trip blank will stay with the cooler until the cooler is returned to the analytical laboratory. All coolers will be taped shut and a custody seal will be placed over the tape to prevent tampering.

6.6 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.

6.7 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.

6.8 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 UTM coordinates.

6.9 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.

6.10 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 6-1 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 and 1311/8270D	8-oz Glass Jar	Cool to ≤ 6°C	14 days
Semi-Volatile Organic Compounds	Soil	8270D	4-oz Glass Jar	Cool to ≤ 6°C	14 days
Polycyclic Aromatic Hydrocarbons	Soil	8270 SIM	4-oz Glass Jar	Cool to ≤ 6°C	14 days
Polychlorinated biphenyls	Soil	8082	8-oz Glass Jar	Cool to ≤ 6°C	14 days
RCRA 8 Metals	Soil	6010C/7471B and 1311/6010C	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.
°C = Degrees Celsius
EPA = U.S. Environmental Protection Agency
oz = ounce
RCRA = Resource Conservation and Recovery Act

Table 6-2 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 and Water Blank	One per day for reusable 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 6-3 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 (mg/kg)	Detection Limit (mg/kg)
Metals[3]					
Lead	400	------	1.0	0.3	0.15
Silver	391	------	1.0	0.3	0.15
Arsenic*	5.6*	------	1.0	0.4	0.2
Barium	15,600	------	1.0	0.2	0.1
Cadmium	70.3	------	1.0	0.2	0.1
Total Chromium	117,000	------	1.0	0.3	0.15
Selenium	391	------	1.0	0.5	0.2708
Mercury	15.6	------	0.1	0.02	0.01
Polychlorinated Biphenyls[4]					
Aroclor-1016	3.93	------	.050	.017	.013
Aroclor-1221	1.49	------	.050	.017	.0083
Aroclor-1232	1.49	------	.050	.017	.009
Aroclor-1242	2.22	------	.050	.017	.0093
Aroclor-1248	2.22	------	.050	.017	.0083
Aroclor-1254	1.12	------	.050	.017	.0083
Aroclor-1260	2.22	------	.050	.017	.0099
Polynuclear Aromatic Hydrocarbons[5]					
Acenaphthene	3,440	------	.010	.0025	.00125
Anthracene	17,200	------	.010	.0025	.00125
Benzo(a)anthracene	1.48	------	10	5	2.45
Benzo(a)pyrene	0.148	------	.010	.0025	.00125
Benzo(b)fluoranthene	1.48	------	.010	.0025	.00125
Benzo(k)fluoranthene	14.8	------	.010	.0025	.00125
Chrysene	148	------	10	5	2.2
Dibenz(a,h)anthracene	0.148	------	.010	.0025	.00125
Fluoranthene	2,290	------	.010	.0025	.00125
Fluorene	2,290	------	.010	.0025	.00125
Indeno(1,2,3-c,d)pyrene	1.48	------	.010	.0025	.00125

Chemical	NMED SSL for Residential (mg/kg)[1]	EPA Residential RSLs (mg/kg)[2]	Limit of Quantitation (mg/kg)	Limit of Detection (mg/kg)	Detection Limit (mg/kg)
Naphthalene	43.0	------	.010	.0025	.00125
Phenanthrene	1,830	------	.010	.0025	.00125
Pyrene	1,720	------	.010	.0025	.00125
Semi-Volatile Organic Compounds[6]					
1,2,4-Trichlorobenzene	73	------	0.333	0.167	0.083
1,2-Dichlorobenzene	2,310	------	0.333	0.167	0.083
1,4-Dichlorobenzene	31.7	------	0.333	0.167	0.083
2,4,5-Trichlorophenol	6,110	------	0.333	0.167	0.091
2,4,6-Trichlorophenol	61.1	------	0.333	0.167	0.083
2,4-Dichlorophenol	183	------	0.333	0.167	0.083
2,4-Dimethylphenol	1,220	------	0.333	0.167	0.083
2,4-Dinitrophenol	122	------	0.667	0.167	.086
2,4-Dinitrotoluene	15.7	------	0.333	0.167	0.083
2,6-Dinitrotoluene	61.1	------	0.333	0.167	0.083
2-Chloronaphthalene	6,260	------	0.333	0.167	0.083
2-Chlorophenol	391	------	0.333	0.167	0.083
2-Methylnaphthalene	NS	230	.010	.0025	.00125
2-Methylphenol	NS	3,100	0.333	0.167	0.083
2-Nitroaniline	NS	610	0.333	0.167	0.083
2-Nitrophenol	NS	NS	0.333	0.167	0.083
3,3'-Dichlorobenzidine	10.8	------	0.333	0.167	0.084
4,6-Dinitro-2-Methylphenol	4.89	------	0.667	0.167	0.083
4-Chloro-3-Methylphenol	NS	6,200	0.667	0.167	0.083
4-Chloroaniline	NS	27	0.333	0.167	0.083
4-Methylphenol	NS	6,200	0.333	0.167	0.083
4-Nitroaniline	NS	250	0.333	0.167	0.120
Acetophenone	7,820	------	0.333	0.167	0.083
Aniline	NS	430	0.667	0.167	0.083
Azobenzene	6.08	------	0.333	0.167	0.096
Benzidine	0.00501	------	2.0	0.867	0.864
Benzoic Acid	NS	250,000	1.333	0.667	0.333

Chemical	NMED SSL for Residential (mg/kg)[1]	EPA Residential RSLs (mg/kg)[2]	Limit of Quantitation (mg/kg)	Limit of Detection (mg/kg)	Detection Limit (mg/kg)
Benzyl Alcohol	NS	6,200	0.333	0.167	0.083
Bis(2-Chloroethoxy)Methane	NS	180	0.333	0.167	0.083
Bis(2-Chloroethyl)Ether	2.68	------	0.333	0.167	0.083
Bis(2-Chloroisopropyl)Ether	91.5	------	0.333	0.167	0.083
Bis(2-Ethylhexyl)Phthalate	347	------	0.333	0.167	0.115
Butylbenzylphthalate	NS	2,800	0.333	0.167	0.083
Dibenzofuran	NS	72	0.333	0.167	0.083
Diethylphthalate	48,900	------	0.333	0.167	0.083
Dimethylphthalate	611,000	------	0.333	0.167	0.083
Di-N-Butylphthalate	6,110	------	0.333	0.167	0.097
Di-n-Octylphthalate	NS	620	0.333	0.167	0.097
Hexachlorobenzene	3.04	------	0.333	0.167	0.083
Hexachlorobutadiene	61.1	------	0.333	0.167	0.083
Hexachlorocyclopentadiene	367	------	0.333	0.167	0.083
Hexachloroethane	42.8	------	0.333	0.167	0.083
Isophorone	5,120	------	0.333	0.167	0.083
Nitrobenzene	53.5	------	0.333	0.167	0.083
N-Nitrosodimethylamine	0.0226	------	0.333	0.167	0.083
N-Nitroso-Di-N-Propylamine	NS	0.76	0.333	0.167	0.083
N-Nitrosodiphenylamine	993	------	0.333	0.167	0.153
N-Nitrosopyrrolidine	2.32	------	0.333	0.167	0.083
Pentachlorophenol	8.94	------	0.667	0.167	0.083
Phenol	18,300	------	0.333	0.167	0.083
Pyridine	NS	78	1.333	0.667	0.333
Explosives[7]					
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
2,4,6-Trinitrotoluene (TNT)	39.1	------	0.04	0.008	0.002
2,4-Dinitrotoluene	15.7	------	0.04	0.008	0.004
2,6-Dinitrotoluene	61.1	------	0.04	0.008	0.005
2-Amino-4,6-Dinitrotoluene	NS	150	0.04	0.008	0.005

Chemical	NMED SSL for Residential (mg/kg)[1]	EPA Residential RSLs (mg/kg)[2]	Limit of Quantitation (mg/kg)	Limit of Detection (mg/kg)	Detection Limit (mg/kg)
2-Nitrotoluene	29.1	------	0.04	0.01	0.003
3-Nitrotoluene	7.82	------	0.04	0.008	0.004
4-Amino-2,6-Dinitrotoluene	NS	150	0.04	0.008	0.005
4-Nitrotoluene	244	------	0.04	0.008	0.004
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	58.2	------	0.04	0.008	0.004
Methyl-2,4,6-trinitrophenylnitramine (Tetryl)	244	------	0.04	0.008	0.002
Nitrobenzene	53.5	------	0.04	0.008	0.004
Nitroglycerin	6.11	------	0.2	0.08	0.053
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	3,910	------	0.04	0.008	0.005
Pentaerythritol Tetranitrate (PETN)	NS	120	0.2	0.08	0.053

Notes:
1 = Soil Screening Levels from NMED 2012: Risk Assessment Guidance for Site Investigations and Remediation, February 2012 (Updated June 2012)
2 = EPA Regional Screening Level Summary Table (TR=1E-6, HQ=1.0) May 2014; value multiplied by 10 to adjust to a $1x10^{-5}$ risk level for carcinogenic compounds, if applicable.
3 = Metals EPA Method 6010C/7471B
4 = PCBs EPA Method 8082A
5 = PAHs EPA Method 8270 SIM
6 = SVOC EPA Method 8270D
7 = Explosives EPA Method 8330B
Samples will be analyzed using the most recently published versions of the analytical methods.
* = Fort Wingate Depot Activity Site Specific Background for Arsenic (5.6 mg/kg) used in place of the NMED SSL of 3.9 mg/kg: NMED December 18, 2013 Letter, Evaluation of Background Levels for Arsenic in Soil, Fort Wingate Depot Activity, New Mexico. Arsenic concentrations ranging up to 11.2 mg/kg may also be considered consistent with background levels as described in the letter.

EPA = US Environmental Protection Agency
mg/kg = milligrams per kilogram
NA = not applicable
NS = Not Specified
NMED = New Mexico Environment Department

Table 6-4 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).

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SECTION 7.0 PROJECT SCHEDULE

A summary of the expected schedule for conducting the removal activities at Parcel 22 is presented below. Days listed are days following the USACE notice to proceed with field work.

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

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SECTION 8.0 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 9.0 REFERENCES

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APPENDIX A
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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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.*

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Sincerely,

Mark Patterson

Mark Patterson
BRAC Environmental Coordinator
Fort Wingate Depot Activity

Enclosures
CF:
Kurt Dongoske, THPO
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